

**The Ephemeroptera, Odonata, Plecoptera,
Megaloptera, and Trichoptera
of
Little River Canyon National Preserve
and
Russell Cave National Monument**

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Executive Summary

The U.S. Geological Survey conducted an inventory of aquatic insects of the orders Ephemeroptera (mayflies), Odonata (dragonflies, damselflies), Plecoptera (stoneflies), Megaloptera (fishflies, dobsonflies, and hellgrammites), and Trichoptera (caddisflies) (the EOPMT taxa) in Little River Canyon National Preserve (LIRI) and Russell Cave National Monument (RUCA) from 2005 to 2007. This inventory is part of a broader survey of the EOPMT faunas of the 18 parks in the Cumberland Piedmont and the Appalachian Highlands monitoring networks of the National Park Service (NPS) Southeast Region. In addition, data from Dr. Richard Brown of Mississippi State University, and from published papers provided important additional sources of information regarding the occurrence and distribution of aquatic insects in LIRI. Standard aquatic sampling techniques supplemented with light-trap sampling were used to investigate the fauna at 53 locations. Of 150 collections, 108 yielded 203 species of EOPMT taxa.

The LIRI, situated on Lookout Mountain in Cherokee and De Kalb Counties in northwest Alabama, is a mountain watershed with streams flowing southwest and is of high value recreational and natural-resource significance. RUCA is a small national monument situated about 30 miles north of LIRI in Jackson County, Alabama. RUCA preserves a site of prehistoric human habitation, as well as an extensive underground karst system. Both parks are administered by the same management staff. Surface water resources at RUCA are limited, but are extensive at LIRI. LIRI contains important aquatic insect habitats, including seeps, springs, and first order streams in the backcountry portion of the park, as well as the Little River itself that flows through the steep-sided canyon from which the park gets its

name. These regions are protected from the habitat degradation that occurs just outside the LIRI boundaries, except that they are strongly affected by the upstream non-park reaches that include extensive agricultural and residential development. The species of EOPMT are exceptionally diverse in the LIRI watershed. These include a number of undescribed, rare species, and potentially endemic species that serve as excellent indicators of the overall health of the aquatic habitat. The total number of EOPMT taxa from LIRI (203) ranks sixth among all 18 parks included in the larger survey.

Two indices were used to evaluate the fauna at each sampling location and among groups of locations, the site sensitivity index and the conservation score. The site sensitivity index is based on the widely used tolerance values of aquatic insects and other aquatic macroinvertebrates. The conservation score is based on the perceived conservation needs of different taxa based on their rarity (number of populations), known distribution (regional, national, and global), and habitat requirements. It was developed specifically to treat all species, including those that do not have assigned tolerance values. These two indices produce similar but not identical rankings of sample locations in terms of potential conservation significance, even though they are based on different criteria. We used these indices to highlight sections of LIRI that may deserve special attention from managers when considering any action that may affect the hydrological resources of the LIRI or RUCA.

Our results indicate that aquatic insects and other aquatic macroinvertebrates can be significant biotic components even in national parks that were not established as a result of prior recognition of, and desire to protect, the aquatic resources. This further indicates that land management agencies could usefully

consider undertaking aquatic insect/aquatic macroinvertebrate surveys in their holdings because of the benefits demonstrated as a result of our survey of LIRI, RUCA, and the other parks of the Cumberland Piedmont and

Appalachian Highland monitoring networks. This could include agencies such as the U.S. Fish and Wildlife Service and the Forest Service, as well as the National Park Service.

Introduction

Aquatic insects are ubiquitous inhabitants of freshwater lotic and lentic systems throughout the world, outside of Antarctica. More than 25,000 species have been documented among those orders of insects whose immature stages are primarily aquatic (Balian and others, 2008). These are the EMOPT taxa (Ephemeroptera [mayflies], Megaloptera [alderflies, dobsonflies, and fishflies], Odonata [damselflies, dragonflies], Plecoptera [stoneflies], and Trichoptera [caddisflies]). In North America approximately 3,250 species are known, representing 12 percent of the world fauna (Merritt and others, 2008). Morse and others (1997) indicate that nearly half of the North American species of the above orders occur in the southeastern United States, with many species endemic to the region, especially the southern Appalachians. McCafferty and others (2010) documented 300 species of mayflies from the southeast, nearly half of all mayfly species recorded from North America. Hamilton and Morse (1990) state that about 40 percent of the caddisfly species known for North America occur in the Southeast, and about 12 percent are endemic taxa. Master and others (1998) consider the United States a global center of freshwater biodiversity, and claimed that the “extraordinary diversity” of the Southeast was the result of its “diverse physical geography, favorable climate, and a long dynamic history.”

In addition to having great ecological significance to healthy aquatic ecosystem functioning, aquatic insects are valuable indicators of ecosystem health. Most species have annual life cycles, whereas some have multiple generations per year, and others have 2- or 3-year life cycles. Insects, therefore, can show a rapid response to perturbations and environmental stress. Different species have different abilities to tolerate ecological

disturbance, from habitat alteration or pollution to global climate change. The large number of aquatic insect species responding to a wide range of disturbances makes them excellent indicators of water quality. Many Federal and state agencies, as well as a variety of citizen groups, use these characteristics to monitor the health of aquatic resources (for example, Carter and Resh (2001), Resh and Jackson (1993), Resh and others (1996), Rosenberg and Resh (1993), Rosenberg and others (2008). At least 86 national parks conduct aquatic macroinvertebrate monitoring as a part of the National Park Service (NPS) Inventory and Monitoring Program (Fancy and Bennetts, 2012). Thus, the importance of aquatic resources and the significance of aquatic insects as indicators of the health of those resources are widely recognized, and aquatic insects are widely utilized in monitoring programs.

The U.S. Geological Survey (USGS) conducted an inventory of the aquatic insect faunas in 17 national parks from 2005 to 2007. In 2010 and 2011, an additional park was surveyed. Thus, all 18 parks in the Appalachian Highlands Monitoring Network (Big South Fork National River and Recreation Area, Blue Ridge Parkway, Great Smoky Mountains National Park, Obed Wild and Scenic River) and the Cumberland Piedmont Monitoring Network (Abraham Lincoln Birthplace National Historic Site, Carl Sandburg Home National Historic Site, Chickamauga and Chattanooga National Military Park, Cowpens National Battlefield, Cumberland Gap National Historical Park, Fort Donelson National Battlefield, Guilford Courthouse National Military Park, Kings Mountain National Military Park, Little River Canyon National Preserve, Mammoth Cave National Park, Ninety Six National Historic Site, Russell Cave National Monument, Shiloh

Little River Canyon National Preserve and Russell Cave National Monument

Survey of Aquatic Insects of the Cumberland Piedmont and Appalachian Highlands Monitoring Networks

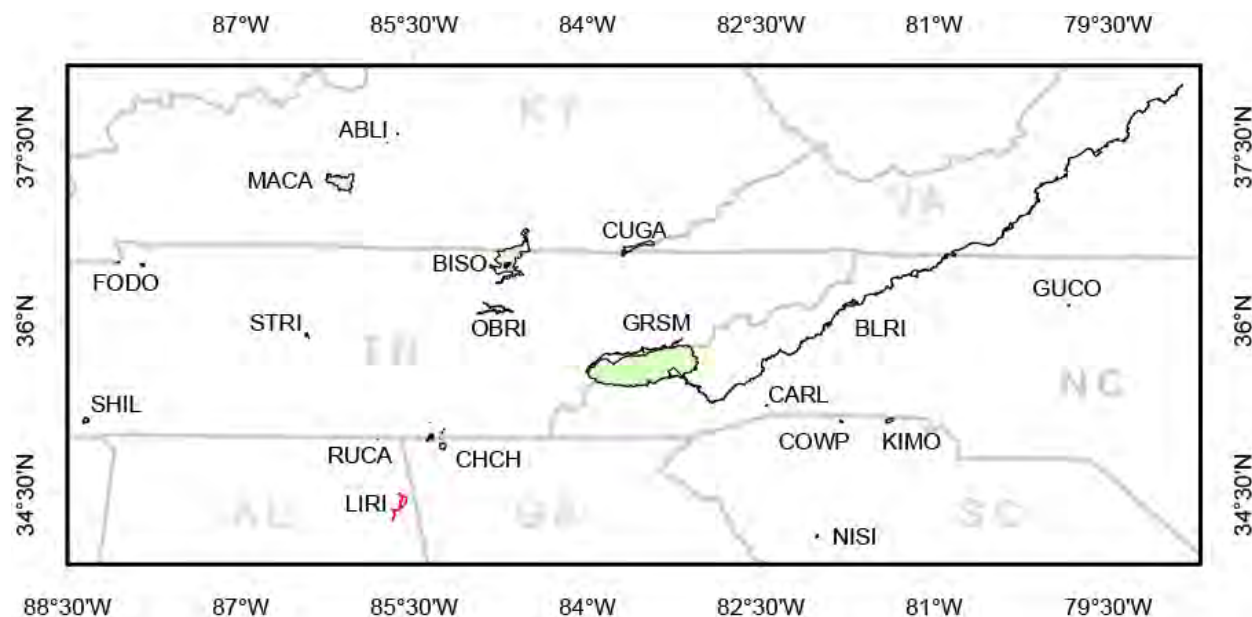


Figure 1. Location of the national parks of the Appalachian Highlands and Cumberland Piedmont monitoring networks. The boundaries of Little River Canyon National Preserve (LIRI) and Russell Cave National Monument (RUCA) in Alabama are highlighted in red. Explanation of the Park Service abbreviations is provided below.

Appalachian Highlands Monitoring Network — BISO, Big South Fork National River and Recreation Area; BLRI, Blue Ridge Parkway; GRSM, Great Smoky Mountains National Park; OBRI, Obed Wild and Scenic River; **Cumberland Piedmont Monitoring Network** — ABLI, Abraham Lincoln Birthplace National Historic Site; CARL, Carl Sandburg Home National Historic Site; CHCH, Chickamauga and Chattanooga National Military Park; COWP, Cowpens National Battlefield; CUGA, Cumberland Gap National Historic Park; FODO, Fort Donelson National Battlefield; GUCO, Guilford Courthouse National Military Park; KIMO, Kings Mountain National Military Park; LIRI, Little River Canyon National Preserve; MACA, Mammoth Cave National Park; NISI, Ninety Six National Historic Site; RUCA, Russell Cave National Monument; SHIL, Shiloh National Military Park; STRI, Stones River National Battlefield]

National Military Park, Stones River National Battlefield) were included. The locations of these parks are presented in figure 1. Official NPS abbreviations for each park are provided in the explanation of figure 1.

The goals of the surveys are to provide each park with a comprehensive inventory of their aquatic insect fauna including species lists with distributions and relative abundances of each species, curated specimens with Park Service Catalog Numbers assigned and deposited at the parks, a database of findings to be incorporated into the NPS Interior Collections Management System, and an assessment of the quality of the aquatic resources of the parks based on the known environmental requirements of the species found.

Separate reports are available for most of the 18 parks included in this survey. This document reports the findings for the Little River Canyon National Preserve (LIRI) and the Russell Cave National Monument

(RUCA). These two units of the NPS located in northeastern Alabama share the same management staff.

Justification

The NPS was established by Congress in 1916. According to the NPS Organic Act (16 U.S.C. 1) one of the purposes of establishing national parks "...is to conserve the scenery and the natural and historic objects and wild life therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations." This portion of the Organic Act commits NPS land managers to the long-term conservation of natural resources, including aquatic resources. Although this often is interpreted to mean water quality, quantity, and fisheries resources, it also means that aquatic invertebrates must be conserved as well. The LIRI was established by Congress in 1992 "...to protect and preserve the natural, scenic,

recreational, and cultural resources of the Little River Canyon area” (Public Law 102–427). RUCA was established in 1961 by presidential proclamation to protect the “...outstanding archeological and ethnological evidences of human habitation in excess of

8,000 years...” (Proclamation 3413). Aquatic insects and aquatic macroinvertebrates in general are integral components of these ecosystems and resources of the LIRI, and thus a comprehensive inventory of the aquatic insects is timely and warranted.

Little River Canyon National Preserve

Little River Canyon National Preserve is situated in the northeastern corner of Alabama, in Cherokee and DeKalb counties. It is 5,586 hectares (ha) in size and consists of the Little River and its canyon downstream from the Little River Falls, and the upstream forested area referred to as the backcountry. The park ranges in elevation from 179 to 542 meters [m] above National Geodetic Vertical Datum of 1929. It is located on Lookout Mountain in the southwestern Appalachian Mountains, along the southern Cumberland Plateau. The park has a ridge and valley morphology, with steep-sided canyons. Vegetation is dominated by oak-hickory and other deciduous forest types (Moore and Leibfreid, 2013).

Aquatic resources

LIRI contains approximately 100 kilometers (km) of flowing waters (fig. 4). The main body of the Little River flows

southwest and carves a deep (200 meters in the lower end), 19-km-long canyon in the Upper Paleozoic sandstones of Lookout Mountain, ultimately emerging near the edge of the mountain at Mouth of Canyon Park. Above Little River Falls, park lands extend laterally encompassing a wider area of the riparian corridor, uplands, and portions of small tributary watersheds. A small beaver pond and other ephemeral wetland areas are found in this section. The upstream end of the park abuts DeSoto State Park on the West Fork Little River. The state of Alabama considers Little River and its tributaries “Outstanding National Resource Waters,” and the overall water quality is considered good. Extensive residential and agricultural areas in the watershed above the LIRI represent the greatest existing potential threats to the health of the river system (Meiman, 2009).

Russell Cave National Monument

Russell Cave National Monument covers an above ground surface area of about 130 ha. The park preserves an ancient site of human habitation that extended from about 10,000 B.C. to 1650 A.D. (Russell Cave web site www.nps.gov/ruca/index.htm). The cave extends approximately 10 km, but all sampling for this study was conducted above ground. The park ranges in elevation from 195

to 514 m above National Geodetic Vertical Datum of 1929. It is composed of the valley portion, in which the cave openings and park facilities are located, and a ridge area which has upper slopes and valleys. The upland areas are predominantly deciduous forest (Schotz and others, 2006).

Aquatic resources

Russell Cave has limited surface water resources (fig. 5). Dry Creek flows a few hundred meters through the park. Russell Cave Spring, the main water source that flows directly into the mouth of Russell Cave, is often at minimal flow during summer months,

but may nearly fill the cave mouth at flood stage. Less than 40 m of flow is above ground from the spring outflow to the cave mouth. The park contains other springs, although these also often have little surface flow. The overall water quality is considered good, and all park waters were designated “Outstanding Natural Resource Waters” by Meiman (2007).

Methods

Sampling Locations

The monitoring network’s Vital Signs Monitoring Plan (Leibfreid, 2010) was consulted for information on water resources of the parks, and park staff were asked for suggestions on where to sample. In addition, named springs and other hydrological features shown on topographic maps were visited where possible, as were most stream/road intersections. Some localities could be accessed only by way of hiking trails or overland to the sites of interest. Ultimately, sampling locations were selected on the basis of their proximity to water and the feasibility of leaving traps unattended overnight.

Light Trapping

Many flying insects are attracted to lights, and ultra-violet lights (UV or black lights) are extremely effective at attracting adults of aquatic insects. Light trapping was done whenever it was warm enough that aquatic insect adults were likely to be active, generally when the nighttime temperatures were above 10 degrees Celsius (°C). We sampled at lights from May through October. Black light traps or black lights hung in front of sheets were used. The traps consisted of a bucket with a funnel above which the light was suspended. Insects landed on the light or the support fins and then fell into the bucket below. This permitted us to leave several lights in different locations each night. Ethyl acetate was added to the bucket in a small paint can with a sponge wick, which served to

kill the insects that fell into the bucket, so that the larger and harder-bodied specimens would not trample on and destroy the smaller and more fragile insects in the trap. These traps have a light-sensitive trigger that turns the light on at dusk and off at daybreak, allowing unattended operation. The next day the traps were retrieved and the contents were sorted. Whenever possible, a limited number of quality specimens were selected for pinning, whereas the bulk of specimens were placed into jars or vials of 70 percent or 95 percent ethyl alcohol. In the event of rain, pinning specimens was usually not feasible because the specimens were too wet, in which case all specimens were preserved in alcohol. Using black lights at sheets involved hanging a UV light in front of a sheet suspended from branches near water. We then picked off interesting specimens, and either kept them dry for pinning or put them into 70 percent or 95 percent ethyl alcohol in vials. This type of sampling required continual attendance at the light, usually for about 2 hours following darkness and thus was more limited in usefulness.

Hand Sampling

Hand sampling with nets was done during daylight at all times of year, regardless of temperatures. The aquatic stages were sampled by turning over rocks, sticks, and logs in the water, or sometimes by using a D-frame net to sample root mats, undercut banks, debris, silt, sand, and other microhabitats in

the water. These samples were examined on site for specimens, usually the immature stages of aquatic insects, but also for those few adults that have aquatic stages, mostly Hemiptera and Coleoptera, and for other groups of organisms, such as crustaceans and worms. If conditions were dry, sweep nets were used to capture adult specimens by swinging the nets through the vegetation over and near the water's edge. Most adults captured in this fashion were put into alcohol, although a limited number were kept dry for later pinning.

Identification

Specimens were sorted to the lowest possible taxonomic level. Trichoptera specimens were identified by Charles Parker, Jason Robinson, and David Etnier. Immature specimens were identified using Floyd (1995), Glover (1996), Glover and Floyd (2004), Unzicker and others (1982), Wiggins (1977), and many other sources. Adults also were identified using a variety of sources, as the literature is very scattered and no comprehensive works are available for the identification of adults of North America, other than the classic work of H.H. Ross on the caddisflies of Illinois published in 1944 (Ross, 1944). Recent revisions of certain genera have provided several useful references for adult caddisfly identification, including *Agapetus* (Etnier and others, 2010), *Agarodes* (Keth and Harris, 2008), *Goerita* (Parker, 1998), *Neophylax* (Vineyard and others, 2005), *Psilotreta* (Parker and Wiggins, 1987), *Rhyacophila* (Prather and Morse, 2001; Prather and others, 1997; Stocks and Morse, 2005), *Triaenodes* (Manuel, 2010), and *Wormaldia* (Muñoz-Quesada and Holzenthal, 2008). Specimens of Ephemeroptera and Plecoptera were sent to Dr. Boris C. Kondratieff of Colorado State University for identification. Resources useful for the identification of Ephemeroptera include Berner (1975), Berner and Pescador (1988),

Carle (1977), Carle and Lewis (1978), Edmunds and others (1976), Jacobus and McCafferty (2000, 2001, 2003, 2004, 2006a, b, 2007, 2008), Jacobus and others (2002), Kondratieff and others (1981b, 2006b), Kondratieff and Voshell (1984), Lewis (1973, 1974, 1976), Lugo-Ortiz and McCafferty (1998), McCafferty (1990), McCafferty and others (1994, 2005), McCafferty and Waltz (1990, 1995, 1998), Morihara and McCafferty (1979a, b), Pescador and Berner (1981), Unzicker and Carlson (1982), Waltz and Burian (2008), Waltz and McCafferty (1987). References for Plecoptera include Abbott and Stewart (1998), Alexander and Stewart (1999), Baumann and Grubbs (1996), Baumann and Kondratieff (2009), Baumann and Stark (2013), DeWalt and others (2001, 2002), Grubbs (2006, 2010, 2012), Grubbs and others (2013), Harrison and Stark (2010), Kondratieff and Kirchner (1982, 1993, 1998, 2000, 2002, 2003, 2004), Kondratieff and others (1981a, 2006, 2008, 2011), Kondratieff and Voshell (1979, 1982), Myers and Kondratieff (2009), Nelson (2000), Sivec and others (2005), Smith and Stark (1998), Stark (1983, 1984), Stark and Armitage (2000, 2002), Stark and Baumann (2004), Stark and Kondratieff (2004, 2010, 2012), Stark and others (2011), Stark and Stewart (1981), Stark and Szczytko (1981, 1988), Stewart and Stark (1984, 1988, 1993, 2008), Szczytko and Stewart (1981). Specimens of adult Odonata were sent to Dr. Carl Cook, Center, Kentucky, for identification.

Data Entry

As specimens were identified the records were entered into a biodiversity database developed and maintained by C.R. Parker. This is a Microsoft Access database that is designed to record specimen data. A copy of the database and the frontend software to use it has been provided to the network offices.

When data are entered into the database each specimen record is assigned a unique

SpecimenID, normally prefixed with the 4-letter park acronym (for example, LIRI-96972305). For each record that represents specimens to be accessioned into a park's collection, NPS Accession and Catalog numbers are assigned from a list of numbers provided by the parks. Specimen RUCA-96829075, for example, was assigned the Accession Number "RUCA-81" and Catalog Number "RUCA 15558."

Specimen Curation

Most specimen records represent one or more specimens stored in a glass vial, on an insect pin, or in an envelope. A small number of records represent specimens that have been destroyed, discarded, or lost. The bulk of the retained material is in 16-milliliter glass vials having screw caps with plastic cone liners and filled with 70 percent ethyl alcohol. In 2005 and early 2006, the only alcohol available was denatured, that is, contaminated with methyl alcohol and (or) other additives, a procedure followed to make the ethanol undrinkable and therefore not subject to sales tax and other purchasing restrictions. Most of those vials have been refilled with straight ethanol, although some vials may have been missed. They are readily recognized by the unpleasant odor when the vial is opened.

Pinned specimens are normally on #2 insect pins that pass through the specimens on the right side of the meso- or metathorax. Small specimens of caddisflies, such as *Hydroptila*, *Agapetus*, *Lype*, and *Wormaldia*, and some Diptera and Hemiptera, are double-mounted on minuten pins. In these preparations, a very thin and short minuten pin is passed through the insect, and the minuten is pinned into a foam block. The foam block is then affixed to a standard sized insect pin (#3 or #4). Some small hard-bodied insects, particularly small beetles, are double-mounted on points. In these mounts, the insect is glued to a small paper triangle and the paper triangle, or point, is then pinned to a standard

size insect pin.

Adults of Odonata and a few other insects are preserved in envelopes. When captured, odonate adults are placed in paper folded into triangles. Appropriate collection information is written on the paper triangles and then the triangles with the specimens are placed into acetone for 12 to 24 hours. The triangles are then removed from the acetone and allowed to dry. In the lab, the specimens are removed from the triangle, identified, and placed into a clear plastic envelope approximately 2.5 x 6 inches. A label is placed into the envelope with the specimens.

All specimens, whether in alcohol, on pins, or in envelopes are labeled with the following information: state:county, park acronym, locality, collection method, elevation, Universal Transverse Mercator (UTM) Zone, UTM coordinates, collection date, collector(s), SpecimenID, identification with the name of the determiner and the year of determination, and the NPS Accession and Catalog numbers. On alcohol

Alcohol Label	Pinned Label
KY:Larue Co, ABLI South Knob Creek at Abraham Lincoln Boyhood Home black light trap; 153 m elev. 16S 620219E 4163478N 30-31 Aug 2006 JLRobinson & CRParker ABLI-60965472 <i>Leuctra tenuis</i> (Pictet, 1841) 2♀ 1♂ Det:BCKondratieff 2008 ACC.NO. ABLI-57 CAT.NO. ABLI 1644	VA:Amherst Co, BLRI Otter Lake, MP-063 left UV light 17S 645109E 4157792N 18 July 2007 JLRobinson & CRParker BLRI-12652230 <i>Heliclus lithophilus</i> (Germar, 1824) Det:AJMayer 2009 ACC.NO. BLRI-568 CAT.NO. BLRI 23824

Figure 2. Sample alcohol and pinned specimen labels.

and envelope labels, the number and type of specimens are also included. Pinned labels are much smaller than alcohol labels (fig. 2); therefore, the data are printed with a small font size (4 point) on heavier weight paper than used for alcohol labels. Also, the number of specimens on a pin is one and specimens are almost always adults, so that information

is not provided. However, when available, the gender is appended to the SpecimenID line as either a ♂ (male) or ♀ (female) symbol. Then, to conserve space in collection trays and reduce the chance of damage to the

common name where available. All labels are printed on a archival quality paper using archival quality ink with an ink jet printer.

Most specimens are deposited in the park's collection. Some specimens are

<i>Argia translata</i>		Hagen in Selys,	1 pair in
Dusky dancer		1865	tandem
Det: Carl Cook			
Kentucky, McCreary Co, BISO			
Big South Fork of the Cumberland River at Blue Heron, upstream from parking lot			
719066 East, 4060785 North		16S	NAD 1983
236 meters		Accession No.	BISO-180
26 July 2006		Catalog No.	BISO 50672
Coll: MGeraghty & CRParker		Spec ID	BISO-94811654
Big South Fork National River and Recreation Area			

Figure 3. Sample envelope label.

specimens, the label is cut into several strips, and the strips are pinned in order onto the insect pin.

Envelope labels (fig. 3) have few size restrictions, so as much information as possible is printed on each, including the

deposited at the University of Tennessee, Knoxville, or at the Colorado State University Collection, Fort Collins. Holotypes of new species have been or will be deposited at the National Museum of Natural History, Washington, D.C.

Site Sensitivity Index

In order to investigate the potential conservation significance of collection localities as an aid to managers, we devised a site sensitivity index (SSI). Aquatic insects are considered to be excellent indicators of environmental conditions and for this reason are widely used in biomonitoring. Many, but not all species of aquatic macroinvertebrates, therefore, have been assigned tolerance values by various monitoring agencies, including the U.S. Environmental Protection Agency (Barbour and others, 1999; Blocksom and

Winters, 2006; Klemm and others, 2003), the Tennessee Department of Environment and Conservation Division of Water Pollution Control (Arnwine, 2006), and the North Carolina Department of Environment and Natural Resources (North Carolina Biological Assessment Unit, 2006). Tolerance values are empirically derived from hundreds or thousands of observations of species occurrences in habitats subjected to different degrees of degradation. Therefore, tolerance values are objective, and are calibrated to the

habitats and regions in which the species are found. These values are provided in appendices 4 and 5, and constitute one of the criteria for our recognition of a species as of potential interest.

This study was not designed to monitor communities and develop biotic indices, and in fact, many of our samples were collected in springs, seeps, and other minimal water habitats that are not treated in biomonitoring protocols. Further, light-trapping for adults is not a standard method for aquatic macroinvertebrate monitoring (but see Collier and Quinn (2003) and Sykora and others (1997)). However, by using the cumulative assigned tolerance values as a measure of relative health we still can make a prescribed assessment of the condition of park streams. For this purpose, in addition to the target species, we included those non-target species that have established tolerance values. We include only those sites that have at least five species with assigned tolerance values less than or equal to 3. These are the species that have the highest sensitivity to disturbance.

Because our sampling was not quantitative, each species at a site was counted only once. We did this for each sample location in each park. These raw site tolerance values were converted to site sensitivity indices by calculating the average tolerance value of each site. We rescaled the scores by subtracting the site tolerance averages from 10, the maximum possible value for any site. This has the effect of inverting the sensitivity scale so that the most sensitive sites have higher values than the least sensitive sites. We then weighted the values by adding the number of sensitive species at each site to the result. We refer to this as the site sensitivity index (SSI) (eq. 1).

$$SSI = \left(10 - \sum_{i=1}^n \frac{TV_i}{n}\right) + n \quad (1)$$

In equation 1 TV_i is the tolerance value of the i th species at a site having a tolerance value of

3 or less and n is the number of species at that site that have such tolerance values.

The weighting of the site tolerance values by the number of sensitive species present resolves the issue that arises when two sites have the same site tolerance values but have different numbers of sensitive species. From a practical standpoint it may be desirable to be able to assign a higher weight to the site that has more sensitive species when resources are limited and choices must be made. Thus, a site having more sensitive species would receive greater consideration in making management decisions than a site of equal sensitivity but having fewer species. The SSI is highly correlated with the number of sensitive species; therefore, the sensitive species count could be used as a surrogate for SSI. However, in practice the SSI does change the ranking of sites in some cases compared with the number of sensitive species alone, and because it involves the use of the tolerance values in its derivation, we believe it is preferable to using just the count of sensitive species.

Conservation Scores

The standard macroinvertebrate protocols used in aquatic monitoring and including tolerance values generally do not treat the species that inhabit very small headwater systems, bogs, and swamps. Therefore, D.R. Lenat (Lenat Consulting Services, Inc., written commun., 2007) devised a scoring system to rank species and sites according to a different set of criteria that specifically allows for the consideration of the species found in such habitats. Lenat designed conservation scores for use in the Blue Ridge Parkway, but we have modified Lenat's approach for use in LIRI and RUCA. Initially, the rarity of each species is assessed, and then using the following criteria, conservation scores (CS) are assigned to each species:

CS

0 = Widespread, generally common, and

without perceived threats, unique habitat requirements, or other characteristics of conservation concern.

- 1 = Fairly widespread species limited to springs, swamps, or bogs, and rarely seen in routine water quality monitoring.
- 2 = Rare in Alabama but may be more common elsewhere, or its presence in LIRI or RUCA represents a significant range extension or disjunction. Also included are species that may be widespread, but are very uncommon throughout their ranges.
- 3 = Species with limited distribution, usually just 1–3 adjacent states, and limited to springs, seeps, bogs and other uncommon habitats. Rare, although this rarity may be a function of limited sampling of spring and seep habitats.
- 4 = Endemic species, extremely rare species, proposed endangered species, or possible new species.

Conservation scores are additive when multiple species are considered by site, and

we summed the CS for all species found at each site to obtain the site level CS. This provides a direct measure of the potential conservation value of each site. We assigned conservation scores to all of the aquatic species listed in appendix 6, Species List.

Appendix 5, Tolerance Values and Conservation Scores, lists all aquatic taxa found in appendix 6 with their tolerance value (TV) and conservation scores. Not every taxon has an assigned tolerance value, and many have a conservation score of zero (0). Those taxa are not included in appendix 5, table 5–1. Table 5–1 is the source of TVs and CSs used to calculate the SSI and site CS.

To help relate SSI and CS results to the park landscape, we used a geographic information system (GIS) map of the park. We plotted the SSI and CS values as circles whose size is based on the range of values, with sites having higher SSI or CS shown with larger circles than those having lower SSI or CS. Further, by grouping sites on the basis of proximity, we produced a second set of SSI and CS values for the grouped sites. We also plotted these grouped-site SSI and CS values in a GIS map for ready visualization.

Results

Specimens

A complete list of all target and non-target taxa for both parks is provided in appendix 6, tables 6–1 and 6–2. In addition, a list of target taxa known to occur in Cherokee and De Kalb

Counties (LIRI), and Jackson County (RUCA), but not found in our sampling is provided in table 6–3.

Little River Canyon National Preserve

Locations and Events

We sampled 38 locations throughout LIRI. In addition, we identified caddisflies from 11 sites sampled by Dr. Richard Brown (Mississippi State University, William H. Cross Expeditions) in 1990 and 1992 and from 11 sites in the published results of Frazer and others (1991). Seven of the Brown sites could not be georeferenced, and some differently labeled sites from the three efforts had identical coordinates. Combined, we have samples from 46 different locations based on UTM coordinates (fig. 4). Including the sites without coordinates, we studied samples from 53 sites that yielded target (EOPMT) taxa (appendix 1, table 1–1). Including all sample sources, we had 150 collections, of which 108 yielded target taxa.

Specimens

We collected 5,326 specimens in LIRI, including 4,821 specimens of target taxa (EOPMT species) and 505 specimens of non-target taxa. A complete list of all species collected, both target and non-target, is presented in appendix 6, table 6–1.

Target Taxa

We found 39 families, 93 genera, and 203 species, including the literature records from Frazer and others (1991) (table 1). Seven of these taxa include specimens of target genera that could not be identified to species. In addition, two species of the stonefly genus *Isoperla* identified as “*Isoperla* species 1” and “*Isoperla* species 2” are included in table 1.

By far, the Trichoptera were the most well represented group, with 4,262 specimens and 142 species. The far greater number of species of caddisflies compared to the other orders is because caddisflies are a larger group of insects in terms of the number of species than the other orders in almost every habitat. The higher abundance of caddisfly specimens in our samples compared to the abundances of

Table 1. Numbers of taxa and specimens of the target EOPMT species collected from the Little River Canyon National Preserve. This includes only specimens that were identified to species and seven genera for which species identification was not possible. The number of Trichoptera specimens is low; as all records from Frazer and others (1991) are counted as 1 individual, it was not possible to obtain specimen counts from that reference. Refer to appendix 2, table 2–1 for a complete listing of all EOPMT records.

Order	Families	Genera	Species	Specimens
Ephemeroptera	7	14	17	146
Odonata	8	11	12	26
Plecoptera	7	18	28	317
Megaloptera	1	3	4	70
Trichoptera	16	47	142	4,262
Total	39	93	203	4,821

specimens of the other orders is primarily because of our use of light-trapping. Most caddisflies are strongly attracted to lights, often occur in large numbers, and occur in a wide range of habitats. Many Ephemeroptera also are strongly attracted to lights, but seldom occur in very large numbers except along productive lakes and large rivers. These habitats are limited in LIRI. Additionally, female subimagos (winged individuals that are not sexually mature and often not

Little River Canyon National Preserve and Russell Cave National Monument

Survey of Aquatic Insects of the Cumberland Piedmont and Appalachian Highlands Monitoring Networks

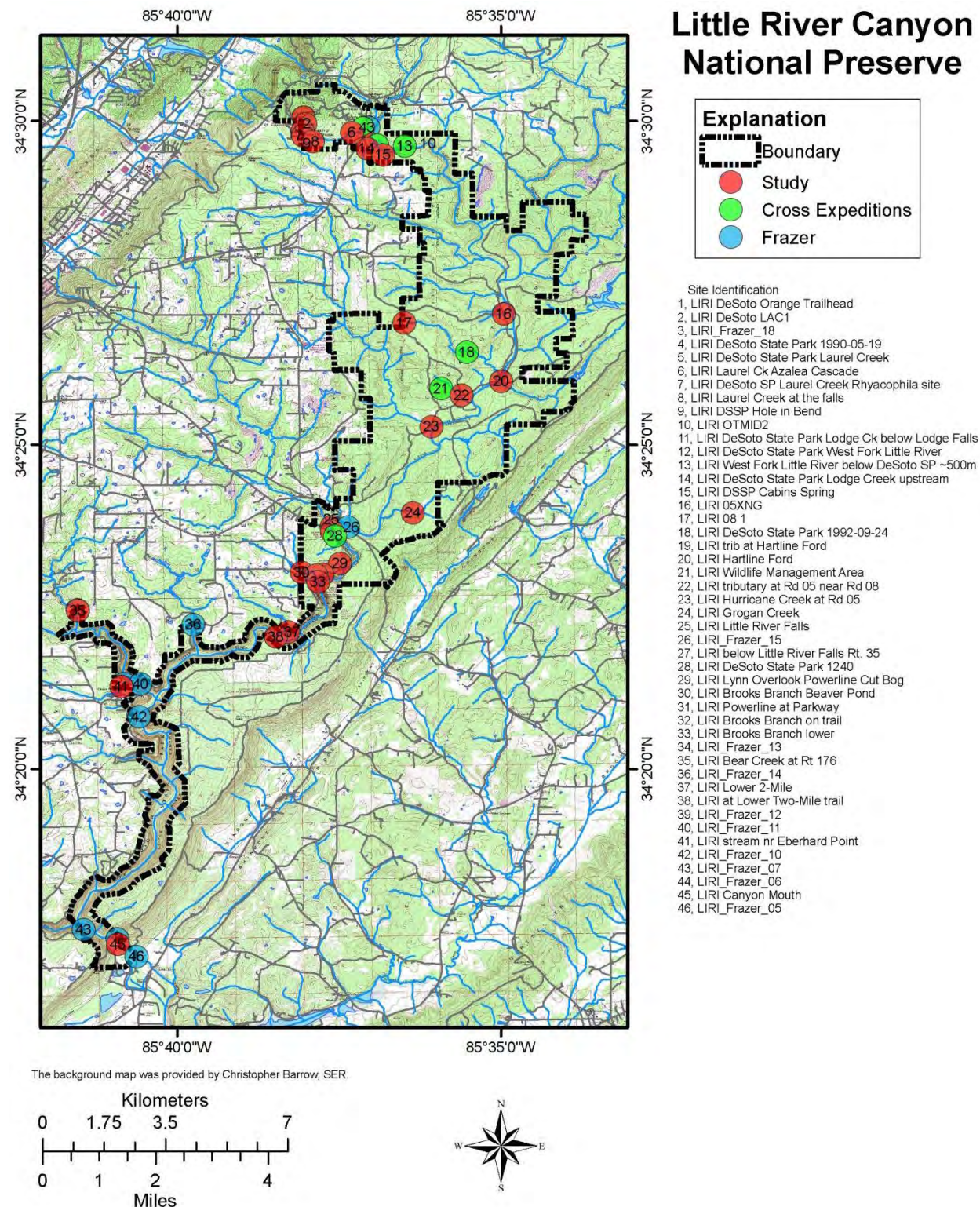


Figure 4. Little River Canyon National Preserve with locations sampled for Ephemeroptera, Odonata, Plecoptera, Megaloptera, and Trichoptera. Sites sampled during the current U.S. Geological Survey study, 2005-7, are shown with red circles. Sites sampled by R. Brown, Mississippi State University, William H. Cross Expeditions, 1990/1992, are shown with green circles. Sites sampled by Frazer and others (1991) are shown with blue circles.

identifiable) predominate in light trap collections of mayflies. Certain groups of Plecoptera are attracted to lights, but the most of the species are not. Odonata rarely come to lights, and only *Corydalus cornutus*, the Eastern Dobsonfly, is a regular visitor to lights among the Megaloptera. Insects in these groups are best collected by active sampling methods involving the use of nets and sieves. These active methods, which we also used, resulted in fewer specimens per site than the passive method of light-trapping.

Non-target Taxa

The non-target taxa that are always captured as a result of passive sampling (specifically light-trapping), included 505 tallied specimens of aquatic and terrestrial snails, worms, beetles, flies, and others (table 2 and appendix 3, table 3–1). Many unsorted specimens remain in jars. These specimens are not included in the database or the appendices. Hand and net sampling also led to the collection of non-target specimens, and interesting finds were deliberately retained. More than 30 of the non-target species we collected are aquatic, and include such species as small Diptera (gnats), Tabanidae (horse and deer flies), Dytiscidae (predaceous diving beetles), Elmidae (riffle beetles), Hydrophilidae (water scavenger beetles), Oligochaeta (worms), Amphipoda (amphipods), Isopoda (isopods),

Basommatophora and Mesogastropoda

Table 2. Numbers of taxa and specimens of the non-target species collected from the Little River Canyon National Preserve. The entry Oligochaeta_order refers to specimens of worms not identified to order. See appendix 3, table 3-1 for a complete listing of non-target records.

Orders	Families	Genera	Specimens
Amphipoda	1	1	2
Basommatophora	2	2	12
Coleoptera	17	34	250
Diptera	7	12	114
Hemiptera	4	4	8
Hymenoptera	1	1	2
Isopoda	2	3	41
Lepidoptera	1	1	2
Mesogastropoda	1	3	10
Neuroptera	1	1	3
Oligochaeta_order	1	1	48
Veneroida	1	3	15
Total	38	65	505

(snails), and others. The smaller number of the terrestrial non-target taxa are highlighted in appendix 3. Some of the non-target species are interesting because they are rare or uncommon in inventories. These include, for example, *Climacia areolaris* (Hagen, 1861) (spongillafly). Larvae of *C. areolaris* live in and feed on freshwater sponges. The presence of this geographically widespread species (Bowles, 2006) of sponge parasite indicates that freshwater sponges also occur in or near the locality where these adults were collected, although we did not see or collect any sponges.

Russell Cave National Monument

Locations and Events

Eight collections were conducted at 5 locations in RUCA (fig. 5 and appendix 1, table 1–2), and target specimens were retrieved from 3 of the locations.

Specimens

We collected 226 specimens, including 152 target and 74 non-target taxa. A complete

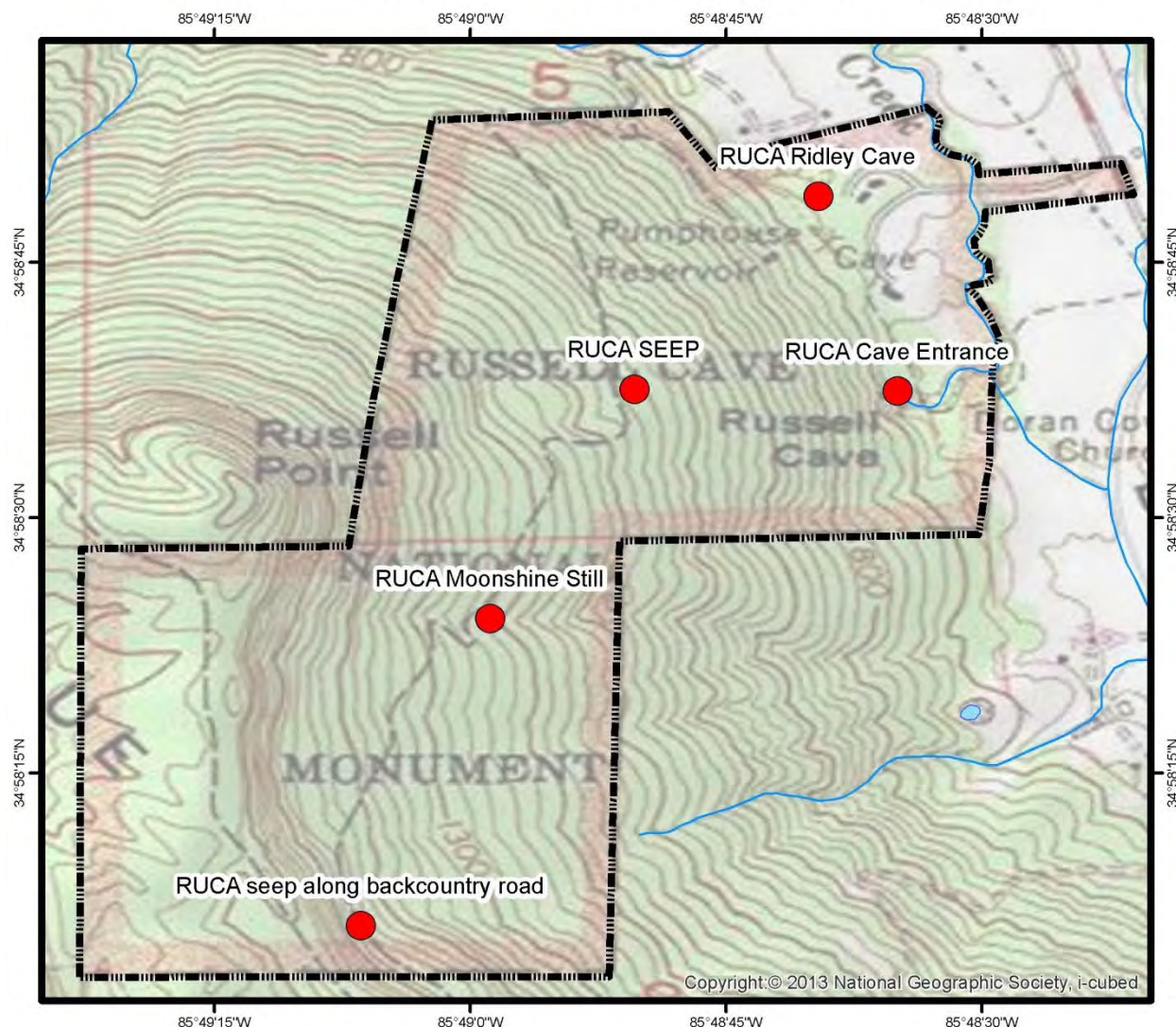
list of all taxa collected, both target and non-target, is included in appendix 6.

Target Taxa

Seventeen families, 25 genera, and 26 species were collected from RUCA (table 3).

All of the mayflies, four of the stoneflies, and four of the caddisfly species were

Russell Cave National Monument



The background map is the USA Topographic Basemap from ESRI's ArcGIS Online Map Services
<http://www.esri.com/software/arcgis/arcgisonline/services/map-services>

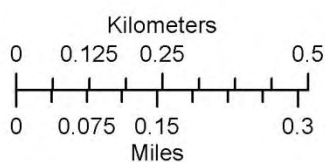


Figure 5. Russell Cave National Monument with locations where Ephemeroptera, Odonata, Plecoptera, Megaloptera, and Trichoptera were collected during the U.S. Geological Survey study from 2005-7.

represented by specimens that could not be identified to species. At RUCA, as at LIRI, Trichoptera is the most speciose group encountered. Possible reasons for this are discussed above under the LIRI Target Taxa section.

Non-target Taxa

As at LIRI, a number of non-target taxa were collected at RUCA. These are summarized in table 4 and full records are provided in appendix 3, Non-Target Species Data.

Total Species

Considering only the taxa to which we could assign species names, we found 198 species of EOPMT taxa in both parks combined.

Table 3. Numbers of taxa and specimens of the target EOPMT species collected from the Russell Cave National Monument (RUCA). This includes only specimens that were identified to species and seven genera for which species identification was not possible but represents the only record of these genera in RUCA. Refer to appendix 2, table 2-2 for a complete listing of all EOPMT records.

Order	Families	Genera	Species	Specimens
Ephemeroptera	3	5	5	33
Odonata	0	0	0	0
Plecoptera	5	6	6	11
Megaloptera	0	0	0	0
Trichoptera	9	14	15	108
Total	17	25	26	152

Species of Interest

In order to highlight species that we consider to be of greatest potential significance to resource managers, we analyzed the target species collected at both parks for their potential conservation significance. We consider 141 (71 percent) of the 198 EOPMT species found in LIRI and RUCA to be potential species of interest. Distributional, biological, and other information about these 141 species are given

Table 4. Numbers of taxa and specimens of the non-target species collected from Russell Cave National Monument (RUCA). The entry Oligochaeta_order refers to specimens of worms not identified to Order. See appendix 3, table 3-2 for a complete listing of non-target specimens.

Orders	Families	Genera	Specimens
Amphipoda	1	1	19
Basommatophora	1	1	6
Diptera	3	3	23
Ixodida	1	1	1
Isopoda	2	2	13
Oligochaeta_order	1	1	11
Psocoptera	1	1	1
Total	10	10	74

in appendix 4, Species of Interest. This appendix does not include those taxa in the parks presently known only at the genus level or higher. The tables in appendix 4 contain a great deal of information about the species and the higher taxa in which they are included. Readers are encouraged to refer to the species accounts for details concerning those species that could be of importance when considering any action that may affect the species or their habitat. Appendix 4i includes a complete account of the criteria used to select species of interest. Below we provide a brief discussion of the nature of the considerations that led to our selection of these species.

Rare species – We recognize rare species as those that occur in just three or fewer (less than 17 percent) of the 18 parks included in the broader survey. Twenty-four species were found only in LIRI (table 5), 15 were found in LIRI and 1 other park, and 14 were found in LIRI and 2 other parks. These 53 species may merit close attention from managers because the species have limited distributions in the networks. Of the 24 species that are restricted to LIRI, 11 are known from a single location within the park, 5 are known only from 2 locations, and none are known from more than 10 locations. Sites that have multiple species of interest ideally would receive special attention when activities are planned for an

Table 5. Species found only in the Little River Canyon National Preserve and not in any of the other parks included in this survey.

[#Loc, number of different localities; #Col, number of different collections; #Spm, number of specimens; *, species of Trichoptera considered endemic to the Little River watershed by Frazer and others (1991)]

Order	Family	Species	#Loc	#Col	#Spm
Plecoptera	Leuctridae	<i>Leuctra rickeri</i>	10	10	57
	Perlidae	<i>Neoperla carlsoni</i>	1	1	3
	Perlodidae	<i>Isoperla davisii</i>	1	1	2
Trichoptera		<i>Isoperla species 1</i>	1	1	1
		<i>Isoperla species 2</i>	1	1	2
	Taeniopterygidae	<i>Taeniopteryx lonicera</i>	2	2	2
	Glossosomatidae	<i>Agapetus avitus</i>	1	1	1
	Hydroptilidae	<i>Hydroptila alabama</i>	1	1	1
		* <i>Hydroptila licina</i>	1	1	1
		* <i>Hydroptila micropotamis</i>	10	10	22
		<i>Hydroptila novicola</i>	2	2	2
		<i>Neotrichia collata</i>	2	2	2
		<i>Neotrichia minutisimella</i>	1	1	1
		<i>Neotrichia okopa</i>	4	4	4
		<i>Oxyethira glasa</i>	2	2	2
	Lepidostomatidae	<i>Lepidostoma compressum</i>	2	2	13
		<i>Lepidostoma weaveri</i>	5	5	21
	Leptoceridae	<i>Ceraclea alces</i>	8	8	13
		<i>Ceraclea resurgens</i>	4	4	18
		<i>Triaenodes cumberlandensis</i>	1	1	1
	Polycentropodidae	<i>Nyctiophylax barrorum</i>	7	7	7
		<i>Polycentropus thaxtoni</i>	1	1	1
	Rhyacophilidae	<i>Rhyacophila lobifera</i>	7	7	15
	Thremmatidae	* <i>Neophylax harrisi</i>	1	1	2

area that could affect the hydrologic resources. In LIRI, 38 of the 45 sites have two or more species of interest. As this is more than 84 percent of the sites sampled, it may be prudent to consider any action that affects aquatic resources as warranting close scrutiny because of the high probability of one or more species of interest being present.

Species Extirpation Vulnerability Rankings – The treatment of species as rare based on their restricted occurrence within the 18 parks of this study does not take into account their rarity over the wider known ranges of the species. Taking a broader perspective on the distribution of species, and thus of their potential vulnerability to extirpation, adds insights to the consideration of the status of a species within the broader landscape of the Little River and Russell Cave. NatureServe (<http://www.natureserve.org/>), a private not-for-profit conservation organization, considers the status of species at much broader scales, from state to national to global. NatureServe has established criteria for ranking the

vulnerability of species across these scales on the basis of the number of known occurrences, geographic extent, and population status of each species. This system is explained in the introduction to appendix 4, but ultimately it leads to a status rank for each species that ranges from G5 to G1, meaning that populations of any given species are secure globally (G5), less secure (G4 to G2), or critically imperiled globally (G1) and thus at risk of extirpation. In a similar manner, most states have adopted a

version of this system and applied it to their own flora and fauna. At state levels, the ranks range from S5 to S1, with corresponding meanings attached. Every species that has a global or state ranking of G1 to G3 or S1 to S3 is considered a species of interest for the purposes of this inventory, and is included in the species of interest tables in appendix 4.

From appendix 4, 23 of the EOPMT taxa found in this survey are ranked G1, G2, or G3, and 38 have a state rank of S1, S2, or S3. Twenty-six species have state ranks of S1, S2, or S3 but have global ranks of G4 or G5. This is what should be expected, as the potential for harm to or even extirpation of local populations is higher overall than for combined regional or global populations of a species.

Tolerance Values – If a species has a tolerance value in the most sensitive range (0–3), it is included in the tables on that basis alone. These species are the most sensitive to disturbance; therefore, knowing where they occur can help managers understand the

relative sensitivity of different locations in the park.

Significance of the Aquatic Insect Fauna

We obtained published tolerance values from the literature sources cited in the section “Methods, Site Sensitivity Index.” We assigned a conservation score to each of the 317 aquatic taxa from both parks. Conservation scores may also be assigned to the non-target species. However, none of the non-target species encountered has a score greater than zero. The tolerance values and conservation scores are provided in appendix 5, Tolerance Values and Conservation Scores.

Site Sensitivity Index — The site sensitivity index (SSI) was calculated for all of the sites at which we found at least five target and non-target aquatic taxa with a tolerance value of 3.0 or less (table 6). LIRI has 41 locations and RUCA has 3 locations with SSI values. SSI values range from 1.65 – 23.49.

Conservation Scores — Sixty-nine target species have CS greater than 0. LIRI has 41 sites with conservation scores greater than 0 (table 6). In RUCA, each of the three sites with target species has a CS value.

We plotted the SSI and CS values for both parks (figs. 6 and 7). Figure 6 shows the relation between LIRI and RUCA using box plots to represent the range of values for CS and SSI. The probability values from Wilcoxon rank sum tests were greater than 0.2 for SSI and greater than 0.1 for CS. In the bar chart in figure 7 individual locations are arranged from the northwest to the southeast. LIRI sites begin on the left and progress southward to the right. Three locations that do not have geographic coordinates are at the end of the LIRI locations. The final three locations are RUCA.

Using SSI and CS — We used the site sensitivity index and the conservation score to

rank sites according to their potential significance for conservation for each park separately (table 6). LIRI DeSoto State Park West Fork Little River was ranked highest by both SSI (23.49) and CS (93). This site has 107 taxa (appendix 2), including 51 with tolerance values less than or equal to 3 and 40 with CS greater than 0 (appendix 5). Among the 40 taxa having CS greater than 0 are 8 that have CS = 4. For LIRI, the site LIRI DeSoto State Park West Fork Little River and the site LIRI DeSoto State Park Lodge Creek upstream was ranked tenth by both SSI (13.48) and CS (21). Most sites were within six ranks by SSI and CS. The site having the greatest difference in ranking was LIRI_Frazer_12, ranked 36th by SSI (3.5) and 20th by CS (8). It is apparent that the two methods of ranking sites can give different results. Possible explanations for differences in ranking by the two measures are considered in the section “Discussion.”

Detecting patterns among sites by direct examination of table 6 is challenging.

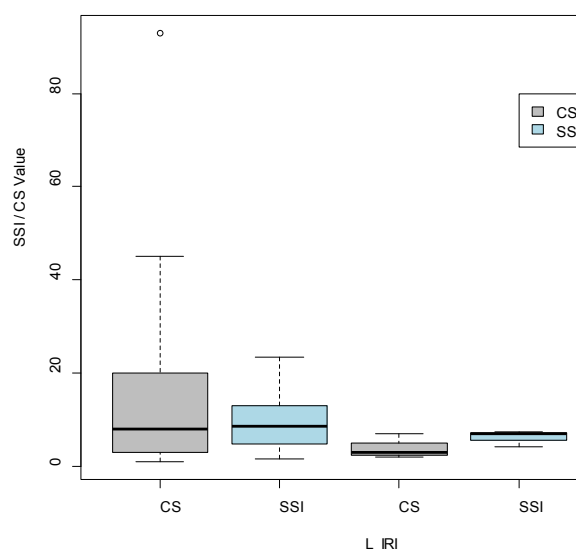


Figure 6. Distribution of values of site sensitivity index (SSI) and conservation score (CS) for Little River Canyon National Preserve (LIRI) and Russell Cave National Monument (RUCA). The outlier (circle) for LIRI CS is for the highest ranked site LIRI DeSoto State Park West Fork Little River.

Table 6. Site sensitivity index and conservation score for individual sites of Little River Canyon National Preserve (LIRI) and Russell Cave National Monument (RUCA). Sites are listed by park and then approximately north to south as in figure 7. Three sites marked with pound symbols (#) do not have coordinates. Seventeen sites did not have qualifying taxa and are not included below.

[SSI, site sensitivity index; rSSI, rank of sites based on site sensitivity index; CS, conservation score; rCS, rank of sites based on conservation score]

Little River Canyon National Preserve				
Site	SSI	rSSI	CS	rCS
LIRI DeSoto LAC1	7.97	25	4	28
LIRI_Frazer_18	7.73	26	7	24
LIRI DeSoto State Park 1990-05-19	2	40	1	37
LIRI DeSoto State Park Laurel Creek	15.37	6	20	11
LIRI Laurel Ck Azalea Cascade	13.15	11	15	16
LIRI DeSoto SP Laurel Creek Rhyacophila site	12.38	13	20	11
LIRI Laurel Creek at the falls	8.13	24	8	20
LIRI OTMID2	1.65	41	1	37
LIRI DSSP Hole in Bend	2.8	39	5	27
LIRI DeSoto State Park Lodge Ck below Lodge Falls	10.52	20	20	11
LIRI DeSoto State Park West Fork Little River	23.49	1	93	1
LIRI West Fork Little River below DeSoto SP ~500m	6.64	28	1	37
LIRI DeSoto State Park Lodge Creek upstream	13.48	10	21	10
LIRI DSSP Cabins Spring	4.1	34	3	30
LIRI 05XNG	17.49	3	37	4
LIRI 08 1	8.44	22	8	20
LIRI tributary at Rd 05 near Rd 08	13.77	9	8	20
LIRI Hurricane Creek at Rd 05	16.52	4	10	18
LIRI Grogan Creek	14.63	7	25	7
LIRI Little River Falls	19.62	2	27	6
LIRI_Frazer_15	11.61	17	40	3
LIRI below Little River Falls Rt. 35	5.1	30	3	30
LIRI DeSoto State Park 1240	4.83	31	3	30
LIRI Lynn Overlook Powerline Cut Bog	14.39	8	7	24
LIRI Brooks Branch Beaver Pond	11.67	16	16	15
LIRI Brooks Branch on trail	6.42	29	9	19
LIRI Brooks Branch lower	16.49	5	7	24
LIRI_Frazer_13	11.7	15	29	5
LIRI Bear Creek at Rt 176	4.17	33	2	34
LIRI_Frazer_14	12.27	14	17	14
LIRI Lower 2-Mile	8.23	23	1	37
LIRI at Lower Two-Mile trail	10.84	18	13	17
LIRI_Frazer_12	3.5	36	8	20
LIRI_Frazer_11	10.59	19	24	8
LIRI_Frazer_10	12.6	12	45	2
LIRI_Frazer_07	3.2	37	3	30
LIRI_Frazer_06	8.64	21	23	9
LIRI_Frazer_05	3.17	38	1	37
#LIRI DeSoto State Park T6S R10E Sec. 29NW	3.57	35	2	34
#LIRI DeSoto State Park, T6S R10E Sec. 19SE - 20SW	4.27	32	2	34
#LIRI DeSoto State Park, T6S R10E Sec. 19W	7.33	27	4	28
Russell Cave National Monument				
Site	SSI	rSSI	CS	rCS
RUCA Ridley Cave	6.97	2	3	2
RUCA Cave Entrance	4.17	3	2	3
RUCA Moonshine Still	7.48	1	7	1

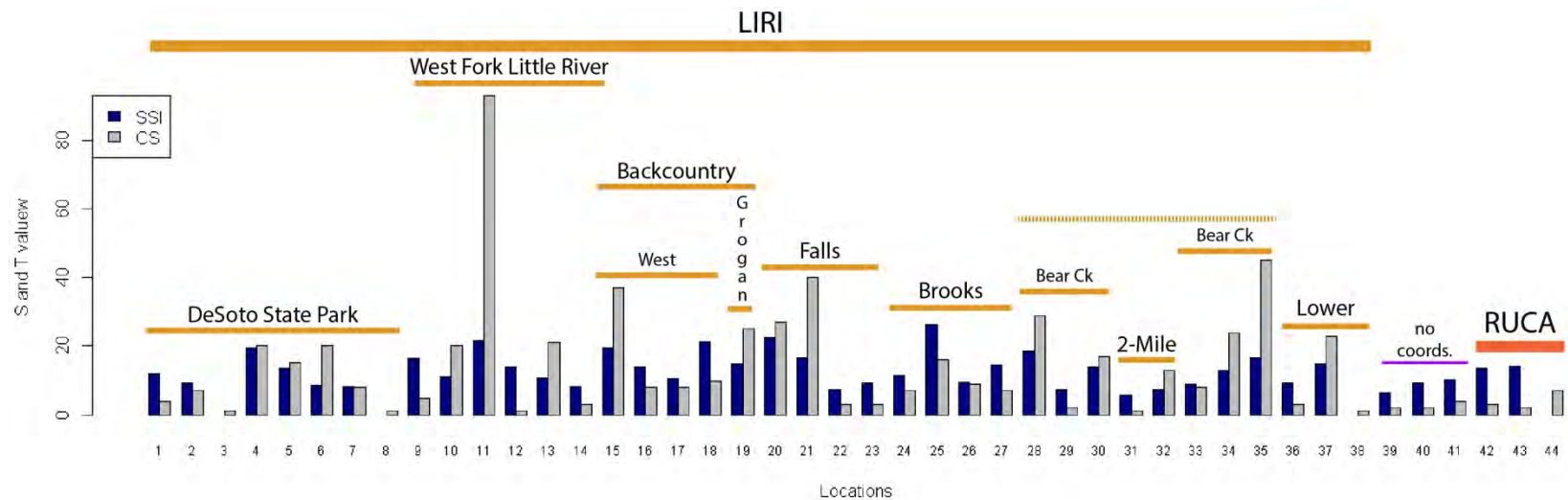


Figure 7. Bar chart of 41 locations in Little River Canyon National Preserve (LIRI) and Russell Cave National Monument (RUCA). Locations are arranged by park and within each park, left to right, from northwest to southeast. Labels above bars identify the grouping of locations as used in the text.

[1, LIRI DeSoto LAC1; 2, LIRI_Frazer_18; 3, LIRI DeSoto State Park 1990-05-19; 4, LIRI DeSoto State Park Laurel Creek; 5, LIRI Laurel Ck Azalea Cascade; 6, LIRI DeSoto SP Laurel Creek Rhyacophila site; 7, LIRI Laurel Creek at the falls; 8, LIRI OTMID2; 9, LIRI DSSP Hole in Bend; 10, LIRI DeSoto State Park Lodge Ck below Lodge Falls; 11, LIRI DeSoto State Park West Fork Little River; 12, LIRI West Fork Little River below DeSoto SP ~500m; 13, LIRI DeSoto State Park Lodge Creek upstream; 14, LIRI DSSP Cabins Spring; 15, LIRI 05XNG; 16, LIRI 08 1; 17, LIRI tributary at Rd 05 near Rd 08; 18, LIRI Hurricane Creek at Rd 05; 19, LIRI Grogan Creek; 20, LIRI Little River Falls; 21, LIRI_Frazer_15; 22, LIRI below Little River Falls Rt. 35; 23, LIRI DeSoto State Park 1240; 24, LIRI Lynn Overlook Powerline Cut Bog; 25, LIRI Brooks Branch Beaver Pond; 26, LIRI Brooks Branch on trail; 27, LIRI Brooks Branch lower; 28, LIRI_Frazer_13; 29, LIRI Bear Creek at Rt 176; 30, LIRI_Frazer_14; 31, LIRI Lower 2-Mile; 32, LIRI at Lower Two-Mile trail; 33, LIRI_Frazer_12; 34, LIRI_Frazer_11; 35, LIRI_Frazer_10; 36, LIRI_Frazer_07; 37, LIRI_Frazer_06; 38, LIRI_Frazer_05; 39, LIRI DeSoto State Park T6S R10E Sec. 29NW; 40, LIRI DeSoto State Park, T6S R10E Sec. 19SE - 20SW; 41, LIRI DeSoto State Park, T6S R10E Sec. 19W; 42, RUCA Ridley Cave; 43, RUCA Cave Entrance; 44, RUCA Moonshine Still]

Therefore we mapped the distribution of the SSI and CS across the park (figure 8). In this plot the circles are scaled by CS and SSI such that the largest circles represent the highest values. The yellow circles represent the conservation scores, and the violet circles represent the site sensitivity index. The brown color represents the overlap between the CS and SSI; in figure 8 the SSI circles are completely covered by the CS circles, so the SSI values all appear brown. Figure 8 shows prominent clusters of SSI and CS sites with high values in the region of DeSoto State Park; the West Fork of the Little River; the backcountry sites west of the Little River from an unnamed tributary at park road 5 to Hurricane Creek; the backcountry site on the east side of Little River, Grogan Creek; the area of the Little River falls; Brooks Branch; an unnamed tributary of Little River along Canyon Rim Road; Bear Creek; and the lower Little River below Bear Creek to the park boundary. This visual analysis is more direct and revealing than scanning table 6. The map appears to support our contention in the discussion of rare taxa in the section “Species of Interest” that most of the LIRI supports communities of significant conservation interest. Although this is gratifying from the point of view that the LIRI is a prominent preserve of aquatic biodiversity in Alabama and the southeastern United States, a modified approach may be of more value in terms of prioritizing sites for conservation or

monitoring. We grouped sites on the basis of the clusters revealed in figure 8, recalculated the SSI and CS values (table 7), and plotted

Table 7. Site sensitivity index and conservation score for grouped sites of Little River Canyon National Preserve.

