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Does Light Trapping for Adult Trichoptera Improve Biomonitoring of Stream Health in Appalachian River Systems?

Coleson Friedrich Wrege
Clemson University, colesonw@gmail.com

DOES LIGHT TRAPPING FOR ADULT TRICHOPTERA IMPROVE BIOMONITORING OF STREAM HEALTH IN APPALACHIAN RIVER SYSTEMS?

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Coleson Friedrich Wrege
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Drs. Michael S. Caterino and John C. Morse, Committee Co-chairs
Dr. Peter H. Adler
Dr. Patrick D. Gerard

ABSTRACT

Rapid biomonitoring with aquatic macroinvertebrates (mostly immature life stages) is a common method to assess stream health. The use of terrestrial emerging adult aquatic insects for biomonitoring has been frequently suggested yet has not been adopted in most protocols. This study explores the addition of a light trapping protocol for adult caddisflies (Trichoptera) to complement existing rapid, multi-habitat benthic biomonitoring protocols that focus on the use of a Biotic Index. Four locations in the southern Appalachian Mountains of North and South Carolina were sampled quarterly for larvae and monthly from April through October for adults. Biotic Index values (both Mixed-Rank and Species), taxa differences, lab processing times, and habitat associations of adults were compared. All locations were similar in all metrics examined. Mixed-Rank Biotic-Index (MRBI) values were consistent among larval but differed among adult sampling periods. Species Biotic-Index (SpBI) values were consistent among larval sampling periods but were lower than MRBI values. SpBI values were lower than MRBI values for adult sampling periods and exhibited less variation. There were no differences between larval and combined (larval + adult) sampling periods within MRBI or SpBI values. Taxa varied somewhat between larval and adult sampling periods but showed high similarities for those taxa with tolerance values. Lab processing times showed little variation between larval and adult communities. No adults definitely developed/emerged from a different water source than where the larvae were sampled. Due to inconclusive results, adding a light trapping event to the current biomonitoring protocols cannot be recommended. Other areas that show potential for light trapping are recommended.

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INTRODUCTION

Stream health is vital to human health and ecosystem functionality. Humans require clean water for many basic necessities (Arcipowski et al., 2017), such as drinking, sanitation, and crop irrigation (Ribolzi et al. 2010, U.S. EPA. 2015). Some industrial and manufacturing processes and recreational activities also depend on this resource (Snyder 2007, Lopes et al. 2016, Melstrom et al. 2015). Therefore, stream health impacts the economy and well-being of people relying on its water.

Streams provide habitats for various organisms. These organisms process nutrients in diverse ways (Cummins and Klug 1979, Wallace and Webster 1996) and interact under the influence of the stream's physical and chemical attributes, including the surrounding terrestrial riparian zone (Nakano and Murakami 2001, Vanni 2002). Healthy streams generally sustain sensitive and specialized species (Morse et al. 1998, Diamond et al. 2002). Additionally, species that are sensitive to pollution may be vulnerable to negative effects of climate change and require healthy stream systems as refugia against these extreme weather events (Durance and Ormerod 2007, Thomson et al. 2012). Therefore, it is critical to assess the health of streams accurately and precisely.

Scientific assessment of biological systems, or biomonitoring, has historically involved various techniques and methods. The primary biomonitoring methods used today for freshwater ecosystems investigate fish, algae, or macroinvertebrates; macroinvertebrates are the standard organisms for cost-effective, rapid biomonitoring of both short- and long-term stream health (Rosenberg and Resh 1993, Barbour et al. 1999).

In the U.S., these protocols vary among municipal and state regulatory agencies, but are based on the recommendations of the US Environmental Protection Agency (Barbour et al. 1999). In North Carolina, under the Department of Environmental Quality (NCDEQ), the protocols focus on obtaining a biotic index value, scaled from 0.0 to 10.0, that represents the mean tolerance value of the benthic community to the presence of general stressors, with lower values indicating higher ecological integrity and higher values indicating stress. The protocols have been in place for the past 35 years, with a few minor revisions as the science has improved, such as updated tolerance values for taxa (NCDEQ 2016). However, portions of the protocols could be improved.

While no protocols are without limitations, understanding or minimizing these shortcomings is critical to scientific assessments. One of the shortcomings in the NCDEQ protocols is areas not sampled or inadequately sampled, such as the hyporheic zone (area beneath and beside a stream bed where mixing of ground and surface water occur) and bank areas with fluctuating water levels. Another shortcoming includes the inability to identify many of the larvae beyond the genus level; for example, larvae for only 47% of southeastern USA Trichoptera species can be identified to the species level (Morse et al. 2017). The importance of species-level identification to separate taxa with widely ranging tolerance values within a genus was convincingly argued by Lenat and Resh (2001). There is, however, the potential to reduce or minimize these shortcomings.

One possible approach to improve aquatic biomonitoring protocols is to investigate the terrestrial riparian ecosystem by sampling emerging aquatic insect adults. Collecting adults typically allows further taxonomic resolution than is possible for larvae,

and habitats that are inadequately or not sampled at all can potentially be sampled indirectly. There are various sampling methods that could be used for this; some have been suggested for their potential for biomonitoring (e.g., Houghton et al. 2011, Cadmus et al. 2016), though none have been standardized. Therefore, protocols are investigated that could practically supplement existing protocols.

A first condition of a protocol would be that it reveals taxa missed or under-sampled due to biases or shortcomings in the benthic protocols. Another condition is that the sampling method must be rapid and cost-effective (both in the field and lab), consistent with the currently rapid nature of existing biomonitoring protocols (Barbour et al. 1999, NCDEQ 2016).

Any addition to these biomonitoring protocols requires organisms (and relevant sampling methods) likely to improve the precision of the biotic index while contributing taxa under-collected as larvae. In healthy Appalachian mountain streams, Ephemeroptera, Plecoptera, and Trichoptera (EPT) are especially well represented (Morse et al. 1993, Parker et al. 2007). While these insect orders include species with significantly different pollution sensitivities among genera and species, Trichoptera inhabit every major microhabitat (Merritt et al. 2008, Wiggins 2004). Although Diptera contain many more aquatic species than Trichoptera and inhabit similar microhabitats, they are not an exclusively aquatic order. Due to their sheer abundance and biomass, and no cost-effective way to separate aquatic emerging adults from terrestrial or semi-aquatic emerging adults, they were not considered for this study. Therefore, Trichoptera are the target organisms in this study.

Furthermore, a method that best fits all of the aforementioned criteria is essential. Recently, using light trapping as a tool for biomonitoring has been explored. Organisms studied typically include Ephemeroptera, Plecoptera, Trichoptera, and Diptera. However, black lighting for Trichoptera as a tool for biomonitoring has been often suggested (e.g., Waringer 2003, Houghton et al. 2011), giving more reason to consider the use of these organisms to improve rapid biomonitoring protocols. Light trapping is known to attract Trichoptera especially well, most of which are crepuscular (Wiggins and Currie 2008). This sampling method collects many taxa that are not frequently collected as aquatic larvae (e.g., Collier et al. 1997, Nowinszky et al. 2014a), and can collect significant numbers when functioning for only a couple of hours (Wright el al. 2013). This method has limitations, including likely missing taxa due to short, synchronous emergence periods of some species, but investigating biotic index values in this context and this protocol's ability to collect different taxa encourage its investigation. Therefore, a light trapping protocol to collect emerging adult Trichoptera will be explored for improving the precision of rapid biomonitoring of wadeable, Appalachian mountain streams.

The overall objective of this study will be to determine if adding a rapid, light-trapping event for adult caddisflies to standardized benthic sampling is a practical method to improve the precision of stream health biomonitoring.

To examine differences in pollution tolerance values obtained by separate and combined protocols, both a Mixed-Rank Biotic Index (MRBI) and Species Biotic-Index (SpBI) were compared. The MRBI included taxa that had either a genus (e.g., *Cheumatopsyche* spp, TV = 6.6) or species (e.g., *Hydropsyche sparna*, TV = 2.5)

tolerance value, whereas the SpBI only included taxa with a species tolerance value (e.g., would not include *Cheumatopsyche* spp, but would include *Hydropsyche sparna*). Taxa were compared at all levels (family, genus, and species) between adult and larval sampling efforts. Lab processing times were compared between larval and adult sampling periods. Potential larval habitat associations of adults were examined.

Sub-objective 1: Compare pollution tolerance values of larval and adult assemblages.

$H1_0$: MRBI values will not differ between larval and adult samples.

$H1_a$: MRBI values will differ between larval and adult samples.

$H2_0$: SpBI values will not differ from MRBI values within larval samples.

$H2_a$: SpBI values will differ from MRBI values within larval samples.

$H3_0$: SpBI values will not differ from MRBI values within adult samples.

$H3_a$: SpBI values will differ from MRBI values within adult samples.

$H4_0$: SpBI values will not differ from MRBI values between larval and adult samples.

$H4_a$: SpBI values will differ from MRBI values between larval and adult samples.

$H5_0$: SpBI values will differ from MRBI values between larval and (larval + adult) samples.

$H5_a$: SpBI values will differ from MRBI values between larval and (larval + adult) samples.

Sub-objective 2: Compare taxa between larval and adult sampling events.

$H6_0$: Taxa will not differ between larval and adult communities.

$H6_a$: Taxa will differ between larval and adult communities.

Sub-objective 3: Compare time spent processing larval and adult samples at each locality.

$H7_0$: Lab processing times will not differ between larval and adult samples.

$H7_a$: Lab processing times will differ between larval and adult samples.

Sub-objective 4: Examine life history of adult taxa to estimate likelihood of coming from the stream being sampled.

LITERATURE REVIEW

Stream health is vital to human health and ecosystem functionality. Humans require clean water for drinking, sanitation, and irrigation, but it is often inaccessible or difficult to obtain. Many residents of rural communities often struggle obtaining clean water (Arcipowski et al. 2017), even when they are aware of the detrimental effects of anthropogenic stressors to their water sources (Ribolzi et al. 2010). Protecting headwater streams is one way to help mitigate these detrimental effects (U.S. EPA. 2015), including reducing the risk of pathogens from cattle (Derlet et al. 2010) or other sources such as human sewage (Ranade 2010). The importance of protecting waters for recreational use is also well-documented (Lopes et al. 2016, Snyder 2007, and Melstrom et al. 2015).

To further understand healthy streams, it is imperative to study their living organisms, or biota. Organismal diversity is typically greater in unpolluted streams that naturally cycle nutrients, and it is imperative to understand how they interact and function (Vanni 2002, Cummins and Klug 1979). Furthermore, aquatic insects are at an intermediate trophic level, influenced by both bottom-up and top-down forces, underscoring their importance for study and conservation (Wallace and Webster 1996). Streams are also connected to their riparian habitats (Nakano and Murakami 2001), with both direct and indirect effects of adult emerging aquatic insects highly dependent upon stream ecological integrity (Baxter et al. 2005).

Furthermore, healthy streams allow sensitive and specialized species to persist and thrive, with southern Appalachia known to contain high diversity of these species (Morse et al. 1998, 2017). Conversely, increases in human land use are positively

correlated with declines in native mussels, fish, and macroinvertebrates (Diamond et al. 2002). Unnatural hydrological pulses restrict the ability of many insects to establish or persist (Canobbio et al. 2009). Managing these modified systems is imperative to both human and non-human health (Resh et al. 1998), including managing the riparian vegetation (Thomson et al. 2012). Where these affects may be exacerbated by climate change, it is also essential to protect and conserve headwater streams to mitigate the downstream effects in altered systems (Durance and Ormerod 2007). Therefore, protecting healthy streams and improving water quality in impaired streams requires site-specific risk assessments and management strategies (Ward et al. 2007). It is therefore critical to implement sound scientific principles to accurately and precisely assess the health, or ecological integrity, of streams.

Scientific assessment of biological systems, or biomonitoring, has historically involved various techniques and methods. Living organisms must to some degree be incorporated into stream health assessment, as the definition of pollution requires that living organisms are being impaired by some change, typically anthropogenic in nature (Spellman 2009). The earliest efforts used indicator taxa (Kolkwitz and Marsson 1908, 1909), followed by bioassays, various chemical tests, and biomonitoring, oftentimes with different organisms (Cairns and Dickson 1973). More recent methods being explored include environmental DNA or eDNA (Mächler et al. 2014, Shaw et al. 2016), or comparing aquatic insect communities in terms of their functional traits (Bady et al. 2005, Menezes et al. 2010). Although universities and other institutions are successfully exploring these methods, most agencies and consulting firms are far from ready to

implement these methods and require further evidence as to the costs and benefits of these methods. Although these and other methods may provide different, yet relevant information (e.g., Leonard and Orth 1986, Miller et al. 1988), communities of macroinvertebrates have become the standard organisms for cost-effective, rapid biomonitoring of both short- and long-term stream health. This preference is because of their ability to respond to synergistic effects of multiple stressors in the water, restricted mobility, large range of trophic levels and functional feeding groups, established pollution tolerance values, and minimal detrimental effect on the resident biota when sampling (Rosenberg and Resh 1993, Barbour et al. 1999, and Bonada et al. 2006).

Specific protocols for benthic macroinvertebrate biomonitoring vary among states, regions, and countries. Within the U.S., multimetric protocols (Barbour et al. 1999) have been developed in most states. Variations in protocol depend upon state and federal agency needs, goals, and priorities, but overall are rapid. Other countries vary in their protocols, including a tendency toward functional trait-based sampling in Europe (Bady et al. 2005, Menezes et al. 2010), and multivariate approaches in Australia (Reynoldson et al. 1997). In North Carolina, under the NC Department of Environmental Quality (NCDEQ), the protocols focus on obtaining a biotic index value, scaled from 0.0 to 10.0, that represents the mean tolerance value of the benthic community to the presence of general stressors (Lenat 1988, Engel and Voshell 2002), with lower values indicating higher ecological integrity and higher values indicating stress. The protocols have been in place for the past 35 years, with a few minor revisions as the science has

improved, such as updated tolerance values for taxa (NCDEQ 2016). However, these protocols still have shortcomings.

No scientific protocols are without limitations but understanding and attempting to minimize these shortcomings is critical to sound science. One shortcoming in the NCDEQ protocols is areas that are not sampled or inadequately sampled, such as the hyporheic zone (area beneath and beside a stream bed where mixing of ground and surface water occur) and bank areas with fluctuating water levels. Within the NCDEQ (2016) protocols, there are no methods that target the hyporheic zone, due to the difficult nature of sampling this habitat (Palmer 1993). Although the bank areas are sampled, the inability to sample them accurately when water levels fluctuate is a hindrance.

Another shortcoming includes the general inability to identify many of the larvae to species; for example, larvae for only 47% of southeastern USA Trichoptera species are identifiable at the species level (Morse et al. 2017). For Trichoptera and many other aquatic macroinvertebrates, species-level identification is critical. Congeneric species often have widely varied pollution tolerance values (e.g., *Hydropsyche* spp, 0.0-7.9, NCDEQ 2016). Other reasons for species level identification of aquatic macroinvertebrates includes life history knowledge and other ecological information (Resh and Unzicker 1975, Lenat and Resh (2001). There is the potential, however, to reduce or minimize these shortcomings in a practical manner.

Aquatic biomonitoring might be improved by incorporating additional sampling methods that provide a more comprehensive inventory of the aquatic species present. In particular it could be useful to sample adult insects that have emerged from the stream.

Various methods are used for collecting adult aquatic insects. Light trapping has been used near large rivers (Waringer 2003, Kortenhoeven 2016) and to examine the impact of a terrestrial preserve on both benthic and adult biota (Houghton 2011). Malaise traps have been used to document inland movement and dispersal patterns of various taxa (Winterbourn et al. 2007). Sticky traps have also documented movement, but more typically along stream corridors (Bird and Hynes 1981, Winterbourn and Crowe 2001). Sweep netting streamside vegetation is also a common method to collect emerging adult aquatic insects, especially those active diurnally (DeWalt et al. 1994, John Morse personal correspondence 2018). Finally, emergence trapping (Malison et al. 2010, Cadmus et al 2016) has been compared with benthic sampling to document limitations of both methods for collecting aquatic insects that emerge, stressing the importance of knowing the questions being asked to determine the usefulness of each method.

Looking to improve the current protocols in the context of the biotic index in a practical, rapid manner requires further exploration. A first condition of a protocol would be that it reveals taxa missed or under-sampled due to biases or shortcomings in the benthic protocols. An area already discussed is the hyporheic zone, of which many larvae are known to inhabit for most (Wright-Stow et al. 2006) or part of their immature lives, often retreating to this zone during times of stress or perturbation (Griffith and Perry 1993, Marchant 1995). Species also vulnerable to under sampling are those that live in root wads, more nearly lentic habitats, and emergent vegetation (NCDEQ 2016). The sampling method must also be rapid and cost-effective (in the field and lab), consistent with the currently rapid biomonitoring protocols (Barbour et al. 1999, NCDEQ 2016).

Any addition to these protocols requires organisms (and relevant sampling methods) likely to improve the precision of the biotic index while contributing taxa under-collected as larvae. In healthy Appalachian mountain streams, Ephemeroptera, Plecoptera, and Trichoptera (EPT) are especially well represented (Morse et al. 1993, 2017, Parker et al. 2007), many of which are unique to the area and of conservation concern. These insect orders include genera and species with widely ranging pollution tolerance sensitivities, but Trichoptera are known to inhabit every major microhabitat (Merritt et al. 2008, Wiggins 2004). Diptera are also well-represented in Appalachian mountain streams, exhibiting an even larger range of pollution tolerance values than Trichoptera, but they are not an exclusively aquatic order. Thus, sampling in a terrestrial environment would require separating aquatic Diptera from terrestrial Diptera, requiring more time and thus money to sort through. They are also a much more speciose group, so identification and sorting times would increase even more. Therefore, Trichoptera are the target organisms in this study.

Furthermore, a method that best fits all of the aforementioned criteria is essential. The rapid assessment criterion limits the options available for supplementary sampling. Town's-style Malaise traps, sticky traps, and emergence traps need to be left out for extended periods of time and are susceptible to human and animal damage, while light traps and sweeping of vegetation can be completed in a matter of hours. Sweeping of vegetation is known to be rather inefficient, although it often yields unique taxa (DeWalt et al. 1994). From this information, light trapping appears to be the best methodology.

Additionally, UV black lights (primary equipment used for light trapping) are known to attract Trichoptera especially well (Waringer 2003, Steiner 2010, Nowinszky et al. 2014a), most of which are crepuscular (Wiggins and Currie 2008). Light trapping collects many taxa not frequently collected as larvae (Collier et al. 1997, Nowinszky et al. 2014a), and the only meteorological condition that consistently influences caddisfly adult emergence and activity is air temperature (Crichton 1960, Nowinszky et al. 2014b). Light trapping can also collect significant numbers of Trichoptera when functioning for only a few hours (Wright el al. 2013, John Morse personal correspondence 2018).

For the purposes of biomonitoring, many of the species collected have been documented to reflect the ecological condition of the stream being sampled (MacLean 1995, Houghton 2006), while adding significant numbers of taxa to that of benthic sampling protocols (Houghton et al. 2011). Some studies (Kovats et al. 1996, Griffith et al. 1998) have documented the exponentially declining rate of inland dispersal of adult Trichoptera collected by light trapping, reflecting the hypothesis that most Trichoptera attracted to lights emerge from the water source the trap is placed near.

It remains to be seen whether the benefits of adding this method justify the costs in doing so. Therefore, light trapping for emerging adult Trichoptera is the method that will be explored for practically improving the precision of rapid biomonitoring of wadeable, Appalachian mountain streams. The limitations of light trapping are noted, but the benefits and practicality of doing so in a rapid manner make light trapping for adult Trichoptera the methodology to explore for improving the precision of rapid biomonitoring of Appalachian mountain stream health.

METHODS

STUDY SITES

Four Appalachian stream locations were selected within North and South Carolina. They are ecologically similar, with differences noted.

The Davidson River (35.2840°N, 82.8023°W, elevation 723 m) is in Pisgah National Forest, just outside Brevard, Transylvania County, NC. It is historically an ecologically healthy river with limited anthropogenic disturbances, reserved mostly for fishing (put-and-take downstream, catch-and-release upstream) and summer crowds in the river with inner-tube floating. There is also a fish hatchery and associated dam, though the site is located above this dam, limiting confounding effects on stream health.

The East Fork of the Chattooga River (34.9860°N, 83.0680°W, elevation 800 m) is upstream of the dam at the Walhalla State Fish Hatchery in Oconee County, SC. It also has a fish hatchery and associated dam, fishing pressure, and summer crowds, though it is not as large a river, with small crowds.

Whitewater River between the upper and lower falls (35.0188°N, 82.9969°W, elevation 570 m) is in Oconee County, SC. It is somewhat remote site, requiring about a 15-minute hike to reach the collection locality. The site is 550 m above Lower Whitewater Falls and is subjected to fly fishing and summer crowds. The crowds are typically smaller, due to its semi-remote location.

Matthews Creek at Asbury Hills United Methodist Youth Camp (35.0803°N, 82.6352°W, elevation 402 m) is in Greenville County, SC. This site has regular summer disturbance of the stream, as it is located within a youth camp that is busy throughout the

summer months. It is subjected to minimal fishing pressure throughout the rest of the year.

EQUIPMENT/PROTOCOLS: Larvae

Modified protocols of the NCDEQ and South Carolina Department of Health and Environmental Control (SCDHEC) were used for benthic sampling quarterly in January, March, July, and November 2017 (some dates in 2016/2018). For each sampling date, the pre-macroinvertebrate sampling protocols were as follows: First, all pertinent locality data were recorded. Then, habitat with basic stream characteristics, flow, weather, and canopy conditions was assessed. Finally, water quality metrics were taken with a YSI meter (water temperature, pH, DO (% and mg/L), and conductivity) and recorded, as per NCDEQ (2016). Appendix A contains a sample data sheet showing all information that was collected (modified after NCDEQ 2016).

Next, aquatic insects were collected as follows: two kick net samples were performed at each location. This was a two-person effort and was performed for 2 minutes (+/- 30 sec) to disturb substrate 2 meters upstream of where the kick net was placed. The bottom edge of the kick net was secured on the stream substrate by rocks to keep organisms from drifting under the net, and water and insects were not allowed to spill over the top of the net. The kick net was lifted out of the stream after the allotted time had elapsed and washed into a white pan for picking in the field, with aquatic insects being placed in vials containing 95% EtOH.

Subsequently, 3 D-frame sweep net (dip net) samples were used to sample areas missed by the riffle kick nets. Target areas included undercut banks, emergent vegetation,

sandy areas, slow moving water, and in areas where the aforementioned habitats were lacking, sweeps were made on bedrock or boulders, particularly where *Podostemum* (Podostemaceae) mats or moss were present. Jabs with the dip nets yielded approximately a softball worth of organic material. After each of the 3 dip net samples were collected, they were placed into a white pan and aquatic insects were picked and placed in 95% EtOH.

The sand sampling protocols outlined in NCDEQ (2016) were not specifically used (different type of net), but sand habitats, where present, were sampled with a dip net in much the same manner. Substrate was either disturbed from upstream of the net or the first few centimeters of substrate were collected. The collected material was placed in a white pan and aquatic insects were picked and placed in 95% EtOH.

A leaf pack sample was collected and washed in a sieve bucket. Enough leaf matter was collected to fill the empty bucket about half full. Then, the bucket was filled to within 8-10 cm from the top with river water, and most of the leaves were washed and removed by hand. The aquatic insects and detrital matter left in the bottom of the bucket were backwashed into a white pan, and aquatic insects were picked and placed in 95% EtOH.

Next, one fine mesh sample was collected. This protocol is modified from the NCDEQ (2016) protocols as this method specifically targets chironomids, and chironomid identifications were not a part of these protocols. To accomplish these protocols, submerged rocks and logs were lifted from the water, scrubbed, and rinsed into a white tub. The collected materials were then poured into a fine mesh sampler called a

"chironomid-getter." This device, made of 2 pieces of fitted and cut 10.16-cm (4-inch) PVC pipe with 200-micron mesh between them, once filled with enough material (until approximately one thumb width of material was retained on the filter screen), was placed into a container filled with 95% ethanol, and let soak for ~20 minutes. It was then backwashed into a white pan with water, and the organisms that floated to the top were collected, as well as any others in the pan, and placed in 95% EtOH.

The last method was visual sampling. In this procedure, rocks and logs were lifted from the water and inspected, and aquatic insects that were not typically removed or disturbed by the other sampling methods were picked from these substrates. Particular emphasis is noted on some highly cryptic taxa (e.g., *Polycentropus*, *Nyctiophylax*, and *Ceraclea*), others that often retreat into rock crevices (e.g., *Neophylax*) or sometimes are found firmly clinging to the surface of the rock (e.g., *Glossosoma*), and other small taxa (e.g., *Leucotrichia* and *Hydroptilla*). This collecting took place for a total of 45 minutes, distributed among the number of individuals looking for insects (e.g., 23 minutes each for two collectors, 15 minutes each for 3 collectors).

All larvae were taken back to the lab and the alcohol from the field was replaced with fresh alcohol (80%) within a few days. These organisms were stored to be identified.

PROTOCOLS AND EQUIPMENT: Adults

Monthly during April through October 2017, at each of the same four locations, a 15-watt fluorescent ultraviolet light tube (F15TB/350BL), operated with a 12-volt battery and DC/AC power converter, was suspended over alcohol in a white pan within a meter of the water's edge across from a riffle during a 2.5-hour period beginning 20 minutes after

sunset (Wright et al. 2013, John Morse personal communication 2018). Sites were sampled within a week of each other. For April through July (spring/summer), sites were sampled from the lowest elevation to highest elevation over a week's time; for August through October (summer/fall), sites were sampled from highest to lowest elevation over a week's time. This sampling order was intended to correspond to slightly different emergence times anticipated due to the changes in elevation. Weather conditions for adult sampling, including moon phase, humidity, precipitation, and wind speed and direction (measured with a handheld anemometer and supplemented with local weather station data) were collected every 15 minutes; see Appendix D for data collection sheet.

PROTOCOLS AND EQUIPMENT: Lab

All larvae and up to 200 adults were identified from each sample, using a plankton splitter to subsample as necessary. Trichoptera were fixed in 80% EtOH, identified to the most refined level possible with current literature, and vouchered in the Clemson University Arthropod Collection (CUAC).

The overall objective of this study was to determine if adding a rapid, light-trapping event for adult caddisflies to standardized benthic sampling is a practical method to improve the accuracy and precision of stream health biomonitoring. For all statistical analyses, an ANOVA was run in JMP Pro 13 (JMP®, 2016), followed by a Fisher's LSD for significant pair-wise comparisons, and F-tests to analyze differences between factor interactions.

SUB-OBJECTIVE 1:

Compare pollution tolerance values of larval and adult assemblages.

The North Carolina Mixed-Rank Biotic Index (MRBI) was used to compare pollution tolerance values (of both genus and species) between larval and adult samples. Additionally, a modified Biotic Index, henceforth called the Species Biotic Index (SpBI), was compared between sites. This index only considered tolerance values for which a species level designation had been assigned. This Species Biotic Index was compared within larvae, within adults, and to the NC Biotic Index between larvae and adults to determine if taxa given only a genus level tolerance value were skewing the data. Finally, the MRBI and SpBI were compared between larval and (larval + adult) samples.

SUB-OBJECTIVE 2:

Compare taxa between larval and adult sampling events.

The Shannon Biodiversity index compared taxa diversity between sites for larval and adult communities. This examines species diversity while accounting for both evenness and abundance (Shannon and Wiener 1963).

EstimateS was used to examine the overall communities at each location and to determine if a consistent sampling period yielded new information across locations. Both Diversity and Shared Species estimates were calculated.

Diversity estimates: Abundance Coverage-based Estimator (ACE) and Chao 1. Abundance-based (rather than Incidence-based) estimators were used because the data were semi-quantitative. Diversity settings: 10000 runs (number of randomizations), extrapolation by a factor of 2, estimate at every sample, bias-corrected formula for Chao1, 2 considered upper abundance limit for Rare or Infrequent species, and randomize individuals without replacement. Species accumulation and rarefaction curves were

computed for all sites and sampling periods, with Chao1 estimates of total species richness. Other Diversity estimates: Fisher's α Diversity, Uniques, Duplicates, and Sørensen Richness Indices. Shared Species settings: 2 considered upper abundance limit for Rare or Infrequent species.

SUB-OBJECTIVE 3:

Compare time spent processing larval and adult samples at each locality.

Samples from each method for each locality were timed to the nearest quarter hour. Time spent processing in the lab and identifying the insects were timed separately. Total lab processing times, identification times per individual, and identification times per taxon were compared between larvae and adults for the month of July and for the last samples at each locality (October for adults, Winter for larvae).

SUB-OBJECTIVE 4:

Examine life history of adult taxa to estimate likelihood of emergence from a different water source.

Adult caddisfly species life history was examined (where known) to hypothesize likelihood of individuals emerging from a different water source.

