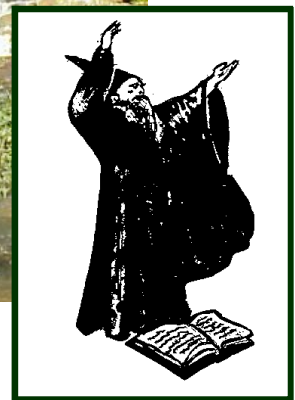
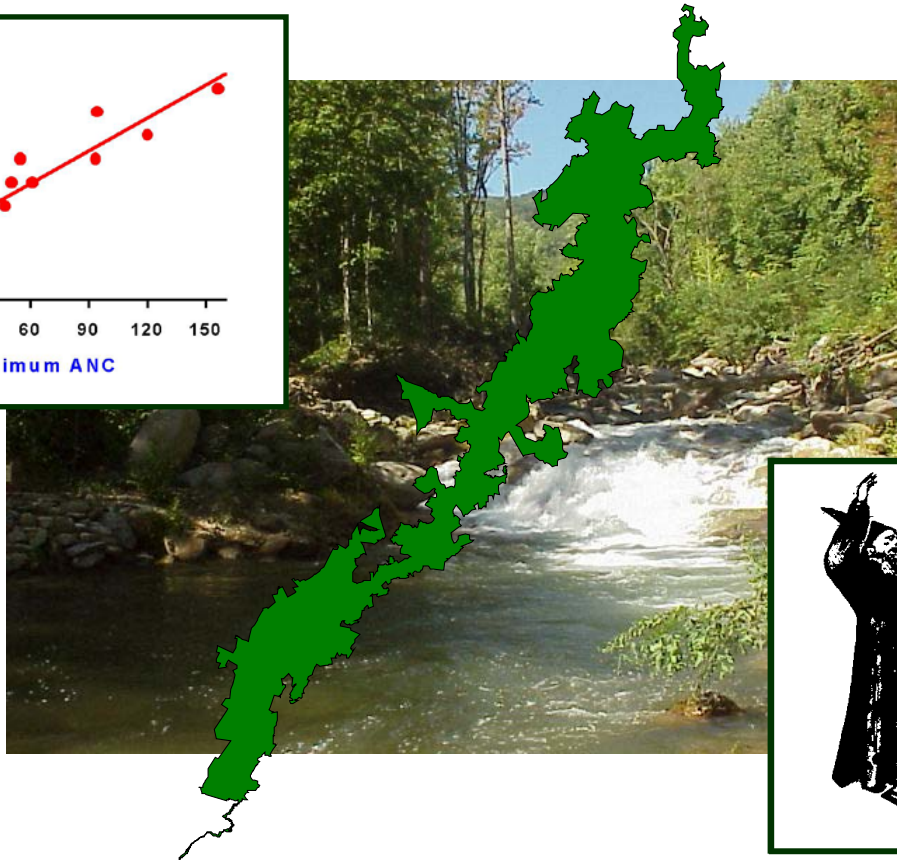
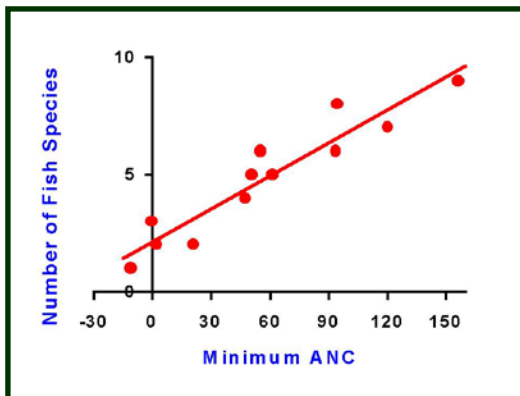


SNP:FISH

Shenandoah National Park: Fish In Sensitive Habitats

Project Final Report - Volume II
Stream Water Chemistry and Discharge,
and Synoptic Water Quality Surveys



A.J. Bulger

B.J. Cosby

C.A. Dolloff

K.N. Eshleman

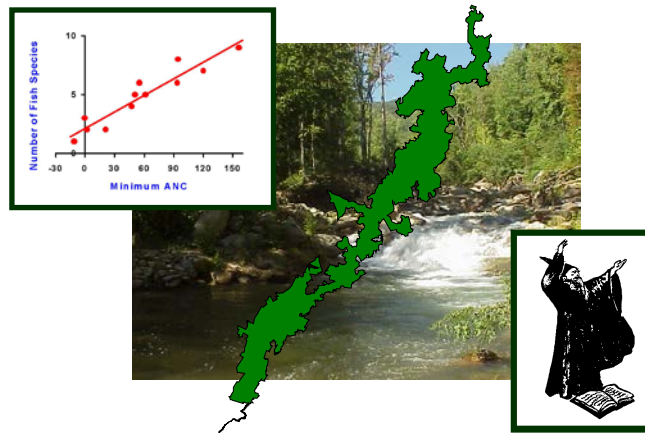
J.R. Webb

J.N. Galloway

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Project Final Report - Volume II



A.J. Bulger¹ B.J. Cosby¹ C.A. Dolloff²
K.N. Eshleman³ J.R. Webb¹ J.N. Galloway¹

¹ Department of Environmental Sciences
Clark Hall, University of Virginia
Charlottesville, VA 22903

² Dept. of Fisheries and Wildlife Sciences,
Virginia Polytechnic and State University
Blacksburg, Virginia 24061

³ University of Maryland, Center for Environmental Sciences
Appalachian Laboratory
Frostburg, MD 21532

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A.J. Bulger B.J. Cosby C.A. Dolloff
K.N. Eshleman J.R. Webb J.N. Galloway

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Dept. of Environmental Sciences
Clark Hall, University of Virginia
Charlottesville, VA 22903

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Prepared by Keith N. Eshleman
University of Maryland, Center for Environmental Sciences
Appalachian Laboratory
Frostburg, MD 21532

Kenneth E. Hyer
Department of Environmental Sciences
Clark Hall, University of Virginia
Charlottesville, VA 22903

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Dept. of Environmental Sciences
Clark Hall, University of Virginia
Charlottesville, VA 22903

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Prepared by Rick Webb
Dept. of Environmental Sciences
Clark Hall, University of Virginia
Charlottesville, VA 22903

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Chapter 3
Synoptic Stream Water Chemistry

prepared by

Rick Webb

Department of Environmental Sciences

University of Virginia, Charlottesville, VA 22903

Introduction

The general purpose of the synoptic stream-water chemistry component of the FISH project was to define the baseflow geochemical regime of the FISH project study watersheds. Specific objectives include:

- 1) To determine the spatial and temporal variability of the acid-base-related chemical composition of stream waters in the study watersheds.
- 2) To identify landscape factors associated with variation in the acid-base-related chemical composition of stream waters in the study watersheds.

These objectives are integral to the FISH project assessment of stream-water acidification effects on fish populations in SNP. Data collection associated with the first objective provided water-quality information needed both for final selection of the primary study streams (see Chapter 1) and for interpretation of fish community surveys conducted during the course of the project (see Chapter 7). Analysis associated with the second objective provides a basis for application of the FISH project findings to SNP as a whole.

This chapter describes:

- 1) Synoptic survey methodology, including selection of study streams and sample sites, collection and analysis of samples, and characterization of landscape factors for the study watersheds.

- 2) Designation of biologically relevant criteria for classification of the synoptic survey samples.
- 3) Observed spatial and temporal variability in the acid-base-related chemical composition of stream waters in the study watersheds.
- 4) Development of regression models that explain variation in the acid-base-related chemical composition of stream waters in the study watersheds as a function of bedrock type and other landscape factors.

Methods

Selection of Synoptic Survey Streams

The FISH study streams were selected from among streams in SNP that are sampled on a weekly or quarterly basis through the SWAS program. Figure 3-1 provides a map of SNP showing the location of 13 streams for which synoptic sampling surveys were conducted during the 1992-1994 period. Table 3-1 provides a listing of the synoptic survey streams and the dates of sampling.

Eight of the synoptic survey streams were selected as primary study streams. Table 3-1 identifies these as “intensive-study” and “extensive-study” streams. These streams were the subject of repeated synoptic sampling (with one exception) and additional biological and hydrochemical data collection. Chapter 1 describes the selection criteria and the differing levels of data collection associated with the intensive-study and extensive-study designations.

As demonstrated by Lynch and Dise (1985) and discussed in Chapter 1, spatial variation in the ANC of stream waters in SNP is largely explained by differences in watershed bedrock. Surficial geology in SNP includes siliciclastic, granitic, and basaltic bedrock. Streams associated with these bedrock classes represent a gradient in ANC from relatively low to relatively high. Because acid-base status was hypothesized as a determinant of fish distributions in SNP, a primary objective for selection of FISH project study streams was representation of these bedrock classes. This objective is reflected in the listing of synoptic survey streams by dominant watershed bedrock type in Table 3-1. Each of the three bedrock classes is represented by primary study streams. Figure 3-2 indicates the locations of the synoptic survey streams in relation to the parkwide distribution of these bedrock classes.

Selection and Documentation of Sampling Sites

A systematic approach to selection of sampling sites for each study stream was followed in order to provide generally uniform spatial coverage. This was achieved by preliminary designation of sites in relation to perennial flows as indicated on U.S. Geological Survey (USGS) 1:24,000-scale topographic maps. Most confluence points were bracketed by sampling sites, and additional sites were selected at approximately 0.5 km intervals along stream courses. The lower-most site on all of the study streams coincided with the SWAS program monitoring site, which on most streams was located at or near the SNP boundary (always within the park). The final designation of the sampling sites was based on conditions observed during the initial sampling. The most important of these conditions were site accessibility, ease of site identification, and apparent completeness of flow mixing. The final number of survey sites established within the primary study watersheds ranged from 9 to 34, with a density of 1.1 to 4.1 sites per km². The higher site densities tended to be associated with the smaller watersheds.

Sample-site documentation included preparation of site-description folders, placement of numbered aluminum tags, determination of elevation with altimeters, and determination of site coordinates based on USGS 1:24,000-scale topographic maps. Site-description folders included site maps and photographs, as well as narrative descriptions of site location and access. The numbered tags (about 4 cm diameter) were nailed at ground level on the downstream side of a prominent tree adjacent each of the sites. A listing of sample sites and sample-site documentation is provided in Table 1 of Appendix I.

Sample Collection and Analysis

The synoptic surveys were conducted on a seasonal basis. As indicated in Table 3-1, the surveys were classified as “cold season” (winter and spring) or “warm season” (summer and fall).

The samples were collected in 500-ml polyethylene bottles (low-density Nalgene). Pre-survey bottle preparation involved detergent and acid washing (1 N HCl), followed by multiple rinsing with deionized water. Each bottle was then filled with deionized water and held at least 12 hours followed by a conductivity check with an acceptance criterion of $<1.2 \mu\text{S cm}^{-1}$. Prior to

the survey each bottle was prelabeled and packed in a zip-lock bag with disposable polyethylene gloves.

The samples were collected by teams that included staff and students with the Department of Environmental Sciences at U.Va. and resource management personnel with SNP. Each sample-collection team was equipped with preprocessed sample bottles, frozen refrigerant and insulated containers for sample transport, thermometers, site-description folders, altimeters, and sample-collection record forms. The procedure for sample collection involved use of the polyethylene gloves and triple rinsing of the sample bottle with water at the collection site. After collection the samples were delivered to the project lab in the Department of Environmental Sciences building (Clark Hall) at U.Va. in Charlottesville, Virginia.

All of the sites sampled in each individual stream survey were sampled in a single day and all of the samples were received at the project lab by the evening of the collection day. The samples were then stabilized by addition of 0.5 ml of chloroform and allowed to come to ambient lab temperature for storage during analysis.

Analysis of synoptic survey samples included pH, ANC, electrical conductivity, sulfate, nitrate, chloride, calcium, magnesium, sodium, potassium, and silica. Quality assurance measures included analysis of reference samples and field duplicates. Instrumentation and analysis methods are summarized in Table 1 of Appendix II. Table 2 of Appendix II provides a summary of quality-assurance information associated with the analysis. Table 3 of Appendix II provides a listing of analysis results. (Note: Appendix II provides information for all stream-water sample analysis associated with the FISH project.)

The synoptic surveys were conducted under a wide range of discharge conditions. Discharge levels associated with individual stream surveys were determined for the five study streams with gauging systems (stilling wells) at the lower-most sampling site. Two of these, White Oak Run and North Fork of Dry Run have been gauged through the SWAS program since 1979 and 1987, respectively. Gauging on Paine Run, Staunton River, and Piney River was initiated for the FISH project in the Fall of 1992 (see Chapter 3 for a description of gauge installation and methods). Table 3-2 lists discharge data for the surveys conducted on these streams while gauging was in place. Discharge is provided as mm day^{-1} and flow percentile. The flow percentiles are based on flow-duration curves developed for each stream for the period of

record through 1995. The flow-percentile value indicates the percentage of days in the record for which discharge was exceeded by the discharge on the day of the survey.

Characterization of the Study Watersheds

Watershed characteristics for each of the synoptic survey sites are listed in Tables 1 and 2 of Appendix I. Sample site elevations, stream orders, and watershed areas were obtained from USGS 1:24,000-scale topographic maps. A geographic-information system (GIS) was used to determine watershed areas and areal percentages of each watershed associated with different bedrock types, different forest-cover types, and defoliation by the gypsy moth.

Information concerning bedrock distribution in SNP was obtained from geologic maps prepared by Gathright (1976) and later digitized by SNP resource management personnel. Five major bedrock formations of Precambrian and Cambrian age are represented in the study watersheds. These include the siliciclastic rocks of the Antietam and Hampton formations, the granitic rocks of the Pedlar and Old Rag formations, and the basaltic rocks of the Catocin formation. Analysis and discussion of bedrock presented in this chapter is based on both the detailed formation information and the more-generalized bedrock class information.

Information concerning forest distribution in SNP was obtained from digitized forest-cover maps prepared by Teetor (1988). For simplification, the seven mapped forest-cover types have been assigned to three classes representing a range of site quality. As designated by this classification, site quality is based on the relative nutrient and moisture requirements of the different forest-cover types. The low site-quality class includes chestnut oak and pine forest-cover types. The medium site-quality class includes northern red oak and black locust forest-cover types. The high site-quality class includes hemlock, yellow poplar, and cove hardwoods forest-cover types.

Information concerning forest defoliation by larva of the gypsy moth was obtained from digital maps of annual parkwide defoliation provided by SNP resource management personnel for the period of 1986-1993. The first documented defoliation occurred in the northern section of the park in 1986. Heavy defoliation had occurred throughout the park by 1993.

Results

Criteria for Sample Classification

The results of the synoptic sampling surveys are presented with an emphasis on ANC and pH. ANC is a basic measure of acid-base status, reflecting the balance between strong-acid anions (sulfate, nitrate, and chloride) and base cations (calcium, magnesium, sodium, and potassium) in solution and largely determining pH level. Surface-water acidification, defined as the loss of ANC (Turner et al., 1990), occurs when concentrations of strong-acid anions increase relative to the concentrations of base cations. If ANC is sufficiently reduced, pH may be depressed to a range associated with adverse effects on aquatic life (Baker and Christensen, 1991).

Both ANC and pH can serve as indicators of surface-water suitability for aquatic biota. Baker, et al. (1990) identified the pH range of 6.0-5.5 with loss of sensitive fish species (e.g., blacknose dace). Schindler (1988) identified surface waters with ANC values of less than 50 $\mu\text{eq L}^{-1}$ as sensitive to effects of acidification. Adams et al. (1991) identified 10 $\mu\text{eq L}^{-1}$ as the ANC value below which long-term exposure will likely cause adverse biological effects. Although these pH and ANC values are approximate rather than exact thresholds, their utility for assessment purposes in SNP is supported by the FISH project findings. Criteria based on these values are applied here for examination of the synoptic survey data (Table 3-3).

Total Variation in Synoptic Survey Sample Composition

A generalized view of acid-base status in SNP stream waters can be obtained by examination of combined data for the multiple synoptic surveys. Figure 3-3 provides frequency distributions of measured ANC and pH for all synoptic survey samples collected during 1992-1994. Table 3-4 lists the range and interquartile distributions for the same data.

A first observation, based on the pH and ANC criteria listed in Table 3-3, is that surface-waters at many of the survey sites provide poor or marginal fish habitat. More than 50% of the samples have ANC values less than the intermediate fish-viability criterion. More than 25% of the samples have ANC values less than the low fish-viability criterion. However, it should be noted that the distributions in Figure 3-3 and Table 3-4 include components of both spatial and temporal variability. Any effort to regionalize the synoptic survey findings to streams waters throughout SNP must account for this variability.

Spatial Variation in Synoptic Survey Sample Composition

A starting point for analysis of spatial variation in the synoptic survey sample data is examination of ANC and pH values for the individual streams. Figures 3-4 through 3-6 provide maps of the three intensive-study streams (Paine Run, Staunton River, and Piney River) with fish-viability ratings indicated for each site based on the lowest ANC and pH values observed for all synoptic survey samples collected at each site. Table 3-5 summarizes the fish-viability ratings for all of the synoptic survey streams.

Figures 3-4 through 3-6 and Table 3-5 illustrate the utility of the previously described geologically based stream classification scheme. Consistent with expectations, most of the sites in the designated low fish-viability classes are located on streams dominated by siliciclastic bedrock. Similarly, most of the sites in the designated intermediate and high fish-viability classes are located on streams dominated by granitic or basaltic bedrock. Note that White Oak Run and Jeremys Run are apparent exceptions to these observations. White Oak Run, a stream associated with siliciclastic bedrock, was only sampled during the warm season when stream-water ANC and pH values are commonly higher than in the cold season. Jeremys Run is a stream with areas of siliciclastic bedrock in a predominately basaltic watershed.

Bedrock determination of spatial variation in the acid-base status of the surveyed stream waters is also revealed by examination of the analyses for individual sampling sites associated with single bedrock classes. Although the 13 study streams are each dominated by one of the three major bedrock classes, the watersheds associated with most of these 13 streams include a mix of bedrock classes (see Table 2 of Appendix I). However, a number of the smaller watersheds defined by the individual sampling sites include only a single bedrock class. Figure 3-7 and Table 3-6 indicate the range and interquartile distributions of ANC, pH, the sum of strong-acid anions (SAA), and the sum of base cations (SBC) obtained for the single-bedrock sites sampled during the spring season of 1992, the single sampling season with the most extensive survey data set. Temporal variance was minimized by not including data from multiple sampling seasons in these distributions.

ANC and pH again display a pronounced bedrock-related gradient. The lowest values are associated with siliciclastic rock, intermediate values are associated with granitic rock and the highest values are associated with basaltic rock. This gradient can be explained as a function of

observed bedrock associations with SAA and SBC. As previously stated, ANC is determined by the relative SAA and SBC concentrations in solution. Whereas both siliciclastic and basaltic bedrock are associated with relatively high SAA concentrations, siliciclastic bedrock is associated with much lower SBC concentrations. Lower stream-water ANC concentrations are thus associated with siliciclastic bedrock. Granitic bedrock, which is associated with both low SAA and low SBC concentrations, is associated with intermediate ANC concentrations. These differences in SAA and SBC indicate variation in the composition and exchange or retention properties of the different bedrock types and associated soils.

The significance of the bedrock association with acid-base status in the synoptic survey streams is further revealed by plotting pH with ANC for the single-bedrock sites sampled in the Spring 1992 surveys (Figure 3-8). This plot serves to highlight the twofold significance of this association. In addition to the bedrock-related gradient in ANC and pH, there is also a bedrock-related gradient in stream-water sensitivity to change in pH. Due to the nonlinear relationship between ANC and pH, a given ANC loss in streams associated with siliciclastic and granitic rock results in a larger depression in pH than occurs given the same ANC loss in streams associated with basaltic rock.

Temporal Variation in Synoptic Survey Sample Composition

Although the FISH project was initiated in response to observation of chronic, or long-term, change in the acid-base status of SNP streams, the collection and interpretation of hydrochemical data has focused on the short-term variation that determines the specific conditions and extremes to which aquatic biota are exposed. The synoptic survey data provide an opportunity to examine the intra-annual variation in acid-base status that is related to season and general hydrologic condition. Note that another component of short-term variation is examined in Chapter 4, which examines episodic acidification associated with stormflow conditions.

Based on previous findings for streams in SNP (Lynch and Dise, 1985) and other upland areas (Baker et al., 1990), it was expected that ANC and pH values would conform to a similar seasonal pattern, with higher values occurring in the warm season and lower values occurring in the cold season. Figures 3-9 through 3-15 provide seasonally differentiated cumulative-frequency distributions of ANC and pH for separate synoptic surveys conducted on the seven primary study

streams with multiple synoptic surveys. Tables 3-7 and 3-8 list the ranges and interquartile distributions of ANC and pH for surveys on all eight of the primary study streams. As expected, cold season ANC values are generally lower than warm season values. For a number of the study streams, however, warm season pH values were lower than, or similar to, cold season pH values.

It was also expected, based on previous studies of episodic acidification (e.g., Wigenton, et al., 1990), that the lowest within-season values of both ANC and pH would occur during high-flow conditions. The data needed to examine conformance with this expectation are available for four of the primary study streams. Figures 3-16 through 3-19 indicate ranges and interquartile distributions of ANC and pH in relation to flow percentiles for seasonally differentiated surveys of these streams. ANC again follows the expected pattern; the lowest values for all four streams are associated with both high flows and cold season surveys. However, the pattern for pH is again inconsistent with expectations. For two of the streams, North Fork of Dry Run and Staunton River, the lowest values are associated with low flows and warm season surveys.

Possible causes for the unexpected temporal variation in stream-water pH values include both carbonic and organic acid effects, either of which may result in a lower pH value for a given ANC (Kaufmann et al., 1988; Munson and Gherini, 1991). Elevated concentrations of these weak acids may tend to be associated with low-flow, warm-season conditions. In the warm season, carbonic acidity increases in the soil due to higher rates of microbial and root respiration. Organic acidity may similarly increase in soils in the warm season due to accelerated organic matter decomposition. Given reduced transport and dilution under low-flow conditions, concentrations of these soil products should increase in both soil and associated stream waters.

Development of a Predictive Model

The regression models described in this section were calculated by application of the SPSS 4.0 statistical software package (Norusis, 1990). Equality of variance and normality assumptions for residuals were checked by plotting residuals with predicted values and by generation of normal probability plots. The plotted confidence intervals for predicted values were determined as described by Lapin (1983).

Regression analysis provides a means to develop models that explain or predict stream-water composition as function of diverse landscape characteristics in individual watersheds. The

first such models for SNP were developed by Lynch and Dise (1985). Their models were based on volume-weighted mean concentrations for 47 of the larger streams in the park. Samples were collected in six separate surveys conducted at different times of the year over the 1982-1983 period. The data obtained through the FISH synoptic surveys provides an opportunity to evaluate the current applicability of models based on the 1982-1983 data and to calibrate new models based on more-recent data.

The models reported by Lynch and Dise (1985) included regressions based on the distribution of bedrock formations and models that included other landscape variables in addition to bedrock. For prediction of ANC, the r^2 (coefficient of determination) value for the bedrock-only model was 0.95. Given that inclusion of other variables (elevation and east-west exposure) provided only a small improvement in explanatory power ($r^2 = 0.96$), the present evaluation of model applicability will be limited to the bedrock-only model.

Table 3-9 lists regression model equations for ANC and pH based on the 1982-1983 survey data. Note that the model for ANC is based on a log transformation of the data, a step that was taken to control unequal variance of the residuals. Also, although Lynch and Dise (1985) provided models for ANC and a number of other stream-water constituents, they did not provide a model for pH. However, the listed model for pH is based on the flow-weighted pH values for the 1982-1983 data set. The methods for calibrating this model are consistent with methods reported by Lynch and Dise (1985).

Figure 3-20 compares measured ANC and pH values for samples collected in the 1992-1994 FISH synoptic surveys (cold season only) with values predicted using the regression models based on the 1982-1983 data. Cold season survey data were used for this comparison because the regressions were based on volume-weighted mean concentrations which tend to be dominated by higher cold-season flows. The models tend to over-predict both ANC and pH, with a large proportion of the observed values plotting outside of the confidence intervals for predicted values. This bias may be due to the changes in acid-base conditions that have occurred over time (see Ryan et al., 1989; Webb et al., 1995). It may also be associated with the difference in watershed size represented by the two data sets; the median watershed area for the 1982-1983 surveys was about twice that of the 1992-1994 surveys. It may also reflect the use of volume-weighted means rather than seasonal survey data for model calibration. Development of new

regression models based on the FISH synoptic surveys should avoid bias associated with any of these factors.

Table 3-10 lists new regression model equations for stream-water ANC and pH based on the FISH synoptic survey data. Two model versions are provided for both cold and warm seasons. For each model, a calibration data set was selected by randomly splitting the total number of cases for the cold or warm-season surveys. The unselected data were reserved for model validation.

Figures 3-21 and 3-22 compare the measured ANC and pH values for the FISH synoptic surveys with values predicted using the warm and cold-season regression models listed in Table 3-10. Results for both the calibration and validation data sets are plotted. In contrast with the results plotted in Figure 3-20 for regressions based on the 1982-1983 data, there is no evidence of prediction bias.

Consistent with the Lynch and Dise (1985) analysis, explanatory variables for the new bedrock-only models include four of the five major bedrock formations. The influence of the fifth bedrock formation (Catoctin) is effectively incorporated in the intercept term. Additional variables tested for possible inclusion in the new all-variables models include the three forest-quality classes, watershed area, sample-site elevation, stream order, and both annual and cumulative watershed defoliation by the gypsy moth. Of these additional variables, only percent high-quality forest and watershed area were significant at $p < 0.01$. The r^2 values for the new models are lower than the values obtained for regression models based on the 1982-1983 data. This is not surprising given that the effect of temporal variation in the 1982-1983 data set was minimized by the use of volume-weighted means. Note that the r^2 value for the new warm-season pH model is especially low by comparison with the other models. This reflects the previously described temporal variability in warm-season pH values.

Consistent with results obtained with the 1982-1983 data, bedrock distribution provides most of the explanatory power in the new models; inclusion of the additional watershed variables increases the percentage of variance explained by only about 2% in each case. Table 3-11 lists the ANC and pH values predicted by the bedrock-only models for stream-waters associated with single bedrock formations. The predicted ANC and pH values for stream waters associated with the different bedrock formations generally decrease in the following order:

Catoctin > Old Rag > Pedlar > Hampton > Antietam

This gradient is consistent with the previously described differences between the generalized siliciclastic, granitic, and basaltic bedrock classes (see Figure 3-7 and Table 3-6). It deviates only slightly from the gradient indicated by the regression models based on the 1982-1983 data; for those models the ANC and pH indicated for the Pedlar Formation was higher than for the Old Rag Formation. However, the indicated differences between the Pedlar and Old Rag Formations are not large in either case.

Both of the additional variables included in the all-variables models were positively correlated with ANC and pH. The observation of higher ANC and pH in the larger watersheds supports the suggestion that the bias associated with application of the 1982-1983 survey regressions (Figure 3-20) may be due to differences in watershed area. This apparent watershed effect may result because stream waters draining larger watersheds have generally had more contact with surficial materials, including alluvial deposits. The positive correlation between ANC and pH and percent high-quality forest is consistent with the observation that vegetative cover is indicative of the underlying surficial material. The explanatory power of this map unit suggests that the distribution of geologic materials is not entirely captured by bedrock maps. For example, bedrock maps do not reflect downslope movement and hydrologic transport of soil and rock fragments. None-the-less, although both watershed area and forest distribution do account for some of the variation in the acid-base status of SNP streams, the information provided is minor by comparison with the explanatory power of bedrock distribution.

Discussion

In addition to provision of water-quality information required during the course of the FISH project, the synoptic survey component has provided a capability to relate the biological findings of the project to SNP as a whole. The calibration of regression models based on the survey data has provided the necessary tools for predicting the acid-base status (ANC and pH) of unsampled streams on a useful within-watershed scale. Several model-related issues, however, warrant further consideration. These include the biological significance of predicted values, potential model improvements, evaluation of model representativeness, and model durability in the context of chronic change.

First is the question of biological significance. With respect to the status of fish populations, the real utility of the models depends on the accurate prediction of biologically relevant stream-water composition. The fish-viability criteria listed in Table 3-3 provide a basis for evaluating this capability. Figures 3-23 and 3-24 compare the actual distributions of measured ANC and pH with fish-viability class predictions based on the bedrock-only models. These plots suggest that the models do a good job of discriminating between the low and high fish-viability classes, with mixed results indicated for predictions in the intermediate class. Notably, the median measured ANC for cold-season samples predicted in the intermediate range is higher than the criterion value for the range. However, the median measured values indicated for all the other distributions do occur in the predicted ranges, although there are varying degrees of overlap. Based on these observations, it may be appropriate to revise or rename the fish-viability classes. High, uncertain, and low fish-viability designations would more accurately reflect the biological significance of the predictions.

Potential improvement in the predictive performance of the models requires improved understanding of factors associated with variation in stream-water composition. The previous examination of spatial and temporal variation in this chapter suggests that most of the remaining uncertainty is associated with temporal variation. In particular, the models do not account for differences in flow conditions and other causes of within-season variation. Temporal patterns associated with gypsy moth defoliation are another factor that is both not well understood and not included in the models. Understanding these components of temporal variation will require consideration of information representing a range of temporal scales. Whereas the synoptic survey data were collected on a seasonal basis, further model development will require incorporation of additional understanding gained by analysis of data collected on weekly and stormflow frequencies.

Another issue that should receive consideration is the question of model representativeness. Concern might be raised that because the synoptic survey data were obtained for only 13 selected watersheds, no information has been provided about other areas in SNP. This concern should be allayed by the large body of information supporting the applicability of a geology-based model of stream-water composition in SNP. A strong and consistent correlation between bedrock and stream-water composition in SNP has been described by a number of

previous studies, including Hendrey et al. (1980), Lynch and Dise (1985), Webb (1988), and Webb et al. (1989). It is correct, however, that absolute verification of model applicability to SNP as a whole has not been provided. Further verification cannot be provided without additional sampling outside of the surveyed watersheds.

Finally, there is the question of model durability. Chronic change in SNP stream waters has been attributed to both atmospheric deposition (Ryan et al., 1989) and to forest defoliation by the gypsy moth (Webb et al., 1995). To the extent that stream-water composition in SNP changes overtime, model calibrations based on the 1992-1994 survey data will no longer be applicable. In this context of change, close attention to monitoring data and periodic validation of predictive models is necessary.

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Table 3-1 - Schedule of FISH Synoptic Stream-Sampling Surveys

		1992		1993		1994	
		COLD SEASON	WARM SEASON	COLD SEASON	WARM SEASON	COLD SEASON	WARM SEASON
Siliciclastic Bedrock							
Paine Run	INT	030892	072992 101892	032793	082293	040994	100694
Meadow Run	EXT	031292	072392	031993	082893		110294
Twomile Run	EXT	031292	072692	040193	081993		
White Oak Run	EXT						110294

Granitic Bedrock

Brokenback Run	EXT	031192	071892	031693	080593		101094
Hazel River		032192					
NF of Dry Run	EXT		070692		082693	042394	103194
Staunton River	INT	031592	080492 101092	031893	082693	021994	100594

Basaltic Bedrock

Jeremys Run		032092					
NF Thornton River		031692					
Piney River	INT	031792	080692	040993	082493	041694	102894
Rose River		031492					
White Oak Canyon		031992	071592				

NOTE: INT = intensive-study stream; EXT = extensive-study stream

Table 3-2 - Stream Discharge Associated with Synoptic Stream-Sampling Surveys Conducted in 1992-1994

STREAM	DATE	mm day ⁻¹	FLOW%
Paine Run	10/18/92	0.56	62
Paine Run	03/27/93	5.26	97
Paine Run	08/22/93	0.05	4
Paine Run	04/09/94	1.44	77
Paine Run	10/06/94	0.11	15
White Oak Run	11/02/94	0.08	34
NF of Dry Run	07/06/92	0.56	23
NF of Dry Run	08/26/93	0.24	12
NF of Dry Run	04/23/94	2.78	78
NF of Dry Run	10/31/94	1.04	41
Staunton River	10/10/92	1.69	61
Staunton River	03/18/93	3.54	84
Staunton River	08/26/93	0.33	6
Staunton River	02/19/94	3.28	81
Staunton River	10/05/94	0.73	20
Piney River	04/09/93	2.78	75
Piney River	08/24/93	0.07	2
Piney River	04/16/94	6.26	94
Piney River	10/28/94	0.59	31

NOTES: Data are for surveys with gauging systems in place at time of survey.
 Gauges are located at lower-most survey site on each stream.
 FLOW % = percentage of days in the record for which discharge is exceeded by the discharge measured on the day of the survey.

Table 3-3 - Fish-Viability Criteria for ANC and pH of Synoptic-Survey Samples

Viability Rating for Fish			
	Low	Intermediate	High
ANC ($\mu\text{eq L}^{-1}$)	< 10	< 50	≥ 50
pH	< 5.5	< 6.0	≥ 6.0

Table 3-4 - Range and Interquartile Distributions of ANC and pH For All FISH
Synoptic Survey Samples Collected During 1992-1994 (N = 807)

	MINIMUM	25%	MEDIAN	75%	MAXIMUM
ANC ($\mu\text{eq L}^{-1}$)	-18.1	4.4	41.9	92.0	361.7
pH	4.8	5.6	6.3	6.8	7.4

Table 3-5 - Summary of Fish-Viability Ratings for Synoptic Survey Sampling Sites

	N	LOW	INT	HIGH
Siliciclastic Bedrock				
Paine Run	35	100%	0%	0%
Meadow Run	18	100%	0%	0%
Twomile Run	13	100%	0%	0%
White Oak Run	10	0%	80%	20%

Granitic Bedrock

Brokenback Run	11	0%	64%	36%
Hazel River	25	0%	12%	88%
NF of Dry Run	10	0%	100%	0%
Staunton River	18	0%	61%	39%

Basaltic Bedrock

Jeremys Run	30	3%	27%	70%
NF Thornton River	23	0%	0%	100%
Piney River	19	0%	26%	74%
Rose River	18	0%	6%	94%
White Oak Canyon	18	0%	0%	100%

NOTES: Ratings are based on fish-viability criteria listed in Table 3-3; ratings for individual sites are determined by the lowest ANC and pH values observed for all synoptic survey samples collected at the site; N = total number of sites on each study stream.

Table 3-6 - Range and Distribution of Stream-Water Concentrations Associated With Major SNP Bedrock Classes: Spring 1992 Synoptic Surveys

	N	MINIMUM	25%	MEDIAN	75%	MAXIMUM
<u>ANC</u> ($\mu\text{eq L}^{-1}$)						
Siliciclastic	62	-18.1	-1.0	1.2	3.7	12.8
Granitic	46	22.0	47.2	58.7	67.0	130.4
Basaltic	14	33.7	97.0	142.9	179.0	226.7
<u>pH</u>						
Siliciclastic	62	4.8	5.4	5.6	5.7	6.0
Granitic	46	6.0	6.7	6.8	6.8	7.1
Basaltic	14	6.6	6.9	7.1	7.2	7.3
<u>Sum of Strong-Acid Anions</u> ($\mu\text{eq L}^{-1}$)						
Siliciclastic	62	103.1	134.6	164.0	186.2	269.7
Granitic	46	37.4	68.3	76.5	85.4	147.6
Basaltic	14	65.3	140.8	186.1	205.9	259.7
<u>Sum of Base Cations</u> ($\mu\text{eq L}^{-1}$)						
Siliciclastic	62	92.1	138.1	168.2	190.4	272.1
Granitic	46	89.5	136.7	147.7	161.3	243.5
Basaltic	14	138.0	232.0	369.5	381.1	450.9

Table 3-7 - Ranges and Interquartile Distributions of Measured ANC ($\mu\text{eq L}^{-1}$) for Synoptic Stream-Sampling Surveys Conducted in 1992-1994

STREAM	DATE	N	MINIMUM	25%	MEDIAN	75%	MAXIMUM
Paine Run	03/08/92	35	-6.3	0.3	1.6	2.8	10.3
Paine Run	07/29/92	19	-9.7	-1.0	3.3	9.1	20.3
Paine Run	10/18/92	35	-2.2	1.9	3.7	6.2	20.3
Paine Run	03/27/93	35	-7.2	-1.8	0.3	1.9	5.3
Paine Run	08/22/93	28	-5.6	5.3	7.8	12.8	27.8
Paine Run	04/09/94	35	-5.6	1.2	2.8	4.4	10.3
Paine Run	10/06/94	25	-3.8	8.3	9.4	12.8	30.3
Meadow Run	03/12/92	18	-18.1	-3.1	-0.6	2.4	7.8
Meadow Run	07/23/92	17	-16.3	-4.3	-1.0	14.5	29.4
Meadow Run	03/19/93	18	-15.6	-5.6	-3.8	1.1	6.2
Meadow Run	08/28/93	18	-6.3	-3.8	-0.5	5.3	41.9
Meadow Run	11/01/94	16	-9.7	3.7	7.8	15.3	17.8
Twomile Run	03/13/92	12	-6.8	-0.6	3.7	5.8	8.7
Twomile Run	07/26/92	10	-16.4	0.7	11.9	16.6	17.8
Twomile Run	04/01/93	13	-4.7	-0.5	3.1	4.5	10.3
Twomile Run	08/19/93	6	7.8	10.3	16.2	22.0	23.7
White Oak Run	11/02/94	10	24.4	32.8	46.8	49.3	52.8
Brokenback Run	03/18/92	11	44.4	52.7	54.4	57.3	71.9
Brokenback Run	07/18/92	11	79.4	86.6	96.1	110.1	137.2
Brokenback Run	03/16/93	11	36.2	47.8	49.2	52.8	75.3
Brokenback Run	08/05/93	11	66.9	105.0	107.7	110.8	141.9
Brokenback Run	10/10/94	11	78.7	95.3	99.0	112.8	131.2
NF of Dry Run	07/06/92	10	31.2	37.0	55.3	60.3	77.0
NF of Dry Run	08/26/93	8	26.9	51.2	67.8	78.7	98.7
NF of Dry Run	04/23/94	9	16.9	24.9	27.5	31.6	40.4
NF of Dry Run	10/31/94	8	20.3	20.3	32.8	50.3	82.8
Staunton River	03/15/92	18	27.9	45.8	52.0	60.0	78.7
Staunton River	08/04/92	15	60.0	82.3	89.5	97.9	106.2
Staunton River	10/10/92	16	51.1	59.4	67.8	73.7	89.4
Staunton River	03/18/93	17	36.9	42.0	45.8	51.8	63.3
Staunton River	08/26/93	14	81.1	95.0	101.1	108.1	113.1
Staunton River	02/19/94	16	36.2	47.8	51.9	56.2	86.2
Staunton River	10/05/94	16	61.2	78.7	86.2	93.7	98.7
Piney River	03/17/92	19	22.0	44.5	87.5	128.1	134.4
Piney River	08/06/92	17	46.2	106.2	185.6	263.7	318.6
Piney River	04/09/93	19	29.4	46.8	102.4	145.3	166.9
Piney River	08/24/93	13	49.4	111.0	198.1	335.1	361.7
Piney River	04/16/94	19	31.9	46.2	103.7	159.0	181.9
Piney River	10/28/94	18	45.0	87.3	164.2	227.7	262.8

Table 3-8 - Ranges and Interquartile Distributions of Measured pH Values for Synoptic Stream-Sampling Surveys Conducted in 1992-1994

STREAM	DATE	N	MINIMUM	25%	MEDIAN	75%	MAXIMUM
Paine Run	03/08/92	35	5.2	5.5	5.6	5.7	5.9
Paine Run	07/29/92	19	5.3	5.4	5.6	5.8	6.2
Paine Run	10/18/92	35	5.2	5.5	5.7	5.8	6.1
Paine Run	03/27/93	35	5.1	5.5	5.5	5.6	5.8
Paine Run	08/22/93	28	5.0	5.4	5.7	5.9	6.1
Paine Run	04/09/94	35	5.1	5.4	5.5	5.6	5.9
Paine Run	10/06/94	25	5.3	5.4	5.6	5.9	6.1
Meadow Run	03/12/92	18	4.8	5.4	5.5	5.6	5.9
Meadow Run	07/23/92	17	4.8	5.1	5.2	5.4	5.8
Meadow Run	03/19/93	18	4.8	5.1	5.3	5.5	5.7
Meadow Run	08/28/93	18	5.1	5.4	5.5	5.7	5.9
Meadow Run	11/01/94	16	5.0	5.5	5.6	5.7	5.9
Twomile Run	03/13/92	12	5.2	5.4	5.8	5.8	6.0
Twomile Run	07/26/92	10	5.3	5.3	5.6	5.9	6.0
Twomile Run	04/01/93	13	5.1	5.5	5.6	5.7	6.0
Twomile Run	08/19/93	6	5.2	5.4	5.7	5.8	6.0
White Oak Run	11/02/94	10	5.6	6.0	6.1	6.4	6.5
Brokenback Run	03/18/92	11	6.6	6.7	6.8	6.8	6.8
Brokenback Run	07/18/92	11	6.3	6.4	6.5	6.7	6.8
Brokenback Run	03/16/93	11	6.6	6.6	6.7	6.7	6.7
Brokenback Run	08/05/93	11	6.3	6.3	6.3	6.4	6.4
Brokenback Run	10/10/94	11	6.4	6.8	6.9	6.9	7.0
NF of Dry Run	07/06/92	10	6.3	6.5	6.5	6.6	6.7
NF of Dry Run	08/26/93	8	6.0	6.1	6.2	6.4	6.5
NF of Dry Run	04/23/94	9	6.1	6.4	6.4	6.5	6.5
NF of Dry Run	10/31/94	8	6.2	6.2	6.3	6.5	6.6
Staunton River	03/15/92	18	6.2	6.7	6.8	6.8	6.9
Staunton River	08/04/92	15	6.8	6.8	6.9	6.9	6.9
Staunton River	10/10/92	16	6.6	6.8	6.8	6.8	6.9
Staunton River	03/18/93	17	6.5	6.6	6.7	6.7	6.8
Staunton River	08/26/93	14	6.1	6.3	6.3	6.3	6.4
Staunton River	02/19/94	16	6.0	6.3	6.6	6.7	6.7
Staunton River	10/05/94	16	6.1	6.7	6.8	6.9	6.9
Piney River	03/17/92	19	6.0	6.4	7.0	7.1	7.1
Piney River	08/06/92	17	6.1	6.5	6.7	6.8	7.0
Piney River	04/09/93	19	6.1	6.4	6.9	6.9	7.0
Piney River	08/24/93	13	6.0	6.8	7.1	7.2	7.3
Piney River	04/16/94	19	6.0	6.3	6.8	7.0	7.1
Piney River	10/28/94	18	6.2	6.6	6.8	6.9	7.2

Table 3-9 - Regression Models for Prediction of ANC and pH Based on 1982-1983
Synoptic Surveys (N = 47)

1. Log_e (ANC+25)

5.3000 - 0.02400 (% Antietam) - 0.01609(% Hampton) - 0.00603(% Pedlar) - 0.00656(% Old Rag)

$r^2 = 0.95$; standard error = 0.17607

2. pH

7.0841 - 0.02032(% Antietam) - 0.01171(% Hampton) - 0.00369(% Pedlar) - 0.00403(% Old Rag)

$r^2 = 0.95$; standard error = 0.13701

Notes: ANC = $\mu\text{eq L}^{-1}$; variables indicated as percentages equal percent of catchment area.

Table 3-10 - Regression models for prediction of ANC ($\mu\text{eq L}^{-1}$) and pH of SNP stream waters.

Dependent Variables	Intercept	% Antietam Formation	% Hampton Formation	% Pedlar Formation	% Old Rag Formation	% High Quality Forest	Watershed Area (km^2)	r^2	Standard Error
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COLD SEASON MODELS (N for calibration = 199)

Log _e [ANC + 25]									
Bedrock only	5.09311	-0.02046	-0.01818	-0.00795	-0.00788	----	----	0.91	0.24040
All Variables	4.72901	-0.01819	-0.01530	-0.00721	-0.00847	0.00804	0.01647	0.93	0.20974
pH									
Bedrock only	7.13752	-0.01786	-0.01601	-0.00578	-0.00422	----	----	0.92	0.20168
All Variables	6.85093	-0.01627	-0.01385	-0.00502	-0.00451	0.05383	0.01697	0.94	0.17425

WARM SEASON MODELS (N for calibration = 181)

Log _e [ANC + 25]									
Bedrock only	5.63647	-0.02338	-0.02129	-0.01066	-0.00885	----	----	0.90	0.26405
All Variables	5.14058	-0.02008	-0.01735	-0.00972	-0.00971	0.01185	0.01769	0.92	0.23519
pH									
Bedrock only	7.13750	-0.01671	-0.01506	-0.00566	-0.00634	----	----	0.84	0.25646
All Variables	6.97119	-0.01662	-0.01425	-0.00473	-0.00608	ns	0.02554	0.86	0.23942

NOTES: Variables indicated as percentages represent percent of watershed area; ns = nonsignificant at $p < 0.01$

Table 3-11 - Predicted ANC and pH Values for Stream Waters Associated With Single Bedrock Formations

	Catoctin	Old Rag	Pedlar	Hampton	Antietam
COLD SEASON					
ANC ($\mu\text{eq L}^{-1}$)	137 (85 - 217)	49 (25 - 85)	49 (25 - 84)	2 (-7 - 14)	-4 (-11 - -6)
pH	7.1 (6.8 - 7.5)	6.7 (6.4 - 7.0)	6.6 (6.2 - 6.9)	5.5 (5.2 - 5.9)	5.4 (5.0 - 5.7)
WARM SEASON					
ANC ($\mu\text{eq L}^{-1}$)	256 (157 - 407)	91 (50 - 153)	72 (38 - 124)	8 (-3 - 26)	2 (-7 - 17)
pH	7.1 (6.7 - 7.6)	6.5 (6.2 - 7.0)	6.6 (6.2 - 7.0)	5.6 (5.2 - 6.1)	5.5 (5.0 - 5.9)

Note: the 95% confidence intervals for the predicted values are indicated in parentheses

Shenandoah National Park

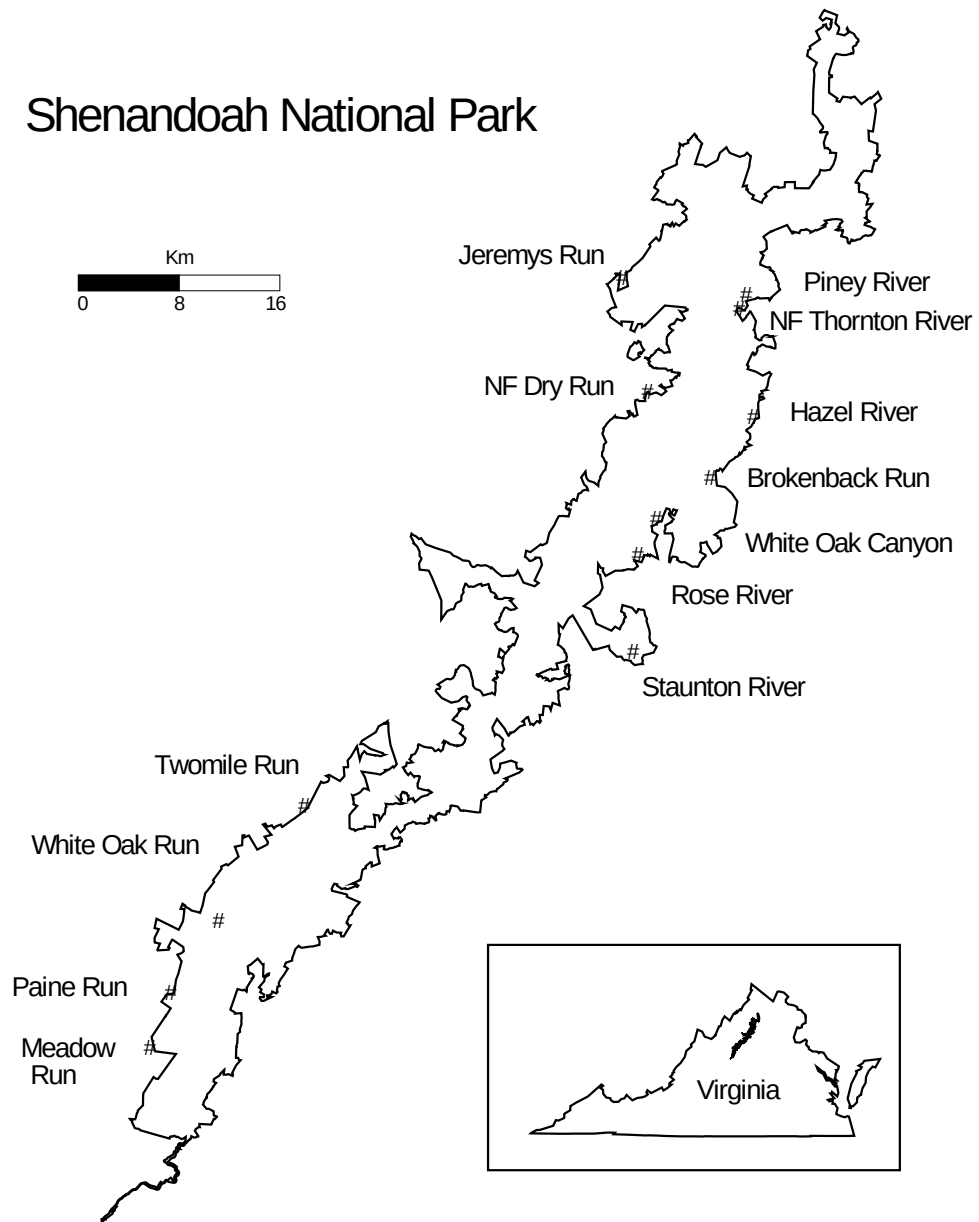


Figure 3-1: Location map for synoptic survey streams in Shenandoah National Park.

Shenandoah National Park

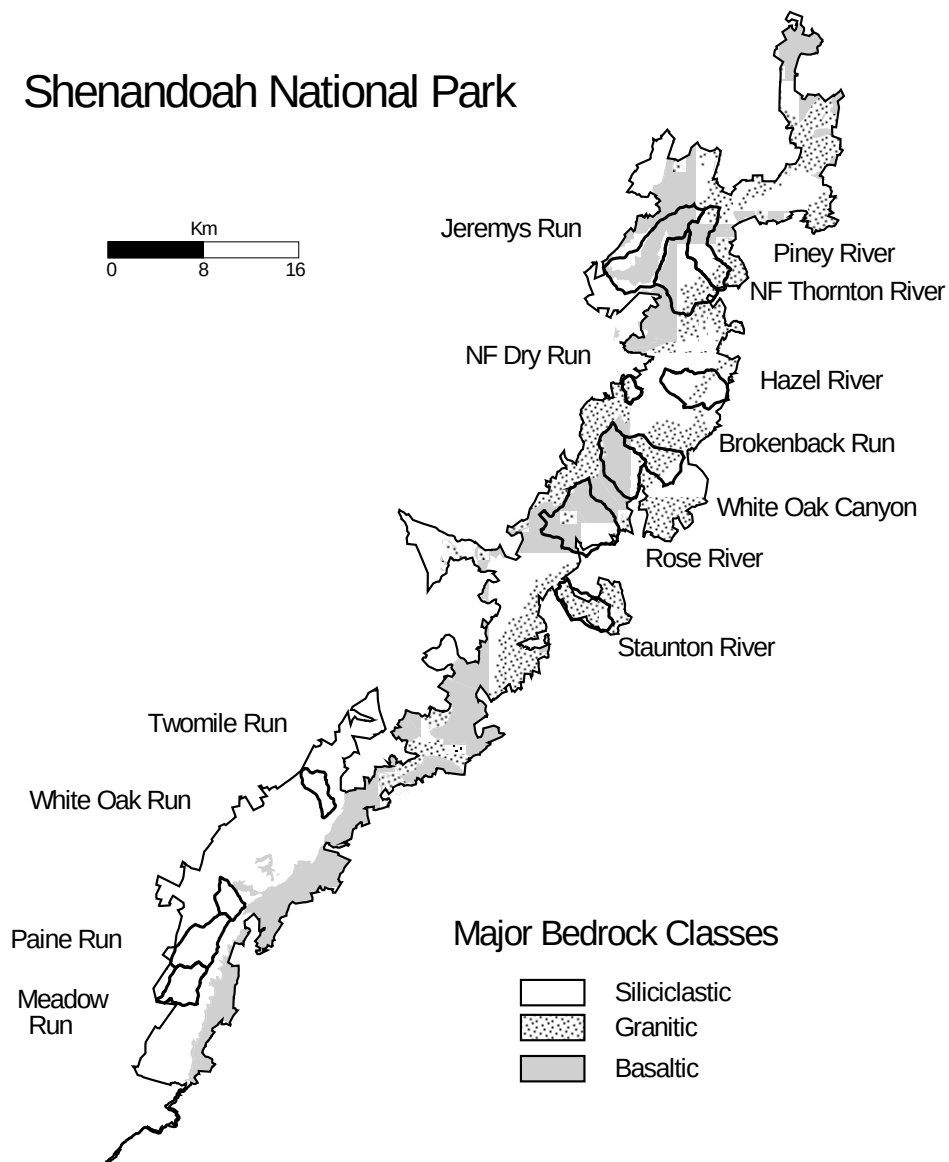


Figure 3-2: Synoptic survey watersheds in relation to distribution of major bedrock classes in Shenandoah National Park.

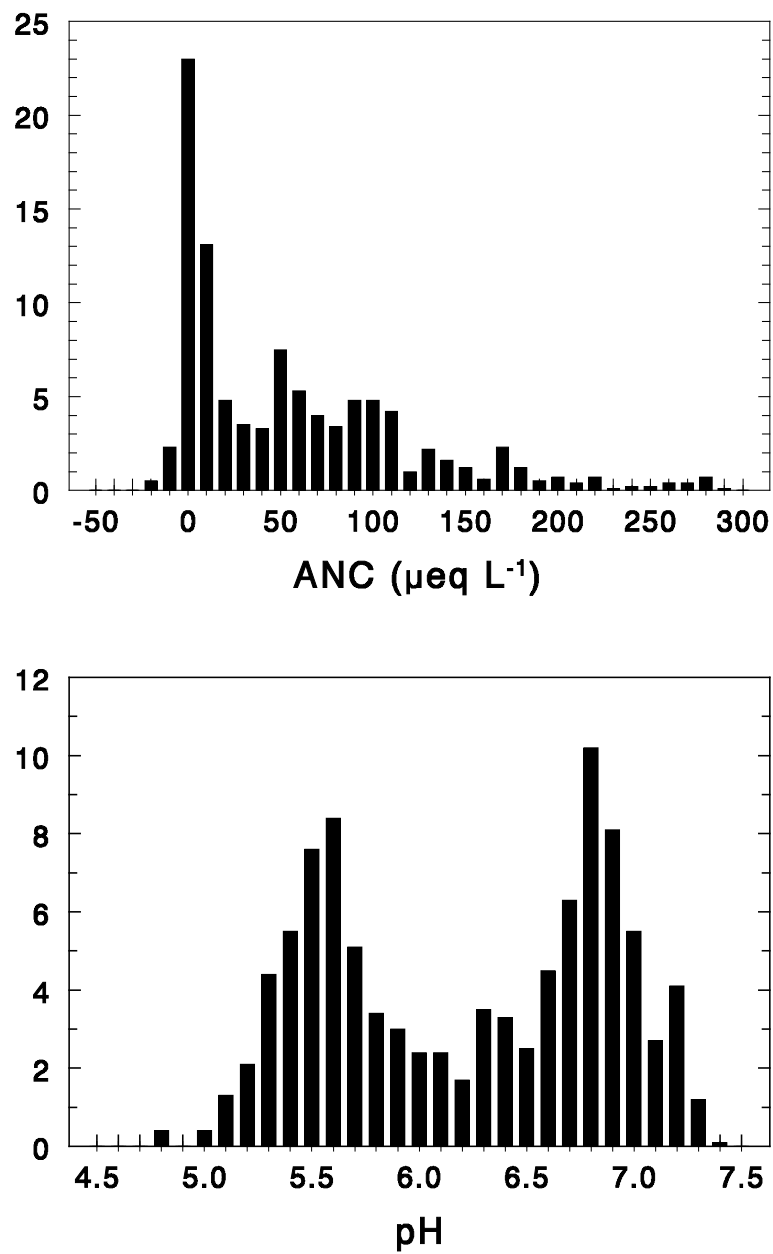


Figure 3-3: Distributions of measured ANC and pH for all FISH synoptic survey samples collected during 1992-1994. N = 802.

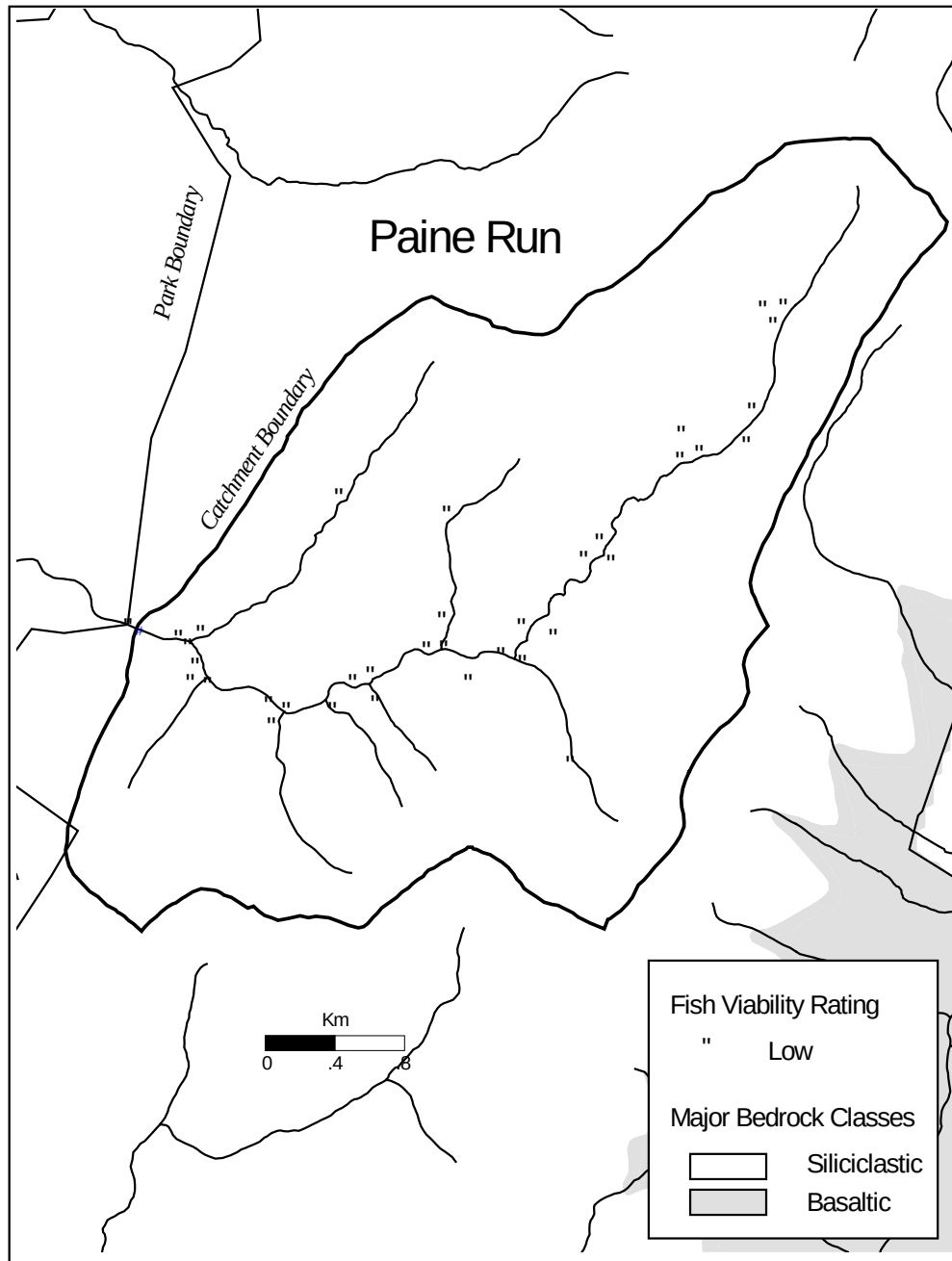


Figure 3-4: Synoptic survey sites in the Paine Run watershed. Fish viability ratings are based on the lowest ANC and pH values observed for synoptic surveys conducted in the period of 1992-1994. (Note: bedrock mapping does not extend to areas outside of the SNP boundary.)

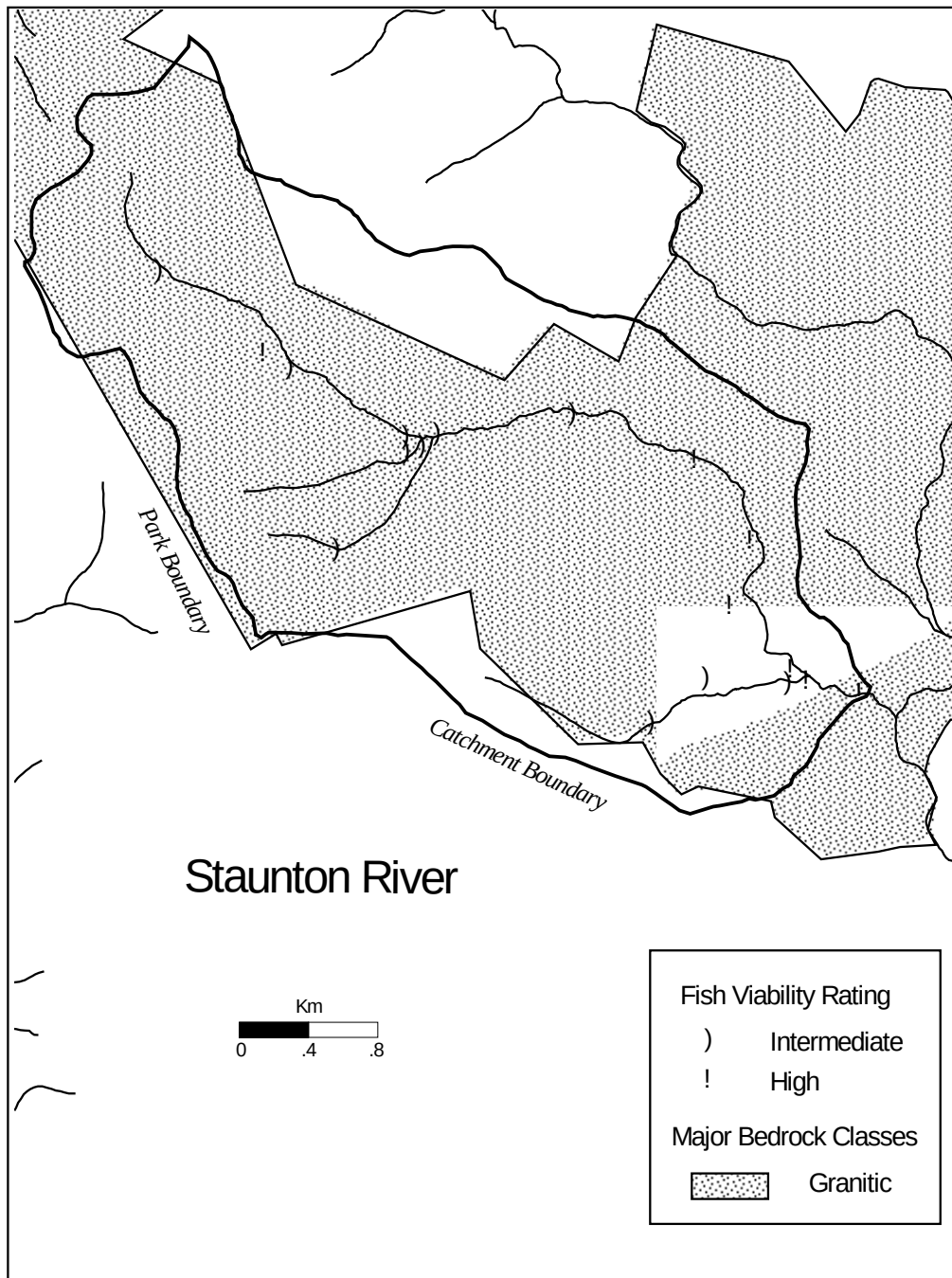


Figure 3-5: Synoptic survey sites in the Staunton River watershed. Fish viability ratings are based on the lowest ANC and pH values observed for synoptic surveys conducted in the period of 1992-1994. (Note: bedrock mapping does not extend to areas outside of the SNP boundary.)

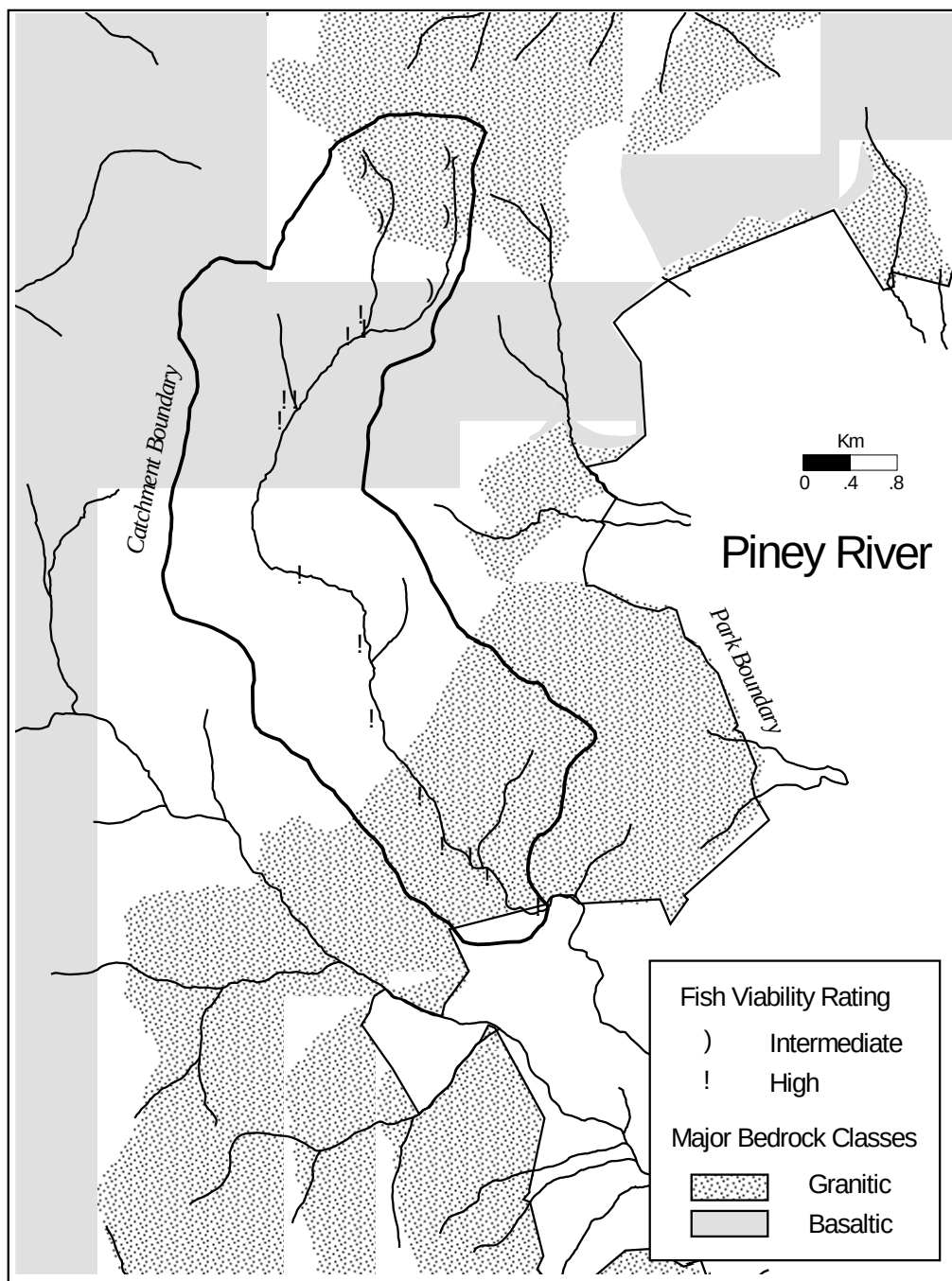


Figure 3-6: Synoptic survey sites in the Piney River watershed. Fish viability ratings are based on the lowest ANC and pH values observed for synoptic surveys conducted in the period of 1992-1994. (Note: bedrock mapping does not extend to areas outside of the SNP boundary.)

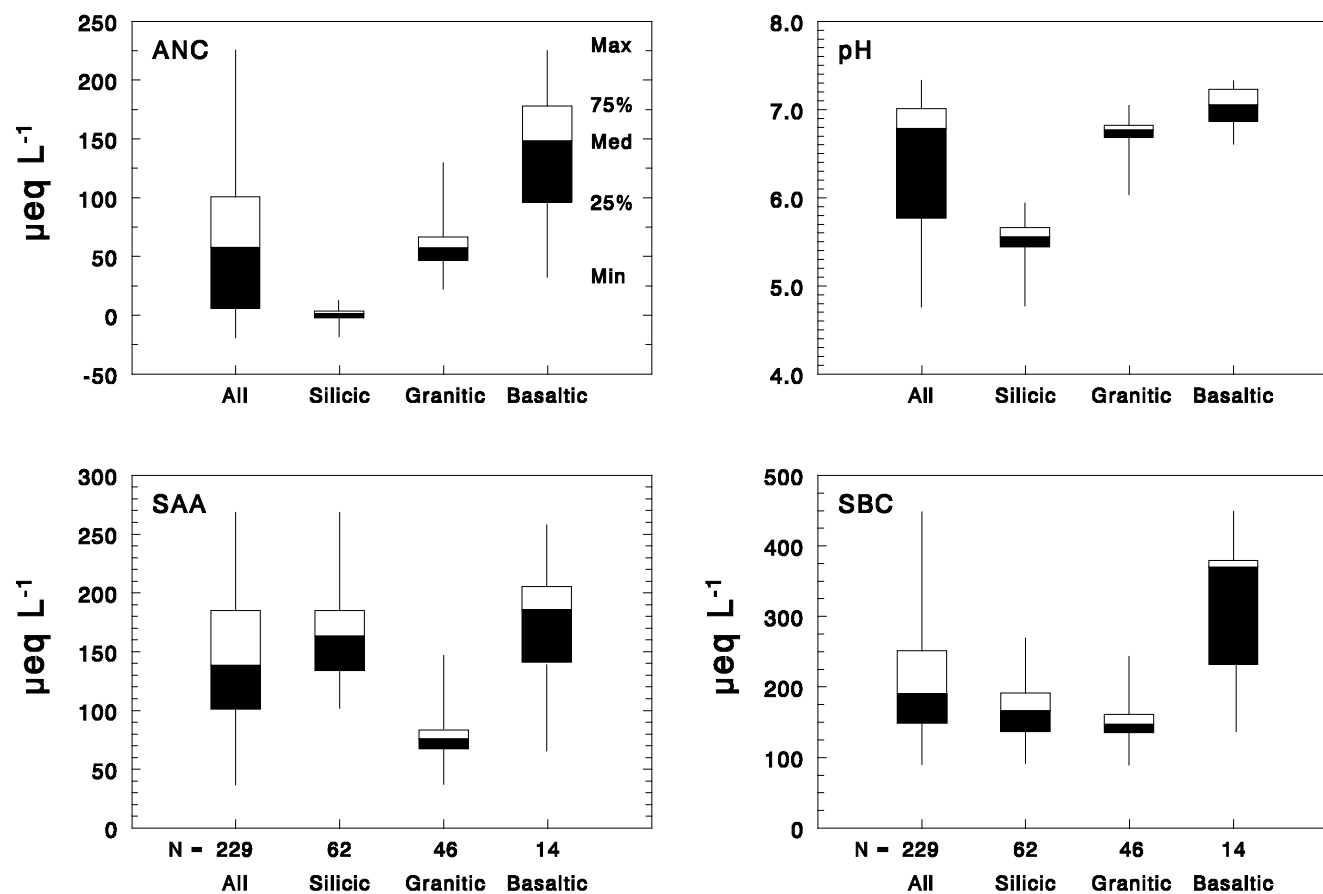


Figure 3-7: Range and interquartile distributions of ANC, pH, sum of strong-acid anions (SAA), and sum of base cations (SBC) for Spring 1992 synoptic surveys. All = all samples. Silicic, Granitic, and Basaltic = samples associated with a single bedrock class.

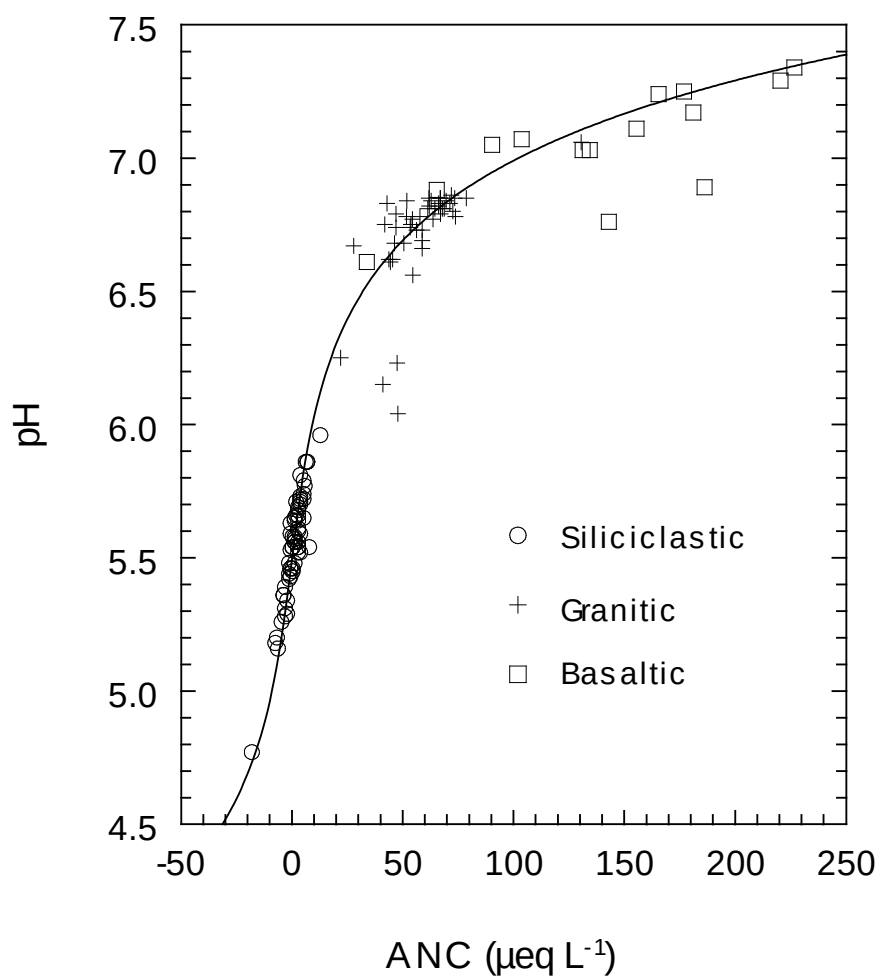


Figure 3-8: Relationship between pH and ANC in subset of Spring 1992 synoptic survey samples associated with single bedrock classes. The line represents the theoretical pH-ANC curve for the mean Pco_2 ($10^{-3.2}$) calculated for the Spring 1992 samples. Note that the pH change for a given ANC change varies for stream waters associated with different bedrock.

Paine Run

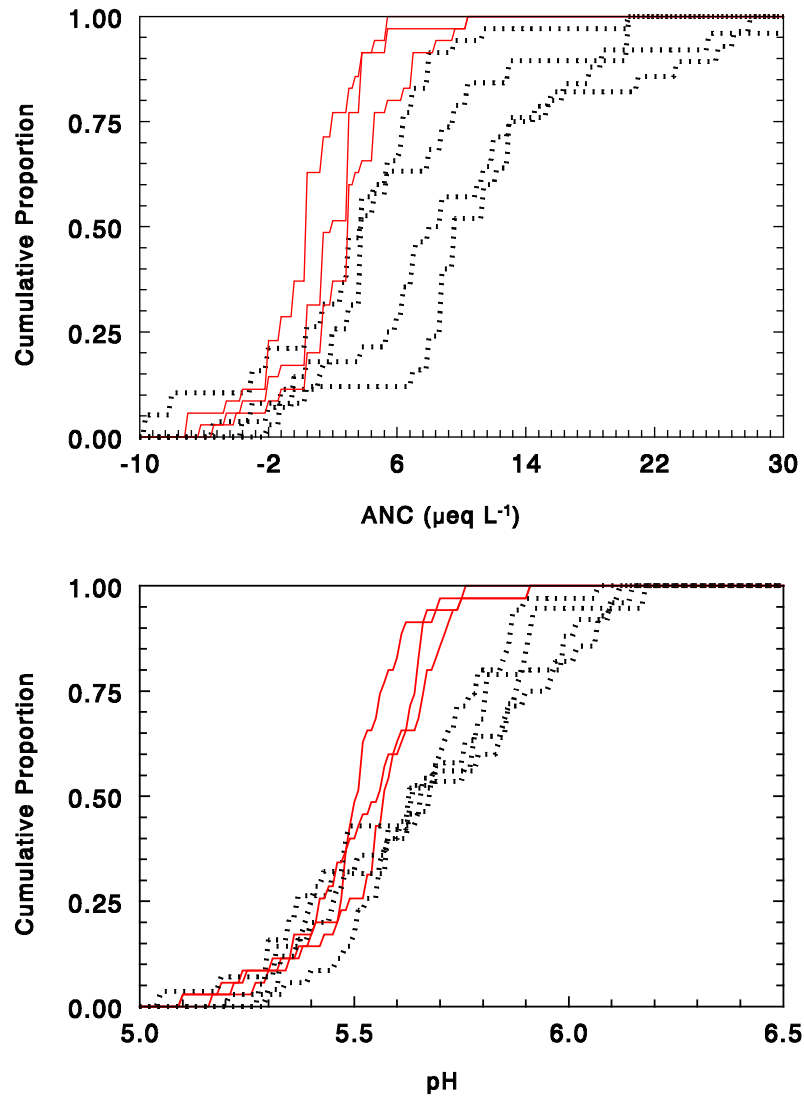


Figure 3-9: Distribution of measured pH and ANC values for synoptic stream-sampling surveys conducted in 1992-94. Solid lines indicate Winter and Spring surveys. Broken lines indicate Summer and Fall surveys.

Meadow Run

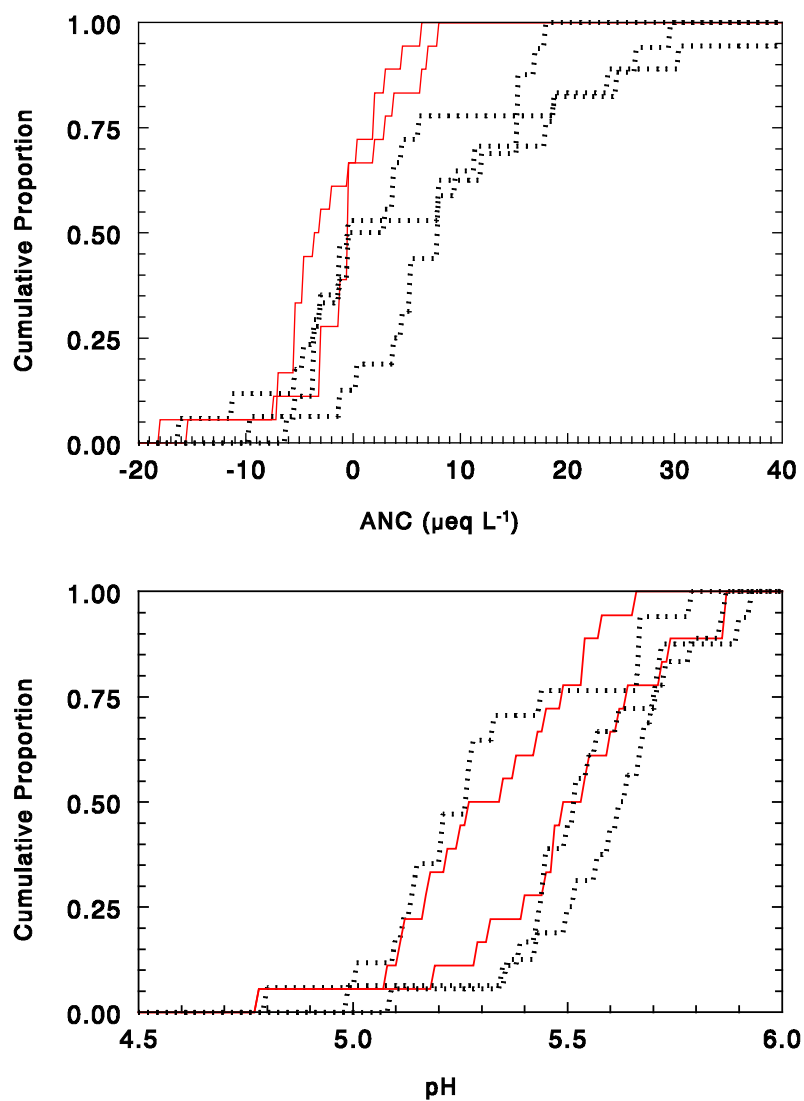


Figure 3-10: Distribution of measured pH and ANC values for synoptic stream-sampling surveys conducted in 1992-94. Solid lines indicate Winter and Spring surveys. Broken lines indicate Summer and Fall surveys.

Twomile Run

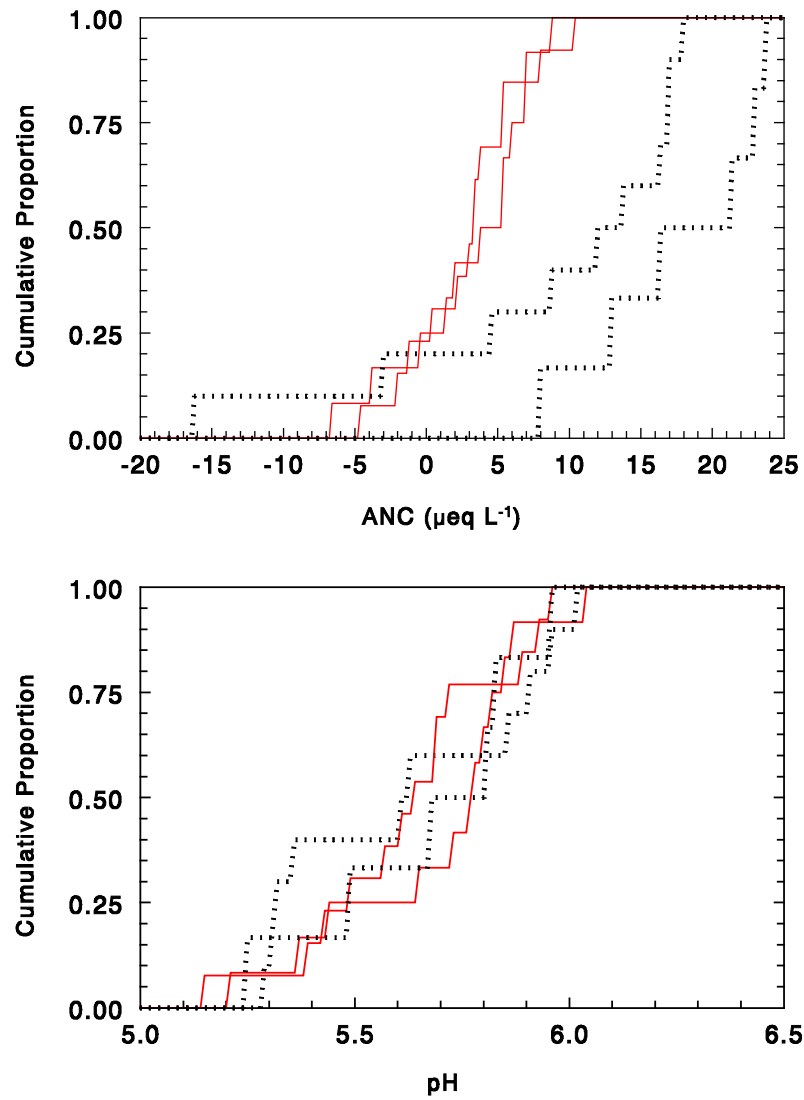


Figure 3-11: Distribution of measured pH and ANC values for synoptic stream-sampling surveys conducted in 1992-94. Solid lines indicate Winter and Spring surveys. Broken lines indicate Summer and Fall surveys.

Brokenback Run

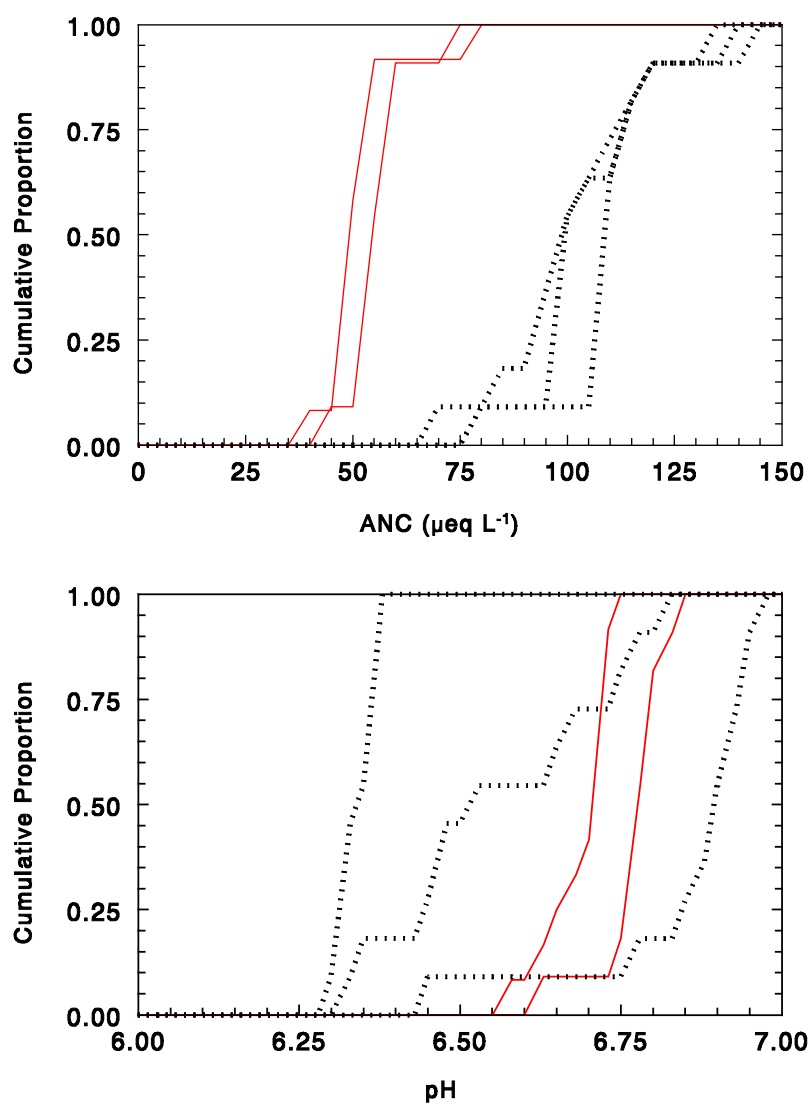


Figure 3-12: Distribution of measured pH and ANC values for synoptic stream-sampling surveys conducted in 1992-94. Solid lines indicate Winter and Spring surveys. Broken lines indicate Summer and Fall surveys.