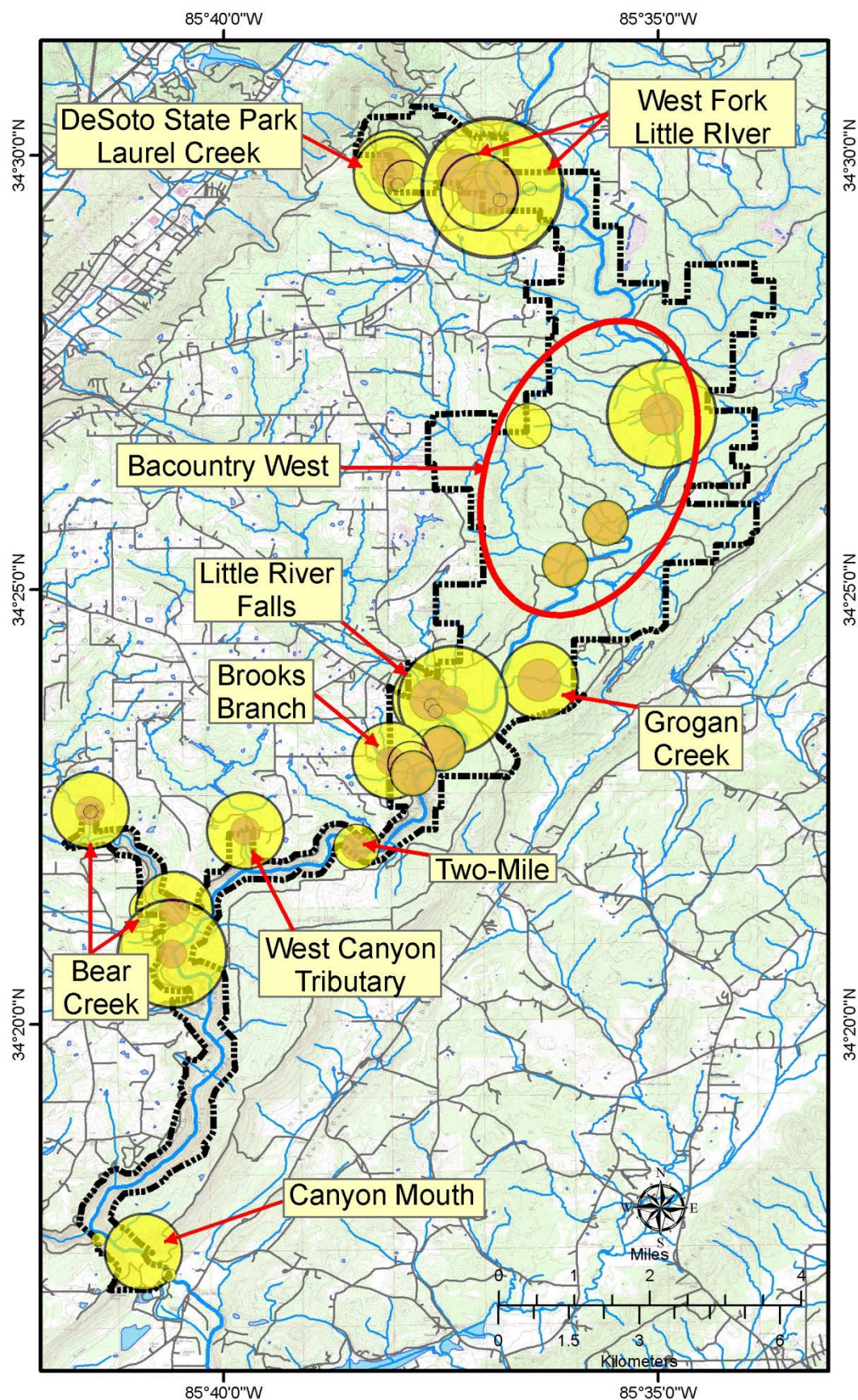
[SSI, site sensitivity index; rSSI, rank of sites based on site sensitivity index; CS, conservation score; rCS, rank of sites based on conservation score]

Site	SSI	rSSI	CS	rCS
DeSoto State Park				
Laurel Creek	45.30	3	75	3
West Fork Little River	64.31	1	122	1
Backcountry West	46.56	2	63	5
Grogan Creek	22.54	7	25	8
Little River Falls	44.58	4	73	4
Brooks Branch	37.45	5	39	6
West Canyon Tributary	17.31	10	17	9
Two-mile	18.75	8	14	10
Bear Creek	36.37	6	108	2
Canyon Mouth	17.59	9	27	7

the grouped-site scores (fig. 9). Examination of the figure of the grouped scores reveals seven prominent sections based on the size of the dots: DeSoto State Park Laurel Creek; West Fork Little River; the Backcountry West; the Falls; Brooks Branch; Bear Creek; and Canyon Mouth. Two of the potential groups identified from figure 7, Two-mile and West Canyon Tributary, are less prominent in figure 9 than in figure 8.

In RUCA grouping of sites is unnecessary. The SSI and CS ranked all sites the same, with RUCA Moonshine Still ranked highest (table 6 and fig. 10).

Figure 8. Little River Canyon National Preserve with site sensitivity index (SSI) and conservation score (CS) for all sites individually. Higher scores for both measures are shown with larger dots. SSI is shown in violet; CS is shown in yellow. Where the scores overlap the symbols appear brown.



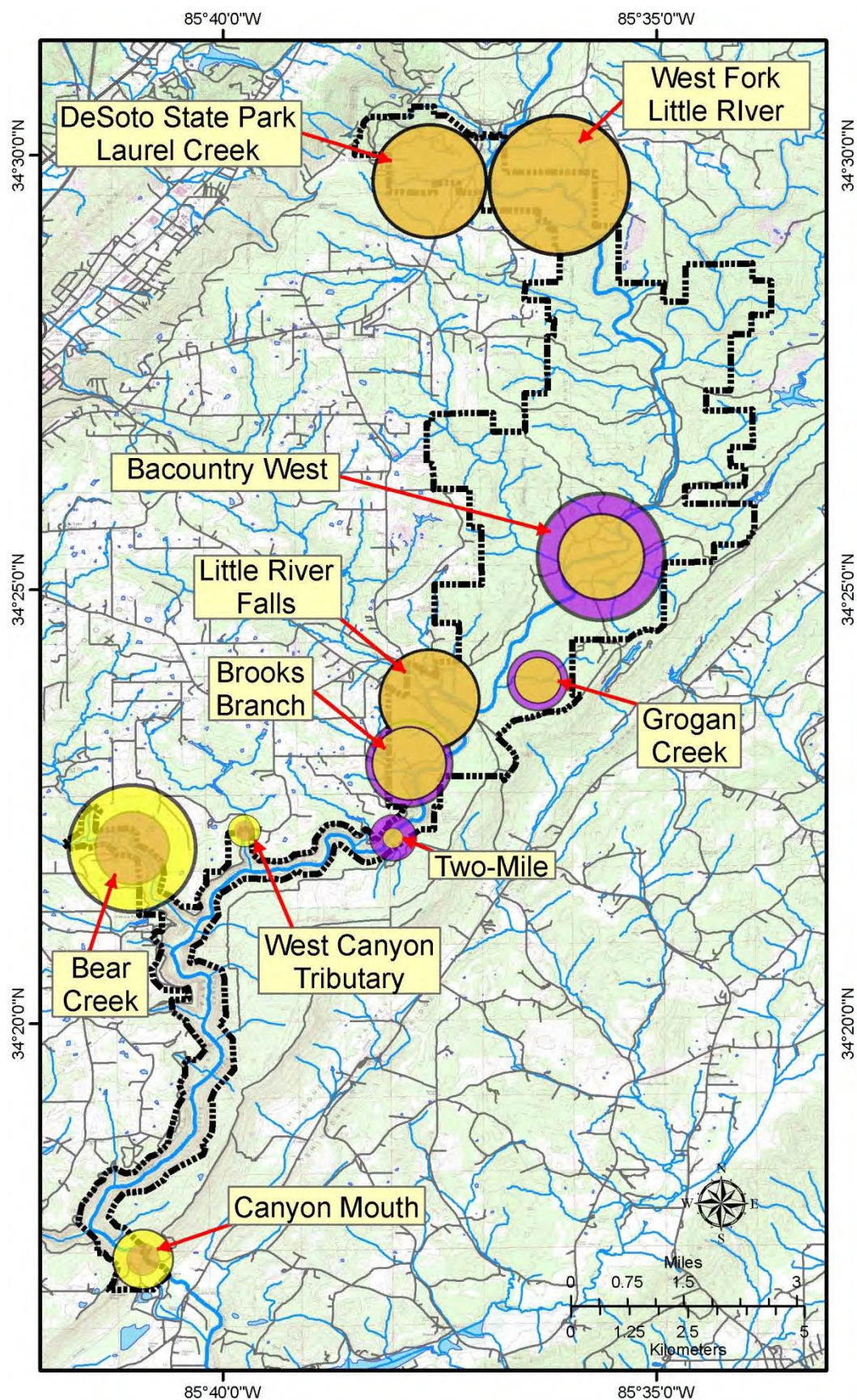


Figure 9. Little River Canyon National Preserve with site sensitivity index (SSI) and conservation score (CS) for grouped sites. Higher scores for both measures are shown with larger dots. SSI is shown in violet; CS is shown in yellow. Where the scores overlap the symbols appear brown.

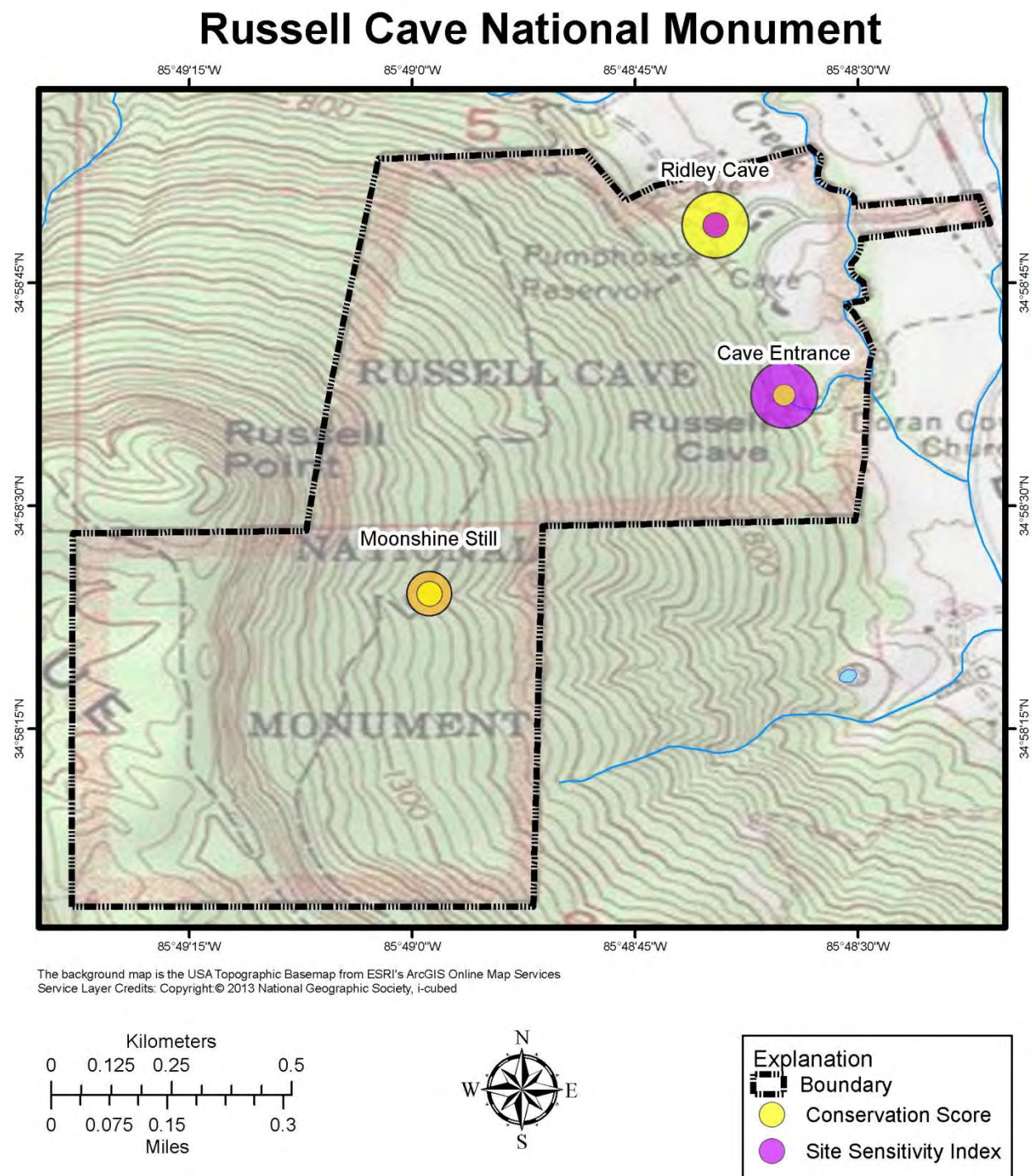


Figure 10. Russell Cave National Monument with site sensitivity index (SSI) and conservation score (CS) for all sites. Higher scores for both measures are shown with larger dots. SSI is shown in violet; CS is shown in yellow. Where the scores overlap the symbols appear brown.

Discussion

LIRI and RUCA are two quite different parks from the standpoint of their respective aquatic insect faunas. The species of EOPMT at LIRI are highly diverse (table 1) and include a number of rare and possibly endemic species (table 5). Of the 18 parks in the broader survey, LIRI has the 6th highest number of target species recorded. The EOPMT fauna in RUCA on the other hand is very limited and, in fact, represents the lowest number of taxa of any of the 18 parks.

Two factors that affect the number of species in a natural area are total land area and sampling effort (table 8). There is a highly significant correlation between park area and the number of EOPMT species for all parks in the two monitoring networks (Pearson correlation = 0.8435, $p < 0.0001$). Similarly, using the number of sampling events as a

These results indicate that (1) larger areas have more species, and (2) greater sampling leads to the discovery of more species, which are well-known and frequently studied issues in ecology (Cao and others, 2002; Chong and Stohlgren, 2007; Collins and others, 2002; Hill and others, 1994; Lewis, 2006).

As a further illustration of the importance of sampling effort in revealing greater biodiversity, prior sampling by other researchers (see “Locations and Events” section) has contributed considerable information to our knowledge of the Trichoptera fauna of the park. The William H. Cross Expeditions conducted by Dr. Brown discovered 21 species of Trichoptera, including one species which was not found in our sampling in LIRI. The extensive monthly sampling for Trichoptera by Frazer and others (1991) discovered 107 species, including 34 species not found in our sampling from 2005 to 2007. In addition, 4 species *new* to science were discovered and described, and 6 species were considered to be endemic to the Little River (species with an asterisk in table 5). The present study found 106 species, including 33 not found by the previous works, giving a total of 142 species of Trichoptera known for LIRI. Clearly, greater sampling effort leads to higher species counts for a given area.

Another factor is the extremely dry conditions encountered during the 2005 to 2007 survey. On the basis of annual discharge records from the USGS streamgauge on the Little River near Blue Pond (USGS 02399200 LITTLE RIVER NEAR BLUE POND AL, at 34.28898°N 85.68052°W), the 3-year period from 2005 to 2007 is the second driest on record since 1959, exceeded only by the 3-year period from 2006 to 2008. A dry spell of this extent affects hydrologic resources throughout the region. We have no data from RUCA directly and make the assumption that conditions there were similar to those at LIRI.

Table 8. Parks of the Appalachian Highland and Cumberland Piedmont monitoring networks with each park's area.

[ha, hectares, calculated from National Park Service geographic information system data; EOPMT species, number of Ephemeroptera, Odonata, Plecoptera, Megaloptera, Trichoptera]

Park	Area (ha)	Collection Events	EOPMT species
ABLI	138	9	34
BISO	49,545	157	280
BLRI	32,944	533	413
CARL	108	95	139
CHCH	3,326	42	116
COWP	340	34	58
CUGA	8,118	47	205
FODO	210	23	53
GRSM	209,988	1,754	575
GUCO	82	11	33
KIMO	1,583	34	94
LIRI	5,586	106	202
MACA	20,791	60	133
NISI	384	39	91
OBRI	3,769	58	221
RUCA	130	8	15
SHIL	1,605	71	120
STRI	261	8	50

measure of sampling effort, we obtain an equally significant correlation between park area and the number of sampling events (Pearson correlation = 0.9722, $p < 0.0001$).

The very dry conditions during this time period likely had a very marked effect on RUCA, as RUCA has a very small watershed. LIRI has a much larger watershed, and its larger streams and main river are thus somewhat buffered from the dry conditions. At RUCA, Dry Creek, the one stream that passes through the park, was reduced to disconnected pools during our visits, including the visit in 2005 which was a year of average discharge at LIRI.

The aquatic insect fauna of RUCA has not, to our knowledge, been sampled prior to our efforts. This combined with RUCA's small land area, limited surface water resources, and the very dry conditions during which this survey was undertaken have resulted in the discovery of only 15 taxa of EOPMT in RUCA. There are more aquatic species to be found in both LIRI and RUCA (see appendix 6, table 6–3), and because the land area of the parks will not increase significantly, those species can be found only through additional sampling effort.

Potential Conservation Application

The LIRI water quality monitoring program includes 11 locations; 5 locations are within the park and 6 are upstream in the wider Little River watershed (Meiman, 2009). The 5 water quality monitoring sites within LIRI correspond closely to our grouped sampling locations (table 9).

Table 9. Water-quality monitoring sites in Little River Canyon National Preserve (Meiman, 2009) and group locations from the present study.

[ID, site identification code]

Name	ID	Group
Burnt House Ford, Little River	BHLR	Backcountry West
Eberhart Point, Little River	EPLR	Bear Creek
Highway 35 Bridge, Little River	HBLR	Little River Falls
Canyon Mouth Little River	CMLR	Canyon Mouth
DeSoto State Park, West Fork Little River	DSLRL	West Fork Little River

We have restricted our discussion to the LIRI itself because that is where we sampled, although the concepts apply to the broader

area as well. In the discussion of rare species under Species of Interest, we indicated that because 84 percent of all sampling locations include species of interest, all areas of the LIRI ideally would be considered for monitoring and conservation purposes. As that is not likely to be feasible in the event LIRI is to develop an aquatic macroinvertebrate monitoring program, selection of a subset of sites is warranted. The results from the grouping of sites in table 6 and figure 8 indicates one strategy for selecting a limited number of monitoring locations within the LIRI. If a LIRI monitoring program that includes aquatic macroinvertebrates should be established, the highest ranked areas in table 6 could be considered first, along with those sites in table 6 that coincide with the existing water quality monitoring sites (table 9). Characteristics of areas of potentially high conservation interest are presented in table 10. The information in table 10 includes a brief description of the grouped area, a list of sampling locations in each area with the SSI and CS values and the number of species of interest found in each, as well as a list of some of the species of interest found there.

Although there are no identified point sources in the LIRI watershed, the extensive agricultural, residential, and recreational areas upstream from the park are sources of concern for managers (Meiman, 2009). The SSI and the CS are potentially useful in making decisions regarding the selection of priority areas for conservation and monitoring. The site sensitivity index is limited in that it applies to aquatic species only, and specifically to those species that regularly are encountered in monitoring activities and have been assigned a tolerance value. The concept of tolerance values in biomonitoring is well established and many studies have documented their usefulness in monitoring programs. The criteria used to assign tolerance values to species are weighted by the responses species show to contamination that

may be very severe. Thus, the site sensitivity index is an objectively based measure that relies on empirical data.

CS, on the other hand, is designed to evaluate all aquatic species, whether they are used in biomonitoring programs or not. The concept is similar to the NatureServe global rankings (G-ranks) and state-modified rankings (S-ranks) of rare species. Conservation scores could also be extended to terrestrial species with modification of the criteria, and may be thought of as park rankings (P-ranks) of species tailored to LIRI and RUCA. Both the selection of rare taxa and the assignment of conservation scores can be subjective. Other biologists might select rare taxa differently or might assign conservation scores differently. However, we believe that biologists having similar expertise and familiarity with the faunas of LIRI and RUCA will arrive at very similar rankings.

Should the SSI and CS be strongly correlated? In that they deal with the same species, there certainly needs to be some degree of correlation (Kendall rank correlation $\tau = 0.597$, $p < 0.0001$). But, the main reason that D.R. Lenat developed the CS is that many of the most at risk aquatic taxa along the Blue Ridge Parkway do not occur in the types of habitats where typical biomonitoring takes place. This means that many species in the specialized habitats where intriguing things are found are rarely encountered during routine biomonitoring and therefore do not have tolerance values or other established criteria for conservation assessment purposes. Most of the sites in table 6 have ranks of SSI and CS within 6 values of each other (15 percent). For some locations the difference in

ranking by SSI and CS is much greater. Brooks Branch Lower, for example, is ranked 5th by SSI and 24th by CS. From appendix 2 we find that 44 taxa are known from this location, and from appendix 5 we see that 24 of the species collected at this site have tolerance values less than or equal to 3, but only 6 species have conservation scores greater than 0. Thus, this disparity in the ranking of Brooks Branch Lower by SSI and CS is because sensitive species based on tolerance values are numerous, but species with conservation scores greater than 0 are few. Therefore, it is reassuring that the correlation between the two measures is as strong as it is, and disparities in the ranking among sites by the two measures are justification for using both in conjunction.

A more limiting consideration regarding disparities in SSI and CS in this report may be between this study and the studies by Frazer and others (1991) and the William H. Cross Expeditions of Dr. Brown. Those studies only include information on caddisflies; there is no information on the non-caddis target species. Those studies provide valuable data that greatly enrich the body of knowledge on Trichoptera, but they contribute nothing to the other target taxa. Thus, for sites sampled during our study we have information on all target species groups, leading to higher CS values than were obtained from the the Frazer and Brown studies. Leaving out the caddisfly data from those studies would seriously diminish the usability of the data, but potentially decrease the disparities between SSI and CS.

Further Research

The LIRI contains truly remarkable aquatic invertebrate faunas. In addition to being very rich in terms of the numbers of species, the faunas also include many species

that are possibly endemic or are rare locally, regionally, or globally. This study also has served to point out the need for further study to improve our knowledge and understanding

of the biotic resources of LIRI and RUCA. Additional work is required before several of the potential *new* species already discovered can be described and named. In addition, improving our knowledge of the distribution, habitat requirements, and ecological relations of almost all of the aquatic species could help managers make more informed decisions regarding the proper approaches to their long-term preservation. As indicated in appendix 6, table 6–3, more than 100 aquatic target species are known to occur in the counties in which the parks are located but have not yet been confirmed to occur in LIRI or RUCA. Many of the named species in the LIRI are unassociated in all life history stages, a serious impediment to conserving the species over the long term. This is particularly so when the aquatic stages are unknown, as it is in the aquatic stage that insects are most at risk from habitat alterations of various types. Association is achieved by collecting specimens in the vicinity of the known adult locations in order to find the larvae and rear them to the adult stage. Much additional collecting is needed in RUCA to obtain specimens at identifiable stages.

We note here that *Somatochlora hineana* Williamson, 1931 (Hine’s Emerald Dragonfly) is the only North American dragonfly on the endangered species list (<http://www.fws.gov/midwest/endangered/insects/hed/index.html>). A historical record for this species is known from Jackson County, Alabama (table 6–3). The habitats of the few known existing populations include spring-fed wetlands, wet meadows and marshes, calcareous streams and associated wetlands overlying dolomite bedrock (from the website above). It is conceivable that relict populations

of this species may still exist in the Little River watershed, including LIRI itself. A concerted effort to find any such populations could provide a *major* lift to recovery efforts for this spectacular insect’s future.

The availability of data from other sources was immensely helpful in this study. The data from the William H. Cross Expeditions conducted by Dr. Brown, and the data from Frazer and others (1991) supplemented our information about the Trichoptera of LIRI. However, both of these sources provided information only about caddisflies, and no information at all about the other target species groups. As pointed out in the “Discussion” section, the Cross Expeditions and the study by Frazer and others (1991) added unique information about the Trichoptera fauna of LIRI that our study did not find. It is certain that additional studies of the Ephemeroptera, Odonata, Plecoptera, and Megaloptera of LIRI will similarly enrich the body of knowledge of this highly diverse ecosystem.

The site sensitivity index and conservation scores developed in the course of this study seem to have great potential use for land managers in all of the parks of the Appalachian Highlands and Cumberland Piedmont monitoring networks. We are applying these measures to all of the other parks in this study, and in the process, we are coming to understand much more clearly their potential application for use in these parks. Further research incorporating these measures could focus on extending the applicability to terrestrial species, as well as determining the potential utility to other land management agencies such as the U.S. Forest Service and the Fish and Wildlife Service.

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Table 10. Areas of potentially high conservation interest in Little River Canyon National Preserve based on high site sensitivity index and (or) high conservation score. Each area is provided a short identifier based on the groups recognized in figure 8. The Notes field gives a brief description of the ecological features of the area. Specific sampling sites, identified by the SiteCode used in the database are listed with site sensitivity index and conservation score values, the number of species of interest found at the sites, and a partial list of significant species found at each site from appendix 6.

[LIRI, Little River Canyon National Preserve; SSI , site sensitivity index; CS, conservation score; S, number of species of interest found at the sites]

Group	Notes	Site	SSI	CS	S	Species
Two-mile	A small tributary of Little River flowing off a steep slope with seeps and depositional areas near the river. Several species of interest.	LIRI at Lower Two-Mile trail	18.41	13	9	<i>Allocapnia nivicola</i> , <i>Helopicus subvarians</i> , <i>Lepidostoma compressum</i> , <i>Lepidostoma weaveri</i> , <i>Taeniopteryx lonicera</i>
		LIRI Lower 2-Mile	12.73	1	4	
Grogan Creek	The only backcountry tributary on the east side of the Little River that was sampled.	LIRI Grogan Creek	41.41	25	18	<i>Ceraclea alabamae</i> , <i>Ceraclea alces</i>
Backcountry West	Several small creeks, seeps, and springs in the backcountry west of the Little River. Numerous species of interest found throughout this area.	LIRI 05XNG	57.43	37	24	<i>Cordulegaster obliqua</i> , <i>Homoplectra doringa</i> , <i>Hydroptila micropotamis</i> , <i>Isoperla species 1</i> , <i>Isoperla species 2</i> , <i>Lepidostoma weaveri</i> , <i>Polycentropus thaxtoni</i> , <i>Rhyacophila ledra</i> , <i>Wormaldia shawnee</i>
		LIRI 08 1	28.42	8	11	<i>Cordulegaster obliqua</i> , <i>Hydroptila micropotamis</i> , <i>Wormaldia shawnee</i>
		LIRI Hurricane Creek at Rd 05	51.11	10	15	<i>Agapetus spinosus</i> , <i>Molanna tryphena</i> , <i>Rhyacophila ledra</i>
		LIRI tributary at Rd 05 near Rd 08	28.01	8	7	<i>Rhyacophila ledra</i>
		LIRI Bear Creek at Rt 176		2	2	
Bear Creek	A third order tributary of Little River that flows approximately 4.2 km through the park in a deep gorge before joining the Little River near Eberhart Point. A very rich stream having numerous species of interest.	LIRI_Frazer_10	58.79	45	35	<i>Ceraclea alabamae</i> , <i>Ceraclea alces</i> , <i>Ceraclea nepha</i> , <i>Cernotina calcea</i> , <i>Cernotina spicata</i> , <i>Hydroptila alabama</i> , <i>Hydroptila callia</i> , <i>Hydroptila micropotamis</i> , <i>Neotrichia okopa</i> , <i>Neureclipsis piersoni</i> , <i>Nyctiophylax barrorum</i> , <i>Oxyethira rivicola</i> , <i>Oxyethira zeronia</i>
		LIRI_Frazer_11	39.04	24	21	<i>Ceraclea alabamae</i> , <i>Ceraclea alces</i> , <i>Ceraclea nepha</i> , <i>Cernotina spicata</i> , <i>Hydroptila micropotamis</i> , <i>Nyctiophylax barrorum</i> , <i>Oxyethira rivicola</i>
		LIRI_Frazer_12	9.77	8	3	<i>Neophylax harrisi</i>

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Group	Notes	Site	SSI	CS	S	Species
		LIRI_Frazer_13	55.02	29	31	<i>Agapetus spinosus</i> , <i>Ceraclea nepha</i> , <i>Cernotina spicata</i> , <i>Hydroptila micropotamis</i> , <i>Hydroptila novicola</i> , <i>Hydroptila oneili</i> , <i>Molanna ulmerina</i> , <i>Neotrichia collata</i> , <i>Neureclipsis piersoni</i> , <i>Oxyethira rivicola</i> , <i>Oxyethira zeronia</i> , <i>Polycentropus elarus</i> , <i>Stactobiella delira</i>
Brooks Branch	A small creek with a beaver pond at its upper end near the park boundary that flows less than 700 m to join the Little River. Several notable species of interest are known from here.	LIRI Brooks Branch Beaver Pond	49.59	16	16	<i>Ceraclea alabamae</i> , <i>Ceraclea alces</i> , <i>Neureclipsis piersoni</i>
		LIRI Brooks Branch lower	47.06	7	19	<i>Agapetus walkeri</i> , <i>Plectrocnemia crassicornis</i>
		LIRI Brooks Branch on trail	19.06	9	4	<i>Agapetus walkeri</i> , <i>Lepidostoma weaveri</i>
		LIRI Lynn Overlook Powerline Cut Bog	29.01	7	14	
Little River Falls	The area of the Little River from just above Yellow Creek to immediately below the Little River Falls. A small rapid river flowing mostly over bedrock at this point. Many species of interest from this reach.	LIRI below Little River Falls Rt. 35	12.55	3	4	<i>Rhyacophila ledra</i> , <i>Theliopsyche melas</i>
		LIRI DeSoto State Park 1240	11.91	3	4	<i>Wormaldia shawnee</i>
		LIRI Little River Falls	68.04	27	29	<i>Allocapnia nivicola</i> , <i>Ceraclea alabamae</i> , <i>Ceraclea alces</i> , <i>Ceraclea resurgens</i> , <i>Hydroptila micropotamis</i> , <i>Neoperla coosa</i> , <i>Oxyethira rivicola</i> , <i>Oxyethira zeronia</i> , <i>Theliopsyche melas</i>
		LIRI_Frazer_15	58.97	40	33	<i>Ceraclea alabamae</i> , <i>Ceraclea alces</i> , <i>Ceraclea nepha</i> , <i>Cernotina calcea</i> , <i>Cernotina spicata</i> , <i>Dibusa angata</i> , <i>Hydroptila callia</i> , <i>Hydroptila chattanooga</i> , <i>Hydroptila micropotamis</i> , <i>Neotrichia okopa</i> , <i>Neureclipsis piersoni</i> , <i>Nyctiophylax barrorum</i> , <i>Oxyethira rivicola</i> , <i>Oxyethira zeronia</i>
DeSoto State Park Laurel Creek	A small spring-fed stream along the Orange Trail in DeSoto State Park. Low gradient upstream of the falls with mixed sand and small gravel over bedrock. Steeper and with cobbles below falls to Azalea Cascade. Stream flow nearly disappears in summer. Many species of interest throughout, including aestivating <i>R. glaberrima</i> .	LIRI DeSoto LAC1	19.34	4	7	<i>Leuctra rickeri</i> , <i>Molanna tryphena</i> , <i>Rhyacophila ledra</i>
		LIRI DeSoto SP Laurel Creek <i>Rhyacophila</i> site	25	20	15	<i>Agapetus spinosus</i> , <i>Agapetus walkeri</i> , <i>Leuctra rickeri</i> , <i>Rhyacophila glaberrima</i> , <i>Rhyacophila ledra</i> , <i>Rhyacophila lobifera</i> , <i>Wormaldia shawnee</i> , <i>Zealeuctra claasseni</i>
		LIRI DeSoto State Park 1990-05-19		1	1	

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Group	Notes	Site	SSI	CS	S	Species
Canyon Mouth	The lower end of Little River within LIRI. Moderate sized river with boulder and cobble substrate. Several species of interest known from this area.	LIRI DeSoto State Park Laurel Creek	54.69	20	20	<i>Cordulegaster obliqua</i> , <i>Leuctra monticola</i> , <i>Leuctra rickeri</i> , <i>Plectrocnemia crassicornis</i> , <i>Polycentropus elarus</i> , <i>Rhyacophila glaberrima</i> , <i>Rhyacophila ledra</i> , <i>Rhyacophila otica</i> , <i>Wormaldia shawnee</i>
		LIRI Laurel Ck Azalea Cascade	39.04	15	20	<i>Agapetus walkeri</i> , <i>Leuctra rickeri</i> , <i>Oxyethira rivicola</i> , <i>Plectrocnemia crassicornis</i> , <i>Rhyacophila glaberrima</i> , <i>Rhyacophila ledra</i> , <i>Rhyacophila otica</i> , <i>Theliopsyche melas</i> , <i>Wormaldia shawnee</i>
		LIRI Laurel Creek at the falls	16.48	8	7	<i>Agapetus spinosus</i> , <i>Leuctra rickeri</i> , <i>Rhyacophila ledra</i>
		LIRI OTMID2		1	2	<i>Rhyacophila ledra</i>
		LIRI_Frazer_18	17.78	7	8	<i>Cernotina spicata</i> , <i>Neotrichia okopa</i> , <i>Theliopsyche melas</i>
		LIRI_Frazer_05		1	2	
		LIRI_Frazer_06	39.37	23	17	<i>Ceraclea alabamae</i> , <i>Ceraclea alces</i> , <i>Cernotina calcea</i> , <i>Cernotina spicata</i> , <i>Nyctiophylax barrorum</i> , <i>Oxyethira rivicola</i> , <i>Rhyacophila lobifera</i>
		LIRI_Frazer_07		3	1	
		LIRI_Frazer_14	40.41	17	22	<i>Hydroptila novicola</i> , <i>Hydroptila novicola</i> , <i>Nyctiophylax barrorum</i> , <i>Oxyethira rivicola</i> , <i>Oxyethira zeronia</i> , <i>Polycentropus elarus</i> , <i>Rhyacophila ledra</i> , <i>Stactobiella delira</i>
		LIRI DeSoto State Park Lodge Ck below Lodge Falls	22.98	20	9	<i>Agapetus walkeri</i> , <i>Dipletrona metaqui</i> , <i>Lepidostoma weaveri</i> , <i>Rhyacophila ledra</i> , <i>Rhyacophila lobifera</i>
West Canyon tributary	A short segment of a third order stream that is accessible at Canyon Road crossing. Flows about 1km in gorge to Little River less than 2 km upstream from mouth of Bear Creek.					<i>Agapetus spinosus</i> , <i>Hydroptila micropotamis</i> , <i>Isoperla holochlora</i> , <i>Leuctra rickeri</i> , <i>Paraleptophlebia debilis</i> , <i>Plectrocnemia crassicornis</i> , <i>Rhyacophila ledra</i> , <i>Rhyacophila lobifera</i>
West Fork Little River	The West Fork of the Little River, including Lodge Creek watershed from DeSoto State Park. Little River is moderate in size, with bedrock and boulder substrate. Many species of interest from this area.	LIRI DeSoto State Park Lodge Creek upstream	34.94	21	18	

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Group	Notes	Site	SSI	CS	S	Species
		LIRI DeSoto State Park West Fork Little River	109.39	93	60	<i>Agapetus avitus</i> , <i>Agapetus spinosus</i> , <i>Ceraclea alabamiae</i> , <i>Ceraclea alces</i> , <i>Ceraclea diluta</i> , <i>Ceraclea nepha</i> , <i>Ceraclea resurgens</i> , <i>Cernotina</i> <i>spicata</i> , <i>Dibusa angata</i> , <i>Hydroptila</i> <i>callia</i> , <i>Hydroptila chattanooga</i> , <i>Hydroptila licina</i> , <i>Hydroptila</i> <i>micropotamis</i> , <i>Isoperla davis</i> , <i>Lepidostoma weaveri</i> , <i>Leuctra rickeri</i> , <i>Neotrichia collata</i> , <i>Neotrichia</i> <i>minutisimella</i> , <i>Neotrichia okopa</i> , <i>Neureclipsis piersoni</i> , <i>Nyctiophylax</i> <i>barrorum</i> , <i>Oxyethira rivicola</i> , <i>Oxyethira zeronia</i> , <i>Perlinella drymo</i> , <i>Polycentropus elarus</i> , <i>Rhyacophila</i> <i>lobifera</i> , <i>Stactobiella delira</i> , <i>Taeniopteryx lonicera</i> , <i>Triaenodes</i> <i>cumberlandensis</i> , <i>Wormaldia</i> <i>shawnee</i>
		LIRI DSSP Cabins Spring	9.23	3	2	<i>Rhyacophila ledra</i>
		LIRI DSSP Hole in Bend	18.37	5	1	<i>Neoperla carlsoni</i>
		LIRI West Fork Little River below DeSoto SP ~500m	20.03	1	4	

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The use of firm, trade, or brand names in this report is for identification purposes only and does not constitute endorsement by the U.S. Geological Survey.

The background layers used in the RUCA maps were downloaded from the Esri Web site. These maps are designed to be used as a basemap by GIS professionals and as a reference map by anyone. The map includes cities, water features, physiographic features, parks, landmarks, highways, roads, railways, airports, and administrative boundaries, overlaid on land cover and shaded relief imagery for added context. Alignment of boundaries is a presentation of the feature provided by our data vendors and does not imply endorsement by Esri or any governing authority.

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APPENDICES

Appendix 1. Locations and Events.

Sampling locations and collection events for Little River Canyon National Preserve (LIRI) and Russell Cave National Monument (RUCA) are presented in the tables below. A sampling location is a place on a river or other water body where specimens were collected. Locations have a physical location, normally represented by a verbal description, geographic coordinates, and an elevation. An event is an occasion on which researchers attempted to collect specimens from a given location. Events have time, method, and collector information. Each location is unique, and each location will have one or more events associate with it.

Table 1-1. Sampling locations and events for Little River Canyon National Preserve (LIRI). Each sample location is presented with the state and county (Co.), followed by the SiteCode as used in the database, a brief description of the location, the Universal Transverse Mercator (UTM) coordinates (all in UTM Zone 16 North), the decimal latitude (Lat) and longitude (Lon), and the elevation in meters above National Geodetic Vertical Datum of 1929. All coordinates are based on the North American Datum 83. Beneath each location entry are details for one or more sampling events that occurred at the site. The event information includes the date of the event, the method used to collect specimens, and the collector(s). Samples collected as part of the William Cross Expeditions are highlighted in green, and samples collected by Frazer and others (1991) are highlighted in blue.
[AL, Alabama; Co., County; °, degrees; N, north; E, east; W, west; ~, approximately; m, meters; Sec., section]

Location	UTMs	Lat/Lon	Elevation (meters)
AL:Cherokee Co., LIRI below Little River Falls Rt. 35, Little R. below falls at Rt. 35	3806753N 626215E	34.39450°N 85.62693°W	364
Event 01: 10 May 2007, by hand, JLRobinson & CRParker			
AL:Cherokee Co., LIRI Canyon Mouth, Little River at Canyon Mouth Park	3794902N 621313E	34.28824°N 85.68192°W	193
Event 01: 22 Nov 2005, by hand, CRParker & MGeraghty			
Event 02: 2 Nov 2006, dip net, JLRobinson & CRParker			
AL:Cherokee Co., LIRI Grogan Creek, Grogan Creek at LIRI Rd 01crossing, 1.1 km NE Rt. 103	3807308N 628119E	34.39927°N 85.60614°W	391
Event 01: 16 Jun 2005, black light trap, JLRobinson & CRParker			
Event 02: 16-17 Jun 2005, black light trap, CRParker & JLRobinson			
Event 03: 2 Mar 2006, by hand, JLRobinson & MGeraghty			
AL:Cherokee Co., LIRI Hartline Ford, Little River at Hartline Ford	3811086N 630159E	34.43307°N 85.58338°W	377
Event 01: 22 Nov 2005, by hand, CRParker & MGeraghty			
AL:Cherokee Co., LIRI Little River Falls, Little River Falls at Rt 35 bridge	3806880N 626209E	34.39564°N 85.62698°W	361
Event 01: 11 May 2005, by hand, JLRobinson			
Event 02: 16 Jun 2005, black light (sheet), CRParker & JLRobinson			
Event 03: 16 Jun 2005, black light trap, JLRobinson & CRParker			
Event 04: 2 Mar 2006, beating, JLRobinson & MGeraghty			
Event 05: 2 Nov 2006, dip net, JLRobinson & CRParker			
Event 06: 10 May 2007, by hand, JLRobinson & CRParker			
AL:Cherokee Co., LIRI trib at Hartline Ford, unnamed trib. Little River at Hartline Ford	3811090N 630159E	34.43311°N 85.58338°W	377
Event 01: 22 Nov 2005, by hand, CRParker & MGeraghty			
AL:Cherokee Co., LIRI Frazer_05, Little River near exit from park boundary	3794564N 621758E	34.28514°N 85.67714°W	m
Event 01: 15 Jun 1990, at light, KSFrazer, SCHarris & GMWard			
AL:Cherokee Co., LIRI_Frazer_06, Little River upstream from park boundary, downstream from mouth of Johnnies Creek	3795058N 621296E	34.28965°N 85.68208°W	m
Event 01: 15 Jun 1990, at light, KSFrazer, SCHarris & GMWard			

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Location	UTMs	Lat/Lon	Elevation (meters)
AL:Cherokee Co., LIRI_Frazer_07, unnamed tributary to Little River, downstream from mouth of Johnnies Creek	3795314N 620498E	34.29205°N 85.69072°W	m
Event 01: 15 Jun 1990, at light, KSFrazer, SCHarris & GMWard			
AL:Cherokee Co., LIRI_Frazer_15, Little River upstream of Falls	3806875N 626599E	34.39555°N 85.62274°W	m
Event 01: 15 Jun 1990, at light, KSFrazer, SCHarris & GMWard			
AL:De Kalb Co., LIRI 05XNG, unnamed stream crossing Rd 05 ca 220 m S Rd 09	3813008N 630196E	34.45040°N 85.58268°W	390
Event 01: 22 Nov 2005, by hand, CRParker & MGeraghty			
Event 02: 7 May 2006, by hand, MGeraghty & CRParker			
Event 03: 8 May 2006, by hand, MGeraghty & CRParker			
Event 04: 18 May 2006, by hand, CRParker, JLRobinson & MGeraghty			
Event 05: 1 Nov 2006, dip net, JLRobinson & CRParker			
Event 06: 18 May-15 Nov 2006, by hand, CRParker, JLRobinson & MGeraghty			
Event 07: 22 Mar 2007, by hand, JLRobinson			
Event 08: 9 May 2007, by hand, JLRobinson & CRParker			
Event 09: 10 May 2007, by hand, JLRobinson & CRParker			
Event 10: 10 May 2007, by hand, JLRobinson & CRParker (Sample ID: by hand)			
Event 11: 10-11 May 2007, black light trap, JLRobinson & CRParker (Sample ID: blt)			
AL:De Kalb Co., LIRI 08 1, headwaters unnamed stream under Rd 08, ca 340 m S Rd 09	3812723N 627855E	34.44812°N 85.60820°W	481
Event 01: 7 May 2006, by hand, MShew, MGeraghty & CRParker			
Event 02: 8 May 2006, black light trap, MShew, MGeraghty & CRParker			
Event 03: 10-11 May 2007, black light trap, CRParker & JLRobinson			
Event 04: 10-11 May 2007, black light trap, JLRobinson & CRParker			
AL:De Kalb Co., LIRI at Lower Two-Mile trail, Little River and trib. at Two-Mile Trail	3803723N 624941E	34.36734°N 85.64123°W	288
Event 01: 2 Mar 2006, beating, JLRobinson & MGeraghty			
Event 02: 2 Nov 2006, dip net, JLRobinson & CRParker			
Event 03: 22 Mar 2007, by hand, JLRobinson & MShew			
AL:De Kalb Co., LIRI Bear Creek at Rt 176, Bear Creek at Rt. 176 bridge	3804411N 620242E	34.37409°N 85.69223°W	348
Event 01: 2 Mar 2006, by hand, JLRobinson & MGeraghty			
Event 02: 2 Nov 2006, dip net, JLRobinson & CRParker			
AL:De Kalb Co., LIRI Brooks Branch Beaver Pond, beaver pond on Brooks Branch	3805565N 625525E	34.38387°N 85.63461°W	378
Event 01: 15-16 Jun 2005, black light trap, JLRobinson & CRParker			
Event 02: 16 Jun 2005, by hand, JLRobinson			
Event 03: 16 Jun 2005, sweeping, CRParker & JLRobinson			
Event 04: 16-17 Jun 2005, black light trap, CRParker & JLRobinson			
Event 05: 16-17 Jun 2005, black light trap, JLRobinson & CRParker			
Event 06: 2 Mar 2006, by hand, JLRobinson & MGeraghty			
AL:De Kalb Co., LIRI Brooks Branch lower, Brooks Branch dwnstrm Little River Canyon Parkway	3805304N 625918E	34.38147°N 85.63038°W	371
Event 01: 10-11 May 2005, black light trap, JLRobinson			
Event 02: 16-17 Jun 2005, black light trap, JLRobinson & CRParker			
Event 03: 17 Jun 2005, black light trap, CRParker & JLRobinson			
AL:De Kalb Co., LIRI Brooks Branch on trail, Brooks Branch where trail to beaver pond first meets stream (dwnstrm of beaver pond, upstrm of road)	3805501N 625873E	34.38325°N 85.63083°W	378
Event 01: 10-11 May 2005, black light trap, JLRobinson			
Event 02: 22 Mar 2007, by hand, JLRobinson & MShew			
AL:De Kalb Co., LIRI DeSoto LAC1, Laurel Ck at 1st trail crossing, ca 190 m S Orange Trail trailhead	3818375N 625429E	34.49937°N 85.63378°W	549
Event 01: 12 May 2005, by hand, JLRobinson			
Event 02: 10 May 2007, by hand, JLRobinson & CRParker (Sample ID: by hand)			
Event 03: 9-10 May 2007, black light trap, JLRobinson & CRParker			
AL:De Kalb Co., LIRI DeSoto Orange Trailhead, trailhead of Orange Trail, DeSoto State Park	3818564N 625387E	34.50108°N 85.63421°W	529
Event 01: 9 May 2007, sweeping, JLRobinson			

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Location	UTMs	Lat/Lon	Elevation (meters)
AL:De Kalb Co., LIRI DeSoto SP Laurel Creek Rhyacophila site, Laurel Creek along Orange Trail 500 m from trailhead	3818025N 625380E	34.49623°N 85.63436°W	511
Event 01: 10 May 2005, by hand, JLRobinson			
Event 02: 3 Mar 2006, beating, JLRobinson & MGeraghty			
Event 03: 1 Nov 2006, dip net, JLRobinson & CRParker			
Event 04: 21 Mar 2007, black light trap, JLRobinson			
Event 05: 9 May 2007, black light (sheet), JLRobinson & CRParker			
Event 06: 10 May 2007, black light (sheet), JLRobinson & CRParker			
Event 07: 20 Mar 2008, by hand, JLRobinson			
AL:De Kalb Co., LIRI DeSoto State Park 1240, Desoto State Park, T7S R10E Sec. 31SW	3806622N 626296E	34.39331°N 85.62607°W	377
Event 01: 20-24 May 1990, black light trap, DHildebrandt & TSchiefer			
Event 02: 20-24 May 1990, black light trap, GBaker & TChittihunsa			
Event 03: 20-24 May 1990, black light trap, RBrown & DPollack			
Event 04: 20-24 May 1990, black light trap, RBrown & JMacGown			
AL:De Kalb Co., LIRI DeSoto State Park 1990-05-19, DeSoto State Park 34 29 54 85 37 08	3818278N 626797E	34.49833°N 85.61889°W	456
Event 01: 18 May 1990, black light trap, DHildebrandt			
AL:De Kalb Co., LIRI DeSoto State Park 1992-09-24, DeSoto State Park	3811909N 629342E	34.44060°N 85.59214°W	394
Event 01: 24 Sep 1992, black light trap, RBrown & DPollack			
AL:De Kalb Co., LIRI DeSoto State Park Laurel Creek, Laurel Ck along Orange Trail ~400 m from trailhead parking area	3818158N 625370E	34.49743°N 85.63445°W	501
Event 01: 11 May 2005, black light (sheet), JLRobinson			
Event 02: 12 May 2005, at light, JLRobinson			
Event 03: 22 Nov 2005, by hand, CRParker & MGeraghty			
Event 04: 7 May 2006, by hand, MGeraghty & CRParker			
Event 05: 7-8 May 2006, black light trap, MGeraghty & CRParker			
Event 06: 8-9 May 2006, black light trap, MGeraghty & CRParker			
Event 07: 18 May 2006, by hand, CRParker, JLRobinson & MGeraghty			
Event 08: 10 May 2007, by hand, JLRobinson & CRParker (Sample ID: by hand)			
Event 09: 9-10 May 2007, black light trap, JLRobinson & CRParker (Sample ID: blt 1)			
AL:De Kalb Co., LIRI DeSoto State Park Lodge Ck below Lodge Falls, Lodge Ck below Lodge Falls	3817807N 627030E	34.49406°N 85.61643°W	432
Event 01: 1 Mar 2006, beating, JLRobinson & MGeraghty			
Event 02: 7-8 May 2006, black light trap, MGeraghty & CRParker			
Event 03: 21 Mar 2007, by hand, JLRobinson			
AL:De Kalb Co., LIRI DeSoto State Park Lodge Creek upstream, Lodge Ck upstrm of Lodge Rd	3817681N 626916E	34.49294°N 85.61769°W	460
Event 01: 7-8 May 2006, black light trap, MGeraghty & CRParker			
Event 02: 9 May 2007, at light, JLRobinson & CRParker			
Event 03: 9 May 2007, by hand, CRParker & JLRobinson			
Event 04: 9 May 2007, by hand, JLRobinson & CRParker (Sample ID: by hand)			
Event 05: 10 May 2007, black light (sheet), JLRobinson & CRParker			
Event 06: 20 Mar 2008, by hand, JLRobinson			
AL:De Kalb Co., LIRI DeSoto State Park T6S R10E Sec. 19SW, DeSoto State Park T6S R10E Sec. 19SW	N E	°N °W	m
Event 01: 18 May 1990, black light trap, DHildebrandt & TSchiefer			
AL:De Kalb Co., LIRI DeSoto State Park T6S R10E Sec. 29NW, DeSoto State Park T6S R10E Sec. 29NW	N E	°N °W	m
Event 01: 18-24 May 1990, black light trap, RBrown & DPollack			
Event 02: 24 May 1990, black light trap, RBrown & JMacGown			
AL:De Kalb Co., LIRI DeSoto State Park T6S R9E Sec. 24NE, DeSoto State Park T6S R9E Sec. 24NE	N E	°N °W	m
Event 01: 23 May 1990, black light trap, RBrown & DPollack			
AL:De Kalb Co., LIRI DeSoto State Park T7S R10E Sec 15SE - 16SE, DeSoto State Park T7S R10E Sec. 15SW - 16SE	N E	°N °W	m
Event 01: 22 May 1990, black light trap, RBrown & DPollack			
AL:De Kalb Co., LIRI DeSoto State Park West Fork Little River, West Fork Little River below Lodge Creek confluence	3817779N 627142E	34.49379°N 85.61521°W	419
Event 01: 15 Jun 1990, at light, KSFrazer, SCHarris & GMWard			
Event 02: 10 May 2005, black light (sheet), JLRobinson			

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Location	UTMs	Lat/Lon	Elevation (meters)
Event 03: 10-11 May 2005, black light trap, JLRobinson			
Event 04: 12 May 2005, at light, JLRobinson			
Event 05: 1 Mar 2006, beating, JLRobinson & MGeraghty			
AL:De Kalb Co., LIRI DeSoto State Park, T6S R10E Sec. 19SE - 20SW, DeSoto State Park, T6S R10E Sec. 19SE - 20SW	N E	°N °W	m
Event 01: 19 May 1990, black light trap, DHildebrandt & TSchiefer			
Event 02: 19 May 1990, black light trap, RBrown & JMacGown			
AL:De Kalb Co., LIRI DeSoto State Park, T6S R10E Sec. 19W, DeSoto State Park, T6S R10E Sec. 19W	N E	°N °W	m
Event 01: 18 May 1990, black light trap, DHildebrandt & TSchiefer			
Event 02: 18 May 1990, black light trap, GBaker & TChittihunsa			
Event 03: 18 May 1990, black light trap, RBrown & DPollock			
Event 04: 18 May 1990, black light trap, RBrown & JMacGown			
AL:De Kalb Co., LIRI DSSP Cabins Spring, spring nr cabins, DeSoto State Park	3817509N 627283E	34.49135°N 85.61371°W	435
Event 01: 12 May 2005, by hand, JLRobinson			
AL:De Kalb Co., LIRI DSSP Hole in Bend, deep hole Little R, bend several hundred meters below lodge, DeSoto SP	3817850N 628342E	34.49428°N 85.60213°W	429
Event 01: 12 May 2005, by hand, JLRobinson			
AL:De Kalb Co., LIRI Hurricane Creek at Rd 05, Hurricane Ck at Rd 05 crossing	3809772N 628533E	34.42143°N 85.60127°W	372
Event 01: 22 Nov 2005, by hand, CRParker & MGeraghty			
Event 02: 7-8 May 2006, black light trap, CRParker, JLRobinson & MGeraghty			
Event 03: 7-8 May 2006, black light trap, MGeraghty & CRParker			
Event 04: 8-9 May 2006, black light trap, MGeraghty & CRParker			
Event 05: 18 May 2006, black light trap, CRParker, JLRobinson & MGeraghty			
AL:De Kalb Co., LIRI Laurel Ck Azalea Cascade, Laurel Ck above Azalea Cascade on Red Trail bridge	3818134N 626542E	34.49707°N 85.62169°W	468
Event 01: 9 May 2007, by hand, CRParker & JLRobinson			
Event 02: 10 May 2007, by hand, JLRobinson & CRParker			
Event 03: 10-11 May 2007, black light trap, JLRobinson & CRParker			
Event 04: 11 May 2007, black light trap, JLRobinson & CRParker (Sample ID: blt)			
AL:De Kalb Co., LIRI Laurel Creek at the falls, Laurel Ck at the falls near midlength, ca 920 m S Orange Trail trailhead on trail	3817864N 625619E	34.49474°N 85.63178°W	484
Event 01: 10 May 2007, by hand, JLRobinson & CRParker (Sample ID: by hand)			
Event 02: 9-10 May 2007, black light trap, JLRobinson & CRParker			
AL:De Kalb Co., LIRI Lower 2-Mile, Lower Two Mile access to Little River in canyon	3803866N 625228E	34.36859°N 85.63808°W	348
Event 01: 2 Mar 2006, beating, JLRobinson & MGeraghty			
Event 02: 22 Mar 2006, beating, JLRobinson, MGeraghty & JRobinson			
AL:De Kalb Co., LIRI Lynn Overlook Powerline Cut Bog, Lynn Overlook powerline bog	3805842N 626420E	34.38626°N 85.62483°W	371
Event 01: 11 May 2005, black light trap, JLRobinson			
AL:De Kalb Co., LIRI No Site Data, LIRI No site data	N E	°N °W	m
Event 01: 12 May 2005, black light trap, JLRobinson			
AL:De Kalb Co., LIRI OTMID2, Laurel Ck ca 800 m S Orange Trail trailhead	3817813N 625484E	34.49430°N 85.63326°W	492
Event 01: 9-10 May 2007, black light trap, JLRobinson & CRParker			
AL:De Kalb Co., LIRI Powerline at Parkway, at powerline and Little River Canyon Parkway	3805523N 626013E	34.38343°N 85.62931°W	380
Event 01: 16 Jun 2005, by hand, JLRobinson			
AL:De Kalb Co., LIRI stream nr Eberhard Point, unnamed stream near Eberhard Point	3802254N 621300E	34.35452°N 85.68103°W	347
Event 01: 2 Nov 2006, dip net, JLRobinson & CRParker			
AL:De Kalb Co., LIRI tributary at Rd 05 near Rd 08, unnamed trib. Little River crossing Rd 05 nr Rd 08	3810673N 629233E	34.42947°N 85.59352°W	376
Event 01: 22 Nov 2005, by hand, CRParker & MGeraghty			
Event 02: 7 May 2006, by hand, MGeraghty & CRParker			
Event 03: 8 May 2006, black light trap, MGeraghty & CRParker			
Event 04: 8-9 May 2006, black light trap, MGeraghty & CRParker			
Event 05: 18 May 2006, by hand, CRParker, JLRobinson & MGeraghty			

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Location	UTMs	Lat/Lon	Elevation (meters)
Event 06: 10 May 2007, by hand, JLRobinson & CRParker			
Event 07: 11 May 2007, by hand, JLRobinson & CRParker			
AL:De Kalb Co., LIRI West Fork Little River below DeSoto SP ~500m, W Fk Little R. ~500 m	3817768N	34.49361°N	
downstrm confl. trib. from Lodge & pkgng lot	627795E	85.60809°W	438
Event 01: 9 May 2005, black light (sheet), JLRobinson			
Event 02: 9 May 2005, by hand, JLRobinson (Sample ID: by hand)			
Event 03: 10 May 2005, black light (sheet), JLRobinson			
Event 04: 12 May 2005, by hand, JLRobinson			
Event 05: 17 Jun 2005, by hand, CRParker & JLRobinson			
AL:De Kalb Co., LIRI Wildlife Management Area, Little River Wildlife Management Area T7S	3810862N	34.43123°N	
R10E Sec. 15SW - 16SE	628751E	85.59873°W	408
Event 01: 22 May 1990, black light trap, DHildebrandt & TSchiefer			
Event 02: 22 May 1990, black light trap, RBrown & DPollock			
AL:De Kalb Co., LIRI_Frazer_10, Little River downstream from mouth of Bear Creek	3801403N	34.34680°N	
	621726E	85.67651°W	m
Event 01: 15 Jun 1990, at light, KSFrazer, SCHarris & GMWard			
AL:De Kalb Co., LIRI_Frazer_11, Bear Creek, upstream from Little River	3802339N	34.35524°N	
	621750E	85.67612°W	m
Event 01: 14 Jun 1990, at light, KSFrazer, SCHarris & GMWard			
Event 02: 15 Jun 1990, at light, KSFrazer, SCHarris & GMWard			
AL:De Kalb Co., LIRI_Frazer_12, unnamed tributary to Bear Creek, below pond at Canyon Park	3802347N	34.35536°N	
	621357E	85.68039°W	m
Event 01: 15 Jun 1990, at light, KSFrazer, SCHarris & GMWard			
AL:De Kalb Co., LIRI_Frazer_13, Bear Creek at Little River Canyon Parkway	3804439N	34.37435°N	
	620232E	85.69233°W	m
Event 01: 15 Jun 1990, at light, KSFrazer, SCHarris & GMWard			
AL:De Kalb Co., LIRI_Frazer_14, unnamed tributary of Little River upstream of Bear Creek	3804045N	34.37047°N	
	622981E	85.66250°W	m
Event 01: 15 Jun 1990, at light, KSFrazer, SCHarris & GMWard			
AL:De Kalb Co., LIRI_Frazer_18, Laurel Creek	3818285N	34.49838°N	
	626923E	85.61752°W	m
Event 01: 15 Jun 1990, at light, KSFrazer, SCHarris & GMWard			

Table 1-2. Locations and sampling events for Russell Cave National Monument (RUCA). Each sample location is presented with the state and county (Co.), followed by the SiteCode as used in the database, a brief description of the location, the Universal Transverse Mercator (UTM) coordinates (all in UTM Zone 16 North), the decimal latitude (Lat) and longitude (Lon), and the elevation in meters above National Geodetic Vertical Datum of 1929. All coordinates are based on the North American Datum 83. Beneath each location entry are details for one or more sampling events that occurred at the site. The event information includes the date of the event, the method used to collect specimens, and the collector(s).

[AL, Alabama; °, degrees; N, north; W, west; E, east]

Location	UTMs	Lat/Lon	Elevation (meters)
AL:Jackson Co., RUCA Cave Entrance, Dry Creek at entrance to Russell Cave	3871147N 608648E	34.97707°N 85.80972°W	223
Event 01: 17 Jun 2005, by hand, CRParker & JLRobinson			
Event 02: 2 Nov 2006, by hand, JLRobinson & CRParker			
Event 03: 23 Mar 2007, by hand, JLRobinson			
Event 04: 23 Nov 2005, by hand, CRParker & MGeraghty			
Event 05: 3 Mar 2006, by hand, JLRobinson & MGeraghty			
AL:Jackson Co., RUCA Moonshine Still, Moonshine Still	3871140N 607873E	34.97709°N 85.81820°W	400
Event 01: 23 Mar 2007, by hand, JLRobinson			
Event 02: 3 Mar 2006, by hand, JLRobinson & MGeraghty			
AL:Jackson Co., RUCA Ridley Cave, stream at Ridley Cave	3871498N 608527E	34.98025°N 85.81100°W	200
Event 01: 23 Nov 2005, by hand, CRParker & MGeraghty			

Reference Cited

Frazer, K. S., Harris, S. C., and Ward, G. M., 1991, Survey of the Trichoptera in the Little River drainage of northeastern Alabama: Bulletin of the Alabama Museum of Natural History, v. 11, p. 17–22.

Appendix 2. Target Species Data.

Data for Ephemeroptera, Odonata, Plecoptera, Megaloptera, and Trichoptera are presented below for Little River Canyon and National Preserve (LIRI) (table 4–1) and Russell Cave National Monument (RUCA) (table 4–2). Each record consists of the order, family, taxon name, and the number and type of specimens, arranged by collection location and event. Many specimens could not be identified to species and are presented as, for example, *Perlesta* species. Adult specimens are recognized in the table by the male and female symbols, larvae by the words “larva” or “larvae.” The entry “mmt,” which is found for five Trichoptera records, means that the specimens are metamorphotypes. Metamorphotype refers to a pupa of a caddisfly that has developed to the point of being identifiable to species based on the developing adult genitalia, and which also has still present in the pupal cocoon the shed larval sclerites. Because of the absolute association that this represents between the adult and larval stages of the species, metamorphotypes are of considerable significance to students of caddisflies.

