

Appendix 1. Locations and Events.

Each location at which samples were collected is listed below. The column Location represents the state and county, followed by the SiteCode from the database, then a brief description of the location. The column UTM's gives the coordinates in Universal Transmercator, Datum83, UTM Zone 16 North. Column Lat/Lon gives the geographic coordinates in decimal degree format. The final column Elevation provides the elevation above sea level in meters (m).

Each location was sampled at least once, and several locations were sampled multiple times. Each sampling occasion is called an event and is distinguished from every other event at the same location by its date, or the collection methods used, and/or by the collectors who took the sample. Following each Location record the events are listed subsequently by date, followed by collection method, and by collector(s). Where additional qualifiers are included in the database field SampleCode, that information is included in parentheses as Sample ID.

Chickamauga and Chattanooga National Military Park

Locations and Events

Location	UTMs	Lat/Lon	Elevation
GA:Catoosa Co., CHCH Alexander Bridge, West Chickamauga Creek, upstrm Alexander Bridge	3864133N 661675E	34.90677°N 85.23035°W	194 m
Event 01: 9-10 May 2006, black light trap, MGeraghty & CRParker			
Event 02: 20 Mar 2007, by hand, JLRobinson			
Event 03: 20-21 Mar 2007, black light trap, JLRobinson			
Event 04: 8 May 2007, sweeping, JLRobinson & CRParker			
GA:Catoosa Co., CHCH Black Creek, Black Creek at edge woods & grassy field south park headquarters / visitor center	3867606N 658789E	34.93853°N 85.26127°W	227 m
Event 01: 15 Jun 2005, by hand, CRParker & JLRobinson (Sample ID: by hand)			
Event 02: 15 Jun 2005, by hand, JLRobinson & CRParker (Sample ID: by hand)			
Event 03: 15 Jun 2005, sweeping, JLRobinson & CRParker (Sample ID: sweeping)			
Event 04: 15-16 Jun 2005, black light trap, JLRobinson & CRParker			
Event 05: 1 Mar 2006, by hand, JLRobinson & MGeraghty			
GA:Catoosa Co., CHCH Chickamauga Ck island, upstrm on island, West Chickamauga Ck ca 275 m W Alexander Bridge	3864158N 661462E	34.90703°N 85.23268°W	227 m
Event 01: 20 Mar 2007, by hand, JLRobinson			
Event 02: 8-9 May 2007, black light trap, JLRobinson & CRParker			
Event 03: 9 May 2007, by hand, JLRobinson & CRParker (Sample ID: by hand)			
GA:Catoosa Co., CHCH cnfl below Jays Mill Alex Bridge rds, confluence streams flowing under Jays Mill Rd and Alexander's Bridge Rd	3865302N 661604E	34.91731°N 85.23090°W	216 m
Event 01: 9-10 May 2006, black light trap, MGeraghty & CRParker			
GA:Catoosa Co., CHCH creek, slow-moving creek along trail from quarry	3863349N 659297E	34.90008°N 85.25652°W	218 m
Event 01: 15 Jun 2005, by hand, CRParker & JLRobinson			
GA:Catoosa Co., CHCH Glenn Field Stream, small stream draining Glenn Field nr Glenn-Viniard Rd & Rt 27	3863487N 658827E	34.90139°N 85.26164°W	219 m
Event 01: 15 Jun 2005, by hand, JLRobinson & CRParker			

Locations and Events

Location	UTMs	Lat/Lon	Elevation
GA:Catoosa Co., CHCH Jays Mill Branch, Jays Mill Branch at Jays Mill Road Event 01: 1 Mar 2006, by hand, JLRobinson & MGeraghty Event 02: 9 May 2006, by hand, MGeraghty & CRParker Event 03: 9-10 May 2006, black light trap, MGeraghty & CRParker Event 04: 30 Oct 2006, dip net, JLRobinson & CRParker	3866537N 661685E	34.92843°N 85.22978°W	215 m
GA:Catoosa Co., CHCH Quarry, quarry pond W of Rt 27 S of Viniard Field Event 01: 15 Jun 2005, by hand, CRParker & JLRobinson	3863332N 659018E	34.89997°N 85.25958°W	219 m
GA:Catoosa Co., CHCH Rt 27 seep, roadside seep along Rt 27 in battlefield Event 01: 14 Jun 2005, by hand, CRParker & JLRobinson	3867409N 658961E	34.93672°N 85.25943°W	229 m
GA:Catoosa Co., CHCH stream at Alexander Bridge Rd nr Jays Mill Rd, stream at Alexander Bridge Rd nr Jays Mill Rd Event 01: 30 Oct 2006, dip net, JLRobinson & CRParker	3865104N 661363E	34.91557°N 85.23358°W	216 m
GA:Catoosa Co., CHCH stream at Glenn-Viniard Road, unnamed creek nr intersect. Rt. 27 and Glenn-Viniard Rd Event 01: 15 Jun 2005, sweeping, JLRobinson & CRParker Event 02: 30 Oct 2006, dip net, JLRobinson & CRParker	3863470N 658825E	34.90124°N 85.26166°W	215 m
GA:Catoosa Co., CHCH stream at RR Xing, stream at RR Xing, NW corner of park Event 01: 20 Mar 2007, by hand, JLRobinson	3865858N 657398E	34.92299°N 85.27682°W	253 m
GA:Catoosa Co., CHCH stream at Viniard Alexander Road, stream at Viniard Alexander Rd ca 1.2 km W Alexander Bridge Rd Event 01: 30 Oct 2006, dip net, JLRobinson & CRParker	3864092N 660509E	34.90658°N 85.24312°W	234 m
GA:Catoosa Co., CHCH trail mud puddle, muddy seep in trail from quarry Event 01: 15 Jun 2005, by hand, JLRobinson & CRParker	3863378N 659250E	34.90035°N 85.25703°W	219 m
GA:Dade Co., CHCH mouth of Skyuka Spring run, at mouth Skyuka Spring run Event 01: 8-9 May 2007, black light trap, JLRobinson & CRParker	3870783N 647038E	34.96984°N 85.38934°W	201 m
GA:Dade Co., CHCH Skyuka Spring, Skyuka Spring, Lookout Mountain Event 01: 31 Oct 2006, dip net, JLRobinson & CRParker Event 02: 20 Mar 2007, by hand, JLRobinson Event 03: 8 May 2007, by hand, JLRobinson & CRParker Event 04: 8-9 May 2007, black light trap, JLRobinson & CRParker	3870855N 647123E	34.96957°N 85.38839°W	213 m
GA:Walker Co., CHCH beaver pond, beaver pond in woods along stream from Cave Spring E of Rt 27 Event 01: 14 Jun 2005, by hand, JLRobinson & CRParker Event 02: 15 Jun 2005, by hand, JLRobinson & CRParker (Sample ID: by hand) Event 03: 15-16 Jun 2005, black light trap, JLRobinson & CRParker	3863133N 658169E	34.89831°N 85.26890°W	220 m
GA:Walker Co., CHCH Black Creek headwaters, headwaters Black Creek at trailhead off McFarland Gap Rd Event 01: 31 Oct 2006, dip net, JLRobinson & CRParker	3867741N 658058E	34.93986°N 85.26925°W	246 m

Locations and Events

Location	UTMs	Lat/Lon	Elevation
GA:Walker Co., CHCH Cave Spring, spring run from Cave Spring off Wilder Road	3863622N 657900E	34.90276°N 85.27175°W	225 m
Event 01: 14 Jun 2005, by hand, JLRobinson & CRParker			
Event 02: 15-16 Jun 2005, black light trap, CRParker & JLRobinson			
Event 03: 28 Feb 2006, by hand, JLRobinson & MGeraghty			
Event 04: 20 Mar 2007, by hand, JLRobinson			
Event 05: 7 May 2007, by hand, JLRobinson & CRParker (Sample ID: by hand)			
Event 06: 8 May 2007, black light trap, JLRobinson & CRParker (Sample ID: blt)			
Event 07: 8 May 2007, by hand, JLRobinson & CRParker (Sample ID: by hand)			
Event 08: 8-9 May 2007, black light trap, JLRobinson & CRParker			
Event 09: 8 Jul 2007, by hand, JLRobinson & CRParker			
GA:Walker Co., CHCH Glenn Fall Creek at Rt. 58, Glenn Falls Creek at Rt. 58 culvert	3872995N 651110E	34.98828°N 85.34435°W	455 m
Event 01: 31 Oct 2006, dip net, JLRobinson & CRParker			
Event 02: 20 Mar 2007, by hand, JLRobinson			
GA:Walker Co., CHCH sinkhole Glenn-Viniard Road, sinkhole along Glenn-Viniard Rd ca 380 m S Wilder Observ. Tower	3863812N 657868E	34.90447°N 85.27207°W	234 m
Event 01: 31 Oct 2006, dip net, JLRobinson & CRParker			
GA:Walker Co., CHCH stream at Glenn-Kelly Road, stream at Glenn-Kelly Rd draining Dyer Field	3864764N 658395E	34.91297°N 85.26612°W	230 m
Event 01: 31 Oct 2006, dip net, JLRobinson & CRParker			
TN:Hamilton Co., CHCH Dogwood Spring, Dogwood Spring, Lookout Mountain	3875772N 650483E	35.01340°N 85.35071°W	403 m
Event 01: 23 Apr 2006, by hand, JLRobinson			
Event 02: 31 Oct 2006, dip net, JLRobinson & CRParker			
TN:Hamilton Co., CHCH Gum Spring, Gum Spring, Lookout Mountain	3874891N 650095E	35.00552°N 85.35512°W	434 m
Event 01: 31 Oct 2006, dip net, JLRobinson & CRParker			
TN:Hamilton Co., CHCH Rock Spring at Point Park, Rock Spring at Point Park	3875513N 650999E	35.01099°N 85.34510°W	580 m
Event 01: 1 Mar 2006, by hand, JLRobinson & MGeraghty			
Event 02: 28 Nov 2006, by hand, JLRobinson & MGeraghty			
Event 03: 8 May 2007, by hand, JLRobinson & CRParker			
TN:Hamilton Co., CHCH stream on Lookout Mountain, steep-sloped stream on Lookout Mountain Parkway	3873021N 651083E	34.98852°N 85.34463°W	435 m
Event 01: 20 Mar 2007, by hand, JLRobinson			

Appendix 2. Target Species Data.

Data for Ephemeroptera, Odonata, Plecoptera, Megaloptera, and Trichoptera are presented below. Each record consists of the order, family, taxon name, and the number and type of specimens, arranged by collecting location and event. Locations and events are arranged date. Many specimens could not be identified to species and are presented as, for example, *Neophylax* species or *Perlesta* species. Adult specimens are identified in the table by the male and female symbols, larvae by the words “larva” or “larvae.” The entry “mmt,” which is found for 3 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 on the basis of the developing adult characters, meaning the genitalia, and which 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 caddisfly students. For those specimens for which the life stage is an immature, the entry “imm.” means immature.