TIME LINE:

Davidson River larval samples: 07 November 2016 (Fall); 03 January 2017 (Winter); 21 March 2017 (Spring); 11 July 2017 (Summer). Whitewater River larval samples: 18 March 2017 (Spring); 22 July 2017 (Summer); 11 November 2017 (Fall); 20 January 2018 (Winter). East Fork Chattooga River larval samples: 18 March 2017 (Spring); 22 July 2017 (Summer); 11 November 2017 (Fall); 20 January 2018 (Winter). Matthew's

Creek larval samples: 24 March 2017 (Spring); 22 July 2017 (Summer); 10 November 2017 (Fall); 23 January 2018 (Winter).

Davidson River adult samples: 11 April 2017, 16 May 2017, 13 June 2017, 12 July 2017, 15 August 2017, 16 September 2017, 13 October 2017. Whitewater River adult samples: 09 April 2017, 14 May 2017, 12 June 2017, 16 July 2017, 17 August 2017, 18 September 2017, 20 October 2017. East Fork Chattooga River adult samples: 13 April 2017, 17 May 2017, 14 June 2017, 18 July 2017, 11 August 2017, 15 September 2017, 11 October 2017. Matthew's Creek adult samples: 08 April 2017, 11 May 2017, 09 June 2017, 15 July 2017, 12 August 2017, 21 September 2017, 22 Oct 2017.

RESULTS

HABITAT PARAMETERS

Larval (Tables 1, 2) and adult (Table 3) habitat parameters were similar between locations and sampling periods. The only factor that had an influence on adult Trichoptera collecting was low temperature at the first and last sampling periods.

Table 1. Chemical water parameters from each larval sampling period, collected in 2017. DO=Dissolved Oxygen. South Carolina location: MC = Matthew's Creek, WW = Whitewater River, EFC = East Fork Chattooga River. North Carolina location: DR = Davidson River.

Season	Location	Temperature (°C)	DO (%)	DO (mg/L)	pH	Conductivity (μS/cm)
Spring	MC	9.20	95.80	11.04	7.35	17.80
	WW	6.40	98.40	12.11	7.61	12.60
	EFC	8.40	99.80	11.65	7.40	14.40
	DR	9.30	97.40	11.19	7.50	11.80
Summer	MC	22.00	91.10	8.02	7.07	17.40
	WW	19.00	92.10	8.33	6.88	13.90
	EFC	18.40	91.80	8.64	6.83	13.50
	DR	17.30	98.30	9.43	7.25	13.50
Fall	MC	11.60	99.80	10.85	7.89	15.70
	WW	7.40	99.50	11.98	6.98	11.10
	EFC	9.10	97.00	11.17	6.92	12.00
	DR	8.95	92.30	10.70	6.68	10.00
Winter	MC	9.30	100.30	11.51	6.88	13.40
	WW	3.50	102.10	13.55	8.03	10.60
	EFC	5.10	95.90	12.26	6.76	12.40
	DR	9.70	90.50	10.25	7.13	11.50

Table 2. Habitat parameters from each larval sampling period, collected 2017. South Carolina locations: MC=Matthew's Creek, WW=Whitewater River, EFC=East Fork Chattooga River. North Carolina locations: DR=Davidson River.

Sampling Period	Location	Width (m)	Max Depth (cm)	Average Depth (cm)	Bank Height (m)	Bank Angle °	Flow Conditions	Turbidity	Light Penetration
Spring	MC	12	120	35	1.5	45	low	clear	good
	WW	20	130	50	2	50	low	clear	partial
	EFC	12	120	45	3	55	low	clear	partial
	DR	15	90	35	3	45	low	clear	good
Summer	MC	12	90	40	1.5	45	normal	clear	good
	WW	20	110	45	1.5	45	normal	clear	partial
	EFC	13	100	40	3	45	normal	clear	good
	DR	15	80	35	2.5	45	normal	clear	good
Fall	MC	10	100	45	1.5	45	normal	clear	good
	WW	15	100	40	2.5	50	normal	clear	partial
	EFC	10	145	25	2.5	45	normal	clear	good
	DR	8	80	30	3	45	low	clear	good
Winter	MC	12	130	50	1.5	50	normal	clear	good
	WW	18	100	45	1.5	45	normal	clear	partial
	EFC	12	145	45	2	55	normal	clear	good
	DR	10	75	28	2	45	high	clear	good

Table 3. Adult sampling weather data, average from data collected every 15 minutes, collected in 2017. South Carolina locations: MC=Matthew's Creek, WW=Whitewater River, EFC=East Fork Chattooga River. North Carolina location: DR=Davidson River.

Sampling Period	Location	Air Temp °C	Humidity (%)	Dew Point (%)	Wind Speed (m/s)	Wind Direction	Precipitation	Moon Phase	Cloud Cover
April	MC	10.29	64.69	35.70	0.19	from upstream	n/a	full	no clouds
	WW	10.66	78.32	65.27	0.37	from upstream	n/a	full	no clouds
	EFC	15.48	80.77	78.32	0.00	n/a	n/a	full	partly cloudy
	DR	14.52	83.27	80.55	0.79	from upstream	n/a	full	partly cloudy
May	MC	18.15	84.09	84.62	0.14	from upstream	n/a	3/4	partly cloudy
	WW	15.14	89.82	88.88	0.31	from upstream	n/a	3/4	no clouds
	EFC	17.99	87.32	87.97	0.00	n/a	n/a	3/4	no clouds
	DR	17.66	88.14	88.34	0.43	from upstream	n/a	3/4	no clouds
June	MC	18.14	87.82	88.41	0.03	from upstream	n/a	full	no clouds
	WW	20.41	90.23	91.81	0.00	n/a	n/a	full	partly cloudy
	EFC	18.37	92.59	93.11	0.00	n/a	n/a	3/4	no clouds
	DR	18.45	94.50	94.75	0.11	from upstream	n/a	full	cloudy
July	MC	20.99	91.86	93.31	0.00	n/a	n/a	half	cloudy
	WW	19.86	92.86	94.15	0.26	from upstream	mist	half	cloudy
	EFC	18.62	90.73	91.85	0.00	n/a	n/a	1/4	no clouds
	DR	19.60	93.36	94.15	0.00	n/a	mist	3/4	no clouds
August	MC	22.01	93.32	20.86	0.00	n/a	n/a	3/4	partly cloudy
	WW	21.73	92.55	20.48	0.00	n/a	n/a	1/4	no clouds
	EFC	20.31	90.41	18.59	0.00	n/a	sprinkle	3/4	cloudy
	DR	19.93	94.23	18.91	0.15	from upstream	n/a	half	no clouds
September	MC	19.85	92.41	93.75	0.00	n/a	n/a	new	no clouds
	WW	19.58	91.77	92.98	0.00	n/a	n/a	new	partly cloudy
	EFC	16.57	90.27	90.37	0.00	n/a	n/a	1/4	no clouds
	DR	16.93	93.77	93.91	0.11	from upstream	n/a	1/4	partly cloudy

Table 3. Adult sampling weather data (*cont.*).

Sampling Period	Location	Air Temp °C	Humidity (%)	Dew Point (%)	Wind Speed (m/s)	Wind Direction	Precipitation	Moon Phase	Cloud Cover
October	MC	18.09	90.09	90.77	0.09	from upstream	n/a	new	cloudy
	WW	12.58	89.86	87.09	0.40	from upstream	n/a	new	no clouds
	EFC	18.55	90.95	91.76	0.00	n/a	n/a	half	no clouds
	DR	18.38	91.23	91.76	0.04	from upstream	n/a	half	cloudy

HYPOTHESIS 1: Mixed-Rank Biotic Index (MRBI)

MRBI values for all larval and adult sampling periods (Table 4) were compared using an ANOVA to test $H1_0$: MRBI values will not differ between larval and adult samples. Location and Sampling Period were the factors, with the Location*Sampling Period interaction as error. The ANOVA provided evidence to reject $H1_0$ ($\alpha = 0.05$: F-ratio = 6.5957, $p < 0.0001$). Residuals were plotted to determine normality using Shapiro-Wilk W test where $W = 0.98$, $p = 0.6631$, providing sufficient evidence to fail to reject that the data are normally distributed. Effects tests: Location was not significant, F-ratio = 0.3814, $p = 0.7671$; Sampling Period was significant, F-ratio = 8.46, $p < 0.0001$.

There were no significant differences between the larval sampling periods across the four sampling localities, but there were significant differences both within the adult sampling periods and between the adult and four larval sampling periods (Figure 1, Table 5). This could be due to differences in taxa collected (Table 6) or explained in part by some of the taxa with relatively moderate tolerance values that were collected in greater abundances (Appendix C) in the adult samples, but with only genus-level tolerance values available (i.e., *Cheumatopsyche* spp with TV = 6.6, *Hydroptila* spp with TV = 6.5; all tolerance values in NCDEQ 2016). Some of the other taxa collected as both adults and larvae that had only a genus-level tolerance value and could have also influenced the data, they were not nearly as abundant in the samples (e.g., *Lepidostoma* spp with TV = 1.0).

Table 4. Mixed-Rank Biotic-Index (MRBI) values for each sampling period by location and life stage of Trichoptera, collected in 2018, with mean and one standard error (SE) included. South Carolina locations: MC = Matthew's Creek, SC; WW = Whitewater River, SC; EFC = East Fork Chattooga River, SC. North Carolina location: DR = Davidson River, NC.

Life Stage	Sampling Period	Location				Mean	SE
		MC	WW	EFC	DR		
Larvae	Spring	2.74	1.61	1.78	2.15	2.07	0.25
	Summer	3.02	2.18	2.04	2.14	2.34	0.23
	Winter	1.86	2.06	2.07	2.05	2.01	0.05
	Fall	1.86	1.80	2.13	2.58	2.09	0.18
Adults	April	1.64	1.93	1.00	2.25	1.71	0.27
	May	3.78	4.16	3.13	4.01	3.77	0.23
	June	2.79	3.62	2.99	2.88	3.07	0.19
	July	3.32	2.38	3.18	1.97	2.71	0.32
	August	3.96	3.74	2.71	3.37	3.45	0.27
	September	3.26	3.43	3.44	3.47	3.40	0.05
	October	1.82	2.23	3.27	2.46	2.44	0.30

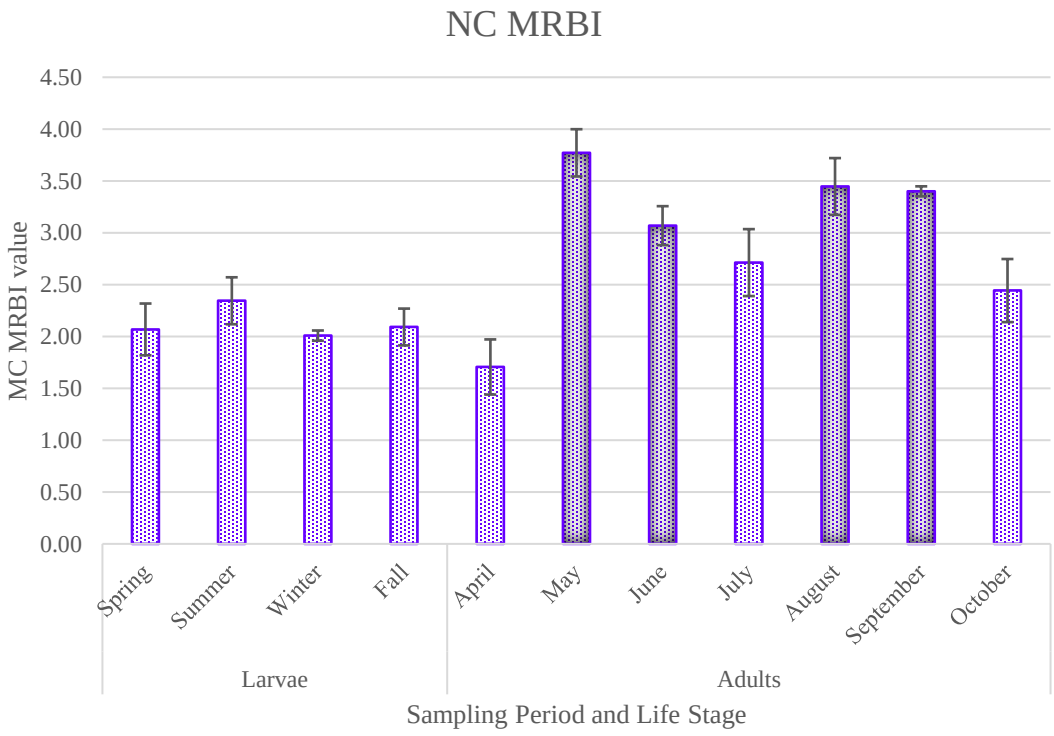

Figure 1. Mixed-Rank Biotic-Index (MRBI) values for each sampling period and life stage of Trichoptera averaged across four locations, collected in 2017. MRBI values can range from 0 to 10, 0 being completely intolerant to reduced dissolved oxygen (DO) and organic pollutants, and 10 completely tolerant of reduced DO and organic pollutants. Shaded bars indicate adult sampling periods statistically different than larval sampling periods (calculated with Fisher's LSD, Table 5). Error bars = +/- one standard error.

Table 5. Fisher's LSD showing similarities in Mixed-Rank Biotic-Index (MRBI) values between sampling periods for Trichoptera, collected across four localities in 2017. F-ratio = 8.46, $p < 0.0001$. Life stage: A = Adults; L = Larvae. Similarity Index: Sampling Periods with no overlapping letters are significantly different from each other.

Sampling Period	Life Stage	Similarity Index						Least Sq Mean
May	A	A						3.77
August	A	A	B					3.45
September	A	A	B					3.40
June	A		B	C				3.07
July	A			C	D			2.71
October	A			C	D	E		2.44
Summer	L				D	E	F	2.34
Winter	L				D	E	F	2.09
Spring	L				D	E	F	2.07
Fall	L					E	F	2.01
April	A						F	1.71

Table 6. Taxa list (Trichoptera) with sampling period (collected 2017) and location. South Carolina locations: 1=Matthew's Creek, 2=Whitewater River, 3=East Fork Chattooga River. North Carolina location: 4=Davidson River.

		Larval Sampling Period				Adult Sampling Period						
Family	Species	Spring	Summer	Fall	Winter	April	May	June	July	August	September	October
Apataniidae	*Apatania incerta*	2		1,2,3,4	1,2,3,4	4						
Brachycentridae	*Brachycentrus spinae ("dark-headed" race)*	3	1,2,3,4	1,2,3,4	1,2,3							
	Micrasema charonis	3,4										
	Micrasema rickeri	1,2,4	2,4	1,2,4	1,2,4	3		1				
	Micrasema spp		4	4			4	1,2	2		2	
	Micrasema wataga		1,2,4					2,4	1	2	1	
Calamoceratidae	*Anisocentropus pyraloides*			1								
	Heteroplectron americanum	3	3,4	4	3							
Dipseudopsidae	*Phylocentropus carolinus*		3	3					4		1,4	
	Phylocentropus lucidus									3,4		
	Phylocentropus placidus					3	1,4	3,4				
Glossosomatidae	*Agapetus pinatus*							1,3,4	2,4	4		
	Agapetus spp	4		3	2,3		1,3,4	4				
	Agapetus tomus						1					
	Glossosoma nigrior	1,2,3,4	1,2,3,4	1,2,3,4	1,2,3,4			1	1		2	4
Goeridae	*Goera calcarata*	1,2,3,4	2	2,3	1,2		1,3,4	1,2,3,4	1,2,3,4	1,2,3,4	1	
Helicopsychidae	*Helicopsyche borealis*							1				
	Helicopsyche paralimnella				2							
	Helicopsyche spp							4	1,2,4			
Hydropsychidae	*Arctopsyche irrorata*	4	1,3,4	1,4		3,4						
	Cheumatopsyche etrona							2,3	2,3	3		
	Cheumatopsyche geora						1	1	1			

Table 6. *(continued)* Taxa list (Trichoptera) with sampling period (collected 2017) and location. South Carolina locations: 1=Matthew's Creek, 2=Whitewater River, 3=East Fork Chattooga River. North Carolina location: 4=Davidson River.

		Larval Sampling Period				Adult Sampling Period						
Family	Species	Spring	Summer	Fall	Winter	April	May	June	July	August	September	October
Hydropsychidae	*Cheumatopsyche gyra*						3	3		3		
	Cheumatopsyche harwoodi						1,2,3,4	1,2,3,4	1,3	1,2,3,4	1,2,3,4	4
	Cheumatopsyche minuscula									3		
	Cheumatopsyche oxa						4	1,2,4		4	1,4	
	Cheumatopsyche parentum											3
	Cheumatopsyche pinula							2				
	Cheumatopsyche spp	1,2,3,4	1,2,3,4	1,2,3,4	1,2,3,4			1				
	Cheumatopsyche virginica								2			
	Diplectrona modesta	1,2,3,4	1,2,3	1,2,3,4	1,2,3,4		1,2,3	1,2,3	1,2,4	1,2,3	4	
	Hydropsyche alhedra			3								
	Hydropsyche betteni		3		3		3,4	3	1,3,4	4	1,2,3,4	1
	Hydropsyche bidens								4			
	Hydropsyche bronta					2	4	3	3		4	
	Hydropsyche depravata							2				
	Hydropsyche morosa								3			
	Hydropsyche slossonae			4	3			3,4				
	Hydropsyche spp	1	4					1,2,4	1,4		3	
	Hydropsyche sparna	1,2,3,4	1,2,3,4	1,2,3,4	1,2,3,4	1,2,3,4	1,2,3,4	1,2,3,4	1,2,3,4	1,2,3,4	1,2,3,4	1,2,3,4
	Hydropsyche venularis							3				
Hydroptilidae	*Hydroptila alabama*						1	2	1,2,3,4	3	1	
	Hydroptila amoena								1,4			
	Hydroptila ampoda						1,3,4	1,2	2		3	
	Hydroptila berneri						2					

Table 6. *(continued)* Taxa list (Trichoptera) with sampling period (collected 2017) and location. South Carolina locations: 1=Matthew's Creek, 2=Whitewater River, 3=East Fork Chattooga River. North Carolina location: 4=Davidson River.

		Larval Sampling Period				Adult Sampling Period						
Family	Species	Spring	Summer	Fall	Winter	April	May	June	July	August	September	October
Hydroptilidae	*Hydroptila gunda*						1		1		1,2	3
	Hydroptila quinola						1,3,4	1,2,3,4	1,2,3	2,3	1,2,4	4
	Hydroptila spp	1,2,4	2,3	2,3,4	2,3	3,4	1,2,3,4	1,2,3,4	1,2,3,4	1,2,3,4	1,2,3,4	1,3,4
	Mayatrichia ayama								2	2,4	2,3	
	Ochrotrichia spp	2										
	Orthotrichia cristata										1,2	
	Orthotrichia spp									1	1	
	Oxyethira abacatia						1					
	Oxyethira forcipata					4					2	3,4
	Oxyethira michiganensis							4	2,4	2,4	1,2,3,4	3,4
	Oxyethira pallida											3
	Oxyethira rivicola						1					3
	Oxyethira sininsigne							2				
	Oxyethira spp						3		2		1	
	Oxyethira zeronia									1,2	1,2	4
	Stactobiella palmata						1	1,2				
	Stactobiella spp						1,2	1,2				
Lepidostomatidae	*Lepidostoma americanum*							3,4				
	Lepidostoma latipenne							3	3	2,4	1,3,4	2,3,4
	Lepidostoma modestum					1,3						
	Lepidostoma spp	1,2,3,4	1,2,3,4	1,2,3,4	1,2,3,4	4	1	1,3,4	1	1,4	1,3	3,4
	Lepidostoma tibiale						3	2	2	2		
	Lepidostoma togatum						3	3				

Table 6. *(continued)* Taxa list (Trichoptera) with sampling period (collected 2017) and location. South Carolina locations: 1=Matthew's Creek, 2=Whitewater River, 3=East Fork Chattooga River. North Carolina location: 4=Davidson River.

		Larval Sampling Period				Adult Sampling Period						
Family	Species	Spring	Summer	Fall	Winter	April	May	June	July	August	September	October
Leptoceridae	*Ceraclea ancylus*	1,2	1,2	2	2			1				
	Ceraclea cancellata							4				
	Ceraclea nepha					3						
	Ceraclea protonepha						1					
	Nectopsyche spp							2				
	Oecetis avara							1	3	3		
	Oecetis inconspicua						3	1,2,3,4	2,3	2	1	3
	Oecetis spp							2	2			
	Setodes incertus								1,2,3,4	2		
	Setodes stehri									2,3,4		
	Triaenodes ignitus							1				
	Triaenodes morsei							4			2	
	Triaenodes spp		2		4							
Limnephilidae	*Hydatophylax argus*						4					
	Ironoquia punctatissima										4	
	Platycentropus radiatus				3							
	Pycnopsyche antica									2,3	2,3,4	1,2,3,4
	Pycnopsyche divergens										4	
	Pycnopsyche flavata										4	4
	Pycnopsyche gentilis											1,2
	Pycnopsyche guttifera										4	4
	Pycnopsyche luculenta										1,2,3,4	1,2,3,4
	Pycnopsyche luculenta/sonso	1,3,4	1,3,4		1,2,3							

Table 6. *(continued)* Taxa list (Trichoptera) with sampling period (collected 2017) and location. South Carolina locations: 1=Matthew's Creek, 2=Whitewater River, 3=East Fork Chattooga River. North Carolina location: 4=Davidson River.

		Larval Sampling Period				Adult Sampling Period						
Family	Species	Spring	Summer	Fall	Winter	April	May	June	July	August	September	October
Limnephilidae	*Pycnopsyche near scabripennis*	2	2	2,3	2,3							
	Pycnopsyche scabripennis										1	
	Pycnopsyche sonso										1,3,4	1
Molannidae	*Molanna ulmerina*							3				
Odontoceridae	*Pseudogoera singularis*									4		
	Psilotreta frontalis	3,4	2	3	3							
	Psilotreta spp	3	3,4									
Philopotamidae	*Chimarra* spp							1				
	Dolophilodes distincta	1,2,3,4	1,2,3,4	1,2,3,4	1,2	1,2	1,3,4	1,3,4	1,2,3	1,2,3,4	1,2,3,4	1,4
Philopotamidae	*Fumonta major*						1		4			
	Wormaldia spp				1		1				1	1
Phryganeidae	*Oligostomis pardalis*	4										
	Oligostomis spp			3								
	Phryganea sayi									4	1	
Polycentropodidae	*Cernotina* spp							2				
	Neureclipsis crepuscularis							2,4				
	Nyctiophylax celta							2,3	2,3,4		1	
	Nyctiophylax denningi							2	2			
	Nyctiophylax moestus			3								
	Nyctiophylax nephophilus	3,4		3	2,3		3	3	2,3,4	3		
	Nyctiophylax spp							1,2,3,4	1,2,3,4	3		
	Plectrocnemia cinerea							1,4	1,2,4	1,2,3,4	4	4

Table 6. *(continued)* Taxa list (Trichoptera) with sampling period (collected 2017) and location. South Carolina locations: 1=Matthew's Creek, 2=Whitewater River, 3=East Fork Chattooga River. North Carolina location: 4=Davidson River.

		Larval Sampling Period				Adult Sampling Period						
Family	Species	Spring	Summer	Fall	Winter	April	May	June	July	August	September	October
Rhyacophilidae	*Rhyacophila minora*	4		3	3							
	Rhyacophila nigrita						3					
	Rhyacophila spp			3	1							1,4
	Rhyacophila torva			3	3							
Sericostomatidae	*Fattigia pele*			1								
Thremmatidae	*Neophylax consimilis*	3	4		1							1,4
	Neophylax mitchelli	1,3,4										
	Neophylax spp			2	1							
	Plectrocnemia spp		1									
	Polycentropus confusus					3	1,3	1,4	1,2,3	3,4	1,2,3,4	4
	Polycentropus spp	1	3,4		2,4		1	1	4	2	1,4	
Psychomyiidae	*Lype diversa*	4	3	2	4		2,3,4	3,4	3	4	1,4	4
	Psychomyia flavida						1,3	1,2,3,4	1	2,3,4	2,3,4	
	Psychomyia nomada							1	1			
Rhyacophilidae	*Rhyacophila acutiloba*	2,3	3	2,3	2,3							
	Rhyacophila amicis				2							
	Rhyacophila atrata				2,3							
	Rhyacophila carolina	1,3,4	3,4	1,2,3,4	1,2,3,4		1	1,2,3,4	1,2,3,4	1,3,4	1,2,3,4	1,2,3,4
	Rhyacophila fuscula	1,2,3,4	2,3,4	1,2,3,4	1,2,3,4	3	2,3,4	3	2,4	2,3,4	2,3,4	1,2,3,4
	Rhyacophila glaberrima										4	1

HYPOTHESIS 2: Mixed-Rank Biotic-Index (MRBI) vs. Species Biotic-Index (SPBI) values within larval samples

The SpBI was compared to the MRBI for larvae only (Table 7). An ANOVA was run in JMP Pro 13 (JMP®, 2016) to test $H2_0$: SpBI values will not differ from MRBI values within larval samples. The overall ANOVA provided sufficient evidence to reject $H2_0$ ($\alpha = 0.05$; F ratio = 8.3200, $p = 0.0012$). Residuals were plotted to determine normality using Shapiro-Wilk W test where $W = 0.9535$, $p = 0.1815$, providing sufficient evidence to fail to reject that the data are normally distributed. BI Type and Location*Sampling Period were significant factors (Table 8, Figure 2). Fisher's LSD was computed to show similarities between Location*Sampling Period interactions (Table 9), and F-tests showed that only Matthew's Creek and the Spring and Summer Sampling Periods showed significant differences with opposite factor (Table 10).

Table 7. Larval Trichoptera Mixed-Rank Biotic-Index (MRBI) and Species Biotic-Index (SpBI) values for each sampling period by location, collected in 2017, with mean and one standard error (SE) included. South Carolina locations: MC = Matthew's Creek; WW = Whitewater River; EFC = East Fork Chattooga River. North Carolina location: DR = Davidson River.

BI Type	Sampling Period	Location				Mean	SE
		MC	WW	EFC	DR		
MRBI	Spring	2.74	1.61	1.78	2.15	2.07	0.25
	Summer	3.02	2.18	2.04	2.14	2.34	0.23
	Winter	1.86	2.06	2.07	2.05	2.01	0.05
	Fall	1.86	1.80	2.13	2.58	2.09	0.18
SpBI	Spring	1.45	1.15	1.47	1.36	1.36	0.07
	Summer	1.72	1.29	1.66	1.43	1.53	0.10
	Winter	1.22	1.44	1.42	1.01	1.27	0.10
	Fall	1.07	1.15	1.54	1.26	1.25	0.10

Table 8. List of ANOVA effects tests for Mixed-Rank Biotic-Index (MRBI) vs. Species Biotic-Index (SpBI) values within larval (Trichoptera) sampling, collected in 2017. Bolded/* p-values indicate significant factor or interaction.

Effect Tests	F ratio	p-value
Location	2.85	0.0977
Sampling Period	3.64	0.0576
Location*Sampling Period	3.28	**0.0458***
BI Type	123.70	**<0.0001***
Location*BI Type	3.26	0.0733
Sampling Period*BI Type	0.20	0.8926

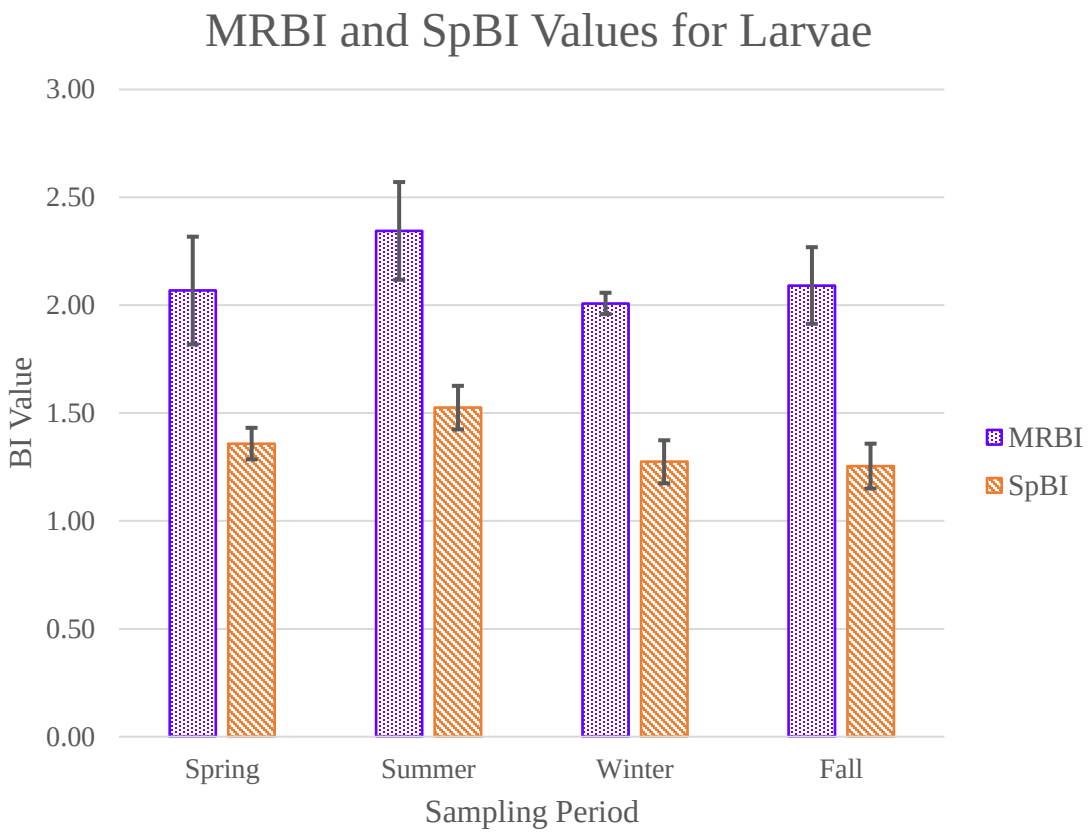

Figure 2. Mixed-Rank Biotic-Index (MRBI) and Species Biotic-Index (SpBI) values for larval (Trichoptera) sampling periods averaged across four locations, collected in 2017. BI values can range from 0 to 10, 0 completely intolerant of reduced dissolved oxygen (DO) and organic pollutants, 10 completely tolerant of reduced DO and organic pollutants. All MRBI values are statistically different from all SpBI values. Error bars = +/- one standard error.