Table 2-1. The Ephemeroptera, Odonata, Plecoptera, Megaloptera, and Trichoptera collected in Little River Canyon National Preserve (LIRI). Data from the William H. Cross Expeditions (Dr. Richard Brown), 1990 and 1992, are highlighted in green. Data from Frazer and others (1991) are highlighted in blue.			
[AL, Alabama; Co., county; mmt, metamorphotype; ♀, female; ♂, male]			
AL:Cherokee Co., LIRI below Little River Falls Rt. 35, 10 May 2007, by hand			
Order	Family	Taxon	Specimens
Plecoptera	Nemouridae	<i>Amphinemura nigritta</i> (Provancher, 1876)	2 ♂♂
	Perlidae	<i>Perlesta</i> species	1 ♂
	Perlidae	<i>Isoperla</i> species	1 ♂
Trichoptera	Lepidostomatidae	<i>Lepidostoma</i> species	1 ♀
		<i>Theliopsyche melas</i> Edwards, 1956	4 larva
	Philopotamidae	<i>Chimarra aterrima</i> Hagen, 1861	4 ♂♂
		<i>Chimarra</i> species	3 ♀♀
	Polycentropodidae	<i>Plectrocnemia cinerea</i> (Hagen, 1861)	2 ♂
	Rhyacophilidae	<i>Rhyacophila ledra</i> Ross, 1939	1 ♂
AL:Cherokee Co., LIRI Canyon Mouth, 22 Nov 2005, by hand			
Order	Family	Taxon	Specimens
Ephemeroptera	Heptageniidae	<i>Maccaffertium</i> species	15 larvae
	Isonychiidae	<i>Isonychia</i> species	15 larvae
Megaloptera	Corydalidae	<i>Corydalus cornutus</i> (Linnaeus, 1763)	4 larvae
Odonata	Coenagrionidae	<i>Enallagma</i> species	3 larvae
	Cordulegastridae	<i>Cordulegaster</i> species	2 larvae
Plecoptera	Leuctridae	<i>Leuctra</i> species	1 larva
	Perlidae	<i>Acronuria</i> species	4 larvae
Trichoptera	Hydropsychidae	<i>Cheumatopsyche</i> species	1 larva
		<i>Hydropsyche dicantha</i> Ross, 1938	9 larvae
	Philopotamidae	<i>Chimarra</i> species	3 larvae
	Polycentropodidae	<i>Polycentropus</i> species	1 larva
AL:Cherokee Co., LIRI Grogan Creek, 16 Jun 2005, black light trap			
Order	Family	Taxon	Specimens
Ephemeroptera	Heptageniidae	<i>Maccaffertium</i> species	7 ♂♂
		<i>Stenonema femoratum</i> (Say, 1823)	1 ♂
Plecoptera	Leuctridae	<i>Leuctra ferruginea</i> (F Walker, 1851)	2 ♂
Trichoptera	Hydropsychidae	<i>Cheumatopsyche analis</i> (Banks, 1903)	1 ♂
		<i>Cheumatopsyche geora</i> Denning, 1948	1 ♂
		<i>Cheumatopsyche pinaca</i> Ross, 1941	1 ♂
		<i>Cheumatopsyche</i> species	3 ♀♀

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		<i>Diplectrona</i> species	3 ♂♂
		<i>Hydropsyche betteni</i> Ross, 1938	4 ♂♂
		<i>Hydropsyche dicantha</i> Ross, 1938	83 ♂♂
		<i>Hydropsyche sparna</i> Ross, 1938	6 ♂♂
		<i>Hydropsyche venularis</i> Banks, 1914	1 ♂
	Hydroptilidae	<i>Hydroptila vala</i> Ross, 1938	1 ♂
		<i>Mayatrichia ayama</i> Mosely, 1937	1 ♀
	Leptoceridae	<i>Ceraclea alabamiae</i> Harris, 1989	1 ♂
		<i>Ceraclea alces</i> (Ross, 1941)	1 ♂
		<i>Ceraclea cancellata</i> (Betten, 1934)	3 ♂♂
		<i>Ceraclea</i> species	4 ♀♀
		<i>Oecetis inconspicua</i> (Walker, 1852)	1 ♂
		<i>Oecetis persimilis</i> (Banks, 1907)	1 ♀
	Philopotamidae	<i>Chimarra aterrima</i> Hagen, 1861	2 ♂♂
		<i>Dolophilodes distincta</i> (Walker, 1852)	1 ♂
	Polycentropodidae	<i>Nyctiophylax nephophilus</i> Flint, 1964	2 ♂♂
		<i>Nyctiophylax</i> species	1 ♂
	Rhyacophilidae	<i>Rhyacophila carolina</i> Banks, 1911	1 ♀
AL:Cherokee Co., LIRI Grogan Creek, 16-17 Jun 2005, black light trap			
Order	Family	Taxon	Specimens
Trichoptera	Glossosomatidae	<i>Glossosoma nigrior</i> Banks, 1911	1 ♀
	Hydropsychidae	<i>Cheumatopsyche analis</i> (Banks, 1903)	2 ♂♂
		<i>Cheumatopsyche oxa</i> Ross, 1938	2 ♂♂
		<i>Cheumatopsyche</i> species	5 ♀♀
		<i>Diplectrona</i> species	1 ♂
		<i>Hydropsyche betteni</i> Ross, 1938	4 ♂♂
		<i>Hydropsyche cheilonis</i> Ross, 1938	1 ♂
		<i>Hydropsyche dicantha</i> Ross, 1938	62 ♂♂
		<i>Hydropsyche sparna</i> Ross, 1938	9 ♂♂
		<i>Hydropsyche</i> species	36 ♀♀
	Lepidostomatidae	<i>Lepidostoma</i> species	1 ♀
	Leptoceridae	<i>Ceraclea alabamiae</i> Harris, 1989	1 ♂
		<i>Ceraclea</i> species	2 ♀♀
		<i>Oecetis inconspicua</i> (Walker, 1852)	7 ♂♂
	Philopotamidae	<i>Chimarra aterrima</i> Hagen, 1861	9 ♂♂
	Polycentropodidae	<i>Nyctiophylax barrorum</i> JC Morse, 1990	1 ♂
AL:Cherokee Co., LIRI Grogan Creek, 2 Mar 2006, by hand			
Order	Family	Taxon	Specimens
Plecoptera	Capniidae	<i>Allocaupnia recta</i> (Claassen, 1924)	1 ♂
	Leuctridae	<i>Leuctra</i> species	1 ♀
		<i>Zealeuctra</i> species	2 ♀♀
	Teniopterygidae	<i>Oemopteryx contorta</i> (Needham & Claassen, 1925)	1 ♀
Trichoptera	Hydropsychidae	<i>Diplectrona modesta</i> Banks, 1908	4 larvae
	Rhyacophilidae	<i>Rhyacophila lobifera</i> Betten, 1934	1 larva
AL:Cherokee Co., LIRI Hartline Ford, 22 Nov 2005, by hand			
Order	Family	Taxon	Specimens
Odonata	Coenagrionidae	<i>Enallagma</i> species	1 larva
	Gomphidae	<i>Dromogomphus spinosus</i> Selys, 1854	1 larva
	Macromiidae	<i>Macromia</i> species	1 larva
AL:Cherokee Co., LIRI Little River Falls, 10 May 2007, by hand			
Order	Family	Taxon	Specimens
Odonata	Coenagrionidae	<i>Argia moesta</i> (Hagen, 1861)	1 ♀
Plecoptera	Nemouridae	<i>Amphinemura nigrutta</i> (Provancher, 1876)	2 ♀♀
	Perlidae	<i>Perlesta</i> species	2 ♀♀
	Perlodidae	<i>Isoperla</i> species	1 ♀
Trichoptera	Lepidostomatidae	<i>Theliopsyche melas</i> Edwards, 1956	1 ♂
	Philopotamidae	<i>Wormaldia shawnee</i> (Ross, 1938)	6 ♂♂
	Polycentropodidae	<i>Polycentropus</i> species	1 ♀
	Rhyacophilidae	<i>Rhyacophila glaberrima</i> Ulmer, 1907	2 larvae
AL:Cherokee Co., LIRI Little River Falls, 11 May 2005, by hand			
Order	Family	Taxon	Specimens
Ephemeroptera	Ephemerellidae	<i>Drunella lata</i> (Morgan, 1911)	10 larvae

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		<i>Drunella</i> species	1 ♀ subimago	
	Heptageniidae	<i>Stenacron pallidum</i> (Traver, 1933)	2 larvae	
	Isonychiidae	<i>Isonychia bicolor</i> (Walker, 1853)	2 larvae	
Odonata	Aeshnidae	<i>Boyeria</i> species	2 larvae	
	Coenagrionidae	Coenagrionidae genus species	1 larva	
Plecoptera	Perlidae	<i>Acroneuria abnormis</i> (Newman, 1838)	2 larvae	
		<i>Perlesta</i> species	1 larva	
Trichoptera	Hydropsychidae	<i>Hydropsyche dicantha</i> Ross, 1938	1 larva	
	Philopotamidae	<i>Chimarra obscura</i> (Walker, 1852)	1 larva	
		<i>Wormaldia shawnee</i> (Ross, 1938)	1 ♀ mmt	
AL:Cherokee Co., LIRI Little River Falls, 16 Jun 2005, black light (sheet)				
Order	Family	Taxon	Specimens	
Ephemeroptera	Caenidae	<i>Caenis</i> species	1 ♀	
	Ephemerellidae	<i>Serratella</i> species	1 ♀	
	Heptageniidae	<i>Leucrocuta hebe</i> (J McDunnough, 1924)	1 ♂	
		<i>Maccaffertium exiguum</i> (Traver, 1933)	2 ♂♂	
		<i>Maccaffertium</i> species	9 subimago	
	Isonychiidae	<i>Isonychia bicolor</i> (Walker, 1853)	2 ♂ subimago	
Plecoptera	Perlidae	<i>Acroneuria abnormis</i> (Newman, 1838)	1 ♀	
		<i>Neoperla coosa</i> Smith & Stark, 1998	7 ♀♀	
		<i>Perlesta</i> species	2 ♀♀	
Trichoptera	Brachycentridae	<i>Micrasema</i> species	2 ♀♀	
		<i>Micrasema wataga</i> Ross, 1938	2 ♂	
	Hydropsychidae	<i>Cheumatopsyche geora</i> Denning, 1948	1 ♀	
		<i>Hydropsyche dicantha</i> Ross, 1938	2 ♀♀	
		<i>Hydropsyche</i> species	1 ♀	
	Hydroptilidae	<i>Macrostemum carolina</i> (Banks, 1909)	3 ♂♂	
		<i>Macrostemum zebratum</i> (Hagen, 1861)	1 ♂	
		<i>Hydroptila micropotamis</i> Harris, 1985	1 ♂	
		<i>Hydroptila</i> species	3 ♀♀	
		<i>Mayatrichia ayama</i> Mosely, 1937	62 ♂	
		<i>Oxyethira rivicola</i> Bickle & Morse, 1954	1 ♂	
	Leptoceridae	<i>Oxyethira</i> species	11 ♀♀	
		<i>Ceraclea alabamae</i> Harris, 1989	6 ♂♂	
		<i>Ceraclea alces</i> (Ross, 1941)	1 ♂	
		<i>Ceraclea cancellata</i> (Betten, 1934)	3 ♂♂	
		<i>Ceraclea maculata</i> (Banks, 1899)	1 ♂	
		<i>Ceraclea resurgens</i> (Walker, 1852)	1 ♂	
		<i>Ceraclea</i> species	11 ♀♀	
		<i>Ceraclea tarsipunctata</i> (Vorhies, 1909)	4 ♂♂	
		<i>Leptocerus americanus</i> (Banks, 1899)	1 ♂	
		<i>Nectopsyche pavidus</i> (Hagen, 1861)	1 ♂	
	Philopotamidae	<i>Oecetis ditissa</i> Ross, 1966	1 ♂	
		<i>Oecetis inconspicua</i> (Walker, 1852)	2 ♂	
		<i>Chimarra aterrima</i> Hagen, 1861	1 ♂	
		<i>Chimarra obscura</i> (Walker, 1852)	3 ♂♂	
		<i>Chimarra</i> species	1 ♀	
		Psychomyiidae	<i>Psychomyia flavida</i> Hagen, 1861	1 ♀
	<i>Psychomyia nomada</i> (Ross, 1938)		7 ♀♀	
	AL:Cherokee Co., LIRI Little River Falls, 16 Jun 2005, black light trap			
	Order	Family	Taxon	Specimens
	Trichoptera	Hydropsychidae	<i>Cheumatopsyche oxa</i> Ross, 1938	2 ♂♂
			<i>Cheumatopsyche</i> species	1 ♀
<i>Hydropsyche dicantha</i> Ross, 1938			29 ♂	
<i>Hydropsyche mississippiensis</i> Flint, 1965			1 ♂	
<i>Hydropsyche</i> species			27 ♀♀	
<i>Macrostemum zebratum</i> (Hagen, 1861)			1 ♀	
Hydroptilidae		<i>Hydroptila gunda</i> Milne, 1936	1 ♂	
		<i>Hydroptila micropotamis</i> Harris, 1985	2 ♂♂	
		<i>Hydroptila paramoena</i> Harris, 1985	1 ♂	
		<i>Mayatrichia ayama</i> Mosely, 1937	29 ♂♂	
		<i>Oxyethira rivicola</i> Bickle & Morse, 1954	12 ♂♂	
		<i>Oxyethira zeronia</i> Ross, 1941	1 ♂	

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	Leptoceridae	<i>Ceraclea alabamiae</i> Harris, 1989	16 ♂♂
		<i>Ceraclea cancellata</i> (Betten, 1934)	7 ♂♂
		<i>Ceraclea resurgens</i> (Walker, 1852)	11 ♂♂
		<i>Ceraclea</i> species	30 ♀♀
		<i>Ceraclea tarsipunctata</i> (Vorhies, 1909)	9 ♂♂
		<i>Oecetis inconspicua</i> (Walker, 1852)	4 ♂♂
		<i>Oecetis persimilis</i> (Banks, 1907)	1 ♂
AL:Cherokee Co., LIRI Little River Falls, 2 Mar 2006, beating			
Order	Family	Taxon	Specimens
Plecoptera	Capniidae	<i>Allocapnia nivicola</i> (Fitch, 1847)	1 ♂
	Taeniopterygidae	<i>Taeniopteryx</i> species	2 ♂♂
AL:Cherokee Co., LIRI_Frazer_05, 15 Jun 1990, at light			
Order	Family	Taxon	Specimens
Trichoptera	Glossosomatidae	<i>Glossosoma nigrior</i> Banks, 1911	1 adult
	Philopotamidae	<i>Dolophilodes distincta</i> (Walker, 1852)	1 adult
AL:Cherokee Co., LIRI_Frazer_06, 15 Jun 1990, at light			
Order	Family	Taxon	Specimens
Trichoptera	Hydropsychidae	<i>Cheumatopsyche analis</i> (Banks, 1903)	1 adult
		<i>Cheumatopsyche geora</i> Denning, 1948	1 adult
		<i>Cheumatopsyche pasella</i> Ross, 1941	1 adult
		<i>Hydropsyche dicantha</i> Ross, 1938	1 adult
		<i>Hydropsyche sparna</i> Ross, 1938	1 adult
		<i>Hydropsyche venularis</i> Banks, 1914	1 adult
		<i>Macrostemum zebratum</i> (Hagen, 1861)	1 adult
	Hydroptilidae	<i>Hydroptila delineata</i> Morton, 1905	1 adult
		<i>Hydroptila gunda</i> Milne, 1936	1 adult
		<i>Hydroptila hamata</i> Morton, 1905	1 adult
		<i>Hydroptila paramoena</i> Harris, 1985	1 ♂
		<i>Mayatrachia ayama</i> Mosely, 1937	1 ♂
		<i>Orthotrichia aegerfasciella</i> (Chambers, 1873)	1 adult
		<i>Oxyethira pallida</i> (Banks, 1904)	1 ♂
		<i>Oxyethira rivicola</i> Bickel & Morse, 1954	1 adult
	Leptoceridae	<i>Ceraclea alabamiae</i> Harris, 1989	1 adult
		<i>Ceraclea alces</i> (Ross, 1941)	1 adult
		<i>Ceraclea cancellata</i> (Betten, 1934)	1 adult
		<i>Ceraclea flava</i> (Banks, 1904)	1 adult
		<i>Ceraclea maculata</i> (Banks, 1899)	1 adult
		<i>Ceraclea neffi</i> (Resh, 1974)	1 adult
		<i>Ceraclea protonepha</i> Morse & Ross, 1975	1 adult
		<i>Ceraclea tarsipunctata</i> (Vorhies, 1909)	1 adult
		<i>Nectopsyche pavidia</i> (Hagen, 1861)	1 adult
	Philopotamidae	<i>Oecetis ditissa</i> Ross, 1966	1 adult
		<i>Oecetis inconspicua</i> (Walker, 1852)	1 adult
		<i>Oecetis persimilis</i> (Banks, 1907)	1 adult
		<i>Chimarra obscura</i> (Walker, 1852)	1 adult
	Polycentropodidae	<i>Cernotina calcea</i> Ross, 1938	1 adult
		<i>Cernotina spicata</i> Ross, 1938	1 adult
		<i>Cynellus fraternus</i> (Banks, 1905)	1 adult
		<i>Nyctiophylax barrorum</i> JC Morse, 1990	1 adult
		<i>Plectrocnemia cinerea</i> (Hagen, 1861)	1 adult
		<i>Polycentropus confusus</i> Hagen, 1861	1 adult
		<i>Rhyacophila lobifera</i> Betten, 1934	1 adult
	Rhyacophilidae		
AL:Cherokee Co., LIRI_Frazer_07, 15 Jun 1990, at light			
Order	Family	Taxon	Specimens
Trichoptera	Hydropsychidae	<i>Diplectrona modesta</i> Banks, 1908	1 adult
		<i>Hydropsyche betteni</i> Ross, 1938	1 adult
AL:Cherokee Co., LIRI_Frazer_15, 15 Jun 1990, at light			
Order	Family	Taxon	Specimens
Trichoptera	Brachycentridae	<i>Micrasema rusticum</i> (Hagen, 1868)	1 adult
		<i>Micrasema wataga</i> Ross, 1938	1 adult
	Dipseudopsidae	<i>Phylocentropus placidus</i> (Banks, 1905)	1 adult
	Hydropsychidae	<i>Cheumatopsyche analis</i> (Banks, 1903)	1 adult
		<i>Cheumatopsyche geora</i> Denning, 1948	1 adult

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		<i>Cheumatopsyche oxa</i> Ross, 1938	1 adult
		<i>Cheumatopsyche pasella</i> Ross, 1941	1 adult
		<i>Cheumatopsyche pinaca</i> Ross, 1941	1 adult
		<i>Hydropsyche dicantha</i> Ross, 1938	1 adult
		<i>Macrostemum zebratum</i> (Hagen, 1861)	1 adult
	Hydroptilidae	<i>Dibusa angata</i> Ross, 1939	1 adult
		<i>Hydroptila callia</i> Denning, 1948	1 adult
		<i>Hydroptila chattanooga</i> Frazer & Harris, 1991	1 adult
		<i>Hydroptila delineata</i> Morton, 1905	1 adult
		<i>Hydroptila micropotamis</i> Harris, 1985	1 adult
		<i>Hydroptila paramoena</i> Harris, 1985	1 adult
		<i>Hydroptila waubesiana</i> Betten, 1934	1 adult
		<i>Mayatrichia ayama</i> Mosely, 1937	1 adult
		<i>Neotrichia okopa</i> Ross, 1939	1 adult
		<i>Orthotrichia aegerfasciella</i> (Chambers, 1873)	1 adult
		<i>Oxyethira forcipata</i> Mosely, 1934	1 adult
		<i>Oxyethira glasa</i> (HH Ross, 1941)	1 adult
		<i>Oxyethira pallida</i> (Banks, 1904)	1 adult
		<i>Oxyethira rivicola</i> Bickel & Morse, 1954	1 adult
		<i>Oxyethira zeronia</i> Ross, 1941	1 adult
		<i>Stactobiella delira</i> (Ross, 1938)	1 adult
		<i>Stactobiella palmata</i> (Ross, 1938)	1 adult
	Leptoceridae	<i>Ceraclea alabamiae</i> Harris, 1989	1 adult
		<i>Ceraclea alces</i> (Ross, 1941)	1 adult
		<i>Ceraclea cancellata</i> (Betten, 1934)	1 adult
		<i>Ceraclea flava</i> (Banks, 1904)	1 adult
		<i>Ceraclea maculata</i> (Banks, 1899)	1 adult
		<i>Ceraclea neffi</i> (Resh, 1974)	1 adult
		<i>Ceraclea nepha</i> (Ross, 1944)	1 adult
		<i>Ceraclea protonepha</i> Morse & Ross, 1975	1 adult
		<i>Ceraclea tarsipunctata</i> (Vorhies, 1909)	1 adult
		<i>Ceraclea transversa</i> (Hagen, 1861)	1 adult
		<i>Nectopsyche pavidia</i> (Hagen, 1861)	1 adult
		<i>Oecetis ditissa</i> Ross, 1966	1 adult
		<i>Oecetis inconspicua</i> (Walker, 1852)	1 adult
		<i>Oecetis nocturna</i> Ross, 1966	1 adult
		<i>Oecetis persimilis</i> (Banks, 1907)	1 adult
		<i>Oecetis scala</i> Milne, 1934	1 adult
		<i>Oecetis sphyræ</i> Ross, 1941	1 adult
	Philopotamidae	<i>Chimarra obscura</i> (Walker, 1852)	1 adult
		<i>Wormaldia thyræ</i> Denning, 1950	1 adult
	Polycentropodidae	<i>Cernotina calcea</i> Ross, 1938	1 adult
		<i>Cernotina spicata</i> Ross, 1938	1 adult
		<i>Cynellus fraternus</i> (Banks, 1905)	1 adult
		<i>Neureclipsis piersoni</i> Frazer & Harris, 1991	1 adult
		<i>Nyctiophylax barrorum</i> JC Morse, 1990	1 adult
		<i>Nyctiophylax celta</i> Denning, 1947	1 adult
		<i>Polycentropus confusus</i> Hagen, 1861	1 adult
	Rhyacophilidae	<i>Rhyacophila carolina</i> Banks, 1911	1 adult
AL:De Kalb Co., LIRI 05XNG, 10-11 May 2007, black light trap			
Order	Family	Taxon	Specimens
Plecoptera	Leuctridae	<i>Leuctra alexanderi</i> Hanson, 1941	2 ♂♂
		<i>Leuctra grandis</i> Banks, 1906	1 ♂
Trichoptera	Dipseudopsidae	<i>Phylocentropus placidus</i> (Banks, 1905)	1 ♂
	Hydropsychidae	<i>Cheumatopsyche</i> species	2 ♀♀
		<i>Hydropsyche dicantha</i> Ross, 1938	36 ♂♂
	Hydroptilidae	<i>Hydroptila armata</i> Ross, 1938	5 ♂♂
		<i>Hydroptila micropotamis</i> Harris, 1985	7 ♂♂
		Hydroptilidae genus species	2 ♀♀
		<i>Orthotrichia aegerfasciella</i> (Chambers, 1873)	2 ♂♂
	Leptoceridae	<i>Ceraclea tarsipunctata</i> (Vorhies, 1909)	2 ♂♂
		<i>Oecetis inconspicua</i> (Walker, 1852)	7 ♂♂
	Philopotamidae	<i>Chimarra</i> species	3 ♀♀

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		<i>Wormaldia moesta</i> (Banks, 1914)	several ♂♂
		<i>Wormaldia shawnee</i> (Ross, 1938)	several ♂♂
	Polycentropodidae	<i>Nyctiophylax affinis</i> (Banks, 1897)	1 ♂
		<i>Nyctiophylax banksi</i> JC Morse, 1972	1 ♂
		<i>Plectrocnemia cinerea</i> (Hagen, 1861)	5 ♂♂
		<i>Polycentropus confusus</i> Hagen, 1861	3 ♂♂
		<i>Polycentropus</i> species	8 ♀♀
		<i>Polycentropus thaxtoni</i> Hamilton & Holzenthal, 1986	1 ♂
	Rhyacophilidae	<i>Rhyacophila carolina</i> Banks, 1911	1 ♀
		<i>Rhyacophila ledra</i> Ross, 1939	3 ♂♂
AL:De Kalb Co., LIRI 05XNG, 18 May 2006, by hand			
Order	Family	Taxon	Specimens
Plecoptera	Leuctridae	<i>Leuctra</i> species	1 ♀
	Perlodidae	<i>Diploperla duplicata</i> (Banks, 1920)	1 larva
		<i>Isoperla holochlora</i> (Klapalek, 1923)	1 ♀
Trichoptera	Hydropsychidae	<i>Diplectrona modesta</i> Banks, 1908	1 larva
		<i>Diplectrona</i> species	1 pupa
	Rhyacophilidae	<i>Rhyacophila carolina</i> Banks, 1911	1 ♀
		<i>Rhyacophila glaberrima</i> Ulmer, 1907	5 larvae
		<i>Rhyacophila ledra</i> Ross, 1939	2 ♂♂
		<i>Rhyacophila</i> species	2 pupae
	Thremmatidae	<i>Neophylax concinnus</i> MacLachlan, 1871	1 larva
AL:De Kalb Co., LIRI 05XNG, 22 Mar 2007, by hand			
Order	Family	Taxon	Specimens
Trichoptera	Lepidostomatidae	<i>Lepidostoma weaveri</i> Harris, 1986	7 ♂♂
		<i>Lepidostomatidae</i> genus species	2 pupae
	Polycentropodidae	<i>Polycentropus</i> species	1 ♀
	Rhyacophilidae	<i>Rhyacophila glaberrima</i> Ulmer, 1907	1 larva
		<i>Rhyacophila ledra</i> Ross, 1939	3 larvae
AL:De Kalb Co., LIRI 05XNG, 22 Nov 2005, by hand			
Order	Family	Taxon	Specimens
Trichoptera	Hydropsychidae	<i>Diplectrona modesta</i> Banks, 1908	2 larvae
		<i>Homoplectra doringa</i> (Milne, 1936)	1 larva
AL:De Kalb Co., LIRI 05XNG, 7 May 2006, by hand			
Order	Family	Taxon	Specimens
Ephemeroptera	Baetidae	<i>Baetidae</i> genus species	1 larva
	Ephemerellidae	<i>Eurylophella</i> species	1 ♀
Megaloptera	Corydalidae	<i>Nigronia fasciatus</i> (Walker, 1853)	2 larvae
Odonata	Cordulegasteridae	<i>Cordulegaster obliqua</i> (Say, 1839)	1 exuviae
Plecoptera	Leuctridae	<i>Leuctra</i> species	1 exuviae
	Nemouridae	<i>Amphinemura</i> species	2 larvae
	Perlodidae	<i>Isoperla</i> species	1 larva
Trichoptera	Hydropsychidae	<i>Homoplectra doringa</i> (Milne, 1936)	1 larva
	Hydroptilidae	<i>Oxyethira rivicola</i> Blackle & Morse, 1954	2 ♂♂
	Rhyacophilidae	<i>Rhyacophila carolina</i> Banks, 1911	1 larva
		<i>Rhyacophila glaberrima</i> Ulmer, 1907	5 prepupae
		<i>Rhyacophila ledra</i> Ross, 1939	7 prepupa
	Thremmatidae	<i>Neophylax concinnus</i> MacLachlan, 1871	1 larva
AL:De Kalb Co., LIRI 05XNG, 9 May 2007, by hand			
Order	Family	Taxon	Specimens
Ephemeroptera	Ameletidae	<i>Ameletus</i> species	1 ♀
	Baetidae	<i>Baetis</i> species	1 larva
Plecoptera	Leuctridae	<i>Leuctra alexanderi</i> Hanson, 1941	6 ♂♂
		<i>Leuctra rickeri</i> James, 1976	10 ♂♂
		<i>Leuctra</i> species	12 ♀♀
	Nemouridae	<i>Amphinemura</i> species	11 ♀♀
	Perlodidae	<i>Isoperla</i> species 1	1 ♀
		<i>Isoperla</i> species 2	2 ♀♀
Trichoptera	Rhyacophilidae	<i>Rhyacophila glaberrima</i> Ulmer, 1907	1 prepupa
		<i>Rhyacophila ledra</i> Ross, 1939	2 larva
	Thremmatidae	<i>Neophylax</i> species	2 larvae

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AL:De Kalb Co., LIRI 08 1, 10-11 May 2007, black light trap			
Order	Family	Taxon	Specimens
Megaloptera	Corydalidae	<i>Chauliodes rastricornis</i> Rambur, 1842	5 ♂♂
Trichoptera	Hydropsychidae	<i>Diplectrona</i> species	1 ♂
		<i>Hydropsyche dicantha</i> Ross, 1938	5 ♂♂
		<i>Hydropsyche simulans</i> Ross, 1938	1 ♂
	Hydroptilidae	<i>Hydroptila armata</i> Ross, 1938	6 ♂♂
		<i>Hydroptila micropotamis</i> Harris, 1985	2 ♂♂
		<i>Hydroptila</i> species	21 ♀♀
	Leptoceridae	<i>Ceraclea protonepha</i> Morse & Ross, 1975	1 ♂
		<i>Ceraclea tarsipunctata</i> (Vorhies, 1909)	4 ♂♂
		<i>Leptocerus americanus</i> (Banks, 1899)	1 ♀
		<i>Oecetis inconspicua</i> (Walker, 1852)	6 ♂♂
	Molannidae	<i>Molanna blenda</i> Sibley, 1926	1 ♂
	Philopotamidae	<i>Wormaldia shawnee</i> (Ross, 1938)	5 ♂
	Polycentropodidae	<i>Nyctiophylax affinis</i> (Banks, 1897)	1 ♂
		<i>Polycentropus confusus</i> Hagen, 1861	1 ♂
AL:De Kalb Co., LIRI 08 1, 7 May 2006, by hand			
Order	Family	Taxon	Specimens
Plecoptera	Nemouridae	<i>Amphinemura nigritta</i> (Provancher, 1876)	2 larvae
AL:De Kalb Co., LIRI 08 1, 8 May 2006, black light trap			
Order	Family	Taxon	Specimens
Megaloptera	Corydalidae	<i>Chauliodes rastricornis</i> Rambur, 1842	3 larvae
Odonata	Cordulegastridae	<i>Cordulegaster obliqua</i> (Say, 1839)	1 adult
Plecoptera	Leuctridae	<i>Leuctra</i> species	1 individual
Trichoptera	Hydroptilidae	<i>Hydroptila</i> species	1 larva
	Rhyacophilidae	<i>Rhyacophila glaberrima</i> Ulmer, 1907	1 larva
AL:De Kalb Co., LIRI at Lower Two-Mile trail, 2 Mar 2006, beating			
Order	Family	Taxon	Specimens
Ephemeroptera	Ameletidae	<i>Ameletus</i> species	1 larva
Plecoptera	Capniidae	<i>Allocapnia nivicola</i> (Fitch, 1847)	6 ♂♂
		<i>Allocapnia</i> species	5 ♀♀
	Nemouridae	<i>Amphinemura</i> species	4 larvae
	Taeniopterygidae	<i>Strophopteryx</i> species	1 ♀
		<i>Taeniopteryx lonicera</i> Ricker and Ross, 1968	1 ♂
		<i>Taeniopteryx</i> species	2 ♀♀
AL:De Kalb Co., LIRI at Lower Two-Mile trail, 22 Mar 2007, by hand			
Order	Family	Taxon	Specimens
Plecoptera	Perlodidae	<i>Helopicus subvarians</i> (Banks, 1920)	1 ♀
Trichoptera	Lepidostomatidae	<i>Lepidostoma compressum</i> Etnier & Way, 1973	1 ♂
		<i>Lepidostoma weaveri</i> Harris, 1986	4 ♂♂
	Philopotamidae	<i>Chimarra aterrima</i> Hagen, 1861	1 ♂
		<i>Chimarra</i> species	1 ♀
		<i>Dolophilodes distincta</i> (Walker, 1852)	4 ♂♂
	Rhyacophilidae	<i>Rhyacophila glaberrima</i> Ulmer, 1907	1 larva
	Thremmatidae	<i>Neophylax aniqua</i> Ross, 1947	2 larvae
		<i>Neophylax</i> species	15 larvae
AL:De Kalb Co., LIRI Bear Creek at Rt 176, 2 Mar 2006, by hand			
Order	Family	Taxon	Specimens
Ephemeroptera	Heptageniidae	<i>Maccaffertium vicarium</i> (Walker, 1853)	1 larva
Plecoptera	Taeniopterygidae	<i>Strophopteryx fasciata</i> (Burmeister, 1839)	1 ♀
		<i>Taeniopteryx</i> species	1 ♀
Trichoptera	Glossosomatidae	<i>Agapetus</i> species	1 larva
AL:De Kalb Co., LIRI Brooks Branch Beaver Pond, 15-16 Jun 2005, black light trap			
Order	Family	Taxon	Specimens
Odonata	Coenagrionidae	<i>Argia fumipennis violacea</i> (Hagen, 1861)	1 adult
		<i>Ischnura verticalis</i> (Say, 1839)	1 adult
AL:De Kalb Co., LIRI Brooks Branch Beaver Pond, 16 Jun 2005, sweeping			
Order	Family	Taxon	Specimens
Odonata	Libellulidae	<i>Erythemis simplicicollis</i> (Say, 1839)	1 ♀

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AL:De Kalb Co., LIRI Brooks Branch Beaver Pond, 16-17 Jun 2005, black light trap			
Order	Family	Taxon	Specimens
Ephemeroptera	Heptageniidae	<i>Maccaffertium</i> species	50 ♂♂
Odonata	Libellulidae	<i>Plathemis lydia</i> (Drury, 1773)	1 ♂
Plecoptera	Leuctridae	<i>Leuctra</i> species	1 ♀
	Nemouridae	<i>Amphinemura</i> species	1 ♀
	Perlidae	<i>Perlesta</i> species	2 ♀♀
Trichoptera	Hydropsychidae	<i>Cheumatopsyche analis</i> (Banks, 1903)	5 ♂♂
		<i>Cheumatopsyche geora</i> Denning, 1948	7 ♂♂
		<i>Diplectrona</i> species	2 ♂♂
		<i>Hydropsyche betteni</i> Ross, 1938	1 adult
		<i>Hydropsyche dicantha</i> Ross, 1938	20 ♂♂
		<i>Hydropsyche</i> species	38 ♀♀
		<i>Potamyia flava</i> (Hagen, 1861)	1 ♀
	Hydroptilidae	<i>Hydroptila</i> species	1 ♀
		<i>Hydroptila talladega</i> Harris, 1985	1 ♂
		<i>Orthotrichia aegerfasciella</i> (Chambers, 1873)	3 ♂♂
		<i>Oxyethira forcipata</i> Mosely, 1934	1 ♂
		<i>Oxyethira</i> species	3 ♀♀
	Leptoceridae	<i>Ceraclea alabamae</i> Harris, 1989	3 ♂♂
		<i>Ceraclea alces</i> (Ross, 1941)	2 ♂♂
		<i>Ceraclea ancylus</i> (Vorhies, 1909)	1 ♂
		<i>Ceraclea cancellata</i> (Betten, 1934)	4 ♂♂
		<i>Ceraclea maculata</i> (Banks, 1899)	1 ♂
		<i>Ceraclea</i> species	10 ♀♀
		<i>Oecetis cinerascens</i> (Hagen, 1861)	5 ♂♂
		<i>Oecetis inconspicua</i> (Walker, 1852)	20 ♂♂
		<i>Oecetis nocturna</i> Ross, 1966	4 ♂♂
		<i>Oecetis persimilis</i> (Banks, 1907)	2 ♂♂
		<i>Oecetis</i> species	12 ♀♀
	Philopotamidae	<i>Chimarra aterrima</i> Hagen, 1861	1 ♂
		<i>Chimarra</i> species	1 ♀
	Phryganeidae	<i>Phryganea sayi</i> Milne, 1931	1 ♂
	Polycentropodidae	<i>Neureclipsis piersoni</i> Frazer & Harris, 1991	1 ♂
		<i>Neureclipsis</i> species	1 ♀
		<i>Nyctiophylax</i> species	1 ♀
		<i>Polycentropus</i> species	1 ♀
AL:De Kalb Co., LIRI Brooks Branch Beaver Pond, 2 Mar 2006, by hand			
Order	Family	Taxon	Specimens
Plecoptera	Capniidae	<i>Allocapnia</i> species	1 ♀
Trichoptera	Phryganeidae	<i>Ptilostomis</i> species	1 larva
AL:De Kalb Co., LIRI Brooks Branch lower, 10-11 May 2005, black light trap			
Order	Family	Taxon	Specimens
Ephemeroptera	Heptageniidae	<i>Heptagenia marginalis</i> Banks, 1910	1 ♀
		<i>Maccaffertium terminatum placitum</i> (Banks, 1910)	1 ♂
Plecoptera	Chloroperlidae	<i>Haploperla brevis</i> (Banks, 1895)	1 ♀
	Nemouridae	<i>Amphinemura nigrutta</i> (Provancher, 1876)	5 ♂♂
	Perlidae	<i>Isoperla</i> species	2 ♂♂
Trichoptera	Glossosomatidae	<i>Agapetus walkeri</i> (Betten & Mosely, 1940)	1 ♀
	Hydropsychidae	<i>Cheumatopsyche geora</i> Denning, 1948	2 ♂♂
		<i>Cheumatopsyche</i> species	1 ♀
		<i>Hydropsyche dicantha</i> Ross, 1938	1 ♂
		<i>Hydropsyche</i> species	25 ♀♀
	Lepidostomatidae	<i>Lepidostoma togatum</i> (Hagen, 1861)	1 ♂
	Leptoceridae	<i>Ceraclea cancellata</i> (Betten, 1934)	2 ♂♂
		<i>Ceraclea protonepha</i> Morse & Ross, 1975	2 ♂♂
		<i>Ceraclea</i> species	4 ♀♀
		<i>Ceraclea tarsipunctata</i> (Vorhies, 1909)	7 ♂♂
	Philopotamidae	<i>Dolophilodes distincta</i> (Walker, 1852)	1 ♂
		<i>Wormaldia moesta</i> (Banks, 1914)	1 ♂
		<i>Wormaldia shawnee</i> (Ross, 1938)	45 ♂♂
	Polycentropodidae	<i>Nyctiophylax affinis</i> (Banks, 1897)	1 ♂

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		<i>Nyctiophylax denningi</i> JC Morse, 1972	1 ♂	
		<i>Plectrocnemia crassicornis</i> (Walker, 1852)	2 ♂♂	
		<i>Polycentropus confusus</i> Hagen, 1861	5 ♂♂	
		<i>Polycentropus</i> species	16 ♀♀	
AL:De Kalb Co., LIRI Brooks Branch lower, 16-17 Jun 2005, black light trap				
Order	Family	Taxon	Specimens	
Ephemeroptera	Heptageniidae	<i>Maccaffertium</i> species	6 subimago	
	Leptophlebiidae	<i>Paraleptophlebia</i> species	1 subimago	
Plecoptera	Leuctridae	<i>Leuctra</i> species	1 ♀	
	Nemouridae	<i>Amphinemura</i> species	1 ♀	
	Perlidae	<i>Perlesta</i> species	1 ♂	
Trichoptera	Hydropsychidae	<i>Cheumatopsyche analis</i> (Banks, 1903)	7 ♂♂	
		<i>Cheumatopsyche geora</i> Denning, 1948	1 ♂	
		<i>Cheumatopsyche pasella</i> Ross, 1941	2 ♂♂	
		<i>Cheumatopsyche</i> species	9 ♀♀	
		<i>Diplectrona</i> species	1 ♂	
		<i>Hydropsyche betteni</i> Ross, 1938	5 ♂♂	
		<i>Hydropsyche dicantha</i> Ross, 1938	7 ♂♂	
		<i>Hydropsyche sparna</i> Ross, 1938	6 ♂♂	
		Hydroptilidae	<i>Hydroptila</i> species	1 ♀
			<i>Mayatrichia ayama</i> Mosely, 1937	6 ♂♂
			<i>Orthotrichia aegerfasciella</i> (Chambers, 1873)	1 ♂
			<i>Oxyethira</i> species	2 ♀♀
	Leptoceridae	<i>Oecetis inconspicua</i> (Walker, 1852)	7 ♂♂	
		<i>Oecetis nocturna</i> Ross, 1966	19 ♂♂	
		<i>Oecetis persimilis</i> (Banks, 1907)	2 ♂♂	
		<i>Oecetis</i> species	4 ♀♀	
	Philopotamidae	<i>Chimarra aterrima</i> Hagen, 1861	7 ♂♂	
		<i>Dolophilodes distincta</i> (Walker, 1852)	3 ♂♂	
	Polycentropodidae	<i>Polycentropus confusus</i> Hagen, 1861	3 ♂	
	Rhyacophilidae	<i>Rhyacophila carolina</i> Banks, 1911	6 ♂♂	
		<i>Rhyacophila torva</i> Hagen, 1861	1 ♂	
AL:De Kalb Co., LIRI Brooks Branch on trail, 10-11 May 2005, black light trap				
Order	Family	Taxon	Specimens	
Ephemeroptera	Leptophlebiidae	<i>Paraleptophlebia</i> species	1 larva	
Megaloptera	Corydalidae	<i>Nigronia fasciatus</i> (Walker, 1853)	1 ♂	
Plecoptera	Nemouridae	<i>Amphinemura</i> species	2 ♀♀	
	Perlodidae	<i>Clioperla clio</i> (Newman, 1839)	1 ♀	
Trichoptera	Glossosomatidae	<i>Agapetus walkeri</i> (Betten & Mosely, 1940)	1 ♀	
	Hydropsychidae	<i>Cheumatopsyche analis</i> (Banks, 1903)	5 ♂♂	
		<i>Diplectrona</i> species	several ♂♂	
		<i>Hydropsyche dicantha</i> Ross, 1938	1 ♂	
		<i>Hydropsyche</i> species	7 ♀♀	
	Lepidostomatidae	<i>Lepidostoma</i> species	1 ♀	
		<i>Lepidostoma weaveri</i> Harris, 1986	1 ♂	
	Leptoceridae	<i>Ceraclea tarsipunctata</i> (Vorhies, 1909)	1 ♂	
	Polycentropodidae	<i>Polycentropus carolinensis</i> Banks, 1905	4 ♂♂	
		<i>Polycentropus confusus</i> Hagen, 1861	8 ♂♂	
		<i>Polycentropus</i> species	2 ♀♀	
AL:De Kalb Co., LIRI Brooks Branch on trail, 22 Mar 2007, by hand				
Order	Family	Taxon	Specimens	
Trichoptera	Lepidostomatidae	<i>Lepidostoma compressum</i> Etnier & Way, 1973	8 ♂♂	
AL:De Kalb Co., LIRI DeSoto LAC1, 10 May 2007, by hand				
Order	Family	Taxon	Specimens	
Plecoptera	Leuctridae	<i>Leuctra rickeri</i> James, 1976	9 ♂♂	
	Nemouridae	<i>Amphinemura nigrutta</i> (Provancher, 1876)	3 ♂♂	
	Perlodidae	<i>Isoperla</i> species	1 larva	
AL:De Kalb Co., LIRI DeSoto LAC1, 12 May 2005, by hand				
Order	Family	Taxon	Specimens	
Megaloptera	Corydalidae	<i>Corydalis cornutus</i> (Linnaeus, 1763)	1 ♀	
		<i>Nigronia fasciatus</i> (Walker, 1853)	2 ♂♂	

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AL:De Kalb Co., LIRI DeSoto LAC1, 9-10 May 2007, black light trap			
Order	Family	Taxon	Specimens
Trichoptera	Brachycentridae	<i>Micrasema</i> species	1 ♀
	Hydropsychidae	<i>Cheumatopsyche campyla</i> Ross, 1938	1 ♂
	Hydroptilidae	<i>Hydroptila</i> species	1 ♀
	Leptoceridae	<i>Ceraclea tarsipunctata</i> (Vorhies, 1909)	1 ♂
	Molannidae	<i>Molanna tryphena</i> Betten, 1934	1 ♀
	Philopotamidae	<i>Wormaldia moesta</i> (Banks, 1914)	7 ♂♂
		<i>Wormaldia</i> species	1 ♀
	Phryganeidae	<i>Agrypnia vestita</i> (Walker, 1852)	1 ♂
	Polycentropodidae	<i>Polycentropus</i> species	1 ♀
Rhyacophilidae	<i>Rhyacophila carolina</i> Banks, 1911	3 ♂♂	
	<i>Rhyacophila ledra</i> Ross, 1939	1 ♂	
AL:De Kalb Co., LIRI DeSoto Orange Trailhead, 9 May 2007, sweeping			
Order	Family	Taxon	Specimens
Odonata	Corduliidae	<i>Epithea cynosura</i> (Say, 1839)	1 ♀
AL:De Kalb Co., LIRI DeSoto SP Laurel Creek <i>Rhyacophila</i> site, 1 Nov 2006, dip net			
Order	Family	Taxon	Specimens
Trichoptera	Rhyacophilidae	<i>Rhyacophila glaberrima</i> Ulmer, 1907	2 ♂ mmt
		<i>Rhyacophila</i> species	several pupae
AL:De Kalb Co., LIRI DeSoto SP Laurel Creek <i>Rhyacophila</i> site, 10 May 2005, by hand			
Order	Family	Taxon	Specimens
Plecoptera	Perlodidae	<i>Isoperla</i> species	1 ♂
AL:De Kalb Co., LIRI DeSoto SP Laurel Creek <i>Rhyacophila</i> site, 10 May 2007, black light (sheet)			
Order	Family	Taxon	Specimens
Trichoptera	Glossosomatidae	<i>Agapetus spinosus</i> Etnier & Way, 1973	1 ♀
AL:De Kalb Co., LIRI DeSoto SP Laurel Creek <i>Rhyacophila</i> site, 20 Mar 2008, by hand			
Order	Family	Taxon	Specimens
Trichoptera	Hydropsychidae	<i>Homoplectra doringa</i> (Milne, 1936)	2 ♂♂
	Rhyacophilidae	<i>Rhyacophila glaberrima</i> Ulmer, 1907	5 pupae
AL:De Kalb Co., LIRI DeSoto SP Laurel Creek <i>Rhyacophila</i> site, 21 Mar 2007, black light trap			
Order	Family	Taxon	Specimens
Plecoptera	Leuctridae	<i>Zealeuctra claasseni</i> (Frison, 1929)	88 ♂
	Nemouridae	<i>Ostrocerca truncata</i> (Claassen, 1923)	2 ♂♂
	Perlodidae	<i>Isoperla</i> species	2 larvae
	Taeniopterygidae	<i>Oemopteryx contorta</i> (Needham & Claassen, 1925)	1 ♀
Trichoptera	Hydropsychidae	<i>Homoplectra doringa</i> (Milne, 1936)	1 ♂
		<i>Homoplectra</i> species	1 ♂
	Rhyacophilidae	<i>Rhyacophila carolina</i> Banks, 1911	1 larva
		<i>Rhyacophila glaberrima</i> Ulmer, 1907	5 larvae
		<i>Rhyacophila ledra</i> Ross, 1939	30 larvae
		<i>Rhyacophila lobifera</i> Betten, 1934	1 ♀
		<i>Rhyacophila</i> species	1 ♂
AL:De Kalb Co., LIRI DeSoto SP Laurel Creek <i>Rhyacophila</i> site, 3 Mar 2006, beating			
Order	Family	Taxon	Specimens
Plecoptera	Capniidae	<i>Allocaupnia</i> species	6 ♀♀
	Leuctridae	<i>Zealeuctra claasseni</i> (Frison, 1929)	several ♂♂
	Taeniopterygidae	<i>Oemopteryx contorta</i> (Needham & Claassen, 1925)	1 ♂
AL:De Kalb Co., LIRI DeSoto SP Laurel Creek <i>Rhyacophila</i> site, 9 May 2007, black light (sheet)			
Order	Family	Taxon	Specimens
Plecoptera	Leuctridae	<i>Leuctra rickeri</i> James, 1976	3 ♂♂
	Nemouridae	<i>Amphinemura</i> species	1 ♀
	Perlodidae	<i>Isoperla</i> species	3 ♂
Trichoptera	Glossosomatidae	<i>Agapetus walkeri</i> (Betten & Mosely, 1940)	1 ♀
	Hydropsychidae	<i>Hydropsyche dicantha</i> Ross, 1938	1 ♂
		<i>Hydropsyche sparna</i> Ross, 1938	1 ♂
	Leptoceridae	<i>Leptocerus americanus</i> (Banks, 1899)	1 ♀
		<i>Oecetis inconspicua</i> (Walker, 1852)	1 ♂
	Philopotamidae	<i>Wormaldia moesta</i> (Banks, 1914)	3 ♂♂
		<i>Wormaldia shawnee</i> (Ross, 1938)	1 ♂
	Rhyacophilidae	<i>Rhyacophila carolina</i> Banks, 1911	1 ♂
		<i>Rhyacophila ledra</i> Ross, 1939	3 pupa

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Trichoptera_family		Trichoptera_genus species	1 ♀	
AL:De Kalb Co., LIRI DeSoto State Park 1240, 20-24 May 1990, black light trap				
Order	Family	Taxon	Specimens	
Trichoptera	Hydropsychidae	<i>Hydropsyche betteni</i> Ross, 1938	1 ♀	
		<i>Hydropsyche betteni</i> Ross, 1938	1 ♂	
		<i>Hydropsyche betteni</i> Ross, 1938	1 ♀	
		<i>Hydropsyche dicantha</i> Ross, 1938	1 ♂	
		<i>Hydropsyche dicantha</i> Ross, 1938	1 ♂	
		<i>Hydropsyche dicantha</i> Ross, 1938	1 ♂	
	Leptoceridae	<i>Ceraclea maculata</i> (Banks, 1899)	1 ♀	
		<i>Ceraclea tarsipunctata</i> (Vorhies, 1909)	1 ♂	
		<i>Nectopsyche candida</i> (Hagen, 1861)	1 ♀	
		<i>Oecetis inconspicua</i> (Walker, 1852)	1 ♂	
Philopotamidae	<i>Wormaldia shawnee</i> (Ross, 1938)	1 ♂		
Polycentropodidae	<i>Polycentropus confusus</i> Hagen, 1861	1 ♂		
AL:De Kalb Co., LIRI DeSoto State Park 1990-05-19, 18 May 1990, black light trap				
Order	Family	Taxon	Specimens	
Trichoptera	Polycentropodidae	<i>Polycentropus</i> species	1 ♀	
	Rhyacophilidae	<i>Rhyacophila banksi</i> Ross, 1944	1 ♂	
AL:De Kalb Co., LIRI DeSoto State Park 1992-09-24, 24 Sep 1992, black light trap				
Order	Family	Taxon	Specimens	
Trichoptera	Leptoceridae	<i>Ceraclea</i> species	1 ♀	
	Limnephilidae	<i>Ironoquia punctatissima</i> (Walker, 1852)	2 ♂♂	
AL:De Kalb Co., LIRI DeSoto State Park Laurel Creek, 10 May 2007, by hand				
Order	Family	Taxon	Specimens	
Plecoptera	Leuctridae	<i>Leuctra</i> species	1 larva	
Trichoptera	Hydropsychidae	<i>Hydropsyche dicantha</i> Ross, 1938	5 ♂♂	
		Leptoceridae	<i>Ceraclea cancellata</i> (Betten, 1934)	1 ♂
	Rhyacophilidae	<i>Rhyacophila carolina</i> Banks, 1911	1 ♀ mmt	
		<i>Rhyacophila glaberrima</i> Ulmer, 1907	1 larva	
		<i>Rhyacophila ledra</i> Ross, 1939	9 pupa	
	<i>Rhyacophila</i> species	1 ♀ pupa		
AL:De Kalb Co., LIRI DeSoto State Park Laurel Creek, 11 May 2005, black light (sheet)				
Order	Family	Taxon	Specimens	
Megaloptera	Corydalidae	<i>Nigronia fasciatus</i> (Walker, 1853)	2 ♂♂	
Trichoptera	Hydropsychidae	<i>Cheumatopsyche analis</i> (Banks, 1903)	1 ♂	
		<i>Diplectrona</i> species	3 ♂♂	
		<i>Hydropsyche dicantha</i> Ross, 1938	1 ♂	
		<i>Hydropsyche sparna</i> Ross, 1938	2 ♂	
		Leptoceridae	<i>Oecetis inconspicua</i> (Walker, 1852)	6 ♂♂
		Molannidae	<i>Molanna blenda</i> Sibley, 1926	1 ♂
	Philopotamidae	<i>Dolophilodes distincta</i> (Walker, 1852)	4 ♂♂	
		<i>Wormaldia moesta</i> (Banks, 1914)	2 ♂♂	
	Polycentropodidae	<i>Polycentropus elarus</i> Ross, 1944	1 ♂	
	Rhyacophilidae	<i>Rhyacophila carolina</i> Banks, 1911	1 ♂	
		<i>Rhyacophila ledra</i> Ross, 1939	1 ♂	
	AL:De Kalb Co., LIRI DeSoto State Park Laurel Creek, 12 May 2005, at light			
Order	Family	Taxon	Specimens	
Plecoptera	Leuctridae	<i>Leuctra</i> species	1 ♀	
	Nemouridae	<i>Amphinemura nigrutta</i> (Provancher, 1876)	1 ♂	
Trichoptera	Hydropsychidae	<i>Cheumatopsyche analis</i> (Banks, 1903)	1 ♂	
		<i>Cheumatopsyche pasella</i> Ross, 1941	1 ♂	
		<i>Diplectrona</i> species	3 ♀♀	
		<i>Hydropsyche betteni</i> Ross, 1938	1 ♀	
		<i>Hydropsyche dicantha</i> Ross, 1938	6 ♂♂	
		<i>Hydropsyche sparna</i> Ross, 1938	7 ♂♂	
	Leptoceridae	<i>Ceraclea maculata</i> (Banks, 1899)	2 ♂♂	
		<i>Ceraclea protonepha</i> Morse & Ross, 1975	3 ♂♂	
		<i>Ceraclea</i> species	1 ♀	
		<i>Oecetis ditissa</i> Ross, 1966	1 ♀	
		<i>Oecetis inconspicua</i> (Walker, 1852)	19 ♂♂	
	Molannidae	<i>Molanna blenda</i> Sibley, 1926	14 ♂♂	

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	Philopotamidae	<i>Chimarra obscura</i> (Walker, 1852)	3 ♂♂
		<i>Wormaldia moesta</i> (Banks, 1914)	2 ♂♂
	Polycentropodidae	<i>Plectrocnemia crassicornis</i> (Walker, 1852)	1 ♀
		<i>Polycentropus confusus</i> Hagen, 1861	3 ♂♂
	Rhyacophilidae	<i>Rhyacophila ledra</i> Ross, 1939	6 ♂♂
		<i>Rhyacophila otica</i> Etnier & Way, 1973	1 ♂
AL:De Kalb Co., LIRI DeSoto State Park Laurel Creek, 18 May 2006, by hand			
Order	Family	Taxon	Specimens
Plecoptera	Leuctridae	<i>Leuctra ferruginea</i> group	3 ♂♂
		<i>Leuctra rickeri</i> James, 1976	3 ♂♂
	Nemouridae	<i>Amphinemura nigritta</i> (Provancher, 1876)	6 ♂
	Perlidae	<i>Perlesta</i> species	2 ♀♀
	Perlodidae	<i>Isoperla</i> species	1 larva
Trichoptera	Glossosomatidae	<i>Agapetus</i> species	1 pupa
	Hydropsychidae	<i>Diplectrona</i> species	1 pupa
	Rhyacophilidae	<i>Rhyacophila glaberrima</i> Ulmer, 1907	5 pupa
		<i>Rhyacophila ledra</i> Ross, 1939	2 pupa
	Thremmatidae	<i>Neophylax concinnus</i> MacLachlan, 1871	1 larva
AL:De Kalb Co., LIRI DeSoto State Park Laurel Creek, 22 Nov 2005, by hand			
Order	Family	Taxon	Specimens
Megaloptera	Corydalidae	<i>Nigronia fasciatus</i> (Walker, 1853)	2 larvae
Odonata	Cordulegastridae	<i>Cordulegaster obliqua</i> (Say, 1839)	1 larva
Trichoptera	Philopotamidae	<i>Chimarra obscura</i> (Walker, 1852)	44 larvae
	Phryganeidae	<i>Ptilostomis</i> species	1 larva
AL:De Kalb Co., LIRI DeSoto State Park Laurel Creek, 7 May 2006, by hand			
Order	Family	Taxon	Specimens
Plecoptera	Nemouridae	<i>Amphinemura</i> species	4 larvae
	Perlodidae	<i>Isoperla</i> species	7 larvae
Trichoptera	Hydropsychidae	<i>Cheumatopsyche</i> species	2 ♀♀
		<i>Homoplectra doringa</i> (Milne, 1936)	10 larvae
	Lepidostomatidae	<i>Lepidostoma</i> species	4 larvae
	Psychomyiidae	<i>Psychomyia</i> species	1 individual
	Rhyacophilidae	<i>Rhyacophila glaberrima</i> Ulmer, 1907	4 pupa
<i>Rhyacophila ledra</i> Ross, 1939		9 pupae	
AL:De Kalb Co., LIRI DeSoto State Park Laurel Creek, 7-8 May 2006, black light trap			
Order	Family	Taxon	Specimens
Trichoptera	Apataniidae	<i>Apatania incerta</i> (Banks, 1897)	1 ♀
	Philopotamidae	<i>Wormaldia moesta</i> (Banks, 1914)	1 ♂
	Polycentropodidae	<i>Polycentropus confusus</i> Hagen, 1861	1 ♂
	Rhyacophilidae	<i>Rhyacophila ledra</i> Ross, 1939	1 ♂
AL:De Kalb Co., LIRI DeSoto State Park Laurel Creek, 9-10 May 2007, black light trap			
Order	Family	Taxon	Specimens
Plecoptera	Leuctridae	<i>Leuctra monticola</i> Hanson, 1941	1 ♂
		<i>Leuctra rickeri</i> James, 1976	1 ♂
		<i>Leuctra</i> species	2 ♀♀
Trichoptera	Hydropsychidae	<i>Hydropsyche dicantha</i> Ross, 1938	4 ♂♂
		<i>Hydropsyche sparna</i> Ross, 1938	1 ♂
	Philopotamidae	<i>Wormaldia shawnee</i> (Ross, 1938)	1 ♀
	Rhyacophilidae	<i>Rhyacophila carolina</i> Banks, 1911	1 ♂
		<i>Rhyacophila ledra</i> Ross, 1939	8 ♂♂
		<i>Rhyacophila</i> species	1 ♂
AL:De Kalb Co., LIRI DeSoto State Park Lodge Ck below Lodge Falls, 1 Mar 2006, beating			
Order	Family	Taxon	Specimens
Ephemeroptera	Ephemerellidae	<i>Eurylophella</i> species	1 larva
Plecoptera	Nemouridae	<i>Amphinemura</i> species	2 ♀♀
		<i>Prostoia</i> species	1 larva
Trichoptera	Hydropsychidae	<i>Diplectrona metaqui</i> Ross, 1970	2 larvae
		<i>Diplectrona</i> species	1 larva
AL:De Kalb Co., LIRI DeSoto State Park Lodge Ck below Lodge Falls, 21 Mar 2007, by hand			
Order	Family	Taxon	Specimens
Plecoptera	Leuctridae	<i>Leuctra</i> species	1 ♀

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Trichoptera	Nemouridae	<i>Ostrocerca truncata</i> (Claassen, 1923)	2 ♂♂
	Perlodidae	<i>Isoperla</i> species	1 larva
	Taeniopterygidae	<i>Taeniopteryx</i> species	1 ♀
	Hydropsychidae	<i>Cheumatopsyche</i> species	2 ♀♀
		<i>Homoplectra doringa</i> (Milne, 1936)	4 ♂♂
	Lepidostomatidae	<i>Lepidostoma weaveri</i> Harris, 1986	4 ♂♂
	Rhyacophilidae	<i>Rhyacophila carolina</i> Banks, 1911	1 ♂
		<i>Rhyacophila glaberrima</i> Ulmer, 1907	1 pupa
		<i>Rhyacophila ledra</i> Ross, 1939	4 prepupa
		<i>Rhyacophila lobifera</i> Betten, 1934	2 pupa
	Thremmatidae	<i>Neophylax</i> species	2 larvae
AL:De Kalb Co., LIRI DeSoto State Park Lodge Ck below Lodge Falls, 7-8 May 2006, black light trap			
Order	Family	Taxon	Specimens
Plecoptera	Leuctridae	<i>Leuctra</i> species	1 ♂
Trichoptera	Nemouridae	<i>Amphinemura nigrutta</i> (Provancher, 1876)	2 ♂♂
	Glossosomatidae	<i>Agapetus walkeri</i> (Betten & Mosely, 1940)	1 ♀
	Hydropsychidae	<i>Diplectrona</i> species	1 ♂
	Rhyacophilidae	<i>Rhyacophila carolina</i> Banks, 1911	1 ♂
AL:De Kalb Co., LIRI DeSoto State Park Lodge Creek upstream, 10 May 2007, black light (sheet)			
Order	Family	Taxon	Specimens
Plecoptera	Leuctridae	<i>Leuctra alexanderi</i> Hanson, 1941	1 ♂
		<i>Leuctra ferruginea</i> (F Walker, 1851)	1 ♂
		<i>Leuctra</i> species	8 ♀♀
Trichoptera	Brachycentridae	<i>Micrasema wataga</i> Ross, 1938	3 ♂♂
	Glossosomatidae	<i>Agapetus spinosus</i> Etnier & Way, 1973	4 ♂♂
	Hydropsychidae	<i>Cheumatopsyche</i> species	5 ♀♀
		<i>Hydropsyche dicantha</i> Ross, 1938	2 ♂♂
		<i>Hydroptila</i> species	8 ♂♂
	Hydroptilidae	<i>Hydroptila delineata</i> Morton, 1905	7 ♂♂
		<i>Hydroptila gunda</i> Milne, 1936	5 ♂♂
		<i>Hydroptila micropotamis</i> Harris, 1985	57 ♀♀
		<i>Oxyethira</i> species	4 ♀♀
	Lepidostomatidae	<i>Lepidostoma</i> species	2 ♀♀
	Leptoceridae	<i>Ceraclea protonepha</i> Morse & Ross, 1975	1 ♂
		<i>Ceraclea tarsipunctata</i> (Vorhies, 1909)	3 ♂♂
		<i>Oecetis inconspicua</i> (Walker, 1852)	39 ♂♂
	Philopotamidae	<i>Chimarra obscura</i> (Walker, 1852)	2 ♂♂
		<i>Wormaldia moesta</i> (Banks, 1914)	2 ♂♂
	Polycentropodidae	<i>Plectrocnemia cinerea</i> (Hagen, 1861)	2 ♂♂
		<i>Polycentropus confusus</i> Hagen, 1861	6 ♂♂
	Rhyacophilidae	<i>Rhyacophila</i> species	4 ♂♂
AL:De Kalb Co., LIRI DeSoto State Park Lodge Creek upstream, 20 Mar 2008, by hand			
Order	Family	Taxon	Specimens
Trichoptera	Rhyacophilidae	<i>Rhyacophila lobifera</i> Betten, 1934	2 pupae
AL:De Kalb Co., LIRI DeSoto State Park Lodge Creek upstream, 7-8 May 2006, black light trap			
Order	Family	Taxon	Specimens
Trichoptera	Polycentropodidae	<i>Plectrocnemia crassicornis</i> (Walker, 1852)	1 ♂
	Rhyacophilidae	<i>Rhyacophila ledra</i> Ross, 1939	2 ♂♂
AL:De Kalb Co., LIRI DeSoto State Park Lodge Creek upstream, 9 May 2007, at light			
Order	Family	Taxon	Specimens
Ephemeroptera	Leptophlebiidae	<i>Paraleptophlebia debilis</i> (Walker, 1853)	2 ♂♂
Plecoptera	Leuctridae	<i>Leuctra alexanderi</i> Hanson, 1941	1 ♂
		<i>Leuctra rickeri</i> James, 1976	4 ♂♂
		<i>Leuctra</i> species	9 ♀♀
	Nemouridae	<i>Amphinemura nigrutta</i> (Provancher, 1876)	1 ♂
	Perlodidae	<i>Diploperla robusta</i> Stark & Gauvin, 1974	2 ♀♀
		<i>Isoperla holochlora</i> (Klapalek, 1923)	2 ♂♂
		<i>Isoperla</i> species	2 ♀♀
		<i>Nyctiophylax serratus</i> Lago & Harris, 1985	1 ♂
	Rhyacophilidae	<i>Rhyacophila ledra</i> Ross, 1939	1 ♂

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AL:De Kalb Co., LIRI DeSoto State Park Lodge Creek upstream, 9 May 2007, by hand				
Order	Family	Taxon	Specimens	
Plecoptera	Leuctridae	<i>Leuctra</i> species	1 ♀	
	Perlodidae	<i>Isoperla</i> species	1 larva	
AL:De Kalb Co., LIRI DeSoto State Park T6S R10E Sec. 19SW, 18 May 1990, black light trap				
Order	Family	Taxon	Specimens	
Trichoptera	Leptoceridae	<i>Ceraclea maculata</i> (Banks, 1899)	1 ♂	
AL:De Kalb Co., LIRI DeSoto State Park T6S R10E Sec. 29NW, 18-24 May 1990, black light trap				
Order	Family	Taxon	Specimens	
Trichoptera	Philopotamidae	<i>Wormaldia shawnee</i> (Ross, 1938)	1 ♂	
AL:De Kalb Co., LIRI DeSoto State Park T6S R10E Sec. 29NW, 24 May 1990, black light trap				
Order	Family	Taxon	Specimens	
Trichoptera	Leptoceridae	<i>Ceraclea ancylus</i> (Vorhies, 1909)	1 ♂	
	Molannidae	<i>Molanna blenda</i> Sibley, 1926	1 ♂	
AL:De Kalb Co., LIRI DeSoto State Park T6S R9E Sec. 24NE, 23 May 1990, black light trap				
Order	Family	Taxon	Specimens	
Trichoptera	Hydropsychidae	<i>Hydropsyche betteni</i> Ross, 1938	1 ♀	
AL:De Kalb Co., LIRI DeSoto State Park T7S R10E Sec 15SE - 16SE, 22 May 1990, black light trap				
Order	Family	Taxon	Specimens	
Trichoptera	Molannidae	<i>Molanna blenda</i> Sibley, 1926	1 ♂	
AL:De Kalb Co., LIRI DeSoto State Park West Fork Little River, 1 Mar 2006, beating				
Order	Family	Taxon	Specimens	
Plecoptera	Capniidae	<i>Allocaupnia</i> species	2 ♀♀	
	Taeniopterygidae	<i>Oemopteryx contorta</i> (Needham & Claassen, 1925)	1 ♂	
		<i>Taeniopteryx lonicera</i> Ricker and Ross, 1968	1 ♀	
AL:De Kalb Co., LIRI DeSoto State Park West Fork Little River, 10 May 2005, black light (sheet)				
Order	Family	Taxon	Specimens	
Ephemeroptera	Baetidae	Baetidae genus species	4 ♂ subimago	
	Caenidae	<i>Caenis amica</i> Hagen, 1861	67 ♂♂	
Plecoptera	Chloroperlidae	<i>Haploperla brevis</i> (Banks, 1895)	1 ♂	
	Leuctridae	<i>Leuctra ferruginea</i> group	1 ♂	
		<i>Leuctra rickeri</i> James, 1976	1 ♂	
		Nemouridae	<i>Amphinemura nigritta</i> (Provancher, 1876)	2 ♂♂
		<i>Amphinemura</i> species	2 ♀♀	
	Perlidae	<i>Neoperla</i> species	4 larvae	
		<i>Perlinella drymo</i> (Newman, 1839)	1 ♂	
	Perlodidae	<i>Isoperla davisii</i> James, 1974	2 ♂♂	
	Trichoptera	Brachycentridae	<i>Micrasema</i> species	5 ♀♀
			<i>Micrasema wataga</i> Ross, 1938	3 ♂♂
Glossosomatidae		<i>Agapetus avitus</i> Edwards, 1956	1 ♀	
		<i>Agapetus spinosus</i> Etnier & Way, 1973	84 ♂♂	
Hydropsychidae		<i>Cheumatopsyche analis</i> (Banks, 1903)	3 ♂♂	
		<i>Cheumatopsyche etrona</i> Ross, 1941	1 ♂	
		<i>Cheumatopsyche geora</i> Denning, 1948	4 ♂♂	
		<i>Cheumatopsyche oxa</i> Ross, 1938	5 ♂♂	
		<i>Cheumatopsyche</i> species	93 ♂	
		<i>Diplectrona</i> species	9 ♂♂	
		<i>Hydropsyche betteni</i> Ross, 1938	1 ♂	
		<i>Hydropsyche dicantha</i> Ross, 1938	5 ♂♂	
		<i>Hydropsyche</i> species	71 ♀♀	
Hydroptilidae		<i>Dibusa angata</i> Ross, 1939	1 ♀	
		<i>Hydroptila armata</i> Ross, 1938	2 ♂♂	
		<i>Orthotrichia aegerfasciella</i> (Chambers, 1873)	2 ♀♀	
		<i>Oxyethira grisea</i> Betten, 1934	4 ♂♂	
		<i>Oxyethira</i> species	89 ♀♀	
		<i>Stactobiella delira</i> (Ross, 1938)	2 ♂♂	
		<i>Stactobiella palmata</i> (Ross, 1938)	14 ♀♀	
		<i>Stactobiella</i> species	102 ♀♀	
Lepidostomatidae		<i>Lepidostoma togatum</i> (Hagen, 1861)	5 ♂	
Leptoceridae		<i>Ceraclea maculata</i> (Banks, 1899)	1 ♂	
	<i>Ceraclea nepha</i> (Ross, 1944)	3 ♂♂		
	<i>Ceraclea protonepha</i> Morse & Ross, 1975	5 ♂♂		