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Ephemeroptera, Odonata, Plecoptera, Megaloptera, Trichoptera			
Order	Family	Species	Specimens
GA:Catoosa Co., CHCH Alexander Bridge, 20 Mar 2007, by hand			
Trichoptera	Thremmatidae	<i>Neophylax concinnus</i> MacLachlan, 1871	2 larvae
GA:Catoosa Co., CHCH Alexander Bridge, 20-21 Mar 2007, black light trap			
Trichoptera	Dipseudopsidae	<i>Phylocentropus placidus</i> (N Banks, 1905)	1 ♀, 1 ♂
	Hydropsychidae	<i>Hydropsyche hageni</i> N Banks, 1905	1 ♂
		<i>Hydropsyche</i> species	7 ♀
	Hydroptilidae	<i>Hydroptila waubesiana</i> Betten, 1934	3 ♂
GA:Catoosa Co., CHCH Alexander Bridge, 8 May 2007, sweeping			
Odonata	Coenagrionidae	<i>Argia tibialis</i> (Rambur, 1842)	2 ♂
GA:Catoosa Co., CHCH Alexander Bridge, 9-10 May 2006, black light trap			
Ephemeroptera	Heptageniidae	Heptageniidae species	3 ♀
		<i>Maccaffertium</i> species	3 ♀, 1 ♂, 1 sub
		<i>Stenacron</i> species	1 ♀, 1 ♀ subimago
	Isonychiidae	<i>Isonychia bicolor</i> (Walker, 1853)	4 ♀, 1 ♀ subimago
Plecoptera	Perlidae	<i>Neoperla robisoni</i> Poulton and Stewart, 1986	1 ♂
		<i>Perlesta shubuta</i> Stark, 1989	1 ♀, 2 ♂
		<i>Perlinella ephyre</i> (Newman, 1839)	2 ♂
Trichoptera	Brachycentridae	<i>Micrasema wataga</i> HH Ross, 1938	1 ♂
	Dipseudopsidae	<i>Phylocentropus placidus</i> (N Banks, 1905)	3 ♀
	Helicopsychidae	<i>Helicopsyche borealis</i> (HA Hagen, 1861)	2 ♀, 12 ♂
	Hydropsychidae	<i>Cheumatopsyche analis</i> (N Banks, 1903)	36 ♂
		<i>Cheumatopsyche oxa</i> HH Ross, 1938	15 ♂
		<i>Cheumatopsyche pasella</i> HH Ross, 1941	54 ♂
		<i>Cheumatopsyche</i> species	124 ♀
		<i>Hydropsyche bassi</i> OS Flint, JR Voshell & CR Parker, 1979	179 ♀, 27 ♂
		<i>Hydropsyche betteni</i> HH Ross, 1938	1 ♂
		<i>Hydropsyche depravata</i> HA Hagen, 1861	38 ♀, 46 ♂
		<i>Hydropsyche scalaris</i> HA Hagen, 1861	3 ♂
		<i>Hydropsyche sparna</i> HH Ross, 1938	1 ♀
		<i>Hydropsyche</i> species	51 ♀, 3 ♂
	Hydroptilidae	<i>Hydroptila armata</i> HH Ross, 1938	4 ♂
		<i>Hydroptila</i> species	1045 ♀
		<i>Hydroptila waubesiana</i> Betten, 1934	10 ♂

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		Hydroptilidae species	316 ♀
Leptoceridae		<i>Ceraclea ancylus</i> (Vorhies, 1909)	15 ♂
		<i>Ceraclea cancellata</i> (Betten, 1934)	119 ♂
		<i>Ceraclea protonepha</i> JC Morse & HH Ross, 1975	1 ♂
		<i>Ceraclea</i> species	120 ♀
		<i>Ceraclea tarsipunctata</i> (Vorhies, 1909)	1 ♂
		<i>Ceraclea transversa</i> (HA Hagen, 1861)	93 ♂
		<i>Leptocerus americanus</i> (N Banks, 1899)	2 ♀, 1 ♂
		<i>Mystacides sepulchralis</i> (Walker, 1852)	6 ♀, 15 ♂
		<i>Nectopsyche pavidia</i> (HA Hagen, 1861)	2 adults, 9 ♀, 7 ♂
		<i>Oecetis cinerascens</i> (HA Hagen, 1861)	1 ♂
		<i>Oecetis ditissa</i> HH Ross, 1966	2 ♂
		<i>Oecetis inconspicua</i> (Walker, 1852)	13 ♀, 12 ♂
		<i>Oecetis nocturna</i> HH Ross, 1966	4 ♂
		<i>Oecetis persimilis</i> (N Banks, 1907)	17 ♂
		<i>Oecetis</i> species	34 ♀
		<i>Setodes</i> species	3 ♀
		<i>Triaenodes ignitus</i> (Walker, 1852)	2 ♀, 2 ♂
		<i>Triaenodes injustus</i> (HA Hagen, 1861)	1 ♀, 1 ♂
Philopotamidae		<i>Chimarra obscura</i> (Walker, 1852)	2 ♂
Polycentropodidae		<i>Nyctiophylax moestus</i> N Banks, 1911	5 ♀, 25 ♂
		<i>Nyctiophylax serratus</i> Lago & Harris, 1985	2 ♀, 10 ♂
		<i>Nyctiophylax</i> species	20 ♀
		<i>Plectrocnemia cinerea</i> (HA Hagen, 1861)	2 ♀, 3 ♂
Psychomyiidae		<i>Lype diversa</i> (N Banks, 1914)	2 ♂
		<i>Psychomyia flavida</i> HA Hagen, 1861	35 ♀
Rhyacophilidae		<i>Rhyacophila carolina</i> N Banks, 1911	1 ♀
GA:Catoosa Co., CHCH Black Creek, 1 Mar 2006, by hand			
Trichoptera	Hydropsychidae	<i>Cheumatopsyche</i> species	1 larva
	Rhyacophilidae	<i>Rhyacophila ledra</i> HH Ross, 1939	1 larva
GA:Catoosa Co., CHCH Black Creek, 15 Jun 2005, by hand			
Odonata	Libellulidae	<i>Pachydiplax longipennis</i> (Burmeister, 1839)	1 ♀
GA:Catoosa Co., CHCH Black Creek, 15 Jun 2005, sweeping			
Ephemeroptera	Heptageniidae	<i>Maccaffertium</i> species	1 ♀, 1 ♂
		<i>Stenonema femoratum</i> (T Say, 1823)	1 ♂
Odonata	Libellulidae	<i>Perithemis tenera</i> (T Say, 1839)	2 larvae
Plecoptera	Perlidae	<i>Perlesta</i> species	6 ♀
Trichoptera	Hydropsychidae	<i>Cheumatopsyche</i> species	7 larvae
		<i>Diplectrona</i> species	1 ♀
	Leptoceridae	<i>Ceraclea</i> species	5 ♀
		<i>Ceraclea transversa</i> (HA Hagen, 1861)	3 ♂
		<i>Oecetis inconspicua</i> (Walker, 1852)	1 ♀, 1 ♂
	Philopotamidae	<i>Chimarra aterrima</i> HA Hagen, 1861	1 ♀
GA:Catoosa Co., CHCH Black Creek, 15-16 Jun 2005, black light trap			
Ephemeroptera	Baetidae	<i>Callibaetis pretiosus</i> N Banks, 1914	1 adult
	Heptageniidae	<i>Maccaffertium</i> species	2 ♀, 1 sub exuv.
Plecoptera	Perlidae	<i>Perlesta</i> species	13 adults, 1 ♀, 1 ♂
Trichoptera	Hydropsychidae	<i>Cheumatopsyche analis</i> (N Banks, 1903)	52 ♂
		<i>Cheumatopsyche oxa</i> HH Ross, 1938	27 ♂
		<i>Cheumatopsyche</i> species	168 ♀
		<i>Diplectrona</i> species	1 ♀
		<i>Hydropsyche depravata</i> HA Hagen, 1861	2 ♂
		<i>Hydropsyche scalaris</i> HA Hagen, 1861	3 ♂
		<i>Hydropsyche</i> species	18 ♀
	Hydroptilidae	<i>Hydroptila gunda</i> Milne, 1936	1 ♂
	Leptoceridae	<i>Ceraclea</i> species	1 ♀
		<i>Oecetis inconspicua</i> (Walker, 1852)	2 ♂
GA:Catoosa Co., CHCH Chickamauga Ck island, 20 Mar 2007, by hand			
Plecoptera	Taeniopterygidae	<i>Taeniopteryx</i> species	1 ♀
Trichoptera	Hydropsychidae	<i>Cheumatopsyche analis</i> (N Banks, 1903)	8 ♀, 4 ♂
GA:Catoosa Co., CHCH Chickamauga Ck island, 8-9 May 2007, black light trap			
Plecoptera	Perlidae	<i>Neoperla stewarti</i> Stark & Baumann, 1978	1 ♂

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		<i>Perlesta</i> species	4 ♀, 9 ♂
GA:Catoosa Co., CHCH Chickamauga Ck island, 9 May 2007, by hand			
Plecoptera	Perlidae	<i>Perlesta</i> species	6 ♀, 8 ♂
GA:Catoosa Co., CHCH cnfl below Jays Mill Alex Bridge rds, 9-10 May 2006, black light trap			
Trichoptera	Hydropsychidae	<i>Cheumatopsyche analis</i> (N Banks, 1903)	3 ♂
	Hydroptilidae	<i>Hydroptila waubesiana</i> Betten, 1934	2 ♂
		<i>Ochrotrichia elongiralla</i> Harris, 1986	1 ♂
	Leptoceridae	<i>Ceraclea cancellata</i> (Betten, 1934)	1 ♂
		<i>Ceraclea protonepha</i> JC Morse & HH Ross, 1975	1 ♂
		<i>Ceraclea transversa</i> (HA Hagen, 1861)	4 ♂
		<i>Oecetis inconspicua</i> (Walker, 1852)	2 ♂
		<i>Oecetis persimilis</i> (N Banks, 1907)	2 ♂
		<i>Triaenodes perna</i> HH Ross, 1938	1 ♀
	Philopotamidae	<i>Chimarra aterrima</i> HA Hagen, 1861	1 ♂
		<i>Chimarra obscura</i> (Walker, 1852)	1 ♂
	Polycentropodidae	<i>Plectrocnemia cinerea</i> (HA Hagen, 1861)	1 ♂
	Psychomyiidae	<i>Lype diversa</i> (N Banks, 1914)	1 ♀, 1 ♂
	Rhyacophilidae	<i>Rhyacophila ledra</i> HH Ross, 1939	1 ♂
GA:Catoosa Co., CHCH creek, 15 Jun 2005, by hand			
Ephemeroptera	Caenidae	<i>Caenis amica</i> HA Hagen, 1861	1 imm.
	Ephemeridae	<i>Hexagenia</i> species	4 imms.
Odonata	Coenagrionidae	<i>Argia fumipennis violacea</i> (HA Hagen, 1861)	1 adult, 1 ♀
		<i>Argia moesta</i> (HA Hagen, 1861)	1 ♂
	Gomphidae	<i>Dromogomphus spinosus</i> Selys, 1854	2 larvae
	Macromiidae	<i>Macromia</i> species	2 larvae
Trichoptera	Polycentropodidae	<i>Polycentropus</i> species	1 larva
GA:Catoosa Co., CHCH Glenn Field Stream, 15 Jun 2005, by hand			
Ephemeroptera	Heptageniidae	<i>Stenonema femoratum</i> (T Say, 1823)	1 imm.
	Leptohyphidae	<i>Tricorythodes</i> species	1 imm.
Odonata	Coenagrionidae	<i>Argia fumipennis violacea</i> (HA Hagen, 1861)	1 adult, 2 ♂, 2 larvae
		<i>Argia tibialis</i> (Rambur, 1842)	1 larva
	Gomphidae	<i>Dromogomphus spinosus</i> Selys, 1854	2 larvae
	Libellulidae	<i>Erythemis simplicicollis</i> (T Say, 1839)	2 ♀
		<i>Libellula cyanea</i> Fabricius, 1775	2 ♀, 1 ♂
		<i>Libellula incesta</i> HA Hagen, 1861	1 ♂
		<i>Libellula luctuosa</i> Burmeister, 1839	1 ♂
		<i>Plathemis lydia</i> (Drury, 1773)	1 ♂
Trichoptera	Dipseudopsidae	<i>Phylocentropus</i> species	1 larva
	Hydropsychidae	<i>Cheumatopsyche</i> species	9 larvae
GA:Catoosa Co., CHCH Jays Mill Branch, 1 Mar 2006, by hand			
Trichoptera	Limnephilidae	<i>Ironoquia kaskaskia</i> (HH Ross, 1938)	2 larvae
GA:Catoosa Co., CHCH Jays Mill Branch, 9 May 2006, by hand			
Trichoptera	Leptoceridae	<i>Ceraclea transversa</i> (HA Hagen, 1861)	5 ♂
	Polycentropodidae	<i>Polycentropus</i> species	1 ♀
	Rhyacophilidae	<i>Rhyacophila ledra</i> HH Ross, 1939	1 ♀ mmt, 4 pupae
GA:Catoosa Co., CHCH Jays Mill Branch, 9-10 May 2006, black light trap			
Megaloptera	Corydalidae	<i>Chauliodes pectinicornis</i> Linnaeus, 1783	1 ♂
Plecoptera	Nemouridae	<i>Amphinemura</i> species	1 ♀
Trichoptera	Hydropsychidae	<i>Cheumatopsyche analis</i> (N Banks, 1903)	1 ♂
		<i>Cheumatopsyche</i> species	30 ♀
		<i>Hydropsyche bassi</i> OS Flint, JR Voshell & CR Parker, 1979	12 ♀, 1 ♂
		<i>Ceraclea cancellata</i> (Betten, 1934)	3 ♂
	Leptoceridae	<i>Ceraclea</i> species	7 ♀
		<i>Oecetis inconspicua</i> (Walker, 1852)	2 ♀, 1 ♂
		<i>Oecetis persimilis</i> (N Banks, 1907)	1 ♀, 4 ♂
		<i>Nyctiophylax moestus</i> N Banks, 1911	1 ♂
	Polycentropodidae	<i>Polycentropus</i> species	1 ♀
	Rhyacophilidae	<i>Rhyacophila ledra</i> HH Ross, 1939	5 ♂
GA:Catoosa Co., CHCH Quarry, 15 Jun 2005, by hand			
Ephemeroptera	Baetidae	<i>Callibaetis</i> species	6 larvae
	Caenidae	<i>Caenis</i> species	3 imms.