Table 9. Fisher's LSD showing similarities between each Location*Sampling Period interaction for larval (Trichoptera) samples across Biotic Index Types, collected in 2017. F-ratio = 3.2806, p = 0.0458. Similarity Index: Sampling Periods with no overlapping letters are significantly different from each other. South Carolina locations: MC = Matthew's Creek; WW = Whitewater River; EFC = East Fork Chattooga River. North Carolina location: DR = Davidson River.

Location*Sampling Period	Similarity Index					Least Sq Mean
MC, Summer	A					2.37
MC, Spring	A	B				2.09
DR, Winter		B	C			1.92
EFC, Summer		B	C	D		1.85
EFC, Winter		B	C	D		1.84
DR, Summer		B	C	D	E	1.78
DR, Spring		B	C	D	E	1.75
WW, Fall		B	C	D	E	1.75
EFC, Fall		B	C	D	E	1.75
WW, Summer		B	C	D	E	1.73
EFC, Spring			C	D	E	1.63
MC, Fall			C	D	E	1.54
DR, Fall			C	D	E	1.53
WW, Winter			C	D	E	1.47
MC, Winter				D	E	1.46
WW, Spring					E	1.38

Table 10. F-test showing similarity of Location*Sampling Period factor interactions for larvae (Trichoptera) across BI types, collected in 2017. $\alpha = 0.05$; p value < 0.05; (bolded/*) indicates opposite factor shows significant difference within listed factor.

F-test Location*Sampling Period	F ratio	p-value
Davidson River	1.33	0.3243
East Fork Chattooga River	0.56	0.6553
Matthew's Creek	9.82	**0.0034***
Whitewater River	1.77	0.2224
Fall	0.77	0.5418
Spring	4.56	**0.0333***
Summer	4.46	**0.0351***
Winter	2.91	0.0937

HYPOTHESIS 3: Mixed-Rank Biotic-Index (MRBI) vs. Species Biotic-Index (SPBI) values within adult samples

The SpBI was compared to the MRBI for adults only (Table 11). An ANOVA was run in JMP Pro 13 (JMP®, 2016) to test $H3_0$: SpBI values will not differ from MRBI values within adult samples. The overall ANOVA provided sufficient evidence to reject $H3_0$ ($\alpha = 0.05$; F ratio = 9.7827, $p < 0.0001$). Residuals were plotted to determine normality using Shapiro-Wilk W test where $W = 0.9862$, $p = 0.7675$, providing sufficient evidence to fail to reject that the data are normally distributed. Many factors and interactions contributed significantly to the model (Table 12, Figure 3). F-tests for all Sampling Period*BI Type interactions show April had no significant differences between BI Types, and SpBI values had no significant differences across Sampling Periods (Table 13). Because MRBI values did have significant differences across Sampling Periods and SpBI values did not, the elimination of taxa without species-level tolerance values significantly reduces the variability of the data (for adult samples). All locations showed significant differences across adult sampling periods, but the months of May, June, August, and September did not show differences across locations (Table 14). These data are the first indicators that these months could be useful as reference periods.

Table 11. Adult Trichoptera Mixed-Rank Biotic-Index (MRBI) and Species Biotic-Index (SpBI) values for each sampling period separated by location, collected in 2017, with mean and one standard error (SE) included. South Carolina locations: MC = Matthew's Creek; WW = Whitewater River; EFC = East Fork Chattooga River. North Carolina location: DR = Davidson River.

BI Type	Sampling Period	Location				Mean	SE
		MC	WW	EFC	DR		
MRBI	April	1.64	1.93	1.00	2.25	1.71	0.27
	May	3.78	4.16	3.13	4.01	3.77	0.23
	June	2.79	3.62	2.99	2.88	3.07	0.19
	July	3.32	2.38	3.18	1.97	2.71	0.32
	August	3.96	3.74	2.71	3.37	3.45	0.27
	September	3.26	3.43	3.44	3.47	3.40	0.05
	October	1.82	2.23	3.27	2.46	2.44	0.30
SpBI	April	1.75	1.93	1.00	1.99	1.67	0.23
	May	1.92	2.55	2.14	2.37	2.25	0.14
	June	1.97	2.00	2.06	2.02	2.01	0.02
	July	1.78	1.54	2.05	1.80	1.79	0.10
	August	2.05	2.15	1.75	2.36	2.08	0.13
	September	1.79	2.06	2.36	2.50	2.18	0.16
	October	1.22	2.13	1.94	1.40	1.67	0.22

Table 12. List of ANOVA effects tests for Mixed-Rank Biotic-Index (MRBI) vs. Species Biotic-Index (SpBI) values within adult (Trichoptera) sampling, collected in 2017. Bolded/* p-values indicate significant factor or interaction.

Effects Test	F-ratio	p-value
Location	1.57	0.2322
Sampling Period	19.36	**<0.0001***
Location*Sampling Period	3.09	**0.0107***
BI Type	151.31	**<0.0001***
Location*BI Type	0.68	0.5768
Sampling Period*BI Type	5.36	**0.0025***

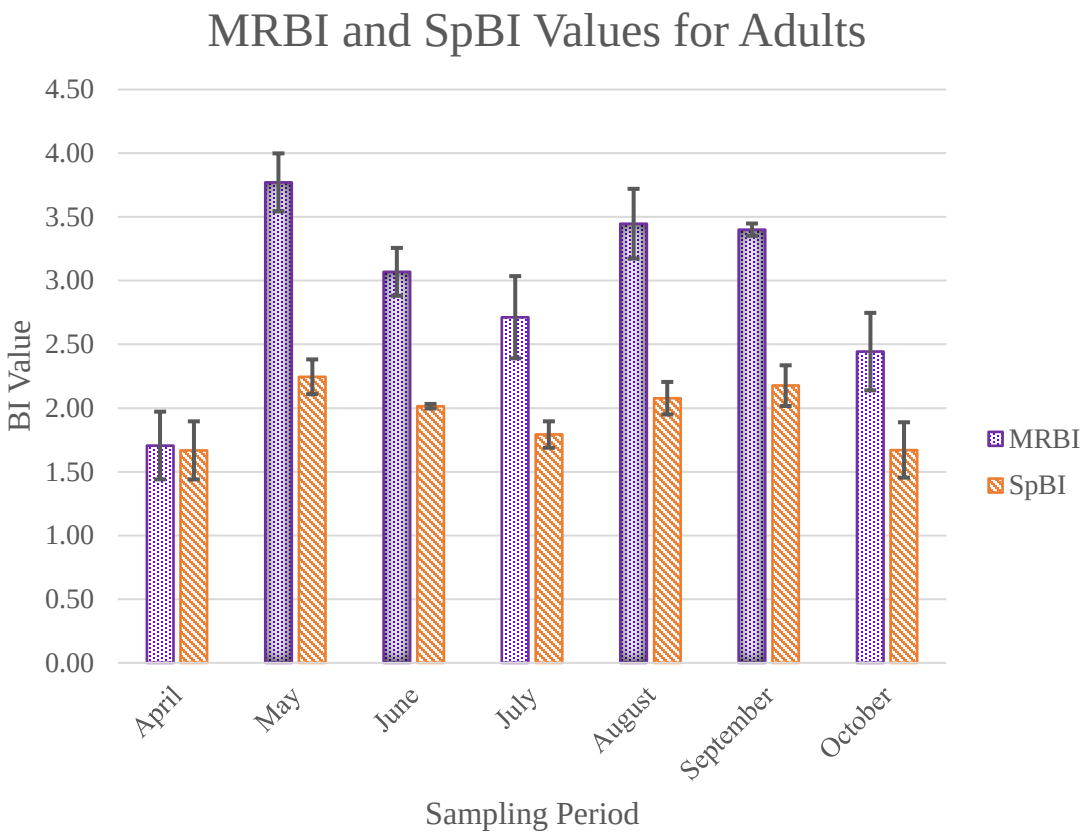

Figure 3. Mixed-Rank Biotic-Index (MRBI) and Species Biotic-Index (SpBI) values for adult Trichoptera sampling periods (2017) averaged across four locations. BI values can range from 0 to 10, 0 completely intolerant to reduced dissolved oxygen (DO) and organic pollutants, 10 completely tolerant of reduced DO and organic pollutants. Shaded bars indicate MRBI sampling periods statistically different than SpBI sampling periods. Error bars = +/- one standard error.

Table 13. F-tests showing similarity of Sampling Period*BI Type interactions for adult Trichoptera, collected in 2017. MRBI = Mixed-Rank Biotic-Index; SpBI = Species Biotic-Index. $\alpha = 0.05$; p value < 0.05; (bolded/*) indicates opposite factor shows significant difference within listed factor.

F-test Sampling Period*BI Type	F Ratio	p-value
April	0.03	0.8582
May	51.70	**<0.0001***
June	24.71	**<0.0001***
July	18.83	**0.0004***
August	41.66	**<0.0001***
September	33.29	**<0.0001***
October	13.24	**0.0019***
MRBI	22.19	**<0.0001***
SpBI	2.53	0.0594

Table 14. F-test showing similarity of Location*Sampling Period interactions for adult Trichoptera collected in 2017. $\alpha = 0.05$; p value < 0.05; (bolded/*) indicates opposite factor shows significant difference within listed factor.

F-test Location*Sampling Period	F Ratio	p-value
Matthew's Creek, SC	6.93	**0.0006***
Whitewater River, SC	6.57	**0.0008***
Davidson River, NC	6.31	**0.0010***
East Fork Chattooga River, SC	8.82	**0.0001***
April	5.31	**0.0084***
May	2.36	0.1051
June	0.78	0.5183
July	3.25	**0.0462***
August	2.87	0.0651
September	0.92	0.4492
October	4.59	**0.0148***

HYPOTHESIS 4: Mixed-Rank Biotic Index (MRBI) vs. Species Biotic Index (SPBI) between larval and adult samples

The SpBI was compared to the MRBI for all life stages (Table 15). An ANOVA was run in JMP Pro 13 (JMP®, 2016) to test $H4_0$: SpBI values will not differ from MRBI values between larval and adult samples. The ANOVA provided sufficient evidence to reject $H4_0$ ($\alpha = 0.05$; F ratio = 11.83, $p < 0.0001$). Residuals were plotted to determine normality using Shapiro-Wilk W test ($W = 0.99$, $p = 0.8098$), providing sufficient evidence to fail to reject that the data are normally distributed. Many factors and interactions contributed significantly to the model (Table 16, Figure 4). Fisher's LSD test shows that MRBI values are more variable (11 levels; A-K) than SpBI values (8 levels; E-L) across all life stages and sampling periods (Table 17). F-tests for Location*BI Type interactions show differences between BI types at each location, but the locations do not differ within BI types, providing evidence that the locations can act as replicates (Table 18).

Table 15. Mixed-Rank Biotic-Index (MRBI) and Species Biotic-Index (SpBI) values for each sampling period averaged across four locations, collected in 2017, separated by Sampling Period and Trichoptera Life Stage, with mean and one standard error (SE) included. See Tables 7 and 11 for values at each location.

Life Stage	Sampling Period	BI Type		SE MRBI	SE SpBI
		MRBI	SpBI		
Larvae	Spring	2.07	1.36	0.25	0.07
	Summer	2.34	1.53	0.23	0.10
	Winter	2.01	1.27	0.05	0.10
	Fall	2.09	1.25	0.18	0.10
Adults	April	1.71	1.67	0.06	0.06
	May	3.77	2.25	0.10	0.07
	June	3.07	2.01	0.08	0.07
	July	2.71	1.79	0.08	0.05
	August	3.45	2.08	0.12	0.07
	September	3.40	2.18	0.09	0.05
	October	2.44	1.67	0.06	0.04

Table 16. List of ANOVA effects tests for Mixed-Rank Biotic-Index (MRBI) vs. Species Biotic-Index (SpBI) values for all Trichoptera life stages, collected in 2017. Bolded/* p-values indicate significant factor or interaction.

Effects Tests	F-ratio	p-value
Location	0.34	0.79
Sampling Period	28.49	**<0.0001***
Location*Sampling Period	3.10	**0.0014***
BI Type	248.01	**<0.0001***
Location*BI Type	1.51	0.23
Sampling Period*BI Type	4.29	**0.0009***

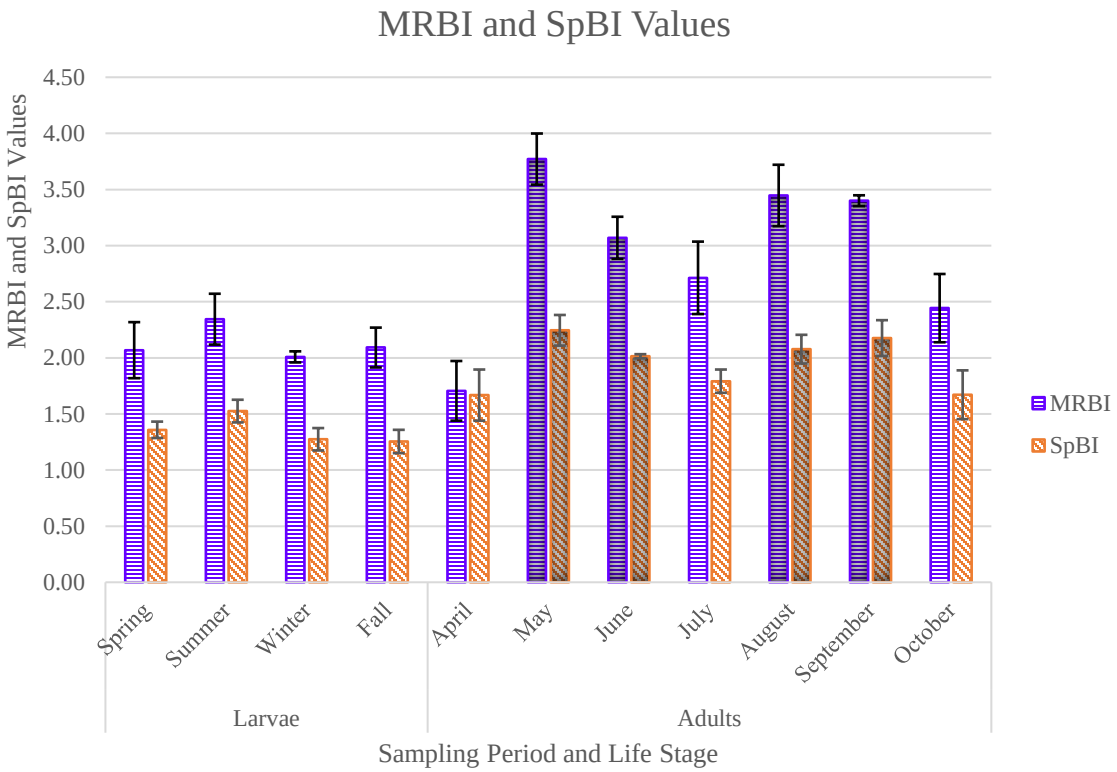

Figure 4. Graph comparing Mixed-Rank Biotic-Index (MRBI) and Species Biotic-Index (SpBI) values across sampling periods and Trichoptera life stages, collected in 2017. MRBI/SpBI values can range from 0 to 10, 0 completely intolerant to reduced dissolved oxygen (DO) and organic pollutants, 10 completely tolerant of reduced DO and organic pollutants. Shaded bars indicate adult sampling periods statistically different than larval sampling periods (respectively for MRBI and SpBI). Error bars = +/- one standard deviation.

Table 17. Fisher's LSD showing similarity of Sampling Period*BI Type factor interactions. Trichoptera collected in 2017. F ratio = 4.29, p = 0.0009. Months = adult sampling periods, seasons = larval sampling periods. Factors with no overlap of letters in similarity index are considered statistically different.

Sampling Period*BI Type	Similarity Index											Least Sq Mean
May, MRBI	A											3.77
August, MRBI	A	B										3.45
September, MRBI	A	B										3.40
June, MRBI		B	C									3.07
July, MRBI			C	D								2.71
October, MRBI				D	E							2.44
Summer, MRBI				D	E	F						2.34
May, SpBI					E	F						2.25
September, SpBI					E	F	G					2.18
Winter, MRBI					E	F	G	H				2.09
August, SpBI					E	F	G	H				2.08
Spring, MRBI					E	F	G	H				2.07
June, SpBI						F	G	H	I			2.01
Fall, MRBI						F	G	H	I			2.01
July, SpBI							G	H	I	J		1.79
April, MRBI								H	I	J	K	1.71
October, SpBI									I	J	K	1.67
April, SpBI									I	J	K	1.68
Summer, SpBI										J	K	L 1.53
Spring, SpBI											K	L 1.36
Fall, SpBI												L 1.27
Winter, SpBI												L 1.25

Table 18. F-test showing similarity of Location*Biotic Index (BI) or Species Biotic Index (SpBI) interactions for Trichoptera collected in 2017. $\alpha = 0.05$; p value < 0.05; (bolded/*) indicates opposite factor shows significant difference within listed factor.

F-test Location*BI Type	F ratio	p-value
Davidson River, NC	59.80	**<0.0001**
East Fork Chattooga River, SC	43.13	**<0.0001**
Matthew's Creek, SC	90.89	**<0.0001**
Whitewater River, SC	58.71	**<0.0001**
BI	1.16	0.3411
SpBI	0.69	0.564

HYPOTHESIS 5: Mixed-Rank Biotic-Index (MRBI) vs. Species Biotic-Index (SPBI) between larval and (larval + adult) samples

SpBI values were compared to MRBI values between larval and combined (larval + adult) samples (Table 19). An ANOVA was run in JMP Pro 13 (JMP®, 2016) to test $H5_0$: SpBI values will not differ from MRBI values between larval and combined (larval + adult) samples. The ANOVA provided sufficient evidence to reject $H5_0$ ($\alpha = 0.05$; F ratio = 20.34, $p < 0.0001$). Residuals were plotted to determine normality using Shapiro-Wilk W test ($W = 0.99$, $p = 0.1689$), providing sufficient evidence to fail to reject that the data are normally distributed. Many factors and interactions contributed significantly to the model (Table 20, Figure 5). All of the MRBI values group together, and all of the SpBI values group together, but there is no clear distinction between any of the larval and (larval + adult) sampling periods within either BI Type (Table 21). This data indicates that adding a light trapping protocol to the current larval protocols is not improving the precision of these protocols.

Table 19. Comparison of mean Mixed-Rank Biotic-Index (MRBI) and Species Biotic-Index (SpBI) values between larval and combined (larval + adult) Trichoptera sampling periods, collected in 2017, with one standard error (SE).

Life Stage	Sampling Period	MRBI	SpBI	SE MRBI	SE SpBI
Larvae (L)	Spring	2.07	1.36	0.50	0.15
	Summer	2.34	1.53	0.45	0.20
	Winter	2.01	1.27	0.10	0.20
	Fall	2.09	1.25	0.36	0.21
Larvae + Adults	April (+L)	2.05	1.28	0.30	0.18
	May (+L)	2.54	1.49	0.30	0.21
	June (+L)	2.38	1.58	0.20	0.22
	July (+L)	2.23	1.40	0.28	0.19
	August (+L)	2.52	1.57	0.36	0.27
	September (+L)	2.59	1.69	0.27	0.27
	October (+L)	2.19	1.47	0.24	0.13

Table 20. List of ANOVA effects tests for Mixed-Rank Biotic-Index (MRBI) vs. Species Biotic-Index (SpBI) values for larvae vs combined (larvae + adults) life stages. Bolded/* p-values indicate significant factor or interaction.

Effects Test	F-ratio	p-value
Location	8.20	**<0.0001***
Sampling Period	12.72	**<0.0001***
Location*Sampling Period	2.12	**0.0012***
BI Type	567.52	**<0.0001***
Location*BI Type	3.88	**0.0100***
Sampling Period*BI Type	1.39	0.1862

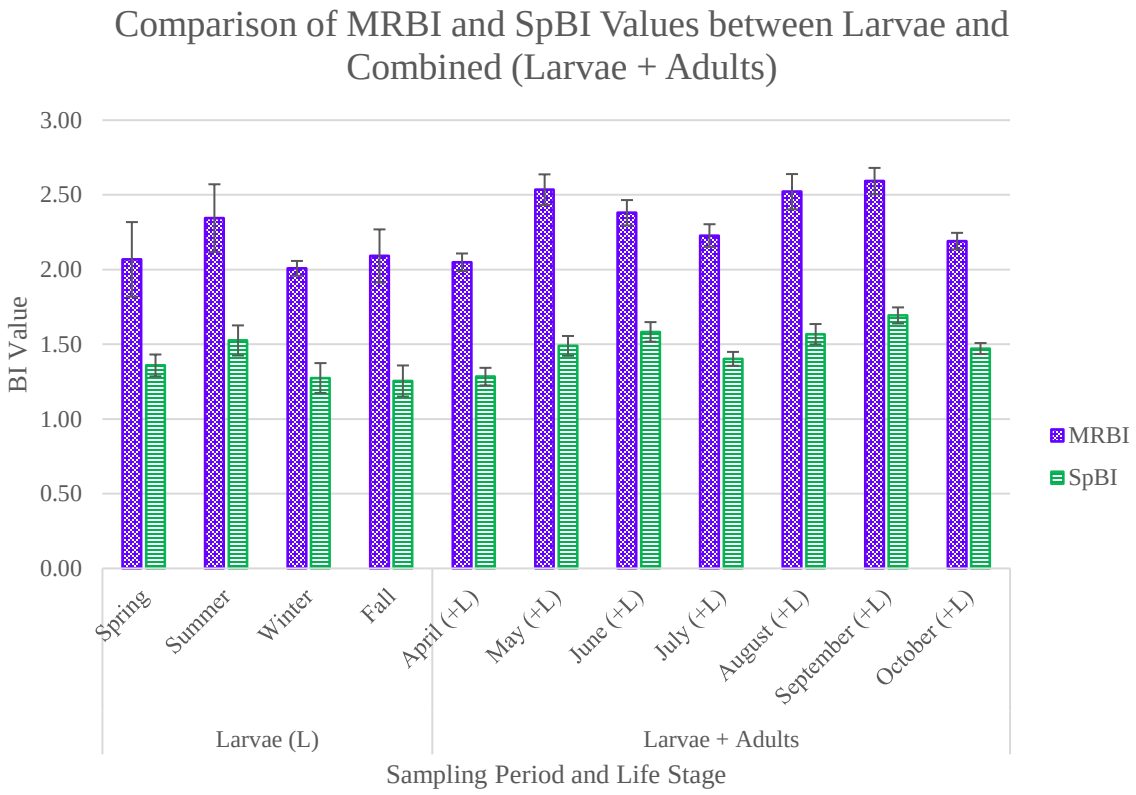

Figure 5. Comparison of mean Mixed-Rank Biotic-Index (MRBI) and Species Biotic-Index (SpBI) values between larval and combined (larval + adult) Trichoptera sampling periods, averaged across four locations, collected in 2017. Error bars = +/- one standard error

Table 21. Fisher's LSD showing similarity of BI Type*Sampling Period interactions averaged across all four locations. Interactions with no overlap of letters in similarity index are considered statistically different. MRBI = Mixed-Rank Biotic-Index; SpBI = Species Biotic-Index. L = larval; L+A = larval + adult.

BI Type*Sampling Period	Similarity Index									Least Sq Mean
September(L+A), MRBI	A									2.59
May(L+A), MRBI	A	B								2.54
August(L+A), MRBI	A	B								2.52
June(L+A), MRBI		B	C							2.38
Summer(L), MRBI	A	B	C	D						2.34
July(L+A), MRBI			C	D	E					2.23
October(L+A), MRBI				D	E	F				2.19
Winter(L), MRBI				D	E	F				2.09
Spring(L), MRBI				D	E	F				2.07
April(L+A), MRBI						F				2.05
Fall(L), MRBI					E	F				2.01
September(L+A), SpBI							G			1.69
June(L+A), SpBI							G	H		1.57
August(L+A), SpBI							G	H		1.57
Summer(L), SpBI							G	H	I J	1.53
May(L+A), SpBI								H	J	1.49
October(L+A), SpBI								H	J	1.47
July(L+A), SpBI								H	I J	1.42
Spring(L), SpBI								H	I J	1.36
April(L+A), SpBI									I	1.28
Fall(L), SpBI									I J	1.27
Winter(L), SpBI									I J	1.25

HYPOTHESIS 6: Shannon Biodiversity Index

The Shannon Biodiversity Index tested both abundance and evenness of the samples (Table 22). An ANOVA was run in JMP Pro 13 (JMP®, 2016) to test $H6_0$: Species assemblages will not differ between larval and adult communities. The ANOVA provided sufficient evidence to reject H_0 ($\alpha = 0.05$; F ratio = 3.7185, p = 0.0014). Residuals were plotted to determine normality using Shapiro-Wilk W test (W = 0.9685, p = 0.2669), providing sufficient evidence to fail to reject H_0: the data are normally distributed. Location not significant (F ratio = 2.1923, p = 0.1095); Sampling Period significant (F ratio = 4.1763, p = 0.0011) but only the month of April differed from the larval sampling periods (Table 23, Figure 6). Thus, for most of the sampling periods, the Shannon Index taxon diversity is the same statistically.

Table 22. Shannon Biodiversity Index values across Sampling Periods, Trichoptera Life Stages, and Locations, with mean and one standard deviation (SD). South Carolina locations: MC = Matthew's Creek; WW = Whitewater River; EFC = East Fork Chattooga River. North Carolina location: DR = Davidson River.

Life Stage	Sampling Period	Location				Mean	SE
		MC	WW	EFC	DR		
Larvae	Spring	2.02	1.89	2.53	2.60	2.26	0.18
	Summer	2.01	2.10	2.00	2.10	2.05	0.03
	Winter	2.10	2.32	2.68	2.21	2.33	0.13
	Fall	2.08	2.31	2.43	2.01	2.21	0.10
Adults	April	0.99	1.10	1.00	1.41	1.13	0.10
	May	2.47	0.56	2.07	1.32	1.60	0.42
	June	2.81	1.91	2.57	2.45	2.43	0.19
	July	2.09	2.34	2.15	2.12	2.17	0.06
	August	1.45	2.04	2.32	2.38	2.05	0.21
	September	2.60	1.80	1.93	2.67	2.25	0.23
	October	2.17	1.55	2.16	2.27	2.04	0.16

Table 23. Fisher's LSD comparing Shannon Biodiversity Index values across all sampling periods, F ratio = 4.1763, p = 0.0011. Trichoptera Life Stage: A = Adults, L = Larvae. Factors with no overlap of letters in similarity index are considered statistically different.