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		<i>Ceraclea resurgens</i> (Walker, 1852)	1 ♂
		<i>Ceraclea tarsipunctata</i> (Vorhies, 1909)	1 ♂
		<i>Oecetis inconspicua</i> (Walker, 1852)	2 ♂
	Philopotamidae	<i>Chimarra aterrima</i> Hagen, 1861	1 ♂
		<i>Dolophilodes distincta</i> (Walker, 1852)	1 ♂
		<i>Wormaldia moesta</i> (Banks, 1914)	1 ♂
		<i>Wormaldia</i> species	1 ♀
	Polycentropodidae	<i>Polycentropus confusus</i> Hagen, 1861	34 ♂♂
		<i>Polycentropus elarus</i> Ross, 1944	3 ♂♂
		<i>Polycentropus</i> species	3 ♀♀
	Rhyacophilidae	<i>Rhyacophila carolina</i> Banks, 1911	8 ♂♂
AL:De Kalb Co., LIRI DeSoto State Park West Fork Little River, 10-11 May 2005, black light trap			
Order	Family	Taxon	Specimens
Trichoptera	Hydroptilidae	<i>Stactobiella delira</i> (Ross, 1938)	2 ♂♂
	Lepidostomatidae	<i>Lepidostoma togatum</i> (Hagen, 1861)	1 ♂
	Leptoceridae	<i>Ceraclea</i> species	12 ♀♀
AL:De Kalb Co., LIRI DeSoto State Park West Fork Little River, 12 May 2005, at light			
Order	Family	Taxon	Specimens
Trichoptera	Hydropsychidae	<i>Hydropsyche</i> species	1 ♀ pupa
	Philopotamidae	<i>Chimarra aterrima</i> Hagen, 1861	2 ♂♂
AL:De Kalb Co., LIRI DeSoto State Park West Fork Little River, 15 Jun 1990, at light			
Order	Family	Taxon	Specimens
Trichoptera	Brachycentridae	<i>Micrasema wataga</i> Ross, 1938	1 adult
	Glossosomatidae	<i>Agapetus spinosus</i> Etnier & Way, 1973	1 adult
	Hydropsychidae	<i>Cheumatopsyche analis</i> (Banks, 1903)	1 adult
		<i>Cheumatopsyche geora</i> Denning, 1948	1 adult
		<i>Cheumatopsyche harwoodi</i> Denning, 1948	1 adult
		<i>Cheumatopsyche helma</i> Ross, 1939	1 adult
		<i>Cheumatopsyche pasella</i> Ross, 1941	1 adult
		<i>Diplectrona modesta</i> Banks, 1908	1 adult
		<i>Hydropsyche betteni</i> Ross, 1938	1 adult
		<i>Hydropsyche dicantha</i> Ross, 1938	1 adult
		<i>Hydropsyche sparna</i> Ross, 1938	1 adult
		<i>Macrostemum zebratum</i> (Hagen, 1861)	1 adult
	Hydroptilidae	<i>Hydroptila callia</i> Denning, 1948	1 adult
		<i>Hydroptila chattanooga</i> Frazer & Harris, 1991	1 adult
		<i>Hydroptila delineata</i> Morton, 1905	1 adult
		<i>Hydroptila hamata</i> Morton, 1905	1 adult
		<i>Hydroptila licina</i> KS Frazer & SC Harris, 1991	1 adult
		<i>Hydroptila micropotamis</i> Harris, 1985	1 adult
		<i>Hydroptila paramoena</i> Harris, 1985	1 adult
		<i>Hydroptila waubesiana</i> Betten, 1934	1 adult
		<i>Mayatrichia ayama</i> Mosely, 1937	1 adult
		<i>Neotrichia collata</i> Morton, 1905	1 adult
		<i>Neotrichia minutisimella</i> (Chambers, 1873)	1 adult
		<i>Neotrichia okopa</i> Ross, 1939	1 adult
		<i>Ochrotrichia tarsalis</i> (Hagen, 1861)	1 adult
		<i>Orthotrichia aegerfasciella</i> (Chambers, 1873)	1 adult
		<i>Oxyethira forcipata</i> Mosely, 1934	1 adult
		<i>Oxyethira pallida</i> (Banks, 1904)	1 adult
		<i>Oxyethira rivicola</i> Blickle & Morse, 1954	1 adult
		<i>Oxyethira zeronia</i> Ross, 1941	1 adult
		<i>Stactobiella delira</i> (Ross, 1938)	1 adult
		<i>Stactobiella palmata</i> (Ross, 1938)	1 adult
	Lepidostomatidae	<i>Lepidostoma weaveri</i> Harris, 1986	1 adult
	Leptoceridae	<i>Ceraclea alabamae</i> Harris, 1989	1 adult
		<i>Ceraclea alces</i> (Ross, 1941)	1 adult
		<i>Ceraclea cancellata</i> (Betten, 1934)	1 adult
		<i>Ceraclea diluta</i> (Hagen, 1861)	1 adult
		<i>Ceraclea maculata</i> (Banks, 1899)	1 adult
		<i>Ceraclea neffi</i> (Resh, 1974)	1 adult
		<i>Ceraclea nepha</i> (Ross, 1944)	1 adult
		<i>Ceraclea protonepha</i> Morse & Ross, 1975	1 adult

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		<i>Ceraclea resurgens</i> (Walker, 1852)	1 adult
		<i>Ceraclea tarsipunctata</i> (Vorhies, 1909)	1 adult
		<i>Ceraclea transversa</i> (Hagen, 1861)	1 adult
		<i>Mystacides sepulchralis</i> (Walker, 1852)	1 adult
		<i>Nectopsyche pavida</i> (Hagen, 1861)	1 adult
		<i>Oecetis ditissa</i> Ross, 1966	1 adult
		<i>Oecetis inconspicua</i> (Walker, 1852)	1 adult
		<i>Oecetis nocturna</i> Ross, 1966	1 adult
		<i>Oecetis persimilis</i> (Banks, 1907)	1 adult
		<i>Oecetis scala</i> Milne, 1934	1 adult
	Limnephilidae	<i>Pycnopsyche antica</i> (Walker, 1852)	1 adult
	Philopotamidae	<i>Chimarra aterrima</i> Hagen, 1861	1 adult
		<i>Chimarra obscura</i> (Walker, 1852)	1 adult
		<i>Wormaldia moesta</i> (Banks, 1914)	1 adult
		<i>Wormaldia shawnee</i> (Ross, 1938)	1 adult
		<i>Wormaldia thyria</i> Denning, 1950	1 adult
	Polycentropodidae	<i>Cernotina spicata</i> Ross, 1938	1 adult
		<i>Cyrnellus fraternus</i> (Banks, 1905)	1 adult
		<i>Neureclipsis crepuscularis</i> (Walker, 1852)	1 adult
		<i>Neureclipsis piersoni</i> Frazer & Harris, 1991	1 adult
		<i>Nyctiophylax affinis</i> (Banks, 1897)	1 adult
		<i>Nyctiophylax barrorum</i> JC Morse, 1990	1 adult
		<i>Nyctiophylax celta</i> Denning, 1947	1 adult
		<i>Nyctiophylax denningi</i> JC Morse, 1972	1 adult
		<i>Plectrocnemia cinerea</i> (Hagen, 1861)	1 adult
		<i>Polycentropus confusus</i> Hagen, 1861	1 adult
	Psychomyiidae	<i>Psychomyia flavida</i> Hagen, 1861	1 adult
	Rhyacophilidae	<i>Rhyacophila carolina</i> Banks, 1911	1 adult
		<i>Rhyacophila glaberrima</i> Ulmer, 1907	1 adult
		<i>Rhyacophila lobifera</i> Betten, 1934	1 adult
AL:De Kalb Co., LIRI DeSoto State Park, T6S R10E Sec. 19SE - 20SW, 19 May 1990, black light trap			
Order	Family	Taxon	Specimens
Trichoptera	Glossosomatidae	<i>Agapetus</i> species	1 adult
	Hydropsychidae	<i>Cheumatopsyche campyla</i> Ross, 1938	1 ♀
		<i>Hydropsyche betteni</i> Ross, 1938	1 ♂
		<i>Hydropsyche dicantha</i> Ross, 1938	1 ♂
		<i>Hydropsyche dicantha</i> Ross, 1938	1 ♀
	Leptoceridae	<i>Ceraclea</i> species	1 ♀
	Molannidae	<i>Molanna blenda</i> Sibley, 1926	1 ♂
	Philopotamidae	<i>Dolophilodes distincta</i> (Walker, 1852)	1 ♀
	Rhyacophilidae	<i>Rhyacophila carolina</i> Banks, 1911	2 ♂♂
AL:De Kalb Co., LIRI DeSoto State Park, T6S R10E Sec. 19W, 18 May 1990, black light trap			
Order	Family	Taxon	Specimens
Trichoptera	Hydropsychidae	<i>Cheumatopsyche campyla</i> Ross, 1938	1 ♀
		<i>Cheumatopsyche campyla</i> Ross, 1938	1 ♀
		<i>Diplectrona</i> species	1 ♀
		<i>Hydropsyche betteni</i> Ross, 1938	1 ♀
		<i>Hydropsyche betteni</i> Ross, 1938	1 ♂
		<i>Hydropsyche dicantha</i> Ross, 1938	1 ♂
	Leptoceridae	<i>Ceraclea cancellata</i> (Betten, 1934)	1 ♂
		<i>Ceraclea maculata</i> (Banks, 1899)	1 ♂
		<i>Ceraclea maculata</i> (Banks, 1899)	1 ♂
		<i>Ceraclea maculata</i> (Banks, 1899)	2 ♂♂
		<i>Oecetis inconspicua</i> (Walker, 1852)	1 ♂
	Philopotamidae	<i>Dolophilodes distincta</i> (Walker, 1852)	1 ♂
		<i>Wormaldia moesta</i> (Banks, 1914)	1 ♂
		<i>Wormaldia shawnee</i> (Ross, 1938)	1 ♂
	Polycentropodidae	<i>Plectrocnemia crassicornis</i> (Walker, 1852)	1 ♀
		<i>Polycentropus</i> species	1 ♀
	Rhyacophilidae	<i>Rhyacophila carolina</i> Banks, 1911	2 ♂♂
		<i>Rhyacophila ledra</i> Ross, 1939	1 ♂

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AL:De Kalb Co., LIRI DSSP Cabins Spring, 12 May 2005, by hand				
Order	Family	Taxon	Specimens	
Plecoptera	Perlodidae	<i>Isoperla</i> species	1 larva	
Trichoptera	Lepidostomatidae	<i>Lepidostoma</i> species	1 larva	
	Rhyacophilidae	<i>Rhyacophila glaberrima</i> Ulmer, 1907	3 larvae	
		<i>Rhyacophila ledra</i> Ross, 1939	3 larvae	
AL:De Kalb Co., LIRI DSSP Hole in Bend, 12 May 2005, by hand				
Order	Family	Taxon	Specimens	
Ephemeroptera	Ephemerellidae	<i>Eurylophella</i> species	20 larvae	
	Heptageniidae	<i>Maccaffertium modestum</i> (Banks, 1910)	5 larvae	
Odonata	Calopterygidae	<i>Calopteryx maculata</i> (Beauvois, 1805)	1 larva	
	Coenagrionidae	<i>Argia</i> species	4 larvae	
Plecoptera	Perlidae	Coenagrionidae_genus species	8 larvae	
		<i>Acroneuria</i> species	4 larvae	
		<i>Neoperla carlsoni</i> Stark & Baumann, 1978	3 larvae	
Trichoptera	Hydroptilidae	<i>Ochrotrichia</i> species	1 larva	
	Leptoceridae	<i>Oecetis</i> species	2 pupae	
AL:De Kalb Co., LIRI Hurricane Creek at Rd 05, 18 May 2006, black light trap				
Order	Family	Taxon	Specimens	
Ephemeroptera	Ephemerellidae	<i>Drunella</i> species	1 larva	
Odonata	Aeshnidae	<i>Boyeria vinosa</i> (Say, 1839)	1 larva	
Plecoptera	Leuctridae	<i>Leuctra</i> species	1 ♀	
	Perlodidae	<i>Isoperla</i> species	1 ♂	
Trichoptera	Dipseudopsidae	<i>Phyllocentropus placidus</i> (Banks, 1905)	1 ♀	
	Glossosomatidae	<i>Agapetus spinosus</i> Etnier & Way, 1973	6 pupae	
		<i>Glossosoma nigrior</i> Banks, 1911	1 larva	
		Hydropsychidae	<i>Cheumatopsyche analis</i> (Banks, 1903)	1 ♂
	Hydropsychidae	<i>Cheumatopsyche geora</i> Denning, 1948	2 ♂♂	
		<i>Cheumatopsyche pinaca</i> Ross, 1941	1 ♂	
		<i>Cheumatopsyche</i> species	108 ♀♀	
		<i>Diplectrona</i> species	3 larvae	
	Hydropsychidae	<i>Hydropsyche betteni</i> Ross, 1938	32 ♂♂	
		<i>Hydropsyche dicantha</i> Ross, 1938	1 ♂	
		Philopotamidae	<i>Chimarra</i> species	1 larva
	Polycentropodidae	<i>Neureclipsis</i> species	1 ♀	
	Rhyacophilidae	<i>Rhyacophila carolina</i> Banks, 1911	1 ♂ pupa	
		<i>Rhyacophila ledra</i> Ross, 1939	1 larva	
	AL:De Kalb Co., LIRI Hurricane Creek at Rd 05, 22 Nov 2005, by hand			
Order	Family	Taxon	Specimens	
Megaloptera	Corydalidae	<i>Nigronia serricornis</i> (Say, 1824)	7 larvae	
Odonata	Aeshnidae	<i>Boyeria vinosa</i> (Say, 1839)	4 larvae	
	Calopterygidae	<i>Calopteryx</i> species	2 larvae	
Trichoptera	Hydropsychidae	<i>Cheumatopsyche</i> species	2 larvae	
		<i>Diplectrona modesta</i> Banks, 1908	1 larva	
		<i>Hydropsyche betteni/depravata</i> group	8 larvae	
	Philopotamidae	<i>Chimarra aterrima</i> Hagen, 1861	1 larva	
AL:De Kalb Co., LIRI Hurricane Creek at Rd 05, 7-8 May 2006, black light trap				
Order	Family	Taxon	Specimens	
Ephemeroptera	Ameletidae	<i>Ameletus</i> species	1 ♀	
Trichoptera	Brachycentridae	<i>Micrasema</i> species	2 ♀♀	
	Hydropsychidae	<i>Hydropsyche betteni</i> Ross, 1938	1 ♂	
		<i>Hydropsyche</i> species	18 ♀♀	
		Hydroptilidae	<i>Hydroptila</i> species	5 ♀♀
	Hydroptilidae	<i>Oxyethira</i> species	9 ♀♀	
		Leptoceridae	<i>Ceraclea protonepha</i> Morse & Ross, 1975	1 ♂
			<i>Ceraclea tarsipunctata</i> (Vorhies, 1909)	1 ♂
	<i>Ceraclea transversa</i> (Hagen, 1861)		3 ♂♂	
	Molannidae	<i>Molanna tryphena</i> Betten, 1934	1 ♂	
	Philopotamidae	<i>Chimarra obscura</i> (Walker, 1852)	1 ♂	
		<i>Dolophilodes</i> species	1 ♀	
	Phryganeidae	<i>Ptilostomis ocellifera</i> (Walker, 1852)	1 ♂	

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	Polycentropodidae	<i>Nyctiophylax denningi</i> JC Morse, 1972	7 ♂♂
		<i>Nyctiophylax serratus</i> Lago & Harris, 1985	3 ♂♂
		<i>Polycentropus confusus</i> Hagen, 1861	1 ♂
	Rhyacophilidae	<i>Rhyacophila carolina</i> Banks, 1911	3 ♂♂
AL:De Kalb Co., LIRI Laurel Ck Azalea Cascade, 10 May 2007, by hand			
Order	Family	Taxon	Specimens
Plecoptera	Leuctridae	<i>Leuctra rickeri</i> James, 1976	5 ♂
Trichoptera	Lepidostomatidae	<i>Theliopsyche melas</i> Edwards, 1956	1 ♂
	Molannidae	<i>Molanna blenda</i> Sibley, 1926	1 ♀
	Philopotamidae	<i>Dolophilodes distincta</i> (Walker, 1852)	1 ♂
	Rhyacophilidae	<i>Rhyacophila banksi</i> Ross, 1944	1 ♂ mmt
		<i>Rhyacophila carolina</i> Banks, 1911	4 ♂♂
		<i>Rhyacophila glaberrima</i> Ulmer, 1907	2 larvae
		<i>Rhyacophila ledra</i> Ross, 1939	1 ♂
AL:De Kalb Co., LIRI Laurel Ck Azalea Cascade, 10-11 May 2007, black light trap			
Order	Family	Taxon	Specimens
Ephemeroptera	Ephemeroptera family	Ephemeroptera genus species	7 adults
Plecoptera	Chloroperlidae	<i>Haploperla brevis</i> (Banks, 1895)	1 ♀
	Leuctridae	<i>Leuctra</i> species	10 ♀♀
	Nemouridae	<i>Amphinemura nigrutta</i> (Provancher, 1876)	2 ♂♂
		<i>Amphinemura</i> species	1 larva
	Perlodidae	<i>Isoperla</i> species	1 ♂
Trichoptera	Glossosomatidae	<i>Agapetus walkeri</i> (Betten & Mosely, 1940)	6 ♂
	Hydropsychidae	<i>Cheumatopsyche geora</i> Denning, 1948	4 ♂♂
		<i>Diplectrona</i> species	2 adults
		<i>Hydropsyche betteni</i> Ross, 1938	3 ♂♂
		<i>Hydropsyche dicantha</i> Ross, 1938	17 ♂♂
		<i>Hydropsyche sparna</i> Ross, 1938	5 ♂♂
	Hydroptilidae	<i>Hydroptila armata</i> Ross, 1938	5 adults
		<i>Hydroptila</i> species	29 ♀♀
		<i>Oxyethira rivicola</i> Bickel & Morse, 1954	1 ♂
	Lepidostomatidae	<i>Theliopsyche melas</i> Edwards, 1956	1 adult
	Leptoceridae	<i>Oecetis inconspicua</i> (Walker, 1852)	2 ♂♂
	Molannidae	<i>Molanna blenda</i> Sibley, 1926	1 adult
	Philopotamidae	<i>Chimarra obscura</i> (Walker, 1852)	1 ♀
		<i>Wormaldia moesta</i> (Banks, 1914)	8 ♂♂
		<i>Wormaldia shawnee</i> (Ross, 1938)	8 ♂♂
	Polycentropodidae	<i>Nyctiophylax affinis</i> (Banks, 1897)	1 adult
		<i>Plectrocnemia cinerea</i> (Hagen, 1861)	5 ♂♂
		<i>Plectrocnemia crassicornis</i> (Walker, 1852)	1 adult
		<i>Polycentropus confusus</i> Hagen, 1861	3 ♂♂
	Rhyacophilidae	<i>Rhyacophila banksi</i> Ross, 1944	1 ♂
		<i>Rhyacophila carolina</i> Banks, 1911	21 ♂♂
		<i>Rhyacophila ledra</i> Ross, 1939	4 ♂♂
		<i>Rhyacophila</i> species	1 ♂
		<i>Rhyacophila zoro</i>	3 adults
AL:De Kalb Co., LIRI Laurel Creek at the falls, 9-10 May 2007, black light trap			
Order	Family	Taxon	Specimens
Megaloptera	Corydalidae	<i>Nigronia fasciatus</i> (Walker, 1853)	1 ♂
Plecoptera	Leuctridae	<i>Leuctra rickeri</i> James, 1976	3 ♂♂
	Nemouridae	<i>Amphinemura nigrutta</i> (Provancher, 1876)	1 ♂
Trichoptera	Glossosomatidae	<i>Agapetus spinosus</i> Etnier & Way, 1973	2 ♂♂
	Hydropsychidae	<i>Hydropsyche dicantha</i> Ross, 1938	6 ♂♂
	Lepidostomatidae	<i>Lepidostoma</i> species	1 ♀
	Leptoceridae	<i>Ceraclea tarsipunctata</i> (Vorhies, 1909)	1 ♂
		<i>Oecetis inconspicua</i> (Walker, 1852)	3 ♂♂
	Philopotamidae	<i>Wormaldia moesta</i> (Banks, 1914)	9 ♂♂
	Phryganeidae	<i>Ptilostomis postica</i> (Walker, 1852)	1 ♀
	Polycentropodidae	<i>Polycentropus confusus</i> Hagen, 1861	2 ♀♀
	Rhyacophilidae	<i>Rhyacophila carolina</i> Banks, 1911	2 ♂♂
		<i>Rhyacophila ledra</i> Ross, 1939	2 ♂♂
		<i>Rhyacophila</i> species	2 ♂♂

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AL:De Kalb Co., LIRI Lower 2-Mile, 2 Mar 2006, beating			
Order	Family	Taxon	Specimens
Ephemeroptera	Heptageniidae	<i>Epeorus vitreus</i> (Walker, 1853)	1 larva
AL:De Kalb Co., LIRI Lower 2-Mile, 22 Mar 2006, beating			
Order	Family	Taxon	Specimens
Ephemeroptera	Ameletidae	<i>Ameletus lineatus</i> Traver, 1932	17 larvae
		<i>Ameletus</i> species	3 ♀♀
Plecoptera	Heptageniidae	<i>Maccaffertium</i> species	1 ♂ subimago
	Capniidae	<i>Allopcania nivicola</i> (Fitch, 1847)	1 ♂
	Nemouridae	<i>Amphinemura nigrutta</i> (Provancher, 1876)	1 ♂
		<i>Amphinemura</i> species	2 larvae
	Perlodidae	<i>Clioptera clio</i> (Newman, 1839)	3 larvae
		<i>Isoperla</i> species	2 larvae
	Taeniopterygidae	<i>Strophopteryx fasciata</i> (Burmeister, 1839)	2 ♀♀
AL:De Kalb Co., LIRI Lynn Overlook Powerline Cut Bog, 11 May 2005, black light trap			
Order	Family	Taxon	Specimens
Odonata	Gomphidae	Gomphidae genus species	1 larva
Plecoptera	Perlodidae	<i>Isoperla</i> species	2 ♂♂
Trichoptera	Brachycentridae	<i>Micrasema</i> species	3 ♀♀
	Hydropsychidae	<i>Cheumatopsyche analis</i> (Banks, 1903)	1 ♂
		<i>Cheumatopsyche geora</i> Denning, 1948	2 ♂♂
		<i>Diplectrona modesta</i> Banks, 1908	2 larvae
		<i>Diplectrona</i> species	4 ♂
		<i>Hydropsyche betteni</i> Ross, 1938	6 ♀♀
		<i>Hydropsyche dicantha</i> Ross, 1938	7 ♂♂
		<i>Lepidostoma togatum</i> (Hagen, 1861)	6 ♂♂
		<i>Ceraclea cancellata</i> (Betten, 1934)	1 ♂
		<i>Ceraclea tarsipunctata</i> (Vorhies, 1909)	20 ♂♂
		<i>Ceraclea transversa</i> (Hagen, 1861)	2 ♂♂
	Lepidostomatidae	<i>Nectopsyche candida</i> (Hagen, 1861)	1 ♀
		<i>Oecetis inconspicua</i> (Walker, 1852)	5 ♂♂
	Philopotamidae	<i>Chimarra obscura</i> (Walker, 1852)	1 ♀
		<i>Dolophilodes distincta</i> (Walker, 1852)	2 ♂♂
		<i>Wormaldia moesta</i> (Banks, 1914)	1 ♂
		<i>Wormaldia shawnee</i> (Ross, 1938)	21 ♂♂
		<i>Wormaldia</i> species	2 ♀♀
	Polycentropodidae	<i>Nyctiophylax affinis</i> (Banks, 1897)	1 ♂
		<i>Plectrocnemia cinerea</i> (Hagen, 1861)	2 ♂♂
		<i>Polycentropus confusus</i> Hagen, 1861	1 ♂
	Rhyacophilidae	<i>Rhyacophila carolina</i> Banks, 1911	7 ♂♂
AL:De Kalb Co., LIRI OTMID2, 9-10 May 2007, black light trap			
Order	Family	Taxon	Specimens
Plecoptera	Nemouridae	<i>Amphinemura nigrutta</i> (Provancher, 1876)	1 ♂
Trichoptera	Philopotamidae	<i>Wormaldia moesta</i> (Banks, 1914)	6 ♂♂
	Rhyacophilidae	<i>Rhyacophila ledra</i> Ross, 1939	9 ♂♂
AL:De Kalb Co., LIRI tributary at Rd 05 near Rd 08, 10 May 2007, by hand			
Order	Family	Taxon	Specimens
Trichoptera	Rhyacophilidae	<i>Rhyacophila glaberrima</i> Ulmer, 1907	1 pupa
AL:De Kalb Co., LIRI tributary at Rd 05 near Rd 08, 11 May 2007, by hand			
Order	Family	Taxon	Specimens
Ephemeroptera	Ameletidae	<i>Ameletus</i> species	3 larvae
	Heptageniidae	<i>Heptagenia</i> species	2 larvae
Plecoptera		Heptageniidae genus species	1 ♀
	Leuctridae	<i>Leuctra rickeri</i> James, 1976	2 ♂♂
	Nemouridae	<i>Amphinemura nigrutta</i> (Provancher, 1876)	2 ♂♂
	Perlodidae	<i>Diploperla robusta</i> Stark & Gaufin, 1974	3 larvae
Trichoptera		<i>Isoperla</i> species	2 larvae
	Rhyacophilidae	<i>Rhyacophila glaberrima</i> Ulmer, 1907	1 ♂ mmt

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AL:De Kalb Co., LIRI tributary at Rd 05 near Rd 08, 18 May 2006, by hand			
Order	Family	Taxon	Specimens
Ephemeroptera	Heptageniidae	<i>Maccaffertium</i> species	1 ♀
Plecoptera	Perlodidae	<i>Diploperla robusta</i> Stark & Gaufin, 1974	1 ♂
Trichoptera	Glossosomatidae	<i>Glossosoma nigrior</i> Banks, 1911	2 larvae
	Rhyacophilidae	<i>Rhyacophila glaberrima</i> Ulmer, 1907	3 larvae
AL:De Kalb Co., LIRI tributary at Rd 05 near Rd 08, 22 Nov 2005, by hand			
Order	Family	Taxon	Specimens
Trichoptera	Hydropsychidae	<i>Diplectrona</i> species	1 larva
AL:De Kalb Co., LIRI tributary at Rd 05 near Rd 08, 7 May 2006, by hand			
Order	Family	Taxon	Specimens
Ephemeroptera	Ameletidae	<i>Ameletus</i> species	1 larva
	Baetidae	Baetidae_genus species	3 larvae
	Heptageniidae	<i>Heptagenia</i> species	21 larvae
Plecoptera	Nemouridae	<i>Amphinemura</i> species	1 larva
Trichoptera	Thremmatidae	<i>Neophylax concinnus</i> MacLachlan, 1871	1 larva
AL:De Kalb Co., LIRI tributary at Rd 05 near Rd 08, 8 May 2006, black light trap			
Order	Family	Taxon	Specimens
Ephemeroptera	Ameletidae	<i>Ameletus</i> species	7 larvae
	Ephemeroptera_family	Ephemeroptera_genus species	1 adult
	Heptageniidae	<i>Stenonema femoratum</i> (Say, 1823)	1 ♂
	Leptophlebiidae	Leptophlebiidae_genus species	5 adults
Plecoptera	Leuctridae	<i>Leuctra</i> species	1 ♀
	Perlodidae	<i>Isoperla</i> species	1 larva
		Perlodidae_genus species	3 larvae
Trichoptera	Rhyacophilidae	<i>Rhyacophila ledra</i> Ross, 1939	2 adult
AL:De Kalb Co., LIRI tributary at Rd 05 near Rd 08, 8-9 May 2006, black light trap			
Order	Family	Taxon	Specimens
Trichoptera	Hydropsychidae	<i>Diplectrona</i> species	1 adult
		<i>Hydropsyche</i> species	1 ♀
	Philopotamidae	<i>Wormaldia moesta</i> (Banks, 1914)	2 ♂♂
	Polycentropodidae	<i>Polycentropus</i> species	1 ♀
	Psychomyiidae	<i>Lype diversa</i> (Banks, 1914)	2 ♀♀
AL:De Kalb Co., LIRI West Fork Little River below DeSoto SP ~500m, 12 May 2005, by hand			
Order	Family	Taxon	Specimens
Trichoptera	Hydropsychidae	<i>Cheumatopsyche</i> species	1 larva
		<i>Hydropsyche alhedra</i> Ross, 1939	1 larva
		<i>Hydropsyche betteni</i> Ross, 1938	1 ♀
	Hydroptilidae	<i>Ochrotrichia</i> species	13 larvae
	Leptoceridae	<i>Ceraclea</i> species	5 larvae
AL:De Kalb Co., LIRI No Site Data, 12 May 2005, black light trap			
Order	Family	Taxon	Specimens
Trichoptera	Leptoceridae	<i>Oecetis inconspicua</i> (Walker, 1852)	17 ♂
AL:De Kalb Co., LIRI West Fork Little River below DeSoto SP ~500m, 17 Jun 2005, by hand			
Order	Family	Taxon	Specimens
Ephemeroptera	Caenidae	<i>Caenis</i> species	2 ♂♂
AL:De Kalb Co., LIRI West Fork Little River below DeSoto SP ~500m, 9 May 2005, black light (sheet)			
Order	Family	Taxon	Specimens
Odonata	Macromiidae	<i>Macromia</i> species	1 larva
Plecoptera	Leuctridae	<i>Leuctra</i> species	1 larva
	Perlidae	<i>Acroneuria</i> species	1 larva
		<i>Perlesta</i> species	3 larvae
	Perlodidae	<i>Diploperla duplicata</i> (Banks, 1920)	1 larva
Trichoptera	Leptoceridae	<i>Ceraclea</i> species	9 ♀♀
AL:De Kalb Co., LIRI West Fork Little River below DeSoto SP ~500m, 9 May 2005, by hand			
Order	Family	Taxon	Specimens
Odonata	Aeshnidae	<i>Boyeria vinosa</i> (Say, 1839)	1 larva
	Coenagrionidae	Coenagrionidae_genus species	1 larva
Trichoptera	Hydropsychidae	<i>Hydropsyche dicantha</i> Ross, 1938	3 larvae

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AL:De Kalb Co., LIRI Wildlife Management Area, 22 May 1990, black light trap			
Order	Family	Taxon	Specimens
Trichoptera	Leptoceridae	<i>Ceraclea maculata</i> (Banks, 1899)	1 ♂
	Philopotamidae	<i>Wormaldia moesta</i> (Banks, 1914)	1 ♂
	Polycentropodidae	<i>Polycentropus</i> species	1 ♀
AL:De Kalb Co., LIRI_Frazer_10, 15 Jun 1990, at light			
Order	Family	Taxon	Specimens
Trichoptera	Brachycentridae	<i>Micrasema wataga</i> Ross, 1938	1 adult
	Hydropsychidae	<i>Cheumatopsyche analis</i> (Banks, 1903)	1 adult
		<i>Cheumatopsyche geora</i> Denning, 1948	1 adult
		<i>Diplectrona modesta</i> Banks, 1908	1 adult
		<i>Hydropsyche dicantha</i> Ross, 1938	1 adult
		<i>Macrostemum zebratum</i> (Hagen, 1861)	1 adult
	Hydroptilidae	<i>Hydroptila alabama</i> Harris & Kelley, 1984	1 adult
		<i>Hydroptila armata</i> Ross, 1938	1 adult
		<i>Hydroptila callia</i> Denning, 1948	1 adult
		<i>Hydroptila gunda</i> Milne, 1936	1 adult
		<i>Hydroptila hamata</i> Morton, 1905	1 adult
		<i>Hydroptila micropotamis</i> Harris, 1985	1 adult
		<i>Hydroptila paramoena</i> Harris, 1985	1 adult
		<i>Hydroptila waubesiana</i> Betten, 1934	1 adult
		<i>Mayatrichia ayama</i> Mosely, 1937	1 adult
		<i>Neotrichia okopa</i> Ross, 1939	1 adult
		<i>Orthotrichia aegerfasciella</i> (Chambers, 1873)	1 adult
		<i>Oxyethira forcipata</i> Mosely, 1934	1 adult
		<i>Oxyethira pallida</i> (Banks, 1904)	1 adult
		<i>Oxyethira rivicola</i> Bickel & Morse, 1954	1 adult
		<i>Oxyethira zeronia</i> Ross, 1941	1 adult
	Lepidostomatidae	<i>Lepidostoma togatum</i> (Hagen, 1861)	1 adult
	Leptoceridae	<i>Ceraclea alabamiae</i> Harris, 1989	1 adult
		<i>Ceraclea alces</i> (Ross, 1941)	1 adult
		<i>Ceraclea cancellata</i> (Betten, 1934)	1 adult
		<i>Ceraclea flava</i> (Banks, 1904)	1 adult
		<i>Ceraclea maculata</i> (Banks, 1899)	1 adult
		<i>Ceraclea neffi</i> (Resh, 1974)	1 adult
		<i>Ceraclea nepha</i> (Ross, 1944)	1 adult
		<i>Ceraclea protonepha</i> Morse & Ross, 1975	1 adult
		<i>Ceraclea tarsipunctata</i> (Vorhies, 1909)	1 adult
		<i>Ceraclea transversa</i> (Hagen, 1861)	1 adult
		<i>Nectopsyche pavida</i> (Hagen, 1861)	1 adult
		<i>Oecetis ditissa</i> Ross, 1966	1 adult
		<i>Oecetis inconspicua</i> (Walker, 1852)	1 adult
		<i>Oecetis nocturna</i> Ross, 1966	1 adult
		<i>Oecetis persimilis</i> (Banks, 1907)	1 adult
		<i>Oecetis scala</i> Milne, 1934	1 adult
	Philopotamidae	<i>Chimarra obscura</i> (Walker, 1852)	1 adult
		<i>Dolophilodes distincta</i> (Walker, 1852)	1 adult
		<i>Wormaldia thyria</i> Denning, 1950	1 adult
	Phryganeidae	<i>Agrypnia vestita</i> (Walker, 1852)	1 adult
	Polycentropodidae	<i>Cernotina calcea</i> Ross, 1938	1 adult
		<i>Cernotina spicata</i> Ross, 1938	1 adult
		<i>Cyrnellus fraternus</i> (Banks, 1905)	1 adult
		<i>Neureclipsis piersoni</i> Frazer & Harris, 1991	1 adult
		<i>Nyctiophylax affinis</i> (Banks, 1897)	1 adult
		<i>Nyctiophylax barrorum</i> JC Morse, 1990	1 adult
		<i>Nyctiophylax celta</i> Denning, 1947	1 adult
		<i>Nyctiophylax denningi</i> JC Morse, 1972	1 adult
		<i>Polycentropus confusus</i> Hagen, 1861	1 adult
		<i>Rhyacophila carolina</i> Banks, 1911	1 adult
	Rhyacophilidae	<i>Rhyacophila glaberrima</i> Ulmer, 1907	1 adult
		<i>Rhyacophila lobifera</i> Betten, 1934	1 larva

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AL:De Kalb Co., LIRI_Frazer_11, 15 Jun 1990, at light			
Order	Family	Taxon	Specimens
Trichoptera	Brachycentridae	<i>Micrasema wataga</i> Ross, 1938	1 adult
	Hydropsychidae	<i>Cheumatopsyche analis</i> (Banks, 1903)	1 adult
		<i>Cheumatopsyche geora</i> Denning, 1948	1 adult
		<i>Cheumatopsyche pasella</i> Ross, 1941	1 adult
		<i>Diplectrona modesta</i> Banks, 1908	1 adult
		<i>Hydropsyche betteni</i> Ross, 1938	1 adult
		<i>Hydropsyche dicantha</i> Ross, 1938	1 adult
		<i>Hydropsyche sparna</i> Ross, 1938	1 adult
	Hydroptilidae	<i>Hydroptila gunda</i> Milne, 1936	1 adult
		<i>Hydroptila micropotamis</i> Harris, 1985	1 adult
		<i>Hydroptila paramoena</i> Harris, 1985	1 adult
		<i>Mayatrichia ayama</i> Mosely, 1937	1 adult
		<i>Orthotrichia aegerfasciella</i> (Chambers, 1873)	1 adult
		<i>Oxyethira rivicola</i> Bickel & Morse, 1954	1 adult
	Leptoceridae	<i>Ceraclea alabamae</i> Harris, 1989	1 adult
		<i>Ceraclea alces</i> (Ross, 1941)	1 adult
		<i>Ceraclea cancellata</i> (Betten, 1934)	1 adult
		<i>Ceraclea maculata</i> (Banks, 1899)	1 adult
		<i>Ceraclea neffi</i> (Resh, 1974)	1 adult
		<i>Ceraclea nepha</i> (Ross, 1944)	1 adult
		<i>Ceraclea protonepha</i> Morse & Ross, 1975	1 adult
		<i>Ceraclea tarsipunctata</i> (Vorhies, 1909)	1 adult
		<i>Mystacides sepulchralis</i> (Walker, 1852)	1 adult
		<i>Nectopsyche pavidia</i> (Hagen, 1861)	1 adult
		<i>Oecetis inconspicua</i> (Walker, 1852)	1 adult
		<i>Oecetis nocturna</i> Ross, 1966	1 adult
	Philopotamidae	<i>Chimarra obscura</i> (Walker, 1852)	1 adult
		<i>Wormaldia moesta</i> (Banks, 1914)	1 adult
	Polycentropodidae	<i>Cernotina spicata</i> Ross, 1938	1 adult
		<i>Nyctiophylax barrorum</i> JC Morse, 1990	1 adult
		<i>Nyctiophylax denningi</i> JC Morse, 1972	1 adult
		<i>Plectrocnemia cinerea</i> (Hagen, 1861)	1 adult
		<i>Polycentropus confusus</i> Hagen, 1861	1 adult
		<i>Polycentropus elarus</i> Ross, 1944	1 adult
		<i>Rhyacophila carolina</i> Banks, 1911	1 adult
	Rhyacophilidae		
AL:De Kalb Co., LIRI_Frazer_12, 15 Jun 1990, at light			
Order	Family	Taxon	Specimens
Trichoptera	Hydropsychidae	<i>Cheumatopsyche campyla</i> Ross, 1938	1 adult
	Limnephilidae	<i>Ironoquia punctatissima</i> (Walker, 1852)	1 adult
	Polycentropodidae	<i>Polycentropus elarus</i> Ross, 1944	1 adult
	Rhyacophilidae	<i>Rhyacophila glaberrima</i> Ulmer, 1907	1 adult
	Thremmatidae	<i>Neophylax</i> species	1 adult
AL:De Kalb Co., LIRI_Frazer_13, 15 Jun 1990, at light			
Order	Family	Taxon	Specimens
Trichoptera	Glossosomatidae	<i>Agapetus spinosus</i> Etnier & Way, 1973	1 adult
	Hydropsychidae	<i>Cheumatopsyche analis</i> (Banks, 1903)	1 adult
		<i>Cheumatopsyche geora</i> Denning, 1948	1 adult
		<i>Cheumatopsyche pasella</i> Ross, 1941	1 adult
		<i>Diplectrona modesta</i> Banks, 1908	1 adult
		<i>Hydropsyche betteni</i> Ross, 1938	1 adult
		<i>Hydropsyche dicantha</i> Ross, 1938	1 adult
		<i>Hydropsyche sparna</i> Ross, 1938	1 adult
	Hydroptilidae	<i>Hydroptila gunda</i> Milne, 1936	1 adult
		<i>Hydroptila hamata</i> Morton, 1905	1 adult
		<i>Hydroptila micropotamis</i> Harris, 1985	1 adult
		<i>Hydroptila novicola</i> RL Bickel & WC Morse, 1954	1 adult
		<i>Hydroptila oneili</i> Harris, 1985	1 adult
		<i>Hydroptila paramoena</i> Harris, 1985	1 adult
		<i>Hydroptila waubesiana</i> Betten, 1934	1 adult
		<i>Mayatrichia ayama</i> Mosely, 1937	1 adult
		<i>Neotrichia collata</i> Morton, 1905	1 adult

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		<i>Orthotrichia aegerfasciella</i> (Chambers, 1873)	1 adult
		<i>Oxyethira forcipata</i> Mosely, 1934	1 adult
		<i>Oxyethira glasa</i> (HH Ross, 1941)	1 adult
		<i>Oxyethira pallida</i> (Banks, 1904)	1 adult
		<i>Oxyethira rivicola</i> Blickle & Morse, 1954	1 adult
		<i>Oxyethira zeronia</i> Ross, 1941	1 adult
		<i>Stactobiella delira</i> (Ross, 1938)	1 adult
		<i>Stactobiella palmata</i> (Ross, 1938)	1 adult
	Leptoceridae	<i>Ceraclea alabamae</i> Harris, 1989	1 adult
		<i>Ceraclea cancellata</i> (Betten, 1934)	1 adult
		<i>Ceraclea maculata</i> (Banks, 1899)	1 adult
		<i>Ceraclea neffi</i> (Resh, 1974)	1 adult
		<i>Ceraclea nepha</i> (Ross, 1944)	1 adult
		<i>Ceraclea protonepha</i> Morse & Ross, 1975	1 adult
		<i>Ceraclea tarsipunctata</i> (Vorhies, 1909)	1 adult
		<i>Mystacides sepulchralis</i> (Walker, 1852)	1 adult
		<i>Nectopsyche pavidia</i> (Hagen, 1861)	1 adult
		<i>Oecetis ditissa</i> Ross, 1966	1 adult
		<i>Oecetis inconspicua</i> (Walker, 1852)	1 adult
		<i>Oecetis nocturna</i> Ross, 1966	1 adult
		<i>Oecetis persimilis</i> (Banks, 1907)	1 adult
	Molannidae	<i>Molanna ulmerina</i> Navas, 1934	1 adult
	Philopotamidae	<i>Chimarra aterrima</i> Hagen, 1861	1 adult
		<i>Chimarra obscura</i> (Walker, 1852)	1 adult
		<i>Dolophilodes distincta</i> (Walker, 1852)	1 adult
	Phryganeidae	<i>Phryganea sayi</i> Milne, 1931	1 adult
	Polycentropodidae	<i>Cernotina spicata</i> Ross, 1938	1 adult
		<i>Cynellus fraternus</i> (Banks, 1905)	1 adult
		<i>Neureclipsis piersoni</i> Frazer & Harris, 1991	1 adult
		<i>Polycentropus confusus</i> Hagen, 1861	1 adult
		<i>Polycentropus elarus</i> Ross, 1944	1 adult
	Rhyacophilidae	<i>Rhyacophila carolina</i> Banks, 1911	1 adult
		<i>Rhyacophila glaberrima</i> Ulmer, 1907	1 adult
AL:De Kalb Co., LIRI_Frazer_14, 15 Jun 1990, at light			
Order	Family	Taxon	Specimens
Trichoptera	Brachycentridae	<i>Micrasema wataga</i> Ross, 1938	1 adult
	Hydropsychidae	<i>Cheumatopsyche analis</i> (Banks, 1903)	1 adult
		<i>Cheumatopsyche pasella</i> Ross, 1941	1 adult
		<i>Hydropsyche betteni</i> Ross, 1938	1 adult
		<i>Hydropsyche dicantha</i> Ross, 1938	1 adult
	Hydroptilidae	<i>Hydroptila armata</i> Ross, 1938	1 adult
		<i>Hydroptila novicola</i> RL Blickle & WC Morse, 1954	1 adult
		<i>Hydroptila oneili</i> Harris, 1985	1 adult
		<i>Hydroptila paramoena</i> Harris, 1985	1 adult
		<i>Mayatrichia ayama</i> Mosely, 1937	1 adult
		<i>Orthotrichia aegerfasciella</i> (Chambers, 1873)	1 adult
		<i>Oxyethira pallida</i> (Banks, 1904)	1 adult
		<i>Oxyethira rivicola</i> Blickle & Morse, 1954	1 adult
		<i>Oxyethira zeronia</i> Ross, 1941	1 adult
		<i>Stactobiella delira</i> (Ross, 1938)	1 adult
	Leptoceridae	<i>Ceraclea maculata</i> (Banks, 1899)	1 adult
		<i>Ceraclea transversa</i> (Hagen, 1861)	1 adult
		<i>Mystacides sepulchralis</i> (Walker, 1852)	1 adult
		<i>Oecetis ditissa</i> Ross, 1966	1 adult
		<i>Oecetis inconspicua</i> (Walker, 1852)	1 adult
		<i>Oecetis nocturna</i> Ross, 1966	1 adult
		<i>Oecetis persimilis</i> (Banks, 1907)	1 adult
	Molannidae	<i>Molanna blenda</i> Sibley, 1926	1 adult
	Philopotamidae	<i>Chimarra aterrima</i> Hagen, 1861	1 adult
		<i>Chimarra obscura</i> (Walker, 1852)	1 adult
		<i>Dolophilodes distincta</i> (Walker, 1852)	1 adult
		<i>Wormaldia moesta</i> (Banks, 1914)	1 adult
		<i>Wormaldia thyria</i> Denning, 1950	1 adult

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	Polycentropodidae	Nyctiophylax affinis (Banks, 1897)	1 adult
		Nyctiophylax barrorum JC Morse, 1990	1 adult
		Nyctiophylax denningi JC Morse, 1972	1 adult
		Plectrocnemia cinerea (Hagen, 1861)	1 adult
		Polycentropus confusus Hagen, 1861	1 adult
		Polycentropus elarus Ross, 1944	1 adult
	Rhyacophilidae	Rhyacophila carolina Banks, 1911	1 adult
		Rhyacophila glaberrima Ulmer, 1907	1 adult
		Rhyacophila ledra Ross, 1939	1 adult
AL:De Kalb Co., LIRI_Frazer_18, 15 Jun 1990, at light			
Order	Family	Taxon	Specimens
Trichoptera	Hydropsychidae	Cheumatopsyche geora Denning, 1948	1 adult
		Cheumatopsyche oxa Ross, 1938	1 adult
		Cheumatopsyche pasella Ross, 1941	1 adult
		Hydropsyche dicantha Ross, 1938	1 adult
	Hydroptilidae	Mayatrichia ayama Mosely, 1937	1 adult
		Neotrichia okopa Ross, 1939	1 adult
		Orthotrichia aegerfasciella (Chambers, 1873)	1 adult
		Oxyethira pallida (Banks, 1904)	1 adult
	Lepidostomatidae	Theliopsyche melas Edwards, 1956	1 adult
	Leptoceridae	Ceraclea tarsipunctata (Vorhies, 1909)	1 adult
		Oecetis ditissa Ross, 1966	1 adult
		Oecetis inconspicua (Walker, 1852)	1 adult
	Limnephilidae	Hydatophylax argus (Harris, 1869)	1 larva
	Polycentropodidae	Cernotina spicata Ross, 1938	1 adult

Table 2-2. The Ephemeroptera, Plecoptera, and Trichoptera collected in Russell Cave National Monument (RUCA).			
[AL, Alabama; Co., county; ♀, female; ♂, male]			
AL:Jackson Co., RUCA Cave Entrance, 17 Jun 2005, by hand			
Order	Family	Taxon	Specimens
Ephemeroptera	Ephemerellidae	<i>Ephemerella</i> species	1 larva
Trichoptera	Glossosomatidae	<i>Glossosoma nigrior</i> Banks, 1911	4 pupa
AL:Jackson Co., RUCA Cave Entrance, 2 Nov 2006, by hand			
Order	Family	Taxon	Specimens
Trichoptera	Glossosomatidae	<i>Glossosoma nigrior</i> Banks, 1911	1 ♂
AL:Jackson Co., RUCA Cave Entrance, 23 Mar 2007, by hand			
Order	Family	Taxon	Specimens
Plecoptera	Leuctridae	<i>Leuctra sibleyi</i> Claassen, 1923	1 ♂
Trichoptera	Brachycentridae	<i>Micrasema</i> species	1 larva
	Glossosomatidae	<i>Agapetus vireo</i> Ross, 1941	2 ♂♂
		<i>Glossosoma nigrior</i> Banks, 1911	4 ♂♂
	Hydropsychidae	<i>Cheumatopsyche oxa</i> Ross, 1938	4 pupa
		<i>Cheumatopsyche pasella</i> Ross, 1941	4 ♂♂
	Psychomyiidae	<i>Lype diversa</i> (Banks, 1914)	several ♂♂
	Rhyacophilidae	<i>Rhyacophila ledra</i> Ross, 1939	1 larva
AL:Jackson Co., RUCA Cave Entrance, 23 Nov 2005, by hand			
Order	Family	Taxon	Specimens
Ephemeroptera	Heptageniidae	<i>Epeorus</i> species	1 immature
Plecoptera	Capniidae	<i>Allocapnia</i> species	1 larva
	Chloroperlidae	<i>Sweltsa</i> species	3 larvae
Trichoptera	Glossosomatidae	<i>Glossosoma nigrior</i> Banks, 1911	2 pupa
	Hydropsychidae	<i>Cheumatopsyche</i> species	29 larvae
	Odontoceridae	<i>Psilotreta</i> species	1 larva
	Polycentropodidae	<i>Polycentropus</i> species	2 larvae
AL:Jackson Co., RUCA Cave Entrance, 3 Mar 2006, by hand			
Order	Family	Taxon	Specimens
Trichoptera	Glossosomatidae	<i>Glossosoma nigrior</i> Banks, 1911	2 ♂
	Hydropsychidae	<i>Cheumatopsyche oxa</i> Ross, 1938	1 ♂
	Psychomyiidae	<i>Lype diversa</i> (Banks, 1914)	5 ♂♂
AL:Jackson Co., RUCA Moonshine Still, 23 Mar 2007, by hand			
Order	Family	Taxon	Specimens
Plecoptera	Leuctridae	<i>Leuctra</i> species	1 ♀
	Nemouridae	<i>Ostrocerca truncata</i> (Claassen, 1923)	2 ♂
Trichoptera	Hydropsychidae	<i>Diplectrona metaqui</i> Ross, 1970	3 larvae
	Philopotamidae	<i>Wormaldia moesta</i> (Banks, 1914)	3 ♂♂
	Rhyacophilidae	<i>Rhyacophila glaberrima</i> Ulmer, 1907	2 larvae
		<i>Rhyacophila ledra</i> Ross, 1939	1 larva
	Thremmatidae	<i>Neophylax</i> species	3 larvae
AL:Jackson Co., RUCA Moonshine Still, 3 Mar 2006, by hand			
Order	Family	Taxon	Specimens
Trichoptera	Hydropsychidae	<i>Diplectrona metaqui</i> Ross, 1970	4 larvae
	Limnephilidae	<i>Pseudostenophylax uniformis</i> (Betten, 1934)	6 larvae
	Rhyacophilidae	<i>Rhyacophila glaberrima</i> Ulmer, 1907	2 larvae
		<i>Rhyacophila ledra</i> Ross, 1939	5 larvae
AL:Jackson Co., RUCA Ridley Cave, 23 Nov 2005, by hand			
Order	Family	Taxon	Specimens
Ephemeroptera	Ephemerellidae	<i>Eurylophella</i> species	28 immatures
	Heptageniidae	<i>Maccaffertium</i> species	2 immatures
	Leptophlebiidae	<i>Paraleptophlebia</i> species	1 immature
Plecoptera	Taeniopterygidae	<i>Strophopteryx</i> species	1 larva
		<i>Taeniopteryx</i> species	2 larvae
Trichoptera	Glossosomatidae	<i>Glossosoma nigrior</i> Banks, 1911	3 larvae
	Hydropsychidae	<i>Hydropsyche sparna</i> Ross, 1938	1 larva
		<i>Hydropsyche</i> species	1 larva
	Philopotamidae	<i>Chimarra aterrima</i> Hagen, 1861	1 larva
	Polycentropodidae	<i>Polycentropus</i> species	1 larva

Reference Cited

Frazer, K. S., Harris, S. C., and Ward, G. M., 1991, Survey of the Trichoptera in the Little River drainage of northeastern Alabama: Bulletin of the Alabama Museum of Natural History, v. 11, p. 17-22.

Appendix 3. Non-Target Species Data.

The records for non-target taxa from Little River Canyon National Preserve (LIRI) are presented in the table below, organized by collection location and event. All non-target specimens collected during this survey are listed, except those that remain unsorted and unidentified. Those reported here represent 3 Phyla, 5 Classes, 13 Orders, 40 Families, and 42 Genera. In addition, many taxa are included in catchall groups that represent specimens that the authors did not identify. These are indicated in the table by entries such as Oligochaeta_order, Diptera_family, and Coleoptera species. Most of the non-target taxa are aquatic species. However, terrestrial species also are represented. Terrestrial species are highlighted in the table by a pale orange background.

Table 3-1. Non-target specimen data from Little River Canyon National Preserve (LIRI). [AL, Alabama; Co., county; indiv(s)., individual, individuals; ♀, female; ♂, male; ~, approximately; m, meters]			
AL:Cherokee Co., LIRI below Little River Falls Rt. 35, 10 May 2007, by hand, JLRobinson & CRParker			
Order	Family	Taxon	Specimens
Neuroptera	Sisyridae	<i>Climacia areolaris</i> (Hagen, 1861)	1 ♀
AL:Cherokee Co., LIRI Canyon Mouth, 22 Nov 2005, by hand, CRParker & MGeraghty			
Order	Family	Taxon	Specimens
Diptera	Chironomidae	Chironomidae species	1 larva
	Limoniidae	<i>Pseudolimnophila</i> species	1 larva
Veneroida	Corbiculidae	<i>Corbicula fluminea</i> (OF Müller, 1774)	2 indivs.
Basommatophora	Physidae	<i>Physa</i> species	2 indivs.
AL:Cherokee Co., LIRI Hartline Ford, 22 Nov 2005, by hand, CRParker & MGeraghty			
Order	Family	Taxon	Specimens
Oligochaeta_order	Oligochaeta_family	Oligochaeta species	6 indivs.
Coleoptera	Dytiscidae	Dytiscidae species	1 larva
Diptera	Chironomidae	Chironomidae species	2 larvae
Isopoda	Asellidae	<i>Caecidotea</i> species	1 indiv.
Veneroida	Corbiculidae	<i>Corbicula fluminea</i> (OF Müller, 1774)	3 indivs.
Basommatophora	Planorbidae	<i>Helisoma</i> species	1 indiv.
Mesogastropoda	Viviparidae	<i>Viviparus</i> species	5 indivs.
AL:Cherokee Co., LIRI Little River Falls, 11 May 2005, by hand, JLRobinson			
Order	Family	Taxon	Specimens
Coleoptera	Coleoptera_family	Coleoptera species	1 adult
Diptera	Chironomidae	Chironomidae species	2 pupae
	Limoniidae	<i>Austrolimnophila</i> species	6 larvae
Basommatophora	Physidae	<i>Physa</i> species	1 indiv.
AL:Cherokee Co., LIRI Little River Falls, 16 Jun 2005, black light trap, JLRobinson & CRParker			
Order	Family	Taxon	Specimens
Coleoptera	Coleoptera_family	Coleoptera species	1 adult
	Curculionidae	<i>Platypus</i> species	1 adult
	Heteroceridae	<i>Heterocerus</i> species	1 adult
		<i>Tropicus pusillus</i> (Say, 1823)	1 adult
	Hydrophilidae	<i>Berosus aculeatus</i> LeConte, 1855	1 adult
		<i>Cercyon praetextatus</i> (Say, 1825)	1 adult
		<i>Enochrus</i> species	1 adult
		<i>Tropisternus collaris collaris</i> (Fabricius, 1775)	1 adult
AL:De Kalb Co., LIRI 05XNG, 10-11 May 2007, black light trap, JLRobinson & CRParker			
Order	Family	Taxon	Specimens
Blattaria	Blattellidae	<i>Parcoblatta fulvescens</i> (Saussure & Zehntner, 1893)	1 adult
Coleoptera	Brentidae	<i>Arrhenodes minuta</i> (Drury, 1770)	1 ♂
	Carabidae	Carabidae species	1 adult

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	Cerambycidae	<i>Anelaphus villosus</i> (Fabricius, 1792)	1 adult
	Coleoptera_family	Coleoptera species	1 adult
	Curculionidae	Curculionidae species	1 adult
	Dytiscidae	<i>Celina hubbelli</i> Young, 1979	1 adult
		<i>Coptotomus longulus lenticus</i> Hilsenhoff, 1980	1 adult
	Elateridae	Elateridae species	1 adult
	Haliplidae	<i>Peltoodytes sexmaculatus</i> Roberts, 1913	1 adult
	Hydrophilidae	<i>Enochrus pygmaeus</i> (Fabricius, 1792)	1 adult
	Phengodidae	<i>Phengodes</i> species	1 ♂
	Scarabaeidae	<i>Phyllophaga</i> species	1 adult
		Scarabaeidae species	1 adult
	Scolytidae	Scolytidae species	1 adult
AL:De Kalb Co., LIRI 05XNG, 7 May 2006, by hand, MGeraghty & CRParker			
Order	Family	Taxon	Specimens
Coleoptera	Scarabaeidae	<i>Phyllophaga anxia</i> (LeConte, 1850)	1 adult
		<i>Phyllophaga ilicis</i> (Knoch, 1801)	1 adult
Amphipoda	Amphipoda_family	Amphipoda species	1 indiv.
Isopoda	Asellidae	<i>Lirceus</i> species	4 indivs.
AL:De Kalb Co., LIRI 05XNG, 8 May 2006, by hand, MGeraghty & CRParker			
Order	Family	Taxon	Specimens
Coleoptera	Dryopidae	<i>Helichus fastigiatus</i> (Say, 1824)	1 ♂
AL:De Kalb Co., LIRI 08 1, 10-11 May 2007, black light trap, CRParker & JLRobinson			
Order	Family	Taxon	Specimens
Coleoptera	Coleoptera_family	Coleoptera species	1 adult
Diptera	Tipulidae	Tipulidae species	3 ♂
AL:De Kalb Co., LIRI 08 1, 7 May 2006, by hand, MShew, MGeraghty & CRParker			
Order	Family	Taxon	Specimens
Oligochaeta_order	Oligochaeta_family	Oligochaeta species	5 indivs.
Coleoptera	Coleoptera_family	Coleoptera species	1 larva
Diptera	Chironomidae	Chironomidae species	9 pupae
AL:De Kalb Co., LIRI 08 1, 8 May 2006, black light trap, MShew, MGeraghty & CRParker			
Order	Family	Taxon	Specimens
Coleoptera	Coleoptera_family	Coleoptera species	1 adult
	Dytiscidae	Dytiscidae species	3 indivs.
Diptera	Diptera_family	Diptera species	1 larva
Isopoda	Asellidae	<i>Lirceus</i> species	3 adults
AL:De Kalb Co., LIRI Brooks Branch Beaver Pond, 16-17 Jun 2005, black light trap, JLRobinson & CRParker			
Order	Family	Taxon	Specimens
Diptera	Tabanidae	<i>Chrysops celatus</i> (Pechuman, 1949)	1 ♀
AL:De Kalb Co., LIRI DeSoto SP Laurel Creek <i>Rhyacophila</i> site, 1 Nov 2006, dip net, JLRobinson & CRParker			
Order	Family	Taxon	Specimens
Isopoda	Asellidae	<i>Lirceus</i> species	6 indivs.
AL:De Kalb Co., LIRI DeSoto State Park Laurel Creek, 18 May 2006, by hand, CRParker, JLRobinson & MGeraghty			
Order	Family	Taxon	Specimens
Isopoda	Isopoda_family	Isopoda species	3 indivs.
AL:De Kalb Co., LIRI DeSoto State Park Laurel Creek, 22 Nov 2005, by hand, CRParker & MGeraghty			
Order	Family	Taxon	Specimens
Coleoptera	Dytiscidae	<i>Neoporus carolinus</i> (Fall, 1917)	1 ♂
		<i>Neoporus undulatus</i> (Say, 1823)	1 ♂
Diptera	Chironomidae	Chironomidae species	6 larvae
Isopoda	Asellidae	<i>Caecidotea</i> species	6 indivs.
AL:De Kalb Co., LIRI DeSoto State Park Laurel Creek, 7 May 2006, by hand, MGeraghty & CRParker			
Order	Family	Taxon	Specimens
Coleoptera	Coleoptera_family	Coleoptera species	1 adult
Diptera	Tipulidae	<i>Leptotarsus</i> species	3 larvae
Isopoda	Asellidae	<i>Lirceus</i> species	11 indivs.
AL:De Kalb Co., LIRI DeSoto State Park Laurel Creek, 7-8 May 2006, black light trap, MGeraghty & CRParker			
Order	Family	Taxon	Specimens
Coleoptera	Coleoptera_family	Coleoptera species	1 adult
	Scarabaeidae	<i>Phyllophaga anxia</i> (LeConte, 1850)	1 adult
		<i>Phyllophaga fraterna</i> Harris, 1842	1 adult

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		<i>Phyllophaga ilicis</i> (Knoch, 1801)	1 adult
Hemiptera	Corixidae	Corixidae species	1 adult
AL:De Kalb Co., LIRI DeSoto State Park Lodge Ck below Lodge Falls, 7-8 May 2006, black light trap, MGeraghty & CRParker			
Order	Family	Taxon	Specimens
Coleoptera	Scarabaeidae	<i>Phyllophaga anxia</i> (LeConte, 1850)	1 adult
		<i>Phyllophaga crenulata</i> (Frölich, 1792)	1 adult
		<i>Phyllophaga drakii</i> (Kirby, 1837)	1 adult
		<i>Phyllophaga fusca</i> (Frölich, 1792)	1 adult
		<i>Phyllophaga hirsuta</i> (Knoch, 1801)	1 adult
	Scolytidae	Scolytidae species	1 adult
Diptera	Tipulidae	Tipulidae species	3 adults
AL:De Kalb Co., LIRI DeSoto State Park Lodge Creek upstream, 10 May 2007, black light (sheet), JLRobinson & CRParker			
Order	Family	Taxon	Specimens
Diptera	Diptera family	Diptera species	1 adult
AL:De Kalb Co., LIRI DeSoto State Park Lodge Creek upstream, 7-8 May 2006, black light trap, MGeraghty & CRParker			
Order	Family	Taxon	Specimens
Coleoptera	Scarabaeidae	<i>Phyllophaga hirsuta</i> (Knoch, 1801)	1 adult
		<i>Phyllophaga ilicis</i> (Knoch, 1801)	1 adult
Diptera	Tipulidae	Tipulidae species	2 adults
AL:De Kalb Co., LIRI DeSoto State Park West Fork Little River, 10 May 2005, black light (sheet), JLRobinson			
Order	Family	Taxon	Specimens
Hemiptera	Enicocephalidae	Enicocephalidae species	1 adult
AL:De Kalb Co., LIRI DSSP Cabins Spring, 12 May 2005, by hand, JLRobinson			
Order	Family	Taxon	Specimens
Coleoptera	Dytiscidae	Dytiscidae species	1 adult
Isopoda	Asellidae	<i>Lirceus</i> species	2 indivs.
AL:De Kalb Co., LIRI DSSP Hole in Bend, 12 May 2005, by hand, JLRobinson			
Order	Family	Taxon	Specimens
Coleoptera	Dytiscidae	Dytiscidae species	1 ♂
	Elmidae	<i>Dubiraphia bivittata</i> (LeConte, 1852)	1 adult
	Staphylinidae	Staphylinidae species	1 adult
Diptera	Chironomidae	Chironomidae species	1 larva
Basommatophora	Planorbidae	<i>Helisoma anceps</i> (Menke, 1830)	1 indiv.
AL:De Kalb Co., LIRI Hurricane Creek at Rd 05, 22 Nov 2005, by hand, CRParker & MGeraghty			
Order	Family	Taxon	Specimens
Oligochaeta_order	Oligochaeta_family	Oligochaeta species	9 indivs.
Coleoptera	Dryopidae	<i>Helichus fastigiatus</i> (Say, 1824)	1 ♂
	Elmidae	<i>Promoresia</i> species	3 larvae
		<i>Stenelmis</i> species	1 larva
	Gyrinidae	<i>Dineutus discolor</i> Aubé	1 ♀
Diptera	Chironomidae	Chironomidae species	33 larvae
	Limoniidae	<i>Hexatoma</i> species	1 larva
	Tabanidae	<i>Chrysops</i> species	1 larva
	Tipulidae	<i>Dolichopeza</i> species	2 larvae
Basommatophora	Physidae	<i>Physa</i> species	1 indiv.
AL:De Kalb Co., LIRI Laurel Ck Azalea Cascade, 10-11 May 2007, black light trap, JLRobinson & CRParker			
Order	Family	Taxon	Specimens
Blattaria	Blattellidae	<i>Parcoblatta virginica</i> (Brunner, 1865)	1 adult
Coleoptera	Brentidae	<i>Arrhenodes minuta</i> (Drury, 1770)	1 adult
	Carabidae	Carabidae species	1 adult
		<i>Clivina americana</i> Dejean, 1831	1 adult
		<i>Clivina bipustulata</i> (Fabricius, 1801)	1 adult
		<i>Semiclivina dentipes</i> (Dejean, 1825)	1 adult
	Cerambycidae	Cerambycidae species	1 adult
	Coleoptera_family	Coleoptera species	1 adult
	Dytiscidae	Dytiscidae species	1 adult
		<i>Neoporus clypealis</i> (Sharp, 1882)	1 adult
	Hydrophilidae	Hydrophilidae species	1 adult
	Scarabaeidae	<i>Phyllophaga</i> species	1 adult
Diptera	Psychodidae	Psychodidae species	2 adults
	Pyrgotidae	<i>Pyrgota</i> species	1 ♀
Hemiptera	Reduviidae	Reduviidae species	1 adult
Hymenoptera	Vespidae	<i>Vespa crabro</i> Linnaeus, 1758	1 ♀

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AL:De Kalb Co., LIRI Lynn Overlook Powerline Cut Bog, 11 May 2005, black light trap, JLRobinson			
Order	Family	Taxon	Specimens
Diptera	Tipulidae	<i>Tipula</i> species	1 larva
Isopoda	Asellidae	<i>Lirceus</i> species	1 indiv.
AL:De Kalb Co., LIRI tributary at Rd 05 near Rd 08, 22 Nov 2005, by hand, CRParker & MGeraghty			
Order	Family	Taxon	Specimens
Isopoda	Asellidae	<i>Caecidotea</i> species	1 indiv.
AL:De Kalb Co., LIRI tributary at Rd 05 near Rd 08, 8 May 2006, black light trap, MGeraghty & CRParker			
Order	Family	Taxon	Specimens
Coleoptera	Coleoptera family	Coleoptera species	1 adult
AL:De Kalb Co., LIRI tributary at Rd 05 near Rd 08, 8-9 May 2006, black light trap, MGeraghty & CRParker			
Order	Family	Taxon	Specimens
Coleoptera	Scarabaeidae	<i>Phyllophaga marginalis</i> (LeConte, 1856)	1 adult
AL:De Kalb Co., LIRI West Fork Little River below DeSoto SP ~500m, 10 May 2005, black light (sheet), JLRobinson			
Order	Family	Taxon	Specimens
Lepidoptera	Micropterigidae	<i>Epimartyria auricrinella</i> Walsingham, 1898	1 adult
AL:De Kalb Co., LIRI West Fork Little River below DeSoto SP ~500m, 9 May 2005, black light (sheet), JLRobinson			
Order	Family	Taxon	Specimens
Coleoptera	Elmidae	<i>Oulimnius latiusculus</i> (LeConte, 1866)	1 larva
AL:De Kalb Co., LIRI West Fork Little River below DeSoto SP ~500m, 9 May 2005, by hand, JLRobinson			
Order	Family	Taxon	Specimens
Coleoptera	Coleoptera	<i>Heterosternuta</i> species	1 adult

The records for non-target taxa from Russell Cave National Monument (RUCA) are presented in the table below, organized by location and collection event. All non-target specimens collected during this survey are listed, except those that remain unsorted and unidentified. Those reported here represent 3 Phyla, 5 Classes, 6 Orders, 8 Families, and 4 Genera. In addition, many taxa are included in catchall groups that represent specimens that the authors did not identify. These are indicated in the table by entries such as Oligochaeta_order, Diptera_family, and Coleoptera species. Most of the non-target taxa are aquatic species. However, terrestrial species also are represented. These are highlighted in the table by a pale orange background.