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Megaloptera	Corydalidae	<i>Chauliodes</i> species	1 larva
Odonata	Aeshnidae	<i>Epiaeschna heros</i> (Fabricius, 1798)	1 ♀
	Coenagrionidae	<i>Argia</i> species	2 exuv.
	Libellulidae	<i>Libellula incesta</i> HA Hagen, 1861	1 ♂
		<i>Libellula luctuosa</i> Burmeister, 1839	1 ♂
		<i>Pachydiplax longipennis</i> (Burmeister, 1839)	2 exuv.
		<i>Perithemis tenera</i> (T Say, 1839)	1 ♂
Trichoptera	Hydropsychidae	<i>Cheumatopsyche</i> species	1 larva
		<i>Hydropsyche</i> species	2 larvae
GA:Catoosa Co., CHCH stream at Glenn-Viniard Road, 15 Jun 2005, sweeping			
Odonata	Coenagrionidae	<i>Argia apicalis</i> (T Say, 1839)	2 ♀
		<i>Enallagma divagans</i> Selys, 1876	3 adults, 2 ♂
	Libellulidae	<i>Erythemis simplicicollis</i> (T Say, 1839)	1 ♀
		<i>Libellula vibrans</i> Fabricius, 1793	1 ♀
GA:Catoosa Co., CHCH stream at RR Xing, 20 Mar 2007, by hand			
Trichoptera	Limnephilidae	<i>Ironoquia punctatissima</i> (Walker, 1852)	4 larvae
GA:Catoosa Co., CHCH trail mud puddle, 15 Jun 2005, by hand			
Odonata	Libellulidae	<i>Libellula vibrans</i> Fabricius, 1793	1 ♂
GA:Dade Co., CHCH mouth of Skyuka Spring run, 8-9 May 2007, black light trap			
Trichoptera	Hydropsychidae	<i>Cheumatopsyche oxa</i> HH Ross, 1938	2 ♂
		<i>Cheumatopsyche</i> species	70 ♀
	Leptoceridae	<i>Nectopsyche exquisita</i> (Walker, 1852)	12 ♀, 2 ♂
		<i>Nectopsyche pavidia</i> (HA Hagen, 1861)	5 ♀, 9 ♂
GA:Dade Co., CHCH Skyuka Spring, 20 Mar 2007, by hand			
Trichoptera	Brachycentridae	<i>Micrasema scotti</i> HH Ross, 1947	1 ♂
	Psychomyiidae	<i>Lype diversa</i> (N Banks, 1914)	2 ♀, 4 ♂
GA:Dade Co., CHCH Skyuka Spring, 8 May 2007, by hand			
Plecoptera	Nemouridae	<i>Amphinemura</i> species	2 ♀
Trichoptera	Brachycentridae	<i>Micrasema scotti</i> HH Ross, 1947	11 ♀, 9 ♂
	Glossosomatidae	<i>Agapetus ibis</i> DA Etnier, JT Baxter, and CR Parker, 2010	10 adults
	Hydroptilidae	<i>Ochrotrichia arva</i> (HH Ross, 1941)	1 ♂
		<i>Ochrotrichia spinosa</i> (HH Ross, 1938)	6 ♀, 15 ♂
	Lepidostomatidae	<i>Lepidostoma togatum</i> (HA Hagen, 1861)	1 ♂
	Psychomyiidae	<i>Lype diversa</i> (N Banks, 1914)	2 ♀
GA:Dade Co., CHCH Skyuka Spring, 8-9 May 2007, black light trap			
Ephemeroptera	Caenidae	<i>Caenis latipennis</i> N Banks, 1907	1 ♀, 12 ♂
	Heptageniidae	<i>Maccaffertium terminatum placitum</i> (N Banks, 1910)	73 ♀, 37 ♂, 10 ♀
	Isonychiidae	<i>Isonychia bicolor</i> (Walker, 1853)	1 ♀
Trichoptera	Brachycentridae	<i>Micrasema wataga</i> HH Ross, 1938	5 ♀, 2 ♂
	Glossosomatidae	<i>Agapetus ibis</i> DA Etnier, JT Baxter, and CR Parker, 2010	13 ♀, 45 ♂
		<i>Padunia jeanae</i> (HH Ross, 1938)	1 ♀, 7 ♂
	Goeridae	<i>Goera calcarata</i> N Banks, 1899	6 ♀, 3 ♂
	Helicopsychidae	<i>Helicopsyche borealis</i> (HA Hagen, 1861)	14 ♀, 3 ♂
	Hydropsychidae	<i>Hydropsyche bassi</i> OS Flint, JR Voshell & CR Parker, 1979	26 ♂
		<i>Hydropsyche incommoda</i> HA Hagen, 1861	8 ♂
		<i>Hydropsyche mississippiensis</i> OS Flint, 1965	1 ♂
		<i>Hydropsyche</i> species	85 ♀
	Hydroptilidae	<i>Hydroptila armata</i> HH Ross, 1938	3 ♂
		<i>Hydroptila gunda</i> Milne, 1936	1 ♂
		<i>Hydroptila</i> species	230 ♀
		<i>Hydroptila waubesiana</i> Betten, 1934	12 ♂
		<i>Ochrotrichia arva</i> (HH Ross, 1941)	3 ♀, 7 ♂
		<i>Orthotrichia aegerfasciella</i> (Chambers, 1873)	1 ♂
	Lepidostomatidae	<i>Lepidostoma togatum</i> (HA Hagen, 1861)	21 ♀, 2 ♂
	Leptoceridae	<i>Ceraclea cancellata</i> (Betten, 1934)	134 ♂
		<i>Ceraclea enodis</i> Whitlock & JC Morse, 1994	3 ♂
		<i>Ceraclea protonepha</i> JC Morse & HH Ross, 1975	2 ♂
		<i>Ceraclea</i> species	174 ♀
		<i>Ceraclea transversa</i> (HA Hagen, 1861)	5 ♂
		<i>Mystacides sepulchralis</i> (Walker, 1852)	1 ♂
		<i>Oecetis inconspicua</i> (Walker, 1852)	28 ♀, 33 ♂

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		<i>Oecetis nocturna</i> HH Ross, 1966	1 ♀, 3 ♂
		<i>Oecetis persimilis</i> (N Banks, 1907)	10 ♀, 6 ♂
		<i>Setodes incertus</i> (Walker, 1852)	1 ♂
		<i>Trienodes ignitus</i> (Walker, 1852)	6 ♀, 1 ♂
		<i>Trienodes injustus</i> (HA Hagen, 1861)	4 ♀
		<i>Trienodes perna</i> HH Ross, 1938	9 ♀, 2 ♂
	Philopotamidae	<i>Chimarra obscura</i> (Walker, 1852)	6 ♀, 3 ♂
	Phryganeidae	<i>Agrypnia vestita</i> (Walker, 1852)	1 ♀
	Polycentropodidae	<i>Plectrocnemia cinerea</i> (HA Hagen, 1861)	9 ♀, 1 ♂
		<i>Polycentropus confusus</i> HA Hagen, 1861	1 ♂
	Psychomyiidae	<i>Lype diversa</i> (N Banks, 1914)	1 ♀, 1 ♂
		<i>Psychomyia flavida</i> HA Hagen, 1861	54 ♀
	Rhyacophilidae	<i>Rhyacophila fenestra</i> HH Ross, 1938	10 ♀, 3 ♂
GA:Walker Co., CHCH beaver pond, 14 Jun 2005, by hand			
Odonata	Coenagrionidae	<i>Enallagma signatum</i> (HA Hagen, 1861)	1 adult, 1 ♂
GA:Walker Co., CHCH beaver pond, 15 Jun 2005, by hand			
Odonata	Calopterygidae	<i>Calopteryx maculata</i> (Beauvois, 1805)	1 ♀
	Libellulidae	<i>Libellula cyanea</i> Fabricius, 1775	1 ♀, 1 ♂
GA:Walker Co., CHCH beaver pond, 15-16 Jun 2005, black light trap			
Ephemeroptera	Heptageniidae	<i>Maccaffertium</i> species	4 ♀, 2 ♂
Odonata	Libellulidae	<i>Erythemis simplicicollis</i> (T Say, 1839)	1 ♀
Plecoptera	Perlidae	<i>Perlesta</i> species	1 ♀, 1 ♂
Trichoptera	Goeridae	<i>Goera calcarata</i> N Banks, 1899	1 ♀, 1 ♂
	Helicopsychidae	<i>Helicopsyche borealis</i> (HA Hagen, 1861)	1 ♂
	Hydropsychidae	<i>Cheumatopsyche analis</i> (N Banks, 1903)	7 ♂
		<i>Cheumatopsyche campyla</i> HH Ross, 1938	2 ♂
		<i>Cheumatopsyche oxa</i> HH Ross, 1938	7 ♀, 177 ♂
		<i>Cheumatopsyche pasella</i> HH Ross, 1941	4 ♂
		<i>Cheumatopsyche</i> species	548 ♀
		<i>Hydropsyche bassi</i> OS Flint, JR Voshell & CR Parker, 1979	54 ♂
		<i>Hydropsyche depravata</i> HA Hagen, 1861	6 adults, 75 ♂
		<i>Hydropsyche etnieri</i> GA Schuster & A Talak, 1977	2 ♂
		<i>Hydropsyche scalaris</i> HA Hagen, 1861	7 ♂
		<i>Hydropsyche sparna</i> HH Ross, 1938	1 ♂
		<i>Hydropsyche</i> species	228 ♀
		<i>Hydropsyche venularis</i> N Banks, 1914	1 ♂
	Hydroptilidae	<i>Hydroptila ampoda</i> HH Ross, 1941	1 ♂
		<i>Hydroptila armata</i> HH Ross, 1938	5 ♂
		<i>Hydroptila gunda</i> Milne, 1936	27 ♂
		<i>Hydroptila paramoena</i> Harris, 1985	3 ♂
		<i>Hydroptila quinola</i> HH Ross, 1947	1 ♂
		<i>Hydroptila</i> species	167 ♀
		<i>Hydroptila waubesiana</i> Betten, 1934	6 ♂
		<i>Orthotrichia aegerfasciella</i> (Chambers, 1873)	1 ♂
		<i>Oxyethira pallida</i> (N Banks, 1904)	6 ♂
		<i>Oxyethira</i> species	16 ♀
	Leptoceridae	<i>Ceraclea</i> species	16 ♀
		<i>Ceraclea tarsipunctata</i> (Vorhies, 1909)	1 ♂
		<i>Ceraclea transversa</i> (HA Hagen, 1861)	1 ♂
		<i>Leptocerus americanus</i> (N Banks, 1899)	1 ♀
		<i>Oecetis inconspicua</i> (Walker, 1852)	7 ♀, 9 ♂
		<i>Oecetis persimilis</i> (N Banks, 1907)	1 ♂
		<i>Trienodes injustus</i> (HA Hagen, 1861)	1 ♂
		<i>Trienodes marginatus</i> Sibley, 1926	45 ♀, 4 ♂
		<i>Trienodes perna</i> HH Ross, 1938	1 ♀
		<i>Trienodes</i> species	10 ♀
	Philopotamidae	<i>Chimarra aterrima</i> HA Hagen, 1861	26 ♀, 50 ♂
	Polycentropodidae	<i>Nyctiophylax serratus</i> Lago & Harris, 1985	1 ♂
		<i>Nyctiophylax</i> species	1 ♀
		<i>Plectrocnemia cinerea</i> (HA Hagen, 1861)	3 ♀, 2 ♂
		<i>Polycentropus blicklei</i> HH Ross & Yamamoto, 1965	1 ♀
	Psychomyiidae	<i>Psychomyia flavida</i> HA Hagen, 1861	8 ♀