Sampling Period	Life Stage	Similarity Index			Least Sq Means
June	A	A			2.43
Winter	L	A			2.33
Spring	L	A			2.26
September	A	A			2.25
Fall	L	A			2.20
July	A	A			2.17
Summer	L	A	B		2.05
August	A	A	B		2.058
October	A	A	B		2.04
May	A		B	C	1.60
April	A			C	1.13

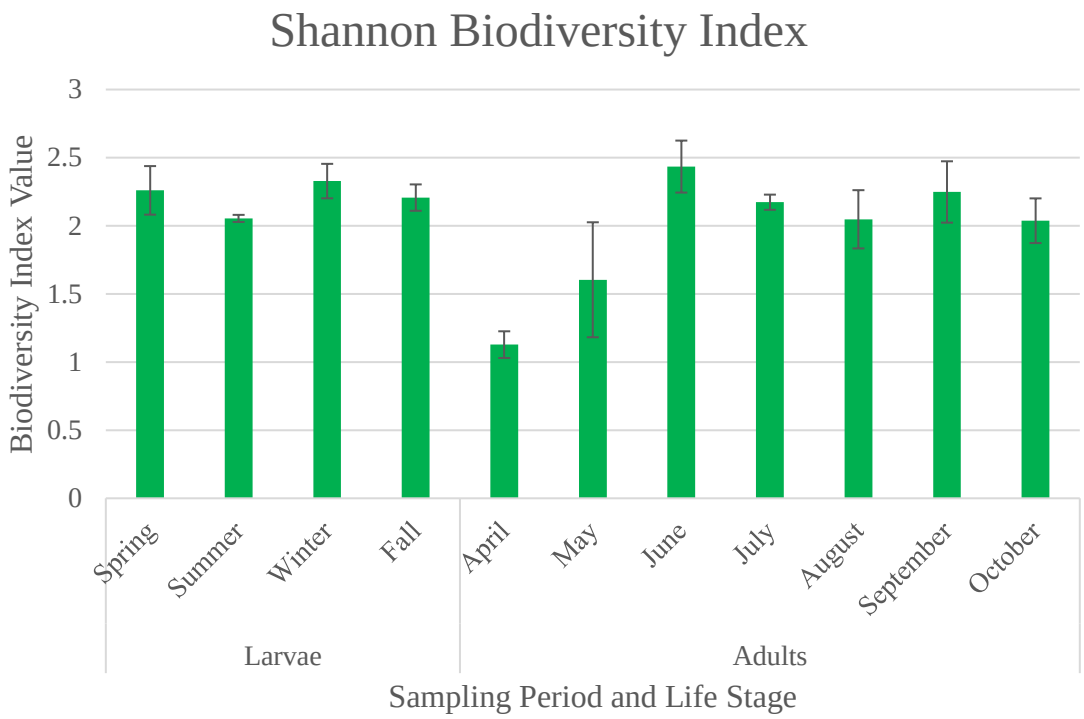

Figure 6. Shannon Biodiversity for each sampling period and Trichoptera life stage. Higher Index Values indicate greater taxa diversity in terms of both abundance and evenness. Error bars = +/- one standard error.

EstimateS

Richness and Shared Species analyses were run in EstimateS (Colwell, 2013) for the overall communities at each location. All localities were similar in Abundance Coverage-based Estimator (ACE), Chao1 estimate, Fisher's α diversity, and Sørensen Richness Index (Table 24). Taxa accumulation and rarefaction curves show that no locations had the 11 sampling periods capture the estimated diversity (Figure 7), ranging from 69% (Matthew's Creek) to 81% (East Fork Chattooga River) of the Chao1 estimated diversity.

Richness and Shared Species analyses were run in EstimateS (Colwell, 2013) to determine if a consistent sampling period yielded new information across locations. Sampling Periods varied in all parameters examined (Table 25). All estimates were similar among larval sampling periods but differed among adult sampling periods, indicating the adults are a less consistent life stage for diversity estimates.

None of the sampling periods completely captured the taxa richness (Figure 8, larvae; Figure 9, adults). Among larvae, the winter sampling period had the highest taxa accumulation, (35), rarefaction (42), Chao1 estimates (40), and percent estimated taxa diversity captured (87%). This sampling period should be investigated in terms of species diversity compared to other seasons. Among adults, June had the highest taxa accumulation (54) and rarefaction (71) estimates, while May had the highest Chao1 estimate (68), and August had the highest percent estimated taxa diversity captured (94%). May had a higher Chao1 estimate (68) than June (63), and August a higher percent estimated taxa diversity captured (94%) than June (85), but the variation for May is over twice that of any of the other sampling periods, and August has a much lower

Chao1 estimated total species richness (August: 37; June: 63), indicating June is a more statistically robust sampling period with higher estimated taxa richness across localities.

Table 24. Abundance Coverage-based Estimator (ACE) and Chao1 estimators of Trichoptera species richness, and Sørensen (incidence-based (qualitative) sample) similarity index, collected in 2017. South Carolina locations: MC = Matthew's Creek; WW = Whitewater River; EFC = East Fork Chattooga River. North Carolina locations: DR = Davidson River.

Location	ACE	Chao1	Fisher's α Diversity	Sørensen
MC	96	86.97	14.16	0.39
WW	85.2	76.18	13.77	0.33
EFC	93.91	84.4	14.88	0.35
DR	90.2	81.19	14.21	0.34

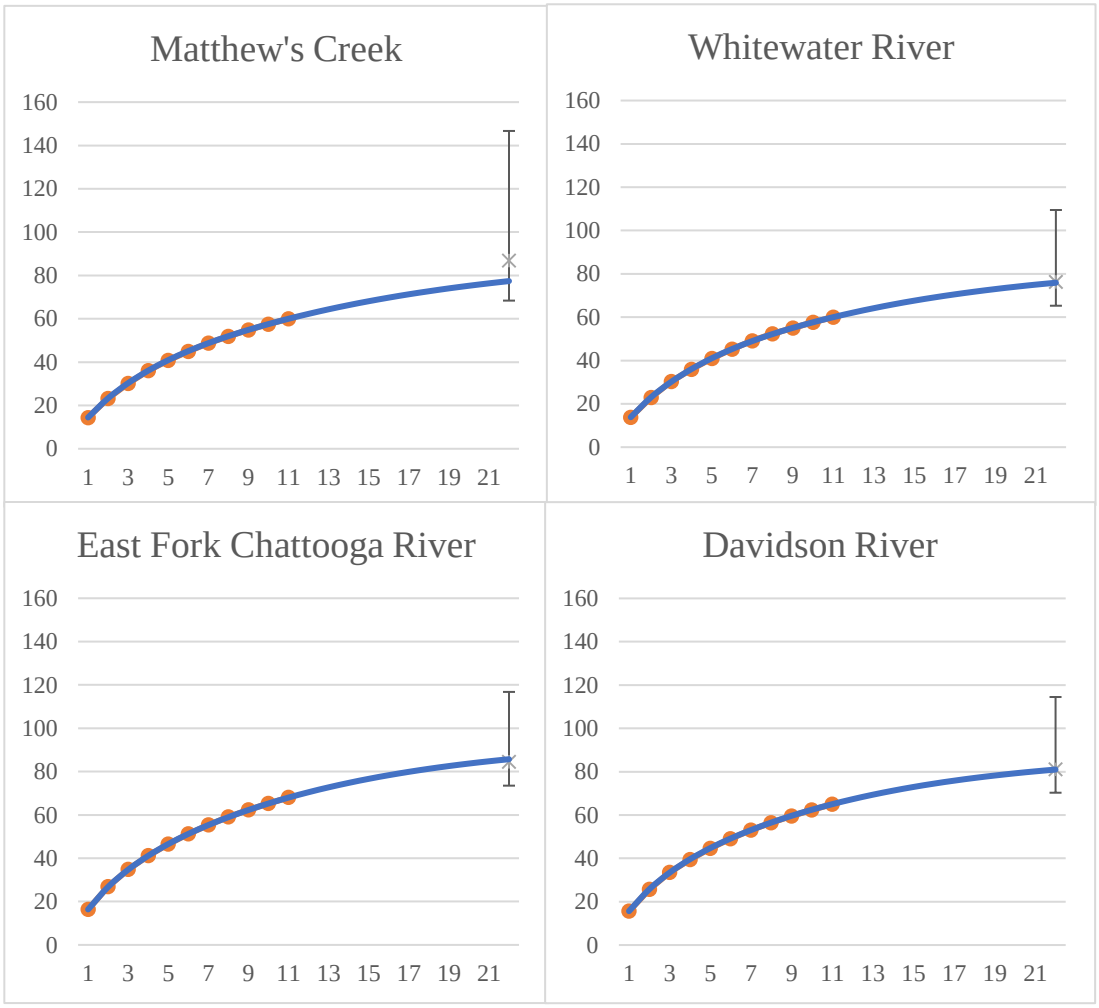

Figure 7. Taxa accumulation (marked) and rarefaction (smooth) curves of Trichoptera for all sites, collected in 2017. Marks on species accumulation plots indicate actual samples. Asterisks on each plot indicate Chao1 estimates of total species richness for that site, with 95% CIs.

Table 25. Abundance Coverage-based Estimator (ACE) and Chao1 estimators of Trichoptera species richness, and Sørensen (incidence-based (qualitative) sample) similarity index for each life stage and sampling period, collected in 2017.

Life Stage	Sampling Season	ACE	Chao1	Fisher's α Diversity	Sorensen
Larvae	Spring	42.00	35.59	7.56	0.66
	Summer	42.75	33.99	5.98	0.66
	Fall	45.63	38.19	6.34	0.68
	Winter	46.25	40.14	7.53	0.60
Adults	April	28.00	17.95	3.97	0.35
	May	86.50	67.54	9.11	0.40
	June	72.67	63.21	16.21	0.47
	July	57.29	49.23	10.50	0.54
	August	41.00	37.14	8.41	0.53
	September	61.40	51.98	9.90	0.59
	October	50.63	40.97	7.79	0.47

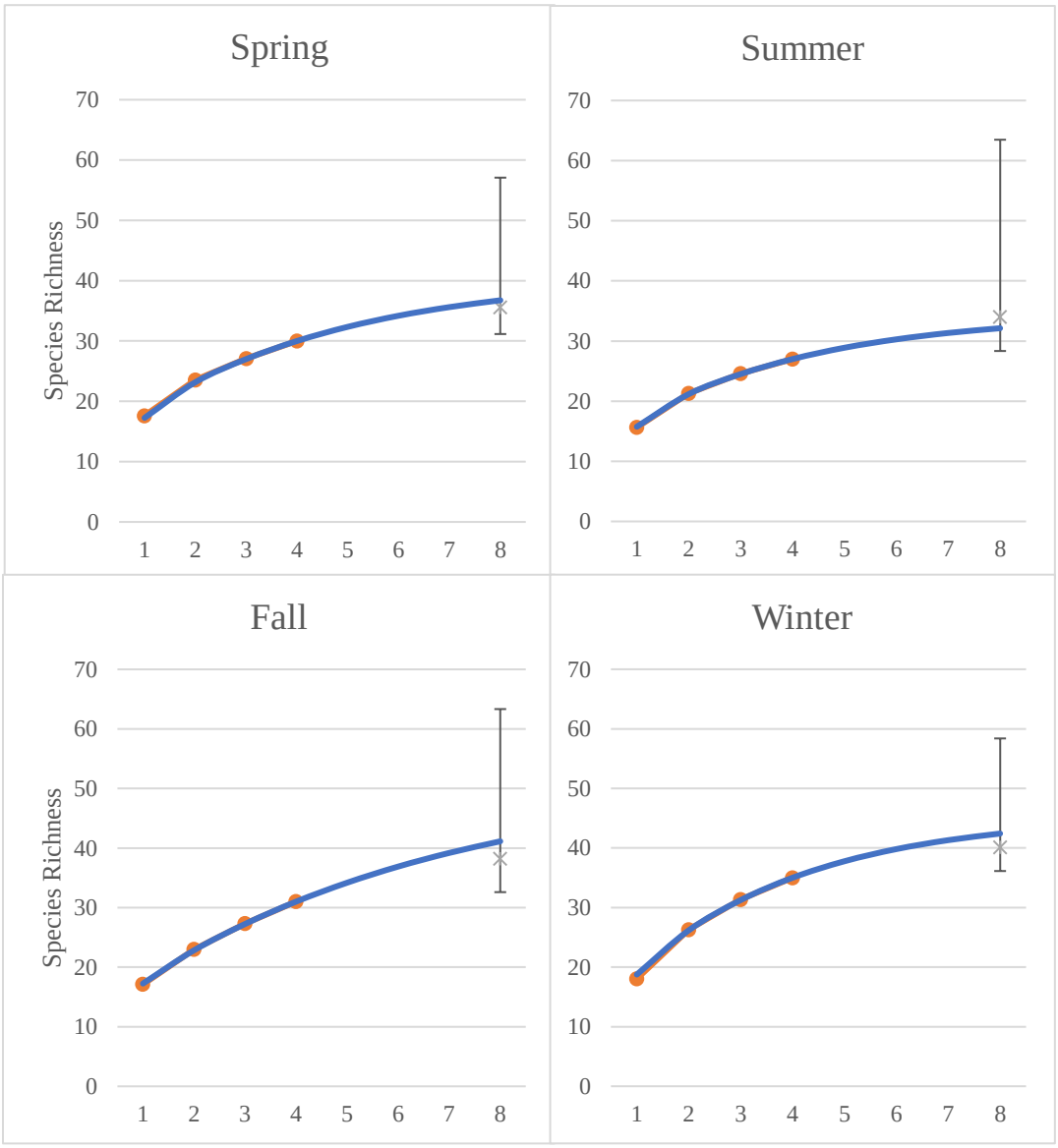

Figure 8. Taxa accumulation (marked) and rarefaction (smooth) curves for all Trichoptera larval sampling periods, collected in 2017. Marks on species accumulation plots indicate actual samples. Asterisks on each plot indicate Chao1 estimates of total species richness for that sampling period, with 95% CIs.

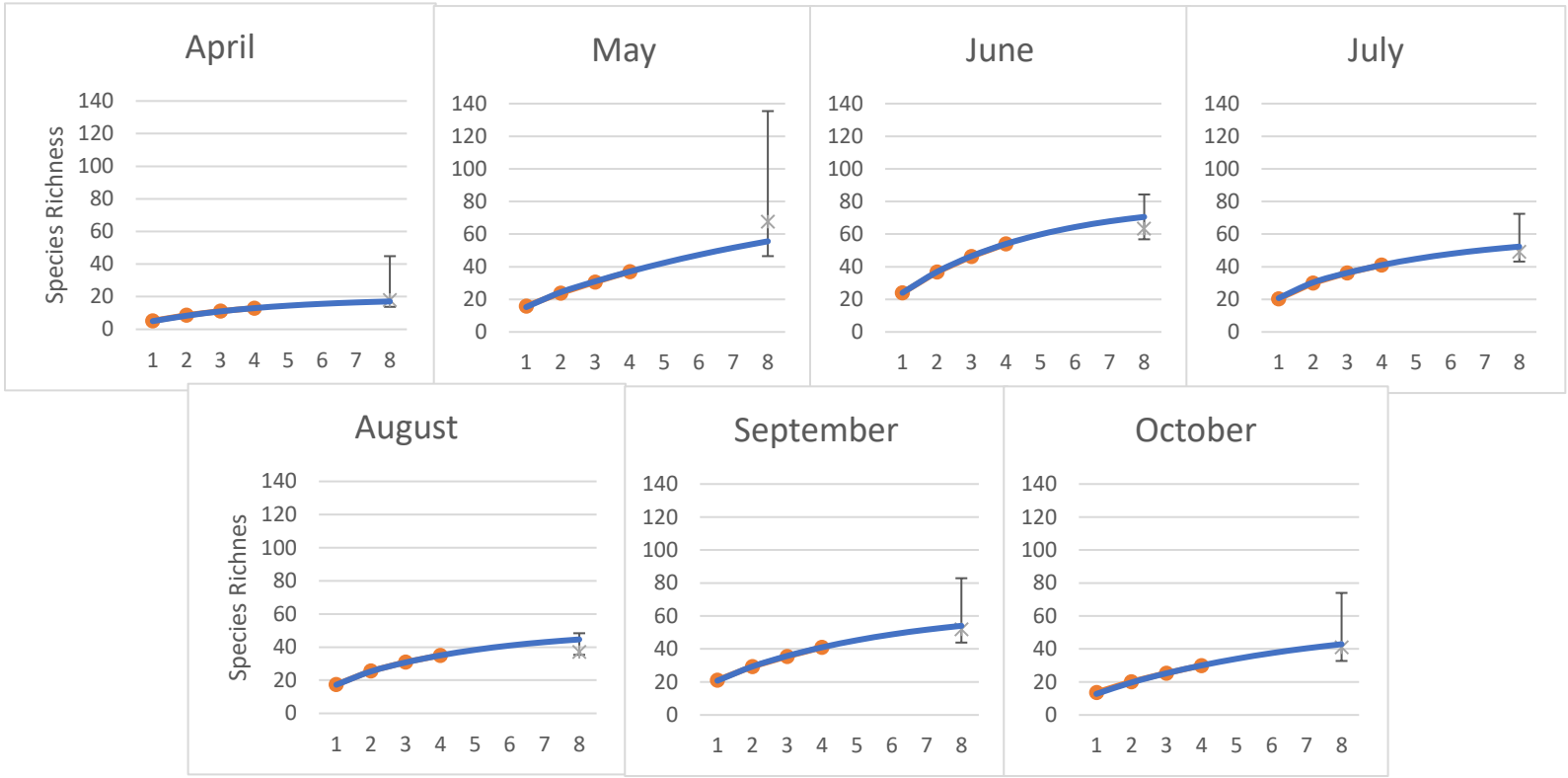

Figure 9. Taxa accumulation (marked) and rarefaction (smooth) curves for all adult Trichoptera sampling periods, collected in 2017. Marks on species accumulation plots indicate actual samples. Asterisks on each plot (upper) indicate Chao1 estimates of total species richness for that sampling period, with 95% CIs.

Species Added

Numbers of unique taxa added to each larval sampling period from each adult sampling period were investigated (Table 26). An ANOVA was run in JMP Pro 13 (JMP®, 2016) to test $H6_0$: 'Species assemblages will not differ between larval and adult communities'. The ANOVA provided sufficient evidence to reject $H5_0$ ($\alpha = 0.05$; F ratio = 90.53, $p < 0.0001$). Residuals were plotted to determine normality using Shapiro-Wilk W test ($W = 0.9953$, $p = 0.9703$), providing sufficient evidence to fail to reject that the data are normally distributed. Many factors and interactions contributed significantly to the model (Table 27). Except for some variation in April, every adult sampling period added taxa that were not collected from the larval sampling periods (Figure 10). Specifically, the month of June had the highest average number of taxa added and smallest variation of all the months across all larval sampling periods (Table 28, Fisher's LSD), and did not vary among locations (Table 29, F-test) providing evidence for its use as a reference month.

Numbers of unique taxa added to all adult sampling periods from larval sampling periods were investigated (Table 30). An ANOVA in JMP Pro 13 (JMP®, 2016) to test $H6_0$. The ANOVA provided sufficient evidence to reject $H6_0$ ($\alpha = 0.05$; F ratio = 4.1224, $p = 0.0287$). Residuals were plotted to determine normality using Shapiro-Wilk W test ($W = 0.9408$, $p = 0.3589$), providing sufficient evidence to fail to reject that the data are normally distributed. Season not significant (F ratio = 0.7143, $p = 0.5678$); Location significant (F ratio = 7.5306, $p = 0.008$; Figure 18). The numbers of unique taxa added differs between some locations, but larval sampling periods produce similar results across sampling periods.

Table 26. Number of unique taxa (Trichoptera) added to each larval sampling period from each adult sampling period averaged across four locations. One standard error included.

Adult Sampling Period	Larval Sampling Periods				Standard Error			
	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter
April	2.25	2.50	2.25	3.00	0.95	0.96	1.25	1.41
May	11.25	12.00	11.25	11.25	2.84	3.16	3.12	2.87
June	18.75	19.50	19.00	19.50	0.48	0.29	0.41	0.65
July	16.00	16.00	16.25	15.25	1.47	1.00	0.85	0.75
August	11.25	12.50	12.25	12.50	2.50	2.72	2.63	2.99
September	17.25	17.25	17.25	17.50	2.66	3.20	2.93	2.72
October	9.25	9.75	9.25	9.50	1.89	1.84	2.29	2.40

Table 27. List of ANOVA effects tests for Mixed-Rank Biotic-Index (MRBI) vs. Species Biotic-Index (SpBI) values for larvae vs combined (larvae + adults) Trichoptera life stages, collected in 2017. Bolded/* p-values indicate significant factor or interaction.

Effects Test	F-ratio	p-value
Location	57.2937	**<0.0001***
Larval Sampling Period	1.4503	0.2384
Adult Sampling Period	576.569	**<0.0001***
Location*Larval Sampling Period	3.3298	**0.0027***
Location*Adult Sampling Period	82.5	**<0.0001***
Season*Month	0.5331	0.929

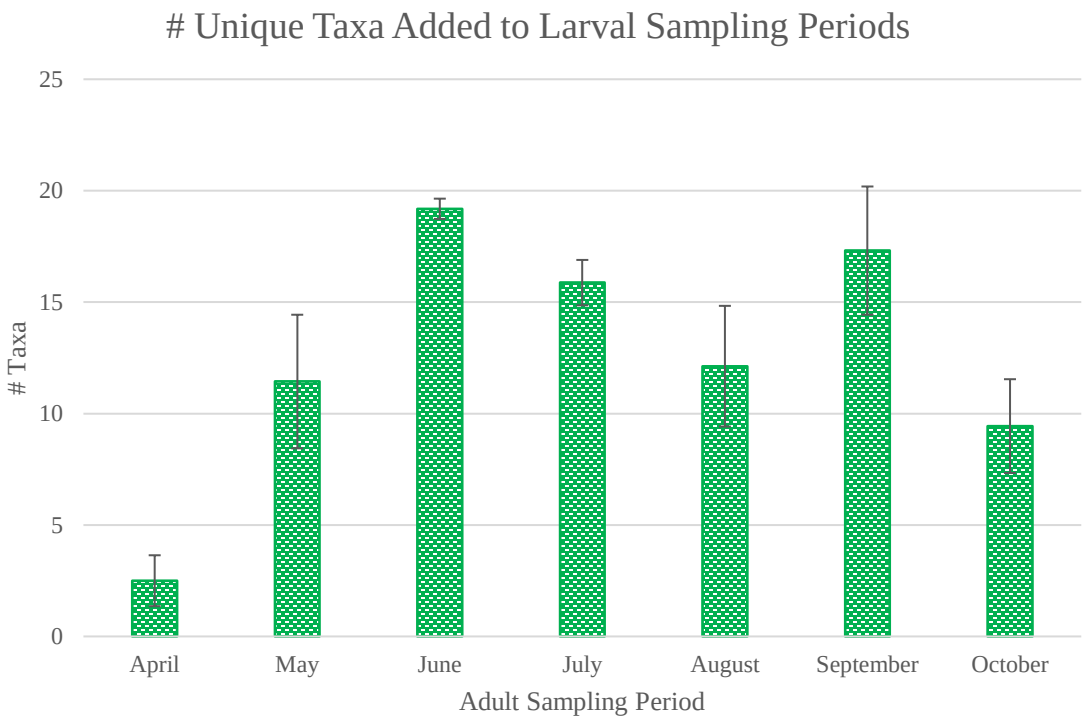

Figure 10. Number of unique taxa added to each larval sampling period from each adult sampling period. Error bars = one standard deviation.

Table 28. Fisher's LSD showing similarity of number of unique Trichoptera taxa added to each larval sampling period from each adult sampling period, collected in 2017. F ratio = 576.5693, $p < 0.0001$. Factors with no overlap of letters in similarity index are considered statistically different.

Month	Similarity Index							Least Sq Mean
June	A							19.19
September		B						17.31
July			C					15.88
August				D				12.13
May					E			11.44
October						F		9.44
April							G	2.50

Table 29. F-test showing similarity of Location*Adult Sampling Period (Month) factor interactions across all larval sampling periods. $\alpha = 0.05$; p value < 0.05; (bolded/*) indicates opposite factor shows significant difference within listed factor. South Carolina locations: MC = Matthew's Creek; WW = Whitewater River; EFC = East Fork Chattooga River. North Carolina location: DR = Davidson River.

F-test Location*Month	F-ratio	p-value
MC	316.03	**<0.0001***
WW	248.91	**<0.0001***
EFC	81.83	**<0.0001***
DR	177.30	**<0.0001***
April	22.96	**<0.0001***
May	157.38	**<0.0001***
June	1.21	0.32
July	15.47	**<0.0001***
August	127.61	**<0.0001***
September	148.84	**<0.0001***
October	78.82	**<0.0001***

Table 30. Number of Trichoptera Taxa Found in Larval Sampling Season at each Location that were not found in adult sampling from the same location, collected in 2017. SE = one standard error. MC = Matthew's Creek; WW = Whitewater River; EFC = East Fork Chattooga River; DR = Davidson River.

Season	Location				Mean	SE
	MC	WW	DR	EFC		
Spring	1	5	6	8	5	1.47
Summer	2	4	4	6	4	0.82
Fall	5	6	3	10	6	1.47
Winter	2	8	1	11	5.5	2.40

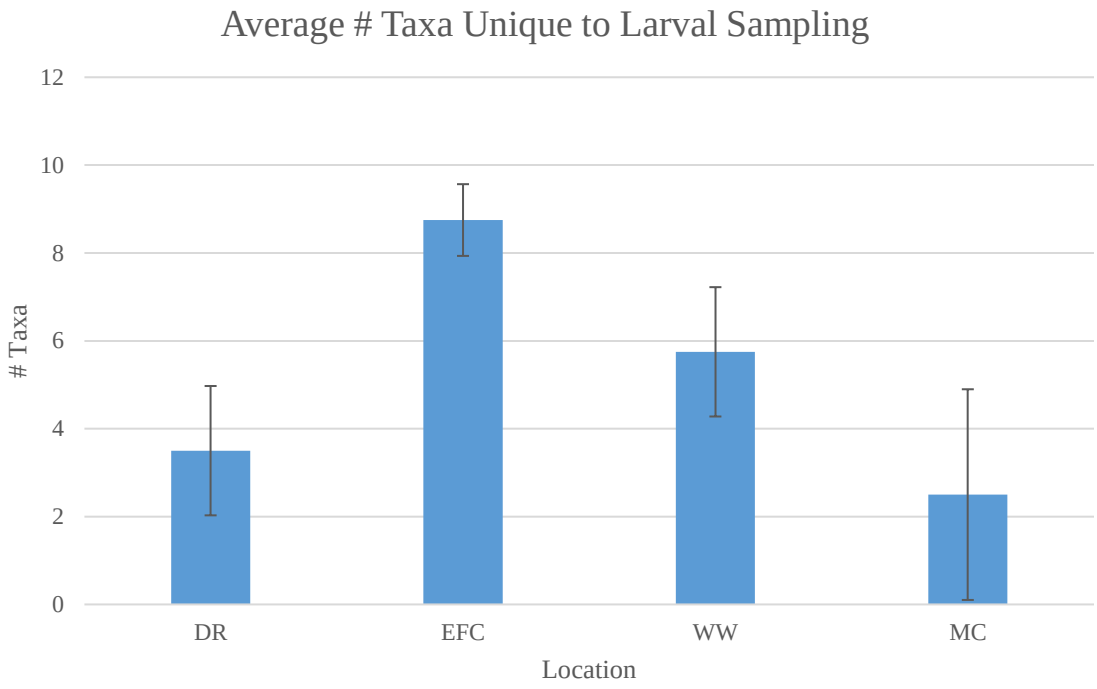

Figure 12. Average number of unique Trichoptera taxa collected from each location that were not collected in any adult samples across all larval sampling periods, collected in 2017. Error bars = one standard error.

HYPOTHESIS 7: Processing Times

Lab processing times were investigated for July (adult) and Summer (larval) sampling periods and the last sampling periods (October, adults; Winter, larvae).

Total Lab Processing Times (minutes) showed some differences (Table 31). An ANOVA was run to test $H7_0$: 'Lab processing times do not differ between larval and adult samples'. The ANOVA provided sufficient evidence to reject H_0 ($\alpha = 0.05$; F ratio = 5.7859, $p = 0.0101$). Residuals were plotted to determine normality using Shapiro-Wilk W test ($W = 0.96$, $p = 0.6035$), providing sufficient evidence to fail to reject that the data are normally distributed. Sampling Period was significant (F ratio = 10.045, $p = 0.0031$). July is the only month significantly higher than all others (Table 32).

Minutes/individual indentification were compared (Table 33). The ANOVA did not provide sufficient evidence to reject $H7_0$ ($\alpha = 0.05$; F ratio = 2.488, $p = 0.1059$). Adult and larval identification times/individual are statistically similar across sampling periods.

Minutes/taxon processing times were compared (Table 34). The ANOVA did not provide sufficient evidence to reject $H7_0$ ($\alpha = 0.05$; F ratio = 1.135, $p = 0.4147$). Adult and larval identification times/taxon are statistically similar across sampling periods.

Table 31. Total lab processing times at each location for the summer and last sampling periods, 2017. Trichoptera Life Stage: L = larvae, A = adults. South Carolina locations: MC = Matthew's Creek; WW = Whitewater River; EFC = East Fork Chattooga River. North Carolina location: DR = Davidson River. SE = one standard error.

Sampling Period	Life Stage	Location				Mean	SE
		MC	WW	EFC	DR		
Summer	L	180	360	300	240	270	38.73
	A	505	355	335	780	493.75	102.68
Last	L	190	195	210	240	208.75	11.25
	A	75	15	100	165	88.75	31.05

Table 32. Fisher's LSD showing similarity of total lab processing times for Trichoptera collected in 2017 for the summer and last sampling periods. F ratio = 10.045, p = 0.0031. Factors with no overlap of letters in similarity index are considered statistically different.

Sampling Period	Life Stage	Similarity Index			Least Sq Mean
July	Adults	A			493.75
Summer	Larvae		B		281.25
Winter	Larvae		B	C	208.75
October	Adults			C	88.75

Table 33. Average identification times (minutes) per individual Trichoptera specimen for the summer and last sampling periods, 2017. South Carolina locations: MC = Matthew's Creek; WW = Whitewater River; EFC = East Fork Chattooga River. North Carolina location: DR = Davidson River.