Table 3-2. Non-target specimen data from Russell Cave National Monument (RUCA). [AL, Alabama; Co., County; indivs., individuals; ♀, female; ♂, male]			
AL:Jackson Co., RUCA Cave Entrance, 23 Nov 2005, by hand, CRParker & MGeraghty			
Order	Family	Taxon	Specimens
Oligochaeta	Oligochaeta	Oligochaeta species	8 indivs.
Ixodida	Ixodidae	<i>Ixodes dentatus</i> Neumann, 1899	1 ♀
Diptera	Chironomidae	Chironomidae species	7 larvae
	Limoniidae	Limoniidae species	1 larva
	Tipulidae	Tipulidae species	6 larvae
Amphipoda	Gammaridae	<i>Gammarus</i> species	19 indivs.
Isopoda	Asellidae	<i>Caecidotea</i> species	7 indivs.
Basommatophora	Physidae	<i>Physa</i> species	6 indivs.
AL:Jackson Co., RUCA Ridley Cave, 23 Nov 2005, by hand, CRParker & MGeraghty			
Order	Family	Taxon	Specimens
Oligochaeta	Oligochaeta	Oligochaeta species	2 indivs.
Diptera	Chironomidae	Chironomidae species	3 larvae
	Limoniidae	Limoniidae species	2 larvae
Psocoptera	Psocoptera	Psocoptera species	1 adult
Isopoda	Asellidae	<i>Caecidotea</i> species	5 indivs.
	Isopoda	<i>Isopoda</i> species	1 indiv.

Appendix 4. Species of Interest.

Many of the species found during this survey are of particular interest because of their rarity, conservation ranking, sensitivity to contamination and disturbance, or unique habitat requirements. These taxa may warrant special attention in management considerations affecting aquatic habitats, and thus are presented in the tables with additional information about their biology, distribution, and sensitivity that might be helpful to managers.

The 141 species included in these tables were selected on the basis of the following criteria: (1) they are known from only 1, 2, or 3 parks and thus are considered rare for this study; (2) they have a NatureServe global conservation rank of G1, G2, or G3, or a state conservation rank of S1, S2, or S3 for any 1 of the 7 states in the study area; (3) they have a tolerance value of 3.0 or less; or (4) they have special habitat requirements that may result in their being potentially at risk in the parks.

(1) Number of parks - One of the purposes of the larger study is to assess the role of the parks as conservation reserves for aquatic species in the region, and species that are found in three or fewer of the parks (less than 17 percent) are potentially more at risk than species that occur in a larger number of parks. Therefore, highlighting those species and the parks in which they occur may serve to alert managers to the possible need for greater scrutiny of the environmental concerns connected with those species and their habitats. The parks and their official National Park Service (NPS) abbreviations are listed here. Of course, the occurrence of species in the parks is partly a function of the number of samples that have been collected in each park (for example, the number of collecting trips, monitoring programs, historic interest by scientists, and so on). Thus, because many more samples have been collected in the Great Smoky Mountains National Park (GRSM) than in other parks, and there is a long history of visits by aquatic entomologists dating back decades, many species in GRSM are recorded that are not known to be present in any other park. Some of these

species have widespread distributions in the study area and almost certainly occur in other parks. Only further sampling will overcome this problem. We know some records of species in the parks from the literature, and where such records are known for a park, a superscript (L) is appended to the park's acronym. Thus, LIRI^(L) indicates that a record for Little River Canyon National Preserve (LIRI) is based, at least in part or perhaps entirely, on a literature reference. Some species were described from specimens collected from the parks, and in those cases this is recognized in the list of parks with an asterisk (*) following the park abbreviation.

Appalachian Highlands Monitoring Network

• BISO	Big South Fork National River and Recreation Area
• BLRI	Blue Ridge Parkway
• GRSM	Great Smoky Mountains National Park
• OBRI	Obed Wild and Scenic River

Cumberland Piedmont Monitoring Network

• ABLI	Abraham Lincoln Birthplace National Historic Site
• CARL	Carl Sandburg Home National Historic Site
• CHCH	Chickamauga and Chattanooga National Military Park
• COWP	Cowpens National Battlefield
• CUGA	Cumberland Gap National Historic Park
• FODO	Fort Donelson National Battlefield
• GUCO	Guilford Courthouse National Military Park
• KIMO	Kings Mountain National Military Park
• LIRI	Little River Canyon National Preserve
• MACA	Mammoth Cave National Park
• NISI	Ninety Six National Historic Site
• RUCA	Russell Cave National Monument
• SHIL	Shiloh National Military Park
• STRI	Stones River National Battlefield

(2) Conservation rankings - Conservation rankings are coded systems in which species' vulnerability to extinction are assessed and rated on large geographic scales, such as global, which covers the entire range of a species, or national, which assess the species' vulnerability to extinction within a country. NatureServe (<http://www.natureserve.org/index.jsp>) maintains a list of species that have been evaluated in a standardized and objective manner, and assigned a rank that reflects each species' vulnerability. In this system, species are assigned ranks according to the criteria given in table 6–1. Many state conservation agencies have adopted a very similar system of ranking the conservation status of state species. In the tables below, state ranks are presented as, for example, ALS2 or TNS1, for Alabama state ranking of S2 and Tennessee state ranking of S1, respectively. The evaluation by NatureServe or any of the states in the study area of a species resulting in a rank of 1, 2, or 3 (table 4–1) is justification for that species to be listed in the tables below.

Table 4–1. The three most critical ranks in the NatureServe global system used in this study. Other ranks are included in the NatureServe system, but those are not used here.

Rank	Definition
G1	Critically imperiled — Critically imperiled globally because of extreme rarity or because of some factor(s) making it extremely vulnerable to extinction. Typically five or fewer occurrences or very few remaining individuals (less than 1,000) or acres (less than 2,000) or linear miles (less than 10).
G2	Imperiled — Imperiled globally because of rarity or because of some factor(s) making it very vulnerable to extinction or elimination. Typically 6 to 20 occurrences or few remaining individuals (1,000 to 3,000) or acres (2,000 to 10,000) or linear miles (10 to 50).
G3	Vulnerable — Vulnerable globally because it is very rare and local throughout its range, it is found only in a restricted range (even if abundant at some locations) or other factors make it vulnerable to extinction or elimination. Typically 21 to 100 occurrences or between 3,000 and 10,000 individuals.

(3) Tolerance values - Tolerance values are numbers assigned to taxa on the basis of empirical assessments of the sensitivity of different taxa to various forms of contamination or habitat disturbance (see for example, Barbour and others, 1999; Blocksom and Winters, 2006; Klemm and others, 2003; Lenat, 1988). Most systems use values in the range of 0–10, in which 0 represents those taxa which are highly sensitive to contamination and tend to be the first taxa to be eliminated from contaminated systems, and 10 represents those taxa that are most tolerant to contamination and become the most common taxa in heavily contaminated systems. Tolerance values are considered valuable when biologists sample communities, and assess the species found in each community as a function of the tolerance values and the relative abundances of the species encountered. This normally leads to an index of biotic integrity, or IBI, which is taken as a direct measure of how healthy, or stressed, a community is at the time it was sampled. Various rating systems are in use in the study region, so we have adopted the system used by the North Carolina Department of Environment and Natural Resources (North Carolina Biological Assessment Unit, 2006) wherever possible. Some taxa are not represented in the North Carolina (NC) system. For those species, we examined the tolerance values listed by the Tennessee (TN) Division of Water Pollution Control (Arnwine, 2006) or the Kentucky (KY) Division of Water (Kentucky Division of Water, 2009), and if a taxon was

listed in one of those two sources, we used that tolerance value. If a taxon was not found in these sources, we searched the U.S. Environmental Protection Agency (EPA) biomonitoring protocol manual (Barbour and others, 1999), which lists tolerance values for several regions, including NC. If that list included a value for a taxon not found in the NC, TN, or KY systems, we accepted the tolerance value in the following preference sequence: Mid-Atlantic (MACS), Midwest (OH), Upper Midwest (WI). In the case of *Leptocerus americanus* we used the tolerance value cited by the Pennsylvania Department of Environmental Protection (2007), which is indicated in the table by “PA” following the value. Taxa not having any tolerance value from one of these sources are indicated in the tables with an entry of n/a.

(4) Special habitat requirements - Unique habitat requirements include isolated springs and bogs, madicolous and hygropetric habitats, and semi-terrestrial habitats. Some of these habitats are on the peripheries of more readily recognized aquatic habitats and, thus, may not be seen as unique or vulnerable habitats. For example, small rock-face seeps, often found along roadways, are unique habitats for a number of species specialized on the madicolous habitat, in which the larvae (rarely the adult) live in a thin film of water flowing over the nearly vertical face of the rocks. Such habitats, particularly if found along a roadway, are subject to loss of shading because of the open nature of roadways, roadside mowing operations, and paving of the drainage ditches they flow into. Other organisms live not in streams or seeps, but rather along the periphery of such habitats, in the leaf litter and under or among the rocks and soils around the edges. These species are vulnerable to trampling by visitors and park employees, exotic animals such as European wild boars that root in these places, and other activities that may open up the habitats and lead to excessive drying of the edges. Species that have special habitat requirements therefore are also included in the tables, with entries in the Comments row below the species' entry row.

Additional information is provided in the tables, as well. This includes the elevation range in meters above National Geodetic Vertical Datum of 1929 at which each species was found during our surveys. We did not have elevations for a small number of localities, and therefore elevations are not reported for small number of species. The list of United States and Mexican states and Canadian provinces in which each species has been recorded is listed, as far as is known. Adult flight periods are reported for adult specimens collected during this study, followed in parentheses by flight periods reported in the literature. Specimens collected during this study only as immatures do not have a flight period, although wherever possible a flight period is reported on the basis of literature references. Some species in the tables are based on literature records that did not include any additional information, and for those species some of the entries are listed as n/a.

Following each species record is a Comments record, which contains biological and ecological information about the species based on the authors' knowledge and reports in the literature. Information in this row may include details on food, growth, habitat, behavior, mating, egg laying, parasites, rarity, endemism, and points of interest.

For each genus, the first listing in square brackets [] is a summary for Habitat, Habit, and Trophic Relationships from the summary tables at the end of each taxon chapter in Merritt and others (2008). These summaries are valuable, concise statements of the basic known ecological characteristics of each genus. The meanings of the entries are explained in the tables 4-2, 4-3, 4-4, and 4-5, which

are from tables 6A, 6B, and 6C of Cummins and others (2008).

Table 4–2. Aquatic habitat classification system. (From table 6A of Cummins and others, 2008). [e.g., for example]		
General Category	Specific Category	Description
Lotic erosional (running-water riffles)	Sediments	Coarse sediments (cobbles, pebbles, gravel) typical of stream riffles.
	Vascular hydrophytes	Vascular plants growing on (e.g., moss <i>Fontinalis</i>) or among (e.g., pondweed <i>Potamogeton pectinatus</i>) coarse sediments in riffles.
	Detritus	Leaf packs (accumulations of leaf litter and other coarse particulate detritus at leading edge or behind obstructions such as logs or large cobbles and boulders) and debris (e.g., logs, branches) in riffles.
Lotic depositional	Sediments	Fine sediments (sand and silt) typical of stream pools and margins.
	Vascular hydrophytes	Vascular plants growing in fine sediments (e.g., <i>Elodea</i> , broad-leaved species of <i>Potamogeton</i> , <i>Ranunculus</i>).
	Detritus	Leaf litter and other particulate detritus in pools and alcoves (backwaters).
Lentic limnetic (standing water)	Open water	On the surface or in the water column of lakes, bogs, ponds.
Lentic littoral (standing water, shallow shore area)	Erosional	Wave-swept shore area of coarse (cobbles, pebbles, gravel) sediments.
	Vascular hydrophytes	Rooted or floating (e.g., duckweed <i>Lemna</i>) aquatic vascular plants (usually with associated macroscopic filamentous algae).
	Emergent zone	Plants on the immediate shore area, e.g., <i>Typha</i> (cattail), with most of the leaves above water.
	Floating zone	Rooted plants with large floating leaves, e.g., <i>Nymphaea</i> (pond lily), and non-rooted plants (e.g., <i>Lemna</i>).
	Submerged zone	Rooted plants with most leaves beneath the surface.
	Sediments	Fine sediments (sand and silt) of the vascular plant beds.
Lentic profundal (standing water, basin)	Sediments	Fine sediments (fine sand, silt and clay) mixed with organic matter of the deeper basins of lakes.
Beach zone	Freshwater lakes	Moist sand beach areas of large lakes.
Table 4–3. Categorization of aquatic insect habits (mode of existence). (From table 6B of Cummins and others, 2008). [e.g., for example]		
Category	Description	
Skaters	Adapted for “skating” on the surface where they feed as scavengers on organisms trapped in the surface film (example: Hemiptera: Gerridae - water striders).	
Swimmers	Adapted for “fishlike” swimming in lotic or lentic habitats. Individuals usually cling to submerged objects, such as rocks (lotic riffles) or vascular plants (lentic), between short bursts of swimming (examples: Ephemeroptera: Siphonuridae, Leptophlebiidae).	
Clingers	Representatives have behavioral (e.g., fixed retreat construction) and morphological (e.g., long, curved tarsal claws, dorsoventral flattening, and ventral gills arranged as a sucker) adaptations for attachment to surfaces in stream riffles and wave-swept rocky littoral zones of lakes (examples: Ephemeroptera: Heptageniidae; Trichoptera: Hydropsychidae; Diptera: Blephariceridae).	
Sprawlers	Inhabiting the surface of floating leaves of vascular hydrophytes of fine sediments, usually with modification for staying on top of the substrate and maintaining the respiratory surfaces free of silt (examples: Ephemeroptera: Caenidae; Odonata: Libellulidae).	

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Climbers	Adapted for living on vascular hydrophytes or detrital debris (e.g., overhanging branches, roots and vegetation along streams, and submerged brush in lakes) with modifications for moving vertically on stem-type surfaces (examples: Odonata: Aeshnidae).
Burrowers	Inhabiting the fine sediments of streams (pools) and lakes. Some construct discrete burrows which may have sand grain tubes extending above the surface of the substrate or individuals may ingest their way through the sediments (examples: Ephemeroptera: Ephemeridae - burrowing mayflies; Diptera: most Chironominae, Chironomini- "blood worm" midges). Some burrow (tunnel) into plant stem, leaves, or roots (miners).

Table 4–4. General classification system for aquatic insect trophic relations. (Applicable only to immature and adult stages that occur in the water.) (From table 6C of Cummins and others, 2008).

Functional group (general category based on feeding mechanism)	Subdivision of Functional Group		General particle size range of food (microns)
	Dominant food	Feeding mechanism	
Shredders	Living vascular hydrophyte tissue	Herbivores - chewers and miners of live macrophytes	
	Decomposing vascular plant tissue - coarse particulate organic matter (CPOM)	Detritivores - chewers of CPOM	$>10^3$
	Wood	Gougers - excavate and gallery, wood	
Collectors	Decomposing fine particulate organic matter (FPOM)	Detritivores - filterers or suspension feeders	
		Detritivores - gatherers or deposit (sediment) feeders (includes feeders on loose surface films)	$<10^3$
Scrapers	Periphyton - attached algae and associated material	Herbivores - grazing scrapers of mineral and organic surfaces	$<10^3$
Macrophyte Piercers	Living vascular hydrophyte cell and tissue fluids or filamentous (macroscopic) algal cell fluids	Herbivores - pierce tissues or cells and suck fluids	$>10^{-2}$ - $>10^3$
Predators	Living animal tissue	Engulfers - carnivores, attach prey and ingest whole animals or parts	$>10^3$
		Piercers - carnivores, attack prey, pierce tissues and cells, and suck fluids	

Two letter abbreviations are used in the columns labeled States. These are based on the standard U.S. Postal Service and Canadian Postal Service abbreviations. The complete list of abbreviations is given in the table below.

Table4–5. Postal codes used in the States field in the tables.

States of United States of America			
Code	State	Code	State
AL	Alabama	MT	Montana
AK	Alaska	NE	Nebraska
AZ	Arizona	NV	Nevada
AR	Arkansas	NH	New Hampshire
CA	California	NJ	New Jersey
CO	Colorado	NM	New Mexico
CT	Connecticut	NY	New York
DE	Delaware	NC	North Carolina
DC	District of Columbia	ND	North Dakota
FL	Florida	OH	Ohio
GA	Georgia	OK	Oklahoma
HI	Hawaii	OR	Oregon
ID	Idaho	PA	Pennsylvania
IL	Illinois	RI	Rhode Island
IN	Indiana	SC	South Carolina
IA	Iowa	SD	South Dakota
KS	Kansas	TN	Tennessee
KY	Kentucky	TX	Texas
LA	Louisiana	UT	Utah
ME	Maine	VT	Vermont
MD	Maryland	VA	Virginia
MA	Massachusetts	WA	Washington
MI	Michigan	WV	West Virginia
MN	Minnesota	WI	Wisconsin
MS	Mississippi	WY	Wyoming

Table4–5. Postal codes used in the States field in the tables.

Provinces of Canada			
Code	Province	Code	Province
AB	Alberta	NS	Nova Scotia
BC	British Columbia	NU	Nunavut
LB	Labrador (Politically, Labrador is part of Newfoundland. However, for biogeographic purposes we list it separately here as LB.)	ON	Ontario
MB	Manitoba	PE	Prince Edward Island
NB	New Brunswick	QC	Quebec
NL	Newfoundland (This refers to the island portion of Newfoundland.)	SK	Saskatchewan
NT	Northwest Territories	YT	Yukon
MO	Missouri		

On-Line Resources

Much useful information incorporated into the tables below came from web sites maintained by various authorities. These include:

- Barber-James, H., Sartori, M., Gattolliat, J.-L., and Webb, J., 2013, World checklist of freshwater Ephemeroptera species, accessed on 17 Dec. 2010, at <http://FADA.biodiversity.be/group/show/35>.
- DeWalt, R.E., Neu-Becker, U. and Stueber, G., 2010. Plecoptera species file online, Version 1.1/4.0, accessed on 17 Dec. 2010, at <http://Plecoptera.SpeciesFile.org>.
- Freshwater animal diversity assessment (FADA), Project, 2010, accessed December 17, 2010, at <http://FADA.biodiversity.be>
- McCafferty, P.W. (Editor). 2010. Mayfly Central, accessed December 17, 2010, at <http://www.entm.purdue.edu/mayfly/index.php>
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ORDER EPHEMEROPTERA HYATT & ARMS

MAYFLIES

Mayflies are cosmopolitan, being found on every continent except Antarctica. Slightly more than 3300 species are known, distributed in 42 families, and more than 430 genera (Barber-James and others, 2008). The highest numbers of species are found in the Palearctic region (790), followed by the Nearctic (650), and the Neotropical (607). It is likely that the tropical component of the order is underrepresented in this compilation owing to the historical bias in systematic surveys that have emphasized the Northern Hemisphere (Balian and others, 2008). In the Western Hemisphere, mayflies are found from near the Arctic Circle south through Mexico, and into Central and South America. With approximately 650 species in 20 or more families and more than 100 genera in North America (Canada, the United States, and the non-tropical portions of Mexico), the Nearctic has one of the richest faunas described to this point. During this survey, we found 139 species in 44 genera and 12 families. In LIRI, we found 17 species in 11 genera and 6 families. In Russell Cave National Monument (RUCAN), we found 5 genera of 3 families represented by specimens that could not be determined to species; these are not represented in the tables below.

Mayfly adults are delicate, small to medium size, 2 or 4 winged insects with 2 or 3 long caudal filaments (tails), and usually, with long legs. Adults often are seen flying about streams, rivers, ponds, and lakes. Mayflies are unable to fold their wings, which therefore, are held vertically over the insect's back when at rest. Many species have sexually dimorphic eyes, with the males having the upper facets enlarged, sometimes extremely so, and differently colored than the lower facets. Females never have the eyes modified in this manner. The larvae are aquatic and live in the habitats near where the adults are seen flying. Like the adults, the larvae have 2 or 3 caudal filaments, although the larva may have 3 whereas the adult of the same species has only 2. The larval stage may last 3–4 weeks, or as long as 2.5 years, but typically lasts 1 year. Mayflies grow through a process called hemimetabolous development, which means that they do not pass through a pupal stage before becoming an adult. This type of development is found in many groups of insects, including the Odonata and Plecoptera, which are also aquatic insects and are discussed below. Larvae pass through many instars (10–50) before finally emerging as a subimago, a flying stage that exists between the larval and the full adult stages. Ephemeroptera are unique in that they are the only insects that have a flying stage before becoming sexually mature. The subimago stage may last from a few minutes to several days before molting to the reproductive imago (adult) stage. Subimagos are recognized by the opaque or cloudy condition of the wings, whereas the imago stage has transparent or hyaline wings. In a few species, the females mate and lay eggs as subimagos, and never molt to the true adult stage (Waltz and Burian, 2008). Approximately 50 species of mayflies are known to be parthenogenetic, although only about half a dozen are obligately so. In facultatively parthenogenetic species, fertilized eggs mature more quickly and more successfully than unfertilized eggs (Brittain, 1982). In obligately parthenogenetic species, eggs mature as rapidly and successfully as do fertilized eggs in sexual species. Mating normally occurs in the air, but a few species mate on a surface. Adults live just 1–2 hours or as long as 14 days. Adults do not feed. Eggs are always laid in water. Hatching may take place within minutes, or may be delayed for many months. Excellent general accounts of mayflies are found in Edmunds and others (1976), Brittain (1982), Unzicker and Carlson (1982), Berner and Pescador (1998), and Waltz and Burian (2008).

Mayflies play essential roles in aquatic ecosystems. Many species are herbivores or detritivores as nymphs, converting energy captured by plants and fungi into animal biomass, and they themselves are an important food source for other animals, both invertebrates and vertebrates. A few genera have carnivorous species that feed on small, soft-bodied invertebrates. Feeding usually stops in the penultimate (next to last) instar. Many mayflies are highly intolerant of human-caused contamination and habitat disturbance, which makes them valuable indicators of the health of aquatic ecosystems.

Suborder Furcatergalia Kluge

Forked-gill mayflies

Infraorder Lanceolata McCafferty

Pronggills

Family Leptophlebiidae Banks

Pronggills

This is one of the largest families of mayflies, having more than 600 species in more than 130 genera throughout the world (Barber-James and others, 2013; Barber-James and others, 2008). In North America 87 species in 10 genera are known. We found 12 species in five genera in the study area. As the common name indicates, the larvae are characterized by having the abdominal gills variously divided into forks or prongs, either simply or elaborately but always distinctively.

Genus *Paraleptophlebia* Lestage — [Habitat — Lotic erosional (sediments and detritus): Habit — Swimmers, clingers, sprawlers: Trophic — Collectors-gatherers (coarse detritus, diatoms), facultative shredders--detritivores] This is one of the larger genera of mayflies, having more than 50 species in the Oriental and Holarctic Regions. About 35 species are known from the Nearctic, and we collected 8 species in the parks. *Paraleptophlebia* species are assigned a genus-level tolerance value of 0.9. In RUCA we found a single larva that could not be identified to species.

Species	Parks	States	Elevation range	Rankings	Tolerance value	Flight dates
<i>Paraleptophlebia debilis</i> (Walker, 1853)	BLRI, LIRI , MACA	AL, CA, GA, IA, KY, MA, MI, NC, NH, NY, OH, OK, ON, QC, SC, SD, TN, VA, WI, WV, YK	161–1575 m	G5	0.9	8 May – 25 June (July – Oct.)

Comments — Berner (1975) considered *P. debilis* to be scarce in the Southeast. We have 5 collections and 18 specimens of this species, including 2 males from Lodge Creek. Forewing up to 9 millimeters (mm) in length.

Infraorder Pannota McCafferty & Edmunds Fused-back mayflies

Family Ephemerellidae Klapálek Spiny crawlers

This moderately sized family of about 18 genera and 155 species is restricted to the Nearctic, Palearctic, and Oriental Regions. More than 70 species in about 10 genera are known from North America (Barber-James and others, 2008). The larvae are distinctive and often ubiquitous in streams in the study region, feeding as collector-gatherers or scrapers on detritus, algae, and diatoms. In a series of papers Jacobus and McCafferty (Jacobus, 2010; Jacobus and Fleek, 2010; Jacobus and McCafferty, 2000, 2001, 2003, 2004, 2007, 2008; Jacobus and others, 2002) revised the family during 2000–9, greatly enhancing understanding and identification of all life stages.

Genus *Drunella* Needham - [Habit — Clingers, sprawlers: Trophic — Scrapers] This genus, having about a dozen species, is found in the Palearctic, Oriental, and Nearctic Regions (Jacobus and McCafferty, 2004), or it may have nearly two dozen species almost evenly split between the Palearctic and Nearctic Regions (FADA, 2010).

Species	Parks	States	Elevation range	Rankings	Tolerance value	Flight dates
<i>Drunella lata</i> (Morgan, 1911)	BISO, BLRI, GRSM ^(L) , LIRI	GA, ME, MI, NC, NH, NY, PA, QC, SC, TN, VA, VT, WV	260–1480 m	G5	0.1	(July)

Comments — This species requires warmer water than either of its closely related species, *D. cornuta* or *D. cornutella*. It prefers and is more abundant in larger streams than the other two species (Funk and others, 2008). Larva up to 10 mm in length, female forewing up to 9 mm, male forewing up to 8.5 mm. We have 9 collections and 48 specimens of this species, including a single collection of 10 specimens from the Little River Falls.

Suborder Pisciforma McCafferty

Minnow, Brush-legged, and Flat-headed mayflies

Family Ameletidae McCafferty

Painted minnows

The Ameletidae are a small family of fewer than 60 species in two genera, found in the Nearctic, Palearctic, and Oriental Regions. Only one genus with 35 species is found in the Nearctic. We found four species in the parks.

Genus *Ameletus* Eaton - [Habitat — Lotic erosional and depositional: Habit — Swimmers, clingers: Trophic — Scrapers, Collectors-gatherers (detritus and diatoms)] This is a Northern Hemisphere genus having about 52 species in the Palearctic, Oriental and Nearctic Regions. Thirty-five species occur in North America, most of them in the West, only about 8 species are found in the East. We found four species in the parks. Several species of *Ameletus* are parthenogenetic, with no recognized males known. Zloty (1996) revised the bisexual North American species, and presented separate keys to the adults of the six species found in the East (2 parthenogenetic species were excluded), as well as a key to the western species. The larvae of the four species found in the parks are known. Carle (1978) provided information to separate the adults and larvae of *A. cryptostimulus* and *A. lineatus*.

Species	Parks	States	Elevation range	Rankings	Tolerance value	Flight dates
<i>Ameletus lineatus</i> JA Traver, 1932	BISO, GRSM ^(L) , LIRI , MACA	AL, AR, IL, IN, KY, MI, MO, NC, NH, OH, PA, SC, TN, VA, WI, WV	183–1480 m	G5	2.4	(Apr. - June)
Comments — This species is parthenogenetic. Larvae are found in debris and emergent vegetation along the banks of swift, cool streams (Burks, 1953). Larva up to 14 mm in length, forewing up to 12 mm. We have 46 records numbering 206 specimens, including 17 specimens from a single location in LIRI.						

Family Heptageniidae Needham in Needham & Betten

Flat-headed mayflies, or Flatheads

The flat-headed mayflies are a large family of nearly 600 species. Half of all known species are found in the Palearctic Region, about 140 species are found in the Oriental Region, and nearly as many are found in the Nearctic Region. About 20 species are known from the Afrotropical Region, fewer than 5 are known from the Neotropical Region, and none are known from Australia. In the Southeast, 67 species are known (McCafferty and others, 2010). We collected 41 species in 8 genera in the parks, including 9 species in 6 genera in LIRI.

As the common name implies, these insects are very flat dorsoventrally in the larval stages. This form allows the insects to live in very high current flows on substrates in riffles because they actually are within a narrow boundary layer of slow current that is formed when fast moving water flows over a solid substrate. The dorsoventrally compressed nature of their bodies, and the orientation of the legs out to the side of the body rather than underneath the body, gives them the freedom to move actively over the substrate without facing the strongest current just fractions of a millimeter above. In many streams in the study area, larvae of flatheads can be seen scooting rapidly about on rocks, even when the rocks have been just removed from the water. In certain genera, some species have the plate-like abdominal gills modified so that they form a disc-like attachment mechanism that further enhances their ability to live in fast currents.

Mature larvae are often quite large, up to 20 mm in length, excluding the caudal filaments. They feed by scraping diatoms, algae, and organic matter from the substrate surface.

Genus *Epeorus* Eaton - [Habitat — Lotic erosional: Habit — Clingers: Trophic — Scrapers; facultative collectors-gatherers] A large genus of flat-headed mayflies with nearly 90 described species. Approximately 52 species are known from the Palearctic, 18 from the Nearctic, 14 from the Oriental, and 2 in the Neotropical Regions. The larvae are easily recognizable in the field because they are the only heptageniids in the study area that have just two tails. Four species were found in the parks. At RUCA we found an unidentifiable larva of *Epeorus* at the main cave entrance.

Species	Parks	States	Elevation range	Rankings	Tolerance value	Flight dates
<i>Epeorus vitreus</i> (F Walker, 1853)	BISO, BLRI, GRSM ^(L) , LIRI	AL, GA, KY, MA, MB, ME, MI, NC, ND, NH, NY, ON, PA, QC, SC, TN, VA, VT, WI, WV	315–867 m	G5	1.3	2 May - 29 July (June - July)

Comments — We have 57 collections and 741 specimens of this species, including a single specimen from **LIRI**.

Genus *Heptagenia* Walsh – [Habitat — Lotic erosional: Habit — Clingers (swimmers): Trophic — Scrapers; facultative collectors-gatherers] This genus has about 25 species, 1 from the Oriental Region and 12 each from the Palearctic and Nearctic Regions.

Species	Parks	States	Elevation range	Rankings	Tolerance value	Flight dates
<i>Heptagenia marginalis</i> N Banks, 1910	BISO ^(L) , BLRI, GRSM ^(L) , LIRI , OBRI	AL, GA, KY, NC, NY, OH, PA, SC, TN, VA, WV	261–1025 m	G5	2.5	1 May - 27 Oct.

Comments — Larva up to 11 mm in length, forewing up to 11 mm. We have 38 collections and 213 specimens of this species, including a single female from Brooks Branch in LIRI.

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Genus *Leucrocuta* Flowers — [Habitat — Lotic erosional and depositional (slow-flowing warm waters): Habit — Clingers: Trophic — Scrapers; collectors-gatherers] This genus is confined to North America and consists of 10 species. Six species were found in the parks.

Species	Parks	States	Elevation range	Rankings	Tolerance value	Flight dates
<i>Leucrocuta hebe</i> (McDunnough, 1924)	BISO ^(L) , GRSM ^(L) , LIRI , STRI	AB, AL, AR, CT, GA, IA, IL, IN, KY, MD, ME, MI, MN, NC, NH, NY, OH, OK, ON, PA, QC, SC, SD, TN, VA, VT, WI, WV	170–586 m	G5	2.4	1 June - 28 July

Comments — Larvae can be found on rocks in all types of streams in moderate current (Flowers and Hilsenhoff, 1975). We have 13 collections and 30 specimens of this species, including a single male from the Little River falls.

Genus *Maccaffertium* Bednarik - [Habitat — Lotic and lentic erosional (depositional): Habit — Clingers (under loose cobbles and boulders): Trophic — Scraper; facultative collectors-gatherers] This is a Nearctic genus of 17 species, one of which extends into the Neotropics. For many years these species were treated as *Stenonema*, and many older records of *Stenonema* now refer to *Maccaffertium*. At **RUCA** we found two larvae of this genus that were not determined to species,

Species	Parks	States	Elevation range	Rankings	Tolerance value	Flight dates
<i>Maccaffertium exiguum</i> (JR Traver, 1933)	BISO ^(L) , BLRI, LIRI , MACA ^(L) , NISI, OBRI ^(L)	AL, AR, FL, GA, IA, IL, IN, KY, LA, MI, MN, MO, MS, NC, NE, NY, OH, OK, SC, SD, TN, TX, VA, WI, WV	157–867 m	G5	1.9	5 June - 29 Aug. (May - Aug.)

Comments — This species inhabits the middle reaches of medium sized rivers (Lewis, 1974). Larvae are found in medium to large streams on rocks and debris (Flowers and Hilsenhoff, 1975). In a Coastal Plain river in Georgia, Jacobi and Benke (1991) found *M. exiguum* to have an asynchronous multivoltine life-history pattern. Larva up to 10 mm in length, male forewing up to 9 mm. We have 13 collections and 220 specimens of this species. We collected two males at Little River falls.

<i>Maccaffertium vicarium</i> (F Walker, 1853)	BISO ^(L) , BLRI, GRSM ^(L) , LIRI , OBRI ^(L) , SHIL	AL, AR, CT, GA, IA, IL, IN, KY, MA, MB, MD, ME, MI, MN, NB, NC, NE, NF, NH, NS, NY, OH, OK, ON, PA, QC, SC, TN, VA, VT, WI, WV	155 - 973 m	G5	1.0	2 May - 30 Aug.
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Comments — We have 52 collections and 477 specimens of this species. We collected a single larva at Bear Creek.

Genus *Stenacron* Jensen - [Habitat — Lotic and lentic erosional: Habit — Clingers: Trophic — Scrapers; facultative collectors-gatherers] This is a North American endemic genus of seven species. We found four species in the parks. *Stenacron* species are very sensitive to contamination, particularly acid mine drainage (Pond and others, 2008).

Species	Parks	States	Elevation range	Rankings	Tolerance value	Flight dates
<i>Stenacron pallidum</i> (JR Traver, 1933)	BISO ^(L) , BLRI, GRSM ^(L) , LIRI , OBRI ^(L)	KY, LA, NC, NY, OH, SC, TN	329–1370 m	G5	2.7	1–29 July

Comments — Larvae up to 8 mm in length. We have 121 collections and 651 specimens of this species. In LIRI we collected two larvae at the Little River falls.

ORDER ODONATA FABRICIUS

DRAGONFLIES AND DAMSELFLIES

The Odonata are commonly encountered aquatic insects throughout the world, being present on every continent except Antarctica. Dragonflies and damselflies consist of nearly 5,700 species world-wide: more than 2,900 species (in 12 families and 427 genera) are dragonflies (Suborder Anisoptera), and more than 2700 species (in 19 families and 352 genera) are damselflies (Suborder Zygoptera) (Kalkman and others, 2008). Odonata species richness is concentrated in the Neotropical and Indo-Malayan regions, which contain almost 60 percent of known species (Clausnitzer and others, 2009). In North America, there are 350 species of dragonflies in 5 families and 68 genera, and 161 species of damselflies in 8 families and 28 genera.

The adults are excellent and obvious fliers around lakes, ponds, swamps, rivers, and streams in forested areas, as well as in open plains. Many species are large, colorful, and exhibit fascinating behaviors, such as hunting for flying insect prey, patrolling a mating territory, or flying in tandem when mating and laying eggs. In addition, many species perch; that is they return to the same spots repeatedly to rest and remain there for several seconds to minutes at a time. Perching behavior makes it possible for patient photographers to approach and take pictures. Many excellent photographs of odonates illustrate a wide number of field guides, helping to enlighten and educate the public about the group. Like mayflies, odonates are unable to fold their wings and must hold them out to the sides or vertically over their backs when not flying. This, too, makes it easier for naturalists to get a good view of the insects.

One striking distinguishing characteristic of all odonates is their reproductive system that uses indirect sperm transfer. Males have two sets of genital organs. The primary genitalia are at the end of the abdomen, as in virtually all insects, and the secondary genitalia are on the underside of the second and third segments. To prepare for mating, a male bends his abdomen forward and connects the primary genitalia with the secondary genitalia. In this position, he transfers his sperm to the secondary genitalia. This may happen before a male wins a female or after successful courting. When a male induces a female to mate, he holds her by her neck using the long appendages at the end of his abdomen. The female then curls her abdomen forward and connects with the male's secondary genitalia on the second abdominal segment. The pair may be perched or flying while mating, which may last a minute or two, or an hour or more. Normally, the male continues to hold the female until she finishes laying her eggs. However, other males may try to dislodge the pair and take the female. So guarding behavior by the successful male is often necessary to ensure the eggs are fertilized and laid using his sperm. Eggs are laid using several techniques, including ovipositing into the stems of aquatic plants or even into logs. Those groups which oviposit into plant material have a well-developed ovipositor. All damselflies and the dragonflies Aeshnidae and Petaluridae have ovipositors. Some of the species that oviposit into plant land on the plants and then back down the stem into the water to oviposit into the submerged portion of the plant, some times as much as 40 centimeters (cm) below the surface. Other species oviposit by dipping the abdomen into water while flying over the surface and washing the eggs off. Hatching usually takes place 2–4 weeks after oviposition, but in some species the eggs enter a diapause in order to pass the winter as eggs which then hatch in the spring. Odonate larvae pass through 5–15 molts. The larval stage may last a few months to 3 years, depending primarily on temperature and photoperiod. Most species in the study area have a univoltine life history. Larvae that are ready to molt to the adult stage can be recognized by their very dark wing pads, similar to the condition in mayfly larvae that are ready to molt to the subimago stage. The larvae crawl out of the water to transform. Some species remain very close to the water's edge, whereas others may move considerable distances from the water, even climbing high into trees to molt. The larvae are less well known than the adults but are no less fascinating. All odonate larvae are predaceous and have a unique "lower lip" (labium) that functions as a prey grabbing instrument. This lower lip is hinged and has highly modified components armed with teeth, spines, and setae. Larvae hunt either actively by climbing about looking for prey or by hiding in the substrate and ambushing prey when they pass close by. When a larva attacks a prey item, it juts its labium forward toward the prey at great speed. The palps of the labium grab the prey, securing it with the spines and teeth, and then jerking it back to the mouth to be eaten. In some larvae the labium is flat and held under the head, whereas in others, it is cupped and held in front of the face, resembling a toothed mask.

Odonata are integral parts of their ecosystems. In many habitats, the larvae are the top predators in freshwater ecosystems, feeding on virtually anything

that moves and is smaller than they are. In turn, many fish feed on dragonfly and damselfly larvae. Larvae also have specific habitat requirements and thus have the potential to be important indicator species. They are generally more tolerant of contamination and habitat disturbance than are mayflies, as is reflected in the tolerance values assigned in the tables below. As adults, dragonflies and damselflies are persistent predators of other adult aquatic and terrestrial insects, feeding frequently over an adult life span that may last many weeks, and, they also become the prey of larger hunters, such as birds.

Many field guides and books are available to aid in identifying odonates in both the larval and adult stages and provide valuable information on habitats, habits, and other biological details. The following references were used in developing these tables: Abbott (2005), Beaton (2007), Huggins and Brigham (1982), Needham and others (2000), Tennessen (2008), Westfall and May (1996).

We found 2 families, 3 genera, and 4 species of damselflies (suborder Zygoptera) in LIRI, but none of them are considered species of interest for this report.

Suborder Anisoptera Selys

Dragonflies

Adult dragonflies are easily distinguishable from adult damselflies by their larger size and stouter bodies; their close-set, very large eyes; and their broad hind wings that are shaped differently than the forewings. Dragonfly larvae are easily distinguished from damselfly larvae by the absence of three large, external gills at the end of the abdomen. Dragonflies have gills internally in the rectum, and live specimens can be seen “inhaling” and “exhaling” when observed carefully. If disturbed, the larvae can rapidly expel water from the rectum and jet away by the hydraulic force of this expulsion.

The taxonomic arrangement used here treats Corduliidae, Libellulidae, and Macromiidae as separate families. This differs from the treatment in Needham and others (2000), the most comprehensive manual for dragonfly identification for North America, in which Corduliinae and Macromiinae are considered as subfamilies of Libellulidae. The arrangement used here is followed by most North American workers today (Garrison, 2010; Paulson and Dunkle, 2012).

During this study, we found 6 species, 6 genera, and 5 families of dragonflies in LIRI. Two of these are potential species of interest.

Family Aeshnidae Rambur

Darners

Darners are cosmopolitan and include some of the largest dragonflies in the study area. The adults have very large eyes that meet at the top of the head. Most species are quite colorful, having green, blue, red, and brown body markings. Adults tend to fly high above the ground or water when feeding. Some species are known to migrate, generally from northern areas southward as the days cool and shorten. The larvae are slender and have limited setae (hairs) on the body. They crawl about the habitat, climbing over vegetation and debris, looking for prey. Larger individuals will feed on smaller individuals of the same species. The labium is flat in all species, never cupped into a mask. Prey of aeshnids sometimes includes tadpoles.

World-wide more than 430 species are known, representing more than 50 genera. Approximately 47 species of darners are found in the Nearctic, distributed among 13 genera (Kalkman and others, 2008). We found 7 species in 6 genera in the parks but just one in LIRI.

Genus *Boyeria* McLachlan -

Spotted Darners

[Habitat — Lotic erosional and depositional (detritus, vascular hydrophytes): Habit — Climbers—sprawlers (clingers under rocks): Trophic — Predators (engulfers)] *Boyeria* is a northern genus. Two species are found in North America, and one each is found in Japan and Europe. We found both North American species in the parks.

Species	Parks	States	Elevation range	Rankings	Tolerance value	Flight dates
<i>Boyeria vinosa</i> (T Say, 1839) Fawn Darner	BISO ^(L) , BLRI, CARL, COWP, CUGA, GRSM ^(L) , GUCO, LIRI , MACA ^(L) , OBRI ^(L)	AL, AR, CT, DC, DE, FL, GA, IA, IL, IN, KS, KY, LA, MA, MD, ME, MI, MN, MO, MS, NB, NC, NE, NH, NJ, NS, NY, OH, OK, ON, PA, PE, QC, RI, SC, TN, TZ, VA, VT, WI, WV	259–987 m	G5, NCS3	5.9	1–31 Aug. (May - Oct.)

Comments — Larvae live in small to medium-sized forested streams and in some localities are quite common in these habitats, hiding under rocks, logs, and similar large objects. It is ranked vulnerable in North Carolina. Larva up to 37 mm in length, adult up to 71 mm. We have 140 collections and 556 specimens of this species, including 6 specimens from 2 localities in LIRI.

Family Cordulegastridae Tillyard

Spiketails

This is a small family with about 50 species in 5 genera. Most species are found in the Oriental and Palaearctic regions. A single genus having 10 species is known from North America. The females of cordulegastrids have an obvious pointed ovipositor, which is the source of the common name.

Genus *Cordulegaster* Leach -

Spiketails

[Habitat — Lotic depositional (headwater streams, sand, silt, detritus): Habit — Climbers—Burrowers: Trophic — Predators (engulfers, await prey)] The genus *Cordulegaster* is found only in the Northern Hemisphere, with approximately 14 species known from the Palaearctic, and 10 found in the Nearctic. We identified five species in the parks. The larvae are found in small woodland streams, where they bury themselves in silt or sand in slow-flowing areas, leaving only the antennae, the eyes, and the terminal abdominal segment exposed. They wait in this position until a suitable prey item comes within reach. The adults are normally found flying along the same streams. Larvae of the different species are distinguishable. The genus has a moderate tolerance value of 5.7.

Species	Parks	States	Elevation range	Rankings	Tolerance value	Flight dates
<i>Cordulegaster obliqua</i> (T Say, 1839) Arrowhead Spiketail	CUGA, GRSM ^(L) , LIRI	AL, AR, CT, DC, FL, GA, IL, IN, KS, KY, LA, MA, MD, ME, MI, MN, MO, MS, NC, NH, NJ, NY, OH, OK, ON, PA, PA, QC, RI, SC, TN, TX, VA, WI, WV	390–501 m	G4, GAS3	5.7	7–27 May (Apr. - July)

Comments — This species is considered vulnerable in Georgia. We found 4 specimens from 3 locations in LIRI. This is the largest spiketail, with the larva up to 45 mm in length, and the adult up to 88 mm.

ORDER PLECOPTERA BURMEISTER

STONEFLIES

The stoneflies, Order Plecoptera, are hemimetabolous aquatic insects distributed world-wide. Approximately 3,500 species are known, distributed among 16 families and about 270 genera. As with virtually all insects, much more study has occurred in the Northern Hemisphere than in the Southern Hemisphere and more in the Temperate than in the Tropical regions. This, therefore, considerably biases our knowledge and understanding of the distribution, ecology, and biology of stoneflies. Current information indicates that stoneflies are largely restricted to cold, running waters. Only a relative handful is found in lakes or other lentic waters, and arid lands are virtually devoid of stoneflies (Fochetti and Tierno de Figueroa, 2008). Stoneflies are weak fliers and poor dispersers - some adults lack functional wings - and coupled with their ecological limitations, tend to be highly restricted in distribution and to display a relatively high degree of endemism. Very few species are found on more than one continent or biogeographic region, and within regions distributions often are restricted to smaller geographic subdivisions. The greatest numbers of species are found in Asia (approximately 1,500 species [Fochetti and Tierno de Figueroa, 2008]), the Nearctic (650 species), and Europe (420 species). It is likely that further study in the coming decades will almost double the number of known species of Plecoptera, with very many new taxa to be found in the tropical regions of the world (Fochetti and Tierno de Figueroa, 2008).

The higher taxonomy of Plecoptera, like that of most insect groups, is not resolved to everyone's satisfaction. The taxonomy used here is the most widely accepted and is based on Zwick (2000), as reflected in Stewart and Stark (2008). Two suborders are recognized, the Northern Hemisphere Arctoperlaria Zwick, and the Southern Hemisphere Antarctoperlaria Zwick. Only the former is found in North America. The Arctoperlaria is subdivided into two groups, the Euholognatha Zwick and the Systellognatha Enderlein.

About 650 species of stoneflies are found in North America, in 9 families and around 100 genera. In this study we found 136 species in 34 genera and all 9 families. North American stonefly larvae can be identified to genus, and in some genera, many species are identifiable, as well. Indispensable resources for stonefly larval taxonomy include Stewart and Stark (1993, 1988, 2008). A new series of publications on adult taxonomy, which includes keys to species, is the "Stoneflies (Plecoptera) of Eastern North America," volumes 1 and 2 (Stark and Armitage, 2000, 2002).

Most North American Plecoptera species have univoltine (1 year) or semivoltine (2 year) life cycles (Stewart and Stark, 1988). A small number of species from northern latitudes may have 3-year life cycles. Species that have univoltine life cycles are characterized as being either fast or slow. A fast, univoltine population is one in which a significant amount of time is spent resting in the egg and (or) larval stage without hatching or with no appreciable growth occurring. In these populations, growth occurs very quickly over just a few months. A slow, univoltine life cycle is one in which there is no stasis during growth, which occurs steadily, if not uniformly, over most of the year. Larvae pass through numerous instars, 10--20 or more, although it is virtually impossible to be precise and the number of instars may vary depending on environmental factors (Stewart and Stark, 1988). Stonefly larvae have a wide range of feeding and habitat requirements (Stewart and Stark, 1988), and the broad generalizations provided in Merritt and others (2008) are best viewed with caution. Many larvae are shredders/herbivores, others are carnivores, some are omnivores, and many begin feeding in one manner as early instars before switching to a different manner of feeding as they mature. Habitat requirements are more stable over the life of larvae, and most species can be characterized as preferring a particular type of stream on the basis of size, temperature, gradient, permanency, or other criteria. Many species have specific microhabitat requirements within a water body. One species is known only at depths of 40--60 meters (m) in Lake Tahoe; another, from the study area is found only in root mats in undercut banks of Appalachian streams. Some of the leaf shredder species can be reliably found in accumulations of leaves and other coarse organic matter.

Stonefly adults rarely feed, and in fact, have only poorly developed mouth parts. The function of the adults is to reproduce, and consequently adults are short lived. Among the Arctoperlaria families, an intriguing mating behavior exists that is not found among the Antarctoperlaria. Many species across many families use vibrational communication (drumming) that allows males and females to locate each other (Stewart and Sandberg, 2006). In this behavior, among

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aggregations of individuals following emergence from the larval habitat, males will signal to potential mates in one of four ways: (1) by tapping the substrate with his abdomen, which may have a specialized structure called a hammer; (2) scratching or scraping the substrate; (3) by rubbing the substrate with the abdomen; and (4) by tremulation or shaking of the substrate. Species specific patterns of vibration using one of these methods allow females within range to distinguish potential mates, and the females will then respond to the males with their own drumming pattern, almost always produced by tapping or by tremulation. Laboratory studies have demonstrated that individuals can detect each other as far as 8 m apart. When a potential mate has been detected, they establish a duet pattern of drumming. When the pair has decided the potential for mating with an individual of the same species exists, the male begins moving toward the female by orienting in response to her vibrational communications until he locates her and mating ensues. Stoneflies are believed to have the most complex form of vibrational communication among insects.

Stark and others (1998, 2012) established common names for about 620 species of Nearctic stoneflies. Each family is given a name, and every species in the family has a name that incorporates the family name. For example, the family Capniidae is called the Snowflies, and the species *Allocapnia formosa* Ricker, 1952, is called the Smokies Snowfly. Family and species names based on this system are given below.

During this survey we collected 24 species in 16 genera and 7 families in LIRI.

Suborder Arctoperlaria Zwick Group Euholognatha Zwick

Family Capniidae Klapálek Snowflies

This is one of the families of winter stoneflies, so called because the adults emerge in the winter months, principally from Nov. through Mar.. The family contains more than 310 described species in 17 genera worldwide, and of those, the majority are found in the Nearctic. More than 150 species in 10 genera are found in North America. We collected 9 species in 2 genera in the parks, but only 2 species in one genus in LIRI. Male snowflies are commonly brachypterous (short-winged) while the females have wings longer than the abdomen (macropterous). Adults are dark brown to black, and may be seen crawling about on snow after emergence, accounting for the common name.

Genus *Allocapnia* Claassen - [Habitat — Lotic erosional (coarse sediments, wood, leaf packs) and depositional: Habit — Clingers: Trophic — Shredders detritivores] Approximately 40 species of *Allocapnia* are known from North America, and we found 8 species in the parks. Males of most species have the wings shorter than the body, at least in some specimens, and sometimes males may be wingless. Females have fully developed wings that extend beyond the end of the abdomen. Snowflies often are found in springs, including those that frequently are dry a short distance from the source (Grubbs, 2011). Bouchard and others (2009) have shown that two species of *Allocapnia* (*A. granulata* and *A. pygmaea*), despite being winter stoneflies often found on snow, are not freeze tolerant. This finding may explain why adults are more commonly found in late winter and early spring. Larvae of *Allocapnia* cannot be identified to species at present, so the genus has been assigned a tolerance value of 2.5. In RUCA we collected only a single larva which could not be determined to species.

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Species	Parks	States	Elevation range	Rankings	Tolerance value	Flight dates
<i>Allocapnia nivicola</i> (Fitch, 1847) Brook Snowfly	CUGA, LIRI	AL, CT, DC, DE, IL, IN, KY, MA, MD, NB, NC, NJ, NS, NY, OH, PA, QC, RI, TN, VA, VT, WI, WV	288–423 m	G5	2.5	2–30 Mar. (Dec. – Apr.)
Comments — “... <i>nivicola</i> occurs almost entirely in small stony brooks.” (Ross and Ricker, 1971). <i>Allocapnia nivicola</i> emerged from January to April in Pennsylvania (Masteller, 1983). DeWalt and others (2005) rated this species critically imperiled in Ohio. Larva up to 7.5 mm in length, adult up to 7 mm. We have 4 collections and 21 specimens of this species, which includes 11 specimens from 3 locations in LIRI.						
<i>Allocapnia recta</i> (Claassen, 1924) Eastern Snowfly	BLRI, CARL, GRSM ^(L) , LIRI , OBRI	AL, CT, DC, DE, GA, IL, IN, KY, LA, MA, MD, ME, MS, NC, NH, NS, NY, OH, ON, PA, QC, SC, TN, VA, VT, WI, WV	266–895 m	G5	2.5	25 Oct. - 1 Jan. (Nov. - Apr.)
Comments — “This species occurs in fairly rapid, clear, cool streams with a gravel or rocky bottom and is more common than most species of the genus in very small spring-fed brooks.” (Ross and Ricker, 1971). Larva up to 7.5 mm in length, adult up to 6 mm. This is a common species: we collected more than 800 specimens in the parks. However, we found only a single male in LIRI.						

Family Leuctridae Klapálek

Needleflies

This family has just over 320 species worldwide with about 60 known from North America. The common name is in reference to the very slender appearance of the adults, in which the wings are “rolled” around the sides of the body when at rest. Larvae are primarily detritivores. In the study region, these are very common and often very abundant species in small, cold streams.

Subfamily Leuctrinae Klapálek

Genus *Leuctra* Stephens - [Habitat — Lotic erosional and depositional: Habit — Sprawlers clingers: Trophic — Shredders detritivores] This genus includes about 200 species worldwide, with nearly 30 species in North America. We found 17 species in the parks. Larvae are inseparable at this time; species have been assigned a genus-level tolerance value of 2.5.

Species	Parks	States	Elevation range	Rankings	Tolerance value	Flight dates
<i>Leuctra alexanderi</i> Hanson, 1941 Anakeesta Needlefly	BISO, BLRI, GRSM ^(L) , LIRI , OBRI	KY, PA, TN, VA, WV	232–1442 m	G4	2.5	1 Apr. - 27 July
Comments — Male up to 5 mm in length, female up to 6 mm. We have 16 collections and 110 specimens of this species, including 16 specimens from 2 locations in LIRI .						
<i>Leuctra ferruginea</i> (Walker, 1851) Eastern Needlefly	BLRI, COWP, CUGA, GRSM ^(L) , LIRI	AL, CT, DE, FL, KY, MA, MD, ME, MI, MN, MS, NB, NC, NF, NS, NY, OH, PA, QC, SC, SK, VA, WI, WV	274–1944 m	G5	2.5	1 Feb. - 31 Nov. (Jan. - Dec.)
Comments — It is perhaps the most common stonefly in the study area. This species prefers small, cold streams, but can be found in a wide variety of habitats. Emergence occurs over an extended period, and adults can be found almost every month of the year in the study region. Development seems strongly affected by stream temperatures, with each stage of development taking longer at lower temperatures. In Prince Edward Island, Dobrin and Giberson (2003) reported a 2-year life cycle, similar to the life cycle reported for Ontario populations. Harrison and Stark (2010) described two new species from Mississippi that previously would have been called <i>L. ferruginea</i> . It is possible that either or both of these newly recognized species will be found in the parks. Larva up to 7 mm in length, adults up to 8.5 mm. We have 100 collections and 829 specimens of this species. We collected 4 specimens from 2 locations in LIRI .						
<i>Leuctra grandis</i> N Banks, 1906 Grand Needlefly	BISO ^(L) , BLRI, GRSM ^(L) , LIRI , MACA	AL, KY, MA, ME, NB, NC, PA, TN, VA, WV	221–1757 m	G4	2.5	2 Mar. - 30 July
Comments — We have 28 collections and 82 specimens of this species, which includes a single specimen from a backcountry stream in LIRI .						
<i>Leuctra monticola</i> Hanson, 1941 Mountain Needlefly	GRSM ^(L) , LIRI	TN, VA	501 m	G1, TNS3, VAS1	2.5	10 May
Comments — An uncommon, regional southern Appalachian endemic (B.C. Kondratieff, Colorado State University, written commun., 2010). This species is considered critically imperiled globally (G1), and similarly is ranked critically imperiled in Virginia. In Tennessee, <i>L. monticola</i> is considered vulnerable. We collected a single specimen from Laurel Creek in LIRI .						
<i>Leuctra rickeri</i> James, 1976 Spined Needlefly	LIRI	AL, IA, IL, IN, KY, MS, OH, WV	376–549 m	G4	2.5	9 -18 May
Comments — Male up to 7 mm in length, female up to 7.5 mm. We have 9 collections and 57 specimens of this species.						

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<i>Leuctra sibleyi</i> Claassen, 1923 Brook Needlefly	BISO, BLRI, GRSM ^(L) , MACA, RUCA	CT, DE, IL, IN, KY, MA, MD, ME, NB, NC, NY, OH, ON, PA, QC, TN, VA, WI, WV	218–1944 m	G5	2.5	5 Mar. - 30 June (May - July)
Comments — This species lives in cool spring streams. Larva up to 9 mm in length, adult up to 11 mm in length. We have 25 collections and 110 specimens of this species. This includes a single male collected at the main cave entrance at RUCA.						
Genus Zealeuctra Ricker — [Habitat—Small streams (some intermittent): Habit — Sprawlers clingers: Trophic — Shredders detritivores] This genus of 11 species is restricted the central and eastern North America (Grubbs and others, 2013). Larvae are found in, and are well adapted to, intermittent headwater streams (Snellen and Stewart, 1979).						
Species	Parks	States	Elevation range	Rankings	Tolerance value	Flight dates
<i>Zealeuctra claasseni</i> (Frison) Common Needlefly	LIRI , OBRI	AR, IL, IN, KS, KY, MO, OK, TN, TX, WV	285–511 m	G5	1.0	3 Feb. - 22 Mar.
Comments — Snellen and Stewart (1979) studied the life history of <i>Z. claasseni</i> and <i>Z. hitei</i> Ricker & Ross. Females produce both nondiapausing and diapausing eggs. Diapausing eggs can remain dormant at least 2 years before hatching, thus permitting populations to survive very dry conditions. Adult up to 10 mm in length. We have 4 collections and 111 specimens of this species, with 96 specimens from a single location in LIRI.						

Family Nemouridae Newman Forestflies

This is the second largest families of stoneflies, having more than 630 described species (Fochetti and Tierno de Figueroa, 2008). The largest number of species is known from the Oriental region, which is also considered one of the most poorly known areas for stoneflies. Approximately 80 species are known in North and Central America. No forestflies are found in South America. The Palaearctic has more than 130 species, and several genera are Holarctic. Baumann (1975) considered Nemouridae the dominant stonefly family in mountain-river ecosystems in terms of species and biomass. The larvae are detritivores.

Subfamily Nemourinae Newman

Genus *Ostrocerca* Ricker — [Habitat — Lotic temporary streams: Habit — n/a: Trophic — n/a] This is a Nearctic endemic with six described species, including four in the study area. Only one was collected during this survey.

Species	Parks	States	Elevation range	Rankings	Tolerance value	Flight dates
<i>Ostrocerca truncata</i> (Claassen, 1923) Truncate Forestfly	ABLI, BISO, BLRI, LIRI , RUCA	CT, IN, KY, MA, MD, ME, NY, OH, ON, PA, QC, VA, WV	164–511 m	G4	2.5	11 Mar. - 23 Apr. (Apr. - June)
Comments — Larva up to 6 mm in length, adult up to 9 mm. We have 7 collections and 24 specimens of this species. We found 5 specimens at 2 locations in LIRI and 3 specimens at 1 location in RUCA.						

Family Taeniopterygidae Klapálek

Willowflies

This family of winter stoneflies is found in North America, Eurasia, and northern Africa (Hitchcock, 1974). Globally it has 12 genera and just over 100 species.

Subfamily Brachypterainae Zwick

Genus *Oemopteryx* Klapálek - [Habitat — Generally lotic erosional (coarse sediments, debris jams, leaf packs) and depositional margins: Habit — Generally sprawlers, clingers: Trophic — Generally shredders detritivores, facultative collectors gatherers and scrapers] This genus is Holarctic with one rare western Palearctic species and five North American species. We found a single species in this survey. The genus has a tolerance value of 1.0.

Species	Parks	States	Elevation range	Rankings	Tolerance value	Flight dates
<i>Oemopteryx contorta</i> (JG Needham & Claassen, 1925) Dark Willowfly	BLRI, CARL, GRSM ^(L) , LIRI , OBRI	CT, KY, MA, MD, ME, NC, NH, PA, TN, VA, WV	266–1757 m	G4	1.0	1 Feb. - 22 Apr. (Apr. - May)

Comments — The life history of this species was studied by Nelson (1982) in GRSM. Larval growth occurred from Oct. to Apr., passing through five instars. Emergence of adults was from Apr. to May. The species is univoltine. Larva up to 10.5 mm in length, adult up to 11.5 mm. We have 14 collections and 38 specimens of this species, including 6 specimens from 3 sites in LIRI.

Genus *Strophopteryx* Frison - [Habitat — Generally lotic erosional (coarse sediments, debris jams, leaf packs) and depositional margins: Habit — Generally sprawlers, clingers: Trophic — Generally shredders detritivores, facultative collectors gatherers and scrapers] Earle and Stewart (2008) describe the larva of *Strophopteryx appalachia* and provide a key to *Strophopteryx* larvae. A tolerance value of 2.5 is assumed for all species of *Strophopteryx*. We collected a single larva that could not be determined to species from RUCA.

Species	Parks	States	Elevation range	Rankings	Tolerance value	Flight dates
<i>Strophopteryx fasciata</i> (Burmeister, 1839) Mottled Willowfly	BISO, GRSM ^(L) , KIMO, LIRI , OBRI	AL, AR, CT, DE, IA, IL, IN, KS, KY, MB, ME, MI, MN, MO, MS, NC, ND, OH, OK, ON, PA, QC, SC, VA, WI, WV	200–1757 m	G5	2.5	31 Dec. - 1 Feb.

Comments — Larva up to 10 mm in length, adult up to 15 mm. We have 16 collections and 72 specimens of this species. In LIRI we have 2 collections and 3 specimens.

Subfamily Taeniopteryginae Zwick

Genus *Taeniopteryx* Pictet — [Habitat — Lotic erosional (coarse sediments, wood, leaf packs) and depositional at margins: Habit — Sprawlers clingers: Trophic — Shredders detritivores, facultative collectors gatherers (scrapers)] Fullington and Stewart (1980) presented a key to the larvae of this genus. These are assigned a tolerance value of 5.4. We collected a single larva that could not be determined to species from the mouth of Ridley Cave in RUCA.

Species	Parks	States	Elevation range	Rankings	Tolerance value	Flight dates
<i>Taeniopteryx lonicera</i> Ricker and Ross, 1968 Honeysuckle Willowfly	LIRI	AL, AR, FL, GA, LA, MD, MS, NC, SC, TN, TX, VA	288 m	G5	5.4	1–2 Mar. (Dec. - Mar.)

Comments — Larva up to 7.5 mm in length, male forewing up to 10 mm, female forewing up to 12 mm. This species is included in this table because it was found in only a single park. We have 2 collections and 2 specimens of this species.

Suborder Arctoperlaria Zwick Group Systellognatha Enderlein

Family Chloroperlidae Okamoto Sallflies

More than 150 species in 19 genera of sallflies are known. They occur primarily in the Holarctic regions (Fochetti and Tierno de Figueroa, 2008). Ten genera and nearly 80 species are known in North America (Stewart and Stark, 1988). We found 13 species in 5 genera in the parks.

Genus *Haploperla* Navás - [Habitat — Lotic erosional: Habit — Clingers: Trophic — Predators (engulfers; Chironomidae), facultative collectors gatherers and scrapers] This genus contains approximately 9 species. Three species are found in eastern Siberia (Zhiltzova, 2010) and six are found in North America. A tolerance value of 1.0 has been assigned to *H. brevis*.

Species	Parks	States	Elevation range	Rankings	Tolerance value	Flight dates
<i>Haploperla brevis</i> (N Banks, 1895) Least Sallfly	BISO, BLRI, COWP, GRSM ^(L) , LIRI, SHIL	AB, AL, AR, BC, CT, DE, GA, IL, IN, KY, MA, MB, MD, ME, MI, MN, MO, MS, NB, NC, NH, NJ, NS, NY, OH, OK, ON, PA, PE, QC, SC, SK, TN, VA, VT, WI, WV	124–1480 m	G5	1.0	1 May - 30 July (Apr. - Oct.)