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GA:Walker Co., CHCH Cave Spring, 14 Jun 2005, by hand				
Trichoptera	Hydropsychidae	<i>Hydropsyche</i> species	2 larvae	
	Hydroptilidae	<i>Hydroptila</i> species	1 larva	
	Philopotamidae	<i>Chimarra</i> species	1 larva	
	Polycentropodidae	<i>Plectrocnemia cinerea</i> (HA Hagen, 1861)	1 ♀, 2 ♂	
GA:Walker Co., CHCH Cave Spring, 15-16 Jun 2005, black light trap				
Ephemeroptera	Baetidae	Baetidae species	1 ♂	
Plecoptera	Perlidae	<i>Perlesta</i> species	1 ♀, 1 ♂	
Trichoptera	Hydropsychidae	<i>Cheumatopsyche oxa</i> HH Ross, 1938	15 ♂	
		<i>Cheumatopsyche pasella</i> HH Ross, 1941	2 ♂	
		<i>Cheumatopsyche</i> species	47 ♀	
		<i>Diplectrona</i> species	1 ♂	
		<i>Hydropsyche bassi</i> OS Flint, JR Voshell & CR Parker, 1979	1 ♂	
		<i>Hydropsyche depravata</i> HA Hagen, 1861	6 adults, 1 ♂	
		<i>Hydropsyche scalaris</i> HA Hagen, 1861	1 ♂	
		<i>Hydropsyche</i> species	3 ♀	
		Hydroptilidae	<i>Hydroptila consimilis</i> Morton, 1905	5 ♂
			<i>Hydroptila gunda</i> Milne, 1936	6 ♂
	<i>Hydroptila</i> species		44 ♀	
	Leptoceridae	<i>Ceraclea cancellata</i> (Betten, 1934)	1 ♀, 1 ♂	
		<i>Ceraclea maculata</i> (N Banks, 1899)	1 ♂	
		<i>Oecetis cinerascens</i> (HA Hagen, 1861)	3 ♀, 1 ♂	
		<i>Oecetis inconspicua</i> (Walker, 1852)	2 ♀, 2 ♂	
		<i>Oecetis persimilis</i> (N Banks, 1907)	1 ♂	
		<i>Trienodes rossi</i> Glover, Manuel, & JC Morse in Manuel, 2010	2 ♀	
		<i>Trienodes</i> species	7 ♀	
		Molannidae	<i>Molanna blenda</i> Sibley, 1926	1 ♀, 2 ♂
		Philopotamidae	<i>Dolophilodes distincta</i> (Walker, 1852)	1 ♂
		Polycentropodidae	<i>Neureclipsis</i> species	2 ♀
	<i>Polycentropus elarus</i> HH Ross, 1944		1 ♂	
	<i>Polycentropus maculatus</i> N Banks, 1908		3 ♂	
	Rhyacophilidae	<i>Rhyacophila ledra</i> HH Ross, 1939	2 ♀, 1 ♂	
GA:Walker Co., CHCH Cave Spring, 20 Mar 2007, by hand				
Plecoptera	Nemouridae	<i>Amphinemura</i> species	1 ♀	
Trichoptera	Glossosomatidae	<i>Agapetus</i> species	3 larvae	
	Hydroptilidae	<i>Ochrotrichia</i> species	3 larvae	
	Limnephilidae	<i>Ironoquia</i> species	5 larvae	
	Rhyacophilidae	<i>Rhyacophila fenestra</i> HH Ross, 1938	2 ♀, 4 larvae, 1 ♀	
		<i>Rhyacophila ledra</i> HH Ross, 1939	1 ♀ mmt	
GA:Walker Co., CHCH Cave Spring, 28 Feb 2006, by hand				
Trichoptera	Glossosomatidae	<i>Glossosoma nigrior</i> N Banks, 1911	2 larvae	
	Rhyacophilidae	<i>Rhyacophila ledra</i> HH Ross, 1939	1 larva	
	Thremmatidae	<i>Neophylax concinnus</i> MacLachlan, 1871	1 larva	
GA:Walker Co., CHCH Cave Spring, 8 May 2007, black light trap				
Trichoptera	Rhyacophilidae	<i>Rhyacophila fenestra</i> HH Ross, 1938	2 ♀, 2 larvae	
GA:Walker Co., CHCH Cave Spring, 8 May 2007, by hand				
Odonata	Coenagrionidae	<i>Enallagma exsulans</i> (HA Hagen, 1861)	1 ♀	
Plecoptera	Perlidae	<i>Perlesta</i> species	1 larva	
Trichoptera	Rhyacophilidae	<i>Rhyacophila fenestra</i> HH Ross, 1938	2 ♀, 4 ♂, 1 pupa	
GA:Walker Co., CHCH Cave Spring, 8-9 May 2007, black light trap				
Plecoptera	Nemouridae	<i>Amphinemura</i> species	2 ♀	
Trichoptera	Glossosomatidae	<i>Agapetus vireo</i> HH Ross, 1941	1 ♂	
	Goeridae	<i>Goera calcarata</i> N Banks, 1899	1 ♀	
	Hydropsychidae	<i>Cheumatopsyche analis</i> (N Banks, 1903)	1 ♂	
		<i>Cheumatopsyche</i> species	21 ♀	
		<i>Hydropsyche</i> species	4 ♀	
	Hydroptilidae	<i>Hydroptila consimilis</i> Morton, 1905	1 ♂	
		<i>Hydroptila paramoena</i> Harris, 1985	2 ♂	
		<i>Hydroptila waubesiana</i> Betten, 1934	5 ♂	
		<i>Hydroptilidae</i> species	74 ♀	
		<i>Oxyethira pallida</i> (N Banks, 1904)	1 ♂	

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	Leptoceridae	<i>Ceraclea transversa</i> (HA Hagen, 1861)	1 ♂
		<i>Oecetis inconspicua</i> (Walker, 1852)	8 ♀, 7 ♂
		<i>Oecetis persimilis</i> (N Banks, 1907)	1 ♀
		<i>Trienodes ignitus</i> (Walker, 1852)	1 ♀
	Psychomyiidae	<i>Lype diversa</i> (N Banks, 1914)	2 ♂
	Rhyacophilidae	<i>Rhyacophila fenestra</i> HH Ross, 1938	6 ♀, 54 ♂
	Thremmatidae	<i>Neophylax concinnus</i> MacLachlan, 1871	2 larvae
GA:Walker Co., CHCH Glenn Fall Creek at Rt. 58, 20 Mar 2007, by hand			
Trichoptera	Hydropsychidae	<i>Diplectrona modesta</i> N Banks, 1908	10 larvae
		<i>Hydropsyche</i> species	1 pupa
	Rhyacophilidae	<i>Rhyacophila glaberrima</i> Ulmer, 1907	9 larvae, 1 ♂ mmt
		<i>Rhyacophila</i> species	1 ♀
TN:Hamilton Co., CHCH Dogwood Spring, 31 Oct 2006, dip net			
Trichoptera	Hydropsychidae	<i>Diplectrona metaqui</i> HH Ross, 1970	1 larva
		<i>Homoplectra doringa</i> (Milne, 1936)	1 larva
TN:Hamilton Co., CHCH Rock Spring at Point Park, 1 Mar 2006, by hand			
Megaloptera	Corydalidae	<i>Neohermes</i> species	1 larva
Trichoptera	Hydropsychidae	<i>Diplectrona metaqui</i> HH Ross, 1970	19 larvae
		<i>Diplectrona</i> species	1 larva
	Lepidostomatidae	<i>Theliopsyche melas</i> Edwards, 1956	8 larvae
	Limnephilidae	<i>Ironoquia</i> species	4 imms.
		<i>Pycnopsyche</i> species	1 larva
	Polycentropodidae	<i>Polycentropus</i> species	1 larva, 1 pupa
	Rhyacophilidae	<i>Rhyacophila glaberrima</i> Ulmer, 1907	5 larvae
	Thremmatidae	<i>Neophylax aniqua</i> HH Ross, 1947	9 larvae
		<i>Neophylax</i> species	7 larvae
TN:Hamilton Co., CHCH Rock Spring at Point Park, 28 Nov 2006, by hand			
Ephemeroptera	Baetidae	Baetidae species	1 larva
TN:Hamilton Co., CHCH Rock Spring at Point Park, 8 May 2007, by hand			
Trichoptera	Hydropsychidae	<i>Diplectrona</i> species	4 ♀, 4 ♂
	Lepidostomatidae	<i>Theliopsyche melas</i> Edwards, 1956	6 ♀, 1 ♂, 1 larva, 1
TN:Hamilton Co., CHCH stream on Lookout Mountain, 20 Mar 2007, by hand			
Trichoptera	Thremmatidae	<i>Neophylax concinnus</i> MacLachlan, 1871	9 larvae

Appendix 3. Non-Target Species Data.

The records for non-target taxa from Chickamauga and Chattanooga National Military Park (CHCH) 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 11 orders, 20 families, and 29 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 “Pseudoscorpiones_order” and “Pseudoscorpiones_family”. The majority of the non-target taxa are aquatic species. However, terrestrial species also are represented. Terrestrial species are highlighted in the table by an orange background.

Chickamauga and Chattanooga National Military Park			
Non-Target Species			
Order	Family	Species	Specimens
GA:Catoosa Co., CHCH Alexander Bridge, 9-10 May 2006, black light trap			
Coleoptera	Beetle family	Beetle species	12 adults
Neuroptera	Sisyridae	<i>Climacia areolaris</i> (HA Hagen, 1861)	1 adult
GA:Catoosa Co., CHCH Black Creek, 15 Jun 2005, by hand			
Coleoptera	Dytiscidae	<i>Neoporus</i> species	1 adult
	Hydrophilidae	<i>Anacena</i> species	4 adults
		<i>Tropisternus natator</i> Orchymont, 1938	1 adult
Amphipoda	Crangonyctidae	<i>Crangonyx</i> species	2 indivs.
Isopoda	Asellidae	<i>Caecidotea</i> species	2 adults, 5 imms.
GA:Catoosa Co., CHCH Black Creek, 15 Jun 2005, sweeping			
Coleoptera	Dytiscidae	<i>Heterosternuta pulcher</i> (LeConte, 1855)	7 adults
	Elmidae	<i>Stenelmis</i> species	4 adults
	Hydrophilidae	Hydrophilidae species	2 adults
Diptera	Chironomidae	Chironomidae species	10 larvae
	Dixidae	<i>Dixella</i> species	1 larva
	Limoniidae	<i>Limonia</i> species	2 larvae
Hemiptera	Gerridae	<i>Gerris</i> species	1 adult
GA:Catoosa Co., CHCH creek, 15 Jun 2005, by hand			
Coleoptera	Elmidae	<i>Dubiraphia bivittata</i> (LeConte, 1852)	3 adults
		<i>Macronychus glabratus</i> T Say, 1825	3 adults
GA:Catoosa Co., CHCH Glenn Field Stream, 15 Jun 2005, by hand			
Coleoptera	Elmidae	<i>Stenelmis</i> species	1 larva
Diptera	Ceratopogonidae	<i>Bezzia</i> / <i>Palpomyia</i> species	2 larvae
	Chironomidae	Chironomidae species	3 larvae
	Stratiomyidae	<i>Stratiomys</i> species	2 larvae
Amphipoda	Crangonyctidae	<i>Crangonyx</i> species	1 indiv.
Veneroida	Corbiculidae	<i>Corbicula fluminea</i> (OF Müller, 1774)	2 indivs.
	Sphaeriidae	<i>Sphaerium</i> species	1 indiv.
Basommatophora	Ancylidae	<i>Ferrissia rivularis</i> (T Say,1817)	1 indiv.
	Physidae	<i>Physa</i> species	3 indivs.
GA:Catoosa Co., CHCH Quarry, 15 Jun 2005, by hand			
Basommatophora	Physidae	<i>Physa</i> species	2 indivs.
GA:Walker Co., CHCH beaver pond, 15 Jun 2005, by hand			
Coleoptera	Elmidae	<i>Dubiraphia bivittata</i> (LeConte, 1852)	9 adults, 1 larva
Veneroida	Sphaeriidae	Sphaeriidae species	2 indivs.
Basommatophora	Physidae	<i>Physa</i> species	2 indivs.