Sampling Period	Life Stage	Location				Mean	SE
		MC	WW	EFC	DR		
Summer	Larvae	1.05	1.58	1.06	1.55	1.31	0.15
	Adults	1.8	1.2	0.83	0.75	1.14	0.24
Last	Larvae	0.69	0.94	0.56	0.66	0.71	0.08
	Adults	1	0.33	0.70	0.43	0.61	0.15

Table 34. Average identification times (minutes) per Trichoptera taxon from the summer and last sampling periods, 2017. South Carolina locations: MC = Matthew's Creek; WW = Whitewater River; EFC = East Fork Chattooga River. North Carolina location: DR = Davidson River. SE = one standard error.

Sampling Period	Life Stage	Location				Mean	SE
		MC	WW	EFC	DR		
Summer	Larvae	4.62	13.13	7.89	5.24	7.72	1.94
	Adults	14.40	8.28	7.50	6.52	9.17	1.78
Last	Larvae	9.41	6.88	7.50	5.83	7.41	0.75
	Adults	4.29	1.43	5.00	3.70	3.60	0.77

Life History

Although biological data were not available for all taxa examined, no taxa were collected that were definitely from a different water source. For those taxa that have data available with regard to their life history, taxa that may have come from a different portion of the stream or possibly from another water source will be discussed.

DISCUSSION

The results of this study fail to provide conclusive evidence that adding a light trapping event for adult Trichoptera to benthic biomonitoring protocols in wadeable, Appalachian mountain streams will improve the accuracy and precision of these protocols in a timely manner. The primary objective of rapid biomonitoring is to obtain a biotic index value to inform management and policy decisions regarding that water body. Some results show the adults indicate a different biotic index value than the larvae, but when the data are combined (larvae + adults), there are no differences either in the Mixed-Rank Biotic-Index (MRBI) or Species Biotic-Index (SpBI) values between the current protocols and these proposed protocols.

This corroborates the usefulness of the current protocols to obtain biotic index values to inform management and policy decisions. Multivariate and other multimetric approaches can be useful (e.g., Barbour et al. 1995, Reynoldson et al. 1997, Lücke and Johnson 2009) and may warrant further exploration in the context of these data.

This study reinforces the importance of species level identifications for taxa (Resh and Unzicker 1975, Lenat and Resh 2001, Houghton 2003). The results show this reduces the variability of the data, even within the combined larval + adult data. Some of the highest abundances of adult taxa were those with only genus level larval tolerance values (e.g., *Cheumatopsyche* spp, TV = 6.6; *Hydroptila* spp, TV = 6.5; NCDEQ 2016, after Lenat 1993), warranting further research associating larvae with their adults. As molecular techniques become more cost-effective, these methods should be further utilized.

Still, the lack of overall conclusive evidence warrants further investigation. There are some differences in taxa collected between the larval and adult sampling periods, yet many of the adult taxa lack tolerance values, or have values at only the genus level. The increase in these adult taxa was reflected in the increased variability across sampling periods for the adult biotic index values and taxa collected compared to sampling periods for the larvae. These variations are likely caused by the narrow emergence windows of many species (e.g., Floyd et al. 2012, Houghton 2012). Thus, when the data were combined, these taxa had no significant impact on the biotic index. Because of this variation in adults, larvae are a more stable life stage to collect in terms of biotic index values, though the tolerance values were based on collections of larvae, so that conclusion is not necessarily notable. Taxonomic diversity was also more stable across larval sampling, but this is in part due to the selectivity of the collecting methods for the larvae and their persisting in that life stage for a much longer period.

Another reason for this lack of conclusive evidence is due to the multi-habitat approach of the NCDEQ (2016) protocols. Some studies supporting the use of light trapping for biomonitoring failed to sample larvae in such a comprehensive manner, using one sampling method in one habitat type (Houghton et al. 2011), or combining single habitat sampling methods across aquatic and terrestrial habitats (Malison et al. 2010).

Even so, this study does not necessarily challenge the previously documented benefits of biomonitoring with adult light-trapped Trichoptera, which merits further discussion. The use of adult light-trapped Trichoptera in water bodies where larval

sampling is less feasible logistically still holds credence (Waringer 2003, Kortenhoeven 2016). Some studies have shown that adult assemblages accurately reflect larval assemblages in terms of ecological integrity (e.g., Stanić-Koštroman et al. 2012, Collier et al. 1997), but this and other studies (e.g., Houghton 2011) provide inconsistent conclusions; there is often significant variation not only in the biotic index values when viewed separately, but also in taxa composition. These data show how context dependent light trapping as a tool for biomonitoring may be. For example, it may be more valuable for examining the stream corridor or surrounding landscape.

Biomonitoring in the context of the stream corridor (to include the riparian habitat) or surrounding landscape has not often been considered by agencies. They are often restricted to view the stream as ending at the visible boundary of the bank, especially for management and legal reasons (Barbour et al. 1999, NCDEQ 2016). Estimating the probability of whether the adults have actually developed in the stream the trap is placed adjacent to is therefore essential. Critiques of light trapping in the context of biomonitoring are based on studies indicating that Trichoptera have been found at various distances from their hypothesized aquatic larval habitat (e.g., Collier and Smith 1998, Winterbourn et al. 2007). However, other studies have given data to suggest this is highly species specific, and the majority of species stay close to the water body in which they developed as larvae (Kovats et al. 1996, Griffith et al. 1998). In that context, even if adults came from a different water source, it shows the potential for that taxon to colonize the water source the trap is placed adjacent to (Collier and Smith, 1998), while acknowledging that the stream is also intimately connected to the riparian ecosystem

(Baxter et al., 2005). Ignoring these connections is a critical mistake when doing research that involves the health of the stream, as the surrounding habitat and biota reflect the health of the stream, but in different ways (Houghton et al. 2011, Serengil et al. 2012). Beginning to understand these nuances is critical to understanding more completely the health of the entire stream corridor (Nakano and Murakami 2001, Muehlbauer et al. 2014). Therefore, if the scope of the current biomonitoring protocols was broadened to a more wholesome, ecosystem approach, the addition of a light trapping event shows promise (Larsen et al., 2016).

Finally, if these protocols were to be adopted in the correct context, the month of June shows the most promise for many reasons. Not only did this month collect the highest number of unique taxa with the least amount of variability when compared against all larval sampling periods, but it also had the most consistency across adult sampling periods in terms of SpBI values. Other studies have shown that sampling in the time period (seasonally) immediately following the peak abundance yields peak species richness while significantly reducing the overall abundance that would need to be sorted (Stanić-Koštroman et al. 2012). Again, this is context dependent, but the majority of the data point to that conclusion.

CONCLUSIONS

This study fails to provide sufficient evidence that adding a light trapping event to current rapid biomonitoring protocols will improve them in a timely manner. Yet it does corroborate the effectiveness of the current multi-habitat benthic protocols. Species-level identifications are still encouraged for the reduction of variability of the data.

Furthermore, although there are differences in taxa collected between larval and adult samples, the taxonomic composition between these sampled communities is more similar than not. Light trapping in the context of biomonitoring still shows potential but requires a different perspective and questions to be effective. Specifically, light trapping for adult Trichoptera in the context of biomonitoring to include the river corridor or for the purposes of connectedness of habitats shows potential.

FUTURE RESEARCH

This study examined light trapping for adult Trichoptera in healthy, wadeable Appalachian streams, so further expanding research to other geographic regions, water body types, and impairment statuses of the water types is warranted. Using light trapping for adult Trichoptera in the context of biomonitoring to assess connectedness to the riparian habitat should also be further examined. This could help with larval-adult associations for species, making tolerance values more accurate and precise. In addition, using DNA data to assign species tolerance values to taxa that only have genus level tolerance values shows promise.

APPENDICES

Appendix A

Benthic Macroinvertebrate Biological Monitoring Data Form

Modified from NCDEQ Biological Assessment Unit for the Pisgah Chapter of Trout Unlimited

Stream: Davidson River **Location/Road:** _____/ 475 **County:** Transylvania
Date: _____ **Section No:** ____ **Survey No:** ____ **Basin:** French Broad **Subbasin:** Davidson River
Observer(s): Coleson Wrege, _____ **Study:** Davidson River Project
Latitude: _____ **Longitude:** _____ **Ecoregion:** Mountain
Water Quality- Meter/Serial Number: _____/_____ Water Temp: _____°C
DO: _____mg/L_____% pH: _____ Conductivity: _____µS/cm
Stream Characteristics- Width: ____m Max Depth: ____cm Avg. Depth**:** ____cm
Bank Height: ____m Bank Angle: ____° (Vertical is 90°, horizontal is 0°. Angles >90° indicate slope is towards mid-channel, <90° indicate slope is away from channel. NA if bank is too low for bank angle to matter.)
__Deeply incised-steep, straight banks __Both banks undercut at bend __Channel filled with sediment
__Recent over-bank deposits __Bar development __Buried structures __Exposed bedrock
__Excessive periphyton growth __Heavy filamentous algae __Green tinge __Sewage smell
__Man-made stabilization, type:
_____

Flow Conditions- __High __Normal __Low Flow Rate Data (if available): _____
Turbidity- __Clear __Slightly Turbid __Turbid __Tannic __Milky __Colored

Weather Conditions-_____ ***Photos-*** __N __Y __Phone __Digital
Light Penetration- __Stream with *good shading* with some breaks for light penetration
__Stream with *full canopy*- breaks for light penetration absent
__Stream with *partial shading*- sunlight and shading are essentially equal
__Stream with *minimal shading*- full sun in all but a few areas
__*No shading*

Notes:
_____
_____

Appendix B

Adult Trichoptera Biological Monitoring Data Form

Modified from NCDWQ Biological Assessment Unit for Benthic Macroinvertebrate Sampling

Stream: _____ **Location/Road:** _____ **County:** Transylvania
Date: _____ **Basin:** French Broad **Subbasin:** Davidson River
Observer(s): Coleson Wrege,_____ **Study:** Thesis Light Trapping
Latitude: _____ **Longitude:** _____ **Ecoregion:** Mountain
Anemometer: Meter/Serial Number: Mastech MS6252B / IEC61010-1
Weather Conditions- Moon Phase: _____ Sunset:_____ Start:_____ End:_____ (Taken every 15 min)

Humidity (%RH):	***Precipitation:***
Start: _____	Start: Mist: __ Sprinkle: __ Steady: __ Downpour: __ Other: _____
15m: _____	15m: Mist: __ Sprinkle: __ Steady: __ Downpour: __ Other: _____
30m: _____	30m: Mist: __ Sprinkle: __ Steady: __ Downpour: __ Other: _____
45m: _____	45m: Mist: __ Sprinkle: __ Steady: __ Downpour: __ Other: _____
60m: _____	60m: Mist: __ Sprinkle: __ Steady: __ Downpour: __ Other: _____
75m: _____	75m: Mist: __ Sprinkle: __ Steady: __ Downpour: __ Other: _____
90m: _____	90m: Mist: __ Sprinkle: __ Steady: __ Downpour: __ Other: _____
105m: _____	105m: Mist: __ Sprinkle: __ Steady: __ Downpour: __ Other: _____
120m: _____	120m: Mist: __ Sprinkle: __ Steady: __ Downpour: __ Other: _____
135m: _____	135m: Mist: __ Sprinkle: __ Steady: __ Downpour: __ Other: _____
150m: _____	150m: Mist: __ Sprinkle: __ Steady: __ Downpour: __ Other: _____

Wind Speed (m/s):	***Wind Direction:****	***Air Temperature (°C):***	***Cloud Cover:***
Start: ___	Start: ___	Start: ____	No Clouds: ___ Partly Cloudy: ___ Cloudy: ___
15m: ___	15m: ___	15m: ____	No Clouds: ___ Partly Cloudy: ___ Cloudy: ___
30m: ___	30m: ___	30m: ____	No Clouds: ___ Partly Cloudy: ___ Cloudy: ___
45m: ___	45m: ___	45m: ____	No Clouds: ___ Partly Cloudy: ___ Cloudy: ___
60m: ___	60m: ___	60m: ____	No Clouds: ___ Partly Cloudy: ___ Cloudy: ___
75m: ___	75m: ___	75m: ____	No Clouds: ___ Partly Cloudy: ___ Cloudy: ___
90m: ___	90m: ___	90m: ____	No Clouds: ___ Partly Cloudy: ___ Cloudy: ___
105m: ___	105m: ___	105m: ____	No Clouds: ___ Partly Cloudy: ___ Cloudy: ___
120m: ___	120m: ___	120m: ____	No Clouds: ___ Partly Cloudy: ___ Cloudy: ___
135m: ___	135m: ___	135m: ____	No Clouds: ___ Partly Cloudy: ___ Cloudy: ___
150m: ___	150m: ___	150m: ____	No Clouds: ___ Partly Cloudy: ___ Cloudy: ___

*****From one of the following: upstream, downstream, across stream (toward observer), or terrestrial (at observer's back as facing stream)

Photos- __N __Y __Phone __Digital
Notes: _____

Appendix C

Voucher List. Location: MC=Matthew's Creek, WW=Whitewater River, EFC=East Fork Chattooga River, DR=Davidson River

Voucher #	Museum Collection #	Family	Species	Abundance	Location	Date
A13001	CUAC 000045148	Rhyacophilidae	*Rhyacophila fuscula*	2	MC	24-Mar-17
A13002	CUAC 000045149	Lepidostomatidae	*Lepidostoma* sp	2	MC	24-Mar-17
A13003	CUAC 000045150	Brachycentridae	*Micrasema rickeri*	1	MC	24-Mar-17
A13004	CUAC 000045151	Glossosomatidae	*Glossosoma nigrior*	1	MC	24-Mar-17
A13005	CUAC 000045152	Rhyacophilidae	*Rhyacophila carolina*	5	MC	24-Mar-17
A13006	CUAC 000045153	Philopotamidae	*Dolophilodes distincta*	12	MC	24-Mar-17
A13007	CUAC 000045154	Polycentropodidae	*Polycentropus* sp	2	MC	24-Mar-17
A13008	CUAC 000045155	Leptoceridae	*Ceraclea ancylus*	2	MC	24-Mar-17
A13009	CUAC 000045156	Thremmatidae	*Neophylax mitchelli*	2	MC	24-Mar-17
A13010	CUAC 000045157	Goeridae	*Goera calcarata*	1	MC	24-Mar-17
A13011	CUAC 000045158	Hydroptilidae	*Hydroptila* sp	1	MC	24-Mar-17
A13012	CUAC 000045159	Hydropsychidae	*Diplectrona modesta*	21	MC	24-Mar-17
A13013	CUAC 000045160	Hydropsychidae	*Cheumatopsyche* sp	34	MC	24-Mar-17
A13014	CUAC 000045161	Hydropsychidae	*Hydropsyche sparna*	1	MC	24-Mar-17
A13015	CUAC 000045162	Limnephilidae	*Pycnopsyche luculenta/sonso*	12	MC	24-Mar-17
A13016	CUAC 000045163	Hydropsychidae	*Hydropsyche* sp	1	MC	24-Mar-17
A23001	CUAC 000045164	Rhyacophilidae	*Rhyacophila fuscula*	30	WW	18-Mar-17
A23002	CUAC 000045165	Rhyacophilidae	*Rhyacophila acutiloba*	1	WW	18-Mar-17
A23003	CUAC 000045166	Brachycentridae	*Micrasema rickeri*	29	WW	18-Mar-17
A23004	CUAC 000045167	Goeridae	*Goera calcarata*	1	WW	18-Mar-17
A23005	CUAC 000045168	Glossosomatidae	*Glossosoma nigrior*	1	WW	18-Mar-17
A23006	CUAC 000045169	Philopotamidae	*Dolophilodes distincta*	37	WW	18-Mar-17
A23007	CUAC 000045170	Lepidostomatidae	*Lepidostoma* sp	4	WW	18-Mar-17
A23008	CUAC 000045171	Hydroptilidae	*Ochrotrichia* sp	1	WW	18-Mar-17
A23009	CUAC 000045172	Hydroptilidae	*Hydroptila* sp	4	WW	18-Mar-17

Voucher List (*cont.*). Location: MC=Matthew's Creek, WW=Whitewater River, EFC=East Fork Chattooga River, DR=Davidson River

Voucher #	Museum Collection #	Family	Species	Abundance	Location	Date
A23010	CUAC 000045173	Hydropsychidae	*Diplectrona modesta*	1	WW	18-Mar-17
A23011	CUAC 000045174	Hydropsychidae	*Hydropsyche sparna*	5	WW	18-Mar-17
A23012	CUAC 000045175	Hydropsychidae	*Cheumatopsyche* sp	1	WW	18-Mar-17
A23013	CUAC 000045176	Apataniidae	*Apatania incerta*	2	WW	18-Mar-17
A23014	CUAC 000045177	Leptoceridae	*Ceraclea ancylus*	5	WW	18-Mar-17
A23015	CUAC 000045178	Limnephilidae	*Pycnopsyche scabripennis group*	2	WW	18-Mar-17
A33001	CUAC 000045179	Rhyacophilidae	*Rhyacophila fuscula*	15	EFC	18-Mar-17
A33002	CUAC 000045180	Rhyacophilidae	*Rhyacophila carolina*	4	EFC	18-Mar-17
A33003	CUAC 000045181	Rhyacophilidae	*Rhyacophila acutiloba*	2	EFC	18-Mar-17
A33004	CUAC 000045182	Goeridae	*Goera calcarata*	1	EFC	18-Mar-17
A33005	CUAC 000045183	Odontoceridae	*Psilotreta frontalis*	1	EFC	18-Mar-17
A33006	CUAC 000045184	Odontoceridae	*Psilotreta* sp	1	EFC	18-Mar-17
A33007	CUAC 000045185	Thremmatidae	*Neophylax mitchelli*	1	EFC	18-Mar-17
A33008	CUAC 000045186	Thremmatidae	*Neophylax consimilis*	1	EFC	18-Mar-17
A33009	CUAC 000045187	Polycentropodidae	*Nyctiophylax nephophilus*	4	EFC	18-Mar-17
A33010	CUAC 000045188	Brachycentridae	*Micrasema charonis*	2	EFC	18-Mar-17
A33011	CUAC 000045189	Glossosomatidae	*Glossosoma nigrior*	8	EFC	18-Mar-17
A33012	CUAC 000045190	Lepidostomatidae	*Lepidostoma* sp	4	EFC	18-Mar-17
A33013	CUAC 000045191	Brachycentridae	*Brachycentrus spinae* "dark-headed"	1	EFC	18-Mar-17
A33014	CUAC 000045192	Philopotamidae	*Dolophilodes distincta*	7	EFC	18-Mar-17
A33015	CUAC 000045193	Limnephilidae	*Pycnopsyche luculenta/sonso*	4	EFC	18-Mar-17
A33016	CUAC 000045194	Calamoceratidae	*Heteroplectron americanum*	4	EFC	18-Mar-17
A33017	CUAC 000045195	Hydropsychidae	*Diplectrona modesta*	2	EFC	18-Mar-17
A33018	CUAC 000045196	Hydropsychidae	*Cheumatopsyche* sp	6	EFC	18-Mar-17
A33019	CUAC 000045197	Hydropsychidae	*Hydropsyche sparna*	18	EFC	18-Mar-17
A43031	CUAC 000045198	Phryganeidae	*Oligostomis pardalis*	1	DR	21-Mar-17
A43033	CUAC 000045199	Limnephilidae	*Pycnopsyche luculenta/sonso*	13	DR	21-Mar-17

Voucher List (*cont.*). Location: MC=Matthew's Creek, WW=Whitewater River, EFC=East Fork Chattooga River, DR=Davidson River

Voucher #	Museum Collection #	Family	Species	Abundance	Location	Date
A43034	CUAC 000045200	Rhyacophilidae	*Rhyacophila fuscula*	10	DR	21-Mar-17
A43035	CUAC 000045201	Goeridae	*Goera calcarata*	1	DR	21-Mar-17
A43036	CUAC 000045202	Hydropsychidae	*Arctopsyche irrorata*	1	DR	21-Mar-17
A43037	CUAC 000045203	Odontoceridae	*Psilotreta frontalis*	1	DR	21-Mar-17
A43038	CUAC 000045204	Lepidostomatidae	*Lepidostoma* sp	8	DR	21-Mar-17
A43039	CUAC 000045205	Brachycentridae	*Micrasema rickeri*	9	DR	21-Mar-17
A43040	CUAC 000045206	Brachycentridae	*Micrasema charonis*	2	DR	21-Mar-17
A43041	CUAC 000045207	Rhyacophilidae	*Rhyacophila carolina*	1	DR	21-Mar-17
A43042	CUAC 000045208	Rhyacophilidae	*Rhyacophila minora*	1	DR	21-Mar-17
A43043	CUAC 000045209	Philopotamidae	*Dolophilodes distincta*	9	DR	21-Mar-17
A43044	CUAC 000045210	Glossosomatidae	*Glossosoma nigrior*	1	DR	21-Mar-17
A43045	CUAC 000045211	Hydropsychidae	*Diplectrona modesta*	1	DR	21-Mar-17
A43046	CUAC 000045212	Hydropsychidae	*Hydropsyche sparna*	2	DR	21-Mar-17
A43047	CUAC 000045213	Thremmatidae	*Neophylax mitchelli*	1	DR	21-Mar-17
A43048	CUAC 000045214	Hydroptilidae	*Hydroptila* sp	5	DR	21-Mar-17
A43049	CUAC 000045215	Polycentropodidae	*Nyctiophylax nephophilus*	6	DR	21-Mar-17
A43050	CUAC 000045216	Psychomyiidae	*Lype diversa*	1	DR	21-Mar-17
A43051	CUAC 000045217	Glossosomatidae	*Agapetus* sp	1	DR	21-Mar-17
A43052	CUAC 000045218	Hydropsychidae	*Cheumatopsyche* sp	9	DR	21-Mar-17
A14001	CUAC 000045219	Limnephilidae	*Pycnopsyche luculenta/sonso*	1	MC	22-Jul-17
A14002	CUAC 000045220	Brachycentridae	*Brachycentrus spinae* "dark-headed"	9	MC	22-Jul-17
A14003	CUAC 000045221	Hydropsychidae	*Arctopsyche irrorata*	1	MC	22-Jul-17
A14004	CUAC 000045222	Lepidostomatidae	*Lepidostoma* sp	5	MC	22-Jul-17
A14005	CUAC 000045223	Glossosomatidae	*Glossosoma nigrior*	2	MC	22-Jul-17
A14006	CUAC 000045224	Leptoceridae	*Ceraclea ancylus*	1	MC	22-Jul-17
A14007	CUAC 000045225	Philopotamidae	*Dolophilodes distincta*	5	MC	22-Jul-17
A14008	CUAC 000045226	Rhyacophilidae	*Rhyacophila carolina*	1	MC	22-Jul-17

Voucher List (*cont.*). Location: MC=Matthew's Creek, WW=Whitewater River, EFC=East Fork Chattooga River, DR=Davidson River

Voucher #	Museum Collection #	Family	Species	Abundance	Location	Date
A14009	CUAC 000045227	Brachycentridae	*Micrasema wataga*	1	MC	22-Jul-17
A14010	CUAC 000045228	Polycentropodidae	*Plectrocnemia* sp	1	MC	22-Jul-17
A14011	CUAC 000045229	Hydropsychidae	*Diplectrona modesta*	1	MC	22-Jul-17
A14012	CUAC 000045230	Hydropsychidae	*Cheumatopsyche* sp	11	MC	22-Jul-17
A14013	CUAC 000045231	Hydropsychidae	*Hydropsyche sparna*	18	MC	22-Jul-17
A24001	CUAC 000045232	Limnephilidae	*Pycnopsyche scabripennis group*	2	WW	22-Jul-17
A24002	CUAC 000045233	Rhyacophilidae	*Rhyacophila fuscula*	1	WW	22-Jul-17
A24003	CUAC 000045234	Lepidostomatidae	*Lepidostoma* sp	11	WW	22-Jul-17
A24004	CUAC 000045235	Brachycentridae	*Micrasema rickeri*	20	WW	22-Jul-17
A24005	CUAC 000045236	Brachycentridae	*Micrasema wataga*	7	WW	22-Jul-17
A24006	CUAC 000045237	Goeridae	*Goera calcarata*	1	WW	22-Jul-17
A24007	CUAC 000045238	Brachycentridae	*Brachycentrus spinae* "dark-headed"	9	WW	22-Jul-17
A24008	CUAC 000045239	Philopotamidae	*Dolophilodes distincta*	13	WW	22-Jul-17
A24009	CUAC 000045240	Leptoceridae	*Ceraclea ancylus*	4	WW	22-Jul-17
A24010	CUAC 000045241	Leptoceridae	*Triaenodes* sp	1	WW	22-Jul-17
A24011	CUAC 000045242	Odontoceridae	*Psilotreta frontalis*	1	WW	22-Jul-17
A24012	CUAC 000045243	Hydroptilidae	*Hydroptila* sp	1	WW	22-Jul-17
A24013	CUAC 000045244	Glossosomatidae	*Glossosoma nigrior*	1	WW	22-Jul-17
A24014	CUAC 000045245	Hydropsychidae	*Cheumatopsyche* sp	16	WW	22-Jul-17
A24015	CUAC 000045246	Hydropsychidae	*Diplectrona modesta*	1	WW	22-Jul-17
A24016	CUAC 000045247	Hydropsychidae	*Hydropsyche sparna*	44	WW	22-Jul-17
A34001	CUAC 000045248	Calamoceratidae	*Heteroplectron americanum*	2	EFC	22-Jul-17
A34002	CUAC 000045249	Limnephilidae	*Pycnopsyche luculenta/sonso*	3	EFC	22-Jul-17
A34003	CUAC 000045250	Lepidostomatidae	*Lepidostoma* sp	11	EFC	22-Jul-17
A34004	CUAC 000045251	Rhyacophilidae	*Rhyacophila fuscula*	19	EFC	22-Jul-17
A34005	CUAC 000045252	Rhyacophilidae	*Rhyacophila carolina*	2	EFC	22-Jul-17
A34006	CUAC 000045253	Rhyacophilidae	*Rhyacophila acutiloba*	4	EFC	22-Jul-17

Voucher List (*cont.*). Location: MC=Matthew's Creek, WW=Whitewater River, EFC=East Fork Chattooga River, DR=Davidson River

Voucher #	Museum Collection #	Family	Species	Abundance	Location	Date
A34007	CUAC 000045254	Glossosomatidae	*Glossosoma nigrior*	7	EFC	22-Jul-17
A34008	CUAC 000045255	Dipseudopsidae	*Phylocentropus carolinus*	1	EFC	22-Jul-17
A34009	CUAC 000045256	Hydropsychidae	*Arctopsyche irrorata*	1	EFC	22-Jul-17
A34010	CUAC 000045257	Odontoceridae	*Psilotreta* sp	1	EFC	22-Jul-17
A34011	CUAC 000045258	Brachycentridae	*Brachycentrus spinae* "dark-headed"	3	EFC	22-Jul-17
A34012	CUAC 000045259	Philopotamidae	*Dolophilodes distincta*	15	EFC	22-Jul-17
A34013	CUAC 000045260	Hydropsychidae	*Hydropsyche sparna*	63	EFC	22-Jul-17
A34014	CUAC 000045261	Hydropsychidae	*Cheumatopsyche* sp	3	EFC	22-Jul-17
A34015	CUAC 000045262	Hydropsychidae	*Diplectrona modesta*	1	EFC	22-Jul-17
A34016	CUAC 000045263	Hydropsychidae	*Hydropsyche betteni*	1	EFC	22-Jul-17
A34017	CUAC 000045264	Hydroptilidae	*Hydroptila* sp	3	EFC	22-Jul-17
A34018	CUAC 000045265	Polycentropodidae	*Polycentropus* sp	1	EFC	22-Jul-17
A34019	CUAC 000045266	Psychomyiidae	*Lype diversa*	1	EFC	22-Jul-17
A44040	CUAC 000045267	Limnephilidae	*Pycnopsyche luculenta/sonso*	2	DR	11-Jul-17
A44041	CUAC 000045268	Calamoceratidae	*Heteroplectron americanum*	1	DR	11-Jul-17
A44042	CUAC 000045269	Rhyacophilidae	*Rhyacophila fuscula*	13	DR	11-Jul-17
A44043	CUAC 000045270	Lepidostomatidae	*Lepidostoma* sp	25	DR	11-Jul-17
A44044	CUAC 000045271	Hydropsychidae	*Arctopsyche irrorata*	1	DR	11-Jul-17
A44045	CUAC 000045272	Glossosomatidae	*Glossosoma nigrior*	47	DR	11-Jul-17
A44046	CUAC 000045273	Brachycentridae	*Brachycentrus spinae* "dark-headed"	9	DR	11-Jul-17
A44047	CUAC 000045274	Rhyacophilidae	*Rhyacophila carolina*	1	DR	11-Jul-17
A44048	CUAC 000045275	Philopotamidae	*Dolophilodes distincta*	30	DR	11-Jul-17
A44049	CUAC 000045276	Brachycentridae	*Micrasema wataga*	1	DR	11-Jul-17
A44050	CUAC 000045277	Brachycentridae	*Micrasema rickeri*	1	DR	11-Jul-17
A44051	CUAC 000045278	Thremmatidae	*Neophylax consimilis*	2	DR	11-Jul-17
A44052	CUAC 000045279	Polycentropodidae	*Polycentropus* sp	4	DR	11-Jul-17
A44053	CUAC 000045280	Hydropsychidae	*Cheumatopsyche* sp	12	DR	11-Jul-17