Comments — A common, abundant, and widespread species that is often overlooked because of its small size. Larva up to 7 mm in length, adult up to 9 mm. We have 62 collections and 179 specimens of this species. In LIRI we collected a single specimen at each of three locations.

Genus *Sweltsa* Ricker — [Habitat — Lotic erosional: Habit — Clingers: Trophic — Predators (engulfers; Chironomidae, Simuliidae)] *Sweltsa* contains about 40 species distributed in the Oriental, Palearctic, and Nearctic Regions, with 30 species known from North America. Nine species are found in the East, and we collected four in the parks. These insects are highly sensitive to disturbance, and are assigned a genus-level tolerance value of 0.0.

Comments — We collected a single larva of *Sweltsa* from the main cave entrance at RUCA.

Family Perlidae Latreille

Stones

This is the largest family of stoneflies, having approximately 50 genera and more than 1,000 species world-wide (Fochetti and Tierno de Figueroa, 2008). This is the only family of Plecoptera that occurs in the Nearctic, Neotropical, Palearctic, Oriental, and Ethiopian Regions. In eastern North America, 15 genera and nearly 80 species are known. Most species appear to be univoltine. However, some are known to have bivoltine populations, and trivoltine life cycles have been indicated for others (Peckarsky, 1979). Larvae live in heterogeneous rocky substrates. Certain species are known to prefer a particular range of substrate particle sizes over others (Peckarsky, 1979). Larvae of Perlidae are carnivorous and feed on a wide range of prey species, but seem to prefer baetid mayflies over other prey.

Subfamily Acroneuriinae Klapálek

Genus *Acroneuria* Pictet - [Habitat — Lotic and lentic erosional: Habit — Clingers: Trophic — Predators (engulfers; Chironomidae, Trichoptera, Ephemeroptera, Plecoptera)] This is a modestly sized Holarctic genus of about 34 species distributed in North America (18 species) and the Palearctic and Oriental regions. We found a single species in LIRI. Claire and Phillips (1968) document one western United States species feeding on trout eggs, and Mathews (1982) reports larvae of an unspecified species of *Acroneuria* killing and feeding on immature specimens of *Desmognathus marmoratus* (Moore, 1899), the Shovel-nosed Salamander, in a laboratory setting. Such behavior has not been reported from field observations.

Species	Parks	States	Elevation range	Rankings	Tolerance value	Flight dates
<i>Acroneuria abnormis</i> (Newman, 1838) Common Stone	BISO ^(L) , BLRI, CARL, CUGA ^(L) , GRSM ^(L) , KIMO, LIRI, OBRI ^(L)	AB, AL, CO, CT, DE, FL, GA, IA, IL, IN, KS, KY, LA, MA, MB, MD, ME, MI, MN, MS, MT, NB, NC, ND, NE, NF, NM, NY, OH, ON, PA, QC, SC, SD, SK, TN, UT, VA, WI, WV, WY	187–1307 m	G5	2.1	27 May - 7 Aug. (May - Sep.)

Comments — Larvae occur in streams, creeks, and rivers. They are normally found under large rocks and boulders. The presence of larvae of various sizes at any one time in a population indicates that *A. abnormis* likely takes up to 3 years to develop (Dosdall and Lehmkuhl, 1979). In Quebec, Steffan (1965) found that 83 percent of phoretic chironomid larvae were found on *A. abnormis* larvae. In Saskatchewan, however, phoretic chironomids are not found on *A. abnormis*, but they are found on other *Acroneuria* larvae (Dosdall and Lehmkuhl, 1979). Genito and Kerans (1999) found *A. abnormis* preferentially fed on different prey species on a seasonal basis. They concluded that the shifts in preference were likely due to shifting abundances of the prey species. We have 397 collections and 4,174 specimens of this species. In LIRI we collected 2 larvae and 1 female from Little River at the falls. Larva up to 26.1 mm in length, female forewing up to 33 mm, male forewing up to 25 mm.

Genus *Perlesta* Banks — [Habitat — Lotic erosional and depositional (in detritus): Habit — Clingers: Trophic — Predators (engulfers; Chironomidae, Simuliidae, Ephemeroptera, Trichoptera), facultative collectors gatherers (especially in early instars)] This genus might be an eastern Nearctic endemic, but two species from China are currently placed in this genus (Stark, 2004). Seventeen species are presently known from North America, but several undescribed species are known from the study area and from several of the parks. Many species of *Perlesta* are assigned a tolerance value of 0.0.

Comments — In LIRI we collected 16 specimens from 6 locations that were not determined to species.

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Genus *Perlinella* Banks — [Habitat — Lotic and lentic erosional: Habit — Clingers: Trophic — Predators (engulfers)] This genus is endemic to eastern North America. Three species are known, and we found two in the parks.

Species	Parks	States	Elevation range	Rankings	Tolerance value	Flight dates
<i>Perlinella drymo</i> (Newman, 1839) Striped Stone	GRSM ^(L) , LIRI , MACA, SHIL	AL, AR, CT, DC, FL, GA, IA, IL, IN, KS, KY, LA, MA, MD, ME, MI, MN, MO, MS, NC, NH, NJ, NS, NY, OH, OK, PA, QC, SC, TN, TX, VA, WI, WV	124–419 m	G5	0.0	22 Mar. - 10 May (Mar. - Apr.)
Comments — Larva up to 16.9 mm in length, female forewing up to 21 mm in length, male forewing up to 19 mm. We collected a single adult male from the West Fork of the Little River.						

Subfamily Perlinae Okamoto

Genus *Neoperla* Needham - [Habitat — Lotic and lentic erosional: Habit — Clingers: Trophic — Predators (engulfers)] This is a large genus of nearly 200 species distributed in the Palearctic, Oriental, and Nearctic Regions. The 15 species of Nearctic *Neoperla* live in relatively clean streams throughout eastern North America. Adults of *Neoperla* have a preference for trees as resting places. This potentially makes them more susceptible to riparian zone clearing than some other perlids DeWalt and others (2002). Larvae have been described for seven species. These stoneflies are assigned a tolerance value of 1.6.

Species	Parks	States	Elevation range	Rankings	Tolerance value	Flight dates
<i>Neoperla carlsoni</i> Stark & Baumann, 1978 Spiny Stone	LIRI	AL, AR, FL, LA, MO, MS, SC, TX, VA	n/a	G4	1.6	(May - Sep.)
Comments — We found three larvae in LIRI. Female forewing up to 10 mm in length, male forewing up to 7 mm.						
<i>Neoperla coosa</i> Smith & Stark 1998 Coosa Stone	BISO, GRSM ^(L) , LIRI , OBRI, SHIL, STRI	AL, TN	120–361 m	G2	1.6	1 June - 30 Aug.
Comments — This species is considered globally imperiled. We collected 7 females from a single location in LIRI. Female forewing up to 13 mm in length, male forewing up to 11 mm.						

Family Perlodidae Klapálek

Stripetails, Springflies

This is a cosmopolitan family of nearly 300 species in 51 genera. The North American fauna consists of about 125 species 30 genera. In the study area, we found 26 species in 10 genera.

Subfamily Isoperlinae Frison

Stripetails

Genus *Isoperla* Banks - [Habitat — Lotic erosional and depositional, large cold lake: Habit — Clingers sprawlers: Trophic — Predators (engulfers; Chironomidae, Simuliidae, Ephemeroptera, Plecoptera), facultative collectors gatherers] This is a large, Holarctic genus of more than 125 species, including a number of undescribed species from the study area. We found 11 named species in the parks. Many new species are currently being described in this genus, including of those below, *I. pseudosimilis*.

Species	Parks	States	Elevation range	Rankings	Tolerance value	Flight dates
<i>Isoperla davisii</i> James, 1974 Alabama Stripetail	LIRI	AL, SC	n/a	G4	0.0	10 May
Comments — We collected 2 males of this species from the West Fork of the Little River.						
<i>Isoperla holochlora</i> (Klapalek, 1923) Pale Stripetail	BLRI, GRSM ^(L) , LIRI	CT, DE, GA, KY, MA, MD, ME, NC, NS, NY, PA, QC, TN, VA, WV	351–1480 m	G5	0.0	1 May - 31 Aug.
Comments — We have 210 collections and 1,816 specimens of this species, which includes 3 specimens from 2 locations in LIRI. Adult up to 14 mm in length.						

Subfamily Perlodinae Klapálek

Springflies

Genus *Diploperla* Needham & Claassen - [Habitat — Lotic and lentic erosional: Habit — Clingers: Trophic — Predators (engulfers)] This is an eastern Nearctic genus of four species. We found two species in the parks.

Species	Parks	States	Elevation range	Rankings	Tolerance value	Flight dates
<i>Diploperla duplicata</i> (N Banks, 1920) Two-lobed Springfly	BLRI, COWP, GRSM ^(L) , KIMO, LIRI , NISI	AL, DE, GA, MD, MS, NC, PA, SC, TN, VA, WV	147–867 m	G4	2.7	1 Mar. - 27 June
Comments — Populations are univoltine. Larvae are carnivorous, and live in leaf or detritus packs in small Appalachian streams (Stewart and Stark, 1984). Larva up to 14 mm in length, male forewing up to 11 mm, female forewing up to 12 mm. We collected a single larva of <i>D. duplicata</i> at two different locations in LIRI.						
<i>Diploperla robusta</i> Stark & Gaufin, 1974 Robust Springfly	ABLI, CUGA, LIRI , MACA	CT, IN, KY, OH, PA, TN, VA, WV	161–460 m	G5	2.7	4 Apr. - 18 June (May – June)
Comments — This species was determined to have a single generation per year in West Virginia (Ashley and others, 1976). No nymphs were found from May through July when the stream was dry. Larvae were found from Aug. to Apr., with adult emergence in the latter half of May. This species is uncommon, and occurs in lower elevation streams (B.C. Kondratieff, written commun., 2010), which conforms well with our data. Larva up to 19 mm in length, male forewing up to 13 mm, female forewing up to 15 mm. We collected 11 specimens from 2 locations in LIRI.						

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Genus *Helopicus* Ricker — [Habitat — Lotic and lentic erosional: Habit — Clingers: Trophic — Predators (engulfers)] An eastern Nearctic endemic, *Helopicus* contains three species distributed from Ontario to Florida and west as far as Oklahoma and Arkansas (Stark and Ray, 1983). These authors provided keys to the species of adults and larvae.

Species	Parks	States	Elevation range	Rankings	Tolerance value	Flight dates
<i>Helopicus subvarians</i> (N Banks, 1920) Vernal Springfly	GRSM ^(L) , LIRI	AL, CT, FL, KY, ME, NC, ON, PA, QC, SC, TN, VA, WV	288–1010 m	G5	0.8	6 -22 Mar. (Feb. - June)

Comments — Larvae feed on chironomids, black flies, and hydropsychids. Eggs hatch in September and grow rapidly through fall and winter. Adults emerge from February to April. Larva up to 20 mm in length, adult up to 19 mm. We found a single female from LIRI.

ORDER TRICHOPTERA KIRBY

CADDISFLIES

Trichoptera is the largest of the predominately aquatic insect orders, with approximately 15,000 described species in 600 genera and 47 families (Holzenthal and others, 2007; Holzenthal and others, 2011). Most of Trichoptera have aquatic larvae, with only a small number having semi-terrestrial or terrestrial larvae. Caddisflies are found in virtually all freshwater habitats throughout the world, except Antarctica. A small number of species is found in brackish and marine habitats. Most of the larval caddisflies make cases or fixed retreats, which play roles in larval feeding, respiration, and camouflage. Those species which do not make cases or fixed retreats are free-living. Trichoptera are most closely related to the order Lepidoptera, the moths, skippers, and butterflies. Adult caddisflies, in fact, closely resemble moths. Adult caddisflies range in size from about 1.5–43 mm. Like Lepidoptera, Trichoptera undergo complete metamorphosis, progressing from egg to larva to pupa to adult. Most caddisflies have a one-year or univoltine life cycle, although bi- and multivoltine life cycles are known. The majority of species are nocturnal as adults, with only a relatively few species day-active.

The use of silk for case making, net spinning, and other functions is one of the defining characteristics of Trichoptera, and is one of the significant factors responsible for the ecological success of the order. Wiggins and Mackay (1978) list five general categories of uses that allow caddisfly larvae to exploit their aquatic habitats: (1) construction of fixed retreats with feeding nets, (2) construction of fixed tubular retreats from which the larvae extend to feed on surrounding substrates or passing prey items, (3) construction of portable cases for protection while moving about and grazing on the substrate in exposed situations, (4) construction of tubular cases or retreats to maintain or enhance current flow over the body, (5) production of a safety line that provides security for free-living larvae searching for prey in strong currents. In addition, the use of silk has also been considered to increase the stability of gravel substrates in streams and thus has the potential to reduce the effects of flooding in areas with high densities of filter-feeding caddisflies (Cardinale and others, 2004; Statzner and others, 1999).

Suborder “Spicipalpia” Weaver

The phylogenetic placement of the first four families is not resolved and represents one of the most debated issues in Trichoptera phylogeny. Some authors treat them as a separate suborder, Spicipalpia (Francia and Wiggins, 1997; Wiggins and Wichard, 1989). Others consider that arrangement to be paraphyletic (that is, artificial) and consider their phylogenetic placement, based on molecular as well as morphological data, to be unresolved (Kjer and others, 2001, 2002a, b; Malm and others, 2013; Morse, 1997). “Spicipalpia” is used here merely for convenience in grouping and not as a statement of support for any particular phylogenetic arrangement.

Family Glossosomatidae Wallengren

Saddle-case making caddisflies

The Glossosomatidae are a cosmopolitan family with approximately 660 species world-wide (Holzenthal and others, 2007). The larvae are characterized by their distinctive stone cases that resemble turtle shells. The larva is hidden within its case by a dome of sand and gravel and with a ventral strap or “plastron” of small sand grains, leaving an opening at either end. The larva can extend its head out of either opening while its posterior end extends out the opposite opening. They feed by scrapping diatoms, algae, and other organic material from the surface of rocks in clean flowing water. Some species of *Glossosoma* feed on detritus, as well. When the larval glossosomatid is ready to pupate, it cuts away the ventral strap and fastens the dome portion of the case to the substrate, and forms a cocoon within which it pupates. Adult glossosomatids are generally brown to black with few markings, however, *Matrioptila* and *Protoptila* have a light transverse bar in the forewing. The species in the Southeast range in size from 2.4 to 8.5 mm in length as adults. Glossosomatids are usually univoltine, taking 1 year to complete their life cycle; however, some populations produce two or three generations per year (Jin and Ward, 2007). Some species of *Agapetus* in Great Britain have been inferred to have two generations per year (Crichton and Fisher, 1978).

Subfamily Agapetinae Martynov

Genus *Agapetus* Curtis - [Habitat — Lotic erosional: Habit — Clingers (laterally compressed turtle shell case, mineral): Trophic — Scrapers, collectors - gatherers] This genus consists of more than 200 species world-wide, but is absent from the Neotropics. In North America, there are 42 described species with 29 known from the Southeast. Specimens of several recently described species were collected during this survey, and some type localities are in the parks of the monitoring networks (Etnier and others, 2010). In that paper, the authors suggest that *Agapetus* species are among the most sensitive caddisflies to human disturbance, particularly sedimentation and similar habitat alterations. Human activity, which alters streams by eliminating the canopy and increasing the amount of sediment in streams, eliminates *Agapetus* species from otherwise suitable habitat. We have observed that healthy populations of *Agapetus* can be found in National Forest and National Park lands, whereas private lands in the vicinity of those protected areas will have few if any populations (Etnier and others, 2010). This is reflected in the tolerance value of 0.0 assigned to all *Agapetus* species. Bonada and others (2004), on the other hand, found larvae of *Agapetus* in Spain living in semiarid regions with relatively low water quality, and assigned the genus a high tolerance value.

Species	Parks	States	Elevation range	Rankings	Tolerance value	Flight dates
<i>Agapetus avitus</i> SF Edwards, 1956	LIRI	AL, KY, MS, TN	419 m	G3	0.0	10–23 May (Apr. – June)
Comments — Endemic in the Southeast Etnier (Etnier and others, 2010) but found only in LIRI during this study. Adult up to 6 mm in length.						
<i>Agapetus spinosus</i> DA Etnier & Way, 1973	BISO, LIRI ^(L)	AL, TN	313–511 m	G2, ALS1	0.0	10–26 May (May – June)
Comments — Endemic in the study area. Alabama ranks it critically imperiled. Morse and others (1997) consider it rare and vulnerable, having been reported just once. Etnier and others (2010) report it in two states and more than 15 localities. We collected 572 specimens from 5 localities in LIRI, and Frazer and others (1991) reported it in one location, as well. Adult up to 6 mm in length.						

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Species	Parks	States	Elevation range	Rankings	Tolerance value	Flight dates
<i>Agapetus vireo</i> HH Ross, 1941	CHCH, RUCA	AL, GA, TN	223–225 m	G1	0.0	23 Mar. – 9 May (Apr. – June, Sep.)
Comments — This species is considered globally imperiled (G1). Morse and others (1997) considered <i>A. vireo</i> to be rare and at risk, being known from only three localities. However, Etnier and others (2010) found populations of <i>A. vireo</i> in nearly 40 locations in the listed states. Endemic in the study area. The collection of adults in Sep. (Etnier and others, 2010) suggests either multicohorts or multigenerations per year in <i>A. vireo</i> in the Southeast. We found 2 males in RUCA from the entrance to Russell Cave.						
<i>Agapetus walkeri</i> (C Betten & ME Mosely, 1940)	BLRI, GRSM ^(L) , LIRI, OBRI	AL, CT, GA, MA, MD, MN, NB, NC, NY, NS, ON, SC, TN, WV	329–1024 m	G1	0.0	8 May - 14 June (Apr. - Sep.)
Comments — This species is considered critically imperiled globally. The rankings for this species have been affected by its earlier taxonomic status as a species believed to be known from just a single specimen. However, a recent review of <i>Agapetus</i> in eastern North America (Etnier and others, 2010) determined that the widespread species previously called <i>A. rossi</i> is a junior synonym of <i>A. walkeri</i> . This has established <i>A. walkeri</i> 's status as a widespread and common species that faces little apparent conservation risk. This species, like <i>A. pinatus</i> , tends to inhabit larger streams and have a longer flight period than most other <i>Agapetus</i> species. We collected 11 specimens from 5 locations in LIRI.						

Subfamily Glossosomatinae Wallengren

Genus *Glossosoma* Curtis - [Habitat — Lotic erosional (including large alpine rivers): Habit — Clingers (turtle shell case, mineral): Trophic — Scrapers] This genus consists of more than 120 species from the Holarctic and Oriental biogeographic regions. In the Southeast, three species are known, one of which is common and widespread in the region. Wymer and Morse (2000) provide a recent redescription of all stages of *G. nigrrior* and keys to the Eastern species.

Species	Parks	States	Elevation range	Rankings	Tolerance value	Flight dates
<i>Glossosoma nigrrior</i> N Banks, 1911	BISO, BLRI, CARL, CHCH, COWP, CUGA, FODO, GRSM ^(L) , KIMO, LIRI, MACA, OBRI, RUCA, SHIL	AL, CT, DE, GA, IN, KY, LB, MA, MD, ME, MI, MN, NC, NF, NH, OH, ON, PA, QC, SC, TN, VA, VT, WI, WV	112–1480 m	G5	1.5	3 Mar. - 15 Dec. (Mar. - Sep.)
Comments — Adults have been collected in every month except January and February, but greatest adult emergence is through the summer months. Oemke (1987) found that a population from a third order stream in Michigan grew faster and individuals were larger, than those of a population from a first order tributary of the same stream. Investigation revealed that temperature, and not diet, was responsible for the difference in growth. Georgian and Wallace (1983) found <i>G. nigrrior</i> to be bivoltine in North Carolina. Trapp and Hendricks (1984) found 2 populations to be bivoltine and 1 population to be univoltine in Giles County, Virginia. The difference was attributed to cooler stream temperatures at the site with the univoltine population compared with the other two sites. Jin and Ward (2007) report that two populations they studied in Alabama were trivoltine, which they attributed to warmer stream temperatures than those found in more northern streams. Larvae grazed mostly on algae (50 percent of gut contents) and detritus (40 percent). We found <i>G. nigrrior</i> in 13 parks during this study, which indicates that it is not at risk regionally. In LIRI we collected 5 specimens from 4 locations, and in RUCA we collected 26 specimens from 2 locations.						

Family Hydroptilidae Stephens

Micro-caddisflies

The family Hydroptilidae is commonly known as the micro-caddisflies due to their small size. Mature larvae range in size from 1.5 to 7.0 mm (Marshall, 1979). However, Hydroptilidae is the largest family of Trichoptera in terms of the number of described species, with about 2000 species known world-wide (Holzenthal and others, 2007). In North America approximately 19 genera, which contain more than 200 species (Wiggins, 1996), are recognized. In the Southeast, approximately 19 genera containing 173 species are known, many of them having been described within the past 30 years. Little is known of hydroptilid biology because of their small size. Hydroptilids are unique among caddisflies in that the first four instars are free living, and only the final fifth instar builds a case. The final instar also is morphologically very different from the earlier instars, as they go through a process called hypermetamorphosis at the final molt. Much of our current understanding of hydroptilid biology is based on laboratory studies by Nielsen (1948). More recently, Resh and Houpp (1986) and Keiper and colleagues (Keiper, 1999; Keiper, 2002; Keiper and Bartolotta, 2003; Keiper and Foote, 2000; Keiper and Harris, 2002; Keiper and Walton, 1999, 2000) have published studies of hydroptilid biology. As a generalization, hydroptilid larvae feed on diatoms and algae. Some species feed by piercing individual cells of algae and eating the contents. Others eat strands of algal filaments, or scrape diatoms from various substrates. Some species have feeding strategies that vary with instar. Most species are univoltine, although two generations per year have been reported in a few species (Nielsen, 1948; Unzicker and others, 1982). Larval cases are diverse within the family, but many species make a case type referred to as a “purse” case. These cases consist of two valves of silk attached along the upper and lower margins, and having the anterior and posterior ends open. The valves may be entirely of silk or may be covered with sand grains or incorporate algae, diatoms, or other materials. The larva can turn around inside the case and have its head extended from either end as it chooses. When not actively crawling about, the larva may attach the case to the substrate with silk. At pupation, the larva firmly affixes the case to the substrate and pupates within. Some genera have very different case types, which will be mentioned below. Larvae are indistinguishable beyond genus at present.

Genus *Dibusa* Ross – [Habitat — Lotic erosional: Habit — Clingers (purse-type case of silk and Lemanea): Trophic — Scrapers (red alga, Lemanea)] This is the largest known micro-caddisfly in North America, reaching 6.0 mm length. Resh and Houpp (1986) studied the biology and distribution of the only species, *D. angata*. Early instar larvae feed on diatoms, but final instars feed only on the red alga, *Lemanea australis*. They also make their purse cases out of filaments of the *Lemanea*, and attach their cases to strands of it when they pupate. Other species of hydroptilids, and other aquatic insects in general, do not normally exhibit such a strict relation to their food source (Wiggins, 1996), although see Ito (Ito, 1997; Ito and others, 1997).

Species	Parks	States	Elevation range	Rankings	Tolerance value	Flight dates
<i>Dibusa angata</i> HH Ross, 1939	BISO, GRSM ^(L) , LIRI	AL, AR, GA, IN, KY, MA, ME, NC, NH, OK, ON, PA, SC, TN, VA, VT, WV	236–260 m	G5, ALS2, NCS3	2.6	12 Apr. – 17 May (Feb. - May)
Comments — The presence of <i>D. angata</i> in a park implies also the presence of <i>Lemanea australis</i> in the park. Alabama ranks <i>D. angata</i> imperiled, and North Carolina ranks it vulnerable. We have 3 collections and 4 specimens of this species.						

Genus *Hydroptila* Dalman - [Habitat — Lotic erosional and depositional (including seeps); Habit — Clingers (purse-type case of silk and fine mineral); Trophic — Piercers herbivores, scrapers] This is the largest genus in the family, having approximately 440 described species (Holzenthal and others, 2007). In North America, more than 100 species are currently known, with a number of undescribed species also known, including several found during this study. Final instar larvae make the typical purse case, usually made of silk with a coating sand grains, but sometimes with diatoms or algal filaments incorporated (Wiggins, 1996). Of the 28 species encountered during this study, only nine have a global or state rarity ranking. Also, because it is not yet possible to identify *Hydroptila* larvae to species, the listed tolerance value is based on evidence that at least some species are relatively tolerant of contamination. The status of *Hydroptila* species in terms of conservation needs is not well advanced. We found 15 species in LIRI during this study, including the following.

Species	Parks	States	Elevation range	Rankings	Tolerance value	Flight dates
<i>Hydroptila alabama</i> SC Harris & Kelley, 1984	LIRI ^(L)	AL, FL, GA, ME, NC, NY, PA, TN, TX	262 m	G4	6.3	15 June
Comments — Frazer and others (1991) reported this species from one location in LIRI.						
<i>Hydroptila callia</i> Denning, 1948	GRSM ^(L) , LIRI ^(L)	AL, CO, MI, MN, NC, NH, NS, OH, PA, QC, SC, TN, VA, WI, WY	262–640 m	G5	6.3	14 May - 30 July
Comments — We have 7 collections and 122 specimens of this species. In LIRI we and Frazer and others (1991) found specimens at three different locations.						
<i>Hydroptila chattanooga</i> KS Frazer & SC Harris, 1991	GRSM ^(L) , LIRI ^(L)	AL, ME, OH, PA, TN	359–520 m	G2	6.3	5 June - 15 Oct.
Comments — This species was described from LIRI and its watershed (Frazer and Harris, 1991). We have 7 collections and 122 specimens of this species. In LIRI we and Frazer and others (1991) found specimens at two different locations.						
<i>Hydroptila licina</i> KS Frazer & SC Harris, 1991	LIRI ^(L)	AL, GA	419 m	G1	6.3	15 June
Comments — This species also was described from LIRI and its watershed (Frazer and Harris, 1991). In addition, we collected a single specimen of this species.						
<i>Hydroptila micropotamis</i> SC Harris, 1989	LIRI ^(L)	AL, GA			6.3	
Comments — Known only from LIRI and vicinity. It is considered critically imperiled globally and in Alabama (Frazer and others, 1991). Morse and others (1997) considered <i>H. micropotamis</i> to be rare and vulnerable. Adult up to 2.6 mm in length. We have 5 collections and 17 specimens of this species, and Frazer and others (1991) found specimens in another 4 locations.						
<i>Hydroptila novicola</i> RL Blickle & WC Morse, 1954	LIRI ^(L)	AL, FL, GA, LA, ME, MN, MS, NH, NY, QC, TX	220–859 m	G4	6.2	(Apr., June-Aug., Oct.)
Comments — A widespread species with scattered populations. Frazer and others (1991) report 3 collections and 59 specimens of this species from LIRI and its watershed.						
<i>Hydroptila oneili</i> SC Harris, 1985	BLRI, GRSM ^(L) , LIRI, OBRI	AL, GA, IL, MO, TN	960 m	G2	6.2	26 May - 18 June
Comments — This species is considered globally imperiled. Adult up to 2.4 mm in length. Frazer and others (1991) found this species in two locations in LIRI.						
<i>Hydroptila paramoena</i> SC Harris, 1985	BISO, BLRI, CHCH, CUGA, LIRI ^(L) , OBRI	AL, GA, KY, TN	220–859 m	G2, TNS2	6.2	9 May – 29 Sep. (Mar. – Oct.)
Comments — <i>Hydroptila paramoena</i> is ranked imperiled globally and in Tennessee. However, some state records for <i>H. amoena</i> may actually refer to this species, and <i>H. paramoena</i> may be found to be more widely distributed with further study. Adult up to 2.5 mm in length. We have 20 collections and 98 specimens of this species. In LIRI we and Frazer and others (1991) found specimens at eight different locations.						

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<i>Hydroptila talladega</i> SC Harris, 1985	BISO, BLRI, COWP, GRSM ^(L) , KIMO, LIRI	AL, GA, KY, NC, OH, PA, SC, TN, VA	214–1041 m	G4, ALS1	6.2	25 May - 27 Aug. (May - June)
Comments — Rare in Alabama, where it is considered critically imperiled. Morse and others (1997) considered <i>H. talladega</i> to be rare and vulnerable. This species seems to prefer small, headwater streams. We collected one specimen from Brooks Branch. We have 15 collections and 76 specimens of this species from the other parks. Adult up to 3 mm in length.						
<i>Hydroptila vala</i> HH Ross, 1938	KIMO, LIRI , MACA, OBRI	AL, AR, IL, IN, KY, MB, OH, OK, TN, VA	211–438 m	G4, VAS2S4	6.2	6 May - 24 June
Comments — We collected a single specimen from Grogan Creek in LIRI.						
Genus <i>Mayatrichia</i> Mosely - [Habit — Clingers? (case of silk, rigid): Trophic — Scrapers] This is a strictly Western Hemisphere genus with seven species known from Canada to Costa Rica. One species occurs in eastern North America. The mature, 2–mm–long larvae make a case entirely of silk in the shape of a simple tube that is slightly curved and tapered, and has strengthening ridges also of silk (Ross, 1944). Some cases may have a few mineral grains incorporated. Larvae live in clean, rapidly flowing streams and rivers.						
Species	Parks	States	Elevation range	Rankings	Tolerance value	Flight dates
<i>Mayatrichia ayama</i> ME Mosely, 1937	BISO ^(L) , BLRI, GRSM ^(L) , LIRI , OBRI	AB, AL, AZ, CO, FL, GA, IA, IL, IN, KS, KY, MB, ME, MI, MN, MO, MS, MT, NB, NC, NH, NT, NY, OH, OK, ON, PA, QC, SC, SK, TN, TX, UT, VA, VT, WI, WY	236–1103 m	G5, NCS2	1.0	10 June - 6 Oct. (May - Sep.)
Comments — North Carolina has ranked this species imperiled. We have 21 collections and 231 specimens of this species. In LIRI we collected 124 specimens from 4 locations, and Frazer and others (1991) found specimens at 7 additional locations.						
Genus <i>Neotrichia</i> Morton — [Habitat — Lotic erosional: Habit — Clingers (case a tube of fine mineral): Trophic — Scrapers] The species of <i>Neotrichia</i> include the smallest of micro-caddisflies, often less than 2 mm in length. <i>Neotrichia</i> is endemic to the Neotropical and Nearctic geographic regions, with more than 110 known species. Approximately 30 species occur in North America, and 12 are reported from the Southeast. Known cases of <i>Neotrichia</i> are tubular and made of sand grains. Larvae are preferentially found on rocks in rapid currents of streams and rivers. Although several species occur in the region of the monitoring networks (Harris and Rasmussen, 2010), only one was collected during this study. Several are known from literature records from the parks. Continued sampling will be required to clarify the status of this genus in the parks. The only information available for members of this genus is where and when they have been collected. Their small size and our present inability to identify the larvae make it unlikely that biology of different species will be elucidated soon. Kentucky Division of Water (2009) assigns all <i>Neotrichia</i> larvae a tolerance value of 2.0.						
Species	Parks	States	Elevation range	Rankings	Tolerance value	Flight dates
<i>Neotrichia collata</i> HH Ross, 1938	CUGA, LIRI ^(L)	AL, IL, KY, ME, NC, SC, UT, VT	347–419 m	G5	2.0	18 July - 5 Aug. (June - Sep.)
Comments — This species was designated as threatened by the Invertebrate Taxa Review Committee of the South Carolina Heritage Trust Program (Floyd and Morse, 1993). Frazer and others (1991) report 34 male specimens from 3 localities in the Little River watershed of Alabama and Georgia.						
<i>Neotrichia minutisimella</i> HH Ross, 1938	LIRI ^(L)	AL, AR, FL, GA, IL, IN, KS, KY, MB, MO, MS, NC, OK, SC, TX	419 m	G5	2.0	18 July - 5 Aug. (June - Sep.)
Comments — Frazer and others (1991) report seven specimens from a single locality in LIRI						

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<i>Neotrichia okopa</i> HH Ross, 1938	LIRI ^(L)	AL, AR, CA, CO, FL, IL, IN, KS, KY, MB, ME, MN, MO, NH, NY, OH, OK, ON, PA, QC, TX, WI	262–438 m	G5	2.0	18 July - 5 Aug. (May - Sep.)
Comments — Frazer and others (1991) reported 189 specimens from 6 localities in the Little River watershed of Alabama and Georgia.						
<i>Neotrichia vibrans</i> HH Ross, 1938	BISO, BLRI, LIRI ^(L)	AL, AR, FL, GA, IL, KS, KY, ME, MN, MO, MS, NH, OH, OK, SC, TN, TX, VA, WI, WV, Mexico	183–326 m	G5	2.0	26 July - 18 Aug. (June - July)
Comments — The common and widespread species will most likely be found in other parks with additional collecting. We collected 19 specimens from 6 locations in the parks.						
Genus <i>Oxyethira</i> Eaton - [Habitat — Lentic vascular hydrophytes (with filamentous algae): Habit — Climbers (purse-type case, flat, flask-shaped, open at back, primarily of silk): Trophic — Piercers herbivores, collectors gatherers, scrapers?] With about 200 known species, <i>Oxyethira</i> is cosmopolitan in distribution. In North America about 50 species are known; more than 30 are found in the Southeast. Larvae make very distinctive cases of silk that resemble a flattened flask with a narrow neck at the anterior end and a slit opening at the posterior end. Larvae prefer lakes, ponds, or the slow moving portions of flowing waters. They are found among submerged aquatic plants where they feed on algae (Nielsen, 1948). Species of <i>Oxyethira</i> are assigned a genus tolerance value of 5.6. We collected 4 species in LIRI, including the following.						
Species	Parks	States	Elevation range	Rankings	Tolerance value	Flight dates
<i>Oxyethira forcipata</i> Mosely, 1934	BISO, BLRI, CARL, CUGA, LIRI ^(L) , NISI	AL, AR, CT, GA, KY, IL, ME, MI, MN, MO, NC, NH, NY, OH, OK, ON, PA, QC, SC, TN, VA, WI	135–1080 m	G5	2.2	1 Jan. - 30 Sep.
Comments — Adult up to 3.1 mm in length. We have 22 collections and 711 specimens of this species, including 5 collections and 5 specimens from LIRI.						
<i>Oxyethira glasa</i> (HH Ross, 1941)	LIRI ^(L)	AL, FL, GA, LA, MS, OK, SC, TX	317 m	G5	5.6	10 May - 5 Aug. (Apr. - Sep.)
Comments — Frazer and others (1991) reported 2 collections and 2 specimens of this species.						
<i>Oxyethira grisea</i> C Betten, 1934	BISO, LIRI ^(L)	AL, DE, GA, IL, IN, LA, ME, MI, MS, NC, NH, NJ, NS, NY, OH, PA, QC, SC, TN, VA	317 m	G5	5.6	10 May - 5 Aug. (Apr. - Sep.)
Comments — Adult up to 3.1 mm in length. We have 2 collections and 8 specimens of this species from the West Fork of the Little River.						
<i>Oxyethira rivicola</i> RL Bickel & WJ Morse, 1954	BISO, LIRI ^(L) , OBRI	AL, AR, GA, ME, MN, NH, PA, QC, SC, TN, VA, WI	260–468 m	G5	5.6	7 May - 6 Oct. (June)
Comments — Adult up to 3 mm in length. We know of 10 collections and 25 specimens of this species from LIRI.						
<i>Oxyethira zeronia</i> HH Ross, 1941	LIRI ^(L) , NISI, OBRI	AL, AR, FL, GA, IL, KS, KY, LA, ME, MI, MN, MO, MS, NC, NH, NJ, NS, OH, OK, ON, PA, QC, SC, TN, TX, VA, WI	135–266 m	G5	5.6	30 May - 16 Oct. (May, Aug. - Nov.)
Comments — We and Frazer and others (1991) found 1 specimen at each of 6 locations in LIRI.						

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Genus <i>Stactobiella</i> Martynov — [Habitat — Lotic erosional and depositional (small rapid streams): Habit — Clingers? (purse-type case of silk and algae and plant stem strands): Trophic — Piercers herbivores, scrapers] This is a small Holarctic genus with a dozen species. Five species are found in North America, but little is known about their biology. In GRSM, larvae have been collected from rocks in small streams less than 1 m in width. They make a typical purse case of silk, occasionally with other material included. <i>Stactobiella</i> species are considered highly sensitive to contamination and disturbance.						
Species	Parks	States	Elevation range	Rankings	Tolerance value	Flight dates
<i>Stactobiella delira</i> HH Ross, 1938	BISO, GRSM ^(L) , LIRI ^(L)	AL, AR, BC, CA, CO, ID, IL, IN, KS, KY, ME, MN, MO, MT, NC, NH, OH, OK, OR, PA, SC, TN, VA, WA, WI, WV, WY, YT	260–574 m	G5	1.3	2–24 May (Apr. - June)
Comments — Larvae are found in clear, cold, rocky streams (Floyd and Morse, 1993). This species was designated as threatened by the Invertebrate Taxa Review Committee of the South Carolina Heritage Trust Program (Floyd and Morse, 1993). We have 8 collections and 40 specimens of this species, including 8 specimens from 4 locations in LIRI.						
<i>Stactobiella palmata</i> (HH Ross, 1938)	BISO, GRSM ^(L) , CUGA, LIRI ^(L)	AB, AL, AR, IL, KS, KY, MB, ME, MN, NC, NH, NS, OH, OK, OR, PA, SC, SD, TN, VA, WI	236–419 m	G5	1.3	17 May - 15 June (May - June)
Comments — Adults up to 2.4 mm in length. We have 9 localities and 432 specimens of this species. In LIRI we have 17 specimens from 3 localities.						

Family Rhyacophilidae Stephens

Free-living caddisflies

The Rhyacophilidae consists of more than 700 species in five genera, one of which, *Rhyacophila* Pictet, contains nearly 600 species (Schmid, 1970). Two genera occur in North America, but only the genus *Rhyacophila* occurs in the study area. Rhyacophilid larvae are free living, without a case or a retreat. The larvae are predators that search their cold stream habitats for prey items, typically other caddisfly larvae, stonefly and mayfly nymphs, and many other organisms of the appropriate size. When larvae are ready to pupate, they construct a domelike rock shelter in a protected area on stable substrate in the water.

Genus *Rhyacophila* Pictet - [Habitat — Lotic erosional: Habit — Clingers (free ranging): Trophic — Predators (engulfers), a few scrapers, collectors gatherers, shredders herbivores (chewers)] More than 120 species are known from North America and we recorded 26 species in the parks. *Rhyacophila* larvae are restricted to well-oxygenated, cold-water streams. Most species apparently are univoltine. When a larva is ready to pupate, it finds a protected spot under or between rocks, or even within rotten wood, and builds a loose shelter of sand and gravel held together with silk. Pupation normally lasts several weeks (Manuel and Folsom, 1982), but we have found one species during this study that survives in an intermittent stream by remaining in its pupal cocoon for up to four months. Most *Rhyacophila* larvae in the parks can be identified with available literature (Flint, 1962; Prather and others, 1997; Stocks and Morse, 2005; Unzicker and others, 1982; Weaver and Sykora, 1979), but considerable uncertainty remains concerning some species, as noted below. Much of the information in the Comments below is from Flint (1962). We collected seven species in LIRI and RUCA.

Species	Parks	States	Elevation range	Rankings	Tolerance value	Flight dates
<i>Rhyacophila banksi</i> HH Ross, 1944	BLRI, GRSM, LIRI , MACA, OBRI	AL, AR, MD, MO, NC, NH, NY, OH, ON, PA, QC, TN, VA, VT, WV	177–802 m	G5	1.0	10 May - 18 June
Comments — We have 8 collections and 37 specimens of this species from the 5 parks listed, including 5 specimens from two locations in LIRI.						
<i>Rhyacophila carolina</i> N Banks, 1911	BISO, BLRI, CARL, CHCH, COWP, CUGA ^(L) , FODO, GRSM ^(L) , KIMO, LIRI , MACA, OBRI ^(L) , SHIL ^(L) , STRI	AL, CT, DE, FL, GA, KY, MA, ME, MO, NB, NC, NE, NH, NJ, NY, OH, ON, PA, QC, SC, TN, VA, VT, WV	114–1715 m	G5	1.0	21 Mar. - 5 Nov. (Apr. - Sep.)
Comments — Often found in small streams less than 5 m in width. In South Carolina, Manuel and Folsom (1982) found this species to be univoltine with an extended adult flight period, with reproduction extending into Oct.. Larva up to 16 mm in length. We have 325 collections and 1,543 specimens of this species, which includes 117 specimens from 14 locations in LIRI; Frazer and others (1991) report finding <i>R. carolina</i> at five additional locations.						
<i>Rhyacophila glaberrima</i> G Ulmer, 1907	BISO, BLRI, CARL, CHCH, CUGA ^(L) , FODO, GRSM ^(L) , LIRI ^(L) , MACA, OBRI, RUCA , SHIL ^(L)	AL, AR, CT, GA, IL, IN, KY, MA, ME, MO, MS, NC, NH, NS, NY, OH, PA, QC, SC, TN, VA, VT, WV	125–1694 m	G5, ALS2	4.3	20 Mar. - 6 Nov. (July - Oct.)
Comments — Despite being very widespread and being found in 10 parks, <i>R. glaberrima</i> is considered imperiled in Alabama. At LIRI, we discovered <i>R. glaberrima</i> pupae in mosses along the edge of an intermittent stream, Laurel Creek, after it had dried up at the start of the summer. We brought some of these pupae back to the lab for rearing, and adults emerged up to 4 months later. This extended pupal diapause has not been reported previously in <i>R. glaberrima</i> . The larvae of <i>R. glaberrima</i> cannot be distinguished from those of <i>R. montana</i> . We have never collected adults of these two species from the same location, although both occur in high elevation springs and seeps of the Blue Ridge Parkway. <i>Rhyacophila montana</i> is restricted to higher elevations (610–1850 m), whereas <i>R. glaberrima</i> is found at lower elevations (125–1694 m). Larva up to 12 mm in length. We have 198 collections and 746 specimens of this species, including 108 specimens from 11 locations in LIRI and 4 specimens from 1 location in RUCA. In addition, Frazer and others (1991) report <i>R. glaberrima</i> from five additional locations in LIRI.						

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Species	Parks	States	Elevation range	Rankings	Tolerance value	Flight dates
<i>Rhyacophila ledra</i> HH Ross, 1939	CHCH, LIRI ^(L) , MACA, OBRI, RUCA	AL, DE, GA, IL, IN, KY, MI, NC, OH, PA, SC, TN, VA, WV	172–549 m	G5	1.0	21 Mar. - 18 June (May - July)
Comments — In addition to <i>R. ledra</i> , we also collected adults from LIRI that greatly resemble this species, except that the males lack parameres (structures of the male genitalia). It is possible that this is a population characteristic, or that these specimens represent an undescribed species or subspecies. The ranges of the two forms do not overlap, and the form without parameres extends only slightly north into Tennessee. Additional study is required. Adult up to 11 mm in length. We have 28 collections and 412 specimens of this species. Of these, 379 specimens are from LIRI and RUCA, and the 105 males are of the form without parameres.						
<i>Rhyacophila lobifera</i> C Betten, 1934	LIRI ^(L)	AL, IL, IN, KS, KY, MO, OH, OK, ON, PA, TN, WV	391–511 m	G5, NCS2	1.0	20 -21 Mar. (Apr. - May)
Comments — Larvae inhabit streams that are prone to drying up in drought years (Ross, 1944). Larva up to 24 mm in length. We have 4 collections and 12 specimens of this species.						
<i>Rhyacophila otica</i> DA Etnier & JD Way, 1973	BISO, BLRI, GRSM ^(L) , LIRI	KY, PA, TN, VA	407–501 m	G3	1.0	12 May - 18 June (July)
Comments — The specimen from LIRI differs from specimens from the other parks, perhaps representing an undescribed species. The larva remains undescribed. Adults up to 9 mm in length. We have 6 collections and 28 specimens of this species.						
<i>Rhyacophila torva</i> HA Hagen, 1861	BISO, BLRI, COWP, CUGA, GRSM ^(L) , KIMO, LIRI , MACA, OBRI	AL, CT, DC, DE, KY, MA, ME, NC, NF, NH, NJ, NS, NY, OH, PA, QC, SC, TN, VA, VT, WI, WV, WY	177–1757 m	G5, ALS2	1.59	23 Feb. – 21 Sep. (Feb. - Sep.)
Comments — The preferred habitat seems to be small streams up to 6 m in width. Ranked imperiled by Alabama. Larva up to 24 mm in length, adult up to 10 mm. We have 135 collections and 357 specimens of this species, with a single male collected along Brooks Branch in LIRI.						

Suborder Annulipalpia Martynov

There is little argument about the monophyly of the Annulipalpia, although there is some disagreement about exactly which families to include. However, there is no dispute that the five families from the study area are annulipalpians. Annulipalpia are characterized by making fixed nets which they use to capture particles from the water column. The form of nets and retreats made are characteristic not only of the families, but also of the genera and sometimes the species. The requirements of net construction and maintenance dictate that larvae live in flowing, or at least moving water; some are found in lakes that have enough wave action to support a net.

Family Hydropsychidae Curtis **Retreat-making caddisflies**

Hydropsychidae is the third largest family of caddisflies, with over 1,500 described species (Holzenthal and others, 2007) in five subfamilies, four of which occur in the study area. The taxonomy of the family is in a state of flux. Some authors have treated one of the subfamilies as a separate family Arctopsychidae: (Nimmo, 1987; Schmid, 1998). Other authors split the large genus *Hydropsyche* into two or more genera. Recent studies using molecular and (or) morphological analyses find little support for splitting the Arctopsychinae from the larger family or for splitting out the genera *Ceratopsyche* or *Symphitopsyche* from *Hydropsyche*. We have adopted the more conservative approach here: among the hydropsychids found in this survey, we recognize the subfamilies Dipletroninae, Hydropsychinae, and Macronematinae, and we recognize the genus *Hydropsyche* without subgenera. The nets and retreats made by the larvae have attracted a good deal of ecological and evolutionary study (Alstad, 1982; Edler and Georgian, 2004; Georgian and Wallace, 1981; Loudon and Alstad, 1990; Miller, 1984; Thorp, 1983, 1984; Wallace, 1975a, b; Wallace and Malas, 1976; Wallace and Merritt, 1980; Wallace and Sherberger, 1974, 1975). Each subfamily, genus, and species tends to have characteristic retreat and net structure, and a consistent net mesh size, which have led to considerable investigation into the mechanisms by which the larvae partition the stream resources of space, current speed, and drifting particulate matter. All larvae of Hydropsychidae have a scraper and file feature that permits them to make sounds. This has been demonstrated in several genera (Silver, 1980), but has been best studied in *Hydropsyche* and is discussed under that genus.

Subfamily Diplelectroninae Ulmer

Genus *Diplelectrona* Westwood - [Habitat — Lotic erosional (headwater streams): Habit — Clingers (net spinners, fixed retreats): Trophic — Collectors filterers (coarse particles, especially detritus)] This genus has about 100 species worldwide, but is absent from Africa and most of South America (Flint and others, 2004). Atypically among hydropsychids in North America, adult genitalia are of little use in distinguishing species, so characters of the head of adults are given more weight. Larvae seem to hold more promise for species discrimination, so an approach that relies on larval characters and molecular analyses is being used to clarify what is likely a complex of several species instead of the two listed here (Harvey and others, 2012). Because the adults are so unreliably identified, we list below records based on larval collections. Consequently, we do not present flight dates from our data, but instead only provide flight dates based on published information.

Species	Parks	States	Elevation range	Rankings	Tolerance value	Flight dates
<i>Diplelectrona metaqui</i> HH Ross, 1970	ABLI, BISO, BLRI, CHCH, GRSM ^(L) , LIRI , MACA, OBRI, RUCA , SHIL	CT, GA, IL, IN, KY, MO, NC, OH, PA, SC, TN, VA	124–1483 m	G4, NCS1	2.0	(Feb. - Dec.)
Comments — The larva has a very distinctive “thumb” on the left mandible, which has made it seem clearly to be a single species (Ross, 1970). However, barcoded specimens seem to fall into two distinct groups (Harvey and others, 2012). Further study is required. Larvae are found in spring seeps very close to the source. <i>Diplelectrona modesta</i> larvae replace <i>D. metaqui</i> larvae just a few meters downstream. Adult up to 10 mm in length. We have 30 collections and 101 specimens of this species, as recognized by the mandible. In LIRI we collected 2 larvae, and in RUCA we collected 7 larvae.						
<i>Diplelectrona modesta</i> N Banks, 1908	BISO, BLRI, CARL, CHCH, COWP, CUGA, FODO, GRSM ^(L) , GUCO, KIMO, LIRI , MACA, OBRI, SHIL	AL, AR, CT, DE, FL, GA, IL, IN, KS, KY, LA, MA, ME, MI, MO, MS, NC, NF, NH, NS, NY, OH, OK, ON, PA, QC, SC, SD, TN, VA, VT, WI, WV	112–1533 m	G5	2.2	(Mar. - Sep.)
Comments — This "species" is a complex of at least five forms (Harvey and others, 2012). These forms are distinct on the basis of molecular analyses, and can be recognized as larvae, but not yet as adults. Several of these forms have been collected during this survey. Ongoing studies combining molecular and morphological methods are attempting to clarify this situation and determine which, if any, of the recognizable forms should be treated as separate species or other taxonomic categories. We labeled the adults as " <i>Diplelectrona</i> species." We believe that this species needs to be considered of special interest because of the current taxonomic uncertainty. Studies of the biology of <i>D. modesta</i> in the literature indicate a univoltine life history (see Benke and Wallace, 1980), but all such information will need to be reevaluated when the current systematic studies are completed. We have 382 collections and 4,930 specimens of this species complex, including 11 specimens from 5 locations in LIRI. Frazer and others (1991) report it from an additional 4 locations.						
Genus <i>Homoplectra</i> Ross - [Habitat — Lotic erosional (rock face springs and seeps): Habit — Clingers (net spinners, fixed retreats): Trophic — Collectors filterers] This is a North American genus with about a dozen species. Three are found in the study area, the rest are restricted to the West. Larvae make retreats in small, high gradient streams having gravel and cobble substrates. Kentucky (Kentucky Division of Water, 2009) has assigned <i>Homoplectra doringa</i> a tolerance value of 3.0, and we have assumed that value for all <i>Homoplectra</i> species.						
Species	Parks	States	Elevation range	Rankings	Tolerance value	Flight dates
<i>Homoplectra doringa</i> (LJ Milne, 1936)	BISO, BLRI, CHCH, CUGA, GRSM ^(L) , LIRI , OBRI	AL, AR, IN, KY, MA, NC, NH, SC, TN, VA, WV	222–1944 m	G5, ALS1	3.0	20 Mar. - 20 July (Apr. - May)
Comments — The only relatively common and widespread species in the genus in the East. It is rated critically imperiled in Alabama. We have 22 collections and 82 specimens of this species, including 19 specimens from 4 locations in LIRI.						

Subfamily Hydropsychinae Curtis

Genus *Cheumatopsyche* Wallengren - [Habitat — Lotic erosional (especially warmer streams and rivers): Habit — Clingers (net spinners, fixed retreats): Trophic — Collectors filterers (particles include algae, detritus, some animals)] A cosmopolitan genus of more than 250 species, including more than 50 in North America. It is absent from the Neotropics. Fifteen species were detected during this survey. Larvae prefer warmer streams, and build their retreats in more sheltered, slower current microhabitats than do *Hydropsyche*. At this time, *Cheumatopsyche* larvae can be separated only into broad groups, which means that species' life histories and ecology are very poorly known. Mature larvae may be as much as 13 mm in length; adults range from 5 - 9 mm in length. The genus is considered to be more tolerant of contamination than many other caddisflies, with a genus tolerance value of 6.6. Betten (1934) reported that the larvae of one species, *C. analis* (which is extremely common in the study area), became pests when the larvae entered a fish hatchery in New York and began to make retreats using fish eggs. All of our records are based on adult males. We collected seven species from LIRI and RUCA, including the ones below.

Species	Parks	States	Elevation range	Rankings	Tolerance value	Flight dates
<i>Cheumatopsyche etrona</i> HH Ross, 1941	LIRI , OBRI	GA, NC, SC, TN, VA	318 m	G4	6.6	10 May - 19 June (June - Sep.)
Comments — Endemic to the Southeast, this species is included here because it was found in just two parks. We collected one specimen in each park.						
<i>Cheumatopsyche geora</i> Denning, 1948	BLRI, CARL, CUGA, FODO, GRSM, KIMO, LIRI ⁽¹⁾ , SHIL		112–683 m	G5, NCS3	6.6	9 May - 29 Sep.
Comments — We and Frazer and others (1991) collected 72 specimens from 14 locations in LIRI, and we collected another 141 specimens in the other 7 parks listed.						
<i>Cheumatopsyche helma</i> HH Ross, 1939	BISO, GRSM ⁽¹⁾ , LIRI ⁽¹⁾ , OBRI	AL, AR, KY, ME, NC, PA, TN, WV	266–866 m	G3, ALS1, NCS3, TNS2	6.6	19 May - 7 August (June)
Comments — This species is not frequently collected and has a spotty distribution through the study area. It is listed as critically imperiled in Alabama, vulnerable in North Carolina, and imperiled in Tennessee. Adult up to 7 mm in length. We have 14 collections and 321 specimens of this species. We and Frazer and others (1991) collected specimens of <i>C. helma</i> from West Fork Little River.						

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Genus *Hydropsyche* Pictet - [Habitat — Lotic erosional: Habit — Clingers (net spinners, fixed retreats): Trophic — Collectors filterers (particles include diatoms, algae, detritus, animals)] Another very large genus having nearly 400 species in all biogeographic regions, but absent from the Neotropics. *Hydropsyche* larvae are, as are all larvae of Hydropsychidae, able to make sounds by stridulating, a process in which a projection on the fore femur, the scraper, is stroked across a series of fine ridges, the file, on the underside of the head. Studies by Jansson and Vuoristo (1979) demonstrated that stridulation is primarily used as a defensive action by larvae in a retreat in response to another larva attempting to enter its retreat and is normally successful more than 90 percent of the time in repelling the advancing larva. In order to stridulate successfully, a larva holds its forelegs steady by clinging to the net and moving its head. Matczak and Mackay (1990) report that *Hydropsyche* larvae respond to resource limitations (amount of food and amount of suitable substrate) by adjusting the size of their territories around their retreats and by becoming more aggressive as resources become scarcer. This genus has been variously reshuffled, split, and recombined in different fashions for many years. Some North American workers still prefer to split the genus into *Hydropsyche sensu strictu*, also known as the *scalaris* species group, and *Ceratopsyche*. Others treat *Ceratopsyche* as a subgenus of *Hydropsyche*, or as the *morosa* species group of *Hydropsyche*. Because of the current lack of clarity, we prefer to treat all species as *Hydropsyche*, although in the Comments we indicate the species group for each species. Larvae of many species can be identified, with caution, using one of several resources: Schuster and Etnier (1978), Scheffer and Wiggins (1986), Unzicker and others (1982). We collected seven species in LIRI and RUCA, including those listed below.

Species	Parks	States	Elevation range	Rankings	Tolerance value	Flight dates
<i>Hydropsyche alhedra</i> HH Ross, 1939	BLRI, CUGA, GRSM ^(L) , LIRI , OBRI	AB, AK, BC, CO, CT, IA, MA, MB, ME, MN, NC, ND, ON, PA, QC, SC, SD, SK, TN, VA, VT, WI, WV, WY, YT	266–968 m	G5	0.0	5 Apr. - 29 Sep. (May - Sep.)
Comments — [<i>morosa</i> species group] Northern transcontinental, from Alaska and the Yukon to Quebec, and south to North Carolina and Tennessee. The populations in GRSM are considered to be atypically large for the species and to have an unusually synchronous spring emergence (Scheffer and Wiggins, 1986). Those larvae normally have a uniformly dark brown head capsule, as well, compared with most other populations in which the head capsule is normally brown with light spots on the frontoclypeus. Larvae are found on rocks in fast currents. <i>Hydropsyche alhedra</i> is considered highly intolerant of disturbance, even though in Wisconsin they often occur in silty streams with eroded banks (Schmude and Hilsenhoff, 1986). We have 50 collections and 450 specimens of this species. Our record for LIRI is based on a single larva.						
<i>Hydropsyche simulans</i> HH Ross, 1938	BISO ^(L) , GRSM ^(L) , LIRI ^(L) , MACA, SHIL	AL, AR, CO, IA, IL, IN, KS, KY, MA, MB, MI, MN, MO, MS, MT, ND, NE, OH, OK, ON, TN, TX, WI, WV, WY	115–542 m	G5, ALS1	2.4	11 May - 29 July (Apr. - Sep.)
Comments — [<i>scalaris</i> species group] Larvae inhabit a wide variety of water, ranging from small, sluggish streams to very large, fast rivers (Schmude and Hilsenhoff, 1986). This species may be bivoltine in some parts of its range (Rhame and Stewart, 1976). Alabama ranks <i>H. simulans</i> critically imperiled. Larvae up to 18 mm long, adults 13–15 mm long. We have 29 collections and 209 specimens of this species. Our record for LIRI is based on Frazer and others (1991).						

Genus *Potamyia* Banks — [Habitat — Lotic erosional (larger rivers): Habit — Clingers (net spinners, fixed retreats): Trophic — Collectors filterers (detritus, diatoms)] This is a monotypic genus found only in North America. The single species is commonly found in large streams to large rivers. Larvae make retreats on rocks in reasonably silt free areas of moderate currents and spin a loose and voluminous capture net, much like *Cheumatopsyche* nets. Fremling (1960) studied the biology of *P. flava* in the Mississippi River.

Species	Parks	States	Elevation range	Rankings	Tolerance value	Flight dates
<i>Potamyia flava</i> HA Hagen, 1861	LIRI, SHIL	AL, AR, DE, FL, GA, IA, IL, IN, KS, KY, LA, MB, MD, MI, MN, MO, MS, MT, NC, ND, NE, NY, OH, OK, ON, PA, QC, SC, SD, TN, TX, VA, WI, WV	120–378 m	G5	2.5	17 -29 June (Apr. - Oct.)

Comments — Larvae live in very large, warm, silty, sandy rivers. They often burrow in submerged logs. *Potamyia flava* is relatively intolerant of contamination and habitat disturbance. Larva up to 13 mm in length, adult up to 11 mm. We have 5 collections and 43 specimens of this species, which includes a single female from Brooks Branch in LIRI.

Subfamily Macronematinae Ulmer

Genus *Macrostemum* Kolenati — [Habitat — Lotic erosional (larger rivers): Habit — Clingers (net spinners, fixed retreats): Trophic — Collectors filterers (fine particles)] This is a cosmopolitan genus having about 100 species. Three species occur in North America, and two were found in this study. Adults are strikingly marked by polished brown and yellow markings on the front wings, and have extremely long antennae. *Macrostemum* larvae make highly specialized retreats of sand and silk that are open at both ends. The retreats of *Macrostemum* may be built on rocks or logs, and have two chambers, one in which the larva lives and the other in which the capture net is suspended. The nets of *Macrostemum* have the finest mesh size of all hydropsychids. As water passes through the chamber with the net, particles as small as individual bacteria are captured. The larva feeds on the net's contents and maintains the net from its living chamber. Larvae and adults are identifiable, with caution, using Ross (1944, as *Macronema*). In addition to *M. carolina* below, we also found *M. zebratum* in LIRI.

Species	Parks	States	Elevation range	Rankings	Tolerance value	Flight dates
<i>Macrostemum carolina</i> N Banks, 1909	LIRI ⁽¹⁾ , OBRI	AL, AR, DE, FL, GA, IL, IN, LA, MD, MO, MS, NC, NJ, NY, OK, SC, TX, VA	361 m	G5	3.6	16 June (Apr. - Oct.)

Comments — Wallace and Sherberger (1974) described the larval retreat and feeding net of this species. They proposed that the flat head of the larva functions as (1) a device to direct the flow of water to the net, (2) a scoop to clean the chamber, and (3) a plug to prevent potential predators or undesirable particulate matter from entering the retreat. In a study of the distribution of hydropsychids in the Savannah River basin, Gordon and Wallace (1975) found *M. carolina* most prevalent in large rivers on the Coastal Plain, where they lived on snags. In comparison, its congener, *M. zebratum*, was found only in small rivers of the upper headwater region of the basin, and they constructed their retreats on the lower sides of rocks. Larva up to 15 mm in length. This species is included here because it was found in just two parks. We have 2 collections and 14 specimens of this species, including 4 specimens from Little River at the falls.

Family Polycentropodidae Ulmer

Polycentropodid caddisflies

This cosmopolitan family has more than 650 described species in 15 (Chamorro and Holzenthal, 2011; Holzenthal and others, 2007) or 23 (de Moor and Ivanov, 2008) genera. The Oriental region has approximately 230 described species, the Neotropical region has more than 170, and the Palearctic has more than 100, whereas the Nearctic, Afrotropical, and Australian regions have less than 100 species each. In North America fewer than 80 species are known among 8 genera. We collected 30 species in 6 genera during this study. Larvae do not make cases; rather they make silken nets of several characteristic configurations. These are described for each genus. Many are filter feeders; however, others are predators.

Genus *Cernotina* Ross - [Habitat — Lotic and lentic: Habit — Clingers (silk tube retreats): Trophic — Predators (engulfers)] Approximately 65 species are known in this genus, which is limited to the Western Hemisphere. It is primarily a Neotropical genus; only about 7 species occur in North America, and 2 of those species are distributed as far south as Central America. The larva of one species, *C. spicata*, has been described (Hudson and others, 1981). Larvae make retreats in shallow depressions on rock and log surfaces with the ends widely open, much like *Nyctiophylax* larvae. The larvae ambush small prey organisms from the retreat. They are found in both lentic and lotic habitats. They are sensitive to excessive silt (DeWalt and Olive, 1988) but are assigned a tolerance value of 6.0.

Species	Parks	States	Elevation range	Rankings	Tolerance value	Flight dates
<i>Cernotina calcea</i> HH Ross, 1938	LIRI ^(L) , OBRI	AL, AR, FL, IL, KS, KY, LA, MO, MS, OK, TN, TX, Mexico	213–359 m	G5	6.0	15 June - 7 Aug.

Comments — We have 4 collections and 6 specimens of this species. Frazer and others (1991) collected *C. calcea* at three locations in LIRI.

<i>Cernotina spicata</i> HH Ross, 1938	BLRI, CARL, LIRI	AL, AR, CT, DE, FL, GA, IL, IN, KS, LA, MA, ME, MI, MS, NC, NH, OK, ON, SC, TN, TX, VA	183–664 m	G5	6.0	30 May - 15 Sep. (May - Sep.)
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Comments — This is a widespread southern species and is likely to occur in all parks in the study area. We collected 17 specimens in 12 samples, of which 1 specimen was from LIRI. Frazer and others (1991) collected specimens from 6 different locations.

Genus *Neureclipsis* McLachlan – [Habitat — Lotic erosional (on vascular hydrophytes or other supports in water column): Habit — Clingers (trumpet-shaped silk nets): Trophic — Collectors filterers, shredders herbivores, engulfers (predators)] This is a small genus having one Holarctic species, five other species from North America, and one species each from Australia and Japan. Three species were found in the parks. The larvae make highly distinctive trumpet-shaped nets of a flimsy mesh of silk strands having the anterior upstream end held open by guy lines. The anterior end may be 3–4 centimeters (cm) wide, and tapers to a narrow posterior end fastened to rocks or logs. Because the nets are large and fine meshed, the larvae place their nets in slow areas of large streams or rivers. Larvae feed mostly on small animals (Wiggins, 1996).

Species	Parks	States	Elevation range	Rankings	Tolerance value	Flight dates
<i>Neureclipsis piersoni</i> Frazer & SC Harris, 1991	BISO, GRSM, LIRI * ^(L)	AL, AR, GA, KY, TN	236–378 m	G2	4.2	17 June - 26 July (May - Oct.)

Comments — This species was described from LIRI and its watershed. We have 9 collections and 15 specimens of this species. We collected 3 specimens from 2 locations in LIRI, and Frazer and others (1991) collected specimens from 3 additional locations.