North Fork of Dry Run

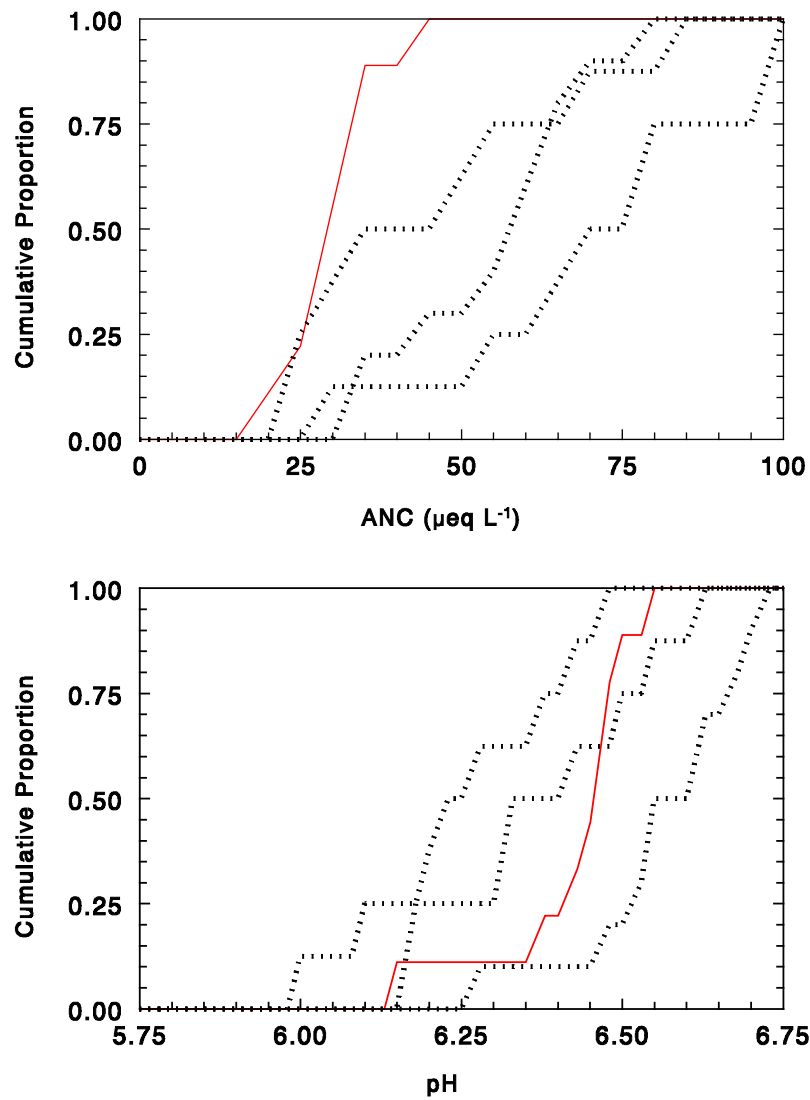


Figure 3-13: Distribution of measured pH and ANC values for synoptic stream-sampling surveys conducted in 1992-94. Solid lines indicate Winter and Spring surveys. Broken lines indicate Summer and Fall surveys.

Staunton River

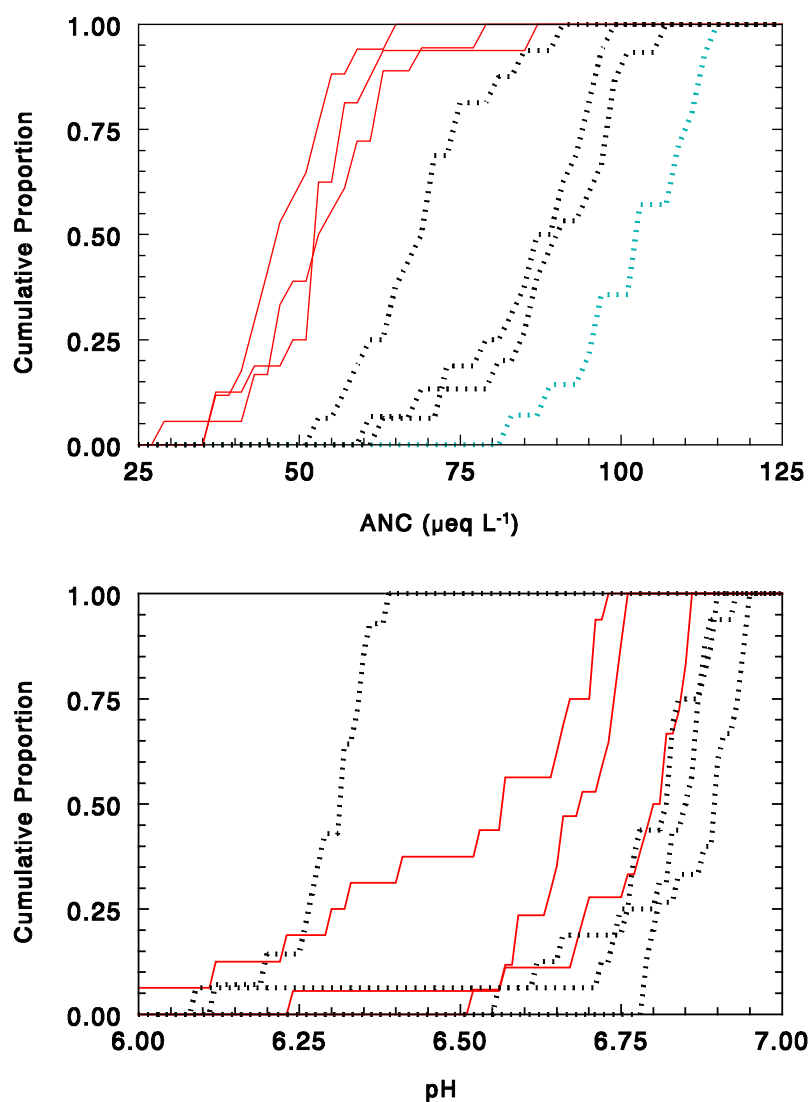


Figure 3-14: Distribution of measured pH and ANC values for synoptic stream-sampling surveys conducted in 1992-94. Solid lines indicate Winter and Spring surveys. Broken lines indicate Summer and Fall surveys.

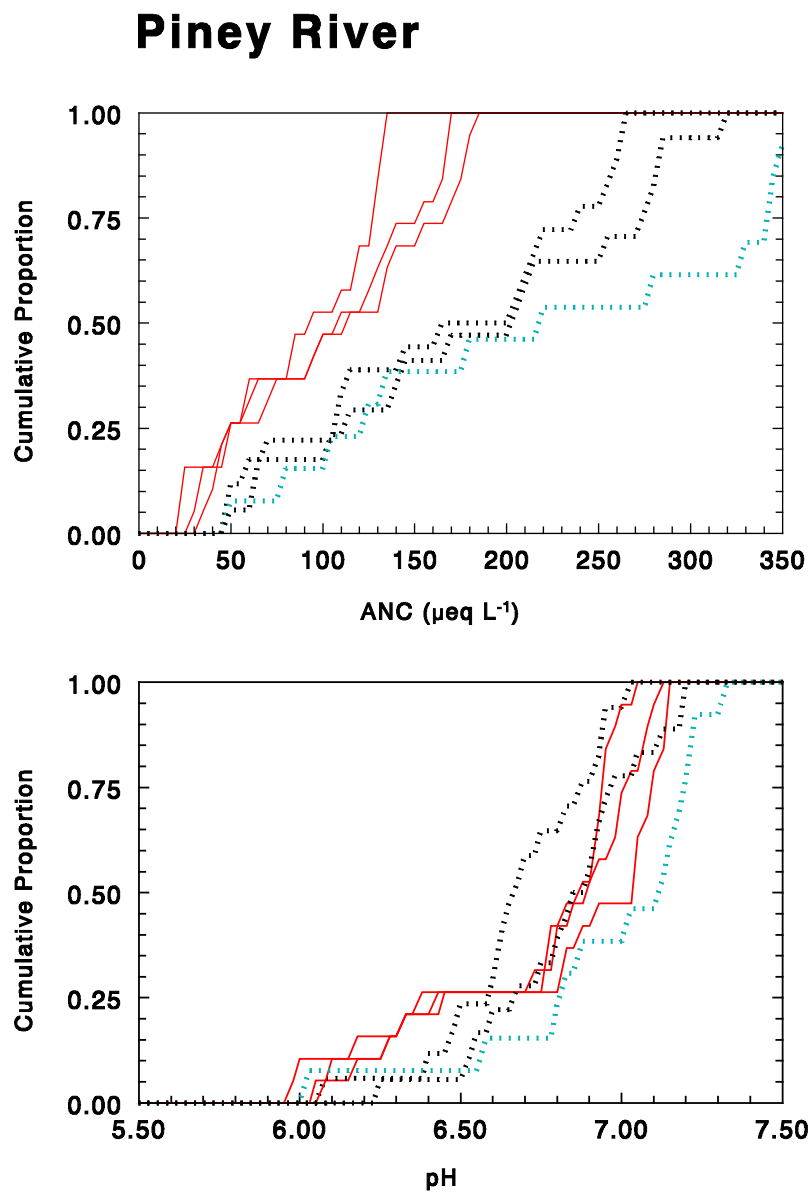


Figure 3-15: Distribution of measured pH and ANC values for synoptic stream-sampling surveys conducted in 1992-94. Solid lines indicate Winter and Spring surveys. Broken lines indicate Summer and Fall surveys.

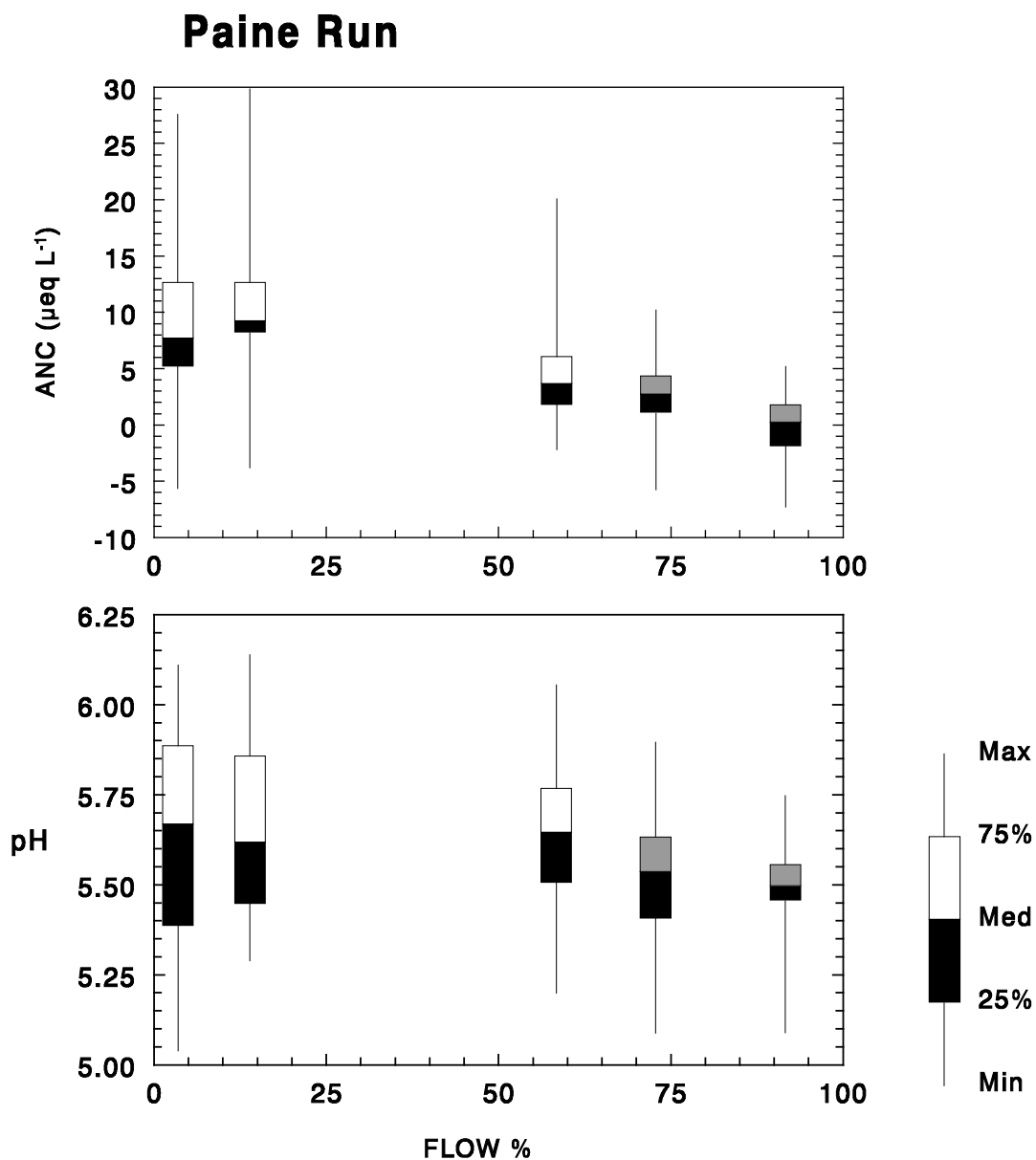


Figure 3-16: Ranges and interquartile distributions of ANC and pH for synoptic stream sampling surveys conducted in 1992-1994. X axis = flow percentiles (see Table 2). Shaded boxes = cold season surveys. Open boxes = warm season surveys.

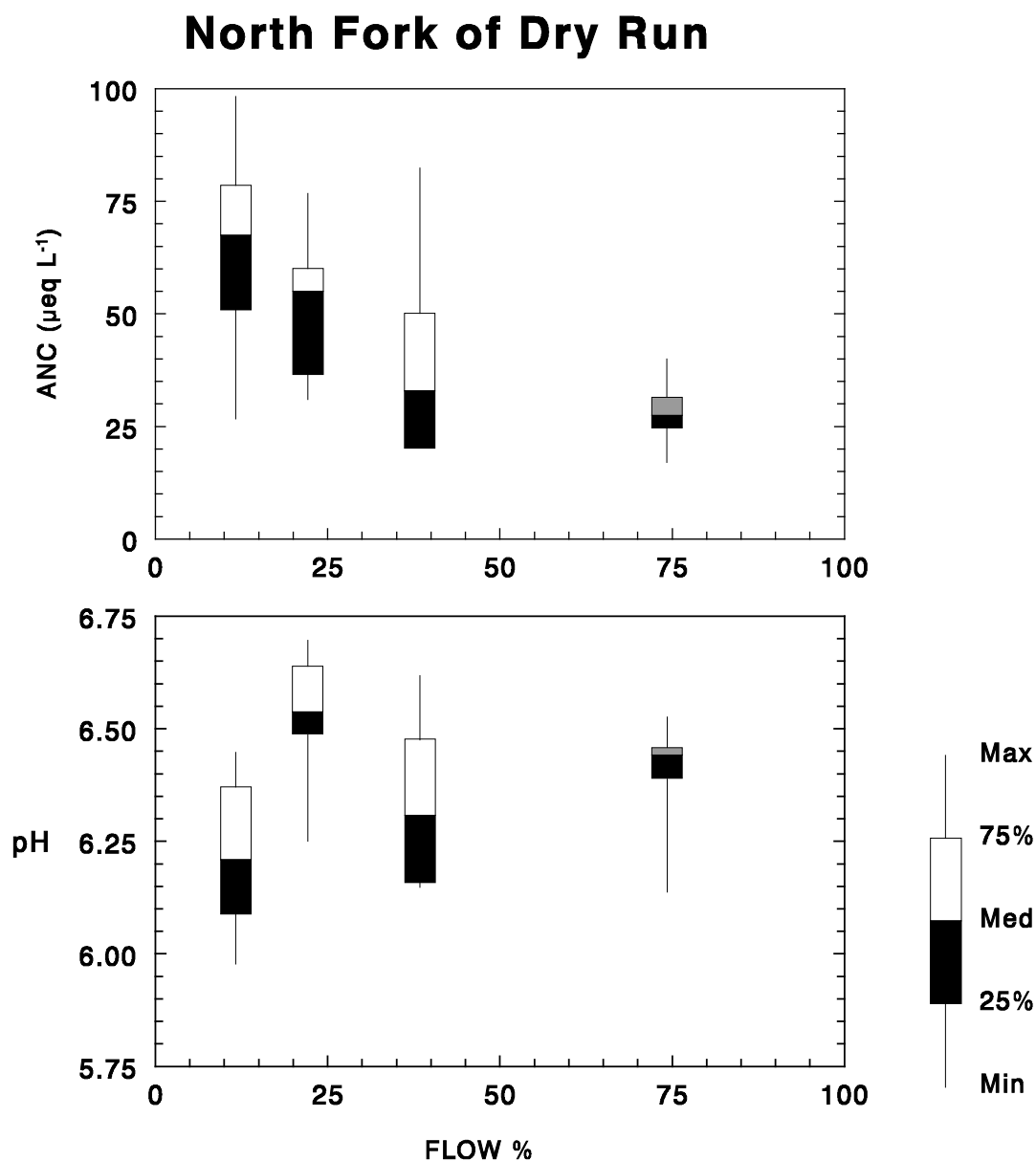


Figure 3-17: Ranges and interquartile distributions of ANC and pH for synoptic stream sampling surveys conducted in 1992-1994. X axis = flow percentiles (see Table 2). Shaded boxes = cold season surveys. Open boxes = warm season surveys.

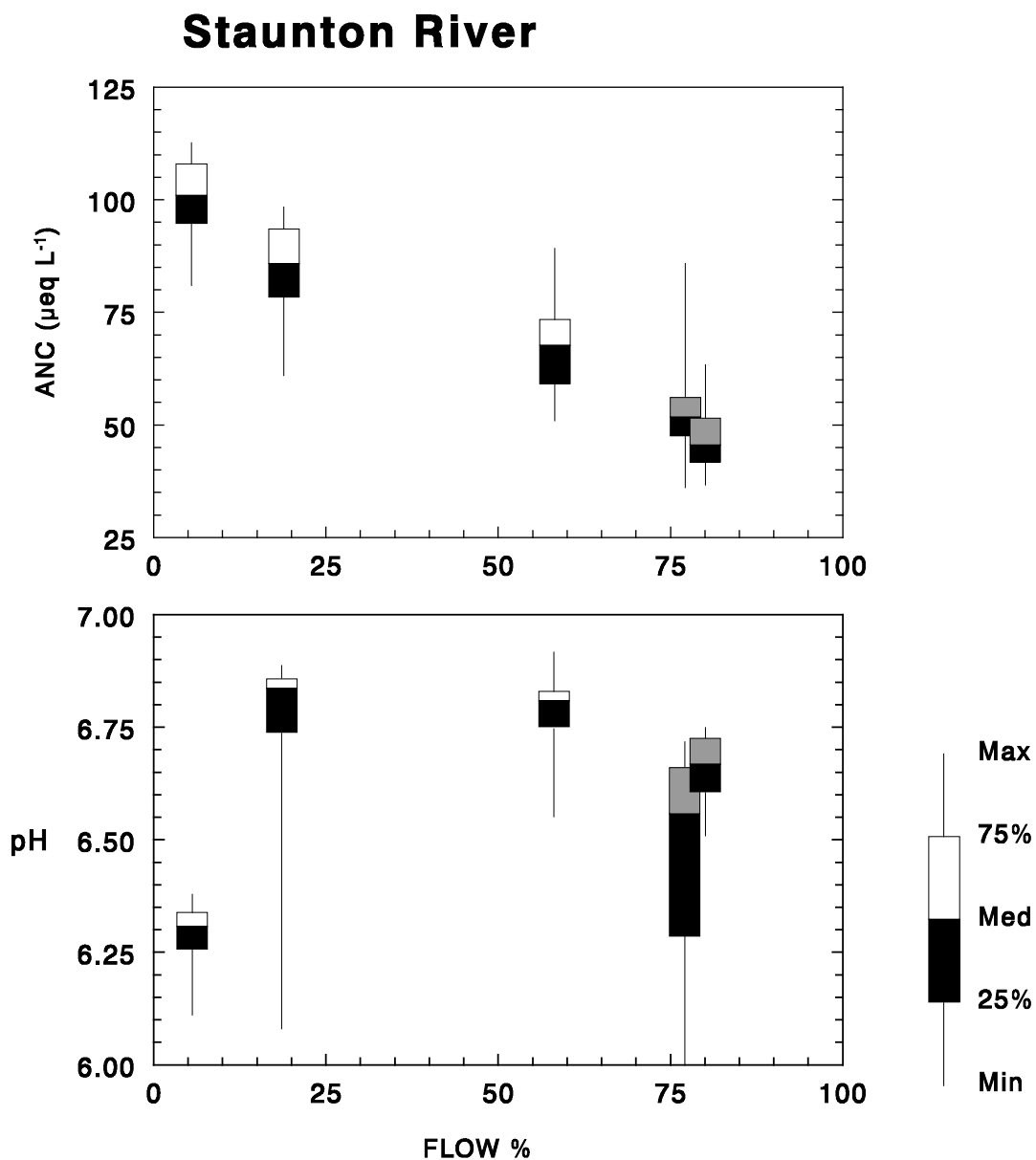


Figure 3-18: Ranges and interquartile distributions of ANC and pH for synoptic stream sampling surveys conducted in 1992-1994. X axis = flow percentiles (see Table 2). Shaded boxes = cold season surveys. Open boxes = warm season surveys.

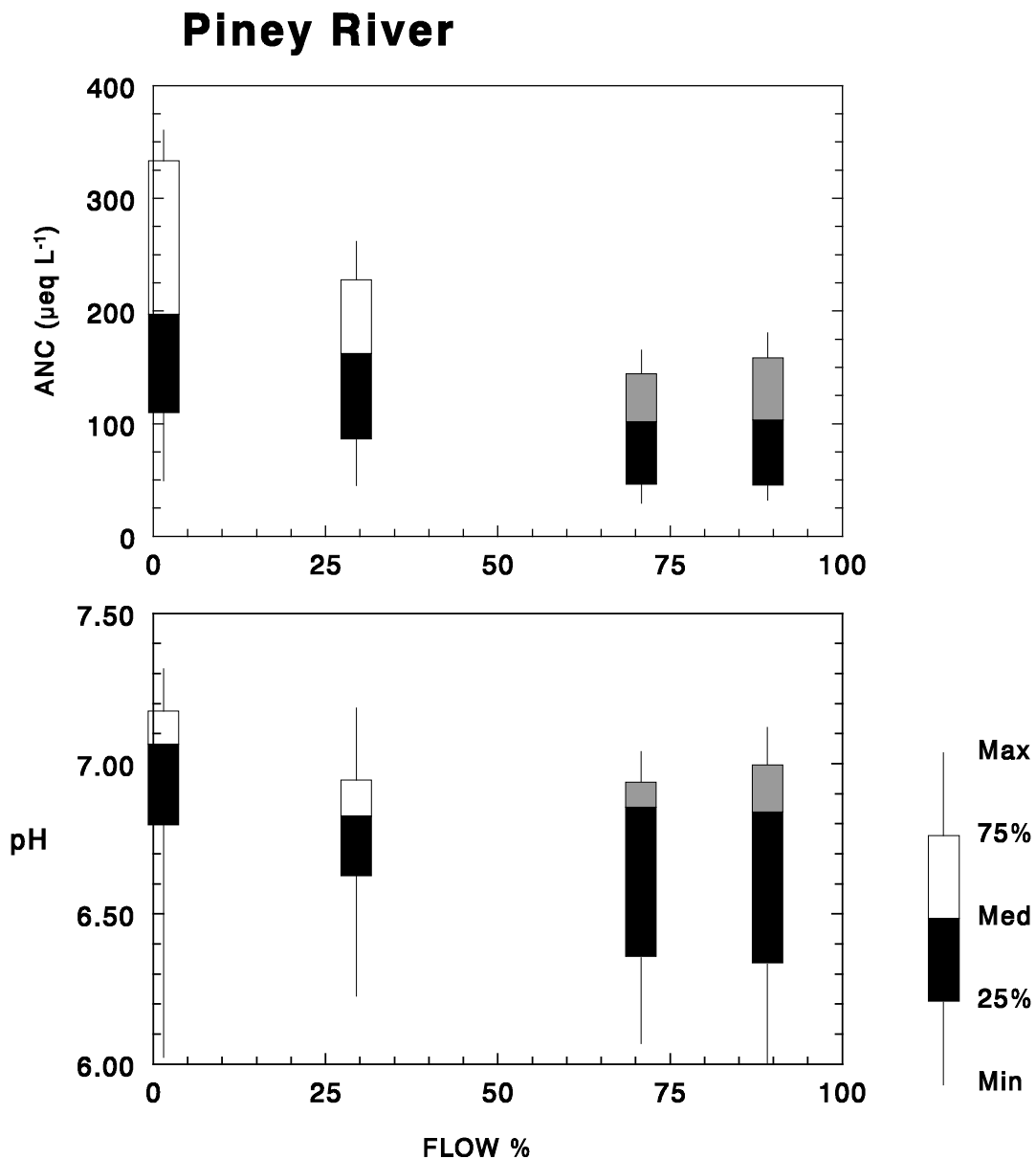


Figure 3-19: Ranges and interquartile distributions of ANC and pH for synoptic stream sampling surveys conducted in 1992-1994. X axis = flow percentiles (see Table 2). Shaded boxes = cold season surveys. Open boxes = warm season surveys.

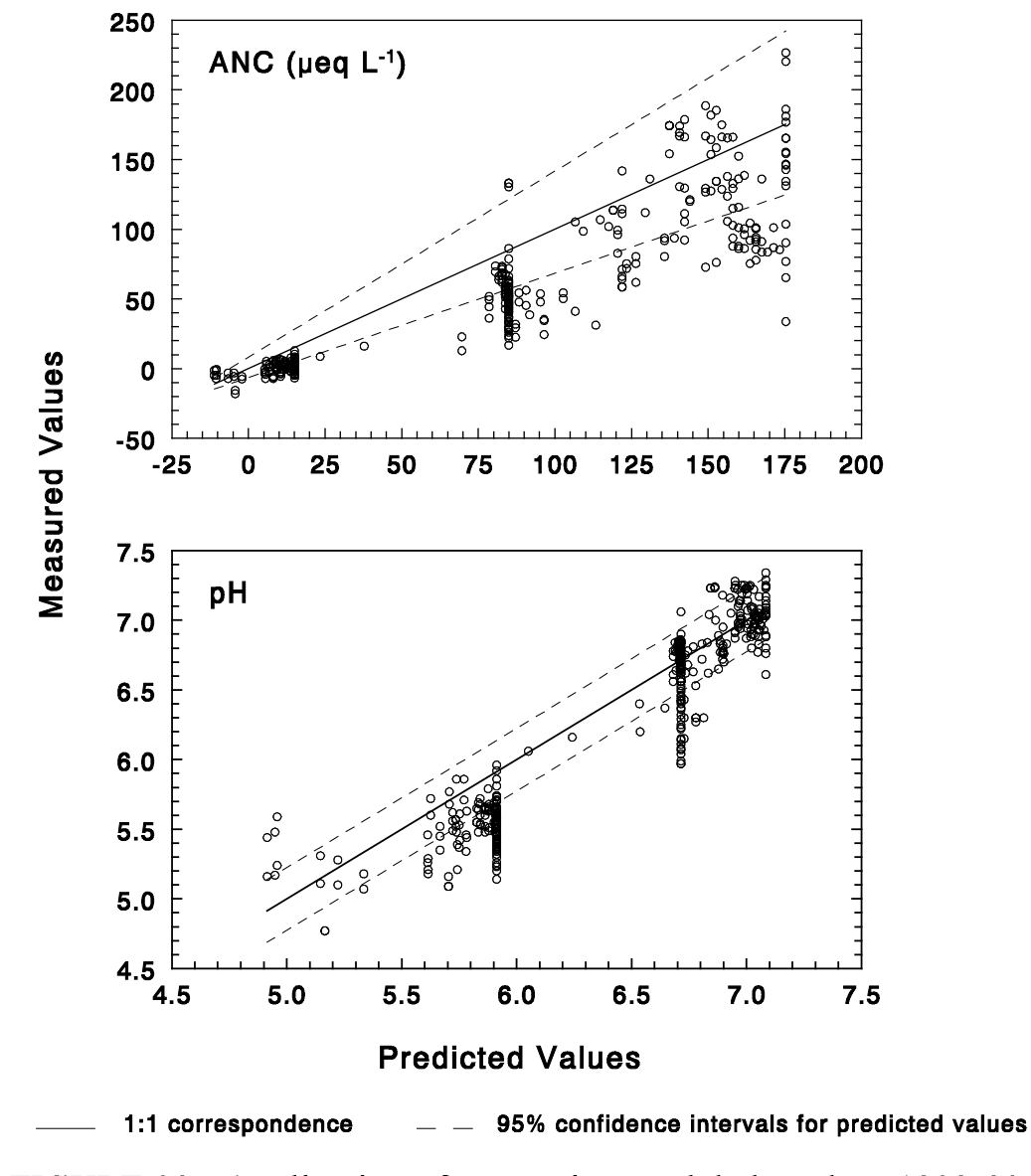


Figure 3-20: Application of regression models based on 1982-83 synoptic surveys to predict the composition of stream waters sampled in FISH synoptic surveys, 1992-1994 (cold season).

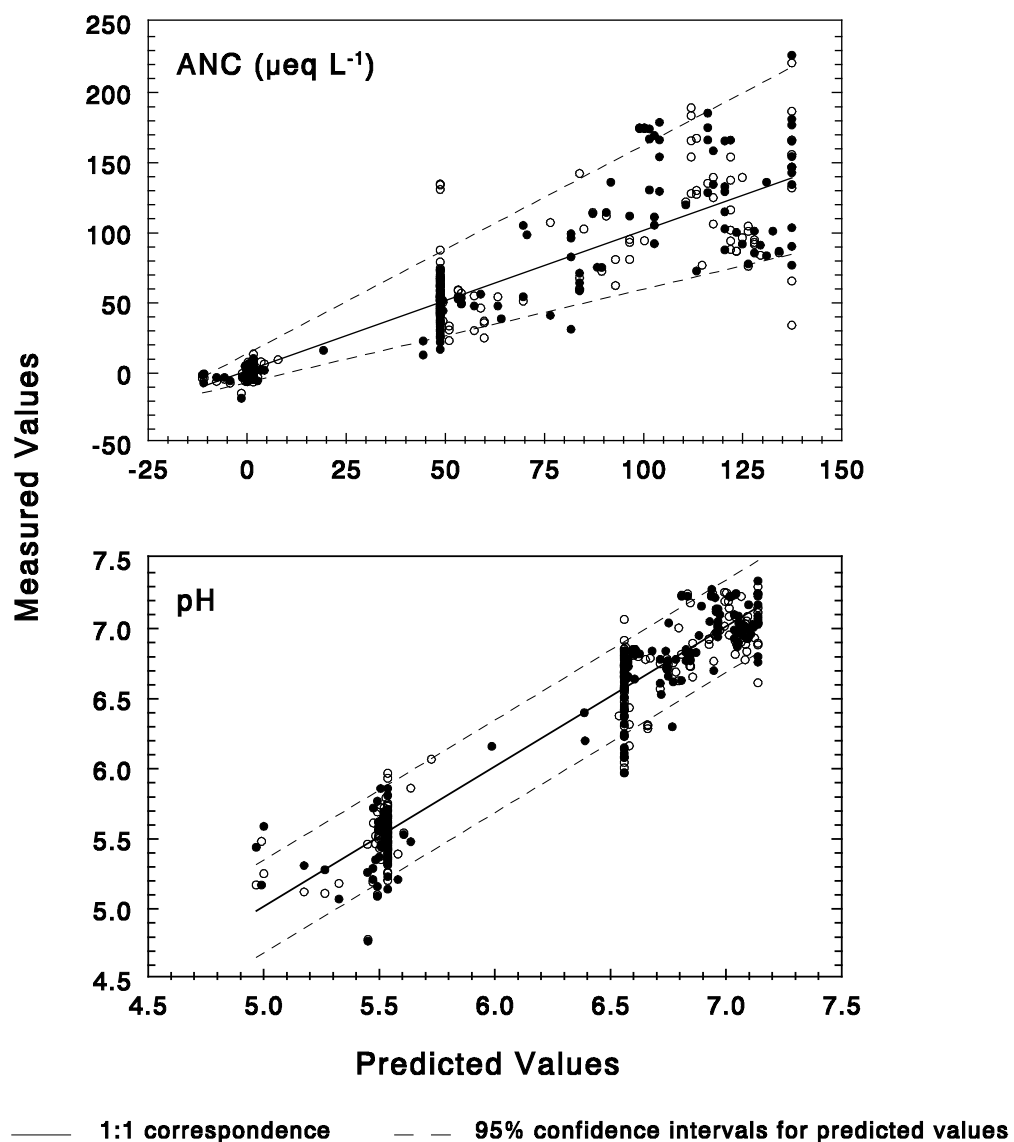


Figure 3-21: Comparison of measured composition of cold-season stream survey samples with values predicted by regression models based on watershed bedrock (Table 10). Closed points = calibration data. Open points = validation data. Compare with Figure 20.

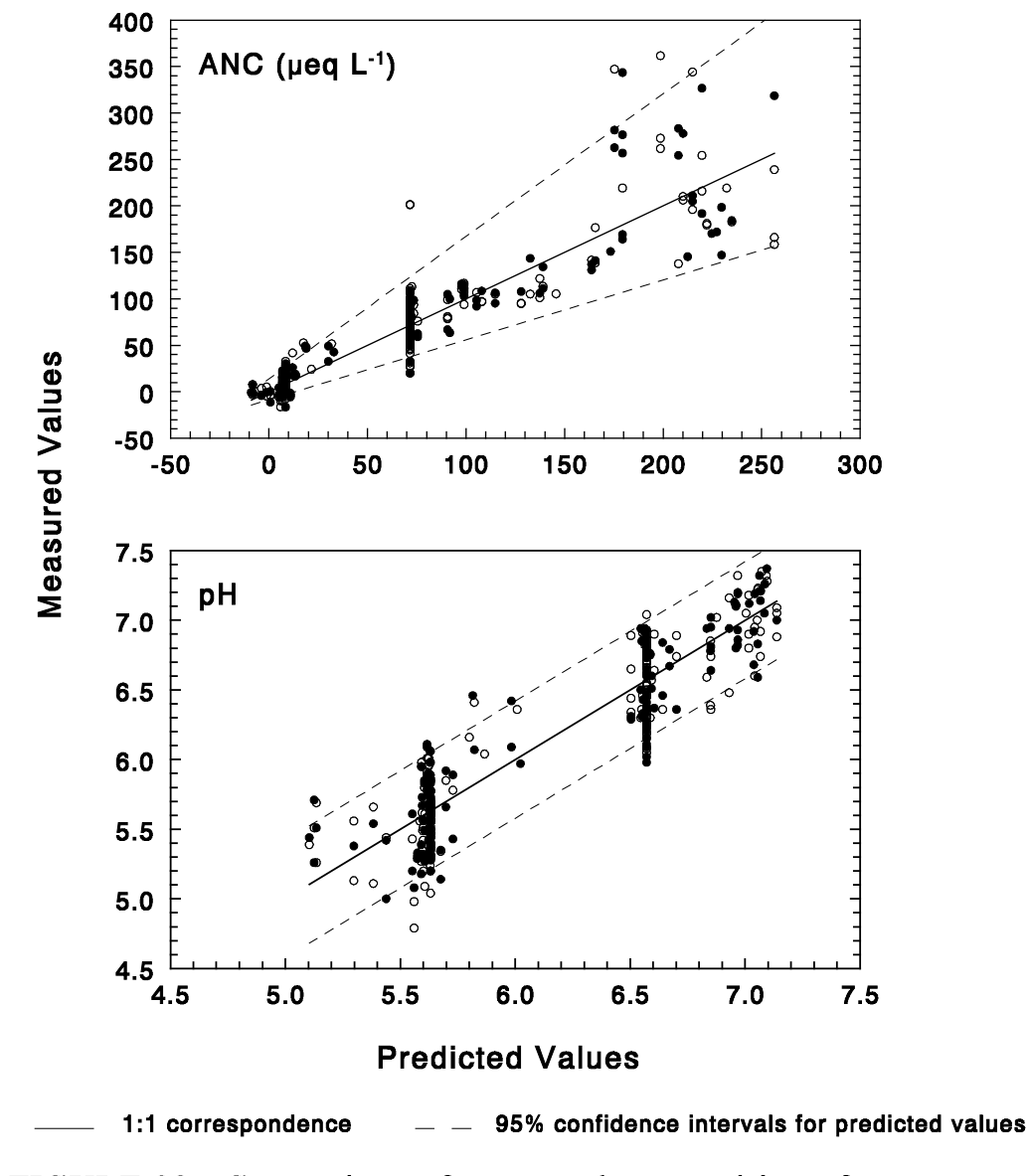


Figure 3-22: Comparison of measured composition of warm-season stream survey samples with values predicted by regression models based on watershed bedrock (Table 10). Closed points = calibration data. Open points = validation data. Compare with Figure 20.

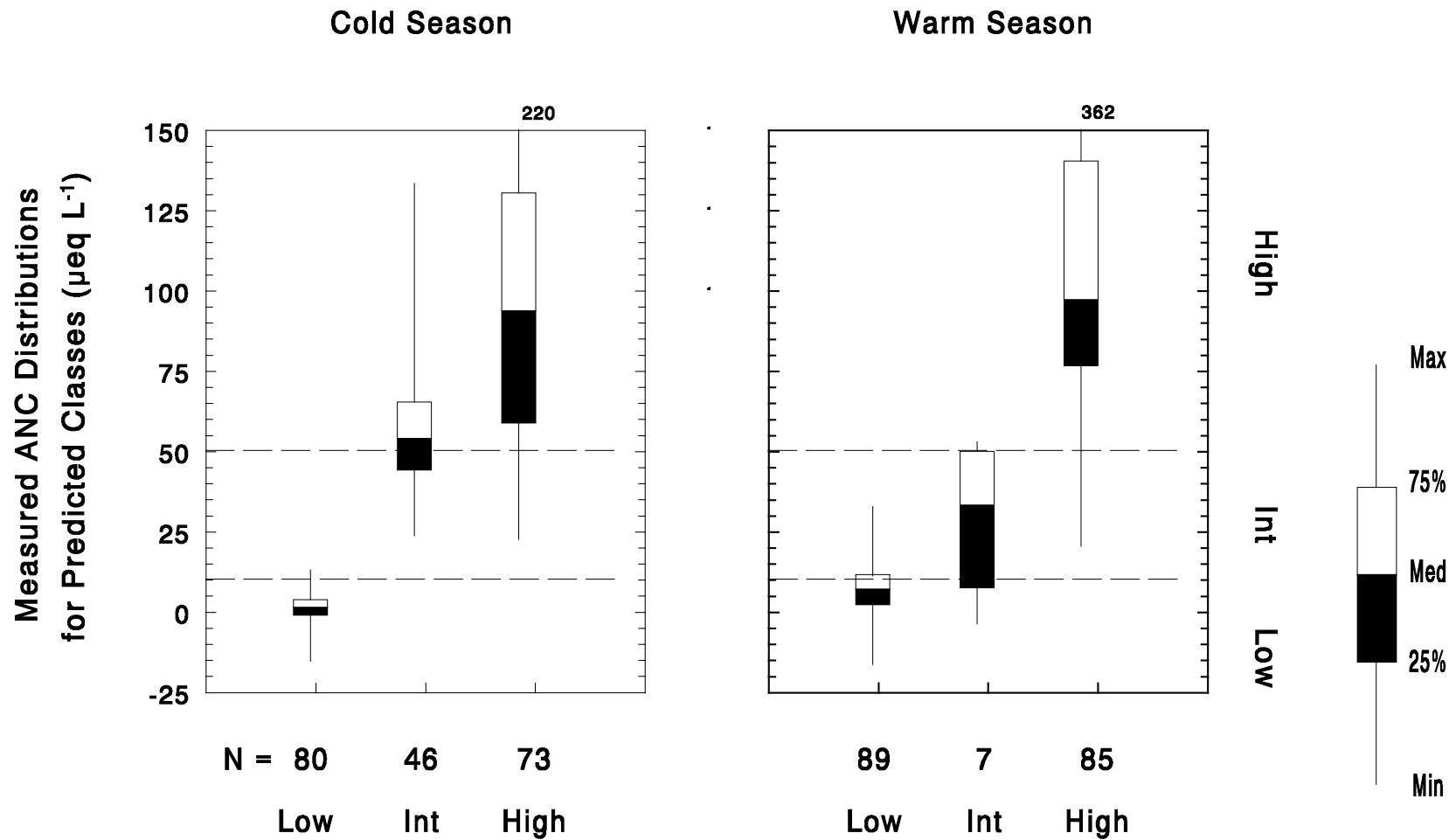


Figure 3-23: Distributions of measured ANC values for predicted low, intermediate, and high fish-viability classes (see Table 3).

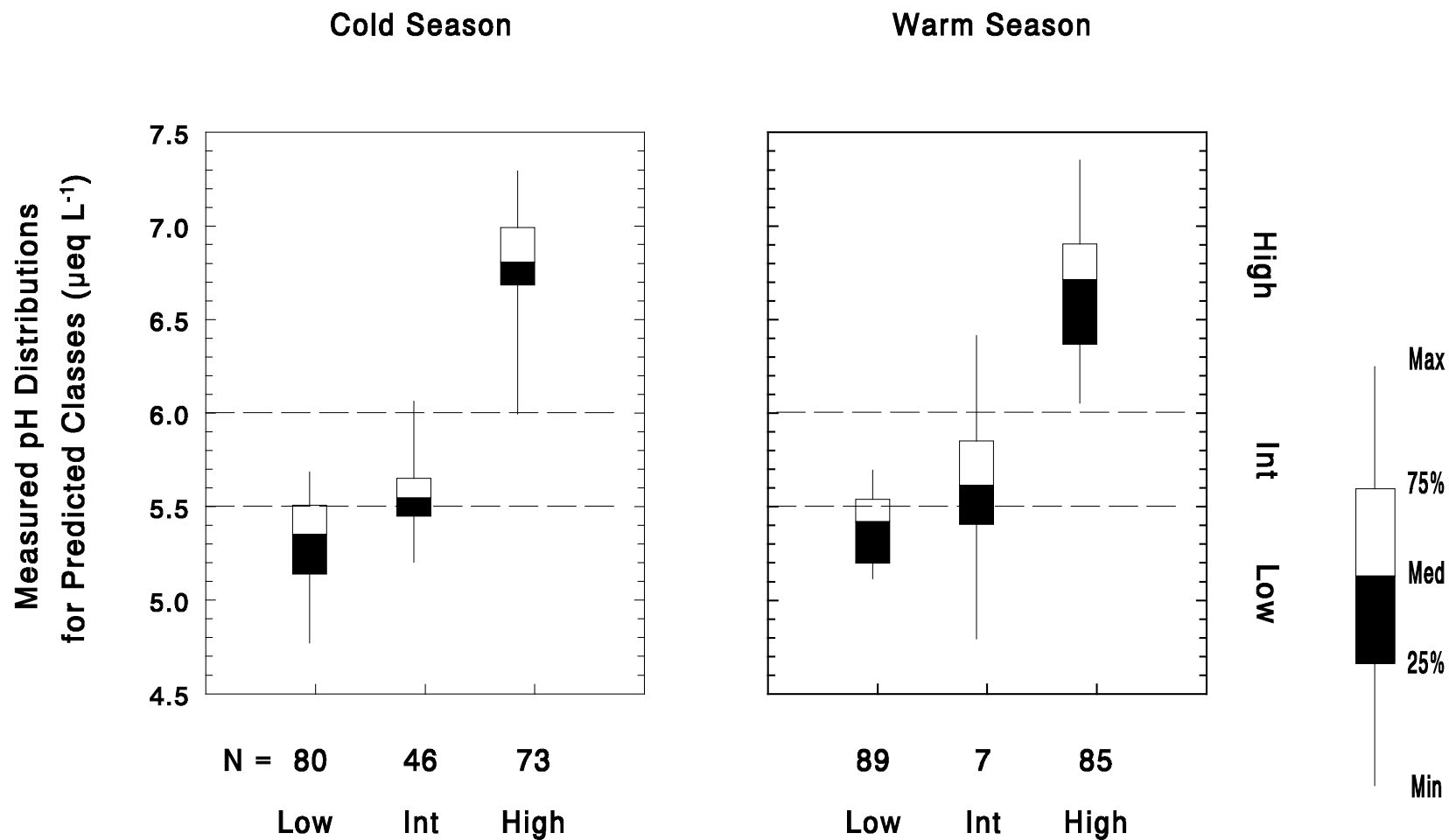


Figure 3-24: Distributions of measured pH values for predicted low, intermediate, and high fish-viability classes (see Table 3). Dashed lines correspond to designated fish viability criteria. Predictions are based on bedrock-only regressions. Plotted distributions represent validation data set.

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Chapter 4

Discharge and Water Chemistry at the Three Intensive Sites

Prepared by

Keith N. Eshleman¹ and Kenneth E. Hyer²

**¹ University of Maryland, Center for Environmental Sciences
Appalachian Laboratory
Frostburg, MD 21532**

**² Department of Environmental Sciences
Clark Hall, University of Virginia
Charlottesville, VA 22903**

Introduction

Episodic acidification is usually defined as the transient loss of acid neutralizing capacity (ANC) and associated depressions in pH and increases in toxic forms of dissolved aluminum in surface waters associated with rainfall and snowmelt events. The process of episodic acidification has been observed in surface waters in Europe, Canada, and the United States and appears to be a ubiquitous process which is to a large degree hydrologically-controlled (Wigington *et al.*, 1990). While reasonably well-studied, there are several important gaps in our observations and understanding of episodic acidification including: (1) the extent and severity of episodic acidification in many regions of the U.S., particularly in acid-sensitive regions of the southeastern U.S., such as Shenandoah National Park (SNP), where few studies of the problem have been completed; (2) the relationship, if any, between the severity of episodic acidification and the level of acid deposition to a watershed; (3) the relationship, if any, between the severity

of episodic acidification and the flowpath(s) of water through a watershed; (4) the relationship, if any, between the severity of episodic acidification and antecedent baseflow conditions on a watershed; (5) the biological effects, if any, of episodic changes in water chemistry on fish populations in acid-sensitive streams; and (6) a predictive simulation model of episodic chemical changes in streams. Closing these gaps in scientific understanding of episodic acidification is presently a primary goal of the Shenandoah Watershed Study (SWAS). The “Fish in Sensitive Habitats” (FISH) Project, conducted during the period 1992-1995, was designed to address several of these gaps in understanding. The purposes of this chapter are to: (1) describe our observations of the severity and extent of episodic acidification in three intensively-studied SNP streams, (2) describe the observed relationships between episodic chemical conditions and baseflow conditions, and (3) discuss the relationship between episodic acidification and hydrologic flowpaths in the three watersheds.

Methods

Installation of field equipment

Each of the three intensively-studied watersheds (Paine Run, PAIN; Piney River, PINE; and Staunton River, STAN) was instrumented during the summer of 1992. Two of the most important criteria used during selection of these three watersheds were (1) suitability for stream gaging and (2) easy access (see Chapter 1 for discussion of selection criteria), which were requirements for conducting this part of the project. In each watershed, we installed (1) a continuously-recording stream gage/instrument shelter and (2) a non-recording stream gage. The continuously-recording stream gage was based on the classical design used by the U.S. Geological Survey and other water monitoring agencies for providing a continuous analog record of stream gage height or stage (Rantz *et al.*, 1982). The gage at each site required the installation of a stilling well into the bank at an appropriate location on the stream; the stilling well was fabricated from a specified length (5-8') of 24" (dia.) steel culvert pipe onto which a sheet metal bottom had been welded. Near the bottom of each cylindrical well, a hole had been cut and a threaded 2" steel nipple was welded to receive a fitting for the water intake pipe. The intake pipe and fitting were made from 2" schedule 40 PVC well casing. During installation, a hole and trench were manually dug to receive the well and intake pipe, with the excavated material used as

backfill after the well was properly leveled in the stream bank. Prior to backfilling, a second 2" (dia.) PVC pipe was buried in the trench; this pipe was later used as a sleeve for the ISCO sequential water sampler tubing (see below).

In addition, over each stilling well, a 6' x 6' walk-in, weather-proof instrument shelter with lockable door was constructed, using either 6" X 6" pressure-treated timbers as pilings (PINE and STAN) or a 4" thick concrete pad on gravel as a foundation (at PAIN). Shelters were built in the shop and carried to each site as separate wall sections. Each shelter was later roofed and sided using fiberglass shingles. Plywood shelves inside the shelter were designed to hold the recording and sampling equipment. Each stream gage was equipped with a Stevens Type A analog stage recorder (1:1 ratio, English scale), including a battery-powered quartz timer to drive the chart, a 10" (dia.) float, and a lead counterweight. All three stream gages were made operational as of October 1, 1992 (the beginning of the 1993 water year). In addition, each instrument shelter housed either one or two ISCO Model 2900 portable sequential water samplers which were pre-programmed to automatically sample the stream at a specified frequency. A resistance-type liquid level sampler actuator (ISCO Model 1640) was later mounted onto an adjustable rod that was attached to a mounting bracket inside each stilling well.

A non-recording stream gage (i.e., a staff gage) was fabricated by screwing a 3-ft porcelain-enamel steel staff plate (English units) onto an appropriate length of timber; the staff gage was then secured to steel brackets that had previously been bolted onto either a large boulder overhanging the respective gage pool or to exposed bedrock in the bottom of the gage pool.

Field sampling—stream discharge

Each stream gage/instrument shelter was visited at least weekly during the three-year project. On each visit, the time, date and gage height on the staff were recorded and these readings were verified against the stage recorder; any deviations of the recorder from the staff gage reading were noted and corrected accordingly. The recorder was checked thoroughly on each visit to insure that it was working properly. This normally required replacing batteries, the pen, or slightly adjusting the pulley on the recorder. Little stage data was actually lost during the entire project until a catastrophic flood totally destroyed the STAN gage/instrument shelter on June 27, 1995. This event was later shown to be initiated by approximately 600 mm of rainfall

during a six-hour period, producing a peak discharge in the Rapidan River (RAPR) at Ruckersville (Virginia) of $10.2 \text{ m}^3 \text{ s}^{-1} \text{ km}^{-2}$, placing the storm on the envelope curve of flood discharge in the United States east of the Mississippi River (Smith *et al.*, 1996). The flood was accompanied by more than 500 landslides, debris flows, and debris avalanches in zero-order basins tributary to both STAN and RAPR (Miller *et al.*, 1995) and was among the most severe on record in the central Appalachian region (Smith *et al.*, 1996).

Field measurements of discharge at the three intensive sites were made routinely during the course of the project to derive a “rating” for each gage. These routine discharge measurements were supplemented by a group of measurements during periods of high flow and (at PAIN) by an indirect peak flow measurement based on Manning’s equation (Rantz *et al.*, 1982). A gage “rating” or “rating curve” is a mathematical relationship between discharge (Q) and gage height (G), usually of the following form:

$$Q = a(G-e)^b$$

where a, b, and e are constants which were estimated by linear regression after log-transforming the variables (Q and G). All discharge measurements were made at an appropriate channel section using a Marsh-McBirney Model 201M electromagnetic velocity meter attached to a wading rod. A tape or calibrated tag line was used to establish approximately 20-25 measurement stations across the section where the stream velocity and depth were measured; all velocity measurements were made at a point 0.6 times the depth from the free water surface. The mid-section method of the U.S. Geological Survey (Rantz *et al.*, 1982) was used to compute the discharge from the velocity measurements and cross-sectional profile of each stream.

Analog gage height records were periodically returned to the laboratory and digitized on a digitizing table using ATLAS GIS/digitizing software running under Windows on a personal computer. A computer program was used to automatically interpolate and transform (using the appropriate rating curve) the raw gage height record into a series of hourly (instantaneous) discharge values. Hourly data were digitally integrated to produce a record of mean daily, mean monthly, and mean annual discharge on a water year (October 1 - September 30) basis.

Field sampling—streamwater chemistry

Water samples (“grabs”) were obtained from each of the three intensive sites during each weekly visit; these samples were collected in 500 ml Nalgene bottles using the standard SWAS protocol (see Chapter 3) which required rinse water to meet a specified conductivity criterion. In addition, the ISCO samplers were used to obtain samples during periods when discharge became elevated due to either a major rainstorm or snowmelt event (“stormflow” periods). Initially, samplers were programmed to collect 1 L samples at an 8-hour frequency following liquid level actuation. However, later in the project, this sampler was programmed and manually-actuated to sample at an 8-hour frequency, while a second sampler was employed which was stage-actuated to sample at a 2-hour frequency. This scheme allowed samples to be collected both immediately before and during major stormflow events. All ISCO bottles were pre-cleaned using the standard SWAS technique. Once collected, all samples (both grabs and ISCOs) were returned to the laboratory for preservation, aliquotting, and chemical analysis. All samples were analyzed for pH, conductivity, ANC, Na^+ , K^+ , Ca^{2+} , Mg^{2+} , Cl^- , NO_3^- , SO_4^{2-} , and Si using standard SWAS methods (see Chapter 3). Samples with a pH less than 6 were also analyzed for two reactive (monomeric) forms of Al (exchangeable and nonexchangeable) using the pyrocatechol violet technique (see Chapter 3). Finally, concentrations of unmeasured dissociated organic acids (OA) were estimated from measured anion deficits using the technique of Eshleman and Hemond (1985).

Results

Stream gaging/annual discharge

Final rating curves for the three intensive sites were computed by linear regression after log-transforming the stage-discharge data and manually adjusting the constant e (the estimated stage at zero flow; Figure 4-1). Coefficients of determination (r^2) for two of the rating curves (PAIN and PINE) were 0.99 or greater, while the r^2 values for the two segments of the STAN rating curve were 0.84 and 1.00. These rating curves were applied to all stage data collected during the three-year project.

Discharge hydrographs were calculated using the continuous hourly flow record and the appropriate rating curve; annual discharge hydrographs (mean daily discharge) for all three water

years for the three sites were computed by integrating the hourly flow records. These data were easily aggregated into one hydrograph for each site covering the period October 1, 1992 through September 30, 1995 (except STAN for which the data are available only through mid-May, 1995 due to the catastrophic event in June, 1995). The three-year discharge record for PAIN (Figure 4-2) indicates that it is apparently the flashiest of the three watersheds, with peak flows exceeding 6-7 cms several times during the project. Three-year hydrographs for PINE (Figure 4-3) and STAN (Figure 4-4) are similar, with peak flows approaching or slightly exceeding 3 cms. Conversely, baseflow in PAIN during mid to late summer periods was found to be much lower than in PINE and STAN, indicating that PAIN has a higher stormflow:baseflow ratio than either PINE or STAN.

Annual discharge for the three water years was aggregated and normalized by dividing by the normal annual runoff estimated from long-term gaging stations either in SNP or outside the national park boundaries; the stations and their long-term annual discharge are: White Oak Run (WOR) in SNP (normal discharge = 492.3 mm/yr) and the Rapidan River near Ruckersville (RAPR; normal discharge = 468.4 mm/yr). In addition, a generalized long-term annual discharge for SNP of 523.2 mm/yr was published by Lynch (1987). Estimated long-term mean discharge for the three intensive sites were thus estimated as: PAIN (443.0 mm/yr), PINE (562.1 mm/yr), and STAN (562.1 mm/yr). Normalized annual discharge values for PAIN suggest that the 1993 water year was much wetter than normal (discharge exceeded 130% of normal), while water years 1994 and 1995 were nearly average (Figure 4-5). At PINE, both the 1993 and 1994 water years were much wetter than normal, while 1995 was about 10% wetter than normal. Annual flows at STAN indicate that all three years were extremely wet relative to normal, particularly the 1993 and 1995 water years when the normalized discharge approached 170% of normal (Figure 4-5).

Seasonal patterns of stream chemistry

Stream acid neutralizing capacity (ANC) exhibited pronounced temporal variability at all three sites over the course of the project, varying both seasonally and as a function of stormflow conditions. In PAIN, ANC always peaked during the late summer/early fall period (15-20 $\mu\text{eq/L}$) when discharge was lowest, and was typical lowest (0-5 $\mu\text{eq/L}$) during the late winter/early

spring period. However, significant depressions in ANC (5-25 $\mu\text{eq/L}$) occurred during all seasons of the year, corresponding to relatively large excursions in discharge during stormflow periods; the lowest ANC values measured in PAIN during these “episodes” ranged from -3 to -9 $\mu\text{eq/L}$, indicating the frequent occurrence of positive mineral acidity in this stream during periods of elevated discharge from rainfall or snowmelt (Figures 4-6 through 4-8). Similar seasonal patterns in ANC were also observed in STAN and PINE, with peak ranges of 100-130 $\mu\text{eq/L}$ (Figures 4-9 through 4-11) and 250-400 $\mu\text{eq/L}$ (Figures 4-12 through 4-14) late in the growing season, respectively. Observed ANC depressions in STAN were in the range of 25-75 $\mu\text{eq/L}$ with observed minimum values between 30 and 50 $\mu\text{eq/L}$ (Figures 4-9 through 4-11). In PINE, observed ANC depressions were in the range of 75-150 $\mu\text{eq/L}$ with observed minimum values slightly below 100 $\mu\text{eq/L}$ (Figures 4-12 through 4-14).

Seasonal patterns in major ion concentrations, which should correspond to the ANC patterns, were generally less obvious in the three streams. In PAIN, both NO_3^- and SO_4^{2-} concentrations were somewhat higher during the dormant period, while K^+ and Na^+ concentrations were lower; Ca^{2+} and Mg^{2+} concentrations were somewhat higher during the dormant period, with variations in these ions apparently synchronous with variations in NO_3^- . Cl^- concentrations showed no seasonal variation (Figures 4-6 through 4-8). In STAN, SO_4^{2-} concentrations exhibited the greatest seasonality, with highest concentrations during the dormant season (Figures 4-9 through 4-11). In PINE, seasonal variations were quite clear, with higher NO_3^- and SO_4^{2-} concentrations during the dormant period, and with concentrations of Ca^{2+} , Mg^{2+} , and Na^+ showing the opposite pattern (Figures 4-12 through 4-14).

Episodic patterns in stream chemistry

During the three-year project, 33 discrete storm events were sampled using our automatic streamwater sampling equipment—either manually- or stage-activated. Since not all 33 storm events occurred at all three sites (and produced a stormflow response) and because some events were not sampled at some sites due to equipment malfunction, only 53 stream-event pairs (“episodes”) were sampled over the course of the project (Table 4-1). In addition, three episodes shown in Table 4-1—while sampled—could not be interpreted since they did not meet two data quality criteria: (1) antecedent samples could be used to estimate baseflow composition

and (2) a sufficiently complete chemograph of ANC ensured that the point of minimum ANC had been sampled. For this reason, episodes in STAN beginning on November 12, 1992 and on June 7, 1993 and an episode in PINE beginning on November 12, 1993 were considered incomplete and were not subjected to additional analysis. Therefore, after eliminating these three episodes, the following episodes were properly sampled in the three streams: 11 in PAIN, 23 in STAN, and 16 in PINE (Table 4-1). In this section, the results of our study of episodic changes in streamwater chemistry are presented.

For each stream-episode pair, the change in acid-base chemical composition was evaluated using the streamwater composition immediately before the event (at antecedent baseflow conditions) and at the time of minimum ANC (usually near the time of peak discharge). These two samples were selected and defined in order to evaluate the maximum changes in acid-base composition during each episode; the chemical composition of the pre-event sample was designated using the subscript “pre” (e.g., ANC_{pre} , $[\text{NO}_3^-]_{\text{pre}}$, etc.), while the composition of the sample taken during the condition of minimum ANC was designated using the subscript “min” (e.g., ANC_{min} , $[\text{NO}_3^-]_{\text{min}}$, etc.). Maximum temporal changes in composition (e.g., ΔANC ,

$\Delta[\text{NO}_3^-]$, etc.) were then calculated for ANC and for all major ions for each episode by subtracting the pre-event concentrations from the concentration measured on the sample with the minimum ANC (Table 4-2). Since ANC can also be expressed as the difference between the sum of base cations (SBC) less the sum of acid anions (SAA) when measured in equivalent units, the change in SAA (ΔSAA) less the change in SBC (ΔSBC) must equal the change in ANC (ΔANC) to maintain electroneutrality (Eshleman and Hemond, 1985). Therefore, deviations in this difference from zero were assumed to be attributable to changes in concentrations of unmeasured dissociated OA which were computed by difference.

Paine Run (PAIN)

Episodic changes in streamwater ANC and pH in PAIN were rather consistent during the project. Despite a very large range in discharge (measured as a *change* in flow) among the episodes, all 11 produced similar changes in ANC (range of -3.2 to -20.7 $\mu\text{eq/L}$) and pH (-0.1 to -0.9 units). Ion concentration changes—particularly for NO_3^- and base cations—were highly variable, however. All base cations except Na^+ exhibited increasing concentrations during the sampled episodes; similarly, NO_3^- and SO_4^{2-} concentration changes were positive during most of

the episodes, while Cl⁻ concentration responses were mixed. OA concentrations, computed from anion deficits, increased during 10 of the 11 episodes, although the magnitude of these changes was typically less than about 10 µeq/L. Overall, the computed values of ΔSAA and ΔSBC were nearly equal in PAIN, with values of SAA changes slightly greater than SBC changes for 6 of the 11 episodes and SBC changes slightly greater than SAA changes for the remaining 5 episodes. The largest ANC and pH depressions were measured during the fall of 1993 and during the late summer of 1994 (Table 4-2).

Chemical concentration data collected during the months of March and April of 1993, a period that included one of the highest discharges measured during the project and a major snowmelt event following the “Blizzard of 1993”, are representative of typical episodes in PAIN (Figure 4-15). Unfortunately, no Al data were available for this period of the study. Beginning on March 4th, an episode associated with a major rainstorm event caused the ANC in PAIN to drop to nearly -10 µeq/L as discharge increased to nearly 600 cfs and remained depressed below normal antecedent levels for another three days. NO₃⁻ and SO₄²⁻ concentrations both rose dramatically, as did concentrations of Ca²⁺, Mg²⁺, and K⁺; Na⁺ and Cl⁻ concentrations were diluted.

From March 12-15, as much as 60” of snow fell on the eastern United States, with the largest amounts falling in mountainous sections of North Carolina, West Virginia, Maryland, Pennsylvania and New York (National Climatic Data Center, 1993); subsequently, in late March-early April, many streams and rivers draining this region experienced some of the highest sustained flows on record (Dow *et al.*, 1994). At Big Meadows in Shenandoah National Park, 17” of snowfall was recorded on March 13-14 as part of the “Blizzard of ‘93”, which was followed by significant rainfall on March 17-18, March 21, March 24, and March 28-30; the combined rain-on-snow melting event produced a three-week long episode during the period March 17-April 6. While our automated samplers were not activated during the melt, grab samples were collected on March 17, March 19, March 23, March 24, March 30, and April 6. Beginning on March 17, ANC became depressed to values slightly below zero and appears to have remained depressed for nearly the entire three-week episode. As in the earlier March event, NO₃⁻ and SO₄²⁻ concentrations both rose during the episode, with the NO₃⁻ increase more dramatic (Figure 4-15); all other ions responded similarly to the first March episode.

Finally, on April 16, another episode was initiated by rainfall, causing a chemical response quite similar—but lesser in magnitude—to the first March episode. During this event, ANC remained depressed for a very short duration—about two days.

Staunton River (STAN)

Episodic changes in streamwater ANC and pH in STAN were more variable than in PAIN, despite the fact that the range in discharge changes was more than one order of magnitude smaller. Among the 23 episodes listed in Table 4-2, the overall range in Δ ANC and Δ pH were -2.4 to -68.1 μ eq/L and 0.0 to -0.5 units, respectively. Ion changes were less variable than in PAIN for NO_3^- and base cations, but more variable for SO_4^{2-} . For the base cations, K^+ concentrations increased during 21 of the episodes, while Ca^{2+} and Mg^{2+} concentrations increased during 17 episodes; Na^+ was diluted during all but three of the episodes. For the acid anions, SO_4^{2-} increased during 20 episodes, NO_3^- increased during 12 episodes, and Cl^- was diluted during all but 5 episodes. Computed OA concentrations increased during all but one of the episodes sampled and the range was very large (0.0 to 64.0 μ eq/L). The largest depressions in ANC and pH were measured during the fall of 1993 (Table 4-2).

The chemical patterns observed in STAN during the March-April, 1993 period were similar to those observed in PAIN, despite the fact that the discharge during the early March rainstorm was much lower. As in PAIN, SO_4^{2-} , NO_3^- , Ca^{2+} , Mg^{2+} , and K^+ concentrations increased during all episodes during this period, while ANC, Cl^- , and Na^+ concentrations decreased (Figure 4-16).

Piney River (PINE)

Episodic changes in streamwater chemical composition in PINE were also quite variable. The ranges in Δ ANC and Δ pH were -9.2 to -163.2 μ eq/L and 0.0 to -0.8 units, respectively. Unlike PAIN and STAN, base cation concentrations were typically diluted at PINE, with 12 of the 15 events showing negative values of Δ SBC; conversely, Δ SAA was positive for 12 of the 15 events, with SO_4^{2-} and NO_3^- typically increasing and Cl^- typically decreasing. Changes in OA concentrations were typically positive and highly variable also. The largest depression in ANC was measured during the fall of 1993, while the largest depression in pH was measured during late spring of 1994 (Table 4-2).

Similar chemical patterns were observed in PINE during the March-April, 1993 period as in PAIN and STAN. As in PAIN and STAN, SO_4^{2-} , NO_3^- , Ca^{2+} , Mg^{2+} , and K^+ concentrations

increased during all episodes during this period, while ANC, Cl^- , and Na^+ concentrations decreased (Figure 4-17). The increases in Ca^{2+} and Mg^{2+} concentrations in PINE during this period were atypical, however, since it was more common for these ion concentrations to decrease during episodes sampled throughout the project (Table 4-2).

Partitioning of ΔANC : mechanisms of episodic acidification

The relative contribution of each ion to ANC depressions during the sampled episodes was determined using the method of Molot *et al.* (1989) which allows a quantitative assessment of the relative contribution of each ion by normalizing the change in ion concentration by the overall ΔANC during a specific episode (Table 4-2); relative contribution values were computed for all ions for all episodes. Because of the electroneutrality constraint (ignoring changes in Al concentrations), the sum of the cation change values less the sum of the anion change values must equal 1.00 (i.e., $\Delta\text{Ca}^{2+}/\Delta\text{ANC} + \Delta\text{Mg}^{2+}/\Delta\text{ANC} + \Delta\text{K}^+/\Delta\text{ANC} + \Delta\text{Na}^+/\Delta\text{ANC} + \Delta\text{NH}_4^+/\Delta\text{ANC} - \Delta\text{SO}_4^{2-}/\Delta\text{ANC} - \Delta\text{NO}_3^-/\Delta\text{ANC} - \Delta\text{Cl}^-/\Delta\text{ANC} - \Delta\text{OA}/\Delta\text{ANC} = 1.00$).

For comparative purposes, the absolute changes in ion concentrations and relative contribution values for the sampled episodes were summarized as box and whisker plots (Figures 4-18 and 4-19). Figure 4-18 clearly illustrates several of the patterns discussed in the preceding section, including the high variability of some of the ion changes. Relative ion contribution ratios displayed as box and whisker plots (Figure 4-19) clearly suggest that increases in nitric and sulfuric acid were the primary cause of ANC depression in PAIN, with organic acid increases playing a secondary role. Base cations tended to compensate for most of the increases in acid concentration. In STAN, increases in sulfuric and organic acids were the primary cause of ANC depression, with base cation increases compensating to a large degree; nitric acid increases were of secondary importance in STAN. In PINE, sulfuric and organic acid increases and base cation dilution were the primary causes of ANC depression, with nitric acid increases playing a secondary role (Figure 4-19).

Relationships between ΔANC , $\text{ANC}_{\min}$, pre-event ANC, and hydroclimatological variables

Consistent with other hydrological studies of episodic acidification (e.g., Eshleman, 1988; Eshleman *et al.*, 1995), the technique of chemical hydrograph separation was used to interpret

differences in runoff contributions among the events sampled and examine the influence of hydrological phenomena on observed hydrochemical changes in the FISH streams—particularly the indicators minimum ANC and Δ ANC. Hydrochemical separations were performed using the method of Sklash *et al.* (1976) and Sklash and Farvolden (1979), which separates hydrographs into pre-event (“old”) water and event (“new”) water contributions. We used the conservative natural tracer, Cl^- , which has provided excellent separations of runoff elsewhere in Virginia (e.g., Eshleman *et al.*, 1993). A hydrograph separation computer program (written in Fortran 90 by D. Bazemore, Univ. of Virginia) performs the separations using field data and computes the total old water contribution (expressed as a percentage of the total event discharge and a new water contribution at peak discharge (also expressed as a percentage of the instantaneous discharge). Since differences in rainfall and streamflow Cl^- concentrations are needed to perform the separations, not all event hydrographs could be separated using this technique; in fact, only 20 of the 50 event-stream pairs could be separated using this technique.

To complete our analysis of hydrological control of episodic acidification, we used event precipitation and precipitation intensity data from the Big Meadows meteorological station as well as discharge data from the individual watersheds (normalized by watershed area) as variables to be examined by correlation analysis. Our goal was to determine those variables which are most strongly correlated with $\text{ANC}_{\min}$ and Δ ANC and (hopefully) build a simple, predictive statistical model of episodic acidification in SNP. The resulting correlation matrix from the analysis indicates that (1) ANC_{pre} , $\text{ANC}_{\min}$, and Δ ANC are all strongly correlated and (2) $\Delta Q_{\max}/\text{Area}$ and $\Delta Q/\text{Area}$ are strongly correlated, and (3) maximum precipitation intensity is strongly correlated with total old water, peak new water, and with event precipitation (Table 4-3).

Further examination of these statistical correlations was conducted using linear regression analysis. The goal of this analysis was to build a suitable regional model of episodic acidification of SNP streams based on data obtained from the FISH sites; specifically, we were interested in predicting $\text{ANC}_{\min}$ and Δ ANC from readily measurable variables. Consistent with previous studies of stream and lake acidification in the northeastern U.S., the results clearly demonstrated that the ANC_{pre} is the best predictor of both $\text{ANC}_{\min}$ and Δ ANC in a bivariate linear model. Linear regression results indicated that ANC_{pre} explained 90% of the total variation in $\text{ANC}_{\min}$ ($\alpha = 0.000$) and 55% of the total variation in Δ ANC ($\alpha = 0.000$). In general,

the greater the ANC_{pre} , the higher the value of ANC_{min} , but the larger the value of ΔANC (Figure 4-20). None of the other hydrometeorological variables were strongly correlated with either ANC_{min} or ΔANC , although maximum precipitation intensity explained 30% of the total variation in the percentage of new water at peak discharge (Figure 4-21).

Discussion

As in virtually all areas where it has been studied (Wigington *et al.*, 1990), episodic acidification during major hydrological events was shown to occur in Shenandoah National Park (SNP). The intensive field study of three geologically-representative SNP watersheds documented dramatic changes in ANC and major ion concentrations in each year of the three-year project. In addition, the patterns of ANC and major ion changes were generally consistent with patterns that have been observed elsewhere; in particular, the statistically-significant linear relationships among ANC_{min} , ΔANC , and ANC_{pre} noted in this study have been noted in a large number of other studies, including comparable studies conducted in the Adirondacks, Catskills, and Appalachian Plateau of western Pennsylvania (Eshleman, 1988; Eshleman, 1992).

An important distinction of the ANC changes observed in the SNP streams is the much lower “intensity” of the episodic acidification process compared with other regions. Eshleman *et al.* (1995) showed that the linear relationships among ANC_{min} , ΔANC , and ANC_{pre} (Figure 4-20) could be interpreted using a two-component mixing model and that the “intensity” of episodic acidification could be quantified by examining the coefficients obtained by regressing ANC_{min} on ANC_{pre} ; the slope (a) of the linear regression equation provides an estimate of the peak “old” water contribution to runoff and the intercept (b) divided by the term $(1 - a)$ provides an estimate of the ANC of the “new” water. In the case of the SNP streams, the slope of the regression line is 0.75—indicating that approximately 75% of the peak discharge is old water; the intercept divided by $(1 - a)$ is $-8.2 \mu eq/L$. By comparison, comparable values of “ a ” for streams in the Adirondacks and Catskills were reported as 0.40 and 0.74, respectively, while values of “ $b/1 - a$ ” were reported as -42 and $-51 \mu eq/L$, respectively (Eshleman *et al.*, 1995). These results indicate that SNP streams receive far more old water at peak discharge than the Adirondack streams and roughly the same old water as the Catskill streams; however, the ANC of the new water received by the SNP streams is far less acidic than the ANC of the new water input to both the Adirondack

and Catskill waters during runoff events. Another way of demonstrating this difference is by computing from the regression equation the value of $ANC_{pre}(X)$ given a value of $ANC_{min} = 0$ (i.e., the x-intercept). In the SNP streams, this value is about 3 $\mu\text{eq/L}$, compared to values of 63 and 18 $\mu\text{eq/L}$ for the Adirondacks and Catskills, respectively (Eshleman *et al.*, 1995). Clearly, only extremely acid-sensitive streams in SNP become acidic ($ANC < 0$) episodically, while moderately acid-sensitive systems in the Adirondacks and Catskills may do so.

While the two-component mixing analysis supports this hydrological interpretation of episodic acidification in SNP streams, the chemical hydrograph separation method using naturally-occurring Cl^- was not supportive of this conclusion. No significant correlation ($\alpha = 0.05$) was found between the peak new water percentage and either ANC_{min} or ΔANC (Table 4-3). There are several possible explanations for this lack of correlation. The most important is that Cl^- has been shown to be a reasonably good tool for quantifying direct precipitation contributions to runoff (Eshleman *et al.*, 1993), but is probably not a good tool for quantifying “new” water contributions in systems where subsurface processes are significant. Swistock *et al.* (1989) proposed that shallow soil water may make an important contribution to episodic acidification in a northern Appalachian Plateau stream in Pennsylvania, while DeWalle *et al.* (1988) used a three-component mixing model to explain chemical changes in the same system during hydrological events. We thus speculate that depressions in ANC in SNP streams are attributable both to inputs of acidic direct precipitation and to acidic subsurface water probably stored antecedently in a shallow vadose zone. This water is “new” from the perspective of the stream, however, since neither component contributes runoff prior to the onset of a precipitation event which presumably causes a relatively rapid subsurface and surface response (Bazemore *et al.*, 1994).

The causes of episodic acidification in SNP streams must be considered partly hydrological. In the least acid-sensitive of the three intensive streams—PINE, base cation dilution was a dominant contributor to ANC depressions (Figure 4-19); however, base cation increases were more the rule in the other two systems—PAIN and STAN. The most logical explanation for this behavior is that nitric acid flushing of the watersheds’ soils—attributable to defoliations by the gypsy moth larva—caused appreciable stripping of soil base cations at all sites during the project. In PAIN and STAN, this base cation stripping was large enough to

overwhelm the presumably normal dilution of base cations resulting from direct precipitation onto saturated areas. In PINE, however, this increase in base cation concentrations in the shallow soil water contribution was counteracted by the normal dilution of base cations associated with direct precipitation onto saturated areas. In addition, base cation stripping may have been more significant in STAN and PAIN since defoliation was more active in these “southern” SNP watersheds during the three-year project.

Consistent with our interpretations of the increases in nitrate concentrations in SNP streams during the late 1980’s and early 1990’s, the increases in nitric acid concentrations during the episodes were considered to be the result of gypsy moth defoliations (Eshleman *et al.*, in review); these increases contributed significantly to ANC depressions at all three sites, but were dominant in PAIN. Since no episodic data are available for these sites prior to gypsy moth defoliation, we cannot directly assess the relative contributions of nitric acid to episodic acidification during the pre-moth period. However, a statistical analysis of episodic acidification in WOR (similar geology as PAIN) during the period 1980-1993 performed by Eshleman *et al.* (1996) suggested (1) no contribution of nitric acid to Δ ANC during the pre-moth period, (2) a shift in Δ ANC corresponding to the first gypsy moth outbreak in 1990, and (3) that the Δ ANC shift could be attributable to increasing nitric acid concentrations counteracted somewhat by increasing base cation concentrations (similar to the observed chemical behavior of PAIN during the post-moth period). This analysis thus supports the interpretation that historical episodic acidification in SNP was not attributable to nitric acid pulses, but was apparently the result of sulfuric acid increases and base cation dilution. The WOR analysis also suggests that the occurrence of episodic acidification in SNP has intensified by the outbreak of gypsy moth defoliation, but it is difficult to extend this interpretation to the other two intensive sites. Nitric acid increases have been shown to be the primary cause of episodic acidification in low ANC systems in both the Adirondacks and Catskills (Eshleman, 1988; Wigington *et al.*, 1990; Schaefer *et al.*, 1990; Eshleman *et al.*, 1995).

Finally, increases in sulfate and organic anion (OA) concentrations in the SNP streams suggested significant contributions of sulfuric and natural organic acids to episodic acidification (Figures 4-19 and 4-20). The importance of sulfuric acid in episodic acidification is consistent with results from other mid-Atlantic regions (e.g., the northern Appalachian Plateau) where

sulfate sorption is a major control of baseflow sulfate concentrations and contrasts with results from regions of the northeastern U.S. where sulfate sorption is not important (e.g., Adirondacks and Catskills; Wigington *et al.*, 1993). Since the source of sulfate in SNP is atmospheric, the contribution of sulfuric acid to episodic acidification in these systems should be interpreted as an atmospheric impact. The contribution of organic substances—on the other hand—is likely due to the release of natural humic substances and has been demonstrated previously for other regions (Wigington *et al.*, 1993) where it could be quantified. Results from SNP thus confirm that episodic acidification is partially the result of natural hydrological and biogeochemical processes, but its intensity can be dramatically affected by both atmospheric acidic inputs and forest defoliation outbreaks.

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SAMPLING DATE (1ST)	PAINE RUN	PINEY RIVER	STAUNTON RIVER
NOVEMBER 2, 1992		X*	X*
NOVEMBER 12, 1992	X*	X*	X*
NOVEMBER 22, 1992	X*	X*	X*
DECEMBER 10, 1992	X*	X*	X*
MARCH 3, 1993	X*	X*	X*
APRIL 10, 1993		X*	
APRIL 16, 1993	X	X	X
JUNE 7, 1993			X
JUNE 19, 1993	X		
JUNE 29, 1993		X	X
JULY 1, 1993		X	X
JULY 19, 1993			X
JULY 26, 1993			X
AUGUST 6, 1993		X	X
SEPTEMBER 20, 1993			X
NOVEMBER 27, 1993	X	X	X
DECEMBER 4, 1993	X		X
DECEMBER 15, 1993		X	
FEBRUARY 23, 1994	X		
MARCH 27, 1994	X	X	
JUNE 12, 1994			X
JUNE 16, 1994		X	
JUNE 27, 1994			X
JUNE 30, 1994			X
JULY 6, 1994			X
JULY 15, 1994			X
JULY 27, 1994			X
AUGUST 11, 1994		X	
AUGUST 18, 1994	X	X	X
SEPTEMBER 23, 1994		X	
OCTOBER 23, 1994			X
NOVEMBER 1, 1994			X
DECEMBER 5, 1994			X

* 8-hr. ISCO sampler only

Table 4-1 The episodes sampled during the FISH Project.

Sampling date	ANC	pH	Ca	Mg	Na	K	SO4	NO3	Cl	OA	SBC	SAA	Q
PAINE RUN													
November 12, 1992	-5.0	-0.3	8.3	11.9	0.4	8.4	3.4	26.5	2.2	1.9	29.0	32.1	27.7
November 22, 1992	-9.2	-0.6	25.1	32.6	-3.2	19.8	20.8	50.9	0.6	11.2	74.3	72.3	388.7
December 10, 1992	-3.4	-0.2	3.2	5.3	-0.4	4.9	4.4	11.7	0.4	-0.1	13.0	16.5	17.8
March 3, 1993	-7.5	-0.6	18.2	24.8	-6.0	11.3	18.8	30.9	-4.0	10.1	48.3	45.7	176.6
April 15, 1993	-6.6	-0.4	4.7	10.0	-2.2	4.2	9.8	6.9	-3.1	9.7	16.7	13.5	7.3
June 19, 1993	-5.9	-0.3	5.8	5.4	-2.9	2.6	14.2	-2.1	-4.7	9.4	10.9	7.4	17.6
November 27, 1993	-20.0	-0.9	25.1	41.6	-3.9	17.7	0.6	86.2	2.7	10.9	80.4	89.5	116.3
December 4, 1993	-8.4	-0.4	4.4	7.9	-1.3	4.2	8.7	12.0	-0.4	3.4	15.3	20.3	29.1
February 23, 1994	-3.2	-0.1	0.1	1.8	-1.5	1.1	7.2	-7.5	-1.2	6.1	1.5	-1.4	24.4
March 27, 1994	-5.0	-0.2	8.0	14.1	-2.2	4.6	16.9	11.7	-1.5	2.4	24.5	27.1	65.5
August 18, 1994	-20.7	-0.9	29.2	34.2	-3.4	8.8	18.1	62.7	-1.4	10.1	68.8	79.4	64.2
STAUNTON RIVER													
November 2, 1992	-21.9	-0.5	18.6	9.1	0.4	3.5	30.4	14.0	1.8	7.3	31.6	46.2	14.6
November 22, 1992	-32.2	-0.2	17.1	9.5	-4.5	4.7	35.9	14.7	-1.1	9.5	26.8	49.5	32.7
December 10, 1992	-20.8	0.0	5.2	3.0	-1.5	1.5	18.6	7.0	-2.1	5.5	8.2	23.5	6.2
March 3, 1993	-18.4	-0.3	14.5	4.6	-12.4	2.2	14.6	10.0	-7.7	10.4	8.9	16.9	16.9
April 16, 1993	-9.0	0.0	11.7	1.7	-0.6	1.2	11.6	1.3	-0.5	10.7	14.1	12.4	4.4
June 29, 1993	-23.7	-0.1	0.3	-0.3	-9.4	2.1	5.7	2.1	-5.3	13.9	-7.3	2.5	6.1
July 1, 1993	-25.9	-0.1	9.2	2.9	-2.8	1.7	25.2	-1.4	-2.0	15.1	11.0	21.8	3.5
July 19, 1993	-29.5	-0.2	5.4	1.8	-8.6	0.5	9.1	4.0	-4.0	19.5	-0.8	9.2	1.0
July 26, 1993	-24.2	-0.3	3.8	1.4	-6.5	2.1	16.3	3.8	-3.2	8.1	0.8	16.9	4.6
August 6, 1993	-34.5	-0.2	-5.5	-2.4	-11.2	0.8	6.2	5.4	-4.9	9.6	-18.3	6.7	6.3
September 21, 1993	-19.9	-0.2	-2.7	-1.5	-8.2	1.1	6.5	-0.8	-2.6	5.4	-11.3	3.2	1.6
November 27, 1993	-68.1	-0.4	29.1	16.0	-17.8	8.7	43.8	-1.0	-3.7	64.9	35.9	39.2	31.8
December 4, 1993	-15.6	0.0	8.1	3.6	2.2	-1.7	23.9	-4.3	-0.9	9.1	12.3	18.7	8.9
June 12, 1994	-12.4	0.0	4.6	2.6	-1.8	0.9	7.4	-0.1	-1.1	12.6	6.4	6.2	8.1
June 27, 1994	-11.8	0.0	-1.8	0.8	-5.1	-0.3	-0.7	1.5	-1.7	4.7	-8.0	-0.9	2.1
June 30, 1994	-19.7	-0.2	-0.2	-1.0	-1.2	0.5	4.0	15.1	-1.2	0.0	-1.8	17.9	0.8
July 6, 1994	-34.7	0.1	-4.2	-2.9	-3.4	0.0	-0.2	21.1	1.4	1.9	-10.5	22.3	1.2
July 15, 1994	-17.5	-0.1	-0.9	-0.7	-4.9	0.5	-2.3	-2.0	-0.7	16.4	-6.1	-5.0	2.0
July 27, 1994	-31.2	-0.3	7.3	2.5	-7.3	0.4	4.8	-1.3	-3.6	34.2	2.9	-0.1	3.9
August 17, 1994	-28.3	-0.3	5.7	1.4	-12.1	2.4	16.8	-5.6	-3.7	18.2	-2.6	7.5	25.2
October 23, 1994	-2.4	0.0	5.5	2.8	0.0	7.5	1.6	0.0	3.1	13.5	15.8	4.7	1.0
November 1, 1994	-4.0	-0.1	6.6	3.8	-4.9	12.6	3.4	0.0	1.5	17.2	18.1	4.9	2.3
December 5, 1994	-10.7	-0.2	9.4	3.3	-3.1	5.8	6.7	0.0	0.2	19.2	15.4	6.9	6.1
PINEY RIVER													
November 1, 1992	-67.3	-0.1	14.4	14.7	-6.0	1.9	42.6	40.7	2.2	6.8	25.0	85.5	33.5
November 22, 1992	-24.4	-0.2	-16.9	-15.2	-9.2	1.5	-8.0	-9.3	-4.2	6.1	-39.8	-21.5	19.7
December 10, 1992	-32.5	-0.3	-5.0	-6.1	-12.4	3.1	7.8	-13.7	-8.0	26.0	-20.4	-13.9	60.3
March 3, 1993	-69.3	-0.4	28.2	18.7	-22.3	6.5	40.4	32.0	-11.4	39.4	31.1	61.0	136.1
April 9, 1993	-13.2	0.0	3.3	3.9	-2.7	-0.3	20.4	1.0	-3.6	-0.4	4.2	17.8	24.4
April 16, 1993	-18.1	0.1	-13.2	3.9	-3.5	0.5	15.9	-2.1	-1.1	-6.9	-12.4	12.7	21.9
June 29, 1993	-35.8	0.1	-7.6	-5.2	5.5	-0.2	2.7	7.7	-1.7	19.6	-7.5	8.7	1.8
July 1, 1993	-47.5	-0.1	-7.0	-8.3	-8.3	1.4	20.9	6.8	-3.1	0.6	-22.2	24.7	7.7
August 6, 1993	-91.9	-0.1	-2.4	-1.9	-12.0	1.5	24.5	37.5	-2.9	18.1	-14.7	59.1	8.8
November 27, 1993	-163.2	-0.4	-4.2	-8.6	-37.5	6.1	53.9	6.7	-14.0	72.3	-44.3	46.6	134.7
December 15, 1993	-19.1	0.0	-4.4	-2.8	-2.2	0.0	0.9	4.6	-1.9	6.1	-9.4	3.6	12.4
March 27, 1994	-9.2	0.0	2.6	-6.0	0.9	-16.5	-7.3	4.9	3.2	-10.6	-19.1	0.7	51.0
June 16, 1994	-109.1	-0.8	-29.9	-29.1	-26.1	11.5	-42.2	12.3	-7.9	73.5	-73.4	-37.8	9.9
August 11, 1994	-108.9	-0.4	-22.0	-20.3	-21.0	5.5	28.7	12.5	-5.4	15.3	-57.8	35.8	4.1
August 18, 1994	-140.3	-0.5	-13.3	-14.3	-39.0	3.3	50.4	8.0	-9.2	27.8	-63.3	49.2	29.8
September 23, 1994	-96.1	-0.2	-16.8	-11.7	-19.5	1.7	11.6	21.1	2.9	14.2	-46.3	35.6	9.3

Table 4-2 Changes in streamwater concentrations during sampled episodes

Variable 1	Variable 2 ANC _{min} (ueq/L)	ANC _{pre} (ueq/L)	Delta ANC (ueq/L)	Delta Q/Area (cm/s)	Delta Qmax/Area (cm/s)	Total Old Water (%)	Peak New Water (%)	Event Precip. (mm)	Max. Intensity (mm/day)
ANC _{pre} (ueq/L)	0.951 41 0.000								
Delta ANC (ueq/L)	-0.613 41 0.000	-0.745 41 0.000							
Delta Q/Area (cm/s)	-0.256 41 0.106	-0.155 41 0.334	0.125 41 0.435						
Delta Qmax/Area (cm/s)	-0.286 41 0.070	-0.177 41 0.269	0.113 41 0.481	0.906 41 0.000					
Total Old Water (%)	-0.149 20 0.531	-0.182 20 0.444	0.277 20 0.238	0.014 20 0.955	-0.029 20 0.905				
Peak New Water (%)	0.295 20 0.207	0.369 20 0.109	-0.358 20 0.121	0.023 20 0.925	0.185 20 0.435	-0.702 20 0.001			
Event Precip. (mm)	0.026 20 0.915	0.246 20 0.297	-0.352 20 0.128	0.355 20 0.125	0.393 20 0.087	-0.346 20 0.135	0.367 20 0.112		
Max. Intensity (mm/day)	0.029 20 0.902	0.202 20 0.393	-0.400 20 0.081	0.023 20 0.925	0.220 20 0.352	-0.456 20 0.043	0.593 20 0.006	0.565 20 0.009	

*The first line in each cell is the Pearson correlation coefficient, the second line is the sample size, and the third line is the level of significance. Shaded boxes denote correlations that are statistically significant at the 0.05 level.

Table 4-3 Correlation matrix for selected hydrochemical variables measured during the FISH project.