Voucher List (*cont.*). Location: MC=Matthew's Creek, WW=Whitewater River, EFC=East Fork Chattooga River, DR=Davidson River

Voucher #	Museum Collection #	Family	Species	Abundance	Location	Date
A44054	CUAC 000045281	Hydropsychidae	*Hydropsyche sparna*	48	DR	11-Jul-17
A44055	CUAC 000045282	Hydropsychidae	*Hydropsyche* sp	1	DR	11-Jul-17
A44056	CUAC 000045283	Odontoceridae	*Psilotreta* sp	1	DR	11-Jul-17
A44057	CUAC 000045284	Brachycentridae	*Micrasema* sp	1	DR	11-Jul-17
A11001	CUAC 000045285	Calamoceratidae	*Anisocentropus pyraloides*	1	MC	10-Nov-17
A11002	CUAC 000045286	Brachycentridae	*Brachycentrus spinae* "dark-headed"	1	MC	10-Nov-17
A11003	CUAC 000045287	Sericostomatidae	*Fattigia pele*	1	MC	10-Nov-17
A11004	CUAC 000045288	Brachycentridae	*Micrasema rickeri*	13	MC	10-Nov-17
A11005	CUAC 000045289	Apataniidae	*Apatania incerta*	10	MC	10-Nov-17
A11006	CUAC 000045290	Lepidostomatidae	*Lepidostoma* sp	18	MC	10-Nov-17
A11007	CUAC 000045291	Rhyacophilidae	*Rhyacophila fuscula*	7	MC	10-Nov-17
A11008	CUAC 000045292	Rhyacophilidae	*Rhyacophila carolina*	2	MC	10-Nov-17
A11009	CUAC 000045293	Glossosomatidae	*Glossosoma nigrior*	9	MC	10-Nov-17
A11010	CUAC 000045294	Philopotamidae	*Dolophilodes distincta*	20	MC	10-Nov-17
A11011	CUAC 000045295	Limnephilidae		3	MC	10-Nov-17
A11012	CUAC 000045296	Hydropsychidae	*Arctopsyche irrorata*	1	MC	10-Nov-17
A11013	CUAC 000045297	Hydropsychidae	*Cheumatopsyche* sp	74	MC	10-Nov-17
A11014	CUAC 000045298	Hydropsychidae	*Diplectrona modesta*	22	MC	10-Nov-17
A11015	CUAC 000045299	Hydropsychidae	*Hydropsyche sparna*	21	MC	10-Nov-17
A21001	CUAC 000045300	Glossosomatidae	*Glossosoma nigrior*	20	WW	11-Nov-17
A21002	CUAC 000045301	Philopotamidae	*Dolophilodes distincta*	8	WW	11-Nov-17
A21003	CUAC 000045302	Brachycentridae	*Micrasema rickeri*	20	WW	11-Nov-17
A21004	CUAC 000045303	Rhyacophilidae	*Rhyacophila fuscula*	14	WW	11-Nov-17
A21005	CUAC 000045304	Rhyacophilidae	*Rhyacophila carolina*	1	WW	11-Nov-17
A21006	CUAC 000045305	Rhyacophilidae	*Rhyacophila acutiloba*	3	WW	11-Nov-17
A21007	CUAC 000045306	Goeridae	*Goera calcarata*	4	WW	11-Nov-17
A21008	CUAC 000045307	Apataniidae	*Apatania incerta*	2	WW	11-Nov-17

Voucher List (*cont.*). Location: MC=Matthew's Creek, WW=Whitewater River, EFC=East Fork Chattooga River, DR=Davidson River

Voucher #	Museum Collection #	Family	Species	Abundance	Location	Date
A21009	CUAC 000045308	Lepidostomatidae	*Lepidostoma* sp	11	WW	11-Nov-17
A21010	CUAC 000045309	Brachycentridae	*Brachycentrus spinae* "dark-headed"	2	WW	11-Nov-17
A21011	CUAC 000045310	Limnephilidae	*Pycnopsyche near scabripennis*	3	WW	11-Nov-17
A21012	CUAC 000045311	Hydroptilidae	*Hydroptila* sp	2	WW	11-Nov-17
A21013	CUAC 000045312	Thremmatidae	*Neophylax* sp	1	WW	11-Nov-17
A21014	CUAC 000045313	Leptoceridae	*Ceraclea ancylus*	1	WW	11-Nov-17
A21015	CUAC 000045314	Hydropsychidae	*Diplectrona modesta*	15	WW	11-Nov-17
A21016	CUAC 000045315	Hydropsychidae	*Cheumatopsyche* sp	49	WW	11-Nov-17
A21017	CUAC 000045316	Psychomyiidae	*Lype diversa*	1	WW	11-Nov-17
A21018	CUAC 000045317	Hydropsychidae	*Hydropsyche sparna*	15	WW	11-Nov-17
A31001	CUAC 000045318	Phryganeidae	*Oligostomis* sp	1	EFC	11-Nov-17
A31002	CUAC 000045319	Rhyacophilidae	*Rhyacophila fuscula*	17	EFC	11-Nov-17
A31003	CUAC 000045320	Rhyacophilidae	*Rhyacophila acutiloba*	2	EFC	11-Nov-17
A31004	CUAC 000045321	Rhyacophilidae	*Rhyacophila torva*	2	EFC	11-Nov-17
A31005	CUAC 000045322	Rhyacophilidae	*Rhyacophila carolina*	4	EFC	11-Nov-17
A31006	CUAC 000045323	Rhyacophilidae	*Rhyacophila* sp	1	EFC	11-Nov-17
A31007	CUAC 000045324	Goeridae	*Goera calcarata*	4	EFC	11-Nov-17
A31008	CUAC 000045325	Odontoceridae	*Psilotreta frontalis*	11	EFC	11-Nov-17
A31009	CUAC 000045326	Philopotamidae	*Dolophilodes distincta*	3	EFC	11-Nov-17
A31011	CUAC 000045327	Brachycentridae	*Brachycentrus spinae* "dark-headed"	7	EFC	11-Nov-17
A31012	CUAC 000045328	Polycentropodidae	*Nyctiophylax nephophilus*	12	EFC	11-Nov-17
A31013	CUAC 000045329	Apataniidae	*Apatania incerta*	5	EFC	11-Nov-17
A31014	CUAC 000045330	Limnephilidae	*Pycnopsyche near scabripennis*	2	EFC	11-Nov-17
A31015	CUAC 000045331	Lepidostomatidae	*Lepidostoma* sp	2	EFC	11-Nov-17
A31016	CUAC 000045332	Glossosomatidae	*Glossosoma nigrior*	27	EFC	11-Nov-17
A31017	CUAC 000045333	Glossosomatidae	*Agapetus* sp	1	EFC	11-Nov-17
A31018	CUAC 000045334	Hydropsychidae	*Cheumatopsyche* sp	49	EFC	11-Nov-17

Voucher List (*cont.*). Location: MC=Matthew's Creek, WW=Whitewater River, EFC=East Fork Chattooga River, DR=Davidson River

Voucher #	Museum Collection #	Family	Species	Abundance	Location	Date
A31019	CUAC 000045335	Hydropsychidae	*Diplectrona modesta*	29	EFC	11-Nov-17
A31020	CUAC 000045336	Hydropsychidae	*Hydropsyche sparna*	54	EFC	11-Nov-17
A31021	CUAC 000045337	Hydropsychidae	*Hydropsyche alhedra*	2	EFC	11-Nov-17
A31022	CUAC 000045338	Hydroptilidae	*Hydroptila* sp	5	EFC	11-Nov-17
A31023	CUAC 000045339	Polycentropodidae	*Nyctiophylax moestus*	1	EFC	11-Nov-17
A31024	CUAC 000045340	Rhyacophilidae	*Rhyacophila minora*	2	EFC	11-Nov-17
A41041	CUAC 000045341	Calamoceratidae	*Heteroplectron americanum*	1	DR	07-Nov-16
A41042	CUAC 000045342	Rhyacophilidae	*Rhyacophila fuscula*	7	DR	07-Nov-16
A41043	CUAC 000045343	Rhyacophilidae	*Rhyacophila carolina*	1	DR	07-Nov-16
A41044	CUAC 000045344	Glossosomatidae	*Glossosoma nigrior*	6	DR	07-Nov-16
A41045	CUAC 000045345	Lepidostomatidae	*Lepidostoma* sp	7	DR	07-Nov-16
A41046	CUAC 000045346	Brachycentridae	*Brachycentrus spinae* "dark-headed"	1	DR	07-Nov-16
A41047	CUAC 000045347	Philopotamidae	*Dolophilodes distincta*	32	DR	07-Nov-16
A41048	CUAC 000045348	Limnephilidae		1	DR	07-Nov-16
A41049	CUAC 000045349	Apataniidae	*Apatania incerta*	20	DR	07-Nov-16
A41050	CUAC 000045350	Brachycentridae	*Micrasema rickeri*	98	DR	07-Nov-16
A41051	CUAC 000045351	Hydroptilidae	*Hydroptila* sp	4	DR	07-Nov-16
A41052	CUAC 000045352	Brachycentridae	*Micrasema* sp	17	DR	07-Nov-16
A41054	CUAC 000045353	Hydropsychidae	*Arctopsyche irrorata*	1	DR	07-Nov-16
A41055	CUAC 000045354	Hydropsychidae	*Cheumatopsyche* sp	16	DR	07-Nov-16
A41056	CUAC 000045355	Hydropsychidae	*Diplectrona modesta*	2	DR	07-Nov-16
A41057	CUAC 000045356	Hydropsychidae	*Hydropsyche sparna*	20	DR	07-Nov-16
A41058	CUAC 000045357	Hydropsychidae	*Hydropsyche slossonae*	4	DR	07-Nov-16
A12001	CUAC 000045358	Rhyacophilidae	*Rhyacophila fuscula*	6	MC	23-Jan-18
A12002	CUAC 000045359	Rhyacophilidae	*Rhyacophila carolina*	3	MC	23-Jan-18
A12003	CUAC 000045360	Rhyacophilidae	*Rhyacophila* sp	1	MC	23-Jan-18
A12004	CUAC 000045361	Glossosomatidae	*Glossosoma nigrior*	10	MC	23-Jan-18

Voucher List (*cont.*). Location: MC=Matthew's Creek, WW=Whitewater River, EFC=East Fork Chattooga River, DR=Davidson River

Voucher #	Museum Collection #	Family	Species	Abundance	Location	Date
A12005	CUAC 000045362	Apataniidae	*Apatania incerta*	12	MC	23-Jan-18
A12006	CUAC 000045363	Philopotamidae	*Dolophilodes distincta*	6	MC	23-Jan-18
A12007	CUAC 000045364	Philopotamidae	*Wormaldia* sp	1	MC	23-Jan-18
A12008	CUAC 000045365	Goeridae	*Goera calcarata*	1	MC	23-Jan-18
A12009	CUAC 000045366	Lepidostomatidae	*Lepidostoma* spp	45	MC	23-Jan-18
A12010	CUAC 000045367	Brachycentridae	*Micrasema rickeri*	11	MC	23-Jan-18
A12011	CUAC 000045368	Brachycentridae	*Brachycentrus spinae* "dark-headed"	8	MC	23-Jan-18
A12012	CUAC 000045369	Thremmatidae	*Neophylax* sp	2	MC	23-Jan-18
A12013	CUAC 000045370	Limnephilidae	*Pycnopsyche luculenta/sonso*	29	MC	23-Jan-18
A12014	CUAC 000045371	Thremmatidae	*Neophylax consimilis*	1	MC	23-Jan-18
A12015	CUAC 000045372	Hydropsychidae	*Cheumatopsyche* sp	80	MC	23-Jan-18
A12016	CUAC 000045373	Hydropsychidae	*Diplectrona modesta*	11	MC	23-Jan-18
A12017	CUAC 000045374	Hydropsychidae	*Hydropsyche sparna*	5	MC	23-Jan-18
A22001	CUAC 000045375	Rhyacophilidae	*Rhyacophila fuscula*	24	WW	20-Jan-18
A22002	CUAC 000045376	Rhyacophilidae	*Rhyacophila acutiloba*	10	WW	20-Jan-18
A22003	CUAC 000045377	Rhyacophilidae	*Rhyacophila carolina*	3	WW	20-Jan-18
A22004	CUAC 000045378	Rhyacophilidae	*Rhyacophila atrata*	1	WW	20-Jan-18
A22005	CUAC 000045379	Rhyacophilidae	*Rhyacophila amicis*	1	WW	20-Jan-18
A22006	CUAC 000045380	Glossosomatidae	*Glossosoma nigrior*	6	WW	20-Jan-18
A22007	CUAC 000045381	Glossosomatidae	*Agapetus* sp	1	WW	20-Jan-18
A22008	CUAC 000045382	Apataniidae	*Apatania incerta*	24	WW	20-Jan-18
A22009	CUAC 000045383	Philopotamidae	*Dolophilodes distincta*	7	WW	20-Jan-18
A22010	CUAC 000045384	Goeridae	*Goera calcarata*	7	WW	20-Jan-18
A22011	CUAC 000045385	Psychomyiidae	*Lype diversa*	1	WW	20-Jan-18
A22012	CUAC 000045386	Polycentropodidae	*Nyctiophylax nephophilus*	1	WW	20-Jan-18
A22013	CUAC 000045387	Polycentropodidae	*Polycentropus* sp	1	WW	20-Jan-18
A22014	CUAC 000045388	Leptoceridae	*Ceraclea ancylus*	2	WW	20-Jan-18

Voucher List (*cont.*). Location: MC=Matthew's Creek, WW=Whitewater River, EFC=East Fork Chattooga River, DR=Davidson River

Voucher #	Museum Collection #	Family	Species	Abundance	Location	Date
A22015	CUAC 000045389	Helicopsychidae	*Helicopsyche paralimnella*	1	WW	20-Jan-18
A22016	CUAC 000045390	Brachycentridae	*Brachycentrus spinae* "dark-headed"	2	WW	20-Jan-18
A22017	CUAC 000045391	Brachycentridae	*Micrasema rickeri*	106	WW	20-Jan-18
A22018	CUAC 000045392	Limnephilidae	*Pycnopsyche luculenta/sonso*	29	WW	20-Jan-18
A22019	CUAC 000045393	Limnephilidae	*Pycnopsyche near scabripennis*	1	WW	20-Jan-18
A22020	CUAC 000045394	Lepidostomatidae	*Lepidostoma* spp	13	WW	20-Jan-18
A22021	CUAC 000045395	Hydroptilidae	*Hydroptila* sp	1	WW	20-Jan-18
A22022	CUAC 000045396	Hydropsychidae	*Cheumatopsyche* sp	34	WW	20-Jan-18
A22023	CUAC 000045397	Hydropsychidae	*Diplectrona modesta*	13	WW	20-Jan-18
A22024	CUAC 000045398	Hydropsychidae	*Hydropsyche sparna*	34	WW	20-Jan-18
A32001	CUAC 000045399	Rhyacophilidae	*Rhyacophila fuscula*	9	EFC	20-Jan-18
A32002	CUAC 000045400	Rhyacophilidae	*Rhyacophila minora*	4	EFC	20-Jan-18
A32003	CUAC 000045401	Rhyacophilidae	*Rhyacophila acutiloba*	3	EFC	20-Jan-18
A32004	CUAC 000045402	Rhyacophilidae	*Rhyacophila torva*	1	EFC	20-Jan-18
A32005	CUAC 000045403	Rhyacophilidae	*Rhyacophila atrata*	1	EFC	20-Jan-18
A32006	CUAC 000045404	Rhyacophilidae	*Rhyacophila carolina*	2	EFC	20-Jan-18
A32007	CUAC 000045405	Apataniidae	*Apatania incerta*	25	EFC	20-Jan-18
A32008	CUAC 000045406	Polycentropodidae	*Nyctiophylax nephophilus*	14	EFC	20-Jan-18
A32009	CUAC 000045407	Odontoceridae	*Psilotreta frontalis*	4	EFC	20-Jan-18
A32010	CUAC 000045408	Glossosomatidae	*Glossosoma nigrior*	30	EFC	20-Jan-18
A32011	CUAC 000045409	Glossosomatidae	*Agapetus* sp	2	EFC	20-Jan-18
A32012	CUAC 000045410	Lepidostomatidae	*Lepidostoma* spp	8	EFC	20-Jan-18
A32013	CUAC 000045411	Brachycentridae	*Brachycentrus spinae* "dark-headed"	8	EFC	20-Jan-18
A32014	CUAC 000045412	Dipseudopsidae	*Phylocentropus carolina*	5	EFC	20-Jan-18
A32015	CUAC 000045413	Calamoceratidae	*Heteroplectron americanum*	2	EFC	20-Jan-18
A32016	CUAC 000045414	Limnephilidae	*Pycnopsyche luculenta/sonso*	1	EFC	20-Jan-18
A32017	CUAC 000045415	Limnephilidae	*Pycnopsyche near scabripennis*	6	EFC	20-Jan-18

Voucher List (*cont.*). Location: MC=Matthew's Creek, WW=Whitewater River, EFC=East Fork Chattooga River, DR=Davidson River

Voucher #	Museum Collection #	Family	Species	Abundance	Location	Date
A32018	CUAC 000045416	Limnephilidae	*Platycentropus radiatus*	1	EFC	20-Jan-18
A32019	CUAC 000045417	Hydropsychidae	*Diplectrona modesta*	12	EFC	20-Jan-18
A32020	CUAC 000045418	Hydropsychidae	*Cheumatopsyche* sp	15	EFC	20-Jan-18
A32021	CUAC 000045419	Hydropsychidae	*Hydropsyche sparna*	19	EFC	20-Jan-18
A32022	CUAC 000045420	Hydropsychidae	*Hydropsyche betteni*	1	EFC	20-Jan-18
A32023	CUAC 000045421	Hydropsychidae	*Hydropsyche slossonae*	2	EFC	20-Jan-18
A32024	CUAC 000045422	Hydroptilidae	*Hydroptila* sp	1	EFC	20-Jan-18
A42045	CUAC 000045423	Rhyacophilidae	*Rhyacophila fuscula*	5	DR	03-Jan-17
A42046	CUAC 000045424	Lepidostomatidae	*Lepidostoma* sp	12	DR	03-Jan-17
A42047	CUAC 000045425	Rhyacophilidae	*Rhyacophila carolina*	3	DR	03-Jan-17
A42048	CUAC 000045426	Brachycentridae	*Micrasema rickeri*	2	DR	03-Jan-17
A42049	CUAC 000045427	Glossosomatidae	*Glossosoma nigrior*	5	DR	03-Jan-17
A42050	CUAC 000045428	Apataniidae	*Apatania incerta*	3	DR	03-Jan-17
A42051	CUAC 000045429	Polycentropodidae	*Nyctiophylax nephophilus*	3	DR	03-Jan-17
A42052	CUAC 000045430	Polycentropodidae	*Polycentropus* sp	2	DR	03-Jan-17
A42053	CUAC 000045431	Limnephilidae		1	DR	03-Jan-17
A42054	CUAC 000045432	Hydropsychidae	*Diplectrona modesta*	2	DR	03-Jan-17
A42055	CUAC 000045433	Leptoceridae	*Triaenodes* sp	1	DR	03-Jan-17
A42056	CUAC 000045434	Hydropsychidae	*Cheumatopsyche* sp	17	DR	03-Jan-17
A42057	CUAC 000045435	Hydropsychidae	*Hydropsyche sparna*	6	DR	03-Jan-17
T14001	CUAC 000045436	Philopotamidae	*Dolophilodes distincta*	6	MC	08-Apr-17
T14002	CUAC 000045437	Lepidostomatidae	*Lepidostoma modestum*	2	MC	08-Apr-17
T14003	CUAC 000045438	Hydropsychidae	*Hydropsyche sparna*	3	MC	08-Apr-17
T24001	CUAC 000045439	Philopotamidae	*Dolophilodes distincta*	1	WW	09-Apr-17
T24002	CUAC 000045440	Hydropsychidae	*Hydropsyche sparna*	1	WW	09-Apr-17
T24003	CUAC 000045441	Hydropsychidae	*Hydropsyche bronta*	1	WW	09-Apr-17
T34001	CUAC 000045442	Lepidostomatidae	*Lepidostoma modestum*	5	EFC	13-Apr-17

Voucher List (*cont.*). Location: MC=Matthew's Creek, WW=Whitewater River, EFC=East Fork Chattooga River, DR=Davidson River

Voucher #	Museum Collection #	Family	Species	Abundance	Location	Date
T34002	CUAC 000045443	Rhyacophilidae	*Rhyacophila fuscula*	7	EFC	13-Apr-17
T34003	CUAC 000045444	Hydropsychidae	*Arctopsyche irrorata*	1	EFC	13-Apr-17
T34004	CUAC 000045445	Brachycentridae	*Micrasema rickeri*	1	EFC	13-Apr-17
T34005	CUAC 000045446	Dipseudopsidae	*Phylocentropus placidus*	1	EFC	13-Apr-17
T34006	CUAC 000045447	Polycentropodidae	*Polycentropus confusus*	1	EFC	13-Apr-17
T34007	CUAC 000045448	Hydroptilidae	*Hydroptila* sp	1	EFC	13-Apr-17
T34008	CUAC 000045449	Leptoceridae	*Ceraclea nepha*	1	EFC	13-Apr-17
T34009	CUAC 000045450	Hydropsychidae	*Hydropsyche sparna*	52	EFC	13-Apr-17
T44001	CUAC 000045451	Hydropsychidae	*Arctopsyche irrorata*	1	DR	11-Apr-17
T44002	CUAC 000045452	Apataniidae	*Apatania incerta*	10	DR	11-Apr-17
T44003	CUAC 000045453	Lepidostomatidae	*Lepidostoma* sp	2	DR	11-Apr-17
T44004	CUAC 000045454	Hydropsychidae	*Hydropsyche sparna*	1	DR	11-Apr-17
T44005	CUAC 000045455	Hydroptilidae	*Hydroptila* sp	2	DR	11-Apr-17
T44006	CUAC 000045456	Hydroptilidae	*Oxyethira forcipata*	3	DR	11-Apr-17
T15001	CUAC 000045457	Hydropsychidae	*Diplectrona modesta*	8	MC	11-May-17
T15002	CUAC 000045458	Philopotamidae	*Dolophilodes distincta*	8	MC	11-May-17
T15003	CUAC 000045459	Hydropsychidae	*Cheumatopsyche harwoodi*	35	MC	11-May-17
T15004	CUAC 000045460	Rhyacophilidae	*Rhyacophila carolina*	8	MC	11-May-17
T15005	CUAC 000045461	Goeridae	*Goera calcarata*	6	MC	11-May-17
T15006	CUAC 000045462	Glossosomatidae	*Agapetus tomus*	1	MC	11-May-17
T15007	CUAC 000045463	Polycentropodidae	*Polycentropus confusus*	2	MC	11-May-17
T15008	CUAC 000045464	Leptoceridae	*Ceraclea protonepha*	1	MC	11-May-17
T15009	CUAC 000045465	Hydropsychidae	*Hydropsyche sparna*	46	MC	11-May-17
T15011	CUAC 000045466	Psychomyiidae	*Psychomyia flavida*	3	MC	11-May-17
T15012	CUAC 000045467	Philopotamidae	*Fumonta major*	1	MC	11-May-17
T15013	CUAC 000045468	Dipseudopsidae	*Phylocentropus placidus*	1	MC	11-May-17
T15014	CUAC 000045469	Polycentropodidae	*Polycentropus* sp	5	MC	11-May-17

Voucher List (*cont.*). Location: MC=Matthew's Creek, WW=Whitewater River, EFC=East Fork Chattooga River, DR=Davidson River

Voucher #	Museum Collection #	Family	Species	Abundance	Location	Date
T15015	CUAC 000045470	Lepidostomatidae	*Lepidostoma* sp	1	MC	11-May-17
T15016	CUAC 000045471	Hydropsychidae	*Cheumatopsyche pinaca*	1	MC	11-May-17
T15017	CUAC 000045472	Hydropsychidae	*Cheumatopsyche geora*	1	MC	11-May-17
T15018	CUAC 000045473	Philopotamidae	*Wormaldia* sp	1	MC	11-May-17
T15019	CUAC 000045474	Hydroptilidae	*Hydroptila gunda*	2	MC	11-May-17
T15020	CUAC 000045475	Hydroptilidae	*Oxyethira abacatia*	1	MC	11-May-17
T15021	CUAC 000045476	Hydroptilidae	*Stactobiella* sp	10	MC	11-May-17
T15022	CUAC 000045477	Hydroptilidae	*Hydroptila* sp	32	MC	11-May-17
T15023	CUAC 000045478	Hydroptilidae	*Stactobiella palmata*	21	MC	11-May-17
T15024	CUAC 000045479	Hydroptilidae	*Hydroptila ampoda*	2	MC	11-May-17
T15025	CUAC 000045480	Hydroptilidae	*Hydroptila quinola*	3	MC	11-May-17
T15026	CUAC 000045481	Hydroptilidae	*Hydroptila alabama*	1	MC	11-May-17
T15027	CUAC 000045482	Hydroptilidae	*Oxyethira rivicola*	1	MC	11-May-17
T25001	CUAC 000045483	Rhyacophilidae	*Rhyacophila fuscula*	2	WW	14-May-17
T25002	CUAC 000045484	Hydropsychidae	*Diplectrona modesta*	1	WW	14-May-17
T25003	CUAC 000045485	Hydropsychidae	*Hydropsyche sparna*	5	WW	14-May-17
T25004	CUAC 000045486	Hydropsychidae	*Cheumatopsyche harwoodi*	6	WW	14-May-17
T25005	CUAC 000045487	Psychomyiidae	*Lype diversa*	1	WW	14-May-17
T25006	CUAC 000045488	Hydroptilidae	*Hydroptila* sp	177	WW	14-May-17
T25007	CUAC 000045489	Hydroptilidae	*Stactobiella* sp	6	WW	14-May-17
T25008	CUAC 000045490	Hydroptilidae	*Hydroptila berneri*	2	WW	14-May-17
T35001	CUAC 000045491	Rhyacophilidae	*Rhyacophila fuscula*	4	EFC	17-May-17
T35002	CUAC 000045492	Goeridae	*Goera calcarata*	5	EFC	17-May-17
T35003	CUAC 000045493	Lepidostomatidae	*Lepidostoma togatum*	11	EFC	17-May-17
T35004	CUAC 000045494	Lepidostomatidae	*Lepidostoma tibiale*	1	EFC	17-May-17
T35005	CUAC 000045495	Leptoceridae	*Oecetis inconspicua*	1	EFC	17-May-17
T35006	CUAC 000045496	Philopotamidae	*Dolophilodes distincta*	21	EFC	17-May-17

Voucher List (*cont.*). Location: MC=Matthew's Creek, WW=Whitewater River, EFC=East Fork Chattooga River, DR=Davidson River

Voucher #	Museum Collection #	Family	Species	Abundance	Location	Date
T35007	CUAC 000045497	Rhyacophilidae	*Rhyacophila nigrita*	1	EFC	17-May-17
T35008	CUAC 000045498	Polycentropodidae	*Polycentropus confusus*	2	EFC	17-May-17
T35009	CUAC 000045499	Glossosomatidae	*Agapetus* sp	3	EFC	17-May-17
T35010	CUAC 000045500	Psychomyiidae	*Lype diversa*	4	EFC	17-May-17
T35011	CUAC 000045501	Psychomyiidae	*Psychomyia flavida*	3	EFC	17-May-17
T35012	CUAC 000045502	Polycentropodidae	*Nyctiophylax nephophilus*	1	EFC	17-May-17
T35013	CUAC 000045503	Hydropsychidae	*Hydropsyche betteni*	1	EFC	17-May-17
T35014	CUAC 000045504	Hydropsychidae	*Hydropsyche sparna*	89	EFC	17-May-17
T35015	CUAC 000045505	Hydropsychidae	*Diplectrona modesta*	4	EFC	17-May-17
T35016	CUAC 000045506	Hydropsychidae	*Cheumatopsyche harwoodi*	15	EFC	17-May-17
T35017	CUAC 000045507	Hydropsychidae	*Cheumatopsyche gyra*	5	EFC	17-May-17
T35018	CUAC 000045508	Hydropsychidae	*Hydropsyche bronta/morosa*	1	EFC	17-May-17
T35019	CUAC 000045509	Hydroptilidae	*Hydroptila* sp	23	EFC	17-May-17
T35020	CUAC 000045510	Hydroptilidae	*Oxyethira* sp	1	EFC	17-May-17
T35021	CUAC 000045511	Hydroptilidae	*Hydroptila ampoda*	2	EFC	17-May-17
T35022	CUAC 000045512	Hydroptilidae	*Hydroptila quinola*	2	EFC	17-May-17
T45001	CUAC 000045513	Limnephilidae	*Hydatophylax argus*	1	DR	16-May-17
T45002	CUAC 000045514	Hydropsychidae	*Arctopsyche irrorata*	1	DR	16-May-17
T45003	CUAC 000045515	Rhyacophilidae	*Rhyacophila fuscula*	1	DR	16-May-17
T45004	CUAC 000045516	Dipseudopsidae	*Phylocentropus placidus*	1	DR	16-May-17
T45005	CUAC 000045517	Goeridae	*Goera calcarata*	4	DR	16-May-17
T45006	CUAC 000045518	Hydropsychidae	*Hydropsyche bronta*	1	DR	16-May-17
T45007	CUAC 000045519	Hydropsychidae	*Hydropsyche sparna*	11	DR	16-May-17
T45008	CUAC 000045520	Hydropsychidae	*Hydropsyche betteni*	1	DR	16-May-17
T45009	CUAC 000045521	Psychomyiidae	*Lype diversa*	4	DR	16-May-17
T45010	CUAC 000045522	Philopotamidae	*Dolophilodes distincta*	6	DR	16-May-17
T45011	CUAC 000045523	Glossosomatidae	*Agapetus* sp	8	DR	16-May-17

Voucher List (*cont.*). Location: MC=Matthew's Creek, WW=Whitewater River, EFC=East Fork Chattooga River, DR=Davidson River

Voucher #	Museum Collection #	Family	Species	Abundance	Location	Date
T45012	CUAC 000045524	Hydropsychidae	*Cheumatopsyche harwoodi*	138	DR	16-May-17
T45013	CUAC 000045525	Brachycentridae	*Micrasema* sp	1	DR	16-May-17
T45014	CUAC 000045526	Hydropsychidae	*Cheumatopsyche oxa*	1	DR	16-May-17
T45015	CUAC 000045527	Hydroptilidae	*Hydroptila* sp	16	DR	16-May-17
T45016	CUAC 000045528	Hydroptilidae	*Hydroptila ampoda*	4	DR	16-May-17
T45017	CUAC 000045529	Hydroptilidae	*Hydroptila quinola*	1	DR	16-May-17
T16001	CUAC 000045530	Hydropsychidae	*Hydropsyche sparna*	16	MC	09-Jun-17
T16002	CUAC 000045531	Hydropsychidae	*Diplectrona modesta*	18	MC	09-Jun-17
T16003	CUAC 000045532	Hydropsychidae	*Hydropsyche betteni*	3	MC	09-Jun-17
T16004	CUAC 000045533	Hydropsychidae	*Cheumatopsyche harwoodi*	10	MC	09-Jun-17
T16005	CUAC 000045534	Hydropsychidae	*Cheumatopsyche oxa*	2	MC	09-Jun-17
T16006	CUAC 000045535	Hydropsychidae	*Cheumatopsyche pinaca*	1	MC	09-Jun-17
T16007	CUAC 000045536	Hydropsychidae	*Cheumatopsyche geora*	2	MC	09-Jun-17
T16008	CUAC 000045537	Rhyacophilidae	*Rhyacophila carolina*	19	MC	09-Jun-17
T16009	CUAC 000045538	Philopotamidae	*Dolophilodes distincta*	10	MC	09-Jun-17
T16010	CUAC 000045539	Leptoceridae	*Oecetis inconspicua*	2	MC	09-Jun-17
T16011	CUAC 000045540	Leptoceridae	*Ceraclea ancylus*	1	MC	09-Jun-17
T16012	CUAC 000045541	Polycentropodidae	*Polycentropus confusus*	3	MC	09-Jun-17
T16013	CUAC 000045542	Brachycentridae	*Micrasema rickeri*	2	MC	09-Jun-17
T16014	CUAC 000045543	Psychomyiidae	*Psychomyia nomada*	1	MC	09-Jun-17
T16015	CUAC 000045544	Helicopsychidae	*Helicopsyche borealis*	2	MC	09-Jun-17
T16016	CUAC 000045545	Leptoceridae	*Triaenodes ignita*	1	MC	09-Jun-17
T16017	CUAC 000045546	Philopotamidae	*Chimarra* sp	1	MC	09-Jun-17
T16018	CUAC 000045547	Glossosomatidae	*Glossosoma nigrior*	1	MC	09-Jun-17
T16019	CUAC 000045548	Glossosomatidae	*Agapetus pinatus*	13	MC	09-Jun-17
T16020	CUAC 000045549	Lepidostomatidae	*Lepidostoma* spp	4	MC	09-Jun-17
T16021	CUAC 000045550	Goeridae	*Goera calcarata*	1	MC	09-Jun-17

Voucher List (*cont.*). Location: MC=Matthew's Creek, WW=Whitewater River, EFC=East Fork Chattooga River, DR=Davidson River

Voucher #	Museum Collection #	Family	Species	Abundance	Location	Date
T16022	CUAC 000045551	Leptoceridae	*Oecetis avara*	1	MC	09-Jun-17
T16023	CUAC 000045552	Psychomyiidae	*Psychomyia flavida*	2	MC	09-Jun-17
T16024	CUAC 000045553	Polycentropodidae	*Plectrocnemia cinerea*	1	MC	09-Jun-17
T16025	CUAC 000045554	Polycentropodidae	*Polycentropus* sp	2	MC	09-Jun-17
T16026	CUAC 000045555	Polycentropodidae	*Nyctiophylax* sp	1	MC	09-Jun-17
T16027	CUAC 000045556	Brachycentridae	*Micrasema* sp	4	MC	09-Jun-17
T16029	CUAC 000045557	Hydropsychidae	*Hydropsyche* sp	1	MC	09-Jun-17
T16030	CUAC 000045558	Hydroptilidae	*Stactobiella palmata*	7	MC	09-Jun-17
T16031	CUAC 000045559	Hydroptilidae	*Hydroptila* sp	48	MC	09-Jun-17
T16032	CUAC 000045560	Hydroptilidae	*Stactobiella* sp	13	MC	09-Jun-17
T16033	CUAC 000045561	Hydroptilidae	*Hydroptila ampoda*	2	MC	09-Jun-17
T16034	CUAC 000045562	Hydroptilidae	*Hydroptila quinola*	2	MC	09-Jun-17
T16035	CUAC 000045563	Hydropsychidae	*Cheumatopsyche* spp	3	MC	09-Jun-17
T26001	CUAC 000045564	Hydropsychidae	*Hydropsyche sparna*	35	WW	12-Jun-17
T26002	CUAC 000045565	Hydropsychidae	*Diplectrona modesta*	1	WW	12-Jun-17
T26003	CUAC 000045566	Goeridae	*Goera calcarata*	1	WW	12-Jun-17
T26004	CUAC 000045567	Polycentropodidae	*Nyctiophylax celta*	3	WW	12-Jun-17
T26005	CUAC 000045568	Polycentropodidae	*Nyctiophylax denningi*	4	WW	12-Jun-17
T26006	CUAC 000045569	Hydropsychidae	*Cheumatopsyche etrona*	2	WW	12-Jun-17
T26007	CUAC 000045570	Hydropsychidae	*Cheumatopsyche harwoodi*	7	WW	12-Jun-17
T26008	CUAC 000045571	Hydropsychidae	*Cheumatopsyche oxa*	2	WW	12-Jun-17
T26009	CUAC 000045572	Hydropsychidae	*Cheumatopsyche pinula*	1	WW	12-Jun-17
T26010	CUAC 000045573	Hydropsychidae	*Hydropsyche* sp	1	WW	12-Jun-17
T26011	CUAC 000045574	Rhyacophilidae	*Rhyacophila carolina*	1	WW	12-Jun-17
T26012	CUAC 000045575	Brachycentridae	*Micrasema wataga*	1	WW	12-Jun-17
T26013	CUAC 000045576	Hydropsychidae	*Hydropsyche depravata*	1	WW	12-Jun-17
T26014	CUAC 000045577	Leptoceridae	*Oecetis inconspicua*	3	WW	12-Jun-17

Voucher List (*cont.*). Location: MC=Matthew's Creek, WW=Whitewater River, EFC=East Fork Chattooga River, DR=Davidson River

Voucher #	Museum Collection #	Family	Species	Abundance	Location	Date
T26015	CUAC 000045578	Psychomyiidae	*Psychomyia flavida*	2	WW	12-Jun-17
T26016	CUAC 000045579	Brachycentridae	*Micrasema* sp	1	WW	12-Jun-17
T26017	CUAC 000045580	Polycentropodidae	*Nyctiophylax* sp	12	WW	12-Jun-17
T26018	CUAC 000045581	Polycentropodidae	*Neureclipsis crepuscularis*	1	WW	12-Jun-17
T26019	CUAC 000045582	Leptoceridae	*Nectopsyche* sp	2	WW	12-Jun-17
T26020	CUAC 000045583	Leptoceridae	*Oecetis* sp	2	WW	12-Jun-17
T26021	CUAC 000045584	Polycentropodidae	*Cernotina* sp	1	WW	12-Jun-17
T26022	CUAC 000045585	Lepidostomatidae	*Lepidostoma tibiale*	2	WW	12-Jun-17
T26023	CUAC 000045586	Hydroptilidae	*Hydroptila* sp	104	WW	12-Jun-17
T26024	CUAC 000045587	Hydroptilidae	*Stactobiella palmata*	1	WW	12-Jun-17
T26025	CUAC 000045588	Hydroptilidae	*Stactobiella* sp	1	WW	12-Jun-17
T26026	CUAC 000045589	Hydroptilidae	*Oxyethira sininsigne*	1	WW	12-Jun-17
T26027	CUAC 000045590	Hydroptilidae	*Hydroptila alabama*	1	WW	12-Jun-17
T26028	CUAC 000045591	Hydroptilidae	*Hydroptila quinola*	4	WW	12-Jun-17
T26029	CUAC 000045592	Hydroptilidae	*Hydroptila ampoda*	2	WW	12-Jun-17
T36001	CUAC 000045593	Hydropsychidae	*Hydropsyche sparna*	43	EFC	14-Jun-17
T36002	CUAC 000045594	Hydropsychidae	*Diplectrona modesta*	1	EFC	14-Jun-17
T36003	CUAC 000045595	Hydropsychidae	*Hydropsyche slossonae*	2	EFC	14-Jun-17
T36004	CUAC 000045596	Hydropsychidae	*Hydropsyche venularis*	2	EFC	14-Jun-17
T36005	CUAC 000045597	Hydropsychidae	*Hydropsyche bronta*	1	EFC	14-Jun-17
T36006	CUAC 000045598	Hydropsychidae	*Hydropsyche betteni*	2	EFC	14-Jun-17
T36007	CUAC 000045599	Philopotamidae	*Dolophilodes distincta*	17	EFC	14-Jun-17
T36008	CUAC 000045600	Psychomyiidae	*Psychomyia flavida*	12	EFC	14-Jun-17
T36009	CUAC 000045601	Glossosomatidae	*Agapetus pinatus*	1	EFC	14-Jun-17
T36010	CUAC 000045602	Lepidostomatidae	*Lepidostoma americanum*	3	EFC	14-Jun-17
T36011	CUAC 000045603	Lepidostomatidae	*Lepidostoma latipenne*	2	EFC	14-Jun-17
T36012	CUAC 000045604	Goeridae	*Goera calcarata*	5	EFC	14-Jun-17

Voucher List (*cont.*). Location: MC=Matthew's Creek, WW=Whitewater River, EFC=East Fork Chattooga River, DR=Davidson River

Voucher #	Museum Collection #	Family	Species	Abundance	Location	Date
T36013	CUAC 000045605	Rhyacophilidae	*Rhyacophila fuscula*	5	EFC	14-Jun-17
T36014	CUAC 000045606	Rhyacophilidae	*Rhyacophila carolina*	5	EFC	14-Jun-17
T36015	CUAC 000045607	Leptoceridae	*Oecetis inconspicua*	4	EFC	14-Jun-17
T36016	CUAC 000045608	Molannidae	*Molanna ulmerina*	2	EFC	14-Jun-17
T36017	CUAC 000045609	Hydropsychidae	*Cheumatopsyche harwoodi*	5	EFC	14-Jun-17
T36018	CUAC 000045610	Hydropsychidae	*Cheumatopsyche gyra*	12	EFC	14-Jun-17
T36019	CUAC 000045611	Hydropsychidae	*Cheumatopsyche etrona*	1	EFC	14-Jun-17
T36020	CUAC 000045612	Lepidostomatidae	*Lepidostoma* spp	12	EFC	14-Jun-17
T36021	CUAC 000045613	Lepidostomatidae	*Lepidostoma togatum*	1	EFC	14-Jun-17
T36022	CUAC 000045614	Psychomyiidae	*Lype diversa*	1	EFC	14-Jun-17
T36023	CUAC 000045615	Polycentropodidae	*Nyctiophylax nephophilus*	2	EFC	14-Jun-17
T36024	CUAC 000045616	Polycentropodidae	*Nyctiophylax celta*	1	EFC	14-Jun-17
T36025	CUAC 000045617	Polycentropodidae	*Nyctiophylax* sp	9	EFC	14-Jun-17
T36026	CUAC 000045618	Dipseudopsidae	*Phylocentropus placidus*	1	EFC	14-Jun-17
T36027	CUAC 000045619	Hydroptilidae	*Hydroptila* sp	46	EFC	14-Jun-17
T36028	CUAC 000045620	Hydroptilidae	*Hydroptila quinola*	2	EFC	14-Jun-17
T46001	CUAC 000045621	Hydropsychidae	*Hydropsyche sparna*	23	DR	13-Jun-17
T46002	CUAC 000045622	Hydropsychidae	*Hydropsyche slossonae*	2	DR	13-Jun-17
T46003	CUAC 000045623	Hydropsychidae	*Hydropsyche* sp	2	DR	13-Jun-17
T46004	CUAC 000045624	Hydropsychidae	*Cheumatopsyche pinaca*	1	DR	13-Jun-17
T46005	CUAC 000045625	Hydropsychidae	*Cheumatopsyche harwoodi*	11	DR	13-Jun-17
T46006	CUAC 000045626	Hydropsychidae	*Cheumatopsyche oxa*	4	DR	13-Jun-17
T46007	CUAC 000045627	Philopotamidae	*Dolophilodes distincta*	6	DR	13-Jun-17
T46008	CUAC 000045628	Goeridae	*Goera calcarata*	18	DR	13-Jun-17
T46009	CUAC 000045629	Rhyacophilidae	*Rhyacophila carolina*	1	DR	13-Jun-17
T46010	CUAC 000045630	Lepidostomatidae	*Lepidostoma americanum*	2	DR	13-Jun-17
T46011	CUAC 000045631	Leptoceridae	*Oecetis inconspicua*	1	DR	13-Jun-17

Voucher List (*cont.*). Location: MC=Matthew's Creek, WW=Whitewater River, EFC=East Fork Chattooga River, DR=Davidson River

Voucher #	Museum Collection #	Family	Species	Abundance	Location	Date
T46012	CUAC 000045632	Leptoceridae	*Triaenodes morsei*	1	DR	13-Jun-17
T46013	CUAC 000045633	Polycentropodidae	*Neureclipsis crepuscularis*	2	DR	13-Jun-17
T46014	CUAC 000045634	Polycentropodidae	*Polycentropus confusus*	3	DR	13-Jun-17
T46015	CUAC 000045635	Psychomyiidae	*Lype diversa*	2	DR	13-Jun-17
T46016	CUAC 000045636	Glossosomatidae	*Agapetus pinatus*	5	DR	13-Jun-17
T46017	CUAC 000045637	Glossosomatidae	*Agapetus* sp	63	DR	13-Jun-17
T46018	CUAC 000045638	Psychomyiidae	*Psychomyia flavida*	11	DR	13-Jun-17
T46019	CUAC 000045639	Brachycentridae	*Micrasema wataga*	4	DR	13-Jun-17
T46020	CUAC 000045640	Leptoceridae	*Ceraclea cancellata*	1	DR	13-Jun-17
T46021	CUAC 000045641	Lepidostomatidae	*Lepidostoma* spp	2	DR	13-Jun-17
T46022	CUAC 000045642	Dipseudopsidae	*Phylocentropus placidus*	2	DR	13-Jun-17
T46023	CUAC 000045643	Helicopsychidae	*Helicopsyche* sp	1	DR	13-Jun-17
T46024	CUAC 000045644	Polycentropodidae	*Plectrocnemia cinerea*	1	DR	13-Jun-17
T46025	CUAC 000045645	Polycentropodidae	*Nyctiophylax* sp	3	DR	13-Jun-17
T46026	CUAC 000045646	Hydroptilidae	*Hydroptila* sp	26	DR	13-Jun-17
T46027	CUAC 000045647	Hydroptilidae	*Oxyethira michiganensis*	1	DR	13-Jun-17
T46028	CUAC 000045648	Hydroptilidae	*Hydroptila quinola*	1	DR	13-Jun-17
T17001	CUAC 000045649	Hydropsychidae	*Diplectrona modesta*	6	MC	15-Jul-17
T17002	CUAC 000045650	Hydropsychidae	*Hydropsyche sparna*	19	MC	15-Jul-17
T17003	CUAC 000045651	Hydropsychidae	*Hydropsyche betteni*	1	MC	15-Jul-17
T17004	CUAC 000045652	Hydropsychidae	*Hydropsyche* sp	1	MC	15-Jul-17
T17005	CUAC 000045653	Philopotamidae	*Dolophilodes distincta*	5	MC	15-Jul-17
T17006	CUAC 000045654	Goeridae	*Goera calcarata*	1	MC	15-Jul-17
T17007	CUAC 000045655	Psychomyiidae	*Psychomyia flavida*	1	MC	15-Jul-17
T17008	CUAC 000045656	Psychomyiidae	*Psychomyia nomada*	5	MC	15-Jul-17
T17009	CUAC 000045657	Brachycentridae	*Micrasema wataga*	2	MC	15-Jul-17
T17010	CUAC 000045658	Polycentropodidae	*Polycentropus confusus*	2	MC	15-Jul-17

Voucher List (*cont.*). Location: MC=Matthew's Creek, WW=Whitewater River, EFC=East Fork Chattooga River, DR=Davidson River

Voucher #	Museum Collection #	Family	Species	Abundance	Location	Date
T17011	CUAC 000045659	Glossosomatidae	*Glossosoma nigrior*	1	MC	15-Jul-17
T17012	CUAC 000045660	Hydropsychidae	*Cheumatopsyche harwoodi*	16	MC	15-Jul-17
T17013	CUAC 000045661	Hydropsychidae	*Cheumatopsyche pinaca*	2	MC	15-Jul-17
T17014	CUAC 000045662	Hydropsychidae	*Cheumatopsyche geora*	9	MC	15-Jul-17
T17015	CUAC 000045663	Rhyacophilidae	*Rhyacophila carolina*	11	MC	15-Jul-17
T17016	CUAC 000045664	Leptoceridae	*Setodes incertus*	1	MC	15-Jul-17
T17017	CUAC 000045665	Lepidostomatidae	*Lepidostoma* sp	2	MC	15-Jul-17
T17018	CUAC 000045666	Polycentropodidae	*Nyctiophylax* sp	2	MC	15-Jul-17
T17019	CUAC 000045667	Polycentropodidae	*Plectrocnemia cinerea*	3	MC	15-Jul-17
T17020	CUAC 000045668	Helicopsychidae	*Helicopsyche* sp	1	MC	15-Jul-17
T17021	CUAC 000045669	Hydroptilidae	*Hydroptila* sp	97	MC	15-Jul-17
T17022	CUAC 000045670	Hydroptilidae	*Hydroptila quinola*	5	MC	15-Jul-17
T17023	CUAC 000045671	Hydroptilidae	*Hydroptila gunda*	2	MC	15-Jul-17
T17024	CUAC 000045672	Hydroptilidae	*Hydroptila alabama*	4	MC	15-Jul-17
T17025	CUAC 000045673	Hydroptilidae	*Hydroptila amoena*	1	MC	15-Jul-17
T27001	CUAC 000045674	Philopotamidae	*Dolophilodes distincta*	2	WW	16-Jul-17
T27002	CUAC 000045675	Hydropsychidae	*Hydropsyche sparna*	53	WW	16-Jul-17
T27003	CUAC 000045676	Hydropsychidae	*Cheumatopsyche pinaca*	2	WW	16-Jul-17
T27004	CUAC 000045677	Hydropsychidae	*Cheumatopsyche etrona*	2	WW	16-Jul-17
T27005	CUAC 000045678	Hydropsychidae	*Cheumatopsyche virginica*	1	WW	16-Jul-17
T27006	CUAC 000045679	Rhyacophilidae	*Rhyacophila fuscula*	3	WW	16-Jul-17
T27007	CUAC 000045680	Rhyacophilidae	*Rhyacophila carolina*	2	WW	16-Jul-17
T27008	CUAC 000045681	Goeridae	*Goera calcarata*	15	WW	16-Jul-17
T27009	CUAC 000045682	Leptoceridae	*Setodes incertus*	9	WW	16-Jul-17
T27010	CUAC 000045683	Leptoceridae	*Oecetis inconspicua*	15	WW	16-Jul-17
T27011	CUAC 000045684	Leptoceridae	*Oecetis* sp	2	WW	16-Jul-17
T27012	CUAC 000045685	Glossosomatidae	*Agapetus pinatus*	2	WW	16-Jul-17

Voucher List (*cont.*). Location: MC=Matthew's Creek, WW=Whitewater River, EFC=East Fork Chattooga River, DR=Davidson River

Voucher #	Museum Collection #	Family	Species	Abundance	Location	Date
T27013	CUAC 000045686	Polycentropodidae	*Polycentropus confusus*	1	WW	16-Jul-17
T27014	CUAC 000045687	Polycentropodidae	*Nyctiophylax denningi*	2	WW	16-Jul-17
T27015	CUAC 000045688	Polycentropodidae	*Nyctiophylax celta*	6	WW	16-Jul-17
T27016	CUAC 000045689	Polycentropodidae	*Nyctiophylax nephophilus*	1	WW	16-Jul-17
T27017	CUAC 000045690	Brachycentridae	*Micrasema* sp	1	WW	16-Jul-17
T27018	CUAC 000045691	Helicopsychidae	*Helicopsyche* sp	3	WW	16-Jul-17
T27019	CUAC 000045692	Hydropsychidae	*Diplectrona modesta*	1	WW	16-Jul-17
T27020	CUAC 000045693	Lepidostomatidae	*Lepidostoma tibiale*	1	WW	16-Jul-17
T27021	CUAC 000045694	Polycentropodidae	*Nyctiophylax* sp	8	WW	16-Jul-17
T27022	CUAC 000045695	Polycentropodidae	*Plectrocnemia cinerea*	2	WW	16-Jul-17
T27023	CUAC 000045696	Hydroptilidae	*Hydroptila* sp	57	WW	16-Jul-17
T27024	CUAC 000045697	Hydroptilidae	*Hydroptila quinola*	4	WW	16-Jul-17
T27025	CUAC 000045698	Hydroptilidae	*Hydroptila alabama*	1	WW	16-Jul-17
T27026	CUAC 000045699	Hydroptilidae	*Hydroptila ampoda*	1	WW	16-Jul-17
T27027	CUAC 000045700	Hydroptilidae	*Mayatrichia ayama*	1	WW	16-Jul-17
T27028	CUAC 000045701	Hydroptilidae	*Oxyethira michiganensis*	1	WW	16-Jul-17
T27029	CUAC 000045702	Hydroptilidae	*Oxyethira* sp	1	WW	16-Jul-17
T37001	CUAC 000045703	Hydropsychidae	*Hydropsyche sparna*	36	EFC	18-Jul-17
T37002	CUAC 000045704	Hydropsychidae	*Hydropsyche betteni*	2	EFC	18-Jul-17
T37003	CUAC 000045705	Hydropsychidae	*Hydropsyche morosa*	1	EFC	18-Jul-17
T37004	CUAC 000045706	Hydropsychidae	*Hydropsyche bronta*	1	EFC	18-Jul-17
T37005	CUAC 000045707	Philopotamidae	*Dolophilodes distincta*	5	EFC	18-Jul-17
T37006	CUAC 000045708	Goeridae	*Goera calcarata*	5	EFC	18-Jul-17
T37007	CUAC 000045709	Lepidostomatidae	*Lepidostoma latipenne*	1	EFC	18-Jul-17
T37008	CUAC 000045710	Leptoceridae	*Setodes incertus*	16	EFC	18-Jul-17
T37009	CUAC 000045711	Leptoceridae	*Oecetis inconspicua*	1	EFC	18-Jul-17
T37010	CUAC 000045712	Leptoceridae	*Oecetis avara*	2	EFC	18-Jul-17

Voucher List (*cont.*). Location: MC=Matthew's Creek, WW=Whitewater River, EFC=East Fork Chattooga River, DR=Davidson River

Voucher #	Museum Collection #	Family	Species	Abundance	Location	Date
T37011	CUAC 000045713	Hydropsychidae	*Cheumatopsyche etrona*	44	EFC	18-Jul-17
T37012	CUAC 000045714	Hydropsychidae	*Cheumatopsyche harwoodi*	6	EFC	18-Jul-17
T37013	CUAC 000045715	Hydropsychidae	*Cheumatopsyche pinaca*	1	EFC	18-Jul-17
T37014	CUAC 000045716	Psychomyiidae	*Lype diversa*	1	EFC	18-Jul-17
T37015	CUAC 000045717	Rhyacophilidae	*Rhyacophila carolina*	1	EFC	18-Jul-17
T37016	CUAC 000045718	Polycentropodidae	*Nyctiophylax celta*	1	EFC	18-Jul-17
T37017	CUAC 000045719	Polycentropodidae	*Nyctiophylax nephophilus*	1	EFC	18-Jul-17
T37018	CUAC 000045720	Polycentropodidae	*Nyctiophylax* sp	6	EFC	18-Jul-17
T37019	CUAC 000045721	Polycentropodidae	*Polycentropus confusus*	1	EFC	18-Jul-17
T37020	CUAC 000045722	Hydroptilidae	*Hydroptila* sp	57	EFC	18-Jul-17
T37021	CUAC 000045723	Hydroptilidae	*Hydroptila quinola*	5	EFC	18-Jul-17
T37022	CUAC 000045724	Hydroptilidae	*Hydroptila alabama*	6	EFC	18-Jul-17
T47001	CUAC 000045725	Hydropsychidae	*Hydropsyche sparna*	13	DR	12-Jul-17
T47002	CUAC 000045726	Hydropsychidae	*Hydropsyche betteni*	2	DR	12-Jul-17
T47003	CUAC 000045727	Hydropsychidae	*Diplectrona modesta*	1	DR	12-Jul-17
T47004	CUAC 000045728	Hydropsychidae	*Hydropsyche* sp	1	DR	12-Jul-17
T47005	CUAC 000045729	Hydropsychidae	*Hydropsyche bidens*	2	DR	12-Jul-17
T47006	CUAC 000045730	Goeridae	*Goera calcarata*	35	DR	12-Jul-17
T47007	CUAC 000045731	Leptoceridae	*Setodes incertus*	18	DR	12-Jul-17
T47008	CUAC 000045732	Rhyacophilidae	*Rhyacophila fuscula*	1	DR	12-Jul-17
T47009	CUAC 000045733	Glossosomatidae	*Agapetus pinatus*	51	DR	12-Jul-17
T47010	CUAC 000045734	Rhyacophilidae	*Rhyacophila carolina*	4	DR	12-Jul-17
T47011	CUAC 000045735	Dipseudopsidae	*Phylocentropus carolinus*	1	DR	12-Jul-17
T47012	CUAC 000045736	Philopotamidae	*Fumonta major*	1	DR	12-Jul-17
T47013	CUAC 000045737	Helicopsychidae	*Helicopsyche* sp	3	DR	12-Jul-17
T47014	CUAC 000045738	Polycentropodidae	*Plectrocnemia cinerea*	5	DR	12-Jul-17
T47015	CUAC 000045739	Polycentropodidae	*Nyctiophylax nephophilus*	1	DR	12-Jul-17

Voucher List (*cont.*). Location: MC=Matthew's Creek, WW=Whitewater River, EFC=East Fork Chattooga River, DR=Davidson River