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Non-Target Species			
Order	Family	Species	Specimens
GA:Walker Co., CHCH beaver pond, 15-16 Jun 2005, black light trap			
Basommatophora	Lymnaeidae	<i>Pseudosuccinea</i> species	1 indiv.
GA:Walker Co., CHCH Cave Spring, 15-16 Jun 2005, black light trap			
Diptera	Dixidae	<i>Dixella</i> species	1 adult
	Stratiomyidae	<i>Oxycera</i> species	1 adult
	Tabanidae	<i>Tabanus lineola</i> Fabricius, 1794	1 ♀
		<i>Tabanus pallidescens</i> Philip, 1936	1 ♀, 1 ♂
		<i>Tabanus sparus</i> subspecies Whitney, 1879	1 ♂
GA:Walker Co., CHCH Cave Spring, 8-9 May 2007, black light trap			
Pseudoscorpiones_order	Pseudoscorpiones_family	Pseudoscorpiones species	1 indiv.

Appendix 4. Species Lists.

All taxa found to occur in Chickamauga and Chattanooga National Military Park are listed below. The species are those names that include the genus, the species epithet, and the author, such as “*Heterosternuta pulcher* (LeConte, 1855)”. Taxa include those entries such as “*Neoporus* species”, in a genus not identifiable to species, that was collected, but that could not be identified to species. No other representatives of the genus *Neoporus* were collected that could be identified to species. Since the genus *Neoporus* is clearly present in CHCH, this entry is included to recognize the occurrence of the genus in the park.

Common names are provided in the list for those taxa which have common names. 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. Most insects and other invertebrate groups do not have “official” common names for different species. For those groups, only a few species have assigned 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 taxa are names that apply to genera, families, orders, or in some cases to higher taxonomic categories.

The majority of species listed are aquatic. A small number of species are terrestrial. These species are indicated in the lists by an orange background.

Chickamauga and Chattanooga National Military Park			
Phylum	Arthropoda	Class	Insecta
Order	Family	Taxon	Common Name
COLEOPTERA	Dytiscidae	<i>Heterosternuta pulcher</i> (LeConte, 1855)	Predaceous Diving Beetle
		<i>Neoporus</i> species	Predaceous Diving Beetle
	Elmidae	<i>Dubiraphia bivittata</i> (LeConte, 1852)	Riffle Beetle
		<i>Macronychus glabratus</i> Say, 1825	Riffle Beetle
		<i>Stenelmis</i> species	Riffle Beetle
	Hydrophilidae	<i>Anacena</i> species	Water Scavenger Beetle
		<i>Tropisternus natator</i> Orchymont, 1938	Water Scavenger Beetle
DIPTERA	Dixidae	<i>Dixella</i> species	Dixid Midge
	Limoniidae	<i>Limonia</i> species	Crane Fly
	Stratiomyidae	<i>Oxycera</i> species	Soldier Fly
		<i>Stratiomys</i> species	Soldier Fly
	Tabanidae	<i>Tabanus lineola</i> Fabricius, 1794	Horse Fly
		<i>Tabanus pallidescens</i> Philip, 1936	Horse Fly
		<i>Tabanus sparus</i> Whitney, 1879	Horse Fly
EPHEMEROPTERA	Baetidae	<i>Callibaetis pretiosus</i> Banks, 1914	Small Minnow Mayfly
	Caenidae	<i>Caenis amica</i> Hagen, 1861	Small Squaregill Mayfly
		<i>Caenis latipennis</i> Banks, 1907	Small Squaregill Mayfly
	Ephemeridae	<i>Hexagenia</i> species	Common Burrowing Mayfly
	Heptageniidae	<i>Maccaffertium terminatum</i> placitum (Banks, 1910)	Flat-headed Mayfly
		<i>Stenacron</i> species	Flat-headed Mayfly
		<i>Stenonema femoratum</i> (Say, 1823)	Flat-headed Mayfly
	Isonychiidae	<i>Isonychia bicolor</i> (Walker, 1853)	Brushy-legged Minnow Mayfly
	Leptohyphidae	<i>Tricorythodes</i> species	Little Stout Crawler Mayfly
	Gerridae	<i>Gerris</i> species	Water Strider
HEMIPTERA			
MEGALOPTERA	Corydalidae	<i>Chauliodes pectinicornis</i> Linnaeus, 1783	Fishfly
		<i>Neohermes</i> species	Fishfly
NEUROPTERA	Sisyridae	<i>Climacia areolaris</i> (Hagen, 1861)	Spongilla fly
ODONATA	Aeshnidae	<i>Epiaeschna heros</i> (Fabricius, 1798)	Swamp Darner
	Calopterygidae	<i>Calopteryx maculata</i> (Beauvois, 1805)	Ebony Jewelwing
	Coenagrionidae	<i>Argia apicalis</i> (Say, 1839)	Blue-fronted Dancer

Phylum	Arthropoda	Class	Insecta
Order	Family	Taxon	Common Name
PLECOPTERA	Libellulidae	<i>Argia fumipennis violacea</i> (Hagen, 1861)	Violet Dancer
		<i>Argia moesta</i> (Hagen, 1861)	Powdered Dancer
		<i>Argia tibialis</i> (Rambur, 1842)	Blue-tipped Dancer
		<i>Enallagma divagans</i> Selys, 1876	Turquoise Bluet
		<i>Enallagma exsulans</i> (Hagen, 1861)	Stream Bluet
		<i>Enallagma signatum</i> (Hagen, 1861)	Orange Bluet
		<i>Gomphidae</i>	Black-shouldered Spinyleg
		<i>Erythemis simplicicollis</i> (Say, 1839)	Eastern Pondhawk
		<i>Libellula cyanea</i> Fabricius, 1775	Spangled Skimmer
		<i>Libellula incesta</i> Hagen, 1861	Slaty Skimmer
	Macromiidae	<i>Libellula luctuosa</i> Burmeister, 1839	Widow Skimmer
		<i>Libellula vibrans</i> Fabricius, 1793	Great Blue Skimmer
		<i>Pachydiplax longipennis</i> (Burmeister, 1839)	Blue Dasher
		<i>Perithemis tenera</i> (Say, 1839)	Eastern Amberwing
		<i>Platthemis lydia</i> (Drury, 1773)	Common Whitetail
		<i>Macromia</i> species	River Cruiser
	Nemouridae	<i>Amphinemura</i> species	Forestfly
		<i>Perlidae</i>	Slender Stone
		<i>Neoperla robisoni</i> Poulton & Stewart, 1986	Multispine Stone
		<i>Neoperla stewarti</i> Stark & Baumann, 1978	Cloudy Stone
TRICHOPTERA	Taeniopterygidae	<i>Perlida</i>	Vernal Stone
		<i>Perlina ephyre</i> (Newman, 1839)	Willowfly
		<i>Brachycentridae</i>	Short-horned Caddisfly
		<i>Micrasema wataga</i> Ross, 1938	Short-horned Caddisfly
	Dipseudopsidae	<i>Phyllocentropus placidus</i> (Banks, 1905)	Buried-tube Caddisfly
		<i>Glossosomatidae</i>	Saddle-case Making Caddisfly
		<i>Agapetus vireo</i> Ross, 1941	Saddle-case Making Caddisfly
		<i>Glossosoma nigrior</i> Banks, 1911	Saddle-case Making Caddisfly
	Goeridae	<i>Padunia jeanae</i> (Ross, 1938)	Saddle-case Making Caddisfly
		<i>Goera calcarata</i> Banks, 1899	Armored Caddisfly
		<i>Helicopsyche borealis</i> (Hagen, 1861)	Snail-case Making Caddisfly
		<i>Hydropsychidae</i>	Retreat-making Caddisfly
	Hydropsychidae	<i>Cheumatopsyche analis</i> (Banks, 1903)	Retreat-making Caddisfly
		<i>Cheumatopsyche campyla</i> Ross, 1938	Retreat-making Caddisfly
		<i>Cheumatopsyche oxa</i> Ross, 1938	Retreat-making Caddisfly
		<i>Cheumatopsyche pasella</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>Homoptera doringa</i> (Milne, 1936)	Retreat-making Caddisfly
		<i>Hydropsyche bassi</i> Flint, Voshell & Parker, 1979	Retreat-making Caddisfly
		<i>Hydropsyche betteni</i> Ross, 1938	Retreat-making Caddisfly
		<i>Hydropsyche depravata</i> Hagen, 1861	Retreat-making Caddisfly
		<i>Hydropsyche etnieri</i> Schuster & Talak, 1977	Retreat-making Caddisfly
		<i>Hydropsyche hageni</i> Banks, 1905	Retreat-making Caddisfly
		<i>Hydropsyche incommoda</i> Hagen, 1861	Retreat-making Caddisfly
		<i>Hydropsyche mississippiensis</i> Flint, 1965	Retreat-making Caddisfly
		<i>Hydropsyche scalaris</i> Hagen, 1861	Retreat-making Caddisfly
		<i>Hydropsyche sparna</i> Ross, 1938	Retreat-making Caddisfly
	Hydroptilidae	<i>Hydropsyche venularis</i> Banks, 1914	Retreat-making Caddisfly
		<i>Hydroptila armata</i> Ross, 1938	Micro-caddisfly
		<i>Hydroptila consimilis</i> Morton, 1905	Micro-caddisfly
		<i>Hydroptila gunda</i> Milne, 1936	Micro-caddisfly
		<i>Hydroptila paramoena</i> Harris, 1985	Micro-caddisfly
		<i>Hydroptila quinola</i> Ross, 1947	Micro-caddisfly
		<i>Hydroptila waubesia</i> Betten, 1934	Micro-caddisfly
		<i>Ochrotrichia arva</i> (Ross, 1941)	Micro-caddisfly
		<i>Ochrotrichia elongiralla</i> Harris, 1986	Micro-caddisfly
		<i>Ochrotrichia spinosa</i> (Ross, 1938)	Micro-caddisfly
	Lepidostomatidae	<i>Orthotrichia aegerfasciella</i> (Chambers, 1873)	Micro-caddisfly
		<i>Oxyethira pallida</i> (Banks, 1904)	Micro-caddisfly
		<i>Lepidostoma togatum</i> (Hagen, 1861)	Scale-mouthed Caddisfly
		<i>Theliopsyche melas</i> Edwards, 1956	Scale-mouthed Caddisfly
	Leptoceridae	<i>Ceraclea ancylus</i> (Vorhies, 1909)	Long-horned Caddisfly
		<i>Ceraclea cancellata</i> (Betten, 1934)	Long-horned Caddisfly
		<i>Ceraclea enodis</i> Whitlock & Morse, 1994	Long-horned Caddisfly

Phylum Arthropoda		Class Insecta	
Order	Family	Taxon	Common Name
		<i>Ceraclea maculata</i> (Banks, 1899)	Long-horned Caddisfly
		<i>Ceraclea protonepha</i> Morse & Ross, 1975	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 exquisita</i> (Walker, 1852)	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>Setodes incertus</i> (Walker, 1852)	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 rossi</i> Glover, Manuel, & Morse, 2010	Long-horned Caddisfly
	Limnephilidae	<i>Ironoquia kaskaskia</i> (Ross, 1938)	Northern Caddisfly
		<i>Ironoquia punctatissima</i> (Walker, 1852)	Northern Caddisfly
		<i>Pycnopsyche</i> species	Stickbait Caddisfly
	Molannidae	<i>Molanna blenda</i> Sibley, 1926	Molannid Caddisfly
	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
	Phryganeidae	<i>Agrypnia vestita</i> (Walker, 1852)	Phryganeid Caddisfly
	Polycentropodidae	<i>Neureclipsis</i> species	Trumpet-net Caddisfly
		<i>Nyctiophylax moestus</i> Banks, 1911	Fine-net Caddisfly
		<i>Nyctiophylax serratus</i> Lago & Harris, 1985	Fine-net Caddisfly
		<i>Plectrocnemia cinerea</i> (Hagen, 1861)	Fine-net Caddisfly
		<i>Polycentropus blicklei</i> Ross & Yamamoto, 1965	Fine-net Caddisfly
		<i>Polycentropus confusus</i> Hagen, 1861	Fine-net Caddisfly
		<i>Polycentropus elarus</i> Ross, 1944	Fine-net Caddisfly
		<i>Polycentropus maculatus</i> Banks, 1908	Fine-net Caddisfly
	Psychomyiidae	<i>Lype diversa</i> (Banks, 1914)	Fine-net Caddisfly
		<i>Psychomyia flavida</i> Hagen, 1861	Fine-net Caddisfly
	Rhyacophilidae	<i>Rhyacophila carolina</i> Banks, 1911	Free-living Caddisfly
		<i>Rhyacophila fenestra</i> Ross, 1938	Free-living Caddisfly
		<i>Rhyacophila glaberrima</i> Ulmer, 1907	Free-living Caddisfly
		<i>Rhyacophila ledra</i> Ross, 1939	Free-living Caddisfly
	Thremmatidae	<i>Neophylax aniqua</i> Ross, 1947	Dog-faced Caddisfly
		<i>Neophylax concinnus</i> MacLachlan, 1871	Dog-faced Caddisfly

Phylum Arthropoda		Class Malacostraca	
Order	Family	Taxon	Common Name
AMPHIPODA	Crangonyctidae	<i>Crangonyx</i> species	Amphipod
ISOPODA	Asellidae	<i>Caecidotea</i> species	Isopod

Phylum Mollusca		Class Bivalvia	
Order	Family	Taxon	Common Name
VENEROIDA	Corbiculidae	<i>Corbicula fluminea</i> (OF Müller, 1774)	Asiatic Clam
	Sphaeriidae	<i>Sphaerium</i> species	Fingernail Clam

Phylum Mollusca		Class Gastropoda	
Order	Family	Taxon	Common Name
BASOMMATOPHORA	Ancylidae	<i>Ferrissia rivularis</i> (Say, 1817)	Creeping Ancylid
	Lymnaeidae	<i>Pseudosuccinea</i> species	Fluke Snail
	Physidae	<i>Physa</i> species	Snail

Appendix 5. 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 below with additional information about their biology, distribution, and sensitivity, that might be helpful to managers.