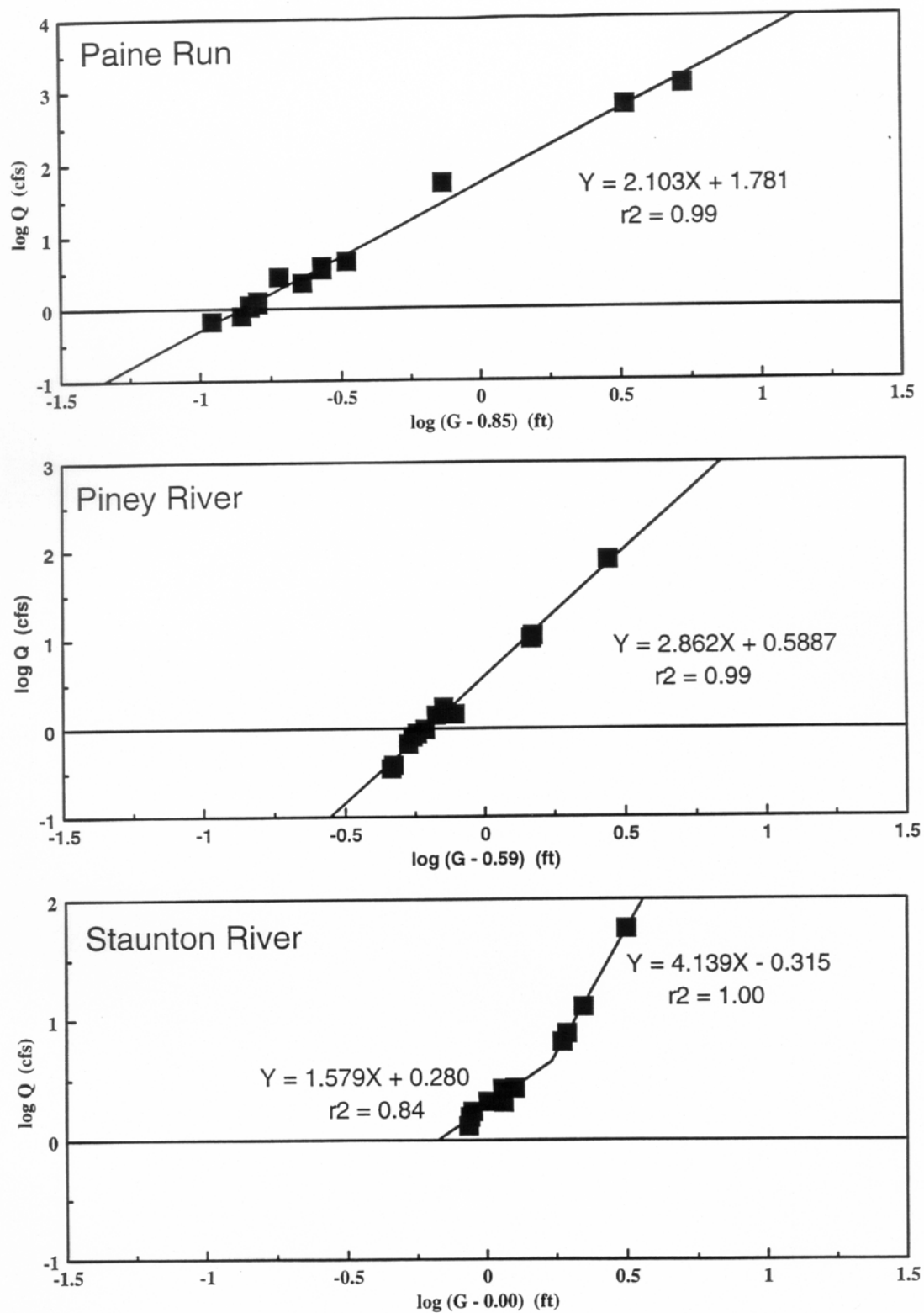


Figure 4-1. Rating curves (log discharge vs. log gage height) for the three intensive sites.

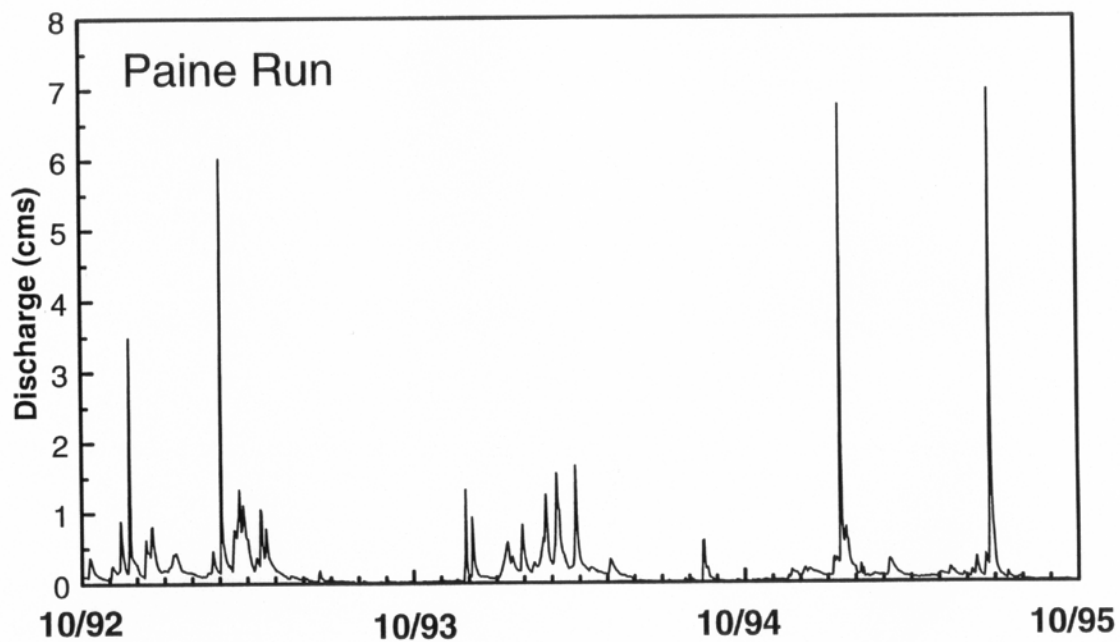


Figure 4-2. Discharge hydrograph for Paine Run for the period 10/92 - 10/95.

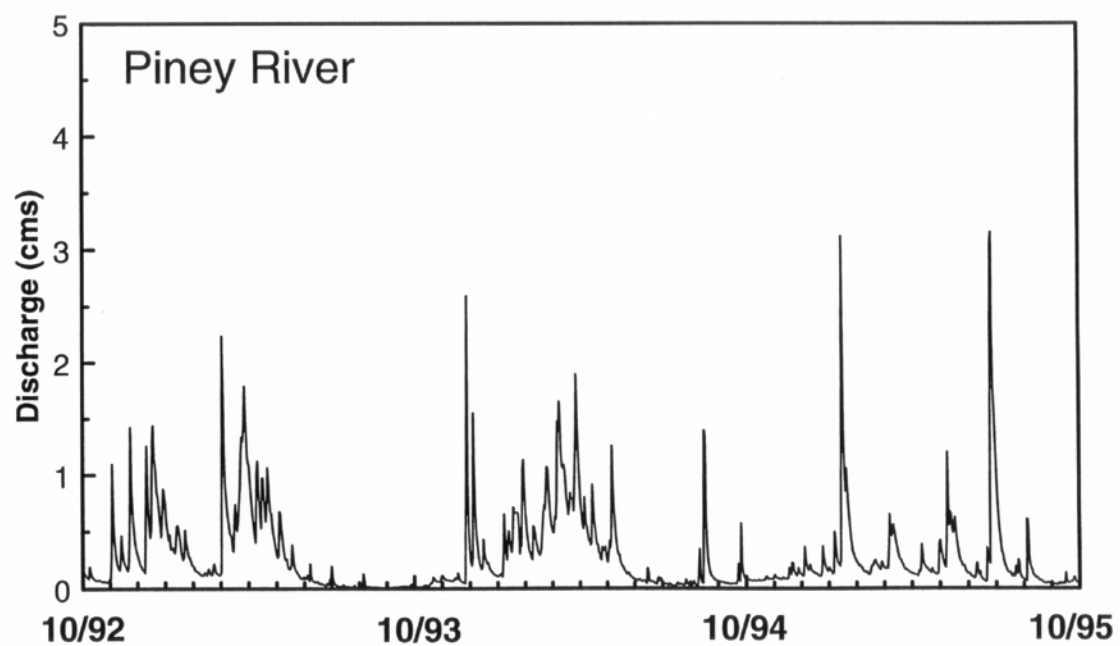


Figure 4-3. Discharge hydrograph for Piney River for the period 10/92 - 10/95.

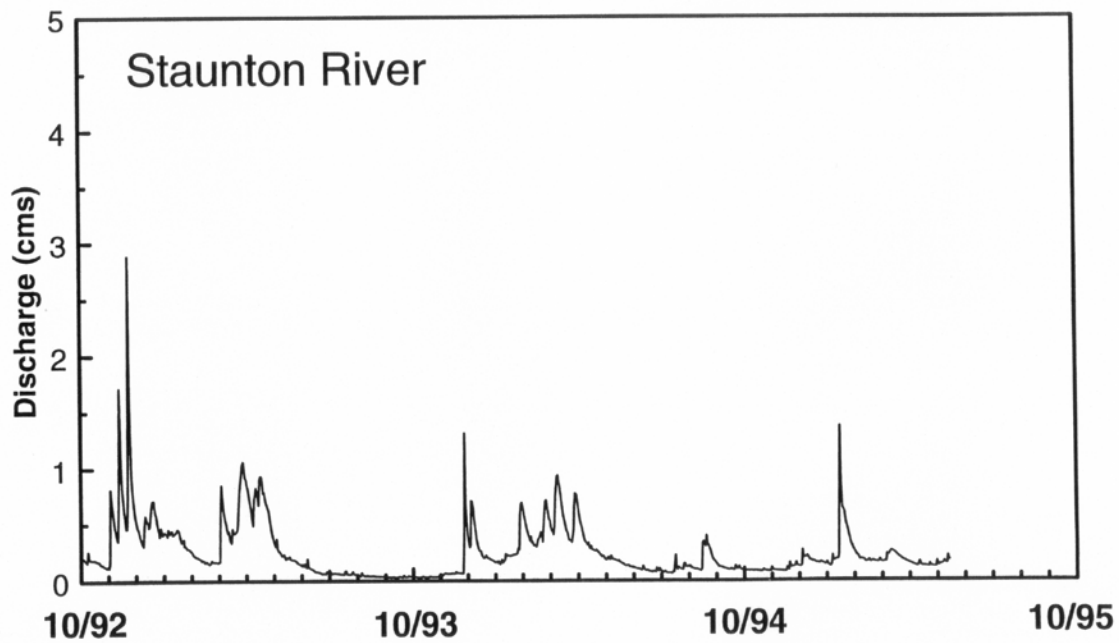


Figure 4-4. Discharge hydrograph for Staunton River for the period 10/92 - 5/95.

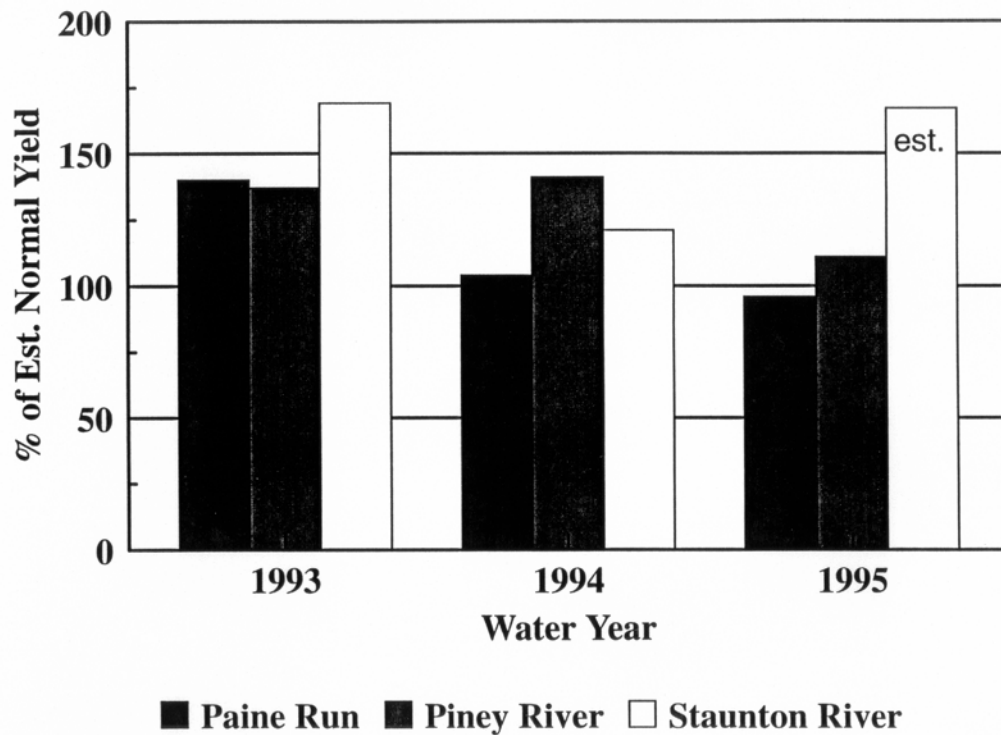


Figure 4-5. Annual water yields as a percentage of the estimated normal yield for the three sites for water years 1993-95.

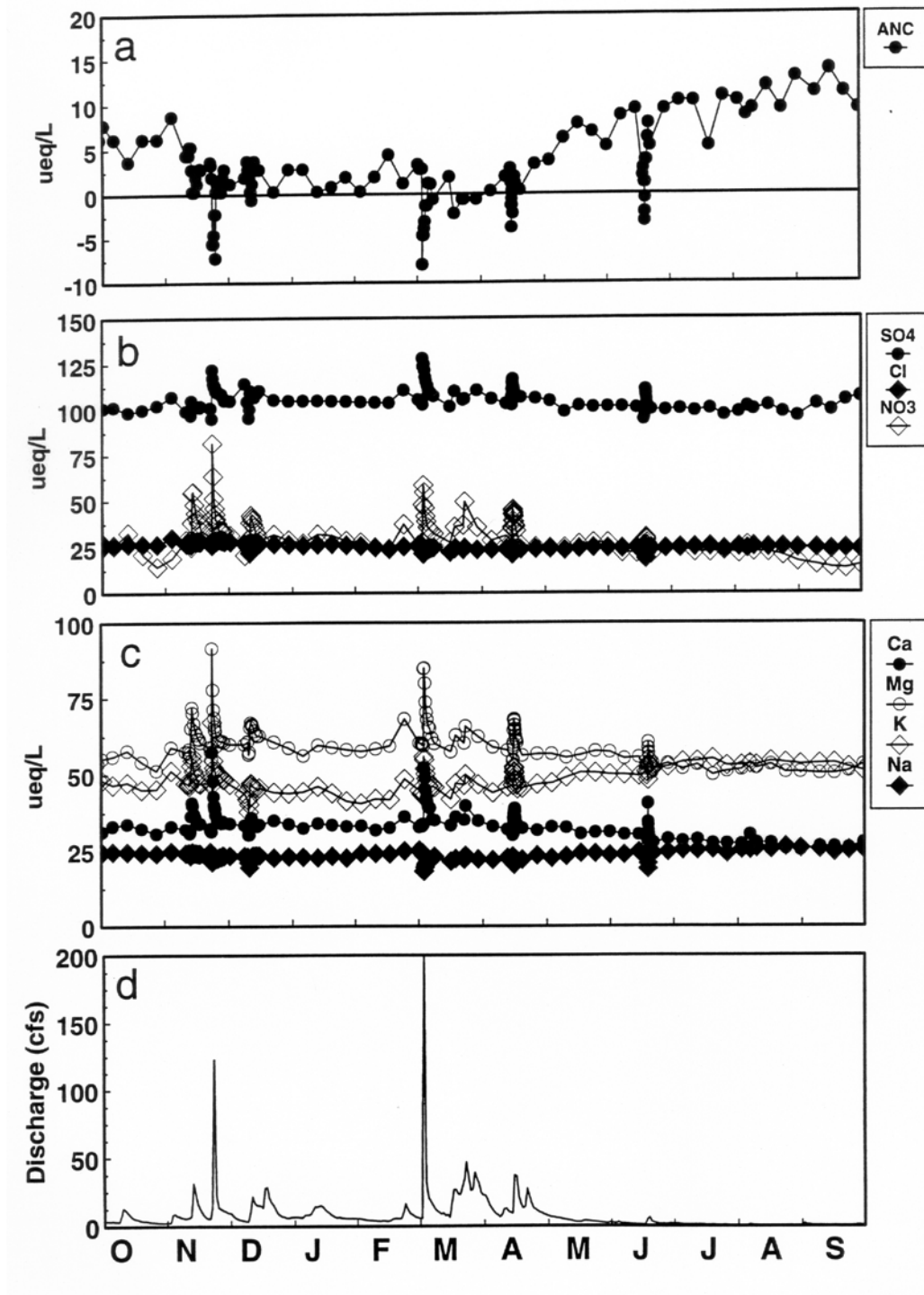


Figure 4-6. ANC, major ion concentrations, and discharge in Paine Run during the 1993 water year.

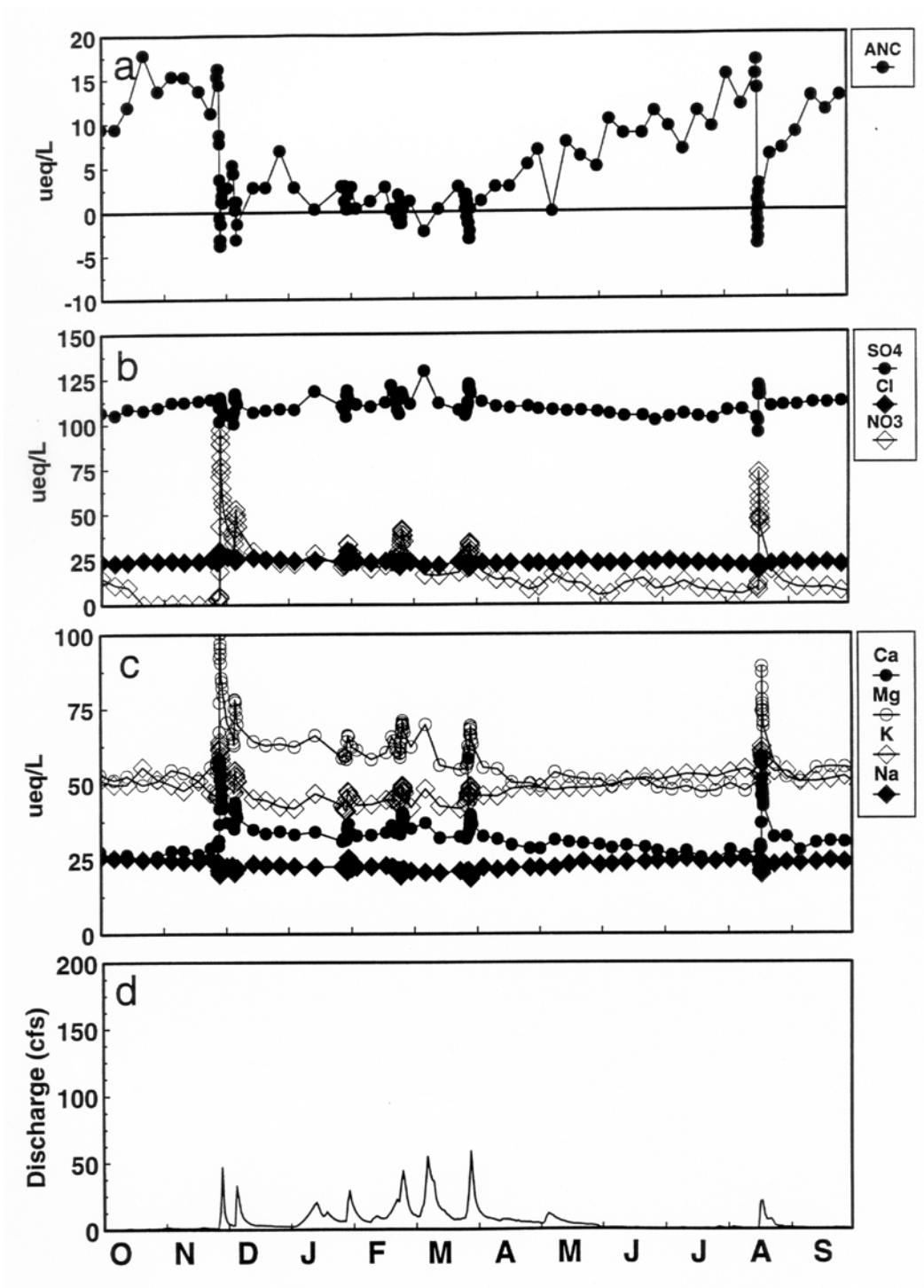


Figure 4-7. ANC, major ion concentrations, and discharge in Paine Run during the 1994 water year.

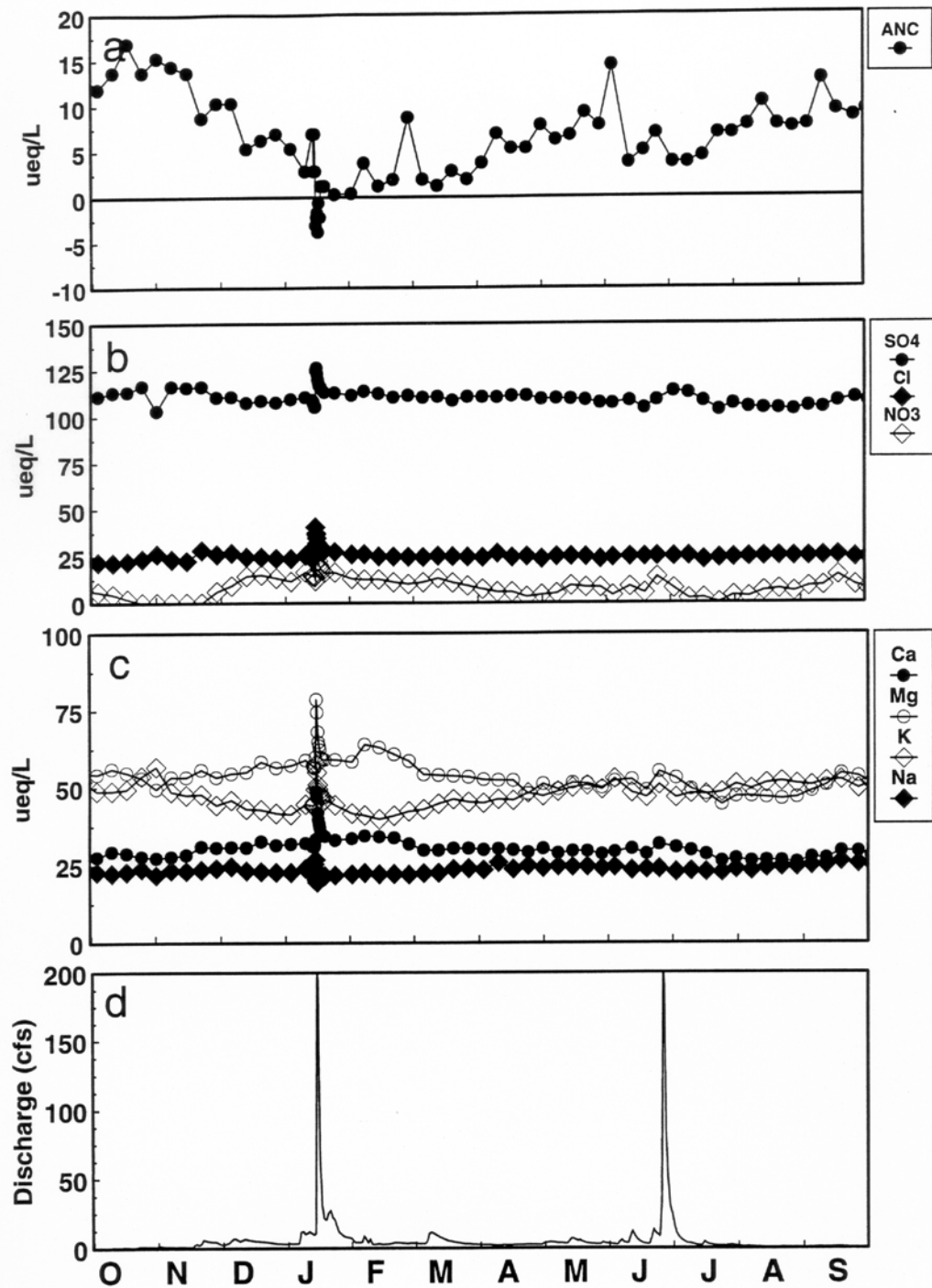


Figure 4-8. ANC, major ion concentrations, and discharge in Paine Run during the 1995 water year.

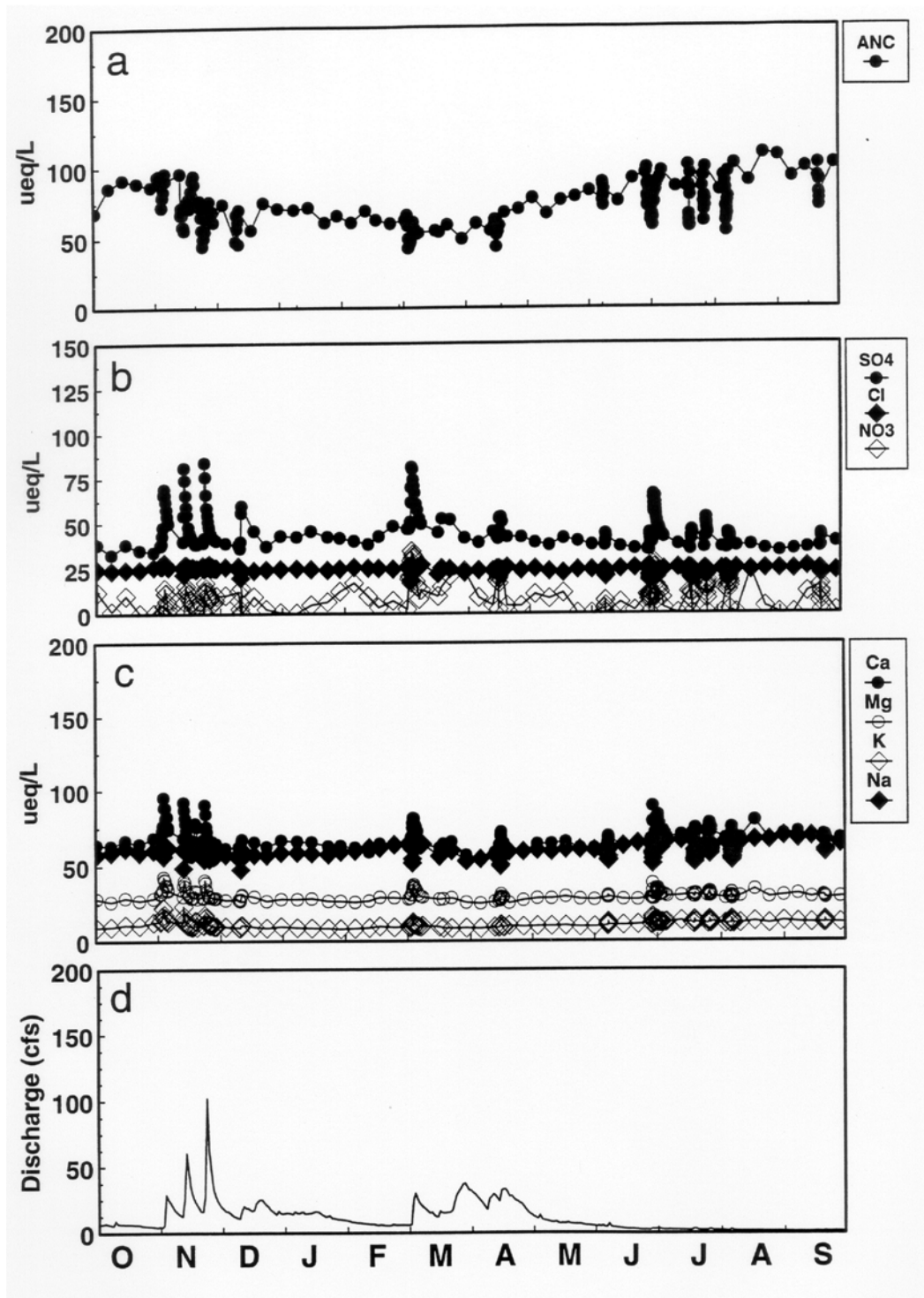


Figure 4-9. ANC, major ion concentrations, and discharge in Staunton River during the 1993 water year.

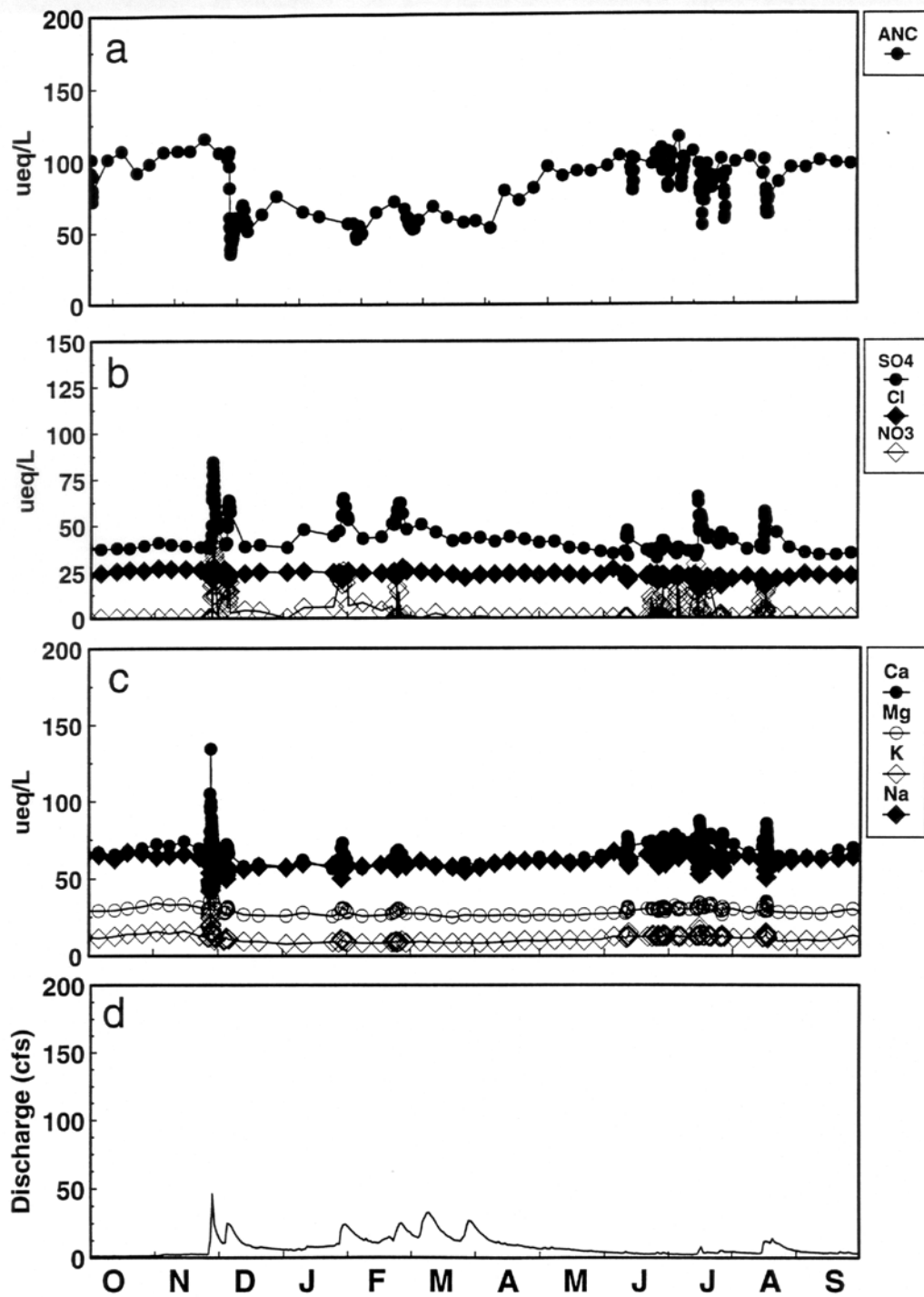


Figure 4-10. ANC, major ion concentrations, and discharge in Staunton River during the 1994 water year.

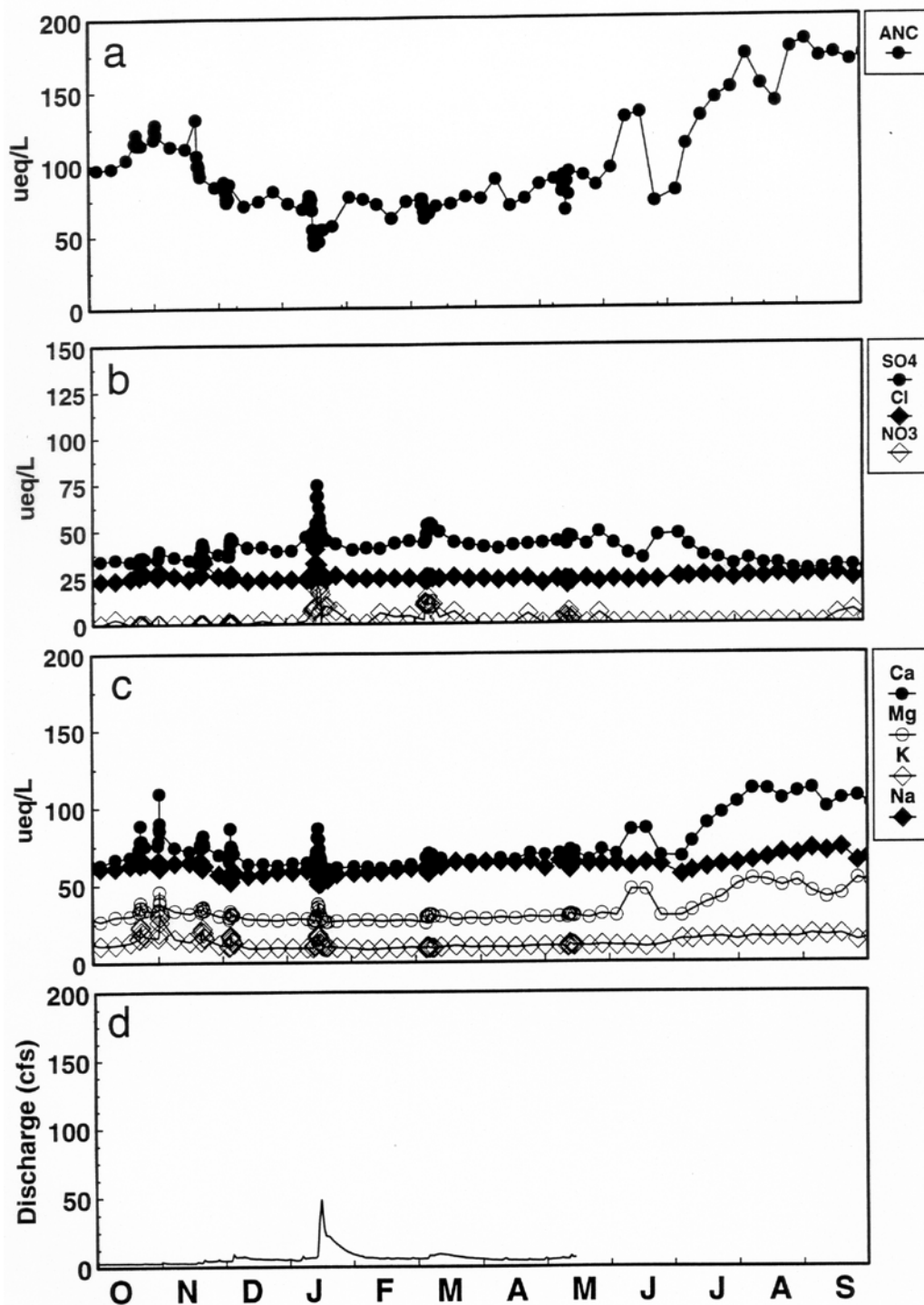


Figure 4-11. ANC, major ion concentrations, and discharge in Staunton River during the 1995 water year.

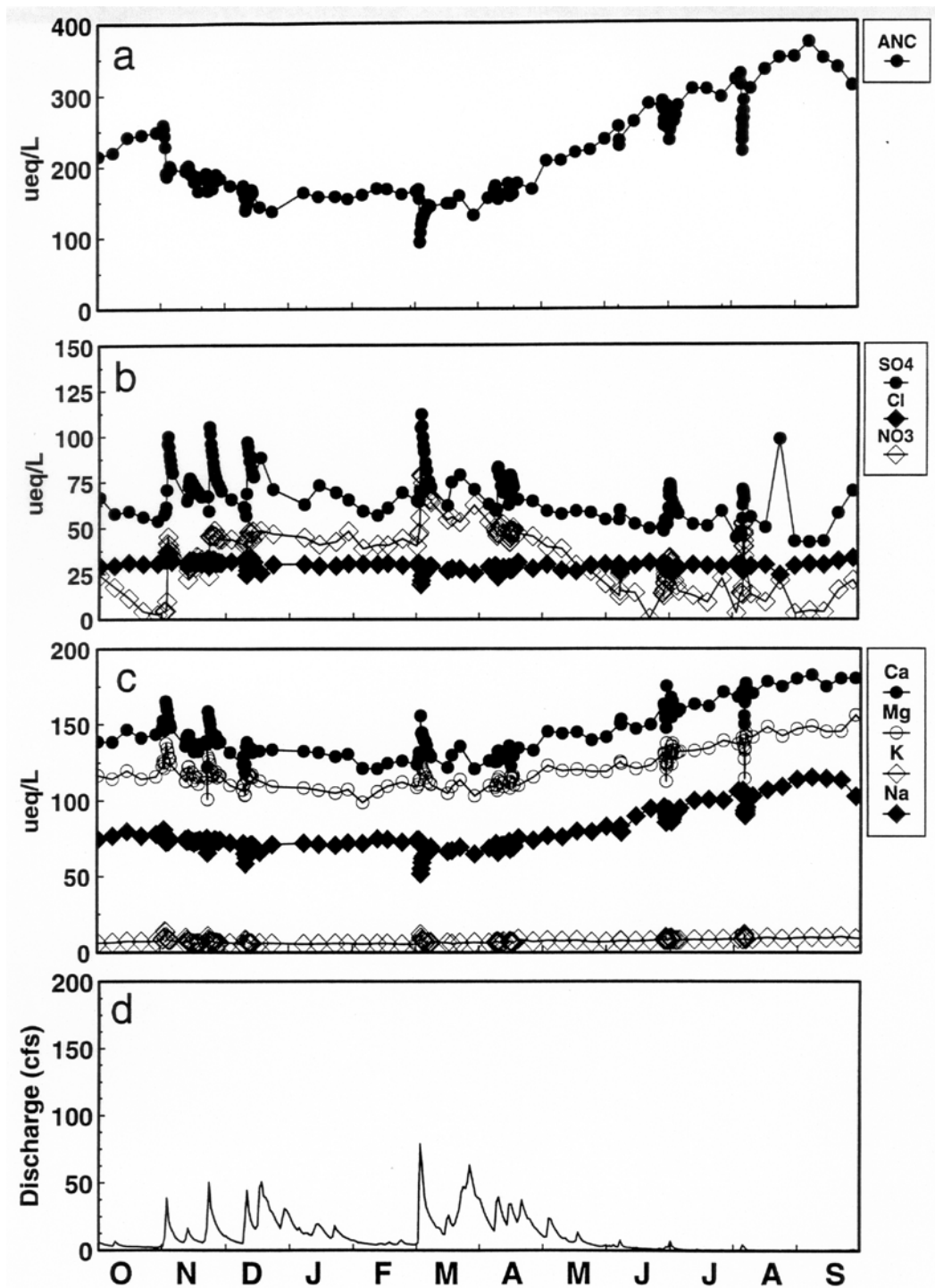


Figure 4-12. ANC, major ion concentrations, and discharge in Piney River during the 1993 water year.

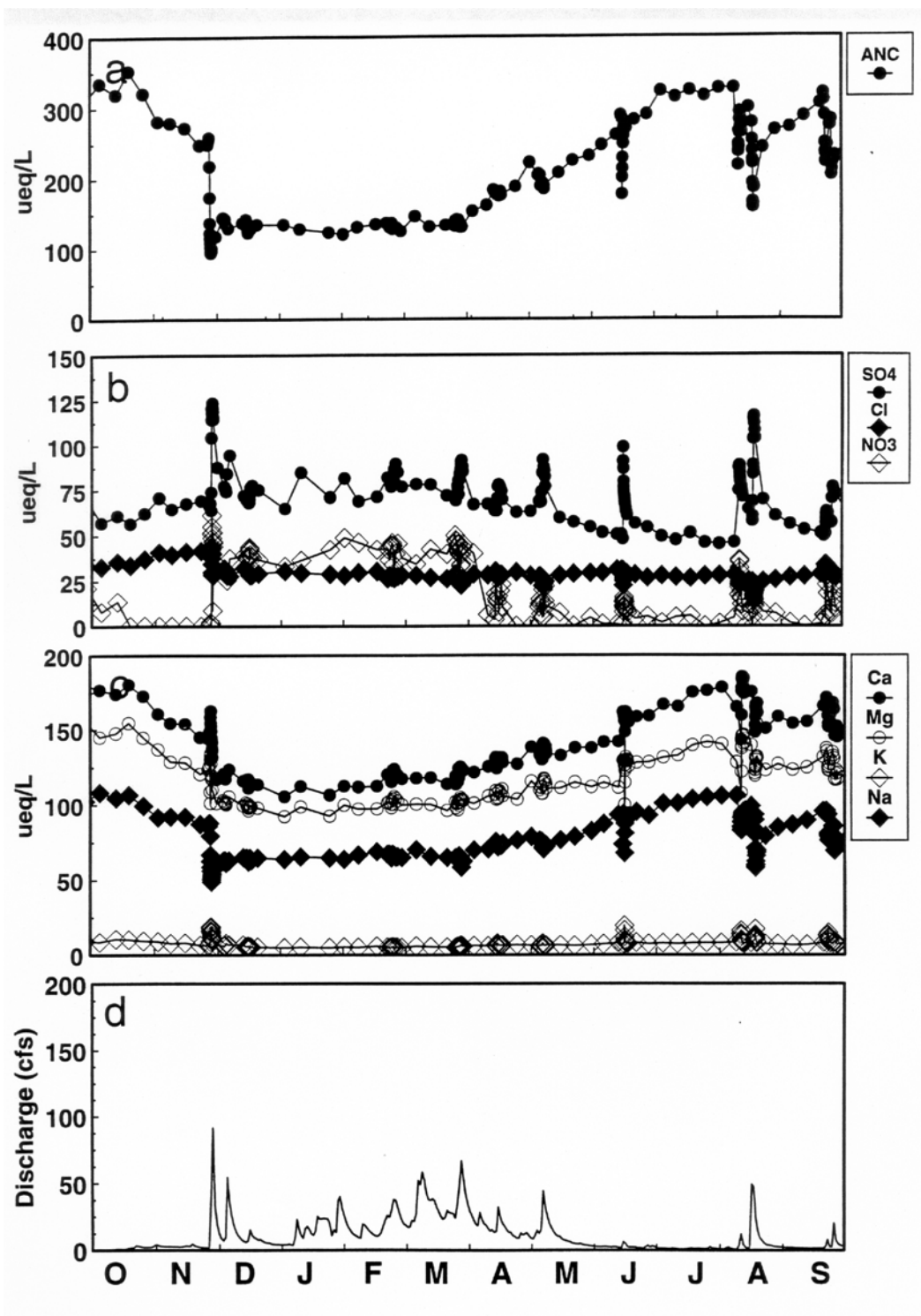


Figure 4-13. ANC, major ion concentrations, and discharge in Piney River during the 1994 water year.

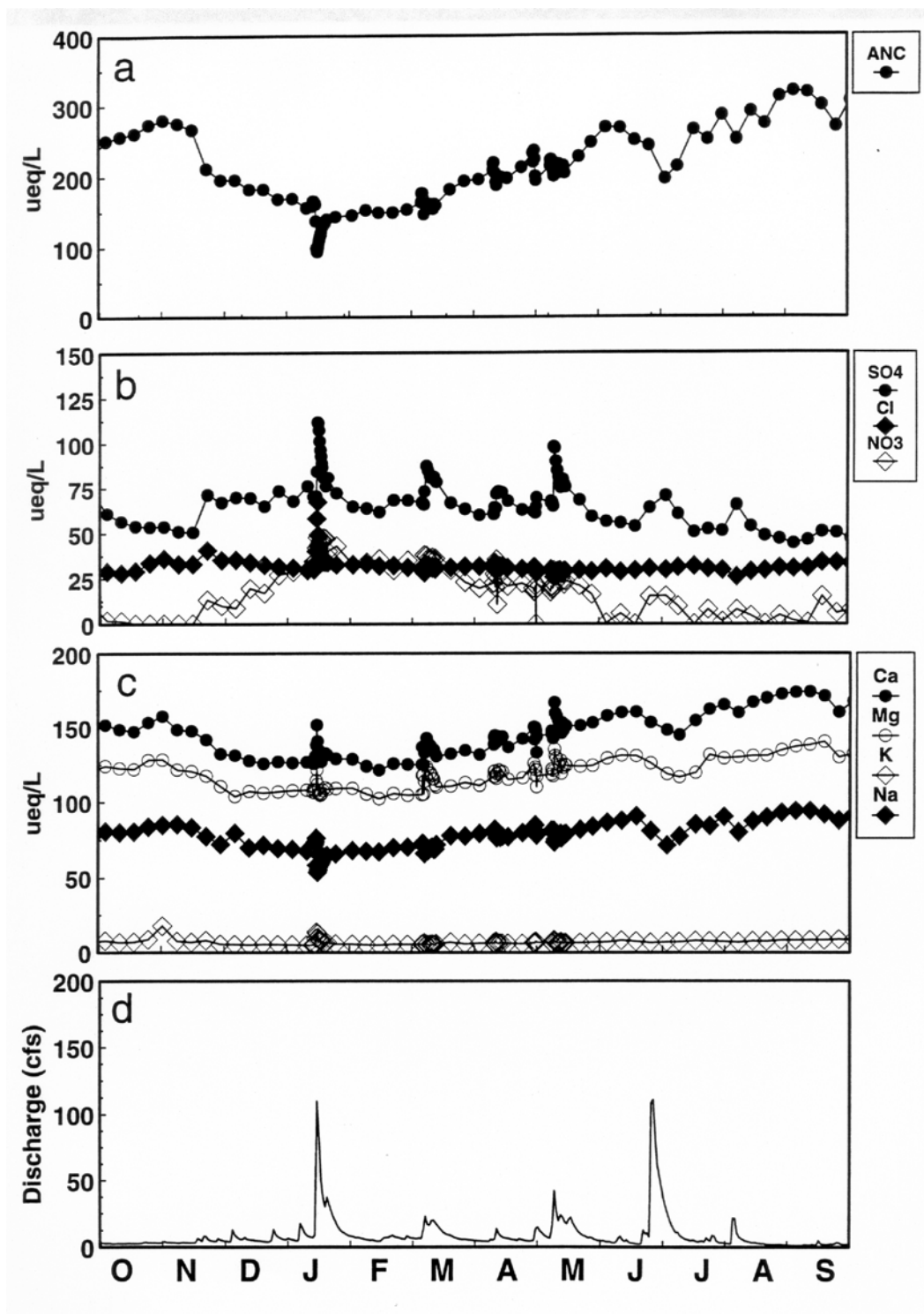


Figure 4-14. ANC, major ion concentrations, and discharge in Piney River during the 1995 water year.

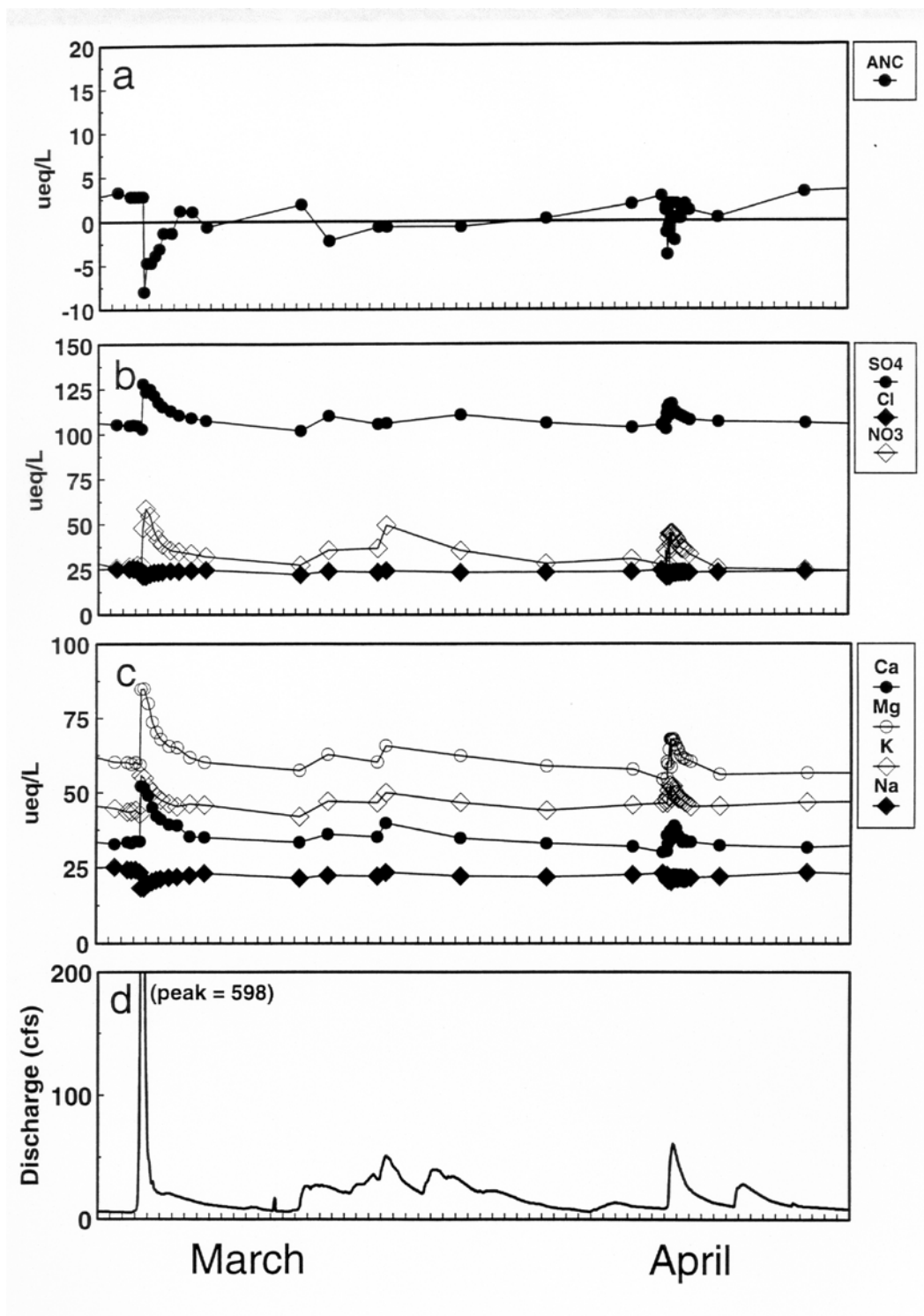


Figure 4-15. ANC, major ion concentrations, and discharge in Paine Run during the period March-April 1993.

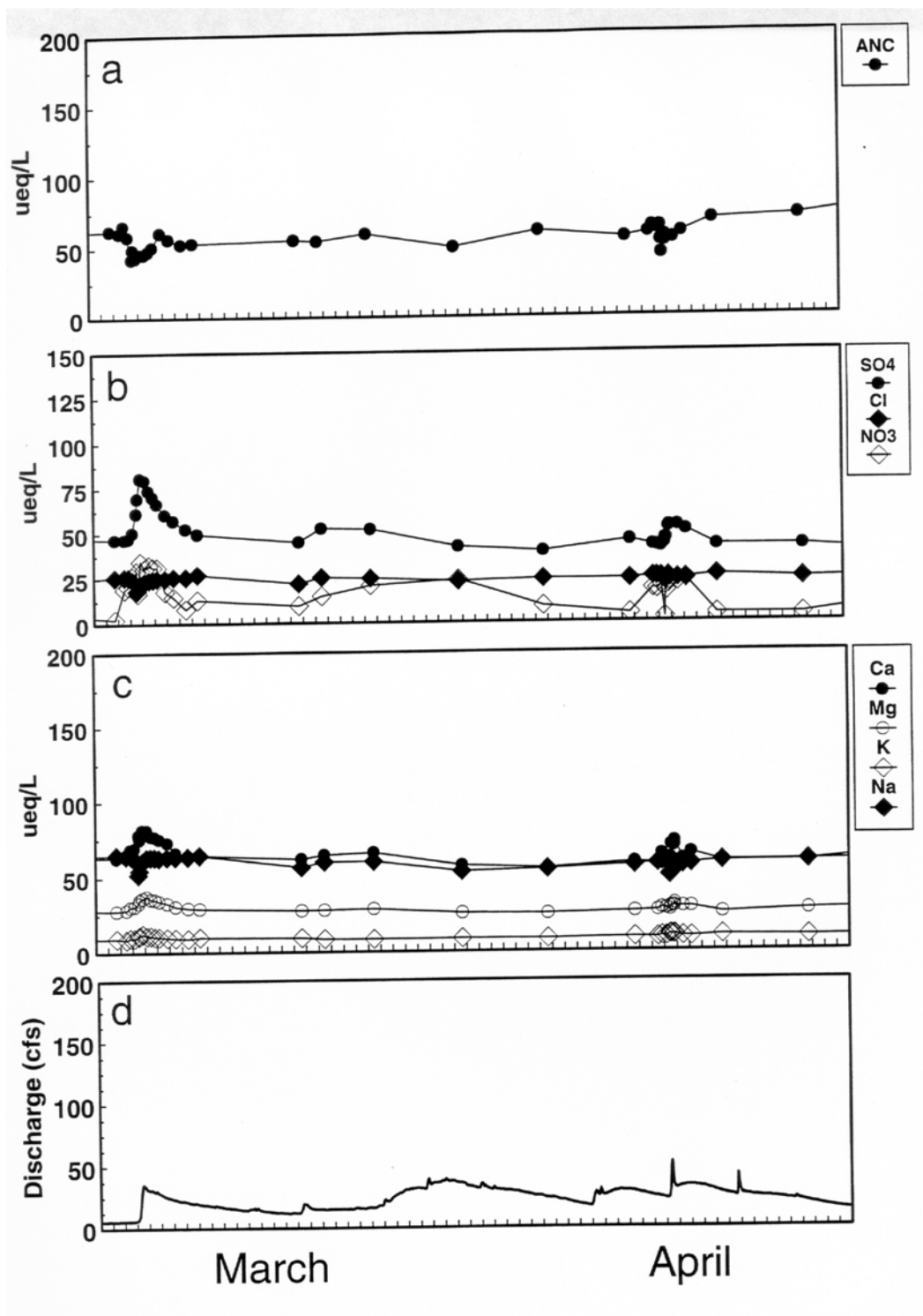


Figure 4-16. ANC, major ion concentrations, and discharge in Staunton River during the period March-April 1993.

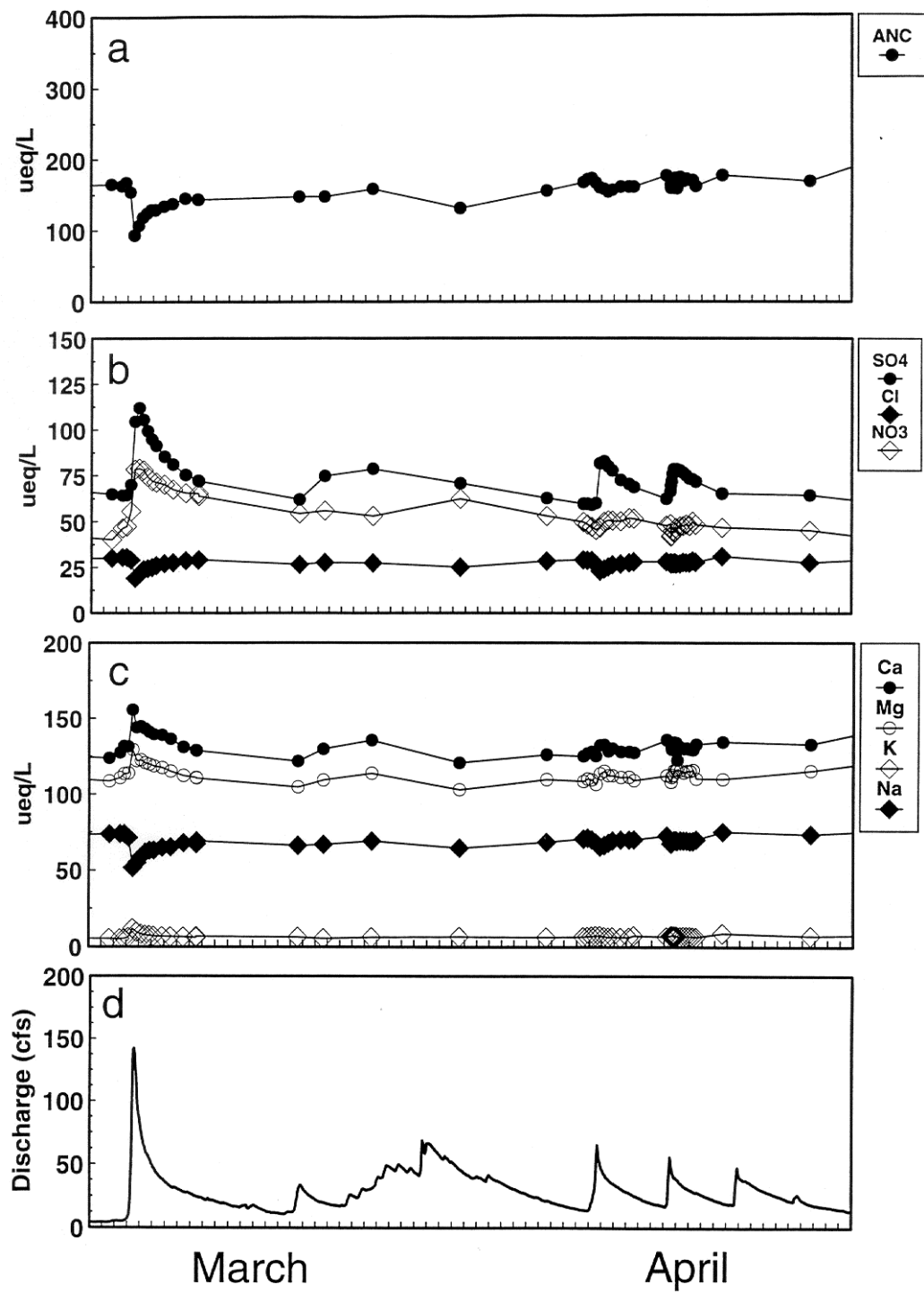


Figure 4-17. ANC, major ion concentrations, and discharge in Piney River during the period March-April 1993.

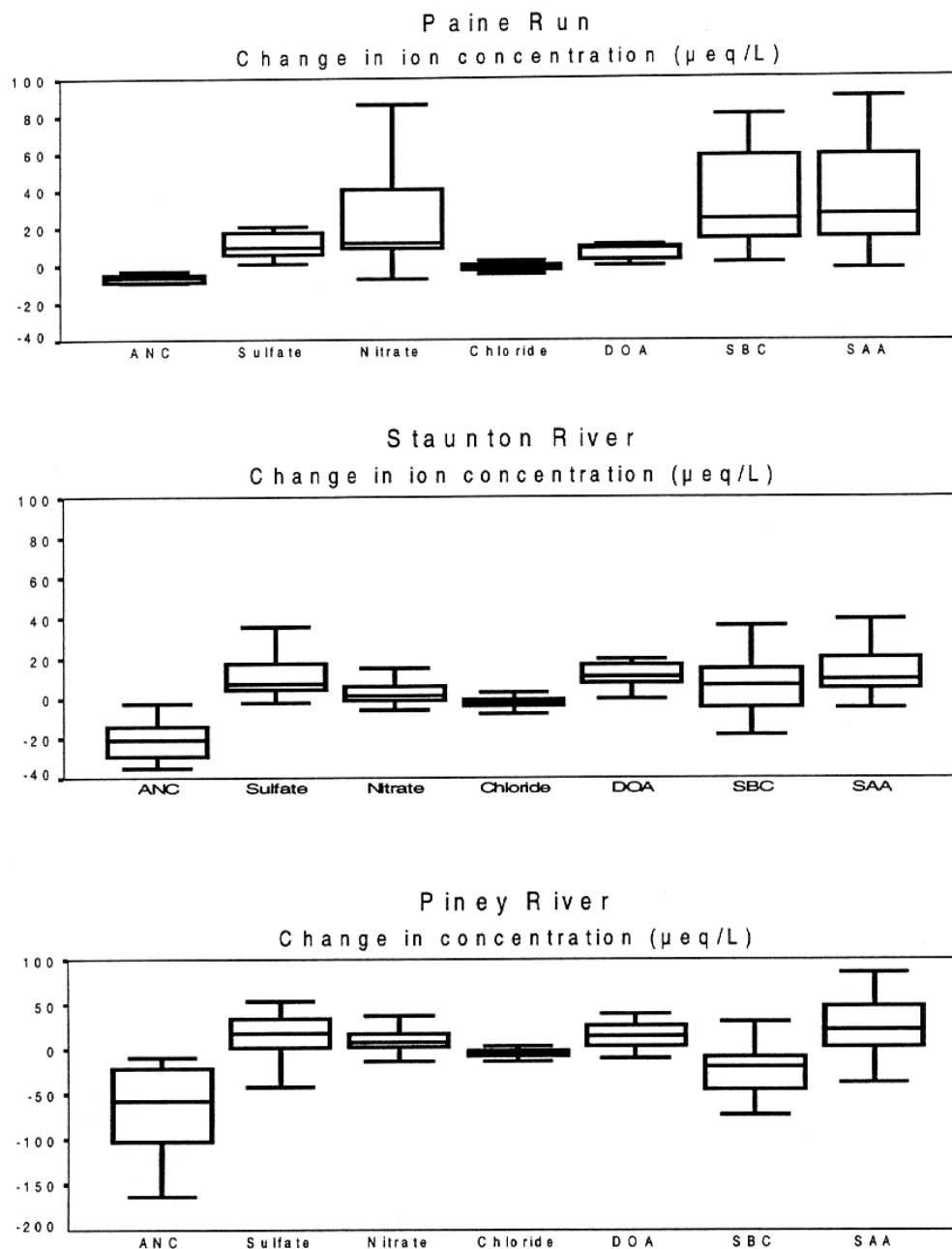


Figure 4-18. Changes in ANC and major ion concentrations during episodes at the three intensive sites represented as box-and-whisker plots.

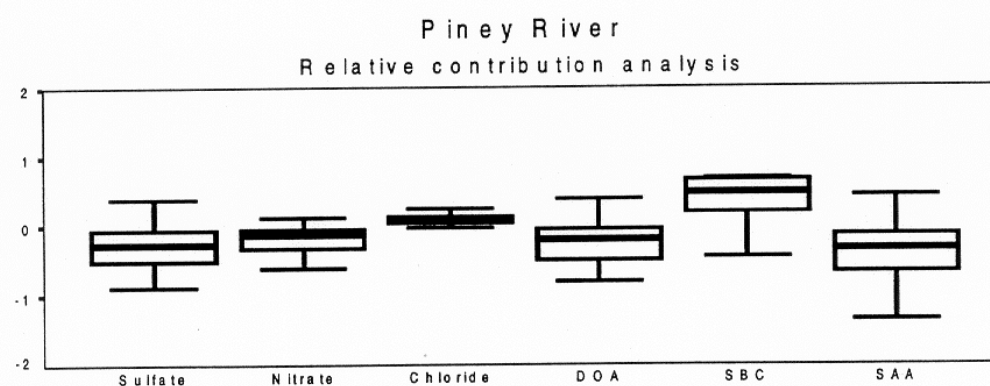
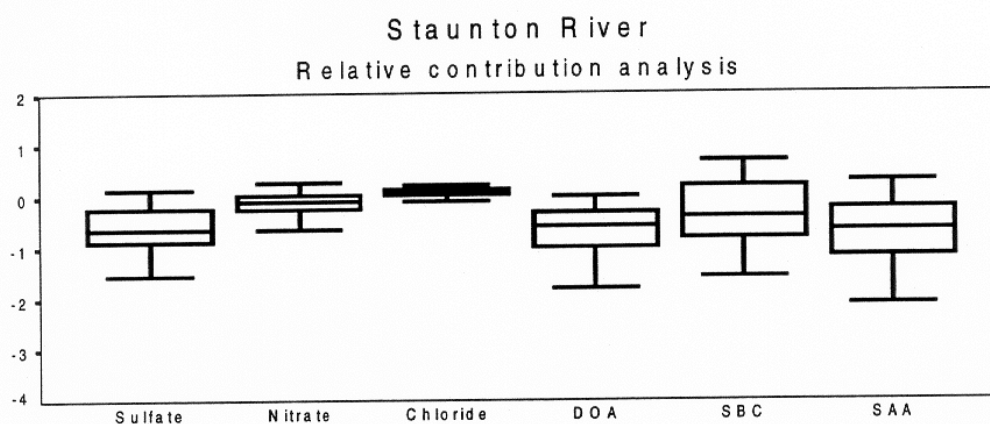
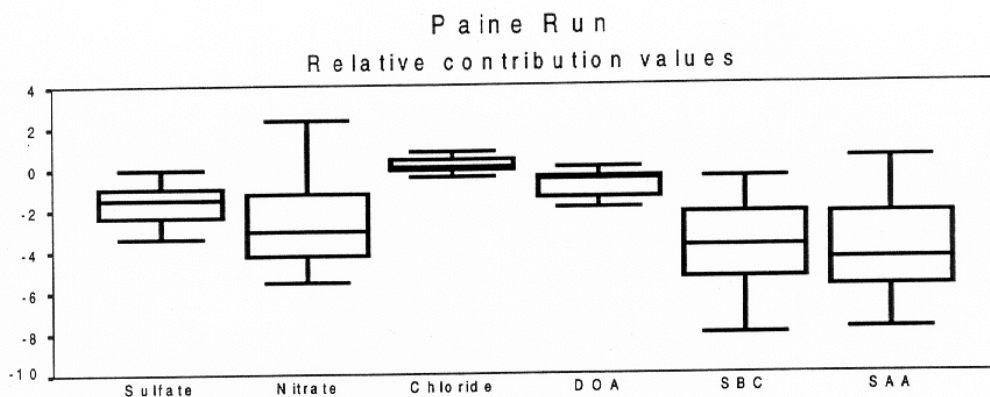


Figure 4-19. Relative contributions of ion changes to Δ ANC during episodes at the three intensive sites.

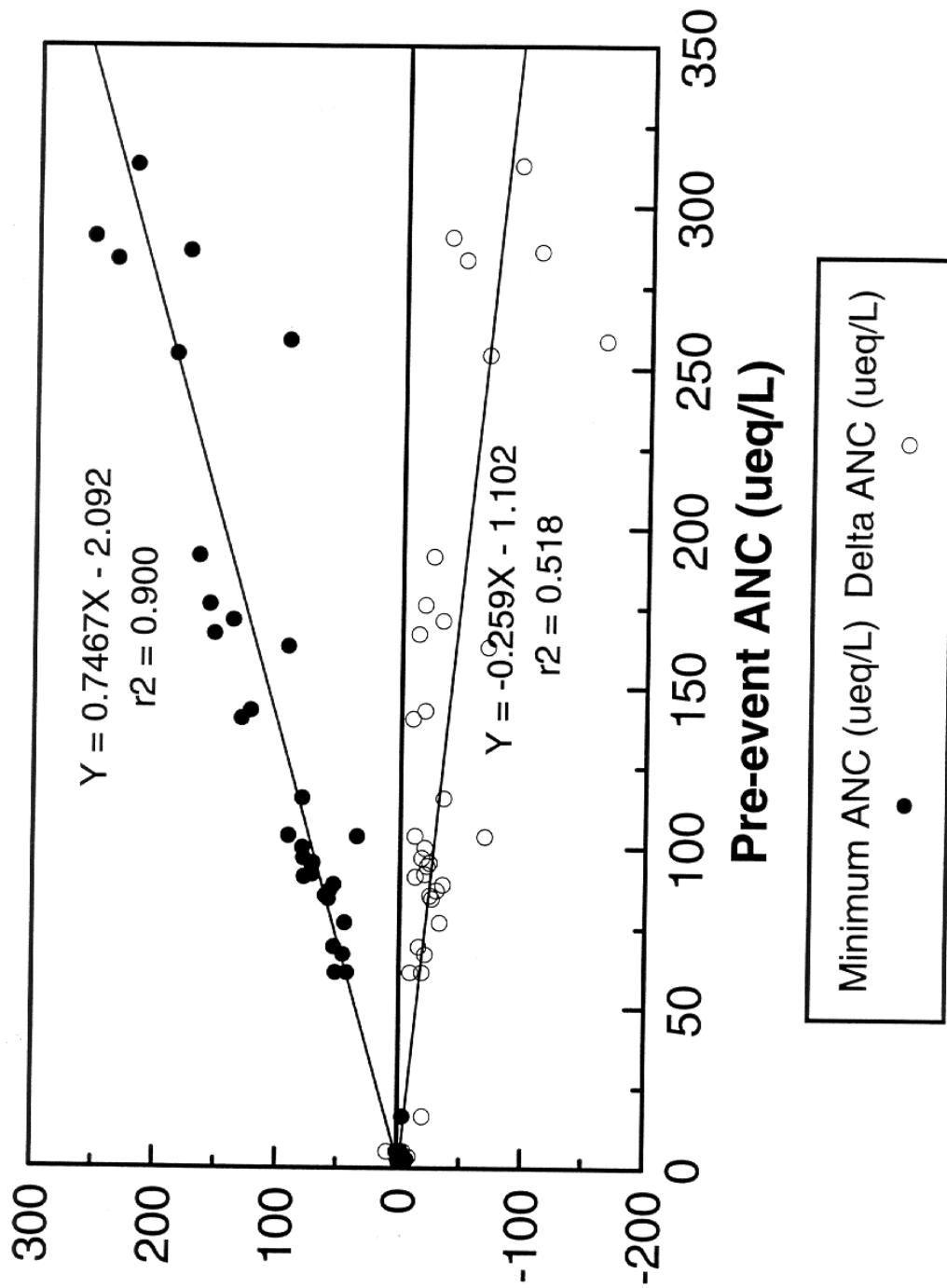


Figure 4-20. Relationships between minimum ANC, Δ ANC, and pre-event ANC during episodes at the three intensive sites.

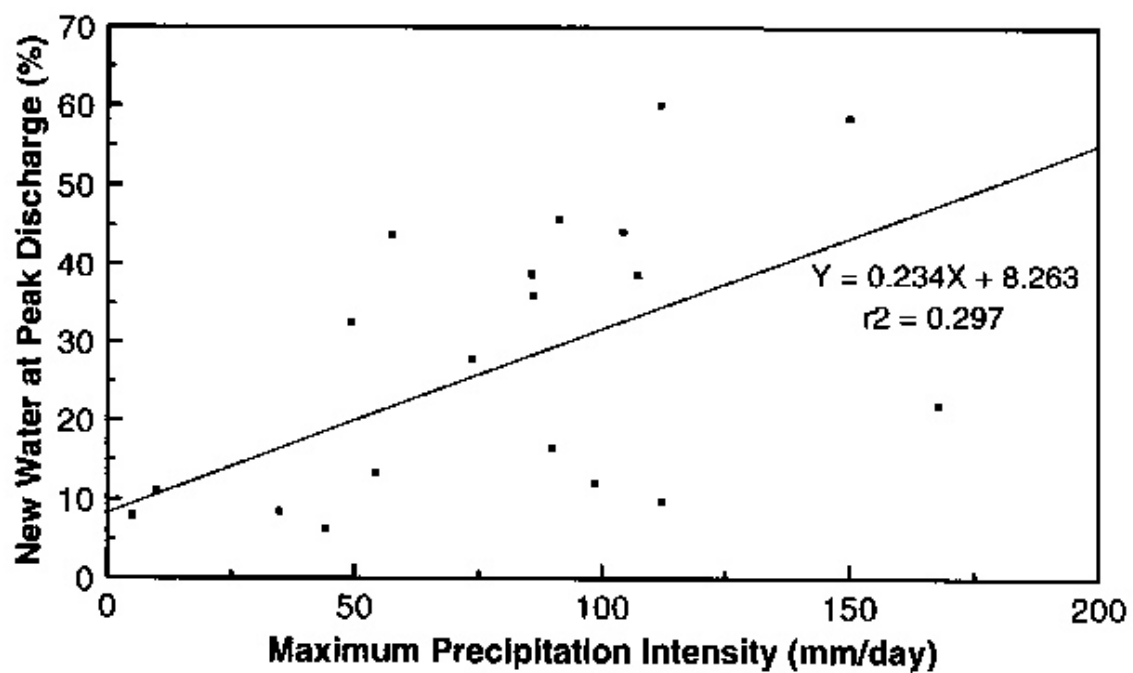


Figure 4-21. Relationship between the new water at peak discharge and maximum precipitation intensity for 20 episodes at the three intensive sites.

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Appendix I

Watershed and Stream-Sampling Site Information

prepared by

Rick Webb

Department of Environmental Sciences

University of Virginia, Charlottesville, VA 22903

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Weekly and Automated (ISCO) Sampling Sites

SITE	TAGNO	STREAM	COUNTY	MAPNAME	UTM_EW	UTM_NS	ELEV
PAIN	NONE	PAINE RUN	AUGUSTA	CRIMORA	693243	4229927	424
PINE	NONE	PINEY RIVER	RAPPAHANNOCK	THORNTON GAP	737523	4287155	360
STAN	24093	STAUNTON RIVER	MADISON	MADISON	729380	4258243	308

Synoptic Sampling Sites

SITE	TAGNO	STREAM	COUNTY	MAPNAME	UTM_EW	UTM_NS	ELEV
BB01	130	BROKENBACK RUN	MADISON	OLD RAG MTN	734833	4272338	335
BB02	132	BROKENBACK RUN	MADISON	OLD RAG MTN	734628	4272252	354
BB03	24241	BROKENBACK RUN	MADISON	OLD RAG MTN	734645	4272393	354
BB04	126	BROKENBACK RUN	MADISON	OLD RAG MTN	734055	4272323	402
BB05	128	BROKENBACK RUN	MADISON	OLD RAG MTN	733852	4272058	418
BB06	131	BROKENBACK RUN	MADISON	OLD RAG MTN	733724	4271893	454
BB07	148	BROKENBACK RUN	MADISON	OLD RAG MTN	733706	4271972	439
BB08	149	BROKENBACK RUN	MADISON	OLD RAG MTN	732999	4272433	543
BB09	140	BROKENBACK RUN	MADISON	OLD RAG MTN	732356	4272805	625
BB10	129	BROKENBACK RUN	MADISON	OLD RAG MTN	731575	4272989	744
BB11	106	BROKENBACK RUN	MADISON	OLD RAG MTN	730965	4272920	817
HR01	26812	HAZEL RIVER	RAPPAHANNOCK	OLD RAG MTN	738349	4277396	329
HR02	226	HAZEL RIVER	RAPPAHANNOCK	OLD RAG MTN	738074	4277421	354
HR03	182	HAZEL RIVER	RAPPAHANNOCK	OLD RAG MTN	737265	4277194	518
HR04	189	HAZEL RIVER	RAPPAHANNOCK	OLD RAG MTN	736982	4277392	610
HR05	177	HAZEL RIVER	RAPPAHANNOCK	OLD RAG MTN	736819	4277649	677
HR06	194	HAZEL RIVER	RAPPAHANNOCK	OLD RAG MTN	735581	4277775	710
HR07	185	HAZEL RIVER	RAPPAHANNOCK	OLD RAG MTN	735401	4278333	664
HR08	195	HAZEL RIVER	RAPPAHANNOCK	OLD RAG MTN	735245	4278432	671
HR09	141	HAZEL RIVER	RAPPAHANNOCK	OLD RAG MTN	734988	4278270	674
SITE	TAGNO	STREAM	COUNTY	MAPNAME	UTM_EW	UTM_NS	ELEV

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HR10	191	HAZEL RIVER	RAPPAHANNOCK	OLD RAG MTN	735337	4278475	664
HR11	198	HAZEL RIVER	RAPPAHANNOCK	OLD RAG MTN	734136	4279199	744
HR20	236	HAZEL RIVER	RAPPAHANNOCK	OLD RAG MTN	738064	4277672	347
HR21	239	HAZEL RIVER	RAPPAHANNOCK	OLD RAG MTN	737916	4278205	390
HR22	230	HAZEL RIVER	RAPPAHANNOCK	OLD RAG MTN	737671	4278559	421
HR23	93	HAZEL RIVER	RAPPAHANNOCK	OLD RAG MTN	737399	4279011	442
HR24	231	HAZEL RIVER	RAPPAHANNOCK	OLD RAG MTN	737314	4279098	454
HR25	242	HAZEL RIVER	RAPPAHANNOCK	OLD RAG MTN	737411	4279217	457
HR26	248	HAZEL RIVER	RAPPAHANNOCK	OLD RAG MTN	737013	4279571	480
HR27	245	HAZEL RIVER	RAPPAHANNOCK	OLD RAG MTN	736410	4279484	549
HR28	235	HAZEL RIVER	RAPPAHANNOCK	OLD RAG MTN	736302	4279480	558
HR29	91	HAZEL RIVER	RAPPAHANNOCK	OLD RAG MTN	736348	4279381	573
HR30	92	HAZEL RIVER	RAPPAHANNOCK	OLD RAG MTN	736035	4278852	610
HR31	244	HAZEL RIVER	RAPPAHANNOCK	OLD RAG MTN	734722	4279046	701
HR32	99	HAZEL RIVER	RAPPAHANNOCK	OLD RAG MTN	735460	4278992	671
HR33	233	HAZEL RIVER	RAPPAHANNOCK	OLD RAG MTN	735780	4279449	637
JR01	24047	JEREMY'S RUN	PAGE	LURAY	727653	4288250	268
JR02	288	JEREMY'S RUN	PAGE	THORNTON GAP	728092	4288021	299
JR03	294	JEREMY'S RUN	PAGE	THORNTON GAP	728445	4288803	366
JR04	300	JEREMY'S RUN	PAGE	THORNTON GAP	728093	4287965	287
JR05	297	JEREMY'S RUN	PAGE	THORNTON GAP	728804	4287838	329
JR06	291	JEREMY'S RUN	PAGE	THORNTON GAP	729689	4287892	347
JR11	133	JEREMY'S RUN	PAGE	THORNTON GAP	730933	4288242	360
JR12	135	JEREMY'S RUN	PAGE	THORNTON GAP	730923	4288103	363
JR13	147	JEREMY'S RUN	PAGE	THORNTON GAP	731111	4287677	405
JR14	199	JEREMY'S RUN	PAGE	THORNTON GAP	730998	4287618	405
JR15	183	JEREMY'S RUN	PAGE	THORNTON GAP	730312	4288131	332
JR16	228	JEREMY'S RUN	PAGE	THORNTON GAP	730416	4288048	335
JR17	134	JEREMY'S RUN	PAGE	THORNTON GAP	730006	4287855	332
JR18	150	JEREMY'S RUN	PAGE	THORNTON GAP	729940	4287735	332
JR19	190	JEREMY'S RUN	PAGE	THORNTON GAP	729958	4287180	482
JR20	197	JEREMY'S RUN	PAGE	THORNTON GAP	730013	4287240	485
JR21	184	JEREMY'S RUN	PAGE	THORNTON GAP	729847	4287853	335
JR75	151	JEREMY'S RUN	PAGE	THORNTON GAP	734505	4293257	774
SITE	TAGNO	STREAM	COUNTY	MAPNAME	UTM_EW	UTM_NS	ELEV
JR76	152	JEREMY'S RUN	PAGE	THORNTON GAP	733910	4292996	704

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JR77	154	JEREMY'S RUN	PAGE	THORNTON GAP	733044	4292058	573
JR78	153	JEREMY'S RUN	PAGE	THORNTON GAP	733638	4292288	622
JR79	155	JEREMY'S RUN	PAGE	THORNTON GAP	733083	4291965	579
JR80	156	JEREMY'S RUN	PAGE	THORNTON GAP	732537	4292084	555
JR81	157	JEREMY'S RUN	PAGE	THORNTON GAP	732211	4291562	527
JR82	158	JEREMY'S RUN	PAGE	THORNTON GAP	731959	4290909	509
JR83	159	JEREMY'S RUN	PAGE	THORNTON GAP	731747	4290336	479
JR84	160	JEREMY'S RUN	PAGE	THORNTON GAP	731584	4289739	442
JR85	161	JEREMY'S RUN	PAGE	THORNTON GAP	731499	4289169	424
JR86	162	JEREMY'S RUN	PAGE	THORNTON GAP	731601	4289106	424
JR87	163	JEREMY'S RUN	PAGE	THORNTON GAP	731340	4288599	402
MR01	26030	MEADOW RUN	AUGUSTA	CRIMORA	691759	4225463	460
MR02	17	MEADOW RUN	AUGUSTA	CRIMORA	694814	4227429	663
MR03	18	MEADOW RUN	AUGUSTA	CRIMORA	694810	4227321	663
MR04	19	MEADOW RUN	AUGUSTA	CRIMORA	694718	4227333	658
MR05	20	MEADOW RUN	AUGUSTA	CRIMORA	694267	4227050	628
MR06	21	MEADOW RUN	AUGUSTA	CRIMORA	693512	4227017	597
MR07	22	MEADOW RUN	AUGUSTA	CRIMORA	693499	4227164	597
MR08	NONE	MEADOW RUN	AUGUSTA	CRIMORA	693404	4227008	585
MR09	23	MEADOW RUN	AUGUSTA	CRIMORA	693129	4226294	518
MR10	24	MEADOW RUN	AUGUSTA	CRIMORA	693172	4226210	518
MR11	25	MEADOW RUN	AUGUSTA	CRIMORA	692958	4226043	500
MR12	51	MEADOW RUN	AUGUSTA	CRIMORA	692985	4225926	500
MR13	52	MEADOW RUN	AUGUSTA	CRIMORA	693694	4225991	594
MR14	53	MEADOW RUN	AUGUSTA	CRIMORA	694272	4225993	655
MR15	26046	MEADOW RUN	AUGUSTA	CRIMORA	694098	4225637	625
MR16	55	MEADOW RUN	AUGUSTA	CRIMORA	693516	4225613	549
MR17	56	MEADOW RUN	AUGUSTA	CRIMORA	692900	4225947	488
MR18	57	MEADOW RUN	AUGUSTA	CRIMORA	692496	4225694	573
NF01	293	NORTH FORK DRY RUN	PAGE	THORNTON GAP	729897	4279070	494
NF02	26027	NORTH FORK DRY RUN	PAGE	THORNTON GAP	729933	4278796	518
NF03	26016	NORTH FORK DRY RUN	PAGE	THORNTON GAP	730081	4278473	555
NF04	26019	NORTH FORK DRY RUN	PAGE	THORNTON GAP	730195	4278299	585
SITE	TAGNO	STREAM	COUNTY	MAPNAME	UTM_EW	UTM_NS	ELEV
NF05	295	NORTH FORK DRY RUN	PAGE	THORNTON GAP	730387	4278006	664
NF06	187	NORTH FORK DRY RUN	PAGE	THORNTON GAP	730433	4277961	677

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NF07	276	NORTH FORK DRY RUN	PAGE	THORNTON GAP	730435	4277873	689
NF08	136	NORTH FORK DRY RUN	PAGE	THORNTON GAP	730310	4277639	762
NF09	137	NORTH FORK DRY RUN	PAGE	THORNTON GAP	730521	4277866	698
NF10	186	NORTH FORK DRY RUN	PAGE	THORNTON GAP	730595	4277830	713
PI01	266	PINEY RIVER	RAPPAHANNOCK	THORNTON GAP	737938	4286960	354
PI02	270	PINEY RIVER	RAPPAHANNOCK	THORNTON GAP	737350	4287363	381
PI03	272	PINEY RIVER	RAPPAHANNOCK	THORNTON GAP	737501	4287198	378
PI04	268	PINEY RIVER	RAPPAHANNOCK	THORNTON GAP	737109	4287446	384
PI05	FISH	PINEY RIVER	RAPPAHANNOCK	THORNTON GAP	736905	4287866	402
PI06	256	PINEY RIVER	RAPPAHANNOCK	THORNTON GAP	736475	4288516	433
PI07	259	PINEY RIVER	RAPPAHANNOCK	BENTONVILLE	736356	4289152	469
PI08	251	PINEY RIVER	RAPPAHANNOCK	THORNTON GAP	735827	4289718	494
PI09	127	PINEY RIVER	RAPPAHANNOCK	THORNTON GAP	735621	4291028	664
PI20	NONE	PINEY RIVER	RAPPAHANNOCK	BENTONVILLE	736972	4293318	985
PI21	83	PINEY RIVER	RAPPAHANNOCK	BENTONVILLE	736265	4293219	957
PI22	84	PINEY RIVER	RAPPAHANNOCK	BENTONVILLE	736420	4292770	853
PI23	87	PINEY RIVER	RAPPAHANNOCK	BENTONVILLE	736981	4292818	914
PI24	90	PINEY RIVER	RAPPAHANNOCK	THORNTON GAP	736859	4292186	853
PI25	89	PINEY RIVER	RAPPAHANNOCK	THORNTON GAP	736315	4291825	847
PI26	88	PINEY RIVER	RAPPAHANNOCK	THORNTON GAP	736283	4291947	777
PI27	85	PINEY RIVER	RAPPAHANNOCK	THORNTON GAP	736179	4291759	768
PI28	86	PINEY RIVER	RAPPAHANNOCK	THORNTON GAP	735745	4291210	768
PI29	96	PINEY RIVER	RAPPAHANNOCK	THORNTON GAP	735654	4291207	695
PR01	26257	PAINE RUN	AUGUSTA	CRIMORA	693243	4229927	427
PR02	16	PAINE RUN	AUGUSTA	CRIMORA	693534	4229863	427
PR03	14	PAINE RUN	AUGUSTA	CRIMORA	693589	4229817	439
PR04	13	PAINE RUN	AUGUSTA	CRIMORA	693632	4229707	439
PR05	12	PAINE RUN	AUGUSTA	CRIMORA	693606	4229610	451
PR06	11	PAINE RUN	AUGUSTA	CRIMORA	693708	4229596	439
PR07	61	PAINE RUN	AUGUSTA	CRIMORA	694059	4229494	451
PR08	5	PAINE RUN	AUGUSTA	CRIMORA	694162	4229461	451
PR09	4	PAINE RUN	AUGUSTA	CRIMORA	694079	4229369	463
SITE	TAGNO	STREAM	COUNTY	MAPNAME	UTM_EW	UTM_NS	ELEV
PR10	3	PAINE RUN	AUGUSTA	CRIMORA	694428	4229467	475
PR11	26025	PAINE RUN	AUGUSTA	CRIMORA	694538	4229631	460
PR12	30	PAINE RUN	AUGUSTA	CRIMORA	694640	4229680	460

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PR13	32	PAINE RUN	AUGUSTA	CRIMORA	694670	4229513	488
PR14	33	PAINE RUN	AUGUSTA	CRIMORA	695201	4229650	500
PR15	35	PAINE RUN	AUGUSTA	CRIMORA	694958	4229830	469
PR16	35	PAINE RUN	AUGUSTA	CRIMORA	695057	4229840	472
PR17	36	PAINE RUN	AUGUSTA	CRIMORA	695055	4230622	524
PR18	37	PAINE RUN	AUGUSTA	CRIMORA	695041	4230005	488
PR19	38	PAINE RUN	AUGUSTA	CRIMORA	695385	4229812	482
PR20	39	PAINE RUN	AUGUSTA	CRIMORA	695799	4229190	543
PR21	26018	PAINE RUN	AUGUSTA	CRIMORA	695509	4229769	488
PR24	42	PAINE RUN	AUGUSTA	CRIMORA	695499	4229980	482
PR25	31	PAINE RUN	AUGUSTA	CRIMORA	695683	4229919	500
PR26	26020	PAINE RUN	AUGUSTA	CRIMORA	695846	4230375	567
PR27	28	PAINE RUN	AUGUSTA	CRIMORA	695935	4230481	509
PR28	44	PAINE RUN	AUGUSTA	CRIMORA	696003	4230359	524
PR29	45	PAINE RUN	AUGUSTA	CRIMORA	696385	4230964	524
PR30	46	PAINE RUN	AUGUSTA	CRIMORA	696494	4231005	533
PR31	47	PAINE RUN	AUGUSTA	CRIMORA	696388	4231118	561
PR32	48	PAINE RUN	AUGUSTA	CRIMORA	696790	4231262	561
PR33	49	PAINE RUN	AUGUSTA	CRIMORA	696900	4231761	587
PR34	50	PAINE RUN	AUGUSTA	CRIMORA	696839	4231855	610
PR35	27	PAINE RUN	AUGUSTA	CRIMORA	696956	4231867	610
PR37	9	PAINE RUN	AUGUSTA	CRIMORA	693659	4229897	439
PR38	24169	PAINE RUN	AUGUSTA	CRIMORA	694434	4230709	475
RR01	24077	ROSE RIVER	MADISON	OLD RAG MTN	729549	4266069	341
RR02	262	ROSE RIVER	MADISON	BIG MEADOWS	725841	4268376	786
RR03	275	ROSE RIVER	MADISON	BIG MEADOWS	725793	4267829	664
RR04	274	ROSE RIVER	MADISON	BIG MEADOWS	725928	4267399	664
RR05	261	ROSE RIVER	MADISON	BIG MEADOWS	726085	4267073	646
RR06	263	ROSE RIVER	MADISON	BIG MEADOWS	726693	4266716	558
RR07	265	ROSE RIVER	MADISON	BIG MEADOWS	727455	4266147	475
RR11	71	ROSE RIVER	MADISON	BIG MEADOWS	724642	4266442	875
SITE	TAGNO	STREAM	COUNTY	MAPNAME	UTM_EW	UTM_NS	ELEV
RR12	29	ROSE RIVER	MADISON	BIG MEADOWS	724424	4266299	981
RR13	70	ROSE RIVER	MADISON	BIG MEADOWS	724407	4266157	963
RR14	65	ROSE RIVER	MADISON	BIG MEADOWS	725070	4266824	774
RR15	66	ROSE RIVER	MADISON	BIG MEADOWS	725654	4267202	768

Appendix I - Table 1 - Sampling Sites

RR16	72	ROSE RIVER	MADISON	BIG MEADOWS	727219	4265193	506
RR17	64	ROSE RIVER	MADISON	BIG MEADOWS	726529	4264792	579
RR18	68	ROSE RIVER	MADISON	BIG MEADOWS	727007	4264842	674
RR19	101	ROSE RIVER	MADISON	BIG MEADOWS	727835	4265518	427
RR20	102	ROSE RIVER	MADISON	BIG MEADOWS	727784	4265663	424
RR21	107	ROSE RIVER	MADISON	BIG MEADOWS	728204	4265611	415
RR30	256	ROSE RIVER	MADISON	BIG MEADOWS	728812	4265696	390
SR01	24093	STAUNTON RIVER	MADISON	MADISON	729380	4258243	314
SR02	103	STAUNTON RIVER	MADISON	FLETCHER	729072	4258302	402
SR03	108	STAUNTON RIVER	MADISON	FLETCHER	728978	4258370	408
SR04	105	STAUNTON RIVER	MADISON	FLETCHER	728961	4258294	411
SR05	104	STAUNTON RIVER	MADISON	FLETCHER	728177	4258043	494
SR06	109	STAUNTON RIVER	MADISON	FLETCHER	728486	4258305	408
SR07	110	STAUNTON RIVER	MADISON	FLETCHER	728723	4259103	433
SR08	111	STAUNTON RIVER	MADISON	FLETCHER	728390	4259560	472
SR09	124	STAUNTON RIVER	MADISON	FLETCHER	727672	4259808	549
SR10	121	STAUNTON RIVER	MADISON	FLETCHER	726893	4259669	646
SR11	115	STAUNTON RIVER	MADISON	FLETCHER	726808	4259595	664
SR12	117	STAUNTON RIVER	MADISON	FLETCHER	726327	4258990	786
SR13	114	STAUNTON RIVER	MADISON	FLETCHER	726718	4259562	664
SR14	112	STAUNTON RIVER	MADISON	FLETCHER	726711	4259652	646
SR15	119	STAUNTON RIVER	MADISON	FLETCHER	726028	4260028	738
SR16	116	STAUNTON RIVER	MADISON	FLETCHER	725878	4260102	780
SR17	120	STAUNTON RIVER	MADISON	FLETCHER	725257	4260562	902
SR18	118	STAUNTON RIVER	MADISON	FLETCHER	728617	4258725	415
TH01	24082	NF THORNTON RIVER	RAPPAHANNOCK	THORNTON GAP	736981	4286023	341
TH02	113	NF THORNTON RIVER	RAPPAHANNOCK	THORNTON GAP	736798	4286102	347
TH03	125	NF THORNTON RIVER	RAPPAHANNOCK	THORNTON GAP	736617	4286191	351
TH04	123	NF THORNTON RIVER	RAPPAHANNOCK	THORNTON GAP	736246	4286419	360
TH05	122	NF THORNTON RIVER	RAPPAHANNOCK	THORNTON GAP	736127	4286431	363
SITE	TAGNO	STREAM	COUNTY	MAPNAME	UTM_EW	UTM_NS	ELEV
TH06	76	NF THORNTON RIVER	RAPPAHANNOCK	THORNTON GAP	735270	4286242	418
TH07	77	NF THORNTON RIVER	RAPPAHANNOCK	THORNTON GAP	735060	4286197	411
TH08	78	NF THORNTON RIVER	RAPPAHANNOCK	THORNTON GAP	734312	4286383	451
TH09	79	NF THORNTON RIVER	RAPPAHANNOCK	THORNTON GAP	735146	4286107	430
TH10	80	NF THORNTON RIVER	RAPPAHANNOCK	THORNTON GAP	735020	4285648	442

Appendix I - Table 1 - Sampling Sites

TH11	81	NF THORNTON RIVER	RAPPAHANNOCK	THORNTON GAP	736061	4286517	363
TH12	82	NF THORNTON RIVER	RAPPAHANNOCK	THORNTON GAP	735680	4286949	384
TH20	258	NF THORNTON RIVER	RAPPAHANNOCK	THORNTON GAP	733581	4289740	600
TH21	260	NF THORNTON RIVER	RAPPAHANNOCK	THORNTON GAP	733649	4289752	597
TH22	254	NF THORNTON RIVER	RAPPAHANNOCK	THORNTON GAP	733642	4289402	573
TH23	255	NF THORNTON RIVER	RAPPAHANNOCK	THORNTON GAP	733869	4288594	503
TH24	257	NF THORNTON RIVER	RAPPAHANNOCK	THORNTON GAP	733955	4288486	494
TH25	253	NF THORNTON RIVER	RAPPAHANNOCK	THORNTON GAP	733790	4288491	500
TH26	274	NF THORNTON RIVER	RAPPAHANNOCK	THORNTON GAP	733074	4288212	561
TH27	267	NF THORNTON RIVER	RAPPAHANNOCK	THORNTON GAP	734636	4287811	427
TH28	271	NF THORNTON RIVER	RAPPAHANNOCK	THORNTON GAP	734584	4287714	439
TH29	273	NF THORNTON RIVER	RAPPAHANNOCK	THORNTON GAP	734694	4287682	433
TH30	272	NF THORNTON RIVER	RAPPAHANNOCK	THORNTON GAP	735150	4287712	415
TM01	26811	TWO MILE RUN	ROCKINGHAM	MCGAHEYSVILLE	703531	4245224	372
TM02	58	TWO MILE RUN	ROCKINGHAM	MCGAHEYSVILLE	705577	4242654	512
TM03	59	TWO MILE RUN	ROCKINGHAM	MCGAHEYSVILLE	705485	4242630	512
TM04	60	TWO MILE RUN	ROCKINGHAM	MCGAHEYSVILLE	705478	4242795	506
TM05	61	TWO MILE RUN	ROCKINGHAM	MCGAHEYSVILLE	705206	4243527	463
TM06	24155	TWO MILE RUN	ROCKINGHAM	MCGAHEYSVILLE	705046	4243753	466
TM07	62	TWO MILE RUN	ROCKINGHAM	MCGAHEYSVILLE	704677	4243829	439
TM08	63	TWO MILE RUN	ROCKINGHAM	MCGAHEYSVILLE	704343	4244279	439
TM09	74	TWO MILE RUN	ROCKINGHAM	MCGAHEYSVILLE	704444	4244360	434
TM10	67	TWO MILE RUN	ROCKINGHAM	MCGAHEYSVILLE	704438	4244174	408
TM11	73	TWO MILE RUN	ROCKINGHAM	MCGAHEYSVILLE	704220	4244321	418
TM12	75	TWO MILE RUN	ROCKINGHAM	MCGAHEYSVILLE	703899	4244635	387
WO01	24085	WHITE OAK CANYON RUN	MADISON	OLD RAG MTN	730905	4268970	341
WO02	200	WHITE OAK CANYON RUN	MADISON	OLD RAG MTN	730614	4269771	390
WO03	24298	WHITE OAK CANYON RUN	MADISON	OLD RAG MTN	730654	4270569	454
WO04	229	WHITE OAK CANYON RUN	MADISON	OLD RAG MTN	730730	4270476	442
SITE	TAGNO	STREAM	COUNTY	MAPNAME	UTM_EW	UTM_NS	ELEV
WO05	232	WHITE OAK CANYON RUN	MADISON	OLD RAG MTN	730715	4270617	453
WO06	234	WHITE OAK CANYON RUN	MADISON	OLD RAG MTN	730837	4271345	628
WO07	145	WHITE OAK CANYON RUN	MADISON	OLD RAG MTN	730646	4272174	738
WO20	139	WHITE OAK CANYON RUN	MADISON	OLD RAG MTN	730045	4271107	689
WO21	143	WHITE OAK CANYON RUN	MADISON	OLD RAG MTN	729523	4271694	823
WO22	144	WHITE OAK CANYON RUN	MADISON	OLD RAG MTN	729219	4272304	890

Appendix I - Table 1 - Sampling Sites

WO23	178	WHITE OAK CANYON RUN	MADISON	OLD RAG MTN	729031	4272765	939
WO24	176	WHITE OAK CANYON RUN	MADISON	OLD RAG MTN	728917	4272823	954
WO25	188	WHITE OAK CANYON RUN	MADISON	OLD RAG MTN	728973	4272917	948
WO26	146	WHITE OAK CANYON RUN	MADISON	OLD RAG MTN	728941	4273082	963
WO27	179	WHITE OAK CANYON RUN	MADISON	OLD RAG MTN	728816	4273323	988
WO28	196	WHITE OAK CANYON RUN	MADISON	OLD RAG MTN	728788	4273217	975
WO29	142	WHITE OAK CANYON RUN	MADISON	OLD RAG MTN	728581	4273226	1004
WO30	200	WHITE OAK CANYON RUN	MADISON	OLD RAG MTN	728582	4273306	994
WR01	WOR1	WHITE OAK RUN	ROCKINGHAM	BROWNS COVE	696958	4235771	457
WR02	WORZ	WHITE OAK RUN	ROCKINGHAM	BROWNS COVE	697296	4235290	463
WR03	WOR2	WHITE OAK RUN	ROCKINGHAM	BROWNS COVE	697390	4235185	469
WR04	277	WHITE OAK RUN	ROCKINGHAM	BROWNS COVE	697458	4235023	482
WR05	26891	WHITE OAK RUN	ROCKINGHAM	BROWNS COVE	697456	4234974	482
WR06	WOR3	WHITE OAK RUN	ROCKINGHAM	BROWNS COVE	697470	4234973	482
WR07	227	WHITE OAK RUN	ROCKINGHAM	BROWNS COVE	697688	4234790	494
WR08	180	WHITE OAK RUN	ROCKINGHAM	BROWNS COVE	697746	4234407	515
WR09	192	WHITE OAK RUN	ROCKINGHAM	BROWNS COVE	698100	4233971	561
WR10	296	WHITE OAK RUN	ROCKINGHAM	BROWNS COVE	698052	4234108	561

¹ SITE = site identification code

TAGNO = code on tree tag adjacent sampling site

MAPNAME = USGS 7.5 minute topographic quadrangle

ELEV = site elevation in meters

APPENDIX I - TABLE 2A: WATERSHED CHARACTERISTICS FOR SYNOPTIC SITES - GEOLOGY

Stream Order, Catchment Area, and Geologic Formation¹

SITE	ORDER	AREA	ANTIETAM	HARPER	WEAVERTON	CATOCTIN	SWIFTRUN	PEDLAR	OLDRAG
BB01	2	9.86	0.0	0.0	0.0	6.6	0.0	0.0	93.4
BB02	1	0.78	0.0	0.0	0.0	0.0	0.0	0.0	100.0

Appendix I - Table 2A - Watershed Characteristics - Geology

BB03	2	8.92	0.0	0.0	0.0	7.3	0.0	0.0	92.7
BB04	2	8.14	0.0	0.0	0.0	8.0	0.0	0.0	92.0
BB05	2	7.87	0.0	0.0	0.0	8.2	0.0	0.0	91.8
BB06	1	2.42	0.0	0.0	0.0	0.0	0.0	0.0	100.0
BB07	1	4.88	0.0	0.0	0.0	13.3	0.0	0.0	86.7
BB08	1	4.07	0.0	0.0	0.0	15.9	0.0	0.0	84.1
BB09	1	2.98	0.0	0.0	0.0	21.7	0.0	0.0	78.3
BB10	1	2.06	0.0	0.0	0.0	31.3	0.0	0.0	68.8
BB11	1	1.09	0.0	0.0	0.0	54.8	0.0	0.0	45.2
HR01	3	13.24	0.0	0.0	0.0	0.0	0.0	76.3	23.7
HR02	1	1.73	0.0	0.0	0.0	0.0	0.0	95.5	4.5
HR03	1	1.34	0.0	0.0	0.0	0.0	0.0	94.2	5.8
HR04	1	0.78	0.0	0.0	0.0	0.0	0.0	90.0	10.0
HR05	1	0.65	0.0	0.0	0.0	0.0	0.0	88.5	11.5
HR06	1	0.84	0.0	0.0	0.0	0.0	0.0	28.1	71.9
HR07	1	1.37	0.0	0.0	0.0	0.0	0.0	22.6	77.4
HR08	1	2.2	0.0	0.0	0.0	0.0	0.0	96.5	3.5
HR09	1	1.96	0.0	0.0	0.0	0.0	0.0	100.0	0.0
HR10	1	2.28	0.0	0.0	0.0	0.0	0.0	96.6	3.4
HR11	2	1.25	0.0	0.0	0.0	0.0	0.0	100.0	0.0
HR20	3	11.05	0.0	0.0	0.0	0.0	0.0	73.9	26.1
HR21	3	10.48	0.0	0.0	0.0	0.0	0.0	72.6	27.4
HR22	3	9.99	0.0	0.0	0.0	0.0	0.0	71.2	28.8
HR23	3	9.25	0.0	0.0	0.0	0.0	0.0	69.0	31.0
HR24	1	0.59	0.0	0.0	0.0	0.0	0.0	40.9	59.1
HR25	3	8.55	0.0	0.0	0.0	0.0	0.0	70.6	29.4
HR26	3	8.27	0.0	0.0	0.0	0.0	0.0	72.2	27.8
HR27	3	7.9	0.0	0.0	0.0	0.0	0.0	74.5	25.5
SITE	ORDER	AREA	ANTIETAM	HARPER	WEAVERTON	CATOCTIN	SWIFTRUN	PEDLAR	OLDRAG
HR28	2	3.15	0.0	0.0	0.0	0.0	0.0	100.0	0.0
HR29	2	4.67	0.0	0.0	0.0	0.0	0.0	57.5	42.5
HR30	2	4.37	0.0	0.0	0.0	0.0	0.0	60.9	39.1
HR31	2	1.92	0.0	0.0	0.0	0.0	0.0	100.0	0.0
HR32	2	2.66	0.0	0.0	0.0	0.0	0.0	100.0	0.0
HR33	2	3.03	0.0	0.0	0.0	0.0	0.0	100.0	0.0
JR01	3	21.98	0.0	20.6	10.3	69.1	0.0	0.0	0.0

Appendix I - Table 2A - Watershed Characteristics - Geology

JR02	1	0.83	0.0	71.9	18.8	9.4	0.0	0.0	0.0
JR03	1	0.29	0.0	100.0	0.0	0.0	0.0	0.0	0.0
JR04	3	20.87	0.0	19.0	9.8	71.2	0.0	0.0	0.0
JR05	3	20.11	0.0	19.0	9.1	71.8	0.0	0.0	0.0
JR06	3	18.15	0.0	15.9	8.6	75.6	0.0	0.0	0.0
JR11	2	12.95	0.0	9.0	7.0	84.0	0.0	0.0	0.0
JR12	2	1.21	0.0	26.1	13.0	60.9	0.0	0.0	0.0
JR13	1	0.62	0.0	37.5	16.7	45.8	0.0	0.0	0.0
JR14	1	0.35	0.0	23.1	15.4	61.5	0.0	0.0	0.0
JR15	1	0.71	0.0	21.4	28.6	50.0	0.0	0.0	0.0
JR16	3	14.62	0.0	10.3	7.3	82.5	0.0	0.0	0.0
JR17	3	15.79	0.0	10.3	8.0	81.6	0.0	0.0	0.0
JR18	2	1.25	0.0	46.9	10.2	42.9	0.0	0.0	0.0
JR19	1	0.44	0.0	88.2	5.9	5.9	0.0	0.0	0.0
JR20	1	0.41	0.0	46.7	13.3	40.0	0.0	0.0	0.0
JR75	1	1.03	0.0	0.0	0.0	100.0	0.0	0.0	0.0
JR76	1	1.96	0.0	0.0	0.0	100.0	0.0	0.0	0.0
JR77	1	3.26	0.0	0.0	0.0	100.0	0.0	0.0	0.0
JR78	1	2.69	0.0	0.0	0.0	100.0	0.0	0.0	0.0
JR79	1	1.43	0.0	0.0	0.0	100.0	0.0	0.0	0.0
JR80	2	5.56	0.0	0.0	0.5	99.5	0.0	0.0	0.0
JR81	2	6.01	0.0	0.0	1.3	98.7	0.0	0.0	0.0
JR82	2	7.12	0.0	2.5	3.6	93.8	0.0	0.0	0.0
JR83	2	8.11	0.0	4.5	4.8	90.7	0.0	0.0	0.0
JR84	2	9.41	0.0	7.2	5.5	87.3	0.0	0.0	0.0
JR85	2	10.3	0.0	7.6	5.8	86.6	0.0	0.0	0.0
JR86	1	0.56	0.0	33.3	19.0	47.6	0.0	0.0	0.0
SITE	ORDER	AREA	ANTIETAM	HARPER	WEAVERTON	CATOCTIN	SWIFTRUN	PEDLAR	OLDRAG
JR87	2	11.85	0.0	9.0	6.8	84.3	0.0	0.0	0.0
MR01	2	8.86	80.3	45.9	0.0	0.0	0.0	0.0	0.0
MR02	1	1.27	18.8	81.3	0.0	0.0	0.0	0.0	0.0
MR03	1	0.5	0.0	100.0	0.0	0.0	0.0	0.0	0.0
MR04	2	1.9	15.1	84.9	0.0	0.0	0.0	0.0	0.0
MR05	2	2.66	18.6	81.4	0.0	0.0	0.0	0.0	0.0
MR06	2	3.12	32.5	69.2	0.0	0.0	0.0	0.0	0.0
MR07	1	1.24	94.4	0.0	0.0	0.0	0.0	0.0	0.0

Appendix I - Table 2A - Watershed Characteristics - Geology

MR08	2	4.49	58.4	48.0	0.0	0.0	0.0	0.0	0.0
MR09	2	5.23	67.8	41.3	0.0	0.0	0.0	0.0	0.0
MR10	1	1.29	28.0	66.0	0.0	0.0	0.0	0.0	0.0
MR11	2	6.67	69.1	45.5	0.0	0.0	0.0	0.0	0.0
MR12	1	1.41	34.2	55.6	0.0	0.0	0.0	0.0	0.0
MR13	1	1.03	15.4	84.6	0.0	0.0	0.0	0.0	0.0
MR14	1	0.64	0.0	100.0	0.0	0.0	0.0	0.0	0.0
MR15	1	0.51	0.0	100.0	0.0	0.0	0.0	0.0	0.0
MR16	1	1.0	16.8	76.9	0.0	0.0	0.0	0.0	0.0
MR17	2	8.11	77.5	47.0	0.0	0.0	0.0	0.0	0.0
MR18	2	8.51	77.8	47.3	0.0	0.0	0.0	0.0	0.0
NF01	1	2.17	0.0	0.0	0.0	0.0	0.0	100.0	0.0
NF02	1	1.7	0.0	0.0	0.0	0.0	0.0	100.0	0.0
NF03	1	1.41	0.0	0.0	0.0	0.0	0.0	100.0	0.0
NF05	1	1.01	0.0	0.0	0.0	0.0	0.0	100.0	0.0
NF06	0	0.99	0.0	0.0	0.0	0.0	0.0	100.0	0.0
NF07	0	0.44	0.0	0.0	0.0	0.0	0.0	100.0	0.0
NF08	0	0.37	0.0	0.0	0.0	0.0	0.0	100.0	0.0
NF09	0	0.18	0.0	0.0	0.0	0.0	0.0	100.0	0.0
NF10	0	0.16	0.0	0.0	0.0	0.0	0.0	100.0	0.0
PI01	2	12.59	0.0	0.0	0.0	68.7	0.0	31.3	0.0
PI02	1	0.94	0.0	0.0	0.0	0.0	0.0	100.0	0.0
PI03	2	12.15	0.0	0.0	0.0	70.1	0.0	29.9	0.0
PI04	2	10.85	0.0	0.0	0.0	78.5	0.0	21.5	0.0
PI05	2	9.86	0.0	0.0	0.0	82.4	0.0	17.6	0.0
PI06	2	8.68	0.0	0.0	0.0	87.5	0.0	12.5	0.0
SITE	ORDER	AREA	ANTIETAM	HARPER	WEAVERTON	CATOCTIN	SWIFTRUN	PEDLAR	OLDRAG
PI07	2	7.44	0.0	0.0	0.0	85.4	0.0	14.6	0.0
PI08	2	6.46	0.0	0.0	0.0	83.1	0.0	16.9	0.0
PI09	2	3.62	0.0	0.0	0.0	70.0	0.0	30.0	0.0
PI20	0	0.08	0.0	0.0	0.0	0.0	0.0	100.0	0.0
PI21	1	0.08	0.0	0.0	0.0	0.0	0.0	100.0	0.0
PI22	1	0.67	0.0	0.0	0.0	3.8	0.0	96.2	0.0
PI23	1	0.23	0.0	0.0	0.0	0.0	0.0	100.0	0.0
PI24	1	0.42	0.0	0.0	0.0	17.6	0.0	82.4	0.0
PI25	1	0.68	0.0	0.0	0.0	46.2	0.0	53.8	0.0

Appendix I - Table 2A - Watershed Characteristics - Geology

PI26	1	1.41	0.0	0.0	0.0	49.1	0.0	50.9	0.0
PI27	2	2.16	0.0	0.0	0.0	49.4	0.0	50.6	0.0
PI28	2	2.99	0.0	0.0	0.0	63.5	0.0	36.5	0.0
PI29	1	0.4	0.0	0.0	0.0	100.0	0.0	0.0	0.0
PR01	2	12.39	9.2	90.8	0.0	0.0	0.0	0.0	0.0
PR02	2	12.28	8.4	91.6	0.0	0.0	0.0	0.0	0.0
PR03	2	10.34	5.8	94.2	0.0	0.0	0.0	0.0	0.0
PR04	2	10.27	5.8	94.2	0.0	0.0	0.0	0.0	0.0
PR05	1	0.95	24.3	75.7	0.0	0.0	0.0	0.0	0.0
PR06	2	9.28	3.9	96.1	0.0	0.0	0.0	0.0	0.0
PR07	2	9.09	4.0	96.0	0.0	0.0	0.0	0.0	0.0
PR08	2	8.24	1.3	98.7	0.0	0.0	0.0	0.0	0.0
PR09	1	0.68	34.6	65.4	0.0	0.0	0.0	0.0	0.0
PR10	1	0.18	28.6	71.4	0.0	0.0	0.0	0.0	0.0
PR11	2	7.75	0.7	99.3	0.0	0.0	0.0	0.0	0.0
PR12	2	7.43	0.3	99.7	0.0	0.0	0.0	0.0	0.0
PR13	1	0.25	10.0	90.0	0.0	0.0	0.0	0.0	0.0
PR14	0	0.24	0.0	100.0	0.0	0.0	0.0	0.0	0.0
PR15	2	7.18	0.4	99.6	0.0	0.0	0.0	0.0	0.0
PR16	2	6.21	0.4	99.6	0.0	0.0	0.0	0.0	0.0
PR17	1	0.55	0.0	100.0	0.0	0.0	0.0	0.0	0.0
PR18	1	0.91	0.0	100.0	0.0	0.0	0.0	0.0	0.0
PR19	2	5.8	0.0	100.0	0.0	0.0	0.0	0.0	0.0
PR20	1	0.5	0.0	100.0	0.0	0.0	0.0	0.0	0.0
PR21	1	1.15	0.0	100.0	0.0	0.0	0.0	0.0	0.0
SITE	ORDER	AREA	ANTIETAM	HARPER	WEAVERTON	CATOCTIN	SWIFTRUN	PEDLAR	OLDRAG
PR24	1	4.08	0.0	100.0	0.0	0.0	0.0	0.0	0.0
PR25	0	0.44	0.0	100.0	0.0	0.0	0.0	0.0	0.0
PR26	1	3.78	0.0	100.0	0.0	0.0	0.0	0.0	0.0
PR27	1	1.88	22.2	77.8	0.0	0.0	0.0	0.0	0.0
PR28	0	0.28	0.0	100.0	0.0	0.0	0.0	0.0	0.0
PR29	1	2.52	0.0	100.0	0.0	0.0	0.0	0.0	0.0
PR30	1	1.96	0.0	100.0	0.0	0.0	0.0	0.0	0.0
PR31	0	0.52	0.0	100.0	0.0	0.0	0.0	0.0	0.0
PR32	1	1.67	0.0	100.0	0.0	0.0	0.0	0.0	0.0
PR33	1	1.31	0.0	100.0	0.0	0.0	0.0	0.0	0.0

Appendix I - Table 2A - Watershed Characteristics - Geology

PR34	0	0.36	0.0	100.0	0.0	0.0	0.0	0.0	0.0
PR35	1	0.87	0.0	100.0	0.0	0.0	0.0	0.0	0.0
PR38	1	0.88	20.6	79.4	0.0	0.0	0.0	0.0	0.0
RR01	3	23.74	0.0	0.0	0.0	90.8	0.0	9.2	0.0
RR02	2	2.7	0.0	0.0	0.0	91.3	0.0	8.7	0.0
RR03	2	3.34	0.0	0.0	0.0	93.0	0.0	7.0	0.0
RR04	2	4.38	0.0	0.0	0.0	94.7	0.0	5.3	0.0
RR05	2	9.9	0.0	0.0	0.0	89.0	0.0	11.0	0.0
RR06	3	10.87	0.0	0.0	0.0	90.0	0.0	10.0	0.0
RR07	2	13.34	0.0	0.0	0.0	91.8	0.0	8.2	0.0
RR11	2	2.24	0.0	0.0	0.0	100.0	0.0	0.0	0.0
RR13	1	0.73	0.0	0.0	0.0	100.0	0.0	0.0	0.0
RR14	2	3.19	0.0	0.0	0.0	96.0	0.0	4.0	0.0
RR15	2	4.09	0.0	0.0	0.0	87.3	0.0	12.7	0.0
RR16	1	3.32	0.0	0.0	0.0	96.9	0.0	3.1	0.0
RR17	1	1.15	0.0	0.0	0.0	100.0	0.0	0.0	0.0
RR18	0	0.4	0.0	0.0	0.0	33.3	0.0	66.7	0.0
RR19	1	4.06	0.0	0.0	0.0	97.6	0.0	2.4	0.0
RR30	3	20.57	0.0	0.0	0.0	92.2	0.0	7.8	0.0
SR01	2	10.5	0.0	0.0	0.0	0.0	0.0	95.7	4.3
SR02	2	10.15	0.0	0.0	0.0	0.0	0.0	98.5	1.5
SR03	2	8.34	0.0	0.0	0.0	0.0	0.0	100.0	0.0
SR04	1	1.75	0.0	0.0	0.0	0.0	0.0	89.6	10.4
SR05	1	0.73	0.0	0.0	0.0	0.0	0.0	100.0	0.0
SITE	ORDER	AREA	ANTIETAM	HARPER	WEAVERTON	CATOCTIN	SWIFTRUN	PEDLAR	OLDRAG
SR06	0	0.35	0.0	0.0	0.0	0.0	0.0	100.0	0.0
SR07	2	7.5	0.0	0.0	0.0	0.0	0.0	100.0	0.0
SR08	2	6.75	0.0	0.0	0.0	0.0	0.0	100.0	0.0
SR11	1	1.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0
SR13	1	0.4	0.0	0.0	0.0	0.0	0.0	100.0	0.0
SR14	1	3.37	0.0	0.0	0.0	0.0	0.0	100.0	0.0
SR15	1	2.5	0.0	0.0	0.0	0.0	0.0	100.0	0.0
SR16	0	0.25	0.0	0.0	0.0	0.0	0.0	100.0	0.0
SR17	1	1.21	0.0	0.0	0.0	0.0	0.0	100.0	0.0
SR18	0	0.06	0.0	0.0	0.0	0.0	0.0	100.0	0.0
TH01	3	19.08	0.0	3.0	2.2	67.8	0.0	25.2	1.8

Appendix I - Table 2A - Watershed Characteristics - Geology

TH02	3	18.72	0.0	3.1	2.2	68.5	0.0	24.9	1.4
TH03	3	18.57	0.0	3.1	2.2	69.0	0.0	24.5	1.3
TH04	3	17.89	0.0	3.2	2.3	71.3	0.0	22.9	0.3
TH05	2	5.26	0.0	0.0	0.0	49.3	0.0	49.8	1.0
TH06	2	4.5	0.0	0.0	0.0	57.8	0.0	42.2	0.0
TH07	1	2.34	0.0	0.0	0.0	78.0	0.0	22.0	0.0
TH08	1	1.18	0.0	0.0	0.0	100.0	0.0	0.0	0.0
TH09	2	1.84	0.0	0.0	0.0	40.8	0.0	59.2	0.0
TH10	2	1.16	0.0	0.0	0.0	31.1	0.0	68.9	0.0
TH11	2	12.5	0.0	4.6	3.3	81.4	0.0	10.8	0.0
TH12	2	11.93	0.0	4.8	3.5	85.2	0.0	6.5	0.0
TH20	1	0.89	0.0	17.6	8.8	73.5	0.0	0.0	0.0
TH21	1	1.39	0.0	0.0	0.0	100.0	0.0	0.0	0.0
TH22	2	2.76	0.0	5.7	2.8	91.5	0.0	0.0	0.0
TH23	2	3.5	0.0	5.9	3.0	91.1	0.0	0.0	0.0
TH24	2	6.39	0.0	8.9	6.5	84.6	0.0	0.0	0.0
TH25	1	2.81	0.0	13.0	10.2	76.9	0.0	0.0	0.0
TH26	1	1.35	0.0	17.6	15.7	66.7	0.0	0.0	0.0
TH27	2	7.68	0.0	7.4	5.4	87.2	0.0	0.0	0.0
TH28	1	1.41	0.0	0.0	0.0	100.0	0.0	0.0	0.0
TH29	2	9.13	0.0	6.2	4.5	89.2	0.0	0.0	0.0
TH30	1	0.85	0.0	0.0	0.0	100.0	0.0	0.0	0.0
TM01	2	5.5	23.9	76.1	0.0	0.0	0.0	0.0	0.0
SITE	ORDER	AREA	ANTIETAM	HARPER	WEAVERTON	CATOCTIN	SWIFTRUN	PEDLAR	OLDRAG
TM02	1	0.59	0.0	100.0	0.0	0.0	0.0	0.0	0.0
TM03	1	0.8	0.0	100.0	0.0	0.0	0.0	0.0	0.0
TM04	2	1.45	0.0	100.0	0.0	0.0	0.0	0.0	0.0
TM05	2	2.23	0.0	100.0	0.0	0.0	0.0	0.0	0.0
TM07	2	3.09	0.8	99.2	0.0	0.0	0.0	0.0	0.0
TM09	1	0.79	33.3	66.7	0.0	0.0	0.0	0.0	0.0
TM10	2	3.58	4.3	95.7	0.0	0.0	0.0	0.0	0.0
TM12	2	5.03	16.5	83.5	0.0	0.0	0.0	0.0	0.0
WO01	2	14.09	0.0	0.0	0.0	82.2	2.0	3.8	10.1
WO02	2	12.0	0.0	0.0	0.0	83.2	2.3	4.4	7.8
WO03	2	7.87	0.0	0.0	0.0	85.7	3.5	6.7	0.6
WO04	2	11.23	0.0	0.0	0.0	83.6	2.5	4.7	6.7

Appendix I - Table 2A - Watershed Characteristics - Geology

WO05	1	3.33	0.0	0.0	0.0	78.9	0.0	0.0	21.1
WO06	1	2.87	0.0	0.0	0.0	81.1	0.0	0.0	18.9
WO07	1	1.39	0.0	0.0	0.0	100.0	0.0	0.0	0.0
WO20	2	6.89	0.0	0.0	0.0	84.5	4.0	7.6	0.0
WO21	2	4.45	0.0	0.0	0.0	76.5	6.0	11.5	0.0
WO22	2	3.83	0.0	0.0	0.0	73.0	6.9	13.2	0.0
WO23	2	3.49	0.0	0.0	0.0	70.5	7.5	14.4	0.0
WO24	1	0.89	0.0	0.0	0.0	42.5	12.5	32.5	0.0
WO25	2	2.35	0.0	0.0	0.0	79.4	6.2	8.2	0.0
WO26	2	2.13	0.0	0.0	0.0	77.3	6.8	9.1	0.0
WO27	1	1.11	0.0	0.0	0.0	95.5	2.3	0.0	0.0
WO28	2	2.02	0.0	0.0	0.0	76.2	7.1	9.5	0.0
WO29	1	0.29	0.0	0.0	0.0	23.1	15.4	46.2	0.0
WO30	1	0.55	0.0	0.0	0.0	66.7	12.5	8.3	0.0
WR01	3	5.1	0.0	88.8	11.2	0.0	0.0	0.0	0.0
WR02	3	4.71	0.0	87.8	12.2	0.0	0.0	0.0	0.0
WR03	3	4.56	0.0	87.4	12.6	0.0	0.0	0.0	0.0
WR04	3	4.48	0.0	87.3	12.7	0.0	0.0	0.0	0.0
WR05	2	1.96	0.0	100.0	0.0	0.0	0.0	0.0	0.0
WR06	2	2.43	0.0	76.6	23.4	0.0	0.0	0.0	0.0
WR07	2	2.3	0.0	75.0	25.0	0.0	0.0	0.0	0.0
WR08	2	1.99	0.0	74.0	26.0	0.0	0.0	0.0	0.0
SITE	ORDER	AREA	ANTIETAM	HARPER	WEAVERTON	CATOCTIN	SWIFTRUN	PEDLAR	OLDRAG
WR09	1	1.16	0.0	84.4	15.6	0.0	0.0	0.0	0.0
WR10	2	1.66	0.0	76.6	23.4	0.0	0.0	0.0	0.0

¹ SITE = site identification code

ORDER = Strahler order

AREA = catchment area in km²

Geologic Formations = aerial percentage of catchment area

Appendix I - Table 2B - Watershed Characteristics - Vegetative Cover

APPENDIX I - TABLE 2B: WATERSHED CHARACTERISTICS FOR SYNOPTIC SITES - VEGETATIVE COVER
Forest-Cover Class and Annual Catchment Defoliation¹

SITE	VEG_LOW	VEG_MED	VEG_HIGH	PCT86	PCT87	PCT88	PCT89	PCT90	PCT91	PCT92	PCT93
BB01	41.1	14.1	43.7	0.0	0.0	0.3	62.8	1.8	20.9	86.4	85.6
BB02	29.0	16.1	54.8	0.0	0.0	0.0	33.3	0.0	3.3	100.0	0.0
BB03	42.2	14.2	42.4	0.0	0.0	0.3	65.8	2.0	22.6	84.9	94.8
BB04	43.2	15.6	40.0	0.0	0.0	0.3	67.3	1.0	22.5	83.5	98.1
BB05	43.8	16.1	38.8	0.0	0.0	0.3	68.2	0.7	23.3	83.0	98.0
BB06	38.3	12.8	48.9	0.0	0.0	1.1	48.9	1.1	28.7	100.0	98.9
BB07	49.2	15.9	34.9	0.0	0.0	0.0	79.4	0.5	23.3	72.5	100.0
BB08	46.5	19.1	34.4	0.0	0.0	0.0	82.2	0.0	15.9	66.9	100.0
BB09	41.2	26.3	32.5	0.0	0.0	0.0	82.6	0.0	0.0	54.8	100.0
BB10	32.5	36.3	31.3	0.0	0.0	0.0	83.5	0.0	0.0	40.5	101.3
BB11	28.6	38.1	33.3	0.0	0.0	0.0	90.5	0.0	0.0	42.9	100.0
HR01	51.3	11.0	37.8	0.0	0.0	7.6	68.4	0.4	35.3	81.7	79.3
HR02	40.3	14.9	44.8	0.0	0.0	28.4	59.7	0.0	85.1	100.0	100.0
HR03	36.5	19.2	44.2	0.0	0.0	34.6	61.5	0.0	94.2	100.0	100.0
HR04	33.3	33.3	33.3	0.0	0.0	23.3	63.3	0.0	96.7	100.0	100.0
HR05	34.6	38.5	26.9	0.0	0.0	28.0	64.0	0.0	96.0	100.0	100.0
HR06	46.9	31.3	21.9	0.0	0.0	15.6	46.9	0.0	3.1	84.4	100.0
HR07	45.3	24.5	30.2	0.0	0.0	9.4	54.7	0.0	11.3	90.6	100.0
HR08	48.8	7.0	44.2	0.0	0.0	0.0	90.6	0.0	0.0	75.3	92.9
HR09	50.0	7.9	42.1	0.0	0.0	0.0	93.3	0.0	0.0	72.0	93.3
HR10	50.0	6.8	43.2	0.0	0.0	0.0	89.8	0.0	0.0	76.1	93.2
HR11	45.8	37.5	16.7	0.0	0.0	18.8	56.3	0.0	0.0	0.0	37.5
HR20	52.3	11.0	36.6	0.0	0.0	3.7	69.4	0.5	26.6	78.0	75.2
HR21	51.9	11.6	36.5	0.0	0.0	3.7	69.5	0.5	26.0	76.9	74.0
HR22	51.3	12.2	36.5	0.0	0.0	3.9	70.0	0.5	24.0	75.7	73.1
HR23	52.1	12.9	35.0	0.0	0.0	4.2	70.8	0.6	18.1	73.8	70.8
HR24	39.1	0.0	60.9	0.0	0.0	0.0	52.2	0.0	78.3	100.0	100.0
HR25	53.0	13.9	33.0	0.0	0.0	4.5	72.0	0.6	13.9	71.7	68.4
HR26	53.0	14.4	32.6	0.0	0.0	4.7	72.3	0.6	14.3	70.7	67.3
HR27	52.0	15.0	33.0	0.0	0.0	4.9	73.0	0.7	14.7	69.4	65.8
HR28	54.9	16.4	28.7	0.0	0.0	8.1	65.0	0.8	6.5	45.5	21.1
SITE	VEG_LOW	VEG_MED	VEG_HIGH	PCT86	PCT87	PCT88	PCT89	PCT90	PCT91	PCT92	PCT93

Appendix I - Table 2B - Watershed Characteristics - Vegetative Cover

HR29	49.7	14.0	36.3	0.0	0.0	2.8	77.9	0.6	18.8	85.1	96.7
HR30	47.6	14.9	37.5	0.0	0.0	3.0	77.5	0.6	13.0	84.0	96.4
HR31	56.2	27.4	16.4	0.0	0.0	13.3	64.0	1.3	0.0	25.3	24.0
HR32	58.3	19.4	22.3	0.0	0.0	9.7	66.0	1.0	1.0	38.8	22.3
HR33	55.2	17.2	27.6	0.0	0.0	8.5	64.4	0.8	2.5	43.2	22.0
JR01	70.0	11.0	19.1	3.3	4.2	19.6	50.5	0.7	0.0	90.4	76.8
JR02	100.0	0.0	0.0	0.0	0.0	0.0	21.9	0.0	0.0	81.3	100.0
JR03	100.0	0.0	0.0	0.0	0.0	0.0	36.4	0.0	0.0	54.5	100.0
JR04	68.6	11.3	20.1	3.5	4.5	20.6	52.3	0.7	0.0	91.4	75.7
JR05	68.0	11.2	20.8	3.6	4.6	21.4	53.1	0.8	0.0	91.1	74.7
JR06	65.1	11.9	23.0	4.0	5.1	22.6	53.3	0.9	0.0	90.1	72.0
JR11	60.4	13.0	26.6	5.0	7.2	26.1	54.9	1.2	0.0	86.2	60.9
JR12	87.2	0.0	12.8	0.0	0.0	19.1	57.4	0.0	0.0	100.0	100.0
JR13	95.8	0.0	4.2	0.0	0.0	29.2	79.2	0.0	0.0	100.0	100.0
JR14	71.4	0.0	28.6	0.0	0.0	14.3	57.1	0.0	0.0	100.0	100.0
JR15	75.0	3.6	21.4	11.1	0.0	0.0	63.0	0.0	0.0	100.0	100.0
JR16	61.7	12.8	25.5	4.4	6.4	24.6	53.9	1.1	0.0	87.8	65.2
JR17	62.1	13.1	24.8	4.6	5.9	23.0	53.0	1.0	0.0	88.7	67.8
JR18	81.3	0.0	18.8	0.0	0.0	34.7	69.4	0.0	0.0	100.0	98.0
JR19	66.7	0.0	33.3	0.0	0.0	23.5	82.4	0.0	0.0	100.0	100.0
JR20	87.5	0.0	12.5	0.0	0.0	56.3	87.5	0.0	0.0	100.0	100.0
JR75	0.0	79.5	20.5	0.0	0.0	0.0	10.3	0.0	0.0	53.8	0.0
JR76	18.4	64.5	17.1	3.9	1.3	6.6	27.6	0.0	0.0	65.8	0.0
JR77	38.1	42.9	19.0	4.0	8.7	12.7	42.1	0.0	0.0	69.0	0.8
JR78	31.1	50.5	18.4	2.9	2.9	7.7	37.5	0.0	0.0	67.3	0.0
JR79	38.2	10.9	50.9	7.3	1.8	0.0	49.1	0.0	0.0	47.3	0.0
JR80	42.1	27.6	30.4	8.8	9.8	10.7	50.2	0.0	0.0	68.4	10.7
JR81	45.5	25.5	29.0	9.1	9.5	12.9	50.9	0.0	0.0	70.7	17.2
JR82	49.6	21.5	28.8	7.6	9.8	22.2	52.0	0.0	0.0	75.3	29.5
JR83	53.8	18.9	27.2	7.0	10.2	26.4	51.3	0.0	0.0	78.3	37.9
JR84	57.5	16.3	26.2	6.9	8.8	27.7	54.1	0.0	0.0	81.3	46.2
JR85	58.6	14.9	26.5	6.3	8.0	25.6	54.5	0.0	0.0	82.9	50.8
JR86	81.0	0.0	19.0	0.0	13.6	63.6	81.8	22.7	0.0	100.0	95.5
JR87	60.2	12.9	26.9	5.5	7.9	27.5	55.5	1.3	0.0	85.2	57.2
MR01	97.1	0.0	2.6	0.0	0.0	0.0	0.0	0.6	36.5	100.0	100.0
SITE	VEG_LOW	VEG_MED	VEG_HIGH	PCT86	PCT87	PCT88	PCT89	PCT90	PCT91	PCT92	PCT93
MR02	100.0	0.0	0.0	0.0	0.0	0.0	0.0	2.0	79.6	100.0	100.0

Appendix I - Table 2B - Watershed Characteristics - Vegetative Cover

MR03	80.0	0.0	20.0	0.0	0.0	0.0	0.0	0.0	94.7	100.0	100.0
MR04	94.6	0.0	5.4	0.0	0.0	0.0	0.0	1.4	82.4	100.0	100.0
MR05	96.1	0.0	3.9	0.0	0.0	0.0	0.0	1.0	70.9	100.0	100.0
MR06	95.9	0.0	4.1	0.0	0.0	0.0	0.0	0.8	61.2	100.0	100.0
MR07	97.9	0.0	2.1	0.0	0.0	0.0	0.0	2.1	4.2	100.0	100.0
MR08	96.5	0.0	3.5	0.0	0.0	0.0	0.0	1.1	43.7	100.0	100.0
MR09	97.0	0.0	3.0	0.0	0.0	0.0	0.0	1.0	43.6	100.0	100.0
MR10	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	30.0	100.0	100.0
MR11	97.3	0.0	2.3	0.0	0.0	0.0	0.0	0.8	41.5	100.0	100.0
MR12	94.5	0.0	5.5	0.0	0.0	0.0	0.0	0.0	21.8	100.0	100.0
MR13	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	37.5	100.0	100.0
MR14	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	60.0	100.0	100.0
MR15	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	60.0	100.0	100.0
MR16	94.9	0.0	5.1	0.0	0.0	0.0	0.0	0.0	30.8	100.0	100.0
MR17	96.8	0.0	2.9	0.0	0.0	0.0	0.0	0.6	38.0	100.0	100.0
MR18	97.0	0.0	2.7	0.0	0.0	0.0	0.0	0.6	38.1	100.0	100.3
NF01	56.0	7.1	36.9	0.0	0.0	1.2	72.3	4.8	6.0	34.9	100.0
NF02	53.8	9.2	36.9	0.0	0.0	0.0	71.2	6.1	7.6	31.8	98.5
NF03	53.7	11.1	35.2	0.0	0.0	0.0	72.7	7.3	9.1	21.8	96.4
NF05	57.9	15.8	26.3	0.0	0.0	0.0	79.5	10.3	2.6	5.1	97.4
NF06	57.9	15.8	26.3	0.0	0.0	0.0	78.9	10.5	2.6	5.3	97.4
NF07	76.5	11.8	11.8	0.0	0.0	0.0	76.5	0.0	0.0	11.8	94.1
NF08	78.6	14.3	7.1	0.0	0.0	0.0	71.4	0.0	0.0	7.1	92.9
NF09	50.0	12.5	37.5	0.0	0.0	0.0	71.4	14.3	0.0	0.0	100.0
NF10	50.0	16.7	33.3	0.0	0.0	0.0	83.3	16.7	0.0	0.0	100.0
PI01	38.9	18.2	42.9	0.0	3.8	32.3	34.0	15.2	0.0	92.3	64.6
PI02	51.4	0.0	48.6	0.0	0.0	55.6	63.9	25.0	0.0	100.0	100.0
PI03	38.6	18.8	42.6	0.0	3.8	32.6	34.3	15.1	0.0	92.1	63.1
PI04	37.6	20.9	41.5	0.0	4.3	31.5	32.5	14.1	0.0	91.2	58.7
PI05	38.5	23.0	38.5	0.0	4.7	33.9	33.7	15.5	0.0	90.3	54.5
PI06	39.8	24.6	35.6	0.0	5.4	34.6	34.3	17.6	0.0	89.0	48.4
PI07	39.6	27.0	33.3	0.0	6.3	35.5	38.0	20.6	0.0	87.1	39.7
PI08	39.7	26.3	34.0	0.0	7.2	37.3	39.4	19.7	0.0	85.1	30.5
PI09	36.7	30.2	33.1	0.0	5.7	40.0	20.0	19.3	0.0	76.4	29.3
SITE	VEG_LOW	VEG_MED	VEG_HIGH	PCT86	PCT87	PCT88	PCT89	PCT90	PCT91	PCT92	PCT93
PI20	0.0	100.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	100.0	33.3
PI21	0.0	100.0	0.0	0.0	0.0	0.0	25.0	0.0	0.0	25.0	0.0

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PI22	11.1	70.4	18.5	0.0	0.0	53.8	7.7	23.1	0.0	46.2	0.0
PI23	11.1	77.8	11.1	0.0	0.0	77.8	0.0	0.0	0.0	66.7	11.1
PI24	25.0	62.5	12.5	0.0	0.0	64.7	0.0	17.6	0.0	82.4	29.4
PI25	37.0	44.4	18.5	0.0	0.0	63.0	0.0	14.8	0.0	88.9	51.9
PI26	20.0	49.1	30.9	0.0	1.8	41.8	3.6	21.8	0.0	61.8	3.6
PI27	26.2	46.4	27.4	0.0	1.2	48.8	2.4	20.2	0.0	71.4	21.4
PI28	32.8	34.5	32.8	0.0	4.3	42.2	12.9	19.8	0.0	77.6	28.4
PI29	40.0	13.3	46.7	0.0	18.8	0.0	31.3	0.0	0.0	56.3	0.0
PR01	96.0	0.0	2.3	0.0	0.0	0.0	0.0	8.8	63.4	100.0	100.2
PR02	96.0	0.0	2.3	0.0	0.0	0.0	0.0	8.9	63.9	100.0	100.2
PR03	95.5	0.0	2.8	0.0	0.0	0.0	0.0	10.5	67.4	100.0	100.3
PR04	95.5	0.0	2.8	0.0	0.0	0.0	0.0	10.6	67.9	100.0	100.3
PR05	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	100.0
PR06	95.3	0.0	3.1	0.0	0.0	0.0	0.0	11.7	74.9	100.0	100.3
PR07	95.2	0.0	3.1	0.0	0.0	0.0	0.0	12.0	76.4	100.0	100.0
PR08	94.7	0.0	3.4	0.0	0.0	0.0	0.0	13.2	84.0	100.0	100.3
PR09	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.8	100.0	100.0
PR10	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	14.3	100.0	100.0
PR11	94.3	0.0	3.7	0.0	0.0	0.0	0.0	14.0	89.0	100.0	100.3
PR12	94.1	0.0	3.8	0.0	0.0	0.0	0.0	14.6	90.6	100.0	100.0
PR13	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	60.0	100.0	100.0
PR14	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	100.0	100.0
PR15	93.9	0.0	4.0	0.0	0.0	0.0	0.0	15.2	92.8	100.0	100.4
PR16	93.3	0.0	4.6	0.0	0.0	0.0	0.0	17.5	92.5	100.0	100.0
PR17	90.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	100.0	100.0
PR18	94.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	97.1	100.0	100.0
PR19	92.9	0.0	4.9	0.0	0.0	0.0	0.0	18.8	92.4	100.0	100.0
PR20	100.0	0.0	0.0	0.0	0.0	0.0	0.0	26.3	100.0	100.0	100.0
PR21	100.0	0.0	0.0	0.0	0.0	0.0	0.0	13.6	97.7	100.0	102.3
PR24	89.9	0.0	7.0	0.0	0.0	0.0	0.0	22.9	93.0	100.0	100.6
PR25	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	82.4	100.0	100.0
PR26	90.4	0.0	6.8	0.0	0.0	0.0	0.0	24.7	91.8	100.0	100.0
PR27	98.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	46.6	100.0	100.0
SITE	VEG_LOW	VEG_MED	VEG_HIGH	PCT86	PCT87	PCT88	PCT89	PCT90	PCT91	PCT92	PCT93
PR28	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	63.6	100.0	100.0
PR29	89.7	0.0	7.2	0.0	0.0	0.0	0.0	34.0	93.8	100.0	100.0
PR30	89.5	0.0	7.9	0.0	0.0	0.0	0.0	43.4	92.1	100.0	100.0

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PR31	94.7	0.0	0.0	0.0	0.0	0.0	0.0	5.0	100.0	100.0	100.0
PR32	89.2	0.0	7.7	0.0	0.0	0.0	0.0	46.9	92.2	100.0	100.0
PR33	90.2	0.0	5.9	0.0	0.0	0.0	0.0	54.9	88.2	100.0	100.0
PR34	92.3	0.0	7.7	0.0	0.0	0.0	0.0	35.7	78.6	100.0	100.0
PR35	93.9	0.0	3.0	0.0	0.0	0.0	0.0	66.7	97.0	100.0	103.0
PR38	97.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	82.4	100.0	100.0
RR01	22.9	36.8	37.8	0.0	0.0	0.0	50.3	42.5	0.6	90.7	26.9
RR02	40.4	40.4	19.2	0.0	0.0	0.0	42.9	30.5	3.8	74.3	8.6
RR03	36.2	45.7	18.1	0.0	0.0	0.0	52.7	27.9	3.9	79.1	7.0
RR04	41.4	37.9	20.7	0.0	0.0	0.0	55.0	36.7	3.0	78.1	5.3
RR05	28.5	44.1	21.7	0.0	0.0	0.0	49.9	30.3	1.3	81.7	17.2
RR06	29.3	43.1	22.4	0.0	0.0	0.0	53.0	32.3	1.2	82.9	15.7
RR07	30.3	41.7	23.7	0.0	0.0	0.0	55.0	37.0	1.0	84.5	12.8
RR11	4.6	51.7	19.5	0.0	0.0	0.0	12.6	11.5	0.0	65.5	59.8
RR13	7.1	42.9	3.6	0.0	0.0	0.0	6.9	10.3	0.0	48.3	62.1
RR14	5.7	53.7	23.6	0.0	0.0	0.0	29.0	13.7	0.0	73.4	46.0
RR15	9.5	51.3	25.9	0.0	0.0	0.0	35.2	19.5	0.0	79.2	35.8
RR16	2.7	74.5	22.7	0.0	0.0	0.0	73.7	64.6	0.0	100.0	64.6
RR17	0.0	88.6	11.4	0.0	0.0	0.0	80.5	68.3	0.0	100.0	26.8
RR18	50.0	0.0	50.0	0.0	0.0	0.0	66.7	200.0	0.0	100.0	100.0
RR19	3.6	63.5	32.8	0.0	0.0	0.0	70.9	54.3	0.0	100.0	59.1
RR30	24.2	40.8	32.2	0.0	0.0	0.0	54.0	39.7	0.7	89.4	25.9
SR01	50.1	11.7	38.2	0.0	0.0	0.0	31.4	59.3	0.0	100.0	95.9
SR02	50.3	12.1	37.6	0.0	0.0	0.0	32.4	61.8	0.0	100.0	96.1
SR03	45.6	14.7	39.7	0.0	0.0	0.0	28.4	64.0	0.0	100.0	95.7
SR04	71.4	0.0	28.6	0.0	0.0	0.0	56.0	50.0	0.0	100.0	98.0
SR05	80.0	0.0	20.0	0.0	0.0	0.0	84.6	69.2	0.0	100.0	92.3
SR06	42.9	0.0	57.1	0.0	0.0	0.0	76.9	76.9	0.0	100.0	100.0
SR07	45.3	16.4	38.3	0.0	0.0	0.0	29.8	66.9	0.0	100.0	95.1
SR08	42.9	18.4	38.8	0.0	0.0	0.0	29.4	70.2	0.0	100.0	94.5
SR11	35.9	33.3	30.8	0.0	0.0	0.0	35.1	51.4	0.0	100.0	100.0
SR13	25.0	43.8	31.3	0.0	0.0	0.0	26.7	33.3	0.0	100.0	100.0
SITE	VEG_LOW	VEG_MED	VEG_HIGH	PCT86	PCT87	PCT88	PCT89	PCT90	PCT91	PCT92	PCT93
SR14	43.7	21.0	35.3	0.0	0.0	0.0	6.4	81.8	0.0	100.0	87.3
SR15	43.3	26.7	30.0	0.0	0.0	0.0	0.0	87.1	0.0	100.0	82.4
SR16	0.0	50.0	50.0	0.0	0.0	0.0	0.0	44.4	0.0	100.0	100.0
SR17	45.7	32.6	21.7	0.0	0.0	0.0	0.0	79.5	0.0	100.0	63.6

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SR18	50.0	0.0	50.0	0.0	0.0	0.0	50.0	50.0	0.0	100.0	100.0
TH01	37.9	16.2	45.7	1.1	4.5	21.2	36.2	7.3	0.0	95.5	29.6
TH02	37.9	16.4	45.6	1.1	4.6	21.4	35.7	7.4	0.0	95.4	28.8
TH03	37.9	16.5	45.5	1.1	4.6	21.5	35.7	7.4	0.0	95.4	28.3
TH04	38.5	17.1	44.3	1.2	4.8	22.3	35.9	7.7	0.0	95.2	25.7
TH05	18.2	26.1	55.7	0.0	0.0	8.4	37.9	0.0	0.0	99.5	28.6
TH06	17.3	30.6	52.0	0.0	0.0	0.0	0.0	0.0	100.0	100.0	100.0
TH07	4.4	51.1	44.4	0.0	0.0	2.2	27.8	0.0	0.0	98.9	4.4
TH08	0.0	66.7	33.3	0.0	0.0	4.4	31.1	0.0	0.0	97.8	0.0
TH09	31.0	7.0	62.0	0.0	0.0	21.1	50.7	0.0	0.0	100.0	18.3
TH10	36.4	0.0	63.6	0.0	0.0	31.1	48.9	0.0	0.0	100.0	13.3
TH11	47.2	13.7	38.9	1.7	6.8	28.4	35.2	11.0	0.0	93.4	23.6
TH12	48.3	14.3	37.2	1.7	7.2	29.8	36.7	11.5	0.0	93.0	20.4
TH20	64.7	5.9	29.4	0.0	40.0	51.4	45.7	11.4	0.0	88.6	0.0
TH21	24.5	54.7	20.8	3.7	0.0	44.4	53.7	24.1	0.0	81.5	0.0
TH22	44.3	31.1	24.5	1.9	13.2	50.0	50.0	24.5	0.0	86.8	0.0
TH23	51.5	24.6	23.9	1.5	11.1	46.7	45.2	24.4	0.0	87.4	0.0
TH24	53.0	17.0	30.0	3.2	13.0	39.3	36.4	13.8	0.0	87.4	2.0
TH25	56.9	8.3	34.9	6.4	15.6	32.1	25.7	1.8	0.0	87.2	4.6
TH26	65.4	3.8	30.8	13.2	28.3	50.9	32.1	0.0	0.0	83.0	7.5
TH27	54.1	14.5	31.4	2.7	10.8	42.8	40.4	16.5	0.0	89.6	5.4
TH28	29.6	40.7	27.8	0.0	0.0	11.1	22.2	0.0	0.0	100.0	0.0
TH29	50.0	18.6	31.1	2.3	9.1	37.8	37.8	13.9	0.0	90.9	4.5
TH30	81.3	0.0	18.8	0.0	0.0	15.2	57.6	9.1	0.0	100.0	90.9
TM01	94.4	0.0	5.2	0.0	0.0	0.0	0.0	15.4	99.1	100.0	100.5
TM02	90.9	0.0	9.1	0.0	0.0	0.0	0.0	43.5	100.0	100.0	100.0
TM03	100.0	0.0	0.0	0.0	0.0	0.0	0.0	71.0	90.3	100.0	100.0
TM04	96.4	0.0	3.6	0.0	0.0	0.0	0.0	57.1	96.4	100.0	100.0
TM05	94.3	0.0	5.7	0.0	0.0	0.0	0.0	38.4	97.7	100.0	100.0
TM07	95.8	0.0	4.2	0.0	0.0	0.0	0.0	27.7	98.3	100.0	100.8
TM09	96.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	100.0	103.3
SITE	VEG_LOW	VEG_MED	VEG_HIGH	PCT86	PCT87	PCT88	PCT89	PCT90	PCT91	PCT92	PCT93
TM10	95.7	0.0	4.3	0.0	0.0	0.0	0.0	23.9	98.6	100.0	100.7
TM12	95.3	0.0	4.1	0.0	0.0	0.0	0.0	17.0	99.0	100.0	100.5
WO01	27.2	48.3	23.7	0.0	0.0	0.0	71.2	5.3	0.0	69.4	62.4
WO02	19.8	55.0	24.4	0.0	0.0	0.0	72.9	4.1	0.0	65.2	67.7
WO03	12.8	66.6	19.7	0.0	0.0	0.0	68.1	0.7	0.0	52.6	53.9

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WO04	16.6	58.8	23.7	0.0	0.0	0.0	73.3	1.8	0.0	62.8	67.6
WO05	24.4	40.9	33.9	0.0	0.0	0.0	86.0	4.7	0.0	86.0	100.0
WO06	15.5	47.3	36.4	0.0	0.0	0.0	85.7	0.0	0.0	83.9	99.1
WO07	12.7	50.9	36.4	0.0	0.0	0.0	83.3	0.0	0.0	66.7	100.0
WO20	4.5	73.4	21.7	0.0	0.0	0.0	66.3	0.4	0.0	46.1	51.3
WO21	2.3	71.3	26.3	0.0	0.0	0.0	57.0	0.0	0.0	44.8	64.0
WO22	2.7	68.9	28.4	0.0	0.0	0.0	53.4	0.0	0.0	38.5	60.8
WO23	3.0	70.4	26.7	0.0	0.0	0.0	50.4	0.0	0.0	32.6	56.3
WO24	11.8	32.4	55.9	0.0	0.0	0.0	47.1	0.0	0.0	47.1	38.2
WO25	1.1	85.7	13.2	0.0	0.0	0.0	49.5	0.0	0.0	23.1	59.3
WO26	1.2	86.7	12.0	0.0	0.0	0.0	47.6	0.0	0.0	19.5	56.1
WO27	0.0	95.3	4.7	0.0	0.0	0.0	45.2	0.0	0.0	16.7	66.7
WO28	1.3	87.2	11.5	0.0	0.0	0.0	46.2	0.0	0.0	16.7	53.8
WO29	9.1	72.7	18.2	0.0	0.0	0.0	45.5	0.0	0.0	27.3	54.5
WO30	0.0	81.0	19.0	0.0	0.0	0.0	50.0	0.0	0.0	4.5	18.2
WR01	82.7	0.0	17.3	0.0	0.0	0.0	0.0	46.7	92.9	100.0	100.0
WR02	84.4	0.0	15.6	0.0	0.0	0.0	0.0	50.5	92.3	100.0	100.0
WR03	84.0	0.0	16.0	0.0	0.0	0.0	0.0	52.3	92.0	100.0	100.0
WR04	84.3	0.0	15.7	0.0	0.0	0.0	0.0	53.2	91.9	100.0	100.0
WR05	76.0	0.0	24.0	0.0	0.0	0.0	0.0	37.3	101.3	100.0	101.3
WR06	90.3	0.0	9.7	0.0	0.0	0.0	0.0	68.1	85.1	100.0	100.0
WR07	90.9	0.0	9.1	0.0	0.0	0.0	0.0	71.9	84.3	100.0	100.0
WR08	90.8	0.0	9.2	0.0	0.0	0.0	0.0	81.8	81.8	100.0	100.0
WR09	93.3	0.0	6.7	0.0	0.0	0.0	0.0	97.8	88.9	100.0	100.0
WR10	90.6	0.0	9.4	0.0	0.0	0.0	0.0	92.2	79.7	100.0	100.0

¹ SITE = site identification code

Forest-cover class = aerial percentage of catchment area

Defoliation = areal percentage of catchment area

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Appendix II

Analysis Methods and Data

prepared by

Rick Webb

Department of Environmental Sciences

University of Virginia, Charlottesville, VA 22903

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APPENDIX II - TABLE 1: ANALYSIS METHODS FOR WATER SAMPLES¹

Aliquot	Instrumentation	Method
Sulfate, Nitrate, and Chloride	Dionex 4000I Ion Chromatograph; HPIC AS4A Separator Column; HPIC AG4A Pre-Column; AMMS Anion Micro-Membrane Suppressor	Simultaneous determination by ion chromatography. Injection volume: 200 μ L. Eluent: 2.2 mL 3.4-4.5 mM Na ₂ CO ₃ /minute. Regenerant: 3-4 ml 0.035 N H ₂ SO ₄ /minute.
Calcium, Magnesium, Potassium, and Sodium	Thermo Jarrel Ash AA/AE Spectrophotometer Model Smith-Hieftje 22	Flame atomic absorption spectrophotometry. Li/La added to aliquot.
Silica	Technicon Autoanalyzer II	Colorimetric detection by molybdate blue technique.
Aluminum, total monomeric	Technicon Autoanalyzer II	Colorimetric detection with open-system samples by pyrocatechol violet technique.
pH	Bechman Psi pH Meter (No. 123114); Corning Calomel Combination pH Electrode (No. 476530)	Potentiometric measurement with open-system samples. Within-aliquot stability (≤ 0.01 units/min.) and sequential aliquot agreement (≤ 0.03 units difference) obtained.
Acid-neutralization capacity	Bechman Psi pH Meter (No. 123114); Corning Calomel Combination pH Electrode (No. 476530)	Five-point Gran titration with 100 ml sample aliquot and 0.005 N HCl titrant. Within-aliquot stability (≤ 0.01 units/min.) obtained for endpoint determinations.
Electrical Conductivity	YSI Model 31 Conductivity Bridge; Beckman CEL-GO1 cell	Standard conductivity bridge and cell. Values corrected to 25° C.

¹ Methods identified in this table apply to the data listed in Appendix II, Tables 3A and 3B. See <http://wsrv.clas.virginia.edu/~swasftp> for detailed methods descriptions.

APPENDIX II - TABLE 2A: QUALITY ASSURANCE DATAAnalytical Bias and Precision^{1,2,3}

SAMPLE	TARGET	N	MEAN	STD DEV	%BIAS	DIFF	%RSD
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Sulfate ($\mu\text{eq L}^{-1}$)

FN09	132.29	88	137.29	1.04	3.78	5.00	0.76
FN10	117.52	86	124.56	1.55	5.99	7.04	1.24
MAD1	81.70	19	81.55	0.76	-0.18	-0.15	0.93
SMR1	62.50	19	62.37	0.74	-0.21	-0.13	1.19
E384	74.88	61	72.67	0.67	-2.95	-2.21	0.92
1185	83.20	57	81.75	0.61	-1.74	-1.45	0.75

Chloride ($\mu\text{eq L}^{-1}$)

FN09	111.67	89	112.40	1.07	0.65	0.73	0.95
FN10	8.46	85	8.82	0.28	4.26	0.36	3.17
MAD1	28.40	19	28.50	0.45	0.35	0.10	1.58
SMR1	16.50	19	16.48	0.27	-0.12	-0.02	1.64
E384	74.88	61	72.67	0.67	-2.95	-2.21	0.92

Nitrate ($\mu\text{eq L}^{-1}$)

FN09	17.11	89	12.92	1.31	-24.49	-4.19	10.14
FN10	14.27	84	14.38	0.28	0.77	0.11	1.95
MAD1	21.40	19	21.19	0.85	0.98	-0.21	4.01
SMR1	2.50	19	2.46	0.20	-1.60	-0.04	8.13
EPA1	12.86	80	12.47	0.17	-3.03	-0.39	1.36
EPA2	114.20	77	115.14	1.13	0.82	0.94	0.98

Calcium ($\mu\text{eq L}^{-1}$)

FN09	250.50	26	244.27	4.73	-2.49	-6.23	1.94
FN10	90.82	31	86.95	1.51	-4.26	-3.87	1.74
MAD1	41.90	12	42.06	0.79	0.38	0.16	1.88
SMR1	22.50	12	22.66	0.51	0.71	0.16	2.25
E384	132.24	15	126.82	3.71	-4.10	-5.42	2.93
1185	199.60	16	192.25	5.60	-3.68	-7.35	2.91

SAMPLE	TARGET	N	MEAN	STD DEV	%BIAS	DIFF	%RSD
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Magnesium ($\mu\text{eq L}^{-1}$)

FN09	64.19	26	65.65	1.11	2.27	1.46	1.69
FN10	23.87	31	23.94	0.30	0.29	0.07	1.25
MAD1	69.70	12	70.30	1.18	0.86	0.60	1.68
SMR1	28.50	12	28.44	0.31	-0.21	-0.06	1.09
E384	74.07	15	73.36	1.11	-0.96	-0.71	1.51
1185	82.30	16	81.24	1.49	-1.29	-1.06	1.83

Sodium ($\mu\text{eq L}^{-1}$)

FN09	112.67	18	114.59	2.05	1.70	1.92	1.79
FN10	24.80	32	24.59	0.31	-0.85	-0.21	1.26
MAD1	30.80	13	30.88	0.39	0.26	0.08	0.10
SMR1	16.60	13	16.57	0.26	-0.18	-0.03	1.57
E384	178.35	12	176.92	3.43	-0.80	-1.43	1.94
1185	174.00	12	170.34	3.59	-1.98	-3.44	2.11

Potassium ($\mu\text{eq L}^{-1}$)

FN09	12.03	28	11.68	0.25	-2.91	-0.35	2.14
FN10	8.19	32	8.07	0.15	-1.47	-0.12	1.86
MAD1	40.20	13	40.28	0.66	0.20	0.08	1.64
SMR1	16.20	13	16.28	0.42	0.49	0.08	2.58
E384	26.88	17	25.77	0.59	-4.13	-1.11	2.29
1185	25.60	18	23.90	0.69	-6.64	-1.70	2.89

Silica ($\mu\text{m L}^{-1}$)

FN09	67.56	42	72.61	1.62	7.47	5.05	2.23
FN10	57.60	42	62.20	0.74	7.99	4.60	1.19
MAD1	104.40	9	102.65	4.16	-1.68	-1.75	4.05
SMR1	70.20	8	69.91	0.62	-0.41	-0.29	0.89

Total Monomeric Aluminum ($\mu\text{g L}^{-1}$)

FN09	13.00	28	26.56	5.22	104.31	13.56	19.65
FN10	158.00	16	179.05	13.49	13.32	21.05	7.53

Hydrogen Ion ($\mu\text{eq L}^{-1}$)

MAD1	0.30	119	0.28	0.06	-6.67	-0.02	21.43
SMR1	2.40	119	2.34	0.17	-2.50	-0.06	7.26

SAMPLE	TARGET	N	MEAN	STD DEV	%BIAS	DIFF	%RSD
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Acid-Neutralization Capacity ($\mu\text{eq L}^{-1}$)

MAD1	50.80	76	50.76	1.46	-0.08	-0.04	2.88
SMR1	2.30	75	2.28	0.89	-0.87	-0.02	39.04

Electrical Conductivity ($\mu\text{S cm}^{-1}$)

MAD1	21.40	105	21.42	0.40	0.09	0.02	1.87
SMR1	11.70	105	11.70	0.21	0.00	0	1.79

¹ SAMPLE = reference-sample identification code (see below)

TARGET = nominal true value

N = number of values obtained during analyses of project samples

MEAN = mean for values obtained during analyses of project samples

STD DEV = standard deviation for values obtained during analyses of project samples

%BIAS = $[(\text{MEAN} - \text{TARGET}) / \text{TARGET}] \times 100$

DIFF = absolute value of MEAN - TARGET

%RSD = $(\text{STD DEV} / \text{MEAN}) \times 100$

² Natural matrix reference samples collected from natural waters and characterized by previous analysis.

A. FN09, FN10 - Lake water samples provided by Environmental Assessment Department, Lockheed Engineering and Sciences. Listed target values are based on analyses by multiple laboratories.

B. SMR1, MAD1 - Stream water samples collected from the Blue Ridge Mountains in Virginia. Target values are based on prior analyses at the project laboratory.

³ Synthetic reference samples prepared to known concentrations.

A. EPA1, EPA2, E384, 1185 - Quality Control Samples supplied by USEPA Environmental Monitoring and Support Laboratory, Cincinnati, Ohio.

APPENDIX II - TABLE 2B: QUALITY ASSURANCE DATAField Duplicate Analysis^{1,2}

ANALYTE	MEAN	STD DEV
Sulfate ($\mu\text{eq L}^{-1}$)	0.41	0.31
Chloride ($\mu\text{eq L}^{-1}$)	0.19	0.21
Nitrate ($\mu\text{eq L}^{-1}$)	1.92	4.36
Calcium ($\mu\text{eq L}^{-1}$)	0.53	0.49
Magnesium ($\mu\text{eq L}^{-1}$)	0.43	0.48
Sodium ($\mu\text{eq L}^{-1}$)	0.38	0.31
Potassium ($\mu\text{eq L}^{-1}$)	0.09	0.09
Silica ($\mu\text{m L}^{-1}$)	0.59	0.57
Hydrogen Ion ($\mu\text{eq L}^{-1}$)	0.05	0.09
Acid-Neutralization Capacity ($\mu\text{eq L}^{-1}$)	3.40	4.83
Electrical Conductivity ($\mu\text{S cm}^{-1}$)	0.48	1.03

¹ Samples collected in separate sample bottles at same time and location. Site locations for duplicate collections included: BB01, BB03, HR01, MR01, NF01, PI01, PR01, RR01, SR01, and TM01.

² MEAN = mean of the absolute difference for 26 duplicate pairs
 STD DEV = standard deviation of the absolute difference for duplicate pairs

APPENDIX II - TABLE 3A: ANALYSES OF INTENSIVE-SITE SAMPLES¹

SITE	DATE	TIME	TYPE	TEMP	ANC	PH	COND	SO4	CL	NO3	CA	MG	K	NA	SIO2	T_AL
PAIN	9/1/92	-999	GRAB	0.0	7.8	6.16	20.6	102.1	26.2	21.0	29.4	53.1	52.6	25.3	101.4	-999.9
PAIN	9/10/92	1520	GRAB	17.0	1.2	5.41	24.0	102.4	27.4	48.7	37.4	66.9	55.0	24.4	100.0	-999.9
PAIN	9/17/92	1315	GRAB	17.5	6.2	5.83	21.2	100.6	27.5	30.9	32.9	56.2	50.6	24.9	102.3	-999.9
PAIN	9/22/92	-999	GRAB	-9.9	7.8	5.88	20.9	101.4	26.8	22.7	31.7	53.2	50.1	24.7	103.3	-999.9
PAIN	9/29/92	-999	GRAB	-9.9	6.2	5.98	20.9	102.3	26.4	24.2	30.4	53.7	48.7	24.4	105.5	-999.9
PAIN	10/1/92	-999	GRAB	-9.9	7.8	5.93	20.9	101.1	27.1	25.8	31.4	55.3	48.3	24.6	104.3	-999.9
PAIN	10/6/92	-999	GRAB	-9.9	6.2	5.93	21.0	101.7	26.4	26.0	33.2	56.0	46.7	24.8	102.2	-999.9
PAIN	10/13/92	1115	GRAB	11.0	3.7	5.78	21.5	98.7	26.8	32.9	33.8	57.9	47.5	24.6	102.8	-999.9
PAIN	10/20/92	1000	GRAB	7.0	6.2	5.89	20.3	100.2	26.6	21.2	32.4	54.2	45.1	24.3	101.0	-999.9
PAIN	10/27/92	1220	GRAB	11.0	6.2	5.91	19.9	102.4	26.5	14.5	30.6	51.4	45.3	24.1	100.0	-999.9
PAIN	11/3/92	1515	GRAB	12.0	8.7	5.83	22.0	107.1	30.0	19.1	33.0	59.0	51.3	24.8	100.6	-999.9
PAIN	11/10/92	1245	GRAB	6.0	4.4	5.75	21.0	99.3	26.8	29.1	32.1	57.5	47.2	24.2	98.5	-999.9
PAIN	11/11/92	2000	AUTO	-9.9	4.4	5.88	21.1	99.6	27.4	28.6	31.9	57.4	47.0	24.4	99.1	-999.9
PAIN	11/12/92	0400	AUTO	-9.9	5.3	5.85	21.0	99.0	26.9	28.4	31.6	58.4	46.3	24.4	98.7	-999.9
PAIN	11/12/92	1200	AUTO	-9.9	5.3	5.82	20.8	99.1	27.0	27.0	30.8	57.0	47.2	24.3	98.9	-999.9
PAIN	11/12/92	2000	AUTO	-9.9	5.3	5.71	20.5	97.2	26.4	25.3	31.3	55.9	48.1	23.5	95.2	-999.9
PAIN	11/13/92	0400	AUTO	-9.9	2.8	5.58	23.6	104.9	27.4	38.3	36.4	65.3	53.0	23.7	94.2	-999.9
PAIN	11/13/92	1200	AUTO	-9.9	0.3	5.57	26.1	103.6	28.3	54.6	40.9	72.0	56.2	24.6	96.6	-999.9
PAIN	11/13/92	2000	AUTO	-9.9	0.3	5.56	26.0	102.4	29.0	55.0	39.9	70.2	54.8	24.7	97.0	-999.9
PAIN	11/14/92	1200	AUTO	-9.9	0.3	5.61	24.1	101.9	28.1	48.2	37.2	66.7	51.3	24.2	96.8	-999.9
PAIN	11/15/92	0400	AUTO	-9.9	1.9	5.63	23.5	101.5	28.3	43.5	36.0	64.1	50.1	24.3	97.5	-999.9
PAIN	11/15/92	2000	AUTO	-9.9	1.2	5.63	23.2	101.7	28.1	40.5	34.7	63.2	49.1	24.3	97.5	-999.9
PAIN	11/16/92	1200	AUTO	-9.9	2.8	5.65	22.7	101.9	28.3	38.4	34.3	61.8	47.5	24.1	97.3	-999.9
PAIN	11/17/92	0400	AUTO	-9.9	2.9	5.67	22.5	101.5	27.9	37.5	33.8	61.6	47.2	24.1	97.5	-999.9
PAIN	11/17/92	1325	GRAB	7.0	2.8	5.66	21.8	102.0	28.2	34.5	34.0	60.6	47.0	24.1	96.6	-999.9
PAIN	11/22/92	0400	AUTO	-9.9	3.6	5.73	21.5	101.1	28.0	30.8	32.4	59.0	47.4	24.6	97.7	-999.9
PAIN	11/22/92	1200	AUTO	-9.9	3.3	5.68	21.5	100.9	27.6	29.4	31.7	57.6	47.7	24.7	98.2	-999.9
PAIN	11/22/92	2000	AUTO	-9.9	1.9	5.71	20.6	95.2	26.2	26.1	31.4	55.1	46.7	23.6	92.5	-999.9
PAIN	11/23/92	0400	AUTO	-9.9	-5.6	5.13	33.0	121.9	28.5	81.7	57.5	91.6	67.3	21.4	81.5	-999.9
PAIN	11/23/92	1200	AUTO	-9.9	-5.6	5.22	29.1	117.4	28.3	63.7	48.0	77.9	58.8	21.9	84.7	-999.9
PAIN	11/23/92	2000	AUTO	-9.9	-4.6	5.32	27.0	114.3	27.9	51.6	42.9	71.4	54.7	22.1	87.7	-999.9
PAIN	11/24/92	0400	AUTO	-9.9	-2.2	5.34	26.0	113.0	28.1	46.3	40.0	68.6	52.5	22.4	90.2	-999.9
PAIN	11/24/92	1200	AUTO	-9.9	-2.2	5.40	25.1	111.9	28.3	43.1	38.7	65.8	51.2	22.5	92.1	-999.9
PAIN	11/24/92	1240	GRAB	11.0	-7.2	5.09	25.3	112.9	28.6	39.9	38.9	64.8	51.4	22.5	91.9	-999.9
PAIN	11/24/92	2000	AUTO	-9.9	0.3	5.41	24.0	110.3	28.1	40.5	37.0	64.2	50.3	22.5	92.2	-999.9
PAIN	11/25/92	1200	AUTO	-9.9	1.2	5.46	23.5	109.8	28.8	37.9	35.7	61.9	49.7	22.5	94.6	-999.9
PAIN	11/26/92	0400	AUTO	-9.9	1.1	5.49	23.0	109.8	29.3	34.8	35.1	61.1	49.9	22.8	96.2	-999.9
PAIN	11/26/92	2000	AUTO	-9.9	1.2	5.51	22.9	108.8	29.0	34.1	34.5	61.2	50.2	23.1	96.6	-999.9

Appendix II Table 3A - Analysis of Intensive Site Samples

SITE	DATE	TIME	TYPE	TEMP	ANC	PH	COND	SO4	CL	NO3	CA	MG	K	NA	SIO2	T_AL
PAIN	11/27/92	1200	AUTO	-9.9	0.3	5.49	23.0	108.6	28.6	34.2	34.1	60.9	49.3	23.1	96.7	-999.9
PAIN	11/28/92	0400	AUTO	-9.9	1.9	5.51	23.0	107.0	28.6	34.2	34.8	61.1	48.7	23.4	96.9	-999.9
PAIN	11/28/92	2000	AUTO	-9.9	2.8	5.54	22.8	105.3	28.2	33.3	34.3	60.6	48.4	23.4	96.5	-999.9
PAIN	12/1/92	1330	GRAB	7.0	1.2	5.60	21.9	105.0	28.0	31.5	34.1	60.0	46.9	23.4	95.8	-999.9
PAIN	12/8/92	1307	GRAB	4.0	1.9	5.65	21.3	114.4	27.1	20.9	33.5	60.0	44.0	23.4	93.5	-999.9
PAIN	12/9/92	2000	AUTO	-9.9	3.7	5.67	21.4	104.5	27.0	29.3	32.8	60.7	42.1	23.0	93.1	-999.9
PAIN	12/10/92	0400	AUTO	-9.9	2.8	5.66	21.5	104.2	27.1	29.1	32.8	61.0	41.9	23.1	92.9	-999.9
PAIN	12/10/92	1200	AUTO	-9.9	2.8	5.68	19.9	95.6	24.5	26.2	30.3	56.7	37.9	21.2	85.1	-999.9
PAIN	12/10/92	2000	AUTO	-9.9	1.9	5.48	20.6	100.4	22.1	26.0	30.4	57.4	40.4	19.6	73.7	-999.9
PAIN	12/11/92	0400	AUTO	-9.9	0.3	5.48	23.1	109.4	25.8	38.5	34.7	65.5	46.3	22.1	83.9	-999.9
PAIN	12/11/92	1200	AUTO	-9.9	0.3	5.48	23.5	110.3	27.0	42.3	35.5	67.1	47.3	22.6	88.1	-999.9
PAIN	12/11/92	2000	AUTO	-9.9	-0.6	5.48	23.5	108.6	27.5	40.8	36.0	66.3	46.8	22.7	89.4	-999.9
PAIN	12/12/92	0400	AUTO	-9.9	1.2	5.52	23.1	108.3	27.5	39.7	35.0	66.5	46.8	23.3	91.2	-999.9
PAIN	12/12/92	1200	AUTO	-9.9	2.8	5.52	23.0	108.4	27.4	37.5	34.6	65.9	46.2	23.4	92.0	-999.9
PAIN	12/13/92	0400	AUTO	-9.9	3.7	5.56	22.8	106.9	27.4	35.6	33.8	64.4	45.9	23.4	92.2	-999.9
PAIN	12/13/92	2000	AUTO	-9.9	2.8	5.55	22.6	108.3	27.4	33.2	33.4	63.3	45.7	23.5	92.2	-999.9
PAIN	12/14/92	1200	AUTO	-9.9	2.8	5.55	22.3	109.0	27.6	31.8	33.2	62.7	45.1	23.4	92.6	-999.9
PAIN	12/15/92	1235	GRAB	2.0	2.8	5.60	21.7	110.5	27.2	28.7	33.7	62.8	45.7	23.5	93.3	-999.9
PAIN	12/22/92	1055	GRAB	5.0	0.3	5.39	22.1	105.4	26.8	32.0	35.1	60.7	44.3	22.8	89.7	-999.9
PAIN	12/29/92	1350	GRAB	5.5	2.8	5.68	21.4	104.9	26.6	28.9	33.9	58.8	44.0	23.2	88.8	-999.9
PAIN	1/5/93	1320	GRAB	11.0	2.8	5.69	20.6	105.0	26.0	27.1	32.5	56.2	44.5	23.1	87.5	-999.9
PAIN	1/12/93	1420	GRAB	8.0	0.3	5.60	21.8	105.0	26.4	31.9	34.0	59.7	46.2	22.8	90.9	-999.9
PAIN	1/19/93	1255	GRAB	4.0	0.8	5.61	21.1	104.8	26.7	31.3	33.5	58.9	44.0	23.3	85.0	-999.9
PAIN	1/26/93	1330	GRAB	3.5	1.9	5.64	20.3	104.5	26.1	28.4	33.1	58.2	41.4	22.7	84.5	-999.9
PAIN	2/2/93	1410	GRAB	1.5	0.3	5.69	20.5	104.1	25.6	27.5	33.3	57.6	40.6	24.2	81.2	-999.9
PAIN	2/9/93	1330	GRAB	4.0	1.9	5.73	20.5	104.0	24.8	24.9	31.8	58.4	42.1	24.1	77.8	-999.9
PAIN	2/16/93	0920	GRAB	4.5	4.4	5.70	20.5	103.7	24.1	23.8	32.6	59.3	41.8	24.0	74.7	-999.9
PAIN	2/23/93	1025	GRAB	2.0	1.2	5.60	23.0	110.6	25.2	37.3	36.2	68.1	48.5	25.0	86.4	-999.9
PAIN	3/2/93	1130	GRAB	2.5	3.3	5.67	21.1	105.4	25.2	26.1	32.8	60.2	44.8	25.2	77.8	-999.9
PAIN	3/3/93	1200	AUTO	-9.9	2.8	5.71	20.7	104.8	25.3	26.6	33.5	60.2	43.6	24.4	76.5	-999.9
PAIN	3/3/93	2000	AUTO	-9.9	2.8	5.64	20.6	105.1	25.4	26.0	33.1	59.6	43.7	24.2	75.3	-999.9
PAIN	3/4/93	0400	AUTO	-9.9	2.8	5.65	21.0	104.7	25.5	27.5	33.8	60.2	44.2	24.3	73.9	-999.9
PAIN	3/4/93	1200	AUTO	-9.9	2.8	5.60	20.6	102.9	24.4	27.4	33.7	59.3	42.8	23.4	73.3	-999.9
PAIN	3/4/93	1415	GRAB	3.5	-8.0	4.98	30.1	128.0	21.4	47.9	52.2	84.8	55.8	18.3	65.6	-999.9
PAIN	3/4/93	2000	AUTO	-9.9	-4.7	5.15	28.8	123.6	21.3	58.5	51.6	84.9	54.9	18.4	64.5	-999.9
PAIN	3/5/93	0400	AUTO	-9.9	-4.7	5.22	27.7	124.9	22.6	54.6	49.0	80.0	51.9	19.6	69.4	-999.9
PAIN	3/5/93	1200	AUTO	-9.9	-3.9	5.28	26.1	121.5	23.3	46.2	45.1	73.7	50.2	20.4	73.8	-999.9
PAIN	3/5/93	2000	AUTO	-9.9	-3.1	5.31	25.2	117.6	23.4	41.7	42.2	70.3	48.7	20.9	76.6	-999.9
PAIN	3/6/93	0400	AUTO	-9.9	-1.3	5.37	23.9	115.3	23.7	38.8	41.0	68.0	47.6	21.3	78.9	-999.9
PAIN	3/6/93	2000	AUTO	-9.9	-1.3	5.41	23.4	112.9	24.1	35.6	39.3	65.6	46.3	21.8	81.1	-999.9
PAIN	3/7/93	1200	AUTO	-9.9	1.2	5.46	22.6	110.4	24.0	34.8	39.0	65.1	45.4	21.9	83.1	-999.9
PAIN	3/8/93	1200	AUTO	-9.9	1.1	5.50	22.5	108.9	24.3	33.8	35.3	61.8	46.2	22.4	84.7	-999.9

Appendix II Table 3A - Analysis of Intensive Site Samples

SITE	DATE	TIME	TYPE	TEMP	ANC	PH	COND	SO4	CL	NO3	CA	MG	K	NA	SIO2	T_AL
PAIN	3/9/93	1620	GRAB	4.5	-0.6	5.46	22.5	107.4	24.8	32.2	35.0	60.2	45.9	23.1	85.5	-999.9
PAIN	3/17/93	0935	GRAB	3.0	1.9	5.50	20.8	101.7	22.2	27.4	33.4	57.4	41.9	21.6	80.6	-999.9
PAIN	3/19/93	1650	GRAB	4.5	-2.2	5.50	23.0	110.1	24.1	35.7	36.1	62.8	47.1	22.4	82.8	-999.9
PAIN	3/23/93	1730	GRAB	-9.9	-0.6	5.49	22.5	105.4	23.6	36.8	35.2	60.2	46.6	22.2	81.0	-999.9
PAIN	3/24/93	1005	GRAB	3.0	-0.6	5.49	24.3	105.8	24.5	49.4	39.8	65.8	50.0	23.4	78.8	-999.9
PAIN	3/30/93	0930	GRAB	8.5	-0.6	5.46	22.0	110.5	23.5	35.5	34.8	62.4	46.7	22.3	80.5	-999.9
PAIN	4/6/93	0900	GRAB	7.0	0.3	5.57	21.3	105.8	23.7	28.5	33.1	58.9	44.1	22.0	77.2	-999.9
PAIN	4/13/93	0920	GRAB	7.5	1.9	5.60	21.5	103.3	23.9	30.9	32.0	57.9	45.9	22.7	78.4	-999.9
PAIN	4/15/93	2000	AUTO	-9.9	2.8	5.80	20.5	104.8	24.9	27.7	30.1	54.5	46.5	23.2	75.4	-999.9
PAIN	4/16/93	0400	AUTO	-9.9	1.6	5.56	23.6	107.4	23.8	35.5	35.7	60.2	47.6	22.5	76.4	-999.9
PAIN	4/16/93	1200	AUTO	-9.9	1.9	5.46	22.0	110.1	21.2	27.1	34.3	58.6	48.2	20.4	72.4	-999.9
PAIN	4/16/93	1520	GRAB	11.0	0.3	5.46	24.5	116.5	22.3	39.0	36.9	67.4	52.2	21.3	76.4	-999.9
PAIN	4/20/93	0955	GRAB	11.0	0.4	5.60	21.2	106.6	23.7	25.8	32.4	56.2	45.5	22.1	79.4	-999.9
PAIN	4/27/93	1110	GRAB	10.0	3.3	5.70	20.5	106.1	24.0	25.0	31.7	56.7	46.8	23.5	80.7	-999.9
PAIN	5/4/93	0820	GRAB	13.5	3.7	5.72	20.5	104.7	24.5	24.0	32.8	56.7	47.2	22.6	79.0	-999.9
PAIN	5/11/93	0820	GRAB	14.0	6.2	5.85	20.6	98.9	23.4	24.6	32.6	55.5	49.1	23.2	84.2	-999.9
PAIN	5/18/93	0900	GRAB	14.0	7.8	5.85	21.0	102.2	24.3	26.5	30.6	56.4	50.7	24.2	88.5	-999.9
PAIN	5/25/93	0826	GRAB	13.0	6.9	5.90	20.5	101.4	24.8	27.4	31.0	57.6	50.6	24.2	86.6	-999.9
PAIN	6/1/93	0820	GRAB	13.0	5.3	5.90	21.1	101.8	24.6	27.3	31.2	57.4	50.0	23.7	88.0	-999.9
PAIN	6/8/93	0820	GRAB	15.0	8.7	5.81	20.9	101.7	24.4	22.1	30.3	55.2	50.0	23.8	85.0	-999.9
PAIN	6/15/93	0834	GRAB	15.0	9.4	5.98	20.6	101.0	24.8	21.8	30.3	55.6	49.6	24.8	90.7	-999.9
PAIN	6/18/93	2000	AUTO	-9.9	2.0	5.47	21.0	94.8	22.7	25.8	29.7	51.7	50.8	22.4	84.1	-999.9
PAIN	6/19/93	0400	AUTO	-9.9	2.8	5.43	21.0	96.2	24.0	24.5	28.5	53.1	49.7	23.8	92.2	-999.9
PAIN	6/19/93	1200	AUTO	-9.9	1.2	5.50	21.0	99.7	24.6	25.0	28.8	52.3	50.6	24.4	93.6	-999.9
PAIN	6/22/93	0844	GRAB	16.0	5.3	5.92	20.1	100.1	24.2	21.2	27.6	52.1	52.0	24.3	102.9	-999.9
PAIN	6/29/93	0819	GRAB	19.0	9.4	5.98	20.6	99.7	24.4	24.4	28.8	53.6	52.6	24.7	103.7	-999.9
PAIN	7/6/93	0810	GRAB	19.0	10.3	5.99	21.5	100.4	24.9	24.5	28.2	51.8	54.1	25.3	104.8	-999.9
PAIN	7/13/93	0821	GRAB	19.5	10.3	5.96	21.5	99.2	25.0	22.3	28.7	53.2	54.4	25.2	108.7	-999.9
PAIN	7/20/93	1626	GRAB	23.0	5.3	6.00	20.5	100.5	25.3	22.2	27.4	49.9	55.1	25.4	108.8	-999.9
PAIN	7/27/93	0850	GRAB	19.8	10.8	5.98	20.5	97.0	23.8	22.9	27.3	51.0	52.9	24.1	110.7	-999.9
PAIN	8/3/93	0842	GRAB	19.5	10.3	6.08	20.9	98.6	25.1	21.6	27.1	51.6	53.0	25.4	115.2	-999.9
PAIN	8/7/93	0900	GRAB	16.5	8.7	6.01	21.0	101.5	24.2	25.8	30.2	53.9	53.5	25.3	114.0	-999.9
PAIN	8/10/93	0924	GRAB	17.5	9.4	6.11	20.4	100.0	25.3	22.5	27.7	52.0	53.0	25.9	114.2	-999.9
PAIN	8/17/93	0840	GRAB	19.0	11.9	5.97	21.0	102.1	24.8	22.2	27.5	53.2	54.3	25.5	115.3	-999.9
PAIN	8/24/93	0930	GRAB	19.0	9.4	6.08	20.9	98.5	25.0	20.4	25.6	50.7	53.9	26.3	119.5	-999.9
PAIN	8/31/93	0915	GRAB	19.5	12.9	6.16	20.9	96.2	24.4	17.1	25.2	50.7	53.3	25.8	121.7	-999.9
PAIN	9/9/93	1320	GRAB	17.5	11.2	6.07	20.2	102.9	24.4	15.3	26.4	50.3	53.5	25.5	121.8	-999.9
PAIN	9/16/93	1515	GRAB	17.0	13.7	6.09	20.4	99.5	23.5	13.9	26.3	50.3	53.8	24.6	118.1	-999.9
PAIN	9/23/93	1320	GRAB	17.5	11.2	5.85	20.5	105.0	24.1	13.2	25.9	51.1	52.3	25.2	121.5	-999.9
PAIN	9/30/93	1340	GRAB	15.5	9.4	5.95	20.6	106.9	23.8	15.2	27.5	53.2	51.1	25.5	120.5	-999.9
PAIN	10/7/93	1150	GRAB	16.0	9.4	5.98	19.6	105.2	23.0	11.1	25.7	51.3	49.8	25.4	117.9	-999.9
PAIN	10/13/93	1720	GRAB	11.5	11.9	6.08	20.0	108.7	23.4	9.8	26.5	52.6	49.8	25.3	113.7	-999.9

Appendix II Table 3A - Analysis of Intensive Site Samples

SITE	DATE	TIME	TYPE	TEMP	ANC	PH	COND	SO4	CL	NO3	CA	MG	K	NA	SIO2	T_AL
PAIN	10/21/93	1122	GRAB	17.0	17.8	6.00	20.0	107.7	24.5	0.1	24.8	49.6	55.6	24.8	117.8	13.5
PAIN	10/28/93	1525	GRAB	11.0	13.7	6.09	18.5	109.3	23.9	0.1	25.9	50.9	51.5	25.1	115.5	19.7
PAIN	11/4/93	1115	GRAB	8.5	15.4	6.11	19.4	112.0	24.1	0.6	27.7	54.6	49.7	24.5	110.7	9.4
PAIN	11/10/93	1133	GRAB	6.0	15.3	6.19	18.5	112.1	23.5	0.6	27.7	53.7	47.8	24.3	107.3	10.9
PAIN	11/17/93	1541	GRAB	13.5	13.7	6.02	19.4	113.0	23.8	0.1	26.6	51.0	51.0	24.2	106.6	18.5
PAIN	11/23/93	1242	GRAB	10.0	11.2	6.11	19.0	113.8	25.1	0.1	28.6	55.5	46.9	25.3	104.8	12.5
PAIN	11/26/93	1200	AUTO	-9.9	15.3	6.13	20.1	113.3	23.7	3.3	29.7	56.5	45.7	23.9	103.3	-999.9
PAIN	11/26/93	2000	AUTO	-9.9	16.2	6.13	20.1	113.5	24.1	2.7	29.3	56.2	46.0	23.5	103.3	-999.9
PAIN	11/27/93	0400	AUTO	-9.9	16.2	6.13	19.5	113.5	24.2	3.2	30.6	58.8	46.4	24.2	104.5	-999.9
PAIN	11/27/93	1200	AUTO	-9.9	14.4	6.04	19.5	109.6	25.6	4.5	29.9	57.9	46.8	23.8	95.9	-999.9
PAIN	11/28/93	0940	GRAB	9.5	-3.1	5.28	29.5	113.0	27.6	77.0	52.6	97.0	59.7	21.4	80.1	55.9
PAIN	12/1/93	1509	GRAB	8.0	2.8	5.53	23.4	105.4	26.5	42.7	37.2	70.5	49.0	22.7	93.8	20.4
PAIN	12/4/93	0400	AUTO	-9.9	5.3	5.71	22.9	104.8	26.1	38.1	37.0	66.7	48.2	22.9	96.1	-999.9
PAIN	12/4/93	1200	AUTO	-9.9	4.4	5.71	22.3	104.6	26.2	36.6	36.0	65.3	47.8	22.5	94.1	-999.9
PAIN	12/4/93	2000	AUTO	-9.9	4.4	5.70	21.8	100.5	25.6	33.8	37.4	63.8	46.9	22.0	91.4	-999.9
PAIN	12/6/93	1320	GRAB	9.0	-1.3	5.42	23.8	111.2	25.4	43.2	38.8	69.9	50.9	22.1	87.2	35.3
PAIN	12/14/93	1200	GRAB	6.0	2.8	5.70	22.5	106.7	26.0	29.5	34.9	64.2	45.1	23.5	91.7	-999.9
PAIN	12/20/93	1310	GRAB	6.0	2.8	5.78	21.2	107.8	25.0	24.9	33.5	62.8	44.5	23.0	92.9	18.2
PAIN	12/27/93	1115	GRAB	2.0	6.9	5.81	21.8	108.5	24.9	23.2	34.2	63.4	42.5	23.0	88.0	15.5
PAIN	1/3/94	1205	GRAB	4.0	2.8	5.80	19.6	108.1	24.1	22.6	33.1	62.3	41.8	22.7	84.5	-999.9
PAIN	1/13/94	1043	GRAB	5.5	0.3	5.44	23.5	118.3	24.3	28.0	34.0	66.1	46.7	22.5	84.9	43.2
PAIN	1/26/94	1420	GRAB	2.5	2.9	5.63	21.4	110.1	24.3	20.9	30.9	58.5	42.8	22.5	79.4	28.5
PAIN	1/27/94	0400	AUTO	-9.9	2.8	5.58	21.5	109.3	24.2	22.1	31.7	59.8	42.0	22.2	80.1	-999.9
PAIN	1/27/94	1200	AUTO	-9.9	2.8	5.56	21.2	108.5	24.0	22.5	31.7	59.2	41.4	22.2	79.8	-999.9
PAIN	1/27/94	2000	AUTO	-9.9	1.2	5.61	21.0	108.5	24.2	21.6	31.1	59.5	41.4	22.2	79.8	-999.9
PAIN	1/28/94	0400	AUTO	-9.9	2.9	5.58	21.3	108.3	24.2	22.6	31.8	59.1	41.1	22.5	80.1	-999.9
PAIN	1/28/94	1200	AUTO	-9.9	2.8	5.51	21.0	104.3	23.4	24.2	31.4	58.2	40.9	21.3	75.1	-999.9
PAIN	1/28/94	2000	AUTO	-9.9	0.3	5.46	22.9	115.9	23.4	25.4	34.9	64.0	45.2	21.0	75.7	-999.9
PAIN	1/29/94	0400	AUTO	-9.9	0.3	5.43	23.9	118.6	29.6	33.5	36.2	66.1	47.4	21.5	76.9	-999.9
PAIN	1/29/94	1200	AUTO	-9.9	1.9	5.46	24.1	115.4	27.8	33.1	36.6	65.7	46.9	25.4	79.0	-999.9
PAIN	1/30/94	1200	AUTO	-9.9	0.4	5.48	23.0	112.2	24.0	28.7	33.7	62.6	45.7	22.0	79.9	-999.9
PAIN	1/31/94	0400	AUTO	-9.9	2.8	5.49	22.8	112.1	24.2	28.4	33.1	62.1	44.9	22.0	80.7	-999.9
PAIN	2/2/94	1155	GRAB	2.5	0.4	5.51	21.6	110.9	23.9	24.2	32.7	61.2	42.9	22.4	80.3	37.5
PAIN	2/9/94	1350	GRAB	6.5	1.2	5.55	21.4	109.6	23.3	20.0	32.9	58.0	43.1	22.6	77.2	37.6
PAIN	2/16/94	1725	GRAB	4.5	2.8	5.62	21.5	112.0	23.9	21.7	33.8	60.3	44.6	22.9	75.7	22.7
PAIN	2/19/94	1200	AUTO	-9.9	0.3	5.58	23.5	121.3	24.5	23.6	36.1	65.5	44.8	22.4	78.2	-999.9
PAIN	2/20/94	1200	AUTO	-9.9	0.3	5.54	23.1	118.0	23.9	24.6	35.4	64.2	44.8	22.1	78.4	-999.9
PAIN	2/21/94	1200	AUTO	-9.9	0.3	5.52	22.6	112.4	23.2	25.7	33.6	61.2	44.6	21.4	77.8	-999.9
PAIN	2/22/94	1200	AUTO	-9.9	-0.6	5.51	22.1	107.9	23.0	28.7	34.5	60.9	43.8	21.2	77.1	-999.9
PAIN	2/23/94	0400	AUTO	-9.9	1.9	5.51	21.7	106.5	23.3	29.4	34.2	59.9	43.5	21.1	77.5	38.4
PAIN	2/23/94	1200	AUTO	-9.9	-0.6	5.46	22.0	105.6	22.1	26.3	33.3	58.7	42.5	20.3	72.9	-999.9
PAIN	2/23/94	1408	GRAB	5.5	-1.3	5.30	22.5	115.3	21.1	21.4	33.1	60.2	44.5	19.6	70.0	111.9

Appendix II Table 3A - Analysis of Intensive Site Samples

SITE	DATE	TIME	TYPE	TEMP	ANC	PH	COND	SO4	CL	NO3	CA	MG	K	NA	SIO2	T_AL
PAIN	2/28/94	1835	GRAB	3.0	1.2	5.50	22.0	111.2	23.5	23.7	35.1	62.1	42.0	21.0	76.5	28.7
PAIN	3/7/94	1730	GRAB	6.0	-2.2	5.36	23.3	129.3	21.5	16.5	36.9	69.7	48.2	20.6	70.9	51.5
PAIN	3/14/94	1710	GRAB	7.0	0.3	5.47	20.5	111.5	21.6	16.2	31.9	56.0	42.5	20.4	73.0	46.3
PAIN	3/24/94	1300	GRAB	10.5	2.8	5.58	20.3	107.7	23.5	17.9	32.3	54.5	41.6	21.1	68.7	33.3
PAIN	3/27/94	1200	AUTO	-9.9	1.9	5.56	20.9	104.9	22.3	22.4	31.7	55.1	42.8	20.8	69.7	-999.9
PAIN	3/27/94	2000	AUTO	-9.9	0.3	5.53	21.4	105.8	22.0	24.4	32.3	56.4	43.3	20.7	68.3	-999.9
PAIN	3/28/94	0400	AUTO	-9.9	1.2	5.49	21.0	106.6	21.6	24.3	33.0	56.4	44.3	20.8	73.1	-999.9
PAIN	3/28/94	1738	GRAB	8.0	-0.6	5.41	22.3	111.8	21.3	26.8	34.1	59.6	45.6	20.8	73.8	47.8
PAIN	4/4/94	1730	GRAB	9.0	1.2	5.64	20.9	112.3	23.1	18.1	32.5	55.2	46.0	22.3	75.3	8.5
PAIN	4/11/94	1635	GRAB	10.5	2.8	5.65	20.1	109.8	22.5	13.8	31.6	54.7	45.7	21.5	71.8	21.2
PAIN	4/18/94	1535	GRAB	14.0	2.8	5.78	19.7	109.0	22.9	14.3	29.7	50.3	48.2	22.2	70.3	20.1
PAIN	4/27/94	1508	GRAB	16.0	5.3	5.56	20.7	109.8	22.8	8.2	28.5	50.0	49.0	22.2	67.7	18.4
PAIN	5/2/94	1552	GRAB	14.0	6.9	5.89	19.8	108.2	22.8	9.9	28.4	49.1	48.4	22.2	76.0	18.4
PAIN	5/9/94	1930	GRAB	10.5		5.77	20.5	107.7	22.3	16.7	31.3	53.7	47.7	22.3	84.4	18.9
PAIN	5/16/94	1930	GRAB	12.5	7.8	5.92	20.3	107.0	23.5	12.2	30.5	52.0	48.4	23.3	82.3	16.7
PAIN	5/23/94	1810	GRAB	16.0	6.2	5.85	20.1	107.4	24.3	11.7	30.1	51.4	48.5	24.2	81.6	7.5
PAIN	5/31/94	1925	GRAB	15.0	5.0	5.99	19.6	106.6	22.7	5.1	29.6	51.0	48.6	23.2	79.2	14.2
PAIN	6/6/94	1845	GRAB	16.0	10.3	5.92	20.0	105.5	22.8	5.8	28.5	48.6	49.5	23.4	76.9	3.0
PAIN	6/13/94	1955	GRAB	16.5	8.7	6.03	20.0	104.2	22.9	11.6	29.4	51.3	50.8	24.0	83.0	-999.9
PAIN	6/22/94	1910	GRAB	17.5	8.7	5.94	20.1	104.4	23.3	14.4	28.7	50.9	51.8	24.1	95.8	11.8
PAIN	6/28/94	1830	GRAB	18.5	11.2	5.74	20.5	101.7	23.6	8.5	27.6	48.5	51.0	24.3	100.5	5.2
PAIN	7/5/94	1717	GRAB	22.0	9.5	6.04	19.5	103.6	24.0	9.6	26.1	47.7	51.9	24.5	103.4	3.1
PAIN	7/12/94	1650	GRAB	21.5	6.9	6.07	20.6	105.3	22.9	12.8	27.6	48.9	53.0	25.1	106.6	11.1
PAIN	7/19/94	1703	GRAB	23.0	11.2	6.13	19.9	103.8	22.8	8.6	25.3	46.9	52.7	24.2	109.5	14.2
PAIN	7/26/94	1642	GRAB	21.0	9.4	6.18	19.0	102.6	22.3	7.5	24.5	47.3	51.9	24.3	110.6	14.8
PAIN	8/2/94	1710	GRAB	21.5	15.3	6.14	20.0	107.0	21.9	6.2	27.8	49.8	53.5	24.7	109.2	15.3
PAIN	8/9/94	1930	GRAB	17.5	11.9	6.25	20.2	107.4	21.6	5.5	26.1	47.2	54.6	25.0	112.7	12.2
PAIN	8/16/94	1820	GRAB	15.0	15.3	6.25	19.6	102.8	21.1	9.0	27.7	50.7	52.6	23.8	107.5	14.9
PAIN	8/16/94	2000	AUTO	-9.9	15.3	6.03	19.6	102.4	21.7	9.1	28.5	52.9	52.6	24.3	109.5	12.3
PAIN	8/17/94	0400	AUTO	-9.9	16.9	6.13	19.9	102.2	21.9	10.0	29.4	54.7	53.2	24.4	113.4	127.4
PAIN	8/17/94	1200	AUTO	-9.9	13.7	5.90	19.0	94.9	20.9	7.7	28.4	50.3	49.9	22.5	98.9	28.5
PAIN	8/18/94	1130	GRAB	18.0	2.9	5.42	25.8	115.7	21.8	41.5	42.8	70.5	56.8	22.2	95.1	34.7
PAIN	8/23/94	1820	GRAB	17.0	6.2	5.86	21.8	109.2	22.2	18.7	32.0	56.5	53.7	23.1	107.9	12.4
PAIN	8/29/94	1745	GRAB	18.0	6.9	6.16	20.8	109.9	23.0	12.1	32.1	51.8	53.9	23.8	108.0	8.9
PAIN	9/5/94	1120	GRAB	16.0	8.7	6.19	20.5	109.8	22.6	9.3	27.7	50.2	50.4	23.6	107.8	10.7
PAIN	9/13/94	1000	GRAB	13.5	12.8	6.05	20.5	111.2	22.5	8.7	30.1	54.8	50.4	23.8	108.1	6.0
PAIN	9/20/94	1100	GRAB	13.5	11.2	6.12	20.3	111.0	22.9	9.3	30.7	55.2	51.1	24.4	109.4	5.6
PAIN	9/27/94	1045	GRAB	15.5	12.8	6.24	20.0	111.7	21.8	7.2	30.4	55.1	52.1	23.9	109.1	5.8
PAIN	10/4/94	1040	GRAB	11.0	11.9	6.17	19.8	111.2	21.9	6.0	27.6	54.3	48.9	23.0	109.8	12.0
PAIN	10/11/94	1030	GRAB	9.0	13.7	6.15	20.3	113.2	21.5	4.6	29.4	56.1	48.9	22.4	108.6	4.6
PAIN	10/18/94	1033	GRAB	9.5	16.9	6.17	20.4	113.4	22.1	2.1	28.8	54.8	49.5	22.9	109.6	13.1
PAIN	10/25/94	1152	GRAB	11.0	13.7	6.06	20.4	116.4	23.6	0.1	27.8	53.2	53.8	23.9	110.2	15.7

Appendix II Table 3A - Analysis of Intensive Site Samples

SITE	DATE	TIME	TYPE	TEMP	ANC	PH	COND	SO4	CL	NO3	CA	MG	K	NA	SIO2	T_AL
PAIN	11/1/94	1017	GRAB	11.0	15.3	5.90	19.8	103.2	26.2	0.1	27.3	49.5	56.8	21.9	95.4	34.0
PAIN	11/8/94	0945	GRAB	8.0	14.4	6.07	20.0	116.3	23.3	0.2	27.7	53.4	48.7	23.4	110.1	16.9
PAIN	11/15/94	1120	GRAB	9.0	13.7	6.11	20.2	115.7	22.6	0.1	28.3	53.3	47.6	23.2	108.3	13.3
PAIN	11/22/94	1030	GRAB	9.5	8.7	5.74	20.7	116.1	28.2	0.1	31.0	55.8	47.8	23.6	103.2	13.7
PAIN	11/29/94	1040	GRAB	6.5	10.3	5.99	20.5	110.4	26.0	6.2	30.6	53.3	44.4	24.1	100.1	12.5
PAIN	12/6/94	1050	GRAB	10.5	10.3	5.86	20.6	110.6	26.8	9.3	30.8	54.6	46.0	24.7	98.0	15.7
PAIN	12/13/94	1115	GRAB	3.0	5.3	5.86	20.7	107.5	24.6	14.4	30.7	55.1	43.1	23.3	95.7	13.2
PAIN	12/20/94	1000	GRAB	2.0	6.2	5.82	20.5	108.5	24.6	15.2	32.6	58.4	42.9	23.1	91.2	5.1
PAIN	12/27/94	1100	GRAB	3.0	6.9	5.88	20.1	107.6	23.9	13.4	31.4	56.5	41.7	22.8	85.3	11.0
PAIN	1/3/95	1200	GRAB	0.5	5.3	5.91	20.1	109.4	23.8	11.5	31.8	57.2	41.3	22.7	82.9	10.3
PAIN	1/10/95	1030	GRAB	1.0	2.8	5.72	21.5	110.4	25.4	16.5	32.1	58.9	44.6	24.0	89.4	5.3
PAIN	1/13/95	2000	AUTO	-9.9	6.9	5.76	20.7	109.0	23.6	14.5	31.0	57.1	44.2	22.4	85.1	-999.9
PAIN	1/14/95	0400	AUTO	-9.9	6.9	5.78	20.7	107.4	24.1	15.1	31.1	56.9	44.3	22.6	84.8	12.5
PAIN	1/14/95	1200	AUTO	-9.9	2.8	5.70	21.0	108.1	28.5	14.1	30.8	56.5	44.6	24.2	84.1	-999.9
PAIN	1/14/95	2000	AUTO	-9.9	6.9	5.77	21.0	105.3	30.3	14.0	31.6	56.3	45.3	25.4	81.9	-999.9
PAIN	1/15/95	0400	AUTO	-9.9	2.8	5.48	23.4	105.5	40.7	11.9	33.3	60.0	49.4	26.8	79.8	-999.9
PAIN	1/15/95	1200	AUTO	-9.9	-3.1	5.28	29.2	124.9	36.8	37.4	48.8	78.6	57.6	20.4	72.4	63.8
PAIN	1/15/95	2000	AUTO	-9.9	-2.2	5.24	28.1	126.2	34.8	32.0	46.7	74.5	55.0	19.5	73.4	54.4
PAIN	1/16/95	0400	AUTO	-9.9	-1.7	5.23	26.2	123.0	32.3	25.2	41.8	68.1	51.0	19.9	76.3	46.1
PAIN	1/16/95	1200	AUTO	-9.9	-3.8	5.27	25.1	120.1	31.3	22.5	39.7	64.9	49.5	20.1	79.0	42.6
PAIN	1/16/95	2000	AUTO	-9.9	-0.6	5.28	24.3	117.7	30.2	20.5	38.3	63.5	48.5	20.5	81.2	38.9
PAIN	1/17/95	0400	AUTO	-9.9	-2.2	5.34	23.5	116.5	29.9	19.4	37.0	62.2	47.5	20.8	83.2	37.3
PAIN	1/17/95	1040	GRAB	7.0	-2.2	5.37	23.1	116.1	29.6	17.8	34.8	60.0	46.6	20.7	84.6	38.7
PAIN	1/17/95	2000	AUTO	-9.9	1.2	5.40	23.0	115.8	29.3	18.1	34.9	59.5	47.1	21.2	85.8	-999.9
PAIN	1/18/95	1200	AUTO	-9.9	1.2	5.44	22.7	114.3	29.0	17.2	34.8	59.2	45.3	21.2	86.9	28.0
PAIN	1/19/95	1200	AUTO	-9.9	1.2	5.50	22.2	113.1	28.2	16.2	34.3	59.1	46.2	21.7	88.8	26.2
PAIN	1/24/95	1030	GRAB	4.0	0.3	5.54	22.0	112.8	27.4	16.3	33.0	59.1	44.3	21.8	89.7	7.5
PAIN	2/1/95	1050	GRAB	4.0	0.4	5.55	21.1	111.5	26.0	12.9	33.6	58.4	41.7	22.1	89.9	20.0
PAIN	2/7/95	1050	GRAB	0.0	3.7	5.65	21.0	113.6	26.1	12.5	34.4	64.0	41.0	22.6	92.7	19.8
PAIN	2/14/95	1007	GRAB	0.5	1.2	5.61	20.8	112.4	24.9	12.6	34.1	63.0	39.8	22.1	90.0	16.4
PAIN	2/21/95	1050	GRAB	7.0	1.9	5.56	20.5	110.4	24.8	11.0	33.8	60.8	40.9	22.2	90.4	23.5
PAIN	2/28/95	1110	GRAB	7.0	8.7	5.64	20.0	111.3	24.7	10.1	31.8	58.6	42.3	22.0	88.0	18.8
PAIN	3/7/95	1030	GRAB	8.0	1.9	5.67	20.0	110.3	24.5	11.1	29.8	54.2	43.0	22.4	86.6	18.8
PAIN	3/14/95	1025	GRAB	8.0	1.2	5.64	20.6	110.7	25.2	13.2	29.7	54.0	44.8	22.6	87.3	23.6
PAIN	3/21/95	1015	GRAB	7.0	2.8	5.69	20.1	108.6	24.8	10.8	30.3	53.7	46.2	23.8	84.0	14.4
PAIN	3/28/95	1120	GRAB	9.0	1.9	5.78	19.6	110.6	24.6	9.1	30.4	53.4	45.3	24.0	82.5	13.0
PAIN	4/4/95	1139	GRAB	10.0	3.7	5.82	20.0	110.5	24.4	7.3	29.9	52.6	45.0	23.5	77.1	12.2
PAIN	4/11/95	1030	GRAB	9.0	6.9	5.92	20.1	110.4	26.6	5.7	30.2	52.3	46.2	25.9	73.4	12.1
PAIN	4/18/95	0932	GRAB	9.0	5.3	5.94	19.8	111.1	24.5	5.7	29.8	52.3	45.8	23.8	69.5	10.3
PAIN	4/25/95	1020	GRAB	8.5	5.3	5.98	19.3	111.2	24.9	3.2	29.1	48.0	48.2	24.9	66.5	15.3
PAIN	5/2/95	0950	GRAB	9.0	7.8	5.88	19.6	109.3	23.6	4.2	30.3	51.1	47.2	24.2	66.2	14.1
PAIN	5/9/95	1115	GRAB	12.0	6.2	5.93	19.3	109.8	24.9	5.0	28.7	49.4	48.7	24.7	62.1	11.0

Appendix II Table 3A - Analysis of Intensive Site Samples

SITE	DATE	TIME	TYPE	TEMP	ANC	PH	COND	SO4	CL	NO3	CA	MG	K	NA	SIO2	T_AL
PAIN	5/16/95	0930	GRAB	11.0	6.7	5.96	20.1	109.5	25.0	9.2	29.5	51.5	50.0	24.5	81.3	13.2
PAIN	5/23/95	0840	GRAB	13.5	9.2	6.04	20.0	108.9	24.8	8.3	29.4	51.3	50.7	24.6	77.4	10.3
PAIN	5/30/95	0935	GRAB	13.5	7.8	6.01	19.8	107.3	23.6	8.3	28.5	49.9	49.4	24.1	83.6	-999.9
PAIN	6/5/95	0835	GRAB	10.5	14.4	6.00	21.4	107.2	24.5	4.0	29.2	52.1	52.8	24.5	78.5	-999.9
PAIN	6/13/95	1235	GRAB	16.0	3.7	5.64	20.3	108.6	24.9	8.7	30.2	52.6	48.3	23.5	96.1	-999.9
PAIN	6/20/95	1120	GRAB	17.5	5.0	5.91	18.4	104.6	24.9	5.3	28.6	49.1	46.8	23.8	87.7	-999.9
PAIN	6/26/95	0940	GRAB	15.0	6.9	5.84	21.1	109.0	25.2	14.0	31.6	55.1	50.9	23.9	95.6	-999.9
PINE	9/1/92	-999	GRAB	0.0	270.0	7.36	37.1	60.0	26.6	7.5	154.3	128.5	7.1	84.7	248.2	-999.9
PINE	9/8/92	1150	GRAB	16.5	166.2	7.12	34.1	82.3	25.9	38.6	135.9	111.9	7.8	66.9	203.7	-999.9
PINE	9/15/92	1235	GRAB	16.5	198.7	7.28	34.8	66.5	28.6	35.0	137.3	116.0	6.7	73.4	220.4	-999.9
PINE	9/24/92	-999	GRAB	-9.9	213.5	6.82	35.3	57.1	30.2	15.2	140.6	118.1	6.8	76.0	231.4	-999.9
PINE	10/1/92	-999	GRAB	-9.9	215.4	7.29	35.4	66.6	29.2	24.1	138.8	116.8	6.1	74.6	224.6	-999.9
PINE	10/8/92	-999	GRAB	-9.9	220.4	7.29	34.9	57.9	29.4	17.8	138.6	114.5	6.5	76.7	223.7	-999.9
PINE	10/15/92	1230	GRAB	13.0	241.7	7.30	36.0	59.2	31.0	11.6	146.6	119.9	7.2	79.6	229.7	-999.9
PINE	10/22/92	0935	GRAB	9.0	245.0	7.07	34.0	56.1	30.3	4.3	141.3	114.4	7.1	76.6	224.3	-999.9
PINE	10/29/92	0915	GRAB	10.5	248.5	7.10	35.1	53.8	30.4	2.6	143.6	116.0	7.3	77.9	225.9	-999.9
PINE	11/1/92	1200	AUTO	-9.9	254.2	7.06	36.7	57.3	33.0	4.6	148.2	122.6	8.2	78.9	231.2	-999.9
PINE	11/1/92	2000	AUTO	-9.9	258.6	7.14	37.3	58.3	33.2	3.9	152.6	126.1	9.0	80.6	232.5	-999.9
PINE	11/2/92	0400	AUTO	-9.9	254.2	7.11	37.1	58.7	33.0	4.8	150.4	125.0	8.8	80.9	230.1	-999.9
PINE	11/2/92	1200	AUTO	-9.9	244.0	7.06	37.0	61.3	33.4	4.6	146.1	121.6	10.0	78.3	228.5	-999.9
PINE	11/2/92	2000	AUTO	-9.9	228.6	6.85	38.1	70.6	36.9	10.0	151.8	125.3	14.0	75.1	213.5	-999.9
PINE	11/3/92	0400	AUTO	-9.9	191.1	6.75	41.0	95.9	37.1	41.6	165.3	137.4	13.3	72.6	196.0	-999.9
PINE	11/3/92	1200	AUTO	-9.9	186.9	6.94	41.1	99.9	35.1	45.2	162.6	137.4	10.1	72.9	205.6	-999.9
PINE	11/3/92	2000	AUTO	-9.9	192.9	6.99	40.0	94.4	33.6	40.9	159.9	134.3	9.0	73.6	210.8	-999.9
PINE	11/4/92	0400	AUTO	-9.9	194.4	7.07	39.8	89.9	33.0	38.6	155.4	131.7	8.2	73.3	211.5	-999.9
PINE	11/4/92	1200	AUTO	-9.9	194.4	7.08	38.4	87.0	32.7	37.3	150.7	128.1	8.0	73.0	212.6	-999.9
PINE	11/4/92	2000	AUTO	-9.9	201.2	7.03	38.3	83.8	32.1	35.6	151.1	128.5	8.1	74.2	212.2	-999.9
PINE	11/5/92	0400	AUTO	-9.9	197.9	7.01	38.0	81.0	31.7	34.6	149.7	127.7	8.0	74.0	211.2	-999.9
PINE	11/5/92	1047	GRAB	11.0	196.9	7.13	37.1	80.0	32.2	33.7	148.1	124.1	7.9	74.3	214.8	-999.9
PINE	11/12/92	1202	GRAB	8.0	194.5	7.03	34.0	64.8	30.6	29.6	136.0	113.1	6.3	74.5	209.5	-999.9
PINE	11/12/92	2000	AUTO	-9.9	198.6	6.89	34.0	66.1	30.4	22.1	137.4	112.8	9.6	73.6	207.8	-999.9
PINE	11/13/92	0400	AUTO	-9.9	196.1	6.97	35.1	72.4	31.6	26.9	142.1	117.9	8.2	73.3	210.2	-999.9
PINE	11/13/92	1200	AUTO	-9.9	195.0	7.16	35.6	75.6	32.1	28.2	140.9	117.9	7.2	74.4	213.0	-999.9
PINE	11/13/92	2000	AUTO	-9.9	201.9	7.09	36.4	77.1	32.3	28.6	143.3	122.3	7.0	75.3	212.7	-999.9
PINE	11/14/92	0400	AUTO	-9.9	196.2	7.02	36.0	76.6	32.0	29.8	143.2	122.7	6.6	73.6	210.8	-999.9
PINE	11/14/92	1200	AUTO	-9.9	191.2	7.09	35.0	74.6	31.4	29.1	139.1	117.9	6.6	74.0	210.8	-999.9
PINE	11/15/92	0400	AUTO	-9.9	191.2	7.00	35.8	74.5	31.6	32.2	138.6	119.3	6.2	73.3	207.6	-999.9
PINE	11/15/92	2000	AUTO	-9.9	186.9	7.02	34.7	72.9	31.3	32.4	137.9	118.5	6.2	73.3	208.0	-999.9
PINE	11/16/92	1200	AUTO	-9.9	179.4	6.81	33.7	71.6	31.4	28.7	132.2	113.4	6.0	72.0	204.4	-999.9
PINE	11/17/92	0400	AUTO	-9.9	182.5	7.09	34.5	70.7	31.4	34.7	136.1	115.6	5.9	73.0	204.4	-999.9
PINE	11/17/92	2000	AUTO	-9.9	186.9	6.99	34.9	69.6	31.5	34.1	134.7	115.4	6.0	73.2	204.4	-999.9
PINE	11/18/92	1200	AUTO	-9.9	166.0	7.06	33.7	68.2	32.1	32.1	132.5	111.2	6.2	73.5	205.2	-999.9

Appendix II Table 3A - Analysis of Intensive Site Samples

SITE	DATE	TIME	TYPE	TEMP	ANC	PH	COND	SO4	CL	NO3	CA	MG	K	NA	SIO2	T_AL
PINE	11/19/92	0400	AUTO	-9.9	185.4	6.98	35.0	67.1	30.8	30.9	137.2	116.0	6.2	73.9	206.4	-999.9
PINE	11/19/92	1120	GRAB	7.0	183.6	7.01	34.1	67.1	31.5	33.0	136.9	116.0	5.9	73.7	206.8	-999.9
PINE	11/22/92	0400	AUTO	-9.9	191.1	6.98	35.9	67.3	33.3	33.1	139.2	116.3	6.3	74.6	207.7	-999.9
PINE	11/22/92	1200	AUTO	-9.9	190.0	7.02	35.7	67.1	32.9	31.1	136.9	114.8	6.5	75.4	210.3	-999.9
PINE	11/22/92	2000	AUTO	-9.9	166.7	6.80	31.1	59.4	29.1	23.8	122.4	101.1	7.8	65.5	181.9	-999.9
PINE	11/23/92	0400	AUTO	-9.9	166.7	6.82	39.4	105.2	33.0	45.7	158.7	129.5	10.7	68.6	190.7	-999.9
PINE	11/23/92	1200	AUTO	-9.9	171.9	6.82	38.7	101.5	32.0	45.6	154.6	128.0	8.9	71.8	200.4	-999.9
PINE	11/23/92	2000	AUTO	-9.9	177.0	6.85	39.0	96.0	31.6	45.7	152.6	126.3	7.9	71.3	205.4	-999.9
PINE	11/24/92	0400	AUTO	-9.9	176.9	6.84	38.9	92.5	31.9	46.6	150.0	124.0	7.4	72.4	207.6	-999.9
PINE	11/24/92	1200	AUTO	-9.9	171.1	6.89	37.9	89.5	32.0	46.5	145.8	120.4	7.2	72.3	208.6	-999.9
PINE	11/24/92	2000	AUTO	-9.9	170.4	6.82	37.4	85.6	33.1	45.9	144.7	120.0	7.2	72.2	206.9	-999.9
PINE	11/25/92	0400	AUTO	-9.9	169.7	6.81	37.2	82.5	32.1	45.7	143.7	118.9	7.0	72.4	205.7	-999.9
PINE	11/25/92	1135	GRAB	8.0	177.8	6.94	35.9	79.8	32.7	48.8	142.6	116.5	7.0	72.3	209.3	-999.9
PINE	11/25/92	1200	AUTO	-9.9	176.9	6.90	35.8	80.3	31.2	45.9	141.1	117.4	6.8	72.6	208.2	-999.9
PINE	11/26/92	0400	AUTO	-9.9	184.4	6.98	36.6	77.4	30.9	45.5	143.2	118.4	6.7	74.2	210.2	-999.9
PINE	11/26/92	2000	AUTO	-9.9	189.4	6.97	36.9	74.9	31.0	44.4	142.6	119.3	6.8	74.1	212.6	-999.9
PINE	11/27/92	1200	AUTO	-9.9	181.9	7.03	36.0	73.5	31.5	43.7	137.9	115.4	6.5	73.4	212.5	-999.9
PINE	11/28/92	0400	AUTO	-9.9	183.7	7.02	36.3	71.8	30.9	44.8	139.5	116.6	6.3	72.9	210.5	-999.9
PINE	11/28/92	2000	AUTO	-9.9	183.7	6.99	36.0	70.1	31.0	43.9	138.5	116.7	6.3	73.9	211.3	-999.9
PINE	12/3/92	1145	GRAB	7.0	173.7	7.06	33.2	65.5	31.7	44.0	131.8	110.3	6.2	72.1	207.9	-999.9
PINE	12/9/92	1200	AUTO	-9.9	166.2	7.03	32.1	61.5	32.6	40.9	123.9	107.2	5.4	69.8	204.5	-999.9
PINE	12/9/92	2000	AUTO	-9.9	173.7	7.06	33.5	60.7	32.2	42.4	129.1	110.9	5.4	71.6	206.8	-999.9
PINE	12/10/92	0400	AUTO	-9.9	171.1	7.05	33.0	60.9	32.5	43.3	128.9	110.1	5.3	70.7	204.1	-999.9
PINE	12/10/92	1200	AUTO	-9.9	156.9	7.02	31.1	56.7	31.1	41.9	118.9	103.6	4.9	65.0	191.6	-999.9
PINE	12/10/92	2000	AUTO	-9.9	138.6	6.77	31.0	68.7	24.5	29.6	124.0	104.0	8.4	58.3	166.4	-999.9
PINE	12/11/92	0400	AUTO	-9.9	143.6	6.91	34.6	96.8	26.9	43.9	135.7	115.5	7.5	62.2	181.2	-999.9
PINE	12/11/92	1300	GRAB	4.0	149.4	7.00	34.9	94.2	29.3	42.9	138.4	115.0	7.8	66.6	189.2	-999.9
PINE	12/11/92	2000	AUTO	-9.9	150.3	7.08	34.8	90.7	29.0	47.6	131.6	114.6	6.5	64.6	190.6	-999.9
PINE	12/12/92	0400	AUTO	-9.9	153.7	7.10	35.1	86.4	29.4	48.3	131.6	116.6	6.3	67.1	195.5	-999.9
PINE	12/12/92	1200	AUTO	-9.9	159.3	7.10	36.0	86.6	32.3	47.2	132.9	116.3	6.2	68.7	201.1	-999.9
PINE	12/12/92	2000	AUTO	-9.9	161.2	7.14	35.7	89.0	33.9	43.2	135.2	116.8	6.2	69.8	202.8	-999.9
PINE	12/13/92	0400	AUTO	-9.9	161.2	7.07	35.8	82.1	30.6	47.3	133.9	116.9	6.1	70.7	204.4	-999.9
PINE	12/13/92	1200	AUTO	-9.9	165.3	7.14	36.0	79.7	31.2	43.7	133.9	115.8	6.0	70.6	206.5	-999.9
PINE	12/13/92	2000	AUTO	-9.9	167.8	7.11	36.0	79.5	30.9	48.4	134.1	117.4	5.8	70.7	206.1	-999.9
PINE	12/14/92	0400	AUTO	-9.9	163.7	7.12	35.5	77.8	31.5	47.9	131.7	115.2	5.9	70.9	206.1	-999.9
PINE	12/17/92	1355	GRAB	6.5	143.7	7.08	34.4	88.2	25.4	48.7	132.8	113.2	6.1	65.9	181.0	-999.9
PINE	12/23/92	1240	GRAB	6.0	137.2	6.67	33.1	71.0	30.1	46.8	133.6	109.5	5.9	71.0	204.8	-999.9
PINE	1/7/93	1315	GRAB	8.0	163.7	6.91	32.8	62.8	30.2	44.9	132.6	108.6	5.6	71.9	205.2	-999.9
PINE	1/14/93	1440	GRAB	5.5	157.8	6.98	32.7	73.2	29.2	41.0	131.7	107.0	5.7	71.2	204.4	-999.9
PINE	1/22/93	1540	GRAB	6.0	157.8	7.13	32.9	69.2	29.3	42.5	129.1	105.1	5.8	70.5	204.4	-999.9
PINE	1/28/93	1320	GRAB	4.0	154.4	7.10	33.2	65.3	30.5	48.3	130.6	107.5	5.8	72.1	204.6	-999.9
PINE	2/4/93	1405	GRAB	4.0	160.3	7.18	31.7	59.2	30.3	38.8	121.3	98.8	5.5	71.7	214.7	-999.9

Appendix II Table 3A - Analysis of Intensive Site Samples

SITE	DATE	TIME	TYPE	TEMP	ANC	PH	COND	SO4	CL	NO3	CA	MG	K	NA	SIO2	T_AL
PINE	2/11/93	1440	GRAB	6.0	169.4	6.90	32.0	56.9	30.1	41.0	121.1	106.0	5.8	74.8	208.6	-999.9
PINE	2/16/93	1240	GRAB	4.5	168.5	7.09	32.8	60.9	30.7	40.6	124.7	109.6	5.8	74.4	205.5	-999.9
PINE	2/23/93	1423	GRAB	2.0	161.2	7.06	32.8	69.2	29.7	44.2	126.2	112.3	5.4	72.5	203.4	-999.9
PINE	3/2/93	1525	GRAB	5.0	165.3	7.11	32.0	64.9	30.1	40.3	124.0	108.7	5.4	73.8	210.7	-999.9
PINE	3/3/93	1200	AUTO	-9.9	162.9	7.10	32.2	64.2	30.5	46.4	127.5	110.9	5.3	73.9	207.1	-999.9
PINE	3/3/93	2000	AUTO	-9.9	167.8	7.14	33.6	64.4	30.6	47.5	131.8	113.5	5.4	73.9	206.7	-999.9
PINE	3/4/93	0400	AUTO	-9.9	154.4	7.06	33.4	70.0	29.1	55.7	131.5	113.9	6.1	71.4	195.8	-999.9
PINE	3/4/93	1200	AUTO	-9.9	93.6	6.73	34.1	104.6	19.2	78.4	155.7	129.5	11.8	51.6	135.9	-999.9
PINE	3/4/93	2000	AUTO	-9.9	107.2	6.87	36.0	112.0	21.3	79.0	144.1	122.1	9.6	55.0	151.1	-999.9
PINE	3/5/93	0400	AUTO	-9.9	118.7	6.91	36.0	105.5	23.9	78.0	144.8	122.6	8.3	58.9	164.9	-999.9
PINE	3/5/93	1200	AUTO	-9.9	124.4	6.99	36.2	99.4	24.5	74.3	143.2	120.8	7.6	61.6	172.4	-999.9
PINE	3/5/93	2000	AUTO	-9.9	129.2	6.98	36.1	94.8	25.1	72.1	141.0	119.9	7.3	63.0	177.3	-999.9
PINE	3/6/93	0400	AUTO	-9.9	129.2	6.97	35.1	91.4	26.1	71.4	139.5	118.7	7.0	63.2	179.7	-999.9
PINE	3/6/93	2000	AUTO	-9.9	134.2	7.07	35.0	85.3	27.2	70.1	139.0	117.6	6.8	65.0	186.3	-999.9
PINE	3/7/93	1200	AUTO	-9.9	137.9	7.08	33.7	81.1	27.7	67.5	136.5	115.2	6.6	65.3	190.2	-999.9
PINE	3/8/93	1200	AUTO	-9.9	145.4	7.11	33.7	75.4	28.8	65.5	131.1	112.3	6.5	68.0	191.6	-999.9
PINE	3/9/93	1200	AUTO	-9.9	144.2	7.13	33.9	72.3	29.0	65.2	129.0	111.1	6.1	67.3	193.6	-999.9
PINE	3/9/93	1240	GRAB	5.0	143.7	7.04	34.0	72.1	29.3	64.0	128.9	110.7	6.8	69.2	194.3	-999.9
PINE	3/17/93	1357	GRAB	3.0	147.8	7.02	31.8	62.1	26.7	54.5	122.0	104.9	6.4	66.3	187.3	-999.9
PINE	3/19/93	1525	GRAB	3.5	147.8	7.05	34.0	74.8	27.8	56.0	130.0	109.5	5.6	67.0	196.0	-999.9
PINE	3/23/93	1325	GRAB	-9.9	158.7	7.06	34.1	78.7	27.6	53.1	135.7	113.9	6.3	69.2	197.4	-999.9
PINE	3/30/93	1345	GRAB	11.0	131.2	7.11	31.0	70.8	25.2	62.4	121.0	103.1	6.5	64.7	178.3	-999.9
PINE	4/6/93	1320	GRAB	8.0	155.3	7.15	32.2	62.8	28.6	53.1	126.3	110.0	6.2	68.6	194.2	-999.9
PINE	4/9/93	1200	AUTO	-9.9	166.9	7.11	32.4	59.7	29.3	49.9	125.3	108.7	6.6	70.8	203.4	-999.9
PINE	4/9/93	2000	AUTO	-9.9	171.2	7.11	33.6	59.7	29.0	48.6	127.3	110.4	6.7	71.5	206.0	-999.9
PINE	4/10/93	0400	AUTO	-9.9	172.8	7.11	33.1	59.2	29.0	47.3	128.2	109.9	7.0	70.3	199.4	-999.9
PINE	4/10/93	1200	AUTO	-9.9	166.2	7.10	32.0	60.2	26.9	45.6	125.5	106.8	7.2	68.3	191.7	-999.9
PINE	4/10/93	2000	AUTO	-9.9	159.9	7.06	33.5	81.8	23.2	46.9	132.5	113.8	7.3	65.6	183.9	-999.9
PINE	4/11/93	0400	AUTO	-9.9	157.5	7.13	34.1	82.9	24.3	50.0	132.7	115.5	6.8	66.6	190.9	-999.9
PINE	4/11/93	1200	AUTO	-9.9	153.7	7.09	34.0	80.1	25.5	50.9	128.7	112.6	6.3	68.1	193.4	-999.9
PINE	4/11/93	2000	AUTO	-9.9	156.1	7.09	34.1	77.9	26.6	50.7	130.4	112.6	6.6	69.6	196.0	-999.9
PINE	4/12/93	1200	AUTO	-9.9	160.4	7.08	33.8	72.8	27.1	50.4	128.2	111.4	6.2	70.3	198.0	-999.9
PINE	4/13/93	0400	AUTO	-9.9	160.4	7.11	34.0	70.5	27.7	52.1	128.2	111.6	6.3	70.3	198.4	-999.9
PINE	4/13/93	1305	GRAB	9.5	160.3	7.12	34.0	68.9	28.2	51.7	127.6	109.4	7.3	70.4	199.2	-999.9
PINE	4/16/93	0400	AUTO	-9.9	176.0	7.16	33.7	62.7	28.4	48.1	136.0	112.6	6.6	73.0	206.5	-999.9
PINE	4/16/93	1200	AUTO	-9.9	163.7	7.11	33.5	66.7	27.7	48.9	133.8	108.3	7.2	67.7	186.6	-999.9
PINE	4/16/93	1250	GRAB	10.5	158.6	6.88	33.9	69.7	27.2	42.1	131.8	111.7	7.6	67.9	187.1	-999.9
PINE	4/16/93	1400	AUTO	-9.9	161.9	7.22	33.7	72.0	27.6	42.6	129.8	111.5	7.5	69.3	190.9	-999.9
PINE	4/16/93	1600	AUTO	-9.9	162.9	7.19	34.1	76.0	27.4	45.1	131.7	112.8	7.2	69.0	193.9	-999.9
PINE	4/16/93	1800	AUTO	-9.9	158.5	7.26	35.1	78.6	27.4	44.3	134.4	116.1	7.2	70.0	199.7	-999.9
PINE	4/16/93	2000	AUTO	-9.9	171.9	7.26	35.1	78.6	27.9	44.5	132.6	115.3	7.2	69.9	199.4	-999.9
PINE	4/16/93	2200	AUTO	-9.9	171.9	7.20	35.2	78.6	27.2	46.8	134.0	116.4	7.1	69.8	200.9	-999.9

Appendix II Table 3A - Analysis of Intensive Site Samples

SITE	DATE	TIME	TYPE	TEMP	ANC	PH	COND	SO4	CL	NO3	CA	MG	K	NA	SIO2	T_AL
PINE	4/17/93	0000	AUTO	-9.9	157.9	7.22	35.0	78.6	27.3	45.9	122.9	116.5	7.1	69.4	200.6	-999.9
PINE	4/17/93	0600	AUTO	-9.9	173.6	7.22	35.1	78.0	27.2	47.6	131.2	116.0	6.7	69.8	201.8	-999.9
PINE	4/17/93	1200	AUTO	-9.9	167.9	7.28	35.0	76.9	28.0	47.8	130.2	114.4	6.8	69.6	202.6	-999.9
PINE	4/17/93	1800	AUTO	-9.9	171.2	7.24	35.0	75.3	27.7	48.7	130.4	115.5	6.8	69.6	203.9	-999.9
PINE	4/18/93	0000	AUTO	-9.9	169.4	7.22	35.0	73.7	27.7	47.9	129.9	115.4	6.8	69.2	204.8	-999.9
PINE	4/18/93	0600	AUTO	-9.9	169.4	7.24	34.6	73.2	28.8	50.2	129.6	116.2	6.6	69.3	202.8	-999.9
PINE	4/18/93	1200	AUTO	-9.9	161.1	7.25	34.6	71.9	28.1	48.5	133.0	110.4	6.3	70.4	203.3	-999.9
PINE	4/20/93	1440	GRAB	12.0	176.2	7.22	33.7	65.5	31.2	46.9	134.7	110.2	8.8	75.4	209.4	-999.9
PINE	4/27/93	1525	GRAB	10.5	167.9	7.28	33.3	64.5	27.9	45.4	133.1	115.6	7.1	73.8	208.4	-999.9
PINE	5/4/93	1205	GRAB	12.5	207.5	7.21	35.8	59.2	30.1	39.8	145.3	123.1	7.9	76.8	222.2	-999.9
PINE	5/11/93	1220	GRAB	16.5	207.9	7.30	35.6	57.6	26.8	38.8	144.1	119.7	7.5	76.0	220.5	-999.9
PINE	5/18/93	1255	GRAB	13.0	219.4	7.20	35.2	59.2	26.4	29.7	144.9	120.7	8.0	79.8	226.9	-999.9
PINE	5/25/93	1302	GRAB	13.5	222.9	7.30	34.2	58.4	29.5	26.3	139.8	119.3	6.7	79.4	228.0	-999.9
PINE	6/1/93	1315	GRAB	13.5	237.5	7.27	35.1	54.6	30.1	19.4	141.7	119.2	6.9	82.9	238.9	-999.9
PINE	6/8/93	0400	AUTO	-9.9	255.4	6.82	36.8	54.5	30.1	12.8	150.6	125.7	7.7	83.3	242.6	-999.9
PINE	6/8/93	1140	GRAB	14.0	228.5	6.70	36.0	59.6	25.7	24.8	149.7	124.5	7.6	79.8	223.1	-999.9
PINE	6/8/93	1200	AUTO	-9.9	236.0	6.86	37.0	59.4	26.9	15.4	153.3	124.4	7.7	79.0	225.4	-999.9
PINE	6/15/93	1333	GRAB	16.0	262.2	7.33	36.1	52.3	29.6	14.6	147.0	121.0	7.4	89.7	258.5	-999.9
PINE	6/22/93	1305	GRAB	17.0	286.9	7.26	37.0	49.7	31.1	0.4	149.9	123.4	7.8	94.8	273.7	-999.9
PINE	6/28/93	2000	AUTO	-9.9	283.0	6.80	40.1	50.2	30.3	14.2	163.2	131.1	8.2	95.5	273.9	-999.9
PINE	6/29/93	0400	AUTO	-9.9	290.5	6.82	40.9	49.7	30.2	14.5	161.3	130.1	7.9	95.6	273.5	-999.9
PINE	6/29/93	1200	AUTO	-9.9	278.8	6.89	40.0	48.4	30.5	12.9	156.7	125.3	7.8	94.1	276.8	-999.9
PINE	6/29/93	1309	GRAB	19.0	283.6	7.28	37.9	48.8	30.8	15.6	154.0	127.6	8.3	94.9	274.0	-999.9
PINE	6/29/93	2200	AUTO	-9.9	256.0	6.86	38.1	51.7	27.9	16.5	147.6	112.7	9.9	85.5	259.0	-999.9
PINE	6/30/93	0000	AUTO	-9.9	264.2	7.00	39.1	52.7	28.8	20.2	153.7	121.5	9.2	91.0	263.0	-999.9
PINE	6/30/93	0200	AUTO	-9.9	264.0	6.79	40.6	54.2	29.0	19.3	175.3	137.4	9.9	92.2	261.9	-999.9
PINE	6/30/93	0400	AUTO	-9.9	261.7	6.78	40.1	53.9	28.1	24.6	153.5	124.2	8.2	88.3	252.8	-999.9
PINE	6/30/93	0600	AUTO	-9.9	256.1	6.83	40.1	53.5	28.1	26.6	153.3	124.9	8.0	88.3	252.9	-999.9
PINE	6/30/93	0800	AUTO	-9.9	260.4	6.81	40.1	53.2	28.3	22.2	154.8	125.3	7.7	89.2	256.2	-999.9
PINE	6/30/93	1000	AUTO	-9.9	260.4	6.86	40.2	53.0	28.2	23.1	153.5	123.0	7.8	89.9	256.7	-999.9
PINE	6/30/93	1200	AUTO	-9.9	254.7	6.87	40.1	52.3	28.5	22.2	153.7	124.9	7.7	90.0	257.2	-999.9
PINE	6/30/93	2000	AUTO	-9.9	276.5	7.11	39.0	53.0	29.2	22.5	159.5	131.2	8.1	92.2	261.8	-999.9
PINE	7/1/93	0400	AUTO	-9.9	283.5	7.15	40.0	52.1	29.9	23.3	161.4	132.2	7.9	94.0	265.2	-999.9
PINE	7/1/93	1200	AUTO	-9.9	268.5	7.16	38.9	55.7	28.8	21.4	155.9	127.2	9.0	90.3	256.7	-999.9
PINE	7/1/93	2000	AUTO	-9.9	272.9	7.12	40.1	60.7	29.0	25.3	160.9	132.1	8.9	93.3	265.1	-999.9
PINE	7/2/93	0000	AUTO	-9.9	259.1	7.11	41.0	70.2	28.7	33.3	162.5	131.4	9.2	90.6	255.8	-999.9
PINE	7/2/93	0400	AUTO	-9.9	261.0	7.15	40.5	67.4	28.9	32.7	162.7	130.9	8.8	91.1	257.1	-999.9
PINE	7/2/93	0800	AUTO	-9.9	256.3	7.15	40.1	69.7	28.9	34.0	167.7	135.4	9.5	90.9	254.2	-999.9
PINE	7/2/93	1000	AUTO	-9.9	254.0	7.14	40.2	69.3	28.5	33.6	160.1	130.9	9.3	89.4	252.4	-999.9
PINE	7/2/93	1200	AUTO	-9.9	236.0	7.03	39.0	73.1	26.9	30.1	154.4	123.9	9.3	85.8	245.6	-999.9
PINE	7/2/93	1400	AUTO	-9.9	256.0	7.07	40.2	73.7	27.3	26.3	162.2	131.3	9.5	89.0	253.3	-999.9
PINE	7/2/93	1600	AUTO	-9.9	248.5	7.09	40.1	73.5	26.9	30.9	159.1	130.3	8.4	87.3	248.1	-999.9

Appendix II Table 3A - Analysis of Intensive Site Samples

SITE	DATE	TIME	TYPE	TEMP	ANC	PH	COND	SO4	CL	NO3	CA	MG	K	NA	SIO2	T_AL
PINE	7/2/93	1800	AUTO	-9.9	251.0	7.11	40.3	72.8	27.0	31.6	162.8	133.1	8.6	87.5	247.2	-999.9
PINE	7/2/93	2000	AUTO	-9.9	258.5	7.08	40.8	71.4	26.6	28.0	163.7	135.7	8.4	88.4	248.7	-999.9
PINE	7/3/93	0000	AUTO	-9.9	265.4	7.17	42.9	69.3	26.8	28.0	165.0	137.4	8.4	89.2	250.5	-999.9
PINE	7/3/93	1200	AUTO	-9.9	266.7	7.17	42.0	65.0	27.5	24.9	161.9	133.2	8.0	90.4	256.1	-999.9
PINE	7/4/93	1200	AUTO	-9.9	261.5	7.18	41.9	62.2	27.8	21.2	159.8	130.9	7.9	91.8	260.5	-999.9
PINE	7/5/93	1200	AUTO	-9.9	270.5	7.24	42.2	59.9	28.4	18.4	158.2	131.6	7.9	93.0	265.7	-999.9
PINE	7/6/93	1258	GRAB	19.0	284.0	7.25	40.1	57.8	28.2	15.3	159.7	132.3	8.1	95.0	270.0	-999.9
PINE	7/13/93	1300	GRAB	20.0	306.9	7.28	41.5	52.1	29.9	13.1	163.3	132.8	8.4	100.0	284.2	-999.9
PINE	7/20/93	1228	GRAB	19.0	306.7	6.99	40.1	51.0	29.4	9.3	161.8	134.4	8.2	100.7	284.4	-999.9
PINE	7/27/93	1315	GRAB	19.5	296.1	7.39	43.0	59.1	29.0	22.6	171.3	139.4	8.7	100.0	276.1	-999.9
PINE	8/3/93	1250	GRAB	19.5	320.3	7.24	42.0	44.8	30.1	3.4	168.0	137.0	9.0	106.1	295.0	-999.9
PINE	8/5/93	1200	AUTO	-9.9	319.7	7.21	41.1	47.8	30.2	14.4	171.3	141.1	8.7	105.4	295.1	-999.9
PINE	8/5/93	2000	AUTO	-9.9	327.8	7.15	42.0	47.8	30.0	14.5	170.6	138.7	8.8	106.7	295.1	-999.9
PINE	8/6/93	0400	AUTO	-9.9	312.9	7.11	41.0	46.2	29.2	14.2	166.7	135.9	8.4	102.7	283.4	-999.9
PINE	8/6/93	1200	AUTO	-9.9	264.2	7.07	38.4	54.9	26.8	17.3	155.5	127.3	10.5	93.3	255.5	-999.9
PINE	8/6/93	1600	AUTO	-9.9	236.0	6.95	36.0	62.4	27.7	13.4	150.1	114.4	11.9	91.4	251.1	-999.9
PINE	8/6/93	1800	AUTO	-9.9	244.0	7.19	41.2	69.7	26.8	39.8	167.8	132.9	10.9	91.2	249.9	-999.9
PINE	8/6/93	2000	AUTO	-9.9	221.0	7.21	41.8	70.7	26.3	51.7	164.4	134.0	9.9	90.7	246.3	-999.9
PINE	8/6/93	2200	AUTO	-9.9	236.5	7.26	42.2	70.6	26.5	52.8	165.7	134.5	9.1	90.0	247.8	-999.9
PINE	8/7/93	0000	AUTO	-9.9	255.4	7.29	43.0	70.1	26.9	52.1	172.9	139.5	9.0	91.9	253.5	-999.9
PINE	8/7/93	0200	AUTO	-9.9	253.0	7.30	42.1	68.8	27.0	48.2	174.7	141.6	8.6	91.2	254.6	-999.9
PINE	8/7/93	0400	AUTO	-9.9	264.0	7.25	42.5	68.6	27.4	47.1	175.3	141.6	8.5	93.5	257.4	-999.9
PINE	8/7/93	0600	AUTO	-9.9	275.4	7.29	43.0	67.9	27.7	46.3	176.8	142.3	8.7	95.6	261.4	-999.9
PINE	8/7/93	0800	AUTO	-9.9	266.0	7.32	42.9	67.2	28.1	42.9	177.1	144.4	8.7	95.7	264.6	-999.9
PINE	8/7/93	1000	AUTO	-9.9	276.5	7.32	43.0	66.2	27.7	39.8	174.8	142.4	8.3	95.3	265.4	-999.9
PINE	8/7/93	1100	GRAB	17.0	291.1	7.19	42.0	65.4	27.1	34.6	176.2	141.9	8.6	96.0	265.9	-999.9
PINE	8/10/93	1310	GRAB	17.5	307.1	7.33	41.0	55.8	29.2	13.9	170.4	141.6	8.8	103.0	285.4	-999.9
PINE	8/17/93	1250	GRAB	20.0	332.8	7.24	42.0	50.2	29.8	9.4	178.2	148.3	9.9	107.0	298.1	-999.9
PINE	8/24/93	1300	GRAB	18.0	349.2	7.16	43.9	98.1	24.3	21.4	175.0	142.2	8.8	109.2	301.9	-999.9
PINE	8/31/93	1401	GRAB	20.0	350.5	7.26	45.9	42.6	29.3	3.2	180.1	146.9	9.5	113.9	313.1	-999.9
PINE	9/7/93	1700	GRAB	17.5	371.1	7.16	43.9	42.1	30.2	4.8	182.5	148.9	10.0	115.3	315.1	-999.9
PINE	9/14/93	1345	GRAB	18.0	349.0	7.27	43.9	42.8	29.9	4.1	174.9	145.1	9.4	114.5	308.1	-999.9
PINE	9/21/93	1515	GRAB	17.0	336.0	7.28	45.0	58.0	32.1	16.2	180.3	145.4	10.4	113.5	296.8	-999.9
PINE	9/28/93	1550	GRAB	15.0	311.1	7.36	45.1	70.0	33.6	21.5	180.4	156.0	9.1	102.8	280.2	-999.9
PINE	10/5/93	1530	GRAB	15.0	335.0	7.31	44.0	57.2	32.9	8.1	176.8	145.2	8.6	108.4	289.7	-999.9
PINE	10/13/93	1025	GRAB	11.5	319.5	7.23	43.5	61.1	35.6	13.7	174.2	147.8	10.7	104.8	272.7	-999.9
PINE	10/19/93	1445	GRAB	15.5	352.5	7.15	43.9	56.7	33.8	0.1	180.5	154.6	10.2	106.9	287.0	-999.9
PINE	10/26/93	1230	GRAB	12.0	321.1	7.22	42.1	62.4	37.3	0.2	172.8	144.9	9.3	99.7	271.4	-999.9
PINE	11/2/93	1255	GRAB	9.8	281.7	7.11	37.6	71.0	41.0	0.1	160.7	137.0	9.0	92.0	253.6	-999.9
PINE	11/8/93	1148	GRAB	7.0	279.7	7.12	35.9	64.8	39.6	0.1	154.4	128.8	7.7	92.4	251.6	-999.9
PINE	11/15/93	1151	GRAB	12.0	272.8	7.17	37.9	67.7	41.3	0.1	154.0	128.2	8.1	92.3	251.0	-999.9
PINE	11/22/93	1450	GRAB	8.0	248.6	7.17	36.2	69.4	41.8	0.1	145.1	120.7	6.4	87.5	243.0	-999.9

Appendix II Table 3A - Analysis of Intensive Site Samples

SITE	DATE	TIME	TYPE	TEMP	ANC	PH	COND	SO4	CL	NO3	CA	MG	K	NA	SIO2	T_AL
PINE	11/26/93	1200	AUTO	-9.9	249.4	7.16	36.5	66.8	41.7	0.7	144.3	123.8	6.4	86.1	243.2	-999.9
PINE	11/26/93	2000	AUTO	-9.9	254.2	7.21	38.0	66.8	41.5	0.7	147.4	124.8	6.5	87.9	243.7	22.0
PINE	11/27/93	0400	AUTO	-9.9	258.6	7.17	38.2	68.1	42.5	2.2	148.8	126.2	7.2	88.1	241.6	-999.9
PINE	11/27/93	1200	AUTO	-9.9	218.6	7.09	34.3	64.2	39.5	0.1	130.3	109.0	9.1	79.7	217.2	-999.9
PINE	11/27/93	1400	AUTO	-9.9	174.2	6.83	30.1	74.1	41.3	1.7	130.7	101.5	15.9	79.7	211.1	-999.9
PINE	11/27/93	1600	AUTO	-9.9	137.9	6.79	36.5	104.4	44.4	51.5	158.6	132.8	18.6	66.9	173.4	9.5
PINE	11/27/93	1800	AUTO	-9.9	123.6	6.79	37.0	114.4	40.8	42.9	154.5	130.4	17.6	62.9	161.3	-999.9
PINE	11/27/93	2000	AUTO	-9.9	116.1	6.82	37.0	120.7	37.9	61.5	162.7	134.6	16.3	58.9	153.6	-999.9
PINE	11/27/93	2200	AUTO	-9.9	109.4	6.87	34.3	118.0	34.6	55.2	152.4	127.6	14.8	56.3	148.7	-999.9
PINE	11/28/93	0000	AUTO	-9.9	103.6	6.77	33.0	118.4	30.1	48.9	149.3	120.4	18.8	50.6	144.3	-999.9
PINE	11/28/93	0200	AUTO	-9.9	96.1	6.78	32.6	119.9	28.7	28.7	143.8	117.9	15.4	49.0	135.5	-999.9
PINE	11/28/93	0400	AUTO	-9.9	95.4	6.82	33.0	122.0	28.5	8.9	144.6	117.6	13.3	50.6	145.0	-999.9
PINE	11/28/93	0600	AUTO	-9.9	98.7	6.86	33.0	123.6	29.7	40.2	142.7	118.1	12.1	52.2	146.9	-999.9
PINE	11/28/93	0800	AUTO	-9.9	99.4	6.88	32.9	120.9	29.0	52.1	141.8	119.3	11.3	53.5	150.9	-999.9
PINE	11/28/93	1000	AUTO	-9.9	97.9	6.92	32.9	119.0	29.5	47.1	137.6	119.2	10.5	54.2	154.5	-999.9
PINE	11/28/93	1200	AUTO	-9.9	101.2	6.87	32.3	115.8	30.3	44.3	136.6	117.4	10.2	54.6	155.5	8.8
PINE	11/28/93	1235	GRAB	9.5	101.9	6.91	32.0	114.6	28.4	46.4	131.7	110.4	9.9	54.4	152.4	-999.9
PINE	11/30/93	1300	GRAB	5.5	118.7	6.59	30.0	87.9	30.7	34.4	117.1	101.3	6.7	58.9	173.3	-999.9
PINE	12/3/93	2000	AUTO	-9.9	144.5	6.97	30.2	77.4	32.1	30.0	120.5	103.4	6.1	63.0	184.7	12.7
PINE	12/4/93	0400	AUTO	-9.9	145.3	7.01	30.5	76.3	31.8	30.2	120.9	102.3	6.1	62.8	182.4	-999.9
PINE	12/4/93	1200	AUTO	-9.9	143.7	7.01	31.0	75.8	31.5	29.0	118.4	101.6	6.2	63.1	182.3	9.6
PINE	12/4/93	2000	AUTO	-9.9	143.7	6.98	30.4	74.5	30.6	28.9	117.5	101.1	6.4	63.1	178.1	-999.9
PINE	12/5/93	0400	AUTO	-9.9	136.9	6.93	29.0	84.4	28.3	25.8	121.0	100.5	7.8	61.6	174.3	10.9
PINE	12/6/93	1329	GRAB	9.0	130.3	6.97	30.2	94.6	28.0	37.7	123.7	105.7	6.8	63.1	180.1	-999.9
PINE	12/13/93	1245	GRAB	6.0	137.8	7.07	31.0	72.2	32.3	39.3	116.1	99.8	6.7	65.4	183.8	-999.9
PINE	12/14/93	2000	AUTO	-9.9	141.2	7.05	30.3	69.8	30.7	38.4	116.9	101.7	5.7	64.3	185.7	10.2
PINE	12/15/93	0400	AUTO	-9.9	142.8	7.06	31.0	69.4	30.5	39.1	116.5	100.8	5.5	64.9	184.4	-999.9
PINE	12/15/93	1200	AUTO	-9.9	136.2	7.09	30.4	69.4	30.6	37.8	114.9	99.1	5.6	63.8	183.5	-999.9
PINE	12/15/93	2000	AUTO	-9.9	136.2	7.11	30.1	68.3	29.9	38.6	114.8	99.7	5.7	63.3	182.3	-999.9
PINE	12/15/93	2200	AUTO	-9.9	131.9	6.92	30.8	71.6	30.0	33.8	117.2	101.1	6.0	63.4	181.8	3.7
PINE	12/16/93	0000	AUTO	-9.9	129.9	7.08	30.4	68.8	29.7	41.8	113.3	98.6	5.5	63.1	179.8	-999.9
PINE	12/16/93	0200	AUTO	-9.9	126.2	7.01	30.0	68.6	29.0	43.5	111.4	96.5	5.5	62.5	175.6	-999.9
PINE	12/16/93	0400	AUTO	-9.9	123.7	7.04	30.0	70.3	28.7	43.7	112.1	98.0	5.6	62.7	175.2	-999.9
PINE	12/16/93	0600	AUTO	-9.9	125.3	7.07	30.2	72.5	28.7	42.5	112.8	98.6	5.6	62.7	175.2	-999.9
PINE	12/16/93	1200	AUTO	-9.9	126.2	7.11	30.2	75.0	28.6	39.8	112.3	98.4	5.5	63.5	176.4	-999.9
PINE	12/16/93	1800	AUTO	-9.9	132.8	7.10	31.0	76.7	28.7	38.7	115.2	99.3	5.6	64.8	178.3	-999.9
PINE	12/17/93	0000	AUTO	-9.9	133.7	7.08	31.0	76.9	28.5	38.8	115.3	99.4	5.4	64.1	178.7	-999.9
PINE	12/17/93	1200	AUTO	-9.9	129.4	7.11	30.9	77.8	28.7	38.1	113.6	99.0	5.2	63.5	179.5	14.0
PINE	12/20/93	1308	GRAB	6.5	135.3	7.07	30.2	75.3	29.3	36.9	113.7	98.3	5.3	65.0	180.3	-999.9
PINE	1/2/94	1205	GRAB	4.0	135.3	7.11	28.9	65.0	30.6	33.2	105.8	92.5	4.9	64.0	172.7	-999.9
PINE	1/10/94	1020	GRAB	1.0	128.7	7.04	28.7	84.9	29.6	36.5	112.6	99.0	5.1	65.7	183.5	-999.9
PINE	1/24/94	1405	GRAB	2.5	123.7	7.04	29.0	71.2	28.9	42.4	106.8	92.8	4.9	65.0	174.4	-999.9

Appendix II Table 3A - Analysis of Intensive Site Samples

SITE	DATE	TIME	TYPE	TEMP	ANC	PH	COND	SO4	CL	NO3	CA	MG	K	NA	SIO2	T_AL
PINE	1/31/94	1430	GRAB	3.5	121.2	6.99	31.0	81.7	28.1	48.9	112.7	100.1	5.3	64.0	174.6	-999.9
PINE	2/7/94	1305	GRAB	6.0	131.2	7.13	31.2	69.0	29.7	46.2	112.1	97.4	5.0	67.0	180.8	-999.9
PINE	2/16/94	1240	GRAB	6.0	135.3	6.97	30.1	71.5	30.4	42.5	112.7	97.6	5.9	69.1	178.5	-999.9
PINE	2/21/94	1500	GRAB	5.5	136.9	7.02	32.0	82.0	26.4	42.8	120.3	101.6	5.1	67.5	180.3	-999.9
PINE	2/22/94	1200	AUTO	-9.9	136.2	7.07	31.5	81.0	28.1	36.7	119.5	102.2	4.9	67.5	182.6	8.2
PINE	2/23/94	0400	AUTO	-9.9	131.2	7.05	31.2	78.5	27.5	43.4	117.5	100.7	5.0	66.6	175.7	-999.9
PINE	2/23/94	1200	AUTO	-9.9	131.2	7.03	30.1	77.0	27.3	44.6	115.6	98.3	4.9	65.1	175.3	-999.9
PINE	2/23/94	2000	AUTO	-9.9	136.2	7.04	31.9	80.9	27.4	46.1	120.7	102.8	5.5	67.3	181.5	-999.9
PINE	2/24/94	0400	AUTO	-9.9	137.0	7.03	32.0	82.7	27.9	44.5	123.2	104.1	5.1	67.3	182.4	-999.9
PINE	2/24/94	1200	AUTO	-9.9	128.7	7.02	31.1	82.3	27.0	34.1	119.3	100.7	5.5	66.4	176.3	-999.9
PINE	2/24/94	2000	AUTO	-9.9	132.8	7.01	32.2	86.7	26.5	29.7	123.9	105.8	4.6	66.9	179.6	13.6
PINE	2/25/94	1200	AUTO	-9.9	131.2	7.07	32.1	89.6	27.4	40.0	121.7	104.6	5.1	65.5	181.3	-999.9
PINE	2/26/94	1200	AUTO	-9.9	130.3	7.04	31.3	85.0	27.6	45.7	119.8	102.9	5.1	65.9	182.0	14.4
PINE	2/28/94	1400	GRAB	4.0	125.4	7.02	31.2	76.9	28.4	37.8	117.6	100.3	4.9	65.3	181.5	-999.9
PINE	3/7/94	1320	GRAB	6.0	146.8	7.11	30.2	78.4	28.3	34.5	118.0	100.7	6.0	70.4	188.1	-999.9
PINE	3/14/94	1315	GRAB	7.0	131.9	7.13	30.7	78.1	27.0	42.6	118.3	100.5	5.5	66.0	182.0	-999.9
PINE	3/22/94	1020	GRAB	8.0	133.7	7.15	29.0	72.2	26.3	39.9	114.2	96.5	5.2	65.3	178.1	-999.9
PINE	3/26/94	1200	AUTO	-9.9	136.2	7.13	30.1	70.1	28.9	50.0	119.3	102.2	5.0	65.2	165.3	-999.9
PINE	3/26/94	2000	AUTO	-9.9	132.5	7.15	30.7	69.4	28.8	47.4	113.9	98.3	4.9	64.6	183.5	-999.9
PINE	3/27/94	0400	AUTO	-9.9	140.3	7.09	31.0	72.6	27.8	46.6	119.9	101.3	5.2	64.8	164.4	-999.9
PINE	3/27/94	1200	AUTO	-9.9	139.4	7.12	31.5	77.3	25.9	41.8	119.3	101.1	5.7	64.8	175.4	-999.9
PINE	3/27/94	1630	AUTO	-9.9	140.4	6.80	30.9	76.1	26.4	27.9	115.7	96.9	5.5	64.9	175.7	-999.9
PINE	3/27/94	1830	AUTO	-9.9	139.4	7.09	31.5	75.8	26.1	29.3	120.5	101.6	5.7	65.9	170.0	-999.9
PINE	3/27/94	2030	AUTO	-9.9	140.4	7.10	31.9	76.1	25.8	45.2	121.0	101.6	5.6	64.6	177.5	-999.9
PINE	3/27/94	2230	AUTO	-9.9	141.9	7.11	31.7	76.4	26.1	44.7	124.0	103.3	5.7	65.9	177.9	8.7
PINE	3/28/94	0230	AUTO	-9.9	141.2	7.06	30.1	80.4	25.3	41.1	120.4	101.4	5.8	65.2	178.8	16.6
PINE	3/28/94	0400	AUTO	-9.9	139.4	7.12	31.0	72.5	26.8	42.0	118.4	99.8	5.7	66.3	177.7	20.4
PINE	3/28/94	1135	GRAB	8.0	137.9	7.07	31.1	80.6	24.3	39.6	120.8	102.2	5.8	64.9	174.1	-999.9
PINE	3/28/94	1600	AUTO	-9.9	141.2	7.08	31.0	81.8	24.7	42.7	124.1	103.6	6.1	64.6	179.1	-999.9
PINE	3/28/94	2000	AUTO	-9.9	139.4	7.08	32.1	83.8	24.7	28.3	125.2	105.1	6.3	65.7	177.9	-999.9
PINE	3/29/94	0200	AUTO	-9.9	138.7	7.06	31.2	85.9	24.2	33.3	123.6	104.2	6.3	63.2	182.3	-999.9
PINE	3/29/94	0600	AUTO	-9.9	133.6	7.05	31.2	87.1	23.0	33.6	124.0	104.0	6.5	62.1	175.1	-999.9
PINE	3/29/94	0800	AUTO	-9.9	131.1	7.05	31.9	89.0	22.9	39.3	123.5	103.9	6.1	58.8	167.6	-999.9
PINE	3/29/94	1000	AUTO	-9.9	131.2	7.07	32.0	90.8	22.6	34.2	123.8	104.2	6.2	61.5	166.4	-999.9
PINE	3/29/94	1600	AUTO	-9.9	131.9	7.11	32.0	91.5	23.2	41.0	124.0	103.2	6.2	62.3	175.7	-999.9
PINE	3/30/94	0000	AUTO	-9.9	133.7	7.03	31.2	88.0	24.0	43.5	123.4	103.5	6.0	63.3	179.0	-999.9
PINE	3/30/94	0800	AUTO	-9.9	131.2	7.06	31.5	85.4	26.6	45.2	123.0	103.0	5.8	63.0	176.4	-999.9
PINE	4/4/94	1215	GRAB	8.5	153.7	7.12	31.0	67.1	28.8	40.1	121.8	101.3	6.2	70.2	193.8	-999.9
PINE	4/11/94	1048	GRAB	9.5	161.9	6.90	31.3	67.4	28.3	6.4	125.5	106.1	6.0	70.9	199.6	-999.9
PINE	4/14/94	2000	AUTO	-9.9	183.7	7.21	31.0	63.8	29.6	3.6	130.7	107.1	6.3	75.3	210.6	-999.9
PINE	4/15/94	0400	AUTO	-9.9	182.5	7.24	32.2	64.9	30.2	17.9	131.5	109.5	6.5	75.8	210.3	18.7
PINE	4/15/94	1200	AUTO	-9.9	179.4	7.21	31.6	65.1	30.0	30.2	124.4	103.8	6.7	74.5	209.9	-999.9

Appendix II Table 3A - Analysis of Intensive Site Samples

SITE	DATE	TIME	TYPE	TEMP	ANC	PH	COND	SO4	CL	NO3	CA	MG	K	NA	SIO2	T_AL
PINE	4/15/94	2000	AUTO	-9.9	178.7	7.23	31.9	63.7	29.0	14.8	128.9	105.1	7.8	73.4	202.9	-999.9
PINE	4/16/94	0400	AUTO	-9.9	177.9	7.06	32.3	70.5	26.9	13.5	127.5	104.4	7.3	72.1	207.9	12.5
PINE	4/16/94	1200	AUTO	-9.9	176.9	7.18	32.5	77.1	26.8	16.6	130.1	108.7	6.7	73.0	203.5	-999.9
PINE	4/16/94	2000	AUTO	-9.9	179.4	7.16	33.0	78.0	27.7	7.6	131.5	109.5	6.5	73.7	209.3	-999.9
PINE	4/17/94	1200	AUTO	-9.9	175.0	7.19	32.4	76.6	28.5	19.6	129.0	107.6	6.3	73.2	206.3	8.1
PINE	4/18/94	0400	AUTO	-9.9	181.2	7.18	32.9	74.5	28.6	23.1	131.3	110.7	6.2	73.7	206.7	-999.9
PINE	4/18/94	1145	GRAB	12.0	176.2	7.15	32.0	69.9	28.2	10.8	128.4	106.2	6.5	74.6	204.6	-999.9
PINE	4/25/94	1250	GRAB	14.0	188.7	7.32	32.7	62.8	29.9	0.1	127.3	103.9	6.9	76.8	216.4	-999.9
PINE	5/2/94	0952	GRAB	11.0	222.5	7.11	35.0	63.4	28.1	0.1	138.5	115.9	6.5	79.0	226.7	-999.9
PINE	5/6/94	1200	AUTO	-9.9	204.4	7.22	32.9	68.8	27.4	10.6	133.1	110.0	6.0	76.7	221.7	20.2
PINE	5/6/94	2000	AUTO	-9.9	206.1	7.07	33.5	68.4	27.2	12.4	135.4	112.1	6.4	75.5	219.8	-999.9
PINE	5/7/94	0400	AUTO	-9.9	204.4	7.13	33.9	69.7	27.7	14.9	135.6	111.7	6.1	75.4	230.4	-999.9
PINE	5/7/94	1200	AUTO	-9.9	204.5	7.16	32.9	68.5	27.4	6.6	130.2	107.8	6.4	75.9	219.5	-999.9
PINE	5/7/94	2000	AUTO	-9.9	189.5	7.02	32.9	74.1	25.7	12.7	130.6	107.6	7.7	72.1	208.8	-999.9
PINE	5/8/94	0400	AUTO	-9.9	191.1	6.85	34.0	84.7	22.4	4.8	140.8	115.2	7.8	71.0	219.2	8.8
PINE	5/8/94	1200	AUTO	-9.9	188.2	7.10	34.2	91.9	22.1	20.2	140.5	117.8	6.5	70.9	203.8	-999.9
PINE	5/8/94	2000	AUTO	-9.9	193.6	7.02	34.1	87.9	23.4	5.2	139.1	116.8	6.3	71.7	217.2	-999.9
PINE	5/9/94	0400	AUTO	-9.9	190.0	7.10	34.1	85.9	24.3	14.0	139.1	115.5	6.2	72.3	208.2	-999.9
PINE	5/9/94	1200	AUTO	-9.9	185.0	7.16	33.8	82.5	24.8	22.3	135.7	113.7	6.1	72.6	207.5	16.2
PINE	5/9/94	1240	GRAB	12.0	189.4	6.87	33.7	77.1	24.8	11.7	134.0	111.1	6.6	73.6	206.3	-999.9
PINE	5/16/94	1400	GRAB	14.0	207.9	6.89	33.0	59.9	28.2	7.5	132.9	111.4	6.6	77.0	220.2	30.2
PINE	5/23/94	1105	GRAB	13.0	225.4	6.75	33.2	57.4	29.1	0.1	138.0	115.2	6.2	79.1	231.7	-999.9
PINE	5/31/94	1250	GRAB	16.0	231.7	7.15	33.9	54.7	29.5	4.7	137.9	112.1	6.8	82.8	240.8	-999.9
PINE	6/6/94	1240	GRAB	16.5	246.7	7.02	35.1	51.7	29.6	1.2	141.7	115.1	7.2	87.6	252.4	65.5
PINE	6/13/94	1440	GRAB	17.0	261.0	7.03	37.0	50.5	31.2	1.0	142.1	111.7	8.1	93.5	260.5	-999.9
PINE	6/15/94	2000	AUTO	-9.9	288.6	7.33	35.9	50.7	31.0	0.4	161.7	129.5	6.5	74.0	275.4	20.8
PINE	6/16/94	0400	AUTO	-9.9	286.1	7.19	37.6	48.8	30.4	1.2	159.2	129.4	7.8	94.4	273.0	-999.9
PINE	6/16/94	1200	AUTO	-9.9	283.6	7.35	37.0	48.2	30.9	1.7	155.9	126.2	7.4	93.7	276.1	-999.9
PINE	6/16/94	1600	AUTO	-9.9	177.0	6.40	34.9	91.0	22.5	13.4	129.3	100.2	19.5	68.2	190.7	16.2
PINE	6/16/94	1800	AUTO	-9.9	201.2	6.60	38.6	98.9	25.1	11.0	148.6	115.1	16.4	81.5	226.0	-999.9
PINE	6/16/94	2000	AUTO	-9.9	213.4	6.77	38.8	87.0	26.3	7.7	155.6	122.9	12.0	87.7	245.0	-999.9
PINE	6/16/94	2200	AUTO	-9.9	228.5	6.89	38.9	79.7	26.7	10.0	157.5	124.4	10.3	89.1	249.8	-999.9
PINE	6/17/94	0000	AUTO	-9.9	249.2	6.82	39.0	76.7	27.3	10.9	159.7	126.5	9.5	89.4	253.3	-999.9
PINE	6/17/94	0200	AUTO	-9.9	249.1	6.98	39.0	74.3	27.3	15.9	160.4	128.7	9.0	90.5	254.2	-999.9
PINE	6/17/94	0400	AUTO	-9.9	248.5	7.00	39.0	72.7	28.1	14.7	161.8	131.8	8.7	90.6	254.2	-999.9
PINE	6/17/94	0600	AUTO	-9.9	258.8	7.11	39.0	71.6	28.1	13.2	160.2	129.8	8.5	90.1	258.1	-999.9
PINE	6/17/94	0800	AUTO	-9.9	265.4	7.22	39.0	70.1	28.7	11.7	159.9	130.0	8.1	90.7	257.0	-999.9
PINE	6/17/94	1000	AUTO	-9.9	265.0	7.24	38.9	68.6	28.5	13.3	158.9	129.8	7.9	90.9	260.8	-999.9
PINE	6/17/94	1200	AUTO	-9.9	264.4	7.24	38.2	67.7	28.6	9.4	158.3	129.1	8.0	90.6	259.0	-999.9
PINE	6/17/94	1600	AUTO	-9.9	271.1	7.24	39.0	66.9	28.8	9.8	159.0	129.1	8.1	90.8	261.0	-999.9
PINE	6/17/94	2200	AUTO	-9.9	276.1	7.24	39.5	65.5	28.7	10.0	159.8	130.2	7.9	91.4	261.4	-999.9
PINE	6/18/94	0400	AUTO	-9.9	278.6	7.31	39.2	63.4	28.8	8.4	159.0	128.9	8.0	92.5	263.3	12.2

Appendix II Table 3A - Analysis of Intensive Site Samples

SITE	DATE	TIME	TYPE	TEMP	ANC	PH	COND	SO4	CL	NO3	CA	MG	K	NA	SIO2	T_AL
PINE	6/18/94	1400	AUTO	-9.9	270.4	7.01	38.5	61.4	29.0	7.3	155.0	125.8	7.7	92.6	268.5	-999.9
PINE	6/22/94	1105	GRAB	17.5	281.7	7.24	38.8	56.7	28.5	4.1	158.6	128.1	8.3	95.5	272.5	22.2
PINE	6/28/94	1140	GRAB	16.0	289.4	6.83	38.9	54.5	26.8	5.3	159.1	128.4	7.3	93.4	267.7	-999.9
PINE	7/5/94	1053	GRAB	18.0	322.5	7.25	40.2	49.6	28.1	1.8	166.9	131.6	7.9	101.2	286.4	-999.9
PINE	7/12/94	1033	GRAB	18.0	314.2	7.28	41.0	47.7	27.4	5.0	165.6	132.9	7.6	101.3	289.7	14.3
PINE	7/19/94	1037	GRAB	18.5	323.5	7.30	42.0	51.5	26.8	5.8	175.2	139.7	8.0	104.1	287.3	26.3
PINE	7/26/94	1027	GRAB	18.5	316.0	7.07	40.5	46.3	28.0	0.2	176.3	142.0	8.1	105.4	295.9	28.7
PINE	8/2/94	1033	GRAB	19.0	326.5	7.18	42.0	45.6	28.3	1.6	178.3	140.4	8.1	106.2	299.1	19.3
PINE	8/9/94	1415	GRAB	18.0	326.9	6.98	40.8	46.4	28.5	4.8	165.3	128.4	8.6	106.5	292.4	-999.9
PINE	8/11/94	2000	AUTO	-9.9	218.0	6.63	36.9	75.1	23.2	17.3	143.3	108.1	14.2	85.5	235.2	-999.9
PINE	8/11/94	2200	AUTO	-9.9	237.2	6.58	41.0	87.4	24.5	21.6	159.6	122.1	16.1	83.4	241.9	19.2
PINE	8/12/94	0000	AUTO	-9.9	247.5	6.70	43.0	88.5	22.8	32.2	177.9	137.7	12.8	88.9	247.1	-999.9
PINE	8/12/94	0200	AUTO	-9.9	244.0	6.67	43.9	88.7	23.2	36.7	175.8	139.1	10.3	88.5	254.6	-999.9
PINE	8/12/94	0400	AUTO	-9.9	266.1	6.96	44.1	87.1	22.8	35.7	184.1	145.8	9.9	91.4	253.2	-999.9
PINE	8/12/94	0600	AUTO	-9.9	266.0	6.89	44.0	84.8	24.5	29.9	185.5	145.5	9.3	91.9	257.9	-999.9
PINE	8/12/94	0800	AUTO	-9.9	263.5	6.88	44.0	82.5	24.7	25.4	183.0	145.9	9.0	93.2	262.6	-999.9
PINE	8/12/94	1000	AUTO	-9.9	282.2	6.88	44.0	81.4	24.3	25.1	184.6	146.2	8.5	94.4	265.4	-999.9
PINE	8/12/94	1200	AUTO	-9.9	292.9	7.03	44.0	79.7	24.2	23.4	182.1	145.7	8.1	94.7	267.4	-999.9
PINE	8/12/94	2000	AUTO	-9.9	283.0	6.91	43.5	75.9	26.0	15.9	184.5	146.7	8.6	95.7	274.4	-999.9
PINE	8/12/94	2200	AUTO	-9.9	272.5	6.88	42.5	77.1	24.3	19.2	177.9	143.8	7.9	93.1	263.9	-999.9
PINE	8/13/94	0200	AUTO	-9.9	269.0	6.86	41.8	75.5	24.6	15.1	174.3	140.7	7.9	93.5	262.1	-999.9
PINE	8/13/94	0800	AUTO	-9.9	264.5	6.84	41.4	73.8	25.3	12.2	175.3	141.6	7.4	94.4	269.6	-999.9
PINE	8/13/94	1600	AUTO	-9.9	278.5	6.84	41.9	71.7	25.1	8.1	175.9	141.3	7.8	96.6	274.3	29.4
PINE	8/16/94	1405	GRAB	16.5	299.2	7.22	41.1	64.8	25.4	7.5	175.5	139.7	8.2	99.4	278.0	27.0
PINE	8/18/94	0800	AUTO	-9.9	277.9	7.01	38.1	58.2	24.8	0.1	152.8	121.1	9.8	93.7	267.1	30.4
PINE	8/18/94	1000	AUTO	-9.9	253.5	6.90	37.8	60.8	23.8	5.1	158.6	123.1	10.7	90.1	258.0	-999.9
PINE	8/18/94	1200	AUTO	-9.9	238.5	6.83	38.0	68.8	22.8	11.4	148.4	119.6	10.8	83.8	246.5	-999.9
PINE	8/18/94	1400	AUTO	-9.9	225.5	6.77	39.5	84.2	21.3	14.6	165.0	131.3	11.4	80.6	232.2	25.3
PINE	8/18/94	1600	AUTO	-9.9	221.0	7.02	37.7	89.1	19.6	8.9	159.3	124.8	13.4	71.4	210.4	22.9
PINE	8/18/94	1800	AUTO	-9.9	192.9	6.63	37.2	103.6	17.4	14.6	163.8	123.6	17.3	60.0	192.2	37.0
PINE	8/18/94	2000	AUTO	-9.9	166.0	6.60	37.8	114.9	19.1	16.6	167.1	126.2	12.6	58.6	186.7	-999.9
PINE	8/18/94	2200	AUTO	-9.9	158.9	6.70	36.8	115.3	16.2	15.6	162.3	125.4	11.5	60.4	189.0	-999.9
PINE	8/19/94	0000	AUTO	-9.9	163.4	6.69	37.8	116.1	17.2	14.2	164.0	129.7	10.6	62.7	198.2	27.1
PINE	8/19/94	0400	AUTO	-9.9	186.0	6.85	37.7	112.2	18.1	14.7	162.5	131.0	9.1	66.3	208.4	-999.9
PINE	8/19/94	0800	AUTO	-9.9	188.0	6.72	37.0	108.2	19.1	11.1	167.7	132.2	8.4	68.4	215.5	-999.9
PINE	8/19/94	1200	AUTO	-9.9	186.5	6.84	36.9	104.0	19.7	12.7	161.3	131.1	7.9	69.9	218.6	21.4
PINE	8/23/94	1320	GRAB	17.0	242.5	7.03	37.0	70.1	25.0	7.9	150.9	123.1	7.2	79.6	241.3	14.9
PINE	8/29/94	1215	GRAB	18.0	267.2	7.11	38.5	60.9	25.9	7.2	158.7	127.2	7.2	85.3	258.9	10.5
PINE	9/5/94	1642	GRAB	16.5	271.1	7.22	37.9	56.4	27.3	1.9	154.1	123.4	6.7	87.0	259.5	30.2
PINE	9/12/94	1540	GRAB	16.0	286.7	6.92	38.0	53.2	27.8	0.2	155.3	125.0	6.8	90.0	265.9	25.1
PINE	9/20/94	1615	GRAB	16.0	304.6	7.18	39.9	51.4	29.0	1.4	166.0	131.9	8.2	96.0	270.8	15.4
PINE	9/22/94	0400	AUTO	-9.9	318.6	7.34	39.1	50.0	29.0	5.9	171.4	137.6	7.9	96.2	270.6	14.9

Appendix II Table 3A - Analysis of Intensive Site Samples

SITE	DATE	TIME	TYPE	TEMP	ANC	PH	COND	SO4	CL	NO3	CA	MG	K	NA	SIO2	T_AL
PINE	9/22/94	1200	AUTO	-9.9	309.4	7.33	40.1	52.8	30.9	6.0	169.4	135.5	13.1	93.0	261.0	-999.9
PINE	9/22/94	2000	AUTO	-9.9	287.8	7.31	38.1	51.0	33.8	4.8	159.4	125.1	13.2	93.9	268.6	-999.9
PINE	9/23/94	0200	AUTO	-9.9	248.2	7.02	38.1	56.8	33.5	27.7	153.9	123.4	14.6	81.4	232.4	10.4
PINE	9/23/94	0400	AUTO	-9.9	236.1	7.15	37.2	58.9	32.9	29.4	152.0	123.0	11.8	80.0	222.0	-999.9
PINE	9/23/94	0600	AUTO	-9.9	233.6	7.12	37.0	60.2	34.0	27.6	154.0	123.5	10.7	79.1	220.4	-999.9
PINE	9/23/94	0800	AUTO	-9.9	222.5	7.15	36.5	61.5	31.8	27.0	154.6	125.9	9.6	76.7	214.1	-999.9
PINE	9/23/94	1600	AUTO	-9.9	224.4	7.24	36.0	63.3	32.3	22.9	156.5	127.3	8.0	78.5	220.4	-999.9
PINE	9/24/94	0000	AUTO	-9.9	246.1	7.25	37.0	62.3	31.4	18.1	160.0	130.0	8.0	80.6	232.7	9.6
PINE	9/25/94	0400	AUTO	-9.9	274.4	7.31	38.0	57.9	31.0	9.3	168.0	134.9	7.7	86.0	249.9	-999.9
PINE	9/25/94	1200	AUTO	-9.9	274.4	7.33	38.0	56.8	31.0	7.6	165.1	132.6	8.3	85.7	247.9	15.5
PINE	9/25/94	2000	AUTO	-9.9	281.1	7.32	38.3	57.1	30.8	6.8	163.6	130.9	8.4	86.0	251.5	-999.9
PINE	9/26/94	0400	AUTO	-9.9	204.4	7.17	35.0	70.6	27.8	24.9	146.2	117.5	9.2	69.6	201.8	13.5
PINE	9/26/94	1200	AUTO	-9.9	211.9	7.20	36.0	76.6	28.5	22.2	147.5	116.7	8.5	72.7	210.1	-999.9
PINE	9/26/94	2000	AUTO	-9.9	221.9	7.26	36.1	75.4	27.9	17.9	150.6	120.7	7.6	74.6	218.4	-999.9
PINE	9/27/94	0400	AUTO	-9.9	226.9	7.26	36.0	74.2	27.9	15.4	152.3	123.0	7.4	75.6	218.8	-999.9
PINE	9/27/94	1200	AUTO	-9.9	226.1	7.31	35.5	72.6	27.6	12.9	145.3	117.0	7.1	76.7	222.8	9.3
PINE	9/27/94	1650	GRAB	15.0	231.1	7.25	36.0	72.5	27.3	10.3	149.8	121.3	7.3	77.2	222.8	11.4
PINE	10/4/94	1610	GRAB	11.0	251.1	7.10	35.0	60.9	29.0	2.0	151.8	124.4	8.0	80.8	232.6	10.8
PINE	10/11/94	1610	GRAB	11.0	256.9	7.20	36.0	56.6	28.1	1.6	148.8	122.9	6.8	80.1	233.1	11.0
PINE	10/18/94	1713	GRAB	12.0	261.1	7.18	35.9	53.9	29.2	0.1	147.4	122.1	7.1	80.6	231.9	4.6
PINE	10/25/94	1730	GRAB	12.0	273.6	7.20	36.2	53.6	33.7	0.1	153.4	128.2	8.8	83.8	233.1	11.6
PINE	11/1/94	1540	GRAB	10.0	280.0	7.17	38.0	53.7	36.0	0.1	157.7	128.6	17.8	85.0	237.8	13.6
PINE	11/8/94	1605	GRAB	9.5	275.3	7.18	36.9	51.0	33.1	0.2	148.6	121.8	7.7	85.4	240.5	9.9
PINE	11/15/94	1610	GRAB	9.5	266.9	7.12	37.0	50.7	33.1	0.1	147.8	120.8	7.0	83.3	234.3	8.0
PINE	11/22/94	1620	GRAB	8.5	211.9	7.03	36.0	71.3	40.6	13.4	142.0	117.7	8.2	77.5	205.5	8.9
PINE	11/29/94	1608	GRAB	7.5	196.2	7.16	33.1	67.1	35.2	10.2	132.3	110.7	5.7	72.3	198.3	8.3
PINE	12/6/94	1540	GRAB	8.0	196.2	6.38	33.1	70.0	35.4	8.8	131.4	103.9	5.5	79.6	234.9	8.9
PINE	12/13/94	1550	GRAB	4.0	182.8	7.07	33.0	69.6	34.0	19.7	127.8	107.4	5.1	70.1	189.8	11.4
PINE	12/20/94	1505	GRAB	3.5	182.8	7.07	32.0	65.0	32.6	17.1	125.8	106.2	5.5	71.8	193.0	6.5
PINE	12/27/94	1640	GRAB	-9.9	168.7	7.08	33.0	73.4	31.5	27.0	127.0	107.0	5.4	69.5	186.8	5.7
PINE	1/3/95	1710	GRAB	1.0	169.4	7.05	32.0	67.8	30.9	28.9	126.3	107.9	5.1	69.0	185.8	4.2
PINE	1/10/95	1530	GRAB	5.5	156.2	7.05	32.7	76.2	30.0	29.7	126.8	108.1	4.9	67.9	185.1	4.0
PINE	1/13/95	1200	AUTO	-9.9	158.7	7.14	32.0	70.5	30.2	34.5	125.9	106.7	4.9	69.5	186.0	-999.9
PINE	1/13/95	2000	AUTO	-9.9	165.3	7.14	33.0	70.1	30.0	34.3	128.5	108.6	5.0	70.1	188.3	-999.9
PINE	1/14/95	0400	AUTO	-9.9	165.3	7.14	33.0	69.4	30.4	34.6	128.5	107.9	5.1	70.7	185.7	8.0
PINE	1/14/95	1200	AUTO	-9.9	163.7	7.20	33.4	70.3	33.7	34.7	126.0	106.5	5.2	72.4	188.0	-999.9
PINE	1/14/95	2000	AUTO	-9.9	161.2	7.17	34.0	70.6	40.1	35.5	130.9	108.3	6.0	73.9	187.8	-999.9
PINE	1/15/95	0400	AUTO	-9.9	137.5	6.94	37.2	84.3	58.2	42.1	138.1	114.6	9.5	76.3	181.6	-999.9
PINE	1/15/95	1200	AUTO	-9.9	98.7	6.88	39.0	111.7	67.5	47.9	151.7	121.7	13.6	58.6	146.6	-999.9
PINE	1/15/95	2000	AUTO	-9.9	93.7	6.84	35.9	111.3	49.2	43.4	140.7	112.1	12.5	53.7	142.9	15.2
PINE	1/16/95	0400	AUTO	-9.9	99.4	6.92	34.8	107.2	42.8	43.5	135.3	108.5	10.2	55.3	152.2	-999.9
PINE	1/16/95	1200	AUTO	-9.9	105.3	6.97	34.0	101.2	39.5	44.4	130.7	105.8	9.1	57.3	158.9	-999.9

Appendix II Table 3A - Analysis of Intensive Site Samples

SITE	DATE	TIME	TYPE	TEMP	ANC	PH	COND	SO4	CL	NO3	CA	MG	K	NA	SIO2	T_AL
PINE	1/16/95	2000	AUTO	-9.9	110.3	7.00	33.8	96.3	37.6	45.5	129.3	106.3	8.6	58.8	164.8	-999.9
PINE	1/17/95	0400	AUTO	-9.9	115.3	7.00	33.9	92.7	36.5	46.5	128.6	104.7	7.9	58.9	168.5	-999.9
PINE	1/17/95	1200	AUTO	-9.9	117.8	7.00	33.9	88.8	35.3	47.0	128.8	105.6	7.6	59.9	170.9	8.8
PINE	1/17/95	1610	GRAB	7.5	121.0	7.00	33.0	86.5	35.2	44.8	127.0	105.3	7.5	60.8	172.3	10.8
PINE	1/18/95	1200	AUTO	-9.9	129.4	7.01	32.7	80.6	34.3	47.4	130.1	107.8	7.1	63.8	179.4	-999.9
PINE	1/19/95	1200	AUTO	-9.9	134.5	7.02	33.7	76.2	34.1	47.2	132.7	109.6	6.7	64.3	184.4	-999.9
PINE	1/20/95	1200	AUTO	-9.9	140.0	7.05	34.0	80.8	34.1	40.1	131.5	108.6	6.7	65.1	184.7	7.1
PINE	1/24/95	1630	GRAB	4.0	143.7	7.00	33.0	72.2	32.7	43.1	129.0	109.2	5.7	66.0	189.7	8.4
PINE	2/1/95	1710	GRAB	4.0	145.5	6.77	31.2	64.9	33.0	32.7	128.7	109.3	5.7	68.2	198.7	7.9
PINE	2/8/95	1110	GRAB	0.5	152.9	6.93	31.9	63.9	33.1	34.1	124.0	105.5	5.2	67.7	198.5	8.0
PINE	2/14/95	1613	GRAB	1.0	149.4	6.99	31.2	61.9	32.1	35.8	121.5	102.4	5.0	67.3	193.4	8.5
PINE	2/21/95	1625	GRAB	5.5	149.5	7.05	31.4	68.5	32.4	29.9	125.8	105.8	5.6	70.2	198.6	10.9
PINE	2/28/95	1545	GRAB	8.5	153.5	7.11	31.9	68.3	31.3	35.2	125.3	104.6	5.5	70.3	194.9	6.5
PINE	3/7/95	1530	GRAB	11.0	163.7	7.09	31.9	67.3	31.1	30.0	125.2	105.1	5.6	72.2	198.4	4.7
PINE	3/7/95	2000	AUTO	-9.9	176.2	7.20	32.0	66.6	31.0	31.3	136.9	118.1	5.6	72.8	204.3	-999.9
PINE	3/8/95	0400	AUTO	-9.9	176.2	7.26	32.5	66.4	31.2	31.7	136.5	117.9	5.6	72.6	203.1	8.4
PINE	3/8/95	1200	AUTO	-9.9	170.0	7.26	32.0	66.1	30.9	29.0	125.1	105.5	5.7	72.3	201.1	-999.9
PINE	3/8/95	2000	AUTO	-9.9	146.9	7.17	31.2	73.2	28.3	38.1	132.9	113.9	6.6	66.3	181.4	-999.9
PINE	3/9/95	2000	AUTO	-9.9	159.4	7.17	34.3	87.4	32.0	37.8	142.9	123.9	5.8	69.1	196.1	6.6
PINE	3/10/95	1200	AUTO	-9.9	154.4	7.19	33.4	84.9	32.5	35.9	140.0	121.9	5.5	68.0	196.4	-999.9
PINE	3/11/95	1200	AUTO	-9.9	157.8	7.20	33.0	81.8	32.0	34.7	138.1	119.2	5.5	69.4	196.4	-999.9
PINE	3/11/95	2000	AUTO	-9.9	161.2	7.22	33.5	81.0	31.5	36.3	137.7	119.7	5.4	69.6	199.8	-999.9
PINE	3/12/95	1200	AUTO	-9.9	156.9	7.24	33.2	81.6	31.5	34.4	135.7	118.0	5.6	70.3	199.8	-999.9
PINE	3/12/95	2000	AUTO	-9.9	158.7	7.17	33.6	81.3	30.9	36.7	135.0	115.7	5.6	69.8	196.6	-999.9
PINE	3/13/95	1200	AUTO	-9.9	154.4	7.21	33.0	81.3	30.9	35.1	135.1	115.4	5.5	69.0	193.8	5.7
PINE	3/14/95	0400	AUTO	-9.9	161.2	7.18	33.2	79.1	30.4	36.2	132.5	111.4	5.4	69.3	194.5	-999.9
PINE	3/14/95	1630	GRAB	8.0	159.4	7.14	32.9	78.6	31.3	33.9	130.8	110.2	6.0	72.0	197.0	6.8
PINE	3/21/95	1630	GRAB	7.0	181.9	7.12	33.5	66.9	31.2	29.9	132.3	110.7	7.0	78.0	206.9	7.3
PINE	3/28/95	1735	GRAB	7.5	193.7	7.15	33.1	63.5	31.8	23.2	134.7	113.2	5.9	77.6	210.6	7.0
PINE	4/4/95	1725	GRAB	7.5	196.2	7.16	33.1	60.2	31.8	19.8	131.8	111.1	6.3	79.4	211.8	6.6
PINE	4/11/95	1620	GRAB	9.0	208.6	7.20	34.7	61.1	30.9	22.6	138.5	117.0	6.4	80.3	214.3	6.1
PINE	4/11/95	2000	AUTO	-9.9	217.9	7.24	36.0	60.7	31.6	22.8	143.4	120.6	6.6	80.6	219.4	-999.9
PINE	4/12/95	0400	AUTO	-9.9	219.5	7.26	37.0	64.4	33.5	27.6	144.6	121.0	6.4	82.1	221.0	7.5
PINE	4/12/95	1200	AUTO	-9.9	206.0	7.27	35.9	64.3	33.7	20.4	140.2	117.1	6.4	80.1	217.4	-999.9
PINE	4/12/95	2000	AUTO	-9.9	205.3	7.20	35.8	63.9	32.4	26.4	140.1	115.9	7.6	78.1	209.6	7.6
PINE	4/13/95	0400	AUTO	-9.9	192.2	7.11	36.9	71.9	31.7	35.5	144.1	119.3	6.8	76.5	209.6	-999.9
PINE	4/13/95	1200	AUTO	-9.9	187.9	7.15	33.8	72.6	31.4	10.9	141.7	118.8	6.4	77.4	207.2	8.8
PINE	4/14/95	0400	AUTO	-9.9	195.4	7.19	34.9	73.2	31.9	30.8	143.8	121.6	6.1	78.1	209.1	-999.9
PINE	4/14/95	2000	AUTO	-9.9	198.8	7.19	34.7	73.0	31.9	27.3	142.7	120.2	6.3	77.0	209.1	-999.9
PINE	4/15/95	2000	AUTO	-9.9	198.8	7.19	34.5	72.6	31.9	23.3	143.7	120.6	6.3	77.5	209.5	-999.9
PINE	4/18/95	1529	GRAB	10.5	197.5	7.32	34.0	67.9	31.0	20.9	136.7	115.2	6.2	77.2	209.3	6.7
PINE	4/25/95	1740	GRAB	7.5	212.9	7.27	34.0	63.1	30.4	22.5	142.5	116.3	6.0	80.0	214.1	5.6

Appendix II Table 3A - Analysis of Intensive Site Samples

SITE	DATE	TIME	TYPE	TEMP	ANC	PH	COND	SO4	CL	NO3	CA	MG	K	NA	SIO2	T_AL
PINE	5/1/95	0400	AUTO	-9.9	232.8	7.24	35.0	62.3	31.1	19.8	150.3	126.0	6.6	82.0	222.4	9.7
PINE	5/1/95	1200	AUTO	-9.9	220.0	7.29	34.2	62.3	31.2	18.1	141.7	118.2	6.5	81.3	220.8	13.0
PINE	5/1/95	2000	AUTO	-9.9	236.1	7.28	35.9	61.6	31.4	18.2	149.8	123.3	6.8	84.9	220.4	9.7
PINE	5/2/95	0400	AUTO	-9.9	224.4	7.20	35.3	61.4	29.8	21.1	147.6	121.6	7.5	80.7	213.7	6.9
PINE	5/2/95	1200	AUTO	-9.9	200.4	7.17	34.9	65.0	28.6	0.1	133.2	110.3	7.0	78.3	216.8	8.4
PINE	5/2/95	1700	GRAB	8.5	194.4	7.11	34.4	69.7	28.6	28.1	144.2	117.4	7.0	78.8	203.0	9.4
PINE	5/9/95	1735	GRAB	10.5	214.4	6.98	34.0	67.0	30.0	17.8	145.6	118.7	6.6	81.4	213.4	7.3
PINE	5/9/95	2000	AUTO	-9.9	222.5	7.23	36.7	67.8	30.1	20.7	147.7	122.0	6.7	81.1	215.5	-999.9
PINE	5/10/95	0400	AUTO	-9.9	223.6	7.26	37.2	67.5	29.2	19.3	147.7	122.1	6.6	80.4	215.1	-999.9
PINE	5/10/95	1200	AUTO	-9.9	214.4	7.23	36.0	66.9	29.3	20.7	142.7	117.6	6.1	80.4	215.4	6.5
PINE	5/10/95	2000	AUTO	-9.9	221.1	7.13	37.0	65.2	28.8	19.6	147.6	121.1	7.8	81.4	213.0	4.2
PINE	5/11/95	0400	AUTO	-9.9	206.9	7.10	40.5	98.2	25.9	29.6	166.9	135.3	8.6	73.7	201.3	9.1
PINE	5/11/95	1200	AUTO	-9.9	200.4	7.14	40.0	97.5	27.6	27.7	159.6	131.1	7.5	75.6	208.6	-999.9
PINE	5/12/95	0400	AUTO	-9.9	209.4	7.13	39.1	90.1	28.8	26.3	157.7	129.3	7.1	76.7	215.2	-999.9
PINE	5/12/95	2000	AUTO	-9.9	210.4	7.19	38.9	85.1	29.0	26.7	154.9	126.7	6.6	77.9	216.3	-999.9
PINE	5/13/95	1200	AUTO	-9.9	206.9	7.19	38.0	81.4	29.4	27.2	151.6	125.1	6.6	78.5	216.7	9.8
PINE	5/14/95	0400	AUTO	-9.9	216.9	7.18	38.9	78.4	29.6	26.7	153.6	127.9	6.6	79.4	216.1	6.1
PINE	5/14/95	1200	AUTO	-9.9	205.4	7.14	37.2	75.4	27.9	25.5	146.2	119.3	7.2	76.5	211.0	7.7
PINE	5/14/95	2000	AUTO	-9.9	207.5	7.15	38.1	78.6	27.6	26.2	153.1	124.6	6.9	77.7	213.8	-999.9
PINE	5/15/95	1200	AUTO	-9.9	209.4	7.20	38.4	80.2	28.5	23.8	148.0	123.1	6.5	78.1	217.2	-999.9
PINE	5/16/95	0400	AUTO	-9.9	215.0	7.29	38.3	77.5	29.3	22.0	151.6	125.3	6.5	79.1	219.1	5.5
PINE	5/16/95	1850	GRAB	10.0	205.0	7.24	36.9	76.0	29.3	23.9	150.9	124.6	6.6	79.2	217.2	5.5
PINE	5/23/95	1600	GRAB	10.5	227.9	6.85	36.3	68.5	29.8	21.3	151.2	123.9	6.6	82.0	224.8	9.4
PINE	5/29/95	1525	GRAB	12.5	247.8	7.19	36.9	59.5	29.1	16.5	153.2	124.6	7.0	84.0	234.9	-999.9
PINE	6/5/95	1550	GRAB	11.5	268.8	7.26	30.8	56.7	30.7	0.5	157.9	129.4	7.1	86.7	241.6	-999.9
PINE	6/12/95	1545	GRAB	15.0	267.9	7.13	36.4	56.0	28.9	5.8	160.2	131.3	8.2	88.0	250.8	-999.9
PINE	6/19/95	1645	GRAB	16.5	250.9	7.01	36.9	54.1	29.6	0.0	160.5	130.9	7.5	90.8	257.4	-999.9
PINE	6/26/95	1750	GRAB	17.5	243.2	7.10	35.4	64.5	30.8	15.3	153.5	126.1	6.7	81.1	230.7	-999.9
STAN	9/1/92	-999	GRAB	0.0	102.8	6.87	18.5	36.3	23.6	0.2	71.7	30.4	11.6	64.3	158.8	-999.9
STAN	9/8/92	0958	GRAB	17.0	73.7	6.82	18.4	40.2	22.8	0.9	70.3	31.0	10.9	56.5	139.1	-999.9
STAN	9/15/92	1020	GRAB	15.0	73.7	6.88	17.3	35.4	24.1	0.2	64.9	28.9	9.9	58.7	146.2	-999.9
STAN	9/24/92	-999	GRAB	-9.9	88.7	6.32	17.0	32.6	24.6	0.2	64.4	27.4	10.2	59.7	149.0	-999.9
STAN	10/1/92	-999	GRAB	-9.9	68.7	6.87	17.8	38.5	24.6	12.3	64.0	28.3	9.2	57.8	144.2	-999.9
STAN	10/8/92	-999	GRAB	-9.9	86.2	6.85	16.2	32.8	24.0	1.5	63.3	26.3	9.6	59.1	145.1	-999.9
STAN	10/15/92	1055	GRAB	12.5	91.9	6.88	18.0	38.4	24.4	10.1	66.6	28.8	11.0	61.8	147.9	-999.9
STAN	10/22/92	0750	GRAB	8.5	89.4	6.37	17.3	35.2	24.4	0.3	64.6	27.0	10.5	58.9	145.9	-999.9
STAN	10/29/92	0445	GRAB	10.0	86.7	6.63	17.5	34.0	25.9	0.3	68.5	28.5	12.7	60.5	146.4	-999.9
STAN	11/1/92	1200	AUTO	-9.9	93.6	6.72	18.2	37.7	26.6	0.2	67.8	31.4	13.2	60.7	146.5	-999.9
STAN	11/1/92	2000	AUTO	-9.9	93.6	6.72	18.6	37.9	26.5	0.2	69.1	31.9	14.0	61.7	146.5	-999.9
STAN	11/2/92	0400	AUTO	-9.9	94.4	6.73	18.6	38.7	26.4	0.2	70.1	31.9	14.2	60.9	145.8	-999.9
STAN	11/2/92	1200	AUTO	-9.9	93.6	6.67	19.2	43.1	26.6	0.2	73.1	33.5	16.9	60.7	140.6	-999.9
STAN	11/2/92	2000	AUTO	-9.9	88.6	6.58	20.2	47.7	27.7	0.2	76.3	34.6	22.4	57.0	129.6	-999.9

Appendix II Table 3A - Analysis of Intensive Site Samples

SITE	DATE	TIME	TYPE	TEMP	ANC	PH	COND	SO4	CL	NO3	CA	MG	K	NA	SIO2	T_AL
STAN	11/3/92	0400	AUTO	-9.9	88.6	6.15	22.8	65.9	27.6	4.3	95.3	42.7	21.9	56.6	119.9	-999.9
STAN	11/3/92	1200	AUTO	-9.9	72.5	6.20	22.9	69.1	28.2	14.2	88.7	40.9	17.7	61.3	136.1	-999.9
STAN	11/3/92	2000	AUTO	-9.9	79.4	6.16	22.5	65.8	27.5	11.3	88.5	40.7	15.8	63.1	141.7	-999.9
STAN	11/4/92	0400	AUTO	-9.9	79.5	6.23	21.6	62.0	27.3	11.6	81.3	37.4	14.1	62.8	143.5	-999.9
STAN	11/4/92	1200	AUTO	-9.9	83.7	6.21	21.0	57.8	26.9	7.0	82.9	36.6	13.8	62.4	145.2	-999.9
STAN	11/4/92	2000	AUTO	-9.9	91.2	6.27	20.8	54.0	26.4	4.9	82.4	36.7	14.4	62.3	145.0	-999.9
STAN	11/5/92	0400	AUTO	-9.9	96.2	6.27	20.5	51.0	25.9	2.6	75.9	34.5	12.9	62.5	144.5	-999.9
STAN	11/5/92	0817	GRAB	12.0	91.2	6.83	19.9	49.9	25.8	0.2	74.0	33.7	13.2	61.7	143.5	-999.9
STAN	11/12/92	1405	GRAB	8.0	96.2	6.42	17.9	40.0	25.2	0.2	68.5	29.8	13.1	61.1	139.5	-999.9
STAN	11/12/92	2000	AUTO	-9.9	67.2	6.05	19.5	54.2	21.8	0.2	92.2	37.1	23.3	48.8	104.6	-999.9
STAN	11/13/92	0400	AUTO	-9.9	71.9	6.09	22.6	80.9	25.9	6.7	87.0	40.2	16.5	60.2	129.3	-999.9
STAN	11/13/92	1200	AUTO	-9.9	66.9	6.08	21.8	74.2	27.0	11.4	81.8	38.6	14.3	61.8	135.3	-999.9
STAN	11/13/92	2000	AUTO	-9.9	58.6	6.11	20.9	65.6	26.6	15.4	78.1	36.5	13.0	60.9	136.8	-999.9
STAN	11/14/92	0400	AUTO	-9.9	58.6	6.16	19.8	59.2	26.8	12.4	73.5	34.0	11.6	59.8	137.6	-999.9
STAN	11/14/92	1200	AUTO	-9.9	56.1	6.24	19.4	54.7	26.7	13.0	69.8	32.3	10.9	59.5	137.6	-999.9
STAN	11/15/92	0400	AUTO	-9.9	75.3	6.23	19.0	48.0	25.8	11.2	68.1	31.0	10.4	59.1	137.4	-999.9
STAN	11/15/92	2000	AUTO	-9.9	71.9	6.24	18.0	44.6	25.6	8.1	66.3	30.7	10.2	58.8	138.6	-999.9
STAN	11/16/92	1200	AUTO	-9.9	77.8	6.34	17.5	42.8	25.4	6.4	63.8	28.7	9.8	58.6	138.0	-999.9
STAN	11/17/92	0400	AUTO	-9.9	71.7	6.40	17.8	40.9	25.8	7.4	64.7	28.7	9.6	58.5	138.0	-999.9
STAN	11/17/92	2000	AUTO	-9.9	83.7	6.24	17.5	39.9	25.5	4.0	66.7	29.4	10.1	59.3	138.5	-999.9
STAN	11/18/92	1200	AUTO	-9.9	91.2	6.16	18.0	38.5	24.8	2.7	78.2	33.4	13.7	60.1	143.3	-999.9
STAN	11/19/92	0400	AUTO	-9.9	94.4	6.18	17.9	38.6	24.8	4.6	75.7	32.6	13.6	60.8	141.5	-999.9
STAN	11/19/92	0915	GRAB	6.5	88.7	6.28	17.4	38.5	25.0	2.4	65.1	28.3	9.6	60.2	139.6	-999.9
STAN	11/22/92	0400	AUTO	-9.9	76.9	6.21	18.0	40.0	26.8	2.5	67.3	29.5	11.2	60.6	139.9	-999.9
STAN	11/22/92	1200	AUTO	-9.9	72.2	6.19	17.8	39.4	26.4	1.6	65.6	28.6	10.8	60.3	141.8	-999.9
STAN	11/22/92	2000	AUTO	-9.9	65.4	6.21	17.6	41.7	25.1	0.7	67.6	28.9	14.9	54.6	119.3	-999.9
STAN	11/23/92	0400	AUTO	-9.9	56.1	6.03	22.9	83.8	25.4	12.4	90.5	40.7	17.6	54.8	116.1	-999.9
STAN	11/23/92	1200	AUTO	-9.9	44.7	6.04	22.0	75.9	25.6	17.2	84.3	38.9	15.9	56.1	122.7	-999.9
STAN	11/23/92	2000	AUTO	-9.9	49.7	6.11	20.6	66.1	26.1	14.3	76.0	34.5	13.2	55.7	126.4	-999.9
STAN	11/24/92	0400	AUTO	-9.9	50.4	6.15	19.6	58.7	26.2	12.8	72.5	33.0	12.2	56.3	128.8	-999.9
STAN	11/24/92	1200	AUTO	-9.9	55.4	6.13	18.5	54.6	26.6	10.5	68.4	30.6	11.4	55.9	131.3	-999.9
STAN	11/24/92	2000	AUTO	-9.9	55.4	6.15	18.5	51.1	26.3	11.2	67.4	30.5	11.4	55.5	131.3	-999.9
STAN	11/25/92	0400	AUTO	-9.9	64.4	6.14	18.6	48.5	26.3	8.4	67.3	29.9	10.9	55.5	132.0	-999.9
STAN	11/25/92	0915	GRAB	8.0	71.2	6.21	17.8	47.2	27.5	10.1	66.7	29.3	11.8	56.9	134.4	-999.9
STAN	11/25/92	1200	AUTO	-9.9	68.7	6.16	17.9	46.2	26.1	8.5	65.5	29.1	10.6	54.8	133.3	-999.9
STAN	11/26/92	0400	AUTO	-9.9	69.5	6.22	17.5	44.0	25.3	8.5	66.1	29.1	10.8	56.4	136.1	-999.9
STAN	11/26/92	2000	AUTO	-9.9	76.2	6.26	17.5	42.2	26.1	5.6	66.1	29.3	10.6	57.0	137.1	-999.9
STAN	11/27/92	1200	AUTO	-9.9	66.7	6.24	17.3	41.5	25.5	6.2	63.3	28.6	9.9	56.5	138.4	-999.9
STAN	11/28/92	0400	AUTO	-9.9	69.5	6.29	17.5	40.8	25.3	7.5	64.5	28.2	9.9	56.9	138.0	-999.9
STAN	11/28/92	2000	AUTO	-9.9	61.7	6.13	17.7	40.4	25.3	9.9	64.5	28.6	9.9	57.5	138.9	-999.9
STAN	12/3/92	0935	GRAB	5.5	74.3	6.39	16.5	38.9	25.9	10.3	61.7	27.4	9.6	57.6	139.5	-999.9
STAN	12/9/92	2000	AUTO	-9.9	48.0	6.14	17.5	38.1	26.4	12.3	62.3	27.6	9.1	58.1	139.2	-999.9

Appendix II Table 3A - Analysis of Intensive Site Samples

SITE	DATE	TIME	TYPE	TEMP	ANC	PH	COND	SO4	CL	NO3	CA	MG	K	NA	SIO2	T_AL
STAN	12/10/92	0400	AUTO	-9.9	66.9	6.26	17.5	37.3	25.4	7.3	61.0	27.2	8.9	57.0	140.1	-999.9
STAN	12/10/92	1200	AUTO	-9.9	57.2	6.20	16.5	36.2	23.7	2.8	59.8	26.7	9.0	54.3	131.5	-999.9
STAN	12/10/92	2000	AUTO	-9.9	61.9	6.25	15.8	39.8	20.0	0.6	63.4	27.7	10.3	47.9	109.1	-999.9
STAN	12/11/92	0400	AUTO	-9.9	46.1	6.28	18.5	55.8	23.3	14.3	66.3	30.2	10.3	55.6	129.7	-999.9
STAN	12/11/92	1035	GRAB	4.5	70.3	6.25	19.0	59.7	24.4	0.2	67.5	30.9	10.6	60.9	140.1	-999.9
STAN	12/17/92	0930	GRAB	6.0	56.2	6.78	18.3	45.8	23.9	9.5	65.7	29.6	9.5	57.6	133.6	-999.9
STAN	12/23/92	1130	GRAB	7.0	75.3	6.26	16.8	37.3	24.5	2.6	62.7	26.7	8.8	57.2	136.2	-999.9
STAN	12/30/92	1120	GRAB	7.0	71.2	6.29	17.2	43.0	24.7	0.8	66.8	28.0	9.6	58.9	138.6	-999.9
STAN	1/7/93	1010	GRAB	9.0	70.3	6.28	16.9	42.4	24.9	0.3	66.2	27.8	8.9	58.9	140.3	-999.9
STAN	1/14/93	1020	GRAB	6.0	71.8	6.19	17.9	45.5	24.5	4.8	65.7	28.2	8.6	58.4	139.1	-999.9
STAN	1/22/93	1035	GRAB	6.5	61.2	6.34	17.6	42.4	24.1	6.5	63.0	26.6	8.4	57.7	136.4	-999.9
STAN	1/28/93	1015	GRAB	2.5	66.1	6.81	17.7	41.7	24.8	12.3	63.2	26.4	8.0	59.4	140.7	-999.9
STAN	2/4/93	1055	GRAB	3.5	61.2	6.83	17.0	40.1	25.7	17.1	62.1	25.8	8.4	60.0	142.2	-999.9
STAN	2/11/93	1100	GRAB	5.5	69.4	6.24	17.0	38.3	25.2	9.6	59.3	26.7	8.8	62.1	140.2	-999.9
STAN	2/16/93	1440	GRAB	4.0	62.8	6.79	18.2	42.7	25.1	3.4	64.5	29.1	9.9	61.9	135.8	-999.9
STAN	2/23/93	1628	GRAB	4.0	60.3	6.76	18.1	48.4	24.7	7.1	63.3	28.8	9.1	64.1	144.5	-999.9
STAN	3/2/93	1700	GRAB	4.0	62.8	6.73	17.5	46.8	25.7	2.5	63.2	28.0	9.5	64.9	143.9	-999.9
STAN	3/3/93	1200	AUTO	-9.9	61.2	6.84	18.0	46.8	25.9	19.2	63.5	28.6	8.8	64.5	141.2	-999.9
STAN	3/3/93	2000	AUTO	-9.9	66.2	6.87	18.5	47.3	25.8	20.7	68.6	30.5	9.9	65.4	141.4	-999.9
STAN	3/4/93	0400	AUTO	-9.9	58.7	6.74	19.1	50.6	24.3	26.2	69.4	30.9	9.8	62.1	132.9	-999.9
STAN	3/4/93	1200	AUTO	-9.9	42.8	6.50	18.5	61.4	18.2	29.2	78.0	33.2	11.0	52.1	101.6	-999.9
STAN	3/4/93	1415	GRAB	4.0	49.5	6.12	19.6	69.7	18.7	16.9	75.1	35.2	11.6	54.8	108.6	-999.9
STAN	3/4/93	2000	AUTO	-9.9	43.7	6.58	21.6	81.0	21.7	34.5	81.3	36.5	12.5	60.7	123.5	-999.9
STAN	3/5/93	0400	AUTO	-9.9	46.1	6.58	22.0	80.0	23.4	30.8	81.1	37.5	11.3	63.2	130.2	-999.9
STAN	3/5/93	1200	AUTO	-9.9	46.1	6.64	21.0	74.2	24.1	32.6	77.5	35.8	11.4	63.4	134.1	-999.9
STAN	3/5/93	2000	AUTO	-9.9	47.9	6.66	20.8	70.6	24.5	31.3	76.9	35.5	10.7	63.4	135.4	-999.9
STAN	3/6/93	0400	AUTO	-9.9	51.1	6.72	20.3	66.8	25.0	31.2	75.2	34.3	10.4	62.9	137.7	-999.9
STAN	3/6/93	2000	AUTO	-9.9	61.1	6.39	19.9	60.7	25.0	17.9	72.9	32.9	10.0	63.4	140.3	-999.9
STAN	3/7/93	1200	AUTO	-9.9	56.7	6.05	19.7	57.2	25.7	14.7	66.2	30.8	9.7	63.6	140.3	-999.9
STAN	3/8/93	1200	AUTO	-9.9	52.9	6.05	19.2	52.5	25.7	8.0	64.3	29.6	9.3	63.6	140.8	-999.9
STAN	3/9/93	1020	GRAB	5.0	53.7	6.75	19.0	49.6	27.0	13.1	64.5	29.2	10.2	64.5	140.2	-999.9
STAN	3/17/93	1540	GRAB	4.5	55.3	6.73	17.5	44.8	21.9	9.6	61.8	27.7	9.5	56.5	123.6	-999.9
STAN	3/19/93	1142	GRAB	3.5	54.3	6.74	18.0	52.4	25.2	14.8	64.4	28.0	8.7	59.9	139.3	-999.9
STAN	3/23/93	1110	GRAB	-9.9	59.3	6.77	18.2	51.8	24.6	20.6	65.8	28.6	8.5	60.1	135.1	-999.9
STAN	3/30/93	1525	GRAB	12.0	49.4	6.73	15.5	41.8	22.6	23.6	57.2	25.6	8.7	53.3	122.8	-999.9
STAN	4/6/93	1528	GRAB	8.0	60.3	6.76	15.4	39.2	23.9	8.8	55.2	25.0	8.4	54.6	127.3	-999.9
STAN	4/13/93	1520	GRAB	10.0	55.4	6.83	17.5	45.2	23.7	4.4	58.8	26.2	9.1	57.1	130.5	-999.9
STAN	4/15/93	1200	AUTO	-9.9	58.7	6.75	16.3	42.4	24.8	18.2	58.0	26.7	8.8	58.0	130.3	-999.9
STAN	4/15/93	2000	AUTO	-9.9	62.8	6.76	16.6	42.0	24.8	17.6	63.8	28.2	9.5	59.0	131.1	-999.9
STAN	4/16/93	0400	AUTO	-9.9	61.2	6.75	16.6	41.4	24.6	20.0	60.6	27.7	9.5	58.4	131.1	-999.9
STAN	4/16/93	1100	GRAB	11.0	62.8	6.19	17.0	43.5	22.2	2.2	58.5	26.8	10.5	49.9	105.7	-999.9
STAN	4/16/93	1200	AUTO	-9.9	52.8	6.60	16.5	45.7	22.4	19.3	61.3	28.5	10.6	50.8	109.4	-999.9

Appendix II Table 3A - Analysis of Intensive Site Samples

SITE	DATE	TIME	TYPE	TEMP	ANC	PH	COND	SO4	CL	NO3	CA	MG	K	NA	SIO2	T_AL
STAN	4/16/93	1400	AUTO	-9.9	43.7	6.50	-100.0	46.1	22.8	16.6	69.9	29.4	10.5	51.1	110.4	-999.9
STAN	4/16/93	1800	AUTO	-9.9	56.2	6.71	-100.0	52.3	24.8	20.4	69.1	29.2	10.4	56.2	123.2	-999.9
STAN	4/16/93	2000	AUTO	-9.9	56.2	6.70	18.0	52.8	23.7	22.2	69.7	31.1	10.4	57.8	128.0	-999.9
STAN	4/16/93	2000	AUTO	-9.9	52.2	6.73	-100.0	52.9	24.1	21.4	72.3	29.4	10.7	57.8	126.8	-999.9
STAN	4/17/93	1200	AUTO	-9.9	54.3	6.74	17.5	53.2	23.8	21.9	60.6	29.1	9.4	56.9	131.4	-999.9
STAN	4/18/93	0400	AUTO	-9.9	58.7	6.77	17.6	50.7	24.1	23.4	64.8	29.1	9.2	57.6	131.5	-999.9
STAN	4/20/93	1620	GRAB	12.5	67.8	6.85	16.5	42.3	25.7	4.3	59.0	25.2	10.3	59.5	131.6	-999.9
STAN	4/27/93	1705	GRAB	11.0	70.3	6.94	16.7	42.2	24.0	4.1	59.4	27.2	9.6	59.6	135.4	-999.9
STAN	5/4/93	1350	GRAB	11.5	77.8	6.89	17.8	39.3	24.8	10.6	64.3	28.4	10.0	60.4	137.1	-999.9
STAN	5/11/93	1415	GRAB	16.0	66.9	6.93	17.6	37.7	23.4	8.2	64.6	28.2	10.0	59.6	140.4	-999.9
STAN	5/18/93	1305	GRAB	13.0	76.2	6.85	18.0	41.6	22.6	11.3	65.9	29.5	10.2	61.1	137.0	-999.9
STAN	5/25/93	1502	GRAB	13.0	78.7	6.90	17.0	40.0	24.3	0.1	61.9	27.9	9.5	61.0	141.8	-999.9
STAN	6/1/93	1515	GRAB	13.5	82.8	6.85	17.0	38.0	24.3	0.1	61.6	27.4	9.5	60.4	145.5	-999.9
STAN	6/7/93	2234	AUTO	-9.9	76.2	6.64	17.0	37.9	24.3	2.6	65.0	29.0	10.1	62.5	147.0	-999.9
STAN	6/8/93	0034	AUTO	-9.9	88.7	6.32	18.0	37.7	24.5	1.0	65.5	29.1	10.0	61.2	148.0	-999.9
STAN	6/8/93	0434	AUTO	-9.9	87.0	6.22	18.3	39.8	23.9	7.1	65.6	30.0	11.1	59.6	141.0	-999.9
STAN	6/8/93	0634	AUTO	-9.9	78.6	6.36	18.0	44.0	21.6	0.0	68.5	30.3	12.5	56.1	129.5	-999.9
STAN	6/8/93	0834	AUTO	-9.9	80.0	6.21	17.8	41.4	23.0	7.0	69.3	29.5	12.1	54.2	126.1	-999.9
STAN	6/8/93	1034	AUTO	-9.9	72.5	6.22	16.9	41.0	20.4	4.1	66.8	29.5	10.5	53.5	123.5	-999.9
STAN	6/8/93	1234	AUTO	-9.9	78.6	6.28	17.6	41.0	20.6	0.2	66.2	29.0	10.5	54.4	125.1	-999.9
STAN	6/8/93	1348	GRAB	14.5	83.7	6.30	17.5	42.3	20.8	0.1	67.6	29.4	10.8	56.2	128.4	-999.9
STAN	6/15/93	1452	GRAB	16.0	75.4	6.86	18.3	37.1	24.7	6.1	63.9	27.7	10.5	63.3	152.4	-999.9
STAN	6/22/93	1506	GRAB	18.0	91.2	6.99	18.0	35.8	25.3	1.6	64.5	27.5	11.0	65.1	157.0	-999.9
STAN	6/28/93	2000	AUTO	-9.9	95.0	6.39	18.0	35.5	24.6	10.2	67.5	28.9	11.0	64.4	156.1	-999.9
STAN	6/29/93	0400	AUTO	-9.9	95.4	6.39	18.5	35.4	24.5	9.4	67.4	28.5	10.7	63.7	157.0	-999.9
STAN	6/29/93	1200	AUTO	-9.9	98.7	6.39	18.3	35.4	24.6	7.6	64.8	28.2	10.5	63.6	157.8	-999.9
STAN	6/29/93	1520	GRAB	17.0	78.7	6.87	19.0	34.9	26.4	0.1	67.7	28.0	12.3	66.0	157.8	-999.9
STAN	6/29/93	1855	GRAB	18.0	86.9	6.46	19.0	44.5	21.0	9.6	79.0	33.4	15.6	57.9	131.0	-999.9
STAN	6/29/93	1920	AUTO	-9.9	86.7	6.32	18.7	43.2	21.5	7.3	89.5	38.2	16.1	58.9	135.6	-999.9
STAN	6/29/93	2120	AUTO	-9.9	72.2	6.30	17.2	41.4	18.4	10.9	66.5	27.8	14.4	51.5	116.1	-999.9
STAN	6/29/93	2320	AUTO	-9.9	71.7	6.30	17.7	41.1	19.3	11.5	67.7	28.2	12.8	54.3	124.1	-999.9
STAN	6/30/93	0120	AUTO	-9.9	76.2	6.22	17.5	38.8	19.5	10.3	67.0	28.3	12.2	54.6	126.7	-999.9
STAN	6/30/93	0320	AUTO	-9.9	79.4	6.30	17.5	39.6	20.1	9.2	67.9	28.4	11.8	56.6	131.1	-999.9
STAN	6/30/93	0520	AUTO	-9.9	88.6	6.34	17.5	39.5	20.5	5.7	67.9	28.5	12.0	57.9	135.3	-999.9
STAN	6/30/93	0720	AUTO	-9.9	84.5	6.36	17.8	39.9	21.0	8.5	68.1	28.6	11.6	59.0	138.6	-999.9
STAN	6/30/93	1120	AUTO	-9.9	88.7	6.42	17.8	39.9	22.1	7.0	66.7	27.9	11.3	60.8	143.8	-999.9
STAN	6/30/93	1320	AUTO	-9.9	86.2	6.58	18.0	39.7	22.1	9.8	66.5	27.8	11.5	60.7	146.6	-999.9
STAN	6/30/93	2000	AUTO	-9.9	84.4	6.69	19.3	40.0	22.9	23.0	71.5	30.7	12.0	62.3	149.7	-999.9
STAN	7/1/93	0400	AUTO	-9.9	84.4	6.74	19.5	39.5	23.3	23.1	71.9	31.0	12.0	64.1	151.4	-999.9
STAN	7/1/93	1200	AUTO	-9.9	70.4	6.59	22.0	63.9	22.4	22.6	79.6	34.0	14.3	61.5	140.6	-999.9
STAN	7/1/93	1400	AUTO	-9.9	61.7	6.62	21.4	65.9	21.8	26.9	81.7	34.7	13.5	61.6	139.7	-999.9
STAN	7/1/93	1600	AUTO	-9.9	64.4	6.73	20.8	60.8	21.7	28.6	77.8	33.2	13.3	61.4	139.5	-999.9

Appendix II Table 3A - Analysis of Intensive Site Samples

SITE	DATE	TIME	TYPE	TEMP	ANC	PH	COND	SO4	CL	NO3	CA	MG	K	NA	SIO2	T_AL
STAN	7/1/93	1800	AUTO	-9.9	64.4	6.72	20.4	57.9	21.3	26.8	77.6	32.8	12.7	61.0	140.4	-999.9
STAN	7/1/93	2000	AUTO	-9.9	66.9	6.71	20.1	56.2	21.5	25.2	76.8	31.4	8.0	61.4	141.6	-999.9
STAN	7/2/93	0000	AUTO	-9.9	71.1	6.59	20.5	58.7	22.1	16.8	77.5	32.8	12.9	61.8	144.9	-999.9
STAN	7/2/93	0400	AUTO	-9.9	63.6	6.61	21.6	64.6	22.2	25.3	82.3	34.8	13.4	63.6	143.5	-999.9
STAN	7/2/93	0600	AUTO	-9.9	66.1	6.61	21.4	64.8	22.3	21.8	83.6	35.0	11.9	63.0	142.7	-999.9
STAN	7/2/93	0800	AUTO	-9.9	63.6	6.59	21.0	61.7	22.1	19.6	79.3	33.7	12.9	62.3	144.0	-999.9
STAN	7/2/93	1000	AUTO	-9.9	58.5	6.61	21.0	64.8	21.3	21.7	81.1	33.9	13.7	61.3	138.4	-999.9
STAN	7/2/93	1200	AUTO	-9.9	78.6	6.73	21.3	61.3	21.0	9.5	77.6	32.0	12.7	61.1	139.0	-999.9
STAN	7/2/93	1400	AUTO	-9.9	63.6	6.75	20.5	59.1	20.8	23.1	75.7	31.8	12.5	60.6	136.9	-999.9
STAN	7/2/93	1600	AUTO	-9.9	75.4	6.76	20.4	57.0	20.8	9.0	75.9	32.2	12.7	60.7	139.4	-999.9
STAN	7/2/93	2000	AUTO	-9.9	74.4	6.81	20.6	54.8	21.5	15.9	76.4	32.3	12.2	62.3	143.0	-999.9
STAN	7/3/93	0000	AUTO	-9.9	80.0	6.78	20.8	52.9	22.0	9.0	77.5	33.2	12.8	63.6	149.8	-999.9
STAN	7/3/93	0600	AUTO	-9.9	74.4	6.80	20.5	51.2	22.5	20.0	73.2	30.9	12.0	63.5	148.6	-999.9
STAN	7/3/93	1200	AUTO	-9.9	87.9	6.79	20.4	49.1	22.8	7.0	70.4	30.3	11.8	63.4	150.7	-999.9
STAN	7/3/93	2000	AUTO	-9.9	82.9	6.71	20.7	48.4	21.9	13.9	73.4	31.2	12.0	61.9	145.6	-999.9
STAN	7/4/93	0400	AUTO	-9.9	86.9	6.72	21.0	47.9	22.6	12.9	72.9	31.0	12.2	63.8	149.2	-999.9
STAN	7/4/93	2000	AUTO	-9.9	89.4	6.72	21.0	45.7	23.2	11.4	73.1	31.1	12.0	65.0	153.3	-999.9
STAN	7/5/93	2000	AUTO	-9.9	91.9	6.77	21.2	43.5	23.5	8.6	71.0	30.5	12.1	65.1	155.5	-999.9
STAN	7/6/93	1513	GRAB	19.0	96.2	6.86	20.0	42.2	24.4	3.0	68.6	29.6	12.5	66.4	155.9	-999.9
STAN	7/13/93	1458	GRAB	19.5	85.3	6.82	20.4	38.3	25.4	0.1	70.5	30.0	13.4	66.9	160.0	-999.9
STAN	7/18/93	2000	AUTO	-9.9	85.4	6.56	19.0	36.8	25.2	11.7	71.4	30.9	12.0	66.6	159.0	-999.9
STAN	7/19/93	0400	AUTO	-9.9	86.9	6.74	19.5	36.8	24.9	20.5	69.4	29.7	11.6	66.1	161.6	-999.9
STAN	7/19/93	1200	AUTO	-9.9	100.4	6.44	19.1	35.6	25.0	7.3	69.2	29.3	11.0	65.9	161.7	-999.9
STAN	7/19/93	2000	AUTO	-9.9	86.1	6.61	19.5	42.6	23.2	7.7	71.3	30.8	14.0	60.1	138.8	-999.9
STAN	7/19/93	2200	AUTO	-9.9	65.4	6.24	18.4	41.1	20.6	11.4	69.7	29.1	13.6	54.0	123.6	41.3
STAN	7/20/93	0000	AUTO	-9.9	61.7	6.43	18.2	42.7	19.7	20.3	73.4	31.4	13.6	52.6	120.6	32.6
STAN	7/20/93	0200	AUTO	-9.9	58.6	6.53	18.8	45.4	19.2	20.6	74.6	30.5	12.1	53.8	122.0	35.4
STAN	7/20/93	0400	AUTO	-9.9	61.1	6.60	19.1	45.7	19.7	19.9	74.1	31.1	12.0	55.9	127.7	-999.9
STAN	7/20/93	0600	AUTO	-9.9	57.4	6.59	19.2	45.9	20.9	24.5	74.8	31.5	12.2	57.5	136.0	-999.9
STAN	7/20/93	0800	AUTO	-9.9	83.6	6.52	19.1	45.2	20.7	10.8	74.6	31.5	11.8	58.8	137.0	-999.9
STAN	7/20/93	1000	AUTO	-9.9	79.2	6.40	19.4	44.9	23.2	0.1	73.6	31.1	12.3	59.9	140.5	28.9
STAN	7/20/93	1059	GRAB	18.5	94.4	6.49	19.2	44.1	21.4	0.1	71.8	30.6	12.3	61.2	140.7	-999.9
STAN	7/26/93	0400	AUTO	-9.9	85.3	6.75	18.8	36.6	24.4	11.6	71.0	29.8	11.4	65.6	160.1	-999.9
STAN	7/26/93	1200	AUTO	-9.9	92.8	6.64	20.1	42.6	24.5	15.3	75.2	32.1	12.2	65.6	159.9	-999.9
STAN	7/26/93	2000	AUTO	-9.9	92.8	6.58	19.6	42.5	24.5	13.6	74.7	31.4	11.9	65.1	159.0	-999.9
STAN	7/26/93	2200	AUTO	-9.9	74.4	6.27	19.8	50.9	21.8	13.3	78.0	32.6	14.2	60.2	136.6	-999.9
STAN	7/27/93	0000	AUTO	-9.9	61.1	6.48	19.5	52.9	21.2	15.3	74.8	31.2	13.6	59.1	133.0	18.4
STAN	7/27/93	0200	AUTO	-9.9	78.7	6.39	19.0	50.5	21.0	10.3	76.5	32.8	12.8	57.9	134.3	18.6
STAN	7/27/93	0400	AUTO	-9.9	68.7	6.63	19.2	49.6	21.2	17.4	72.4	30.5	12.3	58.2	137.3	-999.9
STAN	7/27/93	0600	AUTO	-9.9	71.2	6.51	19.0	47.5	21.2	14.8	71.8	29.7	11.9	58.6	140.1	-999.9
STAN	7/27/93	0800	AUTO	-9.9	71.9	6.64	19.3	46.5	21.5	15.8	74.1	31.0	12.0	60.0	143.0	-999.9
STAN	7/27/93	1000	AUTO	-9.9	77.9	6.56	19.2	45.8	22.0	8.0	74.1	30.8	12.1	60.6	145.9	-999.9

Appendix II Table 3A - Analysis of Intensive Site Samples

SITE	DATE	TIME	TYPE	TEMP	ANC	PH	COND	SO4	CL	NO3	CA	MG	K	NA	SIO2	T_AL
STAN	7/27/93	1200	AUTO	-9.9	71.7	6.72	19.1	45.5	22.0	15.8	73.2	30.8	12.2	60.9	147.5	-999.9
STAN	7/27/93	1400	AUTO	-9.9	76.2	6.77	19.5	45.5	22.1	18.2	75.0	31.1	11.6	62.4	149.7	17.6
STAN	7/27/93	1500	GRAB	19.0	98.7	6.88	20.0	44.4	22.6	0.1	72.6	30.0	12.7	63.1	150.8	-999.9
STAN	8/3/93	1440	GRAB	19.0	82.8	6.90	19.6	36.7	24.5	0.1	68.0	28.3	11.5	65.9	163.6	-999.9
STAN	8/5/93	1200	AUTO	-9.9	92.8	6.77	19.4	36.6	24.5	13.1	68.7	29.5	11.6	66.0	162.9	-999.9
STAN	8/5/93	2000	AUTO	-9.9	87.8	6.77	19.0	36.2	24.3	16.6	68.4	29.2	11.9	65.6	162.1	-999.9
STAN	8/6/93	0400	AUTO	-9.9	88.7	6.79	18.8	36.3	24.3	14.7	70.5	30.3	11.5	65.0	162.4	-999.9
STAN	8/6/93	1200	AUTO	-9.9	83.7	6.70	19.2	44.4	23.6	12.5	74.9	32.1	13.6	59.7	143.3	-999.9
STAN	8/6/93	1400	AUTO	-9.9	71.1	6.47	18.2	42.8	19.6	16.7	75.2	31.7	14.4	55.6	128.2	-999.9
STAN	8/6/93	1600	AUTO	-9.9	61.2	6.60	17.6	43.6	19.6	21.6	72.2	30.3	13.4	54.5	128.2	-999.9
STAN	8/6/93	1800	AUTO	-9.9	54.2	6.60	17.4	42.4	19.3	20.1	65.0	27.9	12.3	53.8	126.2	-999.9
STAN	8/6/93	2000	AUTO	-9.9	62.9	6.69	17.5	42.5	19.6	20.4	68.4	29.1	12.5	55.1	129.1	-999.9
STAN	8/6/93	2200	AUTO	-9.9	65.4	6.68	17.8	43.0	19.8	20.1	69.4	28.7	12.0	56.0	132.5	-999.9
STAN	8/7/93	0000	AUTO	-9.9	68.6	6.69	18.1	43.4	20.3	18.3	71.1	29.5	12.1	57.6	136.3	-999.9
STAN	8/7/93	0200	AUTO	-9.9	71.9	6.74	18.2	44.0	21.8	23.3	69.6	29.0	11.9	58.2	140.0	-999.9
STAN	8/7/93	0400	AUTO	-9.9	69.2	6.72	18.4	43.5	21.9	18.0	70.0	29.6	11.9	59.3	143.2	-999.9
STAN	8/7/93	0600	AUTO	-9.9	75.4	6.73	18.5	43.3	21.0	18.2	69.9	29.5	11.8	60.4	145.8	-999.9
STAN	8/7/93	0800	AUTO	-9.9	66.1	6.73	18.5	42.9	21.7	14.7	69.4	29.5	11.7	60.5	147.6	-999.9
STAN	8/7/93	1000	AUTO	-9.9	75.3	6.76	18.5	43.0	21.9	22.5	68.9	29.1	11.4	60.2	149.4	-999.9
STAN	8/7/93	1200	AUTO	-9.9	77.8	6.78	18.5	42.3	21.8	16.6	69.9	29.0	11.6	61.6	150.6	-999.9
STAN	8/7/93	1250	GRAB	17.0	95.4	6.86	18.5	41.5	21.7	2.0	68.9	29.2	11.8	62.4	149.9	-999.9
STAN	8/10/93	1510	GRAB	17.0	101.2	6.87	19.0	37.1	25.0	0.1	68.5	29.6	11.7	65.1	159.2	-999.9
STAN	8/17/93	1500	GRAB	21.0	89.3	6.87	19.4	37.8	23.8	24.1	79.9	34.2	13.0	67.3	164.9	-999.9
STAN	8/24/93	1452	GRAB	19.0	108.6	6.86	20.5	35.5	24.7	3.6	67.3	29.1	11.6	67.2	167.8	-999.9
STAN	8/31/93	1618	GRAB	20.0	106.9	6.88	21.2	34.4	24.6	0.2	70.9	30.2	13.2	69.6	172.1	-999.9
STAN	9/7/93	1900	GRAB	16.5	91.9	6.77	19.0	35.3	24.4	0.1	72.2	31.2	12.3	67.9	171.2	-999.9
STAN	9/14/93	1128	GRAB	17.5	98.7	6.81	19.8	36.2	25.7	11.7	68.9	29.1	12.1	69.5	169.6	-999.9
STAN	9/20/93	1200	AUTO	-9.9	91.9	6.66	19.4	37.2	24.1	15.0	70.3	30.4	12.1	67.3	168.5	-999.9
STAN	9/20/93	2000	AUTO	-9.9	101.1	6.40	19.0	36.7	24.1	6.1	69.4	29.9	11.9	67.1	166.8	-999.9
STAN	9/21/93	0400	AUTO	-9.9	89.2	6.83	19.3	37.2	24.0	22.5	69.9	29.5	12.2	67.3	167.4	-999.9
STAN	9/21/93	0600	AUTO	-9.9	80.4	6.22	18.8	42.0	22.1	8.5	69.8	29.6	14.0	60.5	146.1	-999.9
STAN	9/21/93	0800	AUTO	-9.9	72.0	6.51	18.4	43.7	21.5	15.7	67.6	28.9	13.2	59.1	145.5	-999.9
STAN	9/21/93	1000	AUTO	-9.9	76.1	6.26	18.5	42.7	21.7	10.8	67.6	28.7	12.5	59.7	146.7	-999.9
STAN	9/21/93	1150	GRAB	17.5	89.7	6.79	19.2	42.1	22.4	1.4	68.9	29.4	12.5	60.7	147.8	-999.9
STAN	9/21/93	1200	AUTO	-9.9	79.4	6.27	18.8	42.3	21.6	11.8	67.0	28.5	12.3	60.4	148.4	-999.9
STAN	9/28/93	1740	GRAB	14.8	101.2	6.92	19.5	39.5	23.4	1.1	68.0	29.2	12.2	64.5	160.7	-999.9
STAN	10/5/93	1705	GRAB	14.5	106.9	6.86	18.8	37.4	24.4	0.1	66.8	29.1	11.5	65.3	163.3	-999.9
STAN	10/13/93	0830	GRAB	10.5	91.9	6.80	18.0	37.9	25.5	0.1	65.5	29.4	12.6	62.6	153.9	-999.9
STAN	10/19/93	1215	GRAB	13.5	97.9	6.92	19.3	37.9	26.2	0.1	67.8	30.6	14.2	66.9	159.8	-999.9
STAN	10/26/93	1030	GRAB	11.0	106.2	6.93	19.0	39.3	25.8	0.2	69.3	31.7	14.3	66.3	161.6	-999.9
STAN	11/2/93	1030	GRAB	8.0	106.9	6.94	19.0	40.8	27.1	0.1	72.1	34.1	15.8	64.0	156.2	-999.9
STAN	11/8/93	0953	GRAB	6.0	106.9	6.89	18.0	39.7	26.6	0.1	71.0	32.8	14.3	64.8	156.4	-999.9

Appendix II Table 3A - Analysis of Intensive Site Samples

SITE	DATE	TIME	TYPE	TEMP	ANC	PH	COND	SO4	CL	NO3	CA	MG	K	NA	SIO2	T_AL
STAN	11/15/93	0944	GRAB	12.0	115.3	6.93	19.2	39.0	26.6	0.1	73.8	33.3	16.0	65.8	158.8	-999.9
STAN	11/22/93	1136	GRAB	7.0	105.3	6.91	18.3	38.3	26.1	0.1	69.2	31.4	12.9	63.8	155.6	-999.9
STAN	11/26/93	1200	AUTO	-9.9	101.8	6.83	18.4	37.8	26.2	0.2	66.0	30.1	11.8	61.7	153.6	-999.9
STAN	11/26/93	2000	AUTO	-9.9	103.7	6.88	18.5	37.6	25.7	0.2	67.0	30.8	11.9	62.1	153.6	-999.9
STAN	11/27/93	0400	AUTO	-9.9	103.5	6.85	18.5	38.0	25.9	0.1	67.6	31.1	12.0	62.5	156.0	18.9
STAN	11/27/93	1200	AUTO	-9.9	106.2	6.83	19.9	41.6	26.1	0.1	74.1	34.6	19.8	58.5	137.6	-999.9
STAN	11/27/93	1400	AUTO	-9.9	96.1	6.73	17.8	44.8	25.8	0.1	80.4	36.1	24.7	53.7	121.0	26.1
STAN	11/27/93	1600	AUTO	-9.9	81.1	6.53	18.0	50.1	25.8	0.1	105.0	46.3	41.9	48.9	110.3	-999.9
STAN	11/27/93	1800	AUTO	-9.9	60.4	6.54	19.4	64.3	26.5	11.5	96.7	42.3	29.5	47.7	96.5	-999.9
STAN	11/27/93	2000	AUTO	-9.9	54.2	6.55	19.9	68.1	25.9	17.6	94.1	42.6	26.4	47.1	95.3	-999.9
STAN	11/27/93	2200	AUTO	-9.9	53.6	6.50	19.5	67.4	24.1	21.2	95.8	43.2	24.6	45.5	90.3	-999.9
STAN	11/28/93	0000	AUTO	-9.9	46.7	6.36	20.0	71.4	24.3	30.6	134.4	51.8	27.5	43.5	87.5	-999.9
STAN	11/28/93	0200	AUTO	-9.9	38.6	6.36	21.2	77.3	20.8	40.4	99.7	46.1	24.6	42.2	84.1	-999.9
STAN	11/28/93	0400	AUTO	-9.9	35.4	6.45	22.0	81.8	22.3	0.0	95.7	47.1	20.7	44.7	92.9	41.5
STAN	11/28/93	0600	AUTO	-9.9	37.8	6.51	22.0	84.2	23.9	28.8	96.0	46.0	19.7	46.2	99.0	30.1
STAN	11/28/93	0800	AUTO	-9.9	36.2	6.51	21.3	81.0	23.6	18.5	89.4	43.4	17.0	47.4	103.3	-999.9
STAN	11/28/93	0940	GRAB	10.5	40.3	6.58	21.1	77.8	22.8	12.5	85.0	40.8	16.8	48.5	105.7	-999.9
STAN	11/28/93	1000	AUTO	-9.9	37.0	6.52	21.0	79.1	23.2	41.5	87.5	42.0	16.4	48.2	106.8	-999.9
STAN	11/28/93	1200	AUTO	-9.9	38.7	6.49	22.0	77.0	23.8	39.1	85.6	41.2	15.8	49.2	109.1	-999.9
STAN	11/28/93	1400	AUTO	-9.9	40.3	6.52	21.6	74.6	24.0	37.6	83.9	40.6	15.1	49.5	112.0	-999.9
STAN	11/28/93	1800	AUTO	-9.9	44.4	6.55	20.9	70.6	24.2	35.1	80.9	38.7	14.0	50.2	115.5	-999.9
STAN	11/28/93	2200	AUTO	-9.9	45.3	6.51	20.4	66.8	24.1	33.6	78.1	37.3	14.5	50.9	117.7	-999.9
STAN	11/29/93	0200	AUTO	-9.9	43.7	6.55	19.6	63.4	23.9	31.9	75.3	36.6	12.9	50.5	119.3	-999.9
STAN	11/29/93	0600	AUTO	-9.9	46.2	6.59	19.3	60.5	24.0	30.6	73.6	35.6	12.6	50.8	121.1	-999.9
STAN	11/29/93	1200	AUTO	-9.9	46.2	6.62	18.6	56.3	24.0	12.6	70.3	33.7	12.0	51.0	123.4	-999.9
STAN	11/29/93	1800	AUTO	-9.9	50.3	6.65	18.5	54.2	24.3	26.6	70.9	33.2	10.1	51.2	125.3	-999.9
STAN	11/30/93	0000	AUTO	-9.9	53.7	6.67	18.1	51.3	24.4	12.0	67.1	30.9	11.4	51.1	125.1	16.6
STAN	11/30/93	1110	GRAB	6.5	60.4	6.06	17.4	48.4	25.9	1.9	63.7	29.9	12.1	53.3	125.5	-999.9
STAN	12/3/93	2000	AUTO	-9.9	67.8	6.66	16.7	40.2	26.5	15.3	61.8	27.7	10.1	53.9	133.2	12.8
STAN	12/4/93	0400	AUTO	-9.9	69.3	6.70	16.8	39.7	24.1	15.2	61.9	27.4	9.7	54.5	132.4	-999.9
STAN	12/4/93	1200	AUTO	-9.9	66.1	6.73	16.8	40.6	24.0	15.1	62.5	27.2	10.2	53.7	130.4	-999.9
STAN	12/4/93	2000	AUTO	-9.9	66.2	6.69	16.6	40.7	23.2	13.4	62.6	27.3	10.7	52.8	126.7	-999.9
STAN	12/5/93	0400	AUTO	-9.9	59.4	6.57	16.0	49.4	20.4	6.2	67.7	28.1	11.8	50.3	111.8	33.7
STAN	12/5/93	0600	AUTO	-9.9	54.4	6.60	16.0	52.2	20.2	8.6	65.9	27.9	11.6	49.8	109.0	27.9
STAN	12/5/93	0800	AUTO	-9.9	54.4	6.62	16.8	57.5	20.9	10.4	69.8	29.8	11.9	52.3	114.5	-999.9
STAN	12/5/93	1000	AUTO	-9.9	56.2	6.65	17.5	60.8	21.9	14.2	71.9	30.8	11.8	53.7	120.7	-999.9
STAN	12/5/93	1400	AUTO	-9.9	54.4	6.65	17.9	62.9	22.6	14.6	69.2	30.6	11.6	55.7	126.2	-999.9
STAN	12/5/93	1800	AUTO	-9.9	53.7	6.69	18.0	63.6	23.2	11.0	70.0	31.0	11.4	56.7	130.2	-999.9
STAN	12/6/93	0000	AUTO	-9.9	55.3	6.64	18.0	62.9	23.6	19.4	70.5	31.9	11.1	57.4	131.3	-999.9
STAN	12/6/93	0600	AUTO	-9.9	56.2	6.68	17.9	60.0	24.0	14.7	67.6	30.9	10.7	56.7	131.6	16.8
STAN	12/6/93	1105	GRAB	9.0	51.1	6.66	17.5	57.3	23.7	2.9	66.0	29.7	10.6	56.8	131.4	-999.9
STAN	12/13/93	1000	GRAB	6.0	62.8	6.80	16.7	38.8	24.3	4.3	57.9	26.6	9.3	56.1	136.3	-999.9

Appendix II Table 3A - Analysis of Intensive Site Samples

SITE	DATE	TIME	TYPE	TEMP	ANC	PH	COND	SO4	CL	NO3	CA	MG	K	NA	SIO2	T_AL
STAN	12/20/93	1130	GRAB	6.0	75.3	6.81	16.5	39.7	25.2	3.8	59.2	26.0	9.1	57.8	138.4	-999.9
STAN	1/2/94	0950	GRAB	4.5	64.5	6.81	16.5	38.3	25.0	0.1	57.7	25.8	7.7	57.2	135.2	-999.9
STAN	1/10/94	0850	GRAB	0.5	61.2	6.75	16.7	47.8	25.4	5.7	61.8	27.7	8.3	59.8	142.4	-999.9
STAN	1/24/94	1150	GRAB	2.0	56.2	6.75	16.8	44.6	24.6	6.0	56.3	25.4	8.9	58.4	130.8	-999.9
STAN	1/27/94	0400	AUTO	-9.9	56.2	6.73	17.0	47.2	24.6	20.7	62.0	27.2	8.6	58.4	135.8	9.0
STAN	1/28/94	1200	AUTO	-9.9	47.8	6.48	16.8	55.4	20.8	18.4	69.5	29.7	11.0	50.2	105.2	20.0
STAN	1/28/94	2000	AUTO	-9.9	45.3	6.62	18.4	62.5	23.0	23.5	68.6	30.2	9.9	56.9	120.6	-999.9
STAN	1/29/94	0400	AUTO	-9.9	47.8	6.61	19.0	64.7	23.1	25.4	72.8	30.9	10.1	57.4	125.2	-999.9
STAN	1/30/94	0400	AUTO	-9.9	54.3	6.64	18.3	59.9	23.9	19.1	65.1	30.5	9.4	58.3	129.1	-999.9
STAN	1/31/94	0400	AUTO	-9.9	48.7	6.60	17.2	54.6	24.1	23.1	62.0	28.8	8.4	57.6	132.4	11.5
STAN	1/31/94	1140	GRAB	3.0	49.4	6.69	17.8	53.0	25.3	6.7	59.4	27.8	9.0	58.7	132.8	-999.9
STAN	2/7/94	1050	GRAB	5.5	63.7	6.79	16.9	43.0	24.5	8.4	56.5	25.6	8.2	57.9	136.5	-999.9
STAN	2/16/94	1050	GRAB	5.0	71.2	6.20	17.0	44.0	24.4	4.0	59.1	26.1	8.2	58.9	136.1	-999.9
STAN	2/21/94	1300	GRAB	6.5	66.2	6.60	18.1	51.1	24.3	6.4	61.9	27.1	8.8	61.1	135.4	-999.9
STAN	2/22/94	1200	AUTO	-9.9	60.3	6.76	17.8	50.4	25.2	0.1	62.2	27.7	8.8	62.1	137.2	15.0
STAN	2/23/94	0400	AUTO	-9.9	60.3	6.72	17.6	50.9	24.5	0.1	64.1	28.1	8.9	61.2	133.4	-999.9
STAN	2/23/94	1200	AUTO	-9.9	56.2	6.70	17.2	53.9	22.3	0.1	64.5	28.4	9.4	58.7	123.5	-999.9
STAN	2/23/94	2000	AUTO	-9.9	59.5	6.73	18.3	58.3	23.5	17.0	67.0	29.5	9.6	61.4	130.5	-999.9
STAN	2/24/94	0400	AUTO	-9.9	55.4	6.70	18.4	56.5	23.6	0.1	66.0	29.4	8.4	56.8	131.4	-999.9
STAN	2/24/94	1200	AUTO	-9.9	53.7	6.69	18.4	58.6	23.3	0.1	66.0	29.3	8.8	57.9	128.6	19.6
STAN	2/24/94	2000	AUTO	-9.9	55.3	6.70	19.0	62.0	24.4	14.0	68.3	30.7	9.1	57.7	131.6	-999.9
STAN	2/25/94	1200	AUTO	-9.9	52.2	6.71	18.5	62.2	24.6	0.1	66.5	30.0	9.2	60.1	132.5	8.8
STAN	2/26/94	1200	AUTO	-9.9	52.8	6.70	18.4	56.5	27.4	0.1	65.6	28.8	10.0	60.5	132.7	-999.9
STAN	2/28/94	1215	GRAB	3.0	58.6	6.58	17.5	48.1	25.6	1.6	60.9	27.2	8.6	58.1	133.6	-999.9
STAN	3/7/94	1100	GRAB	6.5	67.8	6.78	17.0	50.6	25.0	0.1	61.2	27.2	9.2	61.2	135.7	-999.9
STAN	3/14/94	1130	GRAB	7.0	60.3	6.81	16.6	46.4	24.3	2.6	59.0	26.1	8.4	58.0	130.2	-999.9
STAN	3/22/94	1310	GRAB	8.5	56.9	6.83	15.9	41.8	23.8	0.2	56.4	24.8	8.4	57.5	121.8	-999.9
STAN	3/28/94	0940	GRAB	9.0	57.9	6.53	16.4	43.1	22.0	0.1	60.0	26.3	8.5	54.7	114.1	-999.9
STAN	4/4/94	1040	GRAB	8.0	52.9	6.65	16.0	43.5	23.4	0.9	58.8	25.8	8.3	57.4	122.4	-999.9
STAN	4/11/94	0913	GRAB	9.0	78.7	6.21	16.6	41.5	23.7	0.1	60.4	25.9	8.7	59.7	131.1	-999.9
STAN	4/18/94	1020	GRAB	10.0	71.9	6.50	17.0	44.0	24.1	0.1	62.1	26.4	9.2	61.3	132.9	-999.9
STAN	4/25/94	1105	GRAB	12.0	80.3	6.92	17.6	42.7	24.4	0.1	60.9	25.5	9.9	61.5	134.6	-999.9
STAN	5/2/94	0800	GRAB	11.0	95.3	6.44	17.5	40.9	23.4	0.1	63.6	26.5	9.7	61.4	142.8	-999.9
STAN	5/9/94	1130	GRAB	11.0	88.7	6.28	17.4	41.4	24.6	0.1	61.7	26.1	10.2	62.0	139.3	-999.9
STAN	5/16/94	1223	GRAB	13.5	92.0	6.36	17.1	38.1	23.8	0.1	61.3	25.7	10.4	60.0	137.9	14.0
STAN	5/23/94	0845	GRAB	13.0	91.9	6.25	17.4	37.7	23.1	0.1	63.3	26.6	9.9	60.3	143.8	-999.9
STAN	5/31/94	0945	GRAB	-9.9	95.4	6.47	16.9	36.2	23.6	0.1	64.6	27.1	10.6	62.6	147.8	-999.9
STAN	6/6/94	1040	GRAB	15.0	102.8	6.44	19.0	34.9	26.7	0.1	66.6	27.3	12.4	67.2	151.0	26.5
STAN	6/11/94	2000	AUTO	-9.9	94.4	6.70	18.5	36.2	24.1	0.1	67.4	27.5	11.8	63.7	152.6	-999.9
STAN	6/12/94	0400	AUTO	-9.9	91.1	6.72	18.5	36.3	23.7	0.1	67.3	27.2	11.3	64.5	153.4	-999.9
STAN	6/12/94	1200	AUTO	-9.9	101.2	6.74	18.4	35.8	23.5	0.1	67.9	28.5	11.4	64.6	153.5	-999.9
STAN	6/12/94	1800	AUTO	-9.9	78.7	6.75	18.6	43.7	22.6	0.1	72.0	29.8	12.3	62.7	148.9	-999.9

Appendix II Table 3A - Analysis of Intensive Site Samples

SITE	DATE	TIME	TYPE	TEMP	ANC	PH	COND	SO4	CL	NO3	CA	MG	K	NA	SIO2	T_AL
STAN	6/12/94	2000	AUTO	-9.9	79.4	6.87	19.0	44.9	22.5	0.1	76.9	31.4	12.2	63.0	147.9	19.6
STAN	6/12/94	2200	AUTO	-9.9	78.7	6.77	18.7	45.3	22.5	0.1	75.8	30.9	12.1	62.3	142.2	-999.9
STAN	6/13/94	0000	AUTO	-9.9	84.4	6.78	19.5	46.2	22.9	0.3	75.6	31.4	12.7	61.9	140.4	-999.9
STAN	6/13/94	0200	AUTO	-9.9	91.9	6.77	20.0	46.5	21.0	0.2	74.9	31.4	13.1	61.7	139.0	-999.9
STAN	6/13/94	0400	AUTO	-9.9	83.7	6.71	19.8	47.3	21.0	0.1	74.7	31.6	13.2	61.1	136.1	-999.9
STAN	6/13/94	0600	AUTO	-9.9	91.9	6.71	19.9	46.2	20.4	0.1	72.9	30.4	13.2	59.6	132.7	-999.9
STAN	6/13/94	0800	AUTO	-9.9	84.4	6.65	19.5	44.9	20.6	0.1	71.7	30.3	13.5	58.5	130.8	-999.9
STAN	6/13/94	1000	AUTO	-9.9	91.7	6.06	19.4	33.7	23.2	0.1	69.8	28.9	15.0	59.8	126.4	17.0
STAN	6/13/94	1240	GRAB	17.0	100.4	6.47	19.4	43.3	21.3	0.1	70.8	28.8	12.3	62.5	145.7	-999.9
STAN	6/22/94	0820	GRAB	17.0	96.9	6.88	19.5	37.0	22.8	0.1	73.1	30.3	12.3	65.6	158.1	8.3
STAN	6/24/94	0400	AUTO	-9.9	103.7	6.30	18.4	36.7	24.4	0.1	73.9	30.4	12.3	66.5	160.3	-999.9
STAN	6/24/94	1200	AUTO	-9.9	102.8	6.42	18.9	35.7	23.9	11.1	71.9	29.7	12.2	66.4	160.7	11.5
STAN	6/24/94	2000	AUTO	-9.9	100.0	6.34	19.0	37.3	21.9	5.8	72.9	29.8	13.6	62.7	148.4	-999.9
STAN	6/25/94	0400	AUTO	-9.9	101.2	6.27	19.2	37.2	22.6	9.0	72.9	30.1	13.0	64.5	153.9	-999.9
STAN	6/25/94	1200	AUTO	-9.9	103.7	6.34	18.8	36.5	22.8	0.1	71.6	29.5	12.6	64.9	157.7	-999.9
STAN	6/26/94	1200	AUTO	-9.9	105.3	6.42	18.8	35.8	23.2	0.2	71.8	29.7	12.1	64.8	158.9	-999.9
STAN	6/26/94	2000	AUTO	-9.9	107.8	6.42	19.1	35.5	23.2	0.6	72.0	30.0	12.4	65.9	159.9	-999.9
STAN	6/27/94	0400	AUTO	-9.9	101.9	6.41	19.1	36.4	23.6	9.2	72.1	30.1	12.9	64.4	154.9	-999.9
STAN	6/27/94	0600	AUTO	-9.9	92.9	6.26	18.9	32.7	23.9	0.1	72.3	30.1	13.1	62.1	152.3	21.7
STAN	6/27/94	1000	AUTO	-9.9	93.6	6.36	18.1	35.3	21.4	0.3	69.9	28.8	13.0	59.6	143.8	-999.9
STAN	6/27/94	1200	AUTO	-9.9	94.4	6.59	17.8	35.1	20.9	0.1	68.4	28.2	12.8	60.6	145.0	-999.9
STAN	6/27/94	1400	AUTO	-9.9	91.9	6.33	18.0	35.8	21.1	1.7	69.8	28.6	12.3	59.8	143.6	-999.9
STAN	6/27/94	1600	AUTO	-9.9	92.9	6.32	18.0	36.7	19.8	0.1	70.4	29.1	13.3	58.0	136.6	-999.9
STAN	6/27/94	2200	AUTO	-9.9	96.9	6.45	18.8	38.2	21.4	0.1	71.3	29.5	12.6	61.3	148.3	-999.9
STAN	6/28/94	0400	AUTO	-9.9	103.7	6.54	19.1	37.9	21.9	1.0	74.2	31.1	12.7	62.9	152.1	17.1
STAN	6/28/94	0900	GRAB	16.0	103.7	6.42	19.0	37.8	21.5	0.1	71.8	30.0	12.2	63.5	153.7	-999.9
STAN	6/29/94	0400	AUTO	-9.9	100.0	6.73	19.4	37.5	22.8	7.5	74.5	31.1	12.4	64.6	156.9	-999.9
STAN	6/29/94	1200	AUTO	-9.9	103.7	6.76	19.4	36.7	22.3	0.1	72.3	29.8	12.2	65.3	157.5	-999.9
STAN	6/29/94	2000	AUTO	-9.9	105.3	6.73	19.5	37.5	23.4	0.1	74.4	30.5	12.5	65.6	159.8	16.1
STAN	6/30/94	0000	AUTO	-9.9	94.4	6.77	19.7	41.8	21.4	0.1	76.6	31.8	13.8	61.1	142.7	-999.9
STAN	6/30/94	0200	AUTO	-9.9	82.9	6.78	19.6	41.7	21.3	13.0	75.6	30.8	13.5	62.6	146.8	-999.9
STAN	6/30/94	0400	AUTO	-9.9	80.3	6.91	19.6	41.5	21.7	22.6	74.4	30.1	13.0	63.4	148.4	-999.9
STAN	6/30/94	0600	AUTO	-9.9	81.2	6.88	19.8	40.8	23.1	6.6	75.3	30.9	12.3	63.6	150.4	-999.9
STAN	6/30/94	0800	AUTO	-9.9	82.5	6.86	20.0	41.2	23.0	2.7	75.2	31.2	12.4	63.7	152.3	-999.9
STAN	6/30/94	1000	AUTO	-9.9	97.8	6.55	19.0	40.8	23.6	0.1	74.3	30.5	12.4	63.6	153.3	-999.9
STAN	6/30/94	1200	AUTO	-9.9	101.2	6.76	19.0	40.3	22.6	0.1	73.2	30.4	12.3	64.0	154.3	-999.9
STAN	6/30/94	1400	AUTO	-9.9	101.2	6.26	19.2	40.2	22.1	0.1	72.4	30.0	12.4	64.7	155.0	21.6
STAN	6/30/94	1600	AUTO	-9.9	95.0	6.39	18.6	41.7	21.6	0.1	74.9	30.7	13.5	61.5	144.3	-999.9
STAN	6/30/94	1800	AUTO	-9.9	96.9	6.40	18.5	40.6	22.2	4.5	75.6	30.4	13.1	61.8	147.4	-999.9
STAN	6/30/94	2000	AUTO	-9.9	90.7	6.26	17.8	38.5	20.8	0.1	69.0	28.2	12.7	59.4	142.8	-999.9
STAN	6/30/94	2200	AUTO	-9.9	94.4	6.46	17.7	38.2	20.9	0.1	69.6	28.6	12.6	59.9	143.8	-999.9
STAN	7/1/94	0000	AUTO	-9.9	99.3	6.39	17.9	38.4	20.5	3.1	74.5	30.4	13.2	60.8	146.0	-999.9

Appendix II Table 3A - Analysis of Intensive Site Samples

SITE	DATE	TIME	TYPE	TEMP	ANC	PH	COND	SO4	CL	NO3	CA	MG	K	NA	SIO2	T_AL
STAN	7/1/94	0400	AUTO	-9.9	95.0	6.85	18.6	39.0	22.7	0.1	75.2	30.6	12.9	62.2	149.6	-999.9
STAN	7/1/94	1000	AUTO	-9.9	101.9	6.88	19.0	39.0	21.5	0.1	71.5	29.6	12.2	62.8	151.6	-999.9
STAN	7/1/94	1600	AUTO	-9.9	104.4	6.88	19.1	38.9	21.7	0.1	73.1	30.3	12.7	64.0	154.1	20.6
STAN	7/5/94	0904	GRAB	18.0	115.4	6.80	20.7	36.6	22.6	0.1	78.2	32.3	12.7	67.1	161.3	-999.9
STAN	7/6/94	1800	AUTO	-9.9	86.1	6.83	19.3	35.0	23.6	0.1	75.8	30.9	13.1	64.4	159.9	19.9
STAN	7/6/94	2000	AUTO	-9.9	80.7	6.87	19.3	36.3	24.1	21.2	74.0	29.4	12.7	63.7	157.3	-999.9
STAN	7/6/94	2200	AUTO	-9.9	83.6	6.89	19.5	37.3	22.7	16.6	72.4	29.8	12.5	63.9	155.3	-999.9
STAN	7/7/94	0000	AUTO	-9.9	93.7	6.94	19.7	37.1	22.4	11.3	73.8	30.2	12.5	63.9	155.8	-999.9
STAN	7/7/94	0200	AUTO	-9.9	86.2	6.96	19.7	37.3	23.4	8.3	72.6	29.5	12.1	63.5	155.6	-999.9
STAN	7/7/94	0600	AUTO	-9.9	91.2	6.91	19.8	38.2	22.2	13.9	75.5	30.8	11.8	63.9	157.2	21.3
STAN	7/7/94	1400	AUTO	-9.9	101.2	6.99	19.9	37.8	22.1	0.1	72.2	29.2	12.2	65.6	158.9	-999.9
STAN	7/7/94	2200	AUTO	-9.9	94.4	6.98	20.6	38.3	23.1	15.3	75.5	30.9	12.8	65.9	159.7	-999.9
STAN	7/8/94	1200	AUTO	-9.9	98.7	7.02	20.3	37.5	23.2	1.1	73.2	30.2	12.4	67.3	161.7	15.0
STAN	7/12/94	0858	GRAB	18.0	105.3	6.90	20.4	36.4	22.6	0.4	73.1	29.9	11.9	66.9	165.2	12.0
STAN	7/15/94	0400	AUTO	-9.9	96.9	6.78	19.9	36.2	23.5	14.4	75.6	30.8	12.5	67.1	165.5	22.1
STAN	7/15/94	1200	AUTO	-9.9	96.9	6.78	20.0	36.0	23.4	15.1	74.6	30.7	12.7	67.1	166.5	-999.9
STAN	7/15/94	2000	AUTO	-9.9	79.4	6.66	19.4	33.7	22.6	13.2	73.7	30.0	13.1	62.2	151.9	-999.9
STAN	7/15/94	2200	AUTO	-9.9	76.2	6.80	19.1	34.4	21.5	29.1	73.3	29.6	12.6	61.7	151.3	25.2
STAN	7/16/94	0200	AUTO	-9.9	81.1	6.86	19.4	34.0	21.7	8.3	72.4	29.5	12.7	62.1	151.9	22.4
STAN	7/16/94	0800	AUTO	-9.9	90.0	6.88	20.0	35.7	21.9	14.2	75.6	31.0	12.6	63.7	156.9	-999.9
STAN	7/16/94	1600	AUTO	-9.9	93.6	6.86	20.2	35.9	22.8	0.1	75.9	30.9	12.9	65.6	159.6	-999.9
STAN	7/16/94	2000	AUTO	-9.9	92.5	6.89	20.6	36.4	22.7	17.4	76.6	31.2	12.6	66.0	160.8	-999.9
STAN	7/16/94	2200	AUTO	-9.9	94.4	6.89	20.6	36.7	22.6	17.7	77.9	31.3	12.8	65.7	162.6	-999.9
STAN	7/17/94	0000	AUTO	-9.9	71.7	6.57	21.9	65.7	16.4	0.1	87.2	34.3	18.9	52.7	113.9	-999.9
STAN	7/17/94	0200	AUTO	-9.9	61.7	6.59	21.5	62.8	17.7	0.1	85.1	33.9	16.6	55.8	124.3	-999.9
STAN	7/17/94	0400	AUTO	-9.9	54.4	6.65	21.4	62.8	17.9	15.6	84.3	33.6	13.8	57.5	126.3	-999.9
STAN	7/17/94	0800	AUTO	-9.9	77.5	6.73	21.1	55.2	18.4	7.4	83.4	33.4	13.5	59.5	136.8	-999.9
STAN	7/17/94	1400	AUTO	-9.9	85.0	6.82	20.9	49.5	19.9	4.8	80.7	32.4	13.2	61.6	149.2	-999.9
STAN	7/17/94	1800	AUTO	-9.9	81.9	6.81	21.0	47.3	20.6	1.0	78.8	32.3	13.7	63.3	152.6	17.1
STAN	7/18/94	0400	AUTO	-9.9	71.1	6.61	19.5	56.0	15.8	0.1	77.0	31.3	13.7	53.1	124.2	-999.9
STAN	7/18/94	1200	AUTO	-9.9	77.2	6.71	20.1	54.9	18.0	2.9	76.0	31.1	12.9	58.3	140.6	-999.9
STAN	7/18/94	2000	AUTO	-9.9	85.0	6.75	20.5	53.1	19.5	4.2	75.9	31.4	13.4	61.2	149.0	-999.9
STAN	7/19/94	0400	AUTO	-9.9	90.0	6.79	20.5	49.1	20.3	4.2	73.8	30.9	12.9	61.7	150.9	-999.9
STAN	7/19/94	0851	GRAB	18.5	96.2	6.90	19.5	48.3	20.1	0.1	73.9	30.6	12.6	62.9	154.0	13.2
STAN	7/21/94	0400	AUTO	-9.9	88.7	6.78	20.1	43.2	22.0	17.7	77.9	33.1	13.1	65.3	158.9	-999.9
STAN	7/21/94	1200	AUTO	-9.9	85.0	6.80	19.9	43.2	22.1	18.2	76.1	31.6	12.1	65.7	159.5	23.3
STAN	7/21/94	2000	AUTO	-9.9	80.0	6.71	19.3	45.0	20.0	17.9	76.5	31.9	13.4	60.4	143.7	27.3
STAN	7/22/94	0400	AUTO	-9.9	83.7	6.85	19.3	44.7	20.2	15.0	78.4	33.0	12.3	61.6	148.7	-999.9
STAN	7/22/94	1200	AUTO	-9.9	86.2	6.83	19.5	44.9	20.7	15.4	77.8	33.7	12.2	63.4	153.3	-999.9
STAN	7/22/94	2000	AUTO	-9.9	87.8	6.85	19.4	44.3	21.0	15.6	75.7	32.0	12.3	64.2	156.6	15.9
STAN	7/26/94	0843	GRAB	18.0	100.0	6.92	19.0	41.4	21.9	0.2	73.1	30.0	12.1	65.3	158.7	13.4
STAN	7/27/94	0400	AUTO	-9.9	86.1	6.38	18.9	40.2	22.2	0.2	71.6	28.7	12.0	65.6	159.4	22.9

Appendix II Table 3A - Analysis of Intensive Site Samples

SITE	DATE	TIME	TYPE	TEMP	ANC	PH	COND	SO4	CL	NO3	CA	MG	K	NA	SIO2	T_AL
STAN	7/27/94	1200	AUTO	-9.9	89.7	6.36	18.8	40.5	22.5	1.9	71.5	28.9	12.2	64.8	159.4	-999.9
STAN	7/27/94	2000	AUTO	-9.9	78.2	6.14	17.9	41.4	18.8	0.2	63.6	26.6	13.6	56.7	132.7	-999.9
STAN	7/27/94	2200	AUTO	-9.9	74.7	6.32	17.7	44.5	17.7	2.1	71.9	28.8	13.0	55.6	130.7	43.1
STAN	7/28/94	0000	AUTO	-9.9	58.5	6.06	18.4	45.3	19.0	0.6	78.8	31.4	12.6	57.5	135.3	-999.9
STAN	7/28/94	0400	AUTO	-9.9	61.0	6.18	18.8	46.2	19.8	1.5	78.1	31.4	12.9	60.9	143.9	-999.9
STAN	7/28/94	1200	AUTO	-9.9	66.5	6.19	18.8	46.2	21.0	1.0	72.2	29.5	12.4	62.7	149.9	-999.9
STAN	7/28/94	2000	AUTO	-9.9	91.1	6.60	19.0	45.4	20.7	0.2	73.0	30.0	12.2	63.4	153.6	26.8
STAN	8/2/94	0845	GRAB	18.0	97.9	6.93	19.0	42.6	21.5	0.1	71.8	30.0	11.4	64.3	155.9	14.8
STAN	8/9/94	1250	GRAB	17.0	101.2	6.43	18.0	37.5	22.9	0.5	66.4	27.3	11.4	64.4	154.5	-999.9
STAN	8/15/94	2000	AUTO	-9.9	89.4	6.88	18.5	39.5	21.2	5.2	70.2	29.4	12.1	61.0	147.0	-999.9
STAN	8/16/94	0400	AUTO	-9.9	90.0	6.73	19.0	38.1	21.0	9.0	74.5	31.5	11.8	62.9	149.0	-999.9
STAN	8/16/94	1230	GRAB	16.0	99.4	6.91	18.5	39.5	22.5	3.3	72.1	30.0	12.2	64.0	155.7	18.5
STAN	8/17/94	1000	AUTO	-9.9	78.6	6.27	17.1	37.6	19.7	0.5	69.1	28.4	13.7	55.5	128.6	38.9
STAN	8/17/94	1200	AUTO	-9.9	75.4	6.33	17.0	41.3	18.8	1.4	71.3	29.5	12.8	54.7	126.6	-999.9
STAN	8/17/94	1400	AUTO	-9.9	75.4	6.34	17.6	44.9	19.1	1.5	74.5	30.6	13.9	55.1	122.5	-999.9
STAN	8/17/94	1600	AUTO	-9.9	64.7	6.15	17.8	49.1	18.7	0.3	71.7	29.1	15.1	50.3	116.1	51.1
STAN	8/17/94	1800	AUTO	-9.9	61.7	6.42	18.4	54.9	17.3	3.4	80.1	32.9	14.2	50.8	113.5	68.9
STAN	8/17/94	2000	AUTO	-9.9	70.4	6.25	19.2	57.6	17.8	2.4	85.3	35.0	14.1	54.3	120.8	-999.9
STAN	8/17/94	2200	AUTO	-9.9	76.9	6.40	19.1	57.0	18.6	0.1	80.7	32.9	13.7	55.6	127.6	-999.9
STAN	8/18/94	0000	AUTO	-9.9	72.5	6.34	19.0	56.0	18.6	4.8	82.1	34.6	13.0	55.8	131.8	40.2
STAN	8/18/94	0200	AUTO	-9.9	63.7	6.73	19.0	55.2	18.4	17.4	80.3	33.7	12.7	56.5	134.2	-999.9
STAN	8/18/94	0400	AUTO	-9.9	64.5	6.74	18.6	54.6	19.1	13.6	79.3	33.5	12.1	56.8	136.2	-999.9
STAN	8/18/94	0600	AUTO	-9.9	72.0	6.37	18.6	53.6	19.3	5.3	76.0	32.4	12.0	57.1	137.0	-999.9
STAN	8/18/94	0800	AUTO	-9.9	71.1	6.39	18.5	53.2	19.5	3.9	75.1	32.1	11.2	57.4	138.5	-999.9
STAN	8/18/94	1000	AUTO	-9.9	62.5	6.73	18.5	53.9	19.3	16.3	73.6	31.4	11.2	57.6	139.9	-999.9
STAN	8/18/94	1200	AUTO	-9.9	61.9	6.69	18.5	53.6	19.5	15.1	69.1	29.0	11.1	57.7	140.3	26.8
STAN	8/18/94	1400	AUTO	-9.9	72.9	6.40	18.2	52.8	19.9	3.2	68.3	28.7	11.4	57.6	140.5	-999.9
STAN	8/23/94	1130	GRAB	16.0	83.7	6.67	18.0	46.6	21.5	0.1	64.1	28.0	9.6	59.8	146.8	11.8
STAN	8/29/94	1030	GRAB	16.5	93.7	6.76	17.7	38.4	22.1	0.8	64.8	27.7	9.7	61.2	148.7	12.6
STAN	9/5/94	1815	GRAB	16.0	93.6	6.87	17.8	35.7	24.3	0.2	64.2	27.4	10.2	63.0	149.3	15.9
STAN	9/12/94	1730	GRAB	16.5	98.6	6.46	17.5	34.5	23.3	0.2	64.2	27.0	9.7	62.5	152.4	17.8
STAN	9/20/94	1740	GRAB	15.5	96.9	6.96	17.9	34.5	23.2	0.2	68.0	28.8	10.9	63.0	154.2	13.9
STAN	9/27/94	1820	GRAB	15.0	96.2	6.89	18.2	35.4	23.2	0.2	69.7	30.0	13.2	63.9	151.4	13.6
STAN	10/4/94	1740	GRAB	11.0	96.9	6.77	17.5	34.1	23.4	0.2	63.1	26.7	11.1	61.1	153.3	16.7
STAN	10/11/94	1740	GRAB	10.5	97.8	6.88	17.9	34.9	23.6	2.8	66.8	29.7	11.4	61.2	153.1	8.3
STAN	10/18/94	1846	GRAB	12.0	103.7	6.86	18.5	33.8	24.5	0.1	68.2	30.0	13.1	62.9	153.8	16.2
STAN	10/22/94	2000	AUTO	-9.9	115.3	7.01	18.5	34.1	26.0	0.1	73.3	33.1	15.6	64.8	155.4	-999.9
STAN	10/23/94	0400	AUTO	-9.9	116.1	7.05	18.9	33.8	25.5	0.1	72.0	32.5	15.2	64.4	155.2	12.6
STAN	10/23/94	1200	AUTO	-9.9	121.2	7.02	20.0	35.8	27.7	0.1	78.2	35.6	22.3	65.2	148.9	-999.9
STAN	10/23/94	1400	AUTO	-9.9	116.1	6.72	20.5	31.8	29.1	0.1	88.7	38.6	23.4	63.3	148.0	18.6
STAN	10/23/94	1800	AUTO	-9.9	113.7	7.02	19.6	35.5	28.6	0.1	77.5	35.3	22.7	64.4	147.6	-999.9
STAN	10/24/94	0200	AUTO	-9.9	116.2	6.99	19.7	35.5	28.7	0.1	78.7	35.8	20.0	64.7	150.0	-999.9

Appendix II Table 3A - Analysis of Intensive Site Samples

SITE	DATE	TIME	TYPE	TEMP	ANC	PH	COND	SO4	CL	NO3	CA	MG	K	NA	SIO2	T_AL
STAN	10/24/94	1600	AUTO	-9.9	113.7	7.04	20.1	36.0	28.5	0.1	74.7	33.5	18.7	65.0	153.0	13.5
STAN	10/25/94	1920	GRAB	12.0	113.7	6.99	19.4	35.2	27.1	0.1	75.2	33.7	16.8	64.7	154.3	14.7
STAN	10/31/94	2000	AUTO	-9.9	117.8	6.95	19.1	35.0	25.4	0.1	75.8	33.7	16.1	64.8	154.5	12.6
STAN	11/1/94	0400	AUTO	-9.9	124.3	6.93	20.5	35.6	26.6	0.1	78.6	34.6	19.0	66.2	153.3	-999.9
STAN	11/1/94	1200	AUTO	-9.9	126.2	6.93	21.7	38.0	26.7	0.1	86.6	38.7	26.1	63.5	143.7	-999.9
STAN	11/1/94	1400	AUTO	-9.9	127.9	6.67	23.0	39.4	28.7	0.1	109.4	45.8	33.0	62.4	142.1	19.3
STAN	11/1/94	1600	AUTO	-9.9	120.3	6.82	22.2	39.0	28.1	0.1	85.2	38.4	31.6	61.2	139.4	-999.9
STAN	11/1/94	1650	GRAB	9.5	121.9	6.99	22.0	39.0	27.4	0.1	90.1	40.5	29.2	62.1	140.1	29.8
STAN	11/1/94	1800	AUTO	-9.9	120.3	6.90	22.2	39.0	28.3	0.1	85.4	38.4	30.0	62.0	140.4	19.1
STAN	11/8/94	1720	GRAB	8.0	112.8	6.91	19.3	36.2	26.1	0.2	74.5	33.4	15.5	64.5	155.0	16.5
STAN	11/15/94	1800	GRAB	9.5	111.2	6.95	19.2	34.5	24.4	0.1	71.9	31.7	13.5	64.9	154.2	12.2
STAN	11/20/94	2000	AUTO	-9.9	131.2	6.98	19.7	37.0	27.3	0.1	76.1	34.8	19.2	66.1	152.6	-999.9
STAN	11/21/94	0400	AUTO	-9.9	106.2	6.99	18.9	36.5	26.3	0.1	73.7	32.7	13.9	63.1	150.0	11.2
STAN	11/21/94	1200	AUTO	-9.9	99.5	6.95	19.8	37.8	31.7	0.1	75.8	33.7	20.3	62.5	135.4	-999.9
STAN	11/21/94	2000	AUTO	-9.9	100.3	6.83	20.6	41.3	34.8	0.1	80.1	35.3	21.9	61.0	128.2	-999.9
STAN	11/22/94	0400	AUTO	-9.9	98.7	6.82	20.7	43.3	36.0	0.1	82.0	36.1	19.5	61.9	132.6	19.0
STAN	11/22/94	1200	AUTO	-9.9	94.4	7.00	19.9	42.1	34.4	0.1	76.9	34.0	16.8	62.6	139.6	6.7
STAN	11/22/94	1740	GRAB	8.0	91.9	6.85	19.6	40.9	33.0	0.1	75.5	33.6	15.7	62.7	141.9	19.1
STAN	11/29/94	1820	GRAB	5.0	84.4	6.88	17.9	37.6	26.0	0.2	69.8	30.0	11.6	57.2	136.8	10.4
STAN	12/4/94	0400	AUTO	-9.9	87.8	6.86	16.7	36.6	25.0	0.2	67.9	29.5	10.4	56.7	138.0	-999.9
STAN	12/4/94	1200	AUTO	-9.9	84.3	6.95	16.8	36.8	24.7	0.2	65.2	28.1	10.4	56.2	143.1	7.8
STAN	12/4/94	2000	AUTO	-9.9	80.4	6.82	17.2	36.6	25.2	1.4	67.6	29.1	11.1	56.3	135.4	-999.9
STAN	12/5/94	0200	AUTO	-9.9	85.4	6.58	18.8	39.6	24.7	0.2	86.7	33.2	17.6	53.3	121.9	9.3
STAN	12/5/94	0400	AUTO	-9.9	76.2	6.70	17.8	42.2	24.6	0.2	72.2	30.8	17.1	52.2	119.3	-999.9
STAN	12/5/94	0600	AUTO	-9.9	73.6	6.75	18.2	43.5	24.9	0.2	74.6	31.4	16.1	53.1	120.3	-999.9
STAN	12/5/94	1000	AUTO	-9.9	78.7	6.84	18.5	45.0	26.1	0.2	75.3	31.9	15.1	55.2	124.3	-999.9
STAN	12/5/94	1600	AUTO	-9.9	76.2	6.81	18.5	46.2	27.2	0.2	72.0	30.6	13.7	57.3	131.8	-999.9
STAN	12/5/94	2000	AUTO	-9.9	83.7	6.76	18.5	45.7	26.4	0.2	74.1	31.3	13.6	57.4	133.2	-999.9
STAN	12/6/94	0400	AUTO	-9.9	76.1	6.77	18.6	45.1	25.8	0.2	71.3	30.5	13.0	58.9	137.0	11.4
STAN	12/6/94	1650	GRAB	7.5	86.2	6.85	18.2	44.9	25.3	0.2	70.4	30.5	12.4	58.9	139.9	15.4
STAN	12/13/94	1700	GRAB	3.5	71.2	6.83	17.5	41.2	23.4	0.2	63.6	28.0	9.3	56.2	138.1	11.1
STAN	12/20/94	1735	GRAB	3.0	74.4	6.83	17.4	41.4	23.9	1.9	63.8	27.7	9.3	57.1	139.8	6.1
STAN	12/27/94	1810	GRAB	5.0	81.2	6.43	17.0	39.3	23.9	0.2	62.7	27.2	9.6	58.8	140.9	12.3
STAN	1/3/95	1840	GRAB	1.0	72.8	6.82	17.0	39.4	23.9	0.1	64.2	28.2	9.2	58.7	139.9	5.6
STAN	1/10/95	1645	GRAB	5.0	68.7	6.81	17.8	46.6	24.0	1.9	64.6	28.1	9.3	59.6	141.1	6.5
STAN	1/13/95	1200	AUTO	-9.9	73.7	6.68	17.2	43.3	23.7	6.8	63.4	27.2	9.5	59.9	141.6	-999.9
STAN	1/13/95	2000	AUTO	-9.9	77.8	6.65	18.0	45.1	24.2	7.8	58.2	25.7	10.6	59.9	143.0	-999.9
STAN	1/14/95	0400	AUTO	-9.9	77.8	6.72	18.0	45.2	24.5	8.5	62.9	26.8	10.7	60.9	140.9	10.5
STAN	1/14/95	1200	AUTO	-9.9	72.8	6.72	18.1	44.3	28.3	8.1	65.2	27.6	10.4	61.4	138.2	-999.9
STAN	1/14/95	2000	AUTO	-9.9	75.3	6.68	19.0	44.3	32.5	8.0	68.5	29.1	11.1	63.1	136.6	-999.9
STAN	1/15/95	0400	AUTO	-9.9	67.8	6.68	19.6	45.5	40.3	8.6	71.6	30.5	12.2	64.4	130.6	-999.9
STAN	1/15/95	1200	AUTO	-9.9	54.4	6.52	21.8	53.8	50.2	9.3	80.7	34.7	16.8	59.1	109.9	-999.9

Appendix II Table 3A - Analysis of Intensive Site Samples

SITE	DATE	TIME	TYPE	TEMP	ANC	PH	COND	SO4	CL	NO3	CA	MG	K	NA	SIO2	T_AL
STAN	1/15/95	2000	AUTO	-9.9	48.7	6.42	22.8	67.8	43.4	18.6	86.5	37.7	18.0	52.6	101.4	30.4
STAN	1/16/95	0400	AUTO	-9.9	43.7	6.45	21.6	74.3	31.9	22.0	79.7	36.0	16.5	50.6	109.3	-999.9
STAN	1/16/95	1200	AUTO	-9.9	43.7	6.50	20.4	68.7	29.1	19.9	73.6	33.6	14.4	51.6	115.7	-999.9
STAN	1/16/95	2000	AUTO	-9.9	45.3	6.51	19.1	62.5	27.4	19.6	68.5	31.0	12.5	51.2	119.5	-999.9
STAN	1/17/95	0400	AUTO	-9.9	49.3	6.58	18.5	57.2	26.4	18.0	66.3	29.9	11.6	51.2	122.4	-999.9
STAN	1/17/95	1200	AUTO	-9.9	50.3	6.61	18.0	54.3	26.6	16.1	63.5	28.6	10.7	51.5	123.4	-999.9
STAN	1/17/95	1800	GRAB	7.0	50.3	6.71	17.8	50.5	25.5	0.2	62.5	28.1	11.0	52.2	125.5	13.8
STAN	1/18/95	1200	AUTO	-9.9	46.1	6.54	17.2	47.2	25.9	8.8	61.3	27.3	10.2	53.2	127.9	-999.9
STAN	1/19/95	1200	AUTO	-9.9	54.4	6.63	16.9	44.8	25.0	9.8	59.6	26.1	9.9	54.1	130.1	-999.9
STAN	1/20/95	1200	AUTO	-9.9	54.4	6.66	16.9	44.9	24.6	9.7	60.5	26.1	10.0	53.5	127.0	16.5
STAN	1/24/95	1820	GRAB	3.5	56.9	6.65	17.5	43.1	26.1	7.0	61.2	26.7	9.6	57.0	137.3	5.6
STAN	2/1/95	1825	GRAB	3.5	76.9	6.20	17.0	39.9	24.6	0.1	61.9	27.2	9.0	57.8	139.6	10.6
STAN	2/8/95	0805	GRAB	0.0	75.4	6.18	16.6	40.9	24.5	0.1	61.6	27.5	8.2	58.1	141.3	11.6
STAN	2/14/95	1749	GRAB	2.0	71.8	6.72	17.2	40.5	24.8	5.9	60.9	26.7	8.8	58.5	141.0	6.4
STAN	2/21/95	1820	GRAB	6.0	62.0	6.80	17.0	43.3	24.5	3.7	62.1	27.0	9.2	59.7	140.4	12.8
STAN	2/28/95	1730	GRAB	7.0	73.6	6.84	17.5	44.6	24.6	4.3	63.1	27.0	9.8	60.9	136.6	13.9
STAN	3/7/95	1645	GRAB	9.0	75.3	6.84	17.0	43.6	23.8	1.9	59.4	25.6	9.4	60.5	136.4	11.5
STAN	3/7/95	2000	AUTO	-9.9	71.2	6.85	16.0	43.8	23.8	10.3	67.7	29.5	8.7	61.3	136.4	11.1
STAN	3/8/95	0400	AUTO	-9.9	75.3	6.84	17.0	44.3	24.8	11.6	67.9	29.7	9.8	61.9	135.5	-999.9
STAN	3/8/95	1200	AUTO	-9.9	71.2	6.82	17.2	45.1	24.5	10.9	67.6	29.5	10.2	61.1	133.3	-999.9
STAN	3/8/95	2000	AUTO	-9.9	66.2	6.75	17.0	47.9	23.3	10.3	66.8	28.9	10.1	57.7	126.0	18.5
STAN	3/9/95	0400	AUTO	-9.9	61.9	6.81	17.6	52.9	25.1	14.6	70.4	30.9	9.3	58.8	134.5	-999.9
STAN	3/9/95	1200	AUTO	-9.9	63.7	6.80	17.7	53.1	24.9	10.7	68.7	30.5	9.4	60.2	137.4	-999.9
STAN	3/10/95	1200	AUTO	-9.9	66.2	6.78	17.6	53.6	24.9	10.4	69.6	30.9	9.2	61.1	139.5	6.7
STAN	3/11/95	1200	AUTO	-9.9	65.3	6.77	17.7	52.7	24.6	10.7	66.8	29.7	9.2	61.2	139.3	-999.9
STAN	3/14/95	1840	GRAB	8.0	70.3	6.87	17.8	49.3	24.4	3.2	66.9	29.5	9.8	62.2	138.2	11.0
STAN	3/21/95	1745	GRAB	7.5	71.9	6.52	17.9	43.8	25.2	6.6	64.1	27.5	10.6	64.9	138.4	9.0
STAN	3/28/95	1815	GRAB	7.0	76.8	6.92	17.9	42.5	24.1	0.1	65.7	28.5	9.6	63.8	139.1	7.6
STAN	4/4/95	1830	GRAB	7.0	75.4	6.38	17.6	41.2	24.3	0.1	64.1	27.7	9.8	64.7	138.5	8.3
STAN	4/11/95	1800	GRAB	8.0	88.7	6.46	18.1	40.4	23.6	0.1	67.2	29.0	9.7	64.7	140.5	8.0
STAN	4/18/95	1705	GRAB	10.5	70.4	6.94	18.3	42.2	24.1	0.1	66.1	28.0	9.5	64.1	141.9	8.5
STAN	4/25/95	1900	GRAB	7.5	75.4	6.90	18.6	42.7	24.6	5.4	70.5	29.5	10.3	65.0	142.4	7.7
STAN	5/2/95	1820	GRAB	8.5	85.3	6.87	18.0	43.3	22.1	0.1	69.2	28.8	10.3	61.0	134.3	13.3
STAN	5/9/95	1850	GRAB	10.5	88.7	6.25	18.4	44.1	24.3	1.0	70.5	29.4	10.4	65.4	143.4	8.3
STAN	5/13/95	1200	AUTO	-9.9	80.0	6.63	18.0	43.7	23.7	4.3	67.0	29.0	9.7	63.5	144.5	-999.9
STAN	5/13/95	2000	AUTO	-9.9	84.4	6.63	18.6	43.6	23.8	3.4	69.4	30.1	10.4	63.9	144.7	8.4
STAN	5/14/95	0400	AUTO	-9.9	91.2	6.66	19.0	42.7	23.7	3.4	70.9	30.5	10.5	65.1	144.2	8.5
STAN	5/14/95	1200	AUTO	-9.9	88.7	6.56	18.6	45.2	21.3	0.1	71.7	30.4	12.0	60.2	129.2	-999.9
STAN	5/14/95	2000	AUTO	-9.9	84.4	6.68	18.9	45.7	21.9	2.6	72.6	31.1	11.1	61.6	133.9	-999.9
STAN	5/15/95	0400	AUTO	-9.9	67.2	6.63	19.3	46.8	23.4	6.4	71.3	31.1	11.2	63.6	141.1	12.5
STAN	5/15/95	2000	AUTO	-9.9	86.9	6.63	19.0	46.6	23.3	2.4	70.3	30.5	11.0	65.0	145.0	-999.9
STAN	5/16/95	1200	AUTO	-9.9	77.9	6.64	18.9	46.7	23.6	3.3	68.5	29.5	10.1	64.3	144.8	-999.9

Appendix II Table 3A - Analysis of Intensive Site Samples

SITE	DATE	TIME	TYPE	TEMP	ANC	PH	COND	SO4	CL	NO3	CA	MG	K	NA	SIO2	T_AL
STAN	5/16/95	1930	GRAB	9.5	93.7	6.93	19.1	46.2	23.1	0.9	71.4	30.2	10.8	64.0	143.9	10.4
STAN	5/23/95	1730	GRAB	9.5	91.2	6.23	18.0	42.6	24.3	0.1	66.2	28.6	10.4	63.7	146.5	6.6
STAN	5/29/95	1710	GRAB	13.0	84.4	6.88	19.1	49.2	22.9	5.8	72.7	31.0	11.1	63.6	145.8	-999.9
STAN	6/5/95	1710	GRAB	12.0	96.1	6.67	19.2	43.1	24.0	0.1	69.7	29.8	10.5	63.8	149.6	-999.9
STAN	6/12/95	1730	GRAB	15.5	131.2	6.73	19.7	37.7	23.4	0.1	85.5	46.8	10.5	62.0	149.1	-999.9
STAN	6/19/95	1740	GRAB	16.0	134.4	6.48	19.5	35.0	23.4	0.0	86.2	46.6	9.6	64.0	151.6	-999.9
STAN	6/26/95	1910	GRAB	16.0	72.9	6.46	18.5	47.2	23.6	0.1	68.7	29.5	10.7	62.9	145.6	-999.9

¹ SITE = site identification code

TYPE = sample type: GRAB = weekly grab-sample collection; AUTO = automated episode-sample collection

Units: temperature = Celsius; conductivity = μS ; SiO_2 = $\mu\text{m L}^{-1}$; ANC and ions = $\mu\text{eq L}^{-1}$; T_Al (total monomeric aluminum) = $\mu\text{g L}^{-1}$; missing values = -9s

APPENDIX II - TABLE 3B: ANALYSES OF SYNOPTIC SURVEY SAMPLES¹

SITE	DATE	TIME	TEMP	ANC	PH	COND	SO4	CL	NO3	CA	MG	K	NA	SIO2
BB01	3/18/92	0923	5.5	58.7	6.78	16.5	46.2	24.7	10.6	52.2	32.9	8.5	55.6	137.1
BB01	7/18/92	1232	19.0	113.7	6.50	19.9	32.2	23.4	0.2	70.3	44.0	12.3	66.1	176.3
BB01	3/16/93	0930	3.0	53.6	6.71	15.0	38.2	22.4	16.9	48.1	31.2	7.9	52.0	138.0
BB01	8/5/93	1320	17.5	110.4	6.30	19.5	42.2	22.5	1.6	69.0	41.6	11.2	62.6	171.6
BB01	10/10/94	1435	12.5	116.2	6.94	19.2	37.9	22.2	0.2	69.8	45.5	12.3	64.6	169.7
BB02	3/18/92	0907	7.0	44.4	6.61	17.2	71.9	22.8	3.2	57.0	30.0	7.0	54.1	127.5
BB02	7/18/92	1246	18.0	79.4	6.65	19.8	59.0	22.6	5.5	71.9	36.9	8.6	62.9	152.0
BB02	3/16/93	0954	3.0	36.2	6.56	15.9	72.6	19.7	4.0	54.0	27.7	6.4	49.1	123.2
BB02	8/5/93	1312	17.0	66.9	6.29	17.8	65.7	20.4	0.3	61.9	29.3	7.7	59.2	152.3
BB02	10/10/94	1455	13.0	78.7	6.44	18.6	58.0	20.6	6.8	66.9	32.6	8.8	62.5	155.9
BB03	3/18/92	0939	5.0	58.2	6.76	16.9	44.5	24.9	13.1	52.6	33.7	8.7	56.0	137.4
BB03	7/18/92	1256	19.0	115.4	6.31	19.8	31.0	23.2	0.2	69.2	43.2	12.0	65.6	177.2
BB03	3/16/93	1002	2.0	54.3	6.72	15.2	37.3	22.0	16.1	48.2	31.4	8.0	51.5	137.1
BB03	8/5/93	1031	18.0	116.9	6.36	19.1	40.5	22.2	1.6	70.0	43.2	10.9	62.3	172.5
BB03	10/10/94	1740	13.0	114.4	6.85	19.4	37.6	21.9	2.7	70.3	44.4	12.1	63.5	167.9
BB04	3/18/92	0958	5.5	53.6	6.77	17.0	44.1	24.6	14.3	52.9	33.7	8.3	55.4	134.5
BB04	7/18/92	1328	19.0	94.0	6.46	20.0	34.6	22.9	0.2	71.0	44.1	11.5	63.6	171.1
BB04	3/16/93	1044	2.0	48.7	6.70	15.1	38.4	22.3	17.8	48.5	31.2	7.8	50.9	132.7
BB04	8/5/93	1054	17.5	111.2	6.33	19.3	43.0	22.1	3.4	70.3	42.7	10.1	59.8	165.6
BB04	10/10/94	1810	10.0	111.2	6.91	19.9	40.2	22.2	0.1	72.4	44.9	11.5	63.6	165.9
BB05	3/18/92	1015	-9.9	56.3	6.74	16.7	44.2	24.3	14.7	53.3	33.3	8.2	55.3	134.1
BB05	7/18/92	1430	18.5	102.9	6.43	19.8	34.4	23.1	1.9	69.6	43.5	11.3	63.7	170.9
BB05	3/16/93	1115	-9.9	49.2	6.66	15.2	38.6	22.0	19.1	49.1	31.4	7.9	51.1	132.9
BB05	8/5/93	1302	17.5	107.5	6.32	19.0	42.5	21.9	3.1	69.3	42.2	10.0	58.7	162.2
BB05	10/10/94	1704	13.0	104.4	6.93	19.5	40.0	22.1	0.4	69.9	43.5	10.7	62.1	163.5
BB06	3/18/92	1043	4.5	51.7	6.78	14.8	37.0	25.9	5.6	41.3	22.6	9.7	56.9	148.0
BB06	7/18/92	1402	18.5	81.0	6.34	17.6	25.4	25.6	0.2	55.7	30.2	14.1	70.1	196.8
BB06	3/16/93	1200	3.0	49.4	6.74	13.5	31.9	23.0	9.5	39.0	22.0	9.0	53.3	143.3
BB06	8/5/93	1230	17.5	105.0	6.31	17.7	31.8	24.4	0.1	56.7	30.4	13.4	68.9	193.7
BB06	10/10/94	1641	12.5	99.2	6.89	17.8	30.8	23.6	0.1	55.5	30.5	14.2	70.3	187.5
BB07	3/18/92	1055	6.0	54.4	6.75	18.0	47.5	23.8	21.1	59.5	38.8	7.4	53.1	127.0
BB07	7/18/92	1347	18.0	92.2	6.75	20.2	38.1	22.0	6.9	73.9	47.8	9.7	60.2	160.9
BB07	3/16/93	1215	3.0	47.8	6.62	16.1	41.9	20.9	26.2	55.4	36.0	7.0	48.9	124.3

Appendix II Table 3B - Analysis of Synoptic Survey Samples

SITE	DATE	TIME	TEMP	ANC	PH	COND	SO4	CL	NO3	CA	MG	K	NA	SIO2
BB07	8/5/93	1108	17.0	106.9	6.30	19.5	45.4	21.5	3.8	71.6	44.9	8.7	56.4	156.8
BB07	10/10/94	1625	13.0	98.7	6.76	19.6	42.3	21.3	0.1	70.4	44.1	9.4	58.5	155.1
BB08	3/18/92	1140	5.0	56.2	6.78	17.7	46.2	23.5	22.1	60.1	39.3	7.1	51.5	123.7
BB08	7/18/92	1516	17.5	97.2	6.64	19.5	35.9	21.9	2.1	73.7	47.7	8.9	57.4	156.3
BB08	3/16/93	1300	3.0	45.3	6.68	16.4	40.4	20.5	27.9	56.0	37.5	6.8	47.4	120.3
BB08	8/5/93	1400	16.5	108.7	6.37	19.4	43.9	21.2	4.4	72.1	45.9	8.0	54.6	151.9
BB08	10/10/94	1700	11.0	96.9	6.90	19.8	42.3	22.2	4.9	72.3	46.2	9.9	58.4	152.5
BB09	3/18/92	1210	5.0	53.7	6.81	16.7	40.1	23.1	18.0	55.6	38.4	6.4	44.9	116.4
BB09	7/18/92	1545	17.0	106.5	6.46	18.5	31.3	21.8	0.2	70.1	47.7	8.0	50.9	146.5
BB09	3/16/93	1416	2.0	47.8	6.63	15.4	34.6	19.6	31.4	54.9	38.2	6.4	41.6	112.0
BB09	8/5/93	1619	16.5	105.0	6.36	18.5	40.1	20.8	1.5	68.5	45.8	7.7	51.1	146.6
BB09	10/10/94	1640	11.0	95.3	6.84	19.2	40.6	21.2	0.1	71.0	46.0	8.9	54.5	148.3
BB10	3/18/92	1239	4.0	54.4	6.83	15.5	32.0	22.6	18.5	53.3	39.0	5.9	40.7	114.0
BB10	7/18/92	1616	16.0	95.0	6.74	18.0	26.4	21.6	0.2	69.9	51.4	7.2	47.9	145.5
BB10	3/16/93	1455	3.0	50.3	6.72	14.8	26.3	19.4	31.7	53.7	39.2	6.1	38.0	108.8
BB10	8/5/93	1539	16.5	107.9	6.36	18.8	33.8	23.4	3.1	69.9	48.9	8.1	48.3	143.8
BB10	10/10/94	1615	11.5	95.3	6.89	17.3	28.2	20.4	0.1	65.9	47.8	7.5	44.7	135.9
BB11	3/18/92	1335	2.5	71.9	6.76	18.2	35.0	24.8	24.6	65.5	54.0	5.9	41.2	121.2
BB11	7/18/92	1654	17.0	137.2	6.81	21.6	27.6	22.5	1.0	89.7	70.0	7.2	47.5	155.6
BB11	3/16/93	1548	1.0	75.3	6.70	19.0	31.1	20.8	40.6	71.8	60.2	5.0	39.8	120.0
BB11	8/5/93	1215	17.0	141.9	6.36	21.0	34.5	22.4	0.1	87.9	66.3	7.2	45.8	151.4
BB11	10/10/94	1602	10.5	131.2	6.95	21.5	31.3	22.6	10.0	90.0	70.4	7.1	45.2	140.7
HR01	3/21/92	1845	3.0	73.5	6.85	17.2	44.6	25.7	10.1	56.2	41.9	9.3	59.3	152.5
HR02	3/21/92	0900	5.0	53.3	6.74	15.7	38.5	26.0	14.7	48.4	33.3	8.4	53.0	141.8
HR03	3/21/92	0940	5.0	46.9	6.74	14.8	34.0	24.8	17.2	44.2	31.2	8.6	49.5	134.0
HR04	3/21/92	1005	4.5	53.7	6.75	14.4	29.6	23.9	17.2	41.0	31.7	9.1	51.3	138.0
HR05	3/21/92	1040	4.5	56.2	6.73	14.4	25.7	23.8	18.7	41.0	32.4	9.6	50.3	137.6
HR06	3/21/92	1240	4.0	73.7	6.78	15.7	23.2	21.1	24.2	47.9	39.9	10.2	51.7	138.2
HR07	3/21/92	1315	4.0	69.5	6.84	15.5	25.3	21.5	19.2	47.4	39.2	9.6	51.5	140.9
HR08	3/21/92	1325	3.0	66.1	6.83	14.8	37.2	20.8	4.0	44.3	40.6	8.6	49.2	149.9
HR09	3/21/92	1355	3.0	58.7	6.73	14.4	38.9	22.0	4.2	42.1	38.0	8.1	48.5	146.5
HR10	3/21/92	1420	4.0	71.9	6.86	15.2	30.5	21.7	11.9	45.4	39.7	9.2	50.4	144.9
HR11	3/21/92	1615	2.0	43.8	6.62	18.2	36.6	41.4	30.6	65.1	34.6	9.5	56.9	129.4
HR20	3/21/92	0905	3.0	72.5	6.80	18.0	46.4	25.5	10.8	56.8	43.5	9.0	59.6	155.2
HR21	3/21/92	0925	3.0	71.2	6.83	17.5	45.5	25.0	11.0	55.5	42.3	9.0	58.9	151.7
HR22	3/21/92	0950	3.0	68.7	6.81	17.2	44.8	25.3	11.7	53.8	41.2	8.9	57.1	149.5
HR23	3/21/92	1015	3.0	66.9	6.85	16.5	41.8	24.9	9.7	49.9	39.7	8.9	55.8	149.5

Appendix II Table 3B - Analysis of Synoptic Survey Samples

SITE	DATE	TIME	TEMP	ANC	PH	COND	SO4	CL	NO3	CA	MG	K	NA	SIO2
HR24	3/21/92	1030	4.0	63.7	6.77	21.0	75.3	26.0	22.6	66.1	52.6	7.3	66.2	158.1
HR25	3/21/92	1045	3.0	67.0	6.85	16.0	39.5	25.0	9.1	48.8	38.2	9.0	54.8	148.5
HR26	3/21/92	1105	3.0	64.4	6.81	15.7	39.1	24.8	9.4	48.0	37.8	9.0	54.0	145.6
HR27	3/21/92	1200	3.0	61.9	6.82	15.2	36.5	24.5	9.6	46.5	36.5	9.0	51.8	143.4
HR28	3/21/92	1310	2.5	54.4	6.77	15.7	36.9	29.4	11.3	49.2	33.7	9.2	53.2	140.8
HR29	3/21/92	1320	-9.9	66.2	6.82	15.0	35.9	21.0	7.6	43.7	38.1	9.0	51.2	144.6
HR30	3/21/92	1345	3.0	67.0	6.79	14.8	34.2	20.8	8.1	43.8	38.5	8.9	50.7	145.0
HR31	3/21/92	1610	2.0	45.4	6.62	16.2	35.8	32.5	15.4	53.6	32.0	9.0	55.2	140.6
HR32	3/21/92	1625	2.5	50.4	6.68	15.7	35.4	31.0	12.4	51.4	32.7	9.1	53.8	141.5
HR33	3/21/92	1700	3.0	58.7	6.66	15.7	34.6	29.5	10.5	50.1	34.0	9.4	53.5	142.3
JR01	3/20/92	1015	3.0	113.7	7.23	35.0	134.9	36.5	25.3	120.1	120.3	15.3	62.3	146.7
JR02	3/20/92	1045	4.0	16.2	6.16	28.5	172.7	33.2	0.2	58.1	94.6	41.1	35.6	103.8
JR03	3/20/92	1115	5.5	12.8	5.96	27.5	177.8	31.6	0.2	57.3	90.9	44.0	35.3	102.8
JR04	3/20/92	1145	3.0	114.5	7.23	34.5	134.1	36.8	25.6	120.4	118.7	14.9	62.8	149.2
JR05	3/20/92	1225	4.0	111.2	7.24	33.0	132.7	37.3	29.9	122.0	121.1	13.7	64.1	150.0
JR06	3/20/92	1250	3.5	112.0	6.95	36.0	135.3	37.1	31.1	124.1	122.4	13.9	63.4	149.4
JR11	3/20/92	1012	5.0	126.7	7.01	38.0	124.6	39.8	46.5	136.5	130.4	9.6	68.6	159.1
JR12	3/20/92	1022	5.0	41.1	6.53	22.2	115.4	26.1	4.2	62.4	74.8	17.6	36.5	104.4
JR13	3/20/92	1041	6.0	29.5	6.37	19.5	100.7	25.9	3.8	54.0	62.8	19.1	30.8	94.2
JR14	3/20/92	1048	6.0	31.2	6.30	23.2	116.7	24.1	16.2	69.6	71.4	21.3	33.9	100.1
JR15	3/20/92	1120	6.0	101.9	6.62	36.5	165.0	38.7	18.4	121.2	126.0	18.3	63.6	152.4
JR16	3/20/92	1137	5.0	120.0	7.10	37.0	126.6	38.7	39.2	129.6	125.6	10.5	67.8	157.2
JR17	3/20/92	1151	5.0	121.2	6.98	37.0	133.5	38.4	34.7	128.1	126.3	11.8	66.3	155.4
JR18	3/20/92	1201	6.0	22.8	6.40	21.2	121.4	22.9	6.8	58.1	65.6	27.0	27.5	80.9
JR19	3/20/92	1239	6.0	8.7	6.06	24.5	134.0	24.0	27.4	62.9	74.9	33.0	26.8	75.1
JR20	3/20/92	1253	7.0	12.8	6.20	22.7	134.7	21.8	11.7	52.1	71.9	33.5	27.3	85.4
JR21	3/20/92	9999	-9.9	113.7	6.98	35.5	131.9	37.7	33.8	123.7	121.8	12.8	64.6	149.8
JR75	3/20/92	0945	4.0	220.4	7.29	40.5	64.5	42.0	59.8	197.6	136.9	4.2	60.0	161.1
JR76	3/20/92	1010	4.0	226.7	7.34	42.5	60.0	41.5	64.2	196.8	143.3	4.6	64.1	170.4
JR77	3/20/92	1120	4.5	165.4	7.24	39.5	80.6	41.4	64.3	170.1	127.3	4.9	65.6	161.5
JR78	3/20/92	1055	4.5	176.9	7.25	39.0	74.3	42.7	69.1	175.6	128.6	4.9	64.3	159.7
JR79	3/20/92	1130	4.5	131.2	7.03	40.5	96.6	47.3	97.4	150.1	134.2	8.3	85.7	185.3
JR80	3/20/92	1200	4.5	146.7	7.23	39.5	93.4	43.6	71.0	162.7	128.6	6.1	73.7	170.2
JR81	3/20/92	1250	5.5	146.1	7.14	40.5	107.0	43.0	65.9	160.4	132.3	6.7	75.2	171.4
JR82	3/20/92	1315	5.5	136.1	7.17	37.0	110.2	41.7	62.0	153.4	131.7	7.7	74.0	167.6
JR83	3/20/92	1330	6.0	138.7	7.22	39.0	112.3	41.8	60.8	149.6	131.7	8.2	73.1	166.0
JR84	3/20/92	1355	6.0	134.5	7.23	39.0	117.6	40.5	54.2	144.4	129.0	8.8	71.2	164.0

Appendix II Table 3B - Analysis of Synoptic Survey Samples

SITE	DATE	TIME	TEMP	ANC	PH	COND	SO4	CL	NO3	CA	MG	K	NA	SIO2
JR85	3/20/92	1410	6.0	134.5	7.22	39.0	122.0	40.5	51.0	143.3	130.6	9.3	71.6	165.4
JR86	3/20/92	1415	6.5	38.7	6.64	21.7	87.2	30.2	26.9	68.5	70.1	15.7	38.1	107.4
JR87	3/20/92	1510	6.0	129.4	7.25	37.5	122.9	39.7	46.5	138.4	128.3	9.9	70.6	161.6
MR01	3/12/92	1715	6.0	-1.3	5.44	17.2	93.8	26.1	7.2	28.5	47.6	28.8	21.9	75.3
MR01	7/23/92	1810	17.5	-0.7	5.39	16.2	78.5	23.7	7.4	24.7	41.0	28.4	21.6	89.1
MR01	3/19/93	1345	4.5	-4.7	5.16	20.1	103.0	23.3	13.7	30.2	49.7	28.8	20.9	76.1
MR01	8/28/93	1620	20.5	-0.5	5.44	15.3	69.9	23.7	7.9	19.0	32.1	28.0	22.4	115.5
MR02	3/12/92	1040	7.0	-0.6	5.53	16.0	67.2	24.7	20.2	22.2	41.8	31.6	21.1	70.9
MR02	7/23/92	1625	18.0	-1.3	5.32	15.8	61.6	24.9	13.2	19.8	36.0	32.4	22.1	89.0
MR02	3/19/93	1144	5.0	-0.6	5.37	17.1	71.6	23.5	23.8	24.5	41.9	32.8	19.4	70.2
MR02	8/28/93	1250	20.0	2.8	5.42	15.4	57.4	25.2	15.8	16.9	32.4	30.4	22.4	105.5
MR02	11/1/94	1150	12.0	7.8	5.51	14.6	57.7	29.0	1.6	16.7	31.0	38.6	21.1	90.6
MR03	3/12/92	1100	9.0	1.9	5.71	19.2	78.1	24.2	31.4	34.3	48.1	40.6	20.4	68.3
MR03	7/23/92	1616	17.0	17.8	5.66	17.5	74.2	22.8	18.8	32.8	44.6	44.5	20.6	81.2
MR03	3/19/93	1155	6.0	4.4	5.53	19.9	82.2	23.4	29.8	35.5	47.2	41.6	19.9	72.4
MR03	8/28/93	1230	19.5	6.1	5.72	19.7	68.7	23.7	28.2	33.3	44.6	46.5	21.0	100.0
MR03	11/1/94	1133	12.0	15.3	5.59	20.0	74.3	29.2	6.3	35.2	46.2	48.7	22.0	87.4
MR04	3/12/92	1115	8.0	-0.6	5.63	17.7	73.5	25.3	23.0	26.9	44.4	35.0	21.0	69.1
MR04	7/23/92	1637	18.0	9.4	5.27	15.6	66.8	25.6	10.4	24.1	39.1	36.1	21.4	85.4
MR04	3/19/93	1206	5.5	-2.2	5.44	18.3	75.7	23.1	27.3	28.7	43.9	36.5	19.5	71.1
MR04	8/28/93	1215	20.0	3.6	5.61	16.1	61.4	24.5	13.5	20.1	34.6	34.9	21.9	103.8
MR04	11/1/94	1215	12.0	11.9	5.67	15.0	62.2	28.1	3.2	20.8	34.2	40.3	20.7	90.0
MR05	3/12/92	1130	6.0	2.8	5.61	16.7	74.4	23.9	17.3	24.3	42.3	33.3	20.8	67.1
MR05	7/23/92	1531	18.0	7.8	5.20	15.6	70.5	24.0	11.6	24.3	40.7	35.5	21.9	87.2
MR05	3/19/93	1125	4.5	0.3	5.42	17.8	75.5	23.0	23.6	27.2	43.5	34.6	19.7	71.7
MR05	8/28/93	1145	19.0	3.7	5.56	17.0	66.5	24.5	17.0	21.6	36.5	34.5	22.2	106.8
MR06	3/12/92	1210	6.0	-0.6	5.46	17.0	80.8	24.3	14.6	24.9	44.3	31.1	21.1	68.5
MR06	7/23/92	1515	18.0	-3.1	5.20	16.7	72.9	24.4	12.7	23.2	40.5	33.0	21.7	88.8
MR06	3/19/93	1052	2.5	-3.1	5.26	18.7	84.8	22.8	21.3	26.9	45.3	31.8	20.0	72.5
MR06	8/28/93	1405	20.0	-5.6	5.43	15.5	60.1	23.9	13.2	17.6	30.4	30.6	21.9	109.3
MR06	11/1/94	1307	12.0	4.4	5.61	14.6	67.2	27.2	0.1	18.8	32.0	37.6	20.9	87.4
MR07	3/12/92	1225	7.0	-18.1	4.77	22.0	111.1	26.7	0.3	20.8	40.3	10.2	20.8	75.0
MR07	7/23/92	1455	16.0	-16.3	4.79	18.1	87.2	24.5	0.2	16.6	33.5	11.2	21.8	96.3
MR07	3/19/93	1041	4.0	-15.6	4.77	22.5	117.1	21.4	0.3	20.2	39.0	11.5	18.3	68.0
MR07	8/28/93	1045	17.0	-6.3	5.08	12.7	49.9	22.1	0.1	11.0	19.8	11.0	20.1	117.8
MR07	11/1/94	1322	12.0	-9.7	4.98	15.1	68.1	25.4	0.1	15.3	26.6	20.8	19.1	97.1
MR08	3/12/92	1300	5.0	-7.5	5.18	18.2	88.5	25.0	10.8	23.9	43.3	26.3	20.9	69.6

Appendix II Table 3B - Analysis of Synoptic Survey Samples

SITE	DATE	TIME	TEMP	ANC	PH	COND	SO4	CL	NO3	CA	MG	K	NA	SIO2
MR08	7/23/92	1446	17.0	-11.3	5.00	19.1	78.7	25.0	8.0	21.0	38.3	25.6	21.6	92.5
MR08	3/19/93	1242	4.0	-5.6	5.07	19.5	92.8	22.1	15.8	25.6	43.8	26.6	19.4	71.4
MR08	8/28/93	1420	19.5	-3.8	5.44	14.4	57.3	23.4	8.3	16.1	26.7	25.3	21.4	112.3
MR08	11/1/94	1330	11.5	0.3	5.42	14.4	67.3	26.0	0.1	18.0	30.5	32.8	20.1	91.7
MR09	3/12/92	1325	6.0	-3.1	5.28	17.7	88.2	25.8	10.0	26.1	45.2	25.7	21.1	72.8
MR09	7/23/92	1415	17.5	-4.7	5.11	17.4	77.5	25.9	8.3	23.0	39.3	25.0	22.3	97.7
MR09	3/19/93	1257	4.5	-5.6	5.10	19.6	96.3	23.2	15.2	28.2	46.7	25.8	20.1	73.5
MR09	8/28/93	1445	20.0	-0.6	5.54	14.1	56.0	23.1	8.0	16.8	26.7	25.1	21.5	117.7
MR09	11/1/94	9999	12.5	5.3	5.66	13.2	61.2	24.8	0.2	17.7	28.4	34.1	19.7	98.2
MR10	3/12/92	1335	5.0	-3.1	5.39	20.2	102.5	26.6	7.9	28.8	51.2	35.4	23.0	80.3
MR10	7/23/92	1407	17.0	-5.6	5.14	19.6	84.7	26.5	10.8	24.0	43.0	39.4	23.5	97.7
MR10	3/19/93	1307	3.5	-5.6	5.21	21.2	107.3	24.6	18.0	31.7	53.5	35.7	21.9	77.9
MR10	8/28/93	1450	19.5	-3.8	5.34	18.5	76.8	25.3	11.4	20.6	36.6	36.9	23.5	111.4
MR10	11/1/94	9999	11.5	-1.3	5.35	17.2	80.3	29.2	2.1	20.6	38.0	43.0	20.6	86.6
MR11	3/12/92	1345	6.0	-3.1	5.31	18.0	92.4	26.5	9.6	27.4	46.9	27.8	21.8	74.2
MR11	7/23/92	1042	17.0	-3.8	5.13	17.2	80.4	26.3	8.4	24.4	40.9	27.1	22.4	97.8
MR11	3/19/93	1600	5.0	-7.2	5.11	20.1	99.9	23.8	15.6	29.1	48.0	28.0	20.4	74.4
MR11	8/28/93	1540	20.0	-3.8	5.38	15.3	61.9	23.6	8.2	18.3	29.3	26.7	22.0	115.6
MR11	11/1/94	9999	13.5	3.7	5.56	14.2	64.9	25.5	0.2	17.2	29.1	36.1	19.8	96.8
MR12	3/12/92	1400	6.0	6.2	5.86	18.0	98.8	24.3	5.2	31.8	49.5	34.1	22.3	77.7
MR12	7/23/92	1035	17.0	18.6	5.43	16.6	77.3	23.0	7.3	30.4	46.1	38.8	22.4	102.6
MR12	3/19/93	1545	4.5	1.9	5.48	19.4	102.3	21.9	10.4	32.0	49.1	34.5	21.3	79.6
MR12	8/28/93	1530	20.0	18.7	5.78	15.6	59.7	21.2	3.8	21.2	33.6	34.9	21.4	121.9
MR12	11/1/94	9999	13.0	16.9	5.89	15.4	68.0	25.7	0.1	24.1	38.5	39.9	19.7	94.8
MR13	3/12/92	1440	6.0	-0.6	5.46	19.7	100.2	26.3	9.5	28.0	49.3	38.1	22.7	80.9
MR13	7/23/92	1242	17.0	11.2	5.09	17.7	80.4	25.5	14.9	26.8	45.8	43.3	23.5	99.0
MR13	3/19/93	1140	4.5	-3.8	5.34	21.0	101.8	24.8	21.7	31.9	52.4	39.3	21.8	78.0
MR13	8/28/93	0950	17.0	4.4	5.49	19.5	73.0	24.7	19.3	23.7	41.4	42.0	23.7	116.2
MR13	11/1/94	9999	12.0	5.3	5.49	18.6	76.8	29.4	18.6	27.9	48.0	40.3	23.3	94.4
MR14	3/12/92	1500	7.5	3.7	5.73	17.2	95.9	27.1	18.3	31.1	51.2	43.2	22.8	80.5
MR14	7/23/92	1220	14.0	24.4	5.66	16.5	75.4	24.3	3.5	28.7	42.6	41.6	22.5	91.8
MR14	3/19/93	1300	6.0	2.8	5.57	21.7	95.1	27.5	26.7	32.0	55.6	46.0	22.4	78.8
MR14	8/28/93	0925	17.0	23.7	5.70	19.5	63.8	24.5	25.7	30.3	44.3	41.3	22.8	102.7
MR14	11/1/94	9999	12.0	15.3	5.70	19.9	76.8	30.4	13.6	34.7	50.5	49.7	23.0	93.6
MR15	3/12/92	1545	6.0	6.9	5.86	19.0	96.1	24.4	12.7	33.7	48.1	43.3	22.1	80.7
MR15	7/23/92	1130	15.5	29.4	5.78	17.8	84.3	22.6	1.9	33.7	46.3	44.8	21.8	92.4
MR15	3/19/93	1430	6.5	6.2	5.65	20.1	93.8	24.8	12.3	35.2	48.7	45.0	22.3	78.4

Appendix II Table 3B - Analysis of Synoptic Survey Samples

SITE	DATE	TIME	TEMP	ANC	PH	COND	SO4	CL	NO3	CA	MG	K	NA	SIO2
MR15	8/28/93	0850	18.0	30.3	5.86	22.0	87.8	23.5	18.6	39.0	52.0	47.4	23.1	108.9
MR15	11/1/94	9999	12.0	15.3	5.63	20.5	93.4	31.1	0.1	35.9	50.9	49.1	23.8	91.7
MR16	3/12/92	1615	6.0	7.8	5.54	19.2	103.9	24.6	7.1	33.6	49.9	39.3	22.8	80.7
MR16	7/23/92	1104	17.0	26.2	5.66	18.1	83.1	23.3	10.6	35.3	50.0	41.7	22.2	97.0
MR16	3/19/93	1620	5.5	1.9	5.53	20.1	104.4	23.7	13.2	34.0	49.9	40.8	22.2	80.0
MR16	8/28/93	0820	17.5	41.9	5.85	16.9	53.9	20.0	2.9	33.3	47.3	27.4	19.8	113.9
MR16	11/1/94	9999	13.0	17.8	5.92	16.9	75.8	27.0	0.1	30.6	47.2	39.1	20.6	93.9
MR17	3/12/92	1640	6.0	-0.6	5.59	19.0	95.2	25.8	6.8	29.6	48.3	30.7	22.0	75.5
MR17	7/23/92	1022	17.0	-1.4	5.26	16.6	78.6	25.3	7.4	25.5	41.2	28.8	22.4	97.6
MR17	3/19/93	1615	5.0	-4.7	5.24	19.4	100.9	23.7	13.3	30.2	48.7	30.9	20.8	76.7
MR17	8/28/93	1510	20.0	-1.3	5.51	15.1	62.0	23.4	7.7	19.1	30.3	27.8	21.8	116.7
MR17	11/1/94	9999	13.0	7.8	5.69	14.0	64.1	25.3	0.1	18.1	30.2	37.6	19.2	96.9
MR18	3/12/92	1705	6.0	-1.3	5.48	17.7	93.5	26.1	7.2	28.2	47.6	29.3	22.1	74.4
MR18	7/23/92	1007	17.0	-0.6	5.26	17.0	80.2	25.6	7.7	26.9	43.1	29.3	22.9	97.9
MR18	3/19/93	1330	4.5	-7.2	5.17	20.0	101.7	23.6	14.7	30.5	49.8	29.1	20.7	75.5
MR18	8/28/93	1555	20.5	-3.1	5.51	15.8	66.7	24.4	7.8	20.8	32.8	29.0	22.5	116.3
MR18	11/1/94	9999	12.0	7.8	5.71	13.8	64.6	24.0	0.1	18.5	29.9	35.9	19.3	96.9
NF01	7/6/92	0958	15.0	77.0	6.66	26.1	97.2	32.0	16.4	92.1	52.1	10.4	75.5	176.8
NF01	8/26/93	0859	19.0	96.9	6.21	30.9	92.6	32.0	36.4	104.1	58.1	12.7	85.4	196.9
NF01	4/23/94	0949	7.0	40.4	6.53	23.3	109.1	26.6	28.0	83.1	46.8	8.9	66.8	146.1
NF01	10/31/94	1545	13.0	82.8	6.62	27.0	96.4	32.0	19.3	97.2	55.5	11.3	79.3	176.0
NF02	7/6/92	1030	14.0	67.5	6.60	26.0	100.1	32.5	16.0	90.7	51.0	9.8	71.0	162.9
NF02	8/26/93	1324	19.5	98.7	6.27	30.8	92.4	32.1	32.8	103.5	57.3	12.3	84.6	196.7
NF02	4/23/94	1026	7.0	32.8	6.45	23.5	112.2	27.0	35.2	84.7	46.6	8.6	62.9	132.5
NF02	10/31/94	1710	11.0	66.8	6.41	27.0	100.6	33.0	24.8	99.2	55.9	10.5	74.6	162.7
NF03	7/6/92	1105	14.0	60.3	6.53	24.2	95.2	34.9	14.8	82.8	49.7	9.0	69.3	157.1
NF03	8/26/93	1029	18.0	76.2	5.98	29.2	92.4	34.4	32.1	95.8	56.3	9.5	75.4	171.4
NF03	4/23/94	1053	7.0	28.7	6.49	22.8	105.9	28.8	16.4	79.9	46.8	8.4	62.1	129.4
NF03	10/31/94	1636	11.5	50.3	6.48	25.9	97.8	34.7	30.9	90.2	53.3	9.2	72.6	154.7
NF04	7/6/92	1130	13.0	55.3	6.70	24.5	97.6	36.2	16.9	86.4	50.4	8.8	67.0	145.6
NF04	8/26/93	1054	17.0	67.8	6.40	28.0	93.2	34.8	34.4	94.5	54.3	8.2	73.1	161.2
NF04	4/23/94	1114	7.0	26.1	6.46	23.5	111.9	29.6	35.6	83.7	48.3	8.3	60.0	121.2
NF04	10/31/94	1651	11.5	45.3	6.53	26.0	102.1	35.9	34.6	92.0	53.4	8.5	70.3	144.7
NF05	7/6/92	1200	13.0	55.3	6.47	24.0	93.5	38.0	15.8	82.4	50.2	8.2	66.4	145.6
NF05	8/26/93	1127	16.0	61.2	6.37	27.0	88.4	37.1	28.2	88.0	52.7	7.7	71.3	156.2
NF05	4/23/94	1201	7.0	26.2	6.42	22.8	100.2	29.9	31.5	79.9	48.4	8.1	59.7	121.8
NF05	10/31/94	1655	10.5	32.8	6.15	24.8	97.2	36.0	32.5	84.3	51.8	7.3	70.1	144.7

Appendix II Table 3B - Analysis of Synoptic Survey Samples

SITE	DATE	TIME	TEMP	ANC	PH	COND	SO4	CL	NO3	CA	MG	K	NA	SIO2
NF06	7/6/92	1232	13.0	41.2	6.50	22.5	89.8	38.9	16.4	74.7	43.2	8.4	64.3	139.0
NF06	8/26/93	1154	16.0	51.2	6.09	25.5	85.1	35.4	25.8	78.9	45.0	7.7	68.7	147.6
NF06	4/23/94	1142	6.5	23.7	6.36	22.6	94.7	30.5	34.1	79.7	46.1	8.5	59.0	118.8
NF06	10/31/94	1625	10.0	27.8	6.31	24.0	94.6	36.9	34.2	83.4	48.4	7.6	68.8	140.9
NF07	7/6/92	1242	13.0	32.8	6.25	20.4	72.1	48.1	14.2	59.9	33.1	9.8	65.6	131.6
NF07	8/26/93	1207	16.0	26.9	6.19	22.5	69.2	44.0	28.9	65.0	36.0	8.7	68.3	141.7
NF07	4/23/94	1024	7.0	16.9	6.14	20.4	70.6	42.0	34.7	62.4	34.5	10.8	60.9	112.9
NF07	10/31/94	1610	10.0	20.3	6.16	21.6	68.0	50.0	34.7	65.3	37.5	8.9	70.9	132.7
NF08	7/6/92	1316	10.0	31.2	6.54	19.7	68.5	48.4	2.2	55.7	32.6	10.1	66.4	129.0
NF08	10/31/94	1551	10.5	20.3	6.30	21.3	65.4	51.6	31.6	65.1	38.1	10.3	72.6	134.3
NF09	7/6/92	1348	11.0	60.3	6.61	26.1	115.0	24.9	21.1	99.3	60.2	5.3	61.7	150.1
NF09	8/26/93	1241	15.0	78.7	6.45	30.4	116.2	20.6	19.5	100.6	62.9	6.0	69.1	157.5
NF09	4/23/94	1015	5.0	33.7	6.46	25.7	119.8	19.1	40.8	97.4	59.0	5.9	56.6	125.5
NF10	7/6/92	1402	11.0	53.7	6.69	26.6	114.7	27.0	16.5	95.1	57.7	5.0	59.3	150.6
NF10	4/23/94	1000	5.0	30.3	6.43	25.8	117.8	20.2	44.8	98.6	59.3	4.7	54.4	123.7
PI01	3/17/92	1115	5.0	130.6	7.14	32.5	71.0	32.5	57.4	120.1	103.6	5.4	68.3	178.8
PI01	8/6/92	1030	16.0	281.7	6.80	38.4	51.7	25.9	4.2	159.5	130.0	7.3	88.9	261.9
PI01	4/9/93	1815	9.0	166.9	6.97	31.9	59.7	28.7	44.8	126.2	108.3	6.9	71.9	204.2
PI01	8/24/93	1105	19.0	347.3	7.11	43.6	46.3	29.6	3.6	177.9	143.6	8.5	108.0	294.1
PI01	4/16/94	1535	12.5	174.1	7.12	32.5	78.6	26.0	10.6	130.5	107.6	6.9	73.4	202.6
PI01	10/28/94	1105	8.5	262.8	7.10	35.8	51.8	32.0	0.1	147.2	121.9	7.2	81.5	231.2
PI02	3/17/92	1135	5.0	130.4	7.06	24.6	58.9	34.0	2.1	81.4	59.8	10.0	87.9	280.3
PI02	8/6/92	1100	16.0	201.7	6.66	29.8	30.0	32.0	0.2	107.1	73.2	11.0	100.1	343.9
PI02	4/9/93	1220	8.5	132.9	6.79	22.1	33.5	32.1	0.2	74.5	54.4	9.7	82.1	264.1
PI02	4/16/94	1040	11.5	133.2	6.90	22.2	47.8	28.6	0.1	79.2	54.6	10.3	82.3	249.1
PI02	10/28/94	1145	9.0	201.2	7.04	27.7	27.1	36.1	0.1	96.5	68.1	11.9	101.6	330.8
PI03	3/17/92	1145	5.5	129.5	7.14	32.4	70.9	32.5	60.4	120.8	103.9	5.4	67.8	181.5
PI03	8/6/92	1045	16.0	276.7	6.86	39.0	53.4	26.0	6.7	159.9	131.4	7.4	88.0	264.9
PI03	4/9/93	1208	8.0	166.2	6.98	32.3	60.2	28.8	49.3	126.5	109.5	6.5	71.2	202.2
PI03	8/24/93	1125	18.5	343.5	7.20	44.5	49.0	30.2	9.3	179.1	145.3	8.7	108.7	299.0
PI03	4/16/94	1034	11.0	178.7	7.05	32.8	76.5	25.5	0.2	133.2	110.4	6.6	72.5	200.8
PI03	10/28/94	1130	9.5	256.9	7.19	35.0	53.1	32.6	0.1	148.0	123.9	6.5	80.7	226.4
PI04	3/17/92	1155	5.0	127.5	7.14	32.5	72.2	32.7	63.3	122.7	106.2	5.2	67.4	175.1
PI04	8/6/92	1115	16.0	273.0	6.90	40.1	57.0	26.1	8.6	166.7	138.1	6.8	86.9	254.6
PI04	4/9/93	1230	8.5	164.4	6.94	33.9	62.7	28.5	53.3	131.3	114.2	6.2	69.9	196.9
PI04	8/24/93	1140	18.0	361.7	6.80	47.3	53.9	29.5	5.9	183.9	153.7	8.7	107.5	288.9
PI04	4/16/94	1046	11.0	181.9	7.07	33.5	79.8	25.1	0.3	137.8	114.6	6.3	71.6	195.9

Appendix II Table 3B - Analysis of Synoptic Survey Samples

SITE	DATE	TIME	TEMP	ANC	PH	COND	SO4	CL	NO3	CA	MG	K	NA	SIO2
PI04	10/28/94	1155	10.0	261.9	7.18	36.0	55.5	31.6	0.1	151.5	128.7	6.1	77.9	218.5
PI05	3/17/92	1220	6.0	128.7	7.10	33.5	71.6	32.9	65.7	123.1	107.2	5.2	67.7	174.1
PI05	8/6/92	1135	16.0	283.5	6.68	40.6	57.7	24.5	6.8	172.7	141.0	6.6	84.8	250.9
PI05	4/9/93	1245	9.0	166.2	6.93	33.8	62.6	28.3	55.9	133.5	117.0	6.1	68.9	193.2
PI05	4/16/94	1057	11.0	175.0	6.99	33.9	80.9	25.1	0.8	136.9	114.4	6.0	71.5	194.3
PI05	10/28/94	1205	11.5	254.4	6.92	35.5	55.8	31.6	0.1	149.6	128.0	5.4	76.2	212.5
PI06	3/17/92	1255	5.0	115.8	7.03	32.0	64.6	32.0	78.9	119.3	103.1	5.1	65.6	166.5
PI06	8/6/92	1200	16.0	254.4	6.74	37.2	54.4	24.3	13.5	154.5	126.6	6.9	78.5	221.5
PI06	4/9/93	1312	8.5	136.2	6.89	31.9	56.2	26.8	68.2	125.4	107.8	6.0	65.6	176.5
PI06	8/24/93	1210	18.0	326.7	7.14	45.9	60.9	28.0	22.7	189.6	160.9	7.5	90.0	240.9
PI06	4/16/94	1125	11.0	152.5	6.98	32.1	79.4	23.6	23.9	127.9	106.0	5.8	66.7	177.8
PI06	10/28/94	1235	11.5	216.1	6.92	32.9	54.3	31.9	0.1	139.0	118.1	5.8	70.0	187.0
PI07	3/17/92	1355	6.0	115.0	7.09	31.1	57.8	31.5	81.4	117.2	100.4	5.2	66.5	165.6
PI07	8/6/92	1220	16.0	211.1	6.59	33.8	48.4	25.5	20.4	137.0	110.2	6.3	73.2	208.8
PI07	4/9/93	1412	8.0	129.4	6.90	30.9	51.7	26.3	73.4	119.3	102.8	6.0	64.3	172.6
PI07	8/24/93	1600	19.0	344.2	7.22	46.0	46.8	38.1	10.8	177.4	144.9	10.9	119.6	302.8
PI07	4/16/94	1145	11.0	132.9	6.97	30.9	74.7	22.8	25.0	122.1	101.3	5.8	64.6	169.7
PI07	10/28/94	1255	9.5	205.0	6.83	32.0	50.5	32.6	0.1	136.6	112.3	6.0	68.9	183.4
PI08	3/17/92	1425	-9.9	105.7	7.08	29.9	54.7	31.2	79.0	114.4	96.0	5.2	65.9	164.6
PI08	8/6/92	1245	15.5	206.1	6.60	33.0	45.9	26.6	19.9	137.5	108.2	6.4	71.9	205.7
PI08	4/9/93	1447	8.0	123.7	6.90	29.9	49.2	26.3	71.0	117.5	98.5	5.9	63.4	169.0
PI08	8/24/93	1530	19.0	277.9	7.19	42.1	48.0	36.4	30.3	165.9	133.3	9.3	94.7	230.0
PI08	4/16/94	1222	10.5	137.9	6.80	30.1	71.6	23.1	21.9	121.0	97.9	5.9	64.5	178.3
PI08	10/28/94	1320	8.0	210.4	6.95	32.5	49.5	31.4	2.9	139.7	115.2	6.7	69.7	185.4
PI09	3/17/92	1520	5.0	92.2	7.03	26.9	51.8	30.5	62.9	101.2	82.3	4.8	59.6	152.2
PI09	8/6/92	1345	16.0	169.4	6.93	28.8	44.5	27.5	18.6	115.8	88.6	6.1	65.5	187.1
PI09	4/9/93	1537	7.5	105.4	6.94	27.0	47.2	25.9	65.6	105.4	86.9	5.6	58.2	153.6
PI09	8/24/93	1730	20.0	219.4	7.32	34.7	47.0	27.7	25.9	138.2	107.4	7.6	74.6	207.4
PI09	4/16/94	1300	11.0	111.2	7.01	26.0	69.2	21.8	7.9	105.8	83.5	5.2	56.3	150.5
PI09	10/28/94	1500	9.0	164.2	6.82	28.1	48.7	31.3	7.0	117.9	95.5	6.2	62.5	177.4
PI20	3/17/92	0935	8.0	47.8	6.04	12.2	13.4	21.8	25.3	34.2	19.4	7.5	46.2	111.8
PI20	8/6/92	1736	8.5	46.8	6.05	12.1	12.7	22.1	19.7	32.9	17.7	7.1	45.3	110.8
PI20	4/9/93	1017	9.0	46.8	6.07	11.6	12.6	21.3	9.4	31.0	18.0	7.4	44.0	110.2
PI20	8/24/93	0930	14.0	49.4	6.02	14.0	13.9	22.7	16.5	38.2	19.4	7.1	45.5	111.2
PI20	4/16/94	0850	8.5	43.7	5.99	11.5	15.9	20.6	8.0	32.4	17.6	7.0	44.1	107.8
PI20	10/28/94	0930	9.5	45.0	6.23	11.6	15.1	20.3	14.8	33.6	18.8	7.1	44.0	109.9
PI21	3/17/92	1010	8.5	41.1	6.15	21.5	14.4	58.4	68.8	78.4	44.9	11.1	57.1	103.2

Appendix II Table 3B - Analysis of Synoptic Survey Samples

SITE	DATE	TIME	TEMP	ANC	PH	COND	SO4	CL	NO3	CA	MG	K	NA	SIO2
PI21	4/9/93	1045	8.5	46.8	6.08	19.4	15.6	43.0	60.3	66.2	38.8	10.3	52.2	97.6
PI21	4/16/94	0855	9.0	48.7	5.97	19.0	18.5	39.0	51.3	67.1	38.2	10.1	53.7	98.3
PI22	3/17/92	1050	6.0	22.5	6.43	16.8	30.2	32.4	51.7	52.6	32.3	8.2	54.3	103.8
PI22	8/6/92	1642	14.5	59.3	6.60	16.6	30.7	31.7	18.4	53.9	30.1	7.3	57.4	126.6
PI22	4/9/93	1125	7.0	29.4	6.15	15.3	34.4	26.0	29.4	46.9	29.6	7.9	47.5	103.9
PI22	8/24/93	1115	16.0	76.2	6.57	16.8	25.5	29.5	9.3	51.9	30.5	8.1	60.3	146.1
PI22	4/16/94	0930	10.0	31.9	6.30	14.6	39.6	23.7	5.1	49.0	28.5	7.8	49.4	100.4
PI22	10/28/94	1040	7.5	62.5	6.51	15.8	32.6	29.7	11.0	52.6	31.6	8.4	57.3	129.0
PI23	3/17/92	1125	2.0	22.0	6.25	11.9	36.0	26.8	9.9	32.6	20.8	6.1	43.7	92.9
PI23	8/6/92	1800	15.0	46.2	6.45	13.7	35.5	26.6	0.2	44.1	26.1	6.6	47.4	124.8
PI23	4/9/93	1210	6.5	33.7	6.42	12.2	32.0	24.9	10.4	37.5	23.5	6.9	42.5	93.6
PI23	4/16/94	1120	11.0	43.7	6.37	13.0	43.1	20.6	0.2	45.1	25.5	6.9	44.7	92.0
PI23	10/28/94	1210	8.0	69.3	6.53	15.3	28.0	34.2	0.2	52.4	36.4	8.9	49.2	134.0
PI24	3/17/92	1205	5.0	24.4	6.30	12.3	36.4	27.7	8.2	35.3	21.7	6.4	43.4	95.5
PI24	4/9/93	1300	7.0	34.4	6.30	12.0	29.5	25.4	9.6	35.9	23.3	7.6	43.2	93.3
PI24	8/24/93	1315	19.0	100.0	6.79	15.9	11.0	26.9	4.2	56.8	34.6	9.0	53.2	146.8
PI24	4/16/94	1050	11.0	35.3	6.27	12.3	40.4	21.2	0.2	38.3	22.8	7.4	46.2	92.9
PI24	10/28/94	1300	8.0	63.7	6.67	15.7	31.4	35.2	0.1	54.4	37.9	9.8	49.7	131.5
PI25	3/17/92	1320	5.0	82.8	6.85	19.8	46.1	27.5	25.0	74.3	57.9	5.2	51.0	142.9
PI25	8/6/92	1600	15.0	143.7	6.94	23.5	41.1	24.8	4.0	98.4	72.5	4.9	56.1	184.3
PI25	4/9/93	1400	7.0	99.3	6.83	20.7	35.7	24.3	36.7	81.1	64.9	6.1	51.8	150.4
PI25	4/16/94	1245	11.0	96.2	6.77	19.6	47.3	21.1	9.5	81.0	62.0	5.6	51.5	147.2
PI25	10/28/94	1325	10.0	105.3	6.59	21.2	48.7	32.0	1.1	83.9	64.0	4.8	52.8	156.0
PI26	3/17/92	1335	7.0	58.7	6.80	21.5	50.8	30.7	44.7	74.5	59.2	5.3	52.4	121.2
PI26	8/6/92	1523	15.0	101.2	6.39	20.4	39.7	28.2	9.8	74.4	53.2	6.0	58.6	152.5
PI26	4/9/93	1340	7.0	58.7	6.72	19.0	51.9	25.0	33.2	69.2	53.9	5.9	49.0	122.3
PI26	8/24/93	1430	20.0	122.0	6.85	22.4	38.5	27.0	10.1	79.1	57.6	7.8	66.3	176.3
PI26	4/16/94	1010	9.5	66.2	6.76	21.2	84.6	19.0	12.9	82.8	63.6	5.2	47.6	119.1
PI26	10/28/94	1125	8.0	106.2	6.78	20.3	45.6	27.2	1.2	77.2	60.2	6.8	57.2	148.9
PI27	3/17/92	1335	7.0	58.7	6.82	19.7	52.2	29.6	34.0	70.3	55.3	5.0	50.0	123.8
PI27	8/6/92	1540	15.5	111.2	6.64	21.5	42.5	27.4	7.3	81.8	59.2	5.9	58.6	160.5
PI27	4/9/93	1420	7.0	64.3	6.78	19.0	48.5	24.5	32.4	68.9	53.9	5.9	48.5	125.3
PI27	8/24/93	1445	20.0	134.5	7.02	23.5	40.4	26.5	9.5	86.1	64.3	7.5	65.6	175.0
PI27	4/16/94	1300	11.0	71.2	6.77	20.1	74.4	19.8	0.2	79.1	59.8	5.6	49.6	126.0
PI27	10/28/94	1340	10.0	113.7	6.74	21.0	47.2	28.8	0.1	82.7	64.6	6.3	55.3	152.7
PI28	3/17/92	1505	6.0	80.4	6.92	23.5	53.4	29.6	48.6	88.5	71.5	4.7	53.9	139.3
PI28	8/6/92	1425	15.0	138.7	6.48	24.5	43.5	26.7	9.8	98.8	73.7	5.9	60.6	173.6

Appendix II Table 3B - Analysis of Synoptic Survey Samples

SITE	DATE	TIME	TEMP	ANC	PH	COND	SO4	CL	NO3	CA	MG	K	NA	SIO2
PI28	4/9/93	1500	7.0	91.8	6.91	22.8	49.1	24.2	45.4	88.5	71.0	5.6	52.5	142.4
PI28	8/24/93	1545	19.0	176.7	7.16	30.0	43.5	26.4	21.7	117.4	91.4	7.5	68.4	195.7
PI28	4/16/94	1340	11.0	93.7	6.87	22.7	73.8	20.4	15.8	91.9	72.2	5.0	51.4	139.4
PI28	10/28/94	1415	10.0	141.2	6.94	24.5	49.5	29.2	6.5	101.4	81.6	6.1	58.2	164.9
PI29	3/17/92	1530	4.5	134.4	7.03	37.0	51.8	38.9	107.6	150.2	122.1	5.6	64.1	157.3
PI29	8/6/92	1439	15.5	318.6	7.00	44.0	40.4	35.8	27.7	204.8	153.2	5.2	76.8	211.9
PI29	4/9/93	1520	7.5	154.4	7.04	38.1	38.5	34.0	119.9	160.8	130.5	6.6	63.5	159.5
PI29	4/16/94	1350	12.0	165.4	7.09	34.3	63.3	28.6	30.9	153.0	118.6	6.6	64.7	166.8
PI29	10/28/94	1430	10.5	239.2	6.88	39.0	45.8	47.7	24.6	179.7	143.2	5.6	64.0	182.0
PR01	3/8/92	1930	11.0	2.8	5.69	22.3	105.6	27.7	30.7	34.0	61.6	49.2	24.8	85.0
PR01	7/29/92	1200	19.0	2.4	5.91	24.0	93.8	28.6	48.1	36.4	63.2	56.4	25.5	97.1
PR01	10/18/92	1600	11.0	6.2	5.89	20.7	100.1	27.0	21.1	30.9	54.5	46.5	24.5	101.7
PR01	3/27/93	1345	8.5	-0.5	5.48	21.4	104.3	21.8	30.9	32.7	56.3	44.0	21.6	76.0
PR01	8/22/93	0930	18.5	8.7	6.11	20.1	99.7	25.5	21.2	25.8	52.0	52.8	26.3	118.6
PR01	4/9/94	1113	11.0	2.8	5.64	21.0	110.6	22.6	17.3	31.0	54.9	44.6	21.6	72.4
PR01	10/6/94	9999	11.0	12.8	6.09	20.0	111.3	21.9	4.9	28.6	55.2	48.5	23.1	108.6
PR02	3/8/92	1900	9.5	3.7	5.72	21.9	104.8	27.6	28.3	32.8	61.0	49.3	24.7	86.4
PR02	7/29/92	1215	19.0	10.3	5.80	23.0	93.6	28.0	46.8	36.1	63.3	56.4	25.3	98.1
PR02	10/18/92	0855	9.5	6.9	5.85	20.9	98.8	27.0	24.2	30.7	55.8	46.5	24.4	102.1
PR02	3/27/93	1004	7.0	0.3	5.60	21.2	101.6	23.6	29.2	30.4	57.1	44.9	22.5	80.5
PR02	8/22/93	0935	19.5	12.8	6.01	20.5	100.8	24.8	21.8	26.3	53.2	54.1	25.5	119.5
PR02	4/9/94	1149	10.5	2.8	5.68	20.5	110.2	24.4	18.4	31.3	55.0	44.9	21.2	72.6
PR02	10/6/94	9999	12.0	12.0	6.01	20.0	113.2	21.3	5.2	29.0	56.9	49.1	22.6	108.7
PR03	3/8/92	1810	11.0	1.9	5.66	22.9	105.0	27.7	35.0	36.6	63.3	50.2	24.9	82.9
PR03	7/29/92	1330	19.0	3.7	5.75	24.0	94.1	28.5	53.5	38.1	64.5	57.4	25.4	96.1
PR03	10/18/92	0945	9.5	5.3	5.86	21.4	100.8	27.0	28.0	32.7	57.7	46.2	24.4	99.1
PR03	3/27/93	1045	8.0	-1.3	5.48	21.7	101.5	23.0	36.2	34.7	57.2	44.2	21.8	74.9
PR03	8/22/93	0955	18.0	7.0	5.42	23.4	106.6	30.2	25.3	28.7	53.8	56.4	32.9	112.9
PR03	4/9/94	1318	9.0	1.2	5.60	20.9	110.3	22.2	19.4	32.6	54.9	44.9	21.2	69.7
PR03	10/6/94	9999	14.0	8.7	5.78	20.6	117.6	21.2	6.0	31.5	56.7	47.9	22.9	103.3
PR04	3/8/92	1750	10.0	2.8	5.64	23.0	104.1	27.7	36.4	36.5	63.5	50.4	24.7	82.6
PR04	7/29/92	1409	19.0	-3.1	5.90	24.6	94.5	29.2	54.6	37.6	65.3	57.7	25.3	94.4
PR04	10/18/92	0954	9.5	6.2	5.86	21.5	100.0	27.1	28.7	34.2	57.2	46.7	24.9	99.0
PR04	3/27/93	1051	8.0	0.3	5.52	22.0	100.3	23.5	39.3	35.2	58.2	44.9	21.6	74.5
PR04	8/22/93	1005	19.0	5.3	5.95	21.8	108.5	25.4	25.6	30.5	53.5	52.9	27.2	114.6
PR04	4/9/94	1935	11.0	2.8	5.65	21.0	109.9	22.3	20.4	33.5	55.8	46.0	21.6	69.5
PR04	10/6/94	9999	11.0	7.8	5.85	20.6	118.4	20.8	5.0	32.6	57.4	47.0	22.3	104.1

Appendix II Table 3B - Analysis of Synoptic Survey Samples

SITE	DATE	TIME	TEMP	ANC	PH	COND	SO4	CL	NO3	CA	MG	K	NA	SIO2
PR05	3/8/92	1740	9.5	-6.3	5.16	22.5	126.7	25.4	1.1	32.7	52.2	41.5	23.3	95.8
PR05	7/29/92	1358	20.0	-9.7	5.27	19.9	103.9	23.5	2.4	22.6	40.2	43.5	22.7	114.1
PR05	10/18/92	0958	8.5	-1.3	5.39	19.1	105.6	24.0	3.1	24.1	43.0	39.9	23.6	112.7
PR05	3/27/93	1056	8.0	-7.2	5.09	20.3	112.5	19.9	6.2	26.9	44.3	36.0	20.5	77.9
PR05	8/22/93	1010	19.0	-5.6	5.18	18.5	97.2	21.9	6.5	18.3	35.9	41.3	23.2	144.5
PR05	4/9/94	1925	10.0	-5.6	5.09	20.9	119.3	20.6	3.3	27.9	46.0	37.9	20.6	86.2
PR05	10/6/94	9999	12.0	-3.8	5.32	18.1	105.4	16.6	1.2	20.9	41.1	41.2	19.6	142.5
PR06	3/8/92	1730	10.0	2.8	5.68	22.9	103.4	27.4	36.6	36.3	63.9	50.7	24.7	82.5
PR06	7/29/92	1351	19.0	4.4	5.80	24.9	93.7	29.1	57.1	37.9	66.6	58.0	25.4	94.5
PR06	10/18/92	1007	-9.9	6.2	5.86	21.6	99.9	26.8	27.0	34.4	58.4	45.9	24.1	98.7
PR06	3/27/93	1102	8.0	0.3	5.51	21.9	99.4	23.4	39.1	35.3	58.0	44.6	21.7	74.7
PR06	8/22/93	1010	19.0	6.2	5.96	22.0	109.2	25.4	26.6	31.7	54.9	53.8	27.2	112.0
PR06	4/9/94	9999	10.0	3.3	5.65	21.1	109.8	22.5	20.9	33.3	55.6	45.7	21.6	69.5
PR06	10/6/94	9999	12.0	9.4	5.88	21.0	119.1	21.7	5.3	32.3	56.1	48.5	23.4	102.5
PR07	3/8/92	1723	11.0	2.8	5.66	23.0	103.0	27.4	37.8	36.6	63.9	50.8	24.7	82.6
PR07	7/29/92	1440	19.0	-8.1	5.78	27.1	94.1	29.1	54.0	38.6	66.4	58.2	25.6	96.3
PR07	10/18/92	1019	10.5	3.7	5.76	21.9	99.6	26.6	27.8	34.3	58.0	46.3	24.0	98.5
PR07	3/27/93	1110	7.0	-2.2	5.49	22.0	99.7	23.1	40.0	36.0	58.5	44.4	21.5	75.4
PR07	8/22/93	1025	19.0	11.9	5.75	22.5	105.8	28.6	25.4	32.4	54.8	53.7	31.2	112.8
PR07	4/9/94	1405	11.5	2.8	5.64	20.9	109.1	22.4	21.2	33.4	55.7	45.4	21.4	69.9
PR07	10/6/94	9999	11.5	8.7	5.68	21.0	117.6	21.1	5.2	33.1	57.0	47.4	22.6	103.1
PR08	3/8/92	1710	11.0	1.2	5.65	23.1	104.8	29.1	40.5	36.5	64.9	52.7	24.9	82.2
PR08	7/29/92	1451	19.5	7.8	5.89	25.0	94.1	29.3	64.5	39.2	69.5	62.2	26.2	96.0
PR08	10/18/92	1030	10.5	6.1	5.84	22.5	101.0	27.1	31.5	34.1	59.1	49.1	24.6	99.3
PR08	3/27/93	1117	7.0	-0.6	5.55	22.0	98.4	23.8	43.1	35.2	58.8	47.3	22.0	75.9
PR08	8/22/93	1030	19.0	10.8	6.06	23.4	114.8	25.4	29.3	33.0	58.8	60.3	27.3	114.5
PR08	4/9/94	1755	10.5	4.4	5.69	21.1	109.9	22.6	23.0	32.9	56.5	48.2	21.8	69.6
PR08	10/6/94	9999	11.5	12.8	5.98	21.7	123.2	21.4	6.6	33.9	57.9	51.5	23.0	104.4
PR09	3/8/92	1700	10.5	-2.2	5.29	19.4	102.2	24.1	12.7	36.2	52.2	28.0	21.6	87.2
PR09	7/29/92	1432	16.0	-2.2	5.29	17.4	93.2	21.3	4.3	32.5	45.8	23.3	20.5	90.3
PR09	10/18/92	1025	9.0	-1.3	5.33	17.9	92.1	22.4	9.6	33.6	46.3	23.7	21.0	92.5
PR09	3/27/93	1121	7.5	-7.2	5.18	20.5	110.0	20.6	16.6	41.3	53.7	25.7	19.1	71.4
PR09	8/22/93	1035	18.0	-0.6	5.31	15.5	74.3	21.3	8.9	24.8	36.5	20.0	21.8	105.1
PR09	4/9/94	1902	8.0	-4.2	5.21	19.8	109.7	20.7	11.2	40.9	53.2	23.7	18.8	74.7
PR09	10/6/94	9999	11.5	-3.1	5.29	15.0	78.1	19.0	0.7	26.0	37.9	16.5	19.0	98.5
PR10	3/8/92	1650	10.5	2.8	5.52	14.8	74.4	21.1	7.6	26.6	32.8	27.1	22.9	86.8
PR10	10/18/92	1505	11.0	1.9	5.56	14.4	66.2	20.8	9.6	24.6	29.6	25.1	23.1	93.5

Appendix II Table 3B - Analysis of Synoptic Survey Samples

SITE	DATE	TIME	TEMP	ANC	PH	COND	SO4	CL	NO3	CA	MG	K	NA	SIO2
PR10	3/27/93	1130	8.0	-2.2	5.35	16.9	82.3	21.2	15.0	31.7	37.8	27.9	21.6	74.4
PR10	4/9/94	1844	10.0	1.2	5.45	16.5	80.7	22.4	13.7	31.7	36.6	27.0	23.2	77.3
PR11	3/8/92	1640	11.0	2.8	5.60	24.0	106.4	29.2	46.0	37.9	66.6	54.3	25.0	82.7
PR11	7/29/92	1528	18.5	2.8	5.62	27.9	95.2	30.0	72.2	41.8	72.9	64.1	26.4	98.0
PR11	10/18/92	1104	11.5	3.7	5.65	23.2	103.6	28.0	34.3	35.9	62.1	51.1	24.8	100.0
PR11	3/27/93	1145	7.5	1.2	5.54	22.5	98.3	23.8	44.9	36.0	60.1	48.1	22.1	75.9
PR11	8/22/93	1050	19.0	20.8	5.89	26.0	114.7	25.7	31.3	36.4	63.5	63.8	27.3	117.1
PR11	4/9/94	1516	11.5	2.8	5.63	21.8	112.5	22.8	23.4	33.7	57.9	51.0	21.7	70.1
PR11	10/6/94	9999	14.0	17.8	5.87	22.7	126.0	21.7	7.7	36.5	60.9	55.0	22.9	108.0
PR12	3/8/92	1630	10.5	2.8	5.56	24.1	107.4	29.5	46.3	38.4	67.2	54.5	25.1	82.4
PR12	7/29/92	1540	18.0	0.3	5.36	27.2	95.3	30.1	73.8	42.0	73.7	64.3	26.3	97.1
PR12	10/18/92	1110	11.5	4.4	5.62	23.5	103.3	27.7	34.7	36.5	62.1	51.5	24.8	99.8
PR12	3/27/93	1148	7.5	0.3	5.51	22.8	100.3	23.6	46.3	36.1	60.6	48.6	21.8	75.0
PR12	8/22/93	1105	18.0	23.3	5.84	25.0	114.4	25.7	33.0	38.0	65.5	64.1	27.2	118.1
PR12	4/9/94	1605	10.0	1.2	5.61	21.9	113.2	22.9	26.4	34.3	58.3	50.2	21.5	70.1
PR12	10/6/94	9999	14.5	18.7	5.83	23.0	125.8	21.6	7.9	36.8	61.1	55.5	22.9	108.3
PR13	3/8/92	1620	9.5	5.3	5.65	19.9	85.3	25.9	36.8	27.9	55.2	44.3	25.8	94.7
PR13	10/18/92	1054	11.0	6.9	5.78	17.9	78.5	25.7	19.8	22.2	41.8	42.9	27.5	112.0
PR13	3/27/93	1139	8.0	1.2	5.55	19.4	77.5	26.1	37.0	25.7	48.6	42.8	25.2	86.7
PR13	4/9/94	0553	10.0	4.4	5.55	19.1	87.0	24.8	25.3	26.0	46.4	43.6	26.1	89.6
PR14	3/8/92	1600	11.0	3.7	5.70	21.5	82.6	27.2	52.1	37.1	58.2	48.1	24.8	87.0
PR14	7/29/92	1500	17.0	12.8	5.63	19.7	73.3	24.9	36.5	31.2	51.6	46.5	25.3	101.9
PR14	10/18/92	1230	9.5	7.8	5.69	20.0	74.1	26.7	42.3	31.3	50.5	45.0	24.8	101.1
PR14	3/27/93	1245	8.5	2.8	5.61	21.1	77.9	24.3	52.1	36.6	56.5	44.9	22.8	77.0
PR14	4/9/94	1755	10.0	4.4	5.64	21.0	81.3	25.5	47.2	35.3	54.2	45.9	24.8	75.4
PR15	3/8/92	1540	11.0	1.2	5.56	24.5	106.6	29.4	49.2	40.7	68.5	55.2	25.2	84.7
PR15	7/29/92	1819	18.0	2.8	5.34	27.8	93.5	29.8	82.4	44.5	75.5	62.5	25.8	97.1
PR15	10/18/92	1128	11.0	2.8	5.47	23.8	102.1	28.1	42.4	37.3	62.6	51.6	24.4	99.8
PR15	3/27/93	1201	7.5	1.2	5.51	22.5	100.5	23.3	44.0	35.8	61.2	48.4	21.9	75.4
PR15	4/9/94	1626	11.0	1.9	5.51	22.2	113.0	23.0	28.1	34.1	59.0	51.6	22.0	71.4
PR16	3/8/92	1540	10.5	1.2	5.48	24.9	103.8	29.3	53.7	42.3	69.1	55.1	24.9	83.3
PR16	7/29/92	1713	18.0	1.2	5.29	27.8	93.8	30.4	78.7	44.7	73.7	61.3	25.7	95.7
PR16	10/18/92	1136	11.0	2.8	5.50	23.8	101.3	28.2	42.4	38.0	61.6	50.7	24.3	98.8
PR16	3/27/93	1206	7.5	0.3	5.47	23.0	97.2	23.4	47.7	38.2	60.3	48.3	21.2	73.9
PR16	4/9/94	1645	10.0	0.3	5.50	22.0	110.6	22.9	30.6	35.6	57.4	51.0	21.7	68.6
PR17	3/8/92	1500	11.0	3.7	5.59	27.0	132.2	33.9	37.2	38.2	84.2	55.0	31.1	99.4
PR17	7/29/92	1756	17.0	8.7	5.57	27.0	113.9	27.5	46.4	35.6	80.8	58.7	29.0	112.1

Appendix II Table 3B - Analysis of Synoptic Survey Samples

SITE	DATE	TIME	TEMP	ANC	PH	COND	SO4	CL	NO3	CA	MG	K	NA	SIO2
PR17	10/18/92	1205	12.0	7.8	5.55	24.9	115.1	29.6	35.7	34.7	75.3	49.2	29.1	110.6
PR17	3/27/93	1226	7.0	3.7	5.60	25.6	119.2	26.1	42.4	35.2	78.5	50.1	26.9	86.7
PR17	8/22/93	1155	18.5	27.8	5.40	29.0	116.8	29.3	52.4	37.8	92.3	64.5	33.7	133.1
PR17	4/9/94	1729	10.0	3.7	5.56	24.5	127.2	25.1	30.1	35.0	76.5	50.2	26.2	89.8
PR17	10/6/94	9999	12.0	12.8	5.47	25.0	143.7	20.8	3.8	29.3	66.3	63.5	23.9	170.8
PR18	3/8/92	1430	11.0	5.3	5.74	24.0	128.1	31.2	19.4	29.5	72.1	58.2	28.4	96.7
PR18	7/29/92	1728	18.5	9.4	5.68	26.0	120.2	26.5	28.5	28.4	70.4	64.9	27.9	123.1
PR18	10/18/92	1146	10.0	7.8	5.73	22.6	119.1	27.6	12.6	26.1	65.3	53.1	27.2	117.5
PR18	3/27/93	1240	8.0	3.7	5.66	22.3	114.3	23.7	24.2	27.1	65.9	50.5	24.1	82.8
PR18	8/22/93	1135	19.5	14.4	5.67	25.0	134.4	24.4	24.5	27.7	70.0	69.8	29.0	167.7
PR18	4/9/94	1658	12.0	5.3	5.65	22.5	127.6	24.1	14.2	26.9	65.5	54.6	24.4	91.7
PR18	10/6/94	9999	14.0	11.2	5.98	24.2	144.0	20.2	8.4	29.3	71.0	60.8	24.4	156.2
PR19	3/8/92	1410	11.0	2.8	5.54	25.8	104.9	30.0	58.3	43.9	70.0	55.8	25.2	83.5
PR19	7/29/92	1654	18.0	5.3	5.44	27.4	94.7	30.7	78.4	46.5	74.7	61.4	26.1	96.6
PR19	10/18/92	1330	10.5	3.7	5.62	23.8	102.1	28.5	41.3	39.6	61.0	52.9	24.6	100.0
PR19	3/27/93	1200	8.5	-1.3	5.47	22.8	97.7	23.5	47.5	38.3	60.2	47.7	21.1	73.7
PR19	8/22/93	1440	20.0	6.9	5.48	24.5	110.2	25.5	37.4	33.9	57.3	60.4	25.7	120.0
PR19	4/9/94	1733	11.0	0.3	5.48	22.5	112.2	22.8	27.1	36.4	58.4	50.0	21.4	69.0
PR20	3/8/92	1345	10.0	-2.2	5.34	25.8	97.8	25.9	61.7	45.8	65.6	53.6	20.9	84.7
PR20	7/30/92	1655	17.0	8.7	5.59	21.6	99.6	24.6	27.0	36.1	53.4	53.1	21.2	98.7
PR20	10/18/92	1310	9.5	1.9	5.55	22.6	99.6	25.4	35.5	37.2	54.7	52.8	20.8	96.6
PR20	3/27/93	1305	7.0	-2.2	5.32	23.0	97.4	21.7	48.2	39.2	55.6	48.3	18.3	73.0
PR20	8/22/93	1520	19.0	3.7	5.77	22.5	114.6	23.6	22.1	33.6	52.6	55.5	22.7	121.4
PR20	4/9/94	1703	9.5	1.2	5.43	22.0	99.8	21.7	36.0	38.1	54.9	49.2	18.8	72.8
PR21	3/8/92	1320	11.0	-3.8	5.36	25.6	98.9	27.3	65.0	44.1	66.4	55.7	21.8	84.4
PR21	7/30/92	1624	19.0	9.4	5.36	21.6	104.1	23.9	24.7	33.9	52.1	57.4	21.2	103.8
PR21	10/18/92	1245	9.5	-1.3	5.45	22.1	102.3	25.3	31.7	34.3	53.2	51.0	21.1	98.4
PR21	3/27/93	1210	8.5	-3.8	5.35	22.0	93.9	21.2	43.3	36.3	53.2	47.2	18.0	71.0
PR21	8/22/93	1500	20.0	-0.6	5.31	24.0	117.6	23.5	27.5	31.5	52.1	58.5	22.9	133.4
PR21	4/9/94	1438	10.0	-2.2	5.37	21.7	104.0	21.1	31.9	34.8	53.3	49.3	19.0	64.4
PR21	10/6/94	1530	12.0	0.3	5.36	21.8	122.9	20.1	2.6	30.9	50.9	50.3	19.3	118.0
PR24	3/8/92	1250	11.0	1.2	5.57	26.0	103.3	30.9	60.1	42.8	70.5	53.9	25.7	82.6
PR24	7/30/92	1607	18.5	5.3	5.28	27.9	93.7	31.3	79.0	47.0	75.5	61.7	26.3	96.9
PR24	10/18/92	1255	10.5	1.9	5.68	24.5	101.3	29.9	49.3	40.4	65.2	52.7	25.7	100.4
PR24	3/27/93	1150	8.5	0.3	5.51	23.6	96.5	24.1	54.1	39.4	63.1	48.2	22.1	74.0
PR24	8/22/93	1420	20.0	7.8	5.38	26.5	112.0	26.3	45.0	37.1	63.5	62.0	26.3	122.6
PR24	4/9/94	1423	-9.9	1.9	5.53	23.0	112.9	24.4	32.5	36.8	60.6	52.1	23.2	69.6

Appendix II Table 3B - Analysis of Synoptic Survey Samples

SITE	DATE	TIME	TEMP	ANC	PH	COND	SO4	CL	NO3	CA	MG	K	NA	SIO2
PR24	10/6/94	1450	13.0	8.7	5.45	23.5	122.9	22.5	14.7	36.6	59.3	52.1	22.6	105.7
PR25	3/8/92	1240	11.0	2.8	5.54	26.0	114.9	27.5	44.9	48.3	65.7	56.7	24.4	92.9
PR25	7/30/92	1548	17.5	19.4	5.61	27.2	121.8	27.2	49.7	53.4	70.0	68.6	25.2	112.1
PR25	10/18/92	9999	11.0	5.3	5.55	27.5	120.5	27.0	39.6	51.2	66.2	58.4	24.7	105.5
PR25	3/27/93	1140	8.5	3.3	5.56	23.7	116.4	24.1	31.1	43.8	57.4	51.1	22.7	78.9
PR25	4/9/94	1615	10.0	10.3	5.45	24.5	125.5	24.3	17.2	46.4	61.0	53.4	23.6	83.4
PR26	3/8/92	1220	11.5	1.2	5.58	26.2	99.6	30.6	63.0	44.1	70.8	54.9	26.2	84.0
PR26	7/30/92	1528	18.0	6.9	5.32	28.0	93.0	31.5	82.8	49.4	76.5	60.2	26.3	97.5
PR26	10/18/92	1210	11.0	3.7	5.65	24.9	98.9	29.4	51.1	41.6	64.9	53.4	25.9	102.2
PR26	3/27/93	1130	8.5	0.3	5.47	24.3	97.3	24.7	57.7	40.7	64.6	49.2	22.5	76.4
PR26	8/22/93	1315	20.0	6.9	5.37	25.0	113.4	26.4	30.6	35.3	58.3	61.1	26.0	128.0
PR26	4/9/94	1539	13.0	2.8	5.56	22.9	110.1	23.9	34.2	37.4	59.8	51.1	22.7	71.2
PR27	3/8/92	1217	12.0	1.2	5.56	27.0	98.2	31.5	69.5	46.7	73.6	55.4	26.4	83.6
PR27	7/30/92	1519	18.0	6.2	5.35	28.0	91.1	31.9	86.2	50.2	77.8	59.9	26.4	96.2
PR27	10/18/92	1205	11.0	3.7	5.73	25.9	97.6	30.3	57.0	43.5	67.3	53.1	26.3	101.0
PR27	3/27/93	1120	8.5	0.3	5.49	24.6	95.6	25.2	63.7	43.1	66.8	49.5	22.5	76.5
PR27	8/22/93	1300	20.0	5.8	5.67	23.5	109.9	26.2	37.3	35.1	57.8	61.5	26.3	124.9
PR27	4/9/94	1525	12.5	4.4	5.62	23.0	108.7	25.0	37.8	39.3	61.3	52.1	23.9	69.4
PR27	10/6/94	1355	12.5	9.4	5.62	22.6	118.0	22.8	13.2	36.6	58.8	53.4	22.9	109.1
PR28	3/8/92	1211	9.5	-4.7	5.26	23.0	115.7	23.5	21.4	31.8	52.0	52.5	22.8	95.7
PR28	7/30/92	1508	16.0	1.9	5.20	24.4	133.2	24.5	16.5	35.1	58.0	60.7	23.5	122.5
PR28	10/18/92	1150	11.0	-2.2	5.20	24.7	124.2	25.6	19.0	33.0	54.0	56.1	24.2	113.9
PR28	3/27/93	1110	8.5	-4.7	5.23	22.6	116.3	22.9	24.2	31.8	52.1	49.4	21.8	81.7
PR28	8/22/93	1245	19.0	-2.2	5.04	29.0	157.3	23.1	17.5	36.9	62.4	67.5	24.9	152.5
PR28	4/9/94	1533	10.5	-1.3	5.24	23.4	125.8	23.0	20.2	34.1	55.0	52.8	22.9	87.0
PR28	10/6/94	1409	12.5	11.2	5.32	30.1	173.3	27.3	2.7	41.8	63.9	67.8	27.5	155.8
PR29	3/8/92	1150	11.5	0.3	5.45	30.1	95.7	33.3	90.6	55.1	82.5	57.1	27.9	87.5
PR29	7/30/92	1447	16.5	7.8	5.29	29.0	90.3	32.7	92.7	56.0	81.4	58.3	26.6	95.3
PR29	10/18/92	1125	10.0	3.7	5.50	27.9	95.0	30.6	69.6	49.2	71.0	53.1	26.4	102.7
PR29	3/27/93	1050	8.5	0.3	5.47	26.5	95.0	26.2	75.6	47.5	70.8	50.2	22.8	77.7
PR29	8/22/93	1225	18.5	11.9	5.47	28.0	110.7	26.3	58.8	46.0	73.8	61.8	26.1	126.1
PR29	4/9/94	1447	11.0	2.8	5.47	24.9	109.1	25.9	47.5	44.2	66.0	52.0	24.4	78.1
PR29	10/6/94	1324	13.0	9.4	5.44	24.5	117.0	23.2	25.3	44.2	63.7	52.7	22.4	114.0
PR30	3/8/92	1145	11.0	-1.3	5.42	30.9	89.6	33.8	101.7	57.4	84.2	56.7	27.7	86.4
PR30	7/30/92	1432	16.5	7.8	5.31	28.8	86.3	32.6	94.6	56.7	79.5	56.6	26.3	94.5
PR30	10/18/92	1100	10.0	1.2	5.52	27.3	89.1	30.1	68.2	49.2	69.5	52.5	26.4	102.7
PR30	3/27/93	1045	8.5	-0.6	5.40	27.0	88.3	26.7	82.7	48.9	70.6	50.0	22.7	78.2

Appendix II Table 3B - Analysis of Synoptic Survey Samples

SITE	DATE	TIME	TEMP	ANC	PH	COND	SO4	CL	NO3	CA	MG	K	NA	SIO2
PR30	8/22/93	1145	19.0	0.3	5.47	25.5	104.6	25.8	53.5	39.4	57.4	58.8	25.0	129.5
PR30	4/9/94	1428	11.0	0.3	5.41	24.8	102.5	26.6	54.6	44.7	64.3	52.3	24.7	78.5
PR30	10/6/94	1255	12.0	6.9	5.50	23.1	110.9	23.5	22.2	40.5	56.0	50.7	22.5	114.2
PR31	3/8/92	1130	12.0	3.7	5.71	27.1	119.3	32.2	44.3	44.5	76.5	57.0	27.4	90.3
PR31	7/30/92	1420	16.5	15.3	5.65	28.5	121.1	31.2	52.3	50.0	83.2	60.4	27.6	104.7
PR31	10/18/92	1115	10.0	9.4	5.78	27.8	120.5	30.3	42.9	46.6	77.0	54.7	27.6	104.9
PR31	3/27/93	1040	8.5	4.4	5.74	25.7	121.2	25.1	42.3	42.2	73.2	51.6	23.8	78.7
PR31	8/22/93	1200	19.0	25.8	6.06	23.0	166.9	26.1	23.6	57.7	86.7	67.2	30.6	144.3
PR31	4/9/94	1435	11.0	6.9	5.62	24.5	133.0	24.4	23.8	40.9	70.9	50.9	23.5	81.6
PR31	10/6/94	1310	13.0	25.3	5.85	28.7	161.8	23.9	8.4	57.0	83.5	56.9	27.0	124.3
PR32	3/8/92	1120	10.5	0.3	5.46	32.4	88.5	35.5	116.1	63.3	92.2	57.0	29.1	85.2
PR32	7/30/92	1359	15.5	4.4	5.41	29.5	85.0	33.4	100.6	59.0	82.9	54.9	26.8	92.2
PR32	10/18/92	0915	9.5	3.7	5.57	28.0	88.0	31.5	84.2	53.5	75.4	51.4	27.0	97.4
PR32	3/27/93	1035	8.5	-2.2	5.46	28.0	88.8	27.9	95.2	53.8	77.5	50.4	23.7	76.5
PR32	8/22/93	1115	18.0	6.2	5.39	26.0	102.4	26.7	53.6	41.8	61.3	59.5	25.8	127.1
PR32	4/9/94	1409	11.0	2.8	5.30	26.1	101.8	26.0	58.1	47.6	67.5	50.7	23.7	78.5
PR32	10/6/94	1112	11.0	7.8	5.39	23.7	106.7	24.1	23.6	41.6	58.3	50.2	23.1	110.6
PR33	3/8/92	1100	11.0	0.3	5.54	35.5	87.7	38.3	138.6	74.8	105.0	55.4	31.0	82.0
PR33	7/30/92	1338	14.0	9.4	5.50	31.0	82.1	35.7	117.0	68.2	90.8	53.1	27.8	87.5
PR33	10/18/92	1020	9.5	3.7	5.65	31.0	82.9	34.7	107.0	65.4	87.6	52.0	29.4	92.6
PR33	3/27/93	1030	8.5	1.9	5.50	31.0	88.5	30.3	116.7	65.6	89.3	50.6	25.0	73.9
PR33	8/22/93	1010	17.5	11.2	5.64	27.1	87.0	30.5	80.3	55.5	74.2	50.6	27.6	99.3
PR33	4/9/94	1345	10.5	6.9	5.39	28.5	102.0	27.8	65.1	60.4	80.7	49.7	25.3	71.7
PR33	10/6/94	1147	11.0	16.2	5.62	26.2	93.5	28.4	55.4	57.7	72.3	46.5	25.5	92.1
PR34	3/8/92	1045	11.0	0.3	5.58	36.0	95.1	37.9	136.7	81.2	106.7	53.5	30.6	81.4
PR34	7/30/92	1330	14.0	6.9	5.56	36.1	98.3	37.4	143.7	87.1	107.1	56.1	29.7	89.8
PR34	10/18/92	1015	9.5	3.7	5.70	34.0	100.1	36.1	121.4	78.0	96.5	52.8	30.2	94.8
PR34	3/27/93	1015	8.5	2.8	5.59	32.8	109.0	29.7	111.0	76.0	95.6	50.3	25.5	74.0
PR34	8/22/93	1045	17.0	8.7	5.77	31.5	117.8	31.3	88.8	72.5	91.9	52.1	30.1	106.3
PR34	4/9/94	1335	10.0	6.9	5.41	29.1	122.8	26.4	62.3	65.4	82.2	48.4	25.0	73.0
PR34	10/6/94	1157	11.0	8.7	5.57	30.1	122.6	27.3	66.5	71.1	87.5	47.3	26.8	96.3
PR35	3/8/92	1035	11.0	0.3	5.54	34.9	83.7	38.7	138.4	72.3	105.2	56.4	31.2	83.1
PR35	7/30/92	1325	14.0	7.8	5.40	30.0	77.6	34.9	111.2	63.6	87.0	52.0	27.5	87.6
PR35	10/18/92	1000	9.5	1.1	5.71	29.9	78.3	34.0	96.7	60.7	83.6	51.3	28.8	91.7
PR35	3/27/93	1005	8.5	1.9	5.46	30.2	81.9	30.1	114.7	61.9	87.2	50.9	25.1	74.2
PR35	8/22/93	1030	17.5	15.4	5.85	25.0	80.3	30.4	66.4	50.2	69.3	47.8	26.7	95.7
PR35	4/9/94	1330	10.0	8.3	5.40	28.0	94.2	28.8	78.2	57.9	80.1	50.3	25.4	72.6

Appendix II Table 3B - Analysis of Synoptic Survey Samples

SITE	DATE	TIME	TEMP	ANC	PH	COND	SO4	CL	NO3	CA	MG	K	NA	SIO2
PR35	10/6/94	1209	11.0	15.3	5.60	24.2	87.2	27.4	50.0	52.8	67.7	44.3	24.1	90.1
PR37	3/8/92	1745	11.5	10.3	5.90	18.5	101.1	26.8	2.9	19.8	51.0	47.3	25.4	102.2
PR37	7/29/92	1230	19.0	20.3	6.17	18.2	82.5	27.8	6.9	18.1	47.3	54.8	25.8	123.2
PR37	10/18/92	0905	9.5	20.3	6.06	17.9	86.1	27.7	4.0	18.6	47.2	47.9	25.5	118.3
PR37	3/27/93	1010	8.0	5.3	5.75	19.6	100.3	24.8	16.2	22.8	56.1	46.6	23.4	89.1
PR37	8/22/93	1530	20.5	26.9	6.09	16.7	65.9	27.3	10.3	15.3	41.5	51.6	26.1	156.7
PR37	4/9/94	1201	10.5	9.4	5.90	18.3	102.9	24.2	3.8	20.3	52.8	46.6	22.2	98.4
PR37	10/6/94	1655	12.0	30.3	6.14	16.6	68.6	24.3	5.3	16.7	44.5	48.9	24.4	148.9
PR38	3/8/92	1800	11.0	3.7	5.52	21.2	115.4	30.0	10.5	26.3	60.8	46.7	28.0	93.6
PR38	7/29/92	1308	17.5	20.3	5.57	20.8	95.9	30.3	14.0	25.2	57.7	54.7	28.3	115.1
PR38	10/18/92	0925	12.0	11.2	5.49	21.4	99.8	31.0	12.9	25.3	55.2	47.3	27.7	109.0
PR38	3/27/93	1025	8.0	5.3	5.57	22.6	109.4	28.1	29.7	31.9	66.9	47.1	25.6	86.3
PR38	4/9/94	1241	10.5	6.2	5.57	20.6	112.4	25.9	10.8	27.9	60.7	43.3	22.7	91.3
RR01	3/14/92	1420	5.0	104.5	7.03	28.0	58.1	31.6	54.3	108.6	87.4	4.7	56.3	144.1
RR02	3/14/92	1045	4.0	77.8	6.93	24.5	47.8	42.8	49.4	94.8	76.5	2.7	49.6	118.3
RR03	3/14/92	1110	4.0	83.7	6.97	24.7	46.5	41.2	48.3	96.1	78.4	2.7	47.4	118.4
RR04	3/14/92	1130	4.0	83.7	6.96	25.2	47.7	37.8	50.8	96.2	79.9	2.8	46.8	122.0
RR05	3/14/92	1200	4.0	96.2	7.02	26.0	42.9	38.2	46.0	102.8	75.5	3.6	49.1	128.0
RR06	3/14/92	1245	4.0	92.0	7.02	27.5	48.5	36.3	54.4	108.3	79.8	3.7	49.9	129.6
RR07	3/14/92	1326	4.0	92.8	7.05	28.0	54.1	35.8	58.1	110.9	83.2	3.8	52.2	132.4
RR11	3/14/92	1013	2.0	103.7	7.07	23.2	20.2	53.5	32.7	104.2	70.8	4.2	42.5	106.7
RR12	3/14/92	1044	2.0	164.4	7.25	43.5	22.0	150.6	54.3	201.0	128.2	5.2	64.7	106.5
RR13	3/14/92	1056	3.5	65.3	6.88	14.9	12.3	21.2	31.8	59.9	43.0	4.7	30.5	92.1
RR14	3/14/92	1119	2.0	101.2	7.03	24.5	29.7	47.8	34.3	104.9	69.4	4.5	45.8	114.1
RR15	3/14/92	1207	3.0	87.8	7.02	22.7	31.9	40.7	39.1	96.8	62.9	4.5	45.5	112.4
RR16	3/14/92	1304	4.0	86.9	7.01	25.5	45.6	26.4	62.3	96.5	78.8	4.5	52.4	133.1
RR17	3/14/92	1335	5.5	33.7	6.61	38.5	99.2	24.3	72.5	110.6	65.8	7.5	58.6	124.2
RR18	3/14/92	1400	4.5	98.6	7.04	24.2	29.5	27.6	59.3	93.1	77.4	3.8	51.9	133.8
RR19	3/14/92	1450	4.5	85.4	6.93	24.2	50.5	26.4	61.6	96.2	77.9	5.1	54.9	137.0
RR20	3/14/92	1505	4.5	91.9	6.93	28.5	55.5	35.5	58.3	112.1	84.9	4.0	52.9	136.2
RR21	3/14/92	1525	5.0	93.7	6.93	27.5	54.3	32.6	59.4	107.6	83.8	4.4	53.7	135.9
RR30	3/14/92	1500	5.0	85.7	6.93	27.5	58.7	33.1	56.7	108.2	84.8	4.8	55.6	140.0
SR01	3/15/92	0850	6.0	67.8	6.81	18.0	42.1	25.8	15.2	62.9	28.6	8.6	62.5	138.2
SR01	8/4/92	2000	17.0	97.0	6.93	18.8	37.3	24.1	4.8	71.2	29.7	11.4	65.3	160.9
SR01	10/10/92	1830	-9.9	80.8	6.88	18.0	40.6	24.6	11.9	68.5	29.1	10.9	60.7	147.6
SR01	3/18/93	1715	4.0	57.8	6.74	18.3	53.1	23.8	13.4	65.6	29.5	9.4	61.0	138.9
SR01	8/26/93	1740	20.0	113.1	6.34	19.4	36.2	24.7	0.1	70.3	29.6	12.1	68.0	170.2

Appendix II Table 3B - Analysis of Synoptic Survey Samples

SITE	DATE	TIME	TEMP	ANC	PH	COND	SO4	CL	NO3	CA	MG	K	NA	SIO2
SR01	2/19/94	1720	7.5	60.3	6.70	17.4	48.4	24.1	6.9	61.6	27.2	8.9	61.9	136.1
SR01	10/5/94	1750	11.0	96.2	6.86	17.6	34.4	23.8	0.2	64.6	28.4	11.4	60.7	152.9
SR02	3/15/92	0911	6.0	62.8	6.84	18.0	41.3	25.5	17.3	62.4	28.3	8.6	62.2	136.9
SR02	8/4/92	1307	17.0	106.2	6.90	18.5	34.8	23.0	0.7	71.5	30.0	11.0	63.5	156.5
SR02	10/10/92	0855	-9.9	74.4	6.92	18.2	41.3	24.1	15.4	68.8	29.2	10.8	59.0	143.1
SR02	3/18/93	0957	3.0	54.3	6.75	18.2	52.0	23.6	15.3	65.3	29.5	8.9	59.3	135.5
SR02	8/26/93	1725	20.0	109.2	6.35	19.0	34.3	24.2	0.1	69.8	29.5	11.9	64.6	163.8
SR02	2/19/94	1725	6.0	56.9	6.70	17.4	49.7	24.4	6.6	61.3	27.2	9.1	61.6	135.0
SR02	10/5/94	1735	11.0	96.2	6.85	17.0	32.9	23.2	0.2	64.9	28.3	10.9	59.1	149.9
SR03	3/15/92	0935	6.0	61.2	6.81	17.7	38.2	24.9	17.7	62.1	28.1	8.2	60.5	135.7
SR03	8/4/92	1318	17.0	100.3	6.93	18.1	33.9	23.5	7.9	71.5	29.5	11.0	61.5	155.3
SR03	10/10/92	0946	-9.9	89.4	6.61	17.4	37.0	23.6	2.0	68.3	29.0	10.7	56.9	139.7
SR03	3/18/93	1020	3.0	53.7	6.73	17.9	49.2	23.3	16.5	64.5	29.2	8.8	58.9	133.4
SR03	8/26/93	1710	20.0	111.2	6.33	19.0	33.9	24.4	0.5	70.3	29.7	11.8	64.1	163.6
SR03	2/19/94	1715	6.0	61.2	6.72	17.0	45.1	23.8	8.9	60.7	26.6	8.9	60.5	132.8
SR03	10/5/94	1723	11.0	94.4	6.88	16.8	31.9	23.1	0.2	64.0	27.7	10.9	58.0	146.8
SR04	3/15/92	0955	6.5	57.8	6.78	19.2	61.0	28.9	6.2	61.5	29.0	9.9	67.6	147.1
SR04	8/4/92	1200	16.0	98.7	6.94	20.7	59.7	26.8	0.1	73.0	32.4	12.2	75.9	172.8
SR04	10/10/92	0855	-9.9	84.4	6.82	20.2	60.4	27.1	10.6	69.5	30.3	12.1	72.5	168.3
SR04	3/18/93	1005	2.5	42.8	6.65	18.0	61.4	25.2	7.6	59.7	27.7	9.2	59.9	138.7
SR04	2/19/94	1720	7.5	51.2	6.66	18.0	64.1	26.5	0.6	58.9	27.2	9.2	63.5	140.7
SR04	10/5/94	1546	11.5	93.7	6.89	20.9	62.0	26.3	0.2	70.5	32.5	13.0	77.9	176.8
SR05	3/15/92	1030	5.0	58.7	6.69	17.5	47.4	27.7	9.7	56.5	27.3	9.3	65.9	146.4
SR05	8/4/92	1237	17.0	88.7	6.78	19.5	46.7	26.1	5.3	70.9	30.5	11.0	69.9	172.8
SR05	10/10/92	0921	-9.9	59.4	6.75	19.4	55.7	26.5	4.4	65.0	27.7	10.1	69.7	159.8
SR05	3/18/93	1041	1.8	41.2	6.64	17.4	56.5	24.0	20.1	58.6	27.7	8.5	58.2	136.6
SR05	8/26/93	0810	19.0	101.1	6.25	23.6	49.9	26.6	23.1	86.0	37.7	12.8	76.6	184.3
SR05	2/19/94	0945	3.5	51.2	6.64	17.1	55.8	25.9	4.5	54.2	25.6	9.0	64.8	142.0
SR05	10/5/94	1639	11.0	86.2	6.74	19.3	48.3	25.4	4.4	69.7	30.7	10.5	71.8	170.1
SR06	3/15/92	1050	9.5	47.5	6.23	20.2	70.5	29.8	20.2	67.0	31.0	9.2	68.8	151.8
SR06	2/19/94	0915	6.0	52.0	6.32	19.5	74.9	27.9	1.7	64.2	29.8	9.5	68.0	155.7
SR06	10/5/94	1710	11.0	98.7	6.08	22.6	65.2	27.2	3.3	73.3	35.7	12.2	82.0	177.6
SR07	3/15/92	1115	6.0	61.8	6.85	16.7	36.6	24.8	19.2	59.6	27.3	7.9	58.1	134.3
SR07	8/4/92	1934	16.5	96.2	6.89	17.3	28.2	22.3	7.2	68.1	28.2	10.2	57.7	150.1
SR07	10/10/92	1015	-9.9	73.7	6.87	17.6	36.4	23.8	16.8	66.3	28.9	10.1	56.2	138.0
SR07	3/18/93	1130	3.0	51.8	6.74	17.4	46.4	23.9	23.4	61.8	27.5	8.2	57.7	130.6
SR07	8/26/93	1630	20.0	107.0	6.34	18.5	31.2	23.9	0.1	67.6	28.6	11.2	62.9	160.1

Appendix II Table 3B - Analysis of Synoptic Survey Samples

SITE	DATE	TIME	TEMP	ANC	PH	COND	SO4	CL	NO3	CA	MG	K	NA	SIO2
SR07	10/5/94	1515	11.0	91.1	6.89	16.6	32.2	22.9	0.2	64.4	28.6	10.7	57.9	147.9
SR08	3/15/92	1130	6.0	51.9	6.84	16.2	31.5	24.1	20.6	56.8	25.7	7.4	55.1	130.5
SR08	8/4/92	1840	16.5	94.4	6.87	17.0	27.0	22.3	8.6	67.7	27.9	9.7	56.4	146.7
SR08	10/10/92	1049	-9.9	70.3	6.87	16.9	33.0	23.4	18.5	64.8	27.9	9.5	53.2	133.7
SR08	3/18/93	1200	3.0	50.8	6.72	16.3	36.7	22.3	25.8	59.0	25.7	7.5	53.3	124.5
SR08	10/5/94	1442	11.5	89.3	6.87	15.9	28.7	22.8	0.2	61.6	27.2	10.2	55.5	145.1
SR09	3/15/92	1200	6.0	56.8	6.85	16.2	30.0	23.5	23.8	58.0	26.4	6.9	52.2	126.4
SR09	8/4/92	1452	16.0	90.3	6.94	16.8	26.4	21.6	8.6	67.4	28.6	9.4	53.8	143.2
SR09	10/10/92	1107	-9.9	66.9	6.83	16.8	31.8	23.4	13.3	64.2	27.8	9.1	51.8	132.1
SR09	3/18/93	1240	3.0	48.3	6.71	16.4	36.4	22.1	33.9	59.6	26.5	7.2	50.8	121.6
SR09	8/26/93	1605	19.0	107.0	6.28	17.6	27.1	23.3	0.5	67.6	29.1	10.0	56.8	153.5
SR09	2/19/94	1600	6.0	56.2	6.70	15.8	35.2	22.8	13.7	56.3	24.4	7.6	53.4	124.9
SR09	10/5/94	1703	-9.9	89.4	6.86	15.6	26.7	22.1	0.6	61.9	27.3	9.7	51.9	140.3
SR10	3/15/92	1245	6.0	45.4	6.81	15.2	26.1	22.6	23.3	54.0	24.8	6.6	47.5	120.4
SR10	8/4/92	1429	15.5	86.8	6.89	16.0	23.7	20.7	8.8	65.1	27.5	8.7	49.8	140.4
SR10	10/10/92	1215	-9.9	63.7	6.82	15.9	28.5	23.4	18.5	61.2	26.8	8.6	48.4	127.6
SR10	3/18/93	1358	3.0	46.2	6.68	15.0	30.1	21.0	27.0	55.1	24.9	7.0	46.5	116.2
SR10	8/26/93	1420	17.0	101.2	6.31	16.7	24.7	22.5	1.9	65.9	28.7	9.1	53.4	149.5
SR10	2/19/94	1500	4.5	51.2	6.65	14.2	28.5	21.3	13.9	50.2	22.6	6.6	45.1	114.4
SR10	10/5/94	1635	-9.9	84.4	6.84	14.9	24.2	21.6	2.0	59.1	26.3	8.7	48.5	136.7
SR11	3/15/92	1300	6.0	46.2	6.68	16.0	42.1	22.1	14.7	53.1	23.5	8.2	52.0	121.5
SR11	8/4/92	1610	16.0	80.3	6.89	16.9	38.9	21.2	4.6	64.8	26.8	10.6	55.1	142.7
SR11	10/10/92	1207	-9.9	58.7	6.76	17.0	45.5	22.4	15.3	60.9	25.7	10.3	53.4	130.4
SR11	3/18/93	1353	2.0	36.9	6.58	15.6	41.9	20.7	19.8	54.2	23.2	8.2	48.5	116.3
SR11	8/26/93	1335	19.0	96.2	6.27	17.7	39.5	22.9	0.1	65.9	28.1	11.4	57.7	153.1
SR11	2/19/94	1450	4.5	41.9	6.56	15.2	43.6	21.2	3.3	51.2	21.8	8.1	50.4	115.5
SR11	10/5/94	1525	-9.9	72.5	6.86	15.7	38.5	21.5	0.4	58.8	25.8	9.9	53.3	139.0
SR12	3/15/92	1325	6.0	52.0	6.77	14.0	28.2	22.9	6.4	47.9	22.6	8.3	45.5	120.7
SR12	8/4/92	1540	15.0	98.7	6.80	16.6	25.6	21.2	1.3	67.2	29.2	10.7	52.1	143.1
SR12	10/10/92	1149	-9.9	69.4	6.81	16.5	31.1	22.1	13.1	61.0	27.2	10.6	49.1	132.0
SR12	3/18/93	1331	2.0	44.4	6.63	14.5	27.1	20.3	30.8	51.9	23.7	8.4	44.4	115.5
SR12	8/26/93	1030	19.5	111.2	6.31	17.5	26.6	23.7	0.1	68.7	30.2	11.2	55.3	153.8
SR12	2/19/94	1220	5.5	47.8	6.52	14.2	38.7	21.0	7.1	48.9	22.3	8.1	47.6	114.9
SR12	10/5/94	1602	-9.9	86.2	6.82	15.4	26.6	22.4	0.2	60.7	27.7	9.5	51.3	141.8
SR13	3/15/92	1350	6.0	46.9	6.79	13.6	17.0	22.6	19.9	52.2	22.0	8.0	40.8	113.7
SR13	8/4/92	1650	14.5	84.3	6.78	14.4	16.2	20.3	4.5	60.2	23.1	9.1	42.7	131.8
SR13	10/10/92	1227	-9.9	67.8	6.76	14.5	18.7	21.3	14.9	56.6	22.8	9.6	42.2	124.5

Appendix II Table 3B - Analysis of Synoptic Survey Samples

SITE	DATE	TIME	TEMP	ANC	PH	COND	SO4	CL	NO3	CA	MG	K	NA	SIO2
SR13	3/18/93	1416	3.0	44.4	6.65	13.4	17.0	20.2	30.0	52.2	21.1	7.5	37.7	106.6
SR13	8/26/93	1350	16.0	96.2	6.31	14.7	16.9	22.1	0.1	58.5	23.8	9.1	46.5	140.4
SR13	2/19/94	1510	4.0	56.2	6.56	13.0	19.7	20.3	12.6	50.0	20.6	7.2	37.9	104.4
SR13	10/5/94	1447	-9.9	78.7	6.71	13.5	16.6	21.0	0.8	53.8	22.9	8.5	43.5	130.2
SR14	3/15/92	1400	7.0	42.9	6.83	14.8	22.2	23.5	24.6	54.4	25.6	6.0	47.3	118.6
SR14	8/4/92	1701	15.0	86.2	6.92	15.8	20.7	20.6	9.5	64.4	27.5	8.1	47.9	135.3
SR14	10/10/92	1232	-9.9	64.4	6.82	15.3	24.3	22.7	20.2	59.1	26.4	7.7	47.2	125.9
SR14	3/18/93	1422	3.0	45.3	6.73	15.0	28.4	21.5	34.7	56.4	25.3	6.4	46.2	115.4
SR14	8/26/93	1405	17.0	101.1	6.38	16.6	22.0	22.5	6.0	65.6	29.1	8.2	52.4	147.6
SR14	2/19/94	1515	5.5	51.9	6.29	13.8	25.9	21.8	15.3	51.2	23.0	6.4	46.3	113.2
SR14	10/5/94	1456	-9.9	81.9	6.82	14.8	21.9	21.5	4.4	59.6	27.4	8.1	47.5	135.0
SR15	3/15/92	1425	6.0	41.9	6.75	14.0	20.1	23.3	23.9	49.4	23.9	6.2	43.0	109.4
SR15	8/4/92	1720	15.0	67.8	6.83	14.2	20.0	19.8	9.4	56.0	24.9	8.4	42.5	124.1
SR15	10/10/92	1301	-9.9	56.1	6.77	14.3	22.7	22.7	19.2	54.1	25.0	7.9	43.9	118.3
SR15	3/18/93	1450	3.0	39.4	6.58	14.0	26.2	21.0	30.4	50.5	24.2	6.8	42.3	105.1
SR15	8/26/93	1305	17.0	87.9	6.26	15.1	19.5	21.7	4.7	58.0	26.6	8.7	48.2	136.7
SR15	2/19/94	1405	5.5	36.9	6.11	12.8	23.5	21.2	13.2	44.4	21.2	6.3	40.2	104.5
SR15	10/5/94	1419	-9.9	71.2	6.80	13.4	19.5	21.0	3.3	51.3	24.7	8.3	42.9	124.8
SR16	3/15/92	1445	9.0	54.5	6.56	18.2	21.4	21.5	54.7	73.6	32.8	6.8	46.6	112.2
SR16	10/10/92	1315	-9.9	70.3	6.55	19.4	21.0	22.5	54.6	78.7	33.7	8.0	49.8	124.7
SR16	3/18/93	1518	6.0	51.8	6.51	17.4	20.9	21.0	50.9	70.8	30.4	6.8	44.2	111.0
SR16	8/26/93	1250	12.0	93.7	6.11	17.6	18.8	22.9	12.0	59.5	27.3	7.1	51.3	137.6
SR16	2/19/94	1355	7.5	52.9	6.40	17.6	24.3	21.4	47.1	72.6	31.6	6.7	45.0	110.2
SR17	3/15/92	1515	3.0	27.9	6.67	9.9	14.7	21.2	1.5	32.4	16.4	6.6	34.1	102.4
SR17	8/4/92	1745	14.5	60.0	6.79	13.2	21.1	18.5	0.3	52.6	24.6	9.7	38.2	116.7
SR17	10/10/92	1333	-9.9	51.1	6.65	11.2	16.7	21.8	4.7	40.1	19.3	8.0	36.4	110.3
SR17	3/18/93	1538	1.0	36.9	6.56	10.9	18.8	19.9	4.2	35.9	18.1	7.5	34.1	96.7
SR17	8/26/93	1235	16.5	81.1	6.19	12.7	13.3	20.8	0.1	46.0	23.0	8.9	41.0	127.6
SR17	2/19/94	1330	3.0	36.2	5.97	10.4	16.7	19.9	5.6	32.6	16.0	6.7	35.3	98.6
SR17	10/5/94	1301	-9.9	61.2	6.73	11.2	13.8	20.5	1.2	41.3	21.5	8.2	36.4	116.2
SR18	3/15/92	1625	6.0	78.7	6.85	29.0	96.3	33.2	18.0	95.9	43.9	14.5	89.3	178.8
SR18	3/18/93	1700	3.0	63.3	6.75	28.2	108.7	27.0	15.8	99.4	43.7	14.0	86.6	178.2
SR18	2/19/94	1645	7.0	86.2	6.22	27.8	106.9	29.4	12.3	94.8	42.3	13.2	88.0	175.7
TH01	3/16/92	1015	4.0	174.4	7.25	40.1	102.7	36.6	50.9	141.8	136.7	8.1	86.9	217.3
TH03	3/16/92	1105	4.0	174.4	7.25	40.1	103.1	36.5	50.8	142.7	136.1	8.4	88.2	216.8
TH04	3/16/92	1140	5.0	169.4	7.22	39.0	96.5	35.3	53.3	138.3	131.5	8.3	85.0	214.0
TH05	3/16/92	1155	3.0	141.9	7.18	31.0	60.8	29.8	48.5	109.6	98.6	7.6	73.8	197.1

Appendix II Table 3B - Analysis of Synoptic Survey Samples

SITE	DATE	TIME	TEMP	ANC	PH	COND	SO4	CL	NO3	CA	MG	K	NA	SIO2
TH06	3/16/92	1230	4.0	136.1	7.16	32.0	58.5	29.8	56.8	111.7	101.1	7.3	72.8	194.3
TH07	3/16/92	1250	3.0	153.6	7.19	35.0	54.7	30.7	73.3	127.5	112.6	7.9	77.5	202.9
TH08	3/16/92	1340	4.0	181.1	7.17	39.7	53.3	31.0	92.9	146.1	130.2	8.5	84.7	217.1
TH09	3/16/92	1420	0.6	106.9	7.00	24.3	65.1	28.5	18.6	81.1	77.4	6.5	62.0	174.6
TH10	3/16/92	1445	6.0	105.3	6.84	24.2	64.9	28.3	19.7	81.2	77.1	6.2	61.2	174.6
TH11	3/16/92	1600	5.0	188.6	7.25	44.1	120.6	38.8	57.8	158.7	154.6	8.8	91.6	224.5
TH20	3/16/92	0955	2.5	61.9	6.65	30.9	98.2	40.1	58.8	89.3	105.4	16.2	53.9	131.4
TH21	3/16/92	1009	3.5	142.9	6.76	42.3	124.4	44.0	60.1	143.0	140.8	11.5	88.6	212.6
TH22	3/16/92	1028	2.5	93.7	6.88	31.0	101.5	37.7	35.9	94.1	108.7	13.7	59.7	152.6
TH23	3/16/92	1115	2.0	166.1	7.25	41.0	79.9	35.4	81.8	148.4	134.5	8.9	84.3	211.4
TH24	3/16/92	1130	2.5	166.9	7.19	42.0	97.3	39.0	77.5	145.8	143.8	9.3	88.1	212.2
TH25	3/16/92	1150	3.5	154.2	7.05	42.0	117.3	43.6	66.3	140.0	153.5	9.9	92.0	214.5
TH26	3/16/92	1225	3.0	80.4	6.89	36.0	111.7	47.7	66.2	112.3	122.7	11.8	77.6	167.1
TH27	3/16/92	1305	3.5	158.5	7.23	43.1	106.2	40.0	78.4	154.6	152.9	9.3	91.0	218.0
TH28	3/16/92	1340	3.5	155.4	7.11	40.8	114.7	36.7	62.1	137.9	142.9	7.8	88.1	219.5
TH29	3/16/92	1350	3.5	165.5	7.24	43.0	108.1	39.3	74.4	152.9	151.9	9.1	90.7	218.3
TH30	3/16/92	1415	7.0	186.1	6.89	48.6	164.3	42.3	53.2	183.6	176.7	7.6	83.1	241.1
TM01	3/13/92	1635	6.0	5.8	5.77	19.9	97.2	27.8	18.5	32.5	56.7	39.7	26.4	82.1
TM01	7/26/92	1245	18.5	16.2	5.95	18.5	89.5	24.4	14.6	30.0	49.4	44.0	28.1	108.0
TM01	4/1/93	1200	10.5	2.8	5.68	19.4	105.6	23.5	13.0	30.5	52.6	39.4	23.9	83.3
TM01	8/19/93	1217	19.0	22.8	5.95	16.4	68.2	25.4	11.7	22.6	37.0	38.7	31.9	129.1
TM01	11/19/94	1150	9.5	14.4	5.98	20.2	117.0	24.0	0.1	32.4	54.4	44.4	30.5	108.7
TM02	3/13/92	1150	8.0	-6.8	5.20	23.2	86.2	30.9	49.0	31.0	50.3	52.2	25.9	91.3
TM02	7/26/92	1610	14.0	-16.4	5.30	28.0	103.2	30.2	30.0	29.5	49.5	56.2	27.1	111.0
TM02	4/1/93	1436	9.0	-4.7	5.14	23.0	86.6	27.9	53.5	29.7	51.9	52.8	23.3	83.3
TM03	3/13/92	1200	8.0	3.7	5.81	26.5	81.8	28.2	75.6	65.2	70.5	44.6	23.5	71.1
TM03	7/26/92	1617	12.0	11.9	5.60	27.1	79.4	26.0	90.2	68.9	73.8	47.5	25.1	78.8
TM03	4/1/93	1430	9.0	7.8	5.92	22.4	91.6	22.1	36.6	55.7	57.8	41.0	21.4	67.7
TM04	3/13/92	1215	6.0	-3.9	5.36	25.5	88.2	29.2	61.5	46.3	60.2	49.4	24.5	81.4
TM04	7/26/92	1630	14.5	-3.1	5.28	24.4	98.7	27.4	50.7	46.1	60.4	52.2	25.5	97.8
TM04	4/1/93	1441	9.0	-2.2	5.38	22.5	92.5	24.3	43.1	42.3	53.9	46.9	22.1	76.2
TM05	3/13/92	1235	6.0	-0.6	5.43	25.5	89.0	29.8	63.7	44.7	68.1	49.2	23.8	78.3
TM05	7/26/92	1547	17.5	8.7	5.31	23.3	105.5	27.0	36.7	42.9	60.6	53.9	24.3	102.6
TM05	4/1/93	1412	10.0	0.3	5.42	22.3	97.0	23.5	36.9	39.1	57.8	46.0	21.1	76.2
TM06	3/13/92	1310	6.0	6.9	5.76	20.7	96.4	27.2	21.8	34.6	55.5	43.7	25.7	87.0
TM06	7/26/92	1534	18.0	4.4	5.62	26.0	140.0	22.5	18.5	48.8	66.0	57.2	28.2	127.3
TM06	4/1/93	1409	10.0	3.3	5.56	20.1	94.0	24.7	16.4	30.4	53.2	44.1	24.4	83.5

Appendix II Table 3B - Analysis of Synoptic Survey Samples

SITE	DATE	TIME	TEMP	ANC	PH	COND	SO4	CL	NO3	CA	MG	K	NA	SIO2
TM06	8/19/93	1104	18.0	12.8	5.48	33.6	192.5	26.5	19.7	64.0	86.8	66.5	35.8	158.0
TM07	3/13/92	1335	7.0	1.2	5.64	22.5	94.9	28.5	41.7	38.7	61.9	45.4	24.0	76.3
TM07	7/26/92	1513	17.5	13.7	5.35	23.2	116.3	24.8	22.8	42.0	62.3	55.0	25.3	110.5
TM07	4/1/93	1352	10.5	-1.3	5.48	20.9	98.7	23.3	23.2	34.1	55.2	44.8	22.1	77.5
TM07	8/19/93	1407	18.5	7.8	5.24	30.1	160.7	27.7	19.8	50.6	72.6	60.1	32.9	142.2
TM08	3/13/92	1520	9.0	8.7	6.03	21.0	119.8	32.0	1.1	17.6	59.9	56.1	31.6	104.3
TM08	4/1/93	1316	11.5	10.3	5.95	21.0	126.8	25.7	0.2	17.5	61.4	58.3	29.1	100.1
TM09	3/13/92	1435	9.0	5.3	5.72	16.2	88.7	27.6	0.2	9.6	47.7	43.4	26.1	102.0
TM09	4/1/93	1332	11.0	3.3	5.60	16.3	94.1	21.2	0.2	8.1	46.1	44.4	21.1	89.3
TM10	3/13/92	1500	7.0	5.3	5.79	19.7	89.1	27.5	36.2	36.1	58.8	43.6	24.3	74.7
TM10	7/26/92	1429	18.5	17.8	6.01	22.0	108.1	25.2	23.2	40.9	60.4	52.0	26.5	106.9
TM10	4/1/93	1336	10.5	2.0	5.63	20.0	96.0	22.9	21.4	31.7	52.3	43.2	21.6	75.9
TM10	8/19/93	1341	20.5	23.7	5.82	24.0	120.8	25.8	16.4	44.0	63.2	52.7	30.7	126.0
TM11	3/13/92	1535	6.0	1.9	5.84	20.7	92.0	27.6	29.8	33.2	57.9	44.4	24.9	77.6
TM11	7/26/92	1412	18.5	16.9	5.90	21.9	107.7	24.8	20.1	38.7	59.7	52.4	27.0	107.1
TM11	4/1/93	1311	10.5	3.7	5.68	20.0	97.5	22.8	18.1	29.9	52.8	44.3	22.4	78.5
TM11	8/19/93	1327	21.5	16.2	5.67	23.9	120.9	25.5	19.4	39.2	62.9	52.7	30.8	126.9
TM12	3/13/92	1550	6.0	6.9	5.86	20.2	92.4	27.2	28.4	32.5	57.9	44.1	25.6	77.4
TM12	7/26/92	1350	18.5	16.9	5.85	21.5	107.8	24.6	18.8	35.0	60.5	53.1	27.3	106.4
TM12	4/1/93	1300	10.5	5.3	5.71	19.8	98.2	22.4	17.9	29.1	51.9	44.2	22.8	78.7
TM12	8/19/93	1301	19.5	21.2	5.80	24.0	115.2	30.6	20.5	33.5	62.9	55.3	36.6	126.2
WO01	3/19/92	1145	4.5	87.8	6.95	29.5	69.6	34.0	72.4	112.9	97.2	3.8	53.4	134.5
WO01	7/15/92	2030	19.0	179.5	7.00	29.8	41.6	31.8	19.7	127.2	96.9	5.5	57.9	159.6
WO02	3/19/92	1220	4.0	86.2	6.98	23.5	56.9	31.1	30.2	93.3	73.3	4.0	47.1	121.0
WO02	7/15/92	1030	20.0	170.4	7.21	29.0	37.9	31.4	18.7	126.3	94.3	5.5	54.4	151.3
WO03	3/19/92	1250	5.0	91.2	6.93	23.0	48.7	31.8	31.2	95.1	73.1	3.6	43.1	115.2
WO03	7/15/92	1100	20.0	182.9	7.28	29.5	31.0	34.1	19.8	131.0	95.7	5.1	49.8	144.3
WO04	3/19/92	1315	4.5	86.2	7.00	22.5	55.2	30.8	29.2	91.7	70.0	4.2	45.7	119.7
WO04	7/15/92	1120	20.0	172.0	7.21	29.0	36.6	32.2	20.0	125.9	92.4	5.2	52.1	149.4
WO05	3/19/92	1345	5.5	72.8	6.87	20.0	73.2	27.3	22.6	81.9	63.4	5.3	53.6	132.4
WO05	7/15/92	1130	19.0	137.9	7.05	27.9	56.6	26.8	14.1	105.7	81.6	6.5	61.0	165.8
WO06	3/19/92	1445	5.0	76.2	6.97	22.0	61.4	27.2	25.4	79.3	62.4	4.9	50.9	129.9
WO06	7/15/92	1800	18.0	145.4	7.12	27.2	51.8	27.5	14.9	106.1	83.4	5.9	58.9	164.4
WO07	3/19/92	1520	4.5	90.3	7.05	23.5	50.3	29.5	36.2	91.3	73.4	3.4	45.2	125.7
WO07	7/15/92	1846	16.5	166.1	7.09	28.9	44.6	29.2	19.5	116.5	93.4	3.8	54.0	159.8
WO20	3/19/92	1306	5.5	94.4	7.08	23.0	44.8	34.2	31.3	96.8	70.9	3.8	42.1	110.8
WO20	7/15/92	1225	19.0	184.4	7.37	29.3	28.1	35.5	18.0	134.1	92.5	4.6	48.4	141.7

Appendix II Table 3B - Analysis of Synoptic Survey Samples

SITE	DATE	TIME	TEMP	ANC	PH	COND	SO4	CL	NO3	CA	MG	K	NA	SIO2
WO21	3/19/92	1235	5.0	100.3	7.02	22.0	42.1	36.5	30.0	99.3	71.1	3.7	43.6	112.5
WO21	7/15/92	1304	17.0	181.1	7.35	29.1	25.1	37.9	18.4	132.1	91.3	4.8	49.3	140.6
WO22	3/19/92	1206	5.0	101.2	7.05	23.5	41.9	36.6	29.9	103.4	70.8	4.0	43.6	111.1
WO22	7/15/92	1358	17.5	191.9	7.32	30.0	24.0	37.8	18.5	141.0	92.5	4.9	48.7	139.2
WO23	3/19/92	1142	5.0	102.8	7.04	23.2	41.2	37.5	28.5	105.1	70.2	4.2	43.6	109.5
WO23	7/15/92	1325	17.0	196.1	7.23	30.6	23.2	38.7	20.2	144.5	93.4	4.9	48.1	136.0
WO24	3/19/92	1129	5.0	93.7	6.95	23.0	41.9	30.6	30.3	101.1	66.8	5.5	44.3	117.6
WO24	7/15/92	1347	16.5	151.1	7.13	24.0	15.7	33.1	12.5	110.9	72.4	4.7	47.5	143.4
WO25	3/19/92	1111	4.5	101.2	7.00	23.2	41.1	40.4	29.1	105.7	70.8	3.7	43.2	106.6
WO25	7/15/92	1358	17.0	219.2	7.32	33.5	25.8	42.1	16.4	164.6	103.6	4.7	48.2	130.1
WO26	3/19/92	1103	3.0	100.3	6.88	23.2	40.2	40.4	27.9	103.4	70.5	3.5	42.3	105.7
WO26	7/15/92	1415	16.5	198.6	7.26	32.0	26.4	43.9	17.7	153.1	97.0	5.2	48.2	128.1
WO27	3/19/92	1034	3.0	76.9	6.80	22.7	58.1	36.1	18.0	97.3	62.0	3.3	45.8	109.1
WO27	7/15/92	1443	18.0	158.6	7.05	28.0	32.9	40.9	12.8	127.8	78.8	4.8	52.2	141.2
WO28	3/19/92	1019	3.5	75.4	6.77	23.2	50.1	41.5	30.5	103.5	60.9	5.0	43.2	100.9
WO28	7/15/92	1433	18.0	147.2	7.05	27.9	27.6	45.1	18.5	128.1	75.1	6.1	51.7	133.5
WO29	3/19/92	1003	-9.9	75.4	6.83	26.0	24.0	53.7	61.7	115.9	57.2	7.3	46.2	90.6
WO29	7/15/92	1509	17.0	105.4	7.02	29.9	10.1	56.6	64.3	136.0	62.9	8.8	53.8	102.7
WO30	3/19/92	0951	4.0	91.1	6.83	21.7	52.9	34.2	13.1	94.9	64.2	2.3	43.9	113.5
WR01	11/2/94	1655	11.0	52.8	6.16	21.2	84.3	23.7	7.3	38.6	63.5	48.0	22.7	93.4
WR02	11/2/94	1631	10.5	49.3	6.46	18.5	73.7	24.1	1.7	36.8	56.6	40.4	24.4	93.7
WR03	11/2/94	1621	11.0	47.8	6.41	18.9	72.1	24.1	4.3	36.1	57.0	39.6	24.6	94.2
WR04	11/2/94	1324	11.0	46.8	6.07	19.1	70.9	25.9	5.1	36.6	55.7	40.3	26.5	94.8
WR05	11/2/94	1318	12.5	32.8	5.62	22.1	86.5	21.6	18.6	36.1	58.7	52.5	21.4	95.0
WR06	11/2/94	1328	10.0	49.3	6.42	17.0	63.9	25.9	0.1	34.5	53.6	32.3	26.1	96.4
WR07	11/2/94	1357	10.0	51.8	6.36	17.5	63.1	25.7	0.1	35.3	54.5	32.1	26.2	95.2
WR08	11/2/94	1413	10.0	42.8	5.97	17.9	62.0	26.2	2.4	36.0	54.0	33.1	25.6	94.1
WR09	11/2/94	1512	9.0	24.4	6.04	18.5	60.4	25.9	23.9	38.2	54.1	34.9	24.0	90.7
WR10	11/2/94	1517	9.5	32.8	6.09	19.0	62.0	25.9	21.4	40.6	58.7	35.1	25.4	90.9

¹ SITE = site identification code

Units: temperature = Celsius; conductivity = μS ; $\text{SiO}_2 = \mu\text{m L}^{-1}$; ANC and ions = $\mu\text{eq L}^{-1}$;
missing values = -9s

APPENDIX II - TABLE 3C: ADDITIONAL ALUMINUM ANALYSES¹

STREAM	SITE	DATE	TIME	T_AL
PAINE RUN	PAIN	10/1/92	1200	12
PAINE RUN	PAIN	10/8/82	1200	13
PAINE RUN	PAIN	10/15/92	1200	14
PAINE RUN	PAIN	10/22/92	1200	14
PAINE RUN	PAIN	10/29/92	1200	10
PAINE RUN	PAIN	11/5/92	1200	10
PAINE RUN	PAIN	11/12/92	1200	17
PAINE RUN	PAIN	11/19/92	1200	14
PAINE RUN	PAIN	11/26/92	1200	15
PAINE RUN	PAIN	3/4/93	1200	65
PAINE RUN	PAIN	3/5/93	1200	37
PAINE RUN	PAIN	3/16/93	1200	39
PAINE RUN	PAIN	3/19/93	1200	29
PAINE RUN	PAIN	3/23/93	1200	28
PAINE RUN	PAIN	3/24/93	1200	29
PAINE RUN	PAIN	4/6/93	1200	27
PAINE RUN	PAIN	4/13/93	1200	23
PAINE RUN	PAIN	4/20/93	1200	23
PAINE RUN	PAIN	4/27/93	1200	21
PAINE RUN	PAIN	5/4/93	1200	29
PAINE RUN	PAIN	5/11/93	1200	11
PAINE RUN	PAIN	5/18/93	1200	18
PAINE RUN	PAIN	5/25/93	1200	13
PAINE RUN	PAIN	6/1/93	1200	13
PAINE RUN	PAIN	6/8/93	1200	14
PAINE RUN	PAIN	6/14/93	1200	17
PAINE RUN	PAIN	6/17/93	1200	14
PAINE RUN	PAIN	6/18/93	1200	11
PAINE RUN	PAIN	6/18/93	2000	45
PAINE RUN	PAIN	6/19/93	0400	15
PAINE RUN	PAIN	6/19/93	1800	53
PAINE RUN	PAIN	6/19/93	2200	45
PAINE RUN	PAIN	6/20/93	0000	33
PAINE RUN	PAIN	6/20/93	0200	28
PAINE RUN	PAIN	6/20/93	0400	22
PAINE RUN	PAIN	6/20/93	0800	17
PAINE RUN	PAIN	6/20/93	1200	16
PAINE RUN	PAIN	6/20/93	1800	13
PAINE RUN	PAIN	6/21/93	0600	20
PAINE RUN	PAIN	6/22/93	1600	14
PAINE RUN	PAIN	6/29/93	1200	10
PAINE RUN	PAIN	7/6/93	1200	10
PAINE RUN	PAIN	7/13/93	1200	10
PAINE RUN	PAIN	7/20/93	1200	11
PAINE RUN	PAIN	7/27/93	1200	10
PAINE RUN	PAIN	8/3/93	1200	10
PAINE RUN	PAIN	8/10/93	1200	10
PAINE RUN	PAIN	8/17/93	1200	15

Appendix II Table 3C - Additional Aluminum Analyses

STREAM	SITE	DATE	TIME	T_AL
PAINE RUN	PAIN	8/24/93	1200	10
PAINE RUN	PAIN	8/31/93	1200	10
PAINE RUN	PAIN	9/7/93	1200	10
PAINE RUN	PAIN	9/16/93	1200	14
PAINE RUN	PAIN	9/23/93	1200	10
PAINE RUN	PAIN	9/30/93	1200	10
PAINE RUN	PAIN	10/7/93	1200	10
PAINE RUN	PAIN	10/14/93	1200	10
PAINE RUN	PAIN	10/28/93	1200	17
PAINE RUN	PAIN	11/26/93	1200	10
PAINE RUN	PAIN	11/26/93	2000	10
PAINE RUN	PAIN	11/27/93	0400	10
PAINE RUN	PAIN	11/27/93	1200	10
PAINE RUN	PAIN	11/27/93	1600	10
PAINE RUN	PAIN	11/27/93	1800	72
PAINE RUN	PAIN	11/27/93	2000	57
PAINE RUN	PAIN	11/27/93	2200	61
PAINE RUN	PAIN	11/28/93	0000	82
PAINE RUN	PAIN	11/28/93	0200	83
PAINE RUN	PAIN	11/28/93	0400	78
PAINE RUN	PAIN	11/28/93	0600	50
PAINE RUN	PAIN	11/28/93	0800	48
PAINE RUN	PAIN	11/28/93	1000	48
PAINE RUN	PAIN	11/28/93	1200	41
PAINE RUN	PAIN	11/28/93	1400	50
PAINE RUN	PAIN	11/28/93	2000	33
PAINE RUN	PAIN	11/29/93	0200	27
PAINE RUN	PAIN	11/29/93	0800	22
PAINE RUN	PAIN	11/29/93	1600	15
PAINE RUN	PAIN	12/4/93	0400	23
PAINE RUN	PAIN	12/4/93	1200	29
PAINE RUN	PAIN	12/4/93	2000	26
PAINE RUN	PAIN	12/5/93	0400	66
PAINE RUN	PAIN	12/5/93	0600	70
PAINE RUN	PAIN	12/5/93	0800	53
PAINE RUN	PAIN	12/5/93	1000	55
PAINE RUN	PAIN	12/5/93	1400	37
PAINE RUN	PAIN	12/5/93	1800	32
PAINE RUN	PAIN	12/6/93	0000	28
PAINE RUN	PAIN	12/6/93	0600	39
PINEY RIVER	PINE	10/1/92	1200	10
PINEY RIVER	PINE	10/8/92	1200	10
PINEY RIVER	PINE	10/15/92	1200	11
PINEY RIVER	PINE	10/22/92	1200	10
PINEY RIVER	PINE	10/29/92	1200	10
PINEY RIVER	PINE	11/5/92	1200	10
PINEY RIVER	PINE	11/12/92	1200	10
PINEY RIVER	PINE	11/19/92	1200	10
PINEY RIVER	PINE	11/26/92	1200	10
PINEY RIVER	PINE	3/4/93	1200	10
PINEY RIVER	PINE	3/5/93	1200	10
PINEY RIVER	PINE	3/19/93	1200	10

Appendix II Table 3C - Additional Aluminum Analyses

STREAM	SITE	DATE	TIME	T_AL
PINEY RIVER	PINE	3/23/93	1200	10
PINEY RIVER	PINE	3/26/93	1200	10
PINEY RIVER	PINE	4/6/93	1200	10
PINEY RIVER	PINE	4/13/93	1200	11
PINEY RIVER	PINE	4/20/93	1200	10
PINEY RIVER	PINE	4/27/93	1200	16
PINEY RIVER	PINE	5/4/93	1200	15
PINEY RIVER	PINE	5/11/93	1200	13
PINEY RIVER	PINE	5/18/93	1200	17
PINEY RIVER	PINE	5/20/93	1200	18
PINEY RIVER	PINE	5/25/93	1200	10
PINEY RIVER	PINE	6/8/93	1200	10
PINEY RIVER	PINE	6/14/93	1200	10
PINEY RIVER	PINE	6/22/93	1200	11
PINEY RIVER	PINE	6/28/93	1200	12
PINEY RIVER	PINE	6/28/93	2000	24
PINEY RIVER	PINE	6/29/93	0400	16
PINEY RIVER	PINE	6/29/93	2200	12
PINEY RIVER	PINE	6/29/93	1200	10
PINEY RIVER	PINE	6/30/93	0000	11
PINEY RIVER	PINE	6/30/93	0200	10
PINEY RIVER	PINE	6/30/93	0400	25
PINEY RIVER	PINE	6/30/93	0600	14
PINEY RIVER	PINE	6/30/93	0800	14
PINEY RIVER	PINE	6/30/93	1000	10
PINEY RIVER	PINE	6/30/93	1200	10
PINEY RIVER	PINE	6/30/93	2000	10
PINEY RIVER	PINE	7/1/93	0000	10
PINEY RIVER	PINE	7/1/93	0400	13
PINEY RIVER	PINE	7/1/93	1200	12
PINEY RIVER	PINE	7/1/93	2000	15
PINEY RIVER	PINE	7/2/93	0400	19
PINEY RIVER	PINE	7/2/93	0800	12
PINEY RIVER	PINE	7/2/93	1000	10
PINEY RIVER	PINE	7/2/93	1200	10
PINEY RIVER	PINE	7/2/93	1400	10
PINEY RIVER	PINE	7/2/93	1600	10
PINEY RIVER	PINE	7/2/93	1800	15
PINEY RIVER	PINE	7/2/93	2000	10
PINEY RIVER	PINE	7/3/93	0000	10
PINEY RIVER	PINE	7/3/93	1200	10
PINEY RIVER	PINE	7/4/93	1200	10
PINEY RIVER	PINE	7/5/93	1200	10
PINEY RIVER	PINE	7/6/93	1200	10
PINEY RIVER	PINE	7/13/93	1200	10
PINEY RIVER	PINE	7/20/93	1200	10
PINEY RIVER	PINE	7/27/93	1200	10
PINEY RIVER	PINE	8/3/93	1200	10
PINEY RIVER	PINE	8/5/93	1200	17
PINEY RIVER	PINE	8/5/93	2000	11
PINEY RIVER	PINE	8/6/93	0000	22
PINEY RIVER	PINE	8/6/93	1200	10

Appendix II Table 3C - Additional Aluminum Analyses

STREAM	SITE	DATE	TIME	T_AL
PINEY RIVER	PINE	8/6/93	1600	10
PINEY RIVER	PINE	8/6/93	1800	10
PINEY RIVER	PINE	8/6/93	2000	18
PINEY RIVER	PINE	8/6/93	2200	16
PINEY RIVER	PINE	8/7/93	0200	14
PINEY RIVER	PINE	8/7/93	0400	12
PINEY RIVER	PINE	8/7/93	0600	11
PINEY RIVER	PINE	8/7/93	0800	10
PINEY RIVER	PINE	8/7/93	1000	10
PINEY RIVER	PINE	8/10/93	1200	10
PINEY RIVER	PINE	8/17/93	1200	16
PINEY RIVER	PINE	8/24/93	1200	10
PINEY RIVER	PINE	8/31/93	1200	16
PINEY RIVER	PINE	9/1/93	1200	10
PINEY RIVER	PINE	9/7/93	1200	10
PINEY RIVER	PINE	9/14/93	1200	10
PINEY RIVER	PINE	9/21/93	1200	10
PINEY RIVER	PINE	9/28/93	1200	11
PINEY RIVER	PINE	10/5/93	1200	10
PINEY RIVER	PINE	10/12/93	1200	10
PINEY RIVER	PINE	10/19/93	1200	19
PINEY RIVER	PINE	10/26/93	1200	17
PINEY RIVER	PINE	11/26/93	1200	13
PINEY RIVER	PINE	11/26/93	2000	10
PINEY RIVER	PINE	11/27/93	0400	14
PINEY RIVER	PINE	11/27/93	1200	10
PINEY RIVER	PINE	11/27/93	1400	17
PINEY RIVER	PINE	11/27/93	1600	21
PINEY RIVER	PINE	11/27/93	1800	17
PINEY RIVER	PINE	11/27/93	2000	30
PINEY RIVER	PINE	11/27/93	2200	21
PINEY RIVER	PINE	11/28/93	0000	24
PINEY RIVER	PINE	11/28/93	0200	22
PINEY RIVER	PINE	11/28/93	0400	18
PINEY RIVER	PINE	11/28/93	0600	20
PINEY RIVER	PINE	11/28/93	0800	14
PINEY RIVER	PINE	11/28/93	1000	17
PINEY RIVER	PINE	11/28/93	1200	13
PINEY RIVER	PINE	12/3/93	2000	10
PINEY RIVER	PINE	12/4/93	0400	10
PINEY RIVER	PINE	12/4/93	1200	10
PINEY RIVER	PINE	12/4/93	2000	10
PINEY RIVER	PINE	12/5/93	0400	10
STAUNTON RIVER	STAN	10/1/92	1200	12
STAUNTON RIVER	STAN	10/8/92	1200	11
STAUNTON RIVER	STAN	10/15/92	1200	14
STAUNTON RIVER	STAN	10/22/92	1200	10
STAUNTON RIVER	STAN	10/29/92	1200	10
STAUNTON RIVER	STAN	11/5/92	1200	10
STAUNTON RIVER	STAN	11/12/92	1200	10
STAUNTON RIVER	STAN	11/19/92	1200	10
STAUNTON RIVER	STAN	11/26/92	1200	10

Appendix II Table 3C - Additional Aluminum Analyses

STREAM	SITE	DATE	TIME	T_AL
STAUNTON RIVER	STAN	3/4/93	1200	18
STAUNTON RIVER	STAN	3/5/93	1200	10
STAUNTON RIVER	STAN	3/16/93	1200	13
STAUNTON RIVER	STAN	3/19/93	1200	10
STAUNTON RIVER	STAN	3/23/93	1200	10
STAUNTON RIVER	STAN	3/26/93	1200	10
STAUNTON RIVER	STAN	4/6/93	1200	10
STAUNTON RIVER	STAN	4/13/93	1200	10
STAUNTON RIVER	STAN	4/20/93	1200	13
STAUNTON RIVER	STAN	4/27/93	1200	10
STAUNTON RIVER	STAN	5/4/93	1200	15
STAUNTON RIVER	STAN	5/11/93	1200	14
STAUNTON RIVER	STAN	5/18/93	1200	18
STAUNTON RIVER	STAN	5/20/93	1200	16
STAUNTON RIVER	STAN	5/25/93	1200	10
STAUNTON RIVER	STAN	6/1/93	1200	14
STAUNTON RIVER	STAN	6/8/93	1200	18
STAUNTON RIVER	STAN	6/14/93	1200	13
STAUNTON RIVER	STAN	6/20/93	1800	14
STAUNTON RIVER	STAN	6/22/93	1200	10
STAUNTON RIVER	STAN	6/28/93	2000	15
STAUNTON RIVER	STAN	6/29/93	0400	15
STAUNTON RIVER	STAN	6/29/93	1200	13
STAUNTON RIVER	STAN	6/29/93	1920	19
STAUNTON RIVER	STAN	6/29/93	2120	25
STAUNTON RIVER	STAN	6/29/93	2320	20
STAUNTON RIVER	STAN	6/30/93	0120	18
STAUNTON RIVER	STAN	6/30/93	0320	17
STAUNTON RIVER	STAN	6/30/93	0520	13
STAUNTON RIVER	STAN	6/30/93	0720	13
STAUNTON RIVER	STAN	6/30/93	1120	20
STAUNTON RIVER	STAN	6/30/93	1320	16
STAUNTON RIVER	STAN	6/30/93	2000	15
STAUNTON RIVER	STAN	7/1/93	0400	14
STAUNTON RIVER	STAN	7/1/93	1200	16
STAUNTON RIVER	STAN	7/1/93	1400	16
STAUNTON RIVER	STAN	7/1/93	1600	15
STAUNTON RIVER	STAN	7/1/93	2000	12
STAUNTON RIVER	STAN	7/2/93	0000	15
STAUNTON RIVER	STAN	7/2/93	0400	12
STAUNTON RIVER	STAN	7/2/93	0600	14
STAUNTON RIVER	STAN	7/2/93	0800	13
STAUNTON RIVER	STAN	7/2/93	1000	15
STAUNTON RIVER	STAN	7/2/93	1200	14
STAUNTON RIVER	STAN	7/2/93	1400	11
STAUNTON RIVER	STAN	7/2/93	1600	12
STAUNTON RIVER	STAN	7/2/93	1800	10
STAUNTON RIVER	STAN	7/2/93	2000	18
STAUNTON RIVER	STAN	7/3/93	0000	12
STAUNTON RIVER	STAN	7/3/93	1200	13
STAUNTON RIVER	STAN	7/3/93	2000	10
STAUNTON RIVER	STAN	7/3/93	0600	11

Appendix II Table 3C - Additional Aluminum Analyses

STREAM	SITE	DATE	TIME	T_AL
STAUNTON RIVER	STAN	7/4/93	0400	10
STAUNTON RIVER	STAN	7/4/93	2000	16
STAUNTON RIVER	STAN	7/5/93	2000	12
STAUNTON RIVER	STAN	7/6/93	1200	10
STAUNTON RIVER	STAN	7/13/93	1200	10
STAUNTON RIVER	STAN	7/20/93	1200	15
STAUNTON RIVER	STAN	7/27/93	1200	13
STAUNTON RIVER	STAN	8/3/93	1200	10
STAUNTON RIVER	STAN	8/5/93	1200	10
STAUNTON RIVER	STAN	8/5/93	2000	10
STAUNTON RIVER	STAN	8/6/93	0400	10
STAUNTON RIVER	STAN	8/6/93	1200	10
STAUNTON RIVER	STAN	8/6/93	1400	27
STAUNTON RIVER	STAN	8/6/93	1600	22
STAUNTON RIVER	STAN	8/6/93	1800	24
STAUNTON RIVER	STAN	8/6/93	2000	23
STAUNTON RIVER	STAN	8/6/93	2200	21
STAUNTON RIVER	STAN	8/7/93	0000	20
STAUNTON RIVER	STAN	8/7/93	0200	23
STAUNTON RIVER	STAN	8/7/93	0400	25
STAUNTON RIVER	STAN	8/7/93	0600	23
STAUNTON RIVER	STAN	8/7/93	0800	18
STAUNTON RIVER	STAN	8/7/93	1000	17
STAUNTON RIVER	STAN	8/7/93	1200	14
STAUNTON RIVER	STAN	8/10/93	1200	10
STAUNTON RIVER	STAN	8/17/93	1200	18
STAUNTON RIVER	STAN	8/24/93	1200	12
STAUNTON RIVER	STAN	8/31/93	1200	18
STAUNTON RIVER	STAN	9/7/93	1200	11
STAUNTON RIVER	STAN	9/14/93	1200	11
STAUNTON RIVER	STAN	9/20/93	1200	20
STAUNTON RIVER	STAN	9/21/93	0400	10
STAUNTON RIVER	STAN	9/21/93	0600	13
STAUNTON RIVER	STAN	9/21/93	0800	13
STAUNTON RIVER	STAN	9/21/93	1000	12
STAUNTON RIVER	STAN	9/21/93	1200	10
STAUNTON RIVER	STAN	9/28/93	1200	10
STAUNTON RIVER	STAN	10/5/93	1200	10
STAUNTON RIVER	STAN	10/12/93	1200	10
STAUNTON RIVER	STAN	10/19/93	1200	18
STAUNTON RIVER	STAN	10/26/93	1200	17
STAUNTON RIVER	STAN	11/26/93	1200	10
STAUNTON RIVER	STAN	11/26/93	2000	12
STAUNTON RIVER	STAN	11/27/93	0400	10
STAUNTON RIVER	STAN	11/27/93	1200	11
STAUNTON RIVER	STAN	11/27/93	1400	39
STAUNTON RIVER	STAN	11/27/93	1600	35
STAUNTON RIVER	STAN	11/27/93	1800	43
STAUNTON RIVER	STAN	11/27/93	2000	49
STAUNTON RIVER	STAN	11/27/93	2200	48
STAUNTON RIVER	STAN	11/28/93	0000	46
STAUNTON RIVER	STAN	11/28/93	0200	48

Appendix II Table 3C - Additional Aluminum Analyses

STREAM	SITE	DATE	TIME	T_AL
STAUNTON RIVER	STAN	11/28/93	0400	36
STAUNTON RIVER	STAN	11/28/93	0600	29
STAUNTON RIVER	STAN	11/28/93	1000	32
STAUNTON RIVER	STAN	11/28/93	1200	17
STAUNTON RIVER	STAN	11/28/93	1400	16
STAUNTON RIVER	STAN	11/28/93	1800	20
STAUNTON RIVER	STAN	11/28/93	2200	16
STAUNTON RIVER	STAN	11/29/93	0200	15
STAUNTON RIVER	STAN	11/29/93	0600	11
STAUNTON RIVER	STAN	11/29/93	1200	10
STAUNTON RIVER	STAN	11/29/93	1800	10
STAUNTON RIVER	STAN	11/30/93	0000	17
STAUNTON RIVER	STAN	12/3/93	2000	15
STAUNTON RIVER	STAN	12/4/93	0400	10
STAUNTON RIVER	STAN	12/4/93	1200	10
STAUNTON RIVER	STAN	12/4/93	2000	11
STAUNTON RIVER	STAN	12/5/93	0400	25
STAUNTON RIVER	STAN	12/5/93	0600	28
STAUNTON RIVER	STAN	12/5/93	0800	28
STAUNTON RIVER	STAN	12/5/93	1000	21
STAUNTON RIVER	STAN	12/5/93	1400	12
STAUNTON RIVER	STAN	12/5/93	1800	15
STAUNTON RIVER	STAN	12/6/93	0000	13
STAUNTON RIVER	STAN	12/6/93	0600	12

¹ SITE = site identification code

T_Al = total monomeric aluminum ($\mu\text{g L}^{-1}$)

² These analyses were obtained through a related, separately managed research project. Many of the samples were collected at the same sites and times as samples listed in Appendix II, Table 3A. The analysis method, which closely approximates the method listed in Appendix II, Table 1, is described in the following publications:

Dennis, T.E. , S. E. MacAvoy, M. B. Steg and A. J. Bulger. The association of water chemistry variables and fish condition in streams of Shenandoah National Park (USA). *Water, Air, and Soil Pollution*, 85: 365-370, 1995.

Dennis, T.E. The susceptibility of the Blacknose Dace, *Rhinichthys atratulus*, to acidification in Shenandoah National Park, M.S. Thesis, Department of Environmental Sciences, University of Virginia, 1995.

