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Development of Biological Reference Conditions of Wadeable Streams in the Major Ecoregions and Subecoregions of Georgia

Duncan L. Hughes
Columbus State University

DEVELOPMENT OF BIOLOGICAL REFERENCE CONDITIONS OF WADEABLE STREAMS IN THE MAJOR ECOREGIONS AND SUBECOREGIONS OF GEORGIA

Duncan L. Hughes

Columbus State University

The College of Science

The Graduate Program in Environmental Science

Development of Biological Reference Conditions of Wadeable Streams in the Major Ecoregions and Subecoregions of Georgia

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Duncan L. Hughes

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Duncan Lorian Hughes

We approve the thesis of Duncan Lorian Hughes as presented here.

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Date

James A. Gore, Professor and Chair of Environmental Science, Policy, and Geography, Thesis Advisor

18 Nov 2005
Date

Glenn D. Stokes, Associate Dean, College of Science

03/16/06
Date

James B. Stribling, Tetra Tech Incorporated

ABSTRACT

One bioassessment tool available to resource managers to indicate NPS impairment of wadeable streams and rivers are multi-metric invertebrate indices. Such indices are assembled from metrics in broad categories that represent different aspects of community structure and function (*e.g.* richness, composition, tolerance/intolerance, feeding group, and habit). Indices must incorporate suites of metrics that are ecologically relevant, quantifiable, non-redundant, and that best individually discriminate between reference sites and impaired sites. More than 240 wadeable streams in Georgia were sampled during the September thru February index period using RBP protocols during three successive sample seasons (1999-2003). Ecoregional reference (minimally impaired) sites, as well as a gradient of impaired sites, were chosen based on GIS analysis of catchment land use/land cover and riparian and instream physical habitat. Data were analyzed and values calculated for 59 candidate metrics. Individual metrics were evaluated both statistically and graphically for the ability to differentiate between reference and impaired sites. The best metrics were then combined into ecoregional specific discriminating invertebrate indices or reference conditions that classify test streams as biologically comparable to either the reference or impaired group of streams.

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INTRODUCTION

Section 101(a) of the Federal Water Pollution Control Act, or Clean Water Act (CWA), states the objective "...to restore and maintain the chemical, physical, and biological integrity of the Nation's waters". Initial efforts to meet this goal focused on reducing chemical contamination from point source discharges (§301(a) and (b) [CWA]). States and tribes were required to adopt water quality standards that consisted of designating uses for waters and establishing narrative and/or numeric criteria to determine if the designated uses were met (§303(c) [CWA]). Waters that failed to meet designated uses were to be identified, and Total Maximum Daily Loads (TMDLs) established for pollutants that contributed to this failure (§303(d) [CWA]). TMDLs allocate allowable loads among different pollutant sources so that appropriate control actions can be taken, water quality standards achieved, and human health and aquatic resources protected (EPA 1999). States were also required to report the condition of waters to Congress (§305(b) [CWA]). These efforts resulted in the mitigation of point source pollution to surface waters by permitting discharges of allowable levels of specified chemical contaminants. As point source pollution declined, it became evident that non-point source pollution (NPS) evaluation and control was necessary to meet CWA goals (Barbour 1997). The 1988 Amendments required that states develop NPS monitoring plans and management programs (§319(h) [CWA]).

Water quality degradation due to NPS pollution is positively correlated with increasing intensity of land use by humans (Bolstad and Swank 1997; Gage et al.

2004). Sources of anthropogenic stress to stream systems include agricultural and silvicultural practices and urbanization (increased road and population density and increased impervious surfaces). These factors not only contribute to NPS pollution, but also alter the natural flow regimes of lotic systems leading to instream and riparian habitat alteration and loss (Walsh 2004). The recognition that NPS pollution was a major contributor to environmental degradation led to increased interest in biological assessment to evaluate waters (Barbour 1997).

Biological Assessment

Biological assessment (bioassessment) provides a more holistic approach to monitoring water quality than traditional chemical monitoring (Bolstad and Swank 1997). Bioassessments typically consider direct chemical measurements, but place more emphasis on the physical condition of stream and riparian habitat and the structure and function of the benthic community. The main purpose of biological assessment is to determine to what extent waters support aquatic life (Barbour 1997). Bioassessments are thus suited to identify aquatic life use impairments and evaluate their relative magnitude. From this evaluation, the identification of pollutants and their sources directly contribute to development of TMDLs necessary to mitigate pollutant loadings and restore waterbodies to meet designated uses, as required by the non-degradation stipulations of CWA §303(d). To derive appropriate water quality standards and effectively support the uses designated for waters, all sources of pollution (known or potential) to surface water must be considered, including nonchemical changes such as habitat alteration and hydrological modification. Evaluating the health and condition of stream biota (resident monitors) reveals more about both aquatic habitat and water quality over time than periodic or “snapshot” chemical monitoring. Water chemistry fluctuates diurnally, seasonally, and with changes in discharge (Johnson et al. 1997). Recent federal recommendations for monitoring plans have emphasized the need to accelerate the development of biological sampling and assessment as a component of surface water management programs.

The focus on biological assessment led to the formulation of Environmental Protection Agency (EPA) guidelines for conducting such assessments. The EPA published the *Rapid Bioassessment Protocols for Use in Streams and Wadeable Rivers: Periphyton, Benthic Macroinvertebrates, and Fish* (RBP) (Barbour et al. 1999) to establish methodologies for biological assessment. The RBP provides for the integration of protocols for habitat assessment, physical characterization, cross-sectional profiles, substrate determination, chemical monitoring, and biological sampling. The RBP was developed in response to the need for bioassessment methods that were fast, effective, reproducible and less resource intensive than traditional biological survey techniques (Barbour 1997). The RBP provides a mechanism to collect and analyze myriad physical, chemical, and biological data with a minimum of time and effort. This approach is suitable for assessing the current status of biological stream resources of candidate reference streams in each ecoregion and subecoregion in Georgia to establish a baseline for comparing future assessments. The controlled level of effort in this approach also makes possible its use in longer term, routine monitoring programs. Data collected from RBP sampling may be used to make management decisions about the use and protection of water resources (*e.g.* establishing TMDLs, evaluating Best Management Practices (BMPs), developing gradients of impairment in streams, determining causes and sources of impairment, allocating flows, monitoring water quality trends over time, setting priorities for restoration activities, and preserving areas of high water quality (Barbour et al. 1999). Although the RPB is applicable to fish, macroinvertebrates, and periphyton, all characteristic reference condition criteria established by this research are based on benthic macroinvertebrate data. Follow-up studies to characterize fish and periphyton assemblages would strengthen future use of the reference database for assessments.

Advantages of using benthic macroinvertebrates include their ubiquity in aquatic habitats, and their generally restricted mobility and often multi-year life cycles (allowing integration of both chemical and physical perturbations over time). Changes in stream conditions such as nutrient enrichment, toxic contamination and morphologic and habit changes caused by erosion and sedimentation, are reflected by changes in macroinvertebrate community structure and function. Although macroinvertebrates can be monitored by both professional biologists and trained volunteers, documentation of data quality characteristics (such as precision, accuracy, bias, completeness, and representativeness) are necessary for defensible datasets and decision-making (Diamond et al. 1996).

In addition to the RBP, the EPA also published *Biological criteria: Technical guidance for streams and small rivers* (Gibson et al. 1996) to aid in the establishment of narrative and numeric biocriteria to gauge levels of impairment in lotic systems. Biocriteria are numeric values or narratives that describe biological preferences for physical and/or chemical conditions based upon designated reference sites. Such criteria serve as benchmarks for the attainment of biological integrity (aquatic life designated uses) of water resources (Gibson et al. 1996). Effective biocriteria provide scientifically sound evaluations of biological integrity, protect areas of high water quality and natural aquatic communities, support CWA goals of resource protection and anti-degradation, and are defensible in a court of law (Gibson et al. 1996).

Applications of biocriteria include the development of aquatic life designated uses, identification of stressors to aquatic systems, resource management planning, regulatory assessments, and cataloging the status and trends of water resources (Gibson et al. 1996). The process of formulating and implementing biocriteria involve defining biological integrity by selecting appropriate reference streams, using standard sample protocols (RBP), and analyzing biological data collected from reference streams with these protocols to document the natural variation in biota among reference sites (Gibson et al. 1996).

Ecoregional Reference Conditions

In order to biologically assess water quality and stream health it is necessary to establish baseline conditions with which to compare test streams. The use of ecoregional reference streams is one way to accomplish this goal. The purpose of defining ecological regions (ecoregions) is to stratify abiotic variation so that the reference condition for a given area is representative of that area and characterizes realistically attainable physical, chemical, and biological benchmarks (Hughes et al. 1988). It would be unrealistic, for instance, to compare impaired Southern Coastal Plain streams to reference conditions derived from Blue Ridge streams. Factors accounted for by ecoregionalization include; climate, soils and geology, potential natural vegetation, and physiography (Omernik 1987). The resulting ecoregions and subecoregions allow for comparison of streams that should be the most similar to one another with respect to physical habitat, water chemistry, and biota. Ecoregionalization effectively stratifies surface waters into similar groups and accounts for much of the natural variation present in streams throughout the state.

Reference streams must be representative of the region they characterize and minimally impaired for that region. Minimal impairment is recognized as a goal because few undisturbed pristine stream systems are left to set baseline reference conditions (Hughes et al. 1986). Streams that exhibit unusual or anomalous characteristics for a region should not be considered reference streams (as they will provide unrealistic goals for biological criteria in that region). In general, the following characteristics are typical of reference stream sites:

- natural riparian vegetation representative of the region,
- high diversity of substrate materials appropriate to the region,
- natural channel structures and geometry,
- a natural hydrograph,
- undisturbed embankments, providing cover for aquatic biota,
- natural color and odor of stream water,
- the presence of riparian fauna that are representative of the region and that derive some energetic support from the aquatic ecosystem

(Hughes et al. 1986).

Once identified, ecoregional (and subecoregional) reference streams may then serve to establish a characteristic reference condition of numeric values for biological indicators of stream health. These biological indicators, or metrics, may ultimately be combined into biological indices that allow for the detection of sites in stressed conditions. A single minimally impaired site cannot be representative of an entire ecoregion or subecoregion. Reference conditions based upon multiple sites in a given ecoregion provide a more realistic representation of variance and thus, an objective basis for establishing biocriteria. Use of single, specific reference sites is not a defensible approach, since the definition of that high quality would be more dependent upon best professional judgment. The reference condition approach, which uses multiple reference sites to define observable and high quality conditions establishes an achievable target based upon the most common and dominant physical, chemical, and biological conditions within the region being evaluated (Gibson et al. 1996).

Metrics

A metric is defined as any structural or functional attribute of a biological assemblage that changes in a predictable way in the presence of stressors (Barbour et al. 1995). Candidate metrics for this research are divided into five major groups; taxonomic richness, community composition, tolerance/intolerance to pollution, functional feeding group, and habit (Barbour et al. 1999).

Taxonomic richness. These metrics are the distinct numbers of taxa within taxonomic groups (*e.g.* Total Taxa, Ephemeroptera-Plecoptera-Trichoptera (EPT) Taxa, Diptera Taxa). High taxa richness usually correlates with increasing water quality and health of the stream, particularly within the sensitive EPT orders (Lenat and Penrose 1996).

Community Composition. Composition metrics are expressed as percentages, and indicate the proportion of individuals in a sample belonging to a specific taxonomic group. Some composition measures may also serve as tolerance/intolerance metrics (*e.g.* % *Chironomus sp.* and *Cricotopus sp.* / Total Chironomidae) where certain families or genera have an established higher tolerance to pollution than the other members of the same order or family.

Tolerance/Intolerance. Tolerance metrics represent the general level of tolerance to stressors of biota within a sample. Some are weighted scores based on tolerance classes (*e.g.* Beck's Index) (Washington 1984), and some are based on abundance weighted average tolerance values of individuals within the sample (*e.g.* North Carolina Biotic Index (NCBI) (Lenat 1993), Hilsenhoff's Biotic Index (HBI) (Hilsenhoff 1987)).

Functional Feeding Group. These metrics classify dominant feeding mechanisms of the biotic assemblage. Such classification is useful to understand distributions of aquatic insects related to available food resources and feeding preference, and to link food resources with insect morphological adaptations (Cummins and Klug 1979). Increasing human disturbance of streams leads to a decrease in the number and type of specialized feeders and a corresponding increase in more generalized feeders (Gibson *et.al.* 1996). Functional feeding group categories used in this study include:

1- Shredders that chew living or decomposing vascular plant tissue and coarse particulate organic matter (CPOM) or gouge wood

2- Collectors detritivores that consume fine particulate organic matter (FPOM)

3- Scrapers that graze on periphyton from mineral or organic surfaces

4- Filterers collectors that feed on FPOM using morphological and behavioral adaptations to trap food suspended in the water column

5- Predators that consume living animal tissue (eat members of other functional groups and other predators)

(Cummins and Klug 1979; Merritt and Cummins 1996)

Habit. Habit metrics describe movement and positioning mechanisms of benthic organisms (*e.g.* swimmer taxa, percent sprawlers). Such habits (in combination with available habitat and feeding preference) strongly influence the composition of the benthic community in a given habitat (Merritt and Cummins

1996). Habit types evaluated in this study are based on the work of Merritt and Cummins, and include:

1- Clingers that have behavioral and morphological adaptations for attachment to surfaces in fast moving water
2- Sprawlers that inhabit surfaces of floating organic material or fine sediments
3- Burrowers that inhabit fine sediments of stream bottoms
4- Swimmers that are adapted for “fishlike” swimming in lotic habitats
5- Climbers that are adapted to move vertically on vascular hydrophytes or detrital debris

Multimetric Indices

Combining individual metrics into a multimetric index allows integration of different indicators into a single ecologically based index. Indices that are properly assembled and calibrated should not only discriminate reference from impaired streams, but also serve to gauge the degree to which impaired streams diverge from the reference condition (Gibson et al. 1996). Only metrics with an established response to stress should be considered in final index development. Other factors considered when evaluating candidate metrics include (Columbus State University 2000):

- importance within the Ecoregion or Subecoregion under examination
- low incremental cost
- responsive to stressors on a regional scale

- feasibility of measurement on a regional scale

Objective

This research was conducted as part of the Georgia Ecoregions Project, a multi-phase effort by the Georgia Environmental Protection Division (GAEPD) to develop scientifically defensible numeric biological criteria for wadeable streams and rivers in the state. Phase I of the project involved the differentiation and delineation of Level III and Level IV ecoregions of Georgia, resulting in a map that partitioned the state into areas that were the most similar based on abiotic variables (Griffith et al. 2001). Factors considered in these divisions included topography, physiography, climate, elevation, hydrology, land use, geology and soils. This provided the ecoregional framework necessary to compare streams that should have similar physical, chemical, and biological attributes in the absence of disturbance (Omernik and Bailey 1997). These ecoregions categorize the major differences found in topography, physiography, climate, elevation, hydrology, land use, and surface geology as reflected by soils across Georgia. Each of these ecoregions has been further divided into subecoregions, reflecting higher resolution changes in these variables (Appendix A). The sub-ecoregions divided the state into 28 areas, ranging in size from 290 to 31,590 $km^{2.}$

The objective of this research was to characterize the reference condition of wadeable streams among Level III (ecoregions) and Level IV (subecoregions) ecoregions of Georgia. This characterization would document realistically attainable biological, chemical, and physical goals for Georgia streams. In the future, then, these data may be used to develop impairment/non-impairment criteria for Georgia streams, and to evaluate the ecological effects of both point source and nonpoint source pollution, to help establish TMDLs, evaluate BMPs, and prioritize protection and restoration activities. The ultimate goal was to use ecoregionally specific multimetric indices based on the characteristic reference condition to correctly assign test sites to either the reference (minimally impaired) or impaired group of streams, and to establish a gradient of impairment upon which to base resource management decisions.

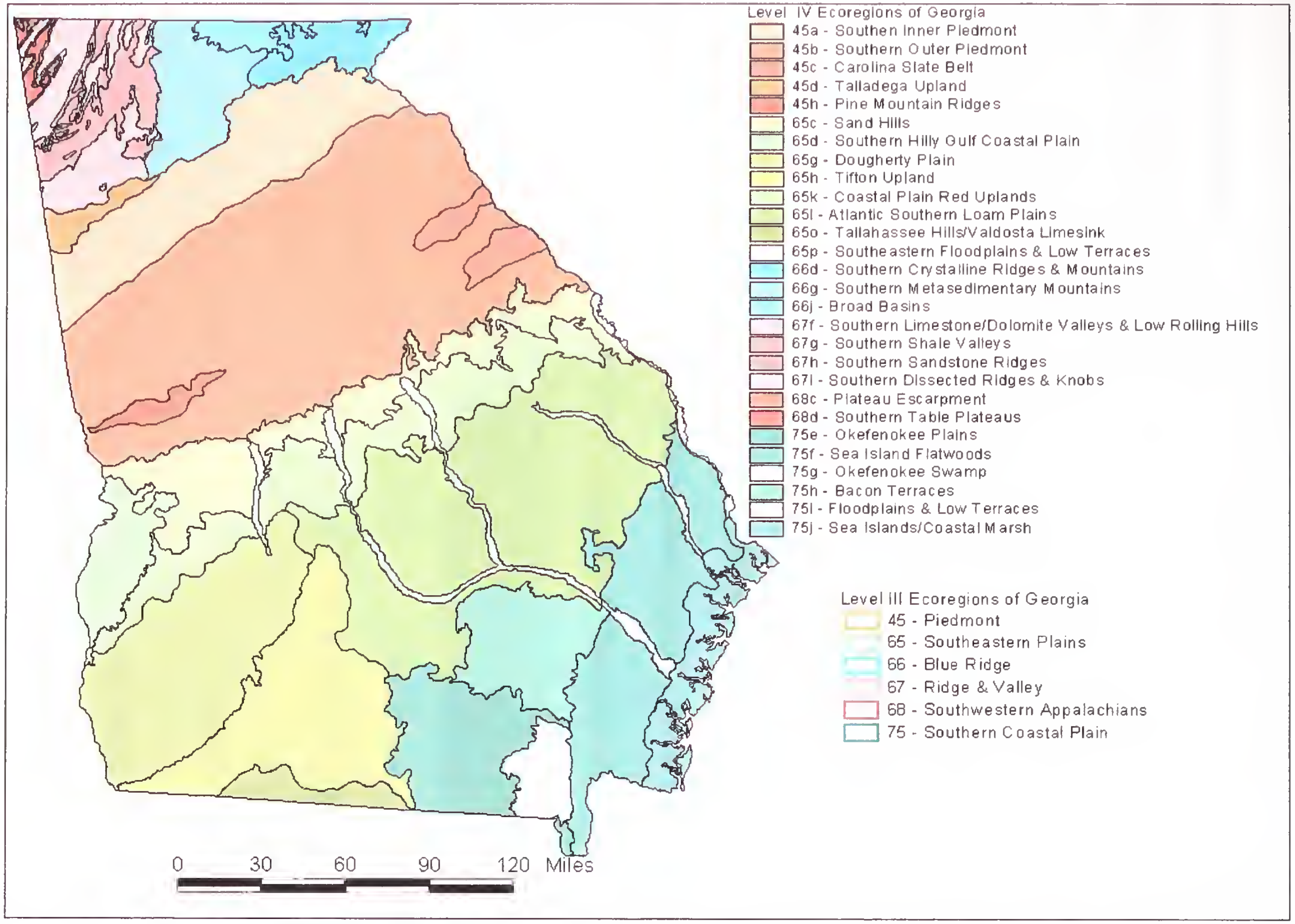
MATERIALS AND METHODS

The study area for this project included all of the State of Georgia as well as catchments of the target size (≈ 10-100 km^2) shared with neighboring states of Alabama, Florida, North Carolina, and Tennessee. No catchments of the target size were shared with South Carolina. This area lies across six ecoregions as described by Omernik (1987): (a) the Blue Ridge Mountains, (b) the Ridge and Valley, (c) the Southwestern Appalachians, (d) the Piedmont, (e) the Southeastern Plains, and (f) the Southern Coastal Plain (Figure 1).

Geographic Information Systems (GIS) was used to delineate potential reference quality catchments of the target size with minimal anthropogenic influence (Olson 2002), that is, those remaining after applying the following filters:

- at least 80% catchment area within the level III or IV ecoregion of interest
- minimal upstream impoundments
- no known NPDES discharges upstream
- no known spills or other pollution incidents
- low human population density
- low agricultural activity
- low urbanization
- low silvicultural activity
- low road and highway density
- minimal nonpoint source pollution problems
- no known intensive fish stocking

Figure 1. Level III and IV ecoregions of Georgia



The combination of catchment-wide land use evaluation and consideration of direct impacts to stream and riparian areas (road-crossings, fish stocking, etc.) provided for a mechanism that selected only those streams that were minimally impaired and representative of ecoregions under consideration (Olson 2002). Land use and land cover data were obtained from the 1998 Land Cover Map of Georgia (Natural Resources Spatial Analysis Laboratory 2001). Catchment-wide land use was quantified using the Arcview extension Analytical Tools Interface for Landscape Assessments (ATtILA) (Ebert and Wade 1999). ATtILA was intended to analyze landscape data, and is well suited for use in quantifying relative human impacts on stream systems from NPS sources. Table 1 summarizes primary and secondary criteria used to rank candidate reference streams for minimal anthropogenic influence (adapted from Olson 2002).

Table 1. Land use measures to select candidate reference streams

Primary selection measures		Secondary selection measures	
Catchment wide	% Urban	45 meter riparian buffer	% Urban
	% Total agriculture		% Total agriculture
	% Barren		% Barren
	Density road/stream crossings	135 meter riparian buffer	% Urban
	Road density		% Total agriculture
	Impoundment density		% Barren
15 meter riparian buffer	% Urban		
	% Total agriculture		

Land use and land cover data derived from the 1998 Land Cover Map of Georgia are included in Appendix B. Prioritization of candidate reference stream catchments (by Level III and IV ecoregions) based on anthropogenic land use was necessary to target field sampling efforts towards those candidate reference streams most representative of the best available reference conditions in given ecoregions.

Sample Collection

Benthic macroinvertebrate and water chemistry samples were collected during a September through February index period to limit seasonal variability associated with such data. During three successive sample seasons (September 1999 – February 2000, September 2000 – February 2001, and September 2001 – February 2002) 119 candidate reference stream samples, 125 impaired stream samples, and 34 randomly selected quality control (QC) duplicate samples were collected in all major ecoregions and subecoregions in Georgia.

Two candidate reference stream samples were not included in this analysis because the target number of organisms (200, with 160 being minimally acceptable) was not achieved. Possible reasons for the lack of macroinvertebrates in these two sites include potential drought effects, poor site selection, and improper sampling technique. Six candidate reference streams were removed from consideration for inclusion in characterizing the reference condition due to abiotic and logistical factors (Table 2). Additionally, one impaired sample was not included in this analysis because the sample was inadvertently mixed during laboratory processing. Quality control samples were not included in this analysis, and were evaluated separately to provide a basis for calculating precision estimates for metrics and final index scores (Ferring 2005). The remaining 111 candidate reference stream samples were used to establish the characteristic reference stream condition in each of the target ecoregions and subecoregions of Georgia. The remaining 130 impaired stream samples were used to evaluate the effectiveness of ecoregional and subecoregional biotic indices, based on the characteristic reference stream condition, to discriminate reference from impaired macroinvertebrate samples (Appendix C contains a complete list of candidate reference and impaired stream sites included in this analysis).

Station ID	Stream Name	Ecoregion	Subecoregion	Reason for Removal
45c-18	Tributary to Rocky Creek	45	45c	Anomalous for subecoregion; phosphorus value > 2x standard deviation from the mean for reference streams in 45c
45d-8	Thompson Creek	45/67	45d/67f&i	Crosses ecoregion boundary
65g-82	Keel Creek	65	65g	Anomalous for subecoregion; D.O. < 2.0 mg/L
65g-83	Tributary to Chickasahatchee Creek	65	65g	Channelized
67g-2	Tributary to Tiger Creek	67	67g	Channelized
75j-29	Tributary to Radcliffe Creek	75	75j	Channelized

Table 2. Candidate reference streams removed from consideration for reference condition characterization

Field Sampling Methods

Sampling Site Selection

Most sample locations chosen were at road/bridge crossings as far downstream in the target catchment as possible. In some cases, samples were either not collected or samples were taken farther upstream than intended due to lack of access, lack of sufficient flow, or anomalous characteristics of physical and/or instream habitat. When possible, samples were collected at least 200 m upstream of bridge crossings to preclude the influence of hydrologic modification by the bridge or runoff from the roadway.

In a few cases, land cover data proved to be out of date, and actual field conditions in candidate reference catchments were not indicative of the predicted land use. Stream segments identified *a priori* as candidate reference streams (based on remote GIS data) and that exhibited evidence of habitat alteration or NPS pollution were either not sampled or were sampled and not included in the characterization of the reference stream condition for each ecoregion (not minimally impaired and considered sub-reference).

At a representative stream segment, a 100-meter stream reach was delineated and flagged at zero, 50, and 100 meters. Usually the zero meter mark (downstream) was at a hydraulic control point (*e.g.*, a riffle). Global Positioning System (GPS) coordinates were taken and noted on all applicable field sheets.

Field Sampling

All field sampling methods conformed to the EPA's Rapid Bioassessment Protocols and to Georgia EPD field sampling protocols (Barbour et al. 1999, GAEPD 1999). Standard operating procedures (SOPs) and field sheets for all field sampling methods and observations may be found in the Quality Assurance Project Plan, Georgia Ecoregions Project, Phase II (Columbus State University 2000). Chain-of-custody was closely monitored and documented from field collection through laboratory and data analysis. Field sampling Quality Control (QC) was achieved through the collection and analysis of duplicate samples and field blanks (for chemical samples) at a randomly selected 10% of all stream sites sampled.

Water chemistry grab samples were then collected in flowing water in precleaned and acid-washed 1L or 500 mL bottles. Grabs were collected at the zero meter mark, and sample locations were approached from downstream. Chemical samples were preserved in the field with 2.0 mL of nitric acid (metals) or sulfuric acid (nutrients). Samples were held on ice from the field to the laboratory for analysis of alkalinity, hardness, ammonia, nitrite, nitrate, phosphorus, zinc, manganese, copper, and iron.

In situ environmental monitoring was then conducted for air and water temperature (°C), dissolved oxygen concentration (mg/L) and percent saturation, pH, conductivity (µs/cm), turbidity (NTU's), and water depth. Parameter values were measured with a Hydrolab H20 multiprobe sonde and recorded on applicable field sheets.

Biological sampling was performed using multi-habitat benthic macroinvertebrate samples with reallocation of d-frame net jabs (or, sample units [SU]) for "missing" habitat types. Separate hierarchies of sample priority were used for high and low gradient streams (Table 3). Stream gradient was determined based on the presence of typical features associated with a particular stream type (*e.g.* riffles in high gradient streams).

Table 3. Benthic sample priority		
HIGH GRADIENT STREAMS		
Priority	**Habitat Type**	**Number of SU**
1	Fast Riffles	3
2	Slow Riffles	3
3	Snags	5
4	Undercut Banks/Rootwads	3
5	Leaf Packs	3
6	Sand	3
7	Macrophytes (if any)	3
LOW GRADIENT STREAMS		
Priority	**Habitat Type**	**Number of SU**
1	Woody debris/Snags	8
2	Undercut Banks/Rootwads	6
3	Leaf Packs	3
4	Sand	3
5	Macrophytes (if any)	3

As an example, if a low-gradient stream reach to be sampled was absent woody debris and snags, samples would be reallocated to the remaining habitat types present in order of the table (*e.g.*, nine SU taken from undercut banks/rootwads, six from leaf packs, and five from sand). A total of at least 20 SU (but never more than 23) were taken at each stream reach regardless of prevalence or quality of habitat types present. Macrophytes were only sampled if present and were not included in the reallocation hierarchy. Samples were collected beginning at the zero meter mark of the reach moving upstream. Sample units were distributed throughout the entire 100 meter reach. All material (detritus, minerals, and macroinvertebrates) was combined into a single composite sample and washed streamside. Large material was removed from the sample prior to preservation, but only after thoroughly checking for attached or concealed organisms. Each stream sample was packed into labeled 1 L plastic bottles and preserved with 70% ethanol. Benthic field sheets were completed to indicate habitat types sampled and provided a qualitative listing of biota encountered. Samples were transported to the laboratory (Columbus State University) for processing and taxonomic identification.

Physical measurements and observations at each station included a habitat assessment, physical characterization evaluation, stream cross sectional profile, and modified Wolman pebble count.

Visual based physical habitat assessments were conducted on each 100-meter stream reach. The habitat assessment protocol was dependant on whether the stream under consideration was high or low gradient (Columbus State University 2000). The RBP habitat assessment considers the quality and variety of both instream (substrate and channel morphology) and riparian (bank structure and vegetation) habitat features (Barbour *et. al.* 1999). Stream reaches are evaluated on a 200-point scale with individual components accounting for a maximum of either 10 or 20 points. Scoring is divided into four categories; optimal, sub-optimal, fair and poor.

Physical characterization of streams is also important in evaluating the quality and integrity of stream habitat. The RBP physical characterization form documents such pertinent physical qualities as weather conditions, site location, watershed features and surrounding land use, stream type, riparian vegetation, and instream features. These data are helpful supplements to better understand the role of physical habitat in stream water quality and biotic integrity. Physical characterization was conducted following the habitat assessment at each site visited. Characterization observations were also conducted by consensus among trained field personnel present. Measurements and observations were documented and recorded on the field sheet.

Stream cross sectional profiles were conducted at a representative transect usually close to the 50-meter mark of the reach. Iron pins (rebar) were driven into both banks perpendicular to the flow of the stream. A measuring tape (tag-line) was stretched taut across the stream and leveled with a hanging line level. A two-meter stick was used to measure water depth from the tag-line and distance from bank pins. Depth and distance measurements were made in at least 20 intervals across the bank-full width of the stream. More measurements were made in areas of high variability, and fewer measurements were made in areas of homogeneous depth and substrate contour. Velocity estimates were also made using the average of three “runs” of 10 meters with a floatation apparatus. Width and depth measurements from the cross-sectional profile, along with velocity estimates, allowed for an estimation of stream discharge (using the velocity-area method) (Gore 1996). Such baseline data may additionally serve to document changes in channel structure over time.

The modified Wolman Pebble Count (Wolman 1954) is a method to assess particle size and variability of stream substrates. Pebble counts were conducted at each sample location using 100 particles randomly selected from water covered portions of the 100-meter reach. Sampling effort was spread so that the first particle was picked up near the zero meter mark and the last particle near the 100-meter mark. Measurements were made with a sand card (W.F. McCollough © 1984) for soils (clay, silt, and sands), and small calipers (gravels and small cobbles) or large calipers (cobbles and boulders) for larger inorganic substrates. All measurements were recorded on field sheets which were taken to the laboratory.

Laboratory Analysis

As with field sampling, laboratory analysis was partitioned by physical, chemical, and biological data. Data entry, database development, and data analysis will be treated separately. All laboratory analysis was conducted at the CSU Environmental Science Laboratory.

Physical Analysis

Physical information collected at all stream sites was evaluated for anomalous features. As previously mentioned, a valid reference stream must be representative of the area it seeks to characterize. Realistic goals for impaired streams will not be accurate if based on un-representative reference streams (*e.g.*, basing expectations only on a single high-gradient, gravel-cobble stream in an ecoregion). Habitat assessment, physical characterization, and Wolman pebble-count data were used to refine the candidate reference stream pool (to remove streams from consideration that were not minimally impaired based on local riparian and instream habitat). Evidence of human modification (dams, channelization), severely degraded habitat (habitat assessment score greater than 2 standard deviations below the mean for candidate reference streams in an ecoregion), and anomalous substrate (*e.g.*, 100% silt in an ecoregion where other candidate reference streams had less than 20% silt and more substrate variability) were physical characteristics used in conjunction with water chemistry parameters to eliminate some streams as candidate reference sites. Stream cross-sectional profiles were used only to estimate discharge and provide additional baseline documentation of channel morphology. Relationships among physical characteristics in Level-III and Level-IV ecoregions were documented and will be discussed in the results section.

Chemical Analysis

In addition to *in situ* water quality data, samples from all sites were laboratory analyzed for nutrients and metals. Preserved field samples were cold-held for transport to the lab and analyzed within allowable holding times. Several nutrient parameters had very short holding times (less than four days), while the metals analyses allowed for holding times up to six months. All chemical laboratory analyses conformed to EPA and Georgia EPD methods and guidelines. Standard operating procedures (SOPs) for all laboratory analytical methods may be found in the Quality Assurance Project Plan, Georgia Ecoregions Project, Phase II (Columbus State University 2000). Laboratory Quality Control was accomplished by analysis of duplicate samples and laboratory blanks on a randomly selected 10% of all stream samples analyzed.

Data were reported and documented on applicable laboratory forms, and unused portions of samples were disposed of in the proper manner.

Biological Analysis

Preserved composite benthic macroinvertebrate samples were held in a locked room in the laboratory until processing. Standard operating procedures (SOPs) for benthic laboratory methodology may be found in the Quality Assurance Project Plan, Georgia Ecoregions Project, Phase II (Columbus State University 2000). The first step in processing a sample was to prepare the sample for sub-sampling. A fixed count random sub-sample is the preferred technique of the RBPs (Barbour et al. 1999). Sub-sampling for this project is in accordance with RBP recommendations and follows the protocol set out by Caton (1991). Samples were rinsed in tap water to temporarily remove alcohol residue. The entire sample was then spread evenly on a gridded tray (30 x 36 cm or thirty 6 x 6 cm grid squares) and covered in water to preclude desiccation of the organisms and detritus. Two gridded trays were used in instances where sample material overflowed a single tray. Samples were then divided equally between the two trays and spread evenly on each tray. Random number sheets were generated to indicate the 6 x 6 cm grid squares that were selected from the sample and sorted. Each grid square picked was removed and placed in a white picking tray under bright light and sorted with forceps to separate all aquatic organisms from detritus and inorganic material. The target number of organisms for this method was 200, with 160 to 240 considered within the acceptable range.

In no case were less than four of the 30 grid-squares picked. If the number of organisms was greater than 240 after four squares, those organisms were re-spread on a gridded tray and re-picked until the target number was achieved. If the total number of organisms was less than 160 after all 30 squares had been picked, the sample was removed from consideration as a candidate reference stream. This only occurred on two occasions when it is likely that "new" water was present in the streams sampled (recent precipitation after extended drought). It is possible that sufficient time had not passed for full colonization by the macroinvertebrate community to occur. All benthic macroinvertebrates were preserved in vials of 95% ethanol, labeled, and held for taxonomic identification. All detritus was preserved for quality control purposes. The detritus from a minimum of 10% of all sub-samples was re-checked to ensure that laboratory personnel were not missing organisms at an unacceptably high rate.

Taxonomic identification of the sub-samples was performed using appropriate taxonomic keys (Appendix D). The primary taxonomic sources were Merritt and Cummins (1996) and Brigham (1982) although a number of keys were used. Initially, organisms were sorted to order or family level. Taxonomic certainty ratings (TCR) were assigned to each identification noted. TCRs (on a scale of one-to-five) serve to indicate how certain the taxonomist was of the identification (with "1" being most certain). In some cases, invertebrates were damaged or missing key body parts that led to higher TCRs. Identification was to lowest practicable taxonomic level (usually genus), and was recorded on macroinvertebrate bench sheets (Columbus State University 2000). At least 10%

of all sample identifications by a single trained taxonomist were independently verified with 90% agreement among identifications as the standard. If 90% agreement was not reached, re-training occurred and re-identification resulted.

Data Analysis

Data analysis occurred in a step-wise process that has been used to develop biocriteria for streams in several states and regions including Maryland (Stribling et al. 1998), Arizona (Gerritsen and Leppo 2000), Idaho (Jessup and Gerritsen 2000), the Mid-Atlantic states (Maxted et al. 2000), West Virginia (Tetra Tech 2000a), Wyoming (Stribling et al. 2000) and Mississippi (Tetra Tech 2002a).

Although the intent of the research and the precise methods differ slightly from state to state, the general conceptual framework is the same. After stream site groups are determined and quantitative field data are collected, biological metrics are compiled, calculated and tested, biotic indices are developed, and indices are tested and refined.

Database Development and Site Groups

The first step in the process was the development of a comprehensive database. Following ecoregionalization, site selection and reconnaissance, field sampling, laboratory analysis of chemical parameters and physical measurements and observations, and benthic macroinvertebrate subsampling and taxonomic identification, all data were entered into the Ecological Data

Application System (EDAS) Version 3.3.2 (Tetra Tech 2000b). EDAS is a Microsoft Access© relational database program that allows storage, manipulation, and retrieval of ecological data. Quality control (QC) measures for data entry included verification of correct entry of a randomly selected 10% of all sites evaluated.

Following database development, abiotic factors including *in situ* and laboratory chemical parameters, and physical habitat assessments and characterization were queried from the database and used to refine the candidate reference stream site group to accurately characterize the best attainable biological condition for each ecoregion and subecoregion considered. Site groups for this research were either reference or impaired within the geographic ecoregional framework. Subsequent research has established a gradient of impairment that is used to establish additional site groups such as is used in the RBP habitat assessment (*e.g.* optimal, sub-optimal, fair, poor) (Gore et al. 2005). Both reference and impaired (stressor) sites were sampled in all six ecoregions (and thereby 28 subecoregions) under consideration. The refinement of site groups and removal of sub-reference candidate reference streams (for abiotic considerations) led to the final group of reference streams that served to characterize the biological reference condition (Appendix C).

Metric Calculation and Scoring

A total of 59 metrics were initially calculated in EDAS, each with a likelihood of being applicable in Georgia and with a documented stress response

(Table 4). At least 10% of all automated metric calculations were hand-verified to ensure that calculations were correct. In addition, the EDAS queries that perform the calculations were checked to ensure that the formulas were written correctly. Corrections were made when necessary and the database was updated to reflect the changes.

Raw data values for all metrics in each Level-III and -IV ecoregion were exported from EDAS into Microsoft Excel© spreadsheets for ease of manipulation and calculation. A separate spreadsheet was created for each ecoregion. Copies of all raw and standardized metric values are available in Appendices K and M respectively.

Table 4. Metric Stress Response

Metric Category	Metric	Stress Response
Richness	Total Taxa	Decrease*
	Ephemeroptera, Plecoptera, & Trichoptera (EPT) Taxa	Decrease*
	Ephemeroptera Taxa	Decrease*
	Plecoptera Taxa	Decrease*
	Trichoptera Taxa	Decrease*
	Coleoptera Taxa	Decrease#
	Diptera Taxa	Decrease*
	Chironomidae Taxa	Decrease*
	Tanytarsini Taxa	Decrease#
	Evenness	Decrease$
	Margalef's Index	Decrease$
	Shannon-Wiener Index	Decrease#
	Simpson's Diversity Index	Increase%
Composition	% EPT	Decrease*
	% Ephemeroptera	Decrease*
	% Amphipoda	Decrease#
	% Chironomidae	Increase*
	% Coleoptera	Decrease#
	% Diptera	Increase*
	% Gastropoda	Decrease#
	% Isopoda	Increase#
	% NonInsect	Increase*
	% Odonata	Increase#
	% Plecoptera	Decrease*
	% Tanytarsini	Decrease*
	% Oligochaeta	Increase*
	% Trichoptera	Decrease*
	% Chironominae / Total Chironomidae (TC)	Variable*
	% Orthocladiinae / TC	Decrease*
	% Tanypodinae / TC	Increase*
	% Hydropsychidae / Total Trichoptera	Increase*
	% Hydropsychidae / Total EPT	Increase*
	% Tanytarsini / TC	Decrease*
	% *Cricotopus sp.* & *Chironomus sp.* / TC	Increase*

Metric Category	Metric	Stress Response
Tolerance/Intolerance	Tolerant Taxa	Increase*
	% Tolerant Individuals	Increase*
	Intolerant Taxa	Decrease*
	% Intolerant Individuals	Decrease*
	% Dominant Individuals	Increase*
	Dominant Individuals	Increase*
	Beck's Index	Decrease*
	Hilsenhoff's Biotic Index (HBI)	Increase*
	North Carolina Biotic Index (NCBI)	Increase&
Functional Feeding Group	% Scraper	Decrease*
	Scraper Taxa	Decrease@
	% Collector	Decrease@
	Collector Taxa	Decrease@
	% Predator	Decrease@
	Predator Taxa	Decrease@
	% Shredder	Decrease*
	Shredder Taxa	Decrease%
	% Filterer	Increase*
	Filterer Taxa	Decrease*
Habit	Clinger Taxa	Decrease*
	% Clinger	Decrease*
	Burrower Taxa	Decrease*
	Climber Taxa	Decrease*
	Sprawler Taxa	Decrease*
	Swimmer Taxa	Decrease*

* (Barbour *et. al.* 1999)

(Barbour *et. al.* 1996)

$ (general literature)

% (Jessup and Stribling 2002)

& (Lenat 1993)

@ (Gerritsen and Leppo 2000)

For each metric, percentile values (5^{th} %, 25^{th} %, 75^{th} % and 95^{th} %), measures of variability (minimum and maximum) and measures of central tendency (mean and median) were calculated for the reference stream distribution. The values from the reference distribution were then used to compare with metric data from impaired streams sampled and processed in the same manner. Raw data values were evaluated statistically and graphically for their ability to individually discriminate streams in the reference and impaired site groups.

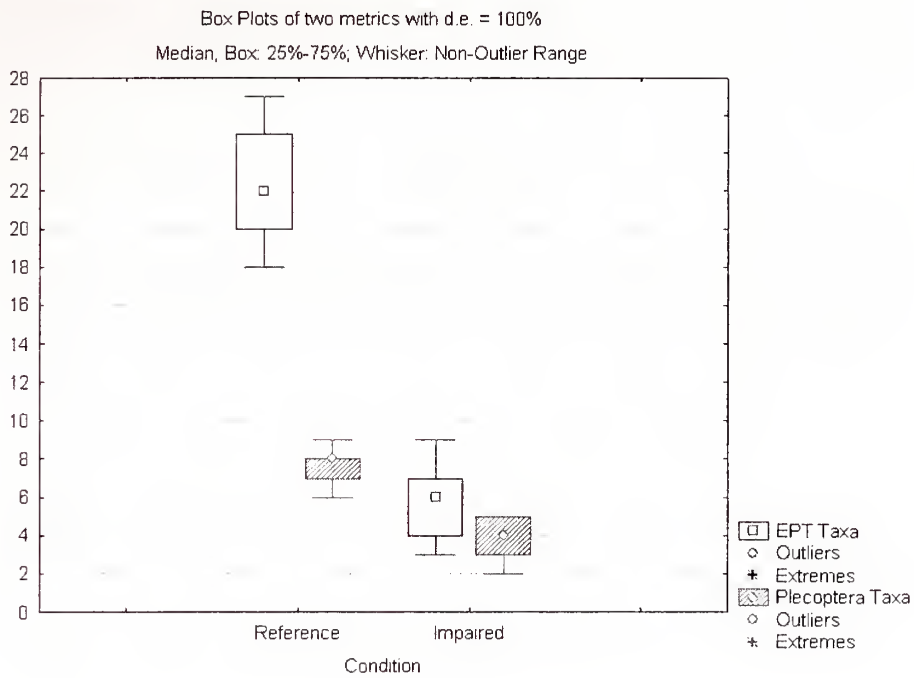
Raw data were evaluated statistically by determining discrimination efficiency (DE). The calculation of DE depends (in part) on whether an individual metric value is expected to increase or decrease in response to stress. A responsive metric will identify a test stream as being either stressed or non-stressed. Discrimination efficiency is a measure of this ability. Raw metric scores for reference and impaired streams in each site class (ecoregion) were used to calculate the DE for each metric by the formula:

$$\mathbf{DE = 100 \times a/b}$$

Where a = the number of impaired streams scoring below the 25^{th} percentile of the reference distribution for metrics that decrease in response to stress (or the number of impaired streams scoring above the 75^{th} percentile of the reference distribution for metrics that increase in response to stress), and b= the total number of impaired samples. Values for DE for each metric in each ecoregion are in Appendix L. Individual metrics in each metric category (richness, composition, tolerance/intolerance, functional feeding group, and habit) that had the highest DE were evaluated graphically to determine the strength of the discrimination.

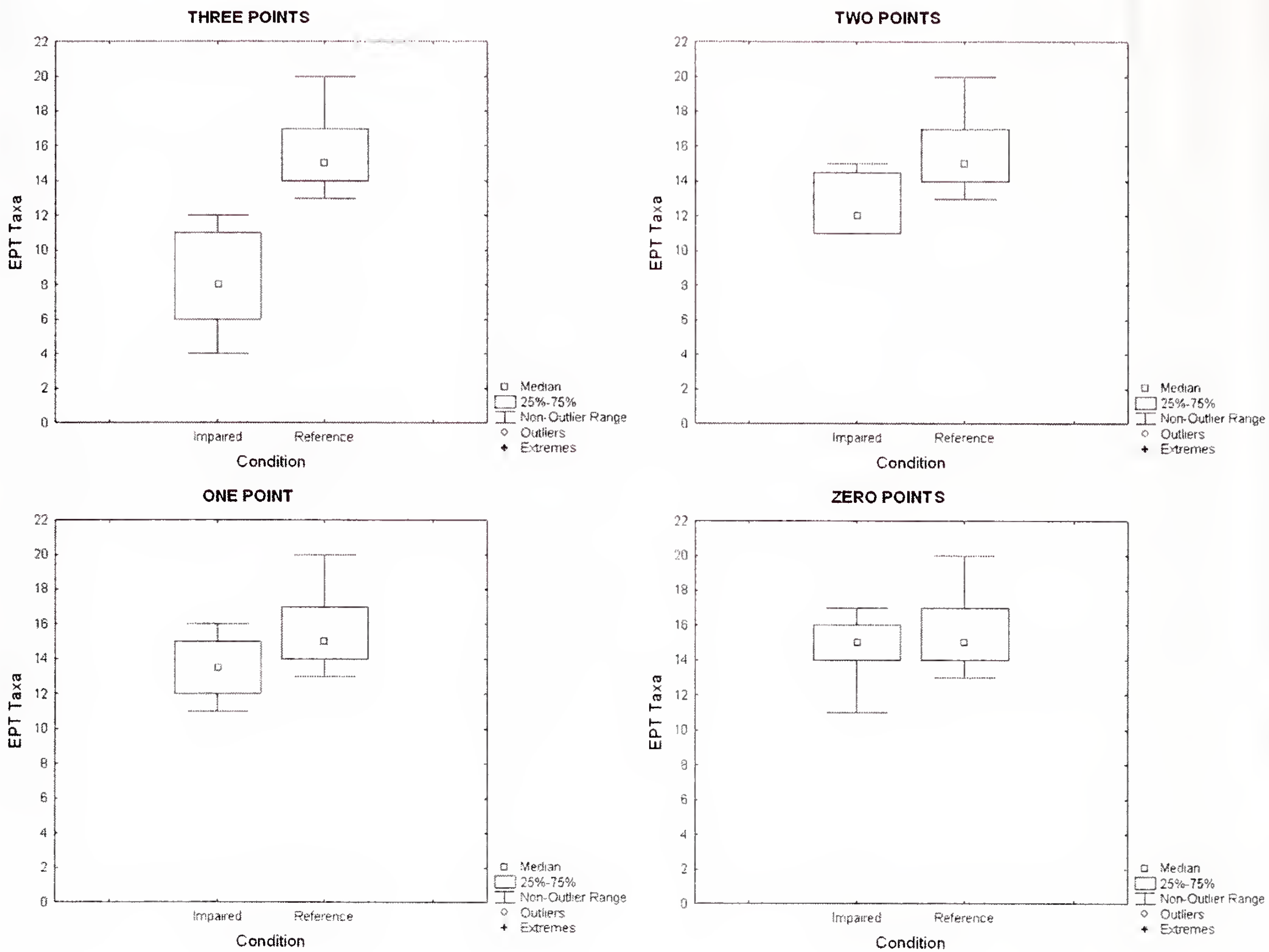
Graphical evaluation is essential to truly identify which metrics can differentiate reference from impaired streams as discrimination efficiency only identifies metrics for further study. Metrics may each have a discrimination efficiency = 100% while one metric clearly outperforms the other when viewed graphically (Figure 2.). In this example, EPT taxa is a much stronger metric than Plecoptera taxa because there is a greater difference between the site groups. Box and whisker plots of site group distributions (of reference and impaired streams) for metrics with the highest DE in each metric category were evaluated. The best performing metrics exhibited the strongest separation of stressed and non-stressed sites.

Figure 2. Box plots for two metrics with discrimination efficiency = 100%



Box and whisker plots of reference versus impaired metric distributions in each ecoregion were given a score from zero to three (with 3 being the strongest) to indicate the strength of the metric (Barbour et. al. 1996). Metrics that showed no overlap of interquartile ranges (IQRs) were given a score of three. Metrics that had some overlap of IQRs but with both medians outside the interquartile overlap were given a score or two. Metrics with moderate overlap of IQRs but with the median of the impaired sites outside the IQR of the reference sites were given a score of one. Finally, metrics with extensive overlap of IQR or with both medians in the overlap were given a score of zero (Figure 3).

Figure 3. Box plot scoring system



Metrics that discriminated reference from impaired stream groups based on statistical and graphical analysis (DE and box plot scores) were considered for inclusion in ecoregionally specific macroinvertebrate indices. All metrics that did not differentiate reference from impaired streams were removed from consideration for inclusion in the candidate indices. In no case was a metric with a discrimination efficiency less than 50% used. In addition to evaluating the efficacy of the metric, it was also important to check for correlations between metrics to preclude inclusion of redundant metrics in the same index (*e.g.*, using EPT taxa and Plecoptera taxa in the same index when all the EPTs are Plecoptera).

Pearson-product-moment correlation analyses of raw metric values revealed those that were redundant with one another. When two metrics were calculated as having a Pearson's r-correlation of greater than 0.90 or less than -0.90, the metrics were not considered for use in the same candidate index. When two metrics had a Pearson's r-value of 0.80 to 0.90 or -0.80 to -0.90, the metrics were considered as valid for all candidate indices if their relationship was not a linear relationship (as judged by scatterplot). If the scatterplot revealed a linear relationship, the metrics were considered to be co-dependent and thus were not considered for inclusion in the same candidate index (Tetra Tech 2002a). Metrics with Pearson's r-values between 0.80 and -0.80 were considered for use in all candidate indices. The individual metrics from each metric category that best differentiated reference streams from impaired streams, and met the above criteria, were considered for inclusion in candidate indices.

Remaining candidate metrics raw data values were scored, or standardized, for comparison to one another. Many of the metrics are on different scales, or have no absolute maximum. In some cases, the number of taxa of a particular Family is limited only by the geographic distribution of taxa occurrence. For some metrics, a high raw score indicates higher biological integrity (*e.g.*, EPT taxa), and for some metrics, a low raw score indicates higher biological integrity (*e.g.*, HBI). Standardization allows for all metrics, whether they increase or decrease in response to stress, to be compared on a 100-point scale (with a higher score equaling a "better" score for that metric).

The method of standardization varied depending on whether the metric score increased or decreased in response to stress (Table 4). For those that decrease in the presence of stressed conditions, standardized scores are calculated as:

100 x c/d

Where c = the metric value for the test stream, and d = the 95th percentile value of the reference stream distribution for the site class. And, for those metrics that increase in the presence of stressed conditions, scores are calculated as:

100 x ((e-c)/(e-f))

Where e = the highest observed value among all streams (reference and impaired) within the site class, c = the metric value for the test stream, and f = the 5th percentile value of the reference stream distribution for the site class.

Multimetric Biotic Index Development

The multimetric approach assimilates biological data, with various ecological meanings, into a single index (for each Level-III and Level-IV ecoregion evaluated) to gauge the health of a stream. Final indices were comprised of five to seven metrics with at least one metric chosen from each of the metric categories (richness, composition, tolerance/intolerance, functional feeding group, and habit). In some cases, particular metric categories did not perform well (i.e., all DE values were < 50%) in specific ecoregions. The inclusion of such metrics decreases the discriminatory power of the index. In such cases, additional metrics from metric categories that did perform well were used. In a very few instances (particularly among the Level-III ecoregions) only three or four metrics of the initial 59 evaluated had adequate DE, box and whisker plot separation, and were minimally redundant. In those cases, the final indices were comprised of the remaining metrics. Indices were assembled in an additive manner, such that;

Index Score for ecoregion (subecoregion) = (g+h+I+j+k+l...)/n

Where g,h,I,j,k,l... = the standardized score of the best candidate metrics, and n = the total number of metrics included in the index. All final indices contained five to seven metrics, and were scored on a 0 to 100 point scale. Indices were also evaluated for discrimination efficiency and box plots were examined. The candidate index for each Level-III and -IV ecoregion that provided the highest DE and best graphical spread was selected as the final index. Final indices are presented in the Results section, below.

RESULTS

Physical, chemical, and biological data collected at 111 candidate reference streams were used to establish reference conditions in each of the target ecoregions and subecoregions (Figure 4). Identical parameters were observed and measured in 124 impaired stream samples. Results are presented for RBP habitat assessment scores, substrate particle size distribution (Wolman pebble count), selected water chemistry parameters, and biological metrics and indices. Additionally, summaries of data collected from reference streams, and the characteristic biological reference condition, are presented for each target ecoregion and subecoregion.

RBP Habitat Assessment

Both reference and impaired site groups across all ecoregions have a virtually identical percentage of streams rated as sub-optimal. However, there is a disparity between the number of streams in each site group rated as either optimal or fair (Table 5). Frequency of occurrence of RBP habitat assessment condition for reference and impaired streams is shown in Figure 5. A complete list of total habitat assessment scores and individual parameters for reference streams are in Appendix F.

Figure 4. Candidate reference streams sampled

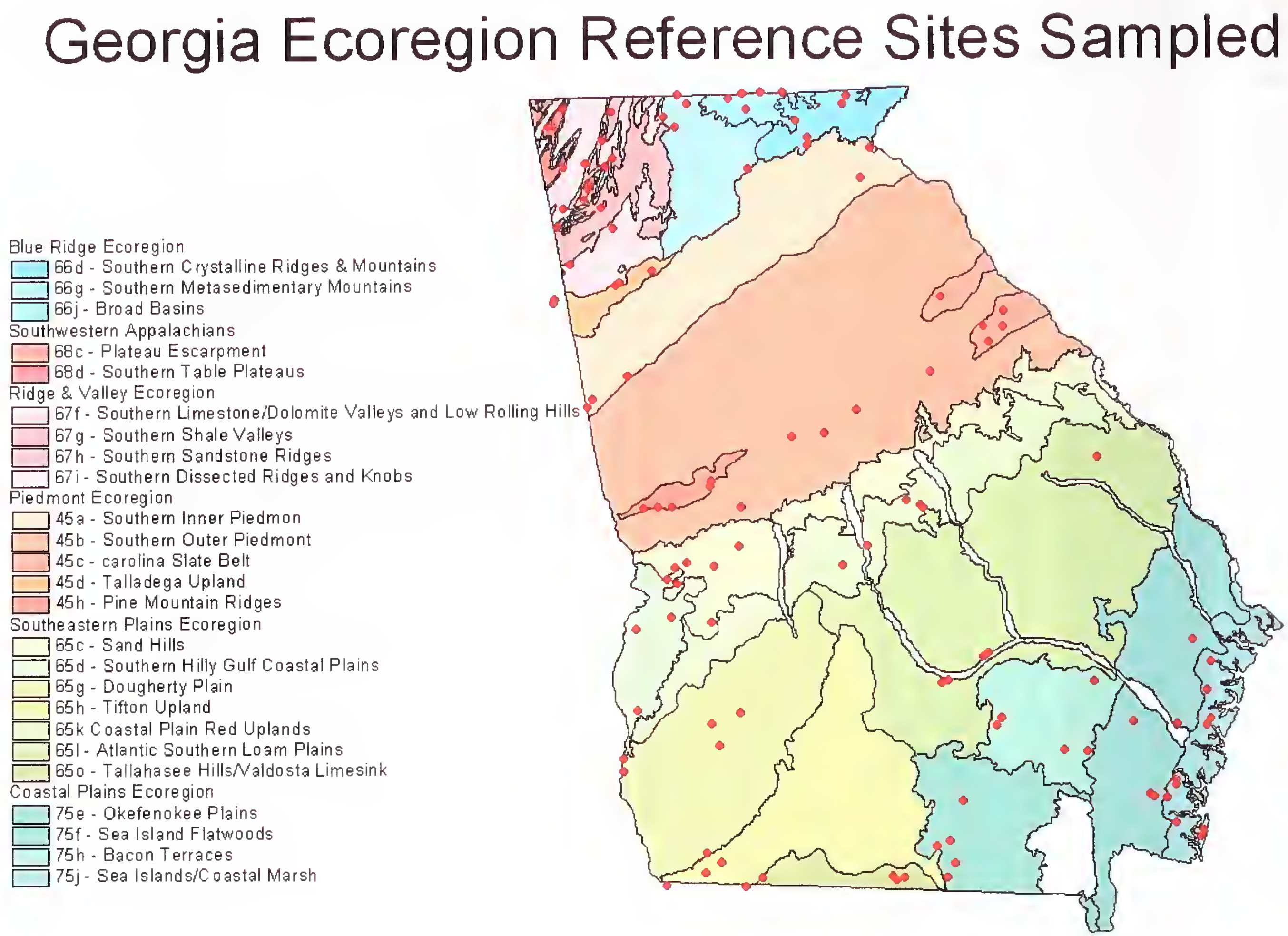
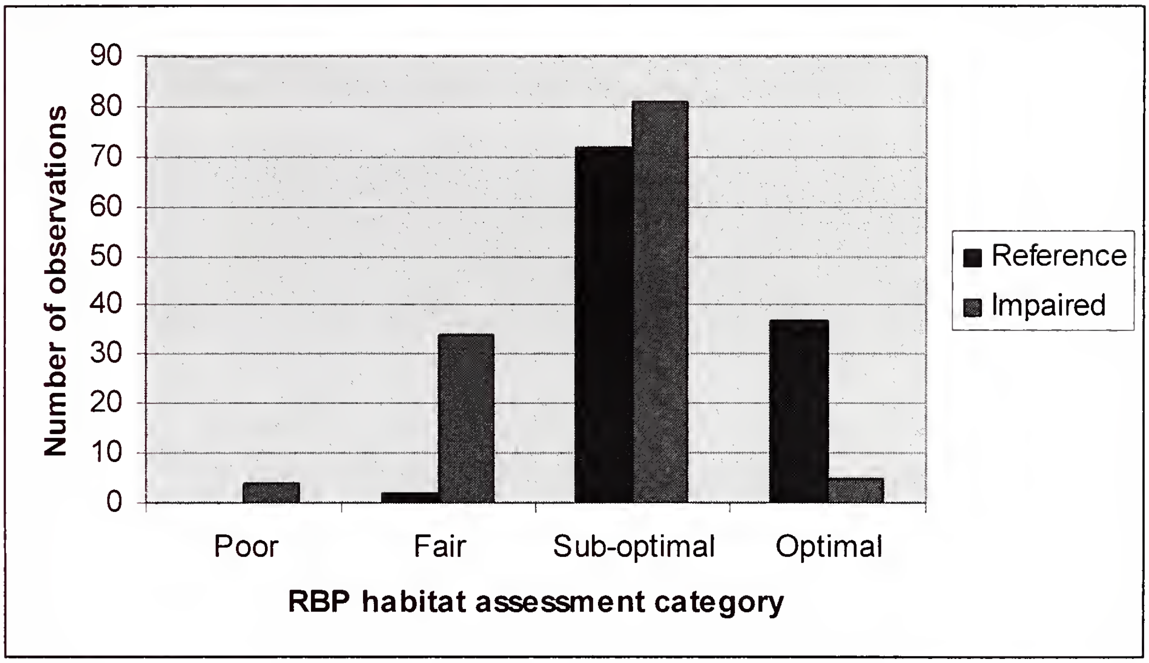


Table 5. Occurrence of RBP habitat condition among reference and impaired streams

% of reference streams	**RBP Habitat Condition Category**	% of impaired streams
33.0	Optimal	4.5
65.2	Sub-optimal	65.0
1.8	Fair	27.7
0.0	Poor	2.8

Figure 5. Frequency of occurrence of RBP habitat assessment condition



Substrate Particle Size Distribution

Ranges (percentages) for reference and impaired distributions by ecoregion are in Table 6. Reference and impaired substrate values did not differ substantially based on their ranges within ecoregions, however, a noticeable difference in particle size was evident across ecoregions. The Southeastern Plains (65) and the Southern Coastal Plain (75) were dominated by smaller substrate particle sizes (silt/clay and sands) as compared to the rest of the target ecoregions. Wolman pebble count data for all reference streams are in Appendix G. These values alone were not used to remove sites from consideration for developing reference condition criteria, but did in at least one case help identify a candidate reference stream that was anomalous for its subecoregion (65g-82, Keel Creek, was removed from consideration in part because the substrate was 100% silt/clay while mean among other 65g candidate reference streams was 17% silt/clay)

Table 6. Substrate particle size distribution (percentages by ecoregion, n=6)						
	Silt/Clay		Sand		Gravel	
Eco-region	Reference	Impaired	Reference	Impaired	Reference	Impaired
45	0-42	0-19	3-89	10-90	2-79	2-65
65	0-74	0-96	0-100	4-99	0-30	0-73
66	0-12	0-19	0-28	5-60	13-69	10-65
67	0-14	0-75	2-14	0-33	28-86	5-97
68	0	0-34	4-22	5-78	8-22	0-44
75	0-100	0-100	0-100	0-100	0-4	0-18
	Cobble		Boulder		Bedrock	
Eco-region	Reference	Impaired	Reference	Impaired	Reference	Impaired
45	0-52	0-36	0-33	0-7	0-21	0-12
65	0-16	0-12	0-2	0-5	0-2	0-30
66	4-54	6-58	0-33	0-27	0-8	0-19
67	0-40	0-46	0-20	0-24	0-19	0-26
68	18-58	0-42	13-94	13-49	1-14	1-14
75	0	0-2	0	0	0	0

Water Chemistry

All of the candidate reference sites sampled met the EPA's National Primary and Secondary Drinking Water Regulations (USEPA 1999b) for the chemical parameters measured with only three exceptions. The standards that were exceeded are the 5 NTU standard for turbidity which was exceeded in 55 instances, the 0.3 mg/L standard for iron, which was exceeded in 34 instances, and the 0.05 mg/L standard for manganese which was exceeded in seven instances (see Figures 6 through 10). Values for all water chemistry parameters observed and analyzed for reference streams are in Appendices H, I, and J. Anomalous chemical parameter data were used to remove streams from reference condition characterization in only two instances. Stream site 45c-18, tributary to Rocky Creek, had a phosphorus value greater than two times the standard deviation from the mean of other reference streams in the Carolina Slate Belt (45c). Stream site 65g-82, Keel Creek, had a dissolved oxygen level <2.0mg/L, and had an instream substrate composed of 100% silt (derived from Wolman pebble count).

Figure 6. Distribution of turbidity concentrations among reference streams (n=111)

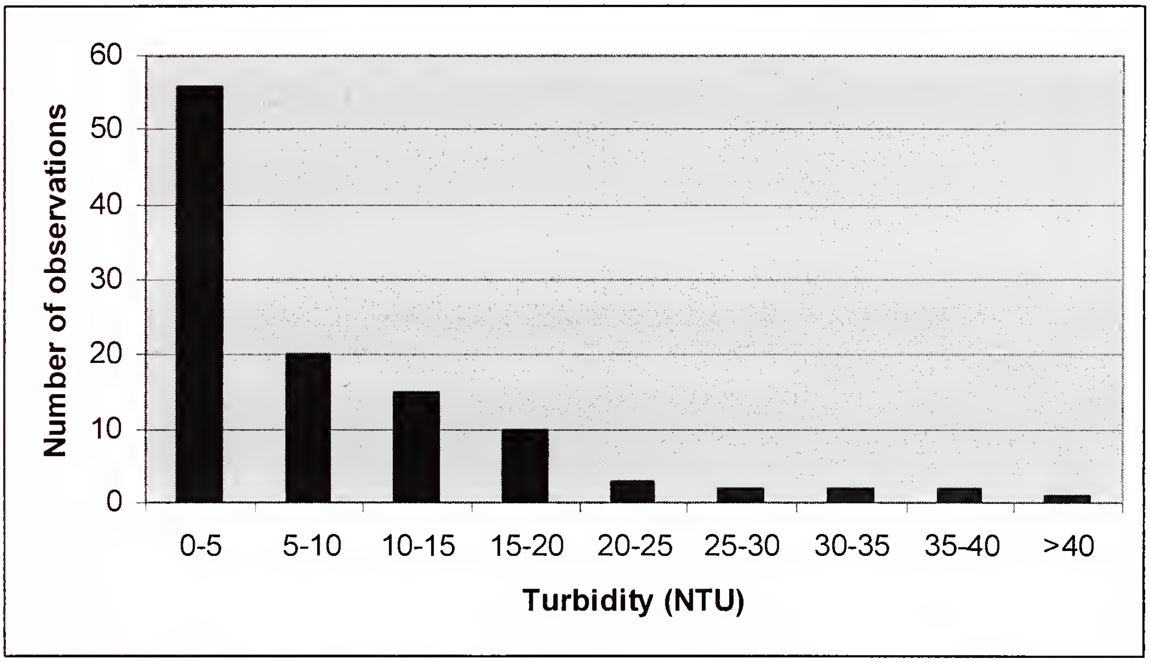


Figure 7. Distribution of dissolved oxygen concentrations among reference streams (n=111)

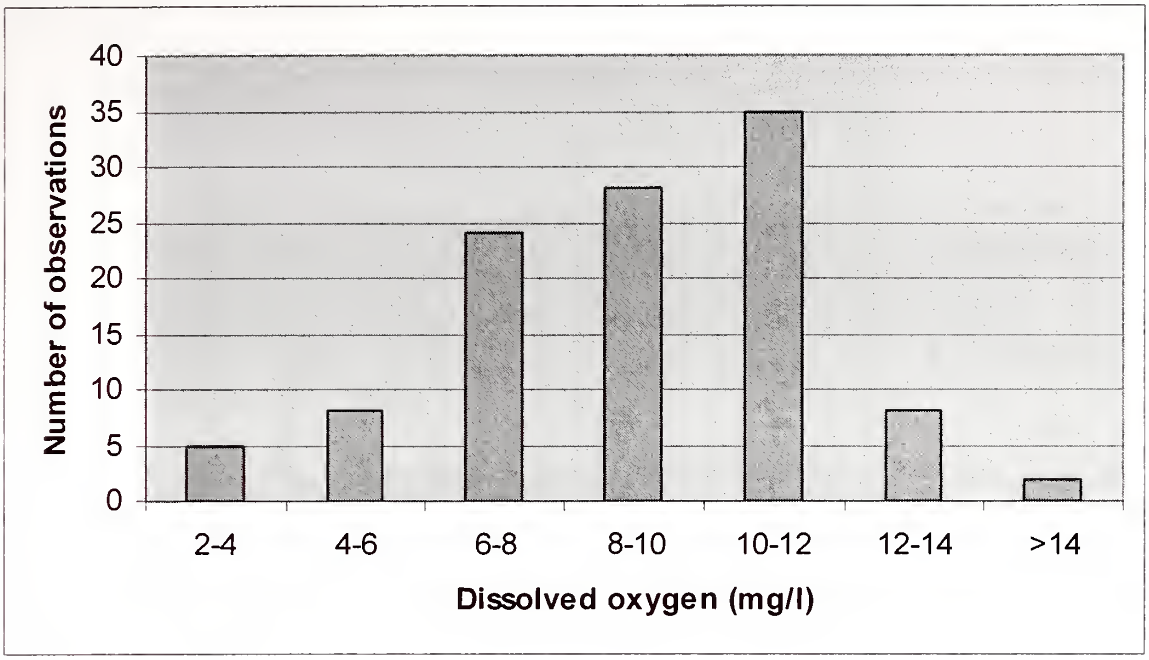


Figure 8. Distribution of conductivity values among reference streams (n=111)

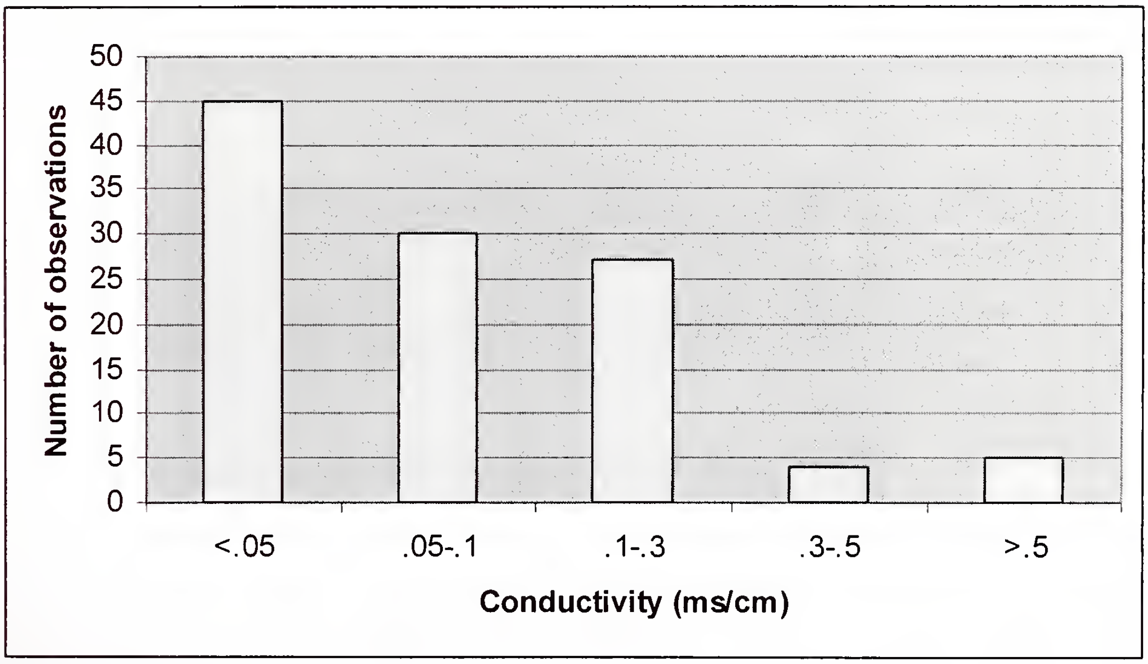


Figure 9. Distribution of nutrient concentrations among reference streams (n=111)

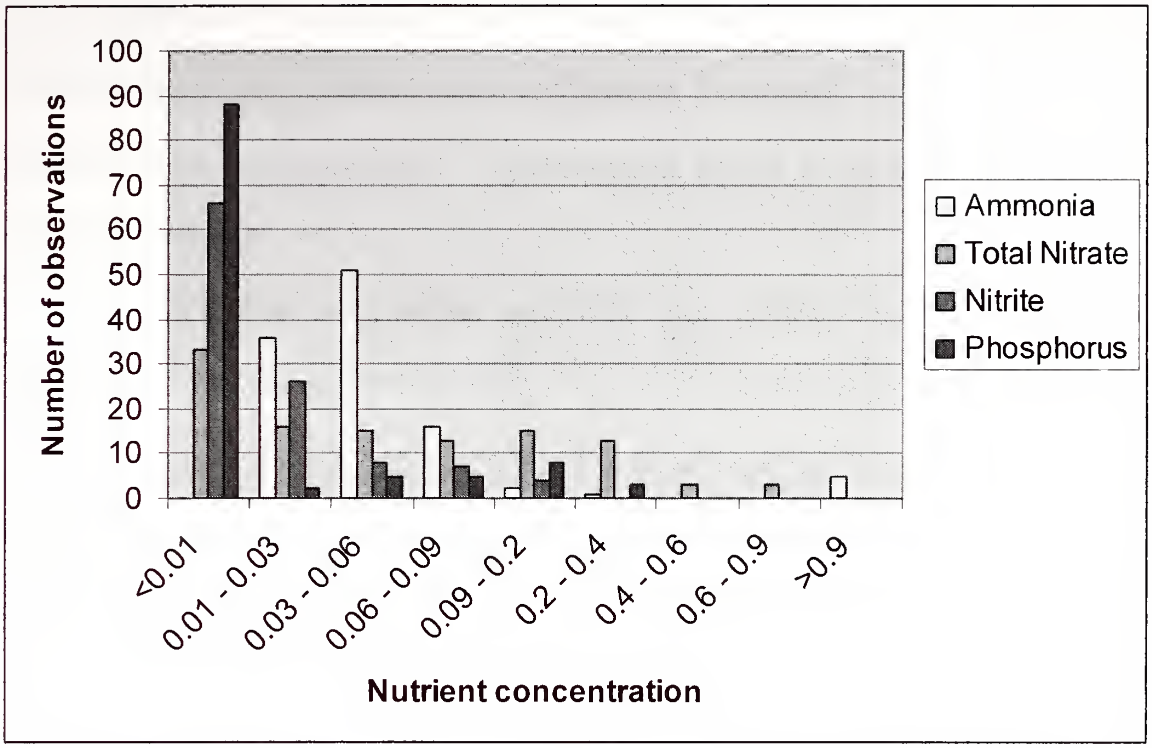
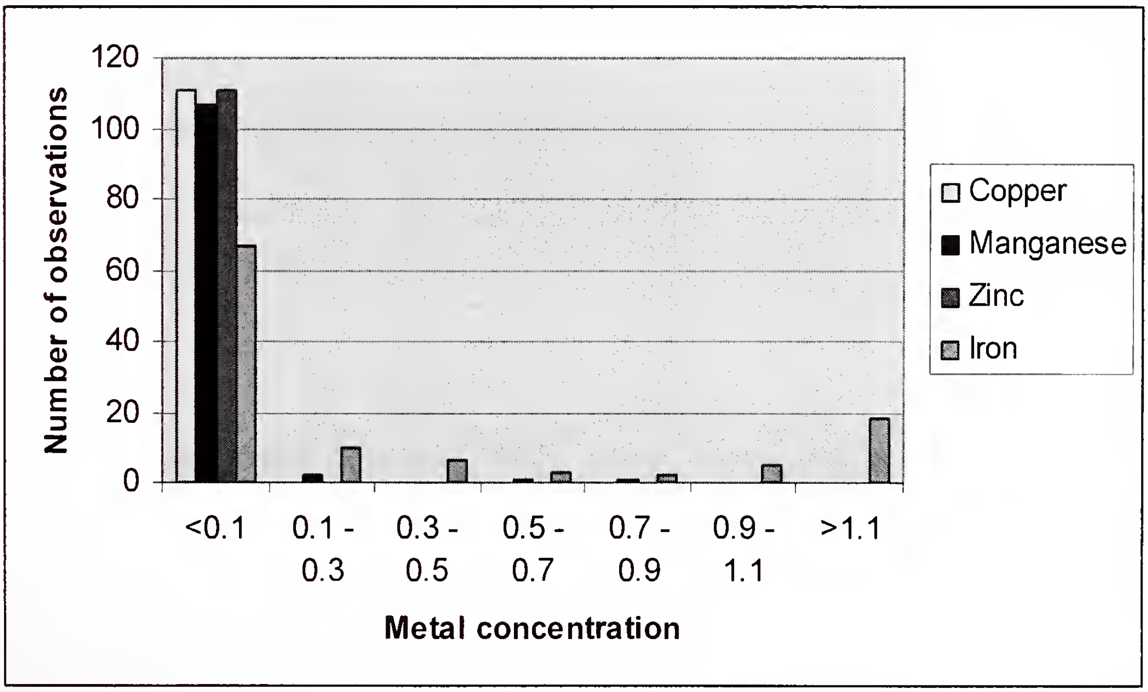


Figure 10. Distribution of metals concentrations among reference streams (n=111)



Benthic Macroinvertebrates

Raw metric values for metrics initially considered for index development are in Appendix K. Discrimination efficiencies for metrics considered for index development are in Appendix L. Standardized scores for discriminating metrics are in Appendix M.

Discrimination efficiencies and box plot scores for final indices for ecoregions and subecoregions (Figure 1) are in Tables 7 and 8. A summary of the composition of both ecoregional and subecoregional indices is provided in Tables 9 through 14. The overall performance of individual metrics by ecoregion and subecoregion are evaluated in Tables 15 and 16.

Table 7. Discrimination efficiency and box plot scores for ecoregional indices

Ecoregion	# GIS picked impaired	# index classified Impaired	discrimination efficiency (%)	box and whisker plot score
45	26	18	69	2
65	42	26	62	1
66	17	13	77	3
67	12	11	92	3
68	5	5	100	3
75	22	16	73	3
Total	124	89	72	

Table 8. Discrimination efficiency and box plot scores for subecoregional indices

Subecoregion	# GIS picked impaired	# index classified Impaired	discrimination efficiency (%)	box and whisker plot score
45a	5	5	100	3
45b	6	6	100	3
45c	5	4	80	3
45d	5	5	100	3
45h	5	4	80	3
65c	7	6	86	3
65d	5	5	100	3
65g	10	10	100	3
65h	5	5	100	3
65k	5	5	100	3
65l	5	5	100	3
65o	5	5	100	3
66d	5	4	80	3
66g	7	7	100	3
66j	5	5	100	3
67f&l	5	5	100	3
67g	5	5	100	3
67h	2	2	100	3
68c&d	5	5	100	3
75e	5	5	100	3
75f	5	5	100	3
75h	7	7	100	3
75j	5	3	60	1
Total	124	118	95	

Table 9. Summary of macroinvertebrate indices for major ecoregions of Georgia

Metric Category	Index 45	Index 65	Index 66	Index 67	Index 68c&d	Index 75
Richness	EPT Taxa	EPT Taxa	Plecoptera Taxa	EPT Taxa	Plecoptera Taxa	
		Margalef's Index	Simpson's Index	Plecoptera Taxa		
Composition	% Chironomidae	% Oligochaeta	% Trichoptera	% Plecoptera	% Hydropsychidae / Total Trichoptera	% Non-Insect
	% Plecoptera	% Tanypod / TC		% Isopoda	% Tanypodinae / TC	% Oligochaeta
	% Odonata					% Odonata
	% EPT					% Tanypodinae / TC
Tolerance / Intolerance	NCBI	% Intolerant Individuals	% Intolerant Individuals	HBI	NCBI	HBI
			NCBI			
Functional Feeding Grp.		% Predator	Predator Taxa		Scraper Taxa	
Habit		% Clinger	Burrower Taxa	Clinger Taxa	% Clinger	

Table 10. Summary of macroinvertebrate indices for subecoregions in Ecoregion 45 in Georgia

Metric Category	Index 45a	Index 45b	Index 45c	Index 45d	Index 45h
Richness	EPT Taxa	Coleoptera Taxa	Tanytarsini Taxa	Coleoptera Taxa	Plecoptera Taxa
Composition	% Chironomidae	% Oligochaeta	% Odonata	% Odonata	% Ephemeroptera
	% *Chironomus* & *Cricotopus* / TC	% Chironomidae	% Tanypodinae / (TC)	% Tanypodinae / TC	% Plecoptera
Tolerance / Intolerance	NCBI	% Intolerant Individuals	Dominant Individuals	NCBI	% Intolerant Individuals
			% Intolerant Individuals	% Tolerant Individuals	
Functional Feeding Group	% Scraper	Scraper Taxa	% Shredder	Shredder Taxa	% Scraper
Habit	% Clinger	Swimmer Taxa	Swimmer Taxa		% Clinger

Table 11. Summary of macroinvertebrate indices for subecoregions in Ecoregion 65 in Georgia

Metric Category	**Index 65c**	**Index 65d**	**Index 65g**	**Index 65h**	**Index 65k**	**Index 65l**	**Index 65o**
Richness	Plecoptera Taxa	Plecoptera Taxa	EPT Taxa	Ephemerop Taxa		Diptera Taxa	Chironom Taxa
		Trichoptera Taxa				Trichoptera Taxa	
Composition	% Plecoptera	% Oligochaeta	% Oligochaeta	% Isopoda	% Tanypodinae / TC	% EPT	% Oligo
	% Trichoptera			% Tanytar-sini	% Gastropoda		
Tolerance / Intolerance	*Cricotop* & *Chironomo* / TC	% Hydropsych. / Trichoptera	HBI	% Tolerant Individuals	% Hydropsych. / Trichoptera	% Tolerant Individs	NCBI
			% Intolerant Individuals				
Functional Feeding Group	Scraper Taxa	% Predator	Filterer Taxa	% Scraper	Scraper Taxa	Shredder Taxa	Scraper Taxa
		% Filterer			% Shredder		
					% Collector		
Habit	Clinger Taxa		Clinger Taxa	Burrower Taxa		Clinger Taxa	Sprawler Taxa
							Burrower Taxa

Table 12. Summary of macroinvertebrate indices for subecoregions in Ecoregion 66 in Georgia

Metric Category	**Index 66d**	**Index 66g**	**Index 66j**
Richness	Diptera Taxa	EPT Taxa	Simpson's Diversity Index
			Margalef's Index
Composition	% Plecoptera	% Chironomidae	% Tanytarsini
	% Odonata	% Tanypodinae / TC	
Tolerance / Intolerance	% Dominant Individuals	NCBI	% Intolerant Individuals
		% Dominant Individuals	
Functional Feeding Group	% Shredder	Scraper Taxa	Predator Taxa
Habit	Clinger Taxa	% Clinger	Sprawler Taxa

Table 13. Summary of macroinvertebrate indices for subecoregions in Ecoregion 67 in Georgia

Metric Category	**Index 67f&i**	**Index 67g**	**Index 67h**
Richness	Plecoptera Taxa	Plecoptera Taxa	Plecoptera Taxa
	Ephemeroptera Taxa		
Composition	% EPT	% Orthocladiinae / Total Chironomidae	% Gastropoda
Tolerance / Intolerance	NCBI	% Hydropsychidae / Total Trichoptera	HBI
	Beck's Index		% Tolerant Individuals
Functional Feeding Group	Scraper Taxa	Shredder Taxa	Scraper Taxa
		Collector Taxa	
Habit	% Clinger	Sprawler Taxa	Swimmer Taxa

* The index for Ecoregion 68, the Southwestern Appalachians, is listed in Table 9. Subecoregions 68c and 68d were combined in that ecoregion and are treated together (and are hereafter referred to as ecoregion 68).