The 43 species included in the tables were selected on the basis of the following criteria: (1) they are known from only one, two, or three parks, and thus are considered rare for this study; (2) they have a NatureServe global rank of G1, G2, or G3, or a state conservation rank of S1, S2, or S3 for any one of the seven states in the Appalachian Highlands and Cumberland Piedmont Monitoring Networks 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) acronyms are listed here. Of course, the occurrence of species in the parks is partially 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 GRSM, including a long history of visits by aquatic entomologists dating back decades, many species are recorded from there that are not known 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, BLRI^(L) indicates that a record for BLRI is based, at least in part or perhaps entirely, on a literature reference.

(2) Conservation rankings - Conservation rankings are coded systems in which species' vulnerability to extinction are assessed

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

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 that a species' rank is 1, 2, or 3 is justification for that species to be listed in the tables below.

Table 6–1. 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 (<1,000) or acres (<2,000) or linear miles (<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 very rare and local throughout its range, or found only in a restricted range (even if abundant at some locations), or because of other factors making 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 how sensitive different taxa are to various forms of pollution or habitat disturbance (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 that are highly sensitive to pollution and tend to be the first taxa to be eliminated from a polluted system, and 10 represents those taxa which are most tolerant of pollution and become the most common taxa in heavily polluted 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 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 (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 Division of Water Pollution Control (Arnwine, 2006) or the Kentucky 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 those 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, Tennessee (TN), or Kentucky (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 state of 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 hygroptetric 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 at which each species was found during our surveys. We did not have elevations for a small number of localities, and therefore a small number of species do not have elevations reported in the tables. The list of United States and Mexican states and Canadian provinces in which each species has been recorded is presented, 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 records. 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 the summary 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 below, which are from Tables 6A, 6B, and 6C of Cummins and others, (2008).

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Table 6–2. Aquatic habitat classification system. From Table 6A of Cummins and others, (2008).

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 6–3. Categorization of aquatic insect habits (mode of existence). From Table 6B of Cummins and others, (2008).

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).
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).

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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).
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Table 6–4. 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 US Postal Service and Canadian Postal Service abbreviations. Mexican states and Central American country abbreviations follow those used in various publications. The complete list of abbreviations is given in the table below.

Table 6–5. Postal codes used in the Species of Interest 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

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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
MO	Missouri		
States of Mexico - only those actually used below are listed here			
Code	State	Code	State
AG	Aguascalientes	MX	Unspecified location in the country of Mexico
BN	Baja California Norte (Official code is BC. This conflicts with British Columbia, Canada, and is here replaced with BN.)	OA	Oaxaca
BS	Baja California Sur	PU	Puebla
CH	Chihuahua	QT	Queretaro
CL	Colima	SI	Sinaloa
CS	Chiapas	SL	San Luis Potosi
DF	Distrito Federal	SO	Sonora
DG	Durango	TM	Tamaulipas
JA	Jalisco	VE	Veracruz
ML	Morelos (The official code is MO, which conflicts with Missouri. We have replaced it here with ML.)		

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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 reasons, 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
Central American Countries			
BE	Belize	HO	Honduras
CR	Costa Rica	MR	Montserrat
GU	Guatemala	NI	Nicaragua

On-Line Resources

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

Barber-James, H., M. Sartori, J.-L. Gattolliat, and J. Webb. 2013. World checklist of freshwater Ephemeroptera species. <http://FADA.biodiversity.be/group/show/35> Accessed on 17 December 2010.

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McCafferty, P. W. (Editor). 2010. Mayfly Central. <http://www.entm.purdue.edu/mayfly/index.php> Accessed on 17 December 2010.

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National Museum of Natural History, The Netherlands, <http://www.odonata.info/odonata/odonata/tree.html> Accessed on 17 December 2010.

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ORDER EPHEMEROPTERA HYATT & ARMS

MAYFLIES

Mayflies are cosmopolitan, being found on every continent except Antarctica. Slightly more than 3,300 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 as a result of 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 on 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 163 species in 50 genera and 14 families. In CHCH, we found 6 species in 4 genera and 4 families.

Mayfly adults are delicate, small to medium size, two or four winged insects with two or three 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 two or three caudal filaments, although the larva may have three while the adult of the same species has only two. The larval stage may last 3-4 weeks, or as long as 2½ years, but typically lasts one 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 considered below. Larvae pass through many instars (10-50) before finally emerging as a subimago (sub adult), 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 pollutants and habitat disturbance, which makes them valuable indicators of the health of aquatic ecosystems.

Suborder Pisciforma McCafferty minnow, brush-legged, and flat-headed mayflies

Family Baetidae Leach small minnow mayflies

This is the largest family of mayflies, having about 900 species in 100 genera world-wide (Gattolliat and Nieto, 2009). The greatest diversity of baetids occurs in the Afrotropical and Neotropical realms. Still, more than 150 species in more than 20 genera are known from the Nearctic. Most larvae are streamlined and are active swimmers, even in swift water. Most also are collector-gatherers, feeding on organic detritus. A limited number of species are carnivorous. A great deal of taxonomic work has been published over the past 30 years in North America, much of it by McCafferty and his students. At present, more than 60 species in at least a dozen genera are known from the study area. We found nearly half of those in the parks.

Genus *Callibaetis* Eaton - [Habitat — Lentic, vascular hydrophytes: Habit — Swimmers, clingers: Trophic — Collectors-gatherers (filamentous algae)] This is a Western Hemisphere genus, with 20 species known from South America and 11 known from North America. *Callibaetis* species are assigned a tolerance value of 9.8. The following species is included here because it was found in only three parks.

Species	Parks	States	Elevation Range	Rankings	Tolerance Value	Flight Dates
<i>Callibaetis pretiosus</i> N Banks, 1914	BLRI, CHCH , SHIL	AL, AR, FL, GA, IN, LA, NC, NH, NY, ON, SC, TN, VA	115-227 m	G5	9.8	16-29 July (April)

Comments — Morse and others (1997) consider this species to be rare in scattered localities in the southern Appalachians. The species is found in mountain stream pools. We have 3 collections and 8 specimens of this species.

Suborder Furcatergalia

fork-gilled mayflies

Family Caenidae Stephens

small squaregills

Genus *Caenis* - [Habitat — Lotic—depositional; lentic—littoral (sediments); Habit — Sprawlers; climbers; Trophic — Collectors—gatherers; scrapers]
This one of the largest genera of mayflies, having about 130 species found in every biotic realm except Australia. Approximately 11 species are found in North America. Six species were collected in the parks. Provonsha (1990) revised the North American *Caenis* and provided keys to larvae and adults.

Species	Parks	States	Elevation Range	Rankings	Tolerance Value	Flight Dates
<i>Caenis latipennis</i> N Banks, 1907	CHCH, FODO, GRSM	AB, AL, AR, AZ, CA, CH, CS, CT, IA, IL, IN, KS, KY, MA, MB, MD, ME, MI, MN, MO, MS, MT, NB, NC, ND, NE, NH, NL, NY, OH, OK, ON, OR, PA, PQ, SC, SD, SK, SL, TA, TN, TX, VA, WA, WI, WV, WY	120-402 m	G5	7.4	9 May - 18 July
Comments — This is a widespread, common species of considerable variability. Provonsha (1990) however, has synonymized 4 of the species, accepting just one of five names as valid. Larvae occur in most freshwater habitats, but prefer still or gently flowing currents areas with silt or fine sand habitats. Larva 3.0-6.8 mm in length, adult male 2.6-4.3 mm, adult female 3.0-6.0 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 realms. 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 are 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 (1988). 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 (1988, 1993, 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 to 20+, 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 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 based on size, temperature, gradient, permanency, or other criteria. Many species have specific microhabitat requirements within a water body. One species is only known from depths of 40–60 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 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; (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 *Allocaenia formosa* Ricker, 1952, is called the Smokies Snowfly. Family and species names based on this system are used below.

Suborder Arctoperlaria Zwick Group Systellognatha Enderlein

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 Realms. In eastern North America, 15 genera and nearly 80 species are known. Most species appear to be univoltine, but some are known to have bivoltine populations, and trivoltine life cycles have been suggested 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

Chickamauga and Chattanooga National Military Park

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

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. 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.

Species	Parks	States	Elevation Range	Rankings	Tolerance Value	Flight Dates
<i>Perlesta shubuta</i> Stark, 1989 Cloudy Stone	CHCH, COWP, NISI	AR, IA, IL, KY, MI, MO, MS, OK	135-274 m	G3	0.0	10 May - 31 June

Comments — This species seems to be limited to larger, permanent streams (Poulton and Stewart 1991, DeWalt and others 2001). Female forewing up to 9.5 mm in length, male forewing up to 7 mm. This species is listed in this table because it has only been found in three parks.

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 1.5.

Species	Parks	States	Elevation Range	Rankings	Tolerance Value	Flight Dates
<i>Neoperla robisoni</i> BC Poulton and KW Stewart, 1986 Slender Stone	CHCH	AR, IL, MO, MS, OK, PA, TN, WI	194 m	G4	1.5	10 May

Comments — DeWalt and others (2005) consider this species extirpated from OH. Female forewing up to 13 mm in length, male forewing up to 10 mm.

<i>Neoperla stewarti</i> BP Stark & RW Baumann, 1978 Multispine Stone	CHCH, MACA	AL, IL, IN, KY, MA, MD, ME, MN, MS, OH, PA, TN, VA, WI, WV	161-262 m	G5	1.5	6 May - 9 June
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Comments — DeWalt and others (2005) consider this species extirpated from OH. Female forewing up to 13 mm in length, male forewing up to 11 mm.

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 ephyre</i> (Newman, 1839) Vernal Stone	CHCH, GRSM ^(L) , MACA	AL, AR, CT, FL, GA, IA, IN, IL, IN, KS, KY, LA, MA, MD, ME, MI, MN, MO, MS, NC, NJ, NY, OH, OK, PA, RI, SC, TN, VA, WI, WV	161-550 m	G5, NCS3	1.3	6 May - 20 June (May)

Comments — Female forewing up to 14 mm in length, male forewing up to 10 mm.

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). The majority 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. A majority of 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 to 43 millimeters. Like Lepidoptera, Trichoptera undergo complete metamorphosis, progressing from egg to larva to pupa to adult. Most caddisflies have a 1-year or univoltine life cycle, although bi- and multivoltine life cycles are known. The majority of species are nocturnal as adults; only a relatively few species are 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) constructing fixed retreats with feeding nets, (2) making fixed tubular retreats from which the larvae extend to feed on surrounding substrates or passing prey items, (3) building portable cases for protection while moving about and grazing on the substrate in exposed situations, (4) fashioning tubular cases or retreats to maintain or enhance current flow over the body, (5) providing 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, 2006; Statzner and others, 1999).

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, *Padunia* 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 one 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

Chickamauga and Chattanooga National Military Park

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

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. 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 caused 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 while 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.