Voucher #	Museum Collection #	Family	Species	Abundance	Location	Date
T47016	CUAC 000045740	Polycentropodidae	*Nyctiophylax celta*	1	DR	12-Jul-17
T47017	CUAC 000045741	Polycentropodidae	*Nyctiophylax* sp	1	DR	12-Jul-17
T47018	CUAC 000045742	Polycentropodidae	*Polycentropus* sp	1	DR	12-Jul-17
T47019	CUAC 000045743	Hydroptilidae	*Hydroptila* sp	51	DR	12-Jul-17
T47020	CUAC 000045744	Hydroptilidae	*Hydroptila alabama*	4	DR	12-Jul-17
T47021	CUAC 000045745	Hydroptilidae	*Hydroptila amoena*	1	DR	12-Jul-17
T47022	CUAC 000045746	Hydroptilidae	*Hydroptila* sp	1	DR	12-Jul-17
T47023	CUAC 000045747	Hydroptilidae	*Oxyethira michiganensis*	1	DR	12-Jul-17
T18001	CUAC 000045748	Hydropsychidae	*Hydropsyche sparna*	17	MC	12-Aug-17
T18002	CUAC 000045749	Hydropsychidae	*Diplectrona modesta*	14	MC	12-Aug-17
T18003	CUAC 000045750	Goeridae	*Goera calcarata*	2	MC	12-Aug-17
T18004	CUAC 000045751	Rhyacophilidae	*Rhyacophila carolina*	4	MC	12-Aug-17
T18005	CUAC 000045752	Hydropsychidae	*Cheumatopsyche harwoodi*	89	MC	12-Aug-17
T18007	CUAC 000045753	Philopotamidae	*Dolophilodes distincta*	1	MC	12-Aug-17
T18008	CUAC 000045754	Polycentropodidae	*Plectrocnemia cinerea*	1	MC	12-Aug-17
T18009	CUAC 000045755	Lepidostomatidae	*Lepidostoma* sp	1	MC	12-Aug-17
T18010	CUAC 000045756	Hydroptilidae	*Hydroptila* sp	67	MC	12-Aug-17
T18011	CUAC 000045757	Hydroptilidae	*Orthotrichia sp*	2	MC	12-Aug-17
T18012	CUAC 000045758	Hydroptilidae	*Oxyethira zeronia*	2	MC	12-Aug-17
T28001	CUAC 000045759	Hydropsychidae	*Hydropsyche sparna*	24	WW	17-Aug-17
T28002	CUAC 000045760	Hydropsychidae	*Diplectrona modesta*	1	WW	17-Aug-17
T28003	CUAC 000045761	Goeridae	*Goera calcarata*	2	WW	17-Aug-17
T28004	CUAC 000045762	Rhyacophilidae	*Rhyacophila fuscula*	3	WW	17-Aug-17
T28005	CUAC 000045763	Limnephilidae	*Pycnopsyche antica*	1	WW	17-Aug-17
T28006	CUAC 000045764	Psychomyiidae	*Psychomyia flavida*	6	WW	17-Aug-17
T28007	CUAC 000045765	Leptoceridae	*Setodes incertus*	3	WW	17-Aug-17
T28008	CUAC 000045766	Leptoceridae	*Oecetis inconspicua*	5	WW	17-Aug-17

Voucher List (*cont.*). Location: MC=Matthew's Creek, WW=Whitewater River, EFC=East Fork Chattooga River, DR=Davidson River

Voucher #	Museum Collection #	Family	Species	Abundance	Location	Date
T28009	CUAC 000045767	Lepidostomatidae	*Lepidostoma latipenne*	2	WW	17-Aug-17
T28010	CUAC 000045768	Lepidostomatidae	*Lepidostoma tibiale*	3	WW	17-Aug-17
T28011	CUAC 000045769	Polycentropodidae	*Plectrocnemia cinerea*	1	WW	17-Aug-17
T28012	CUAC 000045770	Brachycentridae	*Micrasema wataga*	2	WW	17-Aug-17
T28013	CUAC 000045771	Philopotamidae	*Dolophilodes distincta*	4	WW	17-Aug-17
T28014	CUAC 000045772	Hydropsychidae	*Cheumatopsyche harwoodi*	27	WW	17-Aug-17
T28015	CUAC 000045773	Polycentropodidae	*Polycentropus* sp	1	WW	17-Aug-17
T28016	CUAC 000045774	Hydroptilidae	*Hydroptila* sp	87	WW	17-Aug-17
T28017	CUAC 000045775	Hydroptilidae	*Oxyethira zeronia*	3	WW	17-Aug-17
T28018	CUAC 000045776	Hydroptilidae	*Oxyethira michiganensis*	1	WW	17-Aug-17
T28019	CUAC 000045777	Hydroptilidae	*Mayatrichia ayama*	5	WW	17-Aug-17
T28020	CUAC 000045778	Hydroptilidae	*Hydroptila quinola*	16	WW	17-Aug-17
T28021	CUAC 000045779	Leptoceridae	*Setodes stehri*	3	WW	17-Aug-17
T38001	CUAC 000045780	Hydropsychidae	*Hydropsyche sparna*	36	EFC	11-Aug-17
T38002	CUAC 000045781	Hydropsychidae	*Diplectrona modesta*	1	EFC	11-Aug-17
T38003	CUAC 000045782	Goeridae	*Goera calcarata*	16	EFC	11-Aug-17
T38004	CUAC 000045783	Rhyacophilidae	*Rhyacophila fuscula*	5	EFC	11-Aug-17
T38005	CUAC 000045784	Rhyacophilidae	*Rhyacophila carolina*	3	EFC	11-Aug-17
T38006	CUAC 000045785	Philopotamidae	*Dolophilodes distincta*	20	EFC	11-Aug-17
T38007	CUAC 000045786	Psychomyiidae	*Psychomyia flavida*	11	EFC	11-Aug-17
T38008	CUAC 000045787	Limnephilidae	*Pycnopsyche antica*	1	EFC	11-Aug-17
T38009	CUAC 000045788	Leptoceridae	*Oecetis avara*	2	EFC	11-Aug-17
T38010	CUAC 000045789	Leptoceridae	*Setodes stehri*	12	EFC	11-Aug-17
T38011	CUAC 000045790	Hydropsychidae	*Cheumatopsyche harwoodi*	10	EFC	11-Aug-17
T38012	CUAC 000045791	Hydropsychidae	*Cheumatopsyche etrona*	1	EFC	11-Aug-17
T38013	CUAC 000045792	Hydropsychidae	*Cheumatopsyche gyra*	1	EFC	11-Aug-17
T38014	CUAC 000045793	Hydropsychidae	*Cheumatopsyche minuscula*	1	EFC	11-Aug-17

Voucher List (*cont.*). Location: MC=Matthew's Creek, WW=Whitewater River, EFC=East Fork Chattooga River, DR=Davidson River

Voucher #	Museum Collection #	Family	Species	Abundance	Location	Date
T38015	CUAC 000045794	Dipseudopsidae	*Phylocentropus lucidus*	1	EFC	11-Aug-17
T38016	CUAC 000045795	Polycentropodidae	*Nyctiophylax* sp	6	EFC	11-Aug-17
T38017	CUAC 000045796	Polycentropodidae	*Plectrocnemia cinerea*	1	EFC	11-Aug-17
T38018	CUAC 000045797	Polycentropodidae	*Polycentropus confusus*	1	EFC	11-Aug-17
T38019	CUAC 000045798	Polycentropodidae	*Nyctiophylax nephophilus*	2	EFC	11-Aug-17
T38020	CUAC 000045799	Hydroptilidae	*Hydroptila* sp	58	EFC	11-Aug-17
T38021	CUAC 000045800	Hydroptilidae	*Hydroptila quinola*	10	EFC	11-Aug-17
T38022	CUAC 000045801	Hydroptilidae	*Hydroptila alabama*	1	EFC	11-Aug-17
T48001	CUAC 000045802	Phryganeidae	*Phryganea sayi*	1	DR	15-Aug-17
T48002	CUAC 000045803	Hydropsychidae	*Hydropsyche sparna*	23	DR	15-Aug-17
T48003	CUAC 000045804	Hydropsychidae	*Hydropsyche betteni*	3	DR	15-Aug-17
T48004	CUAC 000045805	Rhyacophilidae	*Rhyacophila fuscula*	5	DR	15-Aug-17
T48005	CUAC 000045806	Goeridae	*Goera calcarata*	8	DR	15-Aug-17
T48006	CUAC 000045807	Lepidostomatidae	*Lepidostoma latipenne*	1	DR	15-Aug-17
T48007	CUAC 000045808	Lepidostomatidae	*Lepidostoma* sp	2	DR	15-Aug-17
T48008	CUAC 000045809	Odontoceridae	*Pseudogoera singularis*	1	DR	15-Aug-17
T48009	CUAC 000045810	Psychomyiidae	*Psychomyia flavida*	29	DR	15-Aug-17
T48010	CUAC 000045811	Psychomyiidae	*Lype diversa*	2	DR	15-Aug-17
T48011	CUAC 000045812	Glossosomatidae	*Agapetus pinatus*	3	DR	15-Aug-17
T48012	CUAC 000045813	Leptoceridae	*Setodes stehri*	1	DR	15-Aug-17
T48013	CUAC 000045814	Philopotamidae	*Dolophilodes distincta*	12	DR	15-Aug-17
T48014	CUAC 000045815	Hydropsychidae	*Cheumatopsyche harwoodi*	39	DR	15-Aug-17
T48015	CUAC 000045816	Hydropsychidae	*Cheumatopsyche oxa*	6	DR	15-Aug-17
T48016	CUAC 000045817	Polycentropodidae	*Polycentropus confusus*	3	DR	15-Aug-17
T48017	CUAC 000045818	Rhyacophilidae	*Rhyacophila carolina*	4	DR	15-Aug-17
T48018	CUAC 000045819	Dipseudopsidae	*Phylocentropus lucidus*	2	DR	15-Aug-17
T48019	CUAC 000045820	Polycentropodidae	*Plectrocnemia cinerea*	5	DR	15-Aug-17

Voucher List (*cont.*). Location: MC=Matthew's Creek, WW=Whitewater River, EFC=East Fork Chattooga River, DR=Davidson River

Voucher #	Museum Collection #	Family	Species	Abundance	Location	Date
T48020	CUAC 000045821	Hydroptilidae	*Hydroptila* sp	46	DR	15-Aug-17
T48021	CUAC 000045822	Hydroptilidae	*Hydroptila quinola*	1	DR	15-Aug-17
T48022	CUAC 000045823	Hydroptilidae	*Oxyethira michiganensis*	2	DR	15-Aug-17
T48023	CUAC 000045824	Hydroptilidae	*Mayatrichia ayama*	1	DR	15-Aug-17
T19001	CUAC 000045825	Phryganeidae	*Phryganea sayi*	1	MC	21-Sep-17
T19002	CUAC 000045826	Hydropsychidae	*Hydropsyche sparna*	31	MC	21-Sep-17
T19003	CUAC 000045827	Hydropsychidae	*Hydropsyche betteni*	2	MC	21-Sep-17
T19004	CUAC 000045828	Lepidostomatidae	*Lepidostoma latipenne*	4	MC	21-Sep-17
T19005	CUAC 000045829	Goeridae	*Goera calcarata*	3	MC	21-Sep-17
T19006	CUAC 000045830	Limnephilidae	*Pycnopsyche luculenta*	3	MC	21-Sep-17
T19007	CUAC 000045831	Limnephilidae	*Pycnopsyche sonso*	1	MC	21-Sep-17
T19008	CUAC 000045832	Rhyacophilidae	*Rhyacophila fuscula*	6	MC	21-Sep-17
T19009	CUAC 000045833	Rhyacophilidae	*Rhyacophila carolina*	20	MC	21-Sep-17
T19010	CUAC 000045834	Limnephilidae	*Pycnopsyche scabripennis*	1	MC	21-Sep-17
T19011	CUAC 000045835	Lepidostomatidae	*Lepidostoma* spp	2	MC	21-Sep-17
T19012	CUAC 000045836	Leptoceridae	*Oecetis inconspicua*	2	MC	21-Sep-17
T19013	CUAC 000045837	Brachycentridae	*Micrasema wataga*	4	MC	21-Sep-17
T19014	CUAC 000045838	Psychomyiidae	*Psychomyia flavida*	3	MC	21-Sep-17
T19015	CUAC 000045839	Psychomyiidae	*Lype diversa*	1	MC	21-Sep-17
T19016	CUAC 000045840	Philopotamidae	*Wormaldia* sp	2	MC	21-Sep-17
T19017	CUAC 000045841	Polycentropodidae	*Nyctiophylax celta*	1	MC	21-Sep-17
T19018	CUAC 000045842	Philopotamidae	*Dolophilodes distincta*	4	MC	21-Sep-17
T19019	CUAC 000045843	Polycentropodidae	*Polycentropus confusus*	15	MC	21-Sep-17
T19020	CUAC 000045844	Polycentropodidae	*Polycentropus* sp	2	MC	21-Sep-17
T19021	CUAC 000045845	Dipseudopsidae	*Phylocentropus carolinus*	1	MC	21-Sep-17
T19022	CUAC 000045846	Hydropsychidae	*Cheumatopsyche harwoodi*	9	MC	21-Sep-17
T19023	CUAC 000045847	Hydropsychidae	*Cheumatopsyche oxa*	1	MC	21-Sep-17

Voucher List (*cont.*). Location: MC=Matthew's Creek, WW=Whitewater River, EFC=East Fork Chattooga River, DR=Davidson River

Voucher #	Museum Collection #	Family	Species	Abundance	Location	Date
T19024	CUAC 000045848	Hydroptilidae	*Hydroptila* sp	60	MC	21-Sep-17
T19025	CUAC 000045849	Hydroptilidae	*Hydroptila gunda*	2	MC	21-Sep-17
T19026	CUAC 000045850	Hydroptilidae	*Hydroptila alabama*	1	MC	21-Sep-17
T19027	CUAC 000068875	Hydroptilidae	*Hydroptila quinola*	1	MC	21-Sep-17
T19028	CUAC 000068876	Hydroptilidae	*Orthotrichia cristata*	4	MC	21-Sep-17
T19029	CUAC 000068877	Hydroptilidae	*Orthotrichia* sp	3	MC	21-Sep-17
T19030	CUAC 000068878	Hydroptilidae	*Oxyethira michiganensis*	4	MC	21-Sep-17
T19031	CUAC 000068879	Hydroptilidae	*Oxyethira zeronia*	2	MC	21-Sep-17
T19032	CUAC 000068880	Hydroptilidae	*Oxyethira* sp	4	MC	21-Sep-17
T29001	CUAC 000068881	Rhyacophilidae	*Rhyacophila fuscula*	22	WW	18-Sep-17
T29002	CUAC 000068882	Rhyacophilidae	*Rhyacophila carolina*	4	WW	18-Sep-17
T29003	CUAC 000068883	Hydropsychidae	*Hydropsyche sparna*	70	WW	18-Sep-17
T29004	CUAC 000068884	Hydropsychidae	*Hydropsyche betteni*	1	WW	18-Sep-17
T29005	CUAC 000068885	Limnephilidae	*Pycnopsyche antica*	5	WW	18-Sep-17
T29006	CUAC 000068886	Limnephilidae	*Pycnopsyche luculenta*	1	WW	18-Sep-17
T29007	CUAC 000068887	Leptoceridae	*Triaenodes morsei*	1	WW	18-Sep-17
T29008	CUAC 000068888	Psychomyiidae	*Psychomyia flavida*	2	WW	18-Sep-17
T29009	CUAC 000068889	Hydropsychidae	*Cheumatopsyche harwoodi*	6	WW	18-Sep-17
T29010	CUAC 000068890	Philopotamidae	*Dolophilodes distincta*	1	WW	18-Sep-17
T29011	CUAC 000068891	Glossosomatidae	*Glossosoma nigrior*	1	WW	18-Sep-17
T29012	CUAC 000068892	Polycentropodidae	*Polycentropus confusus*	1	WW	18-Sep-17
T29013	CUAC 000068893	Brachycentridae	*Micrasema* sp	1	WW	18-Sep-17
T29014	CUAC 000068894	Hydroptilidae	*Hydroptila* sp	70	WW	18-Sep-17
T29015	CUAC 000068895	Hydroptilidae	*Hydroptila gunda*	3	WW	18-Sep-17
T29016	CUAC 000068896	Hydroptilidae	*Mayatrichia ayama*	2	WW	18-Sep-17
T29017	CUAC 000068897	Hydroptilidae	*Orthotrichia cristata*	1	WW	18-Sep-17
T29018	CUAC 000068898	Hydroptilidae	*Hydroptila quinola*	2	WW	18-Sep-17

Voucher List (*cont.*). Location: MC=Matthew's Creek, WW=Whitewater River, EFC=East Fork Chattooga River, DR=Davidson River

Voucher #	Museum Collection #	Family	Species	Abundance	Location	Date
T29019	CUAC 000068899	Hydroptilidae	*Oxyethira zeronia*	1	WW	18-Sep-17
T29020	CUAC 000068900	Hydroptilidae	*Oxyethira michiganensis*	4	WW	18-Sep-17
T29021	CUAC 000068901	Hydroptilidae	*Oxyethira forcipata*	1	WW	18-Sep-17
T39001	CUAC 000068902	Hydropsychidae	*Hydropsyche sparna*	96	EFC	15-Sep-17
T39002	CUAC 000068903	Hydropsychidae	*Hydropsyche betteni*	2	EFC	15-Sep-17
T39003	CUAC 000068904	Hydropsychidae	*Hydropsyche* sp	2	EFC	15-Sep-17
T39004	CUAC 000068905	Rhyacophilidae	*Rhyacophila fuscula*	3	EFC	15-Sep-17
T39005	CUAC 000068906	Rhyacophilidae	*Rhyacophila carolina*	3	EFC	15-Sep-17
T39006	CUAC 000068907	Polycentropodidae	*Polycentropus confusus*	1	EFC	15-Sep-17
T39007	CUAC 000068908	Lepidostomatidae	*Lepidostoma latipenne*	3	EFC	15-Sep-17
T39008	CUAC 000068909	Lepidostomatidae	*Lepidostoma* spp	6	EFC	15-Sep-17
T39009	CUAC 000068910	Psychomyiidae	*Psychomyia flavida*	4	EFC	15-Sep-17
T39010	CUAC 000068911	Philopotamidae	*Dolophilodes distincta*	2	EFC	15-Sep-17
T39011	CUAC 000068912	Hydropsychidae	*Cheumatopsyche harwoodi*	4	EFC	15-Sep-17
T39012	CUAC 000068913	Hydroptilidae	*Hydroptila* sp	13	EFC	15-Sep-17
T39013	CUAC 000068914	Hydroptilidae	*Oxyethira michiganensis*	8	EFC	15-Sep-17
T39014	CUAC 000068915	Hydroptilidae	*Mayatrichia ayama*	1	EFC	15-Sep-17
T39015	CUAC 000068916	Hydroptilidae	*Hydroptila ampoda*	1	EFC	15-Sep-17
T39016	CUAC 000068917	Limnephilidae	*Pycnopsyche luculenta*	28	EFC	15-Sep-17
T39017	CUAC 000068918	Limnephilidae	*Pycnopsyche sonso*	15	EFC	15-Sep-17
T39018	CUAC 000068919	Limnephilidae	*Pycnopsyche antica*	8	EFC	15-Sep-17
T49001	CUAC 000068920	Rhyacophilidae	*Rhyacophila fuscula*	41	DR	16-Sep-17
T49002	CUAC 000068921	Rhyacophilidae	*Rhyacophila carolina*	4	DR	16-Sep-17
T49003	CUAC 000068922	Rhyacophilidae	*Rhyacophila glaberrima*	1	DR	16-Sep-17
T49004	CUAC 000068923	Hydropsychidae	*Hydropsyche sparna*	20	DR	16-Sep-17
T49005	CUAC 000068924	Hydropsychidae	*Hydropsyche betteni*	7	DR	16-Sep-17
T49006	CUAC 000068925	Hydropsychidae	*Diplectrona modesta*	1	DR	16-Sep-17

Voucher List (*cont.*). Location: MC=Matthew's Creek, WW=Whitewater River, EFC=East Fork Chattooga River, DR=Davidson River

Voucher #	Museum Collection #	Family	Species	Abundance	Location	Date
T49007	CUAC 000068926	Hydropsychidae	*Hydropsyche bronta*	2	DR	16-Sep-17
T49008	CUAC 000068927	Lepidostomatidae	*Lepidostoma latipenne*	5	DR	16-Sep-17
T49009	CUAC 000068928	Philopotamidae	*Dolophilodes distincta*	8	DR	16-Sep-17
T49010	CUAC 000068929	Psychomyiidae	*Psychomyia flavida*	7	DR	16-Sep-17
T49011	CUAC 000068930	Psychomyiidae	*Lype diversa*	2	DR	16-Sep-17
T49012	CUAC 000068931	Polycentropodidae	*Polycentropus confusus*	2	DR	16-Sep-17
T49013	CUAC 000068932	Dipseudopsidae	*Phylocentropus carolinus*	1	DR	16-Sep-17
T49014	CUAC 000068933	Polycentropodidae	*Plectrocnemia cinerea*	6	DR	16-Sep-17
T49015	CUAC 000068934	Polycentropodidae	*Polycentropus* sp	1	DR	16-Sep-17
T49016	CUAC 000068935	Hydropsychidae	*Cheumatopsyche harwoodi*	11	DR	16-Sep-17
T49017	CUAC 000068936	Hydropsychidae	*Cheumatopsyche oxa*	4	DR	16-Sep-17
T49018	CUAC 000068937	Hydroptilidae	*Hydroptila* sp	28	DR	16-Sep-17
T49019	CUAC 000068938	Hydroptilidae	*Hydroptila quinola*	1	DR	16-Sep-17
T49020	CUAC 000068939	Hydroptilidae	*Oxyethira michiganensis*	1	DR	16-Sep-17
T49021	CUAC 000068940	Limnephilidae	*Pycnopsyche luculenta*	17	DR	16-Sep-17
T49022	CUAC 000068941	Limnephilidae	*Pycnopsyche guttifera*	19	DR	16-Sep-17
T49023	CUAC 000068942	Limnephilidae	*Pycnopsyche sonso*	6	DR	16-Sep-17
T49024	CUAC 000068943	Limnephilidae	*Pycnopsyche antica*	1	DR	16-Sep-17
T49025	CUAC 000068944	Limnephilidae	*Pycnopsyche flavata*	1	DR	16-Sep-17
T49026	CUAC 000068945	Limnephilidae	*Pycnopsyche divergens*	2	DR	16-Sep-17
T49027	CUAC 000068946	Limnephilidae	*Ironoquia punctatissima*	1	DR	16-Sep-17
T110001	CUAC 000068947	Rhyacophilidae	*Rhyacophila fuscula*	3	MC	22-Oct-17
T110002	CUAC 000068948	Limnephilidae	*Pycnopsyche antica*	6	MC	22-Oct-17
T110003	CUAC 000068949	Philopotamidae	*Dolophilodes distincta*	8	MC	22-Oct-17
T110004	CUAC 000068950	Limnephilidae	*Pycnopsyche luculenta*	15	MC	22-Oct-17
T110005	CUAC 000068951	Limnephilidae	*Pycnopsyche sonso*	3	MC	22-Oct-17
T110006	CUAC 000068952	Limnephilidae	*Pycnopsyche gentilis*	2	MC	22-Oct-17

Voucher List (*cont.*). Location: MC=Matthew's Creek, WW=Whitewater River, EFC=East Fork Chattooga River, DR=Davidson River

Voucher #	Museum Collection #	Family	Species	Abundance	Location	Date
T110007	CUAC 000068953	Rhyacophilidae	*Rhyacophila carolina*	14	MC	22-Oct-17
T110008	CUAC 000068954	Rhyacophilidae	*Rhyacophila glaberrima*	1	MC	22-Oct-17
T110009	CUAC 000068955	Rhyacophilidae	*Rhyacophila* sp	2	MC	22-Oct-17
T110010	CUAC 000068956	Philopotamidae	*Wormaldia* sp	1	MC	22-Oct-17
T110011	CUAC 000068957	Hydropsychidae	*Hydropsyche sparna*	1	MC	22-Oct-17
T110012	CUAC 000068958	Hydropsychidae	*Hydropsyche betteni*	1	MC	22-Oct-17
T110013	CUAC 000068959	Thremmatidae	*Neophylax consimilis*	1	MC	22-Oct-17
T110014	CUAC 000068960	Hydroptilidae	*Hydroptila* sp	2	MC	22-Oct-17
T210001	CUAC 000068961	Limnephilidae	*Pycnopsyche antica*	11	WW	20-Oct-17
T210002	CUAC 000068962	Limnephilidae	*Pycnopsyche gentilis*	2	WW	20-Oct-17
T210003	CUAC 000068963	Limnephilidae	*Pycnopsyche luculenta*	1	WW	20-Oct-17
T210004	CUAC 000068964	Rhyacophilidae	*Rhyacophila fuscula*	3	WW	20-Oct-17
T210005	CUAC 000068965	Hydropsychidae	*Hydropsyche sparna*	10	WW	20-Oct-17
T210006	CUAC 000068966	Rhyacophilidae	*Rhyacophila carolina*	1	WW	20-Oct-17
T210007	CUAC 000068967	Lepidostomatidae	*Lepidostoma latipenne*	2	WW	20-Oct-17
T310001	CUAC 000068968	Rhyacophilidae	*Rhyacophila fuscula*	4	EFC	11-Oct-17
T310002	CUAC 000068969	Lepidostomatidae	*Lepidostoma latipenne*	4	EFC	11-Oct-17
T310003	CUAC 000068970	Hydropsychidae	*Hydropsyche sparna*	17	EFC	11-Oct-17
T310004	CUAC 000068971	Rhyacophilidae	*Rhyacophila carolina*	3	EFC	11-Oct-17
T310005	CUAC 000068972	Leptoceridae	*Oecetis inconspicua*	5	EFC	11-Oct-17
T310006	CUAC 000068973	Lepidostomatidae	*Lepidostoma* sp	3	EFC	11-Oct-17
T310007	CUAC 000068974	Hydropsychidae	*Cheumatopsyche parentum*	1	EFC	11-Oct-17
T310008	CUAC 000068975	Limnephilidae	*Pycnopsyche luculenta*	31	EFC	11-Oct-17
T310009	CUAC 000068976	Limnephilidae	*Pycnopsyche antica*	1	EFC	11-Oct-17
T310010	CUAC 000068977	Hydroptilidae	*Hydroptila* sp	10	EFC	11-Oct-17
T310011	CUAC 000068978	Hydroptilidae	*Oxyethira michiganensis*	20	EFC	11-Oct-17
T310012	CUAC 000068979	Hydroptilidae	*Oxyethira forcipata*	1	EFC	11-Oct-17

Voucher List (*cont.*). Location: MC=Matthew's Creek, WW=Whitewater River, EFC=East Fork Chattooga River, DR=Davidson River

Voucher #	Museum Collection #	Family	Species	Abundance	Location	Date
T310013	CUAC 000068980	Hydroptilidae	*Hydroptila gunda*	3	EFC	11-Oct-17
T310014	CUAC 000068981	Hydroptilidae	*Oxyethira rivicola*	2	EFC	11-Oct-17
T310015	CUAC 000068982	Hydroptilidae	*Oxyethira pallida*	2	EFC	11-Oct-17
T410001	CUAC 000068983	Rhyacophilidae	*Rhyacophila fuscula*	8	DR	13-Oct-17
T410002	CUAC 000068984	Rhyacophilidae	*Rhyacophila carolina*	14	DR	13-Oct-17
T410003	CUAC 000068985	Rhyacophilidae	*Rhyacophila* sp	2	DR	13-Oct-17
T410004	CUAC 000068986	Philopotamidae	*Dolophilodes distincta*	6	DR	13-Oct-17
T410005	CUAC 000068987	Polycentropodidae	*Polycentropus confusus*	3	DR	13-Oct-17
T410006	CUAC 000068988	Lepidostomatidae	*Lepidostoma latipenne*	2	DR	13-Oct-17
T410007	CUAC 000068989	Lepidostomatidae	*Lepidostoma* sp	3	DR	13-Oct-17
T410008	CUAC 000068990	Hydropsychidae	*Hydropsyche sparna*	11	DR	13-Oct-17
T410009	CUAC 000068991	Glossosomatidae	*Glossosoma nigrior*	1	DR	13-Oct-17
T410010	CUAC 000068992	Polycentropodidae	*Plectrocnemia cinerea*	1	DR	13-Oct-17
T410011	CUAC 000068993	Psychomyiidae	*Lype diversa*	1	DR	13-Oct-17
T410012	CUAC 000068994	Hydropsychidae	*Cheumatopsyche harwoodi*	2	DR	13-Oct-17
T410013	CUAC 000068995	Hydropsychidae	*Cheumatopsyche pinaca*	1	DR	13-Oct-17
T410014	CUAC 000068996	Thremmatidae	*Neophylax consimilis*	34	DR	13-Oct-17
T410015	CUAC 000068997	Hydroptilidae	*Hydroptila* sp	15	DR	13-Oct-17
T410016	CUAC 000068998	Hydroptilidae	*Hydroptila quinola*	1	DR	13-Oct-17
T410017	CUAC 000068999	Hydroptilidae	*Oxyethira michiganensis*	5	DR	13-Oct-17
T410018	CUAC 000069000	Hydroptilidae	*Oxyethira zeronia*	1	DR	13-Oct-17
T410019	CUAC 000069001	Hydroptilidae	*Oxyethira forcipata*	1	DR	13-Oct-17
T410020	CUAC 000069002	Limnephilidae	*Pycnopsyche antica*	4	DR	13-Oct-17
T410021	CUAC 000069003	Limnephilidae	*Pycnopsyche guttifera*	14	DR	13-Oct-17
T410022a	CUAC 000069004	Limnephilidae	*Pycnopsyche luculenta*	36	DR	13-Oct-17
T410022b	CUAC 000069005	Limnephilidae	*Pycnopsyche luculenta*	33	DR	13-Oct-17
T410023	CUAC 000069006	Limnephilidae	*Pycnopsyche flavata*	1	DR	13-Oct-17

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