Table 14. Summary of macroinvertebrate indices for subecoregions in Ecoregion 75 in Georgia

Metric Category	Index 75e	Index 75f	Index 75h	Index 75j
Richness		Chironomidae Taxa		
Composition	% Oligochaeta	% Oligochaeta	% Oligochaeta	% Oligochaeta
	% Tanypodinae / TC	% Odonata	% Non-Insect	
	% Non-Insect	% Tanypodinae / Total Chironomidae		
Tolerance / Intolerance	Dominant Individuals	Tolerant Taxa	HBI	NCBI
				% Tolerant Individuals
				HBI
Functional Feeding Group	% Collector	% Filterer	Shredder Taxa	Predator Taxa
	% Filterer			Shredder Taxa
Habit			Sprawler Taxa	

Table 15. Performance of macroinvertebrate metrics by ecoregion

Metric	Average discrimination efficiency	# Indices (n=6)	% Indices
North Carolina Biotic Index	0.59	3	50.0
Hilsenhoff's Biotic Index	0.59	2	33.3
%Tanypodinae/Total Chironomidae	0.57	3	50.0
% Intolerant	0.55	2	33.3
% Tolerant	0.50	0	0.0
Intolerant Taxa	0.50	0	0.0
Beck's Biotic Index	0.49	0	0.0
% Odonata	0.47	2	33.3
Plecoptera Taxa	0.44	3	50.0
% Oligochaeta	0.43	2	33.3
% Clinger	0.43	2	33.3
EPT Taxa	0.42	3	50.0
Tolerant Taxa	0.41	0	0.0
% Plecoptera	0.41	2	33.3
% Hydropsychidae/Trichoptera	0.39	1	16.7
% EPT	0.39	1	16.7
Ephemeroptera Taxa	0.39	0	0.0
% Hydropsychidae/EPT	0.36	0	0.0
% Non-Insect	0.34	1	16.7
Scraper Taxa	0.33	1	16.7
% Scraper	0.33	0	0.0
Clinger Taxa	0.33	1	16.7
% Shredder	0.33	0	0.0
% Chironomidae	0.32	1	16.7
Predator Taxa	0.32	1	16.7
Shredder Taxa	0.32	0	0.0
% Ephemeroptera	0.31	0	0.0
% *Chironomus & Cricotopus*/TC	0.31	0	0.0
% Orthocladiinae/TC	0.30	0	0.0
# Dominant Individuals	0.30	0	0.0
% Predator	0.30	1	16.7
% Trichoptera	0.29	1	16.7
Coleoptera Taxa	0.29	0	0.0
Burrower Taxa	0.28	1	16.7

Metric	Average discrimination efficiency	# Indices (n=6)	% Indices
% Coleoptera	0.27	0	0.0
Total Taxa	0.27	0	0.0
Simpson's Diversity Index	0.26	1	16.7
% Filterer	0.26	0	0.0
% Dominant Individuals	0.26	0	0.0
Margalef's Index	0.26	1	16.7
Evenness	0.25	0	0.0
% Isopoda	0.24	1	16.7
Trichoptera Taxa	0.23	0	0.0
Shannon-Wiener Index	0.23	0	0.0
% Tanytarsini/Chironomidae	0.22	0	0.0
Sprawler Taxa	0.22	0	0.0
Diptera Taxa	0.22	0	0.0
Chironomidae Taxa	0.21	0	0.0
% Diptera	0.21	0	0.0
Collector Taxa	0.18	0	0.0
Filterer Taxa	0.14	0	0.0
% Baetidae/Ephemeroptera	0.13	0	0.0
% Collector	0.11	0	0.0
Swimmer Taxa	0.11	0	0.0
% Tanytarsini	0.10	0	0.0
% Gastropoda	0.10	0	0.0
Tanytarsini Taxa	0.10	0	0.0
% Amphipoda	0.05	0	0.0
Climber Taxa	0.04	0	0.0

Table 16. Performance of macroinvertebrate metrics by subecoregion

Metric	Average discrimination efficiency	# Indices (n=23)	% Indices
Hilsenhoff's Biotic Index	0.58	4	17.4
North Carolina Biotic Index	0.57	7	30.4
% Tolerant	0.54	5	21.7
% Intolerant	0.50	5	21.7
Intolerant Taxa	0.49	0	0.0
% Oligochaeta	0.47	8	34.8
Tolerant Taxa	0.45	1	4.3
Beck's Biotic Index	0.45	1	4.3
% Odonata	0.45	4	17.4
%Tanypodinae/Total Chironomidae	0.44	7	30.4
Shredder Taxa	0.42	5	21.7
Plecoptera Taxa	0.41	7	30.4
% Scraper	0.41	3	13.0
% Non-Insect	0.40	2	8.7
% Chironomidae	0.40	3	13.0
% Filterer	0.40	3	13.0
EPT Taxa	0.39	3	13.0
Ephemeroptera Taxa	0.39	2	8.7
% Plecoptera	0.38	3	13.0
% EPT	0.37	2	8.7
% Clinger	0.37	5	21.7
% Hydropsychidae/Trichoptera	0.37	4	17.4
% Diptera	0.37	0	0.0
% Shredder	0.36	3	13.0
Scraper Taxa	0.36	8	34.8
% Ephemeroptera	0.35	1	4.3
% Trichoptera	0.35	1	4.3
% Hydropsychidae/EPT	0.34	0	0.0
Clinger Taxa	0.34	4	17.4
% Coleoptera	0.34	0	0.0
Coleoptera Taxa	0.33	2	8.7
% Orthocladiinae/TC	0.32	1	4.3
Simpson's Diversity Index	0.32	1	4.3
% *Chironomus & Cricotopus*/TC	0.30	2	8.7
Evenness	0.30	0	0.0

Metric	Average discrimination efficiency	# Indices (n=23)	% Indices
Margalef's Index	0.30	1	4.3
Chironomidae Taxa	0.30	2	8.7
% Tanytarsini/Chironomidae	0.30	0	0.0
Predator Taxa	0.30	2	8.7
Sprawler Taxa	0.29	4	17.4
% Predator	0.29	1	4.3
Shannon-Wiener Index	0.29	0	0.0
% Dominant Individuals	0.29	2	8.7
# Dominant Individuals	0.29	2	8.7
Total Taxa	0.29	0	0.0
Diptera Taxa	0.28	2	8.7
Trichoptera Taxa	0.28	2	8.7
% Tanytarsini	0.26	2	8.7
Collector Taxa	0.25	1	4.3
Burrower Taxa	0.25	2	8.7
% Isopoda	0.25	1	4.3
Tanytarsini Taxa	0.21	1	4.3
Swimmer Taxa	0.21	3	13.0
% Gastropoda	0.20	2	8.7
% Collector	0.19	2	8.7
Filterer Taxa	0.17	1	4.3
% Amphipoda	0.15	0	0.0
% Baetidae/Ephemeroptera	0.13	0	0.0
Climber Taxa	0.09	0	0.0

Figure 11. Ecoregion 45 - Piedmont

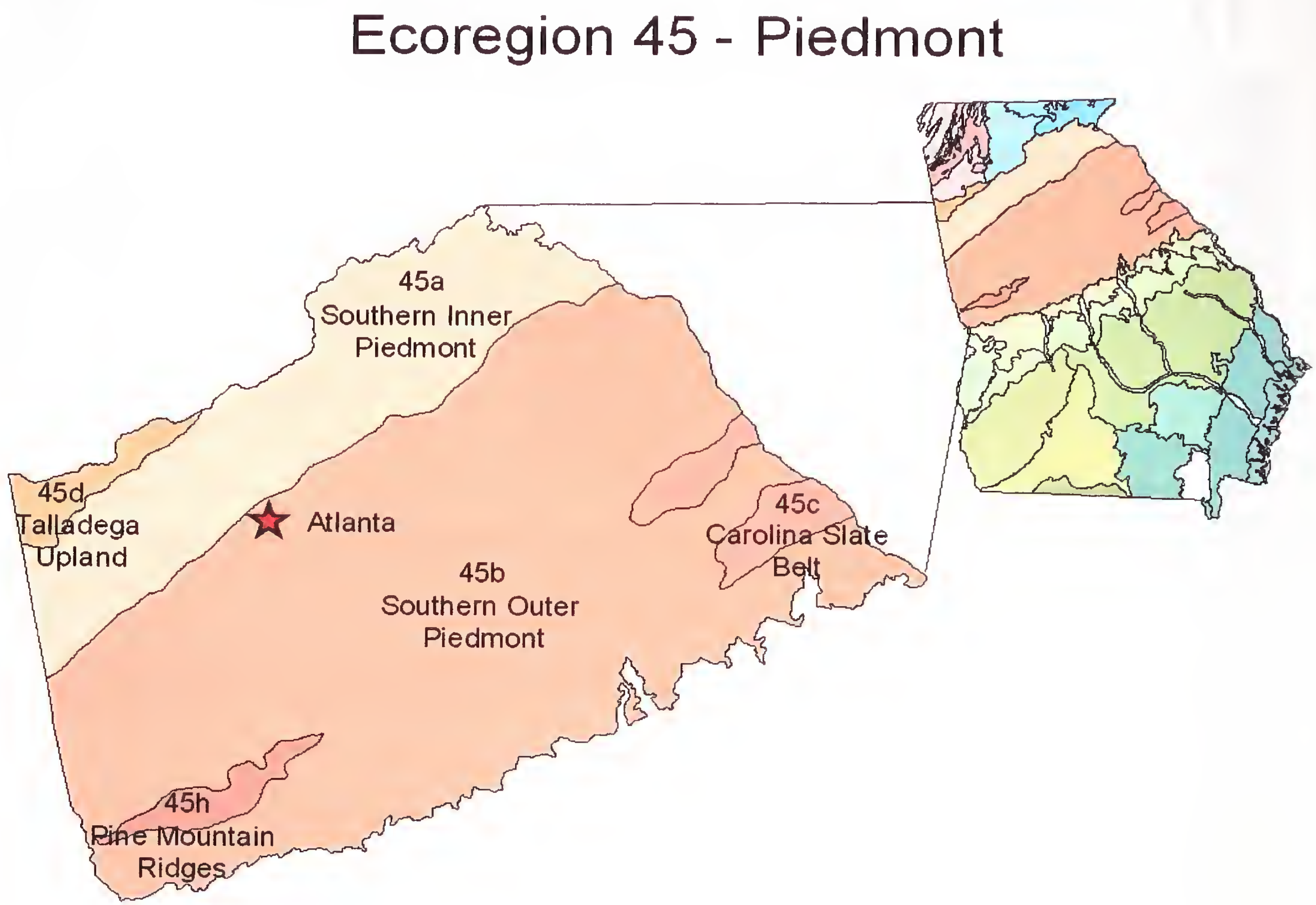


Table 17. Characteristic reference stream land use, habitat, and chemistry data for Ecoregion 45

	Parameter	Mean	Median	Range
Catchment Land use	% Natural	82.7	84.5	40.3-95.6
	% Agriculture	9.0	7.0	0-29.8
	% Silviculture	8.4	7.0	3.0-18.7
	% Urban	5.7	5.7	2.8-8.8
Habitat	Total Habitat Score (200)	155.6	160.0	128-184
	Epifaunal Substrate (20)	15.7	16.0	8-19
	Embeddedness or Pool Substrate Characterization (20)	14.4	15.0	5-18
	Velocity/Depth Regime or Pool Variability (20)	15.1	16.0	8-19
	Sediment Deposition (20)	13.5	14.0	6-19
	Channel Flow Status (20)	14.7	15.0	7-18
	Channel Alteration (20)	17.5	18.0	15-19
	Frequency of Riffles or Channel Sinuosity (20)	15.4	16.0	9-20
	Bank Stability (L) (10)	7.5	8.0	5-10
	Bank Stability (R) (10)	7.8	8.0	5-10
	Vegetative Protection (L) (10)	8.1	8.0	4-9
	Vegetative Protection (R) (10)	8.1	9.0	4-9
	Riparian Veg Width (L) (10)	9.0	9.0	7-10
	Riparian Veg Width (R) (10)	8.7	9.0	5-10
In Stream Habitat (Substrate)	% Silt/Clay	3.7	1.0	0-42.0
	% Sand	36.2	26.2	2.8-89.0
	% Gravel	34.9	35.0	2.0-78.0
	% Cobble	18.3	14.1	0-50.0
	% Boulder	4.2	2.0	0-33.0
	% Bedrock	2.7	0.0	0-20.6
Chemistry *(in situ)*	Specific Conductivity (mS/cm)	0.113	0.052	0.03-1.21
	Dissolved Oxygen (mg/l)	8.9	8.9	2.31-13.77
	pH (SU)	6.9	6.9	6.5-7.4
	Turbidity (NTU)	7.1	3.9	0-30.6
Chemistry (laboratory)	Alkalinity (mg/l as $CaCO_3$)	27.9	16.9	6.7-88.2
	Total Hardness (mg/l $CaCO_3$)	26.1	20.1	6.7-87.2
	Ammonia (mg/l as N)	0.10	0.05	BD-0.97
	Nitrate - Nitrite (mg/l as N)	0.03	0.02	BD-0.08
	Nitrite (mg/l as N)	0.07	0.04	BD-0.25
	Total Phosphorous (mg/l as P)	0.31	0.17	BD-1.17
	Copper (mg/l)	0.007	0.007	BD-0.009
	Iron (mg/l)	2.33	1.12	BD-9.79
	Manganese (mg/l)	0.39	0.35	BD-0.77
	Zinc (mg/l)	0.03	0.02	BD-0.07

BD = Below Detection

Table 18. Central tendency and range for selected metrics for Ecoregion 45				
Metric Category	**Metric**	**Mean**	**Median**	**Range**
Richness	Ephemeroptera, Plecoptera, Trichoptera Taxa (EPT Taxa)	11.6	11.0	2-20
Composition	% Chironomidae	31.8	33.2	3.0-59.6
	% EPT	39.2	34.6	0.8-74.1
	% Diptera	38.8	41.3	7.6-79.7
	% Odonata	1.7	1.4	0-7.4
	% Plecoptera	13.2	6.9	0.4-74.1
Tolerance / Intolerance	Hilsenhoff's Biotic Index (HBI)	5.1	5.1	2.1-7.4
	% Intolerant Individuals	25.1	23.3	3.4-78.0
	North Carolina Biotic Index (NCBI)	5.5	5.4	2.1-7.8

Index 45
EPT Taxa
% Chironomidae
% Plecoptera
% Odonata
% EPT
NCBI

Table 19. Index scores for sites sampled in Ecoregion 45					
Station ID	**Condition**	**Index 45**	**Station ID**	**Condition**	**Index 45**
45a-35	Impaired	59	45h-2	Impaired	37
45a-50	Impaired	33	45a03//	Reference	56
45a-59	Impaired	22	45a-3	Reference	85
45a-61	Impaired	29	45a-89	Reference	65
45a-90	Impaired	57	HH16	Reference	56
45b-120	Impaired	62	HH18	Reference	64
45b-193	Impaired	40	45b-152	Reference	73
45b-203	Impaired	41	45b-156	Reference	42
45b-217	Impaired	7	45b-258	Reference	62
45b-291	Impaired	20	45b-357	Reference	63
45b-44	Impaired	53	HH22	Reference	61
45c-10	Impaired	36	//4	Reference	37
45c-11	Impaired	33	45c-16	Reference	53

Station ID	Condition	Index 45	Station ID	Condition	Index 45
45c-17	Impaired	57	45c-19	Reference	72
45c-3	Impaired	46	45c-8	Reference	61
45c-7	Impaired	49	45d-15	Reference	88
45d-11	Impaired	62	45d-16	Reference	55
45d-14	Impaired	67	45d-4	Reference	55
45d-21	Impaired	63	45d-9	Reference	63
45d-23	Impaired	51	45h-13	Reference	77
45d-6	Impaired	46	45h-16	Reference	52
45h-1	Impaired	64	45h-17	Reference	60
45h-10	Impaired	36	45h-6	Reference	64
45h-11	Impaired	51	45h-9	Reference	67
45h-12	Impaired	50	45d-8	Ref/Removed	57
			45c-18	Ref/Removed	36

Figure 12. Box and whisker comparison for reference vs. impaired streams in Ecoregion 45

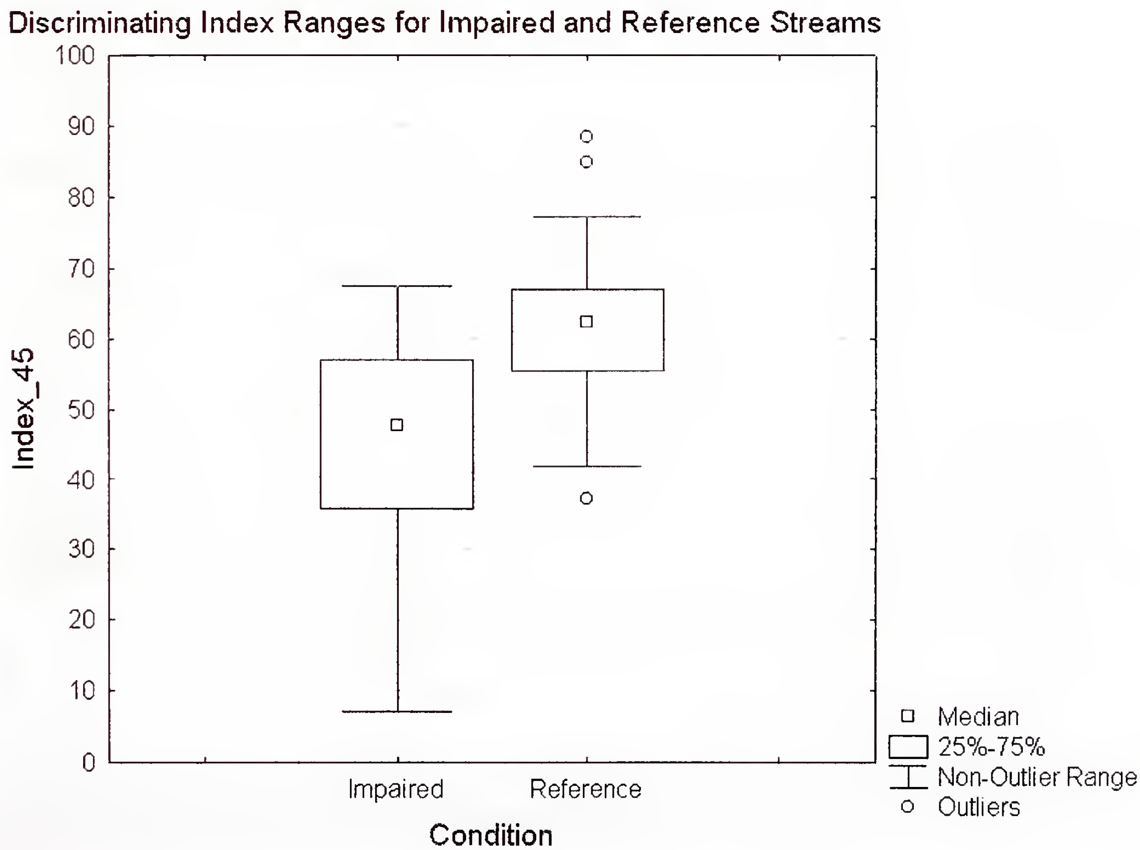


Table 20. Characteristic reference stream land use, habitat, and chemistry data for Subecoregion 45a

	Parameter	Mean	Median	Range
Catchment Land use	% Natural	84.4	86.3	78.6-89.9
	% Agriculture	0.80	0.10	0-2.4
	% Silviculture	8.7	7.0	6.5-11.7
	% Urban	6.2	6.7	3.1-8.8
Habitat	Total Habitat Score (200)	162	164	148-173
	Epifaunal Substrate (20)	16	16	15-17
	Embeddedness (20)	15.4	15	13-17
	Velocity/Depth Regime (20)	16.2	16	15-19
	Sediment Deposition (20)	15	14	14-18
	Channel Flow Status (20)	15.6	16	14-17
	Channel Alteration (20)	17	17	15-19
	Frequency of Riffles (20)	16	17	10-19
	Bank Stability (L) (10)	7.4	8	5-9
	Bank Stability (R) (10)	8.4	9	7-9
	Vegetative Protection (L) (10)	9	9	9
	Vegetative Protection (R) (10)	8.4	9	6-9
	Riparian Veg Width (L) (10)	9	9	9
	Riparian Veg Width (R) (10)	8.4	9	7-9
In Stream Habitat (Substrate)	% Silt/Clay	1.18	0.96	0-4
	% Sand	19.2	13	3-45
	% Gravel	43.4	38	5-79
	% Cobble	28.7	34	8-49
	% Boulder	4.4	3	0-12
	% Bedrock	3.1	1	0-11
Chemistry *(in situ)*	Specific Conductivity (mS/cm)	0.030	0.030	0.025-0.030
	Dissolved Oxygen (mg/l)	9.07	8.95	8.43-10.02
	pH (SU)	7.04	7.15	6.75-7.38
	Turbidity (NTU)	2.44	0.70	0-7.8
Chemistry (laboratory)	Alkalinity (mg/l as $CaCO_3$)	10.5	8.7	7.8-15.0
	Total Hardness (mg/l $CaCO_3$)	11.8	12.0	<0.1 –13.5
	Ammonia (mg/l as N)	0.047	0.043	BD-0.069
	Nitrate - Nitrite (mg/l as N)	0.044	0.044	BD-0.053
	Nitrite (mg/l as N)	0.01	0.01	BD-0.01
	Total Phosphorous (mg/l P)	BD	BD	BD
	Copper (mg/l)	BD	BD	BD
	Iron (mg/l)	BD	BD	BD
	Manganese (mg/l)	BD	BD	BD
	Zinc (mg/l)	BD	BD	BD

BD = Below Detection

Table 21. Central tendency and range for selected metrics in Subecoregion 45a

Metric Category	Metric	Mean	Median	Range
Richness	Ephemeroptera, Plecoptera, Trichoptera Taxa (EPT Taxa)	11.6	11.0	6-18
	Plecoptera Taxa	3.2	3.0	1-6
Composition	% Chironomidae	29.2	29.9	7-58
	% Diptera	31.2	33.0	8-59
	%Tanypodinae/ Total Chironomidae (TC)	13.2	7.8	8-35
	% *Chironomus* &*Cricotopus* / Total Chironomidae (TC)	0.0	0.0	0.0
Tolerance / Intolerance	% Tolerant Individuals	7.9	8.3	5.6-9.3
	Hilsenhoff's Biotic Index (HBI)	5.2	5.1	4.3-5.9
	North Carolina Biotic Index (NCBI)	5.5	5.6	4.9-6.3
	Tolerant Taxa	8	7	7-11
Functional Feeding Group	% Scraper	20.8	15.3	3.1-41.9
Habit	Clinger Taxa	15.4	15.0	9-20
	% Clinger	51.7	53.9	36-67

Index 45a

EPT Taxa
% Chironomidae
% *Chironomus* & *Cricotopus* / TC
NCBI
% Scraper
% Clinger

Table 22. Index scores for sites sampled in Subecoregion 45a

Station ID	Condition	Index 45a
45a-35	Impaired	60
45a-50	Impaired	19
45a-59	Impaired	17
45a-61	Impaired	18
45a-90	Impaired	63
45a03//	Reference	67

Station ID	Condition	Index 45a
45a-3	Reference	69
45a-89	Reference	82
HH16	Reference	78
HH18	Reference	73

Figure 13. Box and whisker comparison for reference vs. impaired streams in Subecoregion 45a

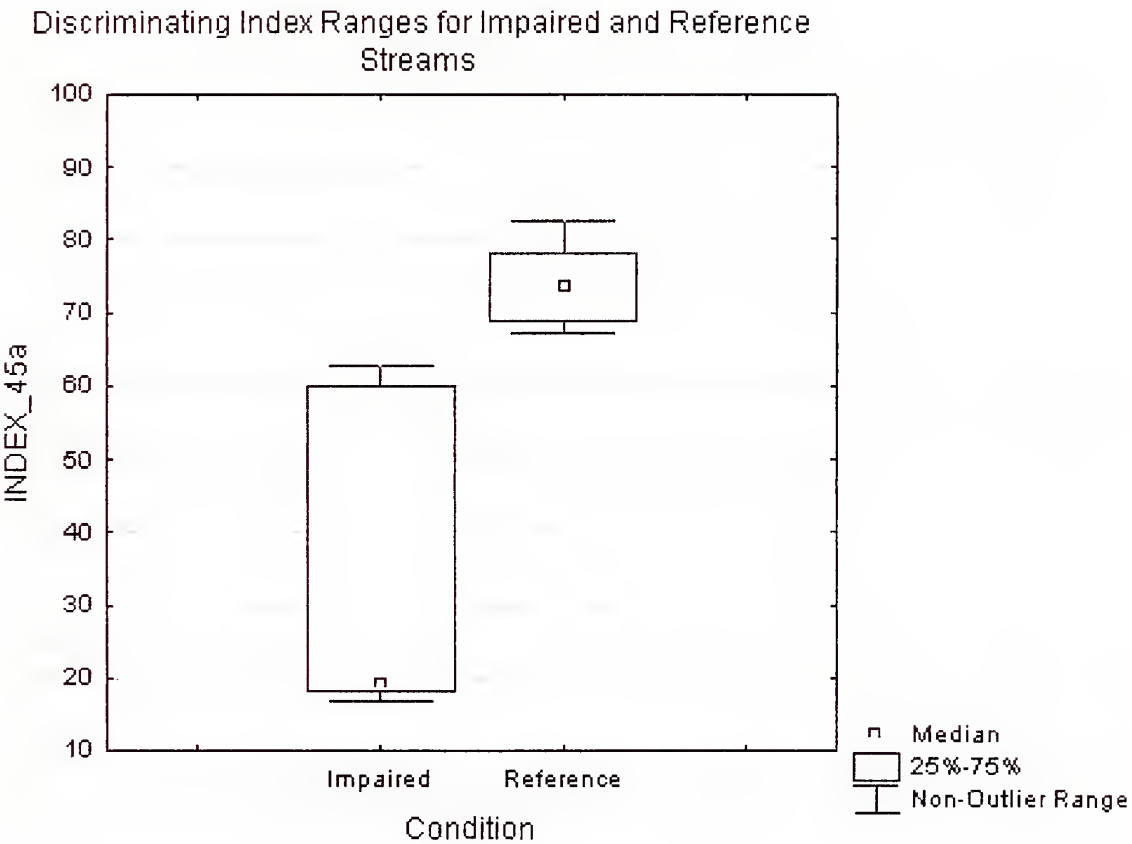


Table 23. Characteristic reference stream land use, habitat, and chemistry data for Subecoregion 45b

Catchment Land use	Parameter	Mean	Median	Range
Catchment Land use	% Natural	86.7	86.8	80.2-92.9
	% Agriculture	0.90	0.50	0.1-2.3
	% Silviculture	7.0	5.2	3.0-14.7
	% Urban	5.4	5.6	4.0-6.5
Habitat	Total Habitat Score (200)	148.8	153.0	128-161
	Epifaunal Substrate (20)	14.6	15.0	8-19
	Embeddedness or Pool Substrate Characterization (20)	12.0	13.0	5-16
	Velocity/Depth Regime or Pool Variability (20)	15.6	16.0	13-17
	Sediment Deposition (20)	11.2	13.0	6-15
	Channel Flow Status (20)	15.8	17.0	13-18
	Channel Alteration (20)	17.0	17.0	15-19
	Frequency of Riffles or Channel Sinuosity (20)	14.6	15.0	12-16
	Bank Stability (L) (10)	6.8	7.0	6-8
	Bank Stability (R) (10)	7.0	7.0	5-9
	Vegetative Protection (L) (10)	8.0	8.0	7-9
	Vegetative Protection (R) (10)	8.4	8.5	8-9
	Riparian Veg Width (L) (10)	9.2	10.0	7-10
	Riparian Veg Width (R) (10)	8.6	9.0	5-10
In Stream Habitat (Substrate)	% Silt/Clay	9.4	1.9	0-42.0
	% Sand	56.1	55.3	24.8-89.0
	% Gravel	23.9	29.1	2.0-43.7
	% Cobble	6.5	1.0	0-22.8
	% Boulder	1.2	1.0	0-2.9
	% Bedrock	4.0	3.0	0-9.9
Chemistry *(in situ)*	Specific Conductivity (mS/cm)	0.081	0.082	0.044-0.106
	Dissolved Oxygen (mg/l)	9.7	7.8	7.2-13.8
	pH (SU)	6.9	6.8	6.6-7.2
	Turbidity (NTU)	10.0	10.5	0-20.3
Chemistry (laboratory)	Alkalinity (mg/l as $CaCO_3$)	24.9	32.5	0-44.9
	Total Hardness (mg/l $CaCO_3$)	27.7	26.6	13.2-40.2
	Ammonia (mg/l as N)	0.36	0.07	BD-0.97
	Nitrate - Nitrite (mg/l as N)	0.08	0.09	0.01-0.16
	Nitrite (mg/l as N)	0.016	0.016	BD-0.016
	Total Phosphorous (mg/l P)	0.042	0.042	BD-0.042
	Copper (mg/l)	0.004	0.004	BD-0.004
	Iron (mg/l)	1.12	1.12	BD-1.12
	Manganese (mg/l)	0.11	0.11	BD-0.11
	Zinc (mg/l)	0.01	0.01	BD-0.01

BD = Below Detection

Table 24. Central tendency and range for selected metrics in Subecoregion 45b

Metric Category	Metric	Mean	Median	Range
Richness	Ephemeroptera, Plecoptera, Trichoptera Taxa (EPT Taxa)	14.4	14.0	9-20
	Trichoptera Taxa	5.5	5.0	3-9
	Coleoptera Taxa	6.8	5.0	3-9
Composition	% EPT	37.2	42.5	17-53
	% Chironomidae	29.2	27.1	22-36
	% Diptera	39.9	38.1	35-44
	% Plecoptera	9.3	10.8	1-17
	% Trichoptera	12.9	10.4	4-30
	% Oligochaeta	1.1	0.8	0-8
	% Coleoptera	9.6	8.8	7-15
Tolerance / Intolerance	Hilsenhoff's Biotic Index (HBI)	5.9	5.9	4.8-6.9
	% Intolerant Individuals	11.9	7.6	5.8-23.3
Functional Feeding Group	% Shredder	13.8	12.1	6-22
	Scraper Taxa	5.8	6.0	2-9
Habit	Clinger Taxa	12.8	15.0	5-18
	Swimmer Taxa	2.8	3.0	1-4

Index 45b

Coleoptera Taxa
% Oligochaeta
% Chironomidae
% Intolerant Individuals
Scraper Taxa
Swimmer Taxa

Table 25. Index scores for sites sampled in Subecoregion 45b

Station ID	Condition	Index 45b
45b-120	Impaired	59
45b-193	Impaired	30
45b-203	Impaired	29
45b-217	Impaired	26
45b-291	Impaired	25
45b-44	Impaired	58

Station ID	Condition	Index 45b
45b-152	Reference	93
45b-156	Reference	69
45b-258	Reference	78
45b-357	Reference	67
HH22	Reference	71

Figure 14. Box and whisker comparison for reference vs. impaired streams in Subecoregion 45b

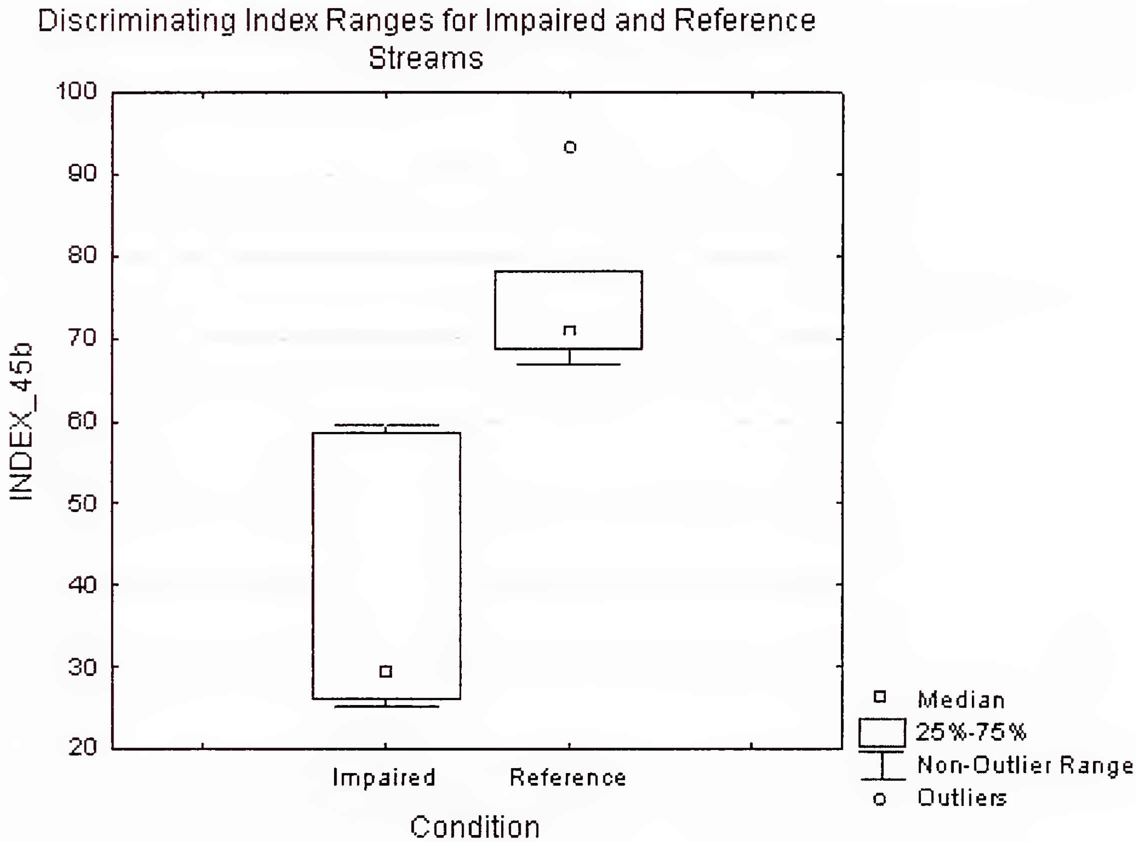


Table 26. Characteristic reference stream land use, habitat, and chemistry data for Subecoregion 45c

Catchment Land use	Parameter	Mean	Median	Range
	% Natural	84.2	84.4	78.5-89.4
	% Agriculture	0.70	0.80	0-1.1
	% Silviculture	10.5	10.2	6.8-14.9
	% Urban	4.7	4.7	3.3-5.9
Habitat	Total Habitat Score (200)	138.3	137.5	130-148
	Epifaunal Substrate (20)	15.3	15.5	14-16
	Pool Substrate Characterization or Embeddedness (20)	14.8	14.5	12-18
	Pool Variability or Velocity/Depth Regime (20)	11.5	10.0	8-18
	Sediment Deposition (20)	12.8	12.5	10-16
	Channel Flow Status (20)	12.3	13.5	7-15
	Channel Alteration (20)	17.8	18.5	15-19
	Channel Sinuosity or Frequency of Riffles (20)	13.3	14.0	9-16
	Bank Stability (L) (10)	6.3	6.0	5-8
	Bank Stability (R) (10)	6.3	6.0	5-8
	Vegetative Protection (L) (10)	6.0	6.0	4-8
	Vegetative Protection (R) (10)	6.0	6.0	4-8
	Riparian Vegetative Width (L) (10)	8.5	9.0	7-9
	Riparian Vegetative Width (R) (10)	7.8	8.0	5-10
In Stream Habitat (Substrate)	% Silt/Clay	4.6	3.7	0-10.1
	% Sand	46.5	50.5	13.0-75.9
	% Gravel	36.2	25.3	20.4-63.0
	% Cobble	11.1	14.1	0-19.0
	% Boulder	1.3	0	0-4.0
	% Bedrock	0.33	0	0-1.0
Chemistry *(in situ)*	Conductivity (mS/cm)	0.129	0.135	0.106-0.141
	Dissolved Oxygen (mg/l)	5.5	4.5	2.3-10.6
	pH (SU)	6.7	6.7	6.5-6.9
	Turbidity (NTU)	17.6	19.8	0-30.6
Chemistry (laboratory)	Alkalinity (mg/l as $CaCO_3$)	50.8	49.8	41.5-61.8
	Hardness (mg/l as $CaCO_3$)	33.3	38.1	6.7-18.8
	Ammonia (mg/l as N)	0.038	0.033	BD - 0.050
	Nitrate - Nitrite (mg/l as N)	0.253	0.253	BD - 0.253
	Nitrite (mg/l as N)	0.052	0.066	BD-0.08
	Total Phosphorous (mg/l as P)	0.147	0.147	0.04-0.255
	Copper (mg/l)	0.009	0.009	BD - 0.009
	Iron (mg/l)	3.3	1.5	0.54-9.8
	Manganese (mg/l)	0.682	0.682	BD - 0.77
	Zinc (mg/l)	0.07	0.07	BD - 0.07

BD = Below Detection

Table 27. Central tendency and range for selected metrics in Subecoregion 45c				
Metric Category	**Metric**	**Mean**	**Median**	**Range**
Richness	Tanytarsini Taxa	3.8	4.0	0-7
	Evenness	0.56	0.58	0.47-0.61
Composition	% Plecoptera	14.9	15.4	0.4-28.4
	% Odonata	1.0	1.0	0.4-1.7
	% Tanypodinae / Total Chironomidae (TC)	7.1	6.7	3.8-11.5
Tolerance / Intolerance	Hilsenhoff's Biotic Index (HBI)	5.7	5.4	4.5-7.4
	Dominant Individuals	46.5	46.0	35-59
	% Intolerant Individuals	24.8	31.2	3.4-33.5
Functional Feeding Group	% Shredder	15.9	16.3	1.3-29.5
Habit	Swimmer Taxa	3.3	3.5	2-4

Index 45c
Tanytarsini Taxa
% Odonata
% Tanypodinae / (TC)
Dominant Individuals
% Intolerant Individuals
%Shredder
Swimmer Taxa

Table 28. Index scores for sites sampled in Subecoregion 45c		
Station ID	**Condition**	**Index 45c**
45c-10	Impaired	23
45c-11	Impaired	48
45c-17	Impaired	26
45c-3	Impaired	50
45c-7	Impaired	77
//4	Reference	49
45c-16	Reference	90
45c-19	Reference	79
45c-8	Reference	85
45c-18	Ref/Removed	55

Figure 15. Box and whisker comparison for reference vs. impaired streams in Subecoregion 45c

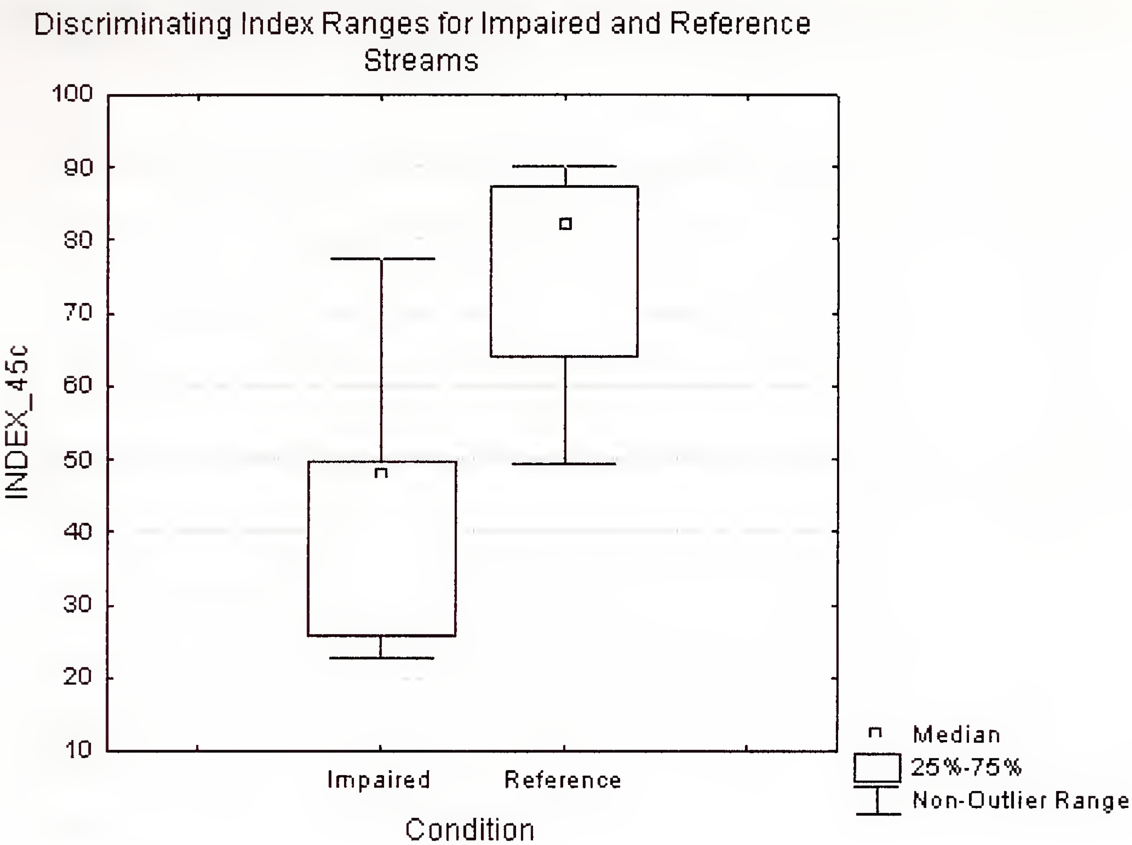


Table 29. Characteristic reference stream land use, habitat, and chemistry data for Subecoregion 45d

	Parameter	Mean	Median	Range
Catchment Land use	% Natural	90.6	91.6	80.3-100
	% Agriculture	0.10	0	0-0.20
	% Silviculture	5.5	5.5	0-11
	% Urban	3.8	2.8	0-8.7
Habitat	Total Habitat Score (200)	169.5	166.5	160-184
	Epifaunal Substrate (20)	17.3	17.0	16-19
	Embeddedness (20)	16.8	17.5	14-18
	Velocity/Depth Regime (20)	16.8	17.0	15-18
	Sediment Deposition (20)	15.7	15.0	13-19
	Channel Flow Status (20)	15.0	15.0	12-18
	Channel Alteration (20)	17.8	18.0	17-18
	Frequency of Riffles (20)	16.8	17.5	12-20
	Bank Stability (L) (10)	8.8	9.0	8-9
	Bank Stability (R) (10)	8.8	8.5	8-10
	Vegetative Protection (L) (10)	8.8	9.0	8-9
	Vegetative Protection (R) (10)	8.8	9.0	8-9
	Riparian Vegetative Width (L) (10)	8.5	9.0	7-9
	Riparian Vegetative Width (R) (10)	9.3	9.0	9-10
In Stream Habitat **(Substrate)**	% Silt/Clay	1.0	0.0	0-4.0
	% Sand	7.3	6.0	5.0-12.0
	% Gravel	43.8	38.0	31.3-68.0
	% Cobble	31.6	30.6	18.0-47.0
	% Boulder	14.3	9.5	5.0-33.3
	% Bedrock	2.0	1.5	0-5.0
Chemistry *(in situ)*	Conductivity (mS/cm)	0.0627	0.0646	0.037-0.088
	Dissolved Oxygen (mg/l)	9.5	9.0	6.9-13.2
	pH (SU)	7.1	7.0	6.8-7.4
	Turbidity (NTU)	2.0	1.6	0-4.9
Chemistry (laboratory)	Alkalinity (mg/l as $CaCO_3$)	20.7	19.0	9.2-35.6
	Hardness (mg/l as $CaCO_3$)	26.7	24.9	15.3-41.8
	Ammonia (mg/l as N)	0.064	0.060	BD-0.095
	Nitrate - Nitrite (mg/l as N)	0.072	0.030	BD-0.072
	Nitrite (mg/l as N)	0.024	0.024	BD-0.036
	Total Phosphorous (mg/l as P)	0.192	0.192	BD-0.192
	Copper (mg/l)	BD	BD	BD
	Iron (mg/l)	1.77	1.77	BD-1.77
	Manganese (mg/l)	0.092	0.092	BD-0.092
	Zinc (mg/l)	0.017	0.017	BD – 0.017

BD = Below Detection

Table 30. Central tendency and range for selected metrics in Subecoregion 45d				
Metric Category	**Metric**	**Mean**	**Median**	**Range**
Richness	Coleoptera Taxa	6.8	8.0	2-9
Composition	% Gastropoda	6.2	3.0	0-18.8
	% Odonata	1.5	1.5	0-2.9
	% Tanypodinae / Total Chironomidae (TC)	5.1	2.3	1.5-14.3
Tolerance / Intolerance	North Carolina Biotic Index (NCBI)	3.6	3.9	2.1-4.6
	% Tolerant Individuals	7.7	8.0	6.2-8.6
Functional Feeding Group	Shredder Taxa	6.8	6.0	6-9
	% Filterer	21.5	12.2	1.7-59.9

Index 45d

Coleoptera Taxa
% Tanypodinae / TC
% Odonata
NCBI
% Tolerant Individuals
Shredder Taxa

Table 31. Index scores for sites sampled in Subecoregion 45d		
Station ID	**Condition**	**Index 45d**
45d-11	Impaired	40
45d-14	Impaired	47
45d-21	Impaired	50
45d-23	Impaired	35
45d-6	Impaired	44
45d-15	Reference	81
45d-16	Reference	81
45d-4	Reference	70
45d-9	Reference	82
45d-8	Ref/Removed	45

Figure 16. Box and whisker comparison for reference vs. impaired streams in Subecoregion 45d

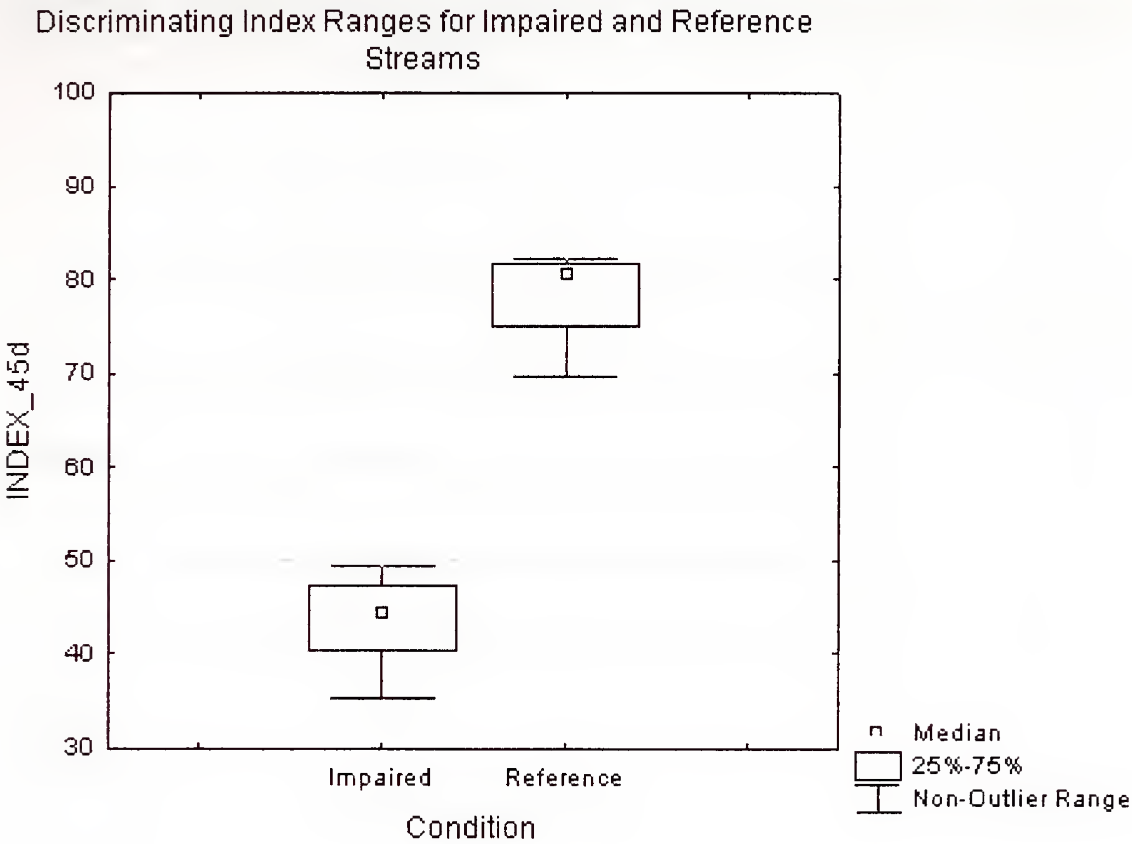


Table 32. Characteristic reference stream land use, habitat, and chemistry data for Subecoregion 45h

Catchment Land use	Parameter	Mean	Median	Range
Catchment Land use	% Natural	85.5	89.3	74.1-89.4
	% Agriculture	0.80	0.40	0-2.4
	% Silviculture	7.7	4.4	3.1-18.7
	% Urban	6.0	6.0	4.8-7.2
Habitat	Total Habitat Score (200)	159.0	165.0	138-166
	Epifaunal Substrate (20)	15.8	17.0	13-17
	Embeddedness (20)	13.6	13.0	10-17
	Velocity/Depth Regime (20)	15.0	15.0	14-16
	Sediment Deposition (20)	12.8	14.0	6-17
	Channel Flow Status (20)	14.6	16.0	9-17
	Channel Alteration (20)	18.2	18.0	17-19
	Frequency of Riffles (20)	16.2	17.0	13-18
	Bank Stability (L) (10)	8.2	8.0	7-10
	Bank Stability (R) (10)	8.4	8.0	8-9
	Vegetative Protection (L) (10)	8.4	8.0	8-9
	Vegetative Protection (R) (10)	8.6	9.0	8-9
	Riparian Vegetative Width (L) (10)	9.6	10.0	9-10
	Riparian Vegetative Width (R) (10)	9.6	10.0	9-10
In Stream Habitat (Substrate)	% Silt/Clay	1.6	1.9	0-4.0
	% Sand	43.1	50.0	15.0-67.6
	% Gravel	32.2	31.0	7.8-65.0
	% Cobble	17.2	5.8	2.0-50.0
	% Boulder	1.6	2.0	0-3.0
	% Bedrock	4.3	0	0-20.6
Chemistry *(in situ)*	Conductivity (mS/cm)	0.035	0.033	0.027-0.044
	Dissolved Oxygen (mg/l)	10.5	10.0	8.9-13.3
	pH (SU)	6.9	7.0	6.5-7.2
	Turbidity (NTU)	5.0	4.1	0-12.0
Chemistry (laboratory)	Alkalinity (mg/l as $CaCO_3$)	12.0	11.2	6.9-16.9
	Hardness (mg/l as $CaCO_3$)	12.7	11.8	10.5-16.9
	Ammonia (mg/l as N)	0.05	0.06	BD -0.06
	Nitrate - Nitrite (mg/l as N)	0.05	0.03	0.02-0.12
	Nitrite (mg/l as N)	BD	BD	BD
	Total Phosphorous (mg/l as P)	BD	BD	BD
	Copper (mg/l)	BD	BD	BD
	Iron (mg/l)	0.13	0.13	BD –0.13
	Manganese (mg/l)	BD	BD	BD
	Zinc (mg/l)	BD	BD	BD

BD = Below Detection

Table 33. Central tendency and range for selected metrics in Subecoregion 45h				
Metric Category	**Metric**	**Mean**	**Median**	**Range**
Richness	Plecoptera Taxa	4.6	4.0	2-7
Composition	% Ephemeroptera, Plecoptera, & Trichoptera (EPT)	46.4	41.7	30.9-69.5
	% Ephemeroptera	12.5	12.1	9.0-17.0
	% Plecoptera	8.3	5.8	2.5-14.0
	% Tanypodinae / Total Chironomidae (TC)	14.0	11.7	5.6-33.0
Tolerance / Intolerance	% Intolerant Individuals	25.4	20.8	16.9-44.1
	Hilsenhoff's Biotic Index (HBI)	4.9	5.1	4.2-5.3
	North Carolina Biotic Index (NCBI)	5.0	5.2	4.0-5.9
Functional Feeding Group	% Scraper	9.8	8.8	4.2-16.3
Habit	% Clinger	45.9	50.0	28.7-61.0

Index 45h

Plecoptera Taxa
% Ephemeroptera
% Plecoptera
% Intolerant Individuals
% Scraper
% Clinger

Table 34. Index scores for sites sampled in Subecoregion 45h		
Station ID	**Condition**	**Index 45h**
45h-1	Impaired	65
45h-10	Impaired	21
45h-11	Impaired	38
45h-12	Impaired	50
45h-2	Impaired	20
45h-13	Reference	79
45h-16	Reference	67
45h-17	Reference	62
45h-6	Reference	54
45h-9	Reference	73

Figure 17. Box and whisker comparison for reference vs. impaired streams in Subecoregion 45h

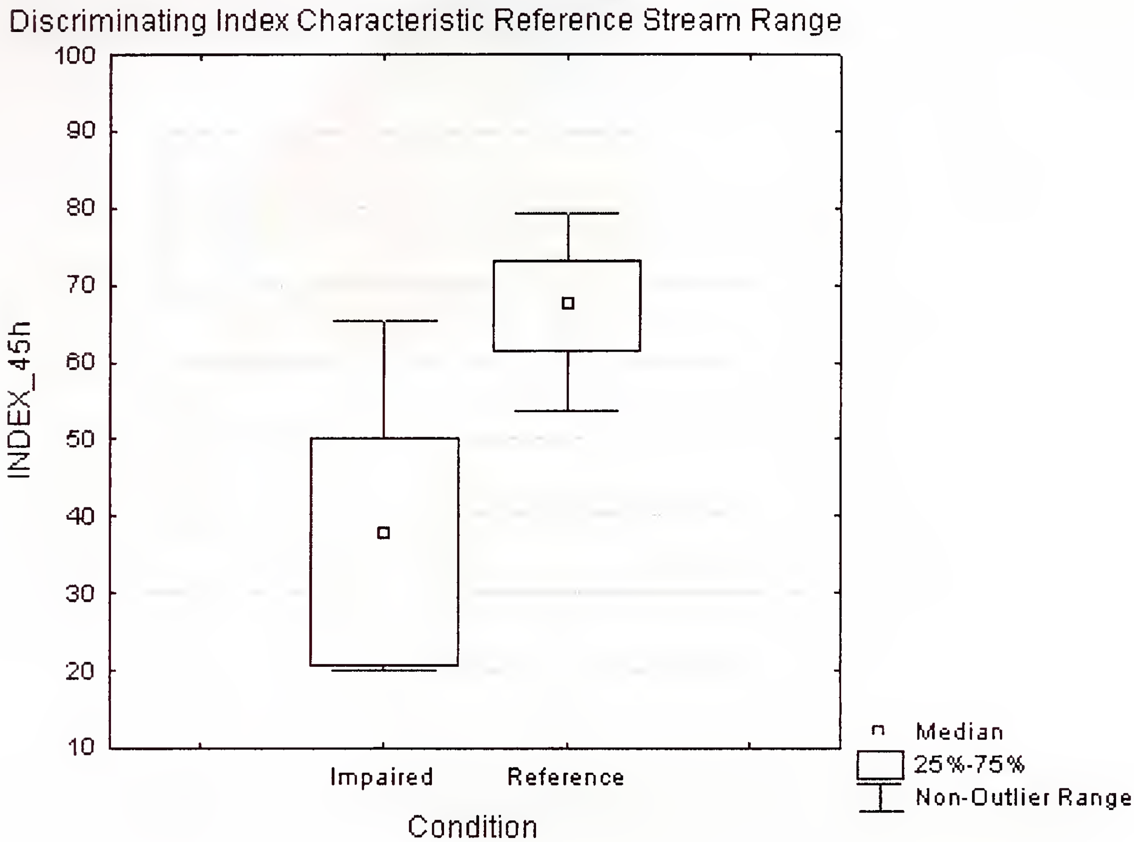


Figure 18. Ecoregion 65 – Southeastern Plains

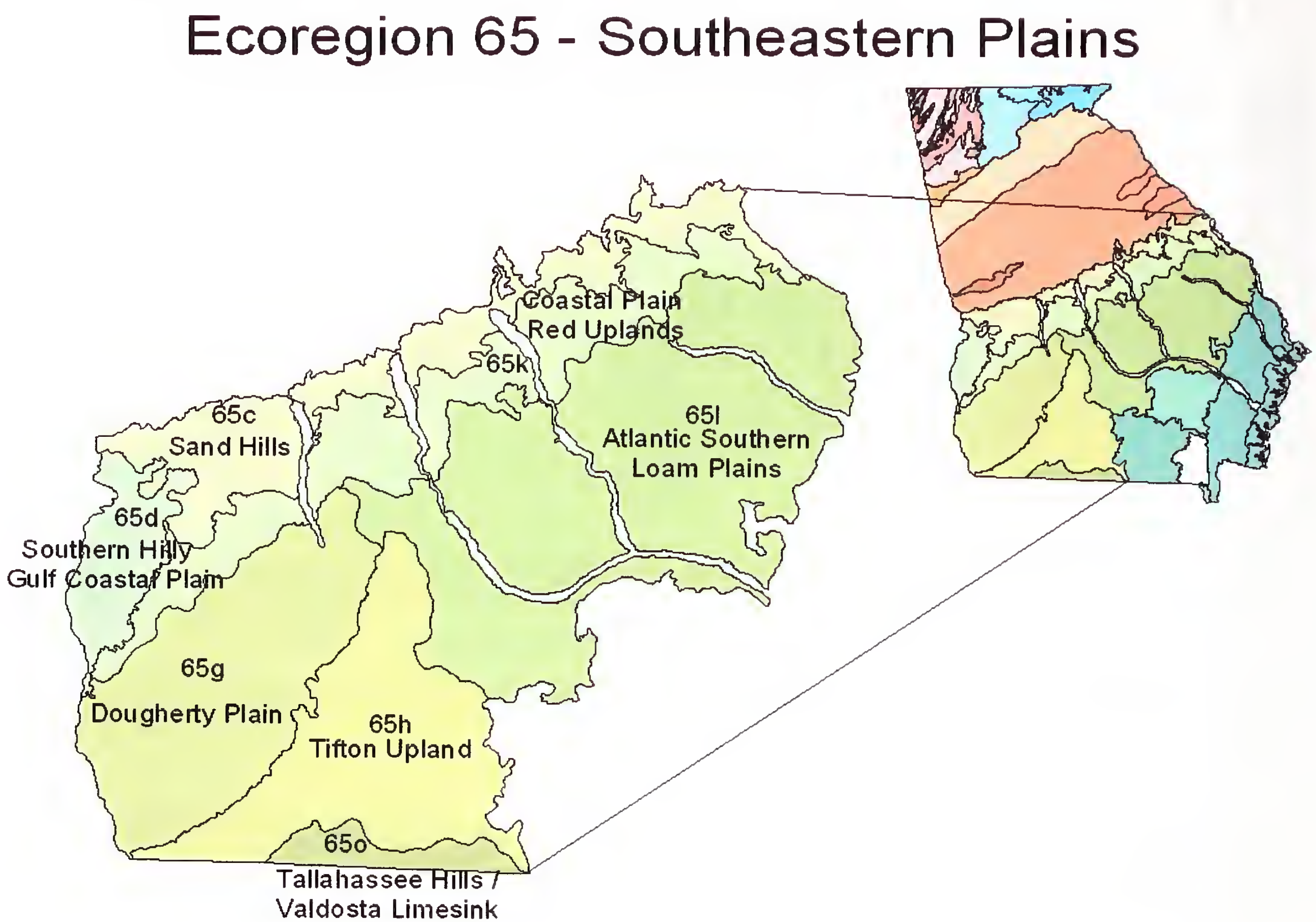


Table 35. Characteristic reference stream land use, habitat, and chemistry data for Ecoregion 65

	Parameter	Mean	Median	Range
Catchment Land use	% Natural	71.3	73.9	43.3-94.8
	% Agriculture	22.5	21.2	0.7-51.2
	% Silviculture	7.8	6.4	0.2-24.8
	% Urban	5.7	5.5	0.7-11.8
Habitat	Total Habitat Score (200)	158.2	161.5	121-179
	Epifaunal Substrate (20)	15.6	16.0	11-18
	Pool Substrate Characterization (20)	14.3	15.0	7-18
	Pool Variability (20)	14.7	16.0	7-19
	Sediment Deposition (20)	15.3	16.0	6-18
	Channel Flow Status (20)	16.5	17.0	10-19
	Channel Alteration (20)	17.2	17.0	15-20
	Channel Sinuosity (20)	14.0	14.5	5-20
	Bank Stability (L) (10)	8.3	9.0	4-10
	Bank Stability (R) (10)	8.3	9.0	4-10
	Vegetative Protection (L) (10)	8.9	9.0	7-10
	Vegetative Protection (R) (10)	9.1	9.0	6-10
	Riparian Vegetative Width (L) (10)	8.0	8.0	4-10
	Riparian Vegetative Width (R) (10)	8.0	8.0	4-10
In Stream Habitat (Substrate)	% Silt/Clay	17.5	7.0	0.0-100.0
	% Sand	79.7	90.5	0.0-100.0
	% Gravel	2.7	0.0	0.0-30.5
	% Cobble	0.6	0.0	0.0-16.7
	% Boulder	0.1	0.0	0.0-1.9
	% Bedrock	0.1	0.0	0.0-2.0
Chemistry *(in situ)*	Specific Conductivity (mS/cm)	0.097	0.060	0.036-0.089
	Dissolved Oxygen (mg/l)	9.3	6.3	5.5-16.5
	pH (SU)	6.1	6.3	4.1-7.5
	Turbidity (NTU)	9.3	6.3	0.0-39.6
Chemistry (laboratory)	Alkalinity (mg/l as $CaCO_3$)	23.2	8.6	0.0-176.0
	Total Hardness (mg/l as $CaCO_3$)	37.0	21.2	0.0-196.9
	Ammonia (mg/l as N)	0.056	0.054	BD-0.089
	Nitrate - Nitrite (mg/l as N)	0.160	0.076	BD-0.806
	Nitrite (mg/l as N)	0.021	0.015	BD-0.061
	Total Phosphorous (mg/l as P)	0.085	0.054	BD-0.209
	Copper (mg/l)	0.003	0.003	BD-0.003
	Iron (mg/l)	1.98	0.82	BD-12.99
	Manganese (mg/l)	0.092	0.092	BD-0.141
	Zinc (mg/l)	0.036	0.034	BD-0.052

BD = Below Detection

Table 36. Central tendency and range for selected metrics in Ecoregion 65				
Metric Category	**Metric**	**Mean**	**Median**	**Range**
Richness	Ephemeroptera, Plecoptera, Trichoptera Taxa (EPT Taxa)	6.6	6.5	0-16
	Margalef's Index	7.6	7.8	2.1-12.0
	Total Taxa	41.8	42.0	12-67
Composition	% Oligochaeta	2.3	1.4	0-11.7
	% Tanypodinae / Total Chironomidae (TC)	17.1	15.2	0-61.0
Tolerance / Intolerance	% Intolerant Individuals	11.1	6.4	0-46.7
	Beck's Index	8.9	8.0	2-21
Functional Feeding Group	% Predator	15.1	11.8	1.5-48.8
Habit	% Clinger	19.3	18.8	0-63.3

Index 65
EPT Taxa
Margalef's Index
% Oligochaeta
% Tanypodinae / TC
% Intolerant Individuals
% Predator
% Clinger

Table 37. Index scores for sites sampled in Ecoregion 65		
Station ID	**Condition**	**Index 65**
65c-12	Impaired	75
65c-3	Impaired	54
65c-4	Impaired	42
65c-40	Impaired	71
65c-5	Impaired	51
65c-8	Impaired	66
65c-88	Impaired	57
65d-1	Impaired	30
65d-20	Impaired	60
65d-21	Impaired	58
65d-32	Impaired	56
65d-39	Impaired	74

Station ID	Condition	Index 65
65g-10	Impaired	36
65g-130	Impaired	38
65g-135	Impaired	33
65g-137	Impaired	32
65g-14	Impaired	37
65g-17	Impaired	48
65g-4	Impaired	34
65g-69	Impaired	39
65g-8	Impaired	29
65g-84	Impaired	27
65h-17	Impaired	43
65h-174	Impaired	59
65h-32	Impaired	31
65h-34	Impaired	32
65h-41	Impaired	51
65k-102	Impaired	56
65k-113	Impaired	42
65k-128	Impaired	43
65k-129	Impaired	46
65k-37	Impaired	46
65l-160	Impaired	42
65L-184	Impaired	43
65l-391	Impaired	38
65l-420	Impaired	45
65l-423	Impaired	35
65o-11	Impaired	43
65o-18	Impaired	49
65o-22	Impaired	44
65o-3	Impaired	61
65o-9	Impaired	11
65c-80	Reference	62
65c-89	Reference	58
HH24	Reference	68
HH25	Reference	74
HH26	Reference	56
65d-14	Reference	77
65d-18	Reference	64
65d-3	Reference	51
65d-38	Reference	64

Station ID	Condition	Index 65
65d-4	Reference	62
65g-120	Reference	51
65g-62	Reference	56
HH29	Reference	70
65h-202	Reference	57
65h-203	Reference	55
65h-206	Reference	46
65h-209	Reference	45
65h-212	Reference	69
65k-54	Reference	48
65k-55	Reference	63
65k-56	Reference	45
65k-68	Reference	39
65k-85	Reference	29
65l-10	Reference	54
65l-342	Reference	44
65l-343	Reference	46
65l-379	Reference	33
65l-381	Reference	55
65o-12	Reference	50
65o-23	Reference	60
65o-24	Reference	60
65o-25	Reference	47
65g-82	Ref/Removed	29
65g-83	Ref/Removed	59

Figure 19. Box and whisker comparison for reference vs. impaired streams in Ecoregion 65

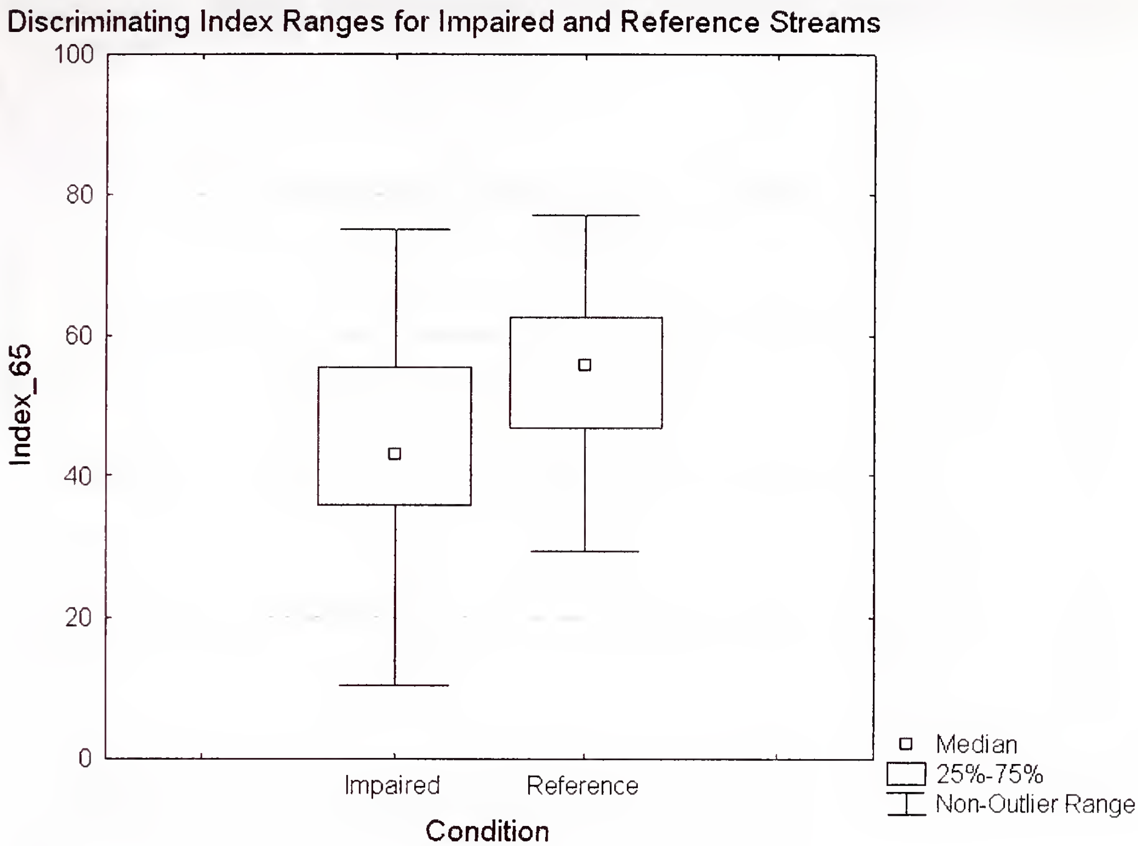


Table 38. Characteristic reference stream land use, habitat, and chemistry data for Subecoregion 65c

Catchment Land use	Parameter	Mean	Median	Range
	% Natural	72.5	72.2	65.4-77.5
	% Agriculture	7.1	8.4	0-13.1
	% Silviculture	15.3	15.3	9.0-21.1
	% Urban	5.1	5.2	3.0-7.3
Habitat	Total Habitat Score (200)	164.4	164.0	159-170
	Epifaunal Substrate (20)	15.6	16.0	13-18
	Pool Substrate Characterization (20)	13.8	15.0	9-16
	Pool Variability (20)	14.8	16.0	10-16
	Sediment Deposition (20)	17.0	17.0	16-18
	Channel Flow Status (20)	19.0	19.0	19
	Channel Alteration (20)	18.4	19.0	17-19
	Channel Sinuosity (20)	11.8	13.0	9-15
	Bank Stability (L) (10)	8.8	9.0	8-9
	Bank Stability (R) (10)	9.2	9.0	8-10
	Vegetative Protection (L) (10)	8.4	8.0	8-9
	Vegetative Protection (R) (10)	8.4	8.0	8-9
	Riparian Vegetative Width (L) (10)	9.4	10.0	8-10
	Riparian Vegetative Width (R) (10)	9.8	10.0	9-10
In Stream Habitat (Substrate)	% Silt/Clay	37.0	12.0	0-22.8
	% Sand	87.0	95.7	63.0-100.0
	% Gravel	1.1	0	0-4.3
	% Cobble	0	0	0
	% Boulder	0	0	0
	% Bedrock	0	0	0
Chemistry *(in situ)*	Specific Conductivity (mS/cm)	0.020	0.015	0.003-0.049
	Dissolved Oxygen (mg/l)	11.3	11.7	10.3-12.5
	pH (SU)	5.1	5.1	4.3-6.2
	Turbidity (NTU)	2.3	1.1	0-6.9
Chemistry (laboratory)	Alkalinity (mg/l as $CaCO_3$)	1.8	0	0-8.2
	Total Hardness (mg/l as $CaCO_3$)	9.8	10.3	5.5-18.0
	Ammonia (mg/l as N)	0.054	0.052	BD - 0.07
	Nitrate - Nitrite (mg/l as N)	0.18	0.11	0.07-0.47
	Nitrite (mg/l as N)	BD	BD	BD
	Total Phosphorous (mg/l as P)	BD	BD	BD
	Copper (mg/l)	BD	BD	BD
	Iron (mg/l)	0.54	0.54	BD - 0.92
	Manganese (mg/l)	BD	BD	BD
	Zinc (mg/l)	BD	BD	BD

BD = Below Detection

Table 39. Central tendency and range for selected metrics in Subecoregion 65c

Metric Category	Metric	Mean	Median	Range
Richness	Trichoptera Taxa	6.0	7.0	3-8
	Plecoptera Taxa	2.2	2.0	1-4
Composition	% Trichoptera	11.7	8.8	4-26
Tolerance / Intolerance	% *Cricotopus* & *Chironomus* / Total Chironomidae (TC)	0	0	0
	Beck's Biotic Index	14.6	14	8-21
Functional Feeding Group	% Scraper	15.5	11.3	3.6-28.0
	% Predator	25.2	19.6	10-39
Habit	Clinger Taxa	13.0	12	10-17

Index 65c

Plecoptera Taxa
% Plecoptera
% Trichoptera
Cricotopus & *Chironomus* / Total Chironomidae
Scraper Taxa
Clinger Taxa

Table 40. Index scores for sites sampled in Subecoregion 65c

Station ID	Condition	Index 65c
65c-12	Impaired	52
65c-3	Impaired	50
65c-4	Impaired	16
65c-40	Impaired	65
65c-5	Impaired	32
65c-8	Impaired	30
65c-88	Impaired	28
65c-80	Reference	53
65c-89	Reference	58
HH24	Reference	62
HH25	Reference	93
HH26	Reference	43

Figure 20. Box and whisker comparison for reference vs. impaired streams in Subecoregion 65c

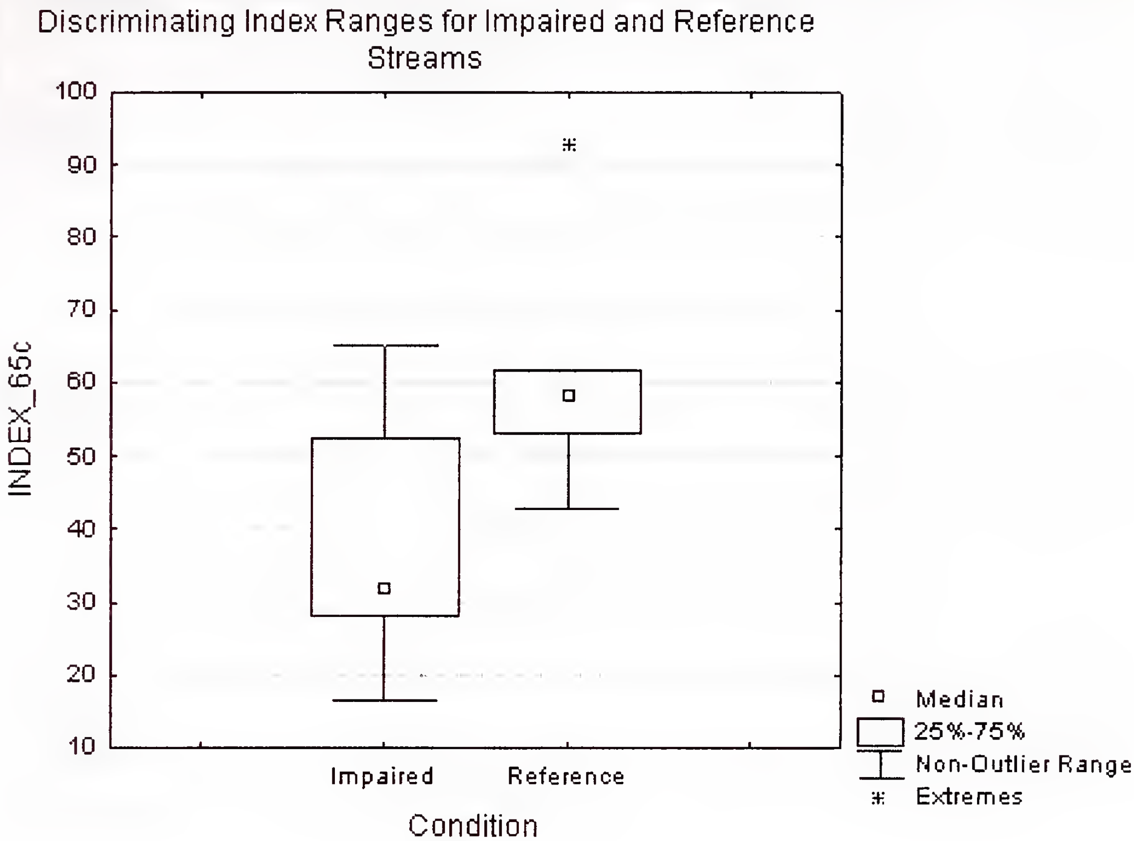


Table 41. Characteristic reference stream land use, habitat, and chemistry data for Subecoregion 65d

Catchment Land use	**Parameter**	**Mean**	**Median**	**Range**
	% Natural	78.6	78.5	77.6-79.3
	% Agriculture	1.9	0.40	0-5.7
	% Silviculture	14.8	15.1	9.9-18.1
	% Urban	4.7	5.2	3.4-5.4
Habitat	Total Habitat Score (200)	149.4	143	121-174
	Epifaunal Substrate (20)	14.8	15.0	11-17
	Pool Substrate Characterization (20)	14.2	14.0	10-18
	Pool Variability (20)	15.4	16.0	9-19
	Sediment Deposition (20)	11.4	11.0	6-17
	Channel Flow Status (20)	16.0	18.0	10-19
	Channel Alteration (20)	17.0	18.0	15-18
	Channel Sinuosity (20)	14.4	14.0	11-17
	Bank Stability (L) (10)	7.0	8.0	4-9
	Bank Stability (R) (10)	6.8	7.0	4-9
	Vegetative Protection (L) (10)	7.6	7.0	6-9
	Vegetative Protection (R) (10)	7.4	7.0	6-9
	Riparian Vegetative Width (L) (10)	9.0	9.0	7-10
	Riparian Vegetative Width (R) (10)	8.4	9.0	6-10
In Stream Habitat (Substrate)	% Silt/Clay	9.7	6.7	4.0-24.0
	% Sand	89.1	91.0	76.0-96.0
	% Gravel	1.2	0	0-5.0
	% Cobble	0	0	0
	% Boulder	0	0	0
	% Bedrock	0	0	0
Chemistry *(in situ)*	Specific Conductivity (mS/cm)	0.048	0.047	0.042-0.058
	Dissolved Oxygen (mg/l)	11.6	11.1	9.3-16.5
	pH (SU)	5.6	6.4	4.1-6.8
	Turbidity (NTU)	11.6	8.8	0-39.6
Chemistry (laboratory)	Alkalinity (mg/l as $CaCO_3$)	7.1	8.6	0-13.4
	Total Hardness (mg/l as $CaCO_3$)	15.4	18.1	6.1-23.0
	Ammonia (mg/l as N)	0.058	0.058	BD - 0.064
	Nitrate - Nitrite (mg/l as N)	0.10	0.08	BD - 0.19
	Nitrite (mg/l as N)	0.013	0.013	BD-0.014
	Total Phosphorous (mg/l as P)	BD	BD	BD
	Copper (mg/l)	BD	BD	BD
	Iron (mg/l)	BD	BD	BD
	Manganese (mg/l)	BD	BD	BD
	Zinc (mg/l)	BD	BD	BD

BD = Below Detection

Table 42. Central tendency and range for selected metrics in Subecoregion 65d				
Metric Category	**Metric**	**Mean**	**Median**	**Range**
Richness	Trichoptera Taxa	4.6	4.0	4-7
	Plecoptera Taxa	3.0	3.0	0-6
Composition	% Ephemeroptera	8.4	10.0	0-12
	% Chironomidae	49.4	45.2	34-71
	% Trichoptera	5.3	5.0	2-8
	% Hydropsychidae / EPT	7.8	8.7	0-16
Tolerance / Intolerance	North Carolina Biotic Index (NCBI)	6.4	6.3	5.9-7.2
	% Hydropsychidae / Trichoptera	44.2	40.0	0-83
	Intolerant Taxa	6.6	6	3-12
Functional Feeding Group	% Predator	24.6	23.0	10-48
	% Filterer	5.3	5.4	0-8

<u>Index 65d</u>
Trichoptera Taxa
Plecoptera Taxa
% Oligochaeta
% Hydropsychidae / Trichoptera
% Predator
% Filterer

Table 43. Index scores for sites sampled in Subecoregion 65d		
Station ID	**Condition**	**Index 65d**
65d-1	Impaired	25
65d-20	Impaired	55
65d-21	Impaired	40
65d-32	Impaired	53
65d-39	Impaired	55
65d-14	Reference	68
65d-18	Reference	78
65d-3	Reference	78
65d-38	Reference	63
65d-4	Reference	62

Figure 21. Box and whisker comparison for reference vs. impaired streams in Subecoregion 65d

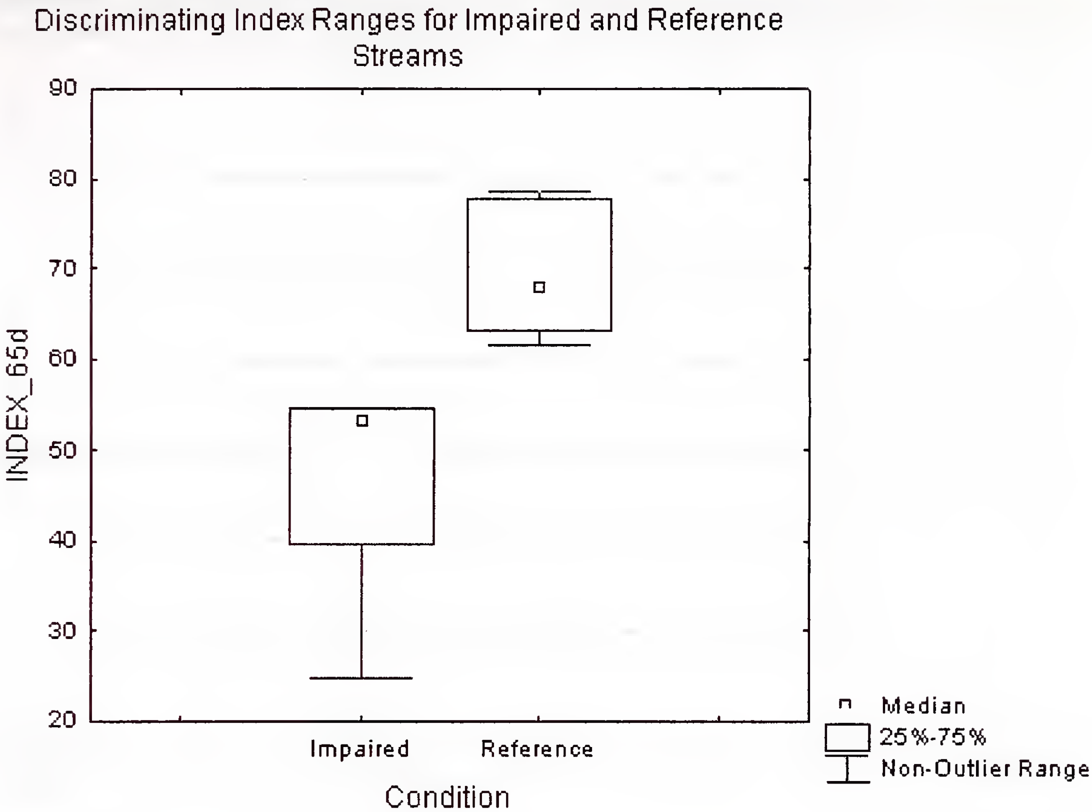


Table 44. Characteristic reference stream land use, habitat, and chemistry data for Subecoregion 65g

Catchment Land use	Parameter	Mean	Median	Range
	% Natural	56.9	55.5	53.7-61.6
	% Agriculture	32.1	36.2	23.4-36.5
	% Silviculture	5.2	4.6	2.5-8.3
	% Urban	5.9	5.5	5.4-6.7
Habitat	Total Habitat Score (200)	151.7	143	141-171
	Epifaunal Substrate (20)	16.3	16.0	15-18
	Pool Substrate Characterization (20)	15.3	15.0	14-17
	Pool Variability (20)	12.0	10.0	10-16
	Sediment Deposition (20)	15.3	15.0	14-17
	Channel Flow Status (20)	15.7	15.0	14-18
	Channel Alteration (20)	15.7	16.0	15-16
	Channel Sinuosity (20)	14.0	15.0	12-15
	Bank Stability (L) (10)	8.0	8.0	7-9
	Bank Stability (R) (10)	8.0	8.0	7-9
	Vegetative Protection (L) (10)	6.7	7.0	4-9
	Vegetative Protection (R) (10)	7.0	8.0	4-9
	Riparian Vegetative Width (L) (10)	8.7	9.0	8-9
	Riparian Vegetative Width (R) (10)	9.0	9.0	9
In Stream Habitat (Substrate)	% Silt/Clay	16.7	20.0	0-30.1
	% Sand	62.1	67.0	49.5-69.9
	% Gravel	19.2	27.2	0-30.5
	% Cobble	1.3	0	0-3.9
	% Boulder	0.65	0	0-1.9
	% Bedrock	0	0	0
Chemistry *(in situ)*	Conductivity (mS/cm)	0.17	0.06	0.052-0.40
	Dissolved Oxygen (mg/l)	8.7	8.7	7.6-9.7
	pH (SU)	6.9	6.8	6.6-7.4
	Turbidity (NTU)	10.9	13.8	3.4-15.6
Chemistry (laboratory)	Alkalinity (mg/l as $CaCO_3$)	68.9	17.4	13.4-176.0
	Hardness (mg/l as $CaCO_3$)	80.7	23.0	22.2-196.9
	Ammonia (mg/l as N)	0.05	0.05	0.04-007
	Nitrate - Nitrite (mg/l as N)	0.18	0.24	0.05-0.25
	Nitrite (mg/l as N)	0.02	0.02	BD-0.02
	Total Phosphorous (mg/l as P)	BD	BD	BD
	Copper (mg/l)	BD	BD	BD
	Iron (mg/l)	0.57	0.57	BD - 0.57
	Manganese (mg/l)	BD	BD	BD
	Zinc (mg/l)	BD	BD	BD

BD = Below Detection

Table 45. Central tendency and range for selected metrics in Subecoregion 65g				
Metric Category	**Metric**	**Mean**	**Median**	**Range**
Richness	Ephemeroptera, Plecoptera, Trichoptera Taxa (EPT Taxa)	10.0	7.0	7-16
	Ephemeroptera Taxa	4.3	3.0	2-8
	Plecoptera Taxa	1.3	1.0	0-3
	Trichoptera Taxa	4.3	5.0	1-7
Composition	% Oligochaeta	2.3	2.5	1.4-2.9
	% EPT	25.0	17.1	8-50
	%Plecoptera	1.4	0.5	0-3.8
Tolerance / Intolerance	Intolerant Taxa	4.3	3.0	3-7
	% Intolerant Individuals	22.1	16.2	3.4-46.7
	Hilsenhoff's Biotic Index (HBI)	5.5	5.5	4.9-6.0
Functional Feeding Group	% Scraper	13.6	10.8	5.5-24.5
	Filterer Taxa	4.7	4.0	3-7
Habit	Clinger Taxa	8.0	8.0	6-10
	% Clinger	13.8	16.2	5.4-19.7

Index 65g

EPT Taxa
% Oligochaeta
% Intolerant Individuals
HBI
Filterer Taxa
Clinger Taxa

Table 46. Index scores for sites sampled in Subecoregion 65g		
Station ID	**Condition**	**Index 65g**
65g-10	Impaired	27
65g-130	Impaired	33
65g-135	Impaired	17
65g-137	Impaired	28
65g-14	Impaired	15
65g-17	Impaired	30
65g-4	Impaired	24
65g-69	Impaired	36
65g-8	Impaired	24

Station ID	Condition	Index 65g
65g-84	Impaired	12
65g-120	Reference	74
65g-62	Reference	74
HH29	Reference	80
65g-82	Ref/Removed	30
65g-83	Ref/Removed	60

Figure 22. Box and whisker comparison for reference vs. impaired streams in Subecoregion 65g

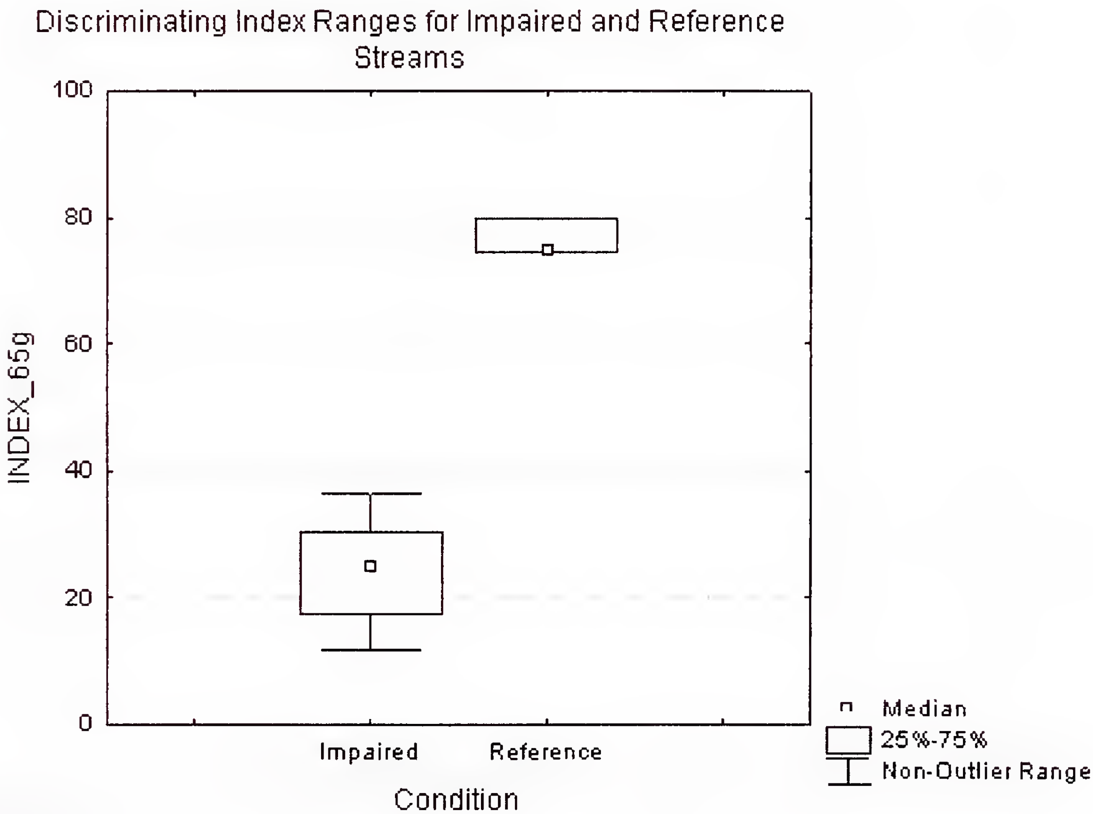


Table 47. Characteristic reference stream land use, habitat, and chemistry data for Subecoregion 65h

	Parameter	Mean	Median	Range
Catchment Land use	% Natural	71.6	70.8	57.4-92.5
	% Agriculture	17.6	18.4	5.8-32.3
	% Silviculture	5.4	6.4	0.20-11.0
	% Urban	5.4	7.2	1.5-8.7
Habitat	Total Habitat Score (200)	159.4	161	159-165
	Epifaunal Substrate (20)	14.0	15.0	8-17
	Pool Substrate Characterization (20)	14.0	15.0	11-15
	Pool Variability (20)	14.0	15.0	10-16
	Sediment Deposition (20)	14.6	15.0	8-18
	Channel Flow Status (20)	14.6	15.0	10-17
	Channel Alteration (20)	17.0	17.0	15-19
	Channel Sinuosity (20)	15.2	15.0	14-17
	Bank Stability (L) (10)	8.0	9.0	5-9
	Bank Stability (R) (10)	7.6	8.0	5-9
	Vegetative Protection (L) (10)	8.4	8.0	8-9
	Vegetative Protection (R) (10)	8.2	8.0	8-9
	Riparian Vegetative Width (L) (10)	8.8	9.0	8-9
	Riparian Vegetative Width (R) (10)	8.8	9.0	8-9
In Stream Habitat **(Substrate)**	% Silt/Clay	8.0	2.0	0-30.0
	% Sand	92.0	98.0	70.0-100.0
	% Gravel	0	0	0
	% Cobble	0	0	0
	% Boulder	0	0	0
	% Bedrock	0	0	0
Chemistry *(in situ)*	Conductivity (mS/cm)	0.079	0.076	0.034-0.141
	Dissolved Oxygen (mg/l)	8.6	8.9	7.3-9.8
	pH (SU)	6.7	6.8	6.1-7.5
	Turbidity (NTU)	10.6	10.7	9.6-11.5
Chemistry (laboratory)	Alkalinity (mg/l as $CaCO_3$)	23.2	25.8	5.1-52.7
	Hardness (mg/l as $CaCO_3$)	26.0	31.31	0-57.7
	Ammonia (mg/l as N)	0.048	0.048	0.040-0.057
	Nitrate - Nitrite (mg/l as N)	0.162	0.055	0.015-0.368
	Nitrite (mg/l as N)	0.011	0.011	BD-0.011
	Total Phosphorous (mg/l as P)	BD	BD	BD
	Copper (mg/l)	BD	BD	BD
	Iron (mg/l)	1.24	1.24	BD-1.24
	Manganese (mg/l)	0.041	0.041	BD-0.041
	Zinc (mg/l)	0.052	0.052	BD-0.052

BD = Below Detection

Metric Category	Metric	Mean	Median	Range
Richness	Ephemeroptera Taxa	3.0	2.0	1-5
	Coleoptera Taxa	4.4	4.0	2-7
Composition	% Tanytarsini	23.9	15.4	8.2-44.1
	% Oligochaeta	1.4	0.4	0-4.6
	% Isopoda	0.0	0.0	0.0
Tolerance / Intolerance	% Tolerant Individuals	1.1	0.5	0-4.0
	North Carolina Biotic Index (NCBI)	5.9	5.7	4.9-7.3
	Intolerant Taxa	5.0	5	3-7
Functional Feeding Group	Filterer Taxa	6.0	6.0	3-9
	% Scraper	11.2	7.1	1.7-29.0
Habit	% Clinger	23.1	12.9	5.9-63.3
	Burrower Taxa	4.2	5.0	1-6

Table 48. Central tendency and range for selected metrics in Subecoregion 65h

Index 65h

Ephemeroptera Taxa
% Isopoda
% Tanytarsini
% Tolerant Individuals
% Scraper
Burrower Taxa

Table 49. Index scores for sites sampled in Subecoregion 65h

Station ID	Condition	Index 65h
65h-17	Impaired	17
65h-174	Impaired	54
65h-32	Impaired	15
65h-34	Impaired	35
65h-41	Impaired	35
65h-202	Reference	66
65h-203	Reference	82
65h-206	Reference	64
65h-209	Reference	53
65h-212	Reference	71

Figure 23. Box and whisker comparison for reference vs. impaired streams in Subecoregion 65h

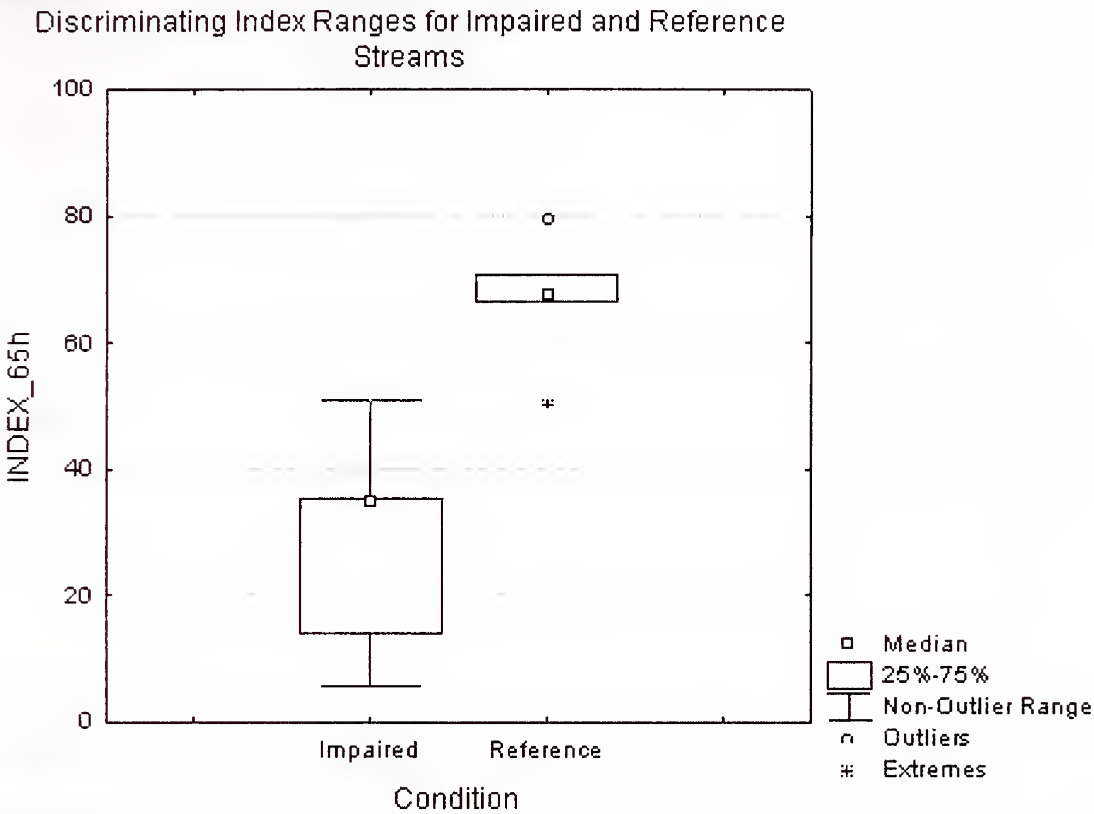


Table 50. Characteristic reference stream land use, habitat, and chemistry data for Subecoregion 65k

Catchment Land use	Parameter	Mean	Median	Range
	% Natural	72.7	72.6	67.5-78.4
	% Agriculture	15.3	12.8	10.5-25.2
	% Silviculture	4.5	4.5	1.4-7.7
	% Urban	7.4	6.2	5.4-11.8
Habitat	Total Habitat Score (200)	155.4	157	135-165
	Epifaunal Substrate (20)	15.2	15.0	15-16
	Pool Substrate Characterization (20)	14.4	15.0	11-16
	Pool Variability (20)	14.2	16.0	8-16
	Sediment Deposition (20)	15.4	17.0	11-18
	Channel Flow Status (20)	17.0	16.0	16-19
	Channel Alteration (20)	16.8	17.0	15-18
	Channel Sinuosity (20)	8.8	9.0	5-11
	Bank Stability (L) (10)	9.2	9.0	9-10
	Bank Stability (R) (10)	9.0	9.0	8-10
	Vegetative Protection (L) (10)	8.2	8.0	7-9
	Vegetative Protection (R) (10)	8.8	9.0	8-9
	Riparian Vegetative Width (L) (10)	8.6	9.0	7-9
	Riparian Vegetative Width (R) (10)	9.8	10.0	9-10
In Stream Habitat (Substrate)	% Silt/Clay	23.8	7.0	1.0-74.0
	% Sand	75.0	91.0	25.0-99.0
	% Gravel	1.2	1.0	0-3.0
	% Cobble	0	0	0
	% Boulder	0	0	0
	% Bedrock	0	0	0
Chemistry *(in situ)*	Conductivity (mS/cm)	0.235	0.119	0.096-0.433
	Dissolved Oxygen (mg/l)	7.9	6.8	5.5-10.8
	pH (SU)	6.7	6.6	6.3-7.0
	Turbidity (NTU)	7.1	5.3	2.5-14.4
Chemistry (laboratory)	Alkalinity (mg/l as $CaCO_3$)	53.02	36.7	22.6-144.1
	Hardness (mg/l as $CaCO_3$)	98.8	53.1	47.2-179.3
	Ammonia (mg/l as N)	0.068	0.069	BD - 0.089
	Nitrate - Nitrite (mg/l as N)	0.23	0.05	BD - 0.81
	Nitrite (mg/l as N)	BD	BD	BD
	Total Phosphorous (mg/l as P)	BD	BD	BD
	Copper (mg/l)	BD	BD	BD
	Iron (mg/l)	3.18	3.18	BD – 5.5
	Manganese (mg/l)	BD	BD	BD
	Zinc (mg/l)	BD	BD	BD

BD = Below Detection

Table 51. Central tendency and range for selected metrics in Subecoregion 65k

Metric Category	Metric	Mean	Median	Range
Composition	% Gastropoda	1.7	1.7	1.0-2.6
	%Tanypodinae/ Total Chironomidae (TC)	11.1	3.3	0-35.2
Tolerance / Intolerance	% Hydropsychidae / Total Trichoptera	25.0	0.0	0-100
Functional Feeding Group	% Collector	59.6	51.2	27.8-96.0
	Scraper Taxa	3.6	3.0	3-5
	% Filterer	8.6	5.1	0-9.0
	% Shredder	4.0	2.3	0.5-23.4

Index 65k

% Gastropoda
% Tanypodinae / TC
% Hydropsychidae / Total Trichoptera
Scraper Taxa
% Shredder
% Collector

Table 52. Index scores for sites sampled in Subecoregion 65k

Station ID	Condition	Index 65k
65k-102	Impaired	34
65k-113	Impaired	26
65k-128	Impaired	30
65k-129	Impaired	55
65k-37	Impaired	58
65k-54	Reference	73
65k-55	Reference	62
65k-56	Reference	56
65k-68	Reference	70
65k-85	Reference	67

Figure 24. Box and whisker comparison for reference vs. impaired streams in Subecoregion 65k

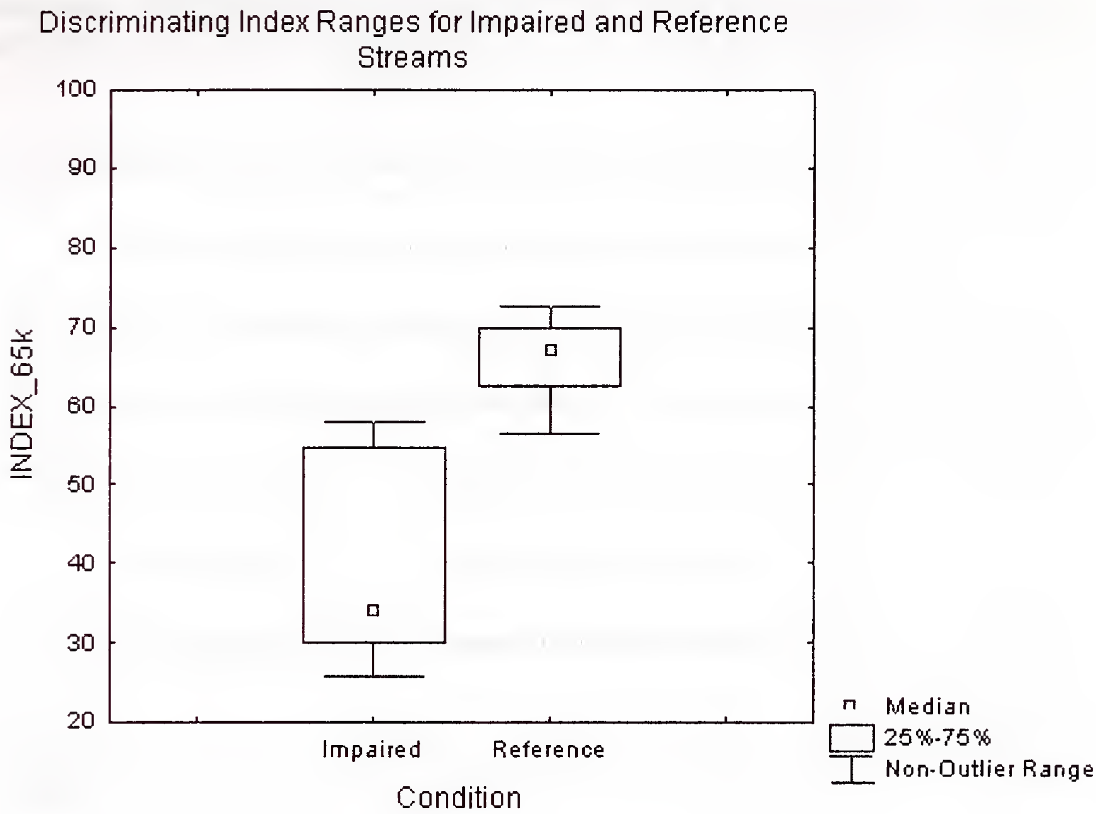


Table 53. Characteristic reference stream land use, habitat, and chemistry data for Subecoregion 65I

	Parameter	Mean	Median	Range
Catchment Land use	% Natural	66.6	65.5	56.5-79.0
	% Agriculture	17.0	17.7	10.7-21.9
	% Silviculture	10.3	6.7	2.9-24.8
	% Urban	6.1	6.1	4.3-7.9
Habitat	Total Habitat Score (200)	163.6	164.0	148-172
	Epifaunal Substrate (20)	16.0	16.0	14-18
	Pool Substrate Characterization (20)	13.6	15.0	7-17
	Pool Variability (20)	15.2	17.0	7-18
	Sediment Deposition (20)	15.6	17.0	11-18
	Channel Flow Status (20)	16.8	17.0	16-18
	Channel Alteration (20)	18.8	19.0	18-20
	Channel Sinuosity (20)	16.4	18.0	9-20
	Bank Stability (L) (10)	9.0	9.0	9
	Bank Stability (R) (10)	9.0	9.0	9
	Vegetative Protection (L) (10)	7.8	8.0	6-9
	Vegetative Protection (R) (10)	7.8	8.0	6-9
	Riparian Vegetative Width (L) (10)	8.8	9.0	8-9
	Riparian Vegetative Width (R) (10)	8.6	9.0	7-10
In Stream Habitat (Substrate)	% Silt/Clay	8.6	5.0	5.0-16.0
	% Sand	91.2	94.1	84.0-95.0
	% Gravel	0.2	0.0	0-1.0
	% Cobble	0	0	0
	% Boulder	0	0	0
	% Bedrock	0	0	0
Chemistry *(in situ)*	Conductivity (mS/cm)	0.080	0.072	0.054-0.135
	Dissolved Oxygen (mg/l)	9.0	9.3	7.6-10.5
	pH (SU)	5.7	5.7	5.0-6.9
	Turbidity (NTU)	12.5	4.7	0.3-37.7
Chemistry (laboratory)	Alkalinity (mg/l as $CaCO_3$)	12.2	3.7	0-50.6
	Hardness (mg/l as $CaCO_3$)	26.1	21.2	13.9-51.3
	Ammonia (mg/l as N)	0.056	0.039	BD - 0.073
	Nitrate - Nitrite (mg/l as N)	0.137	0.039	0.013-0.358
	Nitrite (mg/l as N)	0.015	0.015	BD-0.015
	Total Phosphorous (mg/l as P)	0.070	0.018	BD - 0.178
	Copper (mg/l)	0.003	0.003	BD-0.003
	Iron (mg/l)	0.249	0.271	BD - 0.315
	Manganese (mg/l)	0.141	0.141	BD-0.141
	Zinc (mg/l)	0.03	0.03	BD-0.03

BD = Below Detection

Table 54. Central tendency and range for selected metrics in Subecoregion 65l

Metric Category	Metric	Mean	Median	Range
Richness	Diptera Taxa	26.0	26.0	13-34
	Trichoptera Taxa	3.2	4.0	0-5
Composition	% Trichoptera	2.0	2.1	0-4.4
	% Ephemeroptera, Plecoptera, and Trichoptera (EPT)	4.4	4.6	0-8.8
Tolerance / Intolerance	% Tolerant Individuals	41.0	34.2	23.2-72.5
	Hilsenhoff's Biotic Index (HBI)	6.3	6.4	5.2-7.5
	Tolerant Taxa	14.6	13	9-24
Functional Feeding Group	% Filterer	12.4	8.8	2.3-32.5
	Shredder Taxa	3.8	4.0	3-5
Habit	Clinger Taxa	6.0	5.0	1-12

Index 65l

Trichoptera Taxa
Diptera Taxa
% EPT
% Tolerant Individuals
Shredder Taxa
Clinger Taxa

Table 55. Index scores for sites sampled in Subecoregion 65l

Station ID	Condition	Index 65l
65l-160	Impaired	50
65l-184	Impaired	51
65l-391	Impaired	30
65l-420	Impaired	42
65l-423	Impaired	30
65l-10	Reference	91
65l-342	Reference	58
65l-343	Reference	68
65l-379	Reference	25
65l-381	Reference	81

Figure 25. Box and whisker comparison for reference vs. impaired streams in Subecoregion 65I

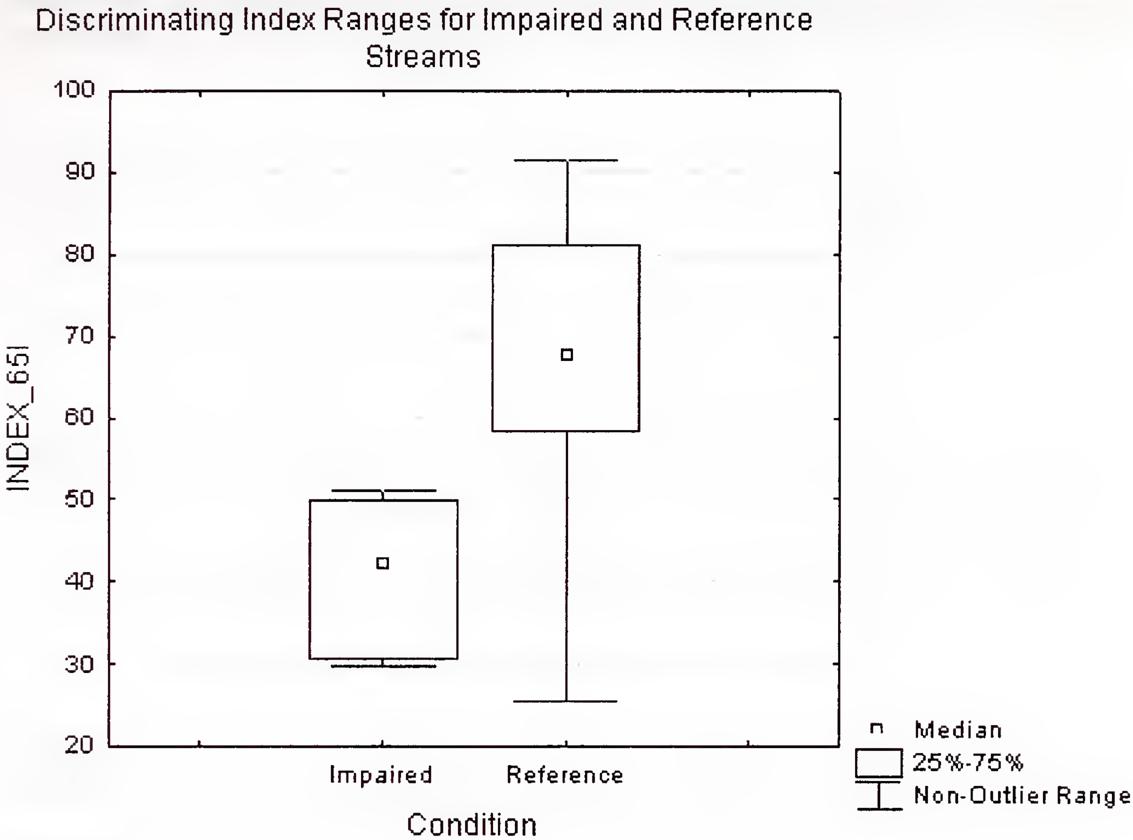


Table 56. Characteristic reference stream land use, habitat, and chemistry data for Subecoregion 65o

	Parameter	Mean	Median	Range
Catchment Land use	% Natural	62.8	57.3	52.4-78.7
	% Agriculture	27.4	32.3	12.9-36.9
	% Silviculture	4.1	4.0	2.9-5.5
	% Urban	5.7	5.5	5.2-6.3
Habitat	Total Habitat Score (200)	165.3	166.5	149-179
	Epifaunal Substrate (20)	16.3	16.0	16-17
	Pool Substrate Characterization (20)	15.5	15.5	14-17
	Pool Variability (20)	17.5	17.5	16-19
	Sediment Deposition (20)	16.3	16.5	14-18
	Channel Flow Status (20)	16.0	15.5	14-19
	Channel Alteration (20)	16.5	16.0	15-19
	Channel Sinuosity (20)	17.5	17.5	16-19
	Bank Stability (L) (10)	7.5	8.0	5-9
	Bank Stability (R) (10)	7.5	8.0	5-9
	Vegetative Protection (L) (10)	8.3	9.0	5-10
	Vegetative Protection (R) (10)	8.3	9.0	5-10
	Riparian Vegetative Width (L) (10)	9.0	9.0	8-10
	Riparian Vegetative Width (R) (10)	9.3	9.0	9-10
In Stream Habitat (Substrate)	% Silt/Clay	18.2	13.4	3.0-43.0
	% Sand	81.3	85.6	57.0-97.0
	% Gravel	0	0	0
	% Cobble	0	0	0
	% Boulder	0	0	0
	% Bedrock	0.5	0.0	0-2.0
Chemistry *(in situ)*	Conductivity (mS/cm)	0.071	0.064	0.045-0.109
	Dissolved Oxygen (mg/l)	8.0	8.0	7.6-8.5
	pH (SU)	5.9	6.1	5.0-6.5
	Turbidity (NTU)	5.0	4.8	0-10.5
Chemistry (laboratory)	Alkalinity (mg/l as $CaCO_3$)	10.6	4.2	0.37-33.8
	Hardness (mg/l as $CaCO_3$)	16.9	9.0	4.0-45.7
	Ammonia (mg/l as N)	0.053	0.053	BD-0.053
	Nitrate - Nitrite (mg/l as N)	0.03	0.03	BD-0.041
	Nitrite (mg/l as N)	0.02	0.02	BD-0.02
	Total Phosphorous (mg/l as P)	0.096	0.062	0.05-0.21
	Copper (mg/l)	BD	BD	BD
	Iron (mg/l)	7.3	7.3	BD-13.0
	Manganese (mg/l)	0.07	0.07	BD-0.07
	Zinc (mg/l)	0.037	0.037	BD-0.037

BD = Below Detection

Table 57. Central tendency and range for selected metrics in Subecoregion 65o

Metric Category	Metric	Mean	Median	Range
Richness	Chironomidae Taxa	25.8	25.5	13-39
	Tanytarsini Taxa	4.3	5.0	0-7
Composition	% Ephemeroptera	10.6	5.0	0.5-31.9
	% Non-Insect	12.6	13.9	1.3-21.3
	% Oligochaeta	2.0	1.9	0-4.4
Tolerance / Intolerance	Beck's Index	6.0	5	2-12
	North Carolina Biotic Index (NCBI)	6.4	6.0	5.3-8.3
Functional Feeding Group	Scraper Taxa	2.5	3.0	1-3
Habit	Burrower Taxa	8.0	6.0	3-17
	Sprawler Taxa	7.5	9.0	3-9

Index 65o

Chironomidae Taxa
% Oligochaeta
NCBI
Scraper Taxa
Sprawler Taxa
Burrower Taxa

Table 58. Index scores for sites sampled in Subecoregion 65o

Station ID	Condition	Index 65o
65o-11	Impaired	51
65o-18	Impaired	49
65o-22	Impaired	58
65o-3	Impaired	69
65o-9	Impaired	23
65o-12	Reference	74
65o-23	Reference	82
65o-24	Reference	74
65o-25	Reference	53

Figure 26. Box and whisker comparison for reference vs. impaired streams in Subecoregion 65o

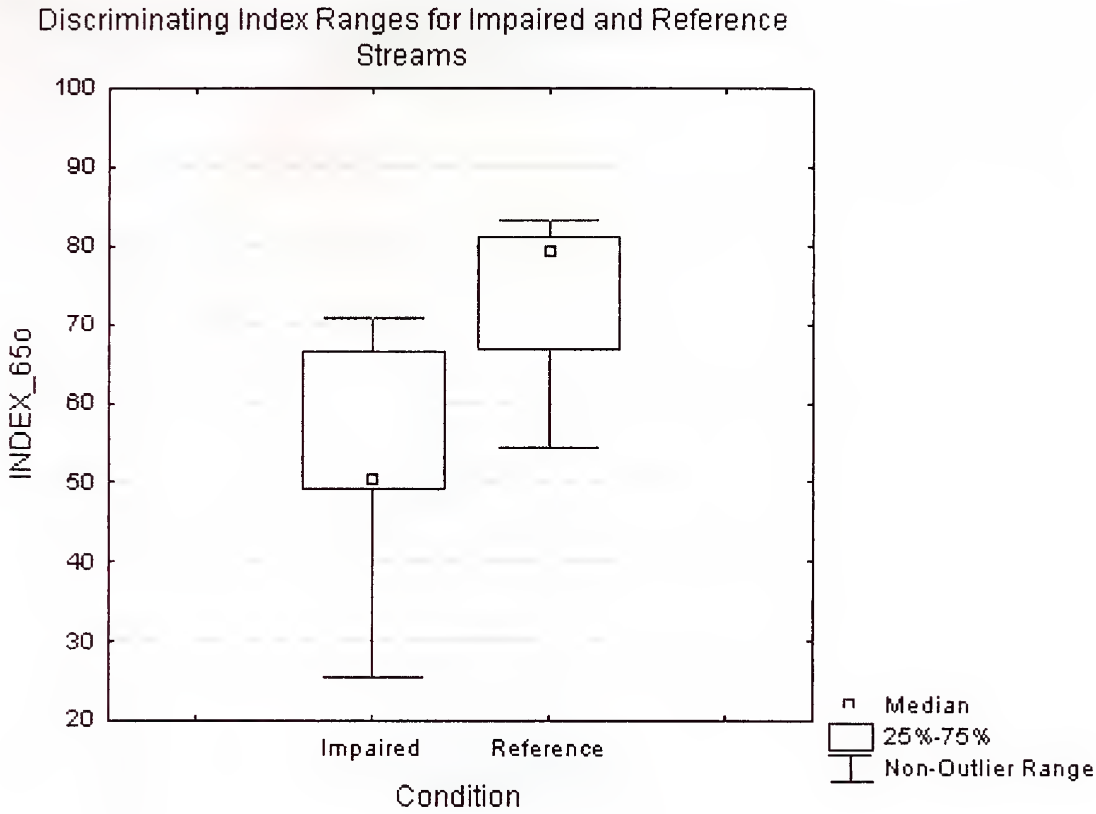


Figure 27. Ecoregion 66 – Blue Ridge

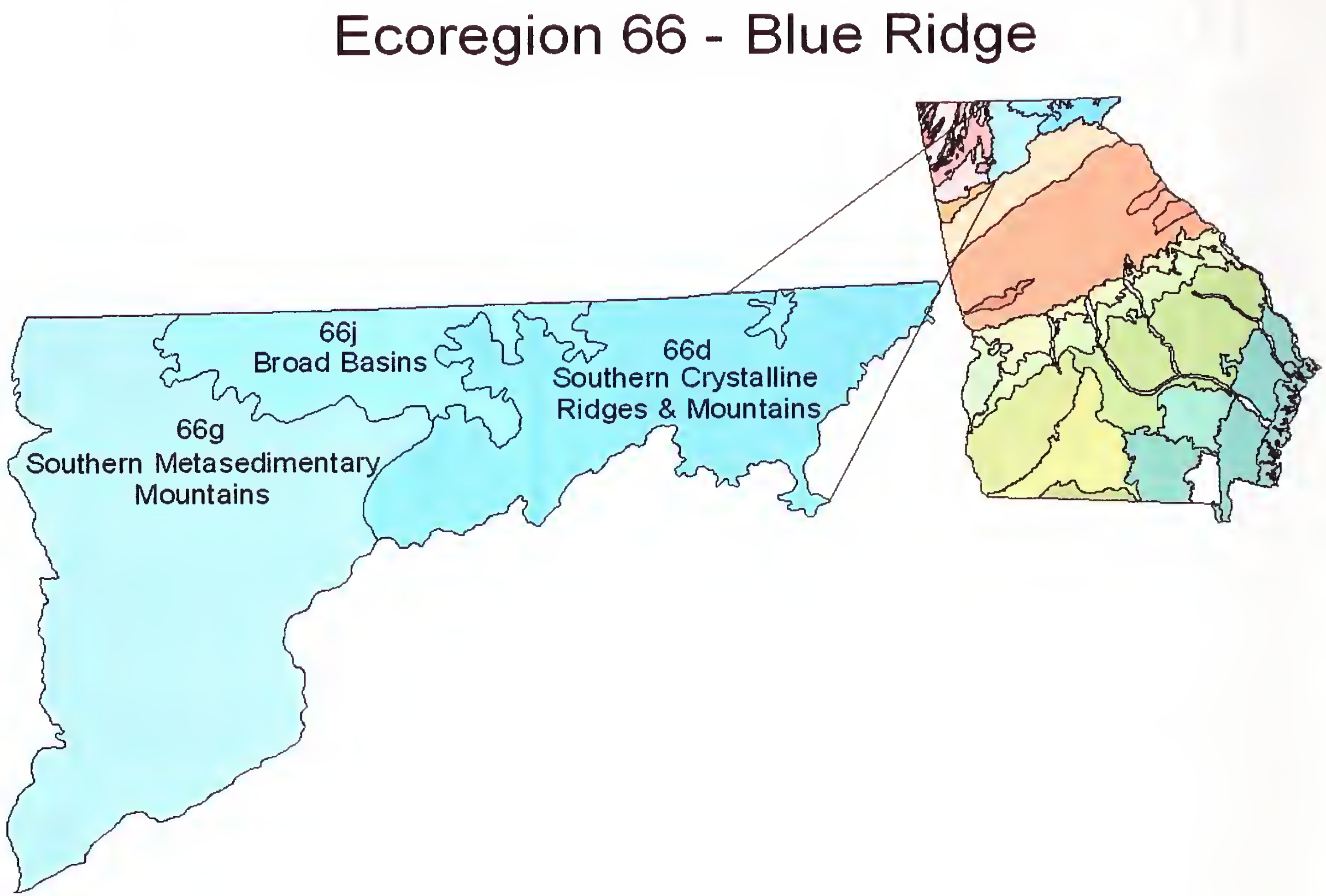


Table 59. Characteristic reference stream land use, habitat, and chemistry data for Ecoregion 66

	Parameter	Mean	Median	Range
Catchment Land use	% Natural	91.3	95.9	61.6-99.8
	% Agriculture	2.9	0.2	0.0-11.7
	% Silviculture	0.4	0.1	0.0-4.0
	% Urban	2.4	1.9	0.0-6.4
Habitat	Total Habitat Score (200)	166.7	167.5	111-192
	Epifaunal Substrate (20)	16.1	16.5	10-19
	Embeddedness (20)	16.0	17.5	4-19
	Velocity/Depth Regime (20)	16.6	17.0	14-19
	Sediment Deposition (20)	15.6	17.0	5-19
	Channel Flow Status (20)	16.5	16.5	13-20
	Channel Alteration (20)	18.1	18.0	15-20
	Frequency of Riffles (20)	17.9	18.0	16-20
	Bank Stability (L) (10)	8.8	9.0	4-10
	Bank Stability (R) (10)	8.5	9.0	3-10
	Vegetative Protection (L) (10)	8.4	9.0	3-10
	Vegetative Protection (R) (10)	7.9	9.0	3-10
	Riparian Vegetative Width (L) (10)	8.9	10.0	1-10
	Riparian Vegetative Width (R) (10)	7.6	8.5	1-10
In Stream Habitat (Substrate)	% Silt/Clay	2.6	0.0	0.0-12.1
	% Sand	8.9	7.0	0.0-28.0
	% Gravel	37.5	35.0	13.2-69.0
	% Cobble	34.3	32.4	4.0-54.0
	% Boulder	14.8	14.0	0.0-33.0
	% Bedrock	1.9	0.0	0.0-8.0
Chemistry *(in situ)*	Specific Conductivity (mS/cm)	0.017	0.016	0.008-0.038
	Dissolved Oxygen (mg/l)	11.0	10.9	8.9-13.0
	pH (SU)	6.8	6.8	6.4-7.2
	Turbidity (NTU)	5.0	4.7	0.0-17.8
Chemistry (laboratory)	Alkalinity (mg/l as $CaCO_3$)	6.1	6.1	0.0-12.3
	Total Hardness (mg/l as $CaCO_3$)	6.6	6.5	2.7-15.4
	Ammonia (mg/l as N)	0.049	0.046	BD-0.036
	Nitrate - Nitrite (mg/l as N)	0.186	0.085	BD-0.841
	Nitrite (mg/l as N)	0.090	0.088	BD-0.053
	Total Phosphorous (mg/l as P)	0.089	0.075	BD-0.062
	Copper (mg/l)	BD	BD	BD
	Iron (mg/l)	0.151	0.102	BD-0.458
	Manganese (mg/l)	0.010	0.006	BD-0.029
	Zinc (mg/l)	0.011	0.012	BD-0.006

BD = Below Detection

Table 60. Central tendency and range for selected metrics in Ecoregion 66				
Metric Category	**Metric**	**Mean**	**Median**	**Range**
Richness	Ephemeroptera, Plecoptera, Trichoptera Taxa (EPT Taxa)	24.4	25.0	11-37
	Simpson's Index	0.042	0.038	0.07-0.02
	Plecoptera Taxa	7.7	9.0	3-12
Composition	% Trichoptera	19.6	20.0	9.6-26.3
Tolerance / Intolerance	Beck's Index	37.2	39.0	19-51
	% Intolerant Individuals	36.8	37.9	12.5-54.7
	North Carolina Biotic Index (NCBI)	4.2	4.2	3.3-5.5
Functional Feeding Group	Predator Taxa	13.3	13.0	8-19
	Shredder Taxa	8.0	8.0	1-15
Habit	Clinger Taxa	22.1	22.0	12-32
	Burrower Taxa	7.2	7.0	4-11

Index 66

Plecoptera Taxa
Simpson's Index
% Trichoptera
% Intolerant Individuals
NCBI
Predator Taxa
Burrower Taxa

Table 61. Index scores for sites sampled in Ecoregion 66		
Station ID	**Condition**	**Index 66**
66d-38	Impaired	80
66d-43	Impaired	51
66d-48	Impaired	90
66d-49	Impaired	55
66d-50	Impaired	39
66g-30	Impaired	33
66g-31	Impaired	39
66g-39	Impaired	43
66g-42	Impaired	74
66g-44	Impaired	32
66g-65	Impaired	41

Station ID	Condition	Index 66
66g-71	Impaired	56
66j-17	Impaired	33
66j-25	Impaired	39
66j-26	Impaired	68
66j-27	Impaired	63
66j-9	Impaired	53
66d-40	Reference	90
66d-41	Reference	88
66d-44	Reference	70
66d-44-2	Reference	75
66d-58	Reference	55
66g-2	Reference	50
66g-2-2	Reference	80
66g-23	Reference	92
66g-5	Reference	85
66g-6	Reference	67
66j-19	Reference	67
66j-211	Reference	72
66j-23	Reference	77
66j-28	Reference	74
66j-31	Reference	58

Figure 28. Box and whisker comparison for reference vs. impaired streams in Ecoregion 66

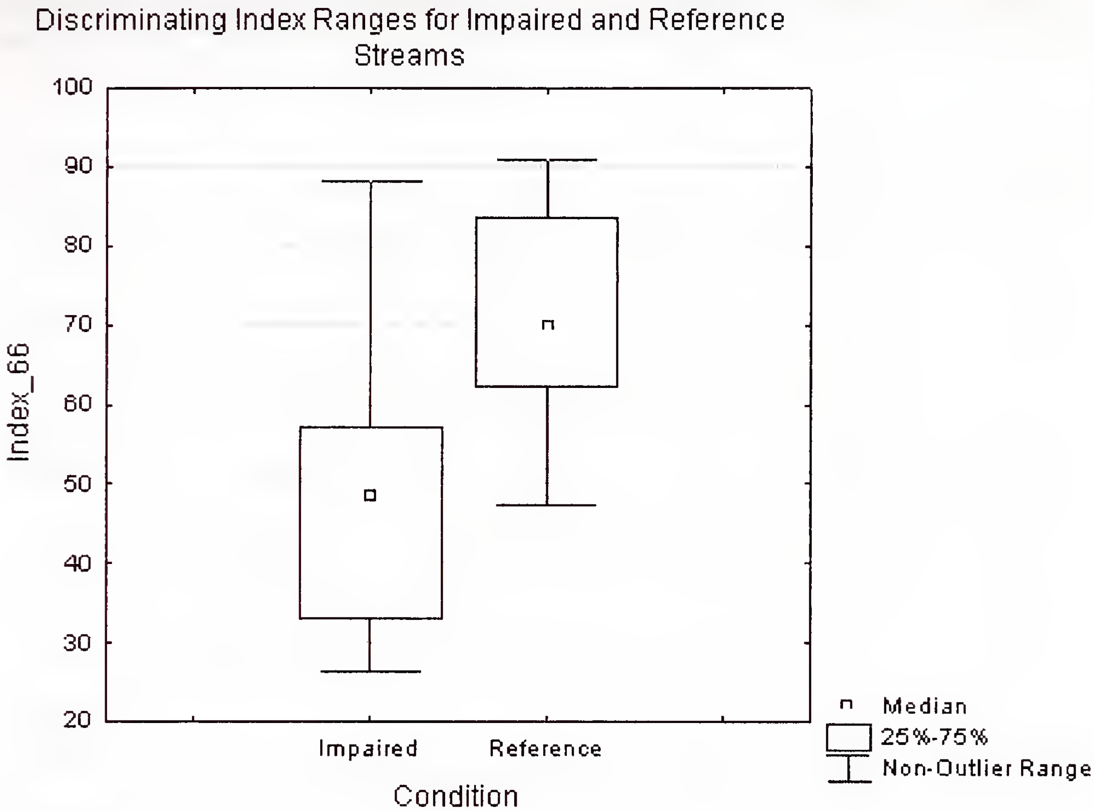


Table 62. Characteristic reference stream land use, habitat, and chemistry data for Subecoregion 66d

	Parameter	Mean	Median	Range
Catchment Land use	% Natural	97.7	97.9	97.2-98.1
	% Agriculture	0	0	0
	% Silviculture	0.30	0.30	0.10-0.50
	% Urban	1.9	1.9	1.5-2.6
Habitat	Total Habitat Score (200)	174.6	179.0	162-186
	Epifaunal Substrate (20)	16.8	17.0	14-19
	Embeddedness (20)	16.6	17.0	15-18
	Velocity/Depth Regime (20)	17.6	18.0	15-19
	Sediment Deposition (20)	16.0	16.0	13-18
	Channel Flow Status (20)	16.8	17.0	15-18
	Channel Alteration (20)	18.2	18.0	17-20
	Frequency of Riffles (20)	18.2	19.0	16-19
	Bank Stability (L) (10)	9.2	9.0	8-10
	Bank Stability (R) (10)	9.0	9.0	8-10
	Vegetative Protection (L) (10)	9.2	9.0	8-10
	Vegetative Protection (R) (10)	8.4	9.0	7-9
	Riparian Vegetative Width (L) (10)	9.8	10.0	9-10
	Riparian Vegetative Width (R) (10)	8.8	9.0	7-10
In Stream Habitat (Substrate)	% Silt/Clay	0.2	0	0-1.0
	% Sand	6.2	6.0	2.9-8.0
	% Gravel	33.1	32.0	28.4-40.2
	% Cobble	39.3	42.0	28.4-54.0
	% Boulder	17.4	17.6	6.0-30.0
	% Bedrock	3.8	3.0	0-8.0
Chemistry *(in situ)*	Specific Conductivity (mS/cm)	0.013	0.012	0.008-0.016
	Dissolved Oxygen (mg/l)	11.2	11.6	9.7-11.9
	pH (SU)	6.7	6.6	6.4-7.1
	Turbidity (NTU)	1.42	0.5	0-5.8
Chemistry (laboratory)	Alkalinity (mg/l as $CaCO_3$)	5.6	5.5	2.5-8.3
	Total Hardness (mg/l as $CaCO_3$)	6.3	4.0	3.5-10.4
	Ammonia (mg/l as N)	0.05	0.051	0.037-0.057
	Nitrate - Nitrite (mg/l as N)	0.052	0.063	BD - 0.07
	Nitrite (mg/l as N)	0.062	0.062	BD - 0.07
	Total Phosphorous (mg/l as P)	0.142	0.142	BD - 0.142
	Copper (mg/l)	BD	BD	BD
	Iron (mg/l)	0.04	0.04	BD - 0.04
	Manganese (mg/l)	0.006	0.006	BD - 0.006
	Zinc (mg/l)	0.006	0.006	BD - 0.006

BD = Below Detection

Table 63. Central tendency and range for selected metrics in Subecoregion 66d				
Metric Category	**Metric**	**Mean**	**Median**	**Range**
Richness	Ephemeroptera, Plecoptera, and Trichoptera Taxa (EPT)	23.0	24.0	12-31
	Diptera Taxa	24.2	25.0	16-31
Composition	% Plecoptera	22.5	24.7	11.3-30.8
	% Odonata	1.2	0.4	0-4.6
Tolerance / Intolerance	Intolerant Taxa	6.6	6.0	4-10
	% Dominant Individuals	26.2	26.0	18-38
Functional Feeding Group	% Shredder	20.5	14.2	8-34
	Predator Taxa	14.6	13.0	12-19
Habit	Clinger Taxa	22.2	22.0	15-32

Index 66d

Diptera Taxa
% Plecoptera
% Odonata
% Dominant Individuals
% Shredder
Clinger Taxa

Table 64. Index scores for sites sampled in Subecoregion 66d		
Station ID	**Condition**	**Index 66d**
66d-38	Impaired	57
66d-43	Impaired	69
66d-48	Impaired	64
66d-49	Impaired	60
66d-50	Impaired	30
66d-40	Reference	75
66d-41	Reference	58
66d-44	Reference	89
66d-44-2	Reference	77
66d-58	Reference	66

Figure 29. Box and whisker comparison for reference vs. impaired streams in Subecoregion 66d

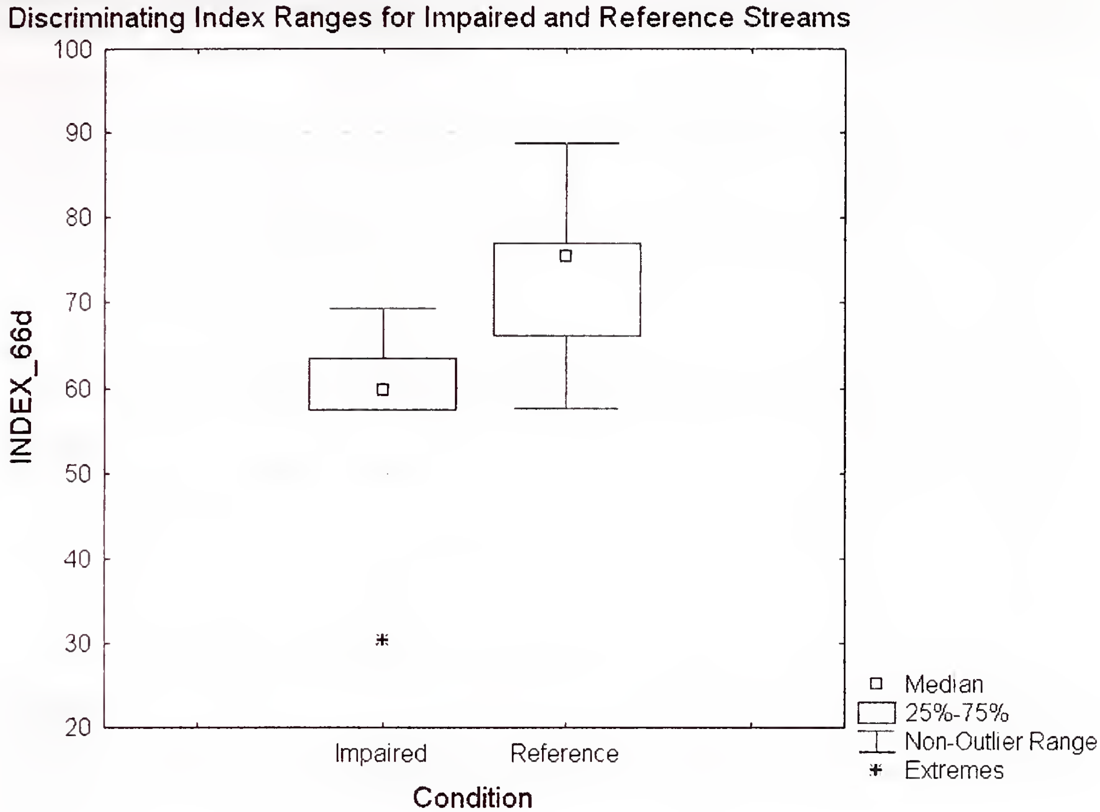


Table 65. Characteristic reference stream land use, habitat, and chemistry data for Subecoregion 66g

	Parameter	**Mean**	**Median**	**Range**
Catchment Land use	% Natural	97.3	97.4	96.0-98.7
	% Agriculture	0	0	0
	% Silviculture	0.10	0	0-0.10
	% Urban	2.6	2.5	1.3-3.9
Habitat	Total Habitat Score (200)	179	179	177-192
	Epifaunal Substrate (20)	16.4	16	15-18
	Embeddedness (20)	18.8	19	18-19
	Velocity/Depth Regime (20)	16.8	17	15-19
	Sediment Deposition (20)	18	18	17-19
	Channel Flow Status (20)	17	17	13-20
	Channel Alteration (20)	18.4	18	17-20
	Frequency of Riffles (20)	19	19	18-20
	Bank Stability (L) (10)	9.6	10	9-10
	Bank Stability (R) (10)	9.4	9	9-10
	Vegetative Protection (L) (10)	8.8	9	8-10
	Vegetative Protection (R) (10)	9	9	8-10
	Riparian Vegetative Width (L) (10)	9.4	10	7-10
	Riparian Vegetative Width (R) (10)	8.8	9	7-10
In Stream Habitat (Substrate)	% Silt/Clay	0.8	0	0-4
	% Sand	6.2	5.9	0-13
	% Gravel	31.0	31.7	13-45
	% Cobble	39.9	38.0	30-51
	% Boulder	21.0	24.8	4-33
	% Bedrock	1.2	0	0-6
Chemistry *(in situ)*	Specific Conductivity (mS/cm)	0.0174	0.0155	0.001-0.034
	Dissolved Oxygen (mg/l)	9.95	9.87	8.9-10.8
	pH (SU)	6.9	7.0	6.6-7.2
	Turbidity (NTU)	6.3	4.7	0.10-17.8
Chemistry (laboratory)	Alkalinity (mg/l as $CaCO_3$)	5.04	2.57	0-12.3
	Total Hardness (mg/l as $CaCO_3$)	6.24	3.5	2.7-15.5
	Ammonia (mg/l as N)	0.053	0.044	BD- 0.084
	Nitrate - Nitrite (mg/l as N)	0.61	0.61	BD->1.0
	Nitrite (mg/l as N)	0.011	0.107	BD-.013
	Total Phosphorous (mg/l as P)	0.071	0.068	BD-0.082
	Copper (mg/l)	BD	BD	BD
	Iron (mg/l)	0.060	0.055	BD-0.102
	Manganese (mg/l)	0.004	0.004	BD-0.005
	Zinc (mg/l)	0.013	0.013	BD-0.014

BD = BELOW DETECTION

Table 66. Central tendency and range for selected metrics in Subecoregion 66g

Metric Category	Metric	Mean	Median	Range
Richness	Ephemeroptera, Plecoptera, and Trichoptera Taxa (EPT)	27.4	27	11-37
	Ephemeroptera Taxa	11.4	14.0	2-16
	Simpson's Index	0.038	0.034	0.02-0.07
Composition	% Chironomidae	17.4	22.5	3.6-24
	% Trichoptera	20.7	20.4	15-26
	% Diptera	23.3	27.9	10-31
	% Tanypodinae / Total Chironomidae (TC)	5.0	7.1	0-8.8
Tolerance / Intolerance	North Carolina Biotic Index (NCBI	4.0	3.9	3.3-4.7
	% Dominant Individuals	10.5	9.9	6.4-16.5
Functional Feeding Group	Scraper Taxa	6.8	7	3-9
	% Predator	12.8	12.1	8-18
Habit	% Clinger	52.6	52.4	47-80

<u>Index 66g</u>

EPT Taxa
% Chironomidae
% Tanypodinae / TC
NCBI
% Dominant Individuals
Scraper Taxa
% Clinger

Table 67. Index scores for sites sampled in Subecoregion 66g

Station ID	Condition	Index 66g
66g-30	Impaired	26
66g-31	Impaired	36
66g-39	Impaired	41
66g-42	Impaired	66
66g-44	Impaired	39
66g-65	Impaired	47
66g-71	Impaired	46
66g-2	Reference	72

Station ID	Condition	Index 66g
66g-2-2	Reference	67
66g-23	Reference	78
66g-5	Reference	85
66g-6	Reference	71

Figure 30. Box and whisker comparison for reference vs. impaired streams in Subecoregion 66g

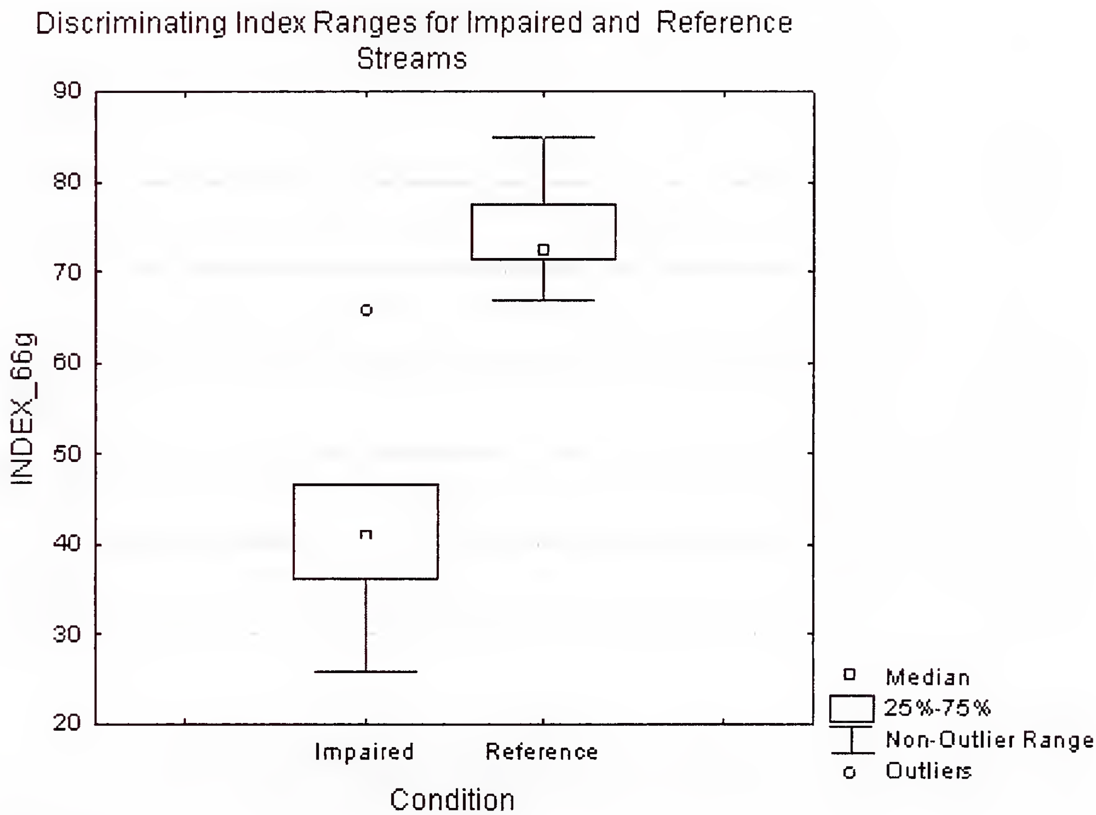


Table 68. Characteristic reference stream land use, habitat, and chemistry data for Subecoregion 66j

	Parameter	**Mean**	**Median**	**Range**
Catchment Land use	% Natural	93.6	93.1	89.6-97.7
	% Agriculture	0	0	0
	% Silviculture	1.2	0.50	0.10-4.0
	% Urban	5.2	4.2	2.1-9.0
Habitat	Total Habitat Score (200)	145.4	160	111-166
	Epifaunal Substrate (20)	15.6	17.0	10-18
	Embeddedness (20)	12.4	15.0	4-17
	Velocity/Depth Regime (20)	15.2	15.0	14-17
	Sediment Deposition (20)	12.4	15.0	5-18
	Channel Flow Status (20)	16.6	16.0	15-19
	Channel Alteration (20)	17.6	18.0	15-20
	Frequency of Riffles (20)	16.8	17.0	16-18
	Bank Stability (L) (10)	7.4	8.0	4-9
	Bank Stability (R) (10)	6.8	8.0	3-8
	Vegetative Protection (L) (10)	7.2	9.0	3-10
	Vegetative Protection (R) (10)	5.6	4.0	3-9
	Riparian Vegetative Width (L) (10)	7.4	9.0	1-10
	Riparian Vegetative Width (R) (10)	4.4	4.0	1-8
In Stream Habitat (Substrate)	% Silt/Clay	6.8	8.0	0-12.1
	% Sand	14.4	15.2	4.0-28.0
	% Gravel	48.3	44.4	30.0-69.0
	% Cobble	23.7	19.2	4.0-44.0
	% Boulder	6.0	4.0	0-14.0
	% Bedrock	0.80	0	0-2.9
Chemistry *(in situ)*	Specific Conductivity (mS/cm)	0.022	0.023	0.014-0.029
	Dissolved Oxygen (mg/l)	11.9	11.9	10.6-13.0
	pH (SU)	6.8	6.6	6.6-7.1
	Turbidity (NTU)	7.3	8.4	1.1-11.0
Chemistry (laboratory)	Alkalinity (mg/l as $CaCO_3$)	7.5	7.8	5.4-10.5
	Total Hardness (mg/l as $CaCO_3$)	7.5	7.8	5.0-9.8
	Ammonia (mg/l as N)	0.041	0.041	BD - 0.046
	Nitrate - Nitrite (mg/l as N)	0.099	0.099	0.057-0.146
	Nitrite (mg/l as N)	0.087	0.087	BD - 0.088
	Total Phosphorous (mg/l as P)	BD	BD	BD
	Copper (mg/l)	BD	BD	BD
	Iron (mg/l)	0.28	0.27	BD - 0.458
	Manganese (mg/l)	0.02	0.02	BD - 0.03
	Zinc (mg/l)	0.01	0.01	BD - 0.013

BD = Below Detection

Table 69. Central tendency and range for selected metrics in Subecoregion 66j

Metric Category	Metric	Mean	Median	Range
Richness	Plecoptera Taxa	8.2	8.0	5-10
	Margalef's Index	12.4	12.4	11.5-13.7
	Evenness	0.67	0.68	0.64-0.70
	Shannon-Wiener Index	3.68	3.69	3.51-3.85
	Simpson's Index	0.04	0.04	0.03-0.05
Composition	% Non-Insect	1.8	1.5	0-4.6
	% Tanytarsini	5.6	5.4	1.7-12.9
	% Tanytarsini / Total Chironomidae (TC)	12.3	10.8	4.5-25.6
Tolerance / Intolerance	% Dominant	11.2	11.3	7-16
	Hilsenhoff's Biotic Index (HBI)	4.4	4.4	3.8-5.0
	% Intolerant Individuals	32.8	34.6	24.6-42.1
Functional Feeding Group	% Filterer	28.6	30.0	15-47
	Predator Taxa	12.2	12	8-16
	Shredder Taxa	10	8	7-15
Habit	Sprawler Taxa	17.6	18.0	13-22

Index 66j

Simpson's Diversity Index
Margalef's Index
% Tanytarsini
% Intolerant Individuals
Predator Taxa
Sprawler Taxa

Table 70. Index scores for sites sampled in Subecoregion 66j

Station ID	Condition	Index 66j
66j-17	Impaired	49
66j-25	Impaired	31
66j-26	Impaired	71
66j-27	Impaired	56
66j-9	Impaired	47
66j-19	Reference	68
66j-211	Reference	82
66j-23	Reference	72

Station ID	Condition	Index 66j
66j-28	Reference	87
66j-31	Reference	73

Figure 31. Box and whisker comparison for reference vs. impaired streams in Subecoregion 66j

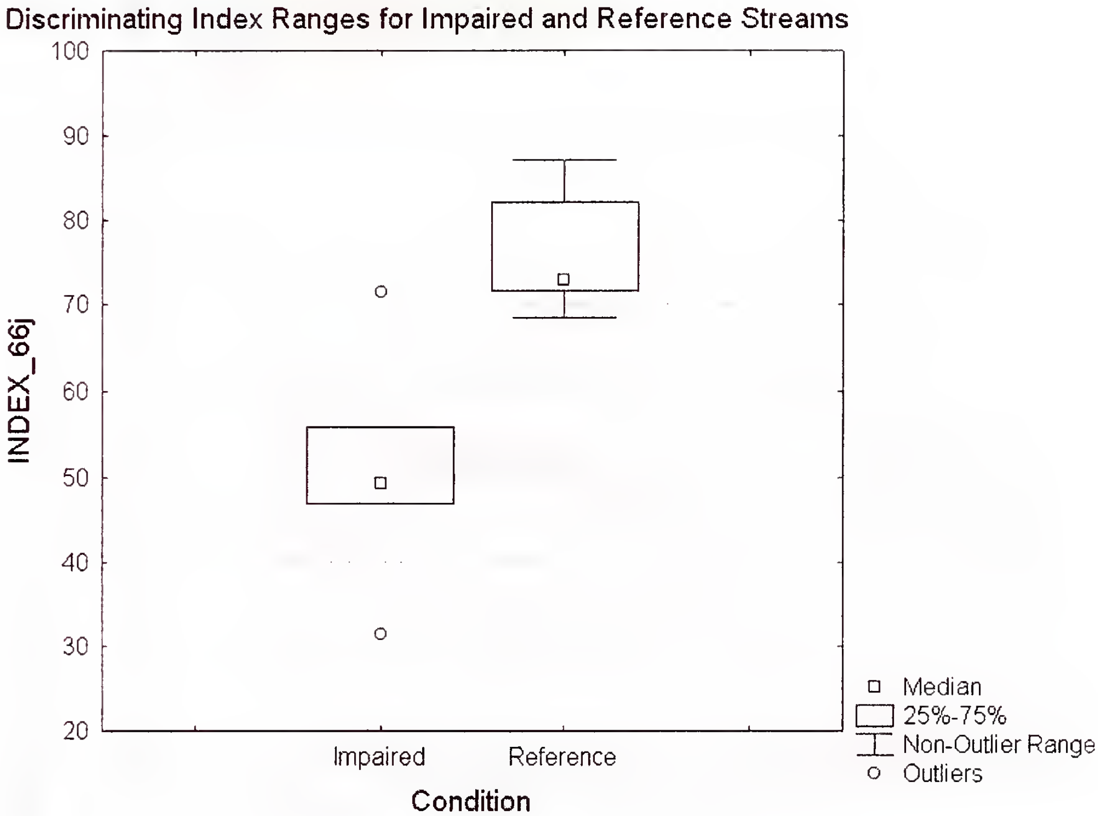


Figure 32. Ecoregion 67 – Ridge and Valley

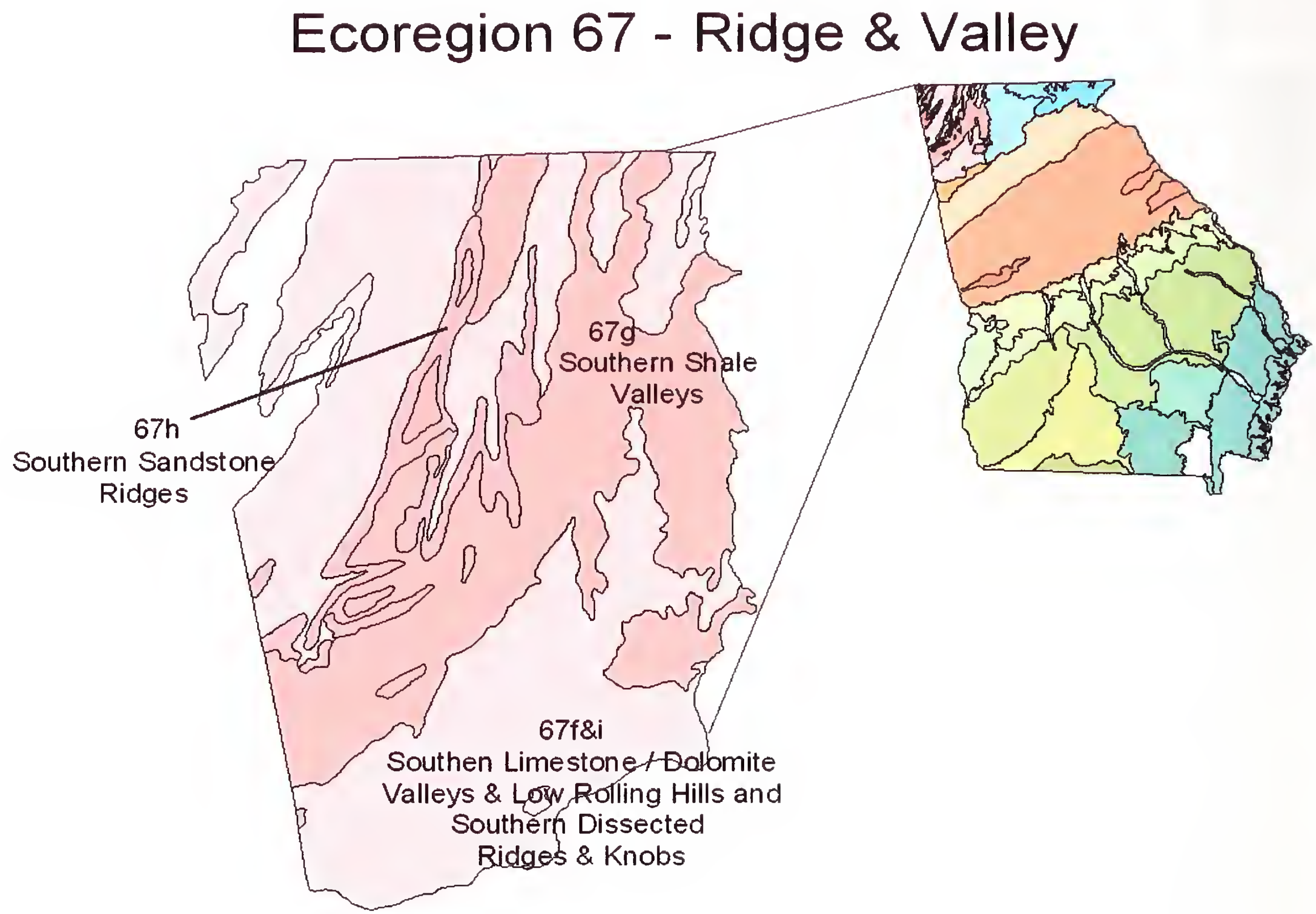


Table 71. Characteristic reference stream land use, habitat, and chemistry data for Ecoregion 67

	Parameter	Mean	Median	Range
Catchment Land use	% Natural	81.2	78.5	65.5-97.1
	% Agriculture	13.8	12.7	0.1-30.4
	% Silviculture	4.2	3.1	0.4-17.8
	% Urban	5.0	4.5	2.4-8.8
Habitat	Total Habitat Score (200)	152.9	155.5	118-174
	Epifaunal Substrate (20)	15.0	15.5	11-18
	Embeddedness (20)	15.7	16.0	12-18
	Velocity/Depth Regime (20)	15.5	16.5	9-18
	Sediment Deposition (20)	14.5	14.5	10-19
	Channel Flow Status (20)	17.1	17.5	14-19
	Channel Alteration (20)	16.5	17.5	13-19
	Frequency of Riffles (20)	15.9	16.5	11-19
	Bank Stability (L) (10)	7.6	8.0	1-10
	Bank Stability (R) (10)	6.8	7.5	3-10
	Vegetative Protection (L) (10)	7.3	7.5	4-10
	Vegetative Protection (R) (10)	7.0	7.0	4-10
	Riparian Vegetative Width (L) (10)	6.9	7.0	3-10
	Riparian Vegetative Width (R) (10)	7.1	8.0	3-10
In Stream Habitat (Substrate)	% Silt/Clay	1.8	0.0	0.0-13.9
	% Sand	8.5	6.9	2.0-24.8
	% Gravel	60.5	58.8	28.0-86.0
	% Cobble	20.3	24.2	0.0-40.2
	% Boulder	3.8	1.0	0.0-20.0
	% Bedrock	5.2	3.0	0.0-19.0
Chemistry *(in situ)*	Specific Conductivity (mS/cm)	0.116	0.131	0.011-0.219
	Dissolved Oxygen (mg/l)	10.8	10.9	8.2-12.1
	pH (SU)	7.3	7.3	6.6-8.1
	Turbidity (NTU)	9.8	9.0	0.0-21.3
Chemistry (laboratory)	Alkalinity (mg/l as $CaCO_3$)	51.4	44.2	6.8-101.6
	Total Hardness (mg/l as $CaCO_3$)	59.9	64.4	11.2-103.8
	Ammonia (mg/l as N)	0.047	0.039	BD-0.079
	Nitrate - Nitrite (mg/l as N)	0.249	0.183	BD-0.681
	Nitrite (mg/l as N)	0.020	0.016	BD-0.039
	Total Phosphorous (mg/l as P)	BD	BD	BD
	Copper (mg/l)	BD	BD	BD
	Iron (mg/l)	0.717	0.717	BD-1.366
	Manganese (mg/l)	0.019	0.019	BD-0.019
	Zinc (mg/l)	0.020	0.020	BD-0.020

BD = Below Detection

Table 72. Central tendency and range for selected metrics in Ecoregion 67				
Metric Category	**Metric**	**Mean**	**Median**	**Range**
Richness	Ephemeroptera, Plecoptera, Trichoptera Taxa (EPT Taxa)	14.2	14.0	4-24
	Plecoptera Taxa	3.8	3.0	0-8
Composition	% Isopoda	2.0	0	0-11.3
	% EPT	28.1	30.0	3.3-50.0
	% Plecoptera	6.7	4.0	0-31.7
Tolerance / Intolerance	Hilsenhoff's Biotic Index (HBI)	4.4	4.0	3.0-7.3
	North Carolina Biotic Index (NCBI)	4.4	4.1	2.9-7.9
Functional Feeding Group	Scraper Taxa	6.7	7.0	3-12
Habit	Clinger Taxa	14.9	14.0	5-24
	% Clinger	36.2	34.2	3.8-58.3

Index 67

EPT Taxa
Plecoptera Taxa
% Plecoptera
% Isopoda
HBI
Clinger Taxa

Table 73. Index scores for site sampled in Ecoregion 67		
Station ID	**Condition**	**Index 67**
67f&I-1	Impaired	26
67f&I-11	Impaired	31
67f&I-20	Impaired	19
67f&i-33	Impaired	36
67f&I-5	Impaired	36
67g-1	Impaired	40
67g-19	Impaired	49
67g-6	Impaired	48
67g-7	Impaired	31
67g-9	Impaired	21
67h-5	Impaired	74

Station ID	Condition	Index 67
67h-8	Impaired	53
67f&i-16	Reference	78
67f&i-17	Reference	65
67f&i-25	Reference	66
67f&i-27	Reference	37
67f&i-37	Reference	55
67g-11	Reference	75
67g-12	Reference	48
67g-13	Reference	66
67g-15	Reference	17
67h-2	Reference	74
67h-3	Reference	64
67h-4	Reference	76
67h-9	Reference	89
67g-2	Ref/Removed	26

Figure 33. Box and whisker comparison for reference vs. impaired streams in Ecoregion 67

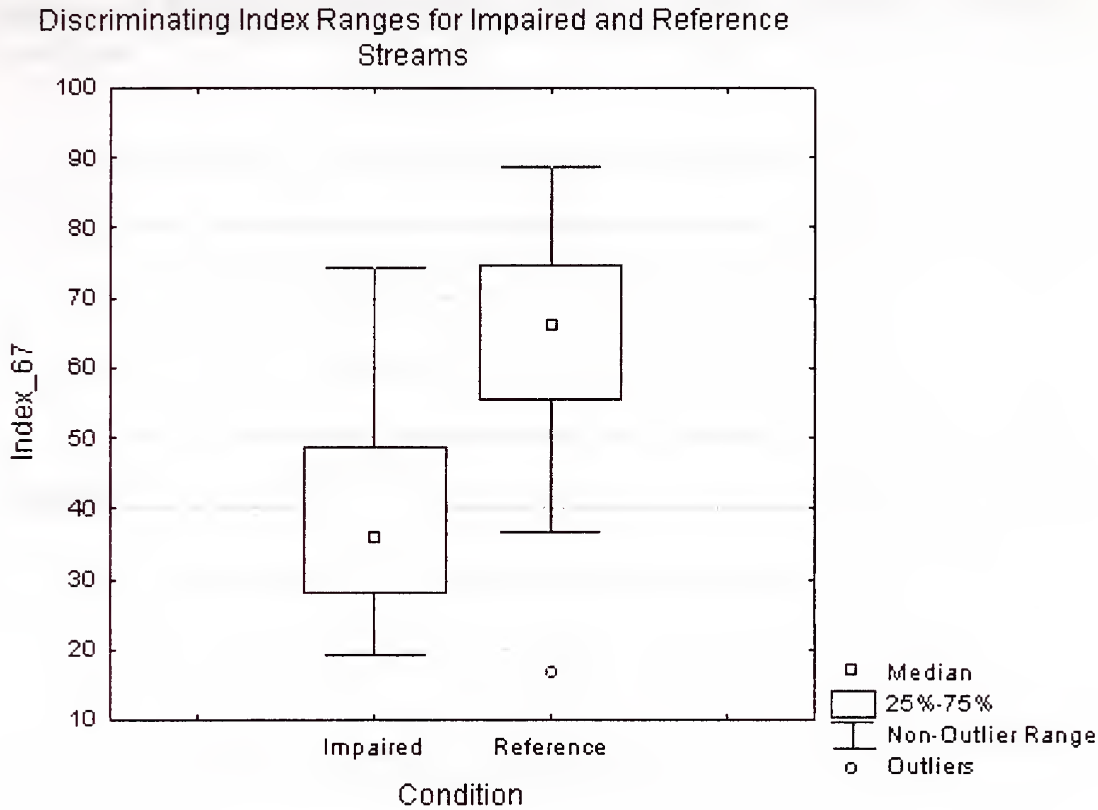


Table 74. Characteristic reference stream land use, habitat, and chemistry data for Subecoregion 67f&i

	Parameter	Mean	Median	Range
Catchment Land use	% Natural	88.4	89.8	76.8-93.5
	% Agriculture	0	0	0
	% Silviculture	6.2	3.7	1.6-17.8
	% Urban	5.3	5.4	2.8-7.2
Habitat	Total Habitat Score (200)	157.0	170.0	118-174
	Epifaunal Substrate (20)	16.2	17.0	13-18
	Embeddedness or Pool Substrate Characterization (20)	16.0	17.0	13-17
	Velocity/Depth Regime or Pool Variability (20)	15.2	16.0	9-18
	Sediment Deposition (20)	14.2	15.0	10-16
	Channel Flow Status (20)	17.6	18.0	14-19
	Channel Alteration (20)	16.2	18.0	13-19
	Frequency of Riffles or Channel Sinuosity (20)	15.0	15.0	11-18
	Bank Stability (L) (10)	8.2	8.0	6-10
	Bank Stability (R) (10)	7.8	8.0	6-9
	Vegetative Protection (L) (10)	7.8	7.0	6-10
	Vegetative Protection (R) (10)	7.8	8.0	6-10
	Riparian Vegetative Width (L) (10)	7.8	9.0	5-10
	Riparian Vegetative Width (R) (10)	7.2	9.0	4-9
In Stream Habitat (Substrate)	% Silt/Clay	1.8	0	0-8.1
	% Sand	7.1	3.0	2.0-14.1
	% Gravel	64.0	61.2	52.5-86.0
	% Cobble	20.8	23.2	7.0-38.6
	% Boulder	1.6	1.0	0-4.0
	% Bedrock	4.7	3.0	0-14.6
Chemistry *(in situ)*	Specific Conductivity (mS/cm)	0.175	0.188	0.131-0.219
	Dissolved Oxygen (mg/l)	10.4	10.8	8.2-11.1
	pH (SU)	7.6	7.5	7.4-8.1
	Turbidity (NTU)	8.7	3.4	0-21.1
Chemistry (laboratory)	Alkalinity (mg/l as $CaCO_3$)	78.2	87.7	40.4-101.6
	Total Hardness (mg/l as $CaCO_3$)	84.2	87.7	64.4-103.8
	Ammonia (mg/l as N)	0.047	0.045	BD-0.063
	Nitrate - Nitrite (mg/l as N)	0.222	0.224	0.08-0.43
	Nitrite (mg/l as N)	0.028	0.028	BD-0.039
	Total Phosphorous (mg/l as P)	BD	BD	BD
	Copper (mg/l)	BD	BD	BD
	Iron (mg/l)	0.068	0.068	BD-0.068
	Manganese (mg/l)	0.019	0.019	BD-0.019
	Zinc (mg/l)	0.02	0.02	BD-0.02

BD = Below Detection

Table 75. Central tendency and range for selected metrics in Subecoregion 67f&i				
Metric Category	**Metric**	**Mean**	**Median**	**Range**
Richness	Ephemeroptera, Plecoptera, and Trichoptera Taxa (EPT)	12.6	14.0	6-17
	Ephemeroptera Taxa	4.2	4.0	1-8
	Plecoptera Index	3.6	3.0	0-6
Composition	% EPT	33.4	34.2	17.9-50.0
	% Non-Insect	14.4	15.8	6.3-21.3
	% Oligochaeta	1.4	0.8	0.4-4.2
	% Chironomidae	25.0	27.5	14.6-29.6
Tolerance / Intolerance	North Carolina Biotic Index (NCBI)	4.3	4.5	3.9-4.9
	Intolerant Taxa	17.4	10	5-19
	Beck's Index	20.0	19.0	13-30
Functional Feeding Group	Scraper Taxa	6.0	6.0	5-7
Habit	% Clinger	39.7	36.3	26.7-58.3

Index 67f&i

Ephemeroptera Taxa
Plecoptera Taxa
% EPT
NCBI
Beck's Index
Scraper Taxa
% Clinger

Table 76. Index scores for sites sampled in Subecoregion 67f&i		
Station ID	**Condition**	**Index 67f&i**
67f&I-1	Impaired	20
67f&I-11	Impaired	32
67f&I-20	Impaired	19
67f&i-33	Impaired	27
67f&I-5	Impaired	35
67f&i-16	Reference	85
67f&i-17	Reference	71
67f&i-25	Reference	76
67f&i-27	Reference	63
67f&i-37	Reference	73

Figure 34. Box and whisker comparison for reference vs. impaired streams in Subecoregion 67f&i

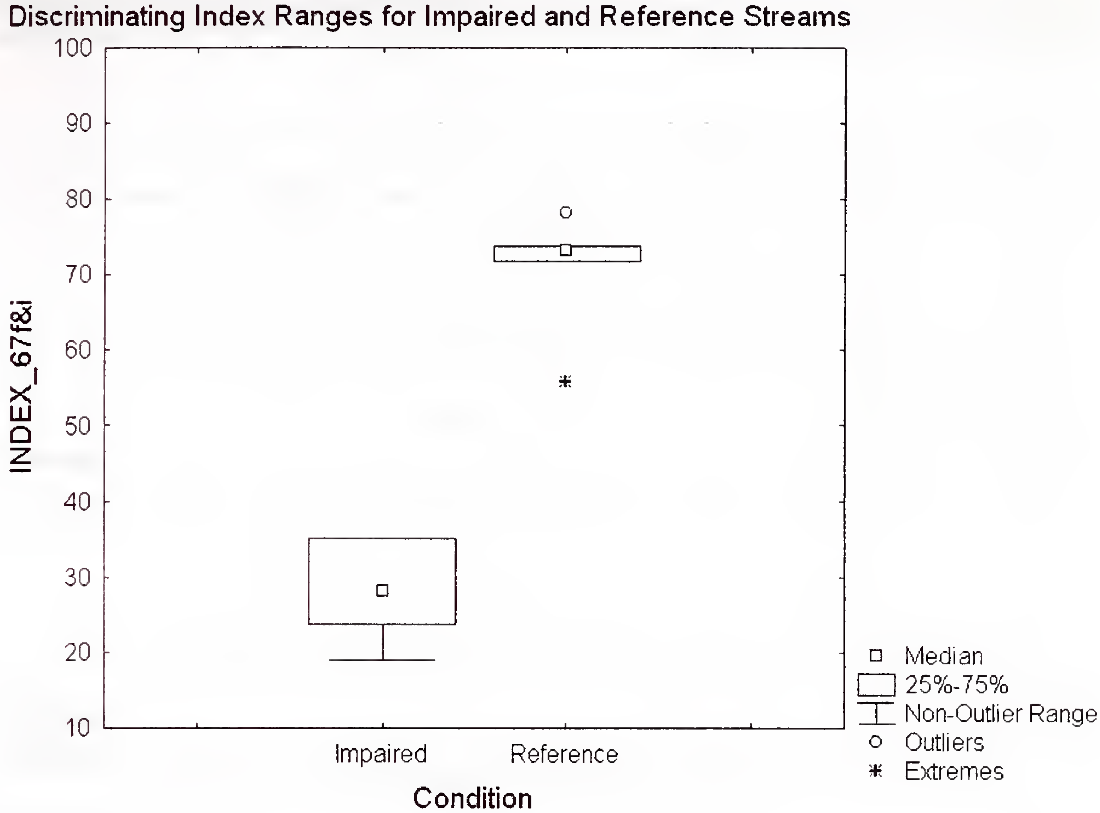


Table 77. Characteristic reference stream land use, habitat, and chemistry data for Subecoregion 67g

Catchment Land use	Parameter	Mean	Median	Range
	% Natural	92.2	92.6	88.5-95.6
	% Agriculture	0	0	0
	% Silviculture	2.2	2.7	0.40-3.6
	% Urban	5.6	4.0	3.8-8.8
Habitat	Total Habitat Score (200)	139.3	141	122-153
	Epifaunal Substrate (20)	12.8	12.5	11-15
	Embeddedness (20)	14.0	16.0	12-16
	Velocity/Depth Regime (20)	17.0	17.0	16-18
	Sediment Deposition (20)	13.0	13.0	11-15
	Channel Flow Status (20)	15.8	16.0	14-17
	Channel Alteration (20)	16.0	15.5	15-18
	Frequency of Riffles (20)	15.8	16.0	13-18
	Bank Stability (L) (10)	6.5	7.5	1-10
	Bank Stability (R) (10)	5.4	4.5	3-8
	Vegetative Protection (L) (10)	6.5	7.0	4-8
	Vegetative Protection (R) (10)	5.5	5.0	4-8
	Riparian Vegetative Width (L) (10)	6.0	6.0	3-9
	Riparian Vegetative Width (R) (10)	5.5	5.0	3-8
In Stream Habitat (Substrate)	% Silt/Clay	0.5	0.5	0-1.0
	% Sand	14.3	13.2	6.0-24.8
	% Gravel	65.6	75.7	28.0-83.2
	% Cobble	7.0	1.0	0-26.0
	% Boulder	5.0	0	0-20.0
	% Bedrock	7.0	5.2	1.0-19.0
Chemistry *(in situ)*	Specific Conductivity (mS/cm)	0.125	0.142	0.011-0.206
	Dissolved Oxygen (mg/l)	10.3	10.2	8.9-11.8
	pH (SU)	7.3	7.3	7.1-7.4
	Turbidity (NTU)	15.0	14.8	9.0-21.3
Chemistry (laboratory)	Alkalinity (mg/l as $CaCO_3$)	57.7	55.6	34.8-84.7
	Total Hardness (mg/l as $CaCO_3$)	72.4	68.0	51.1-102.3
	Ammonia (mg/l as N)	0.051	0.039	BD - 0.079
	Nitrate - Nitrite (mg/l as N)	0.419	0.488	0.020-0.681
	Nitrite (mg/l as N)	0.016	0.016	BD-0.016
	Total Phosphorous (mg/l as P)	BD	BD	BD
	Copper (mg/l)	BD	BD	BD
	Iron (mg/l)	1.37	1.37	BD-1.37
	Manganese (mg/l)	BD	BD	BD
	Zinc (mg/l)	BD	BD	BD

BD = Below Detection

Table 78. Central tendency and range for selected metrics for Subecoregion 67g				
Metric Category	**Metric**	**Mean**	**Median**	**Range**
Richness	Plecoptera Taxa	3.3	3.5	0-6
	Chironomidae Taxa	22.0	18.5	17-34
	Diptera Taxa	27.5	24.0	23-39
Composition	% Plecoptera	4.8	4.5	0-10.4
	% Orthocladiinae / Total Chironomidae (TC)	51.4	48.1	27.5-82.1
Tolerance / Intolerance	%Hydropsychidae /Trichoptera	15.3	13.9	0-33.3
	Beck's Index	18.0	17.0	10-28
	Intolerant Taxa	9.3	10.0	2-15
Functional Feeding Group	Collector Taxa	20.5	21.0	15-25
	Shredder Taxa	4.5	5.0	3-5
Habit	Sprawler Taxa	11.0	9.5	9-16

Index 67g

Plecoptera Taxa
% Hydropsychidae / Total Trichoptera
% Orthocladiinae / TC
Shredder Taxa
Collector Taxa
Sprawler Taxa

Table 79. Index scores for sites sampled in Subecoregion 67g		
Station ID	**Condition**	**Index 67g**
67g-1	Impaired	23
67g-19	Impaired	45
67g-6	Impaired	37
67g-7	Impaired	55
67g-9	Impaired	38
67g-11	Reference	76
67g-12	Reference	70
67g-13	Reference	81
67g-15	Reference	71
67g-2	Ref/Removed	36

Figure 35. Box and whisker comparison for reference vs. impaired streams in Subecoregion 67g

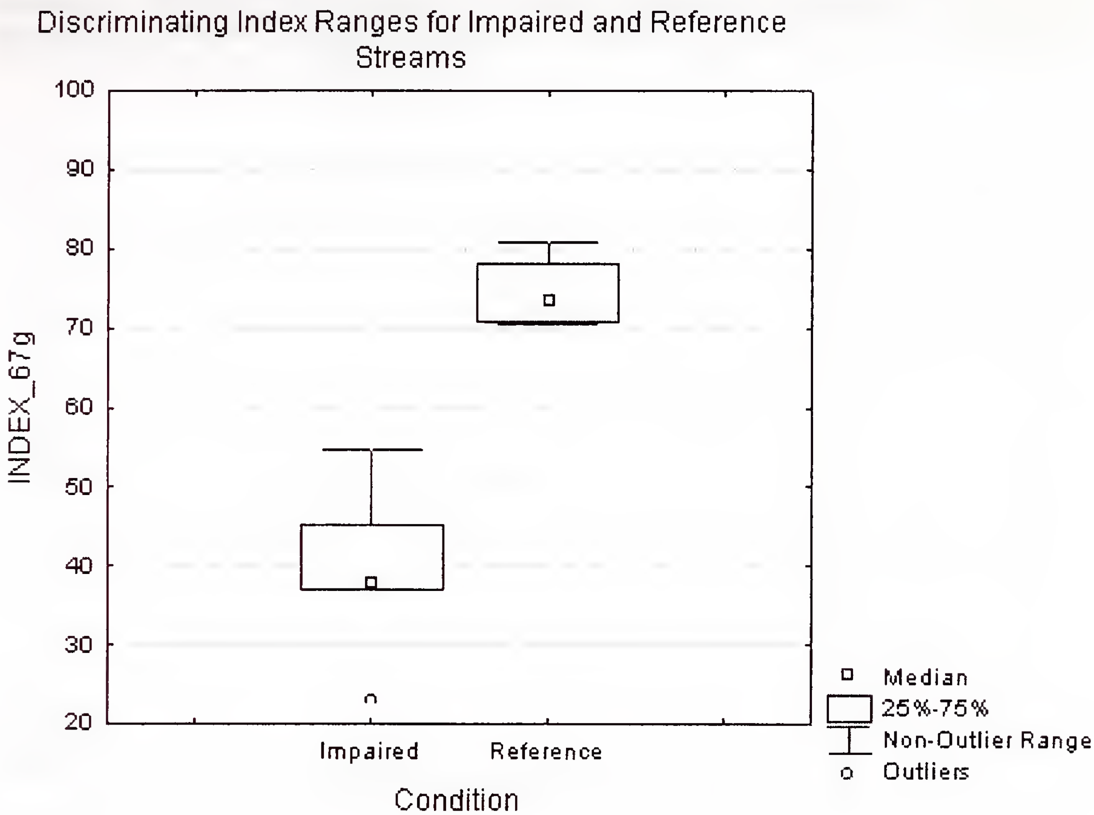


Table 80. Characteristic reference stream land use, habitat, and chemistry data for Subecoregion 67h

Catchment Land use	Parameter	Mean	Median	Range
	% Natural	91.6	91.0	88.5-96.0
	% Agriculture	0	0	0
	% Silviculture	4.0	4.1	1.6-6.1
	% Urban	4.4	4.3	2.4-6.4
Habitat	Total Habitat Score (200)	166.5	167.5	158-173
	Epifaunal Substrate (20)	16.3	16.5	15-17
	Embeddedness (20)	17.5	18.0	16-18
	Velocity/Depth Regime (20)	14.3	15.0	10-17
	Sediment Deposition (20)	17.0	17.5	14-19
	Channel Flow Status (20)	18.0	18.0	17-19
	Channel Alteration (20)	17.8	18.0	17-18
	Frequency of Riffles (20)	17.8	17.5	17-19
	Bank Stability (L) (10)	8.3	9.0	6-9
	Bank Stability (R) (10)	8.0	8.0	6-10
	Vegetative Protection (L) (10)	8.0	8.5	6-9
	Vegetative Protection (R) (10)	8.0	8.5	6-9
	Riparian Vegetative Width (L) (10)	6.5	6.0	6-8
	Riparian Vegetative Width (R) (10)	9.3	9.5	8-10
In Stream Habitat (Substrate)	% Silt/Clay	0	0	0
	% Sand	6.1	6.3	2.0-9.8
	% Gravel	46.9	48.0	42.2-49.5
	% Cobble	36.1	36.5	31.4-40.2
	% Boulder	6.2	6.4	1.0-11.0
	% Bedrock	4.6	4.9	0-8.8
Chemistry *(in situ)*	Conductivity (mS/cm)	0.034	0.032	0.023-0.047
	Dissolved Oxygen (mg/l)	11.7	11.8	10.9-12.1
	pH (SU)	6.8	6.8	6.6-7.0
	Turbidity (NTU)	5.9	6.7	1.3-9.0
Chemistry (laboratory)	Alkalinity (mg/l as $CaCO_3$)	11.8	10.9	6.8-18.5
	Hardness (mg/l as $CaCO_3$)	17.0	16.7	11.2-23.4
	Ammonia (mg/l as N)	0.041	0.034	BD - 0.059
	Nitrate - Nitrite (mg/l as N)	0.066	0.077	0.013-0.107
	Nitrite (mg/l as N)	0.01	0.01	BD-0.01
	Total Phosphorous (mg/l as P)	BD	BD	BD
	Copper (mg/l)	BD	BD	BD
	Iron (mg/l)	BD	BD	BD
	Manganese (mg/l)	BD	BD	BD
	Zinc (mg/l)	BD	BD	BD

BD = Below Detection

Table 81. Central tendency and range for selected metrics in Subecoregion 67h

Metric Category	Metric	Mean	Median	Range
Richness	Ephemeroptera Taxa	8.3	8.5	6-10
	Plecoptera Taxa	4.5	3.5	3-8
Composition	% Chironomidae	11.9	11.6	7.3-17.2
	% Isopoda	0.65	0	0-2.6
	% Gastropoda	26.7	25.6	21.0-34.4
	% Orthocladiinae / Total Chironomidae (TC)	29.4	31.2	15.4-40.0
Tolerance / Intolerance	% Intolerant Individuals	65.2	63.4	59.9-73.8
	% Tolerant Individuals	9.0	7.5	3.4-9.3
	Hilsenhoff's Biotic Index (HBI)	3.4	3.3	3.0-3.8
Functional Feeding Group	Scraper Taxa	8.0	7.0	6.0-12.0
Habit	Swimmer Taxa	1.5	2.0	0-2

Index 67h
Plecoptera Taxa
% Gastropoda
% Tolerant Individuals
HBI
Scraper Taxa
Swimmer Taxa

Table 82. Index scores for sites sampled in Subecoregion 67h

Station ID	Condition	Index 67h
67h-5	Impaired	46
67h-8	Impaired	16
67h-2	Reference	81
67h-3	Reference	76
67h-4	Reference	61
67h-9	Reference	88

Figure 36. Box and whisker comparison for reference vs. impaired streams in Subecoregion 67h

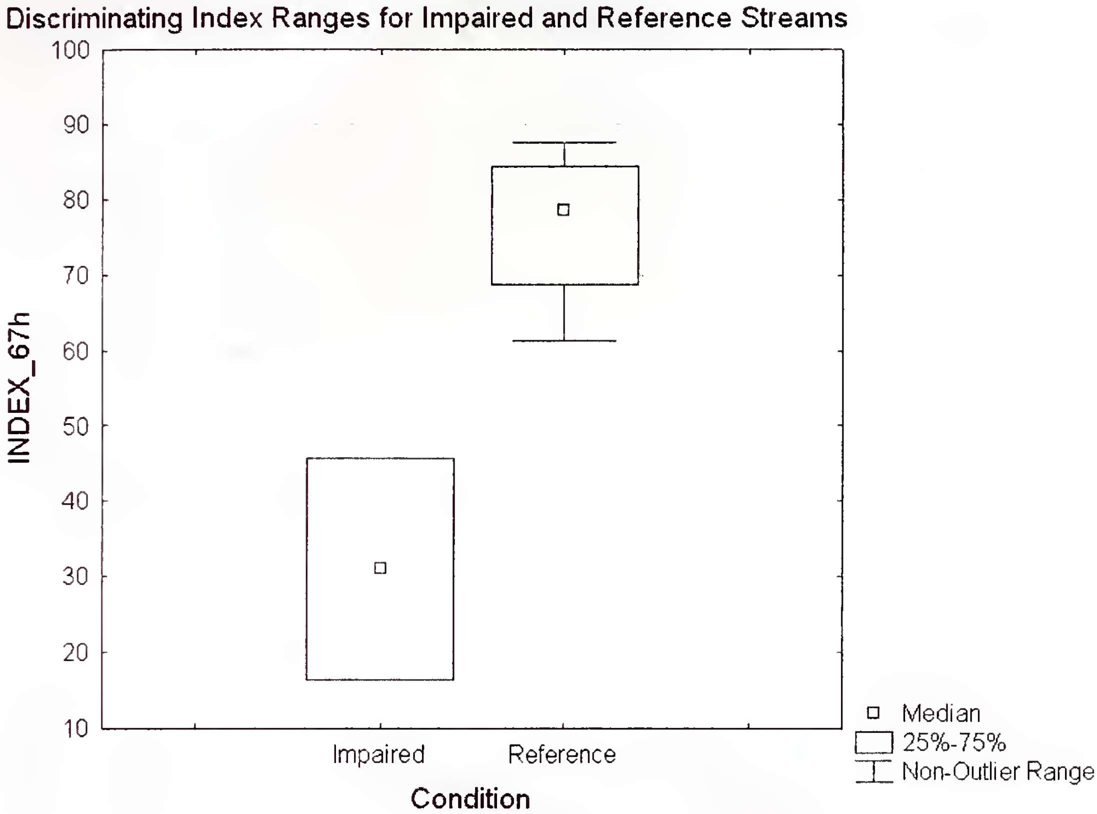


Figure 37. Ecoregion 68 – Southwestern Appalachians

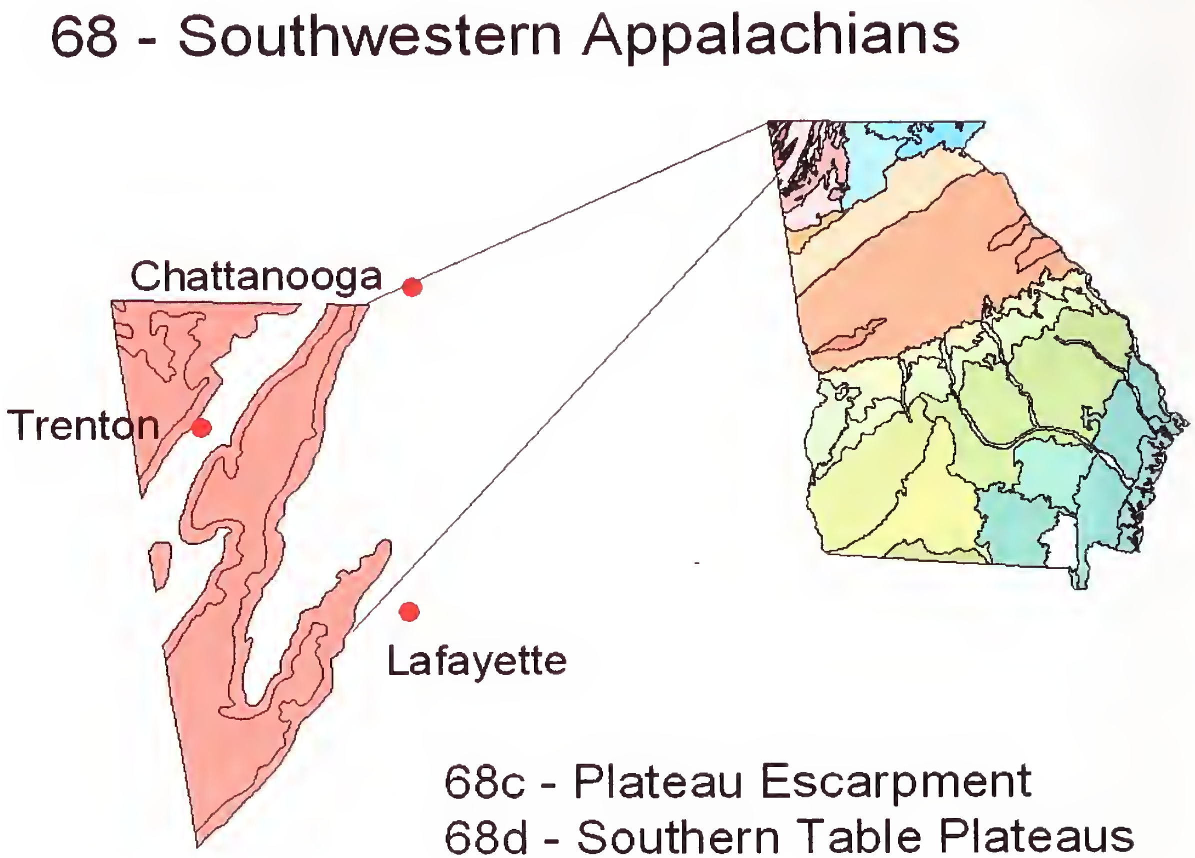


Table 83. Characteristic reference stream land use, habitat, and chemistry data for Ecoregion 68

	Parameter	Mean	Median	Range
Catchment Land use	% Natural	91.4	90.2	88.9-96.4
	% Agriculture	0	0	0
	% Silviculture	1.5	1.4	0.60-2.6
	% Urban	7.0	7.8	3.0-9.7
Habitat	Total Habitat Score (200)	176.3	179.5	161-185
	Epifaunal Substrate (20)	17.5	17.5	16-19
	Embeddedness (20)	18.3	18.0	18-19
	Velocity/Depth Regime (20)	17.5	18.0	15-19
	Sediment Deposition (20)	17.3	17.5	15-19
	Channel Flow Status (20)	18.3	18.5	17-19
	Channel Alteration (20)	17.0	17.5	14-19
	Frequency of Riffles (20)	17.3	17.0	16-19
	Bank Stability (L) (10)	8.8	8.5	8-10
	Bank Stability (R) (10)	9.8	10.0	9-10
	Vegetative Protection (L) (10)	9.3	9.0	9-10
	Vegetative Protection (R) (10)	8.8	9.0	7-10
	Riparian Vegetative Width (L) (10)	7.5	9.0	2-10
	Riparian Vegetative Width (R) (10)	9.3	9.0	9-10
In Stream Habitat (Substrate)	% Silt/Clay	0	0	0
	% Sand	12.8	12.5	4.0-22.0
	% Gravel	13.5	12.0	8.0-22.0
	% Cobble	31.3	24.5	18.0-58.0
	% Boulder	37.3	43.5	13.0-49.0
	% Bedrock	5.3	3.0	1.0-14.0
Chemistry *(in situ)*	Specific Conductivity (mS/cm)	0.039	0.031	0.019-0.075
	Dissolved Oxygen (mg/l)	11.2	11.0	10.6-12.2
	pH (SU)	6.5	6.5	6.3-6.7
	Turbidity (NTU)	1.4	1.4	0.80-1.9
Chemistry (laboratory)	Alkalinity (mg/l as $CaCO_3$)	4.2	3.7	3.5-6.6
	Total Hardness (mg/l as $CaCO_3$)	16.4	12.9	9.5-30.3
	Ammonia (mg/l as N)	0.037	0.035	BD - 0.045
	Nitrate / Nitrite (mg/l as N)	0.128	0.116	0.08-0.20
	Nitrite (mg/l as N)	0.012	0.012	BD - 0.013
	Total Phosphorous (mg/l as P)	BD	BD	BD
	Copper (mg/l)	BD	BD	BD
	Iron (mg/l)	0.781	0.781	BD - 0.781
	Manganese (mg/l)	BD	BD	BD
	Zinc (mg/l)	BD	BD	BD

BD = Below Detection

Table 84. Central tendency and range for selected metrics in Ecoregion 68				
Metric Category	**Metric**	**Mean**	**Median**	**Range**
Richness	Plecoptera Taxa	3.75	4	3-4
Composition	% Tanypodinae/Chironomidae (TC)	8.9	9.9	0.6-15.4
	% Odonata	0.7	0	0-2.9
	% Hydropsychidae / Total Trichoptera	4.0	2.1	0-11.8
Tolerance / Intolerance	% Intolerant Individuals	46.2	44.7	15.4-80.0
	Hilsenhoff's Biotic Index (HBI)	4.3	4.6	3.0-5.3
	North Carolina Biotic Index (NCBI)	4.3	4.3	2.9-5.9
Functional Feeding Group	Scraper Taxa	6.7	4.5	1-7
Habit	% Clinger	26.6	34.7	0.8-36.0

Index 68

Plecoptera Taxa
% Hydropsychidae / Total Trichoptera
% Tanypodinae / TC
NCBI
Scraper Taxa
% Clinger

Table 85. Index scores for sites sampled in Ecoregion 68		
Station ID	**Condition**	**Index 68c&d**
68c&d-1	Impaired	46
68c&d-10	Impaired	30
68c&d-3	Impaired	32
68c&d-7	Impaired	43
68c&d-8	Impaired	60
68c&d-4	Reference	77
68c&d-5	Reference	83
68c&d-6	Reference	83
68c&d-9	Reference	59

Figure 38. Box and whisker comparison for reference vs. impaired streams in Ecoregion 68

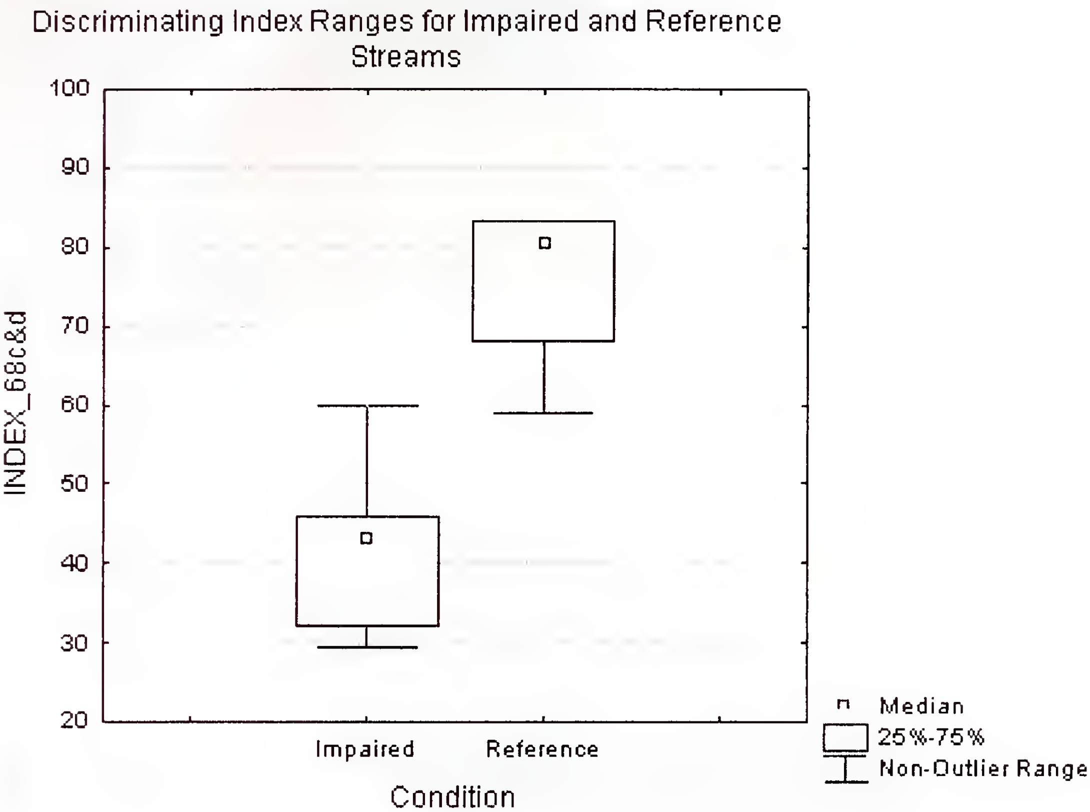


Figure 39. Ecoregion 75 – Southern Coastal Plain

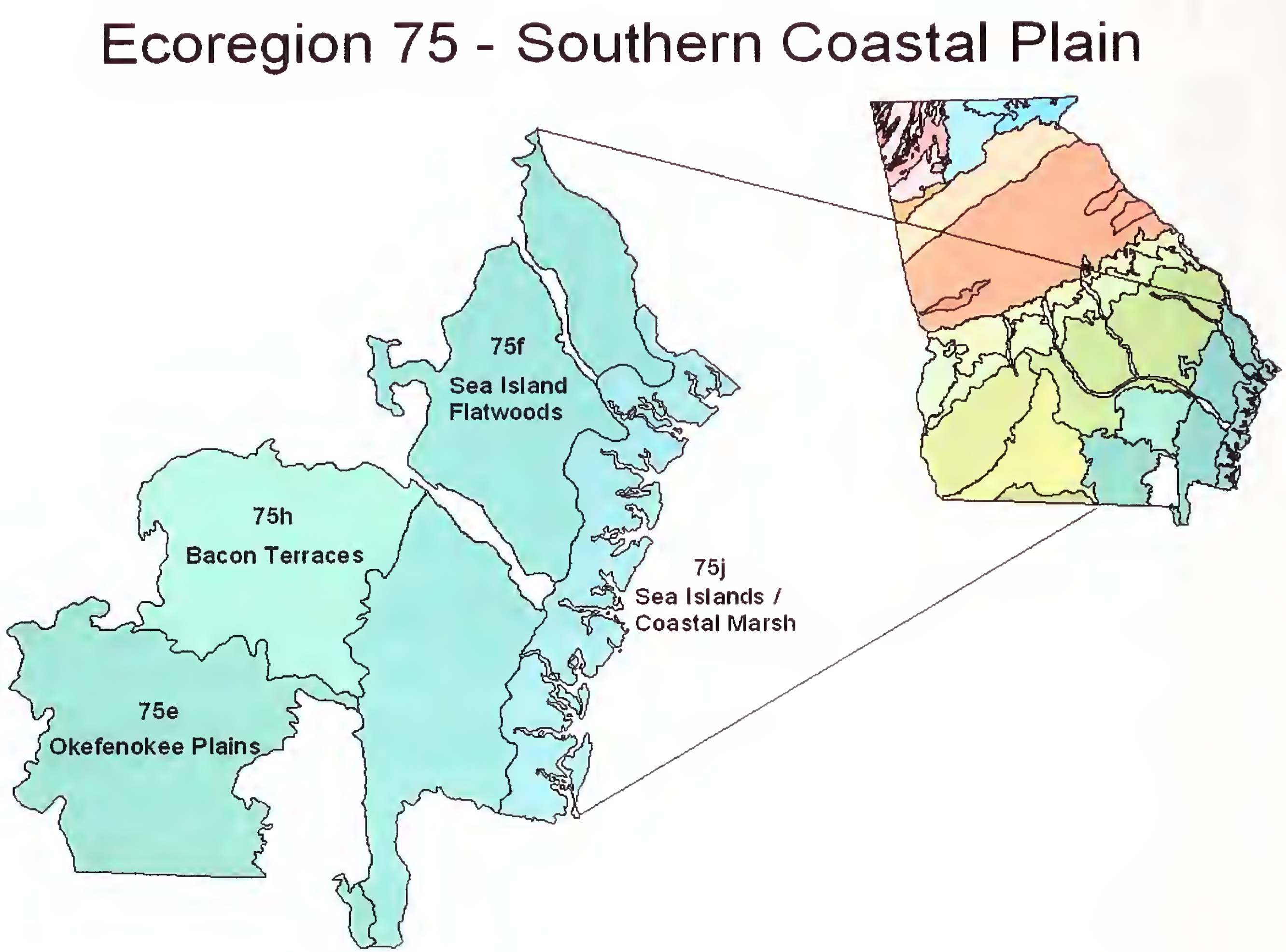


Table 86. Characteristic reference stream land use, habitat, and chemistry data for Ecoregion 75

	Parameter	Mean	Median	Range
Catchment Land use	% Natural	87.0	90.5	64.5-95.9
	% Agriculture	4.9	1.5	0.0-27.1
	% Silviculture	11.8	11.3	0.2-35.0
	% Urban	8.0	6.5	4.1-20.5
Habitat	Total Habitat Score (200)	152.2	152.0	112-181
	Epifaunal Substrate (20)	14.8	15.0	10-19
	Pool Substrate Characterization (20)	13.0	13.0	8-19
	Pool Variability (20)	11.7	11.0	5-19
	Sediment Deposition (20)	15.8	17.5	8-20
	Channel Flow Status (20)	15.8	18.0	5-20
	Channel Alteration (20)	18.2	18.0	13-20
	Channel Sinuosity (20)	13.6	13.0	8-20
	Bank Stability (L) (10)	8.3	9.0	1-10
	Bank Stability (R) (10)	8.3	9.0	1-10
	Vegetative Protection (L) (10)	8.0	8.0	3-10
	Vegetative Protection (R) (10)	8.1	8.5	3-10
	Riparian Vegetative Width (L) (10)	8.6	9.0	5-10
	Riparian Vegetative Width (R) (10)	8.0	9.0	3-10
In Stream Habitat (Substrate)	% Silt/Clay	28.2	12.9	0.0-100.0
	% Sand	71.4	85.6	0.0-100.0
	% Gravel	0.4	0.0	0.0-4.0
	% Cobble	0.0	0.0	0.0
	% Boulder	0.0	0.0	0.0
	% Bedrock	0.0	0.0	0.0
Chemistry *(in situ)*	Specific Conductivity (mS/cm)	0.871	0.108	0.051-8.920
	Dissolved Oxygen (mg/l)	6.7	6.6	3.5-14.6
	pH (SU)	4.8	4.5	3.6-6.7
	Turbidity (NTU)	11.5	6.7	0.0-57.0
Chemistry (laboratory)	Alkalinity (mg/l as $CaCO_3$)	8.8	0.0	0.0-101.4
	Total Hardness (mg/l as $CaCO_3$)	135.5	33.2	7.7-1067.0
	Ammonia (mg/l as N)	5,397	0.083	BD-48.917
	Nitrate - Nitrite (mg/l as N)	0.117	0.051	BD-0.325
	Nitrite (mg/l as N)	0.034	0.025	BD-0.115
	Total Phosphorous (mg/l as P)	0.138	0.122	BD-0.323
	Copper (mg/l)	0.009	0.009	BD-0.015
	Iron (mg/l)	1.076	1.015	BD-2.897
	Manganese (mg/l)	0.040	0.036	BD-0.099
	Zinc (mg/l)	0.018	0.017	BD-0.023

BD = Below Detection

Table 87. Central tendency and range for selected metrics in Ecoregion 75

Metric Category	Metric	Mean	Median	Range
Composition	% Non-Insect	25.4	16.7	0.5-92.4
	% Oligochaeta	2.2	1.0	0.0-8.1
	% Odonata	0.8	0.0	0.0-9.2
	% Tanypodinae / Total Chironomidae (TC)	3.1	0.2	0.0-34.4
Tolerance / Intolerance	Hilsenhoff's Biotic Index (HBI)	7.1	7.2	5.2-9.0

Index 75

% Non-Insect
% Oligochaeta
% Odonata
% Tanypodinae / TC
HBI

Table 88. Index scores for sites sampled in Ecoregion 75

Station ID	Condition	Index 75
75e-20	Impaired	84
75e-3	Impaired	71
75e-36	Impaired	68
75e-46	Impaired	55
75e-54	Impaired	79
75f-127	Impaired	86
75f-137	Impaired	75
75f-44	Impaired	76
75f-45	Impaired	49
75f-50	Impaired	50
75h-1	Impaired	76
75h-41	Impaired	62
75h-47	Impaired	74
75h-69	Impaired	68
75h-70	Impaired	74
75h-72	Impaired	48
75j-11	Impaired	58
75j-12	Impaired	64

Station ID	Condition	Index 75
75j-13	Impaired	88
75j-2	Impaired	77
75j-21	Impaired	84
75j-23	Impaired	66
75j-24	Impaired	75
75j-3	Impaired	60
75j-3-1	Impaired	47
75j-4	Impaired	59
75e-23	Reference	92
75e-59	Reference	85
75e-60	Reference	81
75e-69	Reference	88
75e-78	Reference	88
75f-124	Reference	80
75f-126	Reference	75
75f-61	Reference	72
75f-91	Reference	92
75f-95	Reference	82
75h-10	Reference	97
75h-35	Reference	100
75h-45	Reference	91
75h-60	Reference	81
75h-66	Reference	63
75j-10	Reference	90
75j-15	Reference	82
75j-16	Reference	94
75j-25	Reference	77
75j-26	Reference	83
75j-31	Reference	72
75j-37	Reference	84
75j-41	Reference	76
75j-5	Reference	74
75j-29	Ref/Removed	66

Figure 40. Box and whisker comparison for reference vs. impaired streams in Ecoregion 75

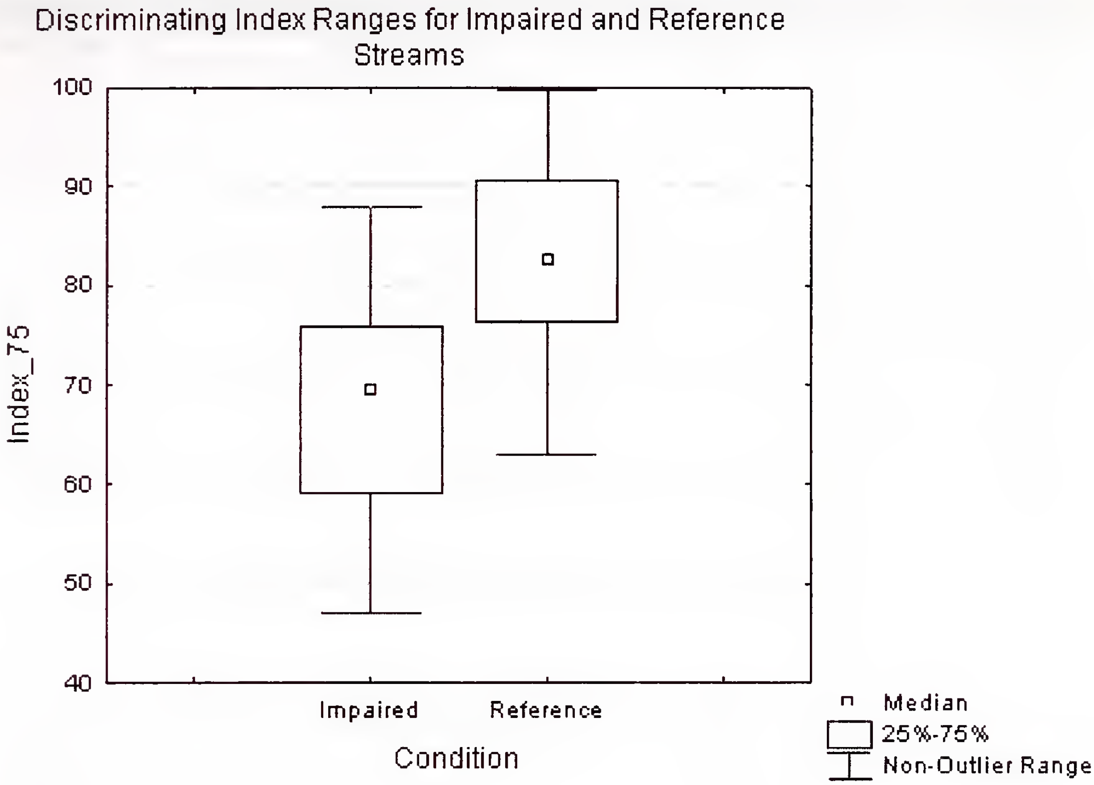


Table 89. Characteristic reference stream land use, habitat, and chemistry data for Subecoregion 75e

Catchment Land use	Parameter	Mean	Median	Range
	% Natural	72.5	76.6	49.1-83.7
	% Agriculture	5.7	4.5	1.7-12.1
	% Silviculture	15.5	15.0	8.3-29.7
	% Urban	6.4	6.2	5.0-9.1
Habitat	Total Habitat Score (200)	166.4	166	149-181
	Epifaunal Substrate (20)	16.0	16.0	11-19
	Pool Substrate Characterization (20)	14.6	16.0	10-19
	Pool Variability (20)	12.4	14.0	5-17
	Sediment Deposition (20)	18.0	18.0	17-19
	Channel Flow Status (20)	17.6	17.0	16-20
	Channel Alteration (20)	19.0	19.0	18-20
	Channel Sinuosity (20)	15.2	16.0	11-20
	Bank Stability (L) (10)	9.6	10.0	9-10
	Bank Stability (R) (10)	9.4	9.0	9-10
	Vegetative Protection (L) (10)	9.2	10.0	8-10
	Vegetative Protection (R) (10)	9.0	9.0	8-10
	Riparian Vegetative Width (L) (10)	8.4	8.0	6-10
	Riparian Vegetative Width (R) (10)	8.0	8.0	6-10
In Stream Habitat (Substrate)	% Silt/Clay	9.2	6.0	0-24.8
	% Sand	89.7	94.0	71.3-100.0
	% Gravel	1.2	0	0-4.0
	% Cobble	0	0	0
	% Boulder	0	0	0
	% Bedrock	0	0	0
Chemistry *(in situ)*	Conductivity (mS/cm)	0.077	0.069	0.055-0.110
	Dissolved Oxygen (mg/l)	6.8	6.0	5.5-9.7
	pH (SU)	4.0	4.0	3.8-4.1
	Turbidity (NTU)	10.3	4.7	0.8-29.2
Chemistry (laboratory)	Alkalinity (mg/l as $CaCO_3$)	0	0	0
	Hardness (mg/l as $CaCO_3$)	31.1	17.8	7.7-97.4
	Ammonia (mg/l as N)	0.058	0.048	BD - 0.083
	Nitrate - Nitrite (mg/l as N)	0.183	0.183	BD - 0.325
	Nitrite (mg/l as N)	0.029	0.025	0.018-0.043
	Total Phosphorous (mg/l as P)	0.042	0.042	BD-0.042
	Copper (mg/l)	BD	BD	BD
	Iron (mg/l)	0.33	0.33	BD-0.39
	Manganese (mg/l)	0.1	0.1	BD-0.1
	Zinc (mg/l)	BD	BD	BD

BD = Below Detection

Table 90. Central tendency and range for selected metrics in Subecoregion 75e				
Metric Category	**Metric**	**Mean**	**Median**	**Range**
Composition	% Non-Insect	12.4	13.9	6.1-17.9
	% Oligochaeta	0.6	0.8	0-1.0
	% Tanypodinae / Total Chironomidae (TC)	4.3	1.2	0-17.7
	% Odonata	0.3	0.0	0-0.8
	% *Chironomus* & *Cricotopus* / Total Chironomidae (TC)	5.9	0.0	0-29.7
Tolerance / Intolerance	Dominant Individuals	97.2	89.0	58-144
	Tolerant Taxa	10	8	4-19
Functional Feeding Group	% Collector	32.7	33.7	22.9-42.9
	% Filterer	3.9	0.8	0-16.9

Index 75e

% Non-Insect
% Oligochaeta
% Tanypodinae / TC
Dominant Individuals
% Collector
% Filterer

Table 91. Index scores for sites sampled in Subecoregion 75e		
Station ID	**Condition**	**Index 75e**
75e-20	Impaired	69
75e-3	Impaired	58
75e-36	Impaired	64
75e-46	Impaired	43
75e-54	Impaired	70
75e-23	Reference	74
75e-59	Reference	70
75e-60	Reference	88
75e-69	Reference	86
75e-78	Reference	92

Figure 41. Box and whisker comparison for reference vs. impaired streams in Subecoregion 75e

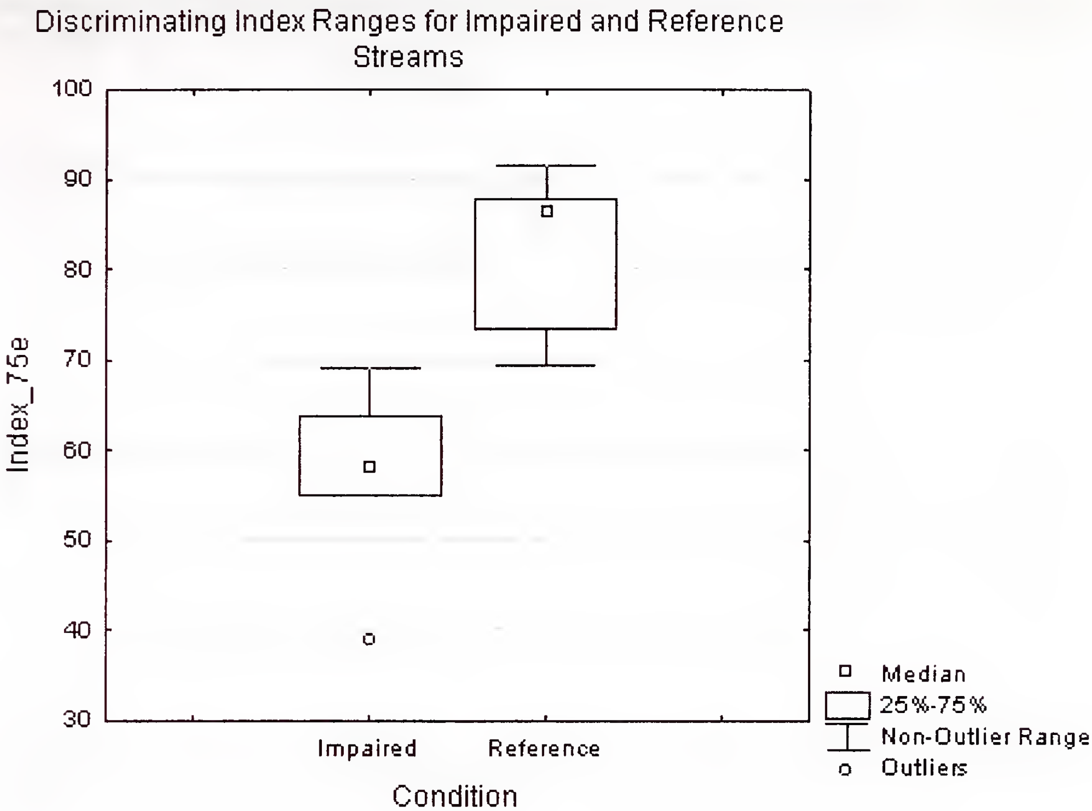


Table 92. Characteristic reference stream land use, habitat, and chemistry data for Subecoregion 75f

	Parameter	Mean	Median	Range
Catchment Land use	% Natural	82.8	81.5	78.5-88.6
	% Agriculture	0	0	0
	% Silviculture	9.8	12.2	4.8-12.5
	% Urban	7.3	6.5	6.0-9.3
Habitat	Total Habitat Score (200)	153.0	151.0	146-164
	Epifaunal Substrate (20)	16.0	17.5	11-18
	Pool Substrate Characterization (20)	14.0	15.0	10-16
	Pool Variability (20)	11.0	10.0	9-15
	Sediment Deposition (20)	15.3	15.5	10-20
	Channel Flow Status (20)	18.0	19.5	13-20
	Channel Alteration (20)	17.5	17.5	15-20
	Channel Sinuosity (20)	12.3	10.5	9-19
	Bank Stability (L) (10)	8.8	8.5	8-10
	Bank Stability (R) (10)	8.8	8.5	8-10
	Vegetative Protection (L) (10)	8.0	8.5	6-9
	Vegetative Protection (R) (10)	8.3	8.5	6-10
	Riparian Vegetative Width (L) (10)	8.3	9.0	6-9
	Riparian Vegetative Width (R) (10)	7.0	8.0	3-9
In Stream Habitat (Substrate)	% Silt/Clay	51.8	53.5	0-100
	% Sand	48.3	46.5	0-100.0
	% Gravel	0	0	0
	% Cobble	0	0	0
	% Boulder	0	0	0
	% Bedrock	0	0	0
Chemistry *(in situ)*	Conductivity (mS/cm)	.117	.120	.051-.179
	Dissolved Oxygen (mg/l)	5.7	6.6	3.5-7.1
	pH (SU)	4.6	4.2	3.7-6.0
	Turbidity (NTU)	6.9	3.4	0-17.4
Chemistry (laboratory)	Alkalinity (mg/l as $CaCO_3$)	20.9	20.9	20.9
	Hardness (mg/l as $CaCO_3$)	40.1	40.1	40.1
	Ammonia (mg/l as N)	6.43	6.43	BD-6.43
	Nitrate - Nitrite (mg/l as N)	0.136	0.053	BD-0.315
	Nitrite (mg/l as N)	0.038	0.034	BD-0.066
	Total Phosphorous (mg/l as P)	0.089	0.089	BD-0.113
	Copper (mg/l)	0.003	0.003	BD-0.003
	Iron (mg/l)	0.87	0.96	BD-1.19
	Manganese (mg/l)	0.036	0.036	BD-0.036
	Zinc (mg/l)	0.017	0.017	BD-0.017

BD = Below Detection

Table 93. Central tendency and range for selected metrics in Subecoregion 75f				
Metric Category	**Metric**	**Mean**	**Median**	**Range**
Richness	Chironomidae Taxa	7.8	8.0	3-12
Composition	% Odonata	0.0	0.0	0.0
	% Amphipoda	2.4	0.8	0-8.1
	% Oligochaeta	3.0	1.9	0-8.1
	% Tanypodinae / Total Chironomidae (TC)	0.1	0.0	0-0.5
Tolerance / Intolerance	Hilsenhoff's Biotic Index (HBI)	7.6	7.3	7.0-9.0
	Tolerant Taxa	6.8	6.5	4-10
Functional Feeding Group	% Filterer	0.3	0.2	0-0.9

Index 75f

Chironomidae Taxa
% Odonata
% Oligochaeta
% Tanypodinae / TC
Tolerant Taxa
% Filterer

Table 94. Index scores for sites sampled in Subecoregion 75f		
Station ID	**Condition**	**Index 75f**
75f-127	Impaired	64
75f-137	Impaired	57
75f-44	Impaired	68
75f-45	Impaired	27
75f-50	Impaired	27
75f-126	Reference	73
75f-61	Reference	90
75f-91	Reference	98
75f-95	Reference	89

Figure 42. Box and whisker comparison for reference vs. impaired streams in Subecoregion 75f

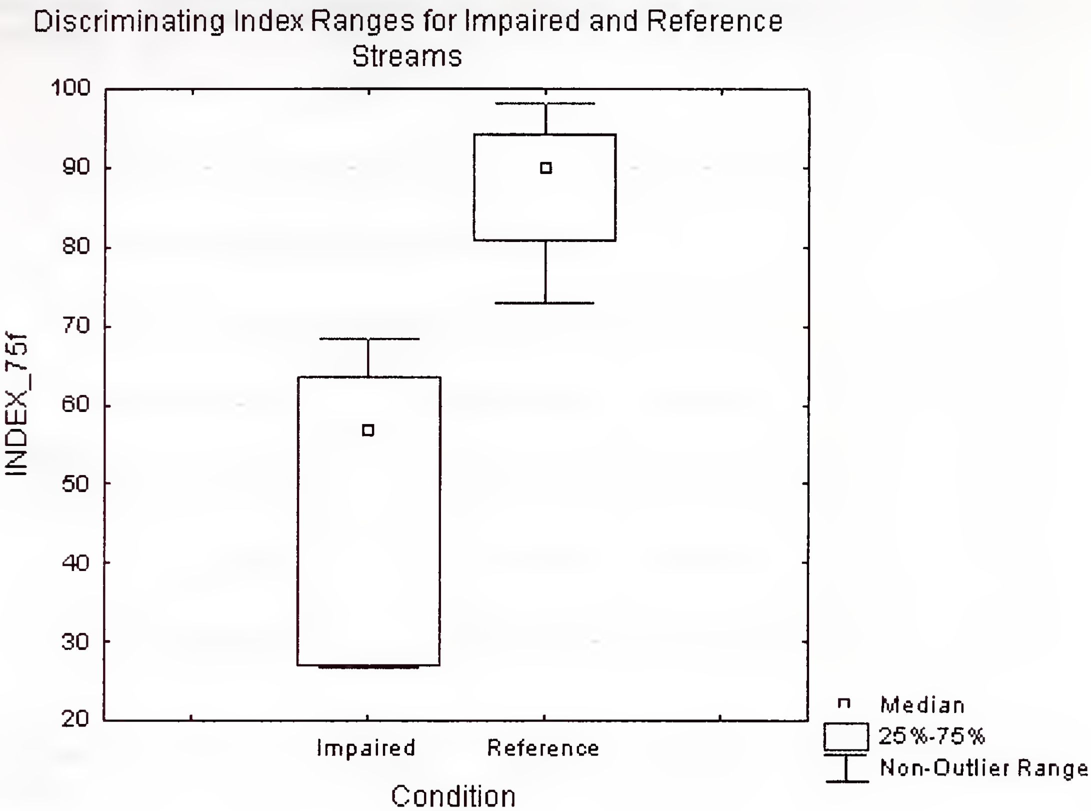


Table 95. Characteristic reference stream land use, habitat, and chemistry data for Subecoregion 75h

Catchment Land use	Parameter	Mean	Median	Range
	% Natural	64.8	65.0	53.8-75.2
	% Agriculture	16.0	17.4	3.3-26.0
	% Silviculture	12.7	12.5	3.4-22.3
	% Urban	6.5	6.6	4.6-8.3
Habitat	Total Habitat Score (200)	159.6	159.0	145-178
	Epifaunal Substrate (20)	15.0	15.0	13-18
	Pool Substrate Characterization (20)	15.0	17.0	10-18
	Pool Variability (20)	12.6	11.0	8-19
	Sediment Deposition (20)	16.2	18.0	8-19
	Channel Flow Status (20)	18.2	18.0	16-20
	Channel Alteration (20)	18.6	18.0	18-20
	Channel Sinuosity (20)	13.0	13.0	10-18
	Bank Stability (L) (10)	9.4	9.0	9-10
	Bank Stability (R) (10)	9.4	9.0	9-10
	Vegetative Protection (L) (10)	8.6	9.0	8-9
	Vegetative Protection (R) (10)	8.8	9.0	7-10
	Riparian Vegetative Width (L) (10)	7.8	9.0	5-10
	Riparian Vegetative Width (R) (10)	7.0	7.0	4-9
In Stream Habitat (Substrate)	% Silt/Clay	17.2	11.0	2.0-54.0
	% Sand	82.2	87.0	46.0-98.0
	% Gravel	0.6	0.0	0-2.0
	% Cobble	0	0	0
	% Boulder	0	0	0
	% Bedrock	0	0	0
Chemistry *(in situ)*	Conductivity (mS/cm)	0.182	0.073	0.061-0.633
	Dissolved Oxygen (mg/l)	5.8	5.6	3.5-7.4
	pH (SU)	4.9	4.8	4.4-5.5
	Turbidity (NTU)	3.8	3.1	1.2-8.1
Chemistry (laboratory)	Alkalinity (mg/l as $CaCO_3$)	1.9	0.0	0-7.5
	Hardness (mg/l as $CaCO_3$)	15.0	13.9	11.7-21.3
	Ammonia (mg/l as N)	2.27	0.081	BD – 6.69
	Nitrate - Nitrite (mg/l as N)	0.144	0.159	BD->1.00
	Nitrite (mg/l as N)	0.01	0.01	BD-0.01
	Total Phosphorous (mg/l as P)	0.168	0.168	BD-0.168
	Copper (mg/l)	BD	BD	BD
	Iron (mg/l)	1.06	1.15	0.20-1.60
	Manganese (mg/l)	BD	BD	BD
	Zinc (mg/l)	BD	BD	BD

BD = Below Detection

Table 96. Central tendency and range for selected metrics in Subecoregion 75h				
Metric Category	**Metric**	**Mean**	**Median**	**Range**
Composition	% Non-Insect	10.3	6.3	1.7-29.6
	% Oligochaeta	2.1	1.3	0-4.2
Tolerance / Intolerance	Hilsenhoff's Biotic Index (HBI)	6.3	6.6	5.2-7.1
	% Tolerant Individuals	31.7	37.0	8.9-55.0
Functional Feeding Group	Shredder Taxa	2.2	2.0	0-5
	% Shredder	2.3	1.3	0-6.7
Habit	Sprawler Taxa	5.8	5.0	3-10

Index 75h

% Non-Insect
% Oligochaeta
HBI
Shredder Taxa
Sprawler Taxa

Table 97. Index scores for sites sampled in Subecoregion 75h		
Station ID	**Condition**	**Index 75h**
75h-1	Impaired	53
75h-41	Impaired	23
75h-47	Impaired	39
75h-69	Impaired	22
75h-70	Impaired	58
75h-72	Impaired	0
75h-10	Reference	76
75h-35	Reference	68
75h-45	Reference	62
75h-60	Reference	67
75h-66	Reference	85

Figure 43. Box and whisker comparison for reference vs. impaired streams in Subecoregion 75h

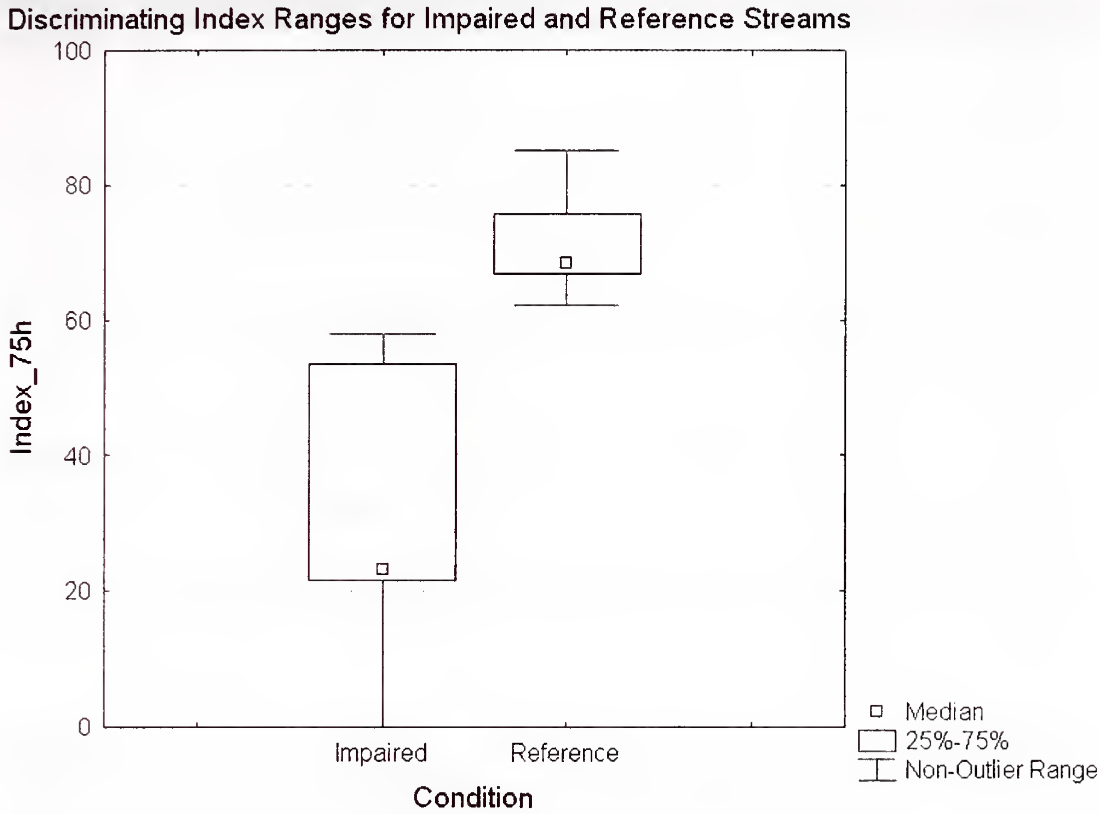


Table 98. Characteristic reference stream land use, habitat, and chemistry data for Subecoregion 75j

	Parameter	Mean	Median	Range
Catchment Land use	% Natural	91.5	93.4	77.8-95.9
	% Agriculture	0.5	0.0	0.0-2.0
	% Silviculture	11.3	11.3	0.2-35.0
	% Urban	7.8	5.5	4.1-2-.2
Habitat	Total Habitat Score (200)	141.1	145.5	112-161
	Epifaunal Substrate (20)	13.5	13.5	10-16
	Pool Substrate Characterization (20)	10.7	10.5	8-15
	Pool Variability (20)	11.2	10.5	8-16
	Sediment Deposition (20)	14.6	14.5	8-19
	Channel Flow Status (20)	12.9	13.5	5-19
	Channel Alteration (20)	17.9	18.0	13-20
	Channel Sinuosity (20)	13.7	12.5	8-19
	Bank Stability (L) (10)	6.9	7.0	1-10
	Bank Stability (R) (10)	7.1	7.5	1-10
	Vegetative Protection (L) (10)	7.2	8.0	3-10
	Vegetative Protection (R) (10)	7.3	8.0	3-9
	Riparian Vegetative Width (L) (10)	9.2	9.0	7-10
	Riparian Vegetative Width (R) (10)	8.9	9.0	7-10
In Stream Habitat (Substrate)	% Silt/Clay	39.8	40.5	0.0-89.0
	% Sand	60.2	59.5	11.0-100.0
	% Gravel	0.0	0.0	0.0
	% Cobble	0.0	0.0	0.0
	% Boulder	0.0	0.0	0.0
	% Bedrock	0.0	0.0	0.0
Chemistry *(in situ)*	Conductivity (mS/cm)	1.75	0.15	0.10-8.92
	Dissolved Oxygen (mg/l)	7.5	7.2	5.0-14.6
	pH (SU)	5.2	5.6	3.6-6.7
	Turbidity (NTU)	12.3	10.0	1.0-33.0
Chemistry (laboratory)	Alkalinity (mg/l as $CaCO_3$)	16.45	2.4	0.0-101.4
	Hardness (mg/l as $CaCO_3$)	261.85	116.3	16.5-1067.0
	Ammonia (mg/l as N)	8.39	0.19	BD-48.92
	Nitrate - Nitrite (mg/l as N)	0.035	0.034	BD->1.0
	Nitrite (mg/l as N)	0.037	0.028	BD-0.115
	Total Phosphorous (mg/l as P)	0.16	0.19	BD-0.32
	Copper (mg/l)	0.015	0.015	BD-0.015
	Iron (mg/l)	1.21	1.03	BD-2.90
	Manganese (mg/l)	0.022	0.019	BD-0.041
	Zinc (mg/l)	0.019	0.019	BD-0.023

BD = Below Detection

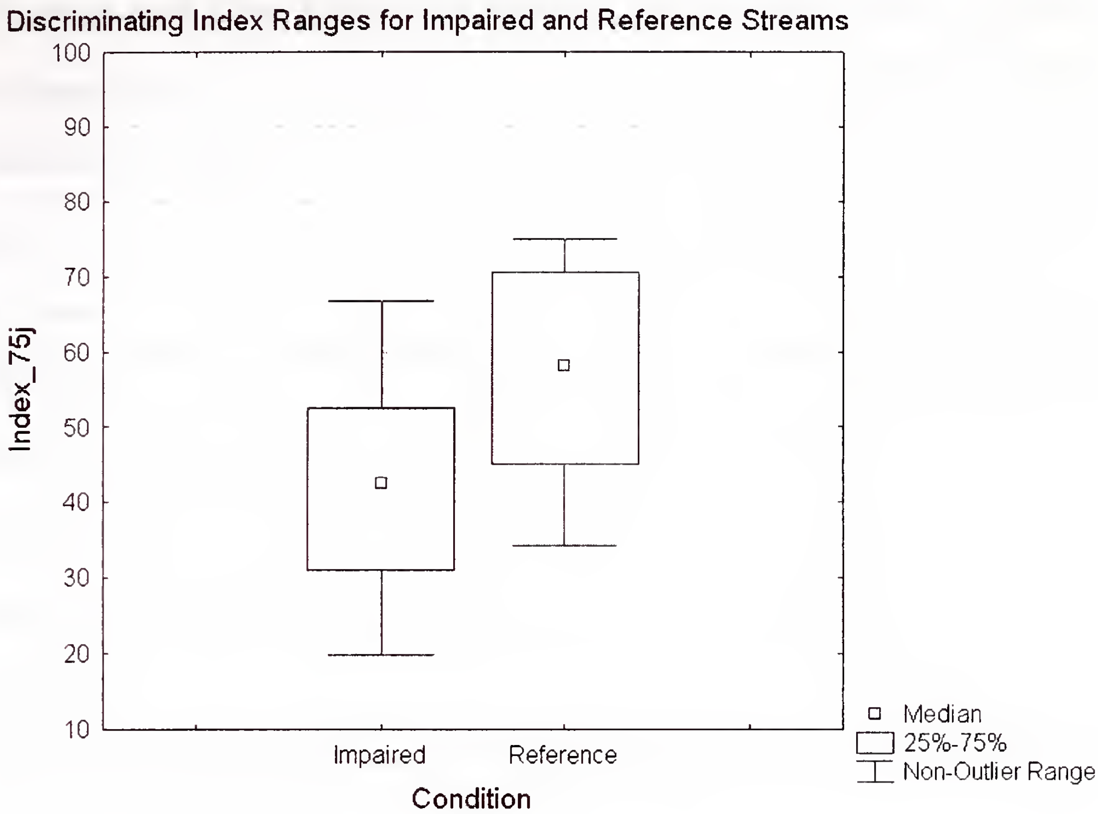
Table 99. Central tendency and range for selected metrics in Subecoregion 75j				
Metric Category	**Metric**	**Mean**	**Median**	**Range**
Composition	% Oligochaeta	2.4	1.7	0.0-6.7
Tolerance / Intolerance	% Tolerant Individuals	31.6	27.1	0.0-88.8
	Hilsenhoff's Biotic Index (HBI)	7.3	7.4	6.1-8.4
	North Carolina Biotic Index (NCBI)	7.8	8.6	7.4-9.8
Functional Feeding Group	Predator Taxa	3.6	4.0	0-11
	Shredder Taxa	1.1	1.0	0-2
	% Shredder	1.7	1.3	0-6.8

Index 75j

% Oligochaeta
% Tolerant Individuals
HBI
NCBI
Predator Taxa
Shredder Taxa

Table 100. Index scores for sites sampled in Subecoregion 75j		
Station ID	**Condition**	**Index 75j**
75j-11	Impaired	31
75j-12	Impaired	51
75j-13	Impaired	73
75j-2	Impaired	70
75j-4	Impaired	44
75f-124	Reference	66
75j-10	Reference	82
75j-15	Reference	88
75j-16	Reference	67
75j-25	Reference	70
75j-26	Reference	65
75j-31	Reference	63
75j-37	Reference	52
75j-41	Reference	66
75j-5	Reference	38
75j-29	Ref/removed	44

Figure 44. Box and whisker comparison for reference vs. impaired streams in Subecoregion 75j



DISCUSSION AND CONCLUSIONS

Multimetric indices were developed using benthic macroinvertebrate assemblage-level data; they were calibrated based on site classes (ecoregion and subecoregion) and their ability to detect the presence of stressed conditions (discrimination efficiency). Physical and chemical data were used primarily to screen streams from consideration as potential reference sites, either because they were anomalous for the site class or because there were unacceptable levels of stress. Physical and chemical data were not used in this analysis to discriminate reference from impaired streams. In fact, some of the physical and chemical measurements and observations did not clearly differentiate between reference and impaired streams (especially in non-urban settings). For instance, visual-based habitat assessment scores were very similar in some subecoregions for both reference and impaired streams. This may have been an issue of scale. Initial filters to select candidate reference streams were based upon catchment-wide land use data (Table 1). Reach specific riparian and instream conditions were used, however, to refine the candidate reference stream pool (based on parameter comparison with other reference streams to confirm that a site met the minimally impaired goal). It is possible that a reference stream received a sub-optimal or fair score on the visual based habitat assessment while catchment-wide land use indicated it should have met the minimally-impaired biological condition. Conversely, it is also possible that an impaired stream received an optimal or sub-optimal habitat assessment score while catchment wide land use data clearly indicated that the stream may have been biologically impaired.

Among chemical parameters, metals concentrations were often not markedly different between reference and impaired streams in the same ecoregion (or subecoregion), and in most cases were below the level of detection for both stream site groups. Additionally, similarity of nutrient concentrations between reference and impaired streams may preclude their use in identifying the degree of impairment of streams, but may be able to pinpoint possible sources of nutrients in some ecoregions (Brosset 2005). Physical and chemical data collected using RBP protocols may best be used to identify potential stressors and serve as a baseline to document changes in water quality and local habitat over time. While both physical and chemical data are important in providing a holistic evaluation of stream water quality, such data should not be used as a sole basis for determining stream condition, or to evaluate the nature or degree of impairment of streams. For these reasons, this discussion centers on the ecoregional framework and factors affecting the selection of metrics and indices used to characterize the biological reference condition in target ecoregions and subecoregions of Georgia.

Two major assumptions underpin this research. The first assumption is that GIS filters and land use/land cover data layers may be used to accurately select catchments with a minimal amount of anthropogenic disturbance (as demonstrated by Olson, 2002). The second assumption is that an ecoregional (or subecoregional) framework allows for the selection of streams that are the most similar to one another in the absence of disturbance (candidate reference streams). One way to test the second assumption is to consider discrimination efficiencies and box and whisker plot scores at the ecoregional and subecoregional levels.

The average DE for macroinvertebrate indices among the ecoregions was 72% (n=6), while that among subecoregions was 95% (n=23). The ecoregional framework used for this research accounts for abiotic variation and partitions the state into areas where the range of natural variability of biological parameters (metrics) can be determined by sampling multiple reference streams. These data then, are used to characterize the biological reference, or minimally impaired, condition for the ecoregion or subecoregion under consideration. The disparity between the overall average discrimination efficiencies at the ecoregional and subecoregional level supports the premise that reference streams are more similar to one another as additional variables are considered and finer resolution used to isolate site groups (subecoregions versus ecoregions).

Discrimination efficiencies at the ecoregional level were highest in the two smallest ecoregions (ecoregion 67 = 92%, and ecoregion 68 = 100%). The four larger ecoregions all had discrimination efficiencies less than 80%. This may indicate that spatial distribution and the geographic relationship of sample sites, as well as abiotic ecoregional divisions, account for biotic variation among minimally impaired streams. At the finer subecoregion scale, only one site group had a discrimination efficiency below 80% (subecoregion 75j = 60%), and 18 of 23 subecoregions had a discrimination efficiency of 100%. The low discrimination in subecoregion 75j, the Sea Islands and Coastal Marsh, may be due to a number of factors including the presence of blackwater and clearwater streams, possible tidal influences, and the potential for drought effects on biota. These factors will be discussed further as potential limitations of macroinvertebrate indices in Georgia.

Box and whisker plot scores were assigned on a scale of 0-3 (with three indicating the greatest difference between graphical representations of the reference and impaired index score distributions and zero, the least) (Figure 3). Ecoregional box and whisker plots scored one (65), two (45), and three (66, 67, 68, and 75). All ecoregional plots had at least some overlap of reference and impaired ranges, but only in ecoregion 65 was there an extensive overlap of the interquartile ranges (IQRs) (Figure 19). The overall impairment group overlap was expected at the ecoregional level due to the larger number of streams considered for each ecoregional index (and increased natural variation in the biotic condition across subecoregions in the same ecoregion). Subecoregional box and whisker plots scored in the highest category with the exception of a single subecoregion (75j) (Table 8). As with ecoregion 65, subecoregion 75j displayed an extensive overlap of reference and impaired IQRs (Figure 44). Almost of half (11) of the subecoregional indices (n=23) showed no overlap of reference and impaired ranges (45a, 45b, 45d, 65d, 65g, 66g, 67f&i, 67g, 67h, 75f, and 75h). It is anticipated that some IQR overlap will occur in at least some of these indices as additional stream samples are added to the existing dataset. However, box and whisker plots confirm that subecoregional indices provide better differentiation between reference and impaired streams than do ecoregional indices.

Based on discrimination efficiencies and box and whisker plot scores, the ecoregional (and subecoregional) framework appears to adequately group similar streams, and is valid, in Georgia, to accurately characterize a test stream as being biologically similar to either the reference or impaired group of streams. When possible, subecoregional indices should be used instead of ecoregional indices as they provide finer resolution and better discrimination between reference and impaired streams.

While the ecoregional framework appears to work well in Georgia, there are several issues of potential concern that must be addressed. A major factor that may affect the validity of metric and index scores in some cases is the size of ecoregions and subecoregions and the number of catchments of the target size ($\approx$ 10-100 km^2) that they contain (versus the actual number of catchments evaluated in this study).

The geographic area of subecoregions in Georgia varies widely (290 to 31,590 km^2). This difference in area may affect the ability of researchers to select an adequate number of candidate reference streams to characterize the biological reference condition, or an adequate number of impaired streams with which to test metrics and benthic macroinvertebrate indices. Due to time and resource constraints, and in an effort to characterize all target ecoregions and subecoregions of Georgia, an initial arbitrary goal of sampling five reference and five impaired streams was set for each subecoregion. The actual numbers of streams included in this analysis are listed in Table 101.

Table 101. Number and percentage of catchments sampled by subecoregion

Sub-ecoregion	# Reference streams sampled	# Impaired streams sampled	Total	# Catchments of target size	% of possible catchments sampled
45a	5	5	10	91	11.0
45b	5	6	11	436	2.5
45c	4	5	9	21	42.9
45d	4	5	9	23	39.1
45h	5	5	10	16	62.5
65c	5	7	12	93	12.9
65d	5	5	10	39	25.6
65g	3	10	13	139	9.4
65h	5	5	10	215	4.7
65k	5	5	10	143	7.0
65l	5	5	10	426	2.3
65o	4	5	9	28	32.1
66d	5	5	10	32	31.3
66g	5	7	12	68	17.6
66j	5	5	10	12	83.3
67f&i	5	5	10	42	23.8
67g	4	5	9	24	37.5
67h	4	2	6	9	66.7
68c&d	4	5	9	11	81.8
75e	5	5	10	82	12.2
75f	4	5	9	148	6.1
75h	5	6	11	74	14.9
75j	10	6	16	47	34.0

The exact proportion of streams that must to be sampled to adequately characterize the biological reference condition and test metrics and indices is unknown. It is expected that a larger proportion of streams will need to be sampled in areas of greater landscape variability and complexity. This was demonstrated by the observation of higher DE for subecoregional indices versus those at the ecoregional level (Tables and 7 and 8). It is evident that further time and effort may be required to adequately characterize ecoregions and some large subecoregions due to the greater number of catchments of the target size (*e.g.* 45b, 65l, 65h etc...). It is noteworthy that the initial goal of sampling five reference and five impaired streams was met with the exception of instances where streams were removed from consideration for characterizing the biological reference condition because of physical or chemical considerations (one stream each in 45c, 45d, 67g, and 75j, and two streams in 65g), or where access to un-sampled reference or impaired streams in very small subecoregions was not possible due to access problems (one reference stream in 65o, and three impaired streams in 67h). Additionally, one candidate reference stream from subecoregion 75f was found to be tidally influenced (where no other reference or impaired streams in 75f were so influenced), and was included in the analysis with subecoregion 75j, which had a number of tidally influenced reference and impaired streams. When time and resources permitted, more than five impaired streams were sampled in some subecoregions to test the ability of indices to correctly classify the streams as impaired (65c, 65g, 66g, 75h, and 75j).

Because the reference condition is dynamic, and is expected to change with time, new biological data should be obtained for both reference and impaired streams. When these data are entered into the existing EDAS database, reference conditions for each ecoregion and subecoregion should be reevaluated. New metrics and indices may be then be assessed and established because of actual changes in the minimally impaired condition (at reference sites), or due to the addition of more reference and impaired stream samples in the larger ecoregions and subecoregions. Though the percentage of streams of the target size sampled in some subecoregions is small, data collected from these streams still provide a foundation to test biological metrics and develop effective indices.

Metric selection and scoring

Metrics were selected for use in the final indices based on a documented stress response and the strength of discrimination between reference and impaired streams (Barbour et al. 1999, Tetra Tech 2000). Among the five major metric categories, (richness, composition, tolerance/intolerance, functional feeding group, and habit) metrics in the tolerance/intolerance category best discriminated reference from impaired stream samples. This determination was made by evaluating mean DE for each metric across ecoregions and subecoregions. In fact, on the ecoregional level, six of the top ten best performing metrics were tolerance/intolerance metrics (with NCBI and HBI at the top). Other reliable metrics on the ecoregional level included two composition metrics (% Tanypodinae/total Chironomidae and % Odonata) and one richness measure (Plecoptera taxa). On the subecoregional level, seven of the ten most reliable metrics were tolerance/intolerance measures, including the top five (HBI, NCBI, % tolerant individuals, % intolerant individuals, and intolerant taxa).

Composition metrics were also included in the top ten at the subecoregional level (% Oligochaeta, % Odonata, and % Tanypodinae/total Chironomidae).

A major reason for the success of the tolerance/intolerance metrics may be the inclusion of taxonomic identification of Chironomidae below family level. Unlike some widely accepted pollution sensitive orders (EPTs), Chironomidae have tolerance values ranging from 0 to 10 (with zero being highly intolerant of pollution). For taxa that occurred in this study, Ephemeroptera had a range of tolerance values from 0-7.6, Plecoptera ranged from 0-6.3, and Trichoptera ranged from 0-7.4. Additionally, chironomind individuals accounted for 44% of all organisms subsampled from reference stream samples statewide, and for 47% of organisms from impaired stream samples. With Georgia streams containing a high proportion of Chironomidae, and their wide range of tolerance values, it is imperative that this family be identified to at least the generic level. Without such resolution, differences in tolerance and community structure may not be apparent.

The top performing richness measures were Plecoptera taxa, EPT taxa, and Ephemeroptera taxa at both the ecoregional and subecoregional level. The “universal metric”, total taxa, only had an overall average discrimination efficiency among subecoregions of .29 (.27 at the ecoregional level) and was considered for inclusion in only one index (and was not used in any final indices). There are certainly severely impaired streams where the “total taxa” metric may be useful. However, the poor performance in this analysis may indicate that stressors in Georgia measured in this study do not affect total numbers of taxa, but rather the structure, function, and composition of the benthic community (as judged by other metric categories and more specific richness measures).

Many of the functional feeding group and habit measures require additional study to determine metric stress response. In prior studies, differing stress responses have been documented for some of these metrics. Stress response may need to be considered on an ecoregional level (rather than statewide). For example, researchers in Maryland noted that percentages of the collector functional feeding group decreased with stress in non-coastal plain streams, but displayed a reciprocal relationship in the coastal plain (Stribling et al. 1998). Although catchment area and stream order are controls for comparing similar streams across ecoregional boundaries, it is anticipated that stress response for some of these functional feeding group and habit metrics may depend upon local conditions in particular geomorphological regions (Delong and Brusven 1998). No feeding group or habit measures were in the top ten performing metrics at either the ecoregional or subecoregional level (Tables 15 and 16). The best performing functional feeding group measures were shredders, scrapers, and filterers. The best performing habit metrics were clingers and burrowers.

Although a goal, inclusion of at least one metric from each metric category was not possible in some cases (and, in fact, decreased the discriminatory power of the index). For example, four subecoregional indices (65c, 65d, 65k, and 67g) use composition metrics that gauge pollution tolerance (*e.g.* % Hydropsychidae/Total Trichoptera) as substitutes for traditional tolerance metrics (*e.g.* HBI, % Intolerant Individuals) that did not perform as well in these particular areas. In some areas of the state (primarily the Southern Coastal Plain), the richness and habit metric categories did not differentiate reference streams from impaired streams (DE < 50%). These metric categories were excluded from use in indices in the affected areas. A possible explanation is that the biological attributes measured by the richness and habit measures were absent or minimal in both reference and impaired streams in these areas (*e.g.* EPT taxa when there are no mayflies, stoneflies, or caddisflies present, even in reference streams). Many of the organisms in the coastal plain are non-insects (*e.g.* Amphipoda, Isopoda, Gastropoda, Oligochaeta, *etc.*) that were not well represented by traditional richness metrics. Also, the habits of many of these organisms are unknown or undifferentiated between reference and impaired streams.

Potential limitations of benthic macroinvertebrate indices in Georgia

Although macroinvertebrate indices performed well in discriminating reference from impaired streams at the both the ecoregional and subecoregional level in Georgia, there are some potential limitations of these indices. Anyone who uses these indices must be aware of at least three potential sources of natural variation among reference streams that were not accounted for in this study and may influence the ability of an index to accurately classify a test stream. First, some ecoregions and subecoregions contain both blackwater and clearwater streams, conditions which may support distinct biota. Next, subecoregion 75j (the Sea Islands and Coastal Marsh) had a nearly equal number of brackish (tidally influenced) and freshwater streams. The structure, function, and composition of the benthic assemblage found in marine (or, near-marine) conditions are different from those found in freshwater systems (Gore et al. 2005). Finally, drought conditions in some areas of Georgia (particularly in Ecoregion 75) during the late 1990's may have affected available habitat for macroinvertebrate colonization thereby altering the observed "reference condition."

Several ecoregions and subecoregions contain both blackwater and clearwater streams (Table 102). No specific threshold criteria were used to identify blackwater streams in this study. These determinations were somewhat subjective, and were made on a case by case basis by field personnel. It is generally agreed that blackwater streams are dominated by excess tannins which produce a low pH, and generally have lower dissolved oxygen concentrations than clearwater streams in the same ecoregion or subecoregion (Meyer 1990). These streams, dominant in some parts of Ecoregions 65 and 75 (the Southeastern Plains and the Southern Coastal Plain respectively), have a unique benthic fauna unlike those of their clearwater counterparts in the same ecoregion or subecoregion. Blackwater stream benthic communities tend to be dominated by oligochaetes and acid-tolerant dipteran larvae. Clearwater streams in the same region tend to be dominated by a different assemblage of macroinvertebrates, containing a greater percentage of Trichoptera and acid-intolerant taxa. The GIS remote sensing technique for selecting candidate reference streams used for this project was not capable of differentiating between blackwater and clearwater streams. Thus, at both ecoregional and subecoregional levels, the suggested macroinvertebrate indices are a composite of blackwater and clearwater streams in each ecoregion. It may be that separate indices need to be created to better discriminate between reference and impaired streams in both blackwater and clearwater stream types. In order to adequately accomplish this task, a greater number of streams in these subecoregions must be sampled and new indices evaluated to discern differences between biotic assemblages in blackwater and clearwater streams (Pillai, 2004, Columbus State University, personal communication).

Table 102. Subecoregions with blackwater and clearwater streams

Sub-ecoregion	Blackwater streams		Clearwater streams	
	Reference	Impaired	Reference	Impaired
65c	4	1	1	6
65h	3	0	2	5
65l	4	4	1	1
65o	3	1	1	4
75f	1	3	3	2
75h	5	5	0	1
75j	4	2	6	4

As with the blackwater / clearwater issue, the GIS remote sensing technique used to select candidate reference streams was unable to identify streams that were influenced by tidal flows. Many catchments evaluated in subecoregion 75j empty into the Atlantic Ocean or tidal estuaries associated with brackish water. As a result, some streams, although located many kilometers inland from the estuary, still contained a proportion of brackish water and therefore salt-tolerant marine species not normally found in freshwater communities (Gore et al. 2005). Because EDAS was developed for use in freshwater bioassessment, the system in its present form does not include metrics for these marine species. As a result, biotic indices derived using these streams may not adequately characterize either the freshwater or brackish water macroinvertebrate reference condition. The creation of appropriate metrics for tidal streams has yet to be undertaken. As new metrics are developed that characterize marine benthic communities, EDAS may be updated to include values for those metrics. Ultimately, it may be necessary to create reference conditions based on both inland freshwater streams, and tidally influenced coastal streams, where both types of streams exist within the same ecoregion or subecoregion. It is anticipated that this will only be an issue with indices created in Subecoregion 75j (and Ecoregion 75). The mixing of both tidal and non-tidal streams to characterize the biological reference condition in 75j is likely the major reason for the low discrimination efficiency (60%) for the macroinvertebrate index in that subecoregion.

The state of Georgia was experiencing a sustained drought during the first years of sampling (1999-2001) for this project. Precipitation and stream gauging records indicate that many streams were reaching average flow conditions during the final sampling years (2001-2002). As a result, many candidate reference streams, especially those in the Southern Coastal Plain (75) and Southeastern Plains (65) were dry for prolonged periods of time. This is supported by anecdotal accounts from field personnel. A number of candidate reference streams in ecoregion 75 were passed over during the first sample seasons as they were either dry or had no sustained flow (intermittent pools). Many of these streams were sampled in subsequent field seasons as flow conditions improved.

Although some macroinvertebrates are known to recolonize re-wetted streams in a relatively short period of time (Gore and Milner 1990), it is difficult to determine if these streams had attained an equilibrium or stable recovered community after such an extended period of drought and sub-optimal flow conditions. For example, the top ten occurrences (in numbers of individuals) of the midge *Polypedilum tritum* (Diptera: Chironomidae) among reference streams were in Ecoregion 75 in streams that were potentially subject to drought effects. In fact, *P. tritum* accounted for over half of the macroinvertebrates subsampled and identified in five of those reference streams (n=24). It is important to note that *P. tritum* was observed in all ecoregions, and occurred in reference streams in all but Ecoregion 67 (the Ridge and Valley). However, in no other ecoregion was its occurrence nearly as prevalent. It may be that *P. tritum* is a dominant organism in the Southern Coastal Plain, or that it is a pioneer colonizer that initially out-competes other taxa in “new” water. As a result of such potential drought effects (especially in Ecoregion 75), macroinvertebrate indices in affected areas should be reevaluated after a period of sustained flows during which the macroinvertebrate community may reach equilibrium conditions with respect to structure, function, and community composition.

As indicated by discussion of the ecoregional framework and metric selection and scoring, and the potential limitations of using these indices, there are a number of opportunities for further research to increase the accuracy and precision of the results presented here. Recommendations for topics that merit further study include:

1. An analysis of the relationships between individual biological metrics and biotic integrity. Should all metrics be weighted equally in additive multimetric indices?
2. Additional research on stress response for functional feeding group and habit metrics. A number of these metrics may have a differing stress response depending on where stream samples are collected. The River Continuum Concept (Vannote et al. 1980) dictates that feeding guilds (and thereby numbers of taxa and percentages of specific functional feeding groups) display a longitudinal gradient of change dependent upon available energy resources. Such concepts may also be applicable in some way at the ecoregional level.
3. Additional collection of samples to refine indices and establish ecoregional stress response. More samples are vital to adequately characterize some of the larger subecoregions. New sampling is especially warranted in Ecoregion 75, where drought effects may be evident in benthic communities. Data from future sampling will serve to calibrate existing indices and identify the need for new indices in all subecoregions.

4. Additional research on differences in blackwater and clearwater streams in applicable ecoregions. Some analyses are underway, but currently, there is no definitive answer as to whether blackwater and clearwater streams in Georgia should be treated separately when using benthic macroinvertebrate indices.

5. Additional research on metrics for salt tolerant marine species. If bioassessment by benthic macroinvertebrates is to be used as a tool to assess water quality in brackish water areas, more information is needed about these biotic communities. Biological metrics with a documented stress response should be developed.

6. Explore a bioregional framework. If water quality standards are to be written with respect to aquatic life, (as well as continuing traditional standards for physiochemical parameters) bioregions make sense to assess water quality. As ecoregions are areas of abiotic similarity, bioregions are areas of biotic similarity. A preliminary non-metric multidimensional scaling (NMDS) ordination of reference streams (based on similarity of macroinvertebrate taxa at the genus level) indicates that some subecoregions may be combined (although not at the current ecoregional level) to reduce the number of effective indices in Georgia (Tetra Tech 2002a).

In summary, ecoregional and subecoregional benthic macroinvertebrate indices are capable of discriminating reference from impaired streams in Georgia. Subecoregional indices more accurately discriminate reference from impaired site groups than ecoregional indices. This indicates that better results are achieved through higher resolution screening to define site groups (subecoregions). The management of aquatic ecosystems depends upon defensible and realistically attainable biological standards. Despite some limitations, a good method to define these standards is to use a multi-metric benthic macroinvertebrate index, based on the characteristic reference condition derived from minimally impaired streams that represent the range of natural conditions present in an ecoregion or subecoregion. The end result of this ecoregional framework is a biological reference condition that sets realistic goals for management of impaired streams, in particular, for specifying thresholds for evaluating responses to restoration, best management practices (BMP), or other stressor-reduction procedures. This provides a “yardstick” for resource managers to use to prioritize water quality monitoring, protection, and restoration efforts. Such information may also aid in identifying stream stressors and sources of impairment, establishing TMDLs, and evaluating the effectiveness of BMPs (Barbour et al. 1999, Stribling et al. 2001). It is anticipated that traditional water quality parameters (both physical and chemical) will also improve as a result of improved biotic condition in impaired streams. The biological reference condition should be reevaluated periodically, and the more often the better. A routine five year cycle divided in some way among ecoregions (similar to the current GAEPD rotating basin monitoring plan) coupled with simultaneous evaluation of metrics, indices, and scoring thresholds, will allow updating of reference conditions. Recalibration of the indices and scoring thresholds could occur on that same 5-year schedule. In areas where land use and land cover are rapidly changing, however, it is vital to document real changes in water quality, habitat loss, and biotic integrity as often as possible. The ultimate goal is not to adjust the reference condition downward as current reference streams are degraded, but to adjust water quality and biotic integrity of impaired streams upward to meet the ecoregionally specific biological reference condition.

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APPENDIX A – Descriptions of ecoregions and subecoregions of Georgia

45. Piedmont

Considered the non-mountainous portion of the old Appalachians Highland by physiographers, the northeast-southwest trending Piedmont ecoregion comprises a transitional area between the mostly mountainous ecoregions of the Appalachians to the northwest and the relatively flat coastal plain to the southeast. It is a complex mosaic of Precambrian and Paleozoic metamorphic and igneous rocks with moderately dissected irregular plains and some hills. The soils tend to be finer-textured than in coastal plain regions. Once largely cultivated, much of this region has reverted to pine and hardwood woodlands, and, more recently, spreading urban- and suburbanization.

45a. The **Southern Inner Piedmont** is mostly higher in elevation with more relief than 45b, but is generally lower and has less relief and contains different rocks and soils than 45d. The rolling to hilly, well-dissected upland contains mostly schist, gneiss, and granite bedrock. In the western portion, west of Atlanta and into Alabama, mica schist and micaceous saprolite are typical. To the east, biotite gneiss is more common. The region is now mostly forested, with major forest types of oak-pine and oak-hickory, with less loblolly-shortleaf pine forest than 45b. Open areas are mostly in pasture, although there are some small areas of cropland. Hay, cattle, and poultry are the main agricultural products. In Georgia, urban/suburban land cover has increased greatly within this ecoregion over the past twenty years.

45b. The **Southern Outer Piedmont** ecoregion has lower elevations, less relief, and less precipitation than 45a. Loblolly-shortleaf pine is the major forest type, with less oak-hickory and oak-pine than in 45a. Gneiss, schist and granite are the dominant rock types, covered with deep saprolite and mostly red, clayey subsoils. The majority of soils are Kanhapludults. The southern boundary of the ecoregion occurs at the Fall Line, where unconsolidated coastal plain sediments are deposited over the Piedmont metamorphic and igneous rocks.

45c. The **Carolina Slate Belt** is found primarily in the Carolinas, although a small area extends into Georgia. The mineral-rich metavolcanic and metasedimentary rocks with slatey cleavage are finer-grained and less metamorphosed than most Piedmont regions. It tends to be less rugged, less dissected, with wider valleys than other Piedmont areas, and it generally has more silty and silty clay soils.

45d. The **Talladega Upland** of the Georgia Piedmont contains some dissected hills and tablelands that are mostly forested and at generally higher elevations than 45a and 45b. The geology is distinctive, consisting of mostly phyllite, quartzite, slate, metasiltstone, and metaconglomerate, in contrast to the high-grade metamorphic and intrusive igneous rocks of 45a and 45b. To the west in Alabama are more mountainous parts of the region, including Alabama's highest peak, 2407-foot Cheaha Mountain. The climate of 45d is slightly cooler and wetter than the other subecoregions (45a, b, and c) of the Georgia Piedmont. Oak-hickory-pine is the natural vegetation type.

45h. The **Pine Mountain Ridges**, a small, narrow region in the southwest portion of the Georgia Piedmont, contains quartzite-capped, steep-sloped ridges that rise 300-400 feet above the Piedmont surface to elevations over 1300 feet. Pine Mountain and Oak Mountain are the primary linear ridges trending southwest to northeast, and several other smaller ridges and mountains between these, including Bull Trail Mountain, Indian Grave Mountain, Salter Mountain, and Huckleberry Pinnacle, add to the region's more mountainous appearance. The Flint River has cut some narrow, steep gorges, 400 feet deep, through the ridges. Streams in this region are often of higher gradient than surrounding areas of 45b, and contain more rocky and gravelly substrates.

65. Southeastern Plains

These irregular plains with broad interstream areas have a mosaic of cropland, pasture, woodland, and forest. Natural vegetation is mostly oak-hickory-pine and Southern mixed forest. The Cretaceous or Tertiary-age sands, silts, and clays of the region contrast geologically with the Paleozoic limestone, shale and sandstone of ecoregions 67 and 68, or with the even older metamorphic and igneous rocks of the Piedmont (45). Elevations and relief are greater than in the Southern Coastal Plain (75), but generally less than in much of the Piedmont. Streams in this area are relatively low-gradient and sandy-bottomed.

65c. The **Sand Hills** of Georgia form a narrow, rolling to hilly, highly dissected coastal plain belt stretching across the state from Augusta to Columbus. The region is composed primarily of Cretaceous and some Eocene-age marine sands and clays deposited over the crystalline and metamorphic rocks of the Piedmont (45). Many of the droughty, low-nutrient soils formed in thick beds of sand, although soils in some areas contain more loamy and clayey horizons. On the drier sites, turkey oak and longleaf pine are dominant, while shortleaf-loblolly pine forests and other oak-pine forests are common throughout the region.

65d. The dissected irregular plains and gently rolling low hills of the **Southern Hilly Gulf Coastal Plain** ecoregion developed over diverse bands of sand, clay, and marl formations. The heterogeneous region that stretches west across Alabama and into Mississippi, has a mix of clayey, loamy, and sandy soils. It has more rolling topography, higher elevations, and more relief than 65g and 65k, and streams have increased gradient. The natural vegetation is mostly oak-hickory-pine forest, and to the south begins a transition into southern mixed forest. Land cover is mostly mixed forest and woodland, pine plantations, with some small areas of pasture and cropland.

65g. The **Dougherty Plain** is mostly flat to gently rolling and influenced by the near-surface limestone. The karst topography contains sinkholes, springs, and fewer streams in the flatter part of the plain. The northwestern boundary is gradational, as more gentle slopes and lower relief are found towards the center of the region. On the southeast, the Pelham escarpment marks the boundary with the Tifton Upland (65h). Landcover is primarily cropland and pasture, with some small areas of mixed forest. Crops such as peanuts and pecans are common, and cotton production has increased dramatically in recent years. Natural forest cover consisted of pines, including longleaf pine, red oaks, and hickories. Many shallow, flat-bottomed depressions are scattered throughout the region, caused by solution of the underlying limestone. The wetter, poorly drained depressions contain blackgum, sweetgum, water oak, and a few pines and cypress. Many of the limesink ponds and marshes act as biological oases in the mostly agricultural landscape.

65h. The **Tifton Upland** of Georgia has more rolling, hilly topography compared to 65g and 75e, with a mosaic of agriculture, pasture, and some mixed pine/hardwood forests. Soils are well-drained, brownish, and loamy, often with iron-rich or plinthic layers. They support crops of cotton, peanuts, soybeans, and corn. On the west side of the region, the Pelham Escarpment has bluffs and deep ravines with cool microclimates that support several rare plants and animals, as well as species with more northern affinities.

65k. In contrast to the more forested Sand Hills (65c) that formed mostly on light-colored Cretaceous sands, the **Coastal Plain Red Uplands** formed on reddish Eocene sand and clay formations. Soils are mostly well-drained with a brown or reddish brown loamy or sandy surface layer and red subsoils. The majority of the area is in cropland or pasture, with some woodland on steeper slopes. The Fort Valley Plateau falls within this ecoregion, a relatively small agricultural area with less relief, flat-topped interfluves, and less dissection than other parts of the 65k.

65l. Also called the Vidalia Upland in Georgia, the **Atlantic Southern Loam Plains** ecoregion is generally lower, flatter, and more gently rolling than 65k, and has more cropland and finer-textured soils than 75f. Similar to 65h, it has an abundance of the agriculturally important Tifton soils, but the region also contains forested areas that are more sloping or are low, flat and poorly drained. Parallel to some of the major stream courses are some excessively-drained, dunal sand ridges with xeric vegetation such as longleaf pine / turkey oak forests, and some distinctive evergreen shrubs, such as rosemary and woody mints.

65o. The **Tallahassee Hills/Valdosta Limesink** ecoregion combines two slightly different areas, both influenced by underlying limestone. The Floridan aquifer is thinly confined in this region, and streams are often intermittent or in parts flow underground in the karst landscape. In the west, the Tallahassee Hills portion has rolling, hilly topography that is more forested than 65h. Clayey sands weathered to a thick red residual soil are typical. Relief decreases towards the east, and the Valdosta Limesink area has more solution basins with ponds, lakes, and swampy depressions, as well as areas with more cropland. The soils are typically brownish. Mixed hardwoods and pine are found on the clayhill upland soils, while longleaf pine/xerophytic oak types occur on the sandy, well-drained areas.

66. Blue Ridge

The Blue Ridge extends from southern Pennsylvania to northern Georgia, varying from narrow ridges to hilly plateaus to more massive mountainous areas with high peaks. The mostly forested slopes, high-gradient, cool, clear streams, and rugged terrain occur on a mix of igneous, metamorphic, and sedimentary geology. Annual precipitation of over 80 inches can occur on the well-exposed high peaks. The southern Blue Ridge is one of the richest centers of biodiversity in the eastern U.S. It is one of the most floristically diverse ecoregions, and includes Appalachian oak forests, northern hardwoods, and, at the highest elevations in Tennessee and North Carolina, Southeastern spruce-fir forests. Shrub, grass, and heath balds, hemlock, cove hardwoods, and oak-pine communities are also significant. Black bear, whitetail deer, wild boar, turkey, grouse, songbirds, many species of amphibians and reptiles, thousands of species of invertebrates, and a variety of small mammals are found here.

66d. The **Southern Crystalline Ridges and Mountains** contain the highest and wettest mountains in Georgia. These occur primarily on Precambrian-age igneous and high-grade metamorphic rocks. The common crystalline rock types include gneiss, schist, and quartzite, covered by well-drained, acidic, brownish, loamy soils. Some mafic and ultramafic rocks also occur here, producing more basic soils. Elevations of this rough, dissected region are typically 1800-4000 feet, with Brasstown Bald Mountain, the highest point in Georgia, reaching 4,784 feet. Although there are a few small areas of pasture and apple orchards, the region is mostly forested.

66g. The **Southern Metasedimentary Mountains** in Georgia contain rocks that are generally not as strongly metamorphosed as the gneisses and schists of 66d. The geologic materials are mostly late Pre-Cambrian and include slate, conglomerate, phyllite, metagraywacke, metasiltstone, metasandstone, and quartzite, with some schist and gneiss. Although the highest peaks are lower than in 66d, and parts of the region have more open low hills, there are some isolated masses of rugged mountains, such as the biologically-diverse Cohutta Mountains, Rich Mountains, and Fort Mountain.

66j. The **Broad Basins** ecoregion is drier, and has lower elevations and less relief than the more mountainous Blue Ridge regions (66g, 66d). It also has less bouldery colluvium than those two surrounding regions and more saprolite. The soils are mostly deep, well-drained, loamy to clayey Ultisols. Although this rolling foothills region is mostly forested, it has more pasture than adjacent regions, and some narrow areas of row crops and truck crops on terraces and floodplains. Much of the pasture and corn crops support local cattle, hog, or poultry operations.

67. Ridge and Valley

Sometimes called the Great Valley in Georgia, this is a relatively low-lying region between the Blue Ridge (66) to the east and the Southwestern Appalachians (68) on the west. As a result of extreme folding and faulting events, the roughly parallel ridges and valleys come in a variety of widths, heights, and geologic materials, including limestone, dolomite, shale, siltstone, sandstone, chert, mudstone, and marble. Springs and caves are relatively numerous. Land cover is mixed and present-day forests cover about 50% of the region. Forested ridges, and valleys with pasture and cropland, are typical in many parts of ecoregion 67. Its diverse habitats contain many unique species of terrestrial and aquatic flora and fauna.

67f. The **Southern Limestone/Dolomite Valleys and Low Rolling Hills** form a heterogeneous region composed predominantly of limestone and cherty dolomite. Landforms are mostly undulating valleys and rounded ridges and hills, with many caves and springs. Soils vary in their productivity, and land cover includes oak-hickory and oak-pine forests, pasture, intensive agriculture, and urban and industrial. Along the Coosa River floodplain, biota more typical of coastal plain regions can be found due to the valley and riverine connection to ecoregion 65 in Alabama.

67g. The **Southern Shale Valleys** consist of undulating to rolling valleys and some low, rounded hills and knobs that are dominated by shale. The soils formed in materials weathered from shale, shaly limestone, and clayey sediments, and tend to be deep, acidic, moderately well-drained, and slowly permeable. The steeper slopes are used for pasture or have reverted to brush and mixed forest land. Small fields of hay, corn, soybeans, tobacco, and garden crops are grown on the foot slopes and bottom land.

67h. The **Southern Sandstone Ridges** region encompasses the major sandstone ridges, but these ridges also have areas of shale, siltstone, and conglomerate. The steep, forested ridges tend to have narrow crests, and the soils are typically stony, sandy, and of low fertility. The chemistry of streams flowing down the ridges can vary greatly depending on the geologic material. In Georgia and Tennessee, most of the sandstone ridges are relatively narrow, but in Alabama, the region also includes the Coosa and Cahaba ridges that are broader and of younger Pennsylvanian-age sandstone and shale. Oak-hickory-pine forests are the dominant land cover.

67i. The **Southern Dissected Ridges and Knobs** contain more crenulated, broken, or hummocky ridges, compared to the smoother, more sharply crested sandstone ridges of 67h. Although shale is common, there is a mixture and interbedding of geologic materials, including cherts, siltstone, sandstone, and quartzose limestone. Oak forests and pine forests are typical for the higher elevations of the ridges, with oak-hickory and a number of more mesic forest species on the lower slopes, knobs, and draws.

68. Southwestern Appalachians

Stretching from Kentucky to Alabama, these low mountains contain a mosaic of forest and woodland with some cropland and pasture. The eastern boundary of the ecoregion, along the abrupt escarpment next to the Ridge and Valley (67), is relatively smooth and only slightly notched by small eastward flowing stream drainages. The western boundary, next to the Interior Plateau's Eastern Highland Rim in Alabama and Tennessee, is more crenulated with a rougher escarpment that is more deeply incised. The mixed mesophytic forest is restricted mostly to the deeper ravines and escarpment slopes, and the summit or tableland forests are dominated by mixed oaks with shortleaf pine.

68c. The **Plateau Escarpment** is characterized by steep, forested slopes and high velocity, high gradient streams. Local relief is often 1000 feet or more. The geologic strata include Mississippian-age limestone, sandstone, shale, and siltstone, and Pennsylvanian-age shale, siltstone, sandstone, and conglomerate. Streams have cut down into the limestone, but the gorge talus slopes are composed of colluvium with huge angular, slabby blocks of sandstone. Vegetation community types in the ravines and gorges include mixed oak and chestnut oak on the upper slopes, more mesic forests on the middle and lower slopes (beech-yellow poplar, sugar maple-basswood-ash-buckeye), with some rare hemlock along rocky streamsides and river birch along floodplain terraces.

68d. The **Southern Table Plateaus** include Sand Mountain and Lookout Mountain in northwest Georgia. While it has some similarities to the Cumberland Plateau (68a) in Tennessee with its Pennsylvanian-age sandstone caprock, shale layers, and coal-bearing strata, this ecoregion is lower in elevation, has a slightly warmer climate, and has more agriculture. Although the Georgia portion is mostly forested, primarily with mixed oak and oak-hickory communities, elevations decrease to the southwest in Alabama and there is more cropland and pasture. The plateau surface is less dissected with lower relief compared to the Plateau Escarpment (68c), and it is slightly cooler with more precipitation than in the nearby lower elevations of 67f.

75. Southern Coastal Plain

The Southern Coastal Plain extends from South Carolina and Georgia through much of central Florida, and along the Gulf coast lowlands of the Florida Panhandle, Alabama, and Mississippi. From a national perspective, it appears to be mostly flat plains, but it is a heterogeneous region also containing barrier islands, coastal lagoons, marshes, and swampy lowlands along the Gulf and Atlantic coasts. In Florida, an area of discontinuous highlands contains numerous lakes. This ecoregion is generally lower in elevation with less relief and wetter soils than ecoregion 65. Once covered by a variety of forest communities that included trees of longleaf pine, slash pine, pond pine, beech, sweetgum, southern magnolia, white oak, and laurel oak, land cover in the region is now mostly slash and loblolly pine with oak-gum-cypress forest in some low lying areas, citrus groves, pasture for beef cattle, and urban.

75e. The **Okefenokee Plains** consist of flat plains and low terraces developed on Pleistocene-Pliocene sands and gravels. These plains have slightly higher elevations and less standing water than 75g, although there are numerous swamps and bays. There are some highly acidic softwater lakes, mostly with low clarity, darkly colored water, but the color is variable depending on rainfall. Soils in the region are somewhat-poorly to poorly drained. The region has mostly coniferous forest and young pine plantation land cover, with areas of forested wetland.

75f. The **Sea Island Flatwoods** are poorly-drained flat plains with lower elevations and less dissection than 65l. Pleistocene sea levels rose and fell several times creating different terraces and shoreline deposits. Spodosols and other wet soils are common, although small areas of better-drained soils add some ecological diversity. Trail Ridge is in this region, forming the boundary with 75g. Loblolly and slash pine plantations cover much of the region. Water oak, willow oak, sweetgum, blackgum and cypress occur in wet areas.

75h. The **Bacon Terraces** include several relatively flat, moderately dissected terraces with subtle east-facing scarps. The terraces, developed on Pliocene-Pleistocene sands and gravels, are dissected in a dendritic pattern by much of the upper Satilla River basin. Cropland is mostly on the well-drained soils on the long, narrow, flat to gently sloping ridges paralleling many of the stream courses. The broad flats of the interfluves are often poorly drained and covered in pine, while bottomland forests are found in the wet, narrow floodplains.

75j. The **Sea Islands/Coastal Marsh** region contains the lowest elevations in Georgia and is a highly dynamic environment affected by ocean wave, wind, and river action. Mostly sandy soils occur on the barrier islands, while organic and clayey soils occur in the freshwater, brackish, and salt marshes. Maritime forests of live oak, red cedar, slash pine, and cabbage palmetto grow on parts of the Sea Islands, and various species of cordgrass, saltgrass, and rushes are dominant in the marshes. The coastal marshes, tidal creeks, and estuaries are important nursery areas for fish, crabs, shrimp, and other marine species. Parts of the region have a long history of human alterations. Native Americans cultivated corn, melons, squash, and beans; a Spanish mission period during the 1500-1600's included crops of citrus, figs, peaches, olives, artichokes, and onions; and a plantation agriculture economy in the late 1700's through the 1800's produced indigo, rice, sugar cane, and sea island cotton.

APPENDIX B – Selected 1998 Georgia land use values for all stream sites

Station ID	Sub-ecoregion	Condition	%Urban	%Ag_Pasture	%Ag_RowCrop	%Ag_Total	%Barren
45a-31	45a	Impaired	8.9	27.8	1.1	28.9	12.4
45a-35	45a	Impaired	16.4	23.5	0.0	23.5	4.9
45a-50	45a	Impaired	55.6	2.0	0.4	2.3	5.5
45a-59	45a	Impaired	78.4	0.5	0.1	0.6	0.0
45a-61	45a	Impaired	59.7	3.5	0.5	4.0	1.7
45a-90	45a	Impaired	5.1	36.3	4.3	40.6	7.4
45a03//	45a	Reference	6.7	3.6	0.0	3.6	7.0
45a-3	45a	Reference	4.9	5.2	0.0	5.3	6.5
45a-89	45a	Reference	0.0	6.6	7.2	13.8	0.5
HH16	45a	Reference	7.2	27.4	2.4	29.8	11.7
HH18	45a	Reference	8.8	16.4	1.2	17.7	11.1
45b-120	45b	Impaired	9.0	52.3	7.4	59.7	3.4
45b-193	45b	Impaired	56.3	6.7	0.2	6.8	2.5
45b-203	45b	Impaired	77.0	0.5	0.0	0.5	1.3
45b-217	45b	Impaired	77.4	0.6	0.0	0.6	3.3
45b-291	45b	Impaired	81.9	0.7	0.0	0.7	2.2
45b-44	45b	Impaired	12.2	15.4	0.5	15.9	8.9
45b-152	45b	Reference	4.0	1.2	0.1	1.2	3.0
45b-156	45b	Reference	4.9	3.0	0.2	3.2	5.5
45b-258	45b	Reference	6.5	11.7	2.3	14.0	5.9
45b-357	45b	Reference	4.8	2.6	0.3	2.8	14.7
HH22	45b	Reference	6.4	10.9	0.8	11.7	4.6
45c-10	45c	Impaired	6.1	31.9	1.8	33.8	7.2
45c-11	45c	Impaired	6.8	26.2	2.0	28.2	5.5

Station ID	Sub-ecoregion	Condition	%Urban	%Ag_Pasture	%Ag_RowCrop	%Ag_Total	%Barren
45c-17	45c	Impaired	4.8	20.1	1.7	21.7	9.7
45c-18	45c	Ref_Removed	17.5	14.8	1.3	16.0	10.5
45c-3	45c	Impaired	4.5	30.2	1.5	31.6	13.4
45c-7	45c	Impaired	6.7	25.4	4.2	29.6	8.9
//4	45c	Reference	5.9	12.0	0.7	12.7	14.9
45c-16	45c	Reference	4.0	16.3	1.1	17.4	6.8
45c-19	45c	Reference	3.3	1.1	0.0	1.1	7.3
45c-8	45c	Reference	5.5	11.4	0.9	12.3	13.1
HH24	45c	Reference	5.2	7.7	8.4	16.1	21.1
45d-11	45d	Impaired	5.5	24.2	0.6	24.8	10.0
45d-14	45d	Impaired	6.2	9.1	0.7	9.8	11.5
45d-21	45d	Impaired	4.8	16.1	1.0	17.0	9.7
45d-23	45d	Impaired	14.5	7.5	0.7	8.2	6.6
45d-6	45d	Impaired	4.5	2.7	0.0	2.7	3.3
45d-8	45d	Ref_Removed	5.5	5.6	0.7	6.4	7.8
45d-15	45d	Reference	0.1	0.5	0.7	1.2	6.3
45d-16	45d	Reference	0.1	2.1	1.3	3.4	1.6
45d-4	45d	Reference	8.7	13.5	0.0	13.5	11.0
45d-9	45d	Reference	2.8	3.2	0.2	3.4	5.5
45h-1	45h	Impaired	5.9	10.1	2.0	12.1	5.9
45h-10	45h	Impaired	6.1	21.7	5.8	27.5	4.2
45h-11	45h	Impaired	17.1	7.7	1.5	9.2	4.2
45h-12	45h	Impaired	8.3	10.4	3.0	13.4	12.3
45h-2	45h	Impaired	5.0	10.7	3.9	14.6	6.8
45h-13	45h	Reference	6.7	3.8	0.6	4.4	7.6

Station ID	Sub-ecoregion	Condition	%Urban	%Ag_Pasture	%Ag_RowCrop	%Ag_Total	%Barren
45h-16	45h	Reference	7.2	0.0	0.0	0.0	18.7
45h-17	45h	Reference	7.0	0.0	0.0	0.0	3.6
45h-6	45h	Reference	4.8	7.8	0.8	8.6	5.3
45h-9	45h	Reference	5.1	13.3	2.4	15.7	3.1
65c-12	65c	Impaired	6.0	11.2	5.7	16.9	5.5
65c-3	65c	Impaired	48.0	6.2	3.8	10.1	7.2
65c-4	65c	Impaired	59.9	3.3	4.3	7.7	7.0
65c-40	65c	Impaired	3.5	12.3	13.8	26.1	21.5
65c-5	65c	Impaired	35.2	5.1	3.4	8.5	6.1
65c-8	65c	Impaired	10.2	14.1	17.1	31.2	5.6
65c-80	65c	Reference	3.0	0.2	9.3	9.5	17.4
65c-89	65c	Reference	7.3	0.6	0.0	0.7	15.3
HH24	65c	Reference	5.2	7.7	8.4	16.1	21.1
HH25	65c	Reference	4.6	4.4	4.5	8.9	13.5
HH26	65c	Reference	5.6	8.0	13.1	21.2	9.0
65d-1	65d	Impaired	81.9	0.2	0.2	0.4	3.8
65d-20	65d	Impaired	4.6	0.8	3.7	4.5	20.0
65d-21	65d	Impaired	5.1	3.9	23.7	27.7	7.5
65d-32	65d	Impaired	5.4	1.4	18.8	20.1	9.3
65d-39	65d	Impaired	5.1	4.6	23.4	28.0	7.0
65d-14	65d	Reference	5.3	1.1	5.7	6.8	9.9
65d-18	65d	Reference	5.2	0.1	0.4	0.5	15.1
65d-3	65d	Reference	5.4	0.9	0.0	0.9	16.2
65d-38	65d	Reference	3.4	0.5	3.6	4.1	14.6
65d-4	65d	Reference	4.2	0.1	0.0	0.1	18.1

Station ID	Sub-ecoregion	Condition	%Urban	%Ag_Pasture	%Ag_RowCrop	%Ag_Total	%Barren
65g-10	65g	Impaired	6.6	0.0	64.0	64.0	5.8
65g-130	65g	Impaired	5.3	6.9	59.2	66.1	5.3
65g-135	65g	Impaired	14.6	5.3	53.6	58.9	5.0
65g-137	65g	Impaired	6.6	9.0	55.9	64.9	6.1
65g-14	65g	Impaired	8.8	0.0	65.1	65.1	2.2
65g-17	65g	Impaired	9.3	0.0	68.0	68.0	3.5
65g-4	65g	Impaired	5.2	0.0	76.9	76.9	2.3
65g-69	65g	Impaired	29.6	0.0	35.6	35.6	2.9
65g-8	65g	Impaired	7.7	0.0	73.1	73.1	1.4
65g-84	65g	Impaired	6.1	0.7	59.4	60.1	4.9
65g-82	65g	Ref_Removed	5.2	3.9	27.1	31.0	4.1
65g-83	65g	Ref_Removed	6.2	3.3	11.1	14.4	6.8
65g-120	65g	Reference	6.7	7.3	23.4	30.7	8.3
65g-62	65g	Reference	5.4	1.1	36.5	37.6	2.5
HH29	65g	Reference	5.5	5.0	36.2	41.2	4.6
65h-17	65h	Impaired	4.7	0.9	59.0	59.9	14.4
65h-174	65h	Impaired	32.9	5.2	25.2	30.4	1.4
65h-32	65h	Impaired	7.1	3.9	61.5	65.3	6.9
65h-34	65h	Impaired	5.8	2.4	70.1	72.5	5.2
65h-41	65h	Impaired	5.6	0.0	66.9	66.9	2.1
65h-5	65h	Impaired	6.6	0.0	66.6	66.6	5.1
65h-202	65h	Reference	8.3	5.3	21.8	27.1	6.5
65h-203	65h	Reference	8.7	3.0	9.5	12.5	11.0
65h-206	65h	Reference	0.1	2.7	22.1	24.8	5.7
65h-209	65h	Reference	7.2	13.8	32.3	46.1	3.0

Station ID	Sub-ecoregion	Condition	%Urban	%Ag_Pasture	%Ag_RowCrop	%Ag_Total	%Barren
65h-212	65h	Reference	1.6	2.8	18.4	21.2	6.5
65k-102	65k	Impaired	5.1	10.3	70.7	81.1	0.7
65k-113	65k	Impaired	25.5	0.0	32.4	32.4	4.0
65k-128	65k	Impaired	5.6	4.0	42.1	46.2	2.3
65k-129	65k	Impaired	5.3	2.7	30.9	33.6	5.1
65k-37	65k	Impaired	7.1	4.9	36.6	41.5	3.1
65k-54	65k	Reference	5.4	2.5	14.8	17.3	1.4
65k-55	65k	Reference	5.6	1.9	25.2	27.1	1.8
65k-56	65k	Reference	4.5	2.5	15.3	17.8	10.6
65k-68	65k	Reference	6.8	0.5	10.5	11.0	7.7
65k-85	65k	Reference	11.8	2.0	10.8	12.8	7.3
65l-160	65l	Impaired	31.1	6.9	26.6	33.6	2.5
65L-184	65l	Impaired	5.3	1.8	28.2	30.0	8.8
65l-391	65l	Impaired	6.2	1.9	52.4	54.3	7.2
65l-420	65l	Impaired	4.7	5.9	59.0	64.9	3.5
65l-423	65l	Impaired	12.8	7.2	30.8	38.0	5.4
65l-10	65l	Reference	4.3	8.0	13.8	21.8	2.9
65l-342	65l	Reference	6.6	8.3	21.9	30.3	4.8
65l-343	65l	Reference	5.5	4.7	21.6	26.3	8.6
65l-379	65l	Reference	2.4	0.1	2.8	2.9	5.5
65l-381	65l	Reference	7.9	0.5	10.7	11.3	24.8
65o-11	65o	Impaired	5.7	2.2	5.2	7.4	2.3
65o-18	65o	Impaired	0.1	1.0	22.0	22.9	14.2
65o-22	65o	Impaired	0.2	1.5	19.1	20.6	21.9
65o-3	65o	Impaired	27.0	3.3	7.6	11.0	8.9

Station ID	Sub-ecoregion	Condition	%Urban	%Ag_Pasture	%Ag_RowCrop	%Ag_Total	%Barren
65o-9	65o	Impaired	2.8	4.8	12.0	16.9	7.2
65o-12	65o	Reference	7.0	1.5	3.3	4.8	0.2
65o-23	65o	Reference	6.3	8.8	32.3	41.1	4.0
65o-24	65o	Reference	5.2	7.8	36.9	44.8	5.5
65o-25	65o	Reference	5.5	2.2	12.9	15.1	2.9
66d-38	66d	Impaired	4.8	0.5	0.0	0.5	0.1
66d-43	66d	Impaired	2.4	6.6	0.0	6.6	3.2
66d-48	66d	Impaired	1.0	2.3	0.2	2.5	0.1
66d-49	66d	Impaired	15.6	0.3	9.0	9.4	2.6
66d-50	66d	Impaired	24.2	1.4	5.8	7.2	3.0
66d-40	66d	Reference	1.9	0.2	0.0	0.2	0.1
66d-41	66d	Reference	2.6	0.2	0.0	0.2	0.2
66d-44	66d	Reference	0.0	0.0	0.0	0.0	0.0
66d-44-2	66d	Reference	0.0	0.0	0.0	0.0	0.0
66d-58	66d	Reference	1.8	0.3	0.0	0.3	0.5
66g-30	66g	Impaired	28.7	12.2	0.0	12.2	3.0
66g-31	66g	Impaired	15.1	9.6	0.0	9.6	4.8
66g-39	66g	Impaired	14.4	21.5	0.0	21.5	10.2
66g-42	66g	Impaired	7.9	3.7	0.0	3.7	6.8
66g-44	66g	Impaired	6.3	25.6	0.0	25.6	6.9
66g-65	66g	Impaired	9.6	6.9	0.0	6.9	4.5
66g-71	66g	Impaired	7.5	8.8	0.0	8.8	12.0
66g-2	66g	Reference	1.5	0.2	0.0	0.2	0.1
66g-2-2	66g	Reference	1.3	0.0	0.0	0.0	0.0
66g-23	66g	Reference	2.5	0.0	0.0	0.0	0.1

Station ID	Sub-ecoregion	Condition	%Urban	%Ag_Pasture	%Ag_RowCrop	%Ag_Total	%Barren
66g-5	66g	Reference	3.9	0.2	0.0	0.2	0.0
66g-6	66g	Reference	3.9	0.2	0.0	0.2	0.0
66j-17	66j	Impaired	2.1	4.6	0.0	4.6	0.7
66j-25	66j	Impaired	8.1	18.1	0.0	18.1	0.3
66j-26	66j	Impaired	0.5	3.8	0.9	4.7	2.6
66j-27	66j	Impaired	5.9	10.2	0.0	10.2	0.8
66j-9	66j	Impaired	7.0	21.8	0.0	21.8	4.6
66j-19	66j	Reference	0.3	2.4	0.5	2.9	0.4
66j-211	66j	Reference	4.2	10.4	0.0	10.4	0.1
66j-23	66j	Reference	0.1	8.9	0.6	9.6	0.0
66j-28	66j	Reference	0.1	3.0	0.4	3.4	0.0
66j-31	66j	Reference	4.1	4.4	0.0	4.4	4.0
67f&I-1	67f&I	Impaired	53.7	7.5	0.0	7.5	3.5
67f&I-11	67f&I	Impaired	21.7	45.7	0.0	45.7	7.0
67f&I-20	67f&I	Impaired	13.8	46.9	0.0	46.9	2.2
67f&i-33	67f&I	Impaired	5.7	30.3	0.0	30.3	3.1
67f&I-5	67f&I	Impaired	39.2	22.8	0.0	22.8	4.5
67f&i-16	67f&I	Reference	5.8	26.3	0.0	26.3	1.6
67f&i-17	67f&I	Reference	5.4	17.4	0.0	17.4	5.1
67f&i-25	67f&I	Reference	2.8	0.1	0.0	0.1	3.7
67f&i-27	67f&I	Reference	7.2	15.2	0.0	15.2	3.0
67f&i-37	67f&I	Reference	5.4	9.2	0.0	9.2	17.8
67g-1	67g	Impaired	0.2	28.5	5.3	33.9	3.1
67g-19	67g	Impaired	22.2	25.3	0.0	25.3	1.8
67g-6	67g	Impaired	6.7	15.1	0.0	15.1	6.2

Station ID	Sub-ecoregion	Condition	%Urban	%Ag_Pasture	%Ag_RowCrop	%Ag_Total	%Barren
67g-7	67g	Impaired	5.9	7.6	0.0	7.6	5.1
67g-9	67g	Impaired	7.2	20.1	0.0	20.1	9.4
67g-2	67g	Ref_Removed	9.7	17.6	0.0	17.6	2.3
67g-11	67g	Reference	4.0	20.4	0.0	20.4	0.4
67g-12	67g	Reference	4.2	30.4	0.0	30.4	0.8
67g-13	67g	Reference	3.8	19.5	0.0	19.5	3.6
67g-15	67g	Reference	8.8	12.7	0.0	12.7	2.7
67h-5	67h	Impaired	1.8	0.0	0.0	0.0	4.0
67h-8	67h	Impaired	0.0	1.4	0.0	1.4	0.2
67h-2	67h	Reference	4.2	9.3	0.0	9.3	6.1
67h-3	67h	Reference	4.5	8.0	0.0	8.0	3.1
67h-4	67h	Reference	2.4	0.6	0.0	0.6	1.6
67h-9	67h	Reference	6.4	10.6	0.0	10.6	5.1
68c&d-1	68c&d	Impaired	2.8	2.3	1.6	3.9	0.0
68c&d-10	68c&d	Impaired	4.3	21.9	0.0	21.9	2.0
68c&d-3	68c&d	Impaired	8.4	43.4	0.0	43.4	0.1
68c&d-7	68c&d	Impaired	2.0	14.2	0.0	14.2	3.3
68c&d-8	68c&d	Impaired	0.0	2.4	0.5	2.8	0.0
68c&d-4	68c&d	Reference	9.7	9.6	0.0	9.6	1.5
68c&d-5	68c&d	Reference	8.3	18.3	0.0	18.3	1.4
68c&d-6	68c&d	Reference	7.2	25.2	0.0	25.2	2.6
68c&d-9	68c&d	Reference	3.0	17.0	0.0	17.0	0.6
75e-20	75e	Impaired	7.0	0.3	2.0	2.3	18.3
75e-3	75e	Impaired	3.9	1.5	24.1	25.6	6.9
75e-36	75e	Impaired	5.6	1.9	32.6	34.5	15.1

Station ID	Sub-ecoregion	Condition	%Urban	%Ag_Pasture	%Ag_RowCrop	%Ag_Total	%Barren
75e-46	75e	Impaired	9.1	9.1	23.4	32.5	12.9
75e-54	75e	Impaired	7.9	0.2	0.4	0.6	18.2
75e-23	75e	Reference	5.0	0.7	7.0	7.6	16.0
75e-59	75e	Reference	6.8	0.2	1.7	1.9	15.0
75e-60	75e	Reference	5.0	1.1	3.0	4.1	8.3
75e-69	75e	Reference	9.1	0.0	12.1	12.1	29.7
75e-78	75e	Reference	6.2	1.7	4.5	6.2	8.4
75f-127	75f	Impaired	22.1	2.2	4.4	6.6	27.1
75f-137	75f	Impaired	42.2	1.0	1.6	2.6	26.9
75f-44	75f	Impaired	75.0	0.3	0.3	0.5	5.4
75f-45	75f	Impaired	84.7	0.0	0.0	0.0	3.9
75f-50	75f	Impaired	15.5	4.9	25.8	30.8	12.6
75f-124	75f	Reference	5.5	0.9	0.6	1.5	11.3
75f-126	75f	Reference	9.3	0.0	0.0	0.0	12.2
75f-61	75f	Reference	6.5	0.0	0.0	0.0	4.8
75f-91	75f	Reference	6.0	0.0	0.0	0.1	12.5
75f-95	75f	Reference	7.8	0.0	0.2	0.2	6.9
75h-1	75h	Impaired	8.5	0.0	33.1	33.1	4.4
75h-41	75h	Impaired	8.1	0.9	2.1	3.1	24.2
75h-47	75h	Impaired	4.2	2.1	13.5	15.6	5.9
75h-69	75h	Impaired	11.4	11.6	24.8	36.4	8.5
75h-70	75h	Impaired	7.9	5.6	20.2	25.7	19.3
75h-72	75h	Impaired	12.1	7.1	11.5	18.6	9.7
75h-10	75h	Reference	5.5	0.0	3.3	3.3	16.0
75h-35	75h	Reference	4.6	3.8	18.5	22.3	3.4

Station ID	Sub-ecoregion	Condition	%Urban	%Ag_Pasture	%Ag_RowCrop	%Ag_Total	%Barren
75h-45	75h	Reference	9.8	0.4	3.8	4.2	2.1
75h-60	75h	Reference	8.3	1.1	26.0	27.1	9.0
75h-66	75h	Reference	7.7	7.2	16.2	23.4	22.3
75j-13	75j	Impaired	74.6	0.0	0.0	0.0	3.0
75j-2	75j	Impaired	31.9	3.5	3.4	6.9	12.1
75j-24	75j	Impaired	26.1	0.0	0.0	0.0	10.2
75j-3	75j	Impaired	54.4	0.0	1.0	1.0	4.2
75j-4	75j	Impaired	82.0	0.0	0.0	0.0	2.7
75j-29	75j	Ref_Removed	20.5	3.5	1.6	5.1	5.3
75j-10	75j	Reference	5.3	0.0	0.0	0.0	20.7
75j-15	75j	Reference	4.1	0.0	0.0	0.0	0.2
75j-16	75j	Reference	9.9	0.0	0.0	0.0	8.7
75j-25	75j	Reference	11.0	0.2	0.3	0.5	16.5
75j-26	75j	Reference	20.2	1.3	0.7	2.0	11.4
75j-31	75j	Reference	5.4	0.0	0.0	0.0	19.2
75j-37	75j	Reference	5.3	0.0	0.0	0.0	0.3
75j-41	75j	Reference	8.4	0.2	0.8	1.0	0.6
75j-5	75j	Reference	5.7	0.8	0.1	0.9	35.0

APPENDIX C – List of stream sites

StationID	Stream_Name	Salinity	StreamOrder	Ecoregion	Subecoregion	Condition
45a-35	Smithwick Creek	Fresh	3	45	45a	Impaired
45a-50	Noonday Creek	Fresh	3	45	45a	Impaired
45a-59	Rottenwood Creek	Fresh	3	45	45a	Impaired
45a-61	Olley Creek	Fresh	3	45	45a	Impaired
45a-90	Mountain Creek	Fresh	4	45	45a	Impaired
45a-3	Davidson Creek	Fresh	4	45	45a	Reference
45a-89	Hillabahatchee Creek	Fresh	2	45	45a	Reference
45a03//	Middle Fork Broad River	Fresh	4	45	45a	Reference-BPJ
HH16	Town Creek	Fresh	2	45	45a	Reference-BPJ
HH18	Whooping Creek	Fresh	3	45	45a	Reference-BPJ
45b-120	Beaverdam Creek	Fresh	1	45	45b	Impaired
45b-193	Trib. Yellow River	Fresh	2	45	45b	Impaired
45b-203	South Fork	Fresh	3	45	45b	Impaired
45b-217	Flint River	Fresh	3	45	45b	Impaired
45b-291	Proctor Creek	Fresh	3	45	45b	Impaired
45b-44	Trib North Oconee River	Fresh	2	45	45b	Impaired
45b-152	Murder Creek	Fresh	3	45	45b	Reference
45b-156	Little Falling Creek	Fresh	2	45	45b	Reference
45b-258	Rocky Creek	Fresh	4	45	45b	Reference
45b-357	Trib. Flint River	Fresh	3	45	45b	Reference
HH22	Copeland Creek	Fresh	3	45	45b	Reference-BPJ
45c-10	Cherokee Creek	Fresh	2	45	45c	Impaired
45c-11	Dry Fork Creek	Fresh	4	45	45c	Impaired
45c-17	Upton Creek	Fresh	4	45	45c	Impaired

StationID	Stream_Name	Salinity	StreamOrder	Ecoregion	Subecoregion	Condition
45c-3	Chickasaw Creek	Fresh	3	45	45c	Impaired
45c-7	Centerville Branch	Fresh	2	45	45c	Impaired
45c-16	Kemp Creek	Fresh	3	45	45c	Reference
45c-19	Bull Creek	Fresh	3	45	45c	Reference
45c-8	Dry Fork Creek	Fresh	4	45	45c	Reference
//4	Florence Creek	Fresh	2	45	45c	Reference-BPJ
45d-11	Swinney Branch	Fresh	1	45	45d	Impaired
45d-14	Big Creek	Fresh	4	45	45d	Impaired
45d-21	Mann Creek	Fresh	3	45	45d	Impaired
45d-23	Greene Creek	Fresh	2	45	45d	Impaired
45d-6	Pegamore Creek	Fresh	4	45	45d	Impaired
45d-15	Terrapin Creek	Fresh	4	45	45d	Reference
45d-16	Wallace Creek	Fresh	2	45	45d	Reference
45d-4	West Fork Pumpkinvine Cr.	Fresh	2	45	45d	Reference
45d-9	Simpson Creek	Fresh	3	45	45d	Reference
45h-1	Three Mile Creek	Fresh	3	45	45h	Impaired
45h-10	Coleachee Creek	Fresh	3	45	45h	Impaired
45h-11	Pigeon Creek	Fresh	3	45	45h	Impaired
45h-12	Lazar Creek	Fresh	3	45	45h	Impaired
45h-2	Powder Creek	Fresh	2	45	45h	Impaired
45h-13	Sparks Creek	Fresh	3	45	45h	Reference
45h-16	Williams Creek	Fresh	2	45	45h	Reference
45h-17	Barnes Creek	Fresh	3	45	45h	Reference
45h-6	Turkey Creek	Fresh	3	45	45h	Reference
45h-9	Mud Creek	Fresh	3	45	45h	Reference

StationID	Stream_Name	Salinity	StreamOrder	Ecoregion	Subecoregion	Condition
65c-12	Magtail Branch	Fresh	2	65	65c	Impaired
65c-3	Rae's Creek	Fresh	3	65	65c	Impaired
65c-4	Rocky Creek	Fresh	4	65	65c	Impaired
65c-40	Deep Creek	Fresh	3	65	65c	Impaired
65c-5	Butler Creek	Fresh	3	65	65c	Impaired
65c-8	Sweetwater Creek	Fresh	3	65	65c	Impaired
65c-88	Hichitee Creek	Fresh	3	65	65c	Impaired
65c-80	Lanahassee Creek	Fresh	3	65	65c	Reference
65c-89	Hollis Creek	Fresh	4	65	65c	Reference
HH24	Whitewater Creek	Fresh	3	65	65c	Reference-BPJ
HH25	Pine Knot Creek	Fresh	4	65	65c	Reference-BPJ
HH26	Shoal Creek	Fresh	3	65	65c	Reference-BPJ
65d-1	Weracoba Creek	Fresh	3	65	65d	Impaired
65d-20	Day Creek	Fresh	1	65	65d	Impaired
65d-21	Clear Creek	Fresh	3	65	65d	Impaired
65d-32	Drag Nasty Creek	Fresh	2	65	65d	Impaired
65d-39	Roaring Branch	Fresh	3	65	65d	Impaired
65d-14	Hannahatchee Creek	Fresh	4	65	65d	Reference
65d-18	Grass Creek	Fresh	4	65	65d	Reference
65d-3	Hollaca Creek	Fresh	3	65	65d	Reference
65d-38	Waukeefriskee Creek	Fresh	3	65	65d	Reference
65d-4	Sally Branch	Fresh	3	65	65d	Reference
65g-10	Trib. Gum Creek	Fresh	2	65	65g	Impaired
65g-130	Trib. Dry Creek	Fresh	2	65	65g	Impaired
65g-135	Fish Pond Drain	Fresh	3	65	65g	Impaired

StationID	Stream_Name	Salinity	StreamOrder	Ecoregion	Subecoregion	Condition
65g-137	Trib. Fish Pond Drain	Fresh	2	65	65g	Impaired
65g-14	Trib. Gum Creek	Fresh	2	65	65g	Impaired
65g-17	Gully Creek	Fresh	3	65	65g	Impaired
65g-4	Little Creek	Fresh	2	65	65g	Impaired
65g-69	Trib. Flint River	Fresh	3	65	65g	Impaired
65g-8	Lilly River	Fresh	2	65	65g	Impaired
65g-84	Trib. Pachitla Creek	Fresh	1	65	65g	Impaired
65g-120	Odom Creek	Fresh	3	65	65g	Reference
65g-62	Kiokee Creek	Fresh	4	65	65g	Reference
HH29	Coheelee Creek	Fresh	4	65	65g	Reference-BPJ
65h-17	Trib. West Fork Deep Creek	Fresh	2	65	65h	Impaired
65h-174	Sugar Creek	Fresh	2	65	65h	Impaired
65h-32	Daniels Creek	Fresh	3	65	65h	Impaired
65h-34	Lime Sink Creek	Fresh	1	65	65h	Impaired
65h-41	Warrior Creek	Fresh	3	65	65h	Impaired
65h-202	Callahan Branch	Fresh	3	65	65h	Reference
65h-203	Fourmile Creek	Fresh	3	65	65h	Reference
65h-206	Shaw Creek	Fresh	2	65	65h	Reference
65h-209	Trib. Willacoochee Creek	Fresh	3	65	65h	Reference
65h-212	South Mosquito Creek	Fresh	3	65	65h	Reference
65k-102	Horsehead Creek	Fresh	3	65	65k	Impaired
65k-113	Town Creek	Fresh	2	65	65k	Impaired
65k-128	Long Branch	Fresh	2	65	65k	Impaired
65k-129	Trib. Kinchafoonee Creek	Fresh	3	65	65k	Impaired
65k-37	Big Cedar Creek	Fresh	4	65	65k	Impaired

StationID	Stream_Name	Salinity	StreamOrder	Ecoregion	Subecoregion	Condition
65k-54	Maiden Creek	Fresh	3	65	65k	Reference
65k-55	Cedar Creek	Fresh	3	65	65k	Reference
65k-56	Porter Creek	Fresh	4	65	65k	Reference
65k-68	Crooked Creek	Fresh	3	65	65k	Reference
65k-85	Okeetuck Creek	Fresh	4	65	65k	Reference
65l-160	Trib Canochee River	Fresh	2	65	65l	Impaired
65L-184	Stitchihatchie Creek	Fresh	2	65	65l	Impaired
65l-391	Little Creek	Fresh	3	65	65l	Impaired
65l-420	Mill Branch	Fresh	2	65	65l	Impaired
65l-423	Vicker's Stream	Fresh	3	65	65l	Impaired
65l-10	Mill Creek	Fresh	3	65	65l	Reference
65l-342	Opposum Creek	Fresh	2	65	65l	Reference
65l-343	Fishing Creek	Fresh	2	65	65l	Reference
65l-379	Red Bluff Creek	Fresh	2	65	65l	Reference
65l-381	Little Sturgeon Creek	Fresh	3	65	65l	Reference
65o-11	Pine Creek	Fresh	1	65	65o	Impaired
65o-18	Alagood Creek	Fresh	3	65	65o	Impaired
65o-22	Trib. Withlacoochee River	Fresh	2	65	65o	Impaired
65o-3	Olive Creek	Fresh	3	65	65o	Impaired
65o-9	Connell Creek	Fresh	1	65	65o	Impaired
65o-12	Hadley Creek	Fresh	2	65	65o	Reference
65o-23	Clyatt Mill Creek	Fresh	2	65	65o	Reference
65o-24	Redland Creek	Fresh	2	65	65o	Reference
65o-25	Trib New River	Fresh	2	65	65o	Reference
66d-38	West Fork Wolf Creek	Fresh	3	66	66d	Impaired

StationID	Stream_Name	Salinity	StreamOrder	Ecoregion	Subecoregion	Condition
66d-43	Hightower Creek	Fresh	4	66	66d	Impaired
66d-48	Clear Creek	Fresh	2	66	66d	Impaired
66d-49	Tiger Creek	Fresh	2	66	66d	Impaired
66d-50	Stekoa Creek	Fresh	3	66	66d	Impaired
66d-40	Chattahoochee River	Fresh	4	66	66d	Reference
66d-41	Dukes Creek	Fresh	4	66	66d	Reference
66d-44	Tallulah River	Fresh	4	66	66d	Reference
66d-44-2	Coleman River	Fresh	2	66	66d	Reference
66d-58	Town Creek	Fresh	4	66	66d	Reference
66g-30	Polecat Branch	Fresh	3	66	66g	Impaired
66g-31	Sharp Mountain Creek	Fresh	4	66	66g	Impaired
66g-39	Flat Creek	Fresh	3	66	66g	Impaired
66g-42	Trib. Talking Rock Creek	Fresh	3	66	66g	Impaired
66g-44	Little Scarecorn Creek	Fresh	2	66	66g	Impaired
66g-65	Talking Rock Creek	Fresh	3	66	66g	Impaired
66g-71	Yellow Creek	Fresh	4	66	66g	Impaired
66g-2	Jacks River	Fresh	3	66	66g	Reference
66g-2-2	Rough Creek	Fresh	3	66	66g	Reference
66g-23	Nimblewill Creek	Fresh	3	66	66g	Reference
66g-5	Mill Creek	Fresh	4	66	66g	Reference
66g-6	Holly Creek	Fresh	4	66	66g	Reference
66j-17	Ivylog Creek	Fresh	3	66	66j	Impaired
66j-25	Hemptown Creek	Fresh	3	66	66j	Impaired
66j-26	Wolf Creek	Fresh	3	66	66j	Impaired
66j-27	Young Cane Creek	Fresh	3	66	66j	Impaired

StationID	Stream_Name	Salinity	StreamOrder	Ecoregion	Subecoregion	Condition
66j-9	Sugar Creek	Fresh	3	66	66j	Impaired
66j-19	Hothouse Creek	Fresh	3	66	66j	Reference
66j-211	Bryan Creek	Fresh	3	66	66j	Reference
66j-23	Moccasin Creek	Fresh	3	66	66j	Reference
66j-28	South Fork Rapier Mill Cr.	Fresh	3	66	66j	Reference
66j-31	East Gumlog Creek	Fresh	3	66	66j	Reference
67f&l-1	Black Branch	Fresh	4	67	67f&l	Impaired
67f&l-11	Town Branch	Fresh	2	67	67f&l	Impaired
67f&l-20	Alpine Creek	Fresh	4	67	67f&l	Impaired
67f&i-33	Jones Branch	Fresh	3	67	67f&l	Impaired
67f&l-5	Coke Oven Branch	Fresh	4	67	67f&l	Impaired
67f&i-16	Cane Creek	Fresh	3	67	67f&l	Reference
67f&i-17	Armuchee East Fork Creek	Fresh	5	67	67f&l	Reference
67f&i-25	Clarks Creek	Fresh	2	67	67f&l	Reference
67f&i-27	Dykes Creek	Fresh	4	67	67f&l	Reference
67f&i-37	Little Cedar Creek	Fresh	4	67	67f&l	Reference
67g-1	Sugar Creek	Fresh	3	67	67g	Impaired
67g-19	Dozier Creek	Fresh	4	67	67g	Impaired
67g-6	Polecat Creek	Fresh	4	67	67g	Impaired
67g-7	Noblet Creek	Fresh	3	67	67g	Impaired
67g-9	Lick Creek	Fresh	4	67	67g	Impaired
67g-11	Little Armuchee Creek	Fresh	3	67	67g	Reference
67g-12	Trib. Little Armuchee Creek	Fresh	4	67	67g	Reference
67g-13	Moss Creek	Fresh	3	67	67g	Reference
67g-15	Trib. Armuchee Creek	Fresh	3	67	67g	Reference

StationID	Stream_Name	Salinity	StreamOrder	Ecoregion	Subecoregion	Condition
67h-5	Trib Ruff Creek	Fresh	3	67	67h	Impaired
67h-8	Panther Creek	Fresh	3	67	67h	Impaired
67h-2	East Chicamagua Creek	Fresh	4	67	67h	Reference
67h-3	Swamp Creek	Fresh	4	67	67h	Reference
67h-4	Snake Creek	Fresh	2	67	67h	Reference
67h-9	Kings Creek	Fresh	2	67	67h	Reference
68c&d-1	Running Water Creek	Fresh	4	68	68c&d	Impaired
68c&d-10	East Fork Little River	Fresh	4	68	68c&d	Impaired
68c&d-3	Higdon Creek	Fresh	4	68	68c&d	Impaired
68c&d-7	West Fork Little River	Fresh	3	68	68c&d	Impaired
68c&d-8	Trib. Middle Fork Little River	Fresh	1	68	68c&d	Impaired
68c&d-4	Rock Creek	Fresh	4	68	68c&d	Reference
68c&d-5	Bear Creek	Fresh	4	68	68c&d	Reference
68c&d-6	Daniels Creek	Fresh	4	68	68c&d	Reference
68c&d-9	Allen Creek	Fresh	4	68	68c&d	Reference
75e-54	Reedy Creek	Fresh	2	75	75e	Impaired
75e-46	Moore Branch	Fresh	1	75	75e	Impaired
75e-36	Swain Creek	Fresh	1	75	75e	Impaired
75e-20	Fullwood Creek	Fresh	2	75	75e	Impaired
75e-36	Trib Alapaha River	Fresh	2	75	75e	Impaired
75e-78	Trib. Alapaha River	Fresh	3	75	75e	Reference
75e-69	Big Branch	Fresh	1	75	75e	Reference
75e-60	Meetinghouse Branch	Fresh	3	75	75e	Reference
75e-59	Ray Branch	Fresh	2	75	75e	Reference
75e-23	Suwannoochee Creek	Fresh	2	75	75e	Reference

StationID	Stream_Name	Salinity	StreamOrder	Ecoregion	Subecoregion	Condition
75f-127	Reynolds Creek	Fresh	1	75	75f	Impaired
75f-137	Clay Branch	Fresh	3	75	75f	Impaired
75f-44	Springfield Canal	Fresh	2	75	75f	Impaired
75f-45	Haney's Creek	Fresh	2	75	75f	Impaired
75f-50	Canoochee Creek	Fresh	2	75	75f	Impaired
75f-124	Trib. Little Waverly Creek	Saline	2	75	75f	Reference
75f-126	Waverly Creek	Fresh	2	75	75f	Reference
75f-61	Raccoon Branch	Fresh	3	75	75f	Reference
75f-91	Little Creek	Fresh	3	75	75f	Reference
75f-95	Cathead Creek	Fresh	2	75	75f	Reference
75h-1	Burket Stream	Fresh	1	75	75h	Impaired
75h-41	Briar Creek	Fresh	2	75	75h	Impaired
75h-47	Cat Creek	Fresh	2	75	75h	Impaired
75h-69	Trib Satilla River	Fresh	2	75	75h	Impaired
75h-70	Pond Fork	Fresh	1	75	75h	Impaired
75h-72	Mill Creek	Fresh	3	75	75h	Impaired
75h-10	Keene Bay Branch	Fresh	3	75	75h	Reference
75h-35	Trib. Hurricane Creek	Fresh	3	75	75h	Reference
75h-45	Dry Creek	Fresh	2	75	75h	Reference
75h-60	Trib. Alapaha River	Fresh	1	75	75h	Reference
75h-66	Otter Creek	Fresh	2	75	75h	Reference
75j-13	Trib. Black Island Creek	Fresh	2	75	75j	Impaired
75j-2	Trib. Little Ogeechee River	Fresh	1	75	75j	Impaired
75j-24	Yellow Bluff Creek	Saline	1	75	75j	Impaired
75j-3	Trib. Hoover Creek	Saline	1	75	75j	Impaired

StationID	Stream_Name	Salinity	StreamOrder	Ecoregion	Subecoregion	Condition
75j-4	Trib. Wilmington River	Fresh	2	75	75j	Impaired
75j-10	Trib. South Newport River	Fresh	1	75	75j	Reference
75j-15	Trib. Hudson Creek	Fresh	1	75	75j	Reference
75j-16	Atwood Creek	Saline	1	75	75j	Reference
75j-25	Trib. White Oak Creek	Fresh	2	75	75j	Reference
75j-26	Trib. Little Satilla River	Fresh	1	75	75j	Reference
75j-31	Todd Creek	Saline	1	75	75j	Reference
75j-37	Trib. Brickhill River	Saline	1	75	75j	Reference
75j-41	White Branch	Saline	2	75	75j	Reference
75j-5	Trib. Jones Creek	Saline	2	75	75j	Reference

APPENDIX D – Taxonomic references

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APPENDIX E – Tolerance Value Protocol

Developed by Michele Brosset, Jodi Williams, and Dr. James Gore

Family Level
RBP SE (North Carolina)
↓
RBP MACS
↓
RBP Average SE genera and species average (Take the average of all genera and species that have a SE value)
↓
RBP Average Countrywide genera/species (If no SE values take the average of all genera and species for the other regions in the RBP)
↓
RBP Nearest Geographically (Family value) Midwest (Ohio)
↓
RBP If have values for both Upper Midwest (Wisconsin) and Northwest (Idaho) then average the two
↓
RBP Upper Midwest (Wisconsin) genus value
↓
RBP Northwest (Idaho) genus value
↓
Ask Gore

Genus Level
RBP SE (North Carolina)
↓
RBP Average Species in SE (North Carolina)
↓
RBP MACS Genus Value
↓
RBP Average species anywhere in US (If not listed in SE take average all species for that genus for all regions)
↓
RBP Nearest Geographically (genus value) Midwest (Ohio)
↓
RBP If have values for both Upper Midwest (Wisconsin) and Northwest (Idaho) then average the two
↓
RBP Upper Midwest (Wisconsin) genus value
↓
RBP Northwest (Idaho) genus value
↓

Tribe, Subfamily, Family value, or Superfamily (Once get to this level, go to Family Level and follow that procedure)
↓
Ask Gore

Species Level

RBP SE (North Carolina) species value
↓
RBP MACS species value
↓
RBP SE (North Carolina) genus value
↓
RBP SE Average Species Value
↓
RBP if MW, UM, or NW is listed for that particular species than use Nearest Geographically (see below)
↓
RBP average species value any region (If not listed for SE, then take the average of all species of that genus for all other regions)
↓
RBP MACS genus value
↓
RBP Nearest Geographically (genus value) Midwest (Ohio)
↓
RBP If have values for both Upper Midwest (Wisconsin) and Northwest (Idaho) then take the genus average
↓
RBP Upper Midwest (Wisconsin) genus value
↓
RBP Northwest (Idaho) genus value
↓
Tribe, Subfamily, Family value, or Superfamily (Once get to this level, go to Family Level and follow that procedure)
↓
Ask Gore

Order Level
If nothing else use the Order Level (or Ask Gore)
RBP SE (North Carolina)
↓
RBP MACS
↓

RBP Average SE family, genera, and species average (Take the average of all family, genera, and species that have a SE value)
↓
RBP Average Countrywide family/genera/species (If no SE values take the average of all genera and species for the other regions in the RBP)
↓
Ask Gore

Complexes

Species complex
When listed as species complex or species group RBP SE species value listed for that species use that value (RBP SE Species Value)
↓
RBP SE Genus Value
↓
RBP SE Average Species (take an Average all species for that genus for the SE)

Species/species complex
When listed as species/species complex or species/species group RBP SE value, take the average of the two SE values (RBP SE Average Complex (or group) value
↓
When no SE value given for either species than take RBP SE Genus Value
↓
When no SE value given for either species and no SE Genus Value, then take the RBP SE species average for all species of that Genus

Exceptions for species/species complex:
When one listed for MAC and one not listed at all, then drop down to SE Genus value

And

If one listed and one not listed for SE 1st take Average species for that Genus, if several SE species values are listed

Genus/Genus complex
Listed as Genus/Genus complex or Genus/Genus Group

RBP SE Average, if have both Genera than take the average of them (RBP SE Average Genus (or group) Complex

Exceptions for Genus/Genus complex:

If one listed for SE other have to take MACS Family Value; then take the SE Average Genus/Species for entire Family (Average Genus/Species Complex) (Average for Family)

And

If one listed for SE, but other not listed and Average taken to get that value, which would include the other genus that is part of the complex, than use the RBP Average Genus/Species Complex

And

If have two different regions (1 genus listed for 1 region and 1 genus listed for a different region, the region value not an average), then average the two different regions for those two genera (Average Genus Complex, don't specify regions)

FFG and Habit/Behavior
RBP value
↓
Merritt and Cummins value
↓
If have species, but none listed can go to genus or family if everything else listed is the same in RBP, similarly for genus, - go to family, etc. (Do not use if several different ones occur, leave as unidentified)
↓
If have species, but none listed can go to genus or family if everything else is the same in Merritt and Cummins, also can use that value if says generally; same for genus go to family, etc. (Do not use if several different ones occur, leave as unidentified)

Additional Sources for Habit & FFG

Thorp & Covich
Maxted 2000 list if CN or not for Habit

Note

Lenat 1993 is the same as the SE (North Carolina) value in the RBP
Maxted 2000 is the same as the MACS value in the RBP

Sources:

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APPENDIX F – RBP habitat assessment scores for reference streams

Station ID	Eco-region	Sub-ecoregion	Total Habit at Score	Bank Stability (Left Bank)	Bank Stability (Right Bank)	Channel Alteration	Channel Flow Status	Channel Sinuosity OR Frequency of Riffles	Pool Substrate Characterization OR Embeddedness
45a03//	45	45a	164	8	9	15	16	16	15
45a-3	45	45a	155	5	9	15	16	17	15
45a-89	45	45a	148	7	7	17	15	10	13
HH16	45	45a	173	9	9	19	17	19	17
HH18	45	45a	169	8	8	19	14	18	17
45b-152	45	45b	145	7	9	16	13	15	13
45b-156	45	45b	161	7	7	19	18	15	16
45b-258	45	45b	128	6	6	18	18	12	5
45b-357	45	45b	153	6	5	17	17	16	10
HH22	45	45b	157	8	8	15	13	15	16
//4	45	45c	130	6	6	19	12	13	12
45c-16	45	45c	137	8	8	18	7	16	14
45c-19	45	45c	138	5	5	19	15	9	18
45c-8	45	45c	148	6	6	15	15	15	15
45d-15	45	45d	166	9	8	17	15	16	18
45d-16	45	45d	160	8	8	18	12	12	18
45d-4	45	45d	167	9	9	18	15	19	14
45d-9	45	45d	184	9	10	18	18	20	17
45h-13	45	45h	138	7	9	18	9	13	10
45h-16	45	45h	160	8	8	18	15	18	13
45h-17	45	45h	166	8	8	17	16	17	17
45h-6	45	45h	165	8	8	19	17	15	13

Station ID	Eco-region	Sub-ecoregion	Total Habit at Score	Bank Stability (Left Bank)	Bank Stability (Right Bank)	Channel Alteration	Channel Flow Status	Channel Sinuosity OR Frequency of Riffles	Pool Substrate Characterization OR Embeddedness
45h-9	45	45h	166	10	9	19	16	18	15
65c-80	65	65c	159	9	9	19	19	13	9
65c-89	65	65c	159	8	8	19	19	9	15
HH24	65	65c	170	9	9	19	19	13	16
HH25	65	65c	170	9	10	17	19	15	16
HH26	65	65c	164	9	10	18	19	9	13
65d-14	65	65d	143	6	6	18	19	11	14
65d-18	65	65d	121	4	4	18	10	14	10
65d-3	65	65d	174	9	9	18	19	17	15
65d-38	65	65d	137	8	7	15	14	16	14
65d-4	65	65d	172	8	8	16	18	14	18
65g-120	65	65g	143	7	7	15	15	12	15
65g-62	65	65g	141	8	8	16	14	15	14
HH29	65	65g	171	9	9	16	18	15	17
65h-202	65	65h	165	9	8	17	15	17	15
65h-203	65	65h	159	9	9	15	17	14	15
65h-206	65	65h	147	8	7	17	10	16	14
65h-209	65	65h	151	8	9	15	14	18	12
65h-212	65	65h	161	9	9	17	17	14	15
65k-54	65	65k	135	9	8	15	16	5	11
65k-55	65	65k	157	9	9	18	16	11	16
65k-56	65	65k	165	9	9	18	18	10	16
65k-68	65	65k	163	10	9	17	19	9	15

Station ID	Eco-region	Sub-ecoregion	Total Habit at Score	Bank Stability (Left Bank)	Bank Stability (Right Bank)	Channel Alteration	Channel Flow Status	Channel Sinuosity OR Frequency of Riffles	Pool Substrate Characterization OR Embeddedness
65k-85	65	65k	157	9	10	16	16	9	14
65l-10	65	65l	171	9	9	18	18	19	15
65l-342	65	65l	172	9	9	19	17	16	16
65l-343	65	65l	163	9	9	18	17	9	17
65l-379	65	65l	148	9	9	20	16	20	7
65l-381	65	65l	164	9	9	19	16	18	13
65o-12	65	65o	162	9	9	15	14	16	14
65o-23	65	65o	149	5	5	15	15	18	15
65o-24	65	65o	179	7	7	19	16	19	17
65o-25	65	65o	171	9	9	17	19	17	16
66d-40	66	66d	169	9	9	18	14	17	16
66d-41	66	66d	165	8	9	17	17	16	15
66d-44	66	66d	162	9	8	17	15	18	15
66d-44-2	66	66d	181	9	9	19	18	19	18
66d-58	66	66d	186	10	10	20	17	19	18
66g-2	66	66g	177	10	9	18	16	19	19
66g-2-2	66	66g	192	10	10	20	19	19	19
66g-23	66	66g	179	9	9	20	17	19	18
66g-5	66	66g	183	10	10	17	20	20	19
66g-6	66	66g	166	9	9	17	13	18	19
66j-19	66	66j	129	7	7	19	15	16	17
66j-211	66	66j	160	9	8	15	16	17	16

Station ID	Eco-region	Sub-ecoregion	Total Habit at Score	Bank Stability (Left Bank)	Bank Stability (Right Bank)	Channel Alteration	Channel Flow Status	Channel Sinuosity OR Frequency of Riffles	Pool Substrate Characterization OR Embeddedness
66j-23	66	66j	161	9	8	16	19	17	10
66j-28	66	66j	111	4	3	20	16	16	4
66j-31	66	66j	166	8	8	18	17	18	15
67f&i-16	67	67f&I	170	8	8	18	18	18	16
67f&i-17	67	67f&I	174	9	9	19	19	15	17
67f&i-25	67	67f&I	118	6	6	13	14	13	13
67f&i-27	67	67f&I	171	8	8	18	18	18	17
67f&i-37	67	67f&I	152	10	8	13	19	11	17
67g-11	67	67g	143	10	4	16	17	18	16
67g-12	67	67g	122	1	3	15	16	13	15
67g-13	67	67g	139	8	5	15	16	16	13
67g-15	67	67g	153	7	8	18	14	16	12
67g-2	67	67g	131	7	7	14	10	8	15
67h-2	67	67h	173	9	9	18	18	18	18
67h-3	67	67h	164	9	7	18	18	17	16
67h-4	67	67h	171	9	10	18	19	19	18
67h-9	67	67h	158	6	6	17	17	17	18
68c&d-4	68	68c&d	179	9	10	17	18	19	18
68c&d-5	68	68c&d	180	8	9	19	19	17	18
68c&d-6	68	68c&d	185	10	10	18	19	17	18
68c&d-9	68	68c&d	161	8	10	14	17	16	19
75e-23	75	75e	163	10	10	20	20	16	11
75e-59	75	75e	173	10	9	18	17	13	17

Station ID	Eco-region	Sub-ecoregion	Total Habit at Score	Bank Stability (Left Bank)	Bank Stability (Right Bank)	Channel Alteration	Channel Flow Status	Channel Sinuosity OR Frequency of Riffles	Pool Substrate Characterization OR Embeddedness
75e-60	75	75e	181	9	9	19	19	11	19
75e-69	75	75e	149	9	9	20	16	20	10
75e-78	75	75e	166	10	10	18	16	16	16
75f-124	75	75f	152	10	10	18	5	9	15
75f-126	75	75f	164	10	10	18	20	9	15
75f-61	75	75f	152	8	8	15	20	10	16
75f-91	75	75f	150	8	8	20	19	19	10
75f-95	75	75f	146	9	9	17	13	11	15
75h-10	75	75h	159	9	9	18	16	13	18
75h-35	75	75h	157	10	10	18	18	11	17
75h-45	75	75h	159	9	9	20	20	18	10
75h-60	75	75h	178	10	10	19	18	13	17
75h-66	75	75h	145	9	9	18	19	10	13
75j-10	75	75j	161	9	9	18	18	17	13
75j-15	75	75j	122	5	5	18	11	12	8
75j-16	75	75j	144	5	5	19	8	19	13
75j-25	75	75j	144	10	10	19	19	8	8
75j-26	75	75j	147	7	7	17	18	13	8
75j-31	75	75j	158	9	9	19	18	12	13
75j-37	75	75j	112	1	1	20	6	19	8
75j-41	75	75j	150	6	8	18	16	18	13
75j-5	75	75j	121	7	7	13	10	10	8

Station ID	Eco-region	Sub-ecoregion	Epifaunal Substrate / Available Cover	Pool Variability OR Velocity / Depth Regime	Riparian Vegetative Zone Width (Left Bank)	Riparian Vegetative Zone Width (Right Bank)	Sediment Deposition	Vegetative Protection (Left Bank)	Vegetative Protection (Right Bank)
45a03//	45	45a	16	19	9	9	14	9	9
45a-3	45	45a	16	16	9	8	14	9	6
45a-89	45	45a	16	15	9	7	14	9	9
HH16	45	45a	17	15	9	9	15	9	9
HH18	45	45a	15	16	9	9	18	9	9
45b-152	45	45b	13	13	7	9	13	8	9
45b-156	45	45b	19	16	10	10	8	8	8
45b-258	45	45b	8	16	9	9	6	7	8
45b-357	45	45b	15	17	10	10	14	8	8
HH22	45	45b	18	16	10	5	15	9	9
//4	45	45c	16	8	9	5	16	4	4
45c-16	45	45c	14	10	9	9	10	7	7
45c-19	45	45c	15	18	7	7	10	5	5
45c-8	45	45c	16	10	9	10	15	8	8
45d-15	45	45d	16	15	7	9	18	9	9
45d-16	45	45d	19	18	9	9	13	8	8
45d-4	45	45d	16	16	9	9	15	9	9
45d-9	45	45d	18	18	9	10	19	9	9
45h-13	45	45h	13	16	9	10	6	9	9
45h-16	45	45h	17	15	9	9	14	8	8
45h-17	45	45h	17	14	10	10	16	8	8
45h-6	45	45h	17	14	10	10	17	8	9

Station ID	Eco-region	Sub-ecoregion	Epifaunal Substrate / Available Cover	Pool Variability OR Velocity / Depth Regime	Riparian Vegetative Zone Width (Left Bank)	Riparian Vegetative Zone Width (Right Bank)	Sediment Deposition	Vegetative Protection (Left Bank)	Vegetative Protection (Right Bank)
45h-9	45	45h	15	16	10	9	11	9	9
65c-80	65	65c	13	16	10	10	16	8	8
65c-89	65	65c	16	10	10	10	17	9	9
HH24	65	65c	16	16	10	10	16	8	9
HH25	65	65c	15	16	9	10	18	8	8
HH26	65	65c	18	16	8	9	18	9	8
65d-14	65	65d	15	17	9	9	7	6	6
65d-18	65	65d	11	16	7	7	6	7	7
65d-3	65	65d	16	16	10	10	17	9	9
65d-38	65	65d	15	9	9	6	11	7	6
65d-4	65	65d	17	19	10	10	16	9	9
65g-120	65	65g	16	10	8	9	14	7	8
65g-62	65	65g	15	10	9	9	15	4	4
HH29	65	65g	18	16	9	9	17	9	9
65h-202	65	65h	17	16	9	9	17	8	8
65h-203	65	65h	14	15	8	9	18	8	8
65h-206	65	65h	15	10	9	9	15	9	8
65h-209	65	65h	14	10	9	9	15	9	9
65h-212	65	65h	16	16	9	8	15	8	8
65k-54	65	65k	15	8	7	10	14	8	9
65k-55	65	65k	15	16	9	9	11	9	9
65k-56	65	65k	16	15	9	10	17	9	9

Station ID	Eco-region	Sub-ecoregion	Epifaunal Substrate / Available Cover	Pool Variability OR Velocity / Depth Regime	Riparian Vegetative Zone Width (Left Bank)	Riparian Vegetative Zone Width (Right Bank)	Sediment Deposition	Vegetative Protection (Left Bank)	Vegetative Protection (Right Bank)
65k-68	65	65k	15	16	9	10	18	8	8
65k-85	65	65k	15	16	9	10	17	7	9
65l-10	65	65l	16	16	9	9	17	8	8
65l-342	65	65l	16	18	9	9	18	8	8
65l-343	65	65l	16	17	8	8	18	9	8
65l-379	65	65l	14	7	10	10	14	6	6
65l-381	65	65l	18	18	9	7	11	8	9
65o-12	65	65o	16	19	9	9	14	9	9
65o-23	65	65o	16	16	9	9	16	5	5
65o-24	65	65o	17	19	10	10	18	10	10
65o-25	65	65o	16	16	8	9	17	9	9
66d-40	66	66d	17	18	9	10	15	8	9
66d-41	66	66d	17	15	10	8	16	8	9
66d-44	66	66d	16	17	10	7	13	10	7
66d-44-2	66	66d	14	19	10	10	18	9	9
66d-58	66	66d	19	19	9	10	17	9	9
66g-2	66	66g	16	17	10	7	18	9	9
66g-2-2	66	66g	17	19	10	10	19	10	10
66g-23	66	66g	18	15	10	9	19	8	8
66g-5	66	66g	16	17	10	9	17	9	9
66g-6	66	66g	15	16	7	9	17	8	9

Station ID	Eco-region	Sub-ecoregion	Epifaunal Substrate / Available Cover	Pool Variability OR Velocity / Depth Regime	Riparian Vegetative Zone Width (Left Bank)	Riparian Vegetative Zone Width (Right Bank)	Sediment Deposition	Vegetative Protection (Left Bank)	Vegetative Protection (Right Bank)
66j-19	66	66j	17	15	1	1	8	3	3
66j-211	66	66j	18	17	9	4	18	9	4
66j-23	66	66j	16	14	10	8	15	10	9
66j-28	66	66j	10	15	9	1	5	5	3
66j-31	66	66j	17	15	8	8	16	9	9
67f&i-16	67	67f&I	18	15	10	9	14	9	9
67f&i-17	67	67f&I	16	16	10	9	15	10	10
67f&i-25	67	67f&I	13	9	5	4	10	6	6
67f&i-27	67	67f&I	17	18	9	9	16	7	8
67f&i-37	67	67f&I	17	18	5	5	16	7	6
67g-11	67	67g	12	17	3	7	11	6	6
67g-12	67	67g	11	17	4	4	15	4	4
67g-13	67	67g	15	16	8	3	12	8	4
67g-15	67	67g	13	18	9	8	14	8	8
67g-2	67	67g	12	9	8	8	15	9	9
67h-2	67	67h	17	15	6	10	17	9	9
67h-3	67	67h	17	17	6	9	14	8	8
67h-4	67	67h	16	10	6	10	18	9	9
67h-9	67	67h	15	15	8	8	19	6	6
68c&d-4	68	68c&d	17	15	8	10	19	9	10
68c&d-5	68	68c&d	18	19	10	9	15	10	9
68c&d-6	68	68c&d	19	18	10	9	19	9	9

Station ID	Eco-region	Sub-ecoregion	Epifaunal Substrate / Available Cover	Pool Variability OR Velocity / Depth Regime	Riparian Vegetative Zone Width (Left Bank)	Riparian Vegetative Zone Width (Right Bank)	Sediment Deposition	Vegetative Protection (Left Bank)	Vegetative Protection (Right Bank)
68c&d-9	68	68c&d	16	18	2	9	16	9	7
75e-23	75	75e	16	10	8	7	19	8	8
75e-59	75	75e	18	16	10	9	17	10	9
75e-60	75	75e	19	17	10	10	19	10	10
75e-69	75	75e	11	5	6	6	17	10	10
75e-78	75	75e	16	14	8	8	18	8	8
75f-124	75	75f	13	16	10	9	18	10	9
75f-126	75	75f	18	9	9	9	18	9	10
75f-61	75	75f	18	15	6	7	13	8	8
75f-91	75	75f	11	11	9	3	20	6	6
75f-95	75	75f	17	9	9	9	10	9	9
75h-10	75	75h	16	9	9	7	18	8	9
75h-35	75	75h	15	16	5	4	18	8	7
75h-45	75	75h	13	11	6	6	19	9	9
75h-60	75	75h	18	19	9	9	18	9	9
75h-66	75	75h	13	8	10	9	8	9	10
75j-10	75	75j	16	15	9	9	12	8	8
75j-15	75	75j	10	8	9	7	13	8	8
75j-16	75	75j	13	11	9	9	17	8	8
75j-25	75	75j	11	14	7	7	19	6	6
75j-26	75	75j	12	13	10	10	14	9	9
75j-31	75	75j	15	8	9	9	19	9	9

Station ID	Eco-region	Sub-ecoregion	Epifaunal Substrate / Available Cover	Pool Variability OR Velocity / Depth Regime	Riparian Vegetative Zone Width (Left Bank)	Riparian Vegetative Zone Width (Right Bank)	Sediment Deposition	Vegetative Protection (Left Bank)	Vegetative Protection (Right Bank)
75j-37	75	75j	14	9	10	10	8	3	3
75j-41	75	75j	16	10	10	10	11	6	8
75j-5	75	75j	15	8	9	9	15	5	5

APPENDIX G – Substrate particle size distribution for reference streams

StationID	Stream Name	Subecoregion	Silt/Clay	Sand	Gravel	Cobble	Boulder	Bedrock
45a03//	Middle Fork Broad River	45a	0.0	44.7	4.9	34.0	5.8	10.7
45a-3	Davidson Creek	45a	0.0	2.8	35.8	49.1	12.3	0.0
45a-89	Hillabahatchee Creek	45a	4.0	23.8	59.4	8.9	0.0	4.0
HH16	Town Creek	45a	1.0	11.5	78.8	7.7	1.0	0.0
HH18	Whooping Creek	45a	1.0	13.0	38.0	44.0	3.0	1.0
45b-152	Murder Creek	45b	1.0	55.3	43.7	0.0	0.0	0.0
45b-156	Little Falling Creek	45b	42.0	54.0	4.0	0.0	0.0	0.0
45b-258	Rocky Creek	45b	2.0	89.0	2.0	1.0	0.0	6.0
45b-357	Trib. Flint River	45b	0.0	24.8	40.6	22.8	2.0	9.9
HH22	Copeland Creek	45b	1.9	57.3	29.1	8.7	2.9	0.0
//4	Florence Creek	45c	10.1	50.5	25.3	14.1	0.0	0.0
45c-16	Kemp Creek	45c	3.7	75.9	20.4	0.0	0.0	0.0
45c-19	Bull Creek	45c	0.0	13.0	63.0	19.0	4.0	1.0
45c-8	Dry Fork Creek	45c	5.8	72.8	21.4	0.0	0.0	0.0
45d-15	Terrapin Creek	45d	0.0	6.0	35.0	47.0	12.0	0.0
45d-16	Wallace Creek	45d	4.0	5.0	68.0	18.0	5.0	0.0
45d-4	West Fork Pumpkinvine Cr.	45d	0.0	12.0	41.0	35.0	7.0	5.0
45d-9	Simpson Creek	45d	0.0	6.1	31.3	26.3	33.3	3.0
45h-13	Sparks Creek	45h	2.0	56.6	14.1	25.3	2.0	0.0
45h-16	Williams Creek	45h	4.0	50.0	43.0	3.0	0.0	0.0
45h-17	Barnes Creek	45h	0.0	15.0	31.0	50.0	3.0	1.0
45h-6	Turkey Creek	45h	1.9	26.2	65.0	5.8	1.0	0.0
45h-9	Mud Creek	45h	0.0	67.6	7.8	2.0	2.0	20.6
65c-80	Lanahassee Creek	65c	22.8	77.2	0.0	0.0	0.0	0.0
65c-89	Hollis Creek	65c	0.0	100.0	0.0	0.0	0.0	0.0

StationID	Stream Name	Subecoregion	Silt/Clay	Sand	Gravel	Cobble	Boulder	Bedrock
HH24	Whitewater Creek	65c	0.0	89.0	11.0	0.0	0.0	0.0
HH25	Pine Knot Creek	65c	0.0	99.0	1.0	0.0	0.0	0.0
HH26	Shoal Creek	65c	37.0	63.0	0.0	0.0	0.0	0.0
65d-14	Hannahatchee Creek	65d	10.0	90.0	0.0	0.0	0.0	0.0
65d-18	Grass Creek	65d	4.0	91.0	5.0	0.0	0.0	0.0
65d-3	Hollaca Creek	65d	4.0	96.0	0.0	0.0	0.0	0.0
65d-38	Waukeefriskee Creek	65d	6.7	92.4	1.0	0.0	0.0	0.0
65d-4	Sally Branch	65d	24.0	76.0	0.0	0.0	0.0	0.0
65g-120	Odom Creek	65g	20.0	49.5	30.5	0.0	0.0	0.0
65g-62	Kiokee Creek	65g	30.7	69.3	0.0	0.0	0.0	0.0
HH29	Coheelee Creek	65g	0.0	67.0	27.2	3.9	1.9	0.0
65h-202	Callahan Branch	65h	3.7	96.3	0.0	0.0	0.0	0.0
65h-203	Fourmile Creek	65h	30.0	70.0	0.0	0.0	0.0	0.0
65h-206	Shaw Creek	65h	1.0	99.0	0.0	0.0	0.0	0.0
65h-209	Trib. Willacoochee Creek	65h	0.0	100.0	0.0	0.0	0.0	0.0
65h-212	South Mosquito Creek	65h	2.0	98.0	0.0	0.0	0.0	0.0
65k-54	Maiden Creek	65k	1.0	99.0	0.0	0.0	0.0	0.0
65k-55	Cedar Creek	65k	7.0	93.0	0.0	0.0	0.0	0.0
65k-56	Porter Creek	65k	7.0	91.0	2.0	0.0	0.0	0.0
65k-68	Crooked Creek	65k	30.0	67.0	3.0	0.0	0.0	0.0
65k-85	Okeetuck Creek	65k	74.0	25.0	1.0	0.0	0.0	0.0
65l-10	Mill Creek	65l	5.0	94.1	1.0	0.0	0.0	0.0
65l-342	Opposum Creek	65l	16.0	84.0	0.0	0.0	0.0	0.0
65l-343	Fishing Creek	65l	5.0	95.0	0.0	0.0	0.0	0.0
65l-379	Red Bluff Creek	65l	5.0	95.0	0.0	0.0	0.0	0.0

StationID	Stream Name	Subecoregion	Silt/Clay	Sand	Gravel	Cobble	Boulder	Bedrock
65l-381	Little Sturgeon Creek	65l	12.0	88.0	0.0	0.0	0.0	0.0
65o-12	Hadley Creek	65o	43.0	57.0	0.0	0.0	0.0	0.0
65o-23	Clyatt Mill Creek	65o	3.0	97.0	0.0	0.0	0.0	0.0
65o-24	Redland Creek	65o	20.8	77.2	0.0	0.0	0.0	2.0
65o-25	Trib. New River	65o	6.0	94.0	0.0	0.0	0.0	0.0
66d-40	Chattahoochee River	66d	0.0	5.9	40.2	28.4	25.5	0.0
66d-41	Dukes Creek	66d	0.0	2.9	28.4	43.1	17.6	7.8
66d-44	Tallulah River	66d	1.0	8.0	35.0	42.0	6.0	8.0
66d-44-2	Coleman River	66d	0.0	8.0	30.0	29.0	30.0	3.0
66d-58	Town Creek	66d	0.0	6.0	32.0	54.0	8.0	0.0
66g-2	Jacks River	66g	0.0	5.9	31.7	31.7	24.8	5.9
66g-2-2	Rough Creek	66g	0.0	0.0	45.0	30.0	25.0	0.0
66g-23	Nimblewill Creek	66g	4.0	13.0	30.0	49.0	4.0	0.0
66g-5	Mill Creek	66g	0.0	9.0	35.0	38.0	18.0	0.0
66g-6	Holly Creek	66g	0.0	2.8	13.2	50.9	33.0	0.0
66j-19	Hothouse Creek	66j	8.0	4.0	30.0	44.0	14.0	0.0
66j-211	Bryan Creek	66j	2.0	17.6	42.2	32.4	2.9	2.9
66j-23	Moccasin Creek	66j	12.1	15.2	44.4	19.2	9.1	0.0
66j-28	South Fork Rapier Mill Creek	66j	12.0	28.0	56.0	4.0	0.0	0.0
66j-31	East Gumlog Creek	66j	0.0	7.0	69.0	19.0	4.0	1.0
67f&i-16	Cane Creek	67f&I	0.0	3.0	63.6	25.3	4.0	4.0
67f&i-17	Armuchee Creek	67f&I	0.0	3.0	86.0	7.0	1.0	3.0
67f&i-25	Clarks Creek	67f&I	1.0	13.6	61.2	9.7	0.0	14.6
67f&i-27	Dykes Creek	67f&I	0.0	2.0	56.4	38.6	1.0	2.0
67f&i-37	Little Cedar Creek	67f&I	8.1	14.1	52.5	23.2	2.0	0.0

StationID	Stream Name	Subecoregion	Silt/Clay	Sand	Gravel	Cobble	Boulder	Bedrock
67g-11	Little Armuchee Creek	67g	1.0	10.5	78.1	1.9	0.0	8.6
67g-12	Trib. Little Armuchee Creek	67g	0.0	24.8	73.3	0.0	0.0	1.9
67g-13	Moss Creek	67g	1.0	6.0	28.0	26.0	20.0	19.0
67g-15	Trib. Armuchee Creek	67g	0.0	15.8	83.2	0.0	0.0	1.0
67g-2	Trib..Tiger Creek	67g	13.9	2.0	76.2	7.9	0.0	0.0
67h-2	East Chicamagua Creek	67h	0.0	7.8	49.5	35.0	1.0	6.8
67h-3	Swamp Creek	67h	0.0	9.8	42.2	31.4	7.8	8.8
67h-4	Snake Creek	67h	0.0	4.9	47.1	40.2	4.9	2.9
67h-9	Kings Creek	67h	0.0	2.0	49.0	38.0	11.0	0.0
68c&d-4	Rock Creek	68c&d	0.0	4.0	16.0	30.0	46.0	4.0
68c&d-5	Bear Creek	68c&d	0.0	22.0	8.0	19.0	49.0	2.0
68c&d-6	Daniels Creek	68c&d	0.0	19.0	8.0	18.0	41.0	14.0
68c&d-9	Allen Creek	68c&d	0.0	6.0	22.0	58.0	13.0	1.0
75e-23	Suwannoochee Creek	75e	13.0	85.0	2.0	0.0	0.0	0.0
75e-59	Ray Branch	75e	0.0	100.0	0.0	0.0	0.0	0.0
75e-60	Meetinghouse Branch	75e	24.8	71.3	4.0	0.0	0.0	0.0
75e-69	Big Branch	75e	6.0	94.0	0.0	0.0	0.0	0.0
75e-78	Trib. Alapaha River	75e	2.0	98.0	0.0	0.0	0.0	0.0
75f-124	Trib. Little Waverly Creek	75f	30.0	70.0	0.0	0.0	0.0	0.0
75f-126	Waverly Creek	75f	98.0	2.0	0.0	0.0	0.0	0.0
75f-61	Raccoon Branch	75f	9.0	91.0	0.0	0.0	0.0	0.0
75f-91	Little Creek	75f	0.0	100.0	0.0	0.0	0.0	0.0
75f-95	Cathead Creek	75f	100.0	0.0	0.0	0.0	0.0	0.0
75h-10	Keene Bay Branch	75h	12.9	86.1	1.0	0.0	0.0	0.0
75h-35	Trib. Hurricane Creek	75h	6.0	94.0	0.0	0.0	0.0	0.0

StationID	Stream Name	Subecoregion	Silt/Clay	Sand	Gravel	Cobble	Boulder	Bedrock
75h-45	Dry Creek	75h	2.0	98.0	0.0	0.0	0.0	0.0
75h-60	Trib. Alapaha	75h	11.0	87.0	2.0	0.0	0.0	0.0
75h-66	Otter Creek	75h	54.0	46.0	0.0	0.0	0.0	0.0
75j-10	Trib. South Newport River	75j	4.0	96.0	0.0	0.0	0.0	0.0
75j-15	Trib. Hudson Creek	75j	37.0	63.0	0.0	0.0	0.0	0.0
75j-16	Atwood Creek	75j	83.0	17.0	0.0	0.0	0.0	0.0
75j-25	Trib. White Oak Creek	75j	44.0	56.0	0.0	0.0	0.0	0.0
75j-26	Trib. Little Satilla River	75j	49.0	51.0	0.0	0.0	0.0	0.0
75j-31	Todd Creek	75j	59.0	41.0	0.0	0.0	0.0	0.0
75j-37	Trib. Brickhill River	75j	3.0	97.0	0.0	0.0	0.0	0.0
75j-41	White Branch	75j	0.0	100.0	0.0	0.0	0.0	0.0
75j-5	Trib. Jones Creek	75j	30.0	70.0	0.0	0.0	0.0	0.0

APPENDIX H – *In situ* chemical parameter values for reference streams

StationID	Ecoregion	Subecoregion	Dissolved Oxygen (mg/L)	pH	Conductivity (µs/cm)	Turbidity (NTUs)
45a03//	45	45a	8.95	6.75	0.0348	0.1
45a-3	45	45a	10.02	7.15	0.0304	0.7
45a-89	45	45a	8.93	7.15	0.0264	0.0
HH16	45	45a	9.03	7.38	0.0254	7.8
HH18	45	45a	8.43	6.78	0.0340	3.6
45b-152	45	45b	7.77	7.16	0.0815	0.0
45b-156	45	45b	7.16	6.83	0.1027	20.3
45b-258	45	45b	13.77	6.58	0.0440	10.5
45b-357	45	45b	12.32	6.80	0.0713	17.5
HH22	45	45b	7.26	7.02	0.1059	1.7
//4	45	45c	3.44	6.49	0.1411	30.6
45c-16	45	45c	2.31	6.70	0.1312	19.9
45c-19	45	45c	10.60	6.67	0.1060	19.7
45c-8	45	45c	5.59	6.90	0.1392	0.0
45d-15	45	45d	7.48	6.94	0.0592	0.0
45d-16	45	45d	6.92	6.80	0.0699	0.0
45d-4	45	45d	13.17	7.39	0.0881	3.2
45d-8	45	45d	5.61	6.92	0.1820	0.0
45d-9	45	45d	10.56	7.08	0.0336	4.9
45h-13	45	45h	9.61	6.99	0.0330	12.0
45h-16	45	45h	10.83	6.89	0.0324	4.1
45h-17	45	45h	10.03	7.04	0.0274	2.1
45h-6	45	45h	13.25	6.45	0.0373	0.0
45h-9	45	45h	8.89	7.17	0.0440	6.9

StationID	Ecoregion	Subecoregion	Dissolved Oxygen (mg/L)	pH	Conductivity (µs/cm)	Turbidity (NTUs)
65c-80	65	65c	11.66	6.16	0.0489	3.0
65c-89	65	65c	12.49	5.29	0.0129	6.9
HH24	65	65c	10.30	5.08	0.0030	0.4
HH25	65	65c	10.26	4.34	0.0193	0.0
HH26	65	65c	11.88	4.50	0.0151	1.1
65d-14	65	65d	16.50	6.35	0.0437	39.6
65d-18	65	65d	9.28	6.76	0.0577	9.6
65d-3	65	65d	11.50	4.13	0.0517	0.0
65d-38	65	65d	9.58	6.48	0.0466	8.8
65d-4	65	65d	11.11	4.10	0.0420	0.0
65g-120	65	65g	9.74	6.75	0.0524	13.8
65g-62	65	65g	7.56	7.35	0.4000	3.4
65g-82	65	65g	2.46	6.83	0.3430	5.0
65g-83	65	65g	7.64	6.82	0.0860	1.1
HH29	65	65g	8.69	6.55	0.0555	15.6
65h-202	65	65h	7.32	6.09	0.0341	9.6
65h-203	65	65h	9.59	7.51	0.1414	10.2
65h-206	65	65h	7.37	6.83	0.0826	10.9
65h-209	65	65h	9.79	6.28	0.0606	11.5
65h-212	65	65h	8.88	6.96	0.0759	10.7
65k-54	65	65k	10.12	6.63	0.1118	4.2
65k-55	65	65k	10.78	6.90	0.0958	5.3
65k-56	65	65k	5.53	6.26	0.1074	9.0
65k-68	65	65k	6.39	6.97	0.4330	14.4
65k-85	65	65k	6.80	6.51	0.4270	2.5

StationID	Ecoregion	Subecoregion	Dissolved Oxygen (mg/L)	pH	Conductivity (µs/cm)	Turbidity (NTUs)
65l-10	65	65l	9.31	6.92	0.1345	4.7
65l-342	65	65l	8.31	5.31	0.0540	2.8
65l-343	65	65l	9.50	5.71	0.0724	0.3
65l-379	65	65l	7.56	4.98	0.0838	17.1
65l-381	65	65l	10.52	5.80	0.0562	37.7
65o-12	65	65o	7.78	6.49	0.1092	10.5
65o-23	65	65o	7.56	5.88	0.0598	0.0
65o-24	65	65o	8.18	6.24	0.0689	0.0
65o-25	65	65o	8.48	4.97	0.0449	9.5
66d-40	66	66d	10.85	6.91	0.0117	0.3
66d-41	66	66d	11.79	6.58	0.0105	0.5
66d-44	66	66d	9.70	7.10	0.0160	0.5
66d-44-2	66	66d	11.90	6.54	0.0083	5.8
66d-58	66	66d	11.55	6.42	0.0158	0.0
66g-2	66	66g	8.90	7.00	0.0155	0.8
66g-2-2	66	66g	10.59	6.55	0.0096	8.0
66g-23	66	66g	9.60	7.07	0.0112	17.8
66g-5	66	66g	10.81	6.77	0.0172	4.7
66g-6	66	66g	9.87	7.23	0.0337	0.1
66j-19	66	66j	12.96	6.57	0.0288	9.6
66j-211	66	66j	10.63	7.10	0.0141	8.4
66j-23	66	66j	12.46	6.58	0.0230	1.1
66j-28	66	66j	11.46	6.61	0.0241	11.0
66j-31	66	66j	11.90	6.95	0.0182	6.6
67f&i-16	67	67f&I	11.33	7.36	0.1307	21.1

StationID	Ecoregion	Subecoregion	Dissolved Oxygen (mg/L)	pH	Conductivity (µs/cm)	Turbidity (NTUs)
67f&i-17	67	67f&I	10.78	7.53	0.1437	19.1
67f&i-25	67	67f&I	11.05	7.44	0.1960	0.0
67f&i-27	67	67f&I	10.80	8.10	0.1880	3.4
67f&i-37	67	67f&I	8.24	7.65	0.2190	0.0
67g-11	67	67g	8.90	7.30	0.2060	14.0
67g-12	67	67g	9.90	7.25	0.1750	15.5
67g-13	67	67g	11.76	7.37	0.0111	9.0
67g-15	67	67g	10.50	7.11	0.1093	21.3
67g-2	67	67g	3.65	7.80	0.2320	0.0
67h-2	67	67h	11.70	6.77	0.0470	9.0
67h-3	67	67h	11.89	6.59	0.0260	4.8
67h-4	67	67h	10.91	6.85	0.0384	8.6
67h-9	67	67h	12.14	6.97	0.0231	1.3
68c&d-4	68	68c&d	11.32	6.69	0.0747	1.9
68c&d-5	68	68c&d	10.58	6.36	0.0310	2.0
68c&d-6	68	68c&d	10.63	6.30	0.0312	0.8
68c&d-9	68	68c&d	12.24	6.65	0.0191	0.9
75e-23	75	75e	5.51	3.96	0.0904	0.8
75e-59	75	75e	7.14	3.91	0.0690	12.8
75e-60	75	75e	9.72	4.09	0.0554	4.7
75e-69	75	75e	5.68	3.80	0.1095	29.2
75e-78	75	75e	6.04	4.00	0.0615	3.1
75f-124	75	75f	7.26	6.72	8.9200	1.0
75f-126	75	75f	3.52	6.00	0.1200	3.4
75f-61	75	75f	7.08	4.18	0.0509	17.4

StationID	Ecoregion	Subecoregion	Dissolved Oxygen (mg/L)	pH	Conductivity (µs/cm)	Turbidity (NTUs)
75f-91	75	75f	6.59	3.67	0.1790	0.0
75f-95	75	75f	3.60	5.45	0.0622	57.0
75h-10	75	75h	5.34	4.42	0.0731	5.2
75h-35	75	75h	7.33	4.44	0.6330	1.2
75h-45	75	75h	3.48	4.79	0.0777	1.3
75h-60	75	75h	5.57	5.45	0.0669	8.1
75h-66	75	75h	7.41	5.47	0.0613	3.1
75j-10	75	75j	6.12	3.55	0.1262	19.2
75j-15	75	75j	7.87	4.57	0.1019	13.8
75j-16	75	75j	14.60	4.48	4.3700	25.7
75j-25	75	75j	5.02	5.59	0.1061	10.0
75j-26	75	75j	6.63	6.07	0.1520	33.0
75j-29	75	75j	5.36	4.44	0.0979	5.9
75j-31	75	75j	5.60	5.72	0.1202	3.0
75j-37	75	75j	8.03	6.21	0.4270	10.5
75j-41	75	75j	9.28	5.89	3.7300	4.6
75j-5	75	75j	7.21	3.74	1.1470	8.3

APPENDIX I – Nutrient values for reference streams

StationID	Ecoregion	Subecoregion	Ammonia (mg/l as N)	Total Nitrate/Nitrite (mg/l as N)	Nitrite (mg/l as N)	Phosphorus (mg/l as P)
45a03//	45	45a	0.037	<0.01	<0.01	<0.01
45a-3	45	45a	0.049	<0.01	<0.01	<0.01
45a-89	45	45a	<0.03	0.034	0.010	<0.01
HH16	45	45a	0.032	0.053	<0.01	<0.01
HH18	45	45a	0.069	<0.01	<0.01	<0.01
45b-152	45	45b	<0.03	0.017	0.016	<0.01
45b-156	45	45b	0.968	0.133	0.015	<0.01
45b-258	45	45b	0.031	0.159	<0.01	<0.01
45b-357	45	45b	0.072	0.093	<0.01	<0.01
HH22	45	45b	<0.03	0.010	<0.01	0.042
//4	45	45c	0.033	0.253	0.077	0.147
45c-16	45	45c	0.050	<0.01	0.012	0.040
45c-19	45	45c	0.032	<0.01	0.066	<0.01
45c-8	45	45c	<0.03	<0.01	<0.01	0.255
45d-15	45	45d	0.095	0.013	<0.01	<0.01
45d-16	45	45d	0.060	0.030	0.036	0.192
45d-4	45	45d	<0.03	0.072	<0.01	<0.01
45d-9	45	45d	0.036	<0.01	0.012	<0.01
45h-13	45	45h	0.048	0.031	<0.01	<0.01
45h-16	45	45h	<0.03	0.026	<0.01	<0.01
45h-17	45	45h	0.062	0.062	<0.01	<0.01
45h-6	45	45h	0.064	0.116	<0.01	<0.01
45h-9	45	45h	0.036	0.022	<0.01	<0.01

StationID	Ecoregion	Subecoregion	Ammonia (mg/l as N)	Total Nitrate/Nitrite (mg/l as N)	Nitrite (mg/l as N)	Phosphorus (mg/l as P)
65c-80	65	65c	0.067	0.107	<0.01	<0.01
65c-89	65	65c	<0.03	0.066	<0.01	<0.01
HH24	65	65c	0.044	0.470	<0.01	<0.01
HH25	65	65c	0.054	0.171	<0.01	<0.01
HH26	65	65c	0.049	0.083	<0.01	<0.01
65d-14	65	65d	<0.03	0.186	0.014	<0.01
65d-18	65	65d	0.052	<0.01	<0.01	<0.01
65d-3	65	65d	<0.03	0.076	<0.01	<0.01
65d-38	65	65d	0.064	<0.01	0.011	<0.01
65d-4	65	65d	<0.03	0.050	<0.01	<0.01
65g-120	65	65g	0.052	0.253	<0.01	<0.01
65g-62	65	65g	0.036	0.051	0.016	<0.01
HH29	65	65g	0.069	0.236	<0.01	<0.01
65h-202	65	65h	0.050	0.015	<0.01	<0.01
65h-203	65	65h	0.046	0.020	0.011	<0.01
65h-206	65	65h	0.040	0.356	<0.01	<0.01
65h-209	65	65h	<0.03	0.055	<0.01	<0.01
65h-212	65	65h	0.057	0.368	<0.01	<0.01
65k-54	65	65k	<0.03	0.016	<0.01	<0.01
65k-55	65	65k	0.070	0.024	<0.01	<0.01
65k-56	65	65k	0.068	0.076	<0.01	<0.01
65k-68	65	65k	0.044	<0.01	<0.01	<0.01
65k-85	65	65k	0.089	0.806	<0.01	<0.01
65l-10	65	65l	<0.03	0.039	<0.01	<0.01

StationID	Ecoregion	Subecoregion	Ammonia (mg/l as N)	Total Nitrate/Nitrite (mg/l as N)	Nitrite (mg/l as N)	Phosphorus (mg/l as P)
65l-342	65	65l	0.054	0.013	<0.01	0.018
65l-343	65	65l	0.073	0.358	<0.01	0.016
65l-379	65	65l	0.042	<0.01	0.015	<0.01
65l-381	65	65l	<0.03	<0.01	<0.01	0.178
65o-12	65	65o	<0.03	<0.01	<0.01	0.209
65o-23	65	65o	<0.03	0.041	<0.01	0.054
65o-24	65	65o	0.053	<0.01	0.020	0.069
65o-25	65	65o	<0.03	0.015	<0.01	0.050
66d-40	66	66d	0.057	<0.01	<0.01	<0.01
66d-41	66	66d	0.050	0.022	<0.01	<0.01
66d-44	66	66d	0.037	<0.01	<0.01	<0.01
66d-44-2	66	66d	0.051	0.070	0.053	0.142
66d-58	66	66d	0.054	0.063	0.070	<0.01
66g-2	66	66g	0.044	<0.01	<0.01	<0.01
66g-2-2	66	66g	0.039	0.841	0.132	0.082
66g-23	66	66g	<0.03	0.370	0.107	0.062
66g-5	66	66g	0.044	>1.0	0.099	0.068
66g-6	66	66g	0.084	<0.01	<0.01	<0.01
66j-19	66	66j	0.036	0.146	0.088	<0.01
66j-211	66	66j	<0.03	0.063	<0.01	<0.01
66j-23	66	66j	<0.03	0.100	0.087	<0.01
66j-28	66	66j	<0.03	0.132	0.086	<0.01
66j-31	66	66j	0.046	0.057	<0.01	<0.01
67f&i-16	67	67f&I	0.036	0.141	0.016	<0.01

StationID	Ecoregion	Subecoregion	Ammonia (mg/l as N)	Total Nitrate/Nitrite (mg/l as N)	Nitrite (mg/l as N)	Phosphorus (mg/l as P)
67f&i-17	67	67f&I	0.052	0.224	<0.01	<0.01
67f&i-25	67	67f&I	<0.03	0.233	<0.01	<0.01
67f&i-27	67	67f&I	0.038	0.432	0.039	<0.01
67f&i-37	67	67f&I	0.063	0.080	<0.01	<0.01
67g-11	67	67g	0.034	0.681	<0.01	<0.01
67g-12	67	67g	0.079	0.582	<0.01	<0.01
67g-13	67	67g	<0.03	0.394	<0.01	<0.01
67g-15	67	67g	0.039	0.020	0.016	<0.01
67h-2	67	67h	0.034	0.107	<0.01	<0.01
67h-3	67	67h	0.059	0.077	0.010	<0.01
67h-4	67	67h	0.031	0.013	<0.01	<0.01
67h-9	67	67h	<0.03	<0.01	<0.01	<0.01
68c&d-4	68	68c&d	0.033	0.087	<0.01	<0.01
68c&d-5	68	68c&d	<0.03	0.145	0.011	<0.01
68c&d-6	68	68c&d	0.044	0.198	<0.01	<0.01
68c&d-9	68	68c&d	0.035	0.080	0.013	<0.01
75e-23	75	75e	0.083	0.325	0.025	<0.01
75e-59	75	75e	0.044	<0.01	0.022	0.042
75e-60	75	75e	<0.03	0.041	0.043	<0.01
75e-69	75	75e	<0.03	<0.01	0.037	<0.01
75e-78	75	75e	0.048	<0.01	0.018	<0.01
75f-124	75	75f	<0.03	0.053	0.034	0.065
75f-126	75	75f	<0.03	<0.01	0.020	<0.01
75f-61	75	75f	0.137	0.315	0.066	<0.01

StationID	Ecoregion	Subecoregion	Ammonia (mg/l as N)	Total Nitrate/Nitrite (mg/l as N)	Nitrite (mg/l as N)	Phosphorus (mg/l as P)
75f-91	75	75f	<0.03	0.039	0.033	<0.01
75f-95	75	75f	12.720	<0.01	<0.01	0.113
75h-10	75	75h	0.051	0.222	<0.01	<0.01
75h-35	75	75h	<0.03	0.159	0.010	<0.01
75h-45	75	75h	6.689	<0.01	<0.01	0.168
75h-60	75	75h	<0.03	0.051	<0.01	<0.01
75h-66	75	75h	0.081	>1.00	<0.01	<0.01
75j-10	75	75j	0.324	>1.0	<0.01	0.133
75j-15	75	75j	<0.03	0.034	0.029	<0.01
75j-16	75	75j	0.980	<0.01	<0.01	<0.01
75j-25	75	75j	0.057	<0.01	0.115	<0.01
75j-26	75	75j	0.031	0.034	0.057	<0.01
75j-31	75	75j	<0.03	<0.01	0.018	<0.01
75j-37	75	75j	<0.03	<0.01	0.022	0.323
75j-41	75	75j	<0.03	<0.01	0.010	<0.01
75j-5	75	75j	48.917	0.016	0.020	0.122

APPENDIX J – Metals, alkalinity, and hardness values for reference streams

StationID	Ecoregion	Sub-ecoregion	Copper (mg/l)	Manganese (mg/l)	Zinc (mg/l)	Iron (mg/l)	Alkalinity (mg/l as CaCO3)	Hardness (mg/l as CaCO3)
45a03//	45	45a	<0.1	<0.1	<0.1	<0.1	15.0	13.5
45a-3	45	45a	<0.1	<0.1	<0.1	<0.1	12.8	14.8
45a-89	45	45a	<0.1	<0.1	<0.1	<0.1	7.8	9.9
HH16	45	45a	<0.1	<0.1	<0.1	<0.1	8.3	12.8
HH18	45	45a	<0.1	<0.1	<0.1	<0.1	8.7	11.2
45b-152	45	45b	<0.1	<0.1	<0.1	<0.1	32.5	26.6
45b-156	45	45b	0.004	0.112	0.010	1.119	34.0	35.3
45b-258	45	45b	<0.1	<0.1	<0.1	<0.1	13.3	13.2
45b-357	45	45b	<0.1	<0.1	<0.1	<0.1	0.0	23.2
HH22	45	45b	<0.1	<0.1	<0.1	<0.1	44.9	40.2
//4	45	45c	0.009	0.592	0.070	9.789	48.8	39.8
45c-16	45	45c	<0.1	<0.1	<0.1	2.312	50.8	6.7
45c-19	45	45c	<0.002	<0.004	<0.006	0.639	41.5	36.3
45c-8	45	45c	<0.1	0.772	<0.1	0.538	61.9	50.5
45d-15	45	45d	<0.1	<0.1	<0.1	<0.1	18.9	26.2
45d-16	45	45d	<0.002	0.092	0.017	1.767	19.2	23.7
45d-4	45	45d	<0.1	<0.1	<0.1	<0.1	35.6	41.8
45d-9	45	45d	<0.1	<0.1	<0.1	<0.1	9.2	15.3
45h-13	45	45h	<0.1	<0.1	<0.1	<0.1	16.1	10.5
45h-16	45	45h	<0.1	<0.1	<0.1	<0.1	11.2	11.7
45h-17	45	45h	<0.1	<0.1	<0.1	<0.1	9.2	11.8
45h-6	45	45h	<0.1	<0.1	<0.1	<0.1	6.9	12.5
45h-9	45	45h	<0.1	<0.1	<0.1	0.132	16.9	17.0

StationID	Ecoregion	Sub-ecoregion	Copper (mg/l)	Manganese (mg/l)	Zinc (mg/l)	Iron (mg/l)	Alkalinity (mg/l as CaCO3)	Hardness (mg/l as CaCO3)
65c-80	65	65c	<0.1	<0.1	<0.1	<0.1	8.2	18.0
65c-89	65	65c	<0.1	<0.1	<0.1	0.156	1.0	4.3
HH24	65	65c	<0.1	<0.1	<0.1	0.917	0.0	5.5
HH25	65	65c	<0.1	<0.1	<0.1	<0.1	0.0	10.3
HH26	65	65c	<0.1	<0.1	<0.1	<0.1	0.0	10.8
65d-14	65	65d	<0.1	<0.1	<0.1	<0.1	8.6	20.8
65d-18	65	65d	<0.1	<0.1	<0.1	<0.1	13.3	23.0
65d-3	65	65d	<0.1	<0.1	<0.1	<0.1	0.0	9.0
65d-38	65	65d	<0.1	<0.1	<0.1	<0.1	13.4	18.1
65d-4	65	65d	<0.1	<0.1	<0.1	<0.1	0.0	6.1
65g-120	65	65g	<0.1	<0.1	<0.1	<0.1	17.4	23.0
65g-62	65	65g	<0.1	<0.1	<0.1	<0.1	176.0	196.9
HH29	65	65g	<0.1	<0.1	<0.1	0.567	13.4	22.2
65h-202	65	65h	<0.1	<0.1	<0.1	<0.1	6.2	8.4
65h-203	65	65h	<0.1	<0.1	<0.1	<0.1	52.7	57.7
65h-206	65	65h	<0.1	<0.1	<0.1	<0.1	26.4	31.3
65h-209	65	65h	<0.002	0.041	0.052	1.240	5.1	0.0
65h-212	65	65h	<0.1	<0.1	<0.1	<0.1	25.8	32.6
65k-54	65	65k	<0.1	<0.1	<0.1	<0.1	22.6	53.1
65k-55	65	65k	<0.1	<0.1	<0.1	0.863	36.7	47.2
65k-56	65	65k	<0.1	<0.1	<0.1	5.487	23.4	48.8
65k-68	65	65k	<0.1	<0.1	<0.1	<0.1	144.1	165.7
65k-85	65	65k	<0.1	<0.1	<0.1	<0.1	38.4	179.3
65l-10	65	65l	<0.1	<0.1	<0.1	0.248	50.6	51.3

StationID	Ecoregion	Sub-ecoregion	Copper (mg/l)	Manganese (mg/l)	Zinc (mg/l)	Iron (mg/l)	Alkalinity (mg/l as CaCO3)	Hardness (mg/l as CaCO3)
65l-342	65	65l	<0.1	<0.1	<0.1	<0.1	1.6	13.9
65l-343	65	65l	<0.1	<0.1	<0.1	0.140	3.7	16.6
65l-379	65	65l	0.003	0.141	0.030	0.293	0.0	27.7
65l-381	65	65l	<0.002	<0.004	<0.006	0.315	5.0	21.2
65o-12	65	65o	<0.1	<0.1	<0.1	12.990	33.8	45.7
65o-23	65	65o	<0.1	<0.1	<0.1	<0.1	7.1	11.6
65o-24	65	65o	<0.002	0.070	0.037	1.662	1.2	4.0
65o-25	65	65o	<0.1	<0.1	<0.1	<0.1	0.4	6.4
66d-40	66	66d	<0.1	<0.1	<0.1	<0.1	5.1	3.5
66d-41	66	66d	<0.1	<0.1	<0.1	<0.1	6.7	3.8
66d-44	66	66d	<0.1	<0.1	<0.1	<0.1	8.3	10.4
66d-44-2	66	66d	<0.002	0.005	<0.006	<0.012	2.5	9.7
66d-58	66	66d	<0.002	0.006	0.006	0.040	5.5	4.0
66g-2	66	66g	<0.1	<0.1	<0.1	<0.1	8.2	6.5
66g-2-2	66	66g	<0.002	0.003	0.014	0.024	0.0	3.1
66g-23	66	66g	<0.002	0.005	0.011	0.102	2.2	2.7
66g-5	66	66g	<0.002	0.004	0.013	0.055	2.6	3.5
66g-6	66	66g	<0.1	<0.1	<0.1	<0.1	12.3	15.4
66j-19	66	66j	<0.002	0.009	0.013	0.113	6.1	5.0
66j-211	66	66j	<0.1	<0.1	<0.1	<0.1	5.4	7.8
66j-23	66	66j	<0.002	0.029	0.012	0.458	7.8	6.8
66j-28	66	66j	<0.002	0.018	0.009	0.265	10.5	7.9
66j-31	66	66j	<0.1	<0.1	<0.1	<0.1	8.0	9.8
67f&i-16	67	67f&I	<0.1	<0.1	<0.1	<0.1	40.4	64.4

StationID	Ecoregion	Sub-ecoregion	Copper (mg/l)	Manganese (mg/l)	Zinc (mg/l)	Iron (mg/l)	Alkalinity (mg/l as CaCO3)	Hardness (mg/l as CaCO3)
67f&i-17	67	67f&I	<0.1	<0.1	<0.1	<0.1	65.3	69.2
67f&i-25	67	67f&I	<0.1	<0.1	<0.1	<0.1	95.8	103.8
67f&i-27	67	67f&I	<0.1	<0.1	<0.1	<0.1	87.7	94.0
67f&i-37	67	67f&I	<0.002	0.019	0.020	0.068	101.6	89.5
67g-11	67	67g	<0.1	<0.1	<0.1	<0.1	84.7	102.3
67g-12	67	67g	<0.1	<0.1	<0.1	1.366	66.9	81.6
67g-13	67	67g	<0.1	<0.1	<0.1	<0.1	44.2	54.4
67g-15	67	67g	<0.1	<0.1	<0.1	<0.1	34.8	51.1
67h-2	67	67h	<0.1	<0.1	<0.1	<0.1	18.5	24.2
67h-3	67	67h	<0.1	<0.1	<0.1	<0.1	9.1	14.3
67h-4	67	67h	<0.1	<0.1	<0.1	<0.1	12.7	19.1
67h-9	67	67h	<0.1	<0.1	<0.1	<0.1	6.8	11.2
68c&d-4	68	68c&d	<0.1	<0.1	<0.1	<0.1	6.6	30.3
68c&d-5	68	68c&d	<0.1	<0.1	<0.1	<0.1	3.5	12.5
68c&d-6	68	68c&d	<0.1	<0.1	<0.1	<0.1	3.9	13.3
68c&d-9	68	68c&d	<0.1	<0.1	<0.1	0.781	2.8	9.5
75e-23	75	75e	<0.002	0.099	<0.006	0.394	0.0	21.7
75e-59	75	75e	<0.1	<0.1	<0.1	<0.1	0.0	11.0
75e-60	75	75e	<0.1	<0.1	<0.1	<0.1	0.0	7.7
75e-69	75	75e	<0.002	<0.004	<0.006	<0.012	0.0	97.4
75e-78	75	75e	<0.1	<0.1	<0.1	0.257	0.0	17.8
75f-124	75	75f	<0.1	<0.1	<0.1	0.363	101.4	1067.0
75f-126	75	75f	<0.1	<0.1	<0.1	<0.1	20.9	40.1
75f-61	75	75f	<0.002	0.036	<0.006	1.015	0.0	57.7

StationID	Ecoregion	Sub-ecoregion	Copper (mg/l)	Manganese (mg/l)	Zinc (mg/l)	Iron (mg/l)	Alkalinity (mg/l as CaCO3)	Hardness (mg/l as CaCO3)
75f-91	75	75f	0.003	<0.004	0.017	0.907	0.0	45.3
75f-95	75	75f	<0.002	<0.004	<0.006	1.187	0.0	30.7
75h-10	75	75h	<0.1	<0.1	<0.1	1.153	0.0	11.7
75h-35	75	75h	<0.1	<0.1	<0.1	0.195	0.0	13.9
75h-45	75	75h	<0.002	<0.004	<0.006	0.964	0.0	21.3
75h-60	75	75h	<0.1	<0.1	<0.1	1.366	7.5	15.4
75h-66	75	75h	<0.1	<0.1	<0.1	1.600	2.2	12.9
75j-10	75	75j	<0.002	<0.004	<0.006	0.419	0.0	16.5
75j-15	75	75j	<0.002	<0.004	<0.006	1.876	0.0	35.7
75j-16	75	75j	<0.002	0.041	<0.006	1.572	0.0	468.0
75j-25	75	75j	<0.002	<0.004	0.023	0.907	0.0	116.3
75j-26	75	75j	0.015	0.006	0.014	1.710	19.8	74.3
75j-31	75	75j	<0.1	<0.1	<0.1	<0.1	8.6	25.8
75j-37	75	75j	<0.002	<0.004	<0.006	2.897	29.4	135.3
75j-41	75	75j	<0.002	<0.004	<0.006	0.500	19.4	600.3
75j-5	75	75j	<0.002	0.019	<0.006	1.157	2.4	307.1

*Detection limits for metals analyses decreased due to the addition of new laboratory apparatus.

APPENDIX K – Raw metric values by ecoregion

Piedmont – Ecoregion 45

Station ID	Sub-eco	Condition	Total Tax	EPT Tax	Ephem Tax	Pleco Tax	Trich Tax	Coleo Tax	Dip Tax	Chiro Tax	Tanyt Tax	Evenness
45a-35	45a	Impaired	86	21	9	6	6	9	51	46	11	0.738
45a-50	45a	Impaired	42	5	2	0	3	1	35	34	7	0.586
45a-59	45a	Impaired	44	1	0	0	1	1	37	31	4	0.525
45a-61	45a	Impaired	58	4	4	0	0	5	35	33	6	0.636
45a-90	45a	Impaired	49	10	3	2	5	10	20	17	1	0.538
45a03//	45a	Reference	62	18	5	4	9	5	28	26	2	0.581
45a-3	45a	Reference	38	13	4	6	3	0	21	18	2	0.530
45a-89	45a	Reference	38	6	1	2	3	12	16	13	1	0.483
HH16	45a	Reference	51	11	2	3	6	11	23	20	1	0.594
HH18	45a	Reference	32	10	4	1	5	4	10	24	4	0.476
45b-120	45b	Impaired	80	21	7	8	6	4	47	44	12	0.724
45b-193	45b	Impaired	52	3	2	0	1	1	44	35	5	0.617
45b-203	45b	Impaired	44	7	3	0	4	1	28	25	5	0.538
45b-217	45b	Impaired	43	3	1	0	2	0	29	29	4	0.484
45b-291	45b	Impaired	49	4	0	1	3	1	35	30	3	0.510
45b-44	45b	Impaired	61	13	7	3	3	2	40	37	8	0.657
45b-152	45b	Reference	69	20	9	2	9	9	32	26	7	0.669
45b-156	45b	Reference	62	9	4	1	4	5	32	24	2	0.671
45b-258	45b	Reference	71	17	8	6	3	8	35	29	7	0.771
45b-357	45b	Reference	46	14	5	4	5	6	19	15	1	0.525
HH22	45b	Reference	49	12	5	1	6	6	24	24	4	0.571
45c-10	45c	Impaired	38	2	1	1	0	4	19	14	2	0.407
45c-11	45c	Impaired	44	6	4	1	1	6	21	15	0	0.535

Station ID	Sub-eco	Condition	Total Tax	EPT Tax	Ephem Tax	Pleco Tax	Trich Tax	Coleo Tax	Dip Tax	Chiro Tax	Tanyt Tax	Evenness
45c-17	45c	Impaired	48	13	6	1	6	5	18	14	1	0.464
45c-3	45c	Impaired	60	13	6	2	5	5	28	25	6	0.667
45c-7	45c	Impaired	53	11	5	3	3	3	34	31	12	0.603
45c-18	45c	Ref/Removed	52	4	0	2	2	3	39	38	9	0.549
//4	45c	Reference	34	2	1	1	0	5	13	9	0	0.468
45c-16	45c	Reference	52	6	3	1	2	5	36	32	7	0.612
45c-19	45c	Reference	45	14	7	2	5	5	18	15	3	0.563
45c-8	45c	Reference	43	5	3	2	0	1	27	24	5	0.592
45d-11	45d	Impaired	54	14	3	5	6	4	26	16	3	0.603
45d-14	45d	Impaired	66	15	5	6	4	5	36	30	4	0.625
45d-21	45d	Impaired	60	11	1	2	8	4	34	31	3	0.631
45d-23	45d	Impaired	50	8	2	1	5	5	30	28	3	0.623
45d-6	45d	Impaired	52	7	3	0	4	7	32	28	8	0.623
45d-8	45d	Ref/Removed	44	5	3	0	2	1	27	25	6	0.565
45d-15	45d	Reference	29	6	0	6	0	8	10	6	0	0.370
45d-16	45d	Reference	61	13	7	1	5	9	26	22	5	0.624
45d-4	45d	Reference	36	9	3	1	5	2	22	19	3	0.446
45d-9	45d	Reference	65	20	7	5	8	8	28	24	6	0.615
45h-1	45h	Impaired	43	10	3	3	4	6	17	12	1	0.490
45h-10	45h	Impaired	56	10	3	3	4	2	35	30	3	0.636
45h-11	45h	Impaired	54	13	7	2	4	6	28	25	4	0.624
45h-12	45h	Impaired	50	7	3	1	3	7	28	23	5	0.657
45h-2	45h	Impaired	69	7	2	0	5	6	36	29	3	0.698
45h-13	45h	Reference	41	13	4	6	3	6	14	13	1	0.501
45h-16	45h	Reference	37	9	2	4	3	4	21	19	1	0.579

Station ID	Sub-eco	Condition	Total Tax	EPT Tax	Ephem Tax	Pleco Tax	Trich Tax	Coleo Tax	Dip Tax	Chiro Tax	Tanyt Tax	Evenness
45h-17	45h	Reference	44	10	3	2	5	4	22	18	4	0.543
45h-6	45h	Reference	63	11	4	4	3	6	37	33	8	0.558
45h-9	45h	Reference	66	18	4	7	7	5	37	33	8	0.663

Station ID	Marga -lef	Shannon base_e	Simpsons	EPT Pct	Ephem Pct	Amph Pct	Bival Pct	Chiro Pct	Coleo Pct	Dip Pct	Gastro Pct	Iso Pct	NonIn Pct
45a-35	15.5	4.0	0.022	34.6	23.8	0.0	0.0	51.3	6.3	56.3	0.4	0.0	1.7
45a-50	7.7	3.1	0.064	18.5	2.4	0.0	0.0	73.2	1.0	79.5	0.0	0.0	1.0
45a-59	8.2	2.7	0.159	0.5	0.0	0.0	0.0	82.3	0.5	88.2	0.0	0.0	7.5
45a-61	10.4	3.5	0.046	8.8	8.8	3.8	9.6	59.6	6.3	61.7	1.3	0.0	19.2
45a-90	8.8	2.9	0.104	38.3	5.8	0.0	0.0	42.9	10.0	45.0	2.9	0.4	5.0
45a03//	11.2	3.2	0.101	30.1	10.9	0.0	0.4	57.6	2.6	59.0	0.0	0.0	3.5
45a-3	7.0	2.8	0.110	64.5	5.6	0.0	0.0	29.9	0.0	33.0	0.5	0.0	1.5
45a-89	6.9	2.6	0.143	31.8	7.8	4.6	0.0	9.7	50.2	11.5	0.0	0.5	5.1
HH16	9.3	3.2	0.063	27.6	4.1	0.0	0.0	41.5	20.7	44.7	0.0	0.0	3.2
HH18	5.7	2.6	0.123	55.7	20.3	0.0	4.2	7.2	22.8	7.6	0.4	5.1	11.0
45b-120	14.4	4.0	0.022	30.8	13.3	0.0	0.4	58.3	2.9	61.7	0.0	0.0	3.3
45b-193	9.3	3.4	0.052	12.5	10.0	0.0	0.0	45.4	0.4	64.6	0.0	0.0	21.3
45b-203	7.8	3.0	0.098	18.3	5.0	0.0	0.8	40.4	8.3	41.7	0.4	0.0	27.9
45b-217	7.7	2.7	0.149	1.3	0.4	0.0	3.3	62.5	0.0	62.5	0.0	0.0	6.3
45b-291	8.8	2.8	0.123	2.6	0.0	0.0	0.0	82.1	0.4	86.0	2.6	0.0	7.7
45b-44	10.9	3.6	0.038	35.4	27.1	0.0	0.0	57.5	0.8	58.8	0.0	0.0	2.9
45b-152	12.4	3.7	0.038	42.5	14.2	0.0	4.6	27.1	11.7	37.5	2.1	0.0	7.9
45b-156	11.2	3.6	0.037	17.0	11.3	13.5	2.6	22.2	6.5	44.3	6.1	1.7	24.8

Station ID	Marga -lef	Shannon base_e	Simpsons	EPT Pct	Ephem Pct	Amph Pct	Bival Pct	Chiro Pct	Coleo Pct	Dip Pct	Gastro Pct	Iso Pct	NonIn Pct
45b-258	13.6	4.0	0.019	28.7	7.6	0.0	5.8	35.7	14.6	44.4	2.3	0.0	9.4
45b-357	8.2	2.9	0.108	45.4	10.4	0.0	0.8	26.3	8.8	38.8	0.0	0.4	6.3
HH22	8.8	3.1	0.085	52.5	31.3	2.5	0.0	34.6	6.7	34.6	0.0	1.3	4.2
45c-10	6.8	2.2	0.285	6.3	3.3	52.5	1.7	22.5	4.2	27.5	1.7	0.0	57.9
45c-11	8.1	2.8	0.132	4.5	3.0	3.5	4.5	56.9	5.4	65.3	6.9	0.0	23.3
45c-17	8.6	2.5	0.196	54.6	51.3	14.2	0.4	12.9	4.2	16.7	2.1	0.0	16.7
45c-3	11.0	3.6	0.038	25.7	21.4	6.2	1.0	44.3	5.7	46.2	4.3	0.0	15.2
45c-7	9.5	3.3	0.056	34.6	27.9	0.0	0.0	55.8	1.7	57.5	1.3	0.0	5.0
45c-18	9.3	3.0	0.096	25.52	0.00	0.00	0.00	64.85	1.26	69.87	0.00	0.00	0.84
//4	6.0	2.6	0.124	0.8	0.4	4.7	2.1	16.1	18.2	19.5	1.3	25.8	60.2
45c-16	9.7	3.2	0.093	33.2	3.7	3.7	0.0	50.5	4.7	55.8	0.0	0.0	5.3
45c-19	8.2	3.0	0.074	67.4	45.9	0.0	1.8	17.0	3.7	21.6	0.9	0.5	5.5
45c-8	8.1	3.1	0.076	39.2	15.3	0.6	4.0	44.9	0.6	47.2	1.1	0.6	11.4
45d-11	9.7	3.3	0.057	27.5	7.9	0.8	0.0	21.7	2.9	62.1	0.4	0.0	2.5
45d-14	11.9	3.4	0.069	36.3	6.3	0.0	1.3	39.6	13.3	42.1	1.7	0.0	5.0
45d-21	10.8	3.5	0.049	48.8	2.5	0.0	0.4	35.0	6.7	38.3	0.4	0.0	2.5
45d-23	9.5	3.2	0.070	36.0	3.4	0.0	0.0	44.4	5.1	52.2	0.6	0.0	4.5
45d-6	9.3	3.4	0.045	30.8	17.9	0.0	0.0	43.3	13.3	45.8	0.0	0.0	0.4
45d-8	8.2	3.0	0.087	49.73	35.83	0.00	0.53	29.41	2.14	39.04	1.07	0.00	4.81
45d-15	5.1	2.0	0.241	74.1	0.0	0.0	0.4	3.0	10.8	10.8	2.2	0.0	3.9
45d-16	10.9	3.4	0.056	20.8	16.7	0.0	0.4	37.9	12.5	41.3	18.8	0.0	20.0
45d-4	6.6	2.4	0.219	16.8	3.0	0.0	0.0	33.2	1.0	79.7	0.0	0.0	0.5
45d-9	12.0	3.3	0.079	22.3	3.8	0.0	0.0	58.3	4.7	64.0	3.8	1.9	7.1
45h-1	7.7	2.7	0.128	45.8	7.1	0.4	0.4	20.4	5.8	27.9	16.3	0.0	17.9
45h-10	10.0	3.5	0.044	10.8	3.8	0.0	0.0	76.3	1.3	80.4	0.0	0.0	0.4

Station ID	Marga -lef	Shannon base_e	Simpsons	EPT Pct	Ephem Pct	Amph Pct	Bival Pct	Chiro Pct	Coleo Pct	Dip Pct	Gastro Pct	Iso Pct	NonIn Pct
45h-11	9.7	3.4	0.045	26.7	10.0	0.0	0.0	42.9	8.8	57.9	0.0	0.0	3.8
45h-12	9.3	3.5	0.039	29.1	15.1	0.0	0.0	40.7	12.6	48.2	2.0	0.0	4.5
45h-2	12.4	3.8	0.027	16.3	5.0	0.0	1.7	48.3	7.1	52.5	2.5	0.0	9.6
45h-13	7.7	2.6	0.169	69.5	16.9	0.0	6.2	10.2	4.5	13.6	0.0	0.0	7.9
45h-16	6.9	3.0	0.065	30.9	9.0	0.0	0.0	59.6	3.4	61.2	0.0	0.0	3.4
45h-17	7.8	3.0	0.082	41.7	13.8	0.0	0.0	39.2	8.3	46.7	0.0	0.4	0.8
45h-6	11.3	3.1	0.110	55.4	12.1	0.0	0.0	27.5	4.2	31.7	0.4	0.0	5.4
45h-9	11.9	3.6	0.040	34.6	10.8	0.0	15.4	41.7	3.3	44.2	0.4	0.0	17.5

Station ID	Odon Pct	Pleco Pct	Tanyt Pct	Oligo Pct	Trich Pct	%Chi /TC	%Orth /TC	%Tpod /TC	Hyd2Tri Pct	Hyd2EPT Pct	Tnyt2 Chi Pct
45a-35	1.3	5.8	9.2	0.8	5.0	56.9	23.6	17.1	75.0	10.8	17.9
45a-50	0.0	0.0	14.1	1.0	16.1	32.0	57.3	8.0	100.0	86.8	19.3
45a-59	2.7	0.0	2.2	4.3	0.5	26.8	60.8	12.4	100.0	100.0	2.6
45a-61	4.2	0.0	8.3	3.8	0.0	69.2	14.7	14.7	0.0	0.0	14.0
45a-90	1.3	9.6	0.8	1.3	22.9	75.7	10.7	13.6	98.2	58.7	1.9
45a03//	3.1	4.4	2.6	3.1	14.8	84.8	3.8	11.4	79.4	39.1	4.5
45a-3	0.0	40.1	2.0	1.0	18.8	28.8	59.3	6.8	67.6	19.7	6.8
45a-89	0.9	19.8	0.5	0.0	4.1	85.7	4.8	4.8	66.7	8.7	4.8
HH16	3.2	9.7	2.9	2.8	13.8	83.3	8.9	7.8	76.7	38.3	1.1
HH18	1.3	0.4	2.1	0.0	35.0	23.5	29.4	35.3	84.3	53.0	29.4
45b-120	1.3	10.8	8.8	0.8	6.7	42.1	41.4	14.3	56.3	12.2	15.0
45b-193	1.3	0.0	6.3	16.7	2.5	55.0	35.8	8.3	100.0	20.0	13.8
45b-203	3.8	0.0	12.9	26.3	13.3	80.4	14.4	5.2	100.0	72.7	32.0

Station ID	Odon Pct	Pleco Pct	Tanyt Pct	Oligo Pct	Trich Pct	%Chi /TC	%Orth /TC	%Tpod /TC	Hyd2Tri Pct	Hyd2EPT Pct	Tnyt2 Chi Pct
45b-217	29.2	0.0	2.5	0.0	0.8	78.0	6.0	15.3	50.0	33.3	4.0
45b-291	2.1	0.4	1.3	5.1	2.1	25.4	26.4	46.1	100.0	83.3	1.6
45b-44	0.8	4.6	16.7	1.7	3.8	57.2	20.3	21.7	55.6	5.9	29.0
45b-152	0.4	12.9	5.4	0.8	15.4	67.7	13.8	15.4	59.5	21.6	20.0
45b-156	7.4	1.3	1.3	0.0	4.3	52.9	21.6	25.5	0.0	0.0	5.9
45b-258	2.3	17.0	6.4	1.2	4.1	41.0	27.9	31.1	57.1	8.2	18.0
45b-357	0.4	4.6	1.3	3.3	30.4	55.6	30.2	14.3	91.8	61.5	4.8
HH22	1.7	10.8	2.5	0.0	10.4	61.4	19.3	19.3	68.0	13.5	7.2
45c-10	3.3	2.9	4.2	0.8	0.0	68.5	5.6	25.9	0.0	0.0	18.5
45c-11	1.0	1.0	0.0	7.9	0.5	31.3	60.9	7.8	100.0	11.1	0.0
45c-17	7.9	0.4	0.8	0.0	2.9	41.9	51.6	6.5	0.0	0.0	6.5
45c-3	5.7	1.0	6.7	0.0	3.3	55.9	19.4	24.7	0.0	0.0	15.1
45c-7	1.3	5.4	19.2	3.3	1.3	60.4	29.9	9.7	100.0	3.6	34.3
45c-18	2.51	2.93	10.88	0.42	22.59	66.45	30.97	2.58	98.15	86.89	16.77
//4	0.4	0.4	0.0	18.2	0.0	76.3	15.8	7.9	0.0	0.0	0.0
45c-16	0.5	28.4	8.4	0.0	1.1	75.0	13.5	11.5	50.0	1.6	16.7
45c-19	1.4	6.9	3.2	2.3	14.7	37.8	56.8	5.4	21.9	4.8	18.9
45c-8	1.7	23.9	5.7	2.3	0.0	89.9	6.3	3.8	0.0	0.0	12.7
45d-11	3.8	11.3	5.0	0.0	8.3	48.1	40.4	11.5	80.0	24.2	23.1
45d-14	3.3	27.5	4.2	0.4	2.5	58.9	27.4	8.4	33.3	2.3	10.5
45d-21	3.3	13.8	2.9	0.4	32.5	67.9	14.3	14.3	62.8	41.9	8.3
45d-23	1.7	3.9	2.2	3.4	28.7	45.6	29.1	21.5	92.2	73.4	5.1
45d-6	6.3	0.0	19.6	0.4	12.9	68.3	10.6	12.5	41.9	17.6	45.2
45d-8	2.14	0.00	6.95	1.07	13.90	56.36	29.09	9.09	80.77	22.58	23.64
45d-15	0.0	74.1	0.0	0.9	0.0	57.1	28.6	14.3	0.0	0.0	0.0

Station ID	Odon Pct	Pleco Pct	Tanyt Pct	Oligo Pct	Trich Pct	%Chi /TC	%Orth /TC	%Tpod /TC	Hyd2Tri Pct	Hyd2EPT Pct	Tnyt2 Chi Pct
45d-16	2.9	0.4	3.3	0.0	3.8	65.9	31.9	2.2	33.3	6.0	8.8
45d-4	1.5	0.5	2.5	0.0	13.4	41.8	53.7	1.5	85.2	67.6	7.5
45d-9	1.4	6.2	3.8	0.9	12.3	70.7	26.8	2.4	11.5	6.4	6.5
45h-1	1.7	6.7	0.4	0.4	32.1	71.4	14.3	14.3	90.9	63.6	2.0
45h-10	5.8	1.7	6.3	0.0	5.4	71.0	12.0	11.5	84.6	42.3	8.2
45h-11	2.1	0.8	9.6	0.0	15.8	69.9	3.9	19.4	28.9	17.2	22.3
45h-12	2.5	1.5	8.5	2.0	12.6	74.1	9.9	16.0	60.0	25.9	21.0
45h-2	11.7	0.0	2.9	2.5	11.3	40.5	15.5	44.0	29.6	20.5	6.0
45h-13	3.4	5.6	0.6	1.7	46.9	50.0	38.9	5.6	16.9	11.4	5.6
45h-16	1.1	14.0	7.9	2.8	7.9	48.1	18.9	33.0	57.1	14.5	0.9
45h-17	2.1	5.8	2.1	0.0	22.1	79.8	8.5	11.7	75.5	40.0	5.3
45h-6	2.5	2.5	10.0	4.2	40.8	57.6	34.8	7.6	69.4	51.1	36.4
45h-9	0.4	13.3	17.9	1.3	10.4	75.0	13.0	12.0	72.0	21.7	43.0

Station ID	Baet 2Eph Pct	CrCh 2Chi Pct	Toler Tax	Toler Pct	Intol Tax	Intol Pct	Dom01 Pct	Dom01 Ind	BeckBI	HBI	NCBI	Scrap Pct	Scrap Tax
45a-35	0.0	12.2	13	15.4	16	18.3	8.3	20	26	5.5	6.3	16.7	8
45a-50	80.0	29.3	9	29.3	3	1.5	16.1	33	8	6.8	7.4	1.5	2
45a-59	0.0	9.8	17	36.0	0	0.0	38.2	71	2	6.4	7.3	0.0	0
45a-61	0.0	36.4	23	46.3	4	3.8	15.4	37	6	7.3	7.8	10.4	5
45a-90	0.0	2.9	14	9.6	7	19.2	27.1	65	18	5.1	5.9	6.7	6
45a03//	0.0	0.0	11	8.7	12	10.9	28.8	66	25	5.7	5.6	15.3	4
45a-3	0.0	0.0	7	5.6	8	46.7	27.9	55	16	4.2	4.9	3.0	3

Station ID	Baet 2Eph Pct	CrCh 2Chi Pct	Toler Tax	Toler Pct	Intol Tax	Intol Pct	Dom01 Pct	Dom01 Ind	BeckBI	HBI	NCBI	Scrap Pct	Scrap Tax
45a-89	0.0	0.0	7	8.3	7	24.0	30.9	67	12	5.0	5.6	41.9	5
HH16	0.0	0.0	8	7.4	10	28.6	14.7	32	18	5.1	5.2	31.8	7
HH18	4.2	0.0	7	9.3	1	3.8	26.6	63	5	5.9	6.3	11.8	3
45b-120	0.0	0.0	17	12.9	15	19.2	5.8	14	29	5.0	5.3	7.1	3
45b-193	0.0	0.9	13	37.1	2	2.1	16.7	40	10	6.2	5.8	10.4	3
45b-203	91.7	2.1	17	52.5	2	3.8	26.3	63	6	7.1	6.9	0.8	2
45b-217	0.0	56.0	20	75.8	0	0.0	32.5	78	1	8.5	9.0	0.8	2
45b-291	0.0	37.3	24	54.5	3	2.1	26.8	63	4	7.4	8.8	3.0	2
45b-44	0.0	0.0	11	9.6	8	17.5	11.7	28	14	5.3	5.8	4.6	3
45b-152	5.9	1.5	19	16.7	12	23.3	12.1	29	26	4.8	5.4	12.5	8
45b-156	0.0	0.0	27	49.1	5	6.5	11.3	26	9	6.9	7.8	10.4	9
45b-258	0.0	8.2	20	21.1	9	7.6	7.0	12	18	5.8	6.5	7.0	6
45b-357	8.0	0.0	11	17.9	5	5.8	27.1	65	14	6.0	6.1	2.9	4
HH22	1.3	0.0	17	42.9	5	16.3	24.6	59	14	5.9	6.9	3.8	2
45c-10	0.0	1.9	21	80.0	1	2.9	52.5	126	3	7.5	7.8	1.7	2
45c-11	16.7	16.5	19	71.3	4	3.5	33.7	68	8	7.4	7.7	9.4	3
45c-17	0.0	3.2	10	61.3	6	6.3	41.3	99	15	6.6	7.4	5.8	5
45c-3	0.0	3.2	17	32.9	5	2.4	10.0	21	11	6.5	7.0	9.0	5
45c-7	0.0	4.5	16	17.1	7	23.8	12.9	31	14	5.3	6.6	7.1	4
45c-18	0.00	17.42	17	43.51	4	3.77	22.18	53	7	7.2	7.3	1.26	1
//4	0.0	10.5	24	57.6	3	3.4	25.0	59	3	7.4	7.8	1.3	2
45c-16	0.0	2.1	22	31.6	2	28.9	28.4	54	4	5.4	7.6	1.1	1
45c-19	11.0	0.0	12	21.6	6	33.5	17.4	38	17	4.5	5.7	31.2	4
45c-8	0.0	1.3	16	19.3	3	33.5	19.9	35	6	5.4	5.1	6.3	4

Station ID	Baet 2Eph Pct	CrCh 2Chi Pct	Toler Tax	Toler Pct	Intol Tax	Intol Pct	Dom01 Pct	Dom01 Ind	BeckBI	HBI	NCBI	Scrap Pct	Scrap Tax
45d-11	0.0	0.0	9	23.8	13	19.6	15.8	38	27	4.9	5.8	8.3	4
45d-14	26.7	0.0	17	18.8	8	30.0	22.5	54	19	4.7	5.9	6.3	4
45d-21	0.0	0.0	16	10.8	5	23.8	12.5	30	13	5.0	5.6	4.6	4
45d-23	0.0	0.0	12	18.0	9	14.0	21.9	39	14	5.7	6.0	3.9	3
45d-6	0.0	1.0	10	11.3	5	11.7	13.3	32	15	5.3	5.7	18.3	5
45d-8	0.00	0.00	11	6.95	3	5.88	19.25	36	6	5.1	4.9	16.58	2
45d-15	0.0	0.0	4	8.6	10	78.0	37.5	87	15	2.1	2.1	7.3	4
45d-16	10.0	0.0	10	7.5	9	26.7	17.9	43	17	4.9	4.6	33.8	7
45d-4	0.0	3.0	8	8.4	7	50.5	44.6	90	15	4.1	3.9	1.5	2
45d-9	12.5	0.0	8	6.2	21	22.7	23.2	49	39	4.3	3.9	7.1	8
45h-1	0.0	0.0	8	10.0	8	25.8	28.3	68	13	5.2	5.4	22.9	4
45h-10	0.0	0.0	12	11.7	5	3.8	12.5	30	14	6.1	6.1	1.7	1
45h-11	4.2	0.0	9	18.8	10	18.8	10.4	25	18	5.8	6.3	5.0	3
45h-12	0.0	0.0	8	8.0	4	7.5	11.1	22	11	5.3	5.5	13.6	3
45h-2	0.0	0.9	18	22.1	3	7.1	9.2	22	9	6.1	6.1	5.4	3
45h-13	0.0	0.0	4	4.5	7	44.1	38.4	68	13	4.2	4.0	7.3	1
45h-16	0.0	0.0	7	14.0	5	16.9	14.6	26	11	5.3	5.9	16.3	2
45h-17	0.0	0.0	4	3.8	8	20.0	20.4	49	18	4.6	4.7	12.5	4
45h-6	0.0	4.5	13	10.8	10	20.8	28.3	68	18	5.3	5.2	4.2	5
45h-9	0.0	0.0	15	12.1	14	25.4	13.8	33	23	5.1	5.2	8.8	4

Station ID	Cllct Pct	Cllct Tax	Pred Pct	Pred Tax	Shred Pct	Shred Tax	Filtr Pct	Filtr Tax	Clngr Tax	Clngr Pct	Brrwr Tax	Clmbr Tax	Sprwl Tax	Swmmr Tax
45a-35	33.3	29	15.0	11	7.5	9	9.6	9	24	36.3	14	1	17	2
45a-50	32.2	18	11.2	3	0.5	1	23.4	6	7	24.4	4	1	13	1
45a-59	56.5	15	12.9	10	0.5	1	4.8	6	6	4.8	9	2	11	0
45a-61	38.3	19	12.9	13	0.8	1	14.6	6	9	18.3	6	5	11	2
45a-90	16.3	14	11.7	10	9.6	3	49.6	5	12	57.5	5	3	9	2
45a03//	10.0	11	7.9	16	4.4	4	15.7	9	20	35.8	13	4	7	2
45a-3	22.8	12	13.7	7	0.5	1	23.9	6	14	38.1	5	0	9	1
45a-89	12.4	11	3.7	5	1.8	4	4.1	3	15	54.8	6	1	3	1
HH16	10.6	11	12.9	12	4.1	7	12.9	5	19	51.2	8	1	7	2
HH18	18.1	9	4.2	6	2.1	2	40.9	6	9	66.2	6	1	5	2
45b-120	39.2	32	14.2	16	13.8	9	9.6	9	15	20.8	11	2	21	2
45b-193	43.8	21	5.4	9	8.8	4	13.8	6	9	23.3	13	1	16	1
45b-203	42.5	14	5.8	8	1.3	3	25.4	8	7	25.8	4	3	9	2
45b-217	41.3	10	37.1	15	0.0	0	6.3	5	4	2.1	8	4	12	0
45b-291	26.4	12	39.1	15	4.3	6	3.4	6	5	3.0	8	3	13	1
45b-44	42.1	22	15.0	13	4.6	5	14.2	7	10	20.8	8	1	18	3
45b-152	15.4	21	9.2	10	21.3	7	29.2	12	18	36.3	11	2	12	3
45b-156	48.7	19	21.3	13	7.4	6	4.3	4	5	3.9	11	6	15	1
45b-258	29.8	23	11.7	13	22.2	12	14.6	8	16	23.4	9	3	21	4
45b-357	28.3	12	5.8	9	6.3	6	54.6	11	15	56.3	3	0	13	3
HH22	47.9	18	8.3	11	12.1	4	13.8	5	10	20.8	2	2	18	3
45c-10	71.3	13	13.8	11	2.5	2	7.5	5	3	4.2	10	4	5	2
45c-11	72.8	19	2.0	4	3.5	6	5.9	4	8	9.4	9	1	10	3
45c-17	72.9	18	10.8	12	0.8	2	1.3	3	9	7.1	9	4	9	1

Station ID	Cllct Pct	Cllct Tax	Pred Pct	Pred Tax	Shred Pct	Shred Tax	Filtr Pct	Filtr Tax	Clngr Tax	Clngr Pct	Brrwr Tax	Clmbr Tax	Sprwl Tax	Swmmr Tax
45c-3	41.9	18	15.2	16	4.8	6	14.8	4	8	17.6	11	3	12	4
45c-7	62.9	17	10.8	11	2.1	3	5.4	8	13	18.8	4	1	12	4
45c-18	19.25	20	5.86	8	6.69	3	24.69	4	8	29.29	6	4	11	0
//4	72.5	15	21.2	11	1.3	2	2.1	2	1	0.4	4	2	7	3
45c-16	31.1	21	5.8	8	29.5	3	8.4	7	9	10.5	11	1	12	4
45c-19	26.6	13	4.1	6	8.3	4	26.6	13	13	50.9	5	1	9	4
45c-8	42.6	17	2.8	4	24.4	3	1.1	2	4	5.7	10	1	8	2
45d-11	12.1	12	18.3	12	19.6	9	37.9	11	18	48.3	5	3	12	0
45d-14	27.1	24	9.6	13	28.8	7	13.8	8	14	25.4	9	4	17	4
45d-21	22.5	22	5.8	9	16.7	7	36.7	9	13	43.3	11	5	17	0
45d-23	26.4	17	6.2	9	6.2	4	42.1	7	12	48.9	8	3	12	0
45d-6	20.4	19	13.3	8	4.2	5	27.5	8	16	49.6	5	2	11	1
45d-8	20.86	18	5.88	10	0.00	0	44.39	6	6	40.11	6	3	11	2
45d-15	6.0	7	5.6	5	77.2	6	1.7	3	8	8.2	2	0	6	0
45d-16	22.9	17	5.8	12	11.3	9	5.4	8	17	30.4	8	6	11	4
45d-4	18.8	11	2.5	3	5.4	6	59.9	9	11	61.9	3	0	9	1
45d-9	22.7	19	7.1	7	5.2	6	19.0	13	25	27.5	4	1	12	0
45h-1	7.9	11	7.5	12	11.7	4	45.0	7	13	55.4	7	0	8	2
45h-10	33.8	14	15.0	15	8.8	7	15.4	9	13	15.4	13	4	12	2
45h-11	25.4	17	9.2	14	13.8	4	24.2	6	13	30.8	9	3	12	2
45h-12	17.6	16	13.1	10	9.0	3	28.1	9	14	45.7	8	0	10	2
45h-2	19.6	18	31.3	23	13.8	4	12.9	8	15	21.7	10	4	15	2
45h-13	9.6	11	9.0	13	0.6	1	65.0	6	9	61.0	5	0	6	4
45h-16	15.7	11	28.1	10	2.2	3	9.0	4	9	28.7	6	1	9	3
45h-17	5.8	11	7.5	10	11.7	5	37.5	9	13	50.0	7	1	12	1

Station ID	Cllct Pct	Cllct Tax	Pred Pct	Pred Tax	Shred Pct	Shred Tax	Filtr Pct	Filtr Tax	Clngr Tax	Clngr Pct	Brrwr Tax	Clmbr Tax	Sprwl Tax	Swmmr Tax
45h-6	20.4	22	5.8	11	3.8	6	60.0	9	17	55.0	9	2	13	1
45h-9	14.6	19	7.5	9	11.3	8	40.4	11	17	34.6	8	1	15	1

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Station ID	Sub -eco	Condition	Total Tax	EPT Tax	Ephem Tax	Pleco Tax	Trich Tax	Coleo Tax	Dip Tax	Chiro Tax	Tanyt Tax	Evenness
65c-12	65c	Impaired	75	16	5	4	7	5	46	40	16	0.634
65c-3	65c	Impaired	30	5	2	0	3	3	16	15	1	0.487
65c-4	65c	Impaired	50	0	0	0	0	2	35	33	10	0.608
65c-40	65c	Impaired	78	20	5	7	8	5	43	38	5	0.622
65c-5	65c	Impaired	62	5	0	0	5	5	38	36	6	0.640
65c-8	65c	Impaired	42	8	2	0	6	2	31	27	4	0.546
65c-88	65c	Impaired	61	8	5	1	2	1	45	39	11	0.663
65c-80	65c	Reference	53	12	2	2	8	2	30	28	3	0.598
65c-89	65c	Reference	42	6	1	2	3	4	25	22	2	0.539
HH24	65c	Reference	47	11	2	2	7	2	29	28	5	0.603
HH25	65c	Reference	35	12	1	4	7	6	14	11	2	0.571
HH26	65c	Reference	42	7	1	1	5	7	21	20	0	0.603
65d-1	65d	Impaired	30	1	0	0	1	0	21	20	2	0.461
65d-20	65d	Impaired	48	7	0	4	3	2	31	27	3	0.650
65d-21	65d	Impaired	41	7	4	1	2	4	18	14	1	0.453
65d-32	65d	Impaired	54	8	3	1	4	0	39	35	8	0.619
65d-39	65d	Impaired	67	16	3	6	7	2	40	33	8	0.645

Station ID	Sub -eco	Condition	Total Tax	EPT Tax	Ephem Tax	Pleco Tax	Trich Tax	Coleo Tax	Dip Tax	Chiro Tax	Tanyt Tax	Evenness
65d-14	65d	Reference	39	16	6	6	4	3	16	13	1	0.560
65d-18	65d	Reference	67	14	4	3	7	4	34	29	4	0.684
65d-3	65d	Reference	52	6	2	0	4	1	29	25	1	0.603
65d-38	65d	Reference	62	13	6	3	4	1	41	35	11	0.608
65d-4	65d	Reference	30	7	0	3	4	2	12	32	5	0.444
65g-10	65g	Impaired	37	0	0	0	0	3	26	24	2	0.504
65g-130	65g	Impaired	33	2	0	0	2	1	26	25	5	0.490
65g-135	65g	Impaired	19	1	1	0	0	0	16	15	1	0.401
65g-137	65g	Impaired	20	0	0	0	0	3	15	9	1	0.358
65g-14	65g	Impaired	29	1	1	0	0	1	18	17	1	0.502
65g-17	65g	Impaired	31	3	1	0	2	2	11	8	0	0.413
65g-4	65g	Impaired	27	1	1	0	0	0	14	11	1	0.547
65g-69	65g	Impaired	48	2	2	0	0	4	34	30	3	0.620
65g-8	65g	Impaired	20	0	0	0	0	0	15	15	1	0.360
65g-84	65g	Impaired	17	0	0	0	0	0	11	5	0	0.262
65g-82	65g	Ref/Removed	7	0	0	0	0	0	0	0	0	0.193
65g-83	65g	Ref/Removed	51	5	2	0	3	3	27	22	5	0.638
65g-120	65g	Reference	47	7	2	0	5	1	29	26	9	0.562
65g-62	65g	Reference	32	7	3	3	1	3	10	7	1	0.415
HH29	65g	Reference	63	16	8	1	7	4	32	32	11	0.695
65h-17	65h	Impaired	30	4	0	1	3	1	16	13	0	0.483
65h-174	65h	Impaired	46	6	2	1	3	1	31	26	5	0.601
65h-32	65h	Impaired	21	0	0	0	0	0	13	12	1	0.363
65h-34	65h	Impaired	17	1	0	0	1	1	10	8	0	0.230
65h-41	65h	Impaired	41	6	1	2	3	7	20	16	1	0.554

Station ID	**Sub -eco**	**Condition**	Total Tax	EPT Tax	Ephem Tax	Pleco Tax	Trich Tax	Coleo Tax	Dip Tax	Chiro Tax	Tanyt Tax	Evenness
65h-202	65h	Reference	47	6	2	2	2	7	30	27	8	0.568
65h-203	65h	Reference	41	6	5	0	1	2	29	29	12	0.540
65h-206	65h	Reference	30	2	2	0	0	7	10	7	2	0.529
65h-209	65h	Reference	47	2	1	0	1	2	34	34	5	0.632
65h-212	65h	Reference	34	10	5	2	3	4	17	14	5	0.505
65k-102	65k	Impaired	55	8	4	0	4	3	35	34	7	0.656
65k-113	65k	Impaired	49	2	1	0	1	3	37	34	8	0.555
65k-128	65k	Impaired	34	5	1	0	4	3	21	18	2	0.487
65k-129	65k	Impaired	31	3	2	1	0	2	15	13	2	0.390
65k-37	65k	Impaired	28	4	0	1	3	3	16	14	0	0.474
65k-54	65k	Reference	21	0	0	0	0	3	11	5	0	0.423
65k-55	65k	Reference	59	12	6	1	5	5	30	27	6	0.652
65k-56	65k	Reference	37	0	0	0	0	4	25	22	0	0.536
65k-68	65k	Reference	28	1	0	0	1	2	13	12	0	0.416
65k-85	65k	Reference	12	0	0	0	0	0	2	1	0	0.152
65l-160	65l	Impaired	31	3	3	0	0	2	17	15	6	0.495
65L-184	65l	Impaired	46	4	0	0	4	9	20	12	2	0.590
65l-391	65l	Impaired	33	1	0	0	1	1	24	22	5	0.480
65l-420	65l	Impaired	44	1	1	0	0	3	29	25	4	0.546
65l-423	65l	Impaired	35	1	1	0	0	4	24	18	3	0.494
65l-10	65l	Reference	47	7	2	1	4	5	26	22	6	0.554
65l-342	65l	Reference	35	3	0	0	3	3	25	20	0	0.424
65l-343	65l	Reference	48	5	1	0	4	3	32	30	4	0.546
65l-379	65l	Reference	23	0	0	0	0	4	13	9	0	0.513
65l-381	65l	Reference	50	8	3	0	5	2	34	29	8	0.592

Station ID	Sub -eco	Condition	Total Tax	EPT Tax	Ephem Tax	Pleco Tax	Trich Tax	Coleo Tax	Dip Tax	Chiro Tax	Tanyt Tax	Evenness
65o-11	65o	Impaired	36	4	2	0	2	4	20	15	2	0.514
65o-18	65o	Impaired	22	3	0	0	3	2	15	5	0	0.341
65o-22	65o	Impaired	32	0	0	0	0	3	25	18	2	0.452
65o-3	65o	Impaired	52	5	2	0	3	11	26	24	5	0.603
65o-9	65o	Impaired	17	1	0	0	1	1	9	4	0	0.313
65o-12	65o	Reference	58	1	1	0	0	4	42	39	7	0.648
65o-23	65o	Reference	52	7	2	2	3	5	33	30	7	0.620
65o-24	65o	Reference	33	5	4	0	1	0	22	21	3	0.465
65o-25	65o	Reference	26	3	1	0	2	2	17	13	0	0.449

Station ID	Marga -lef	Shannon base_e	Simpsons	EPT Pct	Ephem Pct	Amph Pct	Bival Pct	Chiro Pct	Coleo Pct	Dip Pct	Gastro Pct	Iso Pct	NonIn Pct
65c-12	13.5	3.5	0.071	46.7	39.6	0.8	0.4	37.5	3.3	43.3	0.0	0.0	1.3
65c-3	5.6	2.5	0.143	39.5	31.6	0.0	0.0	49.2	2.3	52.0	1.7	0.0	4.0
65c-4	9.0	3.3	0.049	0.0	0.0	0.0	1.8	65.2	1.3	66.5	5.7	0.0	11.5
65c-40	14.0	3.4	0.105	17.9	5.0	0.0	0.0	63.3	6.7	69.6	0.0	0.0	2.5
65c-5	11.2	3.5	0.056	4.3	0.0	0.9	1.3	68.1	10.6	69.8	2.6	0.0	9.4
65c-8	7.6	3.0	0.086	25.8	1.8	0.0	0.9	37.8	4.0	69.3	0.0	0.0	0.9
65c-88	11.2	3.6	0.039	14.7	9.2	0.0	0.0	65.9	0.9	77.0	0.0	0.0	4.6
65c-80	9.5	3.3	0.074	12.9	2.5	2.1	0.0	73.3	1.3	74.6	2.1	0.0	9.2
65c-89	7.8	2.8	0.111	8.7	1.5	0.0	0.0	75.9	3.1	78.5	0.0	0.0	4.1
HH24	8.5	3.3	0.054	29.0	1.3	0.0	0.0	62.9	2.7	64.7	0.0	0.0	1.3
HH25	6.5	3.0	0.074	33.5	5.5	0.0	0.0	48.4	8.2	52.7	0.0	0.0	0.0
HH26	7.8	3.2	0.068	7.0	1.6	0.0	0.0	69.4	8.1	70.4	0.0	0.0	4.8

Station ID	Marga -lef	Shannon base_e	Simpsons	EPT Pct	Ephem Pct	Amph Pct	Bival Pct	Chiro Pct	Coleo Pct	Dip Pct	Gastro Pct	Iso Pct	NonIn Pct
65d-1	5.3	2.5	0.112	0.4	0.0	0.0	3.3	78.3	0.0	79.6	1.7	0.0	16.7
65d-20	8.8	3.5	0.039	21.5	0.0	0.0	0.0	61.0	3.4	65.4	0.0	0.0	3.4
65d-21	7.3	2.5	0.201	22.9	15.8	0.4	4.2	12.9	5.8	15.0	43.3	0.0	52.9
65d-32	9.7	3.4	0.054	17.8	14.0	0.0	0.0	70.8	0.0	76.3	0.0	0.0	0.4
65d-39	12.0	3.5	0.046	28.8	5.0	0.0	1.3	46.3	5.8	60.8	0.0	0.4	2.1
65d-14	7.1	3.0	0.080	41.9	11.5	0.0	0.0	45.2	5.1	47.9	0.0	0.0	4.1
65d-18	12.0	3.7	0.029	18.3	8.3	1.7	0.8	53.3	10.8	60.8	0.8	0.0	5.8
65d-3	9.3	3.3	0.059	14.6	10.0	3.3	0.4	43.8	0.4	65.8	0.0	2.5	6.7
65d-38	11.1	3.3	0.071	18.8	12.1	0.0	0.0	70.8	1.7	75.0	0.4	0.0	2.9
65d-4	5.4	2.4	0.180	48.1	0.0	0.0	0.0	34.1	0.9	39.7	0.0	0.0	3.3
65g-10	6.6	2.8	0.111	0.0	0.0	1.7	4.6	54.6	3.3	57.1	5.4	9.2	39.6
65g-130	5.9	2.6	0.118	1.4	0.0	0.0	0.0	50.7	2.8	78.3	1.4	0.0	17.1
65g-135	3.4	2.1	0.164	9.6	9.6	0.0	0.0	81.7	0.0	84.6	0.0	0.0	5.3
65g-137	3.5	1.9	0.248	0.0	0.0	0.0	0.0	65.9	1.4	89.5	0.0	0.0	8.2
65g-14	5.3	2.7	0.102	1.4	1.4	0.5	4.3	63.8	0.5	64.3	6.3	0.5	33.3
65g-17	5.5	2.3	0.183	1.7	0.8	0.4	0.4	13.9	6.8	51.9	4.6	18.6	38.4
65g-4	5.2	2.8	0.085	9.7	9.7	4.5	0.0	32.5	0.0	43.5	5.2	1.3	42.9
65g-69	8.6	3.4	0.043	4.6	4.6	0.0	3.8	65.8	5.8	74.6	2.1	0.0	10.8
65g-8	3.6	1.9	0.216	0.0	0.0	0.0	0.0	45.4	0.0	45.4	3.9	29.5	54.6
65g-84	3.0	1.4	0.365	0.0	0.0	8.0	54.7	2.2	0.0	8.9	0.4	2.7	91.1
65g-82	1.1	1.1	0.484	0.0	0.0	11.7	0.0	0.0	0.0	0.0	2.1	67.1	100.0
65g-83	9.4	3.4	0.051	8.5	1.0	0.5	3.0	34.2	25.1	38.7	0.5	7.0	24.1
65g-120	8.4	3.1	0.080	8.0	5.0	0.0	1.7	71.0	0.4	79.8	0.0	0.4	7.6
65g-62	5.7	2.3	0.220	50.0	45.8	10.0	0.4	4.2	4.2	5.4	9.6	5.4	39.6
HH29	11.5	3.7	0.029	17.1	8.8	1.9	0.5	40.3	11.6	40.3	11.1	0.0	24.1

Station ID	Marga -lef	Shannon base_e	Simpsons	EPT Pct	Ephem Pct	Amph Pct	Bival Pct	Chiro Pct	Coleo Pct	Dip Pct	Gastro Pct	Iso Pct	NonIn Pct
65h-17	5.3	2.6	0.098	7.1	0.0	16.7	0.0	21.7	4.2	24.2	0.4	39.2	64.2
65h-174	8.2	3.3	0.051	20.0	6.3	1.7	0.0	48.8	0.4	70.8	0.0	0.0	3.8
65h-32	3.7	2.0	0.223	0.0	0.0	16.5	3.4	19.0	0.0	19.4	3.4	46.0	80.6
65h-34	2.9	1.3	0.532	0.4	0.0	0.4	0.0	84.2	0.4	88.3	2.5	2.5	10.8
65h-41	7.6	2.9	0.089	9.9	2.6	18.2	2.6	39.6	6.8	44.3	0.5	14.1	38.5
65h-202	8.7	3.0	0.109	15.6	12.1	0.0	0.0	66.3	10.1	70.9	0.0	0.0	2.0
65h-203	7.3	3.0	0.083	27.1	26.7	0.0	1.3	67.5	2.9	67.5	0.4	0.0	2.1
65h-206	5.4	2.8	0.075	4.1	4.1	0.0	4.6	23.5	36.4	27.2	22.6	0.0	30.9
65h-209	8.5	3.4	0.042	1.4	0.9	0.0	2.3	79.9	1.4	79.9	3.7	0.0	12.8
65h-212	6.4	2.6	0.150	32.2	23.7	0.6	0.6	57.6	5.6	60.5	0.0	0.0	1.7
65k-102	10.0	3.5	0.038	17.3	9.1	10.0	0.0	53.2	10.5	54.1	0.0	0.0	13.2
65k-113	8.9	3.0	0.082	0.9	0.5	12.4	2.3	78.4	1.8	79.8	0.0	0.0	16.5
65k-128	6.1	2.6	0.117	7.6	1.8	2.2	2.7	55.8	25.5	58.5	0.0	0.0	5.4
65k-129	5.5	2.1	0.234	5.0	4.6	0.4	6.3	12.5	0.8	27.9	49.6	0.0	65.4
65k-37	5.1	2.5	0.117	5.4	0.0	6.4	0.0	62.3	7.4	70.6	0.0	9.3	16.2
65k-54	3.8	2.3	0.146	0.0	0.0	1.0	0.5	26.8	5.9	77.6	2.0	0.0	16.6
65k-55	10.6	3.6	0.036	20.5	8.5	0.9	1.3	44.9	17.5	52.6	1.7	0.4	5.6
65k-56	7.0	2.8	0.104	0.0	0.0	11.0	10.4	57.2	12.1	62.4	1.2	1.7	24.3
65k-68	5.1	2.2	0.225	1.5	0.0	10.8	1.5	62.9	11.3	64.4	2.6	2.1	17.0
65k-85	2.1	0.8	0.664	0.0	0.0	3.0	2.0	1.0	0.0	1.5	1.0	81.4	97.5
65l-160	5.6	2.7	0.111	28.7	28.7	0.0	2.8	56.9	1.9	58.3	2.8	1.4	10.2
65L-184	8.2	3.2	0.054	2.1	0.0	10.0	0.0	21.3	9.6	42.9	0.4	14.6	43.8
65l-391	5.8	2.6	0.109	0.4	0.0	22.1	0.0	40.8	1.3	42.5	4.2	25.4	55.8
65l-420	7.8	3.0	0.080	0.4	0.4	9.2	4.2	70.4	1.7	81.7	0.4	0.4	15.0
65l-423	6.2	2.7	0.111	0.4	0.4	14.6	1.3	30.0	5.8	41.7	3.8	5.4	51.3

Station ID	Marga -lef	Shannon base_e	Simpsons	EPT Pct	Ephem Pct	Amph Pct	Bival Pct	Chiro Pct	Coleo Pct	Dip Pct	Gastro Pct	Iso Pct	NonIn Pct
65l-10	8.5	3.0	0.091	7.5	2.6	8.3	0.9	24.1	9.6	27.6	35.5	0.0	52.2
65l-342	6.2	2.3	0.233	1.3	0.0	1.3	0.0	75.4	2.1	84.2	0.0	7.1	12.5
65l-343	8.6	3.0	0.098	8.8	6.3	23.8	0.0	37.9	3.3	39.6	2.9	18.8	46.7
65l-379	4.3	2.6	0.084	0.0	0.0	12.1	0.0	28.2	3.4	39.7	0.0	33.9	56.9
65l-381	9.0	3.2	0.058	4.6	2.5	8.9	1.3	62.4	4.2	77.2	0.0	1.3	13.1
65o-11	6.5	2.8	0.097	4.5	1.4	12.7	3.2	38.0	3.6	46.6	0.9	17.2	45.3
65o-18	3.9	1.9	0.260	1.3	0.0	0.0	0.0	21.2	0.9	78.8	0.0	0.0	19.0
65o-22	5.8	2.4	0.173	0.0	0.0	0.0	0.0	27.8	2.3	77.8	0.0	0.5	19.4
65o-3	9.3	3.3	0.058	23.7	17.8	9.7	0.8	38.1	12.3	40.7	0.8	5.9	18.2
65o-9	3.0	1.7	0.346	0.4	0.0	3.1	0.0	7.1	0.9	19.9	0.0	4.4	78.8
65o-12	10.6	3.5	0.044	0.5	0.5	1.4	1.4	54.3	18.1	57.0	13.6	4.1	21.3
65o-23	9.3	3.4	0.045	13.8	6.7	1.3	0.0	69.6	8.8	72.9	0.0	0.0	1.3
65o-24	6.1	2.4	0.168	32.4	31.9	0.0	0.0	28.2	0.0	56.9	1.1	4.8	10.6
65o-25	4.7	2.4	0.142	4.4	3.4	0.0	0.0	41.5	4.9	73.7	0.5	12.2	17.1

Station ID	Odon Pct	Pleco Pct	Tanyt Pct	Oligo Pct	Trich Pct	%Chi /TC	%Orth /TC	%Tpod /TC	Hyd2Tri Pct	Hyd2EPT Pct	Tnyt2Chi Pct
65c-12	5.4	2.1	15.4	0.0	5.0	63.3	7.8	28.9	33.3	3.6	41.1
65c-3	1.7	0.0	0.6	1.7	7.9	70.1	17.2	9.2	100.0	20.0	1.1
65c-4	20.3	0.0	9.7	3.5	0.0	56.8	0.7	42.6	0.0	0.0	14.9
65c-40	2.9	3.3	4.6	0.0	9.6	28.3	14.5	57.2	30.4	16.3	7.2
65c-5	6.0	0.0	23.4	4.7	4.3	76.9	6.3	16.3	0.0	0.0	34.4
65c-8	0.0	0.0	4.0	0.0	24.0	64.7	10.6	24.7	83.3	77.6	10.6
65c-88	1.4	3.2	7.4	0.5	2.3	70.6	7.7	21.7	40.0	6.3	11.2

Station ID	Odon Pct	Pleco Pct	Tanyt Pct	Oligo Pct	Trich Pct	%Chi /TC	%Orth /TC	%Tpod /TC	Hyd2Tri Pct	Hyd2EPT Pct	Tnyt2Chi Pct
65c-80	1.7	1.7	8.3	2.1	8.8	69.9	5.7	23.3	9.5	6.5	11.4
65c-89	5.1	2.1	2.6	1.5	5.1	48.0	4.1	45.9	90.0	52.9	3.4
HH24	1.3	1.3	9.8	1.3	26.3	69.5	5.0	23.4	44.1	40.0	15.6
HH25	4.9	14.3	30.1	0.0	13.7	89.8	5.7	4.5	28.0	11.5	18.2
HH26	7.5	1.1	0.0	2.7	4.3	52.7	0.8	45.7	0.0	0.0	0.0
65d-1	3.3	0.0	1.7	11.7	0.4	47.9	1.1	50.5	100.0	100.0	2.1
65d-20	4.4	14.1	5.4	0.0	7.3	72.0	16.0	12.0	100.0	34.1	8.8
65d-21	0.8	5.8	0.8	0.4	1.3	38.7	35.5	25.8	100.0	5.5	6.5
65d-32	4.2	0.8	16.5	0.0	3.0	77.8	7.2	15.0	42.9	7.1	23.4
65d-39	0.8	12.9	7.1	0.4	10.8	67.6	19.8	12.6	92.3	34.8	15.3
65d-14	0.5	22.1	4.4	0.0	8.3	75.5	10.2	14.3	83.3	16.5	10.2
65d-18	3.3	5.0	4.6	0.4	5.0	42.2	23.4	34.4	33.3	9.1	8.6
65d-3	7.9	0.0	0.8	0.4	4.6	27.6	11.4	61.0	0.0	0.0	1.9
65d-38	1.3	4.6	12.1	0.4	2.1	84.7	7.6	7.6	40.0	4.4	17.1
65d-4	2.8	41.6	15.4	0.5	6.5	58.9	30.1	11.0	64.3	8.7	45.2
65g-10	0.0	0.0	0.8	17.5	0.0	84.0	9.2	6.1	0.0	0.0	1.5
65g-130	0.5	0.0	18.9	10.1	1.4	85.5	6.4	8.2	0.0	0.0	37.3
65g-135	0.5	0.0	1.0	5.3	0.0	94.1	1.8	4.1	0.0	0.0	1.2
65g-137	0.0	0.0	0.5	8.2	0.0	29.0	71.0	0.0	0.0	0.0	0.7
65g-14	0.5	0.0	2.4	19.3	0.0	93.2	4.5	2.3	0.0	0.0	3.8
65g-17	1.3	0.0	0.0	12.7	0.8	12.1	81.8	6.1	0.0	0.0	0.0
65g-4	3.2	0.0	2.6	20.1	0.0	66.0	30.0	4.0	0.0	0.0	8.0
65g-69	4.2	0.0	1.3	5.0	0.0	29.7	9.5	60.8	0.0	0.0	1.9
65g-8	0.0	0.0	0.5	9.7	0.0	90.4	1.1	8.5	0.0	0.0	1.1
65g-84	0.0	0.0	0.0	24.4	0.0	60.0	40.0	0.0	0.0	0.0	0.0

Station ID	Odon Pct	Pleco Pct	Tanyt Pct	Oligo Pct	Trich Pct	%Chi /TC	%Orth /TC	%Tpod /TC	Hyd2Tri Pct	Hyd2EPT Pct	Tnyt2Chi Pct
65g-82	0.0	0.0	0.0	4.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
65g-83	3.0	0.0	3.5	1.5	7.5	85.3	7.4	4.4	46.7	41.2	10.3
65g-120	4.2	0.0	14.3	2.5	2.9	75.1	11.2	13.6	57.1	21.1	20.1
65g-62	0.8	3.8	0.4	2.9	0.4	50.0	30.0	20.0	0.0	0.0	10.0
HH29	6.9	0.5	10.6	1.4	7.9	71.3	11.5	17.2	0.0	0.0	26.4
65h-17	0.0	5.0	0.0	5.4	2.1	7.7	88.5	1.9	0.0	0.0	0.0
65h-174	4.2	0.4	2.5	1.3	13.3	43.6	20.5	35.9	84.4	56.3	5.1
65h-32	0.0	0.0	1.3	11.4	0.0	71.1	28.9	0.0	0.0	0.0	6.7
65h-34	0.0	0.0	0.5	3.8	0.4	0.0	100.0	0.0	0.0	0.0	1.3
65h-41	0.5	5.2	0.5	2.6	2.1	2.6	78.9	10.5	0.0	0.0	1.3
65h-202	1.5	1.0	13.6	0.0	2.5	84.8	3.8	11.4	60.0	9.7	20.5
65h-203	0.4	0.0	38.3	0.4	0.4	80.2	0.0	19.8	0.0	0.0	56.8
65h-206	0.9	0.0	15.4	1.8	0.0	63.8	7.4	28.7	0.0	0.0	41.2
65h-209	4.1	0.0	8.2	4.6	0.5	71.4	12.0	16.6	100.0	33.3	10.3
65h-212	0.0	4.5	44.1	0.0	4.0	91.2	1.0	7.8	57.1	7.0	76.5
65k-102	3.6	0.0	10.0	0.5	8.2	70.9	3.4	24.8	77.8	36.8	18.8
65k-113	0.9	0.0	13.8	0.5	0.5	53.2	28.7	17.5	100.0	50.0	17.5
65k-128	3.1	0.0	2.7	0.4	5.8	83.2	0.0	15.2	53.8	41.2	4.8
65k-129	0.0	0.4	3.8	8.8	0.0	43.3	26.7	30.0	0.0	0.0	30.0
65k-37	0.5	2.9	0.0	0.5	2.5	29.9	68.5	1.6	0.0	0.0	0.0
65k-54	0.0	0.0	0.0	11.7	0.0	5.5	94.5	0.0	0.0	0.0	0.0
65k-55	2.6	3.4	8.1	0.0	8.5	57.1	7.6	35.2	25.0	10.4	18.1
65k-56	0.0	0.0	0.0	0.0	0.0	57.6	25.3	17.2	0.0	0.0	0.0
65k-68	3.6	0.0	0.0	0.0	1.5	95.9	0.8	3.3	100.0	100.0	0.0
65k-85	1.0	0.0	0.0	10.1	0.0	0.0	100.0	0.0	0.0	0.0	0.0

Station ID	Odon Pct	Pleco Pct	Tanyt Pct	Oligo Pct	Trich Pct	%Chi /TC	%Orth /TC	%Tpod /TC	Hyd2Tri Pct	Hyd2EPT Pct	Tnyt2Chi Pct
65l-160	0.9	0.0	28.2	0.0	0.0	93.5	0.0	6.5	0.0	0.0	49.6
65L-184	0.4	0.0	8.8	3.3	2.1	51.0	31.4	17.6	0.0	0.0	41.2
65l-391	0.0	0.0	2.1	4.2	0.4	75.5	22.4	1.0	0.0	0.0	5.1
65l-420	1.3	0.0	8.8	0.4	0.0	43.2	49.7	3.0	0.0	0.0	12.4
65l-423	0.0	0.0	4.6	26.3	0.0	41.7	55.6	1.4	0.0	0.0	15.3
65l-10	0.9	0.4	5.3	6.1	4.4	70.9	10.9	18.2	50.0	29.4	21.8
65l-342	0.0	0.0	0.0	2.9	1.3	18.2	78.5	2.2	0.0	0.0	0.0
65l-343	1.7	0.0	3.8	0.4	2.5	61.5	25.3	11.0	0.0	0.0	9.9
65l-379	0.0	0.0	0.0	10.9	0.0	30.6	69.4	0.0	0.0	0.0	0.0
65l-381	0.0	0.0	31.2	1.7	2.1	66.2	26.4	6.8	20.0	9.1	50.0
65o-11	0.0	0.0	4.1	8.6	3.2	78.6	14.3	7.1	0.0	0.0	10.7
65o-18	0.0	0.0	0.0	18.6	1.3	2.1	97.9	0.0	0.0	0.0	0.0
65o-22	0.5	0.0	1.9	18.5	0.0	65.0	30.0	5.0	0.0	0.0	6.7
65o-3	5.1	0.0	8.1	0.4	5.9	76.7	12.2	11.1	100.0	25.0	21.1
65o-9	0.0	0.0	0.0	57.1	0.4	0.0	43.8	56.3	0.0	0.0	0.0
65o-12	1.8	0.0	8.1	0.0	0.0	80.8	5.0	11.7	0.0	0.0	15.0
65o-23	2.5	2.1	19.6	3.7	5.0	70.7	10.8	16.2	8.3	3.0	28.1
65o-24	0.0	0.0	3.7	0.0	0.5	71.7	11.3	17.0	100.0	1.6	13.2
65o-25	0.0	0.0	0.0	4.4	1.0	89.4	3.5	2.4	0.0	0.0	0.0

Station ID	Baet 2 Eph Pct	CrCh2Chi Pct	Toler Tax	Toler Pct	Intol Tax	Intol Pct	Dom01 Pct	Dom01 Ind	BeckBI	HBI	NCBI	Scrap Pct	Scrap Tax
65c-12	0.0	0.0	12	8.8	11	26.7	20.0	48	21	4.7	4.1	0.8	2
65c-3	0.0	0.0	6	10.2	2	1.1	31.1	55	6	5.0	5.2	35.0	5
65c-4	0.0	0.7	26	53.3	0	0.0	10.1	23	0	7.3	8.1	7.0	3
65c-40	0.0	0.0	14	10.4	15	16.3	31.3	75	32	5.3	4.4	5.8	4
65c-5	0.0	0.0	15	17.4	3	3.0	19.6	46	7	6.4	6.1	5.1	4
65c-8	0.0	1.2	9	13.3	2	20.0	18.2	41	8	5.3	5.0	1.3	2
65c-88	0.0	0.7	12	23.0	4	6.0	9.7	21	6	6.3	5.3	0.9	1
65c-80	0.0	0.0	12	15.8	9	6.3	23.3	56	18	6.1	5.9	10.8	5
65c-89	0.0	0.0	7	6.7	3	2.6	24.1	47	8	6.1	6.1	23.6	3
HH24	0.0	0.0	10	15.2	5	11.6	12.9	29	14	5.7	5.6	3.6	2
HH25	0.0	0.0	3	9.9	11	22.5	18.7	34	21	4.9	5.6	28.0	5
HH26	0.0	0.0	11	29.6	5	5.9	21.0	39	12	6.4	6.5	11.3	5
65d-1	0.0	17.6	17	56.7	1	0.4	17.9	43	1	7.7	8.5	1.7	2
65d-20	0.0	0.0	11	13.2	5	15.6	11.7	24	16	5.4	6.7	0.0	0
65d-21	0.0	3.2	12	11.7	4	49.2	42.5	102	11	4.2	3.9	43.8	3
65d-32	0.0	0.0	9	7.2	4	3.0	15.3	36	11	5.8	5.8	11.9	2
65d-39	25.0	0.0	8	6.3	10	12.9	13.8	33	22	5.2	5.4	9.6	4
65d-14	0.0	0.0	6	8.3	12	27.6	23.5	51	19	4.9	6.2	6.0	2
65d-18	0.0	1.6	26	38.8	6	7.5	7.1	17	11	6.3	6.4	2.5	4
65d-3	0.0	0.0	20	39.2	3	9.6	18.3	44	5	6.6	7.3	3.3	2
65d-38	0.0	0.0	14	14.6	7	9.6	20.8	50	14	5.9	6.0	4.6	3
65d-4	0.0	0.0	9	8.4	5	43.5	38.3	82	8	4.6	6.3	4.2	1
65g-10	0.0	0.0	20	58.3	1	3.3	25.4	61	2	7.2	6.6	5.8	3
65g-130	0.0	7.3	18	39.6	1	0.9	27.6	60	2	6.9	7.2	1.4	1

Station ID	Baet 2 Eph Pct	CrCh2Chi Pct	Toler Tax	Toler Pct	Intol Tax	Intol Pct	Dom01 Pct	Dom01 Ind	BeckBI	HBI	NCBI	Scrap Pct	Scrap Tax
65g-135	0.0	0.0	8	72.6	0	0.0	31.3	65	0	7.9	7.6	0.0	0
65g-137	0.0	0.0	9	25.0	0	0.0	45.0	99	1	6.3	9.2	0.0	0
65g-14	0.0	3.0	19	85.5	1	1.4	19.3	40	1	7.8	8.0	6.3	2
65g-17	100.0	0.0	17	51.5	0	0.0	37.1	88	3	6.6	6.2	16.9	5
65g-4	100.0	6.0	11	33.1	0	0.0	20.1	31	1	6.7	6.5	5.2	2
65g-69	9.1	0.6	24	66.3	1	0.4	11.7	28	2	7.5	7.9	2.1	2
65g-8	0.0	7.4	13	49.8	0	0.0	32.9	68	0	7.3	7.8	3.9	1
65g-84	0.0	0.0	8	89.3	0	0.0	54.7	123	1	7.4	7.8	0.4	1
65g-82	0.0	0.0	4	18.3	0	0.0	67.1	161	0	6.4	8.0	0.4	1
65g-83	0.0	7.4	21	34.2	1	3.5	16.6	33	2	6.8	6.9	17.1	2
65g-120	0.0	0.0	13	30.3	3	3.4	22.3	53	9	6.0	5.5	5.5	3
65g-62	3.6	0.0	14	24.6	3	46.7	44.2	106	7	4.9	7.0	10.8	4
HH29	0.0	1.1	15	16.7	7	16.2	9.3	20	18	5.5	6.1	24.5	8
65h-17	0.0	0.0	10	47.9	2	5.4	16.7	40	9	6.4	7.5	1.3	2
65h-174	0.0	13.7	18	27.5	4	5.8	12.9	31	9	6.1	6.0	8.3	2
65h-32	0.0	0.0	11	40.1	0	0.0	41.4	98	1	6.9	7.9	3.8	3
65h-34	0.0	0.0	7	83.3	0	0.0	72.5	174	3	8.8	9.4	75.0	2
65h-41	0.0	0.0	18	49.5	3	7.8	18.2	35	11	6.3	7.9	1.0	2
65h-202	0.0	0.0	13	18.6	6	5.0	29.6	59	12	5.3	5.1	13.6	3
65h-203	0.0	0.0	10	15.4	5	27.5	18.3	44	7	5.4	4.9	7.1	5
65h-206	0.0	0.0	12	52.1	4	6.5	15.2	33	7	7.0	7.3	29.0	5
65h-209	0.0	1.7	20	37.9	3	5.0	11.9	26	3	6.9	6.7	4.6	2
65h-212	0.0	0.0	7	6.8	7	17.5	35.6	63	12	5.2	5.7	1.7	2
65k-102	0.0	0.0	17	34.5	3	2.7	10.0	22	6	6.6	6.7	18.2	4

Station ID	Baet 2 Eph Pct	CrCh2Chi Pct	Toler Tax	Toler Pct	Intol Tax	Intol Pct	Dom01 Pct	Dom01 Ind	BeckBI	HBI	NCBI	Scrap Pct	Scrap Tax
65k-113	0.0	0.0	21	36.7	1	0.5	17.4	38	3	6.9	7.2	1.4	2
65k-128	0.0	0.0	17	50.0	0	0.0	23.7	53	3	7.1	7.2	1.3	1
65k-129	9.1	3.3	11	15.0	3	45.8	44.6	107	8	4.7	3.3	49.6	3
65k-37	0.0	0.0	8	28.9	1	2.0	23.5	48	4	6.2	8.1	14.2	2
65k-54	0.0	0.0	9	49.8	2	9.8	24.4	50	3	6.2	7.9	2.4	4
65k-55	0.0	0.0	20	32.5	6	6.0	9.0	21	14	6.2	7.0	18.8	5
65k-56	0.0	2.0	17	45.7	1	0.6	24.3	42	2	7.1	7.2	25.4	3
65k-68	0.0	0.8	13	83.0	1	1.0	44.3	86	3	8.6	7.7	3.1	3
65k-85	0.0	0.0	6	97.0	1	0.5	80.9	161	3	7.7	7.7	2.0	3
65l-160	0.0	0.8	12	37.5	2	4.2	24.5	53	2	7.0	7.4	7.9	4
65L-184	0.0	2.0	26	62.5	1	0.4	12.9	31	4	7.7	8.3	4.2	2
65l-391	0.0	0.0	17	70.4	0	0.0	22.1	53	3	7.6	7.9	5.0	3
65l-420	100.0	1.2	18	21.7	1	2.9	18.8	45	4	6.1	6.5	0.8	2
65l-423	0.0	0.0	19	65.4	1	0.8	26.3	63	4	7.3	6.8	4.2	2
65l-10	0.0	0.0	11	23.2	4	12.7	24.6	56	11	5.2	5.4	14.9	3
65l-342	0.0	1.1	16	23.3	2	5.8	46.7	112	5	5.3	6.3	2.1	2
65l-343	0.0	1.1	24	72.5	0	0.0	23.8	57	2	7.5	7.8	3.8	3
65l-379	0.0	0.0	9	51.7	0	0.0	15.5	27	2	7.0	7.6	0.0	0
65l-381	33.3	0.0	13	34.2	3	2.1	12.7	30	10	6.4	6.5	3.0	2
65o-11	66.7	2.4	16	38.0	2	0.9	21.3	47	6	6.8	7.0	0.9	1
65o-18	0.0	0.0	9	39.8	2	0.9	45.1	102	5	6.2	5.8	13.7	1
65o-22	0.0	1.7	15	31.0	0	0.0	36.1	78	1	6.0	5.2	4.6	2
65o-3	0.0	1.1	15	40.3	3	16.1	14.4	34	6	6.3	7.0	15.7	4
65o-9	0.0	0.0	10	83.2	1	0.4	57.1	129	1	7.9	7.4	0.9	2

Station ID	Baet 2 Eph Pct	CrCh2Chi Pct	Toler Tax	Toler Pct	Intol Tax	Intol Pct	Dom01 Pct	Dom01 Ind	BeckBI	HBI	NCBI	Scrap Pct	Scrap Tax
65o-12	0.0	19.2	31	70.1	0	0.0	12.2	27	2	8.0	8.2	14.0	3
65o-23	0.0	0.0	15	23.3	7	10.8	10.4	25	12	6.1	6.5	14.2	3
65o-24	5.0	0.0	10	14.9	3	30.3	28.7	54	5	4.9	5.3	2.7	3
65o-25	0.0	1.2	11	41.0	1	0.5	30.7	63	5	6.5	5.5	0.5	1

Station ID	Cllct Pct	Cllct Tax	Pred Pct	Pred Tax	Shred Pct	Shred Tax	Filtr Pct	Filtr Tax	Clng Tax	Clng Pct	Brrwr Tax	Clmbr Tax	Sprwl Tax	Swmmr Tax
65c-12	36.3	24	20.0	20	4.6	5	10.0	7	12	22.9	11	3	15	3
65c-3	21.5	9	4.5	4	7.3	3	10.7	4	11	46.3	5	2	6	0
65c-4	30.8	12	32.2	13	0.4	1	4.8	4	5	3.5	8	7	11	0
65c-40	22.9	22	41.7	23	7.9	7	13.8	11	22	22.9	12	5	23	2
65c-5	30.6	21	11.5	15	8.5	3	23.0	6	9	11.9	11	6	11	0
65c-8	10.7	12	11.1	8	4.0	1	55.1	10	12	57.8	7	1	9	1
65c-88	31.8	21	17.1	15	3.2	3	5.1	6	10	11.1	15	1	13	0
65c-80	15.4	11	19.6	14	4.6	5	9.2	6	12	20.4	6	1	16	0
65c-89	12.8	8	37.9	14	3.6	3	8.2	5	11	32.3	9	2	10	0
HH24	12.9	12	18.8	13	1.8	3	32.6	8	15	42.0	5	2	9	1
HH25	11.5	4	10.4	8	2.2	2	11.0	6	17	54.9	3	2	5	1
HH26	9.7	6	39.2	17	3.8	3	3.2	2	10	18.3	5	2	9	0
65d-1	24.6	8	21.7	8	1.3	2	5.4	4	3	2.1	6	3	7	0
65d-20	14.1	11	18.5	12	24.9	5	10.7	4	7	11.2	13	2	9	0
65d-21	22.1	13	7.1	8	8.3	4	7.9	6	10	10.0	7	2	6	1
65d-32	26.3	19	11.0	12	4.2	3	14.4	6	7	19.9	11	2	13	1

Station ID	Cllct Pct	Cllct Tax	Pred Pct	Pred Tax	Shred Pct	Shred Tax	Filtr Pct	Filtr Tax	Clng Tax	Clng Pct	Brrwr Tax	Clmbr Tax	Sprwl Tax	Swmmr Tax
65d-39	14.6	19	10.0	13	13.3	8	28.3	15	21	38.8	8	1	15	2
65d-14	16.1	11	23.0	8	3.2	4	8.3	3	10	30.4	5	2	5	3
65d-18	36.3	18	27.5	19	5.8	6	5.4	7	11	10.4	10	2	13	1
65d-3	28.3	13	48.8	22	2.5	4	0.4	1	3	2.9	10	4	15	2
65d-38	52.5	19	10.4	14	5.8	5	7.9	8	8	10.0	8	2	16	2
65d-4	5.1	4	13.1	11	15.0	3	4.7	2	5	13.1	4	3	8	1
65g-10	42.9	15	6.3	7	27.5	2	2.5	3	4	3.8	4	2	10	1
65g-130	53.5	10	11.1	8	3.2	1	23.5	4	1	0.5	5	2	9	1
65g-135	30.3	8	4.8	5	18.3	2	1.0	1	0	0.0	5	1	6	0
65g-137	84.5	7	3.2	6	5.0	3	0.5	1	0	0.0	3	1	4	3
65g-14	51.2	12	5.3	6	2.9	1	13.5	3	1	11.6	4	1	4	1
65g-17	35.4	13	8.0	8	0.4	1	37.1	1	3	39.2	2	3	5	2
65g-4	57.1	11	3.9	5	1.9	1	13.0	3	1	9.1	5	1	3	2
65g-69	26.3	12	35.4	14	2.5	3	7.9	6	1	0.8	6	3	19	2
65g-8	53.6	6	1.9	3	0.0	0	1.9	3	0	0.0	6	0	3	0
65g-84	97.8	12	1.3	3	0.0	0	0.4	1	3	1.3	5	0	2	0
65g-82	98.8	5	0.0	0	0.0	0	0.8	1	0	0.0	1	0	0	0
65g-83	29.6	20	14.1	9	9.5	2	13.6	8	7	27.1	11	2	6	1
65g-120	18.9	13	5.9	7	1.3	3	19.3	7	10	19.7	6	1	8	0
65g-62	72.5	9	9.2	9	0.8	2	2.1	3	6	5.4	3	0	4	2
HH29	24.5	17	15.7	6	9.7	7	1.9	4	8	16.2	7	0	10	3
65h-17	82.5	16	7.1	6	5.8	3	1.7	1	3	3.3	2	0	9	2
65h-174	8.3	12	24.2	11	5.0	3	30.0	7	11	39.2	4	2	8	1
65h-32	82.3	13	1.3	1	0.4	1	1.3	1	0	0.0	1	0	7	0
65h-34	19.6	10	0.0	0	1.7	3	2.1	1	1	0.4	1	0	4	2

Station ID	Cllct Pct	Cllct Tax	Pred Pct	Pred Tax	Shred Pct	Shred Tax	Filtr Pct	Filtr Tax	Clng Tax	Clng Pct	Brrwr Tax	Clmbr Tax	Sprwl Tax	Swmmr Tax
65h-41	74.0	17	15.6	10	5.7	8	0.5	1	3	5.7	4	2	8	6
65h-202	10.6	12	14.1	13	4.5	2	12.1	6	10	24.1	5	4	10	1
65h-203	31.7	11	7.9	8	1.7	2	18.3	7	6	9.2	5	1	7	4
65h-206	17.1	9	24.9	7	0.9	2	12.4	3	4	12.9	4	1	4	1
65h-209	25.1	16	13.2	10	14.2	4	8.2	5	7	5.9	6	2	12	1
65h-212	18.1	6	9.0	7	1.7	1	54.2	9	12	63.3	1	1	5	3
65k-102	25.0	14	15.0	15	3.6	1	18.2	5	6	20.0	12	4	12	2
65k-113	42.7	22	9.2	7	1.4	3	12.8	6	7	4.1	5	3	11	1
65k-128	47.8	15	10.3	8	0.4	1	20.1	4	5	5.4	4	2	10	0
65k-129	32.9	11	5.0	6	1.3	2	9.2	4	5	2.5	3	1	5	2
65k-37	45.1	11	9.3	6	5.4	4	8.3	2	5	10.8	1	0	9	2
65k-54	51.2	8	19.0	4	1.5	2	23.4	1	2	23.9	4	0	4	1
65k-55	27.8	22	19.2	11	9.0	4	5.1	6	10	27.4	11	3	9	3
65k-56	46.8	9	6.9	8	2.3	3	10.4	6	3	28.3	7	0	13	1
65k-68	76.3	9	7.7	7	7.2	2	3.6	3	2	2.1	8	2	3	0
65k-85	96.0	5	1.5	3	0.0	0	0.5	1	0	0.0	0	1	1	0
65l-160	27.8	5	3.7	5	3.2	2	25.0	5	4	6.9	5	1	5	1
65L-184	55.8	15	11.3	15	5.4	6	12.9	4	2	1.3	7	1	7	10
65l-391	59.2	13	2.9	4	1.7	2	2.9	4	4	2.9	2	0	7	1
65l-420	52.5	20	5.4	9	3.8	2	18.3	3	2	10.4	7	3	13	1
65l-423	65.4	16	7.5	6	4.2	4	10.4	3	1	5.8	4	1	12	3
65l-10	21.1	12	8.8	11	4.8	5	7.9	7	12	19.3	6	1	7	0
65l-342	78.8	16	3.3	7	1.7	3	8.8	3	4	8.8	7	1	9	1
65l-343	65.4	17	10.0	8	1.7	4	10.4	6	5	3.3	10	2	9	2
65l-379	67.8	12	2.9	3	5.7	3	2.3	1	1	3.4	5	0	4	1

Station ID	Cllct Pct	Cllct Tax	Pred Pct	Pred Tax	Shred Pct	Shred Tax	Filtr Pct	Filtr Tax	Clng Tax	Clng Pct	Brrwr Tax	Clmbr Tax	Sprwl Tax	Swmmr Tax
65l-381	49.4	21	6.3	8	2.1	4	32.5	9	8	19.8	5	2	11	3
65o-11	53.8	18	8.1	7	2.7	2	10.0	4	4	9.0	5	1	6	4
65o-18	26.1	5	7.1	5	4.9	5	46.5	2	3	46.9	3	1	7	2
65o-22	36.1	12	4.2	6	3.2	3	43.5	6	4	43.1	6	1	7	1
65o-3	32.2	18	12.7	9	2.5	2	14.0	9	12	26.3	3	3	12	2
65o-9	76.1	9	4.9	3	0.0	0	9.3	2	2	9.3	2	0	3	1
65o-12	29.0	22	24.4	10	2.3	2	11.3	8	5	3.2	17	2	9	4
65o-23	18.3	15	16.7	12	2.5	2	19.6	6	12	23.3	6	1	9	2
65o-24	47.9	13	3.2	4	5.9	2	33.0	5	4	31.4	3	0	9	2
65o-25	21.0	8	5.9	4	5.4	3	35.1	4	2	31.2	6	0	3	2

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Station ID	Sub-ecoregion	Condition	Total Tax	EPT Tax	Ephem Tax	Pleco Tax	Trich Tax	Coleo Tax	Dip Tax	Chiro Tax	Tanyt Tax	Evenness
66d-38	66d	Impaired	49	22	5	8	9	5	17	12	2	0.609
66d-43	66d	Impaired	48	16	3	4	9	5	22	19	3	0.600
66d-48	66d	Impaired	68	37	11	11	15	4	20	13	4	0.675
66d-49	66d	Impaired	69	16	8	3	5	2	44	38	6	0.682
66d-50	66d	Impaired	41	12	4	1	7	3	21	19	1	0.542
66d-40	66d	Reference	70	31	10	9	12	6	26	20	5	0.693
66d-41	66d	Reference	56	24	7	9	8	5	16	10	1	0.672
66d-44	66d	Reference	55	23	5	9	9	4	25	19	0	0.612
66d-44-2	66d	Reference	52	25	7	6	12	1	23	16	0	0.581

Station ID	Sub-ecoregion	Condition	Total Tax	EPT Tax	Ephem Tax	Pleco Tax	Trich Tax	Coleo Tax	Dip Tax	Chiro Tax	Tanyt Tax	Evenness
66d-58	66d	Reference	49	12	1	3	8	3	31	26	0	0.575
66g-30	66g	Impaired	46	7	3	1	3	2	31	25	1	0.549
66g-31	66g	Impaired	44	14	3	4	7	5	23	19	4	0.531
66g-39	66g	Impaired	59	12	6	1	5	6	35	34	9	0.651
66g-42	66g	Impaired	65	32	12	10	10	3	26	22	5	0.693
66g-44	66g	Impaired	46	12	3	4	5	4	28	24	5	0.570
66g-65	66g	Impaired	53	15	8	0	7	5	27	25	7	0.654
66g-71	66g	Impaired	69	26	10	5	11	4	36	27	10	0.656
66g-2	66g	Reference	31	11	2	3	6	8	6	3	1	0.532
66g-2-2	66g	Reference	49	27	9	10	8	2	17	13	3	0.652
66g-23	66g	Reference	77	37	16	11	10	5	29	23	3	0.715
66g-5	66g	Reference	68	35	14	12	9	5	23	17	0	0.675
66g-6	66g	Reference	75	27	16	3	8	7	33	25	7	0.724
66j-17	66j	Impaired	53	14	2	1	11	7	30	24	5	0.601
66j-25	66j	Impaired	39	15	7	2	6	2	18	16	1	0.543
66j-26	66j	Impaired	64	22	5	9	8	9	30	25	4	0.672
66j-27	66j	Impaired	70	24	7	5	12	9	31	26	3	0.636
66j-9	66j	Impaired	60	20	9	6	5	10	23	20	3	0.576
66j-19	66j	Reference	76	20	7	8	5	2	52	42	3	0.676
66j-211	66j	Reference	63	25	8	8	9	4	31	25	4	0.694
66j-23	66j	Reference	69	28	5	10	13	5	32	25	5	0.662
66j-28	66j	Reference	72	22	4	10	8	4	42	32	4	0.702
66j-31	66j	Reference	64	19	1	5	13	3	37	33	6	0.641

Station ID	Marga -lef	Shannon base_e	Simpsons	EPT Pct	Ephem Pct	Amph Pct	Bival Pct	Chiro Pct	Coleo Pct	Dip Pct	Gastro Pct	Iso Pct	NonIn Pct
66d-38	8.8	3.3	0.050	61.3	20.4	0.0	1.3	10.0	6.7	15.4	13.3	0.0	14.6
66d-43	8.8	3.2	0.059	60.2	24.8	0.0	0.0	23.3	9.7	26.7	1.0	0.0	1.9
66d-48	12.2	3.7	0.034	52.9	19.3	0.0	0.0	11.8	15.5	27.7	0.0	0.0	0.4
66d-49	12.4	3.7	0.030	30.4	10.4	0.0	0.4	55.8	0.8	65.0	0.4	0.0	1.3
66d-50	7.4	2.9	0.085	48.7	16.8	0.0	0.0	36.7	2.7	44.7	0.9	0.0	0.9
66d-40	12.6	3.8	0.029	54.6	18.8	0.0	0.4	17.1	10.8	31.3	0.0	0.0	1.7
66d-41	10.4	3.6	0.036	58.1	13.1	0.0	0.0	9.6	13.6	20.7	0.0	0.0	1.5
66d-44	9.9	3.3	0.050	52.6	5.2	0.0	0.0	21.3	2.2	32.2	11.3	0.0	11.3
66d-44-2	9.3	3.2	0.067	60.4	10.8	0.0	0.0	17.1	2.1	35.4	1.3	0.0	1.3
66d-58	8.8	3.2	0.060	28.3	0.4	0.0	3.8	51.3	1.7	53.3	0.0	0.0	16.3
66g-30	8.3	3.0	0.093	44.1	17.2	0.0	0.4	41.4	1.8	45.4	0.4	0.0	7.9
66g-31	8.1	2.8	0.111	65.4	37.6	0.0	0.0	18.0	11.7	21.5	0.5	0.0	1.5
66g-39	10.6	3.6	0.041	21.3	13.3	0.0	0.0	54.6	9.6	56.3	0.4	0.0	10.4
66g-42	12.0	3.7	0.035	46.4	23.7	0.0	0.0	38.6	5.8	44.0	0.0	0.0	1.4
66g-44	8.3	3.1	0.070	32.9	18.9	0.0	0.0	59.5	3.6	61.7	0.0	0.0	0.9
66g-65	9.5	3.6	0.034	32.1	22.1	0.0	0.0	46.7	14.6	49.2	0.4	0.0	0.8
66g-71	12.7	3.5	0.053	55.3	26.5	0.0	0.0	32.1	2.8	38.6	0.0	0.0	2.3
66g-2	5.5	2.9	0.074	41.5	9.4	0.0	0.0	3.6	43.8	9.8	0.4	0.0	0.4
66g-2-2	9.0	3.5	0.038	68.4	19.8	0.0	0.0	13.2	1.9	18.9	0.0	9.0	10.8
66g-23	13.9	3.9	0.026	57.5	27.1	0.0	0.0	23.8	8.3	28.3	0.0	0.0	1.3
66g-5	12.2	3.7	0.034	59.6	21.3	0.0	0.0	22.5	8.8	27.9	0.0	0.0	0.0
66g-6	13.6	3.9	0.022	40.3	21.0	0.0	0.0	24.0	16.3	31.3	0.0	0.0	3.4
66j-17	9.7	3.2	0.071	29.7	5.7	0.0	0.0	54.7	6.1	61.8	0.0	0.0	1.9
66j-25	6.9	3.0	0.078	31.5	14.3	0.0	0.0	38.2	7.1	58.4	1.3	0.0	2.5

Station ID	Marga -lef	Shannon base_e	Simpsons	EPT Pct	Ephem Pct	Amph Pct	Bival Pct	Chiro Pct	Coleo Pct	Dip Pct	Gastro Pct	Iso Pct	NonIn Pct
66j-26	11.5	3.7	0.033	41.8	10.0	0.0	0.0	40.2	7.1	46.9	0.0	0.0	0.4
66j-27	12.6	3.5	0.056	58.3	10.0	0.0	1.7	22.1	7.5	30.4	0.8	0.0	2.5
66j-9	10.8	3.2	0.092	69.2	28.8	0.0	0.4	14.2	9.2	15.4	0.8	0.0	1.3
66j-19	13.7	3.7	0.044	45.8	17.9	0.0	0.0	37.1	2.1	51.3	0.0	0.0	0.0
66j-211	11.6	3.7	0.032	39.5	8.3	0.0	0.5	49.8	3.4	54.1	0.0	0.0	1.5
66j-23	12.4	3.6	0.041	53.8	11.3	0.0	2.1	29.6	4.6	37.1	1.7	0.0	4.6
66j-28	13.0	3.8	0.025	42.1	12.5	0.0	0.8	43.3	4.6	50.4	0.8	0.0	1.7
66j-31	11.5	3.5	0.045	30.4	1.3	0.0	0.4	50.4	9.2	57.9	0.4	0.0	1.3

Station ID	Odon Pct	Pleco Pct	Tanyt Pct	Oligo Pct	Trich Pct	%Chi /TC	%Orth /TC	%Tpod /TC	Hyd2Tri Pct	Hyd2EPT Pct	Tnyt2Chi Pct
66d-38	2.1	17.5	2.1	0.0	23.3	20.8	41.7	37.5	19.6	7.5	20.8
66d-43	1.0	20.4	2.9	1.0	15.0	31.3	64.6	4.2	67.7	16.9	12.5
66d-48	2.1	10.5	1.7	0.0	23.1	17.9	78.6	3.6	50.9	22.2	14.3
66d-49	2.5	6.7	5.8	0.4	13.3	50.0	43.3	6.7	96.9	42.5	10.4
66d-50	2.2	0.4	0.4	0.0	31.4	25.0	75.0	0.0	98.6	63.6	1.2
66d-40	0.4	15.4	5.8	0.8	20.4	51.2	39.0	9.8	46.9	17.6	22.0
66d-41	4.5	24.7	0.5	0.5	20.2	21.1	52.6	21.1	70.0	24.3	5.3
66d-44	0.0	30.4	0.0	0.0	17.0	32.7	63.3	2.0	71.8	23.1	0.0
66d-44-2	0.8	30.8	0.0	0.0	18.8	7.3	80.5	2.4	60.0	18.6	0.0
66d-58	0.0	11.3	0.0	12.5	16.7	47.2	48.0	3.3	77.5	45.6	0.0
66g-30	0.4	0.4	1.3	6.6	26.4	34.0	41.5	14.9	98.3	59.0	3.2
66g-31	0.0	22.0	3.9	1.0	5.9	37.8	35.1	16.2	75.0	6.7	21.6
66g-39	1.7	0.4	16.7	9.6	7.5	78.6	11.5	9.9	55.6	19.6	30.5

Station ID	Odon Pct	Pleco Pct	Tanyt Pct	Oligo Pct	Trich Pct	%Chi /TC	%Orth /TC	%Tpod /TC	Hyd2Tri Pct	Hyd2EPT Pct	Tnyt2Chi Pct
66g-42	0.5	12.1	4.8	1.4	10.6	41.3	47.5	10.0	27.3	6.3	12.5
66g-44	0.9	2.3	23.0	0.9	11.7	42.4	50.0	3.0	92.3	32.9	38.6
66g-65	2.9	0.0	16.3	0.4	10.0	73.2	17.0	8.9	45.8	14.3	34.8
66g-71	0.5	6.0	17.7	2.3	22.8	65.2	18.8	15.9	77.6	31.9	55.1
66g-2	0.4	5.8	0.9	0.0	26.3	28.6	71.4	0.0	84.7	53.8	25.0
66g-2-2	0.0	26.9	4.7	1.9	21.7	42.9	42.9	7.1	4.3	1.4	35.7
66g-23	4.2	10.4	6.7	1.3	20.0	71.9	17.5	8.8	27.1	9.4	28.1
66g-5	2.5	17.9	0.0	0.0	20.4	68.5	25.9	1.9	61.2	21.0	0.0
66g-6	4.7	4.3	12.1	1.7	15.0	62.5	25.0	7.1	85.7	31.9	19.6
66j-17	0.5	13.7	6.1	1.9	10.4	65.5	31.0	3.4	27.3	9.5	11.2
66j-25	0.4	1.3	0.4	0.8	16.0	57.1	40.7	2.2	65.8	33.3	1.1
66j-26	3.8	13.4	1.7	0.0	18.4	13.5	84.4	2.1	63.6	28.0	4.2
66j-27	0.4	10.8	1.3	0.0	37.5	52.8	41.5	3.8	86.7	55.7	5.7
66j-9	3.3	10.0	1.7	0.0	30.4	47.1	41.2	11.8	95.9	42.2	11.8
66j-19	0.8	5.0	1.7	0.0	22.9	20.2	65.2	6.7	90.9	45.5	4.5
66j-211	0.0	13.2	5.4	1.0	18.0	32.4	39.2	28.4	29.7	13.6	10.8
66j-23	0.0	22.5	2.1	0.4	20.0	46.5	49.3	2.8	45.8	17.1	7.0
66j-28	1.3	20.0	5.8	0.0	9.6	44.2	47.1	5.8	21.7	5.0	13.5
66j-31	0.0	2.9	12.9	0.4	26.3	51.2	22.3	21.5	79.4	68.5	25.6

Station ID	Baet2 Eph Pct	CrCh2Chi Pct	Toler Tax	Toler Pct	Intol Tax	Intol Pct	Dom01 Pct	Dom01 Ind	BeckBI	HBI	NCBI	Scrap Pct	Scrap Tax
66d-38	0.0	0.0	4	4.2	19	47.9	13.3	32	35	3.7	3.5	31.3	7
66d-43	0.0	0.0	8	5.3	14	35.0	12.6	26	28	3.7	4.5	20.9	6
66d-48	17.4	0.0	3	2.1	35	53.8	9.7	23	61	3.2	3.2	23.9	7
66d-49	16.0	0.7	15	14.6	12	16.3	8.3	20	27	5.1	5.9	7.9	5
66d-50	86.8	3.6	9	5.8	8	17.3	22.1	50	18	4.3	5.7	4.9	5
66d-40	22.2	0.0	5	2.5	26	46.7	7.9	19	38	3.7	3.4	17.1	6
66d-41	7.7	0.0	5	4.0	22	50.0	9.1	18	40	3.5	3.6	17.2	5
66d-44	8.3	2.0	5	8.7	18	36.5	11.3	26	36	3.8	4.2	13.9	6
66d-44-2	7.7	0.0	0	0.0	23	50.8	15.8	38	38	3.4	3.5	10.4	5
66d-58	0.0	1.6	9	20.8	14	22.9	12.5	30	23	5.3	4.6	0.8	1
66g-30	10.3	10.6	11	20.3	5	4.4	24.2	55	11	6.2	6.5	17.2	4
66g-31	0.0	0.0	5	4.9	11	49.3	27.8	57	18	3.6	4.5	13.7	4
66g-39	46.9	0.0	12	18.8	7	9.6	12.5	30	16	5.9	5.4	9.6	6
66g-42	0.0	0.0	8	5.3	28	47.3	10.6	22	45	3.7	3.6	6.8	5
66g-44	0.0	0.0	10	21.2	10	9.0	15.3	34	20	5.6	6.3	18.0	4
66g-65	30.2	1.8	9	7.9	12	15.4	9.6	23	23	5.2	4.8	4.6	4
66g-71	0.0	0.0	8	6.0	16	11.6	15.8	34	28	5.3	5.3	19.1	4
66g-2	57.1	0.0	1	0.4	9	12.5	16.5	37	19	4.4	4.7	21.0	6
66g-2-2	0.0	0.0	4	11.8	24	54.7	9.9	21	40	3.3	3.3	10.4	3
66g-23	0.0	0.0	3	2.1	34	42.5	8.8	21	51	3.8	3.6	17.5	8
66g-5	2.0	0.0	3	2.1	31	50.0	10.8	26	50	3.7	3.9	18.3	10
66g-6	36.7	1.8	10	11.6	14	21.0	6.4	15	26	4.8	4.6	18.5	7
66j-17	0.0	0.0	4	6.1	15	15.1	19.8	42	27	5.2	5.8	10.8	6
66j-25	14.7	0.0	6	4.2	9	20.6	19.7	47	18	4.7	5.0	17.2	5

Station ID	Baet2 Eph Pct	CrCh2Chi Pct	Toler Tax	Toler Pct	Intol Tax	Intol Pct	Dom01 Pct	Dom01 Ind	BeckBI	HBI	NCBI	Scrap Pct	Scrap Tax
66j-26	4.2	0.0	4	5.9	24	33.1	10.9	26	46	4.0	4.7	9.2	7
66j-27	4.2	11.3	9	6.7	20	27.9	18.3	44	35	4.7	5.0	12.9	10
66j-9	0.0	0.0	5	4.2	15	22.9	25.4	61	28	4.7	5.6	26.7	7
66j-19	0.0	0.0	14	10.8	20	24.6	16.3	39	39	4.7	5.5	16.3	4
66j-211	0.0	0.0	10	16.6	25	34.6	8.3	17	43	4.4	4.5	6.3	5
66j-23	0.0	0.0	7	5.0	23	37.9	12.9	31	39	4.1	4.6	12.1	7
66j-28	0.0	0.0	10	5.0	26	42.1	7.1	17	41	3.8	4.2	10.0	4
66j-31	0.0	3.3	12	14.2	20	24.6	11.3	27	35	5.0	5.1	10.4	6

Station ID	Cllct Pct	Cllct Tax	Pred Pct	Pred Tax	Shred Pct	Shred Tax	Filtr Pct	Filtr Tax	Clngr Tax	Clngr Pct	Brrwr Tax	Clmbr Tax	Sprwl Tax	Swmmr Tax
66d-38	12.5	15	12.1	11	18.3	8	22.5	6	18	44.2	8	1	10	1
66d-43	16.0	13	3.9	7	21.4	6	30.1	12	20	44.2	3	2	13	1
66d-48	23.5	18	11.8	17	12.6	8	23.1	11	35	64.7	6	0	11	3
66d-49	29.2	27	8.8	12	11.3	5	22.9	10	18	34.6	16	3	13	1
66d-50	46.9	16	3.5	5	3.1	3	38.5	8	15	44.7	5	2	9	2
66d-40	17.1	20	19.6	17	8.3	9	29.6	12	32	64.2	9	1	11	3
66d-41	10.6	11	25.3	19	14.1	8	26.8	8	23	69.7	8	2	7	2
66d-44	14.8	15	10.0	12	33.9	8	25.2	9	22	40.0	6	0	11	1
66d-44-2	17.9	15	10.0	13	32.1	10	28.3	6	19	59.6	8	0	10	1
66d-58	37.9	19	6.3	12	14.2	4	19.6	6	15	21.7	6	1	11	1
66g-30	35.7	18	8.4	5	1.8	4	30.0	8	11	46.3	6	1	13	0
66g-31	10.7	12	11.2	5	1.0	1	14.6	11	17	25.9	3	0	10	1
66g-39	30.4	18	9.2	10	2.5	3	22.9	14	20	27.1	7	4	9	3

Station ID	Cllct Pct	Cllct Tax	Pred Pct	Pred Tax	Shred Pct	Shred Tax	Filtr Pct	Filtr Tax	Clngr Tax	Clngr Pct	Brrwr Tax	Clmbr Tax	Sprwl Tax	Swmmr Tax
66g-42	41.1	19	21.7	17	2.4	4	20.3	11	30	53.1	2	1	15	0
66g-44	34.7	17	4.1	6	2.7	4	34.7	8	11	36.0	4	1	13	1
66g-65	35.0	20	6.3	8	4.2	2	32.1	11	16	24.2	3	6	8	3
66g-71	13.5	20	13.5	13	6.0	9	36.7	13	21	45.6	6	0	16	1
66g-2	16.1	5	14.3	10	0.4	1	29.0	7	19	79.9	4	0	1	0
66g-2-2	28.3	16	8.0	8	33.0	10	3.3	5	14	26.4	6	0	10	1
66g-23	27.5	24	11.3	17	12.1	9	14.6	6	28	46.7	11	1	14	2
66g-5	20.8	22	12.1	14	13.8	8	26.7	7	28	57.5	7	1	10	2
66g-6	21.0	22	18.5	16	1.3	3	20.2	11	31	52.4	9	1	10	4
66j-17	21.7	14	9.0	8	16.5	3	38.7	15	25	55.2	4	1	11	0
66j-25	21.8	16	1.3	3	1.3	2	45.4	8	16	65.1	5	1	9	2
66j-26	36.0	21	10.9	11	23.8	11	14.2	5	21	31.0	5	1	19	2
66j-27	16.7	21	3.8	9	5.4	5	45.4	14	30	62.1	8	2	11	1
66j-9	9.6	16	7.1	9	9.6	7	35.8	9	18	62.1	7	4	16	1
66j-19	30.0	32	6.3	11	7.9	8	32.5	10	18	52.5	9	3	20	0
66j-211	31.7	18	23.4	16	15.6	8	18.5	9	26	41.5	5	0	18	2
66j-23	17.5	19	12.1	14	25.8	12	30.0	12	24	40.4	8	1	13	1
66j-28	31.3	24	7.1	12	22.9	15	15.4	9	12	25.8	7	3	22	4
66j-31	19.6	21	14.2	8	4.2	7	46.7	15	20	54.2	5	1	15	0

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Station ID	Sub-ecoregion	Condition	Total Tax	EPT Tax	Ephem Tax	Pleco Tax	Trich Tax	Coleo Tax	Dip Tax	Chiro Tax	Tanyt Tax	Even-ness
67f&I-1	67f&I	Impaired	38	4	3	0	1	1	17	16	4	0.579
67f&I-11	67f&I	Impaired	71	7	1	0	6	4	43	39	3	0.668
67f&I-20	67f&I	Impaired	44	3	1	0	2	4	28	21	1	0.577
67f&i-33	67f&I	Impaired	31	4	0	0	4	5	14	7	0	0.307
67f&I-5	67f&I	Impaired	44	5	1	0	4	2	26	21	4	0.546
67f&i-16	67f&I	Reference	47	14	4	6	4	3	23	17	1	0.563
67f&i-17	67f&I	Reference	56	11	4	6	1	5	35	29	6	0.569
67f&i-25	67f&I	Reference	72	15	4	3	8	8	35	27	7	0.643
67f&i-27	67f&I	Reference	47	6	1	0	5	7	26	23	3	0.573
67f&i-37	67f&I	Reference	58	17	8	3	6	4	27	24	6	0.637
67g-1	67g	Impaired	38	8	4	0	4	5	14	7	0	0.534
67g-19	67g	Impaired	54	11	5	0	6	7	27	23	6	0.593
67g-6	67g	Impaired	29	9	3	3	3	3	11	9	2	0.422
67g-7	67g	Impaired	51	6	4	0	2	15	16	14	1	0.531
67g-9	67g	Impaired	59	4	1	0	3	5	36	30	7	0.647
67g-2	67g	Ref/Removed	58	1	0	0	1	6	33	25	1	0.656
67g-11	67g	Reference	55	21	7	6	8	5	24	17	2	0.573
67g-12	67g	Reference	62	8	4	2	2	7	39	34	8	0.676
67g-13	67g	Reference	40	11	3	5	3	1	23	19	2	0.432
67g-15	67g	Reference	45	4	2	0	2	6	24	18	0	0.488
67h-5	67h	Impaired	75	27	7	7	13	5	30	21	5	0.680
67h-8	67h	Impaired	50	18	5	1	12	1	25	16	2	0.580
67h-2	67h	Reference	68	24	10	3	11	5	28	19	4	0.608

Station ID	**Sub-ecoregion**	**Condition**	Total Tax	EPT Tax	Ephem Tax	Pleco Tax	Trich Tax	Coleo Tax	Dip Tax	Chiro Tax	Tanyt Tax	Even-ness
67h-3	67h	Reference	44	14	9	3	2	3	19	17	3	0.506
67h-4	67h	Reference	39	18	6	4	8	3	12	9	0	0.557
67h-9	67h	Reference	46	22	8	8	6	3	16	9	1	0.468

Station ID	Marga-lef	Shannon base_e	Simpsons	EPT Pct	Ephem Pct	Amph Pct	Bival Pct	Chiro Pct	Coleo Pct	Dip Pct	Gastro Pct	Iso Pct	NonIn Pct
67f&l-1	6.9	3.1	0.062	5.8	4.8	0.0	3.9	54.6	0.5	55.6	4.3	0.5	23.2
67f&l-11	12.8	3.7	0.048	3.3	0.4	2.9	2.1	35.4	16.3	42.9	18.8	5.4	31.7
67f&l-20	7.8	3.2	0.063	4.2	0.4	4.2	17.5	30.8	4.6	42.1	6.7	7.5	48.3
67f&i-33	5.5	1.7	0.439	3.4	0.0	0.4	1.3	8.1	4.3	15.0	65.8	6.4	77.4
67f&l-5	7.8	3.0	0.082	11.7	4.6	0.4	0.0	43.3	17.5	45.8	14.6	0.0	19.2
67f&i-16	8.4	3.1	0.077	50.0	10.0	0.4	0.0	14.6	2.1	39.6	1.3	3.8	6.3
67f&i-17	10.0	3.1	0.086	22.5	19.2	0.0	3.8	27.5	9.6	51.3	11.3	0.0	15.8
67f&i-25	13.0	3.5	0.057	17.9	5.8	0.4	0.4	27.5	15.8	40.0	18.8	0.0	21.3
67f&i-27	8.4	3.1	0.066	42.5	6.3	0.0	0.0	29.6	9.2	38.8	2.1	4.2	7.5
67f&i-37	10.4	3.5	0.044	34.2	24.6	0.8	0.0	25.8	12.1	28.8	11.7	4.2	21.3
67g-1	7.0	2.8	0.102	17.3	4.2	0.0	21.5	12.0	14.7	18.8	22.0	0.5	45.0
67g-19	9.7	3.2	0.065	25.4	8.8	0.0	0.4	29.2	18.3	33.3	17.9	0.4	18.8
67g-6	5.2	2.3	0.155	32.9	1.4	1.9	0.0	16.2	19.0	17.1	1.4	26.4	31.0
67g-7	9.3	2.9	0.138	44.7	43.4	0.5	0.0	13.7	22.8	14.6	1.8	4.6	13.7
67g-9	10.6	3.5	0.037	2.9	1.3	0.8	11.7	57.9	4.6	62.5	1.3	7.5	22.1
67g-2	10.4	3.6	0.038	4.2	0.0	0.0	6.4	43.2	17.4	51.3	5.5	2.5	14.4
67g-11	9.9	3.1	0.083	34.2	4.2	0.8	0.0	25.8	7.1	30.8	22.5	0.0	26.7
67g-12	11.4	3.6	0.040	10.6	4.8	0.5	2.9	57.7	9.1	61.1	13.5	0.0	18.3

Station ID	Marga -lef	Shannon base_e	Simpsons	EPT Pct	Ephem Pct	Amph Pct	Bival Pct	Chiro Pct	Coleo Pct	Dip Pct	Gastro Pct	Iso Pct	NonIn Pct
67g-13	7.1	2.4	0.230	16.3	3.3	1.3	0.0	25.4	0.8	72.9	7.5	0.0	9.2
67g-15	8.0	2.7	0.150	3.3	2.1	35.8	2.1	27.9	5.0	31.3	0.8	11.3	58.3
67h-5	13.5	3.7	0.036	40.4	15.0	0.0	0.0	22.1	11.3	28.8	0.0	11.3	11.7
67h-8	9.2	3.1	0.075	38.9	5.9	1.0	0.0	27.1	0.5	42.4	0.0	15.8	17.7
67h-2	12.2	3.3	0.083	32.9	12.5	0.0	0.4	15.4	3.8	33.8	24.2	0.0	25.8
67h-3	7.9	2.7	0.142	30.0	24.7	0.0	0.0	17.2	1.3	28.6	34.4	0.0	37.4
67h-4	7.2	2.9	0.097	42.7	7.8	0.0	0.0	7.8	5.7	18.8	27.1	2.6	30.7
67h-9	8.3	2.5	0.166	28.8	9.4	0.0	0.0	7.3	3.9	45.1	21.0	0.0	21.5

Station ID	Odon Pct	Pleco Pct	Tanyt Pct	Oligo Pct	Trich Pct	%Chi /TC	%Orth /TC	%Tpod /TC	Hyd2Tri Pct	Hyd2E PT Pct	Tnyt2Chi Pct
67f&I-1	15.0	0.0	12.6	10.6	1.0	91.2	0.0	8.8	100.0	16.7	23.0
67f&I-11	5.0	0.0	1.7	1.7	2.9	28.2	42.4	23.5	28.6	25.0	4.7
67f&I-20	0.8	0.0	0.8	8.8	3.8	29.7	45.9	23.0	0.0	0.0	2.7
67f&i-33	0.0	0.0	0.0	3.0	3.4	26.3	47.4	26.3	87.5	87.5	0.0
67f&I-5	5.4	0.0	7.1	1.3	7.1	45.2	50.0	4.8	41.2	25.0	16.3
67f&i-16	0.0	31.7	0.8	0.8	8.3	17.1	62.9	20.0	5.0	0.8	2.9
67f&i-17	0.0	2.9	5.8	0.8	0.4	33.3	43.9	12.1	0.0	0.0	21.2
67f&i-25	2.5	1.3	5.8	0.4	10.8	54.5	33.3	12.1	34.6	20.9	21.2
67f&i-27	2.1	0.0	2.1	0.8	36.3	22.5	71.8	2.8	50.6	43.1	5.6
67f&i-37	3.8	1.7	10.4	4.2	7.9	71.0	22.6	6.5	36.8	8.5	40.3
67g-1	3.1	0.0	0.0	0.5	13.1	78.3	8.7	13.0	92.0	69.7	0.0
67g-19	1.3	0.0	8.8	0.0	16.7	60.0	15.7	24.3	32.5	21.3	30.0
67g-6	0.0	29.6	1.4	0.9	1.9	71.4	28.6	0.0	75.0	4.2	8.6

Station ID	Odon Pct	Pleco Pct	Tanyt Pct	Oligo Pct	Trich Pct	%Chi /TC	%Orth /TC	%Tpod /TC	Hyd2Tri Pct	Hyd2E PT Pct	Tnyt2Chi Pct
67g-7	3.2	0.0	0.5	6.4	1.4	80.0	16.7	3.3	0.0	0.0	3.3
67g-9	7.1	0.0	11.7	0.0	1.7	82.0	0.7	15.8	50.0	28.6	20.1
67g-2	12.3	0.0	0.8	0.0	4.2	76.5	3.9	19.6	0.0	0.0	2.0
67g-11	1.3	4.6	2.1	3.3	25.4	51.6	33.9	14.5	27.9	20.7	8.1
67g-12	1.0	4.3	14.9	1.0	1.4	59.2	27.5	12.5	33.3	4.5	25.8
67g-13	0.8	10.4	2.9	0.0	2.5	14.8	62.3	3.3	0.0	0.0	11.5
67g-15	2.1	0.0	0.0	7.9	1.3	11.9	82.1	4.5	0.0	0.0	0.0
67h-5	3.8	4.2	5.8	0.0	21.3	86.8	13.2	0.0	58.8	30.9	26.4
67h-8	0.0	11.3	1.0	1.0	21.7	69.1	18.2	12.7	4.5	2.5	3.6
67h-2	2.9	2.5	2.1	1.3	17.9	64.9	27.0	8.1	9.3	5.1	13.5
67h-3	1.8	4.0	2.2	1.3	1.3	61.5	15.4	23.1	0.0	0.0	12.8
67h-4	2.1	12.0	0.0	0.5	22.9	53.3	40.0	6.7	34.1	18.3	0.0
67h-9	0.0	11.2	0.4	0.4	8.2	52.9	35.3	11.8	5.3	1.5	5.9

Station ID	Baet2 Eph Pct	CrCh2 Chi Pct	Toler Tax	Toler Pct	Intol Tax	Intol Pct	Dom01 Pct	Dom01 Ind	BeckBI	HBI	NCBI	Scrap Pct	Scrap Tax
67f&I-1	0.0	4.4	18	50.2	2	4.3	15.9	33	3	6.9	7.2	4.8	3
67f&I-11	0.0	4.7	24	24.2	4	20.0	17.9	43	12	5.7	5.0	19.2	4
67f&I-20	0.0	8.1	21	45.8	4	8.8	17.5	42	6	6.9	7.1	17.9	5
67f&i-33	0.0	0.0	9	12.0	4	68.8	65.8	154	9	3.7	3.2	65.8	1
67f&I-5	100.0	0.0	13	15.4	4	20.4	17.9	43	9	5.4	5.2	29.2	3
67f&i-16	62.5	2.9	12	13.8	8	46.7	17.9	43	17	4.1	3.9	12.1	5
67f&i-17	0.0	0.0	11	8.8	11	40.4	19.6	47	19	4.2	4.4	19.6	5
67f&i-25	0.0	0.0	15	10.0	19	46.7	17.9	43	30	4.0	3.7	39.6	7

Station ID	Baet2 Eph Pct	CrCh2 Chi Pct	Toler Tax	Toler Pct	Intol Tax	Intol Pct	Dom01 Pct	Dom01 Ind	BeckBI	HBI	NCBI	Scrap Pct	Scrap Tax
67f&i-27	0.0	49.3	12	24.6	5	19.6	17.1	41	13	5.4	4.9	13.8	6
67f&i-37	0.0	0.0	13	13.8	10	22.5	11.3	27	21	4.9	4.8	27.5	7
67g-1	0.0	0.0	10	25.7	5	30.4	22.0	42	8	5.3	5.5	30.9	5
67g-19	38.1	2.9	10	7.5	10	40.0	17.9	43	16	4.6	4.1	34.2	6
67g-6	0.0	0.0	5	30.1	6	31.5	26.4	57	11	5.0	5.1	18.5	4
67g-7	1.1	0.0	20	63.9	4	5.9	34.7	76	9	6.9	7.4	13.2	10
67g-9	0.0	0.0	20	35.0	5	2.9	9.2	22	8	7.0	7.1	5.4	6
67g-2	0.0	1.0	21	25.8	5	10.2	11.4	27	6	6.3	6.1	14.0	6
67g-11	40.0	1.6	11	11.7	15	50.4	22.5	54	28	4.0	4.1	34.6	10
67g-12	0.0	2.5	18	23.1	10	22.1	13.5	28	16	5.6	6.2	25.5	8
67g-13	62.5	11.5	11	15.4	10	63.8	46.3	111	18	3.9	3.6	8.8	3
67g-15	20.0	1.5	22	74.2	2	1.3	35.0	84	10	7.3	7.9	6.7	4
67h-5	0.0	0.0	10	18.3	23	29.6	11.3	27	42	4.6	3.7	15.0	4
67h-8	16.7	0.0	17	37.9	10	18.2	16.3	33	20	5.6	5.5	4.4	4
67h-2	23.3	0.0	12	7.1	21	61.3	23.8	57	38	3.4	3.2	37.1	12
67h-3	28.6	5.1	11	9.3	11	59.9	34.4	78	18	3.8	4.6	42.7	7
67h-4	66.7	0.0	7	7.8	15	65.6	27.1	52	25	3.2	3.4	36.5	6
67h-9	68.2	0.0	6	3.4	24	73.8	33.9	79	40	3.0	2.9	24.9	7

Station ID	Cllct Pct	Cllct Tax	Pred Pct	Pred Tax	Shred Pct	Shred Tax	Filtr Pct	Filtr Tax	Clngr Tax	Clngr Pct	Brrwr Tax	Clmbr Tax	Sprwl Tax	Swmr Tax
67f&l-1	60.9	14	15.9	9	1.0	1	5.3	4	6	22.7	7	2	6	0
67f&l-11	41.7	29	13.8	15	4.2	5	6.3	8	8	10.8	9	4	15	0
67f&l-20	40.8	16	13.3	12	1.3	1	23.3	5	4	9.2	11	2	10	2

Station ID	Cllct Pct	Cllct Tax	Pred Pct	Pred Tax	Shred Pct	Shred Tax	Filtr Pct	Filtr Tax	Clngr Tax	Clngr Pct	Brrwr Tax	Clmbr Tax	Sprwl Tax	Swmr Tax
67f&i-33	15.4	10	3.8	3	1.3	3	8.1	7	7	8.1	5	1	4	0
67f&I-5	33.8	14	7.5	8	3.8	3	15.0	9	11	31.7	4	3	10	2
67f&i-16	17.9	18	9.2	6	27.9	8	23.8	4	12	32.1	3	0	15	0
67f&i-17	21.3	20	5.4	9	2.5	4	30.8	10	14	36.3	3	1	17	0
67f&i-25	21.3	21	10.0	18	1.3	2	16.3	15	24	45.0	10	1	10	1
67f&i-27	13.3	17	4.6	6	7.9	2	44.2	8	14	58.3	5	1	7	1
67f&i-37	32.9	23	5.4	8	6.7	8	20.4	7	14	26.7	9	5	13	1
67g-1	29.8	10	5.2	7	2.6	3	15.7	6	13	29.3	7	1	4	0
67g-19	18.3	18	10.0	11	1.3	1	26.3	11	19	39.6	3	1	14	2
67g-6	35.2	9	0.9	2	29.2	2	4.2	7	11	23.1	0	1	6	1
67g-7	61.6	15	6.8	11	5.9	5	5.5	3	14	18.3	5	4	7	3
67g-9	25.8	18	15.4	13	9.6	2	20.8	8	6	3.3	10	4	10	3
67g-2	39.8	16	20.3	17	7.2	3	5.9	4	7	23.7	9	5	13	1
67g-11	19.6	20	7.5	9	3.3	5	22.1	5	15	34.2	5	0	9	2
67g-12	29.8	22	6.7	8	6.7	5	16.3	7	14	29.3	7	0	16	0
67g-13	24.2	15	0.8	2	8.3	5	50.8	7	9	53.8	1	0	9	1
67g-15	78.8	25	5.8	7	1.3	3	6.3	4	5	3.8	8	1	10	1
67h-5	19.6	15	15.4	23	7.9	10	27.5	14	31	47.5	10	3	12	1
67h-8	26.6	16	8.4	10	13.8	5	33.0	11	19	42.9	7	1	10	1
67h-2	12.5	18	10.4	18	5.4	6	24.6	8	22	36.7	7	2	11	2
67h-3	21.1	8	7.9	10	2.2	3	17.6	4	17	33.5	6	1	4	2
67h-4	11.5	11	9.9	8	20.8	8	19.3	5	15	33.3	6	0	8	0
67h-9	13.3	13	6.9	10	14.6	8	37.8	5	18	48.1	6	0	7	2

Southwestern Appalachians – Ecoregion 68

Station ID	**Sub-ecoregion**	**Condition**	Total Tax	EPT Tax	Ephem Tax	Pleco Tax	Trich Tax	Coleo Tax	Dip Tax	Chiro Tax	Tanyt Tax	Evenness
68c&d-1	68c&d	Impaired	36	13	6	1	6	2	16	13	2	0.481
68c&d-10	68c&d	Impaired	54	9	1	1	7	9	24	20	1	0.695
68c&d-3	68c&d	Impaired	53	3	0	0	3	6	31	26	5	0.598
68c&d-7	68c&d	Impaired	51	10	2	2	6	7	30	25	2	0.622
68c&d-8	68c&d	Impaired	68	26	5	10	11	0	38	32	7	0.616
68c&d-4	68c&d	Reference	34	9	2	3	4	3	16	11	2	0.402
68c&d-5	68c&d	Reference	65	19	7	4	8	2	39	28	5	0.670
68c&d-6	68c&d	Reference	45	17	6	4	7	0	23	19	6	0.541
68c&d-9	68c&d	Reference	22	8	3	4	1	1	10	9	1	0.368

Station ID	Marga-lef	Shannon base_e	Simpsons	EPT Pct	Ephem Pct	Amph Pct	Bival Pct	Chiro Pct	Coleo Pct	Dip Pct	Gastro Pct	Iso Pct	NonIn Pct
68c&d-1	6.4	2.6	0.124	76.7	35.8	0.0	0.0	8.8	7.9	10.0	0.0	2.1	4.6
68c&d-10	10.1	3.6	0.030	11.8	1.6	0.0	0.0	44.4	10.2	51.3	8.6	0.0	9.1
68c&d-3	9.5	3.3	0.066	2.1	0.0	0.0	4.2	60.4	7.5	68.8	3.8	0.0	9.2
68c&d-7	9.1	3.4	0.047	26.7	15.4	0.0	0.8	46.7	8.3	52.5	0.0	0.4	6.7
68c&d-8	12.2	3.4	0.082	34.6	10.4	0.0	0.0	25.0	0.0	38.3	0.0	25.4	26.3
68c&d-4	6.0	2.2	0.222	11.3	2.9	0.0	2.1	10.8	2.9	40.0	39.2	0.0	42.9
68c&d-5	11.9	3.6	0.044	21.8	9.7	0.0	5.1	46.3	1.4	69.0	0.0	0.0	6.5
68c&d-6	8.1	3.0	0.100	22.9	6.8	0.4	0.0	29.2	0.0	55.1	0.0	20.3	21.6
68c&d-9	3.8	2.0	0.226	20.4	11.3	0.4	0.0	73.3	0.4	73.8	0.0	0.0	5.0

Station ID	Odon Pct	Pleco Pct	Tanyt Pct	Oligo Pct	Trich Pct	%Chi /TC	%Orth /TC	%Tpod /TC	Hyd2Tri Pct	Hyd2EPT Pct	Tnyt2Chi Pct
68c&d-1	0.0	0.4	1.7	2.1	40.4	23.8	66.7	9.5	99.0	52.2	19.0
68c&d-10	12.3	1.1	2.1	0.0	9.1	53.0	20.5	19.3	88.2	68.2	4.8
68c&d-3	6.3	0.0	4.6	1.3	2.1	82.1	2.8	14.5	0.0	0.0	7.6
68c&d-7	5.8	5.4	4.2	5.4	5.8	42.9	36.6	19.6	0.0	0.0	8.9
68c&d-8	0.4	14.2	5.0	0.8	10.0	55.0	23.3	18.3	41.7	12.0	20.0
68c&d-4	2.9	2.9	0.8	1.7	5.4	19.2	65.4	15.4	0.0	0.0	7.7
68c&d-5	0.0	4.2	3.7	0.9	7.9	68.0	18.0	14.0	11.8	4.3	8.0
68c&d-6	0.0	5.9	12.3	0.4	10.2	85.5	8.7	5.8	4.2	1.9	42.0
68c&d-9	0.0	6.3	0.4	4.6	2.9	4.0	95.5	0.6	0.0	0.0	0.6

Station ID	Baet2 Eph Pct	CrCh2 Chi Pct	Toler Tax	Toler Pct	Intol Tax	Intol Pct	Dom01 Pct	Dom01 Ind	Beck BI	HBI	NCBI	Scrap Pct	Scrap Tax
68c&d-1	5.8	0.0	4	12.5	8	17.5	26.7	64	19	4.9	5.3	11.3	3
68c&d-10	0.0	1.2	13	24.6	8	9.1	8.6	16	14	6.2	6.3	12.3	4
68c&d-3	0.0	2.1	19	28.8	1	0.4	19.6	47	4	6.9	7.6	4.2	3
68c&d-7	97.3	0.0	17	25.0	7	12.9	15.0	36	14	5.7	5.5	2.5	2
68c&d-8	8.0	0.0	12	30.4	23	25.8	25.4	61	42	4.8	4.9	3.3	3
68c&d-4	71.4	0.0	6	4.6	11	80.0	39.2	94	21	3.0	2.9	43.3	5
68c&d-5	33.3	0.0	14	16.7	19	39.4	15.3	33	35	4.7	4.1	6.9	7
68c&d-6	18.8	0.0	8	28.4	19	50.0	22.0	52	32	4.4	4.5	7.6	4
68c&d-9	0.0	0.0	6	18.8	6	15.4	42.5	102	12	5.2	5.9	0.4	1

Station ID	Cllct Pct	Cllct Tax	Pred Pct	Pred Tax	Shred Pct	Shred Tax	Filtr Pct	Filtr Tax	Clngr Tax	Clngr Pct	Brrwr Tax	Clmbr Tax	Sprwl Tax	Swmmr Tax
68c&d-1	24.2	15	2.9	7	0.4	1	60.4	8	12	52.9	1	0	6	3
68c&d-10	24.1	11	26.2	17	2.1	3	12.3	8	15	18.7	10	3	9	3
68c&d-3	36.7	16	20.8	17	8.8	7	2.9	2	7	7.1	11	7	11	1
68c&d-7	48.3	19	16.3	12	12.9	7	6.3	3	8	11.3	5	4	11	3
68c&d-8	44.2	23	10.8	12	7.5	7	24.6	14	22	32.5	5	2	18	3
68c&d-4	12.1	10	7.9	8	1.7	2	30.0	4	8	32.9	4	1	10	0
68c&d-5	25.9	21	15.3	14	6.0	8	30.1	5	16	36.1	14	0	14	1
68c&d-6	37.7	16	10.2	11	9.3	4	24.6	4	12	36.0	6	0	8	2
68c&d-9	86.7	9	5.4	6	3.3	2	0.0	0	2	0.8	0	0	6	3

Southern Coastal Plain – Ecoregion 75

Station ID	Sub-ecoregion	Condition	Total Tax	EPT Tax	Ephem Tax	Pleco Tax	Trich Tax	Coleo Tax	Dip Tax	Chiro Tax	Tanyt Tax	Even-ness
75e-20	75e	Impaired	31	0	0	0	0	5	21	15	1	0.349
75e-3	75e	Impaired	25	1	0	0	1	2	12	10	0	0.417
75e-36	75e	Impaired	23	2	1	0	1	4	11	9	2	0.356
75e-46	75e	Impaired	26	0	0	0	0	2	13	12	0	0.341
75e-54	75e	Impaired	68	15	6	0	9	4	39	36	10	0.660
75e-23	75e	Reference	11	1	0	0	1	1	6	5	0	0.184
75e-59	75e	Reference	31	4	1	0	3	5	18	13	2	0.443
75e-60	75e	Reference	36	2	1	0	1	5	22	16	0	0.508
75e-69	75e	Reference	12	0	0	0	0	2	7	5	0	0.222
75e-78	75e	Reference	15	0	0	0	0	1	10	9	0	0.328

Station ID	Sub-ecoregion	Condition	Total Tax	EPT Tax	Ephem Tax	Pleco Tax	Trich Tax	Coleo Tax	Dip Tax	Chiro Tax	Tanyt Tax	Even-ness
75f-127	75f	Impaired	33	3	1	0	2	1	23	20	4	0.570
75f-137	75f	Impaired	21	1	1	0	0	2	14	11	4	0.262
75f-44	75f	Impaired	18	0	0	0	0	0	13	10	0	0.482
75f-45	75f	Impaired	12	0	0	0	0	1	4	4	0	0.402
75f-50	75f	Impaired	17	0	0	0	0	2	6	4	0	0.394
75f-124	75f	Reference	20	0	0	0	0	0	9	7	0	0.346
75f-126	75f	Reference	16	0	0	0	0	2	8	3	0	0.297
75f-61	75f	Reference	10	0	0	0	0	1	5	5	0	0.216
75f-91	75f	Reference	13	0	0	0	0	0	12	12	0	0.216
75f-95	75f	Reference	16	0	0	0	0	1	12	11	1	0.358
75h-1	75h	Impaired	28	0	0	0	0	4	17	14	1	0.415
75h-41	75h	Impaired	19	0	0	0	0	2	12	9	1	0.347
75h-47	75h	Impaired	25	0	0	0	0	2	16	13	2	0.417
75h-69	75h	Impaired	7	0	0	0	0	1	1	1	0	0.555
75h-70	75h	Impaired	35	1	1	0	0	3	22	20	5	0.445
75h-72	75h	Impaired	12	0	0	0	0	4	0	0	0	0.156
75h-10	75h	Reference	18	3	0	0	3	2	9	7	0	0.293
75h-35	75h	Reference	13	0	0	0	0	1	10	8	0	0.290
75h-45	75h	Reference	16	0	0	0	0	2	13	13	0	0.225
75h-60	75h	Reference	40	4	2	0	2	6	17	13	0	0.545
75h-66	75h	Reference	50	6	1	0	5	6	25	24	2	0.566
75j-11	75j	Impaired	19	0	0	0	0	2	9	8	1	0.404
75j-12	75j	Impaired	20	1	0	0	1	0	12	10	0	0.390
75j-13	75j	Impaired	38	0	0	0	0	3	30	28	8	0.519
75j-2	75j	Impaired	30	1	1	0	0	3	21	17	1	0.486

Station ID	**Sub-ecoregion**	**Condition**	Total Tax	EPT Tax	Ephem Tax	Pleco Tax	Trich Tax	Coleo Tax	Dip Tax	Chiro Tax	Tanyt Tax	Even-ness
75j-21	75j	Impaired	17	0	0	0	0	0	10	10	1	0.411
75j-23	75j	Impaired	16	0	0	0	0	0	7	7	1	0.341
75j-24	75j	Impaired	13	0	0	0	0	2	4	4	0	0.258
75j-3	75j	Impaired	14	0	0	0	0	0	3	2	1	0.201
75j-3-1	75j	Impaired	18	0	0	0	0	0	8	7	1	0.194
75j-4	75j	Impaired	9	0	0	0	0	0	8	3	0	0.131
75j-29	75j	Ref/Removed	8	0	0	0	0	1	1	1	0	0.122
75j-10	75j	Reference	17	0	0	0	0	3	9	7	0	0.222
75j-15	75j	Reference	23	0	0	0	0	2	15	11	0	0.361
75j-16	75j	Reference	6	0	0	0	0	0	3	3	0	0.039
75j-25	75j	Reference	26	0	0	0	0	3	14	12	2	0.418
75j-26	75j	Reference	28	1	1	0	0	4	15	13	2	0.451
75j-31	75j	Reference	35	2	0	0	2	3	17	12	1	0.482
75j-37	75j	Reference	18	0	0	0	0	0	14	13	0	0.375
75j-41	75j	Reference	11	0	0	0	0	0	6	5	0	0.241
75j-5	75j	Reference	9	0	0	0	0	0	5	4	0	0.582

Station ID	Marga-lef	Shannon base_e	Simpsons	EPT Pct	Ephem Pct	Amph Pct	Bival Pct	Chiro Pct	Coleo Pct	Dip Pct	Gastro Pct	Iso Pct	NonIn Pct
75e-20	5.5	1.9	0.336	0.0	0.0	3.8	0.0	70.0	6.7	78.8	0.0	0.0	13.3
75e-3	4.4	2.3	0.175	0.4	0.0	1.3	0.0	34.6	5.4	35.8	0.8	12.5	57.9
75e-36	4.1	1.9	0.249	5.4	4.5	0.9	0.0	15.8	2.3	18.9	0.0	55.0	72.5
75e-46	4.6	1.8	0.335	0.0	0.0	0.0	4.9	24.4	0.9	26.2	56.4	0.9	71.1
75e-54	12.2	3.6	0.043	18.3	11.7	4.2	0.0	45.0	7.9	50.0	0.0	13.3	19.6

Station ID	Marga -lef	Shannon base_e	Simpsons	EPT Pct	Ephem Pct	Amph Pct	Bival Pct	Chiro Pct	Coleo Pct	Dip Pct	Gastro Pct	Iso Pct	NonIn Pct
75e-23	1.9	1.0	0.579	0.5	0.0	1.0	0.0	89.1	1.0	89.6	0.0	6.8	8.9
75e-59	5.5	2.4	0.170	4.8	2.2	4.3	0.0	70.1	7.8	73.2	0.0	8.7	13.9
75e-60	6.4	2.8	0.099	5.4	5.0	2.5	0.0	40.0	32.5	42.9	0.0	12.1	15.4
75e-69	2.1	1.2	0.442	0.0	0.0	1.7	0.0	91.2	1.1	92.3	0.0	4.4	6.1
75e-78	2.6	1.8	0.222	0.0	0.0	2.5	0.0	79.6	2.1	80.0	0.0	15.0	17.9
75f-127	6.1	3.0	0.066	7.5	4.3	12.4	1.1	52.2	1.6	64.5	0.0	3.8	26.3
75f-137	3.6	1.4	0.476	2.5	2.5	4.2	0.0	18.8	1.7	22.1	0.0	68.3	72.5
75f-44	3.7	2.2	0.148	0.0	0.0	0.0	0.0	71.0	0.0	77.0	11.0	0.0	22.0
75f-45	2.3	1.9	0.221	0.0	0.0	0.0	16.4	10.9	5.5	10.9	21.8	0.0	82.7
75f-50	3.0	2.1	0.155	0.0	0.0	0.0	30.5	4.0	1.3	15.0	26.5	0.0	81.9
75f-124	3.5	1.9	0.277	0.0	0.0	13.3	0.0	23.3	0.0	25.4	0.0	7.9	74.6
75f-126	2.8	1.6	0.290	0.0	0.0	8.1	0.4	73.1	1.8	77.1	0.0	3.6	21.1
75f-61	1.7	1.1	0.451	0.0	0.0	1.1	0.0	7.6	0.5	7.6	2.7	88.0	91.8
75f-91	2.2	1.2	0.528	0.0	0.0	0.0	0.0	99.5	0.0	99.5	0.0	0.5	0.5
75f-95	2.8	1.9	0.209	0.0	0.0	0.5	0.0	59.9	0.5	60.8	0.0	34.4	38.7
75h-1	4.9	2.3	0.174	0.0	0.0	19.2	0.0	31.3	2.9	33.8	0.0	2.5	63.3
75h-41	3.4	1.8	0.296	0.0	0.0	2.0	0.0	27.0	3.4	29.9	0.0	10.8	66.7
75h-47	4.4	2.3	0.150	0.0	0.0	2.5	0.0	33.8	7.5	41.7	0.0	3.8	50.4
75h-69	2.0	1.7	0.176	0.0	0.0	4.8	0.0	9.5	4.8	9.5	0.0	0.0	81.0
75h-70	6.3	2.4	0.187	3.1	3.1	0.4	0.0	34.2	16.4	35.6	0.0	40.0	40.4
75h-72	2.2	0.8	0.705	0.0	0.0	1.3	0.0	0.0	9.7	0.0	1.3	1.9	90.3
75h-10	3.2	1.6	0.345	3.2	0.0	2.7	0.0	84.0	1.4	84.5	0.5	3.7	11.0
75h-35	2.2	1.6	0.278	0.0	0.0	0.0	0.0	73.7	0.4	97.9	0.0	0.0	1.7
75h-45	2.8	1.2	0.535	0.0	0.0	3.0	0.0	92.1	4.9	92.1	0.0	0.0	3.0
75h-60	7.1	3.0	0.075	21.3	19.6	11.7	3.8	30.8	9.2	37.1	0.8	7.5	29.6

Station ID	Marga -lef	Shannon base_e	Simpsons	EPT Pct	Ephem Pct	Amph Pct	Bival Pct	Chiro Pct	Coleo Pct	Dip Pct	Gastro Pct	Iso Pct	NonIn Pct
75h-66	8.9	3.1	0.075	5.8	3.3	0.4	2.5	66.7	11.7	67.1	1.7	0.8	6.3
75j-11	3.4	2.1	0.185	0.0	0.0	1.0	2.1	34.5	2.6	35.6	1.0	13.9	57.7
75j-12	3.5	2.1	0.165	7.1	0.0	12.1	0.0	35.8	0.0	36.7	0.0	0.0	55.0
75j-13	6.8	2.8	0.095	0.0	0.0	4.6	0.4	72.6	17.7	75.1	0.0	0.4	6.8
75j-2	5.4	2.6	0.101	1.3	1.3	0.0	3.5	51.3	3.5	85.4	0.9	0.0	9.3
75j-21	2.9	2.2	0.132	0.0	0.0	2.6	0.0	66.8	0.0	66.8	2.2	7.8	33.2
75j-23	2.7	1.9	0.223	0.0	0.0	13.3	0.0	13.8	0.0	13.8	0.0	2.9	86.3
75j-24	2.2	1.4	0.396	0.0	0.0	65.3	0.0	5.1	0.9	5.1	0.0	12.5	94.0
75j-3	2.4	1.1	0.533	0.0	0.0	71.7	0.0	0.8	0.0	1.3	0.0	7.5	98.8
75j-3-1	3.1	1.1	0.595	0.0	0.0	0.0	0.0	11.7	0.0	12.1	0.8	0.8	86.3
75j-4	1.5	0.7	0.695	0.0	0.0	0.0	0.0	84.2	0.0	97.1	0.0	0.0	2.9
75j-29	1.3	0.7	0.687	0.0	0.0	5.0	0.0	0.4	0.4	0.4	0.0	10.8	98.8
75j-10	3.0	1.2	0.541	0.0	0.0	4.9	0.0	83.7	3.9	84.7	0.0	5.4	11.3
75j-15	4.0	2.0	0.216	0.0	0.0	0.4	0.0	62.1	1.3	64.2	0.8	31.3	34.2
75j-16	0.9	0.2	0.929	0.0	0.0	0.0	0.0	98.2	0.0	98.2	0.0	0.5	1.8
75j-25	4.6	2.3	0.155	0.0	0.0	30.4	1.3	50.8	2.1	52.5	1.7	3.8	45.0
75j-26	4.9	2.5	0.118	0.4	0.4	17.1	0.0	60.8	5.0	67.1	0.8	0.4	27.1
75j-31	6.3	2.6	0.151	1.9	0.0	9.3	3.7	52.6	7.0	56.7	0.5	11.6	31.2
75j-37	3.2	2.0	0.206	0.0	0.0	1.1	0.0	93.2	0.0	97.4	0.0	0.0	2.1
75j-41	1.8	1.3	0.393	0.0	0.0	59.7	0.0	7.1	0.0	7.6	0.0	15.1	92.4
75j-5	2.4	2.0	0.129	0.0	0.0	0.0	0.0	56.7	0.0	73.3	3.3	13.3	23.3

Station ID	Odon Pct	Pleco Pct	Tanyt Pct	Oligo Pct	Trich Pct	%Chi /TC	%Orth /TC	%Tpod /TC	Hyd2Tri Pct	Hyd2EPT Pct	Tnyt2Chi Pct
75e-20	1.3	0.0	0.4	9.6	0.0	95.8	4.2	0.0	0.0	0.0	0.6
75e-3	0.0	0.0	0.0	32.5	0.4	84.3	14.5	0.0	0.0	0.0	0.0
75e-36	0.9	0.0	0.9	15.8	0.9	25.7	65.7	8.6	0.0	0.0	5.7
75e-46	1.8	0.0	0.0	6.7	0.0	52.7	3.6	43.6	0.0	0.0	0.0
75e-54	4.2	0.0	18.8	0.8	6.7	66.7	10.2	22.2	12.5	4.5	41.7
75e-23	0.0	0.0	0.0	1.0	0.5	84.2	15.8	0.0	0.0	0.0	0.0
75e-59	0.4	0.0	14.3	0.9	2.6	92.0	5.6	2.5	83.3	45.5	20.4
75e-60	0.8	0.0	0.0	0.8	0.4	80.2	2.1	17.7	0.0	0.0	0.0
75e-69	0.0	0.0	0.0	0.0	0.0	98.2	0.6	1.2	0.0	0.0	0.0
75e-78	0.0	0.0	0.0	0.4	0.0	95.8	4.2	0.0	0.0	0.0	0.0
75f-127	0.0	0.0	14.0	8.6	3.2	82.5	6.2	11.3	0.0	0.0	26.8
75f-137	1.3	0.0	12.5	0.0	0.0	80.0	2.2	17.8	0.0	0.0	66.7
75f-44	1.0	0.0	0.0	5.0	0.0	96.7	0.0	3.3	0.0	0.0	0.0
75f-45	0.9	0.0	0.0	41.8	0.0	14.3	42.9	42.9	0.0	0.0	0.0
75f-50	1.8	0.0	0.0	24.8	0.0	44.4	0.0	55.6	0.0	0.0	0.0
75f-124	0.0	0.0	0.0	2.9	0.0	96.4	0.0	3.6	0.0	0.0	0.0
75f-126	0.0	0.0	0.0	8.1	0.0	100.0	0.0	0.0	0.0	0.0	0.0
75f-61	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0
75f-91	0.0	0.0	0.0	0.0	0.0	95.8	3.8	0.5	0.0	0.0	0.0
75f-95	0.0	0.0	0.9	3.8	0.0	100.0	0.0	0.0	0.0	0.0	1.6
75h-1	0.0	0.0	0.4	6.7	0.0	74.7	25.3	0.0	0.0	0.0	1.3
75h-41	0.0	0.0	0.5	52.0	0.0	94.5	5.5	0.0	0.0	0.0	1.8
75h-47	0.0	0.0	1.3	30.0	0.0	91.4	7.4	0.0	0.0	0.0	3.7
75h-69	0.0	0.0	0.0	28.6	0.0	100.0	0.0	0.0	0.0	0.0	0.0

Station ID	Odon Pct	Pleco Pct	Tanyt Pct	Oligo Pct	Trich Pct	%Chi /TC	%Orth /TC	%Tpod /TC	Hyd2Tri Pct	Hyd2EPT Pct	Tnyt2Chi Pct
75h-70	4.0	0.0	7.1	0.0	0.0	81.8	5.2	13.0	0.0	0.0	20.8
75h-72	0.0	0.0	0.0	83.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0
75h-10	0.0	0.0	0.0	4.1	3.2	3.8	96.2	0.0	0.0	0.0	0.0
75h-35	0.0	0.0	0.0	1.3	0.0	33.9	66.1	0.0	0.0	0.0	0.0
75h-45	0.0	0.0	0.0	0.0	0.0	95.2	4.8	0.0	0.0	0.0	0.0
75h-60	2.9	0.0	0.0	4.2	1.7	93.2	6.8	0.0	50.0	3.9	0.0
75h-66	9.2	0.0	2.1	0.8	2.5	65.0	0.6	34.4	0.0	0.0	3.1
75j-11	4.1	0.0	0.5	36.6	0.0	97.0	1.5	1.5	0.0	0.0	1.5
75j-12	1.3	0.0	0.0	27.9	7.1	93.0	3.5	3.5	100.0	100.0	0.0
75j-13	0.0	0.0	40.5	1.3	0.0	88.4	9.3	1.7	0.0	0.0	55.8
75j-2	0.4	0.0	2.2	4.9	0.0	70.7	0.9	28.4	0.0	0.0	4.3
75j-21	0.0	0.0	0.4	2.6	0.0	100.0	0.0	0.0	0.0	0.0	0.6
75j-23	0.0	0.0	0.4	37.5	0.0	97.0	3.0	0.0	0.0	0.0	3.0
75j-24	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0
75j-3	0.0	0.0	0.4	2.9	0.0	50.0	0.0	50.0	0.0	0.0	50.0
75j-3-1	1.7	0.0	0.4	76.7	0.0	100.0	0.0	0.0	0.0	0.0	3.6
75j-4	0.0	0.0	0.0	2.9	0.0	1.5	0.0	98.5	0.0	0.0	0.0
75j-29	0.4	0.0	0.0	0.4	0.0	100.0	0.0	0.0	0.0	0.0	0.0
75j-10	0.0	0.0	0.0	1.0	0.0	98.8	0.6	0.6	0.0	0.0	0.0
75j-15	0.4	0.0	0.0	1.7	0.0	97.3	0.7	1.3	0.0	0.0	0.0
75j-16	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0
75j-25	0.4	0.0	17.1	5.8	0.0	95.1	3.3	1.6	0.0	0.0	33.6
75j-26	0.4	0.0	34.2	0.8	0.0	93.2	5.5	0.7	0.0	0.0	56.2
75j-31	1.9	0.0	0.9	4.2	1.9	92.9	4.4	2.7	0.0	0.0	1.8
75j-37	0.5	0.0	0.0	1.1	0.0	91.0	0.6	8.5	0.0	0.0	0.0

Station ID	Odon Pct	Pleco Pct	Tanyt Pct	Oligo Pct	Trich Pct	%Chi /TC	%Orth /TC	%Tpod /TC	Hyd2Tri Pct	Hyd2EPT Pct	Tnyt2Chi Pct
75j-41	0.0	0.0	0.0	2.1	0.0	52.9	47.1	0.0	0.0	0.0	0.0
75j-5	3.3	0.0	0.0	6.7	0.0	100.0	0.0	0.0	0.0	0.0	0.0

Station ID	Baet2Eph Pct	CrCh2Chi Pct	Toler Tax	Toler Pct	Intol Tax	Intol Pct	Dom01 Pct	Dom01 Ind	BeckBI	HBI	NCBI	Scrap Pct	Scrap Tax
75e-20	0.0	1.2	14	27.9	0	0.0	56.7	136	2	7.1	7.4	4.2	1
75e-3	0.0	0.0	10	56.7	0	0.0	32.5	78	3	7.3	7.2	0.8	1
75e-36	0.0	0.0	12	77.0	2	5.4	45.0	100	3	7.4	7.5	0.0	0
75e-46	0.0	23.6	17	81.8	0	0.0	56.4	127	1	8.5	9.0	56.4	1
75e-54	0.0	0.9	15	34.2	9	14.6	13.3	32	16	6.2	6.5	3.3	3
75e-23	0.0	0.0	6	12.0	0	0.0	75.0	144	0	6.7	6.8	0.0	0
75e-59	0.0	0.0	13	59.3	4	5.2	36.8	85	9	7.5	7.5	0.9	1
75e-60	0.0	0.0	19	58.3	1	5.0	24.2	58	1	7.4	8.0	1.7	3
75e-69	0.0	29.7	4	29.8	0	0.0	60.8	110	1	7.5	9.6	0.6	1
75e-78	0.0	0.0	8	26.7	2	0.8	37.1	89	3	7.1	7.6	0.0	0
75f-127	0.0	0.0	11	30.6	5	10.8	15.6	29	6	6.4	6.2	0.5	1
75f-137	0.0	0.0	11	14.6	1	0.8	68.3	164	1	6.3	6.8	0.0	0
75f-44	0.0	5.6	13	79.0	0	0.0	26.0	26	0	8.4	9.7	11.0	1
75f-45	0.0	16.7	8	79.1	0	0.0	41.8	46	0	8.0	7.2	21.8	3
75f-50	0.0	0.0	11	80.1	0	0.0	24.8	56	0	7.8	8.1	27.0	5
75f-124	0.0	17.9	15	47.9	0	0.0	49.6	119	1	6.1	8.6	0.0	0
75f-126	0.0	0.0	10	93.3	0	0.0	44.8	100	0	9.0	8.2	0.0	0
75f-61	0.0	0.0	4	65.2	0	0.0	62.0	114	0	7.2	7.7	2.7	1
75f-91	0.0	4.2	5	15.0	0	0.0	71.8	153	0	7.0	8.1	1.9	1

Station ID	Baet2Eph Pct	CrCh2Chi Pct	Toler Tax	Toler Pct	Intol Tax	Intol Pct	Dom01 Pct	Dom01 Ind	BeckBI	HBI	NCBI	Scrap Pct	Scrap Tax
75f-95	0.0	23.6	8	29.7	0	0.0	34.4	73	0	7.3	9.1	0.0	0
75h-1	0.0	0.0	13	70.8	1	4.2	34.2	82	4	7.3	6.7	0.0	0
75h-41	0.0	0.0	12	81.4	2	2.9	52.0	106	3	7.8	6.7	0.0	0
75h-47	0.0	1.2	8	54.2	0	0.0	30.0	72	3	7.1	5.3	0.0	0
75h-69	0.0	0.0	8	54.2	0	0.0	28.6	6	3	7.1	6.7	4.8	1
75h-70	100.0	0.0	3	61.9	0	0.0	40.0	90	0	6.7	7.7	5.3	2
75h-72	0.0	0.0	20	36.0	1	0.4	83.9	130	3	8.0	6.4	6.5	2
75h-10	0.0	0.0	8	37.0	1	0.5	53.9	118	3	5.4	7.3	0.5	1
75h-35	0.0	0.0	6	8.9	0	0.0	44.1	104	1	5.2	4.1	0.0	0
75h-45	0.0	10.7	7	16.3	0	0.0	72.4	147	0	7.0	9.0	0.0	0
75h-60	0.0	12.2	21	55.0	2	20.0	19.2	46	5	6.6	7.3	4.6	2
75h-66	0.0	4.4	20	41.3	3	1.3	16.3	39	6	7.1	7.1	19.2	5
75j-11	0.0	1.5	6	88.4	0	0.0	36.6	71	1	7.9	7.8	2.1	2
75j-12	0.0	0.0	12	68.0	0	0.0	27.9	67	0	8.2	7.5	0.0	0
75j-13	0.0	1.7	16	68.4	1	0.4	20.7	49	3	7.4	7.5	2.5	1
75j-2	0.0	17.2	19	58.8	0	0.0	23.0	52	0	7.9	8.7	0.9	2
75j-21	0.0	0.6	1	54.3	0	0.0	22.8	53	1	7.1	8.0	0.0	0
75j-23	0.0	54.5	2	50.0	0	0.0	37.5	90	2	6.8	9.6	0.0	0
75j-24	0.0	36.4	4	9.7	0	0.0	60.2	130	1	6.5	8.4	0.5	1
75j-3	0.0	0.0	4	75.4	1	0.4	71.7	172	2	7.2	7.9	0.0	0
75j-3-1	0.0	10.7	4	86.3	0	0.0	76.7	184	0	8.0	8.9	0.0	0
75j-4	0.0	1.5	5	87.9	0	0.0	82.9	199	0	9.1	9.8	0.0	0
75j-29	0.0	0.0	3	87.5	0	0.0	82.1	197	0	7.8	8.2	0.0	0
75j-10	0.0	10.6	7	13.8	1	0.5	72.9	148	1	6.9	9.0	0.0	0
75j-15	0.0	28.2	13	31.3	0	0.0	36.7	88	0	7.3	9.3	0.8	1

Station ID	Baet2Eph Pct	CrCh2Chi Pct	Toler Tax	Toler Pct	Intol Tax	Intol Pct	Dom01 Pct	Dom01 Ind	BeckBI	HBI	NCBI	Scrap Pct	Scrap Tax
75j-16	0.0	0.5	2	0.9	0	0.0	96.4	214	0	6.7	9.8	0.0	0
75j-25	0.0	4.9	13	57.1	1	0.4	30.4	73	3	7.6	7.5	2.5	2
75j-26	0.0	0.7	14	50.0	1	0.4	20.0	48	3	7.4	7.4	2.1	3
75j-31	0.0	0.9	24	75.8	2	1.4	34.9	75	3	8.4	8.2	0.5	1
75j-37	0.0	4.0	10	69.5	0	0.0	37.9	72	0	7.9	9.2	0.0	0
75j-41	0.0	0.0	6	9.2	0	0.0	58.8	140	1	6.4	0.0	0.0	0
75j-5	0.0	41.2	4	53.3	1	3.3	23.3	7	1	7.8	8.8	3.3	1

Station ID	Cllct Pct	Cllct Tax	Pred Pct	Pred Tax	Shred Pct	Shred Tax	Filtr Pct	Filtr Tax	Clngr Tax	Clngr Pct	Brrwr Tax	Clmbr Tax	Sprwl Tax	Swmmr Tax
75e-20	22.1	10	9.6	9	2.5	3	1.7	3	1	4.2	5	3	4	3
75e-3	53.8	12	6.3	4	3.3	2	9.6	2	2	1.3	4	0	5	3
75e-36	91.0	8	3.6	6	0.9	1	0.9	2	1	0.5	1	3	3	3
75e-46	23.1	10	14.7	9	0.9	2	0.4	1	0	0.0	6	3	5	0
75e-54	37.9	23	20.4	17	2.9	3	17.1	7	9	9.2	10	5	12	1
75e-23	22.9	7	1.0	1	0.0	0	1.0	2	2	1.0	0	0	4	0
75e-59	26.4	10	9.1	10	2.6	1	16.9	4	6	5.6	4	1	7	3
75e-60	37.5	14	43.3	13	11.3	1	0.8	2	4	4.6	10	0	7	4
75e-69	33.7	4	2.2	3	2.2	2	0.6	1	1	0.6	2	0	2	2
75e-78	42.9	11	2.9	2	0.0	0	0.0	0	0	0.0	3	0	5	1
75f-127	51.6	12	4.3	5	6.5	3	24.7	5	4	12.9	6	0	6	2
75f-137	80.0	8	5.8	7	0.0	0	11.7	4	5	12.9	2	3	5	0
75f-44	81.0	9	4.0	4	1.0	1	0.0	0	0	0.0	5	2	4	0
75f-45	47.3	4	5.5	2	5.5	1	16.4	1	0	0.0	1	1	2	0

Station ID	Cllct Pct	Cllct Tax	Pred Pct	Pred Tax	Shred Pct	Shred Tax	Filtr Pct	Filtr Tax	Clngr Tax	Clngr Pct	Brrwr Tax	Clmbr Tax	Sprwl Tax	Swmmr Tax
75f-50	60.2	4	5.3	6	0.0	0	6.2	1	1	0.4	1	1	4	1
75f-124	28.3	8	3.8	4	0.0	0	12.1	2	0	0.0	3	0	3	0
75f-126	48.9	6	4.9	6	0.0	0	0.4	1	0	0.0	2	0	2	0
75f-61	90.8	4	1.1	2	1.6	1	0.0	0	0	0.0	1	0	1	0
75f-91	10.8	6	0.9	2	6.6	2	0.0	0	1	1.9	3	0	3	0
75f-95	54.2	7	0.5	1	0.0	0	0.9	1	0	0.0	7	1	0	1
75h-1	35.4	9	3.3	4	5.4	5	35.0	3	0	0.0	6	0	2	3
75h-41	71.1	7	3.9	3	0.5	1	2.0	2	0	0.0	3	1	2	2
75h-47	54.2	13	7.5	2	0.4	1	21.7	5	2	7.5	3	1	3	3
75h-69	33.3	2	4.8	1	0.0	0	28.6	1	1	4.8	0	0	0	0
75h-70	58.2	11	20.4	12	0.0	0	3.1	4	5	4.0	3	6	8	2
75h-72	90.3	7	0.6	1	0.0	0	0.6	1	3	8.4	0	0	0	0
75h-10	91.8	11	1.4	2	2.7	2	0.0	0	0	0.0	1	2	5	0
75h-35	66.1	8	0.8	2	0.0	0	23.7	1	1	23.7	2	0	4	1
75h-45	16.7	7	4.9	2	1.0	2	0.0	0	0	0.0	7	0	3	1
75h-60	63.8	16	9.2	10	1.3	2	9.6	5	3	9.6	6	1	7	4
75h-66	35.0	15	13.8	11	6.7	5	2.5	3	7	20.0	8	5	10	1
75j-11	71.6	10	6.2	3	0.0	0	3.6	2	0	0.0	5	2	2	2
75j-12	45.0	5	4.6	5	1.3	2	22.1	5	3	7.9	3	1	3	1
75j-13	56.1	19	16.9	5	2.5	1	3.4	4	4	17.7	8	1	5	0
75j-2	77.9	14	13.7	8	0.4	1	2.2	1	1	0.4	7	2	8	1
75j-21	10.3	6	0.0	0	6.0	1	0.9	2	1	0.4	3	0	0	1
75j-23	50.0	6	0.0	0	0.0	0	0.4	1	0	0.0	1	0	1	0
75j-24	2.8	2	0.0	0	0.0	0	5.1	1	2	0.9	2	0	0	0
75j-3	77.1	6	0.4	1	0.0	0	0.0	0	0	0.0	1	0	1	0

Station ID	Cllct Pct	Cllct Tax	Pred Pct	Pred Tax	Shred Pct	Shred Tax	Filtr Pct	Filtr Tax	Clngr Tax	Clngr Pct	Brrwr Tax	Clmbr Tax	Sprwl Tax	Swmmr Tax
75j-3-1	81.7	7	1.7	1	1.7	1	0.4	1	0	0.0	3	1	0	0
75j-4	15.4	5	1.3	2	0.0	0	0.0	0	0	0.0	4	0	4	0
75j-29	16.3	3	0.8	2	0.4	1	82.1	1	0	0.0	0	1	0	1
75j-10	15.3	7	3.4	3	1.0	2	0.5	1	1	0.5	5	0	2	1
75j-15	46.3	9	4.2	7	4.2	2	0.0	0	0	0.0	7	0	2	3
75j-16	0.9	2	0.0	0	1.4	1	0.5	1	0	0.0	1	0	0	1
75j-25	51.7	10	1.7	4	1.3	2	18.3	3	0	0.0	7	1	5	1
75j-26	31.3	9	4.2	4	1.3	1	27.9	3	1	0.4	6	2	4	2
75j-31	67.0	13	14.4	11	1.4	1	5.1	3	1	1.4	7	0	7	2
75j-37	11.6	7	8.4	4	6.8	1	0.0	0	0	0.0	3	0	5	0
75j-41	8.4	5	0.0	0	0.8	1	0.8	1	0	0.0	1	0	1	0
75j-5	83.3	6	3.3	1	0.0	0	0.0	0	0	0.0	4	1	0	0

APPENDIX L – Discrimination efficiencies for metrics considered for index development

METRIC	45	45a	45b	45c	45d	45h	65	65c	65d	65g	65h	65k	65l	65o
TotalTax	0.00	0.00	0.33	0.20	0.00	0.00	0.43	0.14	0.20	0.90	0.60	0.00	0.40	0.40
EPTTax	0.50	0.60	0.67	0.20	0.40	0.40	0.45	0.43	0.20	1.00	0.40	0.00	0.60	0.40
EphemTax	0.35	0.20	0.67	0.20	0.40	0.20	0.43	0.29	0.40	1.00	0.80	0.00	0.00	0.60
PlecoTax	0.31	0.60	0.50	0.00	0.20	1.00	0.00	0.71	0.60	1.00	0.00	0.00	0.00	0.00
TrichTax	0.23	0.40	0.67	0.00	0.00	0.00	0.36	0.43	0.60	1.00	0.20	0.00	0.80	0.20
ColeoTax	0.46	0.40	1.00	0.20	0.80	0.20	0.36	0.14	0.40	0.70	0.80	0.00	0.40	0.20
DipTax	0.08	0.00	0.00	0.00	0.00	0.20	0.24	0.14	0.00	0.70	0.60	0.00	0.80	0.60
ChiroTax	0.12	0.20	0.00	0.00	0.00	0.20	0.21	0.14	0.40	0.60	0.60	0.00	0.60	0.80
TanytTax	0.04	0.00	0.00	0.60	0.00	0.00	0.17	0.14	0.00	0.90	0.80	0.00	0.00	0.80
Evenness	0.19	0.00	0.50	0.60	0.00	0.20	0.45	0.29	0.40	0.50	0.60	0.20	0.60	0.60
Margalef	0.04	0.00	0.33	0.20	0.00	0.20	0.48	0.29	0.20	0.90	0.60	0.00	0.40	0.40
Shan_base_e	0.15	0.00	0.50	0.60	0.00	0.20	0.36	0.29	0.40	0.60	0.60	0.20	0.20	0.40
Simpsons	0.27	0.20	0.50	0.60	0.00	0.20	0.31	0.43	0.40	0.50	0.40	0.20	0.60	0.60
EPTPct	0.54	0.60	0.67	0.40	0.00	0.80	0.45	0.29	0.40	1.00	0.40	0.00	0.60	0.60
EphemPct	0.35	0.40	0.67	0.00	0.00	0.80	0.50	0.29	0.60	0.80	0.80	0.00	0.00	0.80
AmphPct	0.00	0.00	0.00	0.20	0.00	0.00	0.00	0.00	0.00	0.70	0.00	0.20	0.20	0.00
ChiroPct	0.69	1.00	1.00	0.40	0.40	0.60	0.17	0.00	0.60	0.40	0.20	0.40	0.20	0.00
ColeoPct	0.38	0.40	0.83	0.20	0.20	0.20	0.48	0.43	0.40	0.60	0.40	0.40	0.60	0.80
DipPct	0.65	1.00	0.83	0.40	0.00	0.80	0.00	0.14	0.40	0.50	0.20	0.40	0.20	0.40
GastrPct	0.00	0.00	0.00	0.00	0.80	0.00	0.00	0.00	0.00	0.70	0.00	0.80	0.00	0.60
IsoPct	0.00	0.00	0.00	0.00	0.00	0.00	0.31	0.00	0.20	0.30	0.80	0.20	0.20	0.20
NonInPct	0.31	0.40	0.33	0.20	0.00	0.40	0.38	0.29	0.40	0.60	0.60	0.20	0.20	1.00
OdonPct	0.54	0.20	0.33	0.60	0.80	0.60	0.21	0.43	0.40	0.00	0.20	0.40	0.40	0.20
PlecoPct	0.62	0.60	0.67	0.80	0.20	0.80	0.00	0.57	0.40	1.00	0.00	0.00	0.00	0.00
TanytPct	0.19	0.20	0.17	0.40	0.00	0.20	0.14	0.14	0.40	0.90	1.00	0.00	0.00	0.60
OligoPct	0.31	0.40	0.67	0.20	0.20	0.00	0.57	0.29	0.60	1.00	0.80	0.00	0.20	0.80
TrichPct	0.42	0.60	0.67	0.00	0.20	0.20	0.43	0.57	0.60	1.00	0.20	0.00	0.80	0.20

METRIC	45	45a	45b	45c	45d	45h	65	65c	65d	65g	65h	65k	65l	65o
%Orth/TC	0.27	0.00	0.33	0.20	0.60	0.60	0.19	0.14	0.40	0.60	0.00	0.40	0.40	0.00
%Tpod/TC	0.54	0.80	0.17	0.60	1.00	0.80	0.57	0.14	0.20	0.10	0.20	0.60	0.20	0.20
Hyd2TriPct	0.50	0.60	0.50	0.40	0.60	0.40	0.24	0.29	0.80	0.00	0.20	0.60	0.00	0.20
Hyd2EPTPct	0.35	0.60	0.50	0.40	0.60	0.40	0.26	0.14	0.60	0.00	0.20	0.60	0.00	0.20
Tnyt2ChiPct	0.23	0.40	0.33	0.40	0.00	0.20	0.29	0.14	0.40	0.90	1.00	0.00	0.00	0.60
Baet2EphPct	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CrCh2ChiPct	0.42	1.00	0.50	0.40	0.20	0.20	0.33	0.43	0.40	0.50	0.20	0.20	0.40	0.00
TolerTax	0.42	1.00	0.17	0.00	1.00	0.20	0.40	0.71	0.00	0.50	0.40	0.20	0.80	0.00
TolerPct	0.50	1.00	0.50	0.60	1.00	0.40	0.40	0.43	0.20	0.90	0.80	0.00	0.60	0.20
IntolTax	0.42	0.60	0.67	0.20	0.60	0.60	0.55	0.71	0.60	1.00	0.80	0.20	0.00	0.20
IntolPct	0.58	0.60	0.67	0.80	0.80	0.80	0.57	0.43	0.40	1.00	0.40	0.40	0.00	0.20
Dom01Pct	0.19	0.20	0.50	0.60	0.00	0.00	0.33	0.29	0.20	0.30	0.40	0.20	0.20	0.60
Dom01Ind	0.23	0.20	0.50	0.60	0.00	0.00	0.38	0.29	0.20	0.30	0.40	0.20	0.20	0.60
BeckBI	0.46	0.60	0.67	0.20	0.40	0.40	0.57	0.71	0.20	1.00	0.40	0.00	0.00	0.40
HBI	0.50	0.60	0.67	0.80	1.00	1.00	0.45	0.43	0.20	1.00	0.20	0.00	0.60	0.20
NCBI	0.50	1.00	0.50	0.40	1.00	1.00	0.45	0.29	0.40	0.80	0.80	0.20	0.40	0.60
ScrapPct	0.27	0.80	0.50	0.00	0.40	0.60	0.40	0.86	0.40	0.90	0.60	0.40	0.20	0.40
ScrapTax	0.08	0.40	1.00	0.00	0.20	0.20	0.24	0.43	0.20	0.90	0.00	0.60	0.00	0.80
CllctPct	0.08	0.00	0.17	0.00	0.20	0.20	0.10	0.14	0.40	0.00	0.20	0.80	0.20	0.00
CllctTax	0.04	0.00	0.50	0.20	0.00	0.00	0.14	0.00	0.20	0.40	0.00	0.00	0.20	0.40
PredPct	0.08	0.00	0.33	0.20	0.00	0.00	0.48	0.57	0.60	0.70	0.60	0.20	0.20	0.40
PredTax	0.08	0.20	0.33	0.20	0.00	0.00	0.43	0.29	0.40	0.60	0.60	0.00	0.60	0.20
ShredPct	0.35	0.60	0.67	1.00	0.20	0.00	0.29	0.14	0.20	0.30	0.20	0.60	0.00	0.20
ShredTax	0.23	0.60	0.67	0.40	0.40	0.00	0.29	0.29	0.40	0.80	0.20	0.40	0.60	0.20
FiltrPct	0.12	0.20	0.00	0.20	0.60	0.00	0.24	0.43	0.80	0.40	0.20	0.60	0.80	0.40
FiltrTax	0.12	0.00	0.00	0.00	0.00	0.00	0.26	0.29	0.00	0.80	0.80	0.00	0.00	0.60
ClngrTax	0.31	0.80	0.67	0.20	0.00	0.00	0.45	0.43	0.20	1.00	0.80	0.00	0.60	0.40
ClngrPct	0.38	0.80	0.33	0.20	0.00	0.60	0.48	0.43	0.20	0.80	0.80	0.00	0.40	0.40

METRIC	45	45a	45b	45c	45d	45h	65	65c	65d	65g	65h	65k	65l	65o
BrrwrTax	0.00	0.40	0.00	0.20	0.00	0.00	0.40	0.00	0.00	0.40	0.60	0.40	0.20	0.60
ClmbrTax	0.08	0.00	0.33	0.00	0.00	0.40	0.19	0.29	0.20	0.00	0.60	0.00	0.20	0.00
SprwlTax	0.04	0.00	0.33	0.20	0.00	0.20	0.17	0.14	0.40	0.60	0.20	0.00	0.20	0.80
SwmmrTax	0.19	0.20	0.83	0.40	0.00	0.00	0.26	0.00	0.40	0.30	0.20	0.00	0.00	0.40

METRIC	66	66d	66g	66j	67	67f&i	67g	67h	68c&d	75	75e	75f	75h	75j
TotalTax	0.53	0.60	0.43	0.60	0.50	0.80	0.40	0.00	0.00	0.15	0.00	0.20	0.33	0.10
EPTTax	0.65	0.80	0.86	0.40	0.75	1.00	0.40	0.00	0.20	0.00	0.00	0.00	0.00	0.00
EphemTax	0.35	0.40	0.71	0.20	0.58	1.00	0.20	1.00	0.60	0.00	0.00	0.00	0.00	0.00
PlecoTax	0.71	0.60	0.43	0.80	0.83	1.00	0.80	0.50	0.80	0.00	0.00	0.00	0.00	0.00
TrichTax	0.53	0.40	0.71	0.40	0.08	0.40	0.00	0.00	0.20	0.00	0.00	0.00	0.00	0.00
ColeoTax	0.18	0.20	0.57	0.20	0.25	0.40	0.20	0.50	0.20	0.27	0.00	0.00	0.17	0.00
DipTax	0.29	0.80	0.00	1.00	0.42	0.40	0.60	0.00	0.00	0.27	0.00	0.40	0.00	0.20
ChiroTax	0.18	0.40	0.00	0.60	0.50	0.80	0.60	0.00	0.00	0.27	0.00	0.40	0.33	0.30
TanytTax	0.00	0.00	0.00	0.60	0.17	0.40	0.40	0.00	0.20	0.00	0.00	0.00	0.00	0.00
Evenness	0.53	0.20	0.43	0.80	0.17	0.40	0.20	0.00	0.00	0.15	0.00	0.00	0.17	0.30
Margalef	0.41	0.60	0.43	0.80	0.50	0.80	0.40	0.00	0.00	0.12	0.00	0.00	0.33	0.10
Shan_base_e	0.53	0.20	0.43	0.80	0.17	0.60	0.20	0.00	0.00	0.15	0.00	0.00	0.17	0.30
Simpsons	0.65	0.20	0.71	0.80	0.17	0.40	0.00	0.00	0.00	0.19	0.00	0.20	0.17	0.30
EPTPct	0.35	0.40	0.43	0.40	0.58	1.00	0.20	0.00	0.40	0.00	0.00	0.00	0.00	0.00
EphemPct	0.06	0.00	0.43	0.20	0.58	1.00	0.40	0.50	0.40	0.00	0.00	0.00	0.00	0.00
AmphPct	0.00	0.00	0.00	0.00	0.00	0.00	0.60	0.00	0.00	0.31	0.60	0.60	0.00	0.30
ChiroPct	0.35	0.60	0.86	0.20	0.50	0.80	0.20	1.00	0.20	0.00	0.00	0.00	0.00	0.10
ColeoPct	0.12	0.20	0.57	0.00	0.17	0.60	0.00	0.50	0.20	0.27	0.20	0.00	0.00	0.00
DipPct	0.29	0.40	0.86	0.40	0.25	0.80	0.00	0.50	0.00	0.04	0.00	0.00	0.00	0.20
GastrPct	0.00	0.00	0.00	0.00	0.58	0.00	0.60	1.00	0.00	0.00	0.00	0.00	0.00	0.00
IsoPct	0.00	0.00	0.00	0.00	0.67	0.60	0.60	1.00	0.20	0.27	0.60	0.20	0.50	0.10
NonInPct	0.18	0.20	0.29	0.60	0.42	0.80	0.20	0.00	0.00	0.73	0.80	0.40	1.00	0.40
OdonPct	0.41	1.00	0.00	0.40	0.58	0.60	0.60	0.50	0.60	0.46	0.80	0.80	0.17	0.30
PlecoPct	0.47	0.60	0.57	0.20	0.75	1.00	0.80	0.00	0.60	0.00	0.00	0.00	0.00	0.00
TanytPct	0.00	0.00	0.00	0.80	0.25	0.60	0.60	0.00	0.00	0.00	0.00	0.00	0.00	0.00
OligoPct	0.29	0.20	0.43	0.60	0.50	1.00	0.20	0.00	0.20	0.69	0.80	0.80	0.83	0.50
TrichPct	0.53	0.40	0.71	0.40	0.17	1.00	0.20	0.00	0.20	0.00	0.00	0.00	0.00	0.00
%Orth/TC	0.24	0.40	0.43	0.20	0.58	0.20	1.00	1.00	0.20	0.35	0.00	0.00	0.33	0.00

METRIC	66	66d	66g	66j	67	67f&i	67g	67h	68c&d	75	75e	75f	75h	75j
%Tpod/TC	0.41	0.20	0.86	0.00	0.58	0.60	0.60	0.00	0.80	0.50	0.60	1.00	0.17	0.40
Hyd2TriPct	0.35	0.40	0.29	0.40	0.58	0.60	0.80	0.50	0.60	0.08	0.20	0.00	0.00	0.10
Hyd2EPTPct	0.29	0.40	0.43	0.20	0.58	0.60	0.60	0.50	0.60	0.08	0.20	0.00	0.00	0.10
Tnyt2ChiPct	0.12	0.00	0.29	0.60	0.50	0.60	0.40	0.50	0.20	0.00	0.00	0.00	0.00	0.00
Baet2EphPct	0.00	0.40	0.00	0.00	0.00	0.00	0.80	1.00	0.80	0.00	0.00	0.00	0.00	0.00
CrCh2ChiPct	0.24	0.20	0.29	0.20	0.25	0.60	0.00	0.00	0.40	0.19	0.60	0.00	0.00	0.30
TolerTax	0.18	0.60	1.00	0.00	0.42	0.60	0.40	0.50	0.80	0.23	0.60	0.80	0.00	0.10
TolerPct	0.24	0.20	0.43	0.00	0.08	0.80	0.20	1.00	0.80	0.58	0.40	0.60	0.83	0.50
IntolTax	0.71	0.60	0.71	0.60	0.75	1.00	0.80	0.50	0.80	0.00	0.00	0.00	0.00	0.00
IntolPct	0.59	0.60	0.71	0.60	0.58	0.80	0.40	1.00	1.00	0.00	0.00	0.00	0.00	0.00
Dom01Pct	0.59	0.60	0.71	0.80	0.17	0.40	0.00	0.00	0.00	0.19	0.00	0.20	0.17	0.30
Dom01Ind	0.59	0.40	0.71	0.80	0.08	0.20	0.00	0.00	0.00	0.31	0.40	0.20	0.17	0.30
BeckBI	0.82	0.80	0.71	0.80	0.83	1.00	0.80	0.50	0.60	0.00	0.00	0.00	0.17	0.00
HBI	0.59	0.40	0.71	0.60	0.75	0.80	0.40	1.00	0.80	0.42	0.20	0.60	0.67	0.50
NCBI	0.71	0.60	0.71	0.40	0.75	0.80	0.40	0.50	1.00	0.15	0.20	0.20	0.17	0.70
ScrapPct	0.35	0.40	0.71	0.20	0.33	0.20	0.20	1.00	0.60	0.00	0.00	0.00	0.00	0.00
ScrapTax	0.29	0.00	0.86	0.00	0.58	0.80	0.00	1.00	0.80	0.00	0.00	0.00	0.00	0.00
CllctPct	0.35	0.20	0.29	0.40	0.00	0.20	0.20	0.00	0.00	0.12	0.40	0.00	0.17	0.20
CllctTax	0.24	0.20	0.14	0.60	0.42	0.80	1.00	0.00	0.00	0.23	0.00	0.40	0.50	0.30
PredPct	0.59	0.60	0.71	0.40	0.25	0.20	0.20	0.00	0.20	0.19	0.00	0.00	0.17	0.40
PredTax	0.76	0.60	0.57	0.80	0.17	0.20	0.20	0.00	0.20	0.27	0.00	0.00	0.33	0.50
ShredPct	0.59	0.80	0.14	0.40	0.33	0.60	0.40	0.00	0.40	0.00	0.00	0.00	0.83	0.60
ShredTax	0.76	0.60	0.29	0.80	0.42	0.40	0.80	0.50	0.20	0.00	0.00	0.00	0.67	0.50
FiltrPct	0.59	0.40	0.57	0.80	0.08	0.00	0.00	0.50	0.20	0.35	0.60	0.80	0.50	0.10
FiltrTax	0.12	0.00	0.00	0.40	0.17	0.40	0.20	0.00	0.20	0.00	0.00	0.00	0.00	0.20
ClngrTax	0.53	0.60	0.57	0.20	0.67	1.00	0.20	0.00	0.00	0.00	0.20	0.00	0.00	0.00
ClngrPct	0.35	0.20	0.71	0.20	0.75	1.00	0.40	0.00	0.60	0.00	0.40	0.00	0.00	0.00
BrrwrTax	0.53	0.40	0.57	0.20	0.25	0.00	0.40	0.00	0.20	0.27	0.20	0.40	0.33	0.20

METRIC	66	66d	66g	66j	67	67f&i	67g	67h	68c&d	75	75e	75f	75h	75j
ClmbrTax	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SprwlTax	0.24	0.20	0.29	0.60	0.42	0.40	0.60	0.00	0.20	0.27	0.20	0.00	0.83	0.30
SwmmrTax	0.18	0.00	0.29	0.00	0.00	0.00	0.20	1.00	0.00	0.00	0.20	0.00	0.33	0.00

APPENDIX M – Standardized scores for discriminating metrics

Ecoregion 45

Station ID	Condition	Std EPT	Std Col	Std % EPT	Std % Chiro	Std % Dip	Std % Odon	Std % Plec	Std Tpod /TC	Std Hyd 2Tri	Std %Intol	Std HBI	Std NCBI
45a-35	Impaired	100	83	50	41	41	96	15	66	25	37	69	53
45a-50	Impaired	25	9	27	12	11	100	0	87	0	3	39	31
45a-59	Impaired	5	9	1	0	0	91	0	77	0	0	47	32
45a-61	Impaired	20	46	13	30	34	86	0	72	100	7	27	24
45a-90	Impaired	51	93	55	53	56	96	25	74	2	38	77	60
45b-120	Impaired	100	37	44	32	34	96	28	73	44	38	81	72
45b-193	Impaired	15	9	18	49	31	96	0	86	0	4	53	64
45b-203	Impaired	35	9	26	56	60	87	0	93	0	7	32	41
45b-217	Impaired	15	0	2	26	33	0	0	70	50	0	0	0
45b-291	Impaired	20	9	4	0	3	93	1	0	0	4	23	3
45b-44	Impaired	66	19	51	33	38	97	12	56	44	35	72	62
45c-10	Impaired	10	37	9	80	78	89	7	46	100	6	22	22
45c-11	Impaired	30	56	6	34	30	97	3	87	0	7	25	26
45c-17	Impaired	66	46	79	93	92	73	1	90	100	12	43	31
45c-3	Impaired	66	46	37	51	54	81	2	49	100	5	46	39
45c-7	Impaired	56	28	50	35	40	96	14	83	0	47	73	46
45d-11	Impaired	71	37	40	81	34	87	29	79	20	39	83	63
45d-14	Impaired	76	46	52	57	60	89	71	86	67	60	86	60
45d-21	Impaired	56	37	70	63	64	89	35	73	37	47	79	66
45d-23	Impaired	40	46	52	51	46	94	10	56	8	28	64	58
45d-6	Impaired	35	65	44	52	55	79	0	77	58	23	73	65
45h-1	Impaired	51	56	66	83	78	94	17	73	9	52	75	71

Station ID	Condition	Std EPT	Std Col	Std % EPT	Std % Chiro	Std % Dip	Std % Odon	Std % Plec	Std Tpod /TC	Std Hyd 2Tri	Std %Intol	Std HBI	Std NCBI
45h-10	Impaired	51	19	16	8	10	80	4	79	15	7	55	57
45h-11	Impaired	66	56	38	53	39	93	2	61	71	37	61	53
45h-12	Impaired	35	65	42	56	52	92	4	68	40	15	72	69
45h-2	Impaired	35	56	23	45	46	60	0	5	70	14	54	57
45a03//	Reference	91	46	43	33	38	90	11	79	21	22	63	66
45a-3	Reference	66	0	93	70	71	100	100	90	32	93	97	81
45a-89	Reference	30	100	46	97	99	97	51	94	33	48	81	66
HH16	Reference	56	100	40	54	56	89	25	87	23	57	78	74
HH18	Reference	51	37	80	100	100	96	1	25	16	8	58	53
45b-152	Reference	100	83	61	74	66	99	33	70	41	47	84	71
45b-156	Reference	45	46	24	80	57	75	3	47	100	13	35	23
45b-258	Reference	86	74	41	62	57	92	44	34	43	15	61	48
45b-357	Reference	71	56	66	75	64	99	12	73	8	12	56	57
HH22	Reference	61	56	76	64	69	94	28	61	32	32	58	41
//4	Reference	10	46	1	88	89	99	1	87	100	7	24	24
45c-16	Reference	30	46	48	42	42	98	73	79	50	58	70	28
45c-19	Reference	71	46	97	87	86	95	18	93	78	67	90	64
45c-8	Reference	25	9	57	50	53	94	61	96	100	67	69	76
45d-15	Reference	30	74	100	100	100	100	100	73	100	100	100	100
45d-16	Reference	66	83	30	59	61	90	1	100	67	53	82	87
45d-4	Reference	45	19	24	66	11	95	1	100	15	100	100	100
45d-9	Reference	100	74	32	32	31	95	16	100	88	45	95	100
45h-13	Reference	66	56	100	96	96	89	15	92	83	88	98	98
45h-16	Reference	45	37	45	30	35	96	36	30	43	34	72	61

Station ID	Condition	Std EPT	Std Col	Std % EPT	Std % Chiro	Std % Dip	Std % Odon	Std % Plec	Std Tpod /TC	Std Hyd 2Tri	Std %Intol	Std HBI	Std NCBI
45h-17	Reference	51	37	60	58	54	93	15	78	25	40	89	84
45h-6	Reference	56	56	80	73	73	92	6	88	31	42	73	75
45h-9	Reference	91	46	50	54	57	99	34	78	28	51	78	74
45d-8	Ref/Removed	25	9	72	71	64	93	0	84	19	12	78	81
45c-18	Ref/Removed	20	28	37	23	24	92	8	99	2	8	28	34

Subecoregion 45a

Station ID	Condition	Std EPT	Std Pleco	Std %Chiro	Std %Dip	Std %Tpod/TC	Std CrCh/TC	Std Tol Tax	Std %Tol	Std HBI	Std NCBI
45a-35	Impaired	100	100	42	40	60	66	63	76	63	53
45a-50	Impaired	29	0	12	11	91	19	88	42	18	13
45a-59	Impaired	6	0	0	0	76	73	38	25	31	15
45a-61	Impaired	24	0	30	33	68	0	0	0	0	0
45a-90	Impaired	59	36	53	54	72	92	56	91	74	66
45a03//	Reference	100	71	33	37	79	100	75	93	54	75
45a-3	Reference	76	100	70	69	95	100	100	100	100	100
45a-89	Reference	35	36	97	96	100	100	100	94	81	76
HH16	Reference	65	54	55	54	91	100	94	96	76	90
HH18	Reference	59	18	100	100	0	100	100	92	47	53

Station ID	Condition	Std %Scrap	Std %Shred	Std ShredTax	Std ClngTax	Std %Cling
45a-35	Impaired	42	100	100	100	57
45a-50	Impaired	4	11	16	35	38
45a-59	Impaired	0	12	16	30	8
45a-61	Impaired	26	19	16	45	29
45a-90	Impaired	17	100	47	61	90
45a03//	Reference	38	100	63	100	56
45a-3	Reference	8	12	16	71	60
45a-89	Reference	100	43	63	76	86
HH16	Reference	80	96	100	96	80
HH18	Reference	30	49	31	45	100

Subecoregion 45b

Station ID	Condition	Std EPT Tax	Std Eph Tax	Std Tri Tax	Std Coleo Tax	Std % EPT	Std % Eph	Std % Chiro	Std % Coleo	Std % Dip	Std % Ple	Std % Oligo	Std % Trich
45b-120	Impaired	100	80	71	45	60	48	40	21	48	67	97	24
45b-193	Impaired	15	23	12	11	24	36	62	3	42	0	37	9
45b-203	Impaired	36	34	48	11	36	18	71	59	87	0	0	49
45b-217	Impaired	15	11	24	0	2	1	33	0	46	0	100	3
45b-291	Impaired	21	0	36	11	5	0	0	3	0	3	81	8
45b-44	Impaired	67	80	36	23	69	97	42	6	54	28	94	14
45b-152	Reference	100	100	100	100	83	51	93	83	95	80	97	56
45b-156	Reference	46	45	48	57	33	41	100	47	82	8	100	16
45b-258	Reference	88	91	36	91	56	27	79	100	82	100	96	15

Station ID	Condition	Std EPT Tax	Std Eph Tax	Std Tri Tax	Std Coleo Tax	Std % EPT	Std % Eph	Std % Chiro	Std % Coleo	Std % Dip	Std % Ple	Std % Oligo	Std % Trich
45b-357	Reference	72	57	60	68	89	37	94	62	93	28	87	100
HH22	Reference	62	57	71	68	100	100	80	48	100	67	100	38

Station ID	Condition	Std %Intol	Std IntolTax	Std Beck	Std HBI	Std ScrapTax	Std %Shred	Std ShredTax	Std ClingTax	Std SwmTax
45b-120	Impaired	88	100	100	100	34	62	82	85	53
45b-193	Impaired	10	18	41	67	34	40	36	51	26
45b-203	Impaired	17	18	25	40	23	6	27	40	53
45b-217	Impaired	0	0	4	0	23	0	0	23	0
45b-291	Impaired	10	26	16	29	23	19	55	28	26
45b-44	Impaired	80	70	57	91	34	21	45	57	79
45b-152	Reference	100	100	100	100	91	96	64	100	79
45b-156	Reference	30	44	37	45	100	34	55	28	26
45b-258	Reference	35	79	74	77	68	100	100	91	100
45b-357	Reference	27	44	57	71	45	28	55	85	79
HH22	Reference	74	44	57	73	23	55	36	57	79

Subecoregion 45c

Station ID	Condition	Std Tanyt	Std Even	Std SW	Std Simp	Std %Odon	Std %Pleco	Std %Tpod/TC	Std %Dom
45c-10	Impaired	30	67	70	0	61	11	0	0
45c-11	Impaired	0	88	89	72	93	4	83	54
45c-17	Impaired	15	76	80	42	0	2	89	32

Station ID	Condition	Std Tanyt	Std Even	Std SW	Std Simp	Std %Odon	Std %Pleco	Std %Tpod/TC	Std %Dom
45c-3	Impaired	90	100	100	100	29	3	5	100
45c-7	Impaired	100	99	100	100	89	20	74	100
//4	Reference	0	77	80	76	100	2	82	79
45c-16	Reference	100	100	100	91	99	100	66	69
45c-19	Reference	45	93	95	100	87	25	94	100
45c-8	Reference	75	98	96	99	83	86	100	94
45c-18	Ref/Removed	100	90	94	90	72	11	100	87

Station ID	Condition	Std DomInd	Std %Intol	Std HBI	Std %Shred	Std ShredTax	Std SwmTax
45c-10	Impaired	0	9	0	9	52	50
45c-11	Impaired	64	10	5	12	100	75
45c-17	Impaired	30	19	32	3	52	25
45c-3	Impaired	100	7	36	17	100	100
45c-7	Impaired	100	71	78	7	78	100
//4	Reference	74	10	3	4	52	75
45c-16	Reference	80	86	74	100	78	100
45c-19	Reference	97	100	100	29	100	100
45c-8	Reference	100	100	73	85	78	50
45c-18	Ref/Removed	81	9	9	23	78	0

Subecoregion 45d

Station ID	Condition	Std EPT	Std Eph	Std ColTax	Std % Gast	Std % Odon	Std %Tpod /TC	Std % Tol	Std HBI	Std NCBI	Std % Scrap	Std Shred Tax	Std % Fil
45d-11	Impaired	74	43	45	3	41	50	0	25	6	28	100	38
45d-14	Impaired	79	71	56	10	48	66	29	29	3	21	82	80
45d-21	Impaired	58	14	45	3	48	36	74	19	11	15	82	40
45d-23	Impaired	42	29	56	3	76	0	33	0	0	13	47	31
45d-6	Impaired	37	43	79	0	0	45	72	12	10	62	58	56
45d-15	Reference	32	0	90	13	100	36	87	100	100	25	70	100
45d-16	Reference	69	100	100	100	55	97	93	24	39	100	100	95
45d-4	Reference	47	43	23	0	79	100	88	48	57	5	70	0
45d-9	Reference	100	100	90	23	80	96	100	41	57	24	70	71
45d-8	Ref/Removed	26	43	11	6	68	62	100	19	31	56	0	27

Subecoregion 45h

Station ID	Condition	Std EPT	Std Pleco	Std %EPT	Std %E	Std %Dip	Std %P	Std %Tpod /TC	Std % Intol	Std HBI	Std NCBI	Std % Scrap	Std % Cling	Std Climb Tax
45h-1	Impaired	59	44	69	43	83	48	78	64	51	42	100	93	0
45h-10	Impaired	59	44	16	23	0	12	85	9	4	9	11	26	100
45h-11	Impaired	76	29	40	61	36	6	65	46	18	0	32	52	100
45h-12	Impaired	41	15	44	92	51	11	73	19	42	38	87	76	0
45h-2	Impaired	41	0	24	31	44	0	0	18	0	10	35	36	100
45h-13	Reference	76	88	100	100	100	41	100	100	100	100	47	100	0
45h-16	Reference	53	59	46	55	30	100	29	42	44	17	100	48	56

Station ID	Condition	Std EPT	Std Pleco	Std %EPT	Std %E	Std %Dip	Std %P	Std %Tpod /TC	Std % Intol	Std HBI	Std NCBI	Std % Scrap	Std % Cling	Std Climb Tax
45h-17	Reference	59	29	62	84	53	42	85	50	83	72	80	84	56
45h-6	Reference	65	59	83	74	77	18	96	52	46	52	27	92	100
45h-9	Reference	100	100	52	66	57	96	84	63	57	48	56	58	56

Ecoregion 65

Station ID	Condition	Std TotTax	Std EPT	Std Eph	Std Even	Std Margalef	Std %EPT	Std %Eph	Std %Col	Std %Oligo	Std %Tpod/TC
65c-12	Impaired	100	100	83	95	100	100	100	19	100	53
65c-3	Impaired	48	34	33	73	50	88	100	13	97	85
65c-4	Impaired	80	0	0	91	80	0	0	7	94	30
65c-40	Impaired	100	100	83	93	100	40	17	37	100	6
65c-5	Impaired	99	34	0	95	99	10	0	60	92	73
65c-8	Impaired	67	54	33	81	67	58	6	22	100	59
65c-88	Impaired	98	54	83	99	99	33	32	5	99	64
65d-1	Impaired	48	7	0	69	47	1	0	0	80	17
65d-20	Impaired	77	47	0	97	78	48	0	19	100	80
65d-21	Impaired	66	47	67	68	65	51	55	33	99	58
65d-32	Impaired	86	54	50	92	86	40	48	0	100	75
65d-39	Impaired	100	100	50	96	100	64	17	33	99	79
65g-10	Impaired	59	0	0	75	58	0	0	19	69	90
65g-130	Impaired	53	13	0	73	53	3	0	16	82	87
65g-135	Impaired	30	7	17	60	30	22	33	0	91	93

Station ID	Condition	Std TotTax	Std EPT	Std Eph	Std Even	Std Margalef	Std %EPT	Std %Eph	Std %Col	Std %Oligo	Std %Tpod/TC
65g-137	Impaired	32	0	0	53	31	0	0	8	86	100
65g-14	Impaired	46	7	17	75	46	3	5	3	66	96
65g-17	Impaired	50	20	17	62	49	4	3	38	78	90
65g-4	Impaired	43	7	17	82	46	22	34	0	65	93
65g-69	Impaired	77	13	33	93	76	10	16	33	91	0
65g-8	Impaired	32	0	0	54	32	0	0	0	83	86
65g-84	Impaired	27	0	0	39	26	0	0	0	57	100
65h-17	Impaired	48	27	0	72	47	16	0	23	91	97
65h-174	Impaired	74	40	33	90	73	45	22	2	98	41
65h-32	Impaired	34	0	0	54	32	0	0	0	80	100
65h-34	Impaired	27	7	0	34	26	1	0	2	93	100
65h-41	Impaired	66	40	17	83	67	22	9	38	95	83
65k-102	Impaired	88	54	67	98	89	39	31	59	99	59
65k-113	Impaired	78	13	17	83	79	2	2	10	99	71
65k-128	Impaired	54	34	17	73	54	17	6	100	99	75
65k-129	Impaired	50	20	33	58	48	11	16	5	85	51
65k-37	Impaired	45	27	0	71	45	12	0	41	99	97
65l-160	Impaired	50	20	50	74	49	64	99	10	100	89
65L-184	Impaired	74	27	0	88	73	5	0	54	94	71
65l-391	Impaired	53	7	0	72	52	1	0	7	93	98
65l-420	Impaired	70	7	17	81	69	1	1	9	99	95
65l-423	Impaired	56	7	17	74	55	1	1	33	54	98
65o-11	Impaired	58	27	33	77	57	10	5	20	85	88
65o-18	Impaired	35	20	0	51	34	3	0	5	67	100
65o-22	Impaired	51	0	0	67	51	0	0	13	68	92

Station ID	Condition	Std TotTax	Std EPT	Std Eph	Std Even	Std Margalef	Std %EPT	Std %Eph	Std %Col	Std %Oligo	Std %Tpod/TC
65o-3	Impaired	83	34	33	90	83	53	61	69	99	82
65o-9	Impaired	27	7	0	47	26	1	0	5	0	8
65c-80	Reference	85	81	33	89	84	29	9	7	96	62
65c-89	Reference	67	40	17	80	69	19	5	17	97	25
HH24	Reference	75	74	33	90	75	65	5	15	98	62
HH25	Reference	56	81	17	85	58	75	19	46	100	93
HH26	Reference	67	47	17	90	69	16	6	45	95	25
65d-14	Reference	62	100	100	84	62	94	40	28	100	77
65d-18	Reference	100	94	67	100	100	41	29	61	99	44
65d-3	Reference	83	40	33	90	82	33	34	2	99	0
65d-38	Reference	99	87	100	91	98	42	42	9	99	87
65d-4	Reference	48	47	0	66	48	100	0	5	99	82
65g-120	Reference	75	47	33	84	74	18	17	2	96	78
65g-62	Reference	51	47	50	62	50	100	100	23	95	67
HH29	Reference	100	100	100	100	100	38	30	65	98	72
65h-202	Reference	75	40	33	85	77	35	42	56	100	81
65h-203	Reference	66	40	83	81	65	61	92	16	99	68
65h-206	Reference	48	13	33	79	48	9	14	100	97	53
65h-209	Reference	75	13	17	94	75	3	3	8	92	73
65h-212	Reference	54	67	83	75	56	72	82	32	100	87
65k-54	Reference	34	0	0	63	33	0	0	33	79	100
65k-55	Reference	94	81	100	97	94	46	29	98	100	42
65k-56	Reference	59	0	0	80	62	0	0	68	100	72
65k-68	Reference	45	7	0	62	45	3	0	64	100	95
65k-85	Reference	19	0	0	23	18	0	0	0	82	100

Station ID	Condition	Std TotTax	Std EPT	Std Eph	Std Even	Std Margalef	Std %EPT	Std %Eph	Std %Col	Std %Oligo	Std %Tpod/TC
65l-10	Reference	75	47	33	83	75	17	9	54	89	70
65l-342	Reference	56	20	0	63	55	3	0	12	95	96
65l-343	Reference	77	34	17	82	76	20	22	19	99	82
65l-379	Reference	37	0	0	76	38	0	0	19	81	100
65l-381	Reference	80	54	50	88	79	10	9	24	97	89
65o-12	Reference	93	7	17	97	93	1	2	100	100	81
65o-23	Reference	83	47	33	92	82	31	23	49	93	73
65o-24	Reference	53	34	67	69	54	73	100	0	100	72
65o-25	Reference	42	20	17	67	42	10	12	27	92	96
65g-82	Ref/Removed	11	0	0	29	10	0	0	0	93	100
65g-83	Ref/Removed	82	34	33	95	84	19	3	100	97	93

Station ID	Condition	Std Beck	Std %Intol	Std Intol Tax	Std %Pred	Std Pred Tax	Std Clng Tax	Std %Clng
65c-12	Impaired	100	74	100	52	100	90	48
65c-3	Impaired	33	3	20	12	22	82	97
65c-4	Impaired	0	0	0	84	73	37	7
65c-40	Impaired	100	45	100	100	100	100	48
65c-5	Impaired	38	8	30	30	84	67	25
65c-8	Impaired	43	55	20	29	45	90	100
65c-88	Impaired	33	17	40	44	84	75	23
65d-1	Impaired	5	1	10	56	45	22	4
65d-20	Impaired	87	43	51	48	67	52	23
65d-21	Impaired	60	100	40	18	45	75	21

Station ID	Condition	Std Beck	Std %Intol	Std Intol Tax	Std % Pred	Std Pred Tax	Std Clng Tax	Std % Clng
65d-32	Impaired	60	8	40	29	67	52	42
65d-39	Impaired	100	36	100	26	73	100	81
65g-10	Impaired	11	9	10	16	39	30	8
65g-130	Impaired	11	3	10	29	45	7	1
65g-135	Impaired	0	0	0	12	28	0	0
65g-137	Impaired	5	0	0	8	34	0	0
65g-14	Impaired	5	4	10	14	34	7	24
65g-17	Impaired	16	0	0	21	45	22	82
65g-4	Impaired	5	0	0	10	28	7	19
65g-69	Impaired	11	1	10	92	78	7	2
65g-8	Impaired	0	0	0	5	17	0	0
65g-84	Impaired	5	0	0	3	17	22	3
65h-17	Impaired	49	15	20	18	34	22	7
65h-174	Impaired	49	16	40	63	61	82	82
65h-32	Impaired	5	0	0	3	6	0	0
65h-34	Impaired	16	0	0	0	0	7	1
65h-41	Impaired	60	22	30	41	56	22	12
65k-102	Impaired	33	8	30	39	84	45	42
65k-113	Impaired	16	1	10	24	39	52	9
65k-128	Impaired	16	0	0	27	45	37	11
65k-129	Impaired	43	100	30	13	34	37	5
65k-37	Impaired	22	5	10	24	34	37	23
65l-160	Impaired	11	12	20	10	28	30	15
65L-184	Impaired	22	1	10	29	84	15	3
65l-391	Impaired	16	0	0	8	22	30	6

Station ID	Condition	Std Beck	Std %Intol	Std IntolTax	Std % Pred	Std Pred Tax	Std Clng Tax	Std % Clng
65l-420	Impaired	22	8	10	14	50	15	22
65l-423	Impaired	22	2	10	19	34	7	12
65o-11	Impaired	33	2	20	21	39	30	19
65o-18	Impaired	27	2	20	18	28	22	98
65o-22	Impaired	5	0	0	11	34	30	90
65o-3	Impaired	33	44	30	33	50	90	55
65o-9	Impaired	5	1	10	13	17	15	19
65c-80	Reference	98	17	91	51	78	90	43
65c-89	Reference	43	7	30	99	78	82	68
HH24	Reference	76	32	51	49	73	100	88
HH25	Reference	100	62	100	27	45	100	100
HH26	Reference	65	16	51	100	95	75	38
65d-14	Reference	100	76	100	60	45	75	64
65d-18	Reference	60	21	61	71	100	82	22
65d-3	Reference	27	26	30	100	100	22	6
65d-38	Reference	76	26	71	27	78	60	21
65d-4	Reference	43	100	51	34	61	37	27
65g-120	Reference	49	9	30	15	39	75	41
65g-62	Reference	38	100	30	24	50	45	11
HH29	Reference	98	45	71	41	34	60	34
65h-202	Reference	65	14	61	37	73	75	50
65h-203	Reference	38	76	51	21	45	45	19
65h-206	Reference	38	18	40	65	39	30	27
65h-209	Reference	16	14	30	34	56	52	12
65h-212	Reference	65	48	71	23	39	90	100

Station ID	Condition	Std Beck	Std %Intol	Std Intol Tax	Std % Pred	Std Pred Tax	Std Clng Tax	Std % Clng
65k-54	Reference	16	27	20	49	22	15	50
65k-55	Reference	76	17	61	50	61	75	57
65k-56	Reference	11	2	10	18	45	22	59
65k-68	Reference	16	3	10	20	39	15	4
65k-85	Reference	16	1	10	4	17	0	0
65l-10	Reference	60	35	40	23	61	90	40
65l-342	Reference	27	16	20	9	39	30	18
65l-343	Reference	11	0	0	26	45	37	7
65l-379	Reference	11	0	0	7	17	7	7
65l-381	Reference	54	6	30	16	45	60	41
65o-12	Reference	11	0	0	63	56	37	7
65o-23	Reference	65	30	71	43	67	90	49
65o-24	Reference	27	84	30	8	22	30	66
65o-25	Reference	27	1	10	15	22	15	65
65g-82	Ref/Removed	0	0	0	0	0	0	0
65g-83	Ref/Removed	11	10	10	37	50	52	57

Subecoregion 65c

Station ID	Condition	Std EPT	Std Pleco	Std Tri	Std %Coleo	Std %Odon	Std %Plec	Std %Tric	Std CrCh/TC	Std Tol Tax	Std Intol Tax
65c-12	Impaired	100	100	90	41	79	18	21	100	63	100
65c-3	Impaired	42	0	38	28	98	0	33	100	90	19
65c-4	Impaired	0	0	0	16	0	0	0	43	0	0
65c-40	Impaired	100	100	100	81	92	28	40	100	54	100

Station ID	Condition	Std EPT	Std Pleco	Std Tri	Std %Coleo	Std %Odon	Std %Plec	Std %Tri	Std CrCh/TC	Std Tol Tax	Std Intol Tax
65c-5	Impaired	42	0	64	100	76	0	18	100	50	28
65c-8	Impaired	67	0	77	49	100	0	100	0	77	19
65c-88	Impaired	67	28	26	11	100	27	10	41	63	38
65c-80	Reference	100	56	100	15	99	14	37	100	63	85
65c-89	Reference	50	56	38	38	80	17	22	100	86	28
HH24	Reference	92	56	90	33	100	11	100	100	72	47
HH25	Reference	100	100	90	100	81	100	58	100	100	100
HH26	Reference	58	28	64	98	68	9	18	100	68	47

Station ID	Condition	Std %Intol	Std Beck	Std HBI	Std %Scrap	Std ScrapTax	Std %Pred	Std %Fil	Std ClngTax	Std %Cling
65c-12	Impaired	100	100	100	3	40	51	89	72	44
65c-3	Impaired	6	29	100	100	100	12	87	66	89
65c-4	Impaired	0	0	0	26	60	82	99	30	7
65c-40	Impaired	80	100	90	22	80	100	81	100	44
65c-5	Impaired	15	34	41	19	80	29	63	54	23
65c-8	Impaired	99	39	87	5	40	28	0	72	100
65c-88	Impaired	30	29	43	3	20	44	98	60	21
65c-80	Reference	31	88	55	40	100	50	90	72	39
65c-89	Reference	13	39	55	87	60	97	92	66	62
HH24	Reference	57	69	72	13	40	48	44	90	80
HH25	Reference	100	100	100	100	100	27	87	100	100
HH26	Reference	29	59	40	42	100	100	100	60	35

Subecoregion 65d

Station ID	Condition	Std Pleco	Std Tri	Std %Eph	Std %Chiro	Std %Oligo	Std %Tri	Std Hyd2Tri	Std Hyd2EPT
65d-1	Impaired	0	16	0	0	0	5	0	0
65d-20	Impaired	74	47	0	41	100	93	0	67
65d-21	Impaired	19	31	100	100	97	16	0	95
65d-32	Impaired	19	63	100	18	100	38	61	94
65d-39	Impaired	100	100	42	76	97	100	8	66
65d-14	Reference	100	63	97	78	100	100	18	84
65d-18	Reference	56	100	70	59	97	63	71	92
65d-3	Reference	0	63	84	82	97	58	107	100
65d-38	Reference	56	63	100	18	97	26	64	96
65d-4	Reference	56	63	0	100	97	83	38	92

Station ID	Condition	Std IntolTax	Std NCBI	Std %Pred	Std %Fil	Std SprawlTax	Std SwimTax
65d-1	Impaired	9	0	49	85	44	0
65d-20	Impaired	45	72	42	65	57	0
65d-21	Impaired	36	100	16	76	38	36
65d-32	Impaired	36	100	25	52	82	36
65d-39	Impaired	91	100	22	0	95	71
65d-14	Reference	100	91	52	74	32	100
65d-18	Reference	55	86	62	85	82	36
65d-3	Reference	27	48	100	100	95	71
65d-38	Reference	64	100	23	76	100	71
65d-4	Reference	45	89	29	88	51	36

Subecoregion 65g

Station ID	Condition	Std Tot Tax	Std EPT	Std Eph	Std Plec	Std Tri	Std Tanyt	Std Marga-lef	Std % EPT	Std % Plec	Std % Tant	Std % Olig	Std % Tric	Std Tant /TC
65g-10	Impaired	60	0	0	0	0	19	59	0	0	6	30	0	6
65g-130	Impaired	54	13	0	0	29	46	53	3	0	100	62	19	100
65g-135	Impaired	31	7	13	0	0	9	30	21	0	7	83	0	5
65g-137	Impaired	33	0	0	0	0	9	31	0	0	3	71	0	3
65g-14	Impaired	47	7	13	0	0	9	47	3	0	17	22	0	15
65g-17	Impaired	50	20	13	0	29	0	49	4	0	0	51	11	0
65g-4	Impaired	44	7	13	0	0	9	46	21	0	19	19	0	31
65g-69	Impaired	78	13	27	0	0	28	76	10	0	9	85	0	7
65g-8	Impaired	33	0	0	0	0	9	32	0	0	3	64	0	4
65g-84	Impaired	28	0	0	0	0	0	26	0	0	0	0	0	0
65g-120	Reference	77	46	27	0	74	83	75	17	0	100	96	40	78
65g-62	Reference	52	46	40	100	15	9	50	100	100	3	94	6	39
HH29	Reference	100	100	100	36	100	100	100	37	14	77	100	100	100
65g-82	Ref/Removed	11	0	0	0	0	0	10	0	0	0	88	0	0
65g-83	Ref/Removed	83	33	27	0	44	46	84	18	0	25	100	100	40

Station ID	Condition	Std Intol	Std % Intol	Std Beck	Std HBI	Std % Scrap	Std Scrap Tax	Std Shred Tax	Std FilTax	Std Clng Tax	Std % Cling	Std Sprawl Tax
65g-10	Impaired	15	8	12	36	25	39	30	45	41	19	100
65g-130	Impaired	15	2	12	52	6	13	15	60	10	2	92
65g-135	Impaired	0	0	0	0	0	0	30	15	0	0	61
65g-137	Impaired	0	0	6	81	0	0	45	15	0	0	41

Station ID	Condition	Std Intol	Std % Intol	Std Beck	Std HBI	Std % Scrap	Std Scrap Tax	Std Shred Tax	Std FilTax	Std Clng Tax	Std % Cling	Std Sprawl Tax
65g-14	Impaired	15	3	6	3	27	26	15	45	10	60	41
65g-17	Impaired	0	0	18	65	73	66	15	15	31	100	51
65g-4	Impaired	0	0	6	62	22	26	15	45	10	47	31
65g-69	Impaired	15	1	12	20	9	26	45	90	10	4	100
65g-8	Impaired	0	0	0	33	17	13	0	45	0	0	31
65g-84	Impaired	0	0	6	24	2	13	0	15	31	7	20
65g-120	Reference	45	8	53	97	24	39	45	100	100	100	82
65g-62	Reference	45	100	41	100	47	53	30	45	61	28	41
HH29	Reference	100	37	100	100	100	100	100	60	82	84	100
65g-82	Ref/Removed	0	0	0	78	2	13	0	15	0	0	0
65g-83	Ref/Removed	15	0	12	55	74	26	30	100	71	100	61

Subecoregion 65h

Station ID	Condition	Std Eph	Std Coleo	Std Tanyt	Std Even	Std %Eph	Std %Iso	Std %Tanyt	Std %Oligo	Std %Tanty/TC	Std IntolTax
65h-17	Impaired	0	14	0	78	0	15	0	52	0	29
65h-174	Impaired	40	14	45	97	24	100	6	89	7	59
65h-32	Impaired	0	0	9	59	0	0	3	0	9	0
65h-34	Impaired	0	14	0	37	0	95	1	67	2	0
65h-41	Impaired	20	100	9	90	10	69	1	77	2	44
65h-202	Reference	40	100	71	92	46	100	32	100	28	88
65h-203	Reference	100	29	100	87	100	100	89	96	78	74
65h-206	Reference	40	100	18	86	16	100	36	84	57	59

Station ID	Condition	Std Eph	Std Coleo	Std Tanyt	Std Even	Std %Eph	Std %Iso	Std %Tanyt	Std %Oligo	Std %Tanty/TC	Std IntolTax
65h-209	Reference	20	29	45	100	3	100	19	60	14	44
65h-212	Reference	100	57	45	82	91	100	100	100	100	100

Station ID	Condition	Std %Tol	Std NCBI	Std % Scraper	Std % Pred	Std Pred Tax	Std Filt Tax	Std Clng Tax	Std % Clng	Std Bur Tax	Std Clmb Tax
65h-17	Impaired	47	42	5	31	48	12	26	6	34	0
65h-174	Impaired	75	76	32	100	89	81	95	71	69	56
65h-32	Impaired	58	34	15	6	8	12	0	0	17	0
65h-34	Impaired	0	0	100	0	0	12	9	1	17	0
65h-41	Impaired	45	34	4	69	81	12	26	10	69	56
65h-202	Reference	87	95	52	62	100	70	86	44	86	100
65h-203	Reference	91	100	27	35	65	81	52	17	86	28
65h-206	Reference	42	47	100	100	56	35	34	23	69	28
65h-209	Reference	61	59	18	58	81	58	60	11	100	56
65h-212	Reference	100	83	7	40	56	100	100	100	17	28

Subecoregion 65k

StationID	Condition	Std %Gastro	Std %Tpod/TC	Std H2Tri	Std H2EPT	Std Scrap	Std %Coll	Std %Shred	Std %Fil
65k-102	Impaired	0	30	22	63	83	27	42	23
65k-113	Impaired	0	50	0	50	42	46	16	47
65k-128	Impaired	0	57	46	59	21	52	5	15
65k-129	Impaired	100	15	100	100	63	36	15	64

StationID	Condition	Std %Gastro	Std %Tpod/TC	Std H2Tri	Std H2EPT	Std Scrap	Std %Coll	Std %Shred	Std %Fil
65k-37	Impaired	0	96	100	100	42	49	63	68
65k-54	Reference	80	100	100	100	83	56	17	0
65k-55	Reference	70	0	75	90	100	30	100	82
65k-56	Reference	47	51	100	100	63	51	27	58
65k-68	Reference	100	91	0	0	63	83	84	89
65k-85	Reference	41	100	100	100	63	100	0	100

Subecoregion 65l

Station ID	Condition	Std EPT	Std Tri	Std Dip	Std Chiro	Std Even	Std Simp	Std %EPT	Std %Coleo	Std %Tri
65l-160	Impaired	38	0	51	50	85	72	100	22	0
65L-184	Impaired	51	83	60	40	100	100	25	100	52
65l-391	Impaired	13	21	71	74	82	73	5	15	10
65l-420	Impaired	13	0	86	84	93	90	5	19	0
65l-423	Impaired	13	0	71	60	85	72	5	68	0
65l-10	Reference	90	83	77	74	95	83	88	100	100
65l-342	Reference	38	63	74	67	73	0	15	24	31
65l-343	Reference	64	83	95	100	94	79	100	39	63
65l-379	Reference	0	0	39	30	88	88	0	40	0
65l-381	Reference	100	100	100	97	100	100	55	49	53

Station ID	Condition	Std %Tol	Std Tol Taxa	Std HBI	Std Pred Tax	Std ShredTax	Std %Filt	Std Clng Tax
65l-160	Impaired	71	84	30	48	42	26	36
65l-184	Impaired	20	0	0	100	100	67	18
65l-391	Impaired	4	54	6	38	42	100	36
65l-420	Impaired	100	48	63	87	42	49	18
65l-423	Impaired	14	42	18	58	83	76	9
65l-10	Reference	100	90	100	100	100	85	100
65l-342	Reference	100	60	99	67	63	82	36
65l-343	Reference	0	12	9	77	83	76	45
65l-379	Reference	42	100	28	29	63	100	9
65l-381	Reference	78	78	52	77	83	0	71

Subecoregion 65o

Station ID	Condition	Std Chiro	Std Tanyt	Std % Eph	Std % Col	Std % NI	Std % Oligo	Std % Dom	Std Dom Ind	Std Beck	Std NCBI	Std Scrap	Std Fil Tax	Std Bur Tax	Std Sprwl
65o-11	Impaired	40	29	5	22	44	85	77	79	55	44	33	52	33	67
65o-18	Impaired	13	0	0	5	78	67	26	26	46	85	33	26	20	78
65o-22	Impaired	48	29	0	14	78	68	45	49	9	100	67	78	39	78
65o-3	Impaired	64	71	63	74	80	99	92	92	55	42	100	100	20	100
65o-9	Impaired	11	0	0	5	0	0	0	0	9	29	67	26	13	33
65o-12	Reference	100	100	2	100	76	100	97	98	18	0	100	100	100	100
65o-23	Reference	80	100	24	52	100	93	100	100	100	61	100	78	39	100
65o-24	Reference	56	43	100	0	90	100	61	72	46	100	100	65	20	100
65o-25	Reference	35	0	12	29	81	92	57	64	46	94	33	52	39	33

Ecoregion 66

Station ID	Condition	Std Tot Tax	Std EPT	Std Plec	Std Tri	Std Even	Std SW	Std Simp	Std %Tri	Std Tpod/TC	Std IntolTax	Std %Intol
66d-38	Impaired	64	62	71	69	85	85	70	89	0	60	92
66d-43	Impaired	63	45	35	69	84	82	59	57	92	44	67
66d-48	Impaired	89	100	97	100	94	94	88	88	94	100	100
66d-49	Impaired	90	45	27	38	95	95	93	51	85	38	31
66d-50	Impaired	54	34	9	54	76	75	29	100	100	25	33
66g-30	Impaired	60	20	9	23	77	76	19	100	62	16	8
66g-31	Impaired	58	39	35	54	74	72	0	22	59	34	95
66g-39	Impaired	77	34	9	38	91	91	81	29	76	22	18
66g-42	Impaired	85	90	88	77	97	94	87	40	76	88	91
66g-44	Impaired	60	34	35	38	80	79	47	45	95	31	17
66g-65	Impaired	69	42	0	54	91	91	88	38	79	38	30
66g-71	Impaired	90	73	44	85	91	90	66	87	60	50	22
66j-17	Impaired	69	39	9	85	84	82	45	40	94	47	29
66j-25	Impaired	51	42	18	46	76	76	38	61	98	28	40
66j-26	Impaired	84	62	80	62	94	94	89	70	98	75	64
66j-27	Impaired	92	67	44	92	89	89	62	100	93	63	54
66j-9	Impaired	79	56	53	38	80	81	21	100	71	47	44
66d-40	Reference	92	87	80	92	97	97	95	78	77	82	90
66d-41	Reference	73	67	80	62	94	91	86	77	45	69	96
66d-44	Reference	72	65	80	69	85	85	70	65	98	56	70
66d-44-2	Reference	68	70	53	92	81	81	50	71	97	72	98
66d-58	Reference	64	34	27	62	80	80	58	63	95	44	44
66g-2	Reference	41	31	27	46	74	73	42	100	100	28	24

Station ID	Condition	Std Tot Tax	Std EPT	Std Plec	Std Tri	Std Even	Std SW	Std Simp	Std %Tri	Std Tpod/TC	Std IntolTax	Std %Intol
66g-2-2	Reference	64	76	88	62	91	89	84	83	84	75	100
66g-23	Reference	100	100	97	77	100	100	98	76	79	100	82
66g-5	Reference	89	98	100	69	94	94	88	78	98	97	96
66g-6	Reference	98	76	27	62	100	100	100	57	84	44	40
66j-19	Reference	100	56	71	38	94	94	76	87	85	63	47
66j-211	Reference	83	70	71	69	97	94	91	69	25	78	67
66j-23	Reference	90	79	88	100	92	92	80	76	96	72	73
66j-28	Reference	94	62	88	62	98	98	98	36	88	82	81
66j-31	Reference	84	53	44	100	89	90	75	100	44	63	47

Station ID	Condition	Std %Dom	Std DomInd	Std Beck	Std HBI	Std NCBI	Std %Pred	Std PredTax	Std %Shred	Std ShredTax	Std %Fil	Std Clng	Std Burr
66d-38	Impaired	69	65	70	89	95	50	63	55	62	68	58	83
66d-43	Impaired	73	78	56	89	65	16	40	64	47	47	64	31
66d-48	Impaired	87	85	100	100	100	49	97	38	62	66	100	63
66d-49	Impaired	93	92	54	37	17	37	68	34	39	67	58	100
66d-50	Impaired	27	25	36	67	25	15	28	9	23	23	48	52
66g-30	Impaired	17	13	22	0	0	35	28	5	31	47	35	63
66g-31	Impaired	0	9	36	93	62	47	28	3	8	90	54	31
66g-39	Impaired	73	70	32	11	34	38	57	8	23	67	64	73
66g-42	Impaired	82	87	89	89	92	91	97	7	31	74	96	21
66g-44	Impaired	60	61	40	21	5	17	34	8	31	34	35	42
66g-65	Impaired	87	85	46	36	55	26	45	13	16	41	51	31
66g-71	Impaired	57	61	56	31	38	56	74	18	70	28	67	63

Station ID	Condition	Std %Dom	Std DomInd	Std Beck	Std HBI	Std NCBI	Std %Pred	Std PredTax	Std %Shred	Std ShredTax	Std %Fil	Std Clng	Std Burr
66j-17	Impaired	38	43	54	36	23	37	45	50	23	23	80	42
66j-25	Impaired	39	31	36	52	46	5	17	4	16	4	51	52
66j-26	Impaired	81	78	91	77	57	45	63	72	85	91	67	52
66j-27	Impaired	45	38	70	53	48	16	51	16	39	4	96	83
66j-9	Impaired	11	0	56	51	26	30	51	29	54	31	58	73
66d-40	Reference	95	94	76	89	99	82	97	25	70	48	100	94
66d-41	Reference	90	96	80	94	93	100	100	42	62	56	73	83
66d-44	Reference	79	78	72	84	74	42	68	100	62	60	70	63
66d-44-2	Reference	57	52	76	100	96	42	74	96	78	52	61	83
66d-58	Reference	73	70	46	31	61	26	68	43	31	76	48	63
66g-2	Reference	54	54	38	62	58	60	57	1	8	50	61	42
66g-2-2	Reference	86	90	80	100	100	33	45	99	78	100	45	63
66g-23	Reference	91	90	100	85	94	47	97	36	70	90	89	100
66g-5	Reference	81	78	99	90	83	50	80	41	62	56	89	73
66g-6	Reference	100	100	52	49	61	77	91	4	23	75	99	94
66j-19	Reference	55	49	78	53	32	26	63	24	62	40	58	94
66j-211	Reference	93	99	85	62	65	98	91	47	62	79	83	52
66j-23	Reference	71	67	78	74	61	50	80	78	93	47	77	83
66j-28	Reference	99	99	82	86	72	30	68	69	100	88	38	73
66j-31	Reference	79	76	70	43	43	59	45	13	54	0	64	52

Subecoregion 66d

Station ID	Condition	Std EPT	Std Dip	Std %Chir	Std %Odon	Std %Plec	Std Tol Taxa	Std %Tol	Std Intol Taxa	Std %Intol
66d-38	Impaired	74	57	100	54	57	79	82	75	95
66d-43	Impaired	54	73	73	79	66	50	76	55	69
66d-48	Impaired	100	67	98	54	34	86	92	100	100
66d-49	Impaired	54	100	0	45	22	0	31	47	32
66d-50	Impaired	40	70	43	51	1	43	74	31	34
66d-40	Reference	100	87	87	91	50	71	90	100	92
66d-41	Reference	81	53	100	0	80	71	83	87	99
66d-44	Reference	77	83	77	100	99	71	60	71	72
66d-44-2	Reference	84	77	87	82	100	100	100	91	100
66d-58	Reference	40	100	10	100	37	43	0	55	45

Station ID	Condition	Std %Dom	Std Beck	Std NCBI	Std %Pred	Std Pred	Std %Shred	Std Shred Taxa	Std Cling Taxa	Std Bur Taxa
66d-38	Impaired	63	88	96	50	59	55	82	60	91
66d-43	Impaired	68	71	59	16	38	64	61	66	34
66d-48	Impaired	89	100	100	49	91	38	82	100	68
66d-49	Impaired	99	68	0	36	65	34	51	60	100
66d-50	Impaired	0	45	10	15	27	9	31	50	57
66d-40	Reference	100	96	100	81	91	25	92	100	100
66d-41	Reference	93	100	94	100	100	42	82	76	91
66d-44	Reference	77	91	70	41	65	100	82	73	68
66d-44-2	Reference	45	96	97	41	70	96	100	63	91
66d-58	Reference	69	58	54	26	65	42	41	50	68

Subecoregion 66g

Station ID	Condition	Std EPT	Std Eph	Std Tric	Std Coleo	Std Simp	Std %Chiro	Std %Col	Std %Dip	Std %Pleco	Std %Tri	Std %Tpod /TC	Std Intol Taxa	Std Tol Taxa
66g-30	Impaired	19	19	31	26	20	33	5	33	2	100	8	15	9
66g-31	Impaired	38	19	71	64	0	77	31	80	87	23	0	33	66
66g-39	Impaired	33	38	51	77	80	9	25	11	2	30	40	21	0
66g-42	Impaired	87	75	100	38	86	39	15	35	48	42	39	84	38
66g-44	Impaired	33	19	51	51	47	0	9	0	9	46	83	30	19
66g-65	Impaired	41	50	71	64	87	24	38	25	0	39	46	36	28
66g-71	Impaired	71	63	100	51	66	51	7	46	24	90	2	48	38
66g-2	Reference	30	13	61	100	43	100	100	100	23	100	100	27	100
66g-2-2	Reference	74	56	82	26	83	86	5	85	100	85	57	72	75
66g-23	Reference	100	100	100	64	97	66	22	67	42	79	47	100	85
66g-5	Reference	96	88	92	64	87	68	23	67	71	80	91	93	85
66g-6	Reference	74	100	82	90	100	66	43	61	17	59	57	42	19

Station ID	Condition	Std Intol%	Std %Dom	Std DomInd	Std Beck	Std HBI	Std NCBI	Std %Scrap	Std ScrapTax	Std %Pred	Std ClngTax	Std %Clng	Std BurTax
66g-30	Impaired	8	17	5	22	0	0	84	42	48	36	61	57
66g-31	Impaired	92	0	0	35	94	62	67	42	64	56	34	28
66g-39	Impaired	18	73	66	31	11	34	47	63	52	66	36	66
66g-42	Impaired	88	82	86	89	90	91	33	52	100	99	70	19
66g-44	Impaired	17	60	56	39	21	4	88	42	23	36	48	38
66g-65	Impaired	29	87	83	45	36	54	22	42	36	53	32	28
66g-71	Impaired	22	57	56	55	31	38	93	42	77	69	60	57

Station ID	Condition	Std Intol%	Std %Dom	Std DomInd	Std Beck	Std HBI	Std NCBI	Std %Scrap	Std ScrapTax	Std %Pred	Std ClngTax	Std %Clng	Std BurTax
66g-2	Reference	23	54	49	37	62	58	100	63	81	63	100	38
66g-2-2	Reference	100	86	88	79	100	100	51	31	46	46	35	57
66g-23	Reference	79	91	88	100	85	94	85	83	64	92	62	100
66g-5	Reference	93	81	76	98	90	82	89	100	69	92	76	66
66g-6	Reference	39	100	100	51	49	61	90	73	100	100	69	85

Subecoregion 66j

Station ID	Condition	Std Pleco	Std Even	Std Marga-lef	Std SW	Std Simp	Std %NI	Std %Tanyt	Std %Oligo	Std Tnyt2 chi	Std %Intol	Std %Dom
66j-17	Impaired	10	86	72	84	32	62	53	0	48	37	31
66j-25	Impaired	20	78	51	78	22	48	4	56	5	50	31
66j-26	Impaired	90	96	85	97	90	96	15	100	18	80	80
66j-27	Impaired	50	91	93	92	55	48	11	100	24	68	39
66j-9	Impaired	60	82	80	83	0	77	14	100	51	56	0
66j-19	Reference	80	97	100	97	73	100	14	100	19	60	51
66j-211	Reference	80	99	86	97	93	72	47	48	47	84	95
66j-23	Reference	100	95	92	95	78	0	18	78	30	92	69
66j-28	Reference	100	100	96	100	100	67	51	100	58	100	100
66j-31	Reference	50	92	85	92	72	77	100	78	100	60	78

Station ID	Condition	Std DomInd	Std HBI	Std Cllt Tax	Std PredTax	Std Shred Tax	Std %Filt	Std Sprawl Tax
66j-17	Impaired	43	0	46	51	21	26	51
66j-25	Impaired	32	32	53	19	14	4	42
66j-26	Impaired	80	87	69	71	76	100	88
66j-27	Impaired	39	36	69	58	35	4	51
66j-9	Impaired	0	31	53	58	49	35	74
66j-19	Reference	50	35	100	71	56	46	93
66j-211	Reference	100	54	59	100	56	92	83
66j-23	Reference	68	80	63	90	83	54	60
66j-28	Reference	100	100	79	77	100	100	100
66j-31	Reference	77	15	69	51	49	0	69

Ecoregion 67

Station ID	Condition	Std EPT	Std Eph	Std Plec	Std% EPT	Std %Eph	Std %Gast	Std %Iso	Std %Odon	Std %Plec	Std %Orth /TC	Std % Tpod /TC
67f&I-1	Impaired	18	32	0	13	20	14	100	0	0	0	75
67f&I-11	Impaired	31	11	0	7	2	63	83	67	0	56	12
67f&I-20	Impaired	13	11	0	9	2	22	75	94	0	61	14
67f&i-33	Impaired	18	0	0	7	0	100	79	100	0	62	0
67f&I-5	Impaired	22	11	0	26	19	49	100	64	0	66	93
67g-1	Impaired	35	43	0	38	17	73	100	79	0	11	57
67g-19	Impaired	48	53	0	56	36	60	100	92	0	21	9
67g-6	Impaired	39	32	44	72	6	5	0	100	100	38	100

Station ID	Condition	Std EPT	Std Eph	Std Plec	Std% EPT	Std %Eph	Std %Gast	Std %Iso	Std %Odon	Std %Plec	Std %Orth /TC	Std % Tpod /TC
67g-7	Impaired	26	43	0	98	100	6	86	79	0	22	99
67g-9	Impaired	18	11	0	6	5	4	75	53	0	1	45
67h-5	Impaired	100	74	100	89	61	0	60	75	21	17	100
67h-8	Impaired	79	53	15	85	24	0	42	100	57	24	59
67f&i-16	Reference	61	43	88	100	41	4	89	100	100	83	27
67f&i-17	Reference	48	43	88	49	78	38	100	100	15	58	61
67f&i-25	Reference	66	43	44	39	24	63	100	83	6	44	61
67f&i-27	Reference	26	11	0	93	25	7	88	86	0	95	100
67f&i-37	Reference	75	85	44	75	100	39	88	75	8	30	86
67g-11	Reference	92	74	88	75	17	75	100	92	23	45	51
67g-12	Reference	35	43	29	23	20	45	100	94	22	36	60
67g-13	Reference	48	32	74	36	14	25	100	94	52	82	99
67g-15	Reference	18	21	0	7	8	3	60	86	0	100	94
67h-2	Reference	100	100	44	72	51	81	100	81	13	36	78
67h-3	Reference	61	96	44	66	100	100	100	88	20	20	14
67h-4	Reference	79	64	59	94	32	90	94	86	60	53	85
67h-9	Reference	96	85	100	63	38	70	100	100	56	47	63
67g-2	Ref/Removed	4	0	0	9	0	18	94	18	0	0	29

Station ID	Condition	Std Hyd2Tri	Std Hyd2EPT	Std HBI	Std NCBI	Std Scrap	Std Cllt	Std Shred	Std Cling	Std %Cling	Std Sprawl
67f&l-1	Impaired	0	81	10	14	28	59	13	26	41	37
67f&l-11	Impaired	71	71	39	61	37	100	63	35	19	91
67f&l-20	Impaired	100	100	10	16	46	67	13	18	16	61
67f&i-33	Impaired	13	0	86	97	9	42	38	31	15	24
67f&l-5	Impaired	59	71	44	56	28	59	38	48	57	61
67g-1	Impaired	8	20	48	50	46	42	38	57	53	24
67g-19	Impaired	68	76	64	79	56	76	13	83	71	85
67g-6	Impaired	25	95	55	58	37	38	25	48	42	37
67g-7	Impaired	100	100	9	9	93	63	63	61	33	43
67g-9	Impaired	50	67	7	16	56	76	25	26	6	61
67h-5	Impaired	41	65	64	88	37	63	100	100	85	73
67h-8	Impaired	95	97	42	49	37	67	63	83	77	61
67f&i-16	Reference	95	99	77	83	46	76	100	53	58	91
67f&i-17	Reference	100	100	74	72	46	84	50	61	65	100
67f&i-25	Reference	65	76	79	88	65	88	25	100	81	61
67f&i-27	Reference	49	51	45	63	56	71	25	61	100	43
67f&i-37	Reference	63	90	57	65	65	97	100	61	48	79
67g-11	Reference	72	76	78	78	93	84	63	66	61	55
67g-12	Reference	67	95	41	35	74	92	63	61	53	98
67g-13	Reference	100	100	83	90	28	63	63	39	97	55
67g-15	Reference	100	100	0	0	37	100	38	22	7	61
67h-2	Reference	91	94	93	97	100	76	75	96	66	67
67h-3	Reference	100	100	84	69	65	34	38	75	60	24
67h-4	Reference	66	79	97	93	56	46	100	66	60	49

Station ID	Condition	Std Hyd2Tri	Std Hyd2EPT	Std HBI	Std NCBI	Std Scrap	Std Cllt	Std Shred	Std Cling	Std %Cling	Std Sprawl
67h-9	Reference	95	98	100	100	65	55	100	79	86	43
67g-2	Ref/Removed	100	100	24	37	56	67	38	31	43	79

Subecoregion 67f&i

Station ID	Condition	Std Total Tax	Std EPT Tax	Std Ephem Tax	Std Pleco Tax	Std Chiro Tax	Std Margalef	Std EPT %	Std Ephem %	Std Chiro %	Std Dip %	Std % Non Insect
67f&I-1	Impaired	55	24	42	0	56	56	12	21	0	0	60
67f&I-11	Impaired	100	42	14	0	100	100	7	2	51	51	40
67f&I-20	Impaired	64	18	14	0	73	63	9	2	63	54	0
67f&i-33	Impaired	45	24	0	0	24	44	7	0	100	100	0
67f&I-5	Impaired	64	30	14	0	73	63	24	20	30	39	70
67f&i-16	Reference	68	84	56	100	59	67	100	43	100	64	100
67f&i-17	Reference	81	66	56	100	100	81	46	82	72	17	78
67f&i-25	Reference	100	90	56	50	94	100	37	25	72	62	65
67f&i-27	Reference	68	36	14	0	80	67	88	27	66	68	98
67f&i-37	Reference	84	100	100	50	84	84	70	100	76	100	65

Station ID	Condition	Std Pleco %	Std Oligo %	Std Trich %	Std Intol Tax	Std Intol %	Std Beck	Std HBI	Std NCBI	Std Scrap Tax	Std Cllct Tax	Std Clngr Tax	Std Clngr %
67f&I-1	Impaired	0	0	3	11	9	11	0	0	43	62	27	41
67f&I-11	Impaired	0	88	9	23	43	43	43	64	57	100	36	19
67f&I-20	Impaired	0	19	12	23	19	21	0	2	71	71	18	16

Station ID	Condition	Std Pleco %	Std Oligo %	Std Trich %	Std Intol Tax	Std Intol %	Std Beck	Std HBI	Std NCBI	Std Scrap Tax	Std Cllct Tax	Std Clngr Tax	Std Clngr %
67f&i-33	Impaired	0	75	11	23	100	32	100	100	14	44	32	15
67f&I-5	Impaired	0	93	22	23	44	32	50	58	43	62	50	57
67f&i-16	Reference	100	97	26	46	100	60	98	94	71	80	55	58
67f&i-17	Reference	11	97	1	63	87	67	94	79	71	88	64	65
67f&i-25	Reference	5	100	34	100	100	100	100	100	100	93	100	81
67f&i-27	Reference	0	97	100	29	42	46	51	67	86	75	64	100
67f&i-37	Reference	6	64	25	57	48	74	68	70	100	100	64	48

Subecoregion 67g

StationID	Condition	Std Pleco	Std Dip	Std Chiro	Std %Plec	Std %Orth/TC	Std Hyd2Tri	Std Baet/Eph	Std Intol Tax
67g-1	Impaired	0	38	22	0	11	0	0	35
67g-19	Impaired	0	73	72	0	20	65	64	70
67g-6	Impaired	51	30	28	100	36	18	0	42
67g-7	Impaired	0	44	44	0	21	100	2	28
67g-9	Impaired	0	98	94	0	1	46	0	35
67g-11	Reference	100	65	54	48	43	70	68	100
67g-12	Reference	34	100	100	46	35	64	0	70
67g-13	Reference	85	63	60	100	79	100	100	70
67g-15	Reference	0	65	57	0	100	100	34	14
67g-2	Ref/Removed	0	90	79	0	5	0	0	35

StationID	Condition	Std Beck	Std HBI	Std NCBI	Std Cllt Tax	Std Shred Tax	Std %Clng	Std Bur Tax	Std Sprawl Tax
67g-1	Impaired	30	58	58	41	60	58	89	26
67g-19	Impaired	60	78	90	73	20	78	38	93
67g-6	Impaired	42	67	66	37	40	46	0	40
67g-7	Impaired	34	11	11	61	100	36	64	46
67g-9	Impaired	30	9	18	73	40	7	100	66
67g-11	Reference	100	96	90	81	100	67	64	60
67g-12	Reference	60	50	41	90	100	58	89	100
67g-13	Reference	68	100	100	61	100	100	13	60
67g-15	Reference	38	0	0	100	60	7	100	66
67g-2	Ref/Removed	23	30	43	65	60	47	100	86

Subecoregion 67h

Station ID	Condition	Std Eph	Std Pleco	Std %Chiro	Std % Gast	Std %Iso	Std Orth /TC	Std Tol Tax	Std % Tol	Std % Intol	Std HBI	Std % Scrap	Std Scrap Tax	Std Swm Tax
67h-5	Impaired	71	95	25	0	29	34	0	58	41	37	36	36	50
67h-8	Impaired	51	14	0	0	0	46	33	0	25	0	11	36	50
67h-2	Reference	100	41	59	73	100	69	100	91	84	84	89	100	100
67h-3	Reference	91	41	50	100	100	39	33	85	83	69	100	62	100
67h-4	Reference	61	54	98	81	83	100	100	89	90	91	87	53	0
67h-9	Reference	81	100	100	63	100	90	100	100	100	100	59	62	100

Ecoregion 68

Station ID	Condition	Std Eph	Std Plec	Std % Odon	Std %Ple	Std TPod /TC	Std Hyd 2Tri	Std Hyd 2EPT	Std % Intol	Std HBI	Std NCBI	Std % Scrap	Std Scrap Tax	Std % Clng
68c&d-1	Impaired	88	25	100	7	55	0	23	23	54	51	30	45	100
68c&d-10	Impaired	15	25	0	17	2	11	0	12	20	28	32	60	52
68c&d-3	Impaired	0	0	49	0	28	100	100	1	0	0	11	45	20
68c&d-7	Impaired	29	50	53	87	0	100	100	17	33	46	7	30	31
68c&d-8	Impaired	73	100	97	100	7	58	82	34	59	60	9	45	90
68c&d-4	Reference	29	75	76	47	23	100	100	100	100	100	100	75	91
68c&d-5	Reference	100	100	100	67	31	88	94	52	61	78	18	100	100
68c&d-6	Reference	88	100	100	96	76	96	97	66	68	69	20	60	100
68c&d-9	Reference	44	100	100	100	100	100	100	20	45	37	1	15	2

Ecoregion 75

Station ID	Condition	Std NonInsect%	Std %Odon	Std %Oligo	Std Tpod/TC	Std HBI
75e-20	Impaired	88	86	89	100	56
75e-3	Impaired	42	100	61	100	51
75e-36	Impaired	27	90	81	91	49
75e-46	Impaired	28	81	92	56	19
75e-54	Impaired	82	55	99	77	82
75f-127	Impaired	75	100	90	88	75
75f-137	Impaired	27	86	100	82	79

Station ID	Condition	Std % Non Insect	Std %Odon	Std %Oligo	Std Tpod/TC	Std HBI
75f-44	Impaired	79	89	94	97	20
75f-45	Impaired	17	90	50	56	32
75f-50	Impaired	17	81	70	44	36
75h-1	Impaired	37	100	92	100	50
75h-41	Impaired	33	100	38	100	38
75h-47	Impaired	50	100	64	100	55
75h-69	Impaired	18	100	66	100	56
75h-70	Impaired	60	57	100	87	68
75h-72	Impaired	9	100	0	100	33
75j-11	Impaired	42	55	56	98	35
75j-12	Impaired	45	86	67	96	25
75j-13	Impaired	95	100	98	98	48
75j-2	Impaired	92	95	94	71	33
75j-21	Impaired	68	100	97	100	55
75j-23	Impaired	13	100	55	100	64
75j-24	Impaired	5	100	100	100	72
75j-3	Impaired	0	100	97	49	54
75j-3-1	Impaired	13	82	9	100	32
75j-4	Impaired	99	100	97	0	0
75e-23	Reference	93	100	99	100	67
75e-59	Reference	87	95	99	97	46
75e-60	Reference	86	91	99	82	48
75e-69	Reference	95	100	100	99	45
75e-78	Reference	83	100	100	100	56
75f-124	Reference	25	100	97	96	83

Station ID	Condition	Std NonInsect%	Std %Odon	Std %Oligo	Std Tpod/TC	Std HBI
75f-126	Reference	80	100	90	100	4
75f-61	Reference	7	100	100	100	53
75f-91	Reference	100	100	100	100	58
75f-95	Reference	62	100	96	100	51
75h-10	Reference	90	100	95	100	100
75h-35	Reference	100	100	98	100	100
75h-45	Reference	99	100	100	100	58
75h-60	Reference	71	68	95	100	70
75h-66	Reference	95	0	99	65	56
75j-10	Reference	90	100	99	99	60
75j-15	Reference	67	95	98	99	51
75j-16	Reference	100	100	100	100	68
75j-25	Reference	55	95	93	98	42
75j-26	Reference	74	95	99	99	49
75j-31	Reference	70	80	95	97	20
75j-37	Reference	100	94	99	91	35
75j-41	Reference	7	100	97	100	74
75j-5	Reference	78	64	92	100	36
75j-29	Ref/Removed	0	95	99	100	37

Subecoregion 75e

Station ID	Condition	Std % Amp	Std % Iso	Std % NI	Std % Odon	Std % Oligo	Std Tpod /TC	Std CrCh /TC	Std DomInd	Std TolTax	Std %Cllt	Std %Fil	Std % Clng
75e-20	Impaired	95	100	90	70	71	100	96	10	34	53	91	77
75e-3	Impaired	32	100	22	100	0	100	100	82	62	100	44	23
75e-36	Impaired	23	0	0	78	52	80	100	55	48	100	95	8
75e-46	Impaired	0	100	2	57	80	0	20	21	14	55	98	0
75e-54	Impaired	100	83	80	0	98	49	97	100	27	91	0	100
75e-23	Reference	26	96	97	100	97	100	100	0	89	55	95	19
75e-59	Reference	100	92	89	90	98	94	100	73	41	63	1	100
75e-60	Reference	63	86	87	80	98	59	100	100	0	90	96	85
75e-69	Reference	42	100	100	100	100	97	0	42	100	81	97	10
75e-78	Reference	63	80	83	100	99	100	100	68	75	100	100	0

Subecoregion 75f

Station ID	Condition	Std Dip	Std Chiro	Std % Amp	Std %NI	Std % Odon	Std % Oligo	Std Tpod /TC	Std HBI	Std Tol Tax	Std Cllt Tax	Std % Fil	Std Bur Tax
75f-127	Impaired	100	100	100	74	100	79	80	100	23	100	0	94
75f-137	Impaired	100	93	59	22	29	100	68	100	23	100	29	31
75f-44	Impaired	100	84	0	79	44	88	94	31	0	100	100	78
75f-45	Impaired	33	34	0	10	49	0	23	52	56	58	0	16
75f-50	Impaired	50	34	0	11	0	41	0	60	23	58	62	16
75f-126	Reference	67	25	100	80	100	81	100	0	34	88	97	31

Station ID	Condition	Std Dip	Std Chiro	Std % Amp	Std %NI	Std % Odon	Std % Oligo	Std Tpod /TC	Std HBI	Std Tol Tax	Std Cllt Tax	Std %Fil	Std Bur Tax
75f-61	Reference	42	42	15	0	100	100	100	91	100	58	100	16
75f-91	Reference	100	100	0	100	100	100	99	100	90	88	100	47
75f-95	Reference	100	93	7	60	100	91	100	87	56	100	94	100

Subecoregion 75h

Station ID	Condition	Std Total Tax	Std Chiro	Std Margalef	Std %NI	Std %Oligo	Std %Tol	Std HBI	Std % Shred	Std Shred Tax	Std Sprwl Tax
75h-1	Impaired	58	64	58	31	92	23	23	92	100	21
75h-41	Impaired	40	41	39	27	38	9	7	8	23	21
75h-47	Impaired	52	60	51	45	64	44	30	7	23	32
75h-69	Impaired	15	5	23	11	66	34	31	0	0	0
75h-70	Impaired	73	92	73	56	100	67	48	0	0	85
75h-72	Impaired	25	0	25	0	0	0	0	0	0	0
75h-10	Reference	38	32	37	90	95	66	95	47	45	53
75h-35	Reference	27	37	26	100	99	100	100	0	0	43
75h-45	Reference	33	60	33	99	100	92	34	17	45	32
75h-60	Reference	83	60	83	69	95	43	50	21	45	74
75h-66	Reference	100	100	100	95	99	60	31	100	100	100

Subecoregion 75j

StationID	Condition	Std % Oligo	Std %Tol	Std HBI	Std NCBI	Std Pred Tax	Std %Shred	Std Shred Tax
75j-11	Impaired	52	23	45	32	33	0	0
75j-12	Impaired	64	2	32	38	56	23	100
75j-13	Impaired	99	97	62	38	56	46	50
75j-2	Impaired	94	75	43	19	89	8	50
75j-21	Impaired	97	39	71	29	0	100	50
75j-23	Impaired	51	44	82	3	0	0	0
75j-24	Impaired	100	100	93	23	0	0	0
75j-3	Impaired	96	15	70	32	11	0	0
75j-3-1	Impaired	0	3	40	15	11	30	50
75j-4	Impaired	96	100	0	0	22	0	0
75f-124	Reference	96	88	100	20	44	0	0
75j-10	Reference	99	100	77	13	33	18	100
75j-15	Reference	98	99	66	8	78	76	100
75j-16	Reference	100	100	87	0	0	25	50
75j-25	Reference	93	58	54	37	44	23	100
75j-26	Reference	99	70	63	39	44	23	50
75j-29	Reference	100	0	48	27	22	8	50
75j-31	Reference	95	45	26	26	100	25	50
75j-37	Reference	99	22	45	10	44	100	50
75j-41	Reference	98	90	95	100	0	15	50
75j-5	Reference	92	40	47	17	11	0	0
75j-29	Ref/Removed	100	1	48	27	22	8	50