At least one European species is known to have 6–7 larval instars in certain populations; however, of those North American species whose life histories have been investigated, larvae have 5 instars. Larvae are not identifiable at present.

Species	Parks	States	Elevation Range	Rankings	Tolerance Value	Flight Dates
<i>Agapetus ibis</i> DA Etnier, JT Baxter, and CR Parker, 2010	CHCH	NC, TN, VA	213 m	n/a	0.0	8 May (May - June)
Comments — Endemic in the study area.						
<i>Agapetus vireo</i> HH Ross, 1941	CHCH , RUCA	AL, GA, TN	223-225 m	G1	0.0	23 March – 9 May (April – June, September)
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 September (Etnier and others, 2010) suggests either multicohorts or multigenerations per year in <i>A. vireo</i> in the Southeast.						

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) provided 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, NE, NH, OH, ON, PA, QC, SC, TN, VA, VT, WI, WV	112-1480 m	G5	1.5	3 March - 15 December (March - September)

Comments — Adults have been collected in every month except January and February, but greatest adult emergence is through the summer months. Georgian and Wallace (1983) found *G. nigrrior* to be bivoltine in North Carolina. Trapp and Hendricks (1984) found two populations to be bivoltine and one 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% of gut contents) and detritus (40%). We found *G. nigrrior* in 436 collections totaling 2,608 specimens from 13 parks during this study, which indicates that it is not at risk regionally.

Subfamily Protoptilinae Ross

Genus *Padunia* Martynov - [Habitat - Lotic erosional: Habit - Clingers (depressed turtle shell case, mineral): Trophic - Scrapers] This genus lives in larger streams and rivers as opposed to the headwaters and small streams favored by *Agapetus*. It has a TV = 0.0. Until 2013, the single North American species was placed in the genus *Matrioptila* Ross. Robertson and Holzenthal (2013) synonymized *Matrioptila* with *Padunia*. *Padunia* is an east Asian genus of approximately 20 species, and now with a single Nearctic representative.

Species	Parks	States	Elevation Range	Rankings	Tolerance Value	Flight Dates
<i>Padunia jeanae</i> (HH Ross, 1938)	BISO, BLRI, CHCH , GRSM ^(L)	AL, GA, KY, NC, PA, SC, TN, VA	213-1014 m	G4, ALS2, NCS3	0.0	9 May - 12 June (May - June)

Comments — Considered imperiled in Alabama and vulnerable in North Carolina. Specimens may occur in very large numbers in light trap samples. We have 11 collections and 1,167 specimens of this species.

Family Hydroptilidae Stephens microcaddisflies

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 2,000 species known world-wide (Holzenthal and others, 2007). In North America approximately 19 genera are recognized which contain more than 200 species (Wiggins, 1996). 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 others (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 made 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 at present.

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 (TV = 6.2) is based on evidence that at least some species are relatively tolerant of pollution. The status of *Hydroptila* species in terms of conservation needs is not well advanced.

Species	Parks	States	Elevation Range	Rankings	Tolerance Value	Flight Dates
<i>Hydroptila paramoena</i> SC Harris, 1985	BISO, BLRI, CHCH , CUGA, LIRI, OBRI	AL, GA, TN	220-859 m	G2, TNS2	6.2	9 May - 29 September (March - October)

Comments — *Hydroptila paramoena* is ranked imperiled globally and in Tennessee. However, some state records for *H. amoena* may actually refer to this species, and *H. paramoena* may be found to be more widely distributed with further study. Adult up to 2.5 mm in length. We have 13 collections and 91 specimens of this species.

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Genus *Ochrotrichia* Mosely - [Habitat - Lotic erosional and depositional: Habit - Clingers (purse-type case of silk and fine mineral): Trophic - Collectors gatherers, piercers herbivores] This genus has about 170 known species restricted to the Neotropics and North America. About 76 species are known in North America, and 20 are known from the Southeast. Larvae make typical purse cases, usually with sand grains but sometimes with algae. A few species make cases in which one side is fashioned as the “floor” of the case, without sand grains, and the case sits flat on the substrate. This type is often found on nearly vertical rock faces that are consistently wet by a film of water, often just deep enough to keep the cases covered. Some species are found in intermittent streams. The genus has a tolerance value of 7.2.

Species	Parks	States	Elevation Range	Rankings	Tolerance Value	Flight Dates
<i>Ochrotrichia arva</i> (HH Ross, 1941)	CHCH	AL, AR, KY, MI, MO, OH, TN, VA	213 m	G4	1.5	8-9 May (0)

Comments —

<i>Ochrotrichia elongiralla</i> Harris, 1986	CHCH	AL, TN	216 m	G1	1.0	10 May (April - October)
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Comments — A distinctive species in which the male genitalia are greatly elongated, as the name suggests. It is considered critically imperiled in AL. Male up to 4.8 mm in length, female up to 5.5 mm.

Genus *Oxyethira* 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, *Oxyethira* is cosmopolitan in distribution. In North America about 50 species are known, with more than 30 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 with 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 *Oxyethira* are assigned a genus tolerance value of 5.6.

Species	Parks	States	Elevation Range	Rankings	Tolerance Value	Flight Dates
<i>Oxyethira pallida</i> (N Banks, 1904)	BISO, BLRI, CARL, CHCH , COWP, CUGA, FODO, GRSM, LIRI, MACA, NISI, OBRI, SHIL, STRI	AL, AR, AZ, CA, CO, DC, DE, FL, GA, IA, IL, IN, KS, KY, LA, MD, ME, MI, MN, MO, MS, NB, NC, NE, NH, NY, OH, OK, PA, QC, SC, TN, TX, VA, WI, WV, WY	105-665 m	G5	2.2	1 Jan – 14 Oct (0)

Comments — A common species throughout the study area, adults have been collected almost year round.

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, as well as 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; Weaver and Sykora, 1979; Unzicker and others, 1982; Prather and Morse, 2001 as corrected by Stocks and Morse, 2005), but considerable uncertainty remains concerning some species, as noted below. Much of the information in the Comments below is from Flint (1962).

Species	Parks	States	Elevation Range	Rankings	Tolerance Value	Flight Dates
<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, NF, NH, NJ, NY, OH, ON, PA, QC, SC, TN, VA, VT, WV	114-1715 m	G5	1.0	21 March - 5 November (April - September)
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 October. Larva up to 16 mm in length. We have 325 collections and 1,543 specimens of this species.						
<i>Rhyacophila fenestra</i> HH Ross, 1938	CHCH , MACA, NISI	AL, AR, IL, IN, KY, MO, NC, OH, SC, TN, VT	135-256 m	G5	1.0	8 Mar - 9 May
Comments — Larva up to 14 mm.						
<i>Rhyacophila glaberrima</i> G Ulmer, 1907	BISO, BLRI, CARL, CHCH , CUGA ^(L) , FODO, GRSM ^(L) , LIRI, 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 March - 6 November (July - October)
Comments — Despite being very widespread and being found in 10 parks, <i>R. glaberrima</i> is ranked 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 four 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 BLRI. <i>Rhyacophila montana</i> is restricted to higher elevations (610-1850 m), while <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.						

Suborder Annulipalpia Martynov

There is little argument about the monophyly of the Annulipalpia, although there is some disagreement about exactly which families to recognize. However, there is no dispute that the five families from the study area are annulipalpian. 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. Recent evidence also finds little support for splitting out the genera *Ceratopsyche* and *Symphitopsyche* from *Hydropsyche*. We have adopted the more conservative approach here: among the hydropsychids found in this survey, we recognize the subfamilies Diplectroninae, 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; Thorp and others, 1986; Wallace and Merritt, 1980; Wallace and Sherberger, 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 *Cheumatopsyche* and *Macrostemum*, but has been best studied in *Hydropsyche* and is discussed under that genus.

Subfamily Diplectroninae Ulmer

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Genus *Diplectrona* 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>Diplectrona metaqui</i> HH Ross, 1970	ABLI, BISO, BLRI, CHCH , GRSM ^(L) , LIRI, MACA, RUCA, SHIL	CT, GA, IL, IN, KY, MO, NC, OH, PA, SC, TN, VA	124-1483 m	G4, NCS1	2.0	(February - December)

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. *Diplectrona modesta* larvae replace *D. metaqui* 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.

<i>Diplectrona 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	(March - September)
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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 "*Diplectrona* species." We suggest that this species be considered of special interest because of the current taxonomic uncertainty. Studies of the biology of *D. modesta* in the literature indicate a univoltine life history (for example, (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.

Genus *Homoplectra* 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 #6646} has assigned *Homoplectra doringa* a tolerance value of 3.0, and we have assumed that value for all *Homoplectra* 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	232-1944 m	G5, ALS1	3.0	20 March - 20 July (April - 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.

Subfamily Hydropsychinae Curtis

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, as all larvae of Hydropsychidae, are 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% of the time in repelling the advancing larva. In order to stridulate successfully, larvae hold their forelegs steady by clinging to the net and moving their 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).

Species	Parks	States	Elevation Range	Rankings	Tolerance Value	Flight Dates
<i>Hydropsyche bassi</i> OS Flint, JR Voshell & CR Parker, 1979	BLRI, CHCH	GA, TN, VA	183-225 m	G2	4.3	9 May - 16 Sep
Comments — [<i>scalaris</i> species group]						
<i>Hydropsyche etnieri</i> GA Schuster & A Talak, 1977	CHCH , CUGA	GA, KY, TN, VA	220-433 m	G2	4.3	16 Jun - 20 Jul (May - August)
Comments — [<i>morosa</i> species group] .						
<i>Hydropsyche hageni</i> N Banks, 1905	BLRI, CHCH , OBRI ^(L)	AL, DC, GA, IL, KY, MB, MD, MI, MN, NC, OH, ON, PA, QC, SC, TN, VA, WI, WV	194-668 m	G5, ALS2	0.0	21 March - 15 September (May - August)
Comments — [<i>scalaris</i> species group] This species is considered a species of concern in Alabama. It is extremely sensitive to disturbance. We have 5 collections and 33 specimens of this species. Larvae up to 15 mm in length, adults up to 11 mm.						

Family Polycentropodidae Ulmer

polycentropodid caddisflies

This cosmopolitan family has more than 650 described species in 15 (Chamorro and Holzenthal, 2011; Holzenthal and others, 2011) or 23 (de Moor and Ivanov, 2008) genera. The Oriental region has approximately 230 described species, the Neotropical realm has more than 170, the Palearctic has more than 100, while 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 *Nyctiophylax* 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. The majority of species are found in the Oriental, with about 12 species known from North America. We collected 9 species during this survey, of which 6 were found in BLRI. Larvae are predators that make retreats in substrate depressions that are very similar to those made by *Cernotina*. Life history is generally unknown for *Nyctiophylax* 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 moestus</i> N Banks, 1911	BISO, CHCH , CUGA, GRSM, MACA, OBRI	AB, AK, AL, AR, BC, CT, DE, FL, KY, IL, IN, MA, ME, MI, MN, MT, MB, NC, NH, NJ, NS, NY, OH, OK, ON, OR, PA, QC, SC, SK, TN, VA, WI, WV	187-807 m	G5	0.9	5 May - 28 Aug
Comments — Adult male up to 7 mm.						
<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 Jun (May)
Comments —						

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, being 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 (>85% of their diet).

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Genus <i>Chimarra</i> 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, with 10 known from the Southeast. We encountered five species in the parks. Most species in this genus are sensitive to pollution 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, 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	2.8	21 March - 16 October (April - September)
Comments — Widespread and common in North America, and throughout the study area. We have 103 collections and 734 specimens of this species.						
<i>Chimarra obscura</i> F Walker, 1852	ABLI, BISO ^(L) , BLRI, CHCH , COWP, GRSM ^(L) , KIMO, LIRI, 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	2.8	8 May - 14 October (May - September)
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% of their gut contents composed of detritus. We have 96 collections and 4,796 specimens of this species.						
Genus <i>Dolophilodes</i> — [Habitat - Lotic erosional (warmer rivers): Habit - Clingers (saclike silk nets): Trophic - Collectors filterers]						
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, CD, 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 one of the very few caddisflies that has a common name. It is known as the Winter Caddisfly. The adults of this species can be found in most months of the year in the study area, but more intriguing is the fact that the adult females are wingless in winter months and fully winged in other months. This unusual condition is unknown among other <i>Dolophilodes</i> species.						