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Genus <i>Nyctiophylax</i> Brauer - [Habitat — Lotic erosional and depositional, lentic littoral: Habit — Clingers (silk tube retreats): Trophic — Predators (engulfers), collectors filterers, shredders herbivores] More than 100 species have been described in this genus, from most regions of the world. Most of the species are found in the Oriental Region; about 12 species are known in North America. We collected 9 species during this survey, of which 5 were found in LIRI. Larvae of most species are unknown, but of those that are known all are predators that make retreats in substrate depressions that are very similar to those made by <i>Cernotina</i> . Life history is generally unknown for <i>Nyctiophylax</i> species, but probably is univoltine for most (Unzicker and others, 1982). A genus level tolerance value of 0.9 has been assigned.						
Species	Parks	States	Elevation range	Rankings	Tolerance value	Flight dates
<i>Nyctiophylax affinis</i> (N Banks, 1897)	BISO, BLRI, CARL, CUGA, GRSM, LIRI ^(L) , NISI, SHIL, STRI	AL, AR, BC, CT, DE, FL, GA, IL, IN, KS, KY, LA, MA, MB, ME, MI, MN, MO, MS, MT, NC, ND, NF, NH, NJ, NS, NY, OH, OK, ON, PA, PQ, SC, SD, SK, TN, TX, VA, VT, WI, WV, WY	129–1080 m	G5	0.9	28 May - 1 Aug. (June - Sep.)
Comments — We have 30 collections and 147 specimens of this species. From LIRI we collected 7 specimens from 6 locations, and Frazer and other (1991) collected specimens from 2 additional locations.						
<i>Nyctiophylax banksi</i> JC Morse, 1972	BLRI, GRSM, KIMO, LIRI , NISI, OBRI	AL, CT, MA, ME, MN, MS, NC, ON, PA, PQ, SC, TN	140–859 m	G4	0.9	8 May - 18 June (June)
Comments — We have 12 collections and 276 specimens of this species, including a single specimen from LIRI.						
<i>Nyctiophylax barrorum</i> JC Morse, 1990	LIRI ^(L)	AL, GA	213–419 m	G1	0.9	15–17 June
Comments — We have 7 collections and 7 specimens of this uncommon species.						
<i>Nyctiophylax celta</i> Denning, 1947	BISO, BLRI, GRSM, LIRI , OBRI	AL, AR, CT, FL, GA, IL, KY, MB, MD, ME, MI, MN, MS, NC, NY, OK, ON, PA, QC, SC, TN, TX, VA, WI, WV	228–970 m	G5	0.9	1 May - 27 Sep. (June – July)
Comments — Houghton (2012) found this species almost exclusively in medium and large rivers in Minnesota. We have 23 collections and 290 specimens of this species from 5 parks. In LIRI, we collected a single specimen from the West Fork, and Frazer and others (1991) collected specimens at two other locations.						
<i>Nyctiophylax denningi</i> JC Morse, 1972	BLRI, GRSM, GUCO, KIMO, LIRI ^(L) , NISI, SHIL	AL, DE, GA, MS, NC, PA, SC, TN	124–1039 m	G4	0.9	18 May - 12 July (May - Sep.)
Comments — We have 40 collections and 543 specimens of this species, which includes 10 specimens from 3 locations in LIRI. Frazer and other (1991) report specimens from three additional locations.						
<i>Nyctiophylax nephophilus</i> OS Flint Jr., 1964	BLRI, GRSM, LIRI	GA, NC, NY, PA, SC, TN, VA	374–1533 m	G4	0.9	5 May - 15 Aug. (May - July)
Comments — We have 51 collections and 340 specimens of this species, of which 2 specimens are from Grogan Creek in LIRI.						
<i>Nyctiophylax serratus</i> PK Lago & SC Harris, 1985	CHCH, KIMO, LIRI , NISI, SHIL	AL, AR, FL, KY, MO, MS, OK, TN, TX, VA	124–460 m	G5	0.9	6 May - 31 June
Comments — We have 18 collections and 72 specimens of this species.						

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Genus *Plectrocnemia* Stephens - [Habitat — Lotic erosional, lentic littoral: Habit — Clingers (silk tube retreats): Trophic — Predators (engulfers), collectors filterers, shredders herbivores] This genus contains 91 species (Chamorro and Holzenthal, 2011); about a dozen are known in North America. For many years, North American workers have included this genus as a part of the genus *Polycentropus*, along with the genus *Holocentropus* McLachlan. Chamorro and Holzenthal (2011) restored both groups to genus level following their extensive phylogenetic analysis of the family Polycentropodidae. We use their treatment here. Larvae build sac-like nets with a small tubular dwelling chamber (Lepneva, 1964). We collected larvae of *Polycentropus* at the entrances of Ridley and Russell caves in RUCA; the larvae could not be determined to species.

Species	Parks	States	Elevation range	Rankings	Tolerance value	Flight dates
<i>Plectrocnemia cinerea</i> (HA Hagen, 1861)	BISO, BLRI, CHCH, COWP, CUGA, FODO, GRSM ^(L) , KIMO, LIRI ^(L) , MACA, OBRI, SHIL, STRI	AB, AK, AL, AR, BC, CO, CT, DC, DE, FL, IA, ID, IL, IN, KS, KY, LA, MA, MB, MD, ME, MI, MN, MO, MS, MT, NB, NC, ND, NF, NH, NS, NT, NY, OH, OK, ON, OR, PA, QC, SC, SD, SK, TN, TX, UT, VA, VT, WA, WI, WV	114–1660 m	G5	2.0	30 Mar. - 11 Oct. (Mar. - Oct.)
Comments — This is a very common and widespread species, known in 13 parks and likely to occur in all parks in the study area. We have 157 collections and 769 specimens of this species.						
<i>Plectrocnemia crassicornis</i> (F Walker, 1852)	GRSM ^(L) , LIRI	AL, AR, CT, DC, DE, FL, GA, ID, IL, IN, KS, KY, LA, MA, ME, MI, MN, MS, NC, NH, NS, NY, OH, OK, ON, PA, QC, SC, SD, SK, TN, TX, VA, WI	371–573 m	G5	3.5	8 May - 7 June (Mar. – June)
Comments — This species is capable of living in temporary ponds (Wiggins, 1973). Larvae were collected in the temporary Houston Chambers Pond in GRSM. We have 10 collections and 26 specimens of this species, including 10 specimens from 5 locations in LIRI.						

Genus *Polycentropus* Curtis - [Habitat — Lotic erosional, lentic littoral: Habit — Clingers (silk tube retreats): Trophic — Predators (engulfers), collectors filterers, shredders herbivores] *Polycentropus*, as defined by Chamorro and Holzenthal (2011), is a cosmopolitan genus of at least 165 species found in the Afrotropical, Neotropical, Nearctic, and Palaearctic regions. In North America approximately 30 species are known. Despite being such a large genus, relatively few larvae have been described, and very few have been studied. Larvae cannot be identified at this time. North Carolina (North Carolina Biological Assessment Unit, 2006) and Tennessee (Arnwine, 2006) assign *Polycentropus* larvae a genus-level tolerance value of 3.5.

Species	Parks	States	Elevation range	Rankings	Tolerance value	Flight dates
<i>Polycentropus thaxtoni</i> SW Hamilton & RW Holzenthal, 1986	LIRI	AL, GA	390 m	G2	3.5	11 May
Comments — <i>Polycentropus thaxtoni</i> has a very narrow distributional range and is ranked imperiled globally. The record from LIRI is a new record for Alabama. Adult up to 8 mm in length. We collected a single specimen of this species.						

Family Psychomyiidae Walker

Small fine-net caddisflies

The Psychomyiidae is a small, nearly cosmopolitan family of more than 400 species in nine genera. Psychomyiids are found in every biotic region with the exception of the Neotropics. In North America, four genera with nearly 20 species are known, but only three species in two genera are known from the study area. One of those is *Lype diversa* Banks, 1914, a widespread predominantly eastern species that we collected in 14 parks.

Genus *Psychomyia* Latreille - [Habitat — Lotic erosional: Habit — Clingers (silk tube retreats): Trophic — Facultative collectors–gatherers and scrapers] Flint (1964) described and keyed the larvae of the species that occur in the parks.

Species	Parks	States	Elevation range	Rankings	Tolerance value	Flight dates
<i>Psychomyia nomada</i> HH Ross, 1938	BLRI, GRSM ^(L) , KIMO, LIRI, NISI, OBRI	AL, MA, ME, NC, NY, OH, OR, PA, QC, SC, TN, VA	135–866 m	G5, ALS1	2.5	23 May - 20 Sep.
Comments — An eastern species found in six of the parks, <i>P. nomada</i> is considered critically imperiled in Alabama. We have 16 collections and 177 specimens of this species, including 7 specimens from Little River at the falls.						

Family Philopotamidae Stephens

Fingernet-making caddisflies

Another large cosmopolitan family, Philopotamidae has about 800 described species and 20 genera. In North America five genera are recognized, two of those only recently erected. Philopotamid larvae are characterized by the unique membranous, T-shaped labrum or “upper lip.” Larvae construct a fine-meshed tube attached to rocks or other solid substrates in flowing water. The nets are kept expanded by the flow of water through them and collapse into an amorphous mass when removed from the water. The labrum is specially modified to aid with the construction of these nets; the finger-net making caddisflies are able to lay down about 70 fine strands of silk simultaneously. Wallace and Malas (1976) calculated that a single net of a mature *Dolophilodes distincta* larva could contain up to 100 million tiny mesh openings and more than a kilometer of silk. Philopotamid nets have the finest mesh found among filter-feeding caddisflies. Because of this, philopotamid larvae primarily consume fine detritus (more than 85 percent of their diet).

Genus *Chimarra* Stevens - [Habitat — Lotic erosional (warmer rivers): Habit — Clingers (saclike silk nets): Trophic — Collectors filterers] This is a very large genus having nearly 600 described species in all biogeographic regions of the world. In North America, about 20 species are known, 10 of which are known to be in the Southeast. We encountered five species in the parks. Most species in this genus are sensitive to contamination and disturbance.

Species	Parks	States	Elevation range	Rankings	Tolerance value	Flight dates
<i>Chimarra aterrima</i> HA Hagen, 1861	ABLI, BISO ^(L) , BLRI, CARL, CHCH, COWP, CUGA, FODO, GRSM ^(L) , KIMO, LIRI ^(L) , MACA, NISI, OBRI, RUCA , SHIL ^(L)	AL, AR, CT, DC, DE, FL, GA, IL, IN, KY, LA, MA, MB, MD, ME, MI, MN, MO, MS, NB, NC, NF, NH, NJ, NS, NY, OH, OK, ON, PA, QC, SC, TN, TX, VA, VT, WI, WV	114–739 m	G5	2.6	21 Mar. - 25 Oct. (Apr. - Sep.)
Comments — Widespread and common in North America, and throughout the study area. We have 98 collections and 883 specimens of this species. In LIRI we collected 53 specimens from 8 locations, and Frazer and others (1991) collected specimens from 2 additional locations. In RUCA we collected a single specimen from the entrance to Ridley Cave.						
<i>Chimarra obscura</i> F Walker, 1852	ABLI, BISO ^(L) , BLRI, CHCH, COWP, GRSM ^(L) , KIMO, LIRI ^(L) , MACA, NISI, OBRI, SHIL ^(L) , STRI	AL, AR, CT, DE, FL, GA, IL, IN, KS, KY, LB, MA, MB, MD, ME, MI, MN, MO, MS, NE, NF, NH, NJ, NS, NY, OH, OK, ON, PA, QC, SC, TN, TX, VA, VT, WI, WV	109–668 m	G5	2.7	8 May - 14 Oct. (May - Sep.)
Comments — Parker and Voshell (1982) studied the life history of this species in Virginia. The populations were bivoltine at three study localities (indeterminate at the fourth). Larvae were primarily detritivores, with more than 85 percent of their gut contents composed of detritus. We have 69 collections and 4,794 specimens of this species. In LIRI we collected 59 specimens from 7 locations, and Frazer and others (1991) collected specimens from 6 additional locations.						

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Genus *Dolophilodes* — [Habitat — Lotic erosional (warmer rivers): Habit — Clingers (saclike silk nets): Trophic — Collectors filterers] This genus consists of fewer than 60 species distributed in the Palaearctic (14 species), Oriental (34 species), and Nearctic (7 species) regions. Larvae make fine-mesh tube or finger nets that collapse into amorphous blobs when removed from the water. They are found in fast flowing streams and rivers, but the delicate nets avoid strong currents because of their location under rocks or other stable substrates.

Species	Parks	States	Elevation range	Rankings	Tolerance value	Flight dates
<i>Dolophilodes distincta</i> (F Walker, 1852)	BISO, BLRI, CARL, CHCH, COWP, CUGA, FODO, GRSM, KIMO, LIRI , MACA, NISI, OBRI	AL, CT, DC, DE, GA, IN, KY, LB, MA, MD, ME, MI, MN, MS, NB, NC, NF, NH, NJ, NS, NY, OH, ON, PA, QC, SC, TN, VA, VT, WI, WV, Korea	114–1660 m	G5	0.8	1 Feb. - 29 Oct.

Comments — This species is nearly ubiquitous in the study area. It is common in Eastern and Central North America, and apparently also in Korea. We found it in 13 parks. Altogether, we collected more than 2,200 specimens from 170 locations, including 31 specimens from 9 locations in LIRI. Frazer and others (1991) also collected specimens from four additional locations.

Genus *Wormaldia* McLachlan - [Habitat — Lotic erosional: Habit — Clingers (sac like silk nets): Trophic — Collectors filterers] This genus is cosmopolitan, with nearly 150 species. Most species are Oriental or Western Palearctic, but approximately 20 species are found in North America. Muñoz-Quesada and Holzenthal (2008) revised the North American species and provide keys for adult males. We found four species in the parks. We also found specimens that we are hesitant to put a name on, as they have characters that do not fit exactly with any known species.

Species	Parks	States	Elevation range	Rankings	Tolerance value	Flight dates
<i>Wormaldia moesta</i> N Banks, 1914	ABLI, BISO, BLRI, CARL, COWP, CUGA, GRSM ^(L) , KIMO, LIRI ^(L) , MACA, OBRI, RUCA , SHIL ^(L)	AL, AR, CT, DE, FL, GA, IL, IN, KY, MA, MB, ME, MN, MO, MS, NB, NC, NF, NH, NJ, NS, NT, NY, OH, OK, ON, PA, QC, SC, TN, VA, VT, WI, WV	51–1786 m	G5	2.0	21 Jan. - 16 Dec.

Comments — A common and widespread species. We have 184 collections and 719 specimens of this species. In LIRI we collected 54 specimens from 14 locations, and Frazer and others (1991) found it in 2 other locations. In RUCA we collected four specimens from a spring seep in the wooded area.

<i>Wormaldia shawnee</i> HH Ross, 1938	GRSM ^(L) , LIRI ^(L)	AL, IL, KY, MO, NC, NH, OH, PA, SC, VA	361–758 m	G4, ALS1	3.9	9 May - 30 Aug.
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Comments — In Alabama, this species is considered critically imperiled. We have 14 collections and 173 specimens of this species. We collected 170 specimens from 12 locations in LIRI.

Suborder Integripalpia Martynov

This is the suborder of the case-building caddisflies, which represents just over one-third of all Trichoptera. The development of cases was a major milestone in the evolution of caddisflies (Mackay and Wiggins, 1979), and, of course, the cases have attracted a great deal of attention from scientists and people in general. The roles of cases continue to be debated, with many ideas being propounded about their function in caddisfly biology. An obvious idea is that cases provide protection for the larvae, either directly by providing a shelter when a larva encounters a predator, or indirectly by serving as camouflage or by protecting the larva from environmental hazards. Some workers suggest that cases are essential in respiration, enhancing the flow of fresh water over the gills of the larva as its abdomen undulates within the case. This has allowed many species to colonize and inhabit warmer, lower oxygen habitats than might otherwise have been possible. In addition, it is possible that cases serve as a means of reducing cannibalism among larvae under certain conditions (Wissinger and others, 1996). Good expositions of many of these ideas are found in Wiggins (1973, 1996, 2004). Most of these ideas have supporters and critics, and no doubt many new ideas remain to be postulated. Under any circumstances, cases are a key element in the lives of the Integripalpia.

Family Leptoceridae Leach **Long-horned caddisflies**

The Leptoceridae is the second largest family of Trichoptera, with approximately 1,800 described species and 47 described genera (Holzenthal and others, 2007). The common name derives from the very long antennae of the adults, which are much longer than the front wings. Adults typically have narrow front wings, which are often strikingly marked and colorful, unlike in so many other caddisfly adults. The wing patterns are important in identification, and some adults are more easily identified from dry pinned material than from alcohol material. Larvae make a wide variety of cases and live in many different habitats. Fittingly, the larvae also tend to have unusually long antennae (for caddisfly larvae).

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Genus *Ceraclea* Stephens - [Habitat — Lotic and lentic (some in sponges): Habit — Sprawlers, climbers (case a fine mineral or silk tube): Trophic — Collectors—gatherers, shredders herbivores (chewers), predators (engulfers of sponge)] The genus *Ceraclea* is composed of approximately 160 species from every biotic region except the Neotropics. Approximately 40 species are found in North America, and 16 were found in this study. *Ceraclea* larvae engage in a variety of behaviors and have diverse feeding habits. Some species are detritus feeders and some are herbivores. Some species are predators of freshwater sponges. Morse (1975) revised *Ceraclea* adults and Resh (1976a, b) reviewed the biology, described the larvae, and presented a key to 22 species. Much of the information below is taken from these works. The biology of *Ceraclea* species that feed on sponges has received a great deal of study (Corallini and Gaino, 2003; Resh, 1976b; Resh and others, 1976). Larvae that live in and feed on sponges differ from other larvae morphologically, as well as in habits. The antennae of most leptocerid larvae are quite long relative to other caddisflies, the length being up to eight times the diameter of the antenna. Sponge feeding larvae of *Ceraclea* have much shorter antennae that are only twice as long as wide. In addition, larvae of sponge feeders lack the parafrontal areas characteristic of larvae that do not feed on sponges. Also, the cases of sponge-feeding larvae are cylindrical and are made entirely of silk or of silk with bits of sponge. The cases of non-sponge-feeding larvae typically incorporate sand grains, pieces of detritus, or other materials, and may be cylindrical, tapered, or flattened and hooded with lateral expansions. Many species of *Ceraclea* are highly intolerant of disturbance. Because of this, we have chosen to include all species of *Ceraclea*, even those that do not have established tolerance values and would be excluded from the table on other grounds. We collected 13 species and 283 specimens of *Ceraclea* from LIRI, including the 11 below.

Species	Parks	States	Elevation range	Rankings	Tolerance value	Flight dates
<i>Ceraclea alabamiae</i> SC Harris, 1989	BISO, LIRI ^(L) , OBRI	AL, KY, PA, TN	236–452 m	G2, ALS1	n/a	15 June - 6 Oct. (June)
Comments — This species, originally described from LIRI in Alabama, is now known as far north as Pennsylvania. The Tennessee specimens from this study represent a new state record. Larvae are unknown. Morse and others (1997) consider <i>C. alabamiae</i> to be rare and vulnerable. It has a global rank of imperiled and an Alabama rank of critically imperiled. Adult up to 9 mm in length. We have 15 collections and 261 specimens of this species.						
<i>Ceraclea alces</i> (HH Ross, 1941)	LIRI ^(L)	AL, MA, ME, MN, NY, ON, QC, WI	361–391 m	G4, ALS1	1.1	15 -17 June (June)
Comments — Larvae are found in freshwater sponges. Their cases are made entirely of silk and are cylindrical. Larva up to 8 mm in length, case to 10 mm. We have 4 collections and 9 specimens of this species from LIRI , and Frazer and others (1991) reported it from 4 additional locations.						
<i>Ceraclea ancylus</i> (CT Vorhies, 1909)	BISO ^(L) , BLRI, CHCH, GRSM ^(L) , LIRI , OBRI ^(L)	AL, AR, CT, DE, GA, IL, IN, KS, KY, MA, MB, ME, MN, MO, NC, ND, NY, OH, OK, ON, PA, QC, SC, TN, VA, WI	194–1025 m	G5	0.4	10 May - 28 July (Apr. - Aug.)
Comments — Larvae live in lakes and in fast flowing streams, where they feed on detritus. Resh (1976b) studied the life history of <i>C. ancylus</i> in a creek in Kentucky. Populations are univoltine. Larvae overwinter as fifth instars. These larvae pupate and adults emerge in early spring. The case is made of fine sand grains in a distinctive flattened cylinder with wide dorsolateral flanges, similar to cases made by <i>Molanna</i> larvae. The larva is completely hidden from above by the flanges of the case. Larva up to 8 mm in length, case up to 10 mm, adult up to 11 mm. We have 34 collections and 164 specimens of this species, with 2 collections and 3 specimens from LIRI.						
<i>Ceraclea cancellata</i> (C Betten, 1934)	BISO, BLRI, CHCH, FODO, GRSM ^(L) , KIMO, LIRI ^(L) , MACA, NISI, OBRI, SHIL ^(L) , STRI	AK, AL, AR, BC, CT, DE, FL, GA, IL, IN, KS, KY, LA, MA, MB, ME, MI, MN, MO, MS, MT, NC, ND, NF, NH, NY, OH, OK, ON, PA, QC, SC, TN, VA, WI	105–668 m	G5, NCS1	2.2	9 May - 15 Aug. (Apr. - Sep.)
Comments — This species is considered critically imperiled in North Carolina. Cases are made of sand and are “cornucopia shaped.” We have 50 collections and 3,862 specimens of this species. In LIRI we collected 29 specimens from 8 locations, and Frazer and others (1991) report it at five additional locations. Larva up to 7 mm in length, case up to 8 mm, adult up to 12 mm.						

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<i>Ceraclea diluta</i> (HA Hagen, 1861)	GRSM, LIRI ^(L) , OBRI	AL, AR, CT, DE, FL, GA, IL, IN, KS, KY, LA, MA, MB, ME, MI, MN, MO, MS, MT, NC, ND, NF, NH, NY, OH, OK, ON, PA, PQ, SC, TN, VA, VT, WI, WV	329–419 m	G5	2.3	3 - 15 June (May)
Comments — We have 4 collections and 94 specimens of this species, but just a single specimen from LIRI.						
<i>Ceraclea maculata</i> N Banks, 1899	BISO ^(L) , BLRI, CHCH, COWP, FODO, GRSM ^(L) , LIRI ^(L) , MACA, NISI, SHIL ^(L) , STRI	AL, AR, BC, CA, CO, CT, DC, DE, FL, GA, IA, ID, IL, IN, KS, KY, LA, MA, ME, MI, MN, MO, MS, MT, NB, NC, ND, NH, NJ, NY, OH, OK, OR, PA, PQ, SC, TN, TX, VA, VT, WI, WV	105 - 760 m	G5	6.4	10 May - 13 Oct. (May - Sep.)
Comments — We have 52 collections and 1,281 specimens of this species. In LIRI we collected 22 specimens from 8 locations, and Frazer and others (1991) report it in 6 additional locations						
<i>Ceraclea nepha</i> (HH Ross, 1944)	GRSM ^(L) , KIMO, LIRI ^(L)	AL, AR, DE, FL, GA, IL, KS, KY, MI, MN, MS, NC, OK, SC, TN, TX, VA, WI	200–345 m	G5	2.5	10 May - 15 June (Apr. - Oct.)
Comments — Larvae often are found in waters with high tannic acid content. Cases are cylindrical and made of sand. Larva up to 8 mm in length, case up to 11 mm, adult up to 10 mm. We have 3 collections and 7 specimens of this species. From LIRI we collected 4 specimens in a single location, and Frazer and others (1991) report it in 4 additional locations.						
<i>Ceraclea protonepha</i> JC Morse & HH Ross, 1975	BISO, BLRI, CHCH, COWP, FODO, KIMO, LIRI ^(L) , NISI	AL, DE, FL, GA, KS, KY, LA, MS, NC, SC, TN, TX, VA	157–501 m	G5	2.6	8 May - 26 July (Mar. - June)
Comments — In Mississippi, adults were collected most often near small, sandy streams (Holzenthal and others, 1982). We have 15 collections and 50 specimens of this species. We collected 20 specimens in 6 locations in LIRI, and Frazer and others (1991) report it in 5 additional locations.						
<i>Ceraclea resurgens</i> (F Walker, 1852)	LIRI ^(L)	AL, BC, CO, CT, DC, FL, IL, IN, KY, LA, MB, ME, MI, MN, MT, NC, ND, NH, NJ, NY, OH, OK, ON, OR, PA, PQ, SC, SK, TN, VA, WI, YT	361–419 m	G5, ALS1	0.0	10 May - 16 June (Mar. - July)
Comments — Larvae live in freshwater sponges, apparently in deeper water than <i>C. transversa</i> tend to inhabit. Cases are made entirely of silk and are thicker than those of <i>C. alces</i> or <i>C. transversa</i> . A population in Ohio was found to be univoltine with a brief spring adult flight period (Resh, 1976b). Larva up to 12 mm in length, case up to 15 mm, adults up to 16 mm. We have 2 collections and 18 specimens of this species.						
<i>Ceraclea tarsipunctata</i> (CT Vorhies, 1909)	BISO, BLRI, CHCH, CUGA, FODO, GRSM ^(L) , LIRI ^(L) , MACA, NISI, OBRI, STRI	AL, AR, CA, CT, DE, FL, GA, IA, ID, IL, IN, KS, KY, LA, MA, MB, ME, MI, MN, MO, MS, MT, NB, NC, ND, NH, NY, OH, OK, ON, OR, PA, QC, SC, SD, SK, TN, TX, VA, VT, WI, WV, WY	114–1396 m	G5, NCS3	2.6	8 May - 7 Aug. (Apr. - Aug.)
Comments — This species is considered vulnerable in North Carolina. Cases are cylindrical and made of plant material and sand grains. Populations seem to be univoltine We have 53 collections and 789 specimens of this species. We collected 87 specimens from 12 locations in LIRI, and Frazer and others (1991) report it in 6 additional locations. Larva up to 8 mm in length, case up to 9 mm, adult up to 11 mm.						

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Species	Parks	States	Elevation range	Rankings	Tolerance value	Flight dates
<i>Ceraclea transversa</i> (HA Hagen, 1861)	BISO ^(L) , BLRI, CHCH, GRSM ^(L) , KIMO, LIRI ^(L) , NISI, OBRI, STRI	AL, AR, CT, DC, DE, FL, ID, IL, IN, KS, KY, LA, MA, MB, ME, MI, MN, MO, MS, MT, NC, ND, NF, NH, NY, OH, OK, ON, PA, QC, SC, TN, TX, VA, VT, WI, WV	140–792 m	G5	2.6	8 May - 14 Oct. (Apr. - Sep.)
Comments — Cases are of silk, often with sponge incorporated. Larvae are often found in patches of sponges in much of eastern North America. In Kentucky, Resh (1976b) found populations have two cohorts. Adults of the first cohort emerge early in the spring, mate and lay eggs which hatch a few weeks later. These larvae feed exclusively on sponges and complete all five instars by fall, then overwinter as prepupae. Adults of the second cohort emerge late in the summer. The larvae that result from this emergence do not mature before the sponges gemmulate in the fall. Since the gemmules are inedible, the larvae, third and fourth instars, begin feeding on detritus, which they continue eating until the sponges re-proliferate the next spring. These larvae complete development, pupate, and emerge as adults in late summer. Larva up to 7 mm in length, case up to 11 mm, adult up to 13 mm. We have 48 collections and 246 specimens of this species.						
Genus <i>Leptocerus</i> Leach — [Habitat — Lentic vascular hydrophytes: Habit — Swimmers, climbers (case long and slender, primarily of silk): Trophic — Collectors–gatherers, shredders herbivores (chewers)] This genus has approximately 150 species world–wide, primarily Oriental and African but is represented in the New World by a single North American species.						
Species	Parks	States	Elevation range	Rankings	Tolerance value	Flight dates
<i>Leptocerus americanus</i> (N Banks, 1899)	CHCH, COWP, GRSM ^(L) , LIRI , MACA, NISI	AL, AR, CT, DC, DE, FL, IA, IL, IN, KS, LA, MA, ME, MI, MN, MO, MS, NC, ND, NH, NY, OH, OK, ON, PA, QC, SC, TN, TX, VA, VT, WI, WV	135–511 m	G5	3.0 PA	9 May - 16 June (Apr. - Aug.)
Comments — Larvae live in still waters with aquatic plants. They swim in their cases among the plants, apparently feeding on fine particulate matter. The translucent cases are made entirely of silk and are strongly tapered and slightly curved. Wiggins (1996) reports that larvae removed from their case do not swim and seem unable to build a new case. Edwards (1956) reports two generations per year in Tennessee. The “PA” in the Tolerance value indicates that the value came from the Pennsylvania list of tolerance values. Larva up to 7 mm, case up to 10 mm, adult up to 8 mm. We have 12 collections and 14 specimens of this species. In LIRI we found 1 specimen at each of 3 locations.						

Little River Canyon National Preserve and Russell Cave National Monument

Survey of Aquatic Insects of the Cumberland Piedmont and Appalachian Highlands Monitoring Networks

Genus *Oecetis* McLachlan - [Habitat — Lotic erosional and depositional, lentic littoral: Habit — Clingers sprawlers, climbers (case a curved tube, often tapered, of coarse mineral or plant material): Trophic — Predators (engulfers), shredders herbivores (chewers)?] *Oecetis* consists of nearly 500 described species in all biotic regions. Approximately 25 species are known from North America, but see the discussion below under *O. inconspicua*. *Oecetis* larvae are considered to be carnivorous, feeding exclusively on small aquatic invertebrates, although some species, particularly the early instars, may feed on plant matter. Floyd (1995) described, illustrated, and keyed the larvae of 22 species and is the source for much of the biology information in the Comments below. We found 11 species in the parks, including 5 in LIRI. *Oecetis* larvae have a genus-level tolerance value of 5.7.

Species	Parks	States	Elevation range	Rankings	Tolerance value	Flight dates
<i>Oecetis inconspicua</i> F Walker, 1852	ABLI, BISO, BLRI, CHCH, COWP, CUGA, FODO, GRSM ^(L) , GUCO, KIMO, LIRI , MACA, NISI, OBRI, SHIL, STRI	AB, AK, AL, AR, AZ, BC, CA, CO, CT, DC, DE, FL, GA, IA, IL, IN, KS, KY, LA, MA, MB, MD, ME, MI, MN, MO, MS, MT, NB, NC, ND, NE, NF, NH, NJ, NS, NT, NY, OH, OK, ON, OR, PA, QC, SC, SD, SK, TN, TX, UT, VA, VT, WA, WI, WV, WY, YT	105–1146 m	G5	5.7	12 Jan. - 21 Sep. (Apr. - Oct.)

Comments — Floyd (1995) associated seven larval types, referred to as sp. A through sp. G, that belong to the *O. inconspicua* complex, but did not distinguish any particular form as this species. Current rankings treat each of the separate types of Floyd as globally critically imperiled, imperiled, or vulnerable. Much work remains to be done before this widespread complex of species is resolved. Because of the taxonomic uncertainty in this taxon, it is included in this table. We have 250 collections and 5,809 specimens of this “species.” We collected 220 specimens from 16 locations in LIRI, and Frazer and others (1991) collected additional specimens from 7 other locations.

<i>Oecetis sphyra</i> HH Ross, 1941	BISO, BLRI, LIRI , SHIL	AL, FL, GA, LA, MS, NC, TN, TX, VA	200–359 m	G2	5.7	30 May - 19 Aug. (Apr. – Sep.)
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Comments — This species is considered imperiled globally. In his study of the Trichoptera and Plecoptera faunas of steephead ravines in northern Florida Rasmussen (2004) found *O. sphyra* to be widespread and abundant in those spring-fed habitats. We collected 303 specimens from the parks, including a single record from Frazer and others (1991).

Genus *Triadenodes* McLachlan - [Habitat — Lentic littoral, lotic depositional (vascular hydrophytes): Habit — Swimmers, climbers (case long, tapered of spirally arranged leaf and stem fragments): Trophic — Shredders herbivores (chewers)] Another large genus with more than 200 species rather evenly distributed throughout the biotic regions, including about 25 species in North America. All species make similar cases from plant material arranged in a long, tapered spiral. Glover (1996) described, illustrated, and keyed the larvae of 16 species, and is the source of much of the information in the Comments below. Manuel (2010) revised the North American species and is the best source for information on adults and distributions. We found 5 species in LIRI, including the 4 below.

Species	Parks	States	Elevation range	Rankings	Tolerance value	Flight dates
<i>Triadenodes cumberlandensis</i> DA Etnier & JD Way, 1973	LIRI ^(L)	AL, GA, TN	419 m	G5	2.2	15 June

Comments — Frazer and others (1991) report 57 specimens from three locations in LIRI and its watershed. We have one collection and a single specimen of this species.

<i>Triadenodes injustus</i> (Hagen, 1861)	BLRI, CHCH, FODO, GRSM, LIRI , MACA, NISI, OBRI, SHIL	AB, AL, AR, BC, CT, DE, IL, IN, KS, KY, MA, MD, ME, MI, MN, MO, MS, NC, NF, NH, NS, NY, OH, OK, ON, OR, PA, PQ, SC, SK, TN, TX, VA, VT, WI, WV	124–867 m	G5	2.2	9 May - 16 Oct. (June - Aug.)
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Comments — We have 33 collections and 81 specimens of this species with 2 specimens from 2 locations in LIRI.

Little River Canyon National Preserve and Russell Cave National Monument

Survey of Aquatic Insects of the Cumberland Piedmont and Appalachian Highlands Monitoring Networks

Species	Parks	States	Elevation range	Rankings	Tolerance value	Flight dates
<i>Trienodes marginatus</i> CK Sibley, 1926	BISO, BLRI, CARL, CHCH, CUGA, GRSM ^(L) , KIMO, LIRI , SHIL, STRI	AB, AL, AR, CT, DC, DE, GA, IL, IN, KS, MA, MB, MD, ME, MI, MN, MO, MS, NC, ND, NE, NH, NJ, NS, NY, OH, OK, ON, PA, QC, SC, SD, SK, TN, TX, VA, WI, WV	154–1078 m	G5, NCS3	0.0	1 May - 28 Sep. (Apr. - Nov.)
Comments — Larvae are often found in association with aquatic macrophytes in lakes, ponds, and in root mats in streams. We have 33 collections and 172 specimens of this species, including 7 specimens from 4 locations in LIRI. Larva up to 10 mm in length, case up to 23 mm, adult 12–13 mm.						
<i>Trienodes perna</i> HH Ross, 1938	BISO ^(L) , BLRI, CARL, CHCH, GRSM ^(L) , LIRI , OBRI, SHIL, STRI	AL, AR, DE, FL, GA, IL, KY, KS, LA, MA, MD, MO, MS, NC, NH, NJ, OH, OK, ON, PA, QC, SC, TN, TX, VA, WV	115–668 m	G5	0.4	9 May - 15 Sep. (May - Sep.)
Comments — Larvae usually found in root mats in slow flowing areas of streams and rivers, and in swamps. Cases are made of a spiral of rootlets. Larvae up to 8 mm long, cases up to 12 mm. We have 25 collections and 55 specimens of this species. In LIRI we collected 3 specimens from 3 locations, and Frazer and others (1991) collected additional specimens from 1 other location.						
<i>Trienodes tardus</i> LJ Milne, 1934	BISO, BLRI, GRSM ^(L) , LIRI	AB, AK, AL, AR, AZ, BC, CO, CT, DC, DE, FL, GA, IA, ID, IL, IN, IO, KS, KY, MA, MB, MD, ME, MI, MN, MO, MS, MT, NB, NC, ND, NE, NH, NJ, NS, NY, OH, OK, ON, OR, PA, QC, SC, SD, SK, TN, TX, UT, VA, VT, WA, WI, WV, WY, YT	218–793 m	G5	0.4	11 May - 14 Oct. (May - Oct.)
Comments — Larvae may be restricted to lentic habitats, although adults may be collected near streams. Larvae in lakes are associated with aquatic plants. Cases are made of plant pieces spirally arranged. We have 25 collections and 252 specimens of this species. We collected 2 specimens from 2 locations in LIRI, and Frazer and others (1991) collected additional specimens from 2 other locations. Larvae up to 10 mm long, cases up to 27 mm, adult 10–12 mm.						

Family Molannidae Curtis

Molannid caddisflies

The Molannidae is a small family of the Oriental and Holarctic faunas, having only 2 genera and about 3 dozen species. Both genera occur in North America, but only one of those occurs in the study area. Larvae are instantly recognized by their distinctive shield-shaped tube cases, made of a central tube of fine sand grains with lateral flanges and a prolonged hood or cowl anteriorly made of larger sand grains or gravel. Larvae are completely hidden by the flanges and hood when moving and feeding. In this sense they resemble certain larvae of *Ceraclea* (Leptoceridae), but differ in details of the case construction and in their habitats.

Genus *Molanna* Curtis - [Habitat — Lentic erosional, lotic depositional (headwater streams and springs): Habit — Sprawlers clingers (case flat with dorsal projection and flanges): Trophic — Scrapers, collectors gatherers, predators (engulfers)] This is a mostly Holarctic genus with approximately 2 dozen known species. Six species are known from North America, and four are recorded from the parks. Larvae are believed to be omnivorous, feeding on diatoms, algae, plant material, and small invertebrates. Larvae of three species were described, illustrated, and keyed by Sherberger and Wallace (1971) and Unzicker and others (1982). These papers and Roy and Harper (1980) are the sources for much of the information cited in the Comments below.

Species	Parks	States	Elevation range	Rankings	Tolerance value	Flight dates
<i>Molanna blenda</i> CK Sibley, 1926	BISO, BLRI, CHCH, COWP, CUGA, GRSM ^(L) , KIMO, LIRI , MACA, OBRI, SHIL ^(L)	AL, AR, CT, DE, GA, IL, IN, KY, LA, MA, MI, MN, MO, MS, NC, NF, NH, NY, OH, ON, PA, QC, SC, TN, VA, VT, WI, WV	124–1757 m	G5, ALS2	2.0	22 Mar. - 5 Oct. (Mar. - Oct.)
Comments — <i>Molanna blenda</i> occurs in cold springs and seeps, and in similar areas with accumulations of debris, sand, and silt along the edges of small streams. It is common and widespread in the mountainous areas of the study zone, but also occurs in the coastal zone of at least some of the target states. <i>Molanna blenda</i> cases tend to have numerous mica flakes incorporated in them, along with a fair amount of vegetable debris. Alabama has rated this species S2. Larva up to 12 mm in length, adult up to 11 mm. We have 132 collections and 630 specimens of this species. In LIRI we collected 22 specimens from 7 locations, and Frazer and others (1991) collected specimens at one additional location.						
<i>Molanna tryphena</i> C Betten, 1934	BISO ^(L) , LIRI , SHIL ^(L)	AL, CT, DE, FL, GA, LA, MA, ME, MI, MN, MS, NC, NH, NY, OH, PA, QC, SC, TN, TX, VA, VT, WI	124–549 m	G5	2.0	8 May - 22 Sep. (Mar. - Nov.)
Comments — Larvae occur in larger streams than those occupied by <i>M. blenda</i> , typically at least 5 m in width. The case is similar to those of <i>M. blenda</i> . Both species occur in clean, unpolluted habitats. Pupation in the laboratory lasted one month (Sherberger and Wallace, 1971). Gupta and Stewart (2000) studied the life history and case building behavior of this species in Texas. The streams these authors studied were less than 2 m in width, much smaller than those reported by Sherberger and Wallace (1971) as preferred by <i>M. tryphena</i> larvae. Larvae were most often found in areas having exposed sandy deposits. Larvae fed on diatoms, filamentous algae, some vascular plant tissue, and detritus. Early instars construct tube cases without the lateral flanges and hoods characteristic of the late instars. The Texas spring populations had a univoltine life cycle with an extended, asynchronous adult emergence period. Larva up to 15 mm in length, case up to 26 mm, adult up to 11 mm. We have 8 collections and 38 specimens of this species, including a single specimen from each of 2 localities in LIRI.						

Family Apataniidae Wallengren

Small sturdy-case maker caddisflies

This is a small Holarctic family with fewer than 200 species in 18 genera. Two genera and three species are currently recognized from the study area. The two genera are placed into separate subfamilies.

Subfamily Apataniinae Wallengren

Genus *Apatania* Kolenati - [Habitat — Lotic erosional (especially springs), lentic littoral (oligotrophic lakes); Habit — Clingers climbers sprawlers (case tapered, strongly curved, dorsal projection, mineral); Trophic — Collectors–gatherers, shredders herbivores (chewers)] There are about 100 species in this genus, with 14 known from North America. Several species are transcontinental and (or) Holarctic, but the single species in the study area is confined to eastern North America.

Species	Parks	States	Elevation range	Rankings	Tolerance value	Flight dates
<i>Apatania incerta</i> N Banks, 1897	BLRI, GRSM ^(L) , LIRI	AL, CT, MA, MN, NC, NH, NY, PA, QC, TN, VA, WI	329–1460 m	G5	0.6	25 Mar. - 8 May (Mar. - June)

Comments — Until recently this was treated as three species, all of which were reported from the study area. Flint (2007) synonymized *A. praevolans* Morse and *A. rossi* Morse with *A. incerta*. Larvae occur on rocks in small, cold streams. Case cornucopia shaped, made of fine sand grains. Mature larvae extend the anteriodorsal section into a hood that covers the larva. *Apatania* is considered a highly sensitive taxon in bioassessment work. Larva up to 5.2 mm in length, case up to 6.5 mm, adult up to 9 mm. We have 110 collections and 629 specimens of this species. In LIRI we collected a single female from Laurel Creek.

Family Brachycentridae Ulmer

Short-horned caddisflies

This Holarctic and Oriental family contains 6 genera and about 100 species. Five of the genera are found in North America, and three have been found in the parks.

Genus *Micrasema* McLachlan — [Habitat — Lotic erosional (on logs, branches, or vascular hydrophytes): Habit — Clingers sprawlers (case tapered, sometimes curved, of silk and strands of vegetation): Trophic — Shredders herbivores (chewers), collectors gatherers] More than 60 species are known from the northern Palearctic and Oriental regions, and about 17 species are known from North America. Seven species have been found in the parks. Larvae of *Micrasema* make cylindrical cases of sand grains, plant pieces, or almost entirely of silk. Early instars of some species make cases entirely of sand, and later instars switch to cases mostly of silk. Larvae are inevitably associated with vascular plants, typically mosses, liverworts, or *Podostemum* (Chapin, 1978). Most of the species in the study area are univoltine, although *M. burksi* apparently takes 2 years to develop in GRSM. The adults emerge primarily in early spring, with only a few species having a more extended emergence period. As with most Brachycentridae, *Micrasema* adults are day active. Chapin (1978) reviewed the genus and provided descriptions and keys to the males and larvae. Most *Micrasema* species have tolerance values less than 3.0. We found a single larva of this genus in RUCA.

Species	Parks	States	Elevation range	Rankings	Tolerance value	Flight dates
<i>Micrasema rusticum</i> (HA Hagen, 1868)	BISO ^(L) , CUGA, GRSM ^(L) , LIRI ^(L) , OBRI	AL, AR, GA, IL, IN, KY, MA, MB, ME, MI, MN, MO, NC, NH, NS, NY, OH, OK, ON, PA, QC, SC, SK, TN, VA, VT, WI, WV	261–680 m	G5	0.0	3 Apr. - 27 Aug. (Feb. - Aug.)
Comments – This species lives in large streams and in rivers, and is found at the base of <i>Podostemum</i> , and, in one population, on <i>Valisneria americana</i> (Chapin, 1978). It often is found with <i>M. wataga</i> . Larva up to 7.3 mm in length, case up to 8.7 mm. We have 11 collections and 34 specimens of this species. The LIRI record is based on Frazer and others (1991).						

Family Lepidostomatidae Ulmer

Scale-mouthed caddisflies

This world wide family of more than 400 species contains only two genera, *Lepidostoma* Rambur and *Theliopsyche* Banks, each in its own subfamily. Both genera are represented in the study region. Males of *Lepidostoma* often have bizarre secondary sexual characteristics, such as highly modified palps, antennae, and wings. This led one of the pioneers of Trichoptera studies to call *Lepidostoma* the “curiosity shop” of the Trichoptera (McLachlan, 1874–1880). Many early Trichoptera workers erected genera for oddly modified species, such that about 20 different genera were at one time recognized within the family. Comprehensive work by Weaver (1988, 2002) led to most of those genera being synonymized with *Lepidostoma*, resulting in the classification used here.

Subfamily Lepidostomatinae Ulmer

Genus *Lepidostoma* Rambur - [Habitat — Lotic erosional and depositional (detritus) (headwater streams and springs): Habit — Climbers sprawlers clingers (case square or “rough log cabin” type of leaf and bark fragments, or cylindrical, of sand or silk): Trophic — Shredders detritivores (chewers) (also scavengers)] This large genus contains nearly 400 species distributed around the world. Approximately 80 species are known from North America, and 23 were collected in the parks. Eggs are carried by the females in green masses at the end of the abdomen, and are deposited directly into or nearby water. Larval cases are varied, although the cases of species within certain groups are characteristic of those groups. Cases of early instars of many species may be entirely of sand grains. Some species retain the sand grain construction throughout development, whereas others transition to cases of stems, leaves, and other detrital material. These cases are then either a panel case or a turret case. In the panel-type case, larvae cut leaves or other appropriate detrital material into quadrate pieces and attach the pieces together in a 4-sided arrangement, linking several such units together. Depending on the softness of the material used, the resulting cases are somewhat rounded to almost perfectly square in cross-section. Turret cases are formed of small stems or other slender plant fragments arranged transversely in a whorl. The larvae are not generally identifiable. *Lepidostoma* larvae have a tolerance value of 1.0.

Species	Parks	States	Elevation range	Rankings	Tolerance value	Flight dates
<i>Lepidostoma compressum</i> DA Etnier & JD Way, 1973	GRSM, LIRI	AL, NC, TN	288 m	G1, TNS2	1.0	22 Mar. (Apr. - May)
Comments — This species is considered critically imperiled globally, and imperiled in Tennessee. Morse and others (1997) consider this species rare and vulnerable, being known from only three specimens. Subsequent work has found populations in AL and NC. The larva is unknown. We have 2 collections and 13 specimens of this species.						
<i>Lepidostoma togatum</i> (HA Hagen, 1861)	BISO, CHCH, GRSM ^(L) , LIRI ^(L) , OBRI	AB, AL, AR, CT, DC, DE, GA, KY, MA, MB, MD, ME, MI, MN, MO, NC, ND, NE, NH, NJ, NS, NT, NY, OH, OK, ON, PA, QC, RI, SC, SK, TN, VA, VT, WI, WV	213–408 m	G5	1.0	8 May - 6 Oct. (May - Oct.)
Comments — Larvae are found in both lentic and lotic water. We have 16 collections and 79 specimens of this species, including 24 specimens from 3 locations in LIRI. Frazer and others (1991) reported <i>L. togatum</i> from an additional locality.						
<i>Lepidostoma weaveri</i> SC Harris, 1986	LIRI ^(L)	AL	288–432 m	G1, ALS1	1.0	11 Mar. - 22 June (Mar.)
Comments — This species is known only from Alabama, and it is considered critically imperiled in Alabama and globally. Morse and others (1997) treat it as rare and vulnerable. Larvae live in “small, spring-flowing temporary streams of the Cumberland Plateau” (Harris, 1986). Larvae make a cigar-shaped, panel-type case. Adult up to 8.2 mm in length. We have 5 collections and 21 specimens of this species.						

Subfamily Theliopsychinae Weaver						
Genus <i>Theliopsyche</i> Banks - [Habitat — Lotic erosional (in gravel): Habit — Climbers sprawlers (case cylindrical, of sand): Trophic — Shredders detritivores] A small Nearctic genus of six species. The larva has been described for only one species, although larvae that probably represent several species have been collected. Known cases are made entirely of sand. Larvae inhabit cold seepages in the Appalachian Mountains. Because the larvae of most species are unknown, only one has an assigned tolerance value. However, our experience indicates that all species in the genus are highly sensitive.						
Species	Parks	States	Elevation range	Rankings	Tolerance value	Flight dates
<i>Theliopsyche melas</i> SF Edwards, 1956	BISO, CHCH, LIRI ^(L)	AL, KY, TN, VA, WV	361–580 m	G4, ALS1	0.0	8 -23 May (Apr. - July)
Comments — This species is considered critically imperiled in Alabama, and by the Tennessee Valley Authority. Frazer and others (1991) report a single specimen from LIRI.						

Family Limnephilidae Kolenati

Northern caddisflies

This family has nearly 900 described species in about 100 genera. As the common name implies, these caddisflies are dominant in the Holarctic region, with many species found in both the Nearctic and the Palearctic. More than 200 species in 39 genera occur in the Nearctic, whereas 45 species in 10 genera occur in the Neotropical region. This group has attracted the attention of scientists for many years [for example, McLachlan (1874–1880) and Schmid (1955)], yet much uncertainty remains about what the family limits and internal organization should be. Most recently, for example, Vshivkova and others (2007) have suggested a number of changes to the classification of the family. The arrangement used below likely will change again in the near future. Wiggins (1996) and Morse and Holzenthal (2008) provide keys to genera of larvae. For adults, Ruiter (2000) published a key to the genera of the Western Hemisphere.

Subfamily Dicosmoecinae Schmid

Genus *Ironoquia* Banks - [Habitat — Lotic depositional, lentic littoral (temporary streams and ponds): Habit — Sprawlers (case a curved tube of leaf or bark pieces, or mineral): Trophic — Shredders] [Habitat — Lotic depositional, lentic littoral (temporary streams and ponds): Habit — Sprawlers (case a curved tube of leaf or bark pieces, or mineral): Trophic — Shredders] This is a genus of 6 species, 5 from North America and 1 from Europe. Four have been found in the study area and three in the parks. Larvae of *Ironoquia* are unusual among North American Dicosmoecinae in that they live in temporary pools and streams, which often have extremes of temperature and extended dry periods (Wiggins, 1996). The larvae of one species, *I. plattensis*, are known to burrow and aestivate underground for up to four months (Geluso and others, 2011; Whiles and others, 1999). The larvae of *I. punctatissima* and *I. parvula* have been described by Flint (1960), and the larvae of *I. lyrata* are known by Wiggins (1996). Kentucky Division of Water (2009) assigns *Ironoquia* larvae a tolerance value of 7.7.

Species	Parks	States	Elevation range	Rankings	Tolerance value	Flight dates
<i>Ironoquia punctatissima</i> (F Walker, 1852)	BLRI, CHCH, CUGA, GRSM ^(L) , LIRI, MACA, NISI, SHIL	AK, AL, AR, CT, DE, FL, GA, IL, IN, KS, KY, LA, MA, MD, ME, MI, MN, MO, MS, NC, NH, NJ, NS, NY, OH, OK, ON, PA, QC, SC, TN, TX, VA, VT, WI, WV	124–960 m	G5, ALS2	7.8	30 Aug. - 26 Oct. (Aug. - Nov.)

Comments — This species is included here because Alabama has ranked this species imperiled. Larvae prefer marshes and slow moving streams with an abundance of plants and organic matter (Flint, 1960). Williams and Williams (1975) report that larvae of *I. punctatissima* first appeared in October in the temporary stream in Ontario that they studied, just as pools began forming following a 5-month summer dry spell. Extremely rapid growth occurred with the larvae reaching the 4th instar by early November, and the 5th instar appearing by the end of December. Following ice melt in early April, larvae migrated from the water to the stream-banks, where they remained mostly without moving and without feeding until July. Then they sealed their cases and pupated. Adults first appeared at the end of July, and continued to emerge into August. We have 29 collections and 113 specimens of this species, including 3 specimens from one location in LIRI. Frazer and others (1991) report specimens of this species from one additional location in LIRI, as well. Case made of pieces of bark and leaves, slightly tapered and curved. Larva up to 20 mm in length, adult up to 18 mm.

Subfamily Limnephilinae Kolenati

Genus *Hydatophylax* Wallengren - [Habitat — Lotic depositional (detritus): Habit — Climbers (case a rough cylinder of wood, bark, mineral, with balance sticks): Trophic — Obligate shredders – detritivores; some facultative collectors—gatherers] This is a Northern Hemisphere genus of about 16 species and subspecies. Four species occur in North America, one of which is Holarctic. Two species occur in the eastern states, but only a single species is found in the study area. Larvae are very similar to those of *Pycnopsyche* and make very similar cases. However, *Hydatophylax* is much less commonly encountered than *Pycnopsyche*.

Species	Parks	States	Elevation range	Rankings	Tolerance value	Flight dates
<i>Hydatophylax argus</i> (Harris, 1869)	BLRI, CUGA, GRSM ^(L) , KIMO, LIRI , OBRI	AL, CT, DE, FL, IN, MA, MB, MD, ME, MI, MN, NB, NC, NF, NH, NJ, NY, OH, ON, PA, PE, QC, SC, TN, VA, WA, WI, WV	249–1691 m	G5	2.3	17 May - 14 July

Comments — This is the largest caddisfly in the study area. Lloyd (1915) described this species as “one of the largest and, in the adult, most gaudily colored of all Trichoptera.” Describing the cases Lloyd said they “are constructed of fragments of twigs and bark which vary greatly in size and shape. These fragments, arranged apparently with little regard for system or symmetry, are fastened securely together by means of silk and the tube thus formed is lined from end to end with a tough cylinder of silk.” Regarding feeding habits, Lloyd said “food of the larva throughout the year consists of dead bark and wood rasped from submerged twigs and logs.” Adult forewing up to 28 mm in length, larva up to 40 mm, pupa up to 30 mm. We found 189 specimens from 37 locations in 7 of the parks. In LIRI we collected a single larva.

Genus *Pycnopsyche* Banks – [Habitat – Lotic erosional and depositional, lentic littoral (detritus): Habit – Sprawlers climbers or clingers (case smooth mineral, or like *Hydatophylax*): Trophic – Shredders detritivores (chewers), scrapers (last instar in some species)] This is a North American genus of approximately 19 species, mostly distributed east of the Rocky Mountains. Fourteen species were collected during this survey. Flint (1960) describes the larvae of 6 species and 1 species group, and presents a key. Wojtowicz (1982) describes the larva of *P. flavata*. Wojtowicz and Flint (2006) describe *P. pani* and report that the larvae are indistinguishable from *P. luculenta* and *P. sonso*. Certain species are identifiable as larvae (that is, *P. gentilis* and *P. flavata*), but many specimens can only be assigned to a group, and the larvae of some species remain undescribed. The genus has a tolerance value of 2.3. *Pycnopsyche* are shredders, feeding on leaves and other organic detritus.

Species	Parks	States	Elevation range	Rankings	Tolerance value	Flight dates
<i>Pycnopsyche antica</i> (F Walker, 1852)	BISO ^(L) , BLRI, CUGA ^(L) , GRSM ^(L) , KIMO, LIRI ^(L) , MACA, OBRI ^(L) , SHIL ^(L)	AL, FL, GA, IN, LA, MA, MI, MS, NC, NH, NJ, NY, ON, PA, SC, TN, TX, VA, WI, WV	124–1694 m	G5	2.3	14 June - 27 Oct. (June - Nov.)

Comments — This species is often synonymized with *P. scabripennis* (that is, Flint and others, 2008). We have chosen to accept Wojtowicz's interpretation and treat *P. antica* as a valid species. All specimens we collected were identified as *P. antica*; none matched the description of *P. scabripennis*. Larva up to 25 mm. We collected 414 specimens from 62 locations in the 8 parks where this species occurs, and Frazer and others (1991) report this species (as *P. scabripennis*) in LIRI from the West Fork of the Little River.

Subfamily Pseudostenophylacinae Schmid

Genus *Pseudostenophylax* Martynov - [Habitat — Lotic erosional (detritus) and depositional (including seeps and temporary streams): Habit — Sprawlers (case tapered, curved, smooth, mineral): Trophic — Shredders detritivores (chewers), collectors gatherers] This is the only genus of the subfamily Pseudostenophylacinae found in North America. The genus is primarily Oriental, with a few Asian Palearctic species, and three species in North America. One species is found in the West, and either 1 or 2 species are found in the East. We treat the eastern forms as separate species; some prefer to treat them as variants of a single species. Larvae are found in cold headwater streams, and in intermittent streams. Cases are made of small rock pieces, and are tapered and slightly curved. Larva up to 16 mm in length, case up to 19 mm. Kentucky Division of Water (2009) assigns larvae of *Pseudostenophylax* a tolerance value of 2.0.

Species	Parks	States	Elevation range	Rankings	Tolerance value	Flight dates
<i>Pseudostenophylax uniformis</i> C Betten, 1934	BLRI, CUGA, GRSM ^(L) , MACA, RUCA	CT, IL, IN, KY, MA, ME, MN, MO, NC, NH, NY, OH, ON, PA, QC, SC, TN, VA, VT, WI, WV	149–1944 m	G5, NCS3	2.0	10 May - 12 Sep. (May - July)

Comments — Larvae are restricted to small spring fed streams and pools (Flint, 1957). Larva up to 15 mm in length, pupa up to 17 mm, case up to 17 mm. We collected 249 specimens from 59 locations in the 5 parks listed. This includes 6 larvae from a spring in the wooded portion of RUCA.

Family Phryganeidae Burmeister

Phryganeid caddisflies

The Phryganeidae is a small family of fewer than 75 species in 15 genera. The family generally is Holarctic in distribution. Ten genera have representatives in North America and species of five of those genera occur in the study area. The largest known caddisflies are phryganeids, having a forewing length of up to 43 mm. Most larvae make cylindrical cases from plant pieces cut into rectangles and arranged either as stacked rings (*Oligostomis*, *Ptilostomis*) or as a spiral (*Agrypnia*, *Banksiola*, *Phryganea*). Phryganeid larvae occur in a wide range of habitats, from cool streams to lakes and ponds, temporary pools, and even acidic bogs and brackish coastal waters. Selgeby (1974) reports larvae of three genera from depths as much as 100 m in Lake Superior. Larvae are primarily predaceous as final instars, but early instars of some species feed on filamentous algae and detritus. The principal source for information about Phryganeidae is the book by Wiggins (1998). Phryganeid larvae are easily separated to genus using Wiggins (1996, 1998), but cannot be identified to species at this time. Phryganeids do not have assigned tolerance values.

Genus *Agrypnia* Curtis — [Habitat — Lentic littoral (ponds), lotic depositional: Habit — Climbers (case a spirally arranged, tapered cylinder of leaf pieces): Trophic — Shredders detritivores and herbivores (chewers), scrapers (?)] Seventeen species are known. The genus is Holarctic, with 10 species occurring in North America. Two species occur in the study area, but only one was collected in the parks. Larvae prefer still or slowly moving water. Larvae have been collected from 45–m depths in Lake Superior (Selgeby, 1974).

Species	Parks	States	Elevation range	Rankings	Tolerance value	Flight dates
<i>Agrypnia vestita</i> F Walker, 1852	CHCH, COWP, CUGA, GUCO, GRSM ^(L) , KIMO, LIRI, MACA, SHIL	AB, AL, AR, BC, CT, DC, DE, FL, GA, IL, IN, KS, KY, LB, MA, MB, ME, MI, MN, MO, MS, MT, NC, ND, NF, NH, NJ, NT, NY, OH, OK, ON, OR, PA, QC, SC, TN, TX, VA, VT, WI, WV	112–640 m	G5, ALS2	n/a	9 May - 12 Oct. (May – Nov.)

Comments — A widespread and common species that we collected in nine parks. We have 75 specimens from 59 locations, including 3 specimens from 2 locations in LIRI. It is considered imperiled in Alabama. Larvae up to 30 mm in length, case up to 50 mm, adult up to 22 mm.

Genus *Phryganea* Linnaeus - [Habitat — Lotic depositional and lentic (detritus and vascular hydrophytes): Habit — Climbers (case a spirally arranged, tapered cylinder constructed of leaf pieces): Trophic — Shredders herbivores and detritivores (chewers), predators (engulfers)] A Holarctic genus of eight species. Two species are found in North America and both were collected in this survey. Larvae prefer lakes and marshes, and have been collected from 100–m depths in Lake Superior (Selgeby, 1974). Larvae tend to be omnivorous.

Species	Parks	States	Elevation range	Rankings	Tolerance value	Flight dates
<i>Phryganea sayi</i> LJ Milne, 1931	ABLI, BISO, BLRI, CARL, COWP, KIMO, LIRI, MACA, OBRI, SHIL ^(L)	AL, AR, CT, DC, DE, IL, IN, KS, KY, MA, MD, ME, MI, MO, NC, ND, NJ, NY, OH, ON, PA, QC, SC, SK, TN, VA, WI, WV	124–1080 m	G5, ALS1	6.0	25 May - 13 Oct. (May - Sep.)

Comments — This is one of the larger caddisflies in the Southeast. It is considered critically imperiled in Alabama. Adult forewing length 18–22 mm; mature larvae up to 43 mm; case up to 56 mm. We have 40 collections and 109 specimens of this species. In LIRI we collected 2 specimens from 2 locations.

Family Thremmatidae Martynov

Horsehead caddisflies

This family has a disjunct North America—eastern Asia distribution. Some subfamilies and genera have closest relatives in the two regions to the exclusion of other regions. World-wide there are fewer than 90 species in seven genera. Only one genus occurs in the study area, *Neophylax*, which has about 40 species worldwide. There are 21 species in North America with 17 in the East.

Genus *Neophylax* McLachlan - [Habitat — Lotic erosional: Habit — Clingers (case tapered, slightly curved, mineral with ballast stones one each side): Trophic — Scrapers] Currently about 32 species of *Neophylax* are known from North America, Western Palearctic, and Oriental regions. In the seven states of the study area 16 species are known, along with at least 2 undescribed species. Eleven species were found during this inventory, although only larvae were found for *N. fuscus*. Larvae make a very distinctive case that is instantly recognizable in the field. Cases are robust and tubular, slightly curved and tapered, made of rock pieces, and often have larger “ballast” stones laterally. Pupal cases are firmly attached to the underside of stable rocks. Larvae are found in springs, creeks, and large rivers. Within a stream, species tend to be longitudinally distributed, with overlapping populations resulting in more than one species being found at a single site. Larvae are scrapers, feeding on diatoms, periphyton, and organic debris from the surfaces of rocks. *Neophylax* are univoltine; the adults normally emerge in the fall following a summer diapause of 2 to 6 months in the prepupal stage. Eggs are laid under rocks or overhanging banks above the water surface (Beam and Wiggins, 1987), although at least one western Nearctic species lays eggs in water. Larval growth rates vary considerably. Georgian and Wallace (1983) demonstrate that, in North Carolina, *N. consimilis* larvae take 135 days or less to progress from 1st instar to prepupa, whereas Beam and Wiggins (1987) demonstrate that, in Ontario, *N. aniqua* larvae take up to 240 days. When larvae prepare for diapause they tend to aggregate and are found in clumps of 5 to 20 cases on the same rock. Often the current generation of larvae uses the same locations for aestivation as previous generations, as empty pupal cases of the prior generation persist and can be found together with the current cohort. This has been demonstrated to lead to enhanced aquatic invertebrate diversity compared with rocks that do not have aggregations of *Neophylax* larvae (McCabe and Gotelli, 2003). *Neophylax* was revised recently by Vineyard and others (2005), which is the best source for distribution information and keys to the species. Although *Neophylax* larvae are usually easily identifiable, in biomonitoring programs they are given a genus level tolerance value of 1.6. In RUCA we collected three larvae of *Neophylax* which could not be determined to species.

Species	Parks	States	Elevation range	Rankings	Tolerance value	Flight dates
<i>Neophylax aniqua</i> HH Ross, 1947	BISO, BLRI, CHCH, CUGA, GRSM ⁽¹⁾ , LIRI , OBRI, SHIL	ME, NB, NC, NF, NH, NS, NY, ON, PA, QC, TN, VA, VT, WV	140–1467 m	G5	1.6	29 Sep. - 18 Oct. (Sep. - Oct.)
Comments — This species is restricted to springs and headwater streams. It is normally the first species encountered longitudinally in a stream system (Beam and Wiggins, 1987). Adult up to 12 mm in length. We have 42 collections and 274 specimens of this species, including 2 larvae from a single location in LIRI that appear to be this species.						
<i>Neophylax concinnus</i> R McLachlan, 1871	ABLI, BISO, BLRI, CHCH, CUGA, FODO, LIRI , MACA, OBRI	AL, AR, CT, DE, FL, GA, IL, IN, KY, MA, MD, ME, MI, MN, MO, NC, NH, NJ, NY, OH, ON, PA, QC, RI, SC, TN, VA, VT, WI, WV	128–1025 m	G5, ALS1	1.6	5 Aug. - 18 Oct. (Sep. - Oct.)
Comments — A variable species morphologically and ecologically, limited barcoding data indicate that it is genetically well defined. In Alabama, <i>N. concinnus</i> is considered critically imperiled. We have 24 collections and 96 specimens of this species, including 4 specimens from 3 locations in LIRI. Larva up to 10 mm in length, case up to 11 mm, adult up to 11 mm.						

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Species	Parks	States	Elevation range	Rankings	Tolerance value	Flight dates
<i>Neophylax harrisi</i> PW Scheffer & HE Frania, 2005	LIRI	AL	358 m	n/a	1.6?	4 Oct. (Oct.)
Comments — This species was described from specimens collected very near if not actually in LIRI (Vineyard and others, 2005). It remains poorly known.						

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Appendix 5. Taxa Tolerance Values and Conservation Scores.

Table 5-1. Species tolerance values and conservation scores for aquatic target and non-target taxa. Only those taxa that have an established tolerance value and (or) conservation score greater than 0 are included. Entries such as Amphipoda_family and Dytiscidae_genus represent taxa belonging to the order Amphipoda or the family Dytiscidae, respectively, that we did not identify to a lower taxonomic level. Also provided are numeric summaries for each taxon.

[Sites, number of locations at which a taxon was found; Events, number of separate collection events during which a taxon was found; S, total number of specimens collected of a taxon; TV, assigned tolerance value of a taxon; CS, conservation score of a taxon]

Order	Family	Taxon	Sites	Events	S	TV	CS
Amphipoda	Amphipoda_family	Amphipoda_genus species	1	1	1	7.97	0
Basommatophora	Physidae	Physa species	1	1	6	8	0
	Planorbidae	Helisoma anceps	1	1	1	6.5	0
		Helisoma species	1	1	1	6.5	0
Coleoptera	Dryopidae	Helichus fastigiatus	2	2	9	4.6	0
	Dytiscidae	Celina hubbelli	1	1	1	9	0
		Coptotomus longulus lenticus	1	1	1	9	0
		Dytiscidae_genus species	5	5	12	5	0
		Neoporus carolinus	1	1	1	8.9	0
		Neoporus clypealis	1	1	1	8.9	0
		Neoporus undulatus	1	1	14	8.9	0
	Elmidae	Dubiraphia bivittata	1	1	14	5.9	0
		Oulimnius latiusculus	1	1	1	1.8	0
		Promoresia species	1	1	3	2.35	0
		Stenelmis species	1	1	3	5.4	0
	Gyrinidae	Dineutus discolor	1	1	2	5.5	0
	Haliplidae	Peltodytes sexmaculatus	1	1	2	8.7	0
	Hydrophilidae	Berosus aculeatus	1	1	18	8.43	0
		Enochrus pygmaeus	1	1	1	8.5	0
		Enochrus species	1	1	1	8.5	0
		Hydrophilidae_genus species	1	1	3	5	0
		Tropisternus collaris collaris	1	1	1	9.7	0
Diptera	Chironomidae	Chironomidae_genus species	2	2	14	6	0
	Limoniidae	Austrolimnophila species	1	1	6		0
		Hexatoma species	1	1	1	4.7	0
		Pseudolimnophila species	1	1	1	7.3	0
	Psychodidae	Psychodidae_genus species	1	1	2	10	0
	Tabanidae	Chrysops celatus	1	1	2	7.3	0
		Chrysops species	1	1	1	7.3	0
	Tipulidae	Dolichopeza species	1	1	3	5.5	0
		Leptotarsus species	1	1	3	4	0
		Tipula species	1	1	1	7.7	0
		Tipulidae_genus species	1	1	6	7.7	0
Ephemeroptera	Ameletidae	Ameletus lineatus	1	1	17	2.38	0
		Ameletus species	5	7	19	2.38	0
	Baetidae	Baetidae_genus species	3	3	9	4	0
		Baetis species	1	1	1	4	0
	Caenidae	Caenis amica	1	1	70	7.41	0

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Order	Family	Taxon	Sites	Events	S	TV	CS
	Ephemerelellidae	<i>Caenis</i> species	2	2	3	7.6	0
		<i>Drunella lata</i>	1	1	10	0.1	0
		<i>Drunella</i> species	2	2	2	0.1	0
		<i>Eurylophella</i> species	1	1	28	4.34	1
		<i>Serratella</i> species	1	1	1	1.57	1
	Heptageniidae	<i>Epeorus vitreus</i>	1	1	1	1.2	0
		<i>Heptagenia marginalis</i>	1	1	1	2.5	2
		<i>Heptagenia</i> species	1	2	23	2.5	0
		Heptageniidae_genus species	1	1	1	4	0
		<i>Leucrocuta hebe</i>	1	1	1	2.8	1
		<i>Maccaffertium exiguum</i>	1	1	2	1.9	0
		<i>Maccaffertium modestum</i>	1	1	5	5.8	0
		<i>Maccaffertium</i> species	1	1	2	3	0
		<i>Maccaffertium terminatum placitum</i>	1	1	1	4.5	0
		<i>Maccaffertium vicarium</i>	1	1	1	1	0
		<i>Stenacron pallidum</i>	1	1	2	2.9	0
		<i>Stenonema femoratum</i>	2	2	2	7.5	0
	Isonychiidae	<i>Isonychia bicolor</i>	1	2	7	3.8	0
		<i>Isonychia</i> species	1	1	15	3.8	0
	Leptophlebiidae	Leptophlebiidae_genus species	1	1	5	2	0
		<i>Paraleptophlebia debilis</i>	1	1	2	0.9	0
		<i>Paraleptophlebia</i> species	1	1	1	0.9	0
Hemiptera	Corixidae	Corixidae_genus species	1	1	5	9	0
Isopoda	Asellidae	<i>Caecidotea</i> species	2	2	12	9.11	0
		<i>Lirceus</i> species	6	6	30	7.7	0
	Isopoda_family	Isopoda_genus species	1	1	1	8	0
Megaloptera	Corydalidae	<i>Chauliodes rastricornis</i>	1	2	47	8.98	0
		<i>Corydalus cornutus</i>	2	2	6	5.6	0
		<i>Nigronia fasciatus</i>	5	6	10	6.2	0
		<i>Nigronia serricornis</i>	1	1	7	5.5	0
Mesogastropoda	Viviparidae	<i>Viviparus</i> species	1	1	5	6	0
Neuroptera	Sisyridae	<i>Climacia areolaris</i>	1	1	1	6.5	0
Odonata	Aeshnidae	<i>Boyeria</i> species	1	1	2	6.3	0
		<i>Boyeria vinosa</i>	2	3	6	6.3	0
	Calopterygidae	<i>Calopteryx maculata</i>	1	1	1	7.8	0
		<i>Calopteryx</i> species	1	1	4	8.3	0
	Coenagrionidae	<i>Argia fumipennis violacea</i>	1	1	2	8.2	0
		<i>Argia moesta</i>	1	1	1	8.2	0
		<i>Argia</i> species	1	1	4	8.7	0
		Coenagrionidae_genus species	3	3	10	9	0
		<i>Enallagma</i> species	2	2	4	9	0
		<i>Ischnura verticalis</i>	1	1	2	9.5	0
	Cordulegastridae	<i>Cordulegaster obliqua</i>	3	3	4	5.7	0
		<i>Cordulegaster</i> species	1	1	2	6.1	0
	Corduliidae	<i>Epithea cynosura</i>	1	1	1	8.57	0
	Gomphidae	<i>Dromogomphus spinosus</i>	1	1	1	5.9	0
		Gomphidae_genus species	1	1	1	5.8	0
	Libellulidae	<i>Erythemis simplicicollis</i>	1	1	1	7.7	0
		<i>Plathemis lydia</i>	1	1	1	10	0
	Macromiidae	<i>Macromia</i> species	2	2	2	6.7	0
Oligochaeta_order	Oligochaeta_family	Oligochaeta_genus species	2	2	11	8.2	0
Plecoptera	Capniidae	<i>Allocaupnia nivicola</i>	3	3	11	2.8	1
		<i>Allocaupnia recta</i>	1	1	1	2.8	2

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Trichoptera	Chloroperlidae	<i>Allocapnia</i> species	1	1	1	1.4	0
		<i>Haploperla brevis</i>	3	3	3	1.3	0
	Leuctridae	<i>Leuctra alexanderi</i>	2	4	16	0.7	3
		<i>Leuctra ferruginea</i>	2	2	4	0.7	0
		<i>Leuctra ferruginea group</i>	2	2	14	0.7	0
		<i>Leuctra grandis</i>	1	1	1	0.7	1
		<i>Leuctra monticola</i>	1	1	1	0.7	3
		<i>Leuctra rickeri</i>	9	10	57	0.7	3
		<i>Leuctra</i> species	1	1	1	0.7	0
		<i>Zealeuctra claasseni</i>	1	2	96	0	1
		<i>Zealeuctra</i> species	1	1	2	0	1
	Nemouridae	<i>Amphinemura nigrutta</i>	14	15	54	3.33	0
		<i>Amphinemura</i> species	12	13	39	3.4	0
		<i>Ostrocerca truncata</i>	1	1	3	2.5	1
		<i>Prostoia</i> species	1	1	1	6.1	0
	Perlidae	<i>Acroneuria abnormis</i>	1	2	3	2.2	0
		<i>Acroneuria</i> species	3	3	9	0	0
		<i>Neoperla carlsoni</i>	1	1	3	1.6	4
		<i>Neoperla coosa</i>	1	1	7	1.6	3
		<i>Neoperla</i> species	1	1	4	1.6	1
		<i>Perlesta</i> species	6	8	16	0	1
		<i>Perlinella drymo</i>	1	1	1	0	0
	Perlodidae	<i>Cliperla clio</i>	2	2	4	4.8	0
		<i>Diploperla duplicata</i>	2	2	2	2.7	0
		<i>Diploperla robusta</i>	2	3	11	2.7	0
		<i>Helopicus subvarians</i>	1	1	1	0.8	0
		<i>Isoperla davisii</i>	1	1	2	2	4
		<i>Isoperla holochlora</i>	2	2	3	0	0
		<i>Isoperla</i> species	15	20	46	1.5	0
		<i>Isoperla</i> species 1	1	1	1	2	4
		<i>Isoperla</i> species 2	1	1	2	2	4
		Perlodidae_genus species	1	1	3	2	0
	Taeniopterygidae	<i>Oemopteryx contorta</i>	3	4	6	2	0
		<i>Strophopteryx fasciata</i>	2	2	3	2.5	0
		<i>Strophopteryx</i> species	1	1	1	2.5	0
		<i>Taeniopteryx lonicera</i>	2	2	2	6.3	2
		<i>Taeniopteryx</i> species	1	1	2	6.3	1
Trichoptera	Apataniidae	<i>Apatania incerta</i>	1	1	1	0.6	0
	Brachycentridae	<i>Micrasema rusticum</i>	1	1	1	0	0
		<i>Micrasema</i> species	1	1	1	0.56	0
		<i>Micrasema wataga</i>	7	8	129	3.2	0
	Dipseudopsidae	<i>Phyllocentropus placidus</i>	3	3	4	3.5	0
	Glossosomatidae	<i>Agapetus avitus</i>	1	1	1	0	3
		<i>Agapetus</i> species	3	3	3	0	1
		<i>Agapetus spinosus</i>	6	7	573	0	3
		<i>Agapetus walkeri</i>	5	5	11	0	1
		<i>Glossosoma nigrior</i>	2	6	26	1.55	1
	Hydropsychidae	<i>Cheumatopsyche analis</i>	14	17	42	6.6	0
		<i>Cheumatopsyche campyla</i>	4	5	7	6.6	0
		<i>Cheumatopsyche etrona</i>	1	1	1	6.6	3
		<i>Cheumatopsyche geora</i>	14	16	72	6.6	0
		<i>Cheumatopsyche harwoodi</i>	1	1	1	6.6	0
		<i>Cheumatopsyche helma</i>	1	2	2	6.6	1
		<i>Cheumatopsyche oxa</i>	1	2	8	6.6	0

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		<i>Cheumatopsyche pasella</i>	1	1	5	6.6	0
		<i>Cheumatopsyche pinaca</i>	3	3	3	6.6	0
		<i>Cheumatopsyche</i> species	1	1	29	6.6	0
		<i>Diplectrona metaqui</i>	1	2	7	2	3
		<i>Diplectrona modesta</i>	9	10	15	2.2	3
		<i>Diplectrona</i> species	14	20	64	2.2	1
		<i>Homoplectra doringa</i>	4	6	19	3	1
		<i>Homoplectra</i> species	1	1	1	3	1
		<i>Hydropsyche alhedra</i>	1	1	1	0	0
		<i>Hydropsyche betteni</i>	17	23	140	8.1	0
		<i>Hydropsyche betteni/depravata</i> group	1	1	8	8.1	0
		<i>Hydropsyche cheilonis</i>	1	1	1	4.3	0
		<i>Hydropsyche dicantha</i>	27	38	668	4	0
		<i>Hydropsyche mississippiensis</i>	1	1	1	4.3	0
		<i>Hydropsyche simulans</i>	1	1	1	4	0
		<i>Hydropsyche sparna</i>	1	1	1	3.2	0
		<i>Hydropsyche</i> species	1	1	1	4.3	0
		<i>Hydropsyche venularis</i>	2	2	2	5.3	0
		<i>Macrostemum carolina</i>	1	1	4	3.6	1
		<i>Macrostemum zebratum</i>	5	6	20	3.6	0
		<i>Potamyia flava</i>	1	1	1	5	1
	Hydroptilidae	<i>Dibusa angata</i>	2	2	2	3	2
		<i>Hydroptila alabama</i>	1	1	1	6.3	3
		<i>Hydroptila armata</i>	6	6	20	6.3	0
		<i>Hydroptila callia</i>	3	3	3	6.3	2
		<i>Hydroptila chattanooga</i>	2	2	2	6.3	3
		<i>Hydroptila delineata</i>	4	4	11	6.3	1
		<i>Hydroptila gunda</i>	6	6	13	6.3	1
		<i>Hydroptila hamata</i>	4	4	4	6.3	0
		<i>Hydroptila licina</i>	1	1	1	6.3	4
		<i>Hydroptila micropotamis</i>	9	10	22	6.3	3
		<i>Hydroptila novicola</i>	2	2	2	6.3	0
		<i>Hydroptila oneili</i>	2	2	2	6.3	0
		<i>Hydroptila paramoena</i>	8	8	8	6.3	3
		<i>Hydroptila</i> species	8	9	121	6.3	0
		<i>Hydroptila talladega</i>	1	1	1	6.2	2
		<i>Hydroptila vala</i>	1	1	1	6.2	1
		<i>Hydroptila waubesiana</i>	4	4	4	6.2	0
		<i>Hydroptilidae</i> genus species	1	1	123	6.2	0
		<i>Mayatrachia ayama</i>	11	12	133	1	0
		<i>Neotrichia collata</i>	2	2	2	0	1
		<i>Neotrichia mentonensis</i>	0	0	1	0	4
		<i>Neotrichia minutisimella</i>	1	1	1	0	4
		<i>Neotrichia okopa</i>	4	4	4	0	4
		<i>Ochrotrichia</i> species	2	2	14	3.5	0
		<i>Ochrotrichia tarsalis</i>	1	1	1	3.5	0
		<i>Orthotrichia aegerfasciella</i>	11	12	131	6	0
		<i>Oxyethira forcipata</i>	5	5	5	2.22	0
		<i>Oxyethira glasa</i>	2	2	2	2.22	0
		<i>Oxyethira grisea</i>	1	1	4	2.22	0
		<i>Oxyethira pallida</i>	7	7	7	2.22	0
		<i>Oxyethira rivicola</i>	10	11	25	2.22	0
		<i>Oxyethira</i> species	6	6	120	2.22	0
		<i>Oxyethira zeronia</i>	6	6	6	2.22	0

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		<i>Stactobiella delira</i>	4	6	8	1.5	1
		<i>Stactobiella palmata</i>	3	4	17	1.5	1
		<i>Stactobiella</i> species	1	1	102	1.29	1
	Lepidostomatidae	<i>Lepidostoma compressum</i>	2	2	13	1	3
		<i>Lepidostoma</i> species	7	7	11	1	0
		<i>Lepidostoma togatum</i>	4	5	25	1	0
		<i>Lepidostoma weaveri</i>	5	5	21	1	4
		<i>Lepidostomatidae</i> genus species	1	1	2	1	0
		<i>Theliopsyche melas</i>	4	5	10	1	1
	Leptoceridae	<i>Ceraclea alabamiae</i>	9	11	40	6	3
		<i>Ceraclea alces</i>	8	8	13	6	3
		<i>Ceraclea ancylus</i>	2	2	3	2.5	0
		<i>Ceraclea cancellata</i>	13	14	34	2.5	0
		<i>Ceraclea diluta</i>	1	1	1	2.3	1
		<i>Ceraclea flava</i>	3	3	3	0	0
		<i>Ceraclea maculata</i>	14	17	28	6.4	0
		<i>Ceraclea neffi</i>	6	6	6	1	0
		<i>Ceraclea nepha</i>	5	6	8	6	0
		<i>Ceraclea protonepha</i>	11	12	25	6	0
		<i>Ceraclea resurgens</i>	2	4	18	6	0
		<i>Ceraclea</i> species	9	12	102	3	0
		<i>Ceraclea tarsipunctata</i>	18	20	93	3	0
		<i>Ceraclea transversa</i>	6	6	11	2.7	0
		<i>Leptocerus americanus</i>	3	3	3	3	0
		<i>Mystacides sepulchralis</i>	4	4	4	3.5	0
		<i>Nectopsyche candida</i>	2	2	6	3.8	1
		<i>Nectopsyche pavida</i>	7	7	9	4.2	0
		<i>Oecetis cinerascens</i>	1	1	6	5.7	0
		<i>Oecetis ditissa</i>	9	9	9	5.7	0
		<i>Oecetis inconspicua</i>	23	27	227	1.85	1
		<i>Oecetis nocturna</i>	8	8	32	4.1	0
		<i>Oecetis persimilis</i>	10	10	13	4.7	0
		<i>Oecetis scala</i>	3	3	3	5.7	0
		<i>Oecetis</i> species	3	3	18	5.7	0
		<i>Oecetis sphyra</i>	1	1	1	5.7	0
		<i>Triaenodes cumberlandensis</i>	1	1	1	3.5	4
		<i>Triaenodes ignitus</i>	1	1	1	4.58	1
		<i>Triaenodes injustus</i>	2	2	2	2.2	1
		<i>Triaenodes marginatus</i>	4	4	7	4.5	0
		<i>Triaenodes perna</i>	4	4	4	4.06	1
		<i>Triaenodes</i> species	4	4	9	4.46	0
		<i>Triaenodes tardus</i>	4	4	4	4.7	0
	Limnephilidae	<i>Hydatophylax argus</i>	1	1	1	2.3	0
		<i>Ironoquia punctatissima</i>	2	2	4	7.3	0
		<i>Pycnopsyche antica</i>	1	1	1	2.3	1
	Molannidae	<i>Molanna blenda</i>	7	9	22	3.9	0
		<i>Molanna tryphena</i>	2	2	2	6	0
		<i>Molanna ulmerina</i>	1	1	1	6	0
	Philopotamidae	<i>Chimarra aterrima</i>	1	1	1	1.9	0
		<i>Chimarra obscura</i>	13	15	65	3.4	0
		<i>Chimarra</i> species	7	7	14	3.4	0
		<i>Dolophilodes distincta</i>	13	14	35	0.8	0
		<i>Dolophilodes</i> species	1	1	1	0.8	0
		<i>Wormaldia moesta</i>	1	1	4	0.65	0

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Order	Family	Taxon	Sites	Events	S	TV	CS
		<i>Wormaldia shawnee</i>	12	13	170	0.65	1
		<i>Wormaldia</i> species	3	3	4	0.4	0
		<i>Wormaldia thyria</i>	4	4	4	0.4	3
	Phryganeidae	<i>Agrypnia vestita</i>	2	2	3	5.7	0
		<i>Phryganea sayi</i>	2	2	2	6	0
		<i>Ptilostomis ocellifera</i>	1	1	1	6.7	0
		<i>Ptilostomis postica</i>	1	1	1	6.4	0
		<i>Ptilostomis</i> species	2	2	2	6.7	0
	Polycentropodidae	<i>Cernotina calcea</i>	3	3	3	6	2
		<i>Cernotina spicata</i>	7	7	7	6	1
		<i>Cyrnellus fraternus</i>	5	5	5	7.4	0
		<i>Neureclipsis crepuscularis</i>	1	1	1	4.2	0
		<i>Neureclipsis piersoni</i>	5	5	6	4.4	3
		<i>Neureclipsis</i> species	2	2	2	4.4	0
		<i>Nyctiophylax affinis</i>	8	8	9	0.9	0
		<i>Nyctiophylax banksi</i>	1	1	1	0.9	0
		<i>Nyctiophylax barrorum</i>	7	7	7	0.9	4
		<i>Nyctiophylax celta</i>	3	3	3	0.9	0
		<i>Nyctiophylax denningi</i>	6	6	13	0.9	0
		<i>Nyctiophylax nephophilus</i>	1	1	2	0.9	0
		<i>Nyctiophylax serratus</i>	2	2	6	0.9	1
		<i>Nyctiophylax</i> species	2	2	2	0.9	0
		<i>Plectrocnemia cinerea</i>	9	9	27	3.5	0
		<i>Plectrocnemia crassicornis</i>	5	5	10	3.5	0
		<i>Polycentropus carolinensis</i>	1	1	4	3.5	0
		<i>Polycentropus confusus</i>	18	21	108	3.5	0
		<i>Polycentropus elarus</i>	6	6	9	3.5	2
		<i>Polycentropus</i> species	2	2	3	3.5	0
		<i>Polycentropus thaxtoni</i>	1	1	1	3.5	4
	Psychomyiidae	<i>Lype diversa</i>	1	2	29	4.3	0
		<i>Psychomyia flavida</i>	2	2	2	3.3	0
		<i>Psychomyia nomada</i>	1	1	7	2	0
		<i>Psychomyia</i> species	1	1	1	2.44	0
	Rhyacophilidae	<i>Rhyacophila banksi</i>	2	3	5	1	1
		<i>Rhyacophila carolina</i>	19	28	122	0	0
		<i>Rhyacophila glaberrima</i>	1	2	4	0.8	2
		<i>Rhyacophila ledra</i>	2	3	7	3.4	1
		<i>Rhyacophila lobifera</i>	7	7	15	2.5	4
		<i>Rhyacophila otica</i>	2	2	4	1	3
		<i>Rhyacophila</i> species	6	8	18	0.73	0
		<i>Rhyacophila torva</i>	1	1	1	1.8	0
	Thremmatidae	<i>Neophylax aniqua</i>	1	1	2	1.6	0
		<i>Neophylax concinnus</i>	3	4	4	1.2	0
		<i>Neophylax harrisi</i>	1	1	2	2.2	4
		<i>Neophylax</i> species	1	1	3	2.2	0
Veneroida	Corbiculidae	<i>Corbicula fluminea</i>	2	2	5	6.3	0

Appendix 6. Species Lists.

Lists of all taxa collected in both parks are presented in tables 6-1 and 6-2. Table 6-3 lists species of target taxa that have been reported for the counties that include LIRI and RUCA. The species listed are those names that include the genus, the species epithet, and the author, such as *Parcoblatta fulvescens* (Saussure & Zehntner, 1893). Entries such as *Platypus* species indicate a taxon, in this case a genus, that was collected, but that could not be identified to species and for which no other representatives of the genus were collected that could be identified. Since the genus *Platypus* is clearly present, this entry is included to recognize its occurrence in the park.

In all lists, common names are provided. The Odonata and Plecoptera have “official” common names that are in wide use and are generally widely accepted. These names are used for those orders here. Most insects and other invertebrate groups do not have official common names for different species. For those groups, only a few species have common names. For a separate project, we created common names for some mayflies and caddisflies. These names are included here. The names provided for the rest of the species are names that apply to genera, families, orders, or in some cases to higher taxonomic categories.

Table 6-1. Species known from Little River Canyon National Preserve. Terrestrial species are indicated by an orange highlight. Aquatic species are not highlighted.

Phylum Arthropoda	Class Insecta		
Order	Family	Taxon	Common name
Blattaria	Blatellidae	<i>Parcoblatta fulvescens</i> (Saussure & Zehntner, 1893)	Fulvous Wood Cockroach
		<i>Parcoblatta virginica</i> (Brunner, 1865)	Virginia Wood Cockroach
Coleoptera	Brentidae	<i>Arrhenodes minuta</i> (Drury, 1770)	Oak Timberworm
	Carabidae	<i>Clivina americana</i> Dejean, 1831	Ground Beetle
		<i>Clivina bipustulata</i> (Fabricius, 1801)	Ground Beetle
		<i>Semiclivina dentipes</i> (Dejean, 1825)	Ground Beetle
		<i>Anelaphus villosus</i> (Fabricius, 1792)	Twig Pruner
	Cerambycidae	<i>Platypus</i> species	Weevil
	Curculionidae	<i>Helichus fastigiatus</i> (Say, 1824)	Long-toed Water Beetle
	Dytiscidae	<i>Celina hubbelli</i> Young, 1979	Predaceous Diving Beetle
		<i>Coptotomus longulus lenticus</i> Hilsenhoff, 1980	Predaceous Diving Beetle
		<i>Heterosternuta</i> species	Predaceous Diving Beetle
		<i>Neoporus carolinus</i> (Fall, 1917)	Predaceous Diving Beetle
		<i>Neoporus clypealis</i> (Sharp, 1882)	Predaceous Diving Beetle
		<i>Neoporus undulatus</i> (Say, 1823)	Predaceous Diving Beetle
	Elmidae	<i>Dubiraphia bivittata</i> (LeConte, 1852)	Riffle Beetle
		<i>Oulimnius latiusculus</i> (LeConte, 1866)	Riffle Beetle
		<i>Promoresia</i> species	Riffle Beetle
		<i>Stenelmis</i> species	Riffle Beetle
	Gyrinidae	<i>Dineutus discolor</i> Aubé	Whirligig Beetle
	Haliplidae	<i>Peltodytes sexmaculatus</i> Roberts, 1913	Crawling Water Beetle
	Heteroceridae	<i>Heterocerus</i> species	Variegated Mud-loving Beetle
		<i>Tropicus pusillus</i> (Say, 1823)	Variegated Mud-loving Beetle
	Hydrophilidae	<i>Berosus aculeatus</i> LeConte, 1855	Water Scavenger Beetle
		<i>Cercyon praetextatus</i> (Say, 1825)	Water Scavenger Beetle
		<i>Enochrus pygmaeus</i> (Fabricius, 1792)	Water Scavenger Beetle
		<i>Tropisternus collaris collaris</i> (Fabricius, 1775)	Water Scavenger Beetle
	Phengodidae	<i>Phengodes</i> species	Glowworm
	Scarabaeidae	<i>Phyllophaga anxia</i> (LeConte, 1850)	Scarab Beetle
		<i>Phyllophaga crenulata</i> (Frölich, 1792)	Scarab Beetle
		<i>Phyllophaga drakii</i> (Kirby, 1837)	Scarab Beetle
		<i>Phyllophaga fraterna</i> Harris, 1842	Scarab Beetle
		<i>Phyllophaga fusca</i> (Frölich, 1792)	Scarab Beetle
		<i>Phyllophaga hirsuta</i> (Knoch, 1801)	Scarab Beetle

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Phylum Arthropoda		Class Insecta	
Order	Family	Taxon	Common name
Diptera		<i>Phyllophaga ilicis</i> (Knoch, 1801)	Scarab Beetle
		<i>Phyllophaga marginalis</i> (LeConte, 1856)	Scarab Beetle
	Limoniidae	<i>Austrolimnophila</i> species	Crane Fly
		<i>Hexatoma</i> species	Crane Fly
		<i>Pseudolimnophila</i> species	Crane Fly
	Pyrgotidae	<i>Pyrgota</i> species	Scarab Parasite Fly
	Tabanidae	<i>Chrysops celatus</i> (Pechuman, 1949)	Deer Fly
	Tipulidae	<i>Dolichopeza</i> species	Crane Fly
		<i>Leptotarsus</i> species	Crane Fly
		<i>Tipula</i> species	Crane Fly
Ephemeroptera	Ameletidae	<i>Ameletus lineatus</i> Traver, 1932	Linear Painted Minnow Mayfly
	Baetidae	<i>Baetis</i> species	Small Minnow Mayfly
	Caenidae	<i>Caenis amica</i> Hagen, 1861	Small Squaregill Mayfly
	Ephemerellidae	<i>Drunella lata</i> (Morgan, 1911)	Broad Spiny Crawler Mayfly
		<i>Eurylophella</i> species	Spiny Crawler Mayfly
		<i>Serratella</i> species	Spiny Crawler Mayfly
	Heptageniidae	<i>Epeorus vitreus</i> (Walker, 1853)	Glassy Two-tailed Flat-headed Mayfly
		<i>Heptagenia marginalis</i> Banks, 1910	Flat-headed Mayfly
		<i>Leucrocota hebe</i> (J McDunnough, 1924)	Flat-headed Mayfly
		<i>Maccaffertium exiguum</i> (Traver, 1933)	Little Flat-headed Mayfly
		<i>Maccaffertium modestum</i> (Banks, 1910)	Gentle Flat-headed Mayfly
		<i>Maccaffertium terminatum placitum</i> (Banks, 1910)	Flat-headed Mayfly
		<i>Maccaffertium vicarium</i> (Walker, 1853)	Flat-headed Mayfly
		<i>Stenacron pallidum</i> (Traver, 1933)	Pale Flat-headed Mayfly
		<i>Stenonema femoratum</i> (Say, 1823)	Flat-headed Mayfly
		<i>Isonychia bicolor</i> (Walker, 1853)	Brushy-legged Minnow Mayfly
	Leptophlebiidae	<i>Paraleptophlebia debilis</i> (Walker, 1853)	Pronggill Mayfly
Hymenoptera	Vespidae	<i>Vespa crabro</i> Linnaeus, 1758	European Hornet
Lepidoptera	Micropterigidae	<i>Epimartyria auricrinella</i> Walsingham, 1898	Mandibulate Moth
Megaloptera	Corydalidae	<i>Chauliodes rastricornis</i> Rambur, 1842	Fishfly
		<i>Corydalus cornutus</i> (Linnaeus, 1763)	Dobsonfly, Hellgrammite
		<i>Nigronia fasciatus</i> (Walker, 1853)	Fishfly
		<i>Nigronia serricornis</i> (Say, 1824)	Fishfly
		<i>Climacia areolaris</i> (Hagen, 1861)	Spongillafly
Neuroptera	Sisyridae	<i>Boyeria vinosa</i> (Say, 1839)	Fawn Darner
Odonata	Aeshnidae	<i>Calopteryx maculata</i> (Beauvois, 1805)	Ebony Jewelwing
	Coenagrionidae	<i>Argia fumipennis violacea</i> (Hagen, 1861)	Violet Dancer
		<i>Argia moesta</i> (Hagen, 1861)	Powdered Dancer
		<i>Enallagma</i> species	Bluet
	Cordulegastridae	<i>Ischnura verticalis</i> (Say, 1839)	Eastern Forktail
		<i>Cordulegaster obliqua</i> (Say, 1839)	Arrowhead Spiketail
		<i>Epitheca cynosura</i> (Say, 1839)	Common Baskettail
	Gomphidae	<i>Dromogomphus spinosus</i> Selys, 1854	Black-shouldered Spinyleg
	Libellulidae	<i>Erythemis simplicicollis</i> (Say, 1839)	Eastern Pondhawk
		<i>Plathemis lydia</i> (Drury, 1773)	Common Whitetail
		<i>Macromia</i> species	River Cruiser
	Capniidae	<i>Allocapnia nivicola</i> (Fitch, 1847)	Brook Snowfly
		<i>Allocapnia recta</i> (Claassen, 1924)	Eastern Snowfly
	Chloroperlidae	<i>Haploperla brevis</i> (Banks, 1895)	Least Sallfly
	Leuctridae	<i>Leuctra alexanderi</i> Hanson, 1941	Anakeesta Needlefly
		<i>Leuctra ferruginea</i> (F Walker, 1851)	Eastern Needlefly
		<i>Leuctra grandis</i> Banks, 1906	Grand Needlefly
		<i>Leuctra monticola</i> Hanson, 1941	Mountain Needlefly
		<i>Leuctra rickeri</i> James, 1976	Spined Needlefly
		<i>Zealeuctra claasseni</i> (Frison, 1929)	Common Needlefly
		<i>Amphinemura nigritta</i> (Provancher, 1876)	Little Black Forestfly
Plecoptera	Nemouridae	<i>Ostrocerca truncata</i> (Claassen, 1923)	Truncate Forestfly
		<i>Prostoia</i> species	Forestfly

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Order	Family	Taxon	Common name
	Perlidae	<i>Acroneuria abnormis</i> (Newman, 1838)	Common Stone
		<i>Neoperla carlsoni</i> Stark & Baumann, 1978	Spiny Stone
		<i>Neoperla coosa</i> Smith & Stark, 1998	Coosa Stone
		<i>Perlesta</i> species	Stone
		<i>Perlinella drymo</i> (Newman, 1839)	Striped Stone
	Perlodidae	<i>Clioperla clio</i> (Newman, 1839)	Clio Stripetail
		<i>Diploperla duplicata</i> (Banks, 1920)	Two Lobed Springfly
		<i>Diploperla robusta</i> Stark & Gaufin, 1974	Robust Springfly
		<i>Helopius subvarians</i> (Banks, 1920)	Vernal Springfly
		<i>Isoperla davis</i> James, 1974	Alabama Stripetail
		<i>Isoperla holochlora</i> (Klapalek, 1923)	Pale Stripetail
		<i>Isoperla</i> species 1	Stripetail
		<i>Isoperla</i> species 2	Stripetail
	Taeniopterygidae	<i>Oemopteryx contorta</i> (Needham & Claassen, 1925)	Dark Willowfly
		<i>Strophopteryx fasciata</i> (Burmeister, 1839)	Mottled Willowfly
		<i>Taeniopteryx lonicera</i> Ricker and Ross, 1968	Honeysuckle Willowfly
Trichoptera	Apataniidae	<i>Apatania incerta</i> (Banks, 1897)	Uncertain Smaller Stone-case Maker
	Brachycentridae	<i>Micrasema rusticum</i> (Hagen, 1868)	Rustic Short-horned Caddisfly
		<i>Micrasema wataga</i> Ross, 1938	Wataga Short-horned Caddisfly
	Dipseudopsidae	<i>Phylocentropus placidus</i> (Banks, 1905)	Buried Tube Caddisfly
	Glossosomatidae	<i>Agapetus avitus</i> Edwards, 1956	Saddle-case Making Caddisfly
		<i>Agapetus spinosus</i> Etnier & Way, 1973	Spiny Saddle-case Making Caddisfly
		<i>Agapetus walkeri</i> (Betten & Mosely, 1940)	Saddle-case Making Caddisfly
		<i>Glossosoma nigrior</i> Banks, 1911	Darker Saddle-case Making Caddisfly
	Hydropsychidae	<i>Cheumatopsyche analis</i> (Banks, 1903)	Retreat-making Caddisfly
		<i>Cheumatopsyche campyla</i> Ross, 1938	Retreat-making Caddisfly
		<i>Cheumatopsyche etrona</i> Ross, 1941	Retreat-making Caddisfly
		<i>Cheumatopsyche geora</i> Denning, 1948	Retreat-making Caddisfly
		<i>Cheumatopsyche harwoodi</i> Denning, 1948	Retreat-making Caddisfly
		<i>Cheumatopsyche helma</i> Ross, 1939	Retreat-making Caddisfly
		<i>Cheumatopsyche oxa</i> Ross, 1938	Oxate Little Retreat-maker
		<i>Cheumatopsyche pasella</i> Ross, 1941	Retreat-making Caddisfly
		<i>Cheumatopsyche pinaca</i> Ross, 1941	Retreat-making Caddisfly
		<i>Diplectrona metaqui</i> Ross, 1970	Retreat-making Caddisfly
		<i>Diplectrona modesta</i> Banks, 1908	Retreat-making Caddisfly
		<i>Homoplectra doringa</i> (Milne, 1936)	Retreat-making Caddisfly
		<i>Hydropsyche alhedra</i> Ross, 1939	Alhedra Retreat-maker
		<i>Hydropsyche betteni</i> Ross, 1938	Bettens Retreat-maker
		<i>Hydropsyche cheilonis</i> Ross, 1938	Retreat-making Caddisfly
		<i>Hydropsyche dicantha</i> Ross, 1938	Two-spined Retreat-maker
		<i>Hydropsyche mississippiensis</i> Flint, 1965	Retreat-making Caddisfly
		<i>Hydropsyche simulans</i> Ross, 1938	Retreat-making Caddisfly
		<i>Hydropsyche sparna</i> Ross, 1938	Spurious Retreat-maker
		<i>Hydropsyche venularis</i> Banks, 1914	Beautiful Retreat-maker
		<i>Macrostemum carolina</i> (Banks, 1909)	Carolina Caddisfly
		<i>Macrostemum zebratum</i> (Hagen, 1861)	Zebra Caddisfly
		<i>Potamyia flava</i> (Hagen, 1861)	Yellow Retreat-maker
	Hydroptilidae	<i>Dibusa angata</i> Ross, 1939	Red Algae Caddisfly
		<i>Hydroptila alabama</i> Harris & Kelley, 1984	Micro-caddisfly
		<i>Hydroptila armata</i> Ross, 1938	Micro-caddisfly
		<i>Hydroptila callia</i> Denning, 1948	Micro-caddisfly
		<i>Hydroptila chattanooga</i> Frazer & Harris, 1991	Micro-caddisfly
		<i>Hydroptila delineata</i> Morton, 1905	Delineated Micro-caddisfly
		<i>Hydroptila gunda</i> Milne, 1936	Micro-caddisfly
		<i>Hydroptila hamata</i> Morton, 1905	Barbed Micro-caddisfly
		<i>Hydroptila licina</i> KS Frazer & SC Harris, 1991	Micro-caddisfly
		<i>Hydroptila micropotamis</i> Harris, 1985	Little River Micro-caddisfly

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Order	Family	Taxon	Common name
		<i>Hydroptila novicola</i> RL Bickie & WC Morse, 1954	Micro-caddisfly
		<i>Hydroptila oneili</i> Harris, 1985	Micro-caddisfly
		<i>Hydroptila paramoena</i> Harris, 1985	Micro-caddisfly
		<i>Hydroptila talladega</i> Harris, 1985	Micro-caddisfly
		<i>Hydroptila vala</i> Ross, 1938	Micro-caddisfly
		<i>Hydroptila waubesiana</i> Betten, 1934	Micro-caddisfly
		<i>Mayatrichia ayama</i> Mosely, 1937	Micro-caddisfly
		<i>Neotrichia collata</i> Morton, 1905	Micro-caddisfly
		<i>Neotrichia minutisimella</i> (Chambers, 1873)	Minute Micro-caddisfly
		<i>Neotrichia okopa</i> Ross, 1939	Micro-caddisfly
		<i>Ochrotrichia tarsalis</i> (Hagen, 1861)	Micro-caddisfly
		<i>Orthotrichia aegerfasciella</i> (Chambers, 1873)	Micro-caddisfly
		<i>Oxyethira forcipata</i> Mosely, 1934	Micro-caddisfly
		<i>Oxyethira glasa</i> (HH Ross, 1941)	Glassy Micro-caddisfly
		<i>Oxyethira grisea</i> Betten, 1934	Gray Micro-caddisfly
		<i>Oxyethira pallida</i> (Banks, 1904)	Pale Micro-caddisfly
		<i>Oxyethira rivicola</i> Bickie & Morse, 1954	Micro-caddisfly
		<i>Oxyethira zeronia</i> Ross, 1941	Micro-caddisfly
		<i>Stactobiella delira</i> (Ross, 1938)	Silly Micro-caddisfly
		<i>Stactobiella palmata</i> (Ross, 1938)	Palmate Micro-caddisfly
	Lepidostomatidae	<i>Lepidostoma compressum</i> Etnier & Way, 1973	Scale-mouthed Caddisfly
		<i>Lepidostoma togatum</i> (Hagen, 1861)	Scale-mouthed Caddisfly
		<i>Lepidostoma weaveri</i> Harris, 1986	Scale-mouthed Caddisfly
		<i>Theliopsyche melas</i> Edwards, 1956	Scale-mouthed Caddisfly
	Leptoceridae	<i>Ceraclea alabamiae</i> Harris, 1989	Long-horned Caddisfly
		<i>Ceraclea alces</i> (Ross, 1941)	Long-horned Caddisfly
		<i>Ceraclea ancylus</i> (Vorhies, 1909)	Long-horned Caddisfly
		<i>Ceraclea cancellata</i> (Betten, 1934)	Long-horned Caddisfly
		<i>Ceraclea diluta</i> (Hagen, 1861)	Long-horned Caddisfly
		<i>Ceraclea flava</i> (Banks, 1904)	Long-horned Caddisfly
		<i>Ceraclea maculata</i> (Banks, 1899)	Long-horned Caddisfly
		<i>Ceraclea neffi</i> (Resh, 1974)	Long-horned Caddisfly
		<i>Ceraclea nepha</i> (Ross, 1944)	Long-horned Caddisfly
		<i>Ceraclea protonepha</i> Morse & Ross, 1975	Long-horned Caddisfly
		<i>Ceraclea resurgens</i> (Walker, 1852)	Long-horned Caddisfly
		<i>Ceraclea tarsipunctata</i> (Vorhies, 1909)	Long-horned Caddisfly
		<i>Ceraclea transversa</i> (Hagen, 1861)	Long-horned Caddisfly
		<i>Leptocerus americanus</i> (Banks, 1899)	Long-horned Caddisfly
		<i>Mystacides sepulchralis</i> (Walker, 1852)	Long-horned Caddisfly
		<i>Nectopsyche candida</i> (Hagen, 1861)	Long-horned Caddisfly
		<i>Nectopsyche pavidia</i> (Hagen, 1861)	Long-horned Caddisfly
		<i>Oecetis cinerascens</i> (Hagen, 1861)	Long-horned Caddisfly
		<i>Oecetis ditissa</i> Ross, 1966	Long-horned Caddisfly
		<i>Oecetis inconspicua</i> (Walker, 1852)	Long-horned Caddisfly
		<i>Oecetis nocturna</i> Ross, 1966	Long-horned Caddisfly
		<i>Oecetis persimilis</i> (Banks, 1907)	Long-horned Caddisfly
		<i>Oecetis scala</i> Milne, 1934	Long-horned Caddisfly
		<i>Oecetis sphyra</i> Ross, 1941	Long-horned Caddisfly
		<i>Triaenodes cumberlandensis</i> Etnier & Way, 1973	Long-horned Caddisfly
		<i>Triaenodes ignitus</i> (Walker, 1852)	Long-horned Caddisfly
		<i>Triaenodes injustus</i> (Hagen, 1861)	Long-horned Caddisfly
		<i>Triaenodes marginatus</i> Sibley, 1926	Long-horned Caddisfly
		<i>Triaenodes perna</i> Ross, 1938	Long-horned Caddisfly
		<i>Triaenodes tardus</i> Milne, 1934	Long-horned Caddisfly
	Limnephilidae	<i>Hydatophylax argus</i> (Harris, 1869)	Lavish Caddisfly
		<i>Ironoquia punctatissima</i> (Walker, 1852)	Spotted Ironoquia
		<i>Pycnopsyche antica</i> (Walker, 1852)	Stickbait Caddisfly
	Molannidae	<i>Molanna blenda</i> Sibley, 1926	Mountain Millstone
		<i>Molanna tryphena</i> Betten, 1934	Molannid Caddisfly
		<i>Molanna ulmerina</i> Navas, 1934	Molannid Caddisfly

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Phylum Arthropoda		Class Insecta	
Order	Family	Taxon	Common name
	Philopotamidae	<i>Chimarra aterrima</i> Hagen, 1861	Finger-net Caddisfly
		<i>Chimarra obscura</i> (Walker, 1852)	Finger-net Caddisfly
		<i>Dolophilodes distincta</i> (Walker, 1852)	Winter Caddisfly
		<i>Wormaldia moesta</i> (Banks, 1914)	Mournful Finger-net Caddis
		<i>Wormaldia shawnee</i> (Ross, 1938)	Finger-net Caddisfly
		<i>Wormaldia thyria</i> Denning, 1950	Finger-net Caddisfly
	Phryganeidae	<i>Agrypnia vestita</i> (Walker, 1852)	Phryganeid Caddisfly
		<i>Phryganea sayi</i> Milne, 1931	Phryganeid Caddisfly
		<i>Ptilostomis ocellifera</i> (Walker, 1852)	Phryganeid Caddisfly
		<i>Ptilostomis postica</i> (Walker, 1852)	Phryganeid Caddisfly
	Polycentropodidae	<i>Cernotina calcea</i> Ross, 1938	Fine-net Caddisfly
		<i>Cernotina spicata</i> Ross, 1938	Fine-net Caddisfly
		<i>Cyrnellus fraternus</i> (Banks, 1905)	Brotherly Caddisfly
		<i>Neureclipsis crepuscularis</i> (Walker, 1852)	Evening Caddisfly
		<i>Neureclipsis piersoni</i> Frazer & Harris, 1991	Trumpet-net Caddisfly
		<i>Nyctiophylax affinis</i> (Banks, 1897)	Fine-net Caddisfly
		<i>Nyctiophylax banksi</i> JC Morse, 1972	Fine-net Caddisfly
		<i>Nyctiophylax barrorum</i> JC Morse, 1990	Fine-net Caddisfly
		<i>Nyctiophylax celta</i> Denning, 1947	Fine-net Caddisfly
		<i>Nyctiophylax denningi</i> JC Morse, 1972	Fine-net Caddisfly
		<i>Nyctiophylax nephophilus</i> Flint, 1964	Fine-net Caddisfly
		<i>Nyctiophylax serratus</i> Lago & Harris, 1985	Fine-net Caddisfly
		<i>Plectrocnemia cinerea</i> (Hagen, 1861)	Ashy Fine-net Caddisfly
		<i>Plectrocnemia crassicornis</i> (Walker, 1852)	Fine-net Caddisfly
		<i>Polycentropus carolinensis</i> Banks, 1905	Fine-net Caddisfly
		<i>Polycentropus confusus</i> Hagen, 1861	Fine-net Caddisfly
		<i>Polycentropus elarus</i> Ross, 1944	Fine-net Caddisfly
		<i>Polycentropus thaxtoni</i> Hamilton & Holzenthal, 1986	Fine-net Caddisfly
	Psychomyiidae	<i>Lype diversa</i> (Banks, 1914)	Diverse Little Caddis
		<i>Psychomyia flavida</i> Hagen, 1861	Common Little Caddis
		<i>Psychomyia nomada</i> (Ross, 1938)	Nomad Caddis
	Rhyacophilidae	<i>Rhyacophila banksi</i> Ross, 1944	Free-living Caddisfly
		<i>Rhyacophila carolina</i> Banks, 1911	Free-living Caddisfly
		<i>Rhyacophila glaberrima</i> Ulmer, 1907	Free-living Caddisfly
		<i>Rhyacophila ledra</i> Ross, 1939	Free-living Caddisfly
		<i>Rhyacophila lobifera</i> Betten, 1934	Free-living Caddisfly
		<i>Rhyacophila otica</i> Etnier & Way, 1973	Free-living Caddisfly
		<i>Rhyacophila torva</i> Hagen, 1861	Free-living Caddisfly
	Thremmatidae	<i>Neophylax aniqua</i> Ross, 1947	Horsehead Caddisfly
		<i>Neophylax concinnus</i> MacLachlan, 1871	Horsehead Caddisfly
Phylum Arthropoda		Class Malacostraca	
Order	Family	Taxon	Common Name
Isopoda	Asellidae	<i>Caecidotea</i> species	Isopod
		<i>Lirceus</i> species	Isopod
Order	Family	Taxon	Common Name
Veneroida	Corbiculidae	<i>Corbicula fluminea</i> (OF Müller, 1774)	Asiatic Clam
Phylum Mollusca		Class Gastropoda	
Order	Family	Taxon	Common Name
Basommatophora	Physidae	<i>Physa</i> species	Aquatic Snail
	Planorbidae	<i>Helisoma anceps</i> (Menke, 1830)	Two-ridge Rams-horn
Mesogastropoda	Viviparidae	<i>Viviparus</i> species	Aquatic Snail

Table 6-2. Species known from Russell Cave National Monument. Terrestrial species are indicated by an orange highlight. Aquatic species are not highlighted.

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Phylum Arthropoda		Class Arachnida	
Order	Family	Taxon	Common Name
Ixodida	Ixodidae	<i>Ixodes dentatus</i> Neumann, 1899	Eastern Cottontail Tick

Phylum Arthropoda		Class Insecta	
Order	Family	Taxon	Common Name
Ephemeroptera	Ephemerellidae	<i>Ephemerella</i> species	Spiny Crawler Mayfly
		<i>Eurylophella</i> species	Spiny Crawler Mayfly
	Heptageniidae	<i>Epeorus</i> species	Flat-headed Mayfly
		<i>Maccaffertium</i> species	Flat-headed Mayfly
		<i>Paraleptophlebia</i> species	Prongbill Mayfly
Plecoptera	Capniidae	<i>Allocaenia</i> species	Snowfly
	Chloroperlidae	<i>Sweltsa</i> species	Salifly
	Leuctridae	<i>Leuctra sibleyi</i> Claassen, 1923	Brook Needlefly
	Nemouridae	<i>Ostrocerca truncata</i> (Claassen, 1923)	Truncate Forestfly
	Taeniopterygidae	<i>Strophopteryx</i> species	Willowfly
		<i>Taeniopteryx</i> species	Willowfly
Trichoptera	Brachycentridae	<i>Micrasema</i> species	Short-horned Caddisfly
	Glossosomatidae	<i>Agapetus vireo</i> Ross, 1941	Saddle-case Making Caddisfly
		<i>Glossosoma nigrior</i> Banks, 1911	Saddle-case Making Caddisfly
		<i>Cheumatopsyche oxa</i> Ross, 1938	Oxate Little Retreat-maker
	Hydropsychidae	<i>Cheumatopsyche pasella</i> Ross, 1941	Retreat-making Caddisfly
		<i>Diplectrona metaqui</i> Ross, 1970	Retreat-making Caddisfly
		<i>Hydropsyche sparna</i> Ross, 1938	Spurious Retreat-maker
		<i>Pseudostenophylax uniformis</i> (Betten, 1934)	Northern Caddisfly
	Odontoceridae	<i>Psilotreta</i> species	Sturdy Case-maker Caddisfly
	Philopotamidae	<i>Chimarra aterrima</i> Hagen, 1861	Finger-net Caddisfly
		<i>Wormaldia moesta</i> (Banks, 1914)	Mournful Finger-net Caddis
	Polycentropodidae	<i>Polycentropus</i> species	Fine-net Caddisfly
	Psychomyiidae	<i>Lype diversa</i> (Banks, 1914)	Diverse Little Caddis
	Rhyacophilidae	<i>Rhyacophila glaberrima</i> Ulmer, 1907	Free-living Caddisfly
		<i>Rhyacophila ledra</i> Ross, 1939	Free-living Caddisfly
	Thremmatidae	<i>Neophylax</i> species	Horsehead Caddisfly

Phylum Arthropoda		Class Malacostraca	
Order	Family	Taxon	Common Name
Amphipoda	Gammaridae	<i>Gammarus</i> species	Amphipod
Isopoda	Asellidae	<i>Caecidotea</i> species	Isopod

Phylum Mollusca		Class Gastropoda	
Order	Family	Taxon	Common Name
Basommatophora	Physidae	<i>Physa</i> species	Aquatic Snail

Target Species that may occur in LIRI or RUCA

Numerous target species have been reported in the literature as occurring in the counties containing LIRI (Cherokee, De Kalb) and RUCA (Jackson). Many of these species likely exist within the parks and will possibly be found with additional collecting. For this reason, table 6-3 lists the Ephemeroptera, Odonata, Plecoptera, and Trichoptera species that have been reported from these counties in different publications. The source publications are indicated in the table, and their citations are provided below.

Table 6-3. Species of Ephemeroptera, Odonata, Plecoptera, and Trichoptera known to occur in the counties in which Little River national Preserve (LIRI) and Russell Cave National Monument (RUCA) are located that were not recorded from LIRI or RUCA during this study.				
Order	Family	Taxon	County	Source
Ephemeroptera	Baetidae	<i>Plauditus punctiventris</i> (J McDunnough, 1923)	De Kalb	9
		<i>Proclotron fragile</i> (J McDunnough, 1923)	Jackson	6
		<i>Proclotron rubropictum</i> (J McDunnough, 1923)	De Kalb	9
		<i>Pseudocloeon propinquum</i> (Walsh, 1863)	De Kalb, Jackson	9
	Caenidae	<i>Caenis anceps</i> JR Traver, 1935	Cherokee, De Kalb	7, 8
		<i>Caenis hiliaris</i> (Say, 1839)	Cherokee, De Kalb	7, 8
	Ephemerellidae	<i>Drunella tuberculata</i> (Morgan, 1911)	De Kalb, Jackson	7, 9
		<i>Ephemerella catawba</i> JR Traver, 1932	De Kalb	7, 9
		<i>Ephemerella needhami</i> J McDunnough, 1925	Cherokee, De Kalb	7, 8
		<i>Eurylophella temporalis</i> (J McDunnough, 1924)	Cherokee	7, 8
		<i>Serratella serratoides</i> (J McDunnough, 1931)	De Kalb	7, 9
	Ephemeridae	<i>Serratella sordida</i> (J McDunnough, 1925)	De Kalb	7, 9
		<i>Ephemerella guttulata</i> Pictet, 1843	Jackson	6, 7
		<i>Hexagenia limbata</i> (Serville, 1829)	Cherokee, De Kalb, Jackson	7, 8
	Heptageniidae	<i>Cinygmula subaequalis</i> (N Banks, 1914)	Jackson	6, 7
		<i>Epeorus rubidus</i> (JR Traver, 1933)	Jackson	6, 7
		<i>Heptagenia flavescens</i> (Walsh, 1862)	De Kalb	7, 9
		<i>Heptagenia pulla</i> (Clemens, 1913)	De Kalb	7, 9
		<i>Leucrocota aphrodite</i> (J McDunnough, 1926)	Cherokee, De Kalb	7, 8
		<i>Leucrocota juno</i> (J McDunnough, 1924)	DeKalb	7
		<i>Maccaffertium mediopunctatum</i> (J McDunnough, 1926)	DeKalb	7, 9
		<i>Stenacron interpunctatum</i> (T Say, 1839)	Cherokee, De Kalb	7, 8
		<i>Tricorythodes albilineatus</i> Berner, 1946	Jackson	6, 7
		<i>Leptophlebia cupida</i> (T Say, 1823)	Cherokee	7, 8
	Leptophlebiidae	<i>Choroterpes basalis</i> (N Banks, 1900)	Jackson	6, 7
		<i>Leptophlebia bradleyi</i> Needham, 1932	Jackson	6, 7
	Potamanthidae	<i>Paraleptophlebia volitans</i> (J McDunnough, 1924)	De Kalb	7, 9
		<i>Anthopotamus myops</i> (Walsh, 1863)	Jackson	6
	Siphonuridae	<i>Anthopotamus neglectus</i> (JR Traver, 1935)	Cherokee	7, 8
		<i>Siphonurus quebecensis</i> (Provancher, 1878)	Jackson	7
Odonata	Aeshnidae	<i>Anax junius</i> (Drury, 1773)	Cherokee, De Kalb, Jackson	11, 12, 13
		<i>Anax longipes</i> HA Hagen, 1861	Cherokee, De Kalb, Jackson	11, 12, 13
		<i>Basiaeschna janata</i> (T Say, 1839)	De Kalb, Jackson	12, 13
		<i>Coryphaeschna ingens</i> Rambur, 1842	Jackson	13
		<i>Epiaeschna heros</i> (Fabricius, 1798)	Cherokee, Jackson	11, 13
		<i>Gomphaeschna furcillata</i> T Say, 1839	Jackson	13
		<i>Nasiaeschna pentacantha</i> (Rambur, 1842)	Jackson	13
		<i>Calopteryx angustipennis</i> (Selys, 1853)	De Kalb, Jackson	12, 13
		<i>Hetaerina americana</i> (Fabricius, 1798)	De Kalb, Jackson	12, 13
	Coenagrionidae	<i>Argia apicalis</i> (T Say, 1839)	Cherokee, De Kalb, Jackson	11, 12, 13
		<i>Argia bipunctulata</i> (HA Hagen, 1861)	Jackson	12
		<i>Argia sedula</i> (HA Hagen, 1861)	De Kalb, Jackson	12, 13
		<i>Argia tibialis</i> (Rambur, 1842)	De Kalb, Jackson	12, 13
		<i>Argia translata</i> HA Hagen in Selys, 1865	Cherokee, De Kalb, Jackson	11, 12, 13
		<i>Chromagrion conditum</i> HA Hagen in Selys, 1865	De Kalb, Jackson	12, 13
		<i>Enallagma aspersum</i> (HA Hagen, 1861)	De Kalb, Jackson	12, 13
		<i>Enallagma basidens</i> Calvert, 1902	Cherokee, Jackson	11, 13

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	<i>Enallagma civile</i> (HA Hagen, 1861)	Cherokee, De Kalb, Jackson	11, 12, 13	
	<i>Enallagma divagans</i> Selys, 1876	De Kalb, Jackson	12, 13	
	<i>Enallagma exulans</i> (HA Hagen, 1861)	Cherokee, De Kalb, Jackson	11, 12, 13	
	<i>Enallagma geminatum</i> Kellicott, 1895	De Kalb, Jackson	12, 13	
	<i>Enallagma signatum</i> (HA Hagen, 1861)	Cherokee, De Kalb	11, 12	
	<i>Enallagma traviatum</i> Selys, 1876	De Kalb, Jackson	12, 13	
	<i>Ischnura hastata</i> (T Say, 1839)	Jackson	13	
	<i>Ischnura posita</i> HA Hagen, 1861	Cherokee, De Kalb, Jackson	11, 12, 13	
	<i>Ischnura ramburii</i> (Selys, 1850)	Cherokee, Jackson	11, 13	
Cordulegastridae	<i>Cordulegaster maculata</i> Selys, 1854	De Kalb, Jackson	12, 13	
Corduliidae	<i>Epithea costalis</i> (Selys, 1871)	De Kalb, Jackson	12	
	<i>Epithea princeps</i> HA Hagen, 1861	Jackson	12	
	<i>Helocordulia uhleri</i> (Selys, 1871)	De Kalb, Jackson	12, 13	
	<i>Neurocordulia molesta</i> (Walsh, 1863)	Jackson	13	
	<i>Somatochlora hineana</i> Williamson, 1931	Jackson	13	
	<i>Somatochlora linearis</i> (HA Hagen, 1861)	Jackson	13	
	<i>Somatochlora tenebrosa</i> (T Say, 1839)	Jackson	13	
Gomphidae	<i>Arigomphus submedianus</i> (Williamson, 1914)	Jackson	13	
	<i>Arigomphus villosipes</i> (Selys, 1854)	De Kalb	12	
	<i>Gomphus crassus</i> HA Hagen in Selys, 1878	Jackson	13	
	<i>Gomphus exilis</i> Selys, 1854	Cherokee, De Kalb, Jackson	11, 12, 13	
	<i>Gomphus hybridus</i> (Williamson, 1902)	Jackson	13	
	<i>Gomphus lineatifrons</i> Calvert, 1921	Jackson	13	
	<i>Gomphus lividus</i> Selys, 1854	Cherokee, De Kalb, Jackson	11, 12, 13	
	<i>Gomphus quadricolor</i> Walsh, 1863	Jackson	13	
	<i>Gomphus vastus</i> Walsh, 1862	Jackson	13	
	<i>Hagenius brevistylus</i> Selys, 1854	De Kalb, Jackson	12, 13	
	<i>Progomphus obscurus</i> (Rambur, 1842)	Cherokee, Jackson	11, 13	
	<i>Stylogomphus albistylus</i> (HA Hagen in Selys, 1878)	Cherokee, Jackson	11, 13	
	<i>Stylurus plagiatus</i> Selys, 1854	Jackson	13	
Lestidae	<i>Archilestes grandis</i> (Rambur, 1842)	Jackson	13	
	<i>Lestes disjunctus</i> Selys, 1862	De Kalb	12	
	<i>Lestes rectangularis</i> T Say, 1839	Cherokee, De Kalb, Jackson	11, 12, 13	
	<i>Lestes vigilax</i> HA Hagen in Selys, 1862	De Kalb, Jackson	12, 13	
Libellulidae	<i>Celithemis elisa</i> (HA Hagen, 1861)	De Kalb	12	
	<i>Celithemis eponina</i> (Drury, 1773)	Cherokee, Jackson	11, 13	
	<i>Celithemis fasciata</i> Kirby, 1889	De Kalb, Jackson	12, 13	
	<i>Celithemis verna</i> Pritchard, 1935	Jackson	12, 13	
	<i>Libellula cyanea</i> Fabricius, 1775	De Kalb, Jackson	12, 13	
	<i>Libellula deplanata</i> Rambur, 1842	Jackson	12	
	<i>Libellula flavida</i> Rambur, 1842	Jackson	13	
	<i>Libellula incesta</i> HA Hagen, 1864	Cherokee, De Kalb, Jackson	11, 12, 13	
	<i>Libellula luctuosa</i> Burmeister, 1839	Cherokee, De Kalb, Jackson	11, 12, 13	
	<i>Libellula lydia</i> (Drury, 1770)	De Kalb, Jackson	12, 13	
	<i>Libellula pulchella</i> Drury, 1773	Jackson	13	
	<i>Libellula semifasciata</i> Burmeister, 1839	Jackson	13	
	<i>Libellula vibrans</i> Fabricius, 1793	Jackson	13	
	<i>Pachydiplax longipennis</i> (Burmeister, 1839)	Cherokee, Jackson	11, 13	
	<i>Pantala flavescens</i> (Fabricius, 1798)	Jackson	13	
	<i>Perithemis tenera</i> (T Say, 1839)	Cherokee, Jackson	11, 13	
	<i>Sympetrum ambiguum</i> (Rambur, 1842)	Cherokee, Jackson	11, 13	
	<i>Sympetrum rubicundulum</i> (T Say, 1839)	Jackson	13	
	<i>Sympetrum vicinum</i> (HA Hagen, 1861)	Cherokee, Jackson	11, 15	
	<i>Tramea lacerata</i> HA Hagen, 1861	Jackson	13	
Macromiidae	<i>Didymops transversa</i> (T Say, 1839)	Jackson	13	
	<i>Macromia illinoensis</i> Walsh, 1862	De Kalb, Jackson	12, 13	
	<i>Macromia taeniolata</i> Rambur, 1842	Jackson	13	
Plecoptera	Chloroperlidae	<i>Alloperla hamata</i> Surdick, 1981	Jackson	2, 18
	Leuctridae	<i>Allocapnia tsalagi</i> Grubbs, 2008	Jackson	2
		<i>Leuctra alabama</i> James, 1974	Jackson	2
		<i>Leuctra tenuis</i> (Pictet, 1841)	DeKalb	6
		<i>Zealeuctra fraxina</i> Ricker and HH Ross, 1969	Jackson	1, 5
		<i>Zealeuctra ukayodi</i> Grubbs, 2013	Jackson	5
	Perlidae	<i>Acroneuria carolinensis</i> (N Banks, 1905)	De Kalb	17

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		<i>Neoperla clymene</i> (Newman, 1839)	De Kalb	17
		<i>Perlesta lagoi</i> Stark, 1989	Jackson	3
	Taeniopterygidae	<i>Taeniopteryx burksi</i> Ricker & HH Ross, 1968	Cherokee	16
		<i>Taeniopteryx maura</i> Ricker & HH Ross, 1968	Cherokee, De Kalb	11, 12
		<i>Taeniopteryx ugola</i> Ricker & HH Ross, 1968	Jackson	4
Trichoptera	Rhyacophilidae	<i>Rhyacophila alabama</i> SC Harris, 1991	Jackson	14, 19

Sources

Published references from the scientific literature for the species listed in table 6-3 are given below. These include records from the Web site of the Northern Prairie Wildlife Research Center of the USGS:

Mayflies -- <http://www.npwrc.usgs.gov/resource/distr/insects/mfly/chklist/chklist.htm>

Stoneflies -- <http://www.npwrc.usgs.gov/resource/distr/insects/sfly/chklist/chklist.htm>

Dragonflies and Damselflies -- <http://www.npwrc.usgs.gov/resource/distr/insects/dfly/chklist/chklist.htm>

The reference number(s) are given for each species in the Source column of table 6-3.

1. Grubbs, S. A., 2006, *Allocapnia sano*, a new species of snowfly (Plecoptera: Capniidae) from Alabama, U.S.A., plus six new state records: Zootaxa, v. 1197, p. 39-43.
2. Grubbs, S. A., 2011, A review of stonefly (Insecta; Plecoptera) taxonomic research in Alabama, with new state records and an updated checklist: Illiesia, v. 7, p. 24-30.
3. Grubbs, S. A., 2012, An amended redescription of the male of *Perlesta etnieri* (Plecoptera: Perlidae) plus new *Perlesta* state records: Illiesia, v. 8, p. 111-113.
4. Grubbs, S. A., and Sheldon, A. L., 2008, *Allocapnia muskogee* and *A. menawa*, new species of snowflies (Plecoptera: Capniidae) from the Talladega National Forest region of eastern Alabama, U.S.A., plus four new state records: Illiesia, v. 4, p. 99-109.
5. Grubbs, S., Kondratieff, B., Stark, B. P., and DeWalt, R., 2013, A review of the Nearctic genus *Zealeuctra* Ricker (Plecoptera, Leuctridae), with the description of a new species from the Cumberland Plateau region of eastern North America: ZooKeys, v. 344, p. 17-47.
6. Harrison, A. B., and Stark, B. P., 2010, Two new species of stoneflies in the *Leuctra ferruginea* group (Plecoptera: Leuctridae), with notes on the *Leuctra* species known for Mississippi and Alabama, U.S.A.: Illiesia, v. 60, p. 16-33.
7. Kondratieff, B. C., and Harris, S. C., 1986, Preliminary checklist of the mayflies (Ephemeroptera) of Alabama: Entomological News, v. 97, p. 230-236.
8. Mayflies of Cherokee County, Alabama, USGS website, http://www.npwrc.usgs.gov/resource/distr/insects/mfly/chklist/states/counties/al_19.htm
9. Mayflies of De Kalb County, Alabama, USGS website http://www.npwrc.usgs.gov/resource/distr/insects/mfly/chklist/states/counties/al_49.htm
10. Mayflies of Jackson County, Alabama, USGS website http://www.npwrc.usgs.gov/resource/distr/insects/mfly/chklist/states/counties/al_71.htm
11. Odonata of Cherokee County, Alabama, USGS

- website http://www.npwrc.usgs.gov/resource/distr/insects/dfly/chklist/states/counties/al_19.htm
12. Odonata of De Kalb County, Alabama, USGS
website http://www.npwrc.usgs.gov/resource/distr/insects/dfly/chklist/states/counties/al_49.htm
13. Odonata of Jackson County, Alabama, USGS
website http://www.npwrc.usgs.gov/resource/distr/insects/dfly/chklist/states/counties/al_71.htm
14. Prather, A. L., and Morse, J. C., 2001, Eastern Nearctic *Rhyacophila* species, with revision of the *Rhyacophila invaria* group (Trichoptera: Rhyacophilidae): Transactions of the American Entomological Society, v. 127, p. 85-166.
15. Smith, A. D., and Stark, B. P., 1998, *Neoperla coosa* (Plecoptera: Perlidae), a new stonefly species from Alabama: Entomological News, v. 109, p. 153-158
16. Stoneflies of Cherokee County, Alabama, http://www.npwrc.usgs.gov/resource/distr/insects/sfly/chklist/states/counties/al_19.htm
17. Stoneflies of De Kalb County, Alabama, USGS
website http://www.npwrc.usgs.gov/resource/distr/insects/dfly/chklist/states/counties/al_49.htm
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