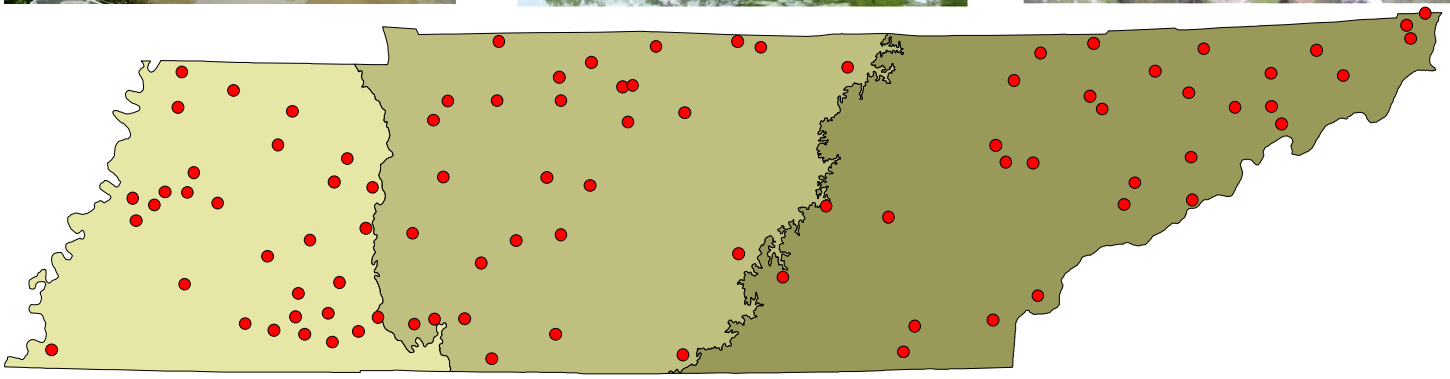
2007-8 PROBABILISTIC MONITORING OF WADEABLE STREAMS IN TENNESSEE

Volume 4: Water Chemistry

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By

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ACKNOWLEDGMENTS

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Tony Olsen with the USEPA Western Ecology Division in Corvallis, Oregon assisted with the statistical survey design and provided a subsample of randomly selected wadeable streams for each of the three regions. Barbara Rosenbaum, INDUS Corporation, contractor for EPA, assisted with the random selection process.

Water Pollution Control staff from the eight Environmental Field Offices conducted the field surveys which included reconnaissance, sample collection, field measurements and habitat assessments. The managers of these staff during the study period were:

Chattanooga EFO	Dick Urban	Johnson City EFO	Jeff Horton
Columbia EFO	Tim Wilder	Knoxville EFO	Paul Schmierbach
Cookeville EFO	Rob Howard	Memphis EFO	Terry Templeton
Jackson EFO	Pat Patrick	Nashville EFO	Joe Holland

The Tennessee Department of Health Inorganic Chemistry Laboratories in Knoxville, Nashville and Jackson analyzed the chemical samples. The director of the TDH chemistry and biological laboratories is Dr. Bob Read.

Cover photos of sample sites provided by Water Pollution Control staff in Jackson, Memphis, Nashville, Knoxville and Johnson City Environmental Field Offices.

1. INTRODUCTION

In 2000, the Water Pollution Control Division (WPC) began to incorporate probabilistic monitoring into its stream assessment program. The 2007 Wadeable Streams Assessment (WSA) study is a probabilistically-based survey of wadeable streams in Tennessee that builds upon EPA's 2004 Wadeable Streams Assessment survey of the nation's streams (USEPA, 2006). Biological, bacteriological, physical, and chemical data from a random sub-sampling of Tennessee streams were extrapolated to all wadeable streams in Tennessee. These data will provide a baseline to which future efforts can be compared, thus providing an opportunity for scientifically valid trend analysis.

For the purpose of this study, Tennessee was divided into three divisions based on level III ecoregions. Each ecoregion is defined as having similarity in key ecological factors such as soils, vegetation, climate, geology and physiography (Omernik, 1995). A random sample of 30 wadeable streams was selected in each division of the state for a total of 90 sites. Results of the study will be reported in 6 volumes. Details on the study design and site selection process can be found in Volume 2 of this report series.

This volume will present results of chemical and in-stream water quality measurements (field data). Field data included pH, dissolved oxygen, temperature, flow, and conductivity. Statewide results were compared to the 2004 National Wadeable Stream study. The purpose of this volume is only to present statistical comparisons of data and not assessments of use support which is presented in Volume 1. The chemical and field data for each site are provided in the appendices.

Kim Sparks collects winter quarter samples to determine nutrient levels in a wadeable stream. Samples are taken to the state laboratory for analyses.

Photo provided by Nashville Environmental Field Office.

2. WATER CHEMISTRY DATA

One of the objectives of the Tennessee wadeable streams assessment (WSA) was to collect quarterly (seasonal) chemical samples at each site. Sampling focused on nutrients and included total phosphorus, nitrate + nitrite, ammonia, total Kjeldahl nitrogen, total organic carbon and total suspended solids. Total phosphorus and nitrate + nitrite values were compared to numeric interpretations of narrative criteria for each ecoregion (Denton et al, 2001). These numeric translators will be referred to as criteria for the remainder of this report. The data for pH, temperature and dissolved oxygen were compared to Tennessee's general water quality criteria (Tennessee Water Quality Control Board, 2007). For other parameters, which fall under narrative criteria, descriptive statistics are compared for each season and division.

TDEC's Quality System Standard Operating Procedure for the Chemical and Bacteriological Sampling of Surface Water was followed for sample collection (TDEC, 2004). With the exception of west Tennessee, some sites were not sampled every season due to insufficient stream flow (Table 1). All samples were delivered to the Tennessee Department of Health Inorganic Chemistry Laboratories for analysis. Data are provided in Appendix A.

Table 1: Number of stations sampled each season.

Division	Winter	Spring	Summer	Fall
West	30	30	30	30
Middle	29	30	28	30
East	25	29	25	29
Total	84	89	83	89

Nutrients can enter streams from point and nonpoint sources. Point sources include municipal waste-water treatment plants, industrial discharges, concentrated livestock operations, urban stormwater, and home waste treatment systems. Nonpoint sources include soil erosion and runoff from crops, lawns, and pastures. Low nutrient levels limit the growth of algae and aquatic plants. When additional nutrients become available to the system, it stimulates aquatic plant growth.

Streams with elevated nutrient levels often have floating algal mats and clinging filamentous algae. This condition of nutrient enrichment and high plant productivity can result in low dissolved oxygen levels, which may then lead to a reduction in biological diversity. The sites with elevated nutrient levels may not be considered impaired unless there is also a biological response. Volume 1 further discusses assessments for the WSA sites and their impairment status.

a. Total Phosphorus Results

The concentrations of total phosphorus at WSA sites were compared to the criteria guidelines for their corresponding ecoregion (Table 2). These guidelines are based on the 90th percentile of total phosphorus levels at ecoregion reference sites. The percent of sites passing regional criteria for all seasons increased from west to east (Figures 1 and 2). Only seven percent of the sites in west Tennessee met criteria every season, while about one-third of the sites in east Tennessee met criteria every season. Statewide, eight sites failed total phosphorus criteria during every season. Twice as many sites met criteria during every season.

Table 2: Total phosphorus criteria guidelines for each ecoregion.

Division	Ecoregion	mg/L
West	65e, 65j	0.04
	74a	0.12
	74b	0.10
Middle	71e	0.04
	71f, 71g	0.03
	71h, 71i	0.18
East	66e, 66g	0.01
	66f, 68a, 69d, 69e	0.02
	67f, 68b	0.04
	67g	0.09

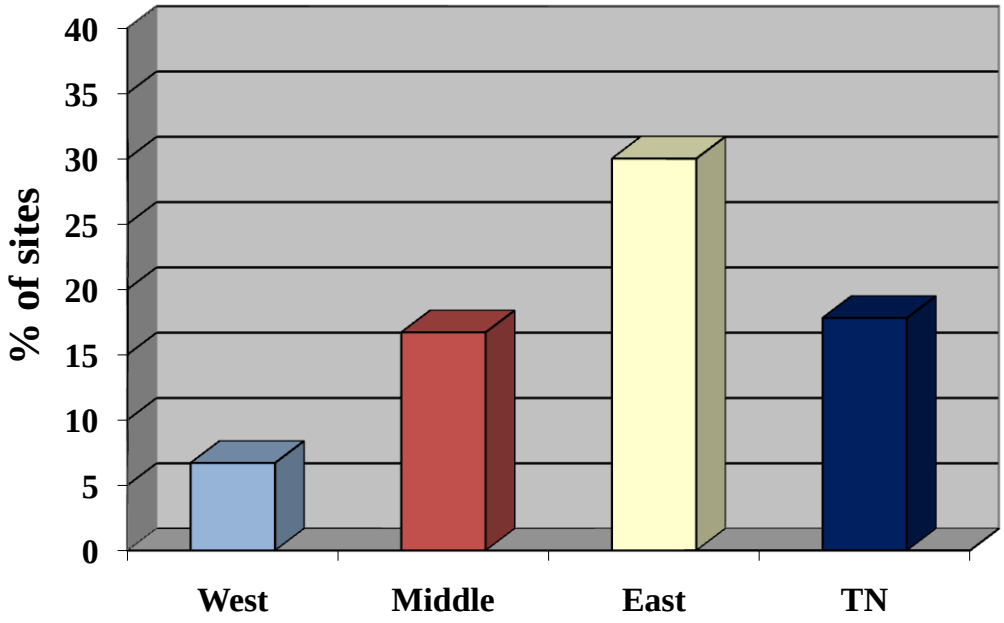

Figure 1: Percent of WSA sites meeting total phosphorus criteria for all seasons.

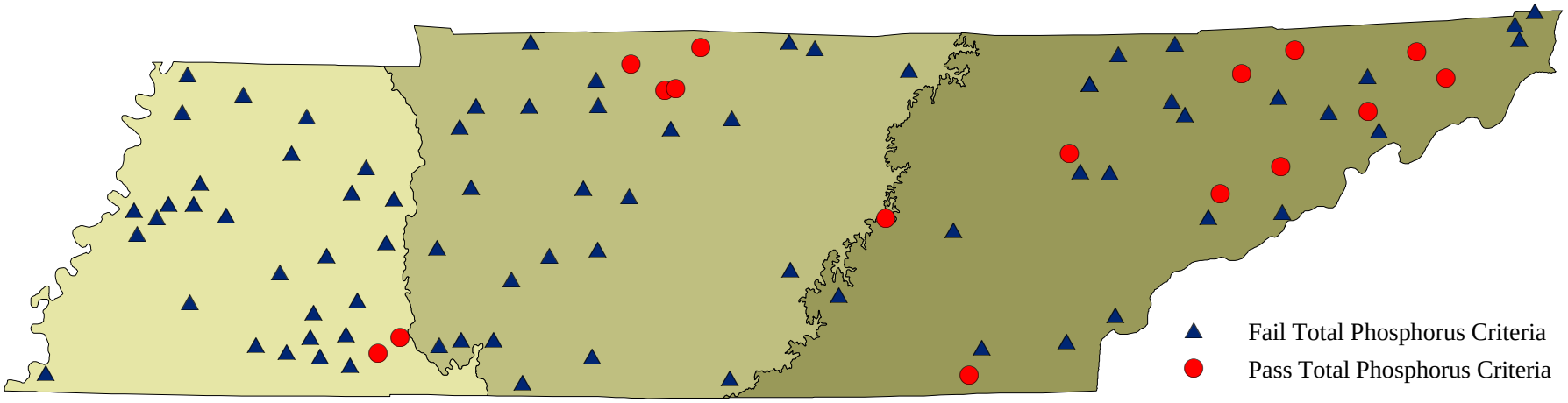

Figure 2: Location of sites that pass/fail criteria for total phosphorus for all seasons.

Statewide, most sites had a total phosphorus (TP) value above criteria at least once during the sample year (Table 3). For all seasons, the western division had the most number of sites failing guidelines.

Sites were most likely to have low phosphorus levels in the fall, when 73% passed criteria (Figure 3). This was the only season where the number of samples meeting criteria was fairly consistent across all three divisions. Spring had the second highest number of sites meeting criteria with 63% of sites at or below regional guidelines. There was more variance between divisions in spring. Only half of the sites during spring met TP criteria in the western division. Middle Tennessee had the highest number of sites passing criteria in the spring with percentages comparable to fall.

In summer, less than half of the sites met criteria statewide. East Tennessee was slightly better than the other divisions with 52% of the sites meeting phosphorus guidelines. Winter was the most likely season for streams to have elevated phosphorus in all three divisions. Statewide, less than one third of the sites passed criteria during the winter.

Several streams such as North Fork Lick Creek in Perry County failed to meet Total Phosphorus criteria in the winter season. *Photo provided by Columbia Environmental Field Office.*

Table 3: Number of seasonal samples above (>) criteria for total phosphorus.

	0 samples > criteria	1 sample > criteria	2 samples > criteria	3 samples > criteria	4 samples > criteria
West	2	5	11	9	3
Middle	5	8	10	5	2
East	9	8	4	6	3
TN	16	21	25	20	8

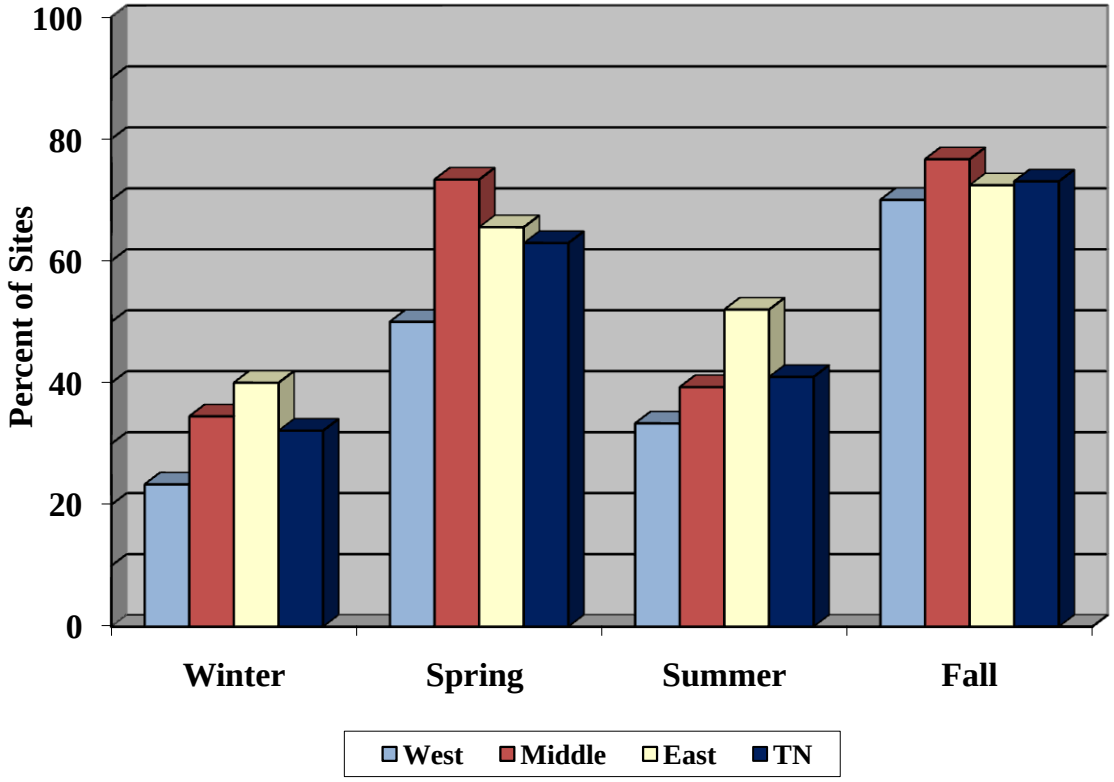

Figure 3: Percent of WSA sites that met total phosphorus criteria for each season.

b. Comparison of Total Phosphorus Results to National Probabilistic Study

Tennessee fell in two assessment regions in the National Wadeable Streams Assessment conducted in 2004 (EPA, 2006). Middle and east Tennessee were included in the Southern Appalachians. This region extended from Pennsylvania into Alabama, through the eastern portion of the Ohio Valley, and included the Ozark Mountains of Missouri, Arkansas and Oklahoma. West Tennessee was included in the Coastal Plains. This region covered the low-elevation areas of the East and Southeast, including the Atlantic and Gulf of Mexico coastal plains and the lowlands of the Mississippi Delta.

Samples were only collected once during the national study between July and November. This corresponds with summer and fall sampling during the state study, so only these seasons were used for comparison (Figure 4). Statewide, when compairing to the national study, a lower percentage of sites fell in the good category. Within the Southern Appalachian assessment region, east Tennessee scored better than the national study while middle Tennessee scored lower. Only half as many streams in west Tennessee met phosphorus guidelines when compared with the Coastal Plain assessment region.

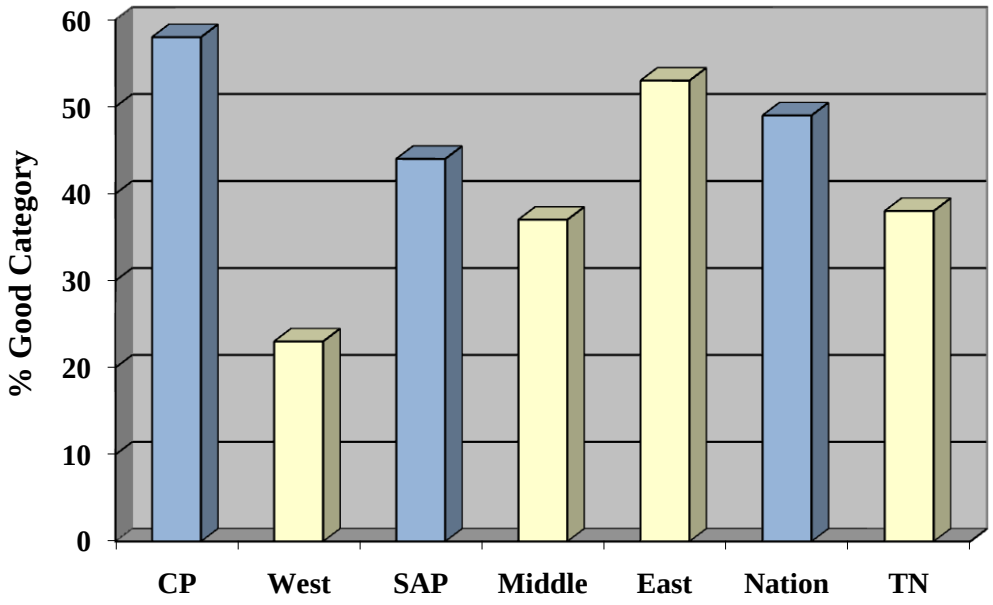

Figure 4: Comparison of 2004 national study (blue) and 2007 state probabilistic study (yellow) total phosphorus results July through November. SAP is Southern Appalachian**.** CP is Coastal Plain in the national study. Good category for state result (TN, East, Middle, West) is defined as passing total phosphorus criteria.

As shown previously, total phosphorus levels vary by season. The single sample collected at each site in the national study could have been collected either in summer or fall. If national trends in the Southern Appalachian and Coastal Plain assessment regions follow those in Tennessee streams, fall (October and November) TP levels are generally lower than summer (July and August). Depending on which season individual samples were collected during the national study, the results could have been shifted toward more or fewer streams falling in the good category (Figure 5).

Another potential problem with comparing data is that the national study grouped sites and reported results based on large areas which were aggregations of rather dissimilar Level III ecoregions (Figure 6). This resulted in a broadening of the definition of the reference condition. Also, the national study compaired results to the 75^{th} percentile of the reference condition, while the state study was comparing results to the 90^{th} percentile. The state study used nutrient guidelines for reference conditions that have been specifically refined and calibrated for smaller Level IV ecoregions (Figure 7).

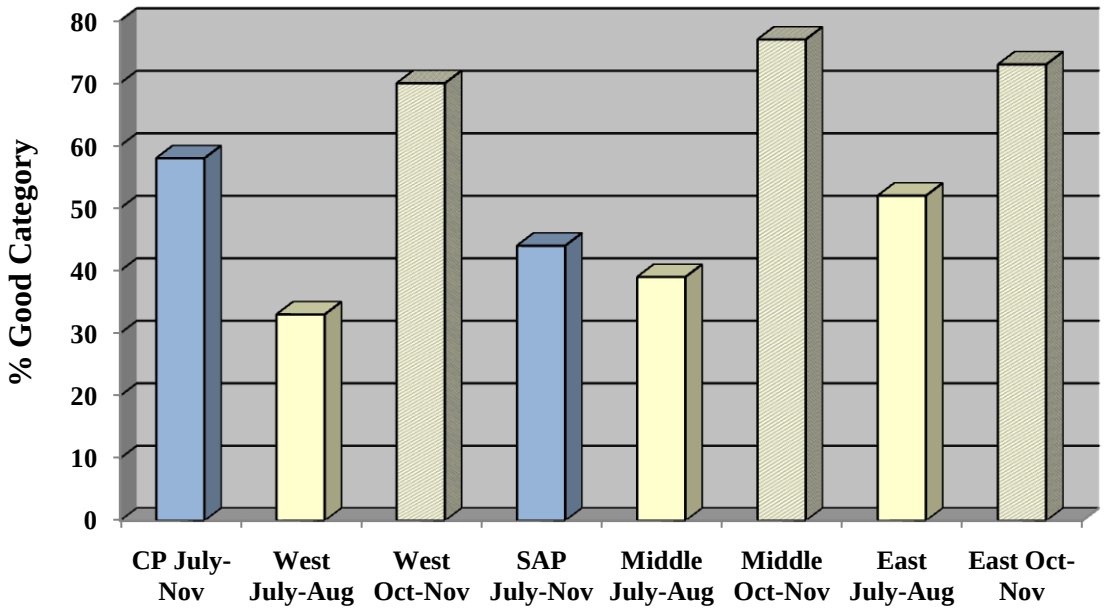

Figure 5: Comparison of total phosphorus results of national study with summer and fall data from the state study. SAP is Southern Appalachian and CP is Coastal Plain assessment regions from the national study. East, middle and west represent divisions in the state study.

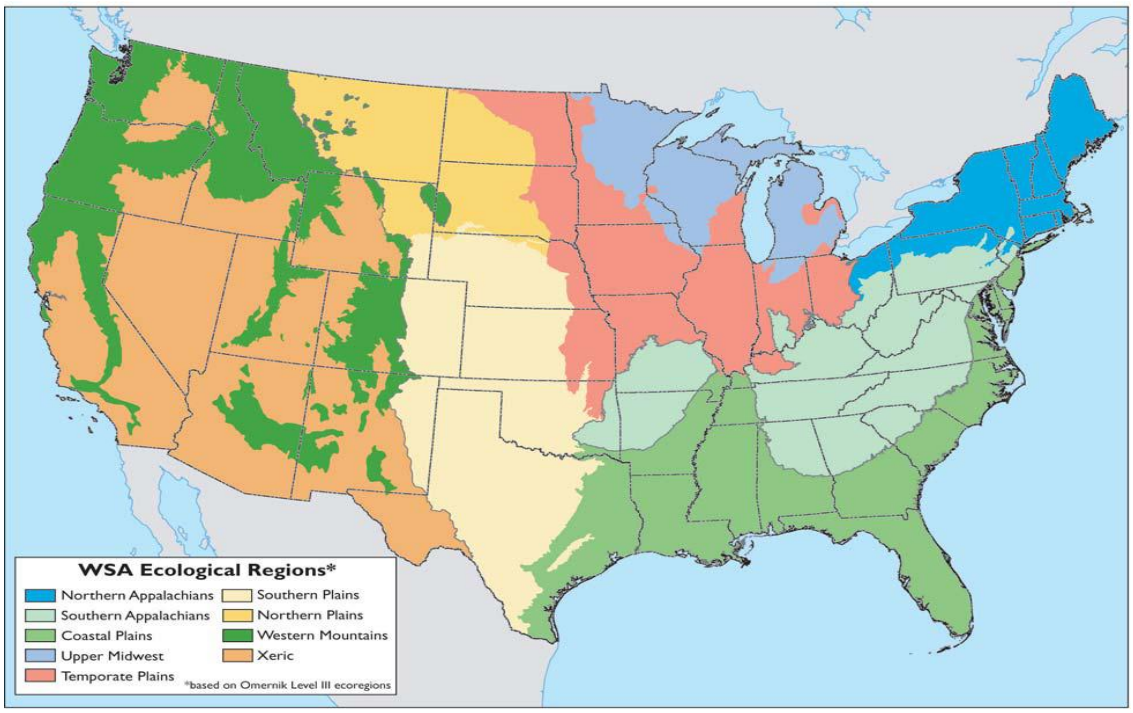

Figure 6: Aggregated ecoregions used in the 2004 national probabilistic study of wadeable streams. ***Map copied from EPA Wadeable Stream Assessment website.***

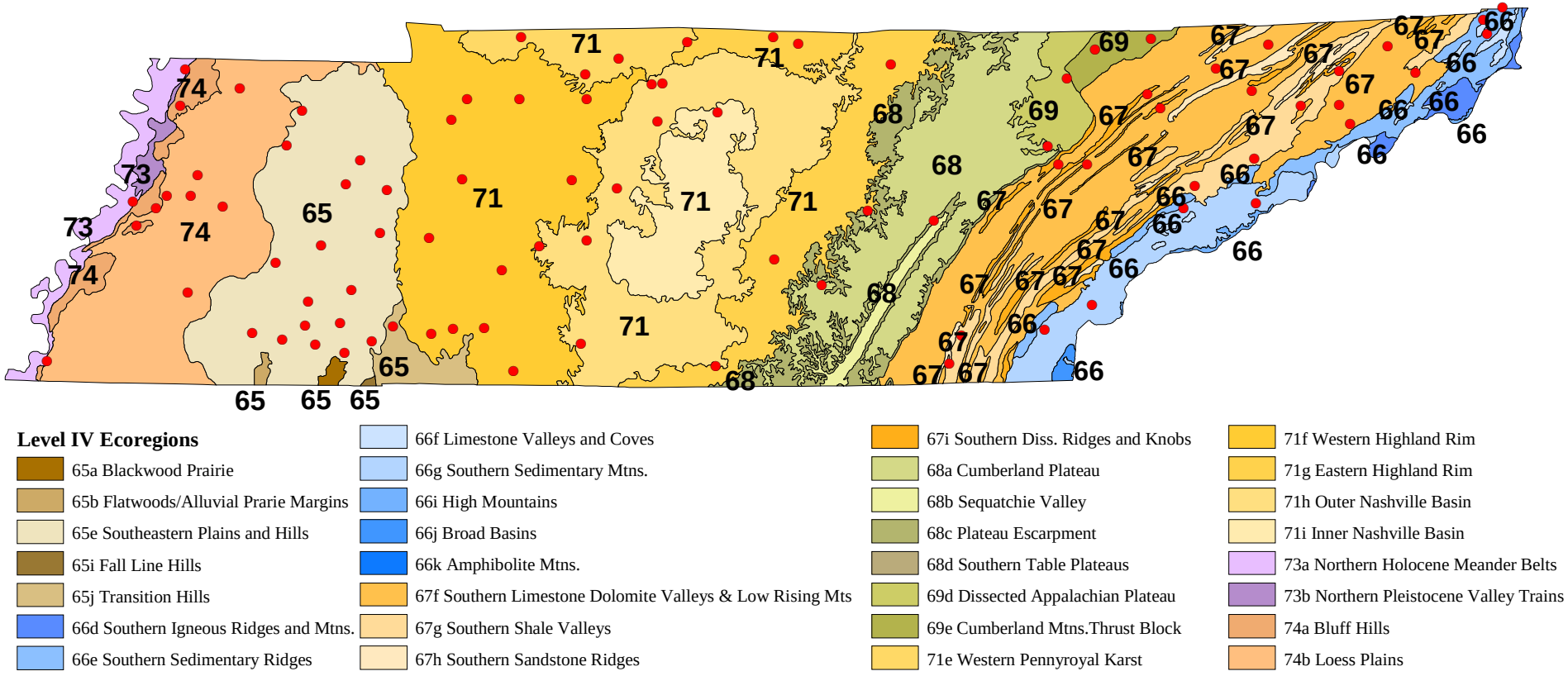

Figure 7: Level IV Ecoregions of Tennessee used in the 2007 state probabilistic study of wadeable streams.

c. Nitrate + Nitrite Results

The concentrations of nitrate + nitrite at the WSA sites were compared to the criterion for their corresponding ecoregion (Table 4). These guidelines are based on the 90th percentile of nitrate + nitrite levels at ecoregion reference sites.

Almost half of the sites in east and west Tennessee met criteria every season. Only about a fourth of the streams met criteria in middle Tennessee (Figures 8 and 9). Throughout the state, there were 56 streams that had at least one sample over the nitrate + nitrite criteria. It is important to note that nearly half of these streams were only elevated during one season. Only eight sites (9%) statewide were above criteria every season (Table 5). Six of these were in the middle division.

Table 4: Nitrate + Nitrite criteria for each ecoregion.

Division	Ecoregion	mg/L
West	65e	0.34
	65j	0.22
	74a	0.22
	74b	1.19
Middle	71e	3.48
	71f	0.32
	71g, 71h, 71i	0.92
East	66e, 66f, 66g	0.31
	67f, 67g	1.22
	68a	0.23
	68b	0.43
	69d, 69e	0.27

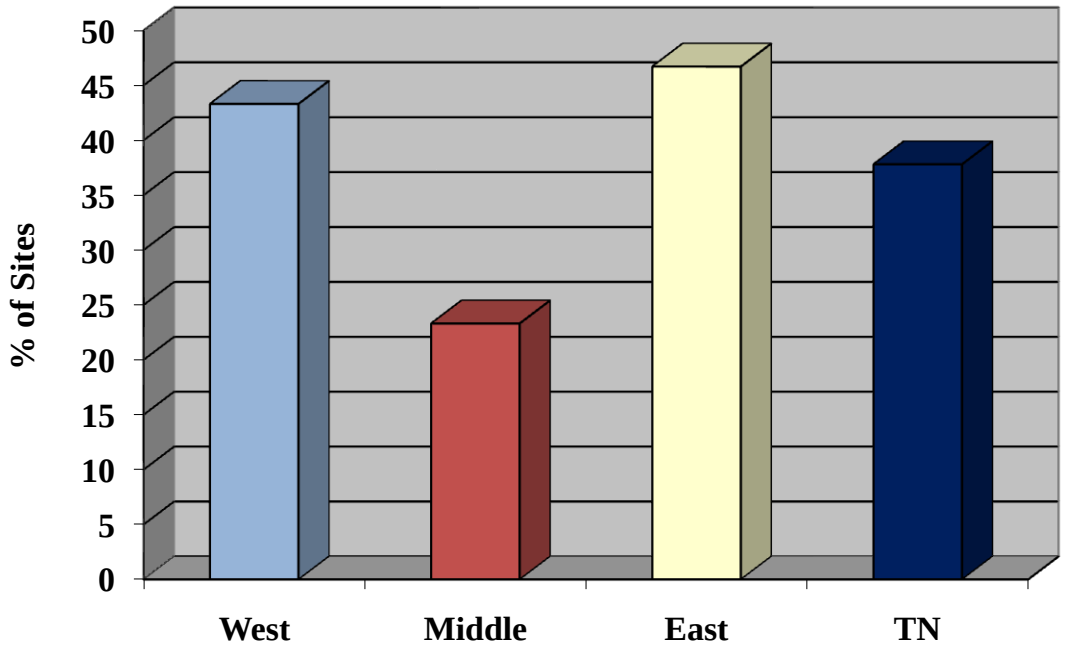

Figure 8: Percent of WSA sites that met nitrate + nitrite criteria for all seasons.

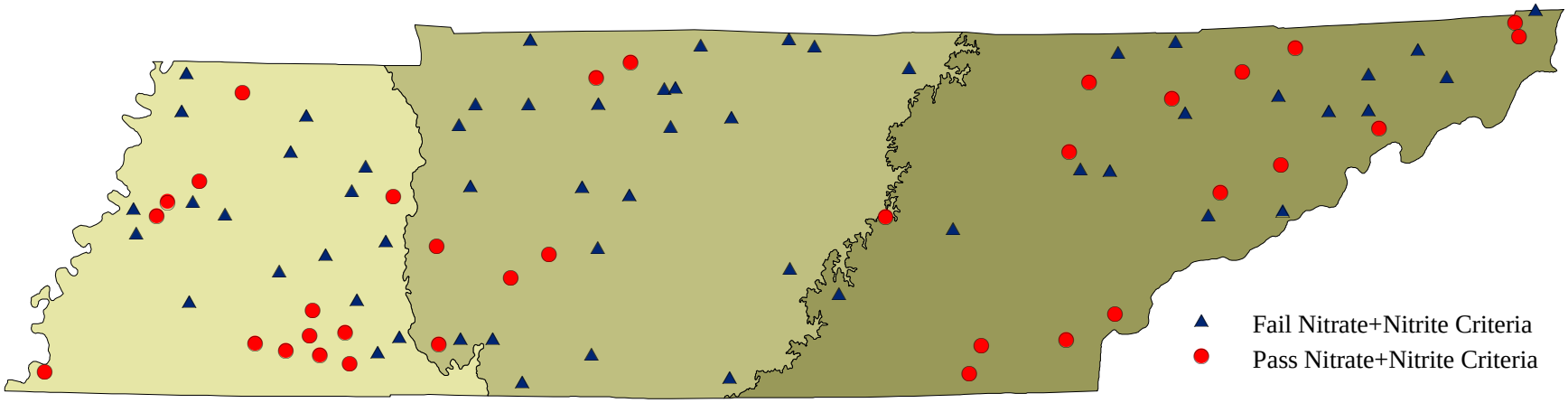

Figure 9. Location of sites that pass/fail criteria for Nitrate + Nitrite.

Seasonal and geographical patterns of nitrate+nitrite levels were very different from those for total phosphorus (Figure 10). Streams in west Tennessee were the most likely to pass criteria in every season. Middle Tennessee streams were the most likely to have elevated levels of nitrate+nitrite in every season except summer, when east Tennessee streams were more likely to exceed criteria.

Statewide, summer and fall had the most streams meeting criteria. Summer was the only season that was consistent between divisions. Almost all (90%) of the west Tennessee streams met criteria in the fall while only about half (57%) of the streams in middle Tennessee met criteria.

Winter had the fewest streams meeting criteria in all divisions. Only about half of the sites passed statewide. Less than a third of the streams in middle Tennessee met criteria in winter.

Middle Tennessee streams were the most likely to have elevated nitrate+nitrite. West Fork Hickory Creek in Coffee County was above criteria for the Eastern Highland Rim (71g) in every season. *Photo provided by Columbia Environmental Field Office.*

Table 5: Number of seasonal samples above (>) criteria for Nitrate+Nitrite.

	0 samples > criteria	1 sample > criteria	2 samples > criteria	3 samples > criteria	4 samples > criteria
West	13	12	1	3	1
Middle	7	9	3	5	6
East	14	5	4	5	2
TN	34	26	8	13	9

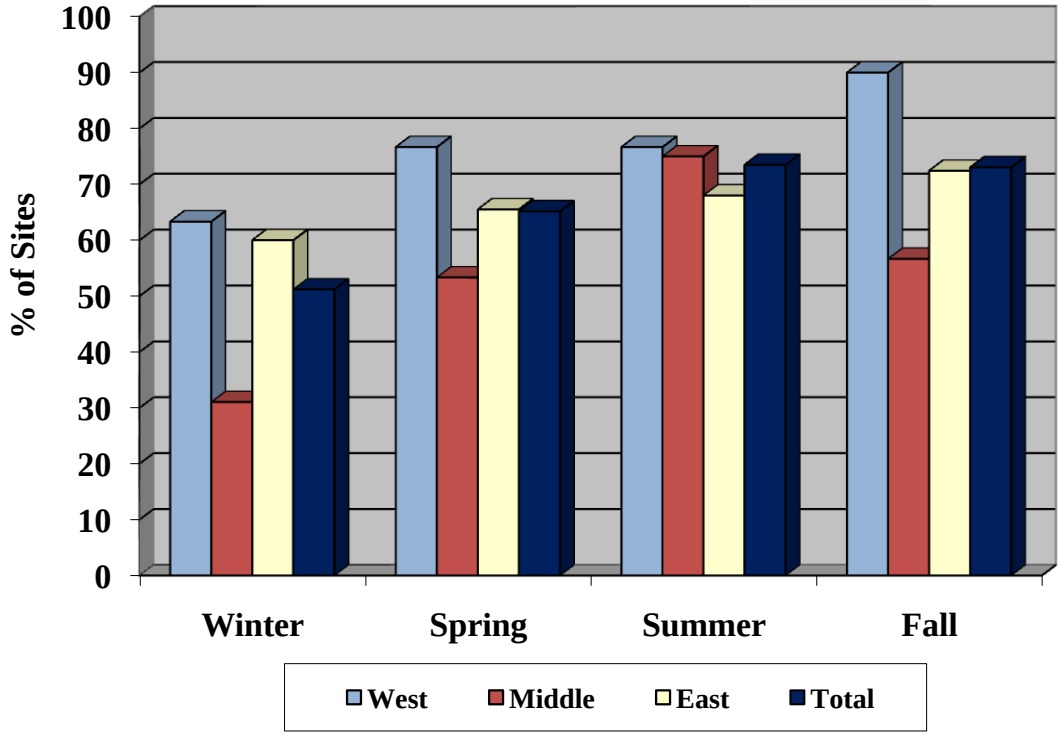

Figure 10: Percent of WSA sites that met Nitrate + Nitrite criteria for each season.

d. Comparison of Nitrate + Nitrite Results to National Probabilistic Study

Since national study sites were sampled between July and November, only the summer and fall state collections were used for comparison (Figure 11). Tennessee streams were more likely to fall in the good category for nitrate+nitrite in all divisions during these months. Seasonal variation between summer and fall did not substantially affect results, except in middle Tennessee, where the number of streams in the good category was only slightly higher than the national study during the fall.

The same issues that affect direct comparisons between the two studies for total phosphorus apply for nitrate+nitrite. In addition, the national study used total nitrogen which includes total Kjeldahl nitrogen (organic nitrogen + ammonia), nitrates, and nitrites. Total Kjeldahl nitrogen was below detection levels at two-thirds of the sites in July through November in the state study, so nitrate+nitrite levels are generally the same as total nitrogen. Total nitrogen was most different from nitrate+nitrite levels in the western division (Figure 12).

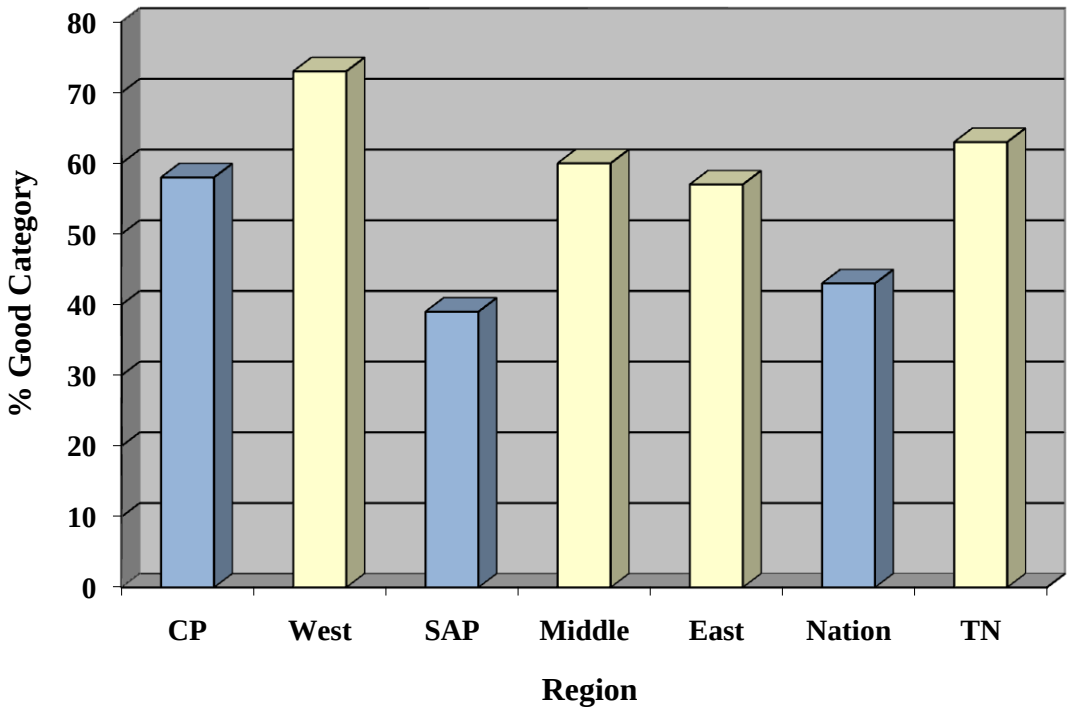

Figure 11: Comparison of 2004 national study (blue) and 2007 state probabilistic study (yellow) Nitrate+Nitrite results July through November. SAP is Southern Appalachian**.** CP is Coastal Plain in the national study. National study results are total nitrogen. Good category for state results (TN, East, Middle, West) is defined as passing nitrate+nitrite criteria.

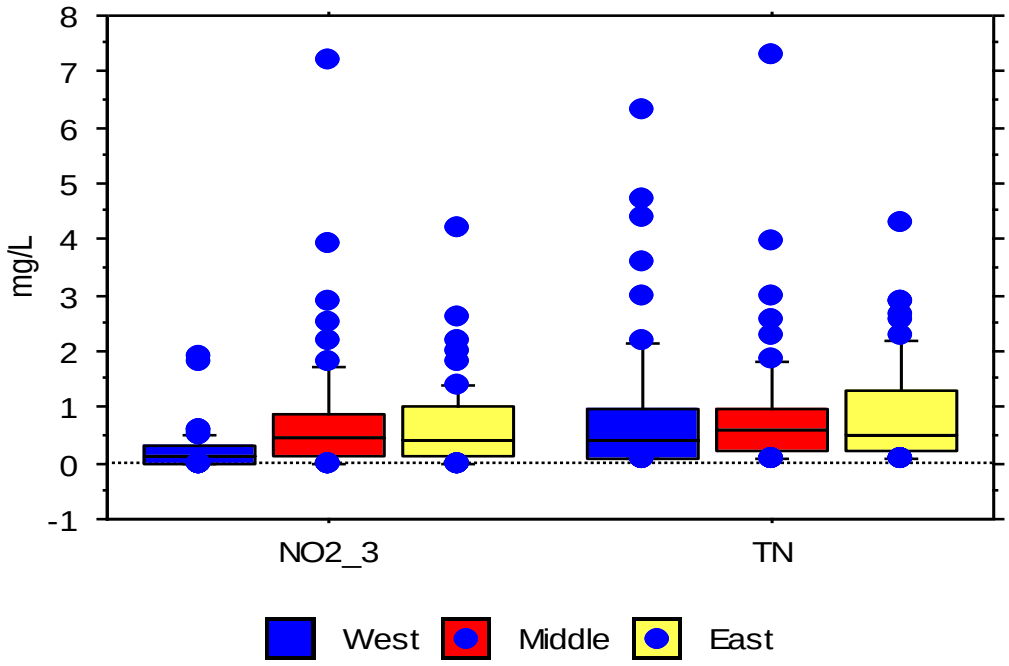

Figure 12: Comparison of Nitrate+Nitrite (NO2_3) and Total Nitrogen (TN) results for samples collected July through November 2007 for the state probabilistic study.

e. Ammonia –N (as Nitrogen)

Ammonia exists in the aquatic environment in two forms. One is an un-ionized form (NH_3) and the other is an ionized form (NH_4^+). The state lab tests for total ammonia nitrogen, which is a total of both forms. The form of ammonia greatly depends on the pH of the water and to a lesser extent the temperature. More and more ammonia will become present in the un-ionized form as the pH and temperature rise. The un-ionized form is much more toxic to fish and aquatic insects than the ionized form. With the presence of oxygen and specialized forms of bacteria, the ammonia will be converted to nitrites which are then converted to nitrates.

Ammonia was below detection limits every season at two-thirds of the stations. Ammonia levels were highest in west Tennessee (Table 6). Over half of the west Tennessee streams had detectable ammonia levels (Figure 13). Ammonia was only found in three middle Tennessee streams. Ammonia was most likely to be measurable in spring (Figure 14).

Table 6: Summary Statistics for Ammonia (measured in mg/L as Nitrogen).

Division	Season	Min	Max	Mean	Stand. Dev.
West	Winter	<0.03	1.0	0.063	0.184
	Spring	<0.03	0.32	0.053	0.081
	Summer	<0.03	1.2	0.109	0.274
	Fall	<0.03	1.0	0.064	0.196
	Total	<0.03	**1.2**	**0.072**	**0.184**
Middle	Winter	<0.03	<0.03	<0.03	0
	Spring	<0.03	0.066	0.018	0.011
	Summer	<0.03	0.03	0.016	0.003
	Fall	<0.03	0.24	0.022	0.039
	Total	<0.03	**0.24**	**0.018**	**0.013**
East	Winter	<0.03	<0.03	<0.03	0.001
	Spring	<0.03	0.82	0.057	0.151
	Summer	<0.03	0.14	0.03	0.039
	Fall	<0.03	0.03	0.015	0.002
	Total	<0.03	**0.82**	**0.029**	**0.048**
Tennessee	Winter	<0.03	1.0	0.031	0.062
	Spring	<0.03	0.82	0.043	0.081
	Summer	<0.03	1.2	0.052	0.105
	Fall	<0.03	1.0	0.034	0.079
	Total	<0.03	**1.2**	**0.04**	**0.082**

<0.03 values are below the detection limit of 0.03 mg/L. For these, a value of 0.015 was used for calculating the mean and standard deviation.

Western division streams were the most likely to have detectable ammonia levels. Poplar Creek in Haywood County had the highest ammonia concentrations.

Photo provided by Jackson Environmental Field Office.

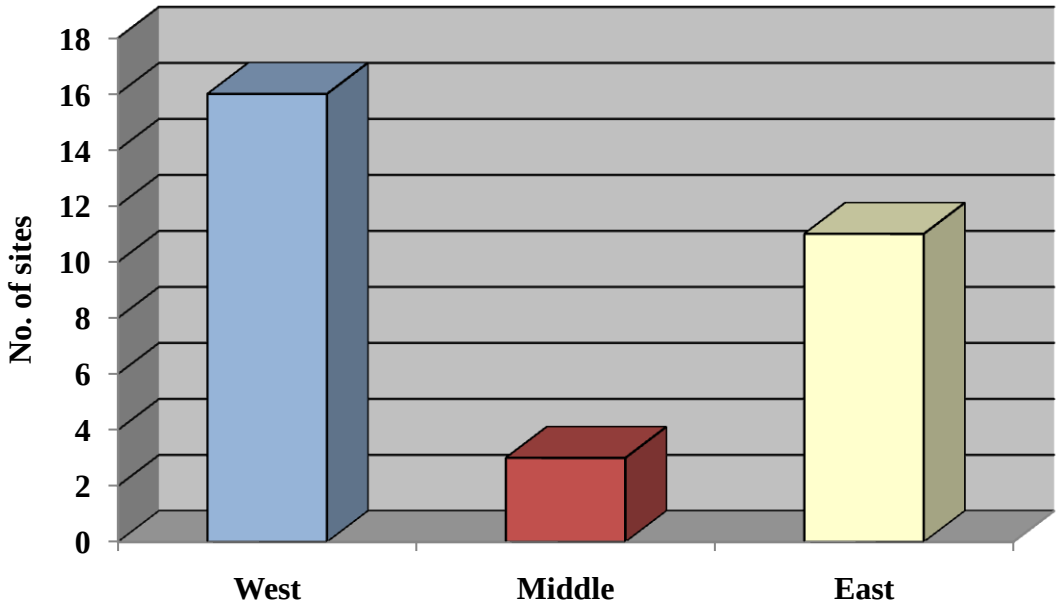

Figure 13: Number of WSA sites in each division with detectable Ammonia levels.

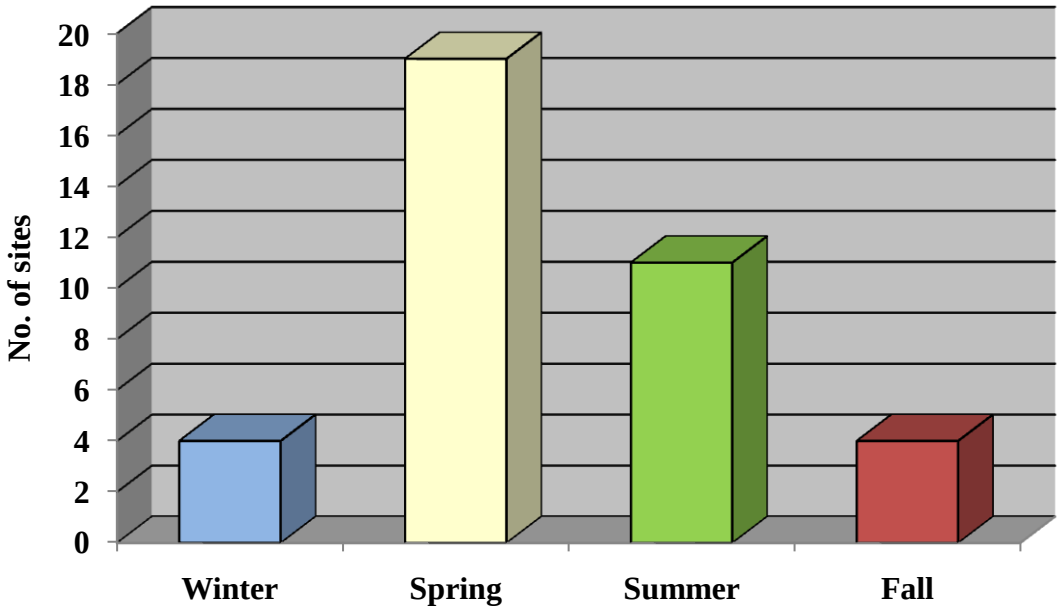

Figure 14: Number of WSA sites per season with detectable Ammonia levels.

f. Total Kjeldahl Nitrogen (TKN)

Total Kjeldahl Nitrogen is a sum of ammonia + organic nitrogen. Approximately half of the sites had detectable levels of TKN at least one season. The TKN levels were the lowest in middle Tennessee and were highest in west Tennessee (Table 7). All but two of the streams in west Tennessee had measureable levels of TKN at least one season (Figure 15). Summer had the highest mean TKN concentrations statewide. However, TKN was most likely to be detected in the spring (Figure 16).

Table 7: Summary Statistics for Total Kjeldahl Nitrogen (measured in mg/L).

Division	Season	Min	Max	Mean	Stand. Dev.
West	Winter	<0.15	3.7	0.48	0.80
	Spring	<0.15	1.7	0.41	0.36
	Summer	<0.15	4.4	0.85	1.22
	Fall	<0.15	4.7	0.47	0.92
	Total	<0.15	**4.7**	**0.52**	**0.83**
Middle	Winter	<0.15	<0.15	<0.15	0
	Spring	<0.15	0.42	0.13	0.10
	Summer	<0.15	0.58	0.11	0.13
	Fall	<0.15	0.85	0.13	0.17
	Total	<0.15	**0.85**	**0.11**	**0.10**
East	Winter	<0.15	0.93	0.11	0.17
	Spring	<0.15	1.10	0.25	0.27
	Summer	<0.15	1.19	0.26	0.36
	Fall	<0.15	0.68	0.09	0.97
	Total	<0.15	**1.19**	**0.18**	**0.22**
Tennessee	Winter	<0.15	3.7	0.22	0.32
	Spring	<0.15	1.7	0.26	0.24
	Summer	<0.15	4.4	0.41	0.57
	Fall	<0.15	4.7	0.23	0.40
	Total	<0.15	**4.7**	**0.28**	**0.38**

<0.15 values are below the detection limit of 0.15 mg/L. For these, a value of 0.075 was used for calculating the mean and standard deviation.

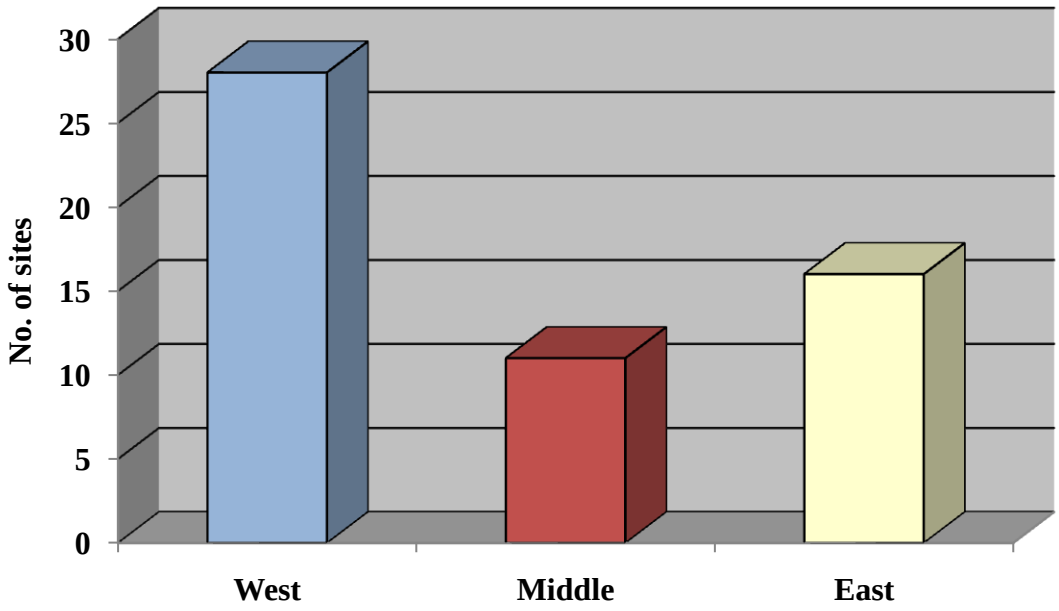

Figure 15: Number of WSA sites in each division with detectable TKN levels.

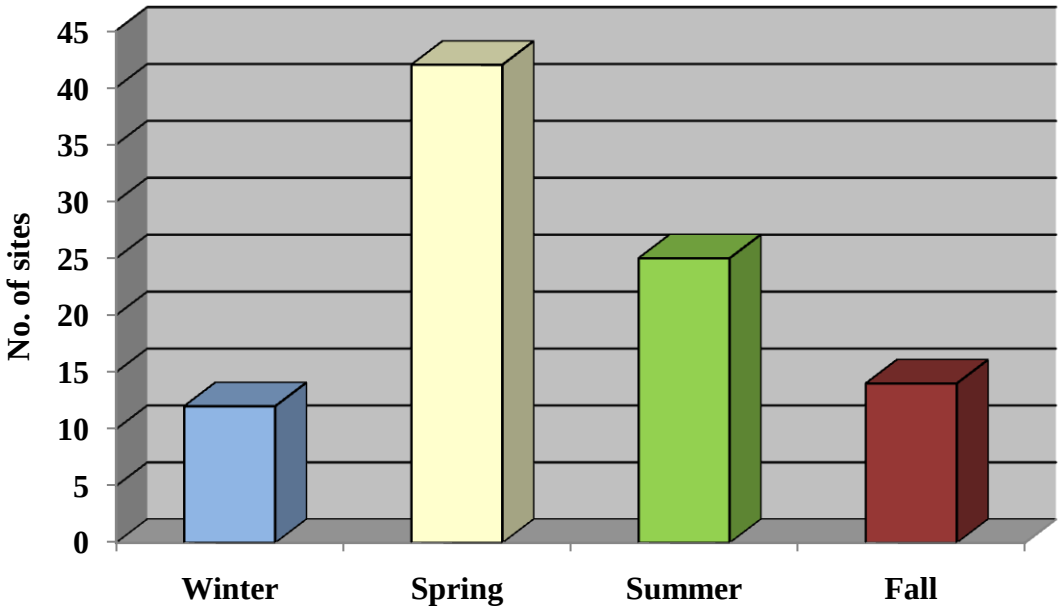

Figure 16: Number of WSA sites per season with detectable TKN levels.

g. Total Suspended Solids (TSS)

Total suspended solids (TSS) can include a wide variety of material, such as silt and decaying organic matter. High TSS can block light from reaching submerged vegetation and reduce photosynthesis and oxygen production. If light is completely blocked from bottom dwelling plants, the plants stop producing oxygen and will die. High TSS can also cause an increase in surface water temperatures because suspended particles absorb heat from sunlight. Pollutants such as bacteria, nutrients, pesticides and metals may attach to sediment particles and be transported to the water where they are released or carried further downstream. A decrease in water clarity caused by TSS can affect the ability of aquatic life to see and catch food. Suspended sediment can clog gills, reduce growth rates, and prevent egg and larval development. When suspended solids settle to the bottom of a stream, they cause a reduction in habitat availability.

Mean TSS levels in west Tennessee were three to four times higher than the other divisions (Table 8). Over 80% of the streams in west Tennessee had measureable suspended solids (Figure 17). Less than one fourth of the streams in the other two divisions had detectable suspended solid levels. Statewide, levels were highest in the spring and lowest in the fall, although this varied between divisions (Figure 18).

Table 8: Summary Statistics for Total Suspended Solids (measured in mg/L).

Division	Season	Min	Max	Mean	Stand. Dev.
West	Winter	<10	312	26.7	57.9
	Spring	<10	260	23.9	46.2
	Summer	<10	137	28.0	33.6
	Fall	<10	37	10.5	8.2
	Total	**<10**	**312**	**22.3**	**36.5**
Middle	Winter	<10	12	5.1	.9
	Spring	<10	11	5.2	1.1
	Summer	<10	35	7.3	6.8
	Fall	<10	13	5.6	2.0
	Total	**<10**	**35**	**5.8**	**2.7**
East	Winter	<10	82	11.3	18.3
	Spring	<10	47	7.6	8.7
	Summer	<10	21	6.4	4.2
	Fall	<10	23	5.9	3.4
	Total	**<10**	**82**	**7.8**	**8.7**
Tennessee	Winter	<10	312	14.4	25.7
	Spring	<10	260	12.2	18.7
	Summer	<10	137	13.9	14.9
	Fall	<10	37	7.3	4.5
	Total	**<10**	**312**	**12.0**	**16.0**

<0.03 values are below the detection limit of 0.03 mg/L. For these, a value of 0.015 was used for calculating the mean and standard deviation.

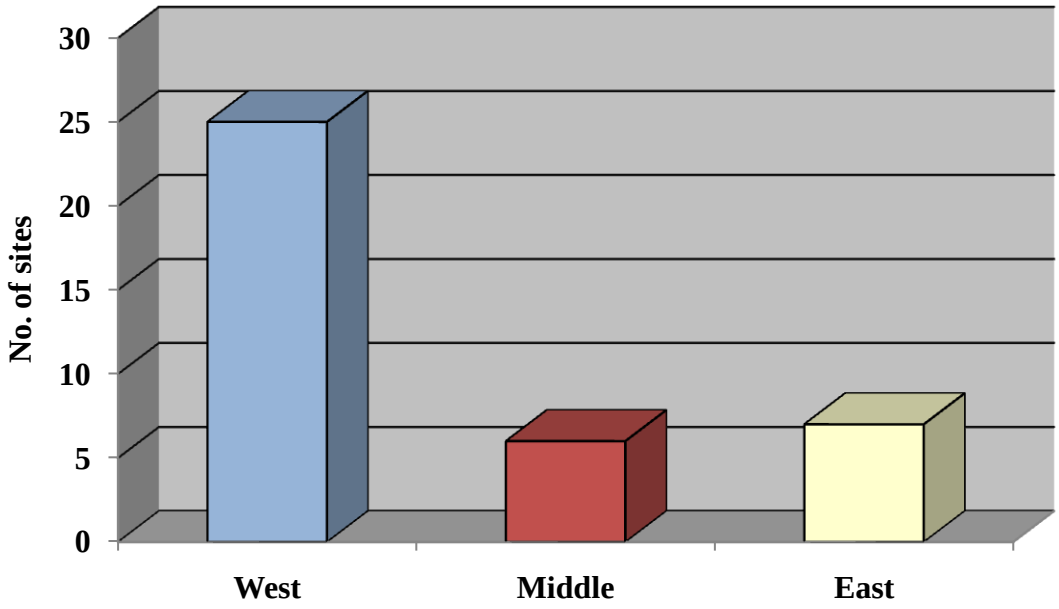

Figure 17: Number of WSA sites in each division with detectable TSS levels.

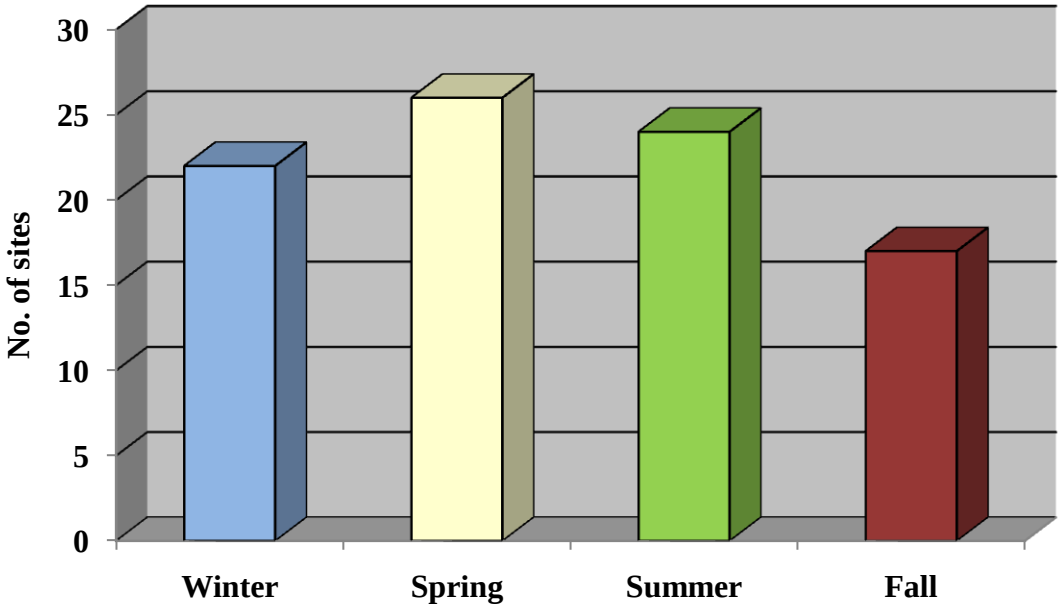

Figure 18: Number of WSA sites per season with detectable TSS levels.

h. Total Organic Carbon (TOC)

Total organic carbon is a measurement of the amount of carbon that is bound in organic compounds. TOC can be derived from decaying vegetation, bacterial growth, and metabolic activities of living organisms. Other sources of TOC can include agricultural chemicals such as herbicides and insecticides and also wastewater treatment plants. The amount of carbon in a freshwater stream is an indicator of the organic character of the stream. High organic content can increase the growth of microorganisms which contribute to the depletion of oxygen.

West Tennessee streams had the highest levels of TOC and the most variability between stations (Table 9). The TOC in the western division was about three times greater than the other two divisions. This could be due to the large amount of cropland and agricultural runoff. Middle and east Tennessee were fairly comparable in distribution of TOC levels (Figure 19). Statewide, there was little variability in TOC concentrations across seasons (Figure 20).

Table 9: Summary statistics for Total Organic Carbon (measured in mg/L)

Division	Season	Min	Max	Mean	Stand. Dev.
West	Winter	0.60	12.0	3.63	2.82
	Spring	0.66	9.9	3.55	2.32
	Summer	0.56	13.0	4.31	3.59
	Fall	0.55	18.0	5.14	4.41
	Total	**0.55**	**18.0**	**4.15**	**3.39**
Middle	Winter	<0.1	1.8	.96	.46
	Spring	.38	3.3	1.21	.65
	Summer	<0.1	4.0	1.23	1.0
	Fall	<0.1	4.5	1.52	.96
	Total	**<0.1**	**4.5**	**1.23**	**.77**
East	Winter	.53	4.5	1.30	.91
	Spring	.66	2.9	1.33	.68
	Summer	.58	3.5	1.55	.79
	Fall	<0.1	3.6	1.46	.96
	Total	**<0.1**	**4.5**	**1.41**	**.84**
Tennessee	Winter	<0.1	12	1.98	1.39
	Spring	.38	9.9	2.03	1.22
	Summer	<0.1	13	2.40	1.8
	Fall	<0.1	24	2.91	2.49
	Total	**<0.1**	**24**	**2.33**	**1.73**

<0.1 values are below the detection limit of 0.1 mg/L. For these, a value of 0.05 was used for calculating the mean and standard deviation.

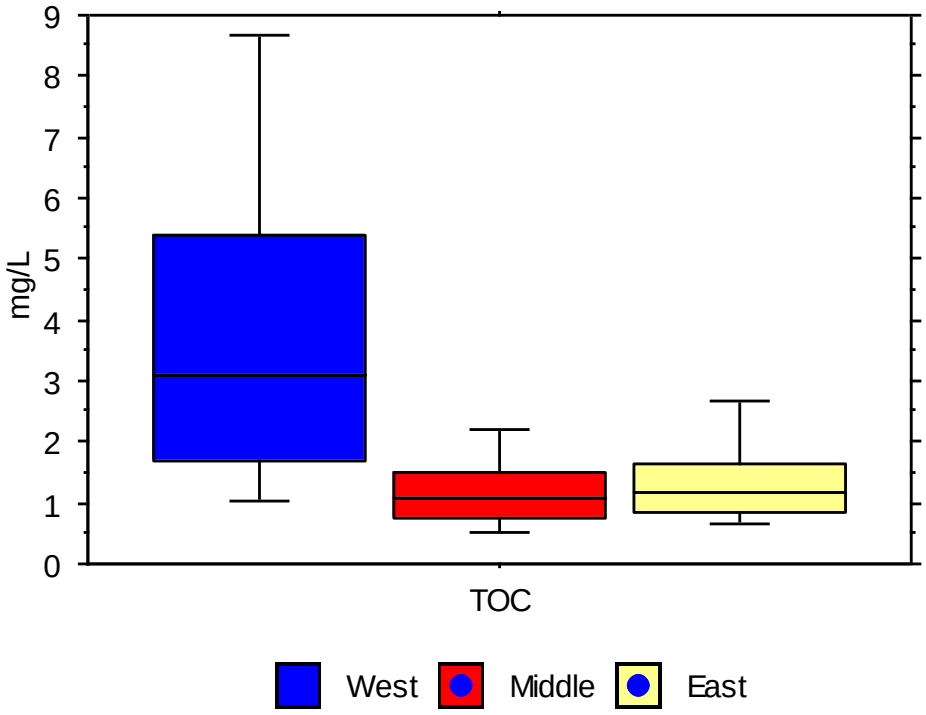

Figure 19: Distribution of TOC levels across divisions at WSA stations.

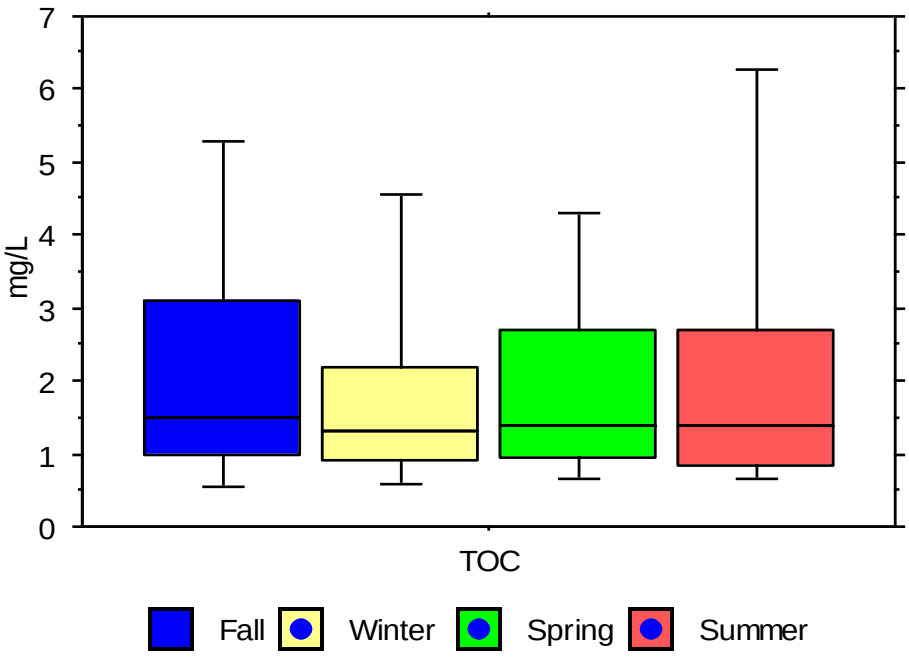

Figure 20: Distribution of TOC levels across seasons at WSA stations.

3. FIELD DATA

Field measurements of pH, dissolved oxygen, temperature and conductivity were taken concurrent with sampling. Data are presented in Appendix C.

a. pH

Low pH, elevated alkalinity, or a significant change in the pH or acidity of the water over a relatively short period of time, can greatly impact aquatic life. The effects include respiratory or osmoregulatory failure, inability to molt and alteration of habitat through precipitation of metals. Generally, pH levels below 5.5 increase the toxicity of metals while pH above 9 increases the toxicity of ammonia.

According to the general water quality criteria, pH values for wadeable streams must be within the range of 6.0 to 9.0 (TWQCB, 2007). The majority of probabilistic sites met pH criteria during all four seasons (Figure 21). Middle Tennessee was the only division where all pH measurements were within the 6.0 to 9.0 range every season. Only five sites between the other two divisions did not meet criteria (Table 10). All pH measurements that violated criteria were on the acidic side (below a pH of 6.0). During winter, every sample in the state passed pH criteria (Figure 22). Summer had the most sites that failed to meet the pH criteria.

Table 10: Seasonal pH at WSA sites that did not meet criteria.

Station	Division	Eco-region	HUC	pH			
				Winter	Spring	Summer	Fall
BIRCH000.6JO	East	66e	06010102	6.0	6.22	5.42	5.11
COSBY012.2CO	East	66g	06010106	8.11	5.96	5.54	6.31
HAWKI002.1CR	West	65e	08010203	6.47	6.79	5.06	4.88
HROCK002.4CR	West	65e	06040005	6.40	7.27	6.43	5.79
NFFDE1T1.5HE	West	65e	08010205	6.23	6.75	5.74	6.79

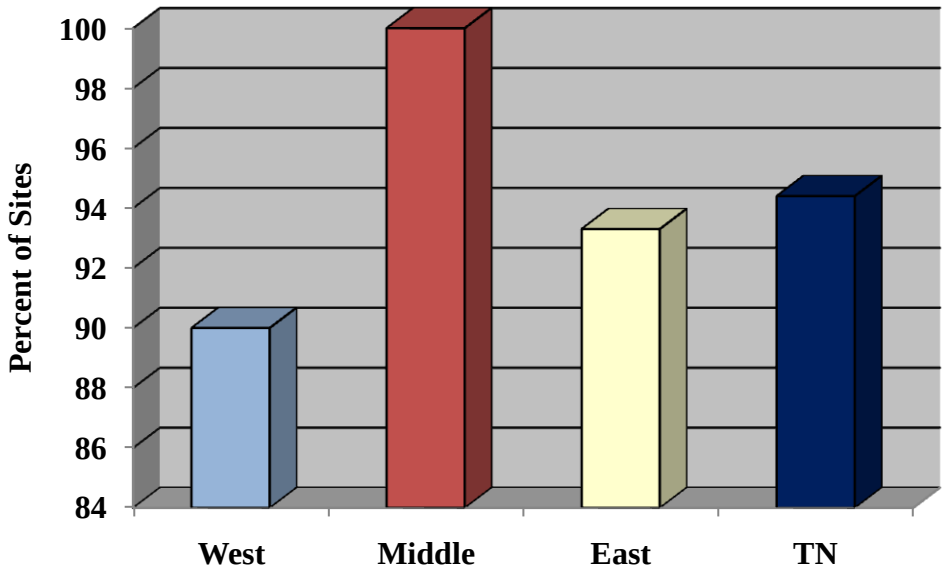

Figure 21: Percent of WSA sites that met pH criteria for all seasons.

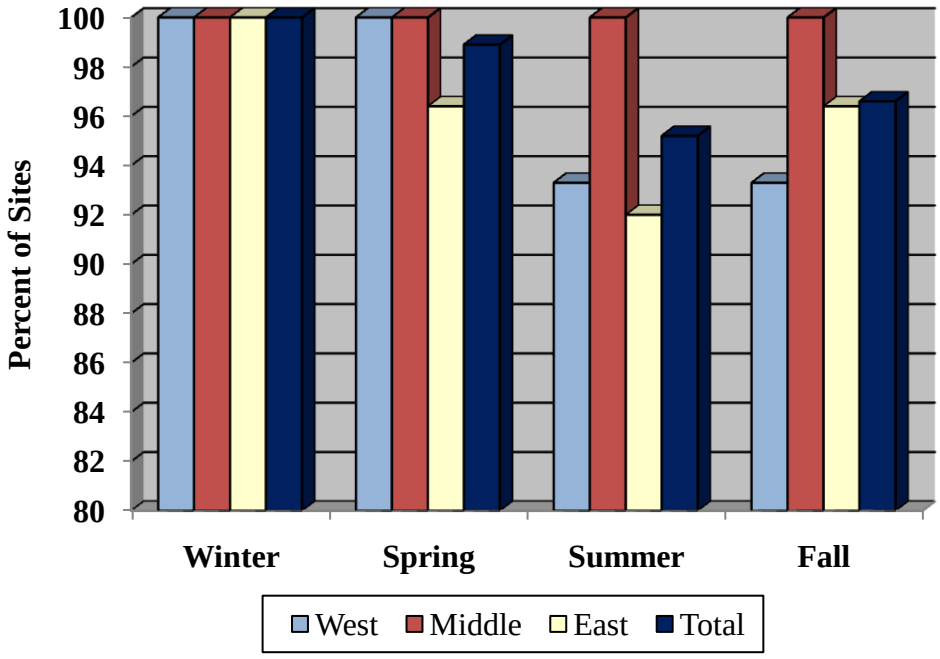

Figure 22: Percent of WSA sites that met pH criteria for each season.

b. Dissolved Oxygen

Adequate dissolved oxygen (DO) in streams is critical for healthy biological populations. Low levels of dissolved oxygen may be caused by decay of organic material, a disruption of photosynthesis of algae, inflow of substantial amounts of ground water, or reduced stream flow.

According to Tennessee's water quality criteria, the dissolved oxygen concentrations in most surface waters should not be less than 5.0 mg/L to support fish and aquatic life (TWQCB, 2007). The exceptions are trout streams where the minimum is 6.0 mg/L, streams in the Blue Ridge Mountains (7.0 mg/L), and naturally reproducing trout streams (8.0 mg/L).

Dissolved oxygen criteria were met during all seasons at 64 (71%) of the sites (Figure 23). In west Tennessee, less than half of the sites met criteria, while in middle and east Tennessee, 83% of sites met criteria. Four streams in the study were naturally reproducing trout streams in the Blue Ridge Mountains of east Tennessee, which had a DO requirement of 7.0 mg/L. Only one of these streams failed to meet the criterion.

DO levels varied seasonally with colder months having the highest levels. In winter all sites met DO criteria. Only one site had low DO in spring. Cold water has the ability to hold more dissolved oxygen than warm water. As the temperature of water increases, the solubility of oxygen gas in the water decreases, resulting in a lower DO capacity during the hotter times of the year. Also, as the temperature of water rises, the activity of fish and aquatic life that consume DO rises and requires more oxygen to support their metabolism than in cooler times. In all three divisions, the summer had the most sites with low DO followed by fall (Figure 24).

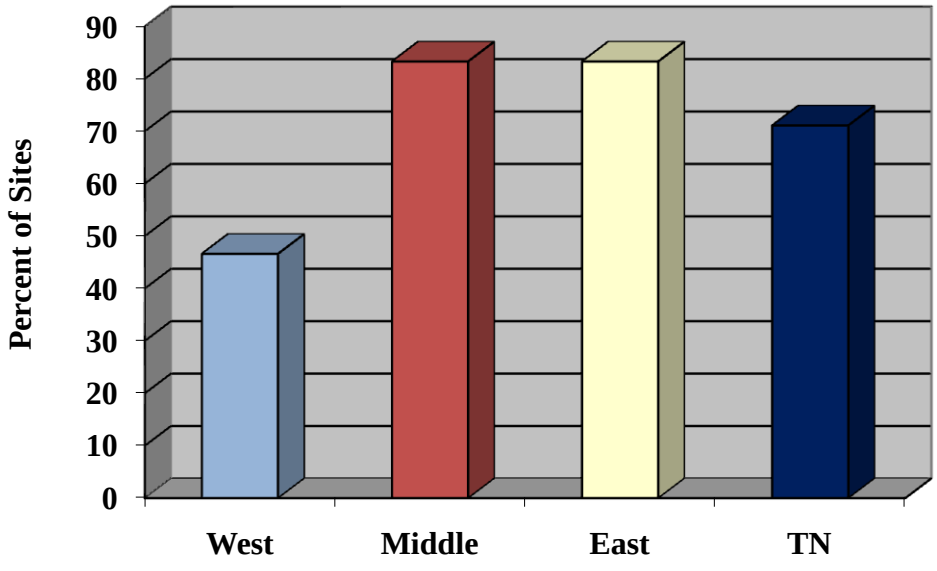

Figure 23: Percent of WSA sites that met DO criteria for all seasons.

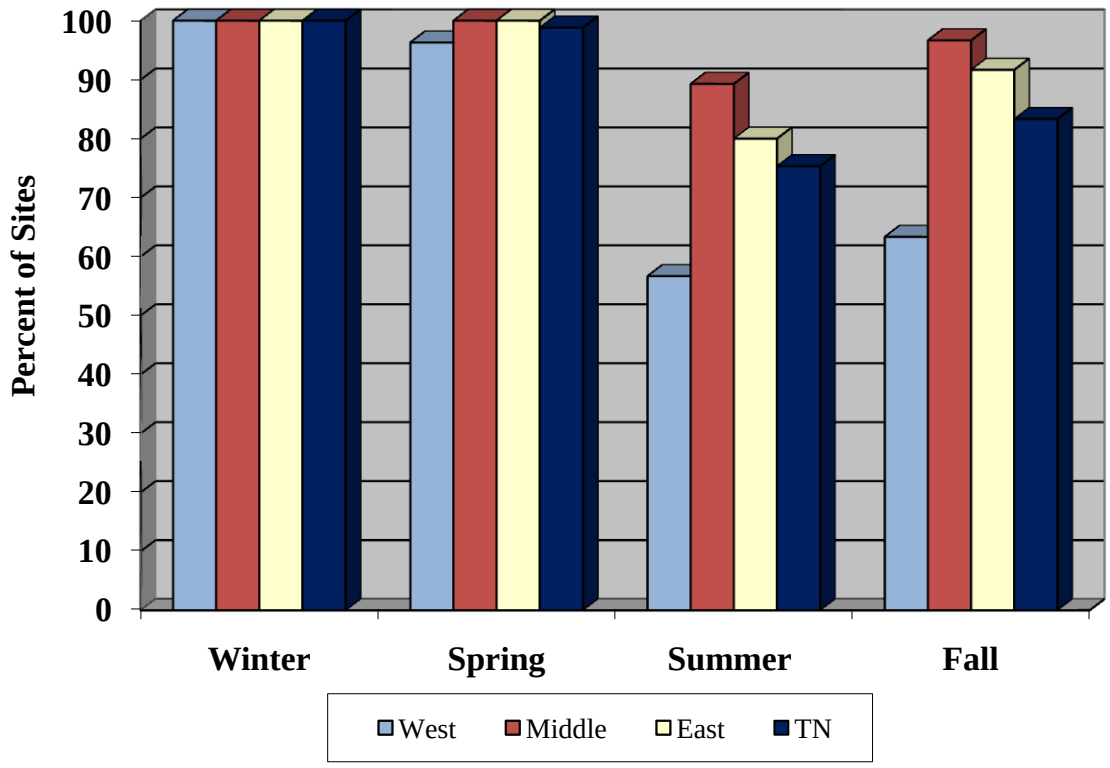

Figure 24: Percent of WSA sites that met DO criteria for each season.

c. Temperature

Water temperature is an important component of the aquatic environment. It is a key factor in determining the distribution, diversity and abundance of aquatic life. Most species have a preferred temperature range. Metabolism, growth, emergence and reproduction are directly related to temperature. Water temperature also affects dissolved oxygen levels and the susceptibility of benthic fauna to parasites.

According to Tennessee's water quality criteria for the support of fish and aquatic life in wadeable streams, the temperature shall not exceed 30.5°C (TWQCB, 2007). The maximum temperature in trout streams and tributaries of trout streams should not exceed 20°C. None of the trout streams included in the study exceeded this criterion. There were only two streams that had a recorded temperature higher than criteria for fish and aquatic life. One was in the middle division and the other was in the western division during summer.

Natural water temperatures are extremely variable in different ecoregions. Water temperatures that are acceptable in lowland parts of the state would not support many of the benthic macroinvertebrates and fish in the mountain areas. Likewise, these streams would be too cold for lowland species to thrive.

The water temperatures at the probabilistic monitoring sites were compared to the ecoregion reference sites for each season. Boxplots comparing the seasonal temperature ranges for ecoregions and divisions can be found in Appendix D. During winter and spring, temperatures at the WSA sites were comparable to the ecoregion reference sites in all three divisions of the state. Summer and fall had the greatest temperature differences between reference sites and WSA sites. For these two seasons, temperatures at the WSA streams were generally higher than the reference sites, except in east Tennessee during the summer. This could be attributed to drought conditions and elevated air temperatures. According to the National Climatic Data Center, air temperatures during 2007 were much above normal in middle and west Tennessee and above normal in east Tennessee (Figure 25).

Fall had the greatest difference between the median ecoregion reference and median WSA temperatures. The middle division had the greatest difference in fall temperatures, with the median water temperature for the WSA streams 5.9°C warmer than the median for ecoregion reference streams (Figure 26). Summer had the next greatest difference followed by winter and spring. This pattern was true for all three divisions of the state.

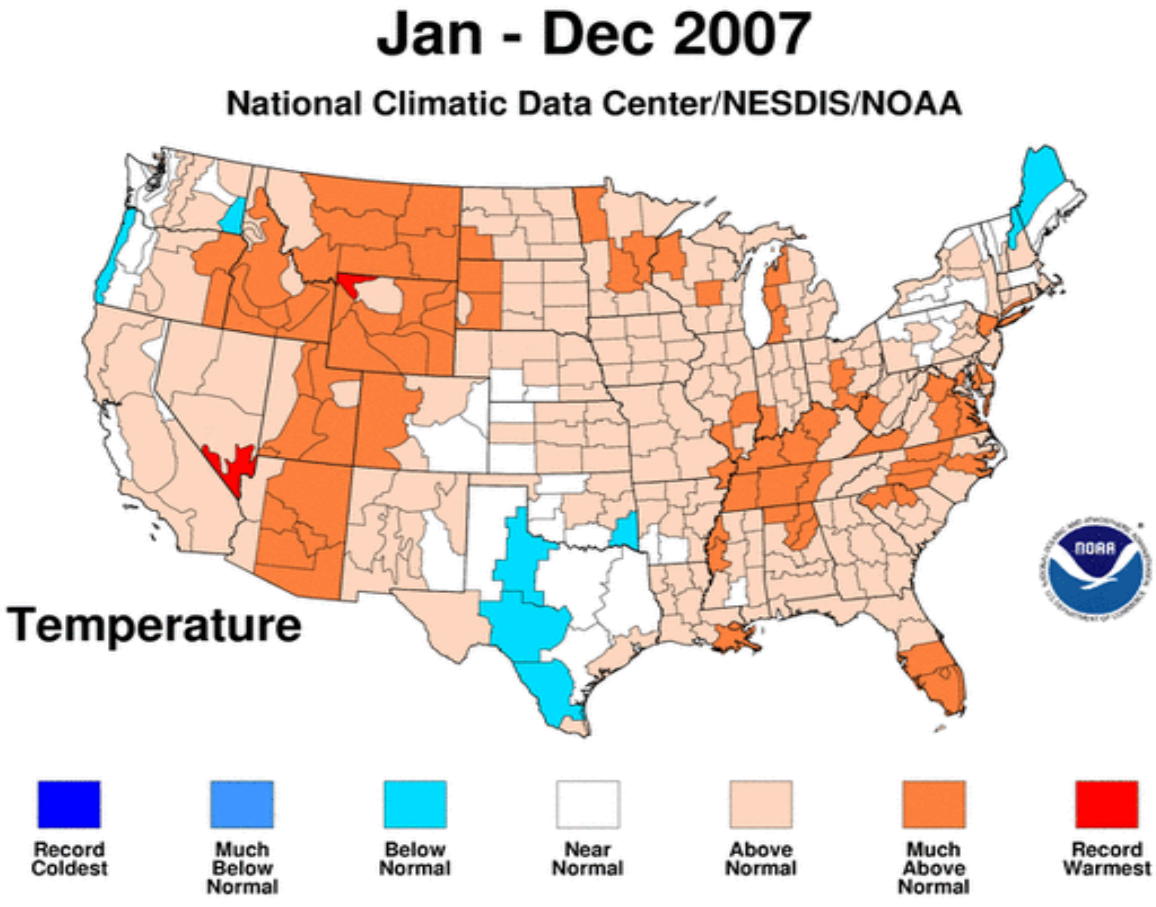

Figure 25: U.S. divisional temperature ranks in 2007. *Map copied from NOAA National Climatic Data Center Website*

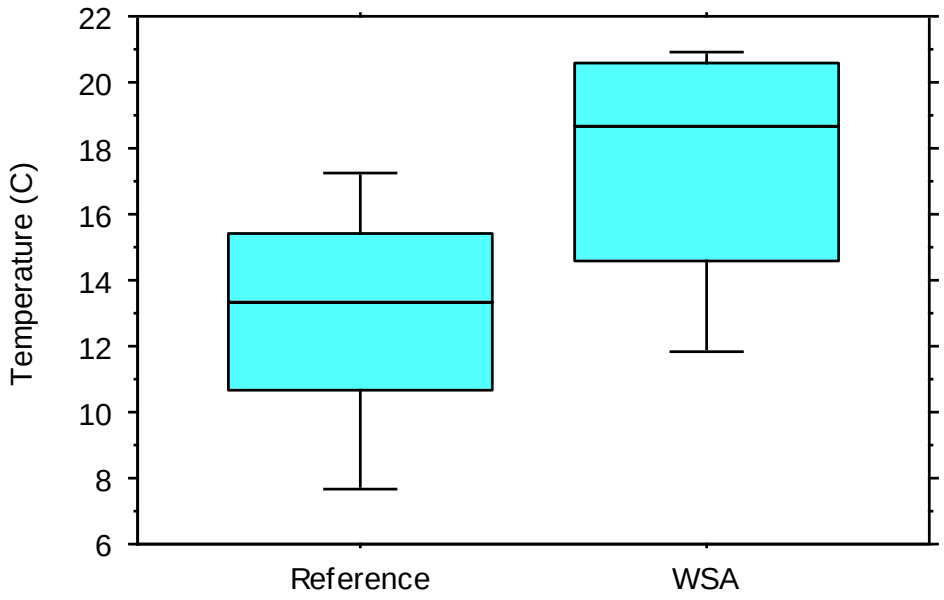

Figure 26: Fall water Temperature ranges for reference and WSA sites in middle Tennessee.

d. Stream Flow

Stream flow measurements were taken in conjunction with nutrient sampling as well as some of the bacteriological samples. Flow was measured in cubic feet per second (CFS). The flow at the probabilistic sites ranged widely due to stream size and rainfall fluctuations (Table 11). The streams vary in size from a first order with a drainage of 0.1 square mile to a fourth order with a drainage of 159 square miles.

Drought also had an effect on stream flow. Statewide, this was most apparent in the summer when seven streams were dry and four had flow less than 0.01 cfs. However streams in east Tennessee were equally likely to be affected in summer, fall and winter with approximately 16% of streams having little or no flow (Figure 27). Only two sites in middle Tennesee, one in winter and one in summer, were dry. Spring was the only season that all study sites had flow.

Table 11: Summary Statistics for Stream Flow (measured in CFS).

Division	Season	Minimum	Maximum	Mean	Stand. Dev.
West	Winter	0.02	300.06	18.47	54.1
	Spring	0.15	312.17	20.54	55.6
	Summer	0.00	13.11	1.42	2.8
	Fall	<0.01	11.34	1.67	3.1
	Total	**0.00**	**312.17**	**10.53**	**28.9**
Middle	Winter	0.00	78.49	18.32	17.2
	Spring	0.66	87.60	23.97	29.2
	Summer	0.00	42.60	3.95	9.1
	Fall	0.08	103.17	13.16	25.7
	Total	**0.00**	**103.17**	**14.97**	**20.3**
East	Winter	0.00	300.00	29.23	68.0
	Spring	0.11	112.00	15.54	27.7
	Summer	0.00	28.80	3.92	7.0
	Fall	0.00	73.63	4.02	11.6
	Total	**0.00**	**300.00**	**13.18**	**28.6**
Tennessee	Winter	0.00	300.06	22.01	46.4
	Spring	0.11	312.17	20.02	37.5
	Summer	0.00	42.60	3.09	6.3
	Fall	0.00	103.17	6.23	13.5
	Total	**0.0**	**312.17**	**12.83**	**25.9**

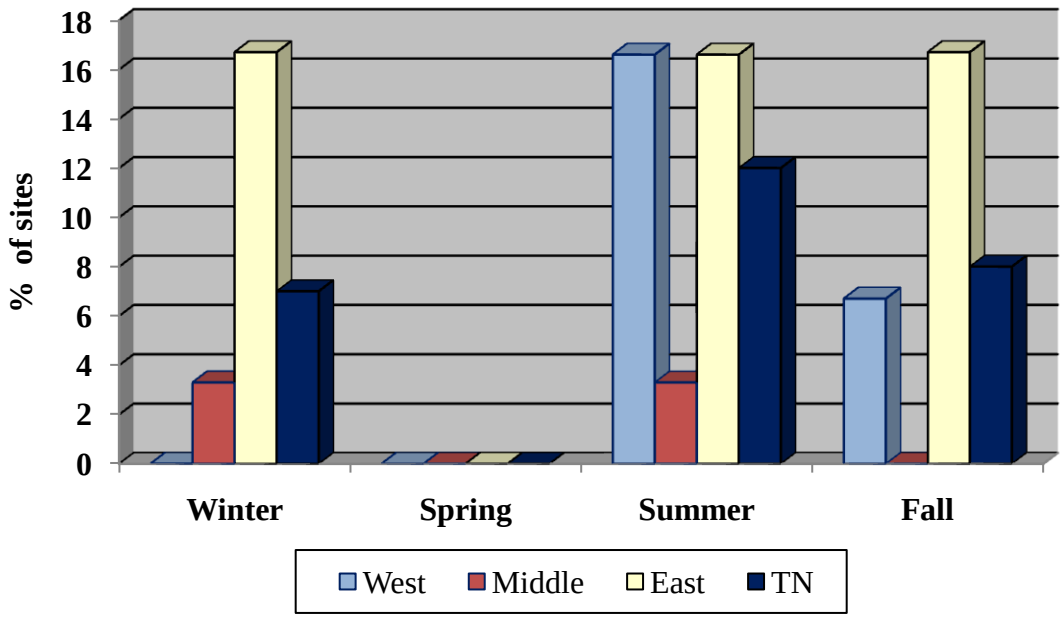

Figure 27: Percent of streams with Flow ≤ 0.01cfs during study period.

e. Conductivity

The conductivity of water measures the ability of the water to conduct an electric current. Conductivity can reflect the amount of inorganic substances such as total dissolved solids or ions in the water. Some of the substances that raise the conductivity include chloride, nitrate, sulfate, and phosphate anions (ions that carry a negative charge) or sodium, magnesium, calcium, iron, and aluminum cations (ions that carry a positive charge). Organic substances such as oil can lower the conductivity. Conductivity is affected by geologic factors such as the types of rocks and soils in the area. It can also be influenced by municipal and industrial discharges to a stream as well as runoff from urban and agricultural areas, which will cause more of a fluctuation than the geologic factors.

The mean conductivity measurements were similar for middle and east Tennessee (Table 12). However, there was a wider range of values in the east (Figure 28). The mean conductivity for west Tennessee was about half that of the other divisions and was less variable.

Table 12: Summary Statistics for Conductivity (measured in uMHO).

Division	Season	Minimum	Maximum	Mean	Stand. Dev.
West	Winter	26	469	134	105
	Spring	24	445	141	121
	Summer	28	475	146	105
	Fall	32	460	172	110
	Total	**24**	**475**	**148**	**110**
Middle	Winter	40	567	246	143
	Spring	33	545	220	128
	Summer	62	823	343	126
	Fall	58	831	300	199
	Total	**33**	**831**	**277**	**149**
East	Winter	6	692	233	200
	Spring	6	633	278	192
	Summer	8	570	335	175
	Fall	7	548	291	206
	Total	**6**	**692**	**289**	**193**
Tennessee	Winter	6	692	204	149
	Spring	6	633	213	147
	Summer	8	823	275	135
	Fall	7	831	254	172
	Total	**6**	**831**	**238**	**151**

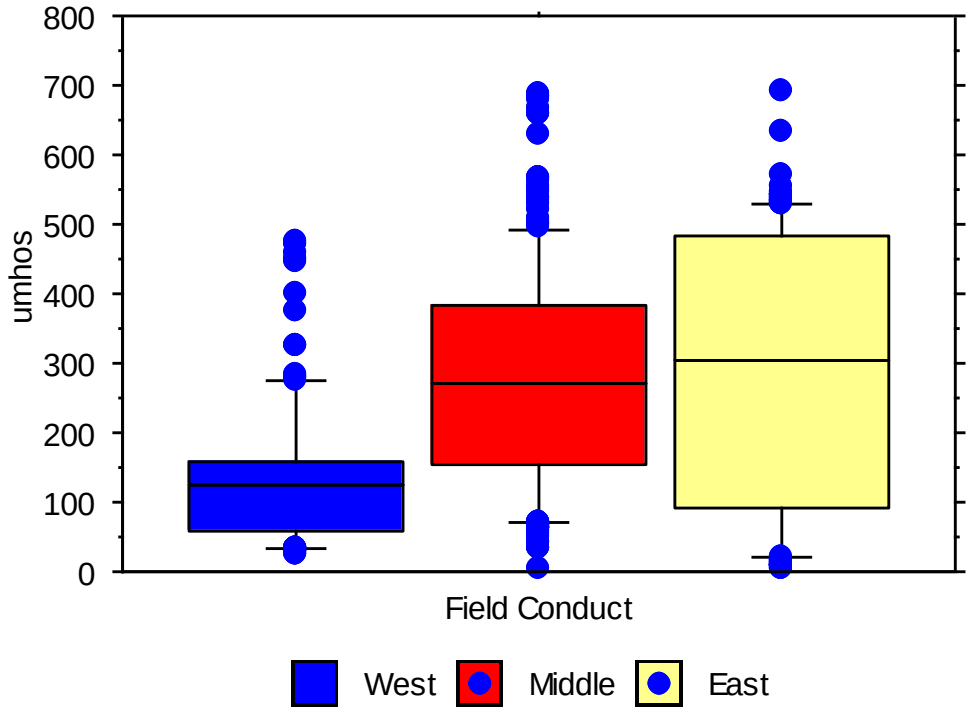

Figure 28: Distribution of Conductivity measurements at WSA sites.

Michael Finks uses a multi-parameter probe to measure conductivity, dissolved oxygen, temperature and pH at Miller Creek in Robertson County.

Photo provided by Nashville Environmental Field Office.

4. SUMMARY

The results of the probabilistic monitoring study indicate that a relatively large portion of the streams in the state have elevated nutrient levels at some point during the year. Statewide about 82% of streams had a least one seasonal sample above Tennessee's narrative nutrient guidelines for total phosphorus. For nitrate + nitrite this figure was 62%. The percentage of streams that complied with Tennessee's narrative nutrient criteria for total phosphorus and nitrate + nitrate was the lowest during the winter.

West Tennessee tended to have more streams with elevated levels of total phosphorus than middle and east Tennessee during all seasons. West Tennessee also had significantly higher mean levels of ammonia, total Kjeldahl nitrogen, total suspended solids, and total organic carbon. Mean DO, pH, and conductivity measurements were the lowest in the western division.

The middle division had the greatest number of streams with an elevated level of nitrate + nitrite, with about half as many sites passing for all seasons as east and west Tennessee. The percent of sites passing nitrate + nitrite guidelines statewide was the highest for summer, followed very closely by fall.

A lower percentage of state streams fell in the good category for total phosphorus during the summer and fall months compared to the national study. Within the Southern Appalachian assessment region, east Tennessee scored better than the national study, while middle Tennessee scored lower. Only half as many streams in west Tennessee met phosphorus guidelines when compared with the Coastal Plain assessment region.

Tennessee streams in all three divisions were more likely to fall in the good category for nitrate+nitrite than streams in the national study during the summer/fall sampling period. Seasonal variation between summer and fall did not substantially affect results except in middle Tennessee where the number of streams in the good category was only slightly higher than the national study during the fall.

Probabilistic monitoring is a useful tool to provide a perspective of statewide and regional water quality conditions. This approach helps reduce the amount of costly chemical analyses needed. It is a good way to gather information in areas where a comprehensive targeted approach may not be feasible. Probabilistic monitoring also provides a good baseline for future statewide trend analyses by equalizing effort across the state.

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APPENDIX A

Total Phosphorus Data for the Wadeable Streams Sites

(Station location information is provided in volume 2 of this report series)

Table A-1: Total Phosphorus Data for the Wadeable Streams Sites.

Station ID	Division	Eco-region	Date	Season	Total Phos. (mg/L)	Nutrient Criteria (mg/L)
BEAGL008.3OV	Middle	71g	07-31-2007	Summer	0.05	0.03
BEAGL008.3OV	Middle	71g	01-23-2008	Winter	0.05	0.03
BEAGL008.3OV	Middle	71g	04-21-2008	Spring	0.025	0.03
BEAGL008.3OV	Middle	71g	10-09-2007	Fall	0.02	0.03
BEAR002.1WY	West	65e	07-03-2007	Summer	0.37	0.04
BEAR002.1WY	West	65e	01-09-2008	Winter	0.22	0.04
BEAR002.1WY	West	65e	11-19-2007	Fall	0.18	0.04
BEAR002.1WY	West	65e	04-02-2008	Spring	0.11	0.04
BEAVE008.9KN	East	67F	08-28-2007	Summer	0.98	0.04
BEAVE008.9KN	East	67F	11-27-2007	Fall	0.53	0.04
BEAVE008.9KN	East	67F	04-29-2008	Spring	0.28	0.04
BEAVE008.9KN	East	67F	03-06-2008	Winter	0.03	0.04
BFLAT018.0UN	East	67F	06-02-2008	Spring	0.041	0.04
BFLAT018.0UN	East	67F	08-22-2007	Summer	0.04	0.04
BIRCH000.6JO	East	66e	03-04-2008	Winter	0.03	0.01
BIRCH000.6JO	East	66e	11-27-2007	Fall	0.02	0.01
BIRCH000.6JO	East	66e	07-25-2007	Summer	0.005	0.01
BIRCH000.6JO	East	66e	04-22-2008	Spring	0.0025	0.01
BIRDS012.3BN	West	65e	07-12-2007	Summer	0.09	0.04
BIRDS012.3BN	West	65e	10-16-2007	Fall	0.04	0.04
BIRDS012.3BN	West	65e	04-22-2008	Spring	0.021	0.04
BIRDS012.3BN	West	65e	01-23-2008	Winter	0.02	0.04
BRUSH001.1LS	Middle	71f	11-07-2007	Fall	0.04	0.03
BRUSH001.1LS	Middle	71f	04-30-2008	Spring	0.033	0.03
BRUSH001.1LS	Middle	71f	02-28-2008	Winter	0.03	0.03
BRUSH001.1LS	Middle	71f	08-10-2007	Summer	0.02	0.03
BSPRI003.9CH	Middle	71f	07-05-2007	Summer	0.09	0.03
BSPRI003.9CH	Middle	71f	05-07-2008	Spring	0.029	0.03
BSPRI003.9CH	Middle	71f	01-22-2008	Winter	0.02	0.03
BSPRI003.9CH	Middle	71f	11-01-2007	Fall	0.01	0.03
BUNDR000.6WE	Middle	71f	03-03-2008	Winter	0.04	0.03
BUNDR000.6WE	Middle	71f	04-29-2008	Spring	0.014	0.03
BUNDR000.6WE	Middle	71f	11-06-2007	Fall	0.01	0.03
BUNDR000.6WE	Middle	71f	08-08-2007	Summer	0.01	0.03
BYRD001.5HS	East	67f	02-13-2008	Winter	0.04	0.04
BYRD001.5HS	East	67f	11-14-2007	Fall	0.01	0.04
BYRD001.5HS	East	67f	04-29-2008	Spring	0.01	0.04

Table A-1 Cont.

Station ID	Division	Eco-region	Date	Season	Total Phos. (mg/L)	Nutrient Criteria (mg/L)
BYRD001.5HS	East	67f	07-17-2007	Summer	0.005	0.04
CANDI017.1BR	East	67F	01-09-2008	Winter	0.06	0.04
CANDI017.1BR	East	67F	08-08-2007	Summer	0.04	0.04
CANDI017.1BR	East	67F	10-03-2007	Fall	0.03	0.04
CANDI017.1BR	East	67F	04-23-2008	Spring	0.03	0.04
CANDI033.1BR	East	67G	08-08-2007	Summer	0.05	0.09
CANDI033.1BR	East	67G	01-09-2008	Winter	0.05	0.09
CANDI033.1BR	East	67G	04-23-2008	Spring	0.025	0.09
CANDI033.1BR	East	67G	10-03-2007	Fall	0.02	0.09
CANE001.4SH	West	74b	08-07-2007	Summer	0.52	0.10
CANE001.4SH	West	74b	11-06-2007	Fall	0.31	0.10
CANE001.4SH	West	74b	01-15-2008	Winter	0.28	0.10
CANE001.4SH	West	74b	04-08-2008	Spring	0.18	0.10
CANE004.5VA	Middle	71H	02-11-2008	Winter	0.02	0.18
CANE004.5VA	Middle	71H	10-10-2007	Fall	0.01	0.18
CANE004.5VA	Middle	71H	04-21-2008	Spring	0.0025	0.18
CATHE001.5MY	Middle	71h	08-13-2007	Summer	0.23	0.18
CATHE001.5MY	Middle	71h	02-26-2008	Winter	0.21	0.18
CATHE001.5MY	Middle	71h	11-07-2007	Fall	0.19	0.18
CATHE001.5MY	Middle	71h	05-22-2008	Spring	0.16	0.18
CFORK003.4SR	Middle	71g	05-07-2008	Spring	0.014	0.03
CFORK003.4SR	Middle	71g	08-16-2007	Summer	0.01	0.03
CFORK003.4SR	Middle	71g	01-22-2008	Winter	0.01	0.03
CFORK003.4SR	Middle	71g	11-01-2007	Fall	0.005	0.03
CHISH015.4LW	Middle	71f	08-07-2007	Summer	0.62	0.03
CHISH015.4LW	Middle	71f	02-28-2008	Winter	0.04	0.03
CHISH015.4LW	Middle	71f	04-29-2008	Spring	0.017	0.03
CHISH015.4LW	Middle	71f	11-27-2007	Fall	0.01	0.03
CLEAR001.3GE	East	67F	04-29-2008	Spring	0.17	0.03
CLEAR001.3GE	East	67F	02-13-2008	Winter	0.16	0.03
CLEAR001.3GE	East	67F	07-17-2007	Summer	0.12	0.03
CLEAR001.3GE	East	67F	11-14-2007	Fall	0.09	0.03
CLOVE1T0.5OB	West	74A	07-03-2007	Summer	0.54	0.12
CLOVE1T0.5OB	West	74A	10-03-2007	Fall	0.36	0.12
CLOVE1T0.5OB	West	74A	02-08-2008	Winter	0.12	0.12
CLOVE1T0.5OB	West	74A	04-02-2008	Spring	0.11	0.12
COLD006.3LE	West	74A	01-08-2008	Winter	0.13	0.12

Table A-1 Cont.

Station ID	Division	Eco-region	Date	Season	Total Phos. (mg/L)	Nutrient Criteria (mg/L)
COLD006.3LE	West	74a	07-18-2007	Summer	0.09	0.12
COLD006.3LE	West	74a	04-30-2008	Spring	0.065	0.12
COLD006.3LE	West	74a	10-02-2007	Fall	0.005	0.12
CORN002.5JO	East	66f	03-04-2008	Winter	0.03	0.02
CORN002.5JO	East	66f	11-27-2007	Fall	0.02	0.02
CORN002.5JO	East	66f	07-25-2007	Summer	0.005	0.02
CORN002.5JO	East	66f	04-22-2008	Spring	0.0025	0.02
COSBY012.2CO	East	66G	08-21-2007	Summer	0.04	0.01
COSBY012.2CO	East	66G	03-06-2008	Winter	0.02	0.01
COSBY012.2CO	East	66G	12-05-2007	Fall	0.005	0.01
COSBY012.2CO	East	66G	05-13-2008	Spring	0.0025	0.01
COVE003.8SV	East	66g	12-05-2007	Fall	0.05	0.01
COVE003.8SV	East	66g	08-22-2007	Summer	0.05	0.01
COVE003.8SV	East	66g	03-06-2008	Winter	0.04	0.01
COVE003.8SV	East	66g	05-13-2008	Spring	0.022	0.01
CROOK005.0MC	West	65e	02-20-2008	Winter	0.08	0.04
CROOK005.0MC	West	65e	07-11-2007	Summer	0.04	0.04
CROOK005.0MC	West	65e	04-08-2008	Spring	0.0355	0.04
CROOK005.0MC	West	65e	11-16-2007	Fall	0.03	0.04
CYPRE002.1CK	West	74b	02-14-2008	Winter	0.36	0.10
CYPRE002.1CK	West	74b	07-16-2007	Summer	0.3	0.10
CYPRE002.1CK	West	74b	10-04-2007	Fall	0.175	0.10
CYPRE002.1CK	West	74b	04-17-2008	Spring	0.16	0.10
CYPRE005.9OB	West	74b	01-09-2008	Winter	1.0	0.10
CYPRE005.9OB	West	74b	04-02-2008	Spring	0.38	0.10
CYPRE005.9OB	West	74b	11-19-2007	Fall	0.2	0.10
CYPRE005.9OB	West	74b	07-23-2007	Summer	0.01	0.10
CYPRE023.8MC	West	65e	07-06-2007	Summer	0.07	0.04
CYPRE023.8MC	West	65e	01-11-2008	Winter	0.06	0.04
CYPRE023.8MC	West	65e	04-08-2008	Spring	0.043	0.04
CYPRE023.8MC	West	65e	10-10-2007	Fall	0.01	0.04
DIXON000.4LW	Middle	71F	08-07-2007	Summer	0.2	0.03
DIXON000.4LW	Middle	71F	02-28-2008	Winter	0.04	0.03
DIXON000.4LW	Middle	71F	05-06-2008	Spring	0.024	0.03
DIXON000.4LW	Middle	71F	11-27-2007	Fall	0.02	0.03
DRAKE011.8SR	Middle	71H	05-07-2008	Spring	0.022	0.18
DRAKE011.8SR	Middle	71H	07-16-2007	Summer	0.01	0.18

Table A-1 Cont.

Station ID	Division	Eco-region	Date	Season	Total Phos. (mg/L)	Nutrient Criteria (mg/L)
DRAKE011.8SR	Middle	71H	01-22-2008	Winter	0.01	0.18
DRAKE011.8SR	Middle	71H	11-01-2007	Fall	0.005	0.18
EFPOP007.3RO	East	67f	04-29-2008	Spring	0.955	0.04
EFPOP007.3RO	East	67f	08-28-2007	Summer	0.91	0.04
EFPOP007.3RO	East	67f	11-27-2007	Fall	0.27	0.04
EFPOP007.3RO	East	67f	03-06-2008	Winter	0.11	0.04
FALL001.5UN	East	67F	08-22-2007	Summer	0.05	0.04
FALL001.5UN	East	67F	06-02-2008	Spring	0.043	0.04
FALL001.5UN	East	67F	12-03-2007	Fall	0.01	0.04
FALL003.2HA	East	67f	08-22-2007	Summer	0.08	0.04
FALL003.2HA	East	67f	12-03-2007	Fall	0.06	0.04
FALL003.2HA	East	67f	06-02-2008	Spring	0.046	0.04
GAMMO000.7SU	East	67F	02-12-2008	Winter	0.04	0.04
GAMMO000.7SU	East	67F	04-08-2008	Spring	0.015	0.04
GAMMO000.7SU	East	67F	11-13-2007	Fall	0.01	0.04
GAMMO000.7SU	East	67F	07-18-2007	Summer	0.005	0.04
GAP000.1CT	East	67f	03-04-2008	Winter	0.03	0.04
GAP000.1CT	East	67f	07-25-2007	Summer	0.015	0.04
GAP000.1CT	East	67f	04-22-2008	Spring	0.012	0.04
GAP000.1CT	East	67f	11-27-2007	Fall	0.01	0.04
GRASS005.1GE	East	67f	07-17-2007	Summer	0.31	0.04
GRASS005.1GE	East	67f	02-13-2008	Winter	0.04	0.04
GRASS005.1GE	East	67f	04-29-2008	Spring	0.014	0.04
GRASS005.1GE	East	67f	11-14-2007	Fall	0.01	0.04
GREEN016.2WE	Middle	71f	11-06-2007	Fall	0.04	0.03
GREEN016.2WE	Middle	71f	03-03-2008	Winter	0.04	0.03
GREEN016.2WE	Middle	71f	08-08-2007	Summer	0.03	0.03
GREEN016.2WE	Middle	71f	04-29-2008	Spring	0.027	0.03
HALLS001.7LE	West	74b	05-13-2008	Spring	0.16	0.10
HALLS001.7LE	West	74b	01-08-2008	Winter	0.12	0.10
HALLS001.7LE	West	74b	07-18-2007	Summer	0.11	0.10
HALLS001.7LE	West	74b	10-02-2007	Fall	0.005	0.10
HAWKI002.1CR	West	65e	07-05-2007	Summer	0.15	0.04
HAWKI002.1CR	West	65e	02-19-2008	Winter	0.08	0.04
HAWKI002.1CR	West	65e	04-16-2008	Spring	0.03	0.04
HAWKI002.1CR	West	65e	10-16-2007	Fall	0.01	0.04
HAYES003.3HR	West	65e	07-02-2007	Summer	0.05	0.04

Table A-1 Cont.

Station ID	Division	Eco-region	Date	Season	Total Phos. (mg/L)	Nutrient Criteria (mg/L)
HAYES003.3HR	West	65e	11-05-2007	Fall	0.04	0.04
HAYES003.3HR	West	65e	01-16-2008	Winter	0.04	0.04
HAYES003.3HR	West	65e	04-21-2008	Spring	0.027	0.04
HICKO008.4CA	East	69E	02-20-2008	Winter	0.6	0.02
HICKO008.4CA	East	69E	11-28-2007	Fall	0.02	0.02
HICKO008.4CA	East	69E	08-27-2007	Summer	0.005	0.02
HICKO008.4CA	East	69E	05-22-2008	Spring	0.0025	0.02
HORSE007.0GE	East	66E	02-13-2008	Winter	0.02	0.01
HORSE007.0GE	East	66E	10-10-2007	Fall	0.005	0.01
HORSE007.0GE	East	66E	04-29-2008	Spring	0.0025	0.01
HROCK002.4CR	West	65E	02-14-2008	Winter	0.11	0.04
HROCK002.4CR	West	65E	04-10-2008	Spring	0.089	0.04
HROCK002.4CR	West	65E	11-20-2007	Fall	0.04	0.04
HROCK002.4CR	West	65E	07-23-2007	Summer	0.005	0.04
HURRI007.4HE	West	65E	07-05-2007	Summer	0.085	0.04
HURRI007.4HE	West	65E	01-04-2008	Winter	0.065	0.04
HURRI007.4HE	West	65E	04-09-2008	Spring	0.0405	0.04
HURRI007.4HE	West	65E	11-20-2007	Fall	0.005	0.04
HYDE002.7LE	West	74b	07-02-2007	Summer	0.63	0.10
HYDE002.7LE	West	74b	01-08-2008	Winter	0.2	0.10
HYDE002.7LE	West	74b	04-30-2008	Spring	0.12	0.10
HYDE002.7LE	West	74b	10-02-2007	Fall	0.005	0.10
INDIA003.7GR	East	67F	06-02-2008	Spring	0.019	0.09
INDIA003.7GR	East	67F	12-03-2007	Fall	0.005	0.09
KERR000.4HD	West	65J	10-16-2007	Fall	0.03	0.04
KERR000.4HD	West	65J	07-11-2007	Summer	0.03	0.04
KERR000.4HD	West	65J	01-24-2008	Winter	0.02	0.04
KERR000.4HD	West	65J	04-18-2008	Spring	0.014	0.04
LAURE002.5GY	East	68A	01-07-2008	Winter	0.06	0.02
LAURE002.5GY	East	68A	06-17-2008	Summer	0.043	0.02
LAURE002.5GY	East	68A	04-30-2008	Spring	0.0025	0.02
LAURE006.3JO	East	66E	03-04-2008	Winter	0.04	0.01
LAURE006.3JO	East	66E	11-27-2007	Fall	0.03	0.01
LAURE006.3JO	East	66E	11-28-2007	Fall	0.005	0.01
LAURE006.3JO	East	66E	04-22-2008	Spring	0.0025	0.01
LBART006.5DI	Middle	71f	02-20-2008	Winter	0.07	0.03
LBART006.5DI	Middle	71f	07-03-2007	Summer	0.05	0.03

Table A-1 Cont.

Station ID	Division	Eco-region	Date	Season	Total Phos. (mg/L)	Nutrient Criteria (mg/L)
LBART006.5DI	Middle	71f	11-26-2007	Fall	0.03	0.03
LBART006.5DI	Middle	71f	04-09-2008	Spring	0.026	0.03
LONG004.9MA	Middle	71g	01-23-2008	Winter	0.05	0.03
LONG004.9MA	Middle	71g	08-01-2007	Summer	0.04	0.03
LONG004.9MA	Middle	71g	10-09-2007	Fall	0.03	0.03
LONG004.9MA	Middle	71g	04-22-2008	Spring	0.023	0.03
MFORK1T1.5HE	West	65e	07-03-2007	Summer	0.08	0.04
MFORK1T1.5HE	West	65e	01-04-2008	Winter	0.07	0.04
MFORK1T1.5HE	West	65e	10-09-2007	Fall	0.035	0.04
MFORK1T1.5HE	West	65e	04-08-2008	Spring	0.032	0.04
MIDDL001.2SV	East	67G	08-22-2007	Summer	0.05	0.09
MIDDL001.2SV	East	67G	03-06-2008	Winter	0.04	0.09
MIDDL001.2SV	East	67G	05-13-2008	Spring	0.024	0.09
MIDDL001.2SV	East	67G	12-05-2007	Fall	0.005	0.09
MILLE007.3RN	Middle	71E	07-05-2007	Summer	0.1	0.04
MILLE007.3RN	Middle	71E	05-07-2008	Spring	0.016	0.04
MILLE007.3RN	Middle	71E	01-22-2008	Winter	0.01	0.04
MILLE007.3RN	Middle	71E	11-01-2007	Fall	0.005	0.04
NFLIC002.0PE	Middle	71f	02-26-2008	Winter	0.07	0.03
NFLIC002.0PE	Middle	71f	11-07-2007	Fall	0.01	0.03
NFLIC002.0PE	Middle	71f	05-22-2008	Spring	0.0083	0.03
NFLIC002.0PE	Middle	71f	08-08-2007	Summer	0.005	0.03
NREEL000.4OB	West	74a	02-15-2008	Winter	0.58	0.12
NREEL000.4OB	West	74a	04-02-2008	Spring	0.5	0.12
NREEL000.4OB	West	74a	07-07-2007	Summer	0.31	0.12
NREEL000.4OB	West	74a	10-03-2007	Fall	0.28	0.12
OTOWN008.9CL	East	69E	02-20-2008	Winter	0.07	0.02
OTOWN008.9CL	East	69E	05-22-2008	Spring	0.032	0.02
OTOWN008.9CL	East	69E	11-28-2007	Fall	0.01	0.02
OWL003.7HD	West	65e	02-20-2008	Winter	0.08	0.04
OWL003.7HD	West	65e	04-08-2008	Spring	0.041	0.04
OWL003.7HD	West	65e	11-16-2007	Fall	0.04	0.04
OWL003.7HD	West	65e	07-18-2007	Summer	0.02	0.04
POND013.8CK	West	74b	10-03-2007	Fall	1.92	0.10
POND013.8CK	West	74b	01-09-2008	Winter	0.53	0.10
POND013.8CK	West	74b	04-15-2008	Spring	0.48	0.10
POND013.8CK	West	74b	07-20-2007	Summer	0.03	0.10

Table A-1 Cont.

Station ID	Division	Eco-region	Date	Season	Total Phos. (mg/L)	Nutrient Criteria (mg/L)
POPLA000.1MG	East	69D	03-06-2008	Winter	0.04	0.02
POPLA000.1MG	East	69D	11-27-2007	Fall	0.02	0.02
POPLA000.1MG	East	69D	08-28-2007	Summer	0.005	0.02
POPLA000.1MG	East	69D	04-29-2008	Spring	0.0025	0.02
POPLA014.7HY	West	74b	02-14-2008	Winter	0.14	0.10
POPLA014.7HY	West	74b	10-04-2007	Fall	0.08	0.10
POPLA014.7HY	West	74b	04-17-2008	Spring	0.047	0.10
PRUN000.1GS	Middle	71h	02-14-2008	Winter	0.22	0.18
PRUN000.1GS	Middle	71h	11-28-2007	Fall	0.21	0.18
PRUN000.1GS	Middle	71h	08-13-2007	Summer	0.2	0.18
PRUN000.1GS	Middle	71h	05-06-2008	Spring	0.18	0.18
RIPLE001.5GE	East	67F	02-13-2008	Winter	0.04	0.04
RIPLE001.5GE	East	67F	07-17-2007	Summer	0.01	0.04
RIPLE001.5GE	East	67F	04-29-2008	Spring	0.0073	0.04
RIPLE001.5GE	East	67F	11-14-2007	Fall	0.005	0.04
ROBIN000.6FR	Middle	71f	02-14-2008	Winter	0.05	0.03
ROBIN000.6FR	Middle	71f	05-19-2008	Spring	0.046	0.03
ROBIN000.6FR	Middle	71f	08-14-2007	Summer	0.02	0.03
ROBIN000.6FR	Middle	71f	11-28-2007	Fall	0.01	0.03
ROSE001.3MC	West	65e	01-11-2008	Winter	0.08	0.04
ROSE001.3MC	West	65e	07-02-2007	Summer	0.06	0.04
ROSE001.3MC	West	65e	04-08-2008	Spring	0.038	0.04
ROSE001.3MC	West	65e	10-10-2007	Fall	0.01	0.04
RUTHE007.4MY	Middle	71H	08-20-2007	Summer	0.61	0.18
RUTHE007.4MY	Middle	71H	11-27-2007	Fall	0.37	0.18
RUTHE007.4MY	Middle	71H	05-19-2008	Spring	0.27	0.18
RUTHE007.4MY	Middle	71H	02-26-2008	Winter	0.26	0.18
SCAMP008.3SR	Middle	71H	07-16-2007	Summer	0.11	0.18
SCAMP008.3SR	Middle	71H	11-01-2007	Fall	0.07	0.18
SCAMP008.3SR	Middle	71H	05-07-2008	Spring	0.052	0.18
SCAMP008.3SR	Middle	71H	01-22-2008	Winter	0.05	0.18
SCOTT000.9DA	Middle	71h	05-13-2008	Spring	0.25	0.18
SCOTT000.9DA	Middle	71h	01-15-2008	Winter	0.24	0.18
SCOTT000.9DA	Middle	71h	07-18-2007	Summer	0.19	0.18
SCOTT000.9DA	Middle	71h	10-01-2007	Fall	0.005	0.18
SEQUA101.2BL	East	68b	09-12-2007	Fall	0.06	0.04

Table A-1 Cont.

Station ID	Division	Eco-region	Date	Season	Total Phos. (mg/L)	Nutrient Criteria (mg/L)
SEQUA101.2BL	East	68b	06-17-2008	Summer	0.052	0.04
SEQUA101.2BL	East	68b	01-07-2008	Winter	0.05	0.04
SEQUA101.2BL	East	68b	04-30-2008	Spring	0.026	0.04
SEQUA101.2BL	East	68b	10-03-2007	Fall	0.02	0.04
SFCUB009.5DE	West	65e	07-05-2007	Summer	0.11	0.04
SFCUB009.5DE	West	65e	02-19-2008	Winter	0.08	0.04
SFCUB009.5DE	West	65e	10-11-2007	Fall	0.04	0.04
SFCUB009.5DE	West	65e	04-16-2008	Spring	0.029	0.04
SFFDE1T0.7MN	West	65e	07-05-2007	Summer	0.07	0.04
SFFDE1T0.7MN	West	65e	10-10-2007	Fall	0.05	0.04
SFFDE1T0.7MN	West	65e	04-22-2008	Spring	0.027	0.04
SFFDE1T0.7MN	West	65e	01-16-2008	Winter	0.02	0.04
SFMUD003.8MC	West	65E	07-17-2007	Summer	0.09	0.04
SFMUD003.8MC	West	65E	11-05-2007	Fall	0.08	0.04
SFMUD003.8MC	West	65E	01-23-2008	Winter	0.03	0.04
SFMUD003.8MC	West	65E	04-22-2008	Spring	0.021	0.04
SHARP014.4WI	Middle	71f	07-09-2007	Summer	0.09	0.03
SHARP014.4WI	Middle	71f	01-15-2008	Winter	0.03	0.03
SHARP014.4WI	Middle	71f	05-13-2008	Spring	0.017	0.03
SHARP014.4WI	Middle	71f	10-01-2007	Fall	0.005	0.03
SINKI003.0CO	East	67G	08-21-2007	Summer	0.05	0.09
SINKI003.0CO	East	67G	03-06-2008	Winter	0.045	0.09
SINKI003.0CO	East	67G	12-05-2007	Fall	0.015	0.09
SINKI003.0CO	East	67G	05-13-2008	Spring	0.014	0.09
SMITH003.5HD	West	65j	10-16-2007	Fall	0.02	0.04
SMITH003.5HD	West	65j	07-31-2007	Summer	0.02	0.04
SMITH003.5HD	West	65j	01-24-2008	Winter	0.02	0.04
SMITH003.5HD	West	65j	04-18-2008	Spring	0.0108	0.04
SPRIN009.0WS	Middle	71i	07-17-2007	Summer	0.19	0.18
SPRIN009.0WS	Middle	71i	05-13-2008	Spring	0.11	0.18
SPRIN009.0WS	Middle	71i	01-15-2008	Winter	0.11	0.18
SPRIN009.0WS	Middle	71i	10-01-2007	Fall	0.005	0.18
STOKE004.9CK	West	74B	01-09-2008	Winter	1.3	0.10
STOKE004.9CK	West	74B	10-03-2007	Fall	0.22	0.10
STOKE004.9CK	West	74B	04-15-2008	Spring	0.19	0.10
STOKE004.9CK	West	74B	07-20-2007	Summer	0.09	0.10
SULPH036.0RN	Middle	71E	05-07-2008	Spring	0.015	0.04

Table A-1 Cont.

Station ID	Division	Eco-region	Date	Season	Total Phos. (mg/L)	Nutrient Criteria (mg/L)
SULPH036.0RN	Middle	71E	01-22-2008	Winter	0.01	0.04
SULPH036.0RN	Middle	71E	11-01-2007	Fall	0.005	0.04
TAR003.0CS	West	65E	02-07-2008	Winter	0.07	0.04
TAR003.0CS	West	65E	08-21-2007	Summer	0.06	0.04
TAR003.0CS	West	65E	05-06-2008	Spring	0.044	0.04
TAR003.0CS	West	65E	10-18-2007	Fall	0.04	0.04
THOMP000.2WY	West	65e	01-15-2008	Winter	0.24	0.04
THOMP000.2WY	West	65e	04-10-2008	Spring	0.058	0.04
THOMP000.2WY	West	65e	11-20-2007	Fall	0.02	0.04
THOMP000.2WY	West	65e	07-17-2007	Summer	0.02	0.04
TISDA1T1.2LE	West	74b	07-02-2007	Summer	0.68	0.10
TISDA1T1.2LE	West	74b	01-08-2008	Winter	0.11	0.10
TISDA1T1.2LE	West	74b	05-13-2008	Spring	0.1	0.10
TISDA1T1.2LE	West	74b	10-02-2007	Fall	0.005	0.10
TITUS1T0.1CA	East	69E	02-20-2008	Winter	0.6	0.02
TITUS1T0.1CA	East	69E	11-28-2007	Fall	0.01	0.02
TITUS1T0.1CA	East	69E	05-22-2008	Spring	0.0025	0.02
TOWEE005.9PO	East	66g	01-09-2008	Winter	0.04	0.01
TOWEE005.9PO	East	66g	08-08-2007	Summer	0.02	0.01
TOWEE005.9PO	East	66g	04-23-2008	Spring	0.016	0.01
TOWEE005.9PO	East	66g	10-03-2007	Fall	0.01	0.01
TRACE003.5CY	Middle	71G	10-09-2007	Fall	0.08	0.03
TRACE003.5CY	Middle	71G	01-23-2008	Winter	0.04	0.03
TRACE003.5CY	Middle	71G	09-20-2007	Summer	0.03	0.03
TRACE003.5CY	Middle	71G	04-22-2008	Spring	0.018	0.03
TUMBL003.8HU	Middle	71F	02-20-2008	Winter	0.08	0.03
TUMBL003.8HU	Middle	71F	11-26-2007	Fall	0.02	0.03
TUMBL003.8HU	Middle	71F	04-09-2008	Spring	0.017	0.03
TUMBL003.8HU	Middle	71F	07-23-2007	Summer	0.005	0.03
WATSO002.3WI	Middle	71h	07-09-2007	Summer	0.41	0.18
WATSO002.3WI	Middle	71h	01-15-2008	Winter	0.41	0.18
WATSO002.3WI	Middle	71h	05-13-2008	Spring	0.37	0.18
WATSO002.3WI	Middle	71h	10-01-2007	Fall	0.005	0.18
WELLS007.6HO	Middle	71F	02-20-2008	Winter	0.08	0.03
WELLS007.6HO	Middle	71F	07-02-2007	Summer	0.06	0.03
WELLS007.6HO	Middle	71F	04-09-2008	Spring	0.032	0.03
WELLS007.6HO	Middle	71F	11-26-2007	Fall	0.03	0.03

Table A-1 Cont.

Station ID	Division	Eco-region	Date	Season	Total Phos. (mg/L)	Nutrient Criteria (mg/L)
WFHIC007.0CE	Middle	71G	02-12-2008	Winter	0.06	0.03
WFHIC007.0CE	Middle	71G	05-28-2008	Spring	0.05	0.03
WFHIC007.0CE	Middle	71G	11-29-2007	Fall	0.03	0.03
WFHIC007.0CE	Middle	71G	08-16-2007	Summer	0.02	0.03
WFRED010.7MT	Middle	71e	07-18-2007	Summer	0.14	0.04
WFRED010.7MT	Middle	71e	02-20-2008	Winter	0.1	0.04
WFRED010.7MT	Middle	71e	11-26-2007	Fall	0.08	0.04
WFRED010.7MT	Middle	71e	04-09-2008	Spring	0.062	0.04
WHITE013.5HU	Middle	71f	07-02-2007	Summer	0.04	0.03
WHITE013.5HU	Middle	71f	11-26-2007	Fall	0.02	0.03
WHITE013.5HU	Middle	71f	04-22-2008	Spring	0.016	0.03

APPENDIX B

Nitrate + Nitrite Data for the Wadeable Streams Sites

(Station location information is provided in volume 2 of this report series)

Table B-1: Nitrate + Nitrite Data for the Wadeable Streams Sites.

Station ID	Division	Eco-region	Date	Season	Nitrate Nitrite mg/L	Nutrient Criteria (mg/L)
BEAGL008.3OV	Middle	71g	01-23-2008	WINTER	1.5	0.92
BEAGL008.3OV	Middle	71g	07-31-2007	SUMMER	1.0	0.92
BEAGL008.3OV	Middle	71g	04-21-2008	SPRING	0.99	0.92
BEAGL008.3OV	Middle	71g	10-09-2007	FALL	0.42	0.92
BEAR002.1WY	West	65e	07-03-2007	SUMMER	1.8	0.34
BEAR002.1WY	West	65e	04-02-2008	SPRING	0.79	0.34
BEAR002.1WY	West	65e	01-09-2008	WINTER	0.58	0.34
BEAR002.1WY	West	65e	11-19-2007	FALL	0.003	0.34
BEAVE008.9KN	East	67F	08-28-2007	SUMMER	2.6	1.22
BEAVE008.9KN	East	67F	04-29-2008	SPRING	1.4	1.22
BEAVE008.9KN	East	67F	11-27-2007	FALL	1.3	1.22
BEAVE008.9KN	East	67F	03-06-2008	WINTER	1.0	1.22
BFLAT018.0UN	East	67F	06-02-2008	SPRING	1.8	1.22
BFLAT018.0UN	East	67F	08-22-2007	SUMMER	0.5	1.22
BIRCH000.6JO	East	66e	04-22-2008	SPRING	0.04	0.31
BIRCH000.6JO	East	66e	11-27-2007	FALL	0.003	0.31
BIRCH000.6JO	East	66e	07-25-2007	SUMMER	0.003	0.31
BIRCH000.6JO	East	66e	03-04-2008	WINTER	0.003	0.31
BIRDS012.3BN	West	65e	07-12-2007	SUMMER	0.29	0.34
BIRDS012.3BN	West	65e	01-23-2008	WINTER	0.22	0.34
BIRDS012.3BN	West	65e	04-22-2008	SPRING	0.035	0.34
BIRDS012.3BN	West	65e	10-16-2007	FALL	0.003	0.34
BRUSH001.1LS	Middle	71f	02-28-2008	WINTER	0.45	0.32
BRUSH001.1LS	Middle	71f	08-10-2007	SUMMER	0.11	0.32
BRUSH001.1LS	Middle	71f	04-30-2008	SPRING	0.04	0.32
BRUSH001.1LS	Middle	71f	11-07-2007	FALL	0.003	0.32
BSPRI003.9CH	Middle	71f	01-22-2008	WINTER	1.1	0.32
BSPRI003.9CH	Middle	71f	05-07-2008	SPRING	0.71	0.32
BSPRI003.9CH	Middle	71f	11-01-2007	FALL	0.7	0.32
BSPRI003.9CH	Middle	71f	07-05-2007	SUMMER	0.37	0.32
BUNDR000.6WE	Middle	71f	11-06-2007	FALL	0.003	0.32
BUNDR000.6WE	Middle	71f	04-29-2008	SPRING	0.003	0.32
BUNDR000.6WE	Middle	71f	08-08-2007	SUMMER	0.003	0.32
BUNDR000.6WE	Middle	71f	03-03-2008	WINTER	0.003	0.32
BYRD001.5HS	East	67f	02-13-2008	WINTER	0.78	1.22
BYRD001.5HS	East	67f	11-14-2007	FALL	0.4	1.22
BYRD001.5HS	East	67f	04-29-2008	SPRING	0.35	1.22

Table B-1 Cont.

Station ID	Division	Eco-region	Date	Season	Nitrate Nitrite mg/L	Nutrient Criteria (mg/L)
BYRD001.5HS	East	67f	07-17-2007	SUMMER	0.15	1.22
CANDI017.1BR	East	67F	01-09-2008	WINTER	0.54	1.22
CANDI017.1BR	East	67F	08-08-2007	SUMMER	0.42	1.22
CANDI017.1BR	East	67F	04-23-2008	SPRING	0.28	1.22
CANDI017.1BR	East	67F	10-03-2007	FALL	0.21	1.22
CANDI033.1BR	East	67G	08-08-2007	SUMMER	0.48	1.22
CANDI033.1BR	East	67G	01-09-2008	WINTER	0.41	1.22
CANDI033.1BR	East	67G	10-03-2007	FALL	0.26	1.22
CANDI033.1BR	East	67G	04-23-2008	SPRING	0.24	1.22
CANE001.4SH	West	74b	04-08-2008	SPRING	0.34	1.19
CANE001.4SH	West	74b	11-06-2007	FALL	0.003	1.19
CANE001.4SH	West	74b	08-07-2007	SUMMER	0.003	1.19
CANE001.4SH	West	74b	01-15-2008	WINTER	0.003	1.19
CANE004.5VA	Middle	71H	02-11-2008	WINTER	0.22	0.92
CANE004.5VA	Middle	71H	10-10-2007	FALL	0.1	0.92
CANE004.5VA	Middle	71H	04-21-2008	SPRING	0.048	0.92
CATHE001.5MY	Middle	71h	11-07-2007	FALL	0.62	0.92
CATHE001.5MY	Middle	71h	02-26-2008	WINTER	0.56	0.92
CATHE001.5MY	Middle	71h	05-22-2008	SPRING	0.28	0.92
CATHE001.5MY	Middle	71h	08-13-2007	SUMMER	0.14	0.92
CFORK003.4SR	Middle	71g	01-22-2008	WINTER	1.2	0.92
CFORK003.4SR	Middle	71g	05-07-2008	SPRING	0.56	0.92
CFORK003.4SR	Middle	71g	11-01-2007	FALL	0.52	0.92
CFORK003.4SR	Middle	71g	08-16-2007	SUMMER	0.48	0.92
CHISH015.4LW	Middle	71f	11-27-2007	FALL	0.25	0.32
CHISH015.4LW	Middle	71f	04-29-2008	SPRING	0.17	0.32
CHISH015.4LW	Middle	71f	08-07-2007	SUMMER	0.16	0.32
CHISH015.4LW	Middle	71f	02-28-2008	WINTER	0.003	0.32
CLEAR001.3GE	East	67F	02-13-2008	WINTER	2.9	1.22
CLEAR001.3GE	East	67F	04-29-2008	SPRING	1.9	1.22
CLEAR001.3GE	East	67F	11-14-2007	FALL	0.93	1.22
CLEAR001.3GE	East	67F	07-17-2007	SUMMER	0.79	1.22
CLOVE1T0.5OB	West	74A	02-08-2008	WINTER	1.4	0.22
CLOVE1T0.5OB	West	74A	04-02-2008	SPRING	0.89	0.22
CLOVE1T0.5OB	West	74A	07-03-2007	SUMMER	0.58	0.22
CLOVE1T0.5OB	West	74A	10-03-2007	FALL	0.14	0.22
COLD006.3LE	West	74a	01-08-2008	WINTER	0.36	0.22

Table B-1 Cont.

Station ID	Division	Eco-region	Date	Season	Nitrate Nitrite mg/L	Nutrient Criteria (mg/L)
COLD006.3LE	West	74a	04-30-2008	SPRING	0.16	0.22
COLD006.3LE	West	74a	10-02-2007	FALL	0.13	0.22
COLD006.3LE	West	74a	07-18-2007	SUMMER	0.12	0.22
CORN002.5JO	East	66f	07-25-2007	SUMMER	0.11	0.31
CORN002.5JO	East	66f	04-22-2008	SPRING	0.011	0.31
CORN002.5JO	East	66f	11-27-2007	FALL	0.003	0.31
CORN002.5JO	East	66f	03-04-2008	WINTER	0.003	0.31
COSBY012.2CO	East	66G	03-06-2008	WINTER	0.4	0.31
COSBY012.2CO	East	66G	05-13-2008	SPRING	0.3	0.31
COSBY012.2CO	East	66G	08-21-2007	SUMMER	0.26	0.31
COSBY012.2CO	East	66G	12-05-2007	FALL	0.24	0.31
COVE003.8SV	East	66g	08-22-2007	SUMMER	0.6	0.31
COVE003.8SV	East	66g	03-06-2008	WINTER	0.56	0.31
COVE003.8SV	East	66g	12-05-2007	FALL	0.37	0.31
COVE003.8SV	East	66g	05-13-2008	SPRING	0.36	0.31
CROOK005.0MC	West	65e	04-08-2008	SPRING	0.015	0.34
CROOK005.0MC	West	65e	11-16-2007	FALL	0.003	0.34
CROOK005.0MC	West	65e	07-11-2007	SUMMER	0.003	0.34
CROOK005.0MC	West	65e	02-20-2008	WINTER	0.003	0.34
CYPRE002.1CK	West	74b	04-17-2008	SPRING	2.0	1.19
CYPRE002.1CK	West	74b	02-14-2008	WINTER	1.1	1.19
CYPRE002.1CK	West	74b	10-04-2007	FALL	0.14	1.19
CYPRE002.1CK	West	74b	07-16-2007	SUMMER	0.13	1.19
CYPRE005.9OB	West	74b	04-02-2008	SPRING	1.0	1.19
CYPRE005.9OB	West	74b	01-09-2008	WINTER	0.59	1.19
CYPRE005.9OB	West	74b	07-23-2007	SUMMER	0.2	1.19
CYPRE005.9OB	West	74b	11-19-2007	FALL	0.18	1.19
CYPRE023.8MC	West	65e	10-10-2007	FALL	0.003	0.31
CYPRE023.8MC	West	65e	04-08-2008	SPRING	0.003	0.31
CYPRE023.8MC	West	65e	07-06-2007	SUMMER	0.003	0.31
CYPRE023.8MC	West	65e	01-11-2008	WINTER	0.003	0.31
DIXON000.4LW	Middle	71F	02-28-2008	WINTER	0.91	0.32
DIXON000.4LW	Middle	71F	11-27-2007	FALL	0.82	0.32
DIXON000.4LW	Middle	71F	05-06-2008	SPRING	0.82	0.32
DIXON000.4LW	Middle	71F	08-07-2007	SUMMER	0.49	0.32
DRAKE011.8SR	Middle	71H	01-22-2008	WINTER	1.7	0.92
DRAKE011.8SR	Middle	71H	05-07-2008	SPRING	0.85	0.92

Table B-1 Cont.

Station ID	Division	Eco-region	Date	Season	Nitrate Nitrite mg/L	Nutrient Criteria (mg/L)
DRAKE011.8SR	Middle	71H	11-01-2007	FALL	0.46	0.92
DRAKE011.8SR	Middle	71H	07-16-2007	SUMMER	0.25	0.92
EFPOP007.3RO	East	67f	08-28-2007	SUMMER	4.2	1.22
EFPOP007.3RO	East	67f	11-27-2007	FALL	2.2	1.22
EFPOP007.3RO	East	67f	03-06-2008	WINTER	2.2	1.22
EFPOP007.3RO	East	67f	04-29-2008	SPRING	1.5	1.22
FALL001.5UN	East	67F	06-02-2008	SPRING	0.66	1.22
FALL001.5UN	East	67F	08-22-2007	SUMMER	0.58	1.22
FALL001.5UN	East	67F	12-03-2007	FALL	0.42	1.22
FALL003.2HA	East	67f	06-02-2008	SPRING	2.0	1.22
FALL003.2HA	East	67f	08-22-2007	SUMMER	1.8	1.22
FALL003.2HA	East	67f	12-03-2007	FALL	1.6	1.22
GAMMO000.7SU	East	67F	02-12-2008	WINTER	1.8	1.22
GAMMO000.7SU	East	67F	04-08-2008	SPRING	1.5	1.22
GAMMO000.7SU	East	67F	11-13-2007	FALL	1.4	1.22
GAMMO000.7SU	East	67F	07-18-2007	SUMMER	1.2	1.22
GAP000.1CT	East	67f	07-25-2007	SUMMER	2.3	1.22
GAP000.1CT	East	67f	03-04-2008	WINTER	2.2	1.22
GAP000.1CT	East	67f	04-22-2008	SPRING	1.8	1.22
GAP000.1CT	East	67f	11-27-2007	FALL	1.2	1.22
GRASS005.1GE	East	67f	02-13-2008	WINTER	1.6	1.22
GRASS005.1GE	East	67f	07-17-2007	SUMMER	1.4	1.22
GRASS005.1GE	East	67f	04-29-2008	SPRING	0.92	1.22
GRASS005.1GE	East	67f	11-14-2007	FALL	0.52	1.22
GREEN016.2WE	Middle	71f	11-06-2007	FALL	0.35	0.32
GREEN016.2WE	Middle	71f	03-03-2008	WINTER	0.22	0.32
GREEN016.2WE	Middle	71f	04-29-2008	SPRING	0.14	0.32
GREEN016.2WE	Middle	71f	08-08-2007	SUMMER	0.003	0.32
HALLS001.7LE	West	74b	05-13-2008	SPRING	0.56	1.19
HALLS001.7LE	West	74b	01-08-2008	WINTER	0.55	1.19
HALLS001.7LE	West	74b	10-02-2007	FALL	0.003	1.19
HALLS001.7LE	West	74b	07-18-2007	SUMMER	0.003	1.19
HAWKI002.1CR	West	65e	10-16-2007	FALL	0.52	0.34
HAWKI002.1CR	West	65e	02-19-2008	WINTER	0.38	0.34
HAWKI002.1CR	West	65e	04-16-2008	SPRING	0.35	0.34
HAWKI002.1CR	West	65e	07-05-2007	SUMMER	0.34	0.34
HAYES003.3HR	West	65e	11-05-2007	FALL	0.003	0.34

Table B-1 Cont.

Station ID	Division	Eco-region	Date	Season	Nitrate Nitrite mg/L	Nutrient Criteria (mg/L)
HAYES003.3HR	West	65e	04-21-2008	SPRING	0.003	0.34
HAYES003.3HR	West	65e	07-02-2007	SUMMER	0.003	0.34
HAYES003.3HR	West	65e	01-16-2008	WINTER	0.003	0.34
HICKO008.4CA	East	69E	08-27-2007	SUMMER	0.58	0.27
HICKO008.4CA	East	69E	05-22-2008	SPRING	0.097	0.27
HICKO008.4CA	East	69E	11-28-2007	FALL	0.003	0.27
HICKO008.4CA	East	69E	02-20-2008	WINTER	0.003	0.27
HORSE007.0GE	East	66E	02-13-2008	WINTER	0.19	0.31
HORSE007.0GE	East	66E	04-29-2008	SPRING	0.11	0.31
HORSE007.0GE	East	66E	11-14-2007	FALL	0.003	0.31
HROCK002.4CR	West	65E	07-23-2007	SUMMER	0.6	0.34
HROCK002.4CR	West	65E	02-14-2008	WINTER	0.33	0.34
HROCK002.4CR	West	65E	11-20-2007	FALL	0.32	0.34
HROCK002.4CR	West	65E	04-10-2008	SPRING	0.14	0.34
HURRI007.4HE	West	65E	01-04-2008	WINTER	0.46	0.34
HURRI007.4HE	West	65E	04-09-2008	SPRING	0.34	0.34
HURRI007.4HE	West	65E	11-20-2007	FALL	0.003	0.34
HURRI007.4HE	West	65E	07-05-2007	SUMMER	0.003	0.34
HYDE002.7LE	West	74b	07-02-2007	SUMMER	1.9	1.19
HYDE002.7LE	West	74b	04-30-2008	SPRING	0.87	1.19
HYDE002.7LE	West	74b	01-08-2008	WINTER	0.3	1.19
HYDE002.7LE	West	74b	10-02-2007	FALL	0.003	1.19
INDIA003.7GR	East	67F	06-02-2008	SPRING	0.44	1.22
INDIA003.7GR	East	67F	12-03-2007	FALL	0.22	1.22
KERR000.4HD	West	65J	01-24-2008	WINTER	0.31	0.22
KERR000.4HD	West	65J	04-18-2008	SPRING	0.19	0.22
KERR000.4HD	West	65J	10-16-2007	FALL	0.17	0.22
KERR000.4HD	West	65J	07-11-2007	SUMMER	0.003	0.22
LAURE002.5GY	East	68A	01-07-2008	WINTER	0.66	0.23
LAURE002.5GY	East	68A	04-30-2008	SPRING	0.12	0.23
LAURE002.5GY	East	68A	06-17-2008	SUMMER	0.003	0.23
LAURE006.3JO	East	66E	11-28-2007	FALL	0.36	0.31
LAURE006.3JO	East	66E	03-04-2008	WINTER	0.26	0.31
LAURE006.3JO	East	66E	04-22-2008	SPRING	0.25	0.31
LBART006.5DI	Middle	71f	11-26-2007	FALL	1.1	0.32
LBART006.5DI	Middle	71f	04-09-2008	SPRING	0.71	0.32
LBART006.5DI	Middle	71f	02-20-2008	WINTER	0.63	0.32

Table B-1 Cont.

Station ID	Division	Eco-region	Date	Season	Nitrate Nitrite mg/L	Nutrient Criteria (mg/L)
LBART006.5DI	Middle	71f	07-03-2007	SUMMER	0.14	0.32
LONG004.9MA	Middle	71g	01-23-2008	WINTER	2.0	0.92
LONG004.9MA	Middle	71g	04-22-2008	SPRING	1.2	0.92
LONG004.9MA	Middle	71g	08-01-2007	SUMMER	0.88	0.92
LONG004.9MA	Middle	71g	10-09-2007	FALL	0.43	0.92
MFORK1T1.5HE	West	65e	01-04-2008	WINTER	1.3	0.34
MFORK1T1.5HE	West	65e	04-08-2008	SPRING	0.91	0.34
MFORK1T1.5HE	West	65e	07-03-2007	SUMMER	0.26	0.34
MFORK1T1.5HE	West	65e	10-09-2007	FALL	0.25	0.34
MIDDL001.2SV	East	67G	03-06-2008	WINTER	0.75	1.22
MIDDL001.2SV	East	67G	05-13-2008	SPRING	0.46	1.22
MIDDL001.2SV	East	67G	12-05-2007	FALL	0.38	1.22
MIDDL001.2SV	East	67G	08-22-2007	SUMMER	0.15	1.22
MILLE007.3RN	Middle	71E	11-01-2007	FALL	2.5	3.48
MILLE007.3RN	Middle	71E	01-22-2008	WINTER	1.8	3.48
MILLE007.3RN	Middle	71E	07-05-2007	SUMMER	1.2	3.48
MILLE007.3RN	Middle	71E	05-07-2008	SPRING	1.0	3.48
NFLIC002.0PE	Middle	71f	11-07-2007	FALL	0.3	0.32
NFLIC002.0PE	Middle	71f	02-26-2008	WINTER	0.29	0.32
NFLIC002.0PE	Middle	71f	05-22-2008	SPRING	0.12	0.32
NFLIC002.0PE	Middle	71f	08-08-2007	SUMMER	0.003	0.32
NREEL000.4OB	West	74a	04-02-2008	SPRING	0.66	0.22
NREEL000.4OB	West	74a	07-07-2007	SUMMER	0.4	0.22
NREEL000.4OB	West	74a	02-15-2008	WINTER	0.35	0.22
NREEL000.4OB	West	74a	10-03-2007	FALL	0.003	0.22
OTOWN008.9CL	East	69E	11-28-2007	FALL	1.4	0.27
OTOWN008.9CL	East	69E	05-22-2008	SPRING	0.36	0.27
OTOWN008.9CL	East	69E	02-20-2008	WINTER	0.32	0.27
OWL003.7HD	West	65e	04-08-2008	SPRING	0.16	0.34
OWL003.7HD	West	65e	02-20-2008	WINTER	0.16	0.34
OWL003.7HD	West	65e	11-16-2007	FALL	0.003	0.34
OWL003.7HD	West	65e	07-18-2007	SUMMER	0.003	0.34
POND013.8CK	West	74b	04-15-2008	SPRING	1.3	1.19
POND013.8CK	West	74b	01-09-2008	WINTER	0.92	1.19
POND013.8CK	West	74b	10-03-2007	FALL	0.003	1.19
POND013.8CK	West	74b	07-20-2007	SUMMER	0.003	1.19
POPLA000.1MG	East	69D	08-28-2007	SUMMER	0.11	0.27

Table B-1 Cont.

Station ID	Division	Eco-region	Date	Season	Nitrate Nitrite mg/L	Nutrient Criteria (mg/L)
POPLA000.1MG	East	69D	11-27-2007	FALL	0.003	0.27
POPLA000.1MG	East	69D	04-29-2008	SPRING	0.003	0.27
POPLA000.1MG	East	69D	03-06-2008	WINTER	0.003	0.27
POPLA014.7HY	West	74b	04-17-2008	SPRING	2.1	1.19
POPLA014.7HY	West	74b	02-14-2008	WINTER	0.9	1.19
POPLA014.7HY	West	74b	10-04-2007	FALL	0.003	1.19
PRUN000.1GS	Middle	71h	11-28-2007	FALL	2.9	0.92
PRUN000.1GS	Middle	71h	02-14-2008	WINTER	2.2	0.92
PRUN000.1GS	Middle	71h	05-06-2008	SPRING	1.8	0.92
PRUN000.1GS	Middle	71h	08-13-2007	SUMMER	1.4	0.92
RIPLE001.5GE	East	67F	02-13-2008	WINTER	3.2	1.22
RIPLE001.5GE	East	67F	04-29-2008	SPRING	1.6	1.22
RIPLE001.5GE	East	67F	11-14-2007	FALL	1.0	1.22
RIPLE001.5GE	East	67F	07-17-2007	SUMMER	0.68	1.22
ROBIN000.6FR	Middle	71f	02-14-2008	WINTER	3.7	0.32
ROBIN000.6FR	Middle	71f	05-19-2008	SPRING	2.3	0.32
ROBIN000.6FR	Middle	71f	11-28-2007	FALL	1.8	0.32
ROBIN000.6FR	Middle	71f	08-14-2007	SUMMER	1.5	0.32
ROSE001.3MC	West	65e	04-08-2008	SPRING	0.16	0.34
ROSE001.3MC	West	65e	07-02-2007	SUMMER	0.12	0.34
ROSE001.3MC	West	65e	01-11-2008	WINTER	0.11	0.34
ROSE001.3MC	West	65e	10-10-2007	FALL	0.003	0.34
RUTHE007.4MY	Middle	71H	11-27-2007	FALL	2.2	0.92
RUTHE007.4MY	Middle	71H	02-26-2008	WINTER	1.5	0.92
RUTHE007.4MY	Middle	71H	05-19-2008	SPRING	1.3	0.92
RUTHE007.4MY	Middle	71H	08-20-2007	SUMMER	0.003	0.92
SCAMP008.3SR	Middle	71H	01-22-2008	WINTER	2.0	0.92
SCAMP008.3SR	Middle	71H	05-07-2008	SPRING	0.69	0.92
SCAMP008.3SR	Middle	71H	11-01-2007	FALL	0.51	0.92
SCAMP008.3SR	Middle	71H	07-16-2007	SUMMER	0.28	0.92
SCOTT000.9DA	Middle	71h	01-15-2008	WINTER	2.9	0.92
SCOTT000.9DA	Middle	71h	05-13-2008	SPRING	1.1	0.92
SCOTT000.9DA	Middle	71h	10-01-2007	FALL	0.6	0.92
SCOTT000.9DA	Middle	71h	07-18-2007	SUMMER	0.41	0.92
SEQUA101.2BL	East	68b	09-12-2007	SUMMER	0.51	0.43
SEQUA101.2BL	East	68b	10-03-2007	FALL	0.5	0.43
SEQUA101.2BL	East	68b	04-30-2008	SPRING	0.4	0.43

Table B-1 Cont.

Station ID	Division	Eco-region	Date	Season	Nitrate Nitrite mg/L	Nutrient Criteria (mg/L)
SEQUA101.2BL	East	68b	01-07-2008	WINTER	0.13	0.43
SFCUB009.5DE	West	65e	02-19-2008	WINTER	0.47	0.34
SFCUB009.5DE	West	65e	04-16-2008	SPRING	0.24	0.34
SFCUB009.5DE	West	65e	07-05-2007	SUMMER	0.15	0.34
SFCUB009.5DE	West	65e	10-11-2007	FALL	0.003	0.34
SFFDE1T0.7MN	West	65e	01-16-2008	WINTER	2.9	0.34
SFFDE1T0.7MN	West	65e	07-05-2007	SUMMER	0.4	0.34
SFFDE1T0.7MN	West	65e	04-22-2008	SPRING	0.13	0.34
SFFDE1T0.7MN	West	65e	10-10-2007	FALL	0.11	0.34
SFMUD003.8MC	West	65E	11-05-2007	FALL	0.003	0.34
SFMUD003.8MC	West	65E	04-22-2008	SPRING	0.003	0.34
SFMUD003.8MC	West	65E	07-17-2007	SUMMER	0.003	0.34
SFMUD003.8MC	West	65E	01-23-2008	WINTER	0.003	0.34
SHARP014.4WI	Middle	71f	01-15-2008	WINTER	0.66	0.32
SHARP014.4WI	Middle	71f	10-01-2007	FALL	0.13	0.32
SHARP014.4WI	Middle	71f	07-09-2007	SUMMER	0.1	0.32
SHARP014.4WI	Middle	71f	05-13-2008	SPRING	0.074	0.32
SINKI003.0CO	East	67G	03-06-2008	WINTER	0.58	1.22
SINKI003.0CO	East	67G	08-21-2007	SUMMER	0.34	1.22
SINKI003.0CO	East	67G	12-05-2007	FALL	0.26	1.22
SINKI003.0CO	East	67G	05-13-2008	SPRING	0.24	1.22
SMITH003.5HD	West	65j	01-24-2008	WINTER	0.23	0.22
SMITH003.5HD	West	65j	07-31-2007	SUMMER	0.14	0.22
SMITH003.5HD	West	65j	10-16-2007	FALL	0.12	0.22
SMITH003.5HD	West	65j	04-18-2008	SPRING	0.096	0.22
SPRIN009.0WS	Middle	71i	01-15-2008	WINTER	2.2	0.92
SPRIN009.0WS	Middle	71i	05-13-2008	SPRING	0.074	0.92
SPRIN009.0WS	Middle	71i	10-01-2007	FALL	0.003	0.92
SPRIN009.0WS	Middle	71i	07-17-2007	SUMMER	0.003	0.92
STOKE004.9CK	West	74B	01-09-2008	WINTER	1.0	1.19
STOKE004.9CK	West	74B	04-15-2008	SPRING	0.19	1.19
STOKE004.9CK	West	74B	10-03-2007	FALL	0.003	1.19
STOKE004.9CK	West	74B	07-20-2007	SUMMER	0.003	1.19
SULPH036.0RN	Middle	71E	01-22-2008	WINTER	1.6	3.48
SULPH036.0RN	Middle	71E	05-07-2008	SPRING	1.1	3.48
SULPH036.0RN	Middle	71E	11-01-2007	FALL	0.46	3.48
TAR003.0CS	West	65E	05-06-2008	SPRING	0.15	0.34

Table B-1 Cont.

Station ID	Division	Eco-region	Date	Season	Nitrate Nitrite mg/L	Nutrient Criteria (mg/L)
TAR003.0CS	West	65E	10-18-2007	FALL	0.003	0.34
TAR003.0CS	West	65E	08-21-2007	SUMMER	0.003	0.34
TAR003.0CS	West	65E	02-07-2008	WINTER	0.003	0.34
THOMP000.2WY	West	65e	01-15-2008	WINTER	1.4	0.34
THOMP000.2WY	West	65e	07-17-2007	SUMMER	0.48	0.34
THOMP000.2WY	West	65e	04-10-2008	SPRING	0.47	0.34
THOMP000.2WY	West	65e	11-20-2007	FALL	0.44	0.34
TISDA1T1.2LE	West	74b	01-08-2008	WINTER	0.44	1.19
TISDA1T1.2LE	West	74b	05-13-2008	SPRING	0.4	1.19
TISDA1T1.2LE	West	74b	07-02-2007	SUMMER	0.38	1.19
TISDA1T1.2LE	West	74b	10-02-2007	FALL	0.31	1.19
TITUS1T0.1CA	East	69E	05-22-2008	SPRING	0.1	0.27
TITUS1T0.1CA	East	69E	11-28-2007	FALL	0.003	0.27
TITUS1T0.1CA	East	69E	02-20-2008	WINTER	0.003	0.27
TOWEE005.9PO	East	66g	10-03-2007	FALL	0.003	0.31
TOWEE005.9PO	East	66g	08-08-2007	SUMMER	0.003	0.31
TOWEE005.9PO	East	66g	01-09-2008	WINTER	0.003	0.31
TRACE003.5CY	Middle	71G	01-23-2008	WINTER	2.1	0.92
TRACE003.5CY	Middle	71G	04-22-2008	SPRING	0.64	0.92
TRACE003.5CY	Middle	71G	10-09-2007	FALL	0.24	0.92
TUMBL003.8HU	Middle	71F	02-20-2008	WINTER	0.68	0.32
TUMBL003.8HU	Middle	71F	11-26-2007	FALL	0.61	0.32
TUMBL003.8HU	Middle	71F	04-09-2008	SPRING	0.49	0.32
TUMBL003.8HU	Middle	71F	07-23-2007	SUMMER	0.15	0.32
WATSO002.3WI	Middle	71h	01-15-2008	WINTER	2.4	0.92
WATSO002.3WI	Middle	71h	05-13-2008	SPRING	1.2	0.92
WATSO002.3WI	Middle	71h	10-01-2007	FALL	0.55	0.92
WATSO002.3WI	Middle	71h	07-09-2007	SUMMER	0.51	0.92
WELLS007.6HO	Middle	71F	11-26-2007	FALL	1.2	0.32
WELLS007.6HO	Middle	71F	04-09-2008	SPRING	0.64	0.32
WELLS007.6HO	Middle	71F	02-20-2008	WINTER	0.62	0.32
WELLS007.6HO	Middle	71F	07-02-2007	SUMMER	0.29	0.32
WFHIC007.0CE	Middle	71G	02-12-2008	WINTER	3.1	0.92
WFHIC007.0CE	Middle	71G	05-28-2008	SPRING	1.7	0.92
WFHIC007.0CE	Middle	71G	11-29-2007	FALL	1.2	0.92
WFHIC007.0CE	Middle	71G	08-16-2007	SUMMER	1.2	0.92
WFRED010.7MT	Middle	71e	02-20-2008	WINTER	7.3	3.48

Table B-1 Cont.

Station ID	Division	Eco-region	Date	Season	Nitrate Nitrite mg/L	Nutrient Criteria (mg/L)
WFRED010.7MT	Middle	71e	11-26-2007	FALL	7.2	3.48
WFRED010.7MT	Middle	71e	04-09-2008	SPRING	6.6	3.48
WFRED010.7MT	Middle	71e	07-18-2007	SUMMER	3.9	3.48
WHITE013.5HU	Middle	71f	11-26-2007	FALL	0.82	0.32
WHITE013.5HU	Middle	71f	04-22-2008	SPRING	0.3	0.32
WHITE013.5HU	Middle	71f	07-02-2007	SUMMER	0.14	0.32

APPENDIX C

Field Data and Additional Chemical Data for the Wadeable Streams Sites

(Station location information is provided in volume 2 of this report series)

Table C-1: Field data and additional chemical data.

Station ID	Eco-region	Division	Date	Season	pH	DO mg/L	Temp °C	Flow CFS	Conduc uMHO	Amm n mg/L	Tot KN mg/L	TOC mg/L	TSS mg/L
BEAGL008.3OV	71g	Middle	01-23-2008	Winter	8.49	17.20	4.52		198	<0.03	<0.15	1.2	<10
BEAGL008.3OV	71g	Middle	04-21-2008	Spring	8.42	11.50	18.41		235	<0.03	<0.15	1.3	<10
BEAGL008.3OV	71g	Middle	07-31-2007	Summer	7.70	9.15	25.50		437	<0.03		1.4	<10
BEAGL008.3OV	71g	Middle	10-09-2007	Fall	8.05	8.51	19.00			<0.03	<0.15	2.2	<10
BEAR002.1WY	65e	West	01-09-2008	Winter	6.64	11.76	10.04	2.68	102	<0.03	<0.15	6.9	72
BEAR002.1WY	65e	West	04-02-2008	Spring	7.07	10.76	13.83	10.18	66	0.17	0.68	4.5	15
BEAR002.1WY	65e	West	07-03-2007	Summer	6.92	6.86	21.47	< 0.01	125	<0.03	1.20	7.5	75
BEAR002.1WY	65e	West	11-19-2007	Fall	7.13	4.83	12.62	< 0.01	130	<0.03	<0.15	11.0	<10
BEAVE008.9KN	67F	East	03-06-2008	Winter	7.12	11.70	9.59	300.00	186	<0.03	0.93	4.5	82
BEAVE008.9KN	67F	East	04-29-2008	Spring	7.69	11.10	15.20	112.00	364	<0.03	0.26	2.7	11
BEAVE008.9KN	67F	East	08-28-2007	Summer	7.41		26.03	28.83	464	<0.03	<0.15	3.5	<10
BEAVE008.9KN	67F	East	11-27-2007	Fall	6.81		10.95	73.63	286	<0.03	<0.15	3.5	23
BFLAT018.0UN	67F	East	06-02-2008	Spring	7.93		18.15		426	0.05	0.41	1.3	<10
BFLAT018.0UN	67F	East	08-22-2007	Summer	7.61		19.18	1.58	398	0.14	<0.15	0.8	<10
BIRCH000.6JO	66e	East	03-04-2008	Winter	6.00	10.06	7.12	6.27	6	<0.03	<0.15	1.0	<10
BIRCH000.6JO	66e	East	04-22-2008	Spring	6.22	10.27	9.69	1.08	6	<0.03	<0.15	0.7	<10
BIRCH000.6JO	66e	East	07-25-2007	Summer	5.42	9.13	14.49	4.97	8	<0.03	<0.15	2.0	<10
BIRCH000.6JO	66e	East	09-19-2007	Fall	6.62	8.51	12.98	0.13	7				
BIRCH000.6JO	66e	East	09-25-2007	Fall	6.17	8.45	15.50	0.09	8				
BIRCH000.6JO	66e	East	10-03-2007	Fall	5.69	8.82	13.36	0.03	8				
BIRCH000.6JO	66e	East	10-09-2007	Fall	5.11	8.45	14.56	0.09	8				
BIRCH000.6JO	66e	East	10-11-2007	Fall	6.26	9.58	11.58	<0.01	8	<0.03	<0.15	<.1	<10
BIRCH000.6JO	66e	East	11-27-2007	Fall	7.52	9.93	7.53	0.93	7	<0.03	<0.15	1.6	<10
BIRDS012.3BN	65e	West	01-23-2008	Winter	6.68	14.10	2.90	37.06	140	<0.03	<0.15	1.6	<10
BIRDS012.3BN	65e	West	04-22-2008	Spring	7.60	9.41	15.50	47.69	64	<0.03	<0.15	1.9	13
BIRDS012.3BN	65e	West	07-10-2008	Summer	6.85	13.07	24.83		138				

Table C-1 Cont.

Station ID	Eco-region	Division	Date	Season	pH	DO mg/L	Temp °C	Flow CFS	Conduc uMHO	Amm n mg/L	Tot KN mg/L	TOC mg/L	TSS mg/L
BIRDS012.3BN	65e	West	07-12-2007	Summer	6.85	6.25	23.88	5.65	110	0.16	0.64	5.7	12
BIRDS012.3BN	65e	West	08-05-2008	Summer	7.57	7.07	24.56		346				
BIRDS012.3BN	65e	West	09-23-2008	Fall		9.50	22.09		287				
BIRDS012.3BN	65e	West	09-24-2008	Fall	7.77	9.89	21.59		344				
BIRDS012.3BN	65e	West	09-25-2008	Fall		9.51	20.86		359				
BIRDS012.3BN	65e	West	09-30-2008	Fall	7.55	8.77	19.51		328				
BIRDS012.3BN	65e	West	10-01-2008	Fall	7.80	8.32	18.17		357				
BIRDS012.3BN	65e	West	10-09-2008	Fall	7.34	8.27	18.68		162				
BIRDS012.3BN	65e	West	10-16-2007	Fall	7.40	8.61	18.43	0.48	241	<0.03	0.52	3.3	14
BRUSH001.1LS	71f	Middle	02-28-2008	Winter	7.99	14.44	6.35	1.18	108	<0.03	<0.15		<10
BRUSH001.1LS	71f	Middle	04-30-2008	Spring	7.41	9.73	16.01	1.34	64	<0.03	<0.15	1.2	<10
BRUSH001.1LS	71f	Middle	08-10-2007	Summer	7.60	5.48	23.30	0.12	123	<0.03	<0.15	1.2	<10
BRUSH001.1LS	71f	Middle	09-26-2007	Fall	8.07	8.16	20.79		129				
BRUSH001.1LS	71f	Middle	10-03-2007	Fall	8.25	8.69	19.38		148				
BRUSH001.1LS	71f	Middle	10-04-2007	Fall	8.00	8.58	19.53		135				
BRUSH001.1LS	71f	Middle	10-08-2007	Fall	7.93	8.50	20.36		134				
BRUSH001.1LS	71f	Middle	10-09-2007	Fall	7.76	8.37	19.69		134				
BRUSH001.1LS	71f	Middle	11-07-2007	Fall	7.73	13.12	5.69	1.08	138	<0.03	<0.15	1.5	<10
BSPRI003.9CH	71f	Middle	01-22-2008	Winter	7.24	12.88	4.88	1.48	257	<0.03	<0.15	0.8	<10
BSPRI003.9CH	71f	Middle	05-07-2008	Spring	8.00	10.03	14.74	3.43	222	<0.03	<0.15	1.1	<10
BSPRI003.9CH	71f	Middle	07-05-2007	Summer	8.00	9.24	20.74	0.50	336	<0.03	<0.15	1.1	10
BSPRI003.9CH	71f	Middle	08-08-2007	Summer	7.93	8.43	21.62		349				
BSPRI003.9CH	71f	Middle	08-16-2007	Summer	8.40	9.65	28.12		336				
BSPRI003.9CH	71f	Middle	08-20-2007	Summer	8.29	8.86	23.45		354				
BSPRI003.9CH	71f	Middle	08-28-2007	Summer	8.20	9.43	22.94		354				
BSPRI003.9CH	71f	Middle	08-30-2007	Summer	8.01	7.67	21.56		319				
BSPRI003.9CH	71f	Middle	11-01-2007	Fall	8.69	10.35	12.72	0.78	345	<0.03	<0.15	1.1	<10

Table C-1 Cont.

Station ID	Eco-region	Division	Date	Season	pH	DO mg/L	Temp °C	Flow CFS	Conduc uMHO	Amm n mg/L	Tot KN mg/L	TOC mg/L	TSS mg/L
BUNDR000.6WE	71f	Middle	03-03-2008	Winter	7.20	12.41	12.54	3.17	64	<0.03	<0.15	1.1	<10
BUNDR000.6WE	71f	Middle	04-29-2008	Spring	7.24	11.50	10.71	1.97	57	<0.03	<0.15	1.4	<10
BUNDR000.6WE	71f	Middle	08-08-2007	Summer	7.19	6.56	24.20	0.08	81	<0.03	<0.15	1.6	<10
BUNDR000.6WE	71f	Middle	09-26-2007	Fall	7.68	7.62	21.27		78				
BUNDR000.6WE	71f	Middle	10-03-2007	Fall	8.03	9.10	16.85		67				
BUNDR000.6WE	71f	Middle	10-04-2007	Fall	7.67	8.08	20.05		72				
BUNDR000.6WE	71f	Middle	10-08-2007	Fall	7.42	7.74	19.07		75				
BUNDR000.6WE	71f	Middle	10-09-2007	Fall	7.30	7.40	21.02		79				
BUNDR000.6WE	71f	Middle	11-06-2007	Fall	7.96	6.33	8.70	0.71	62	<0.03	<0.15	2.5	<10
BYRD001.5HS	67f	East	02-13-2008	Winter	8.17	11.24	7.39	2.43	354	<0.03	<0.15	1.1	<10
BYRD001.5HS	67f	East	04-29-2008	Spring	7.66	11.14	10.06	4.09	339	<0.03	<0.15	1.4	10
BYRD001.5HS	67f	East	07-17-2007	Summer	8.17	8.26	20.45	0.16	336	<0.03	<0.15	0.6	<10
BYRD001.5HS	67f	East	09-18-2007	Fall	7.99	10.75	15.16	0.32	363				
BYRD001.5HS	67f	East	09-24-2007	Fall	8.05	9.42	17.33	0.25	354				
BYRD001.5HS	67f	East	10-02-2007	Fall	7.88	8.78	13.28	4.72	354				
BYRD001.5HS	67f	East	10-08-2007	Fall	7.63	7.96	15.59	0.42	357				
BYRD001.5HS	67f	East	10-10-2007	Fall	7.86	8.05	15.03	0.34	358	<0.03	<0.15	0.8	<10
BYRD001.5HS	67f	East	11-14-2007	Fall	7.83	8.86	12.14	0.46	362	<0.03	<0.15	0.8	<10
CANDI017.1BR	67F	East	01-09-2008	Winter	7.77	9.96	11.78		229	<0.03	<0.15		
CANDI017.1BR	67F	East	04-23-2008	Spring	8.09	9.49	16.70		239	<0.03	0.21		
CANDI017.1BR	67F	East	08-08-2007	Summer	7.78	6.53	26.22	7.90	367	<0.03	<0.15		
CANDI017.1BR	67F	East	10-03-2007	Fall	7.64	5.50	18.06		359	<0.03	<0.15		
CANDI033.1BR	67G	East	01-09-2008	Winter	7.98	10.86	12.70		215	<0.03	<0.15		
CANDI033.1BR	67G	East	04-23-2008	Spring	8.03	10.91	17.36		214	<0.03	0.21		
CANDI033.1BR	67G	East	08-08-2007	Summer	7.73	4.45	26.49	1.65	292	<0.03	1.10		
CANDI033.1BR	67G	East	10-03-2007	Fall	7.67	6.27	18.13		279	<0.03	<0.15		
CANE001.4SH	74b	West	01-15-2008	Winter	6.61	6.96	12.00	6.42	174	<0.03	<0.15	2.4	<10

Table C-1 Cont.

Station ID	Eco-region	Division	Date	Season	pH	DO mg/L	Temp °C	Flow CFS	Conduc uMHO	Amm n mg/L	Tot KN mg/L	TOC mg/L	TSS mg/L
CANE001.4SH	74b	West	04-08-2008	Spring	7.28	4.74	20.55	3.96	280	0.07	0.38	2.0	<10
CANE001.4SH	74b	West	08-07-2007	Summer	6.70	5.72	26.40	4.58	207	<0.03	<0.15	0.8	<10
CANE001.4SH	74b	West	11-06-2007	Fall	6.93	0.68	16.47	3.87	123	<0.03	0.94	24.0	17
CANE004.5VA	71H	Middle	02-11-2008	Winter	8.34	10.70	9.43		56	<0.03	<0.15	1.1	<10
CANE004.5VA	71H	Middle	04-21-2008	Spring	7.50	12.52	12.75		64	<0.03	<0.15	0.9	<10
CANE004.5VA	71H	Middle	10-09-2007	Fall	7.21	7.77	21.08		191				
CANE004.5VA	71H	Middle	10-10-2007	Fall	7.71	8.03	19.78		188	<0.03	<0.15	1.4	<10
CATHE001.5MY	71h	Middle	02-26-2008	Winter	7.59	12.66	9.82	24.09	259	<0.03	<0.15	1.6	<10
CATHE001.5MY	71h	Middle	05-22-2008	Spring	7.90	10.35	18.56	22.43	195	<0.03	<0.15	1.2	<10
CATHE001.5MY	71h	Middle	08-13-2007	Summer	7.53	6.33	24.60	2.74	224	<0.03	<0.15	0.7	<10
CATHE001.5MY	71h	Middle	10-04-2007	Fall	7.78	8.51	21.37		198				
CATHE001.5MY	71h	Middle	10-08-2007	Fall	7.63	7.72	21.55		194				
CATHE001.5MY	71h	Middle	10-10-2007	Fall	7.81	8.25	19.62		178				
CATHE001.5MY	71h	Middle	10-15-2007	Fall	7.62	8.87	17.50		191				
CATHE001.5MY	71h	Middle	10-17-2007	Fall	7.53	8.16	20.09		190				
CATHE001.5MY	71h	Middle	11-07-2007	Fall	7.86	11.21	11.21	1.47	246	<0.03	<0.15	2.4	<10
CFORK003.4SR	71g	Middle	01-22-2008	Winter	7.81	13.00	6.35	9.28	176	<0.03	<0.15	0.8	<10
CFORK003.4SR	71g	Middle	05-07-2008	Spring	7.85	10.37	15.74	14.74	156	<0.03	<0.15	1.1	<10
CFORK003.4SR	71g	Middle	08-08-2007	Summer	7.86	7.44	22.97		284				
CFORK003.4SR	71g	Middle	08-16-2007	Summer	7.78	6.78	21.90	0.36	284	<0.03	<0.15	0.7	<10
CFORK003.4SR	71g	Middle	08-20-2007	Summer	7.97	6.55	22.41		294				
CFORK003.4SR	71g	Middle	08-28-2007	Summer	8.05	6.09	21.58		304				
CFORK003.4SR	71g	Middle	08-30-2007	Summer	7.54	4.60	21.29		302				
CFORK003.4SR	71g	Middle	11-01-2007	Fall	8.02	9.44	14.34	1.26	308	<0.03	<0.15	1.5	<10
CHISH015.4LW	71f	Middle	02-28-2008	Winter	7.84	14.73	5.64	11.52	65	<0.03	<0.15		<10
CHISH015.4LW	71f	Middle	04-29-2008	Spring	7.09	10.69	14.09	9.72	70	<0.03	<0.15	0.7	<10
CHISH015.4LW	71f	Middle	08-07-2007	Summer	7.47	7.88	25.87	2.30	101	<0.03	<0.15	0.9	<10

Table C-1 Cont.

Station ID	Eco-region	Division	Date	Season	pH	DO mg/L	Temp °C	Flow CFS	Conduc uMHO	Amm n mg/L	Tot KN mg/L	TOC mg/L	TSS mg/L
CHISH015.4LW	71f	Middle	10-04-2007	Fall	7.54	9.10	20.16		105				
CHISH015.4LW	71f	Middle	10-08-2007	Fall	7.54	8.16	20.26		106				
CHISH015.4LW	71f	Middle	10-10-2007	Fall	7.84	8.72	18.60		103				
CHISH015.4LW	71f	Middle	10-15-2007	Fall	7.50	9.56	15.99		102				
CHISH015.4LW	71f	Middle	10-17-2007	Fall	7.45	8.85	18.55		106				
CHISH015.4LW	71f	Middle	11-27-2007	Fall	7.40	10.64	10.24	10.05	94	<0.03	<0.15	1.2	<10
CLEAR001.3GE	67F	East	02-13-2008	Winter	8.02	8.03	9.84	10.25	491	<0.03	<0.15	1.7	38
CLEAR001.3GE	67F	East	04-29-2008	Spring	8.24	9.76	9.76	6.80	490	0.06	0.85	2.9	47
CLEAR001.3GE	67F	East	07-17-2007	Summer	7.79	6.44	20.28	2.60	489	0.11	0.56	1.6	15
CLEAR001.3GE	67F	East	09-18-2007	Fall	7.88	8.27	16.11	1.54	480				
CLEAR001.3GE	67F	East	09-24-2007	Fall	7.89	7.62	19.07	0.34	474				
CLEAR001.3GE	67F	East	10-02-2007	Fall	8.10	7.80	14.11	1.55	466				
CLEAR001.3GE	67F	East	10-08-2007	Fall	8.01	7.71	18.09	1.14	478				
CLEAR001.3GE	67F	East	10-10-2007	Fall	7.88	7.12	17.68	0.92	482	<0.03	0.68	2.0	<10
CLEAR001.3GE	67F	East	11-14-2007	Fall	7.87	8.52	11.29	1.62	458	0.03	<0.15	1.7	<10
CLOVE1T0.5OB	74A	West	02-08-2008	Winter	7.13	13.01	4.41	1.51	449	<0.03	<0.15	2.6	11
CLOVE1T0.5OB	74A	West	04-02-2008	Spring	7.26	12.51	12.00	1.89	400	<0.03	0.23	2.9	33
CLOVE1T0.5OB	74A	West	07-03-2007	Summer	7.37	4.52	22.07	0.01	236	<0.03	1.20	13.0	35
CLOVE1T0.5OB	74A	West	10-03-2007	Fall	7.11	4.49	19.66		204	<0.03	1.00	13.0	<10
COLD006.3LE	74a	West	01-08-2008	Winter	7.61	9.64	14.07	2.08	469	<0.03	<0.15	1.7	<10
COLD006.3LE	74a	West	04-30-2008	Spring	7.60	9.48	15.96	3.90	445	<0.03	0.26		<10
COLD006.3LE	74a	West	05-21-2008	Spring				1.99				1.9	
COLD006.3LE	74a	West	07-18-2007	Summer	7.90	7.70	26.64	0.79	475	<0.03	<0.15	2.0	<10
COLD006.3LE	74a	West	10-02-2007	Fall	7.66	8.37	19.59	1.17	460	<0.03	<0.15	1.8	<10
CORN002.5JO	66f	East	03-04-2008	Winter	6.25	10.87	7.57	3.89	19	<0.03	<0.15	1.0	<10
CORN002.5JO	66f	East	04-22-2008	Spring	6.73	9.73	10.58	1.14	24	<0.03	<0.15	0.7	<10
CORN002.5JO	66f	East	07-25-2007	Summer	6.74	8.62	15.16	3.21	20	<0.03	<0.15	1.6	<10

Table C-1 Cont.

Station ID	Eco-region	Division	Date	Season	pH	DO mg/L	Temp °C	Flow CFS	Conduc uMHO	Amm n mg/L	Tot KN mg/L	TOC mg/L	TSS mg/L
CORN002.5JO	66f	East	09-19-2007	Fall	6.77	8.74	13.61	0.26	35				
CORN002.5JO	66f	East	09-25-2007	Fall	6.76	7.64	16.80	0.17	35				
CORN002.5JO	66f	East	10-03-2007	Fall	6.78	7.57	15.21	0.27	34				
CORN002.5JO	66f	East	10-09-2007	Fall	6.61	7.56	15.87	0.25	36				
CORN002.5JO	66f	East	10-11-2007	Fall	6.72	8.92	11.94	0.20	35	<0.03	<0.15	0.9	<10
CORN002.5JO	66f	East	11-27-2007	Fall	6.35	9.86	7.68	1.71	37	<0.03	<0.15	1.4	<10
COSBY012.2CO	66G	East	03-06-2008	Winter	8.11	11.75	7.25	63.42	15	<0.03	<0.15	0.6	10
COSBY012.2CO	66G	East	05-13-2008	Spring	5.96	11.15	10.48	14.20	18	<0.03	<0.15	0.8	<10
COSBY012.2CO	66G	East	08-21-2007	Summer	5.54	9.02	19.50	0.99	17	<0.03	<0.15	0.8	<10
COSBY012.2CO	66G	East	12-05-2007	Fall	6.31	11.42	6.47	4.65	11	<0.03	<0.15	0.8	<10
COVE003.8SV	66g	East	03-06-2008	Winter	8.47	11.47	10.24	19.38	165	<0.03	<0.15	1.1	<10
COVE003.8SV	66g	East	05-13-2008	Spring	7.13	10.84	14.86	6.58	197	<0.03	<0.15	1.1	<10
COVE003.8SV	66g	East	08-22-2007	Summer	8.07	8.84	21.46	1.57	270	<0.03	<0.15	0.9	<10
COVE003.8SV	66g	East	12-05-2007	Fall	7.23	11.52	8.03	2.83	168	<0.03	<0.15	2.8	<10
CROOK005.0MC	65e	West	02-20-2008	Winter	6.92	11.77	8.49	3.43	57	<0.03	<0.15	2.6	13
CROOK005.0MC	65e	West	04-08-2008	Spring	7.10	9.94	14.44	16.12	35	<0.03	0.28	2.7	19
CROOK005.0MC	65e	West	07-11-2007	Summer	7.35	6.66	24.54	0.06	323	0.10	0.57	4.6	<10
CROOK005.0MC	65e	West	11-16-2007	Fall	6.81	9.21	10.16	0.52	188	<0.03	<0.15	5.2	<10
CYPRE002.1CK	74b	West	02-14-2008	Winter	7.19	14.13	2.75	13.46	115	0.13	0.86	7.6	15
CYPRE002.1CK	74b	West	04-17-2008	Spring	7.42	9.50	16.24	2.25	197	<0.03	0.49	4.3	<10
CYPRE002.1CK	74b	West	07-16-2007	Summer	6.55	4.19	22.75	0.71	128	0.19	0.79	3.0	17
CYPRE002.1CK	74b	West	10-04-2007	Fall	6.31	3.58	19.08	0.05	142	<0.03	0.59	4.4	
CYPRE005.9OB	74b	West	01-09-2008	Winter	6.79	10.77	8.54	24.03	128	1.00	1.90	12.0	70
CYPRE005.9OB	74b	West	04-02-2008	Spring	6.78	11.38	11.32	12.90	123	0.15	0.99	8.2	25
CYPRE005.9OB	74b	West	07-23-2007	Summer	6.50	8.53	18.72	0.32	115	<0.03	<0.15	1.4	12
CYPRE005.9OB	74b	West	11-19-2007	Fall	6.95	6.91	13.99	0.26	132	<0.03	<0.15	5.2	<10
CYPRE023.8MC	65e	West	01-11-2008	Winter	7.36	9.99	10.69	8.37	26	<0.03	<0.15	4.2	<10

Table C-1 Cont.

Station ID	Eco-region	Division	Date	Season	pH	DO mg/L	Temp °C	Flow CFS	Conduc uMHO	Amm n mg/L	Tot KN mg/L	TOC mg/L	TSS mg/L
CYPRE023.8MC	65e	West	04-08-2008	Spring	6.71	9.78	13.69	23.06	24	<0.03	0.39	5.7	<10
CYPRE023.8MC	65e	West	07-06-2007	Summer	6.37	6.06	28.06	0.73	30	<0.03	0.52	3.8	<10
CYPRE023.8MC	65e	West	10-10-2007	Fall	6.37	7.30	23.35	0.63	39	<0.03	0.58	3.1	<10
DIXON000.4LW	71F	Middle	02-28-2008	Winter			9.25	3.47		<0.03	<0.15		<10
DIXON000.4LW	71F	Middle	05-06-2008	Spring	8.19	10.90	16.45	4.50	102	<0.03	<0.15	0.6	<10
DIXON000.4LW	71F	Middle	08-07-2007	Summer	7.36	7.09	10.24	0.52	148	<0.03	<0.15	0.8	<10
DIXON000.4LW	71F	Middle	10-04-2007	Fall	8.04	9.69	19.50		144				
DIXON000.4LW	71F	Middle	10-08-2007	Fall	7.76	8.81	18.75		165				
DIXON000.4LW	71F	Middle	10-10-2007	Fall	8.17	10.01	15.59		142				
DIXON000.4LW	71F	Middle	10-15-2007	Fall	7.90	10.95	15.30		163				
DIXON000.4LW	71F	Middle	10-17-2007	Fall	7.73	9.60	18.51		153				
DIXON000.4LW	71F	Middle	11-27-2007	Fall	7.71	11.25	10.95	1.99	128	<0.03	<0.15	1.3	<10
DRAKE011.8SR	71H	Middle	01-22-2008	Winter	8.26	16.51	4.12	8.96	303	<0.03	<0.15	1.1	<10
DRAKE011.8SR	71H	Middle	05-07-2008	Spring	8.21	9.80	19.50	24.96	264	<0.03	0.18	1.1	<10
DRAKE011.8SR	71H	Middle	07-16-2007	Summer	7.87	6.10	23.53	0.71	372	<0.03	<0.15	1.5	<10
DRAKE011.8SR	71H	Middle	08-09-2007	Summer	7.88	4.15	27.74		376				
DRAKE011.8SR	71H	Middle	08-16-2007	Summer	7.99	4.77	27.04		376				
DRAKE011.8SR	71H	Middle	08-20-2007	Summer	7.76	2.85	27.99		387				
DRAKE011.8SR	71H	Middle	08-28-2007	Summer	7.77	2.35	26.11		401				
DRAKE011.8SR	71H	Middle	08-30-2007	Summer	7.73	4.99	26.51		377				
DRAKE011.8SR	71H	Middle	11-01-2007	Fall	8.23	12.24	13.83	1.40	452	<0.03	<0.15	1.7	<10
EFPOP007.3RO	67f	East	03-06-2008	Winter	7.03	11.74	9.55	47.89	244	<0.03	0.24	1.6	<10
EFPOP007.3RO	67f	East	04-29-2008	Spring	7.62	10.38	14.09	27.95	384	0.82	1.10	2.3	<10
EFPOP007.3RO	67f	East	08-28-2007	Summer	6.91		24.43	17.34	404	<0.03	<0.15	2.3	<10
EFPOP007.3RO	67f	East	11-27-2007	Fall	6.77		12.89	42.26	249	<0.03	<0.15	3.6	<10
FALL001.5UN	67F	East	06-02-2008	Spring	8.11		20.33		412	0.04	0.46	1.1	<10
FALL001.5UN	67F	East	08-22-2007	Summer	7.79		23.73	8.10	399	<0.03	<0.15	0.7	<10

Table C-1 Cont.

Station ID	Eco-region	Division	Date	Season	pH	DO mg/L	Temp °C	Flow CFS	Conduc uMHO	Amm n mg/L	Tot KN mg/L	TOC mg/L	TSS mg/L
FALL001.5UN	67F	East	12-03-2007	Fall	7.70	13.32	8.62	0.48	291	<0.03	<0.15	1.4	<10
FALL003.2HA	67f	East	06-02-2008	Spring	7.85	10.31	18.18		504	0.07	0.72	1.2	14
FALL003.2HA	67f	East	08-22-2007	Summer	7.65		20.82	4.88	459	<0.03	1.10	1.8	21
FALL003.2HA	67f	East	12-03-2007	Fall	7.46	11.72	9.23	2.32	338	<0.03	<0.15	1.1	<10
GAMMO000.7SU	67F	East	01-21-1999	Winter	7.73	10.63	12.08		452	<0.02	<0.1		<10
GAMMO000.7SU	67F	East	02-12-2008	Winter	7.43	9.94	10.93	2.29	556	<0.03	<0.15	0.5	16
GAMMO000.7SU	67F	East	04-08-2008	Spring	7.68	10.45	15.14	2.33	542	<0.03	<0.15	0.7	<10
GAMMO000.7SU	67F	East	07-16-2002	Summer	7.76	9.03	18.70		472	<0.02	1.19		<10
GAMMO000.7SU	67F	East	07-18-2007	Summer	7.43	3.21	16.87	1.07	497	<0.03	<0.15	0.7	<10
GAMMO000.7SU	67F	East	09-18-2007	Fall	7.75	5.77	14.65	0.73	530				
GAMMO000.7SU	67F	East	09-24-2007	Fall	7.43	7.44	15.87	0.24	515				
GAMMO000.7SU	67F	East	10-02-2007	Fall	7.72	7.02	13.20	0.12	532				
GAMMO000.7SU	67F	East	10-08-2007	Fall	7.77	8.91	15.49	0.66	533				
GAMMO000.7SU	67F	East	10-10-2007	Fall	7.59	8.72	15.18	0.99	536	<0.03	<0.15	<.1	14
GAMMO000.7SU	67F	East	11-13-2007	Fall	7.79	4.56	13.75	0.82	443	<0.03	<0.15		<10
GAP000.1CT	67f	East	03-04-2008	Winter	7.81	8.88	12.52	2.31	505	<0.03	<0.15	0.8	<10
GAP000.1CT	67f	East	04-22-2008	Spring	7.97	9.71	12.58	1.89	481	<0.03	0.16	0.9	<10
GAP000.1CT	67f	East	09-19-2007	Fall	7.39	5.90	15.33	0.39	530				
GAP000.1CT	67f	East	09-25-2007	Fall	7.63	6.13	17.81	0.20	504				
GAP000.1CT	67f	East	10-03-2007	Fall	7.61	5.88	15.28	0.19	518				
GAP000.1CT	67f	East	10-09-2007	Fall	7.30	5.67	16.67	0.16	528				
GAP000.1CT	67f	East	10-11-2007	Fall	7.22	7.23	14.15	0.13	539	<0.03	<0.15	1.0	10
GAP000.1CT	67f	East	11-27-2007	Fall	7.21	7.68	11.14	0.37	548	<0.03	<0.15	1.0	<10
GRASS005.1GE	67f	East	02-13-2008	Winter	7.91	10.70	7.14	5.46	692	<0.03	<0.15	2.5	<10
GRASS005.1GE	67f	East	04-29-2008	Spring	8.18	10.95	11.09	0.29	633	<0.03	<0.15	2.5	<10
GRASS005.1GE	67f	East	07-17-2007	Summer	7.89	7.78	21.78	0.08	529	<0.03	0.52	1.8	<10
GRASS005.1GE	67f	East	09-18-2007	Fall	8.07	7.56	15.81	0.09	512				

Table C-1 Cont.

Station ID	Eco-region	Division	Date	Season	pH	DO mg/L	Temp °C	Flow CFS	Conduc uMHO	Amm n mg/L	Tot KN mg/L	TOC mg/L	TSS mg/L
GRASS005.1GE	67f	East	09-24-2007	Fall	7.95	6.36	19.04	0.01	518				
GRASS005.1GE	67f	East	10-02-2007	Fall	8.06	2.59	13.86	0.17	515				
GRASS005.1GE	67f	East	10-08-2007	Fall	8.02	7.58	17.29	0.02	518				
GRASS005.1GE	67f	East	10-10-2007	Fall	7.80	7.02	17.05	0.06	519	<0.03	<0.15	1.9	<10
GRASS005.1GE	67f	East	11-14-2007	Fall	7.92	7.74	12.46	<0.01	466	<0.03	<0.15	2.5	<10
GREEN016.2WE	71f	Middle	03-03-2008	Winter	7.25	12.55	13.36	7.97	42	<0.03	<0.15	<.1	<10
GREEN016.2WE	71f	Middle	04-29-2008	Spring	6.98	10.05	15.58	6.35	49	<0.03	<0.15	0.4	<10
GREEN016.2WE	71f	Middle	08-08-2007	Summer	7.07	8.10	24.80	1.62	74	<0.03	<0.15	0.6	<10
GREEN016.2WE	71f	Middle	09-26-2007	Fall	7.42	8.71	22.10		71				
GREEN016.2WE	71f	Middle	10-03-2007	Fall	7.91	8.88	21.61		80				
GREEN016.2WE	71f	Middle	10-04-2007	Fall	7.60	9.12	20.87		73				
GREEN016.2WE	71f	Middle	10-08-2007	Fall	7.26	8.84	21.80		73				
GREEN016.2WE	71f	Middle	10-09-2007	Fall	7.29	8.77	19.87		73				
GREEN016.2WE	71f	Middle	11-06-2007	Fall	7.50	10.14	14.94	2.36	73	<0.03	<0.15	<.1	<10
HALLS001.7LE	74b	West	01-08-2008	Winter	7.31	10.92	13.92	1.62	282	<0.03	<0.15	2.5	<10
HALLS001.7LE	74b	West	05-13-2008	Spring	7.39	8.40	16.68	3.04	326	0.05	0.48	4.0	34
HALLS001.7LE	74b	West	07-18-2007	Summer	8.32	9.77	31.09	0.23	275	<0.03	4.40		<10
HALLS001.7LE	74b	West	10-02-2007	Fall	7.59	7.51	20.77	0.70	249	<0.03	<0.15	3.3	<10
HAWKI002.1CR	65e	West	02-19-2008	Winter	6.47	10.93	9.68	1.46	45	<0.03	0.76	2.2	10
HAWKI002.1CR	65e	West	04-16-2008	Spring	6.79	9.62	13.16	1.29	40	<0.03	0.20	2.1	10
HAWKI002.1CR	65e	West	07-05-2007	Summer	5.06	6.53	18.77	0.83	31	<0.03	<0.15	1.0	36
HAWKI002.1CR	65e	West	10-16-2007	Fall	4.88	4.86	14.36	0.38	35	<0.03	<0.15	0.6	16
HAYES003.3HR	65e	West	01-16-2008	Winter	7.16	13.21	3.49	1.14	99	<0.03	<0.15	2.8	15
HAYES003.3HR	65e	West	04-21-2008	Spring	7.60	10.57	20.18	2.35	62	<0.03	0.23	2.6	11
HAYES003.3HR	65e	West	07-02-2007	Summer	7.05	5.09	23.84	<0.01	150	<0.03	<0.15	3.7	<10
HAYES003.3HR	65e	West	11-05-2007	Fall	7.23	8.73	11.04		111	<0.03	<0.15	4.2	<10
HAYES003.3HR	65e	West	11-06-2007	Fall				0.52					

Table C-1 Cont.

Station ID	Eco-region	Division	Date	Season	pH	DO mg/L	Temp °C	Flow CFS	Conduc uMHO	Amm n mg/L	Tot KN mg/L	TOC mg/L	TSS mg/L
HICKO008.4CA	69E	East	02-20-2008	Winter	7.72		4.76		172		<0.15	0.9	<10
HICKO008.4CA	69E	East	05-22-2008	Spring	7.64	10.27	16.07	20.30	260	<0.03	<0.15	1.4	<10
HICKO008.4CA	69E	East	08-27-2007	Summer	6.83	9.71	24.25	5.02	450	<0.03	<0.15	2.0	<10
HICKO008.4CA	69E	East	11-28-2007	Fall	7.52	11.77	5.59	42.07	149	<0.03	<0.15	3.6	<10
HORSE007.0GE	66E	East	02-13-2008	Winter	7.01	10.50	6.56	5.46	13	<0.03	<0.15	0.8	<10
HORSE007.0GE	66E	East	04-29-2008	Spring	6.11	10.37	9.31	57.48	12	<0.03	0.31	0.8	<10
HORSE007.0GE	66E	East	09-18-2007	Fall	8.01	4.51	16.91	0.41	28				
HORSE007.0GE	66E	East	09-24-2007	Fall	7.24	6.50	19.42	0.21	33				
HORSE007.0GE	66E	East	10-02-2007	Fall	6.56	6.32	16.68	0.28	36	<0.03	<0.15	0.5	<10
HORSE007.0GE	66E	East	10-08-2007	Fall	6.79	6.68	18.44	0.07	37				
HORSE007.0GE	66E	East	10-10-2007	Fall	6.75	6.90	18.14	0.18	39	<0.03	<0.15	0.5	<10
HORSE007.0GE	66E	East	11-14-2007	Fall	6.40	0.45	10.29	0.45	28	<0.03	<0.15	0.6	<10
HROCK002.4CR	65E	West	02-14-2008	Winter	6.40	13.35	2.27	3.53	75	<0.03	3.70		16
HROCK002.4CR	65E	West	04-10-2008	Spring	7.27	9.51	16.54	1.40	66	<0.03	0.58	4.4	35
HROCK002.4CR	65E	West	07-23-2007	Summer	6.43	8.70	19.15	0.36	44	<0.03	<0.15	0.9	<10
HROCK002.4CR	65E	West	11-20-2007	Fall	5.79	8.16	14.46	0.50	72	<0.03	<0.15	3.1	<10
HURRI007.4HE	65E	West	01-04-2008	Winter	8.16	17.06	0.89	0.11	116	<0.03	<0.15	3.2	<10
HURRI007.4HE	65E	West	04-09-2008	Spring				0.99		<0.03	0.20	3.1	21
HURRI007.4HE	65E	West	07-05-2007	Summer	6.89	3.32	23.57	0.00	125	<0.03	0.83	3.7	30
HURRI007.4HE	65E	West	11-20-2007	Fall	7.05	8.24	16.34	0.01	135	<0.03	<0.15	6.6	<10
HYDE002.7LE	74b	West	01-08-2008	Winter	8.01	8.66	13.58	0.39	228	<0.03	0.59	5.3	11
HYDE002.7LE	74b	West	04-30-2008	Spring	7.54	7.57	13.37	0.66	377	0.16	0.64		11
HYDE002.7LE	74b	West	05-21-2008	Spring				0.73				9.9	
HYDE002.7LE	74b	West	07-02-2007	Summer	6.76	4.46	29.31	0.57	135	0.99	4.40	13.0	57
HYDE002.7LE	74b	West	10-02-2007	Fall	7.05	4.31	19.21	<0.01	280	0.48	<0.15	12.0	19
INDIA003.7GR	67F	East	06-02-2008	Spring	7.91	9.41	19.35		358	0.04	0.32	1.4	<10
INDIA003.7GR	67F	East	12-03-2007	Fall	7.58	12.35	5.68	0.84	248	<0.03	<0.15	1.3	<10

Table C-1 Cont.

Station ID	Eco-region	Division	Date	Season	pH	DO mg/L	Temp °C	Flow CFS	Conduc uMHO	Amm n mg/L	Tot KN mg/L	TOC mg/L	TSS mg/L
KERR000.4HD	65J	West	01-24-2008	Winter	7.47	12.46	6.49	0.88	114	<0.03	<0.15	1.2	<10
KERR000.4HD	65J	West	04-18-2008	Spring	7.86	9.81	13.80	0.99	95	<0.03	<0.15	1.4	<10
KERR000.4HD	65J	West	07-11-2007	Summer	7.62	8.44	21.50	0.33	137	<0.03	<0.15	1.1	<10
KERR000.4HD	65J	West	10-16-2007	Fall	7.51	8.72	17.91	0.31	146	<0.03	<0.15	2.3	<10
LAURE002.5GY	68A	East	01-07-2008	Winter	8.05	9.67	10.89		251	<0.03	<0.15		
LAURE002.5GY	68A	East	04-30-2008	Spring						<0.03	<0.15		
LAURE002.5GY	68A	East	06-17-2008	Summer	7.31	5.02	17.49		72	0.14	0.37		
LAURE006.3JO	66E	East	03-04-2008	Winter	7.45	10.73	9.49	46.59	102	<0.03	<.2	1.0	<10
LAURE006.3JO	66E	East	04-22-2008	Spring	8.09	10.29	11.79	31.87	103	0.19	<0.15	0.7	<10
LAURE006.3JO	66E	East	11-07-2007	Fall	8.04	11.68	5.94	10.17	137	<0.03	<0.15	1.2	<10
LAURE006.3JO	66E	East	11-13-2007	Fall	7.57	10.92	8.93	12.27	144				
LAURE006.3JO	66E	East	11-19-2007	Fall	8.09	14.21	8.08	10.69	141				
LAURE006.3JO	66E	East	11-27-2007	Fall	7.98	11.45	9.25	15.96	136	<0.03	<0.15	1.0	<10
LAURE006.3JO	66E	East	11-28-2007	Fall	7.80	11.77	4.79	16.22	131	<0.03	<0.15	0.9	<10
LBART006.5DI	71f	Middle	02-20-2008	Winter	7.65	13.42	9.02	27.52	261	<0.03	<0.15	0.6	<10
LBART006.5DI	71f	Middle	04-09-2008	Spring	7.62	10.57	13.56	56.10	250	<0.03	<0.15	0.6	<10
LBART006.5DI	71f	Middle	07-03-2007	Summer	8.02	8.42	20.96	2.08	354	<0.03	<0.15	1.1	<10
LBART006.5DI	71f	Middle	08-06-2007	Summer	7.86	6.60	25.42		342				
LBART006.5DI	71f	Middle	08-14-2007	Summer	7.96	6.98	23.05		355				
LBART006.5DI	71f	Middle	08-15-2007	Summer	7.88	6.62	24.11		352				
LBART006.5DI	71f	Middle	08-21-2007	Summer	8.01	6.08	24.96		354				
LBART006.5DI	71f	Middle	08-28-2007	Summer	7.84	6.40	24.36		360				
LBART006.5DI	71f	Middle	11-26-2007	Fall	7.77	11.19	13.24	17.82	323	<0.03	<0.15	1.1	<10
LONG004.9MA	71g	Middle	01-23-2008	Winter	7.82	14.77	5.67		124	<0.03	<0.15	0.9	<10
LONG004.9MA	71g	Middle	04-22-2008	Spring	7.69	10.88	14.67		145	<0.03	<0.15	1.0	<10
LONG004.9MA	71g	Middle	08-01-2007	Summer	7.41	6.90	23.60		187	<0.03	<0.15	1.0	<10
LONG004.9MA	71g	Middle	10-09-2007	Fall	7.70	4.90	21.30			<0.03	0.53	1.2	

Table C-1 Cont.

Station ID	Eco-region	Division	Date	Season	pH	DO mg/L	Temp °C	Flow CFS	Conduc uMHO	Amm n mg/L	Tot KN mg/L	TOC mg/L	TSS mg/L
MIDDL001.2SV	67G	East	03-06-2008	Winter	8.56	13.26	10.74	9.81	359	<0.03	<0.15		<10
MIDDL001.2SV	67G	East	05-13-2008	Spring	6.97	10.75	17.61	2.90	391	<0.03	0.26	1.6	<10
MIDDL001.2SV	67G	East	08-22-2007	Summer	7.90	7.01	25.84	0.47	570	<0.03	<0.15	2.8	<10
MIDDL001.2SV	67G	East	12-05-2007	Fall	7.29	12.88	7.97	0.82	281	<0.03	<0.15	1.0	<10
MILLE007.3RN	71E	Middle	01-22-2008	Winter	7.61	10.72	10.86	0.70	396	<0.03	<0.15	<.1	<10
MILLE007.3RN	71E	Middle	05-07-2008	Spring	7.67	9.50	14.25	3.16	303	<0.03	<0.15	0.6	<10
MILLE007.3RN	71E	Middle	07-05-2007	Summer	8.08	9.21	17.72	0.19	474	<0.03	<0.15	<.1	35
MILLE007.3RN	71E	Middle	08-08-2007	Summer	7.94	8.98	17.61		498				
MILLE007.3RN	71E	Middle	08-16-2007	Summer	8.14	9.12	20.15		488				
MILLE007.3RN	71E	Middle	08-20-2007	Summer	8.13	8.88	18.70		504				
MILLE007.3RN	71E	Middle	08-28-2007	Summer	8.03	8.93	18.33		509				
MILLE007.3RN	71E	Middle	08-30-2007	Summer	7.57	7.52	16.97		485				
MILLE007.3RN	71E	Middle	11-01-2007	Fall	8.25	10.15	13.35	0.41	489	<0.03	<0.15	<.1	<10
NFFDE1T1.5HE	65e	West	01-04-2008	Winter	6.23	13.79	3.28	1.42	59	<0.03	<0.15	1.1	12
NFFDE1T1.5HE	65e	West	04-08-2008	Spring	6.75	9.59	15.54	2.99	58	<0.03	0.54	1.7	<10
NFFDE1T1.5HE	65e	West	07-03-2007	Summer	5.74	4.90	20.94	0.71	34	0.13	<0.15	1.6	20
NFFDE1T1.5HE	65e	West	10-09-2007	Fall	6.79	5.86	20.71	0.18	33	<0.03	<0.15	1.1	14
NFLIC002.0PE	71f	Middle	02-26-2008	Winter	6.42	11.77	9.14	8.16	40	<0.03	<0.15	0.6	<10
NFLIC002.0PE	71f	Middle	05-22-2008	Spring	6.70	10.15	17.94	5.58	33	<0.03	<0.15	0.5	<10
NFLIC002.0PE	71f	Middle	08-08-2007	Summer	6.86	6.70	26.70	1.12	62	<0.03	<0.15	<.1	<10
NFLIC002.0PE	71f	Middle	09-26-2007	Fall	7.41	8.36	22.16		58				
NFLIC002.0PE	71f	Middle	10-03-2007	Fall	7.83	8.30	22.14		67				
NFLIC002.0PE	71f	Middle	10-04-2007	Fall	7.25	8.75	21.69		61				
NFLIC002.0PE	71f	Middle	10-08-2007	Fall	7.46	8.45	23.60		61				
NFLIC002.0PE	71f	Middle	10-09-2007	Fall	7.09	8.50	21.75		61				
NFLIC002.0PE	71f	Middle	11-07-2007	Fall	6.55	10.55	12.20	2.46	67	<0.03	<0.15	0.5	<10
NREEL000.4OB	74a	West	02-15-2008	Winter	7.29	14.44	2.91	300.06	113	<0.03	0.77	5.1	312

Table C-1 Cont.

Station ID	Eco-region	Division	Date	Season	pH	DO mg/L	Temp °C	Flow CFS	Conduc uMHO	Amm n mg/L	Tot KN mg/L	TOC mg/L	TSS mg/L
NREEL000.4OB	74a	West	04-02-2008	Spring	7.10	10.75	13.62	312.17	181	0.32	1.70	8.0	260
NREEL000.4OB	74a	West	07-07-2007	Summer	7.42	4.23	26.09	4.14	255	<0.03	1.80	8.6	31
NREEL000.4OB	74a	West	10-03-2007	Fall	7.07	3.28	20.29		251	<0.03	1.20	12.0	24
OTOWN008.9CL	69E	East	02-20-2008	Winter	8.05		4.25	0.44	133	<0.03	<0.15	1.4	<10
OTOWN008.9CL	69E	East	05-22-2008	Spring	8.71	10.59	12.14	0.14	174	0.05	0.62	2.1	<10
OTOWN008.9CL	69E	East	11-28-2007	Fall	7.75	10.65	4.89		140	<0.03	<0.15	3.5	<10
OWL003.7HD	65e	West	02-20-2008	Winter	6.75	12.45	6.87	18.97	108	<0.03	<0.15	2.2	<10
OWL003.7HD	65e	West	04-08-2008	Spring	7.70	9.33	15.31	51.26	96	<0.03	<0.15	2.7	<10
OWL003.7HD	65e	West	07-18-2007	Summer	6.50	4.24	23.94	1.18	67	<0.03	1.50		<10
OWL003.7HD	65e	West	11-16-2007	Fall	6.35	9.74	8.45	3.68	86	<0.03	<0.15	3.5	<10
POND013.8CK	74b	West	01-09-2008	Winter	6.81	9.51	10.36	9.78	203	0.11	1.00	7.8	29
POND013.8CK	74b	West	04-15-2008	Spring	6.73		6.72	5.31	221	0.28	1.10	8.1	17
POND013.8CK	74b	West	07-20-2007	Summer	6.87	3.97	28.20	<0.01	158	<0.03	<0.15	8.8	11
POND013.8CK	74b	West	10-03-2007	Fall	6.91	1.45	20.17		266	1.00	4.70	18.0	37
POPLA000.1MG	69D	East	03-06-2008	Winter	7.15	12.81	6.87	15.39	56	<0.03	<0.15	0.7	
POPLA000.1MG	69D	East	04-29-2008	Spring	7.89	11.68	10.14	2.36	106	<0.03	<0.15	0.7	<10
POPLA000.1MG	69D	East	08-28-2007	Summer	6.92		23.91	0.01	303	<0.03	<0.15	1.4	<10
POPLA000.1MG	69D	East	11-27-2007	Fall	7.12		9.99	1.24	100	<0.03	<0.15	2.1	<10
POPLA014.7HY	74b	West	02-14-2008	Winter	6.38	14.41	1.08	5.74	77	<0.03	<0.15	3.5	<10
POPLA014.7HY	74b	West	04-17-2008	Spring	7.56	10.47	12.04	0.77	111	<0.03	0.26	1.9	<10
POPLA014.7HY	74b	West	07-06-2007	Summer	6.79	1.44	23.36	0.01	125	1.20	3.40	7.4	50
POPLA014.7HY	74b	West	10-04-2007	Fall	6.72	3.15	20.84	0.03	153	<0.03	<0.15	6.7	<10
PRUN000.1GS	71h	Middle	02-14-2008	Winter	8.14	12.59	11.87	2.63	352	<0.03	<0.15	0.9	<10
PRUN000.1GS	71h	Middle	05-06-2008	Spring	8.03	9.97	17.84	1.80	395	<0.03	0.20	1.3	<10
PRUN000.1GS	71h	Middle	08-13-2007	Summer	7.74	7.25	22.20	0.26	356	0.03	<0.15	0.8	<10
PRUN000.1GS	71h	Middle	10-09-2007	Fall	7.75	7.52	21.15		418				
PRUN000.1GS	71h	Middle	10-10-2007	Fall	7.89	8.17	17.50		405				

Table C-1 Cont.

Station ID	Eco-region	Division	Date	Season	pH	DO mg/L	Temp °C	Flow CFS	Conduc uMHO	Amm n mg/L	Tot KN mg/L	TOC mg/L	TSS mg/L
PRUN000.1GS	71h	Middle	10-29-2007	Fall	7.80	9.58	12.93		424				
PRUN000.1GS	71h	Middle	11-04-2008	Fall			13.75		599				
PRUN000.1GS	71h	Middle	11-05-2008	Fall	6.82	8.18	14.19		645				
PRUN000.1GS	71h	Middle	11-18-2008	Fall	6.84	10.90	9.51		831				
PRUN000.1GS	71h	Middle	11-19-2008	Fall	7.09	10.57	9.55		829				
PRUN000.1GS	71h	Middle	11-28-2007	Fall	7.78	10.53	10.79	1.36	413	<0.03	<0.15	1.0	<10
RIPLE001.5GE	67F	East	02-13-2008	Winter	7.93	10.26	9.48	2.30	531	<0.03	<0.15	1.4	<10
RIPLE001.5GE	67F	East	04-29-2008	Spring	8.13	9.10	11.25		519	<0.03	<0.15	1.1	<10
RIPLE001.5GE	67F	East	07-17-2007	Summer	7.78	8.55	20.84	0.77	542	<0.03	<0.15	1.4	<10
RIPLE001.5GE	67F	East	09-18-2007	Fall	7.76	7.38	16.27	0.50	541				
RIPLE001.5GE	67F	East	09-24-2007	Fall	7.63	5.83	19.16	0.27	533				
RIPLE001.5GE	67F	East	10-02-2007	Fall	7.81	6.92	14.55	2.25	524				
RIPLE001.5GE	67F	East	10-08-2007	Fall	7.82	6.95	17.99	0.39	528				
RIPLE001.5GE	67F	East	10-10-2007	Fall	7.81	7.46	18.29	2.52	527	<0.03	<0.15	1.2	<10
RIPLE001.5GE	67F	East	11-14-2007	Fall	7.83	8.60	12.66	2.05	510	<0.03		1.4	<10
ROBIN000.6FR	71H	Middle	02-14-2008	Winter	7.44	13.92	5.09	2.48	191	<0.03	<0.15	0.7	<10
ROBIN000.6FR	71H	Middle	05-19-2008	Spring	7.52	8.89	15.10	2.87	192	<0.03	0.31	1.8	<10
ROBIN000.6FR	71H	Middle	08-14-2007	Summer	7.32	7.28	20.80	0.74	242	<0.03	<0.15	0.7	<10
ROBIN000.6FR	71H	Middle	10-09-2007	Fall	7.65	7.92	18.52		246				
ROBIN000.6FR	71H	Middle	10-10-2007	Fall	7.74	7.56	16.85		240				
ROBIN000.6FR	71H	Middle	10-17-2007	Fall	8.10	8.58	17.30		267				
ROBIN000.6FR	71H	Middle	11-28-2007	Fall	7.42	10.18	9.91	1.33	228	<0.03	<0.15	1.4	<10
ROSE001.3MC	65e	West	01-11-2008	Winter	6.86	9.79	8.84	31.57	44	<0.03	<0.15	4.5	<10
ROSE001.3MC	65e	West	04-08-2008	Spring	6.31	9.59	14.80	34.96	30	<0.03	0.27	3.6	14
ROSE001.3MC	65e	West	07-02-2007	Summer	6.38	8.04	23.39	6.12	28	<0.03	<0.15	1.2	<10
ROSE001.3MC	65e	West	10-10-2007	Fall	7.13	9.60	14.99	6.54	33	0.03	<0.15	1.0	<10
RUTHE007.4MY	71H	Middle	02-26-2008	Winter	7.85	11.85	9.81	78.49	389	<0.03	<0.15	1.3	<10

Table C-1 Cont.

Station ID	Eco-region	Division	Date	Season	pH	DO mg/L	Temp °C	Flow CFS	Conduc uMHO	Amm n mg/L	Tot KN mg/L	TOC mg/L	TSS mg/L
RUTHE007.4MY	71H	Middle	05-19-2008	Spring	7.93	9.15	17.34	69.61	365	<0.03	0.20	1.6	<10
RUTHE007.4MY	71H	Middle	08-20-2007	Summer	7.70	3.47	26.40	0.93	492	<0.03	<0.15	4.0	<10
RUTHE007.4MY	71H	Middle	10-04-2007	Fall	7.80	6.82	20.13		534				
RUTHE007.4MY	71H	Middle	10-08-2007	Fall	7.96	9.41	21.46		498				
RUTHE007.4MY	71H	Middle	10-10-2007	Fall	8.27	11.88	19.91		498				
RUTHE007.4MY	71H	Middle	10-15-2007	Fall	8.08	12.82	16.21		466				
RUTHE007.4MY	71H	Middle	10-17-2007	Fall	7.95	9.57	19.06		536				
RUTHE007.4MY	71H	Middle	11-27-2007	Fall	7.84	9.50	11.83		413	<0.03	<0.15	3.6	13
SCAMP008.3SR	71H	Middle	01-22-2008	Winter	7.90	15.82	3.86	19.68	325	<0.03	<0.15	1.2	<10
SCAMP008.3SR	71H	Middle	05-07-2008	Spring	8.45	11.18	18.72	42.35	306	<0.03	<0.15	1.3	<10
SCAMP008.3SR	71H	Middle	07-16-2007	Summer	8.47		26.86	2.52	328	<0.03	<0.15	2.7	<10
SCAMP008.3SR	71H	Middle	08-08-2007	Summer	8.12	8.32	29.13		330				
SCAMP008.3SR	71H	Middle	08-16-2007	Summer	8.45	11.09	30.91		314				
SCAMP008.3SR	71H	Middle	08-20-2007	Summer	8.29	9.61	31.07		318				
SCAMP008.3SR	71H	Middle	08-28-2007	Summer	8.42	9.81	30.67		327				
SCAMP008.3SR	71H	Middle	08-30-2007	Summer	8.28	8.87	28.25		319				
SCAMP008.3SR	71H	Middle	11-01-2007	Fall	8.28	13.26	13.71	1.84	419	<0.03	<0.15	2.7	<10
SCOTT000.9DA	71h	Middle	01-15-2008	Winter	7.71	10.90	8.14	1.25	550	<0.03	<0.15	1.5	<10
SCOTT000.9DA	71h	Middle	05-13-2008	Spring	8.12	9.46	16.76	0.66	488	<0.03		1.3	
SCOTT000.9DA	71h	Middle	07-18-2007	Summer	7.93	7.98	24.02	0.13	561	<0.03	<0.15	1.9	<10
SCOTT000.9DA	71h	Middle	10-01-2007	Fall	7.82		20.40	0.08	567	<0.03	<0.15	1.5	<10
SCOTT000.9DA	71h	Middle	10-02-2007	Fall	7.98	9.85	21.85		554				
SCOTT000.9DA	71h	Middle	10-09-2007	Fall	7.95	8.49	22.20		536				
SCOTT000.9DA	71h	Middle	10-10-2007	Fall	7.94	8.94	19.14		520				
SCOTT000.9DA	71h	Middle	10-29-2007	Fall	7.84	9.32	17.00		629				
SEQUA101.2BL	68b	East	01-07-2008	Winter	7.51	6.50	8.66		70	<0.03	<0.15		
SEQUA101.2BL	68b	East	04-30-2008	Spring						<0.03	0.21		

Table C-1 Cont.

Station ID	Eco-region	Division	Date	Season	pH	DO mg/L	Temp °C	Flow CFS	Conduc uMHO	Amm n mg/L	Tot KN mg/L	TOC mg/L	TSS mg/L
SEQUA101.2BL	68b	East	06-17-2008	Summer	7.79	7.83	21.32		245	0.04	0.20		
SEQUA101.2BL	68b	East	09-12-2007	Summer						<0.03	<0.15		
SEQUA101.2BL	68b	East	10-03-2007	Fall	7.59	7.64	17.18		289	<0.03	<0.15		
SFCUB009.5DE	65e	West	02-19-2008	Winter	7.54	13.22	6.33	18.43	59	<0.03	0.77	1.3	19
SFCUB009.5DE	65e	West	04-16-2008	Spring	7.50	11.82	9.46	23.20	46	<0.03	0.15	1.4	18
SFCUB009.5DE	65e	West	07-05-2007	Summer	6.62	4.59	24.67	0.72	67	<0.03	0.50	3.9	11
SFCUB009.5DE	65e	West	10-11-2007	Fall	6.67	5.45	15.89	0.05	85	<0.03	<0.15	4.0	15
SFFDE1T0.7MN	65e	West	01-16-2008	Winter	7.10	12.97	5.00	0.24	82	<0.03	<0.15	1.1	<10
SFFDE1T0.7MN	65e	West	04-22-2008	Spring	7.53	8.80	19.70	0.47	53	<0.03	<0.15	1.6	10
SFFDE1T0.7MN	65e	West	07-05-2007	Summer	7.17	6.53	22.26	0.05	59	<0.03	<0.15	1.8	<10
SFFDE1T0.7MN	65e	West	10-10-2007	Fall	6.82	8.99	17.68	0.02	59	<0.03	<0.15	1.4	<10
SFMUD003.8MC	65E	West	01-23-2008	Winter	7.40	14.43	3.53	1.70	113	<0.03	<0.15	2.8	<10
SFMUD003.8MC	65E	West	04-22-2008	Spring	7.52	9.31	14.52	0.47	98	<0.03	<0.15	1.6	11
SFMUD003.8MC	65E	West	07-17-2007	Summer	7.14	3.26	25.38	<0.01	254	<0.03	1.60	5.8	48
SFMUD003.8MC	65E	West	11-05-2007	Fall	7.12	6.41	11.83	0.89	184	<0.03	<0.15	7.5	27
SHARP014.4WI	71f	Middle	01-15-2008	Winter	6.75	11.52	2.86	15.66	252	<0.03	<0.15	1.4	<10
SHARP014.4WI	71f	Middle	05-13-2008	Spring	7.87	8.90	13.62	14.56	234	<0.03	<0.15	1.6	<10
SHARP014.4WI	71f	Middle	07-09-2007	Summer	7.91	7.68	25.72	6.08	268	<0.03	0.51	2.2	13
SHARP014.4WI	71f	Middle	10-01-2007	Fall	7.49		17.56	6.03	282	<0.03	<0.15	1.4	<10
SHARP014.4WI	71f	Middle	10-02-2007	Fall	8.04	9.89	20.11		275				
SHARP014.4WI	71f	Middle	10-09-2007	Fall	7.63	6.51	21.54		280				
SHARP014.4WI	71f	Middle	10-10-2007	Fall	7.84	9.12	19.10		277				
SHARP014.4WI	71f	Middle	10-29-2007	Fall	7.53	10.25	12.81		288				
SINKI003.0CO	67G	East	03-06-2008	Winter	8.57	12.19	7.15	11.87	180	<0.03	<0.15	1.5	<10
SINKI003.0CO	67G	East	05-13-2008	Spring	7.33	10.26	13.24	1.72	239	<0.03	<0.15	1.0	<10
SINKI003.0CO	67G	East	08-21-2007	Summer	7.51	10.68			326	<0.03	<0.15	1.2	<10
SINKI003.0CO	67G	East	12-05-2007	Fall	6.92	9.37	11.16	1.09	241	<0.03	<0.15	1.2	<10

Table C-1 Cont.

Station ID	Eco-region	Division	Date	Season	pH	DO mg/L	Temp °C	Flow CFS	Conduc uMHO	Amm n mg/L	Tot KN mg/L	TOC mg/L	TSS mg/L
SMITH003.5HD	65j	West	01-24-2008	Winter	7.66	12.50	5.98	11.18	146	<0.03	<0.15	0.6	<10
SMITH003.5HD	65j	West	04-18-2008	Spring	7.75	10.13	13.37	17.17	133	<0.03	<0.15	0.6	<10
SMITH003.5HD	65j	West	07-31-2007	Summer	7.24	6.54	24.48	0.49	151	<0.03	<0.15	0.6	
SMITH003.5HD	65j	West	10-16-2007	Fall	8.78	6.95	19.36	1.27	149	<0.03	2.00	0.6	<10
SPRIN009.0WS	71i	Middle	01-15-2008	Winter	7.62	12.21	6.26	56.18	456	<0.03	<0.15	1.5	<10
SPRIN009.0WS	71i	Middle	05-13-2008	Spring	8.22	9.85	18.63	17.20	384	0.03	<0.15	2.9	<10
SPRIN009.0WS	71i	Middle	07-17-2007	Summer	7.47	5.20	24.50	1.38	314	<0.03	<0.15	3.9	<10
SPRIN009.0WS	71i	Middle	10-01-2007	Fall	7.53		19.98		450	<0.03	<0.15	4.5	<10
SPRIN009.0WS	71i	Middle	10-02-2007	Fall	7.99	10.95	26.26		454				
SPRIN009.0WS	71i	Middle	10-09-2007	Fall	7.67	5.47	22.70		424				
SPRIN009.0WS	71i	Middle	10-29-2007	Fall	7.70	10.02	14.49		481				
STOKE004.9CK	74B	West	01-09-2008	Winter	6.97	10.62	10.36	4.25	127	0.25	2.00	10.0	85
STOKE004.9CK	74B	West	04-15-2008	Spring	6.88		8.30	2.28	229	<0.03	0.49	4.1	18
STOKE004.9CK	74B	West	07-20-2007	Summer	6.90	2.73	26.31	0.21	140	<0.03	<0.15	7.6	32
STOKE004.9CK	74B	West	10-03-2007	Fall	6.52	4.18	20.85		156	<0.03	0.92	8.7	13
SULPH036.0RN	71E	Middle	01-22-2008	Winter	7.54	13.22	3.22	26.56	348	<0.03	<0.15	1.0	<10
SULPH036.0RN	71E	Middle	05-07-2008	Spring	7.90	9.18	16.49	76.90	289	<0.03	<0.15	1.1	<10
SULPH036.0RN	71E	Middle	10-22-2007	Fall	7.83	5.54	16.69		403				
SULPH036.0RN	71E	Middle	10-30-2007	Fall	7.66	8.60	11.30		415				
SULPH036.0RN	71E	Middle	10-31-2007	Fall	8.41	9.42	11.46		415				
SULPH036.0RN	71E	Middle	11-01-2007	Fall	8.11	8.72	13.20	4.95	419	<0.03	<0.15	1.6	<10
SULPH036.0RN	71E	Middle	11-07-2007	Fall	7.37	7.20	8.53		480				
TAR003.0CS	65E	West	02-07-2008	Winter	7.02	10.46	7.77	25.69	36	<0.03	0.50	4.2	12
TAR003.0CS	65E	West	05-06-2008	Spring	6.79	8.57	15.59	11.97	32	0.06	0.38	3.0	17
TAR003.0CS	65E	West	08-21-2007	Summer	6.53	4.23	25.87	0.76	37	<0.03	<0.15	2.7	24
TAR003.0CS	65E	West	10-18-2007	Fall	6.56	4.89	20.91	9.96	32	<0.03	0.15	3.1	13
TELLI040.5MO	66G	East	09-18-2008	Fall	7.12	9.06	16.67	27.50	25	<.028	<0.14	1.1	<10

Table C-1 Cont.

Station ID	Eco-region	Division	Date	Season	pH	DO mg/L	Temp °C	Flow CFS	Conduc uMHO	Amm n mg/L	Tot KN mg/L	TOC mg/L	TSS mg/L
THOMP000.2WY	65e	West	01-15-2008	Winter	6.63	12.05	6.89	16.92	69	<0.03	<0.15	1.3	28
THOMP000.2WY	65e	West	04-10-2008	Spring	6.73	9.95	16.18	58.80	42	<0.03	0.59	3.9	59
THOMP000.2WY	65e	West	07-17-2007	Summer	6.18	10.17	18.60	13.11	38	<0.03	<0.15	0.7	137
THOMP000.2WY	65e	West	11-20-2007	Fall	6.67	10.49	14.41	11.34	39	<0.03	<0.15	0.8	<10
TISDA1T1.2LE	74b	West	01-08-2008	Winter	7.21	10.37	14.71	0.02	158	<0.03	<0.15	2.0	<10
TISDA1T1.2LE	74b	West	05-13-2008	Spring	6.67	10.79	13.59	0.15	153	0.03	0.32	2.5	20
TISDA1T1.2LE	74b	West	07-02-2007	Summer	6.90	6.22	21.91	0.03	117	0.16	1.00	7.7	120
TISDA1T1.2LE	74b	West	10-02-2007	Fall	6.87	7.22	18.15	0.02	131	<0.03	<0.15	1.3	11
TITUS1T0.1CA	69E	East	02-20-2008	Winter	7.45		6.45	<0.01	22	<0.03	<0.15	0.7	<10
TITUS1T0.1CA	69E	East	05-22-2008	Spring	7.31	10.52	12.91	0.11	27	0.03	<0.15	0.8	<10
TITUS1T0.1CA	69E	East	11-28-2007	Fall	7.08	10.77	6.75	<0.01	23	<0.03	<0.15	1.6	<10
TOWEE005.9PO	66g	East	01-09-2008	Winter	7.13	9.68	10.35		39	<0.03	<0.15		
TOWEE005.9PO	66g	East	04-23-2008	Spring	7.81	9.70	14.89		38	<0.03	<0.15		
TOWEE005.9PO	66g	East	08-08-2007	Summer	6.86	2.87	24.34	0.51	107	<0.03	<0.15		
TOWEE005.9PO	66g	East	10-03-2007	Fall						<0.03	<0.15		
TRACE003.5CY	71G	Middle	01-23-2008	Winter	8.22	14.66	6.11		107	<0.03	<0.15	1.4	<10
TRACE003.5CY	71G	Middle	04-22-2008	Spring	7.60	11.41	14.41		120	<0.03	<0.15	1.8	<10
TRACE003.5CY	71G	Middle	09-20-2007	Fall	7.84	9.02	20.97		260	<0.03	<0.15	1.3	<10
TRACE003.5CY	71G	Middle	10-09-2007	Fall	7.88	8.27	21.10			<0.03	0.61	1.7	<10
TUMBL003.8HU	71F	Middle	02-20-2008	Winter	7.57	11.19	11.07	65.92	174	<0.03	<0.15	<.1	<10
TUMBL003.8HU	71F	Middle	04-09-2008	Spring	7.51	10.10	14.08		140	<0.03	<0.15	0.5	<10
TUMBL003.8HU	71F	Middle	07-23-2007	Summer	7.84	8.42	14.84	13.80	241	<0.03	<0.15	<.1	<10
TUMBL003.8HU	71F	Middle	08-06-2007	Summer	7.82	7.78	21.21		235				
TUMBL003.8HU	71F	Middle	08-14-2007	Summer	7.90	8.01	21.23		245				
TUMBL003.8HU	71F	Middle	08-15-2007	Summer	7.77	7.83	21.62		242				
TUMBL003.8HU	71F	Middle	08-21-2007	Summer	7.62	7.66	21.80		240				
TUMBL003.8HU	71F	Middle	08-28-2007	Summer	7.76	7.99	22.09		247				

Table C-1 Cont.

Station ID	Eco-region	Division	Date	Season	pH	DO mg/L	Temp °C	Flow CFS	Conduc uMHO	Amm n mg/L	Tot KN mg/L	TOC mg/L	TSS mg/L
TUMBL003.8HU	71F	Middle	11-26-2007	Fall	7.69	10.00	14.18	41.50	224	<0.03	<0.15	0.6	<10
WATSO002.3WI	71h	Middle	01-15-2008	Winter	7.50	10.77	8.13	5.82	567	<0.03	<0.15	1.0	<10
WATSO002.3WI	71h	Middle	05-13-2008	Spring	7.63	8.87	15.28	3.15	545	<0.03	0.42	1.4	<10
WATSO002.3WI	71h	Middle	07-09-2007	Summer	7.96	8.58	23.00	0.47	658	<0.03	<0.15	1.9	<10
WATSO002.3WI	71h	Middle	10-01-2007	Fall	7.58		17.30	0.56	682	<0.03	<0.15	1.5	<10
WATSO002.3WI	71h	Middle	10-02-2007	Fall	7.90	11.08	19.25		668				
WATSO002.3WI	71h	Middle	10-09-2007	Fall	7.62	7.89	20.79		680				
WATSO002.3WI	71h	Middle	10-10-2007	Fall	7.22	9.61	17.83		683				
WATSO002.3WI	71h	Middle	10-29-2007	Fall	7.56	10.43	14.60		688				
WELLS007.6HO	71F	Middle	02-20-2008	Winter	7.72	11.97	10.24	39.13	253	<0.03	<0.15	0.5	<10
WELLS007.6HO	71F	Middle	04-09-2008	Spring	7.61	10.41	13.95	80.26	223	<0.03	<0.15	0.8	<10
WELLS007.6HO	71F	Middle	07-02-2007	Summer	7.81	8.88	23.87	9.32	307	<0.03	0.58	0.8	<10
WELLS007.6HO	71F	Middle	08-06-2007	Summer	7.83	7.25	24.38		331				
WELLS007.6HO	71F	Middle	08-14-2007	Summer	7.95	7.63	23.75		336				
WELLS007.6HO	71F	Middle	08-15-2007	Summer	7.86	7.51	24.22		335				
WELLS007.6HO	71F	Middle	08-21-2007	Summer	7.89	7.18	24.94		333				
WELLS007.6HO	71F	Middle	08-28-2007	Summer	7.85	7.70	28.80		335				
WELLS007.6HO	71F	Middle	11-26-2007	Fall	7.78	10.49	13.09	32.93	274	<0.03	<0.15	0.9	<10
WFHIC007.0CE	71G	Middle	01-14-2008	Winter	8.01	12.35	7.90		224	<0.03	<0.15	1.1	<10
WFHIC007.0CE	71G	Middle	01-14-2008	Winter	8.01	12.35	7.90		224	<0.03	<0.15		<10
WFHIC007.0CE	71G	Middle	02-12-2008	Winter	7.87	10.90	11.84		220	<0.03	<0.15	1.8	<10
WFHIC007.0CE	71G	Middle	03-18-2008	Spring	7.74	11.42	13.75		155	0.05	0.35	3.3	<10
WFHIC007.0CE	71G	Middle	04-28-2008	Spring	7.92	12.35	15.61		216	<0.03	0.24		<10
WFHIC007.0CE	71G	Middle	05-28-2008	Spring	7.53	8.24	16.93		255	0.07	0.39	1.7	<10
WFHIC007.0CE	71G	Middle	06-24-2008	Summer	7.87	8.14	17.46		327	<0.03	<0.15	0.8	<10
WFHIC007.0CE	71G	Middle	08-16-2007	Summer	7.80	9.02	20.60	2.30	338	<0.03	<0.15	0.9	<10
WFHIC007.0CE	71G	Middle	10-09-2007	Fall	7.94	8.68	18.59		327				

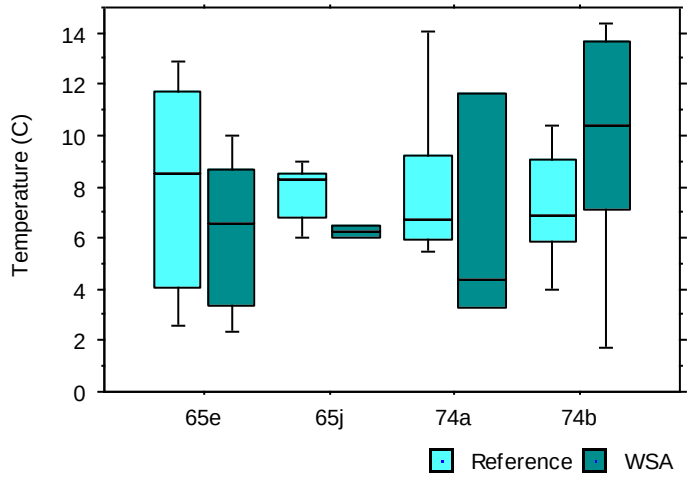
Table C-1 Cont.

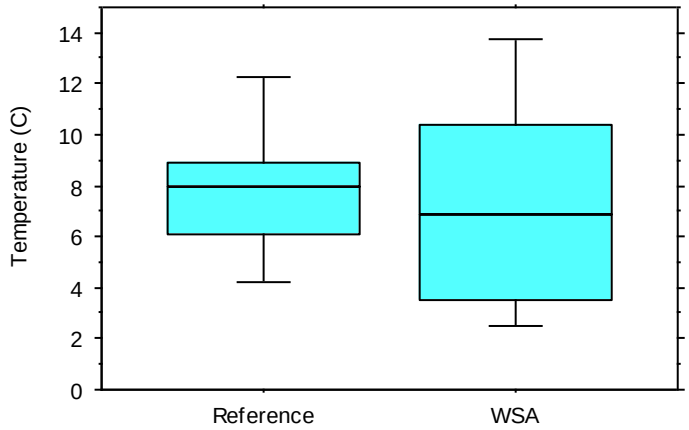
Station ID	Eco-region	Division	Date	Season	pH	DO mg/L	Temp °C	Flow CFS	Conduc uMHO	Amm n mg/L	Tot KN mg/L	TOC mg/L	TSS mg/L
WFHIC007.0CE	71G	Middle	10-10-2007	Fall	8.04	9.85	17.14		333				
WFHIC007.0CE	71G	Middle	10-23-2007	Fall	7.73	6.75	18.50		529	<0.03	<0.15	1.9	<10
WFHIC007.0CE	71G	Middle	10-24-2007	Fall	7.72	7.38	15.05		284	<0.03	<0.15	<.1	
WFHIC007.0CE	71G	Middle	10-25-2007	Fall	7.74	8.32	13.45		276				
WFHIC007.0CE	71G	Middle	11-29-2007	Fall	7.81	10.47	10.87		257	<0.03	<0.15	1.3	<10
WFHIC007.0CE	71G	Middle	12-13-2007	Fall	7.79	7.35	14.90		275	0.24	0.85	3.1	<10
WFRED010.7MT	71e	Middle	02-20-2008	Winter	6.94	10.70	10.73		394	<0.03	<0.15	0.7	10
WFRED010.7MT	71e	Middle	04-09-2008	Spring	7.65	9.88	14.65		358	<0.03	<0.15	0.9	11
WFRED010.7MT	71e	Middle	07-18-2007	Summer	7.78	7.20	23.50	42.60	481	<0.03	<0.15	1.0	25
WFRED010.7MT	71e	Middle	08-06-2007	Summer	7.54	7.02	24.03		476				
WFRED010.7MT	71e	Middle	08-14-2007	Summer	7.75	7.27	22.67		490				
WFRED010.7MT	71e	Middle	08-15-2007	Summer	7.68	7.06	22.95		491				
WFRED010.7MT	71e	Middle	08-21-2007	Summer	7.97	6.72	24.07		490				
WFRED010.7MT	71e	Middle	08-28-2007	Summer	7.70	6.96	23.27		496				
WFRED010.7MT	71e	Middle	11-26-2007	Fall	7.43	10.90	11.46	103.17	447	<0.03	<0.15	1.2	12
WHITE013.5HU	71f	Middle	04-22-2008	Spring	8.13	9.74	17.34	87.60	174	<0.03	<0.15	0.6	<10
WHITE013.5HU	71f	Middle	07-02-2007	Summer	7.72	7.56	22.38	17.87	264	<0.03	<0.15	<.1	<10
WHITE013.5HU	71f	Middle	08-06-2007	Summer	7.77	6.70	24.94		277				
WHITE013.5HU	71f	Middle	08-14-2007	Summer	7.82	6.91	24.68		823				
WHITE013.5HU	71f	Middle	08-15-2007	Summer	7.78	6.72	25.00		284				
WHITE013.5HU	71f	Middle	08-21-2007	Summer	7.84	6.46	24.74		284				
WHITE013.5HU	71f	Middle	08-28-2007	Summer	7.88	6.90	25.22		285				
WHITE013.5HU	71f	Middle	11-26-2007	Fall	7.70	10.24	13.10	67.07	234	<0.03	<0.15	0.7	10

APPENDIX D

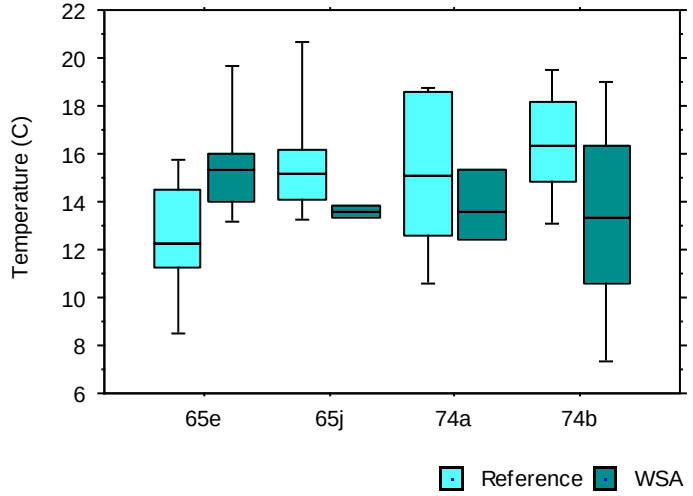
Seasonal Water Temperature Ranges At Ecoregion Reference Sites and WSA Sites

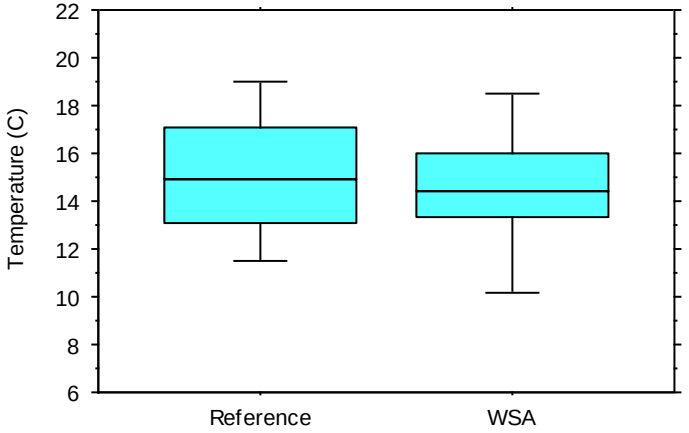
West Tennessee - Winter



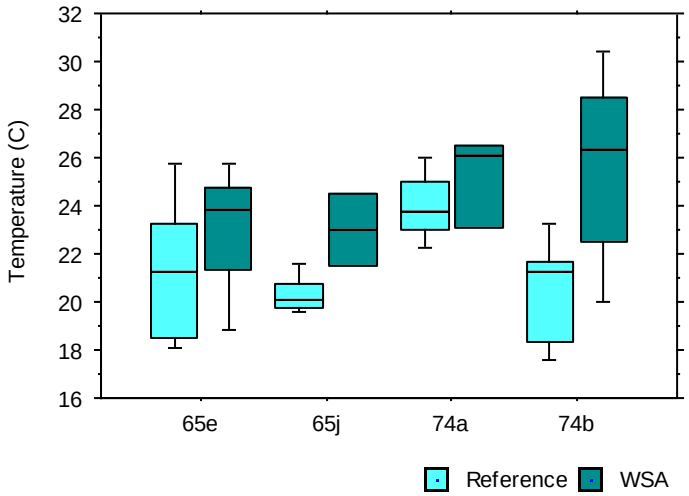


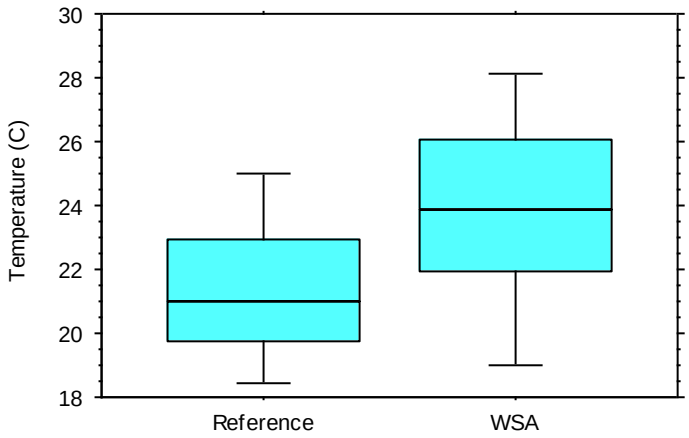
West Tennessee - Spring



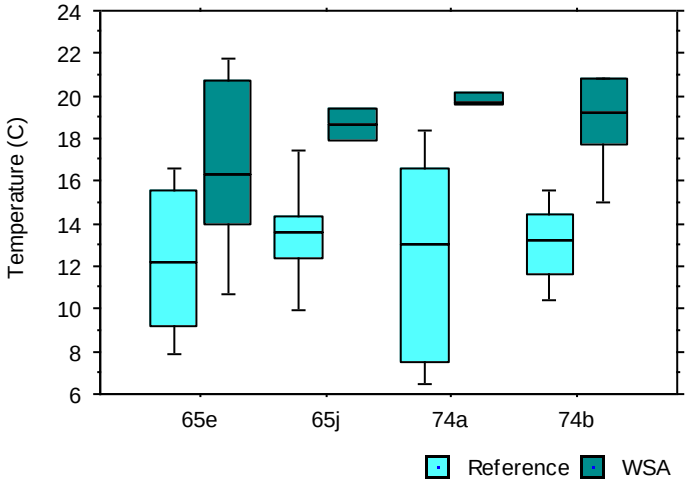


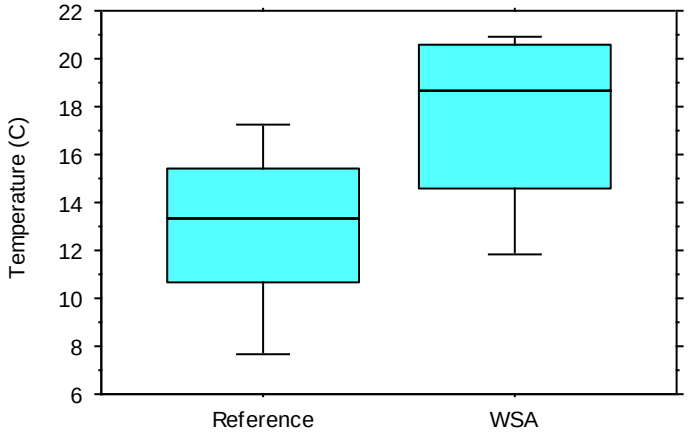
West Tennessee - Summer



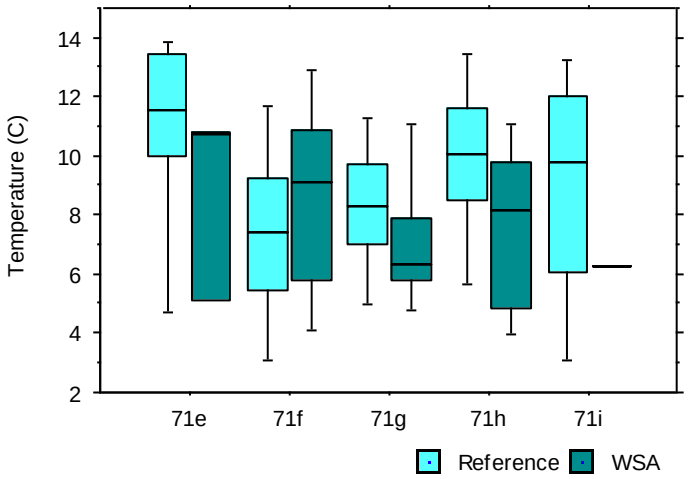


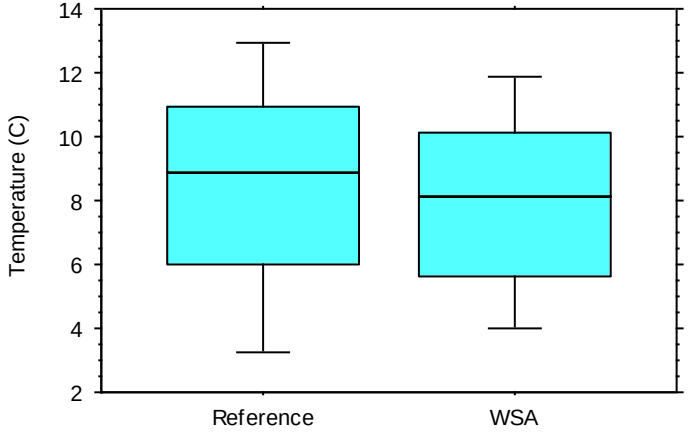
West Tennessee - Fall



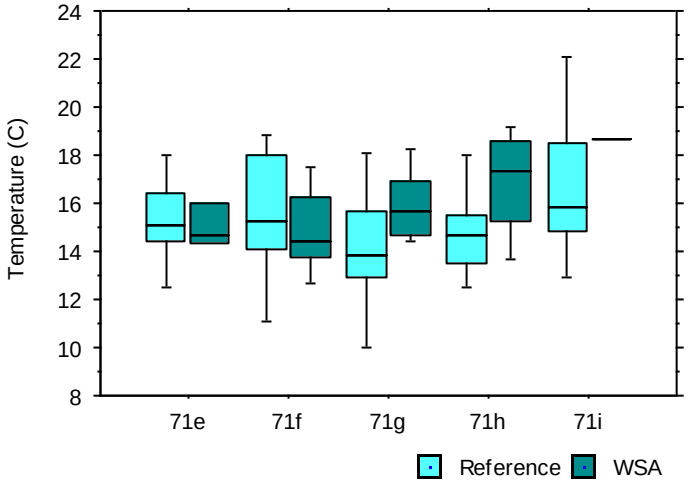


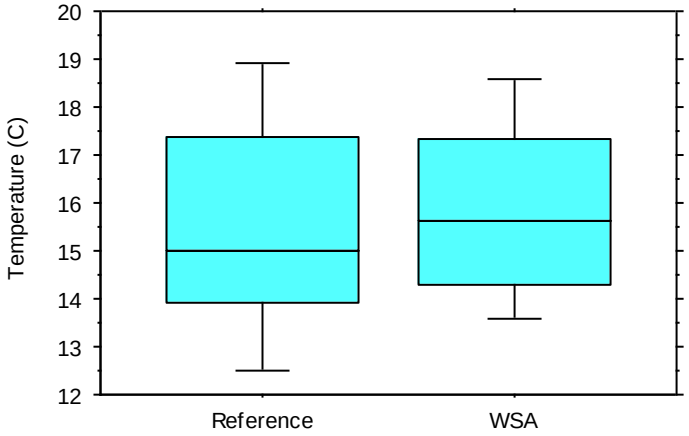
Middle Tennessee - Winter



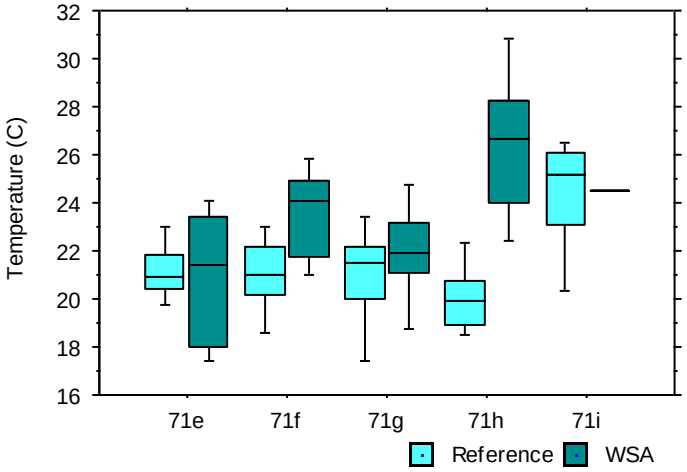


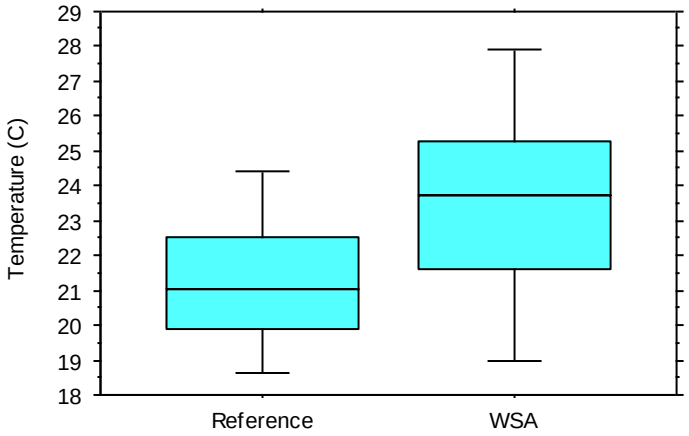
Middle Tennessee - Spring



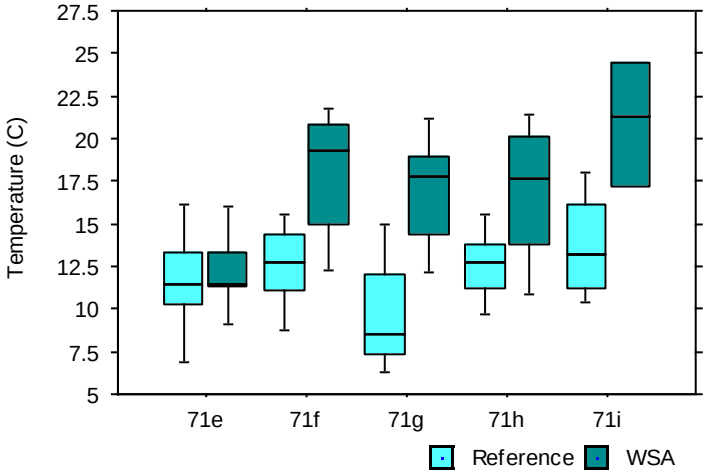


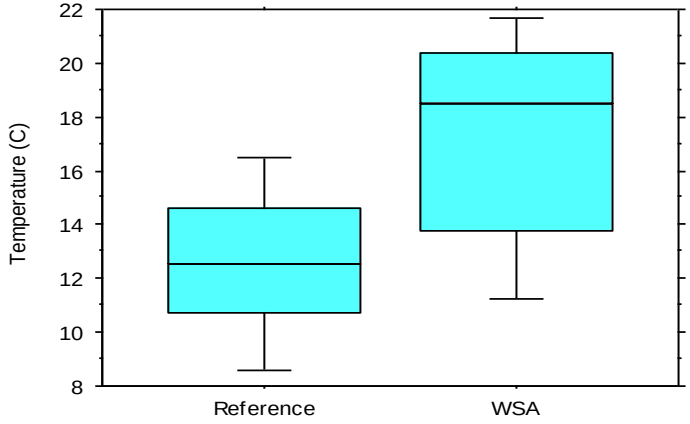
Middle Tennessee - Summer



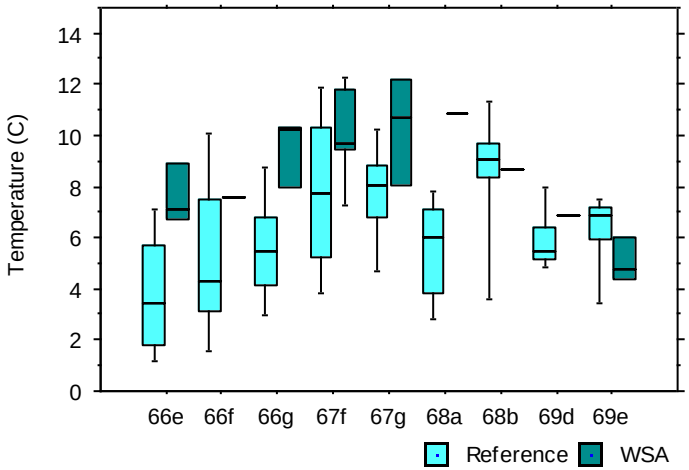


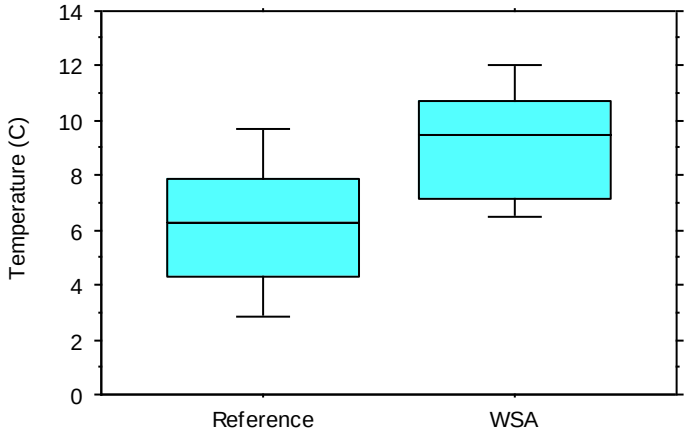
Middle Tennessee - Fall



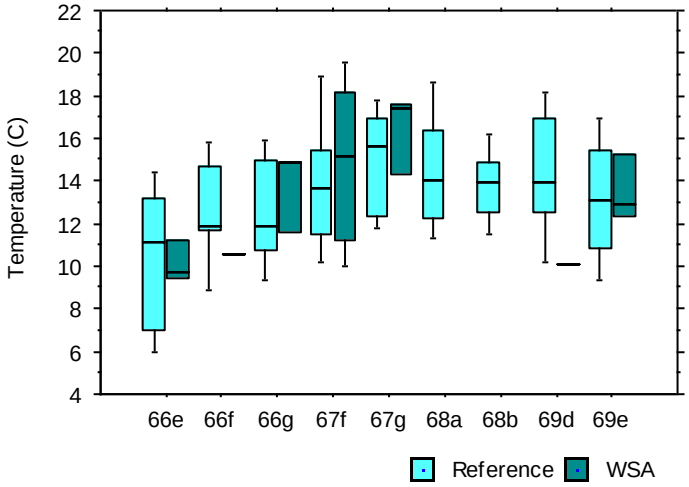


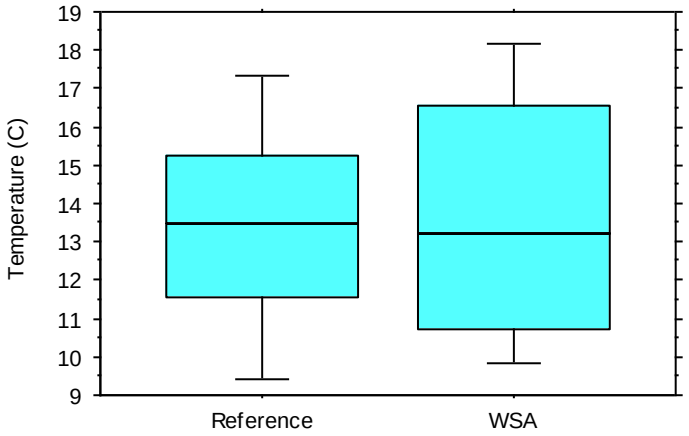
East Tennessee - Winter



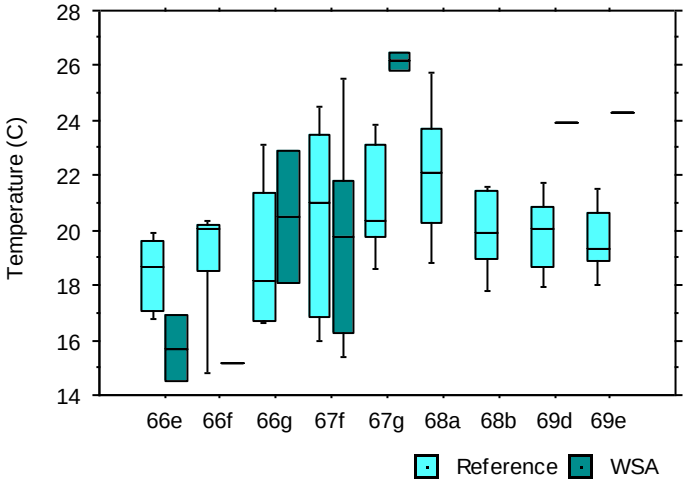


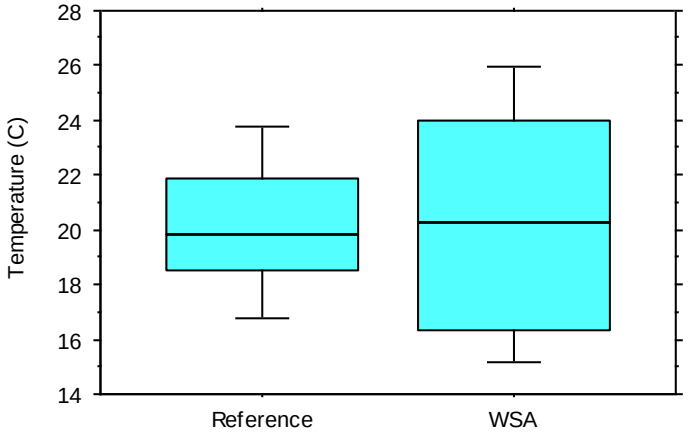
East Tennessee - Spring





East Tennessee - Summer





East Tennessee - Fall