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, 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 (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 Brachycentridae Ulmer short-horned caddisflies

This Holarctic and Oriental family contains six genera and about 100 species. Five of the genera are found in North America, and three have been found in the parks. Larvae are characterized by their short antennae, which provide the family with its common name. Cases are made of plant materials with a square cross section, or are made of silk spun as tubes that may or may not have sand or plant material incorporated.

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 two 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* are day-active. Chapin (1978) reviewed the genus, and provided descriptions and keys to the males and larvae. We collected two species in BLRI. Most *Micrasema* species have tolerance values less than 3.0, but *M. wataga*, one of the two species collected along the BLRI has tolerance value of 3.2 and is not included below.

Species	Parks	States	Elevation Range	Rankings	Tolerance Value	Flight Dates
<i>Micrasema scotti</i> HH Ross, 1947	CHCH, GRSM ^(L)	AL, IN, TN, VA, WV	213-1014 m	G3, ALS1	2.6	20 March - 8 May (March - August)
Comments – Case straight and entirely of silk. Larvae may have a preference for hard water streams. Larva up to 9 mm in length, case up to 10 mm, adult up to mm. We have 4 collections and 25 specimens of this species.						

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 Andersen, 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.

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, 1976a, b; 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, being up to eight times the length versus 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.

Species	Parks	States	Elevation Range	Rankings	Tolerance Value	Flight Dates
<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 (April - August)
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.						
<i>Ceraclea cancellata</i> (C Betten, 1934)	BISO, BLRI, CHCH , FODO, GRSM ^(L) , KIMO, LIRI, 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, WV, YT	105-668 m	G5, NCS1	2.2	9 May - 15 August (April - September)
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. Larva up to 7 mm in length, case up to 8 mm, adult up to 12 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, 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, NE, NF, NH, NY, OH, OK, ON, PA, QC, SC, TN, TX, VA, VT, WI, WV	140-792 m	G5	2.6	8 May - 14 October (April - September)
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. Because 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>Oecetis</i> 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)?] <i>Oecetis</i> consists of nearly 500 described species in all biotic regions. Approximately 25 species are known from North America, but see the discussion below under <i>O. inconspicua</i> . <i>Oecetis</i> 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. <i>Oecetis</i> 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 January - 21 September (April - October)
Comments — Floyd (1995) associated seven larval types that belong to the <i>O. inconspicua</i> complex, but did not distinguish any particular form as this species. Current rankings treat each of the separate types of Floyd, referred to as sp. A through sp. G, 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.”						
Genus <i>Setodes</i> Rambur - [Habitat - Lotic erosional and depositional, lentic littoral: Habit - Sprawlers clingers, burrowers (case curved, stout or slender, mineral): Trophic - Collectors gatherers (particles include algae and animals), predators (engulfers)] More than 300 species of <i>Setodes</i> are known, the majority in the Oriental region. Nine are known from North America, but only two were found during the parks survey. Cases of all species are very similar, being made of small, flat sand grains shaped into straight or slightly curved cylinders without taper. Larvae burrow into fine sand deposits (Merrill and Wiggins, 1971). Larvae apparently omnivorous, feeding on filamentous algae and small invertebrates (Merrill and Wiggins, 1971). Holzenthal (1982) reviewed the adults of the North American species of <i>Setodes</i> . Larvae up to 8.5 mm in length, case up to 8.5 mm, adult up to 8 mm.						
Species	Parks	States	Elevation Range	Rankings	Tolerance Value	Flight Dates
<i>Setodes incertus</i> (F Walker, 1852)	ABLI, BISO, BLRI, CHCH , COWP, MACA	AL, CT, GA, KY, MA, MD, ME, MI, MN, NC, NH, NJ, NY, ON, PA, QC, SC, TN, VA, WI, WV	153-1039 m	G5, ALS1	0.9	9 May - 30 August (June - August)
Comments — Alabama has ranked <i>S. incerta</i> critically imperiled. It is widespread in the East and was found in six parks. We have 13 collections and 45 specimens of this species.						

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Genus *Trienodes* 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.

Species	Parks	States	Elevation Range	Rankings	Tolerance Value	Flight Dates
<i>Trienodes 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	18 May – 6 October (June - August)

Comments — We have 33 collections and 81 specimens of this species.

<i>Trienodes rossi</i> JB Glover, KL Manuel, & JC Morse in KL Manuel, 2010	CHCH , KIMO	GA, SC	211-225 m	n/a	n/a	24 May – 27 August ()
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Comments — This recently described species was found in two parks, extending the known range of the species from southern South Carolina to northern South Carolina and Georgia. Larvae are unknown. We have 4 collections and 12 specimens of this species.

Family Molannidae Curtis molannid caddisflies

The Molannidae is a small family of the Oriental and Holarctic faunas, having only two genera and about three 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 two 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) (see also (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	3.9	10 May - 5 October (March - October)

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Comments — *Molanna blanda* 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. *Molanna blanda* cases tend to have numerous mica flakes incorporated in them, along with a fair amount of vegetable debris. Alabama has rated this species as imperiled. Larva up to 12 mm in length, adult up to 11 mm. We have 190 collections and 627 specimens of this species.

Family Goeridae Ulmer

armored caddisflies

This family often has been treated as a subfamily within the Limnephilidae. The general consensus now is to treat it as a separate family. It consists of approximately 180 species and 11 or 12 genera found in most regions of the world, although they are absent from the Neotropical region and Australia (de Moor and Ivanov, 2008, Holzenthal and others, 2011). There are 30 species in 5 genera in North America, of which 6 species in 2 genera were found in the parks. Among these species larvae are characterized by having, among other features, the anterolateral corners of the pronotum and the mesepisternum sharply produced forward. In addition, the cases are strongly made sand particles with larger “ballast” stones attached along the sides. When a larva is tightly tucked in its stone case with its legs withdrawn and these stout projections at the entrance, the larva seems well protected from intrusion by potential predators. For these reasons, we refer to goerids as armored caddisflies. Larvae feed on periphyton and fine detritus.

Genus *Goera* Stevens - [Habitat - Lotic erosional: Habit - Clingers (case mineral, with two lateral ballast stones on each side): Trophic - Scrapers] This genus is represented in Asia, Europe, and North America by about 130 species. Six species are found in the Southeast, and three have been found in the parks. Flint (1960) described and keyed the larvae of three species. All species have very similar cases consisting of a central cylinder of rock pieces, with larger “ballast” stones attached in a series along each side. The number of ballast stones on each side of a case is typically 2-4, but in some populations there is a single, very large stone on each side. A rather common and well known undescribed species occurs throughout GRSM.

Species	Parks	States	Elevation Range	Rankings	Tolerance Value	Flight Dates
<i>Goera calcarata</i> N Banks, 1895	BISO ^(L) , BLRI, CHCH , COWP, CUGA ^(L) , GRSM ^(L)	AL, CT, DE, GA, KY, MA, ME, MN, NB, NC, NH, NJ, NS, NY, OH, PA, QC, SC, TN, VA, VT, WV	206 - 1575 m	G5	0.3	5 May - 21 October
Comments — We have 122 collections and 707 specimens of this species.						

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, while 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 quadrangle 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 a tolerance value of 1.0.

Species	Parks	States	Elevation Range	Rankings	Tolerance Value	Flight Dates
<i>Lepidostoma togatum</i> (HA Hagen, 1861)	BISO, CHCH , GRSM(L), LIRI, OBRI	AB, AL, AR, CT, DC, DE, GA, KY, MA, MB, MD, ME, MI, MN, MO, NC, ND, NF, 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 October (May - October)

Comments — Larvae are found in both lentic and lotic water.

Subfamily Theliopsychinae Weaver

Genus *Theliopsyche* 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 suggests 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	AL, KY, TN, VA, WV	361-580 m	G4, ALS1	0.0	8 -23 May (April - July)
Comments — This species is considered critically imperiled in Alabama, and by the Tennessee Valley Authority.						

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 Palaearctic. More than 200 species in 39 genera occur in the Nearctic, while 45 species in 10 genera occur in the Neotropical region. This group has attracted the attention of scientists for many years (for example, Schmid, 1955), yet much uncertainty remains about what the family limits and internal organization should be. Most recently, 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 (1995) 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 six species, five from North America and one 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 (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, 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 August - 26 October (August - November)

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) reported 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 five month summer dry spell. Extremely rapid growth occurred with the larvae reaching the 4th instar by early November, and 5th instars 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. Case made of pieces of bark and leaves, slightly tapered and curved. Larva up to 20 mm in length, adult up to 18 mm.

Family Helicopsychidae Ulmer

snail-case maker caddisflies

Helicopsychid larvae are instantly recognizable by their unique cases which look like snail shells covered with sand grains. The family is cosmopolitan, with the genus *Helicopsyche* having more than 200 described species. The family contains one other genus, having a single species that is endemic to New Zealand.

Genus *Helicopsyche* von Siebold - [Habitat - Lotic and lentic erosional (including thermal springs): Habit - Climbers (case snail shell shaped, mineral): Trophic - Scrapers] In the Americas, this genus has over 100 species, most of them found in the Neotropics; eight species occur in the United States and one extends into Canada. Two species occur in the Southeast, but only one was found during this study. *Helicopsyche* larvae scrape periphyton from rocks, but the gut contents sometimes are reported to contain animal matter as well. Larvae up to 8 mm in length, case up to 7 mm diameter, adult up to 7 mm.

Species	Parks	States	Elevation Range	Rankings	Tolerance Value	Flight Dates
<i>Helicopsyche borealis</i> HA Hagen, 1861	ABLI, BISO ^(L) , BLRI, CHCH, CUGA, GRSM ^(L) , KIMO, MACA, NISI, OBRI ^(L)	AB, AL, AR, AZ, CA, CO, CT, DE, FL, GA, ID, IL, IN, KS, KY, MA, MB, MD, ME, MI, MN, MO, MS, MT, NB, NC, ND, NE, NH, NJ, NM, NS, NT, NY, OH, OK, ON, OR, PA, QC, SC, SD, SK, TN, TX, UT, VA, VT, WA, WI, WV, WY	153-1025 m	G5	0.0	9 May - 6 October (May - October)

Comments — The life history of *H. borealis* is highly variable. Vaughn (1985) studied populations in thermally constant and thermally fluctuating streams in Oklahoma, and found the population in the constant temperature stream was multivoltine while the population in the thermally varying stream was univoltine. She found that larvae pupated within 9-12 weeks after hatching from eggs in the laboratory, and found no egg diapause. Williams and others (1983) found that a population in southern Ontario was univoltine. They also found that larvae lived in the hyporheic zone as well as on rocks at the surface. Interestingly, they hypothesized that the unique snail shape of the cases could be an evolutionary adaptation to living and moving about in the interstices because the shape of the case makes it resistant to crushing. Wiggins (1996) reports that larvae have a very wide thermal tolerance, with specimens occurring in thermal streams of Yellowstone National Park where water temperatures reach 34°C and no other caddisflies occur. Ross (1944) reported continual emergence of adults from spring through early fall, whereas other studies found no evidence of egg-diapause or extended adult emergence (Resh and others, 1984). These authors also determined that *H. borealis* displayed a high degree of tolerance to chemical pollutants in Big Sulphur Creek, California. Because of the wide variance between the biology and thermal tolerance of many western populations compared with eastern populations, Jackson and Resh (1992) examined the genetic variation in several California locations and in three eastern populations. They found 4 genetically distinct types of *Helicopsyche* in California, including one type that was similar to the eastern type. Future study may reveal 2 or more distinct species that currently are called *H. borealis*. But, it is most likely that the eastern form found in the parks will retain the name *H. borealis* since Hagen described the species based on specimens from Washington, DC, and the St. Lawrence River, Canada. As with other scrapers, *H. borealis* is considered highly vulnerable to disturbance, especially siltation, which accounts for its tolerance value of 0.0. We have 57 collections and 1,107 specimens of this species.

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 two 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 emerging in the fall following a summer diapause of two to six 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. In North Carolina, Georgian and Wallace (1983) demonstrated that *N. consimilis* larvae take 135 days or fewer to progress from 1st instar to prepupa, while in Ontario, Beam and Wiggins (1987) demonstrated that *N. aniqua* larvae take up to 240 days. When larvae prepare for diapause they tend to aggregate and often 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 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.

Species	Parks	States	Elevation Range	Rankings	Tolerance Value	Flight Dates
<i>Neophylax aniqua</i> HH Ross, 1947	BISO, BLRI, CHCH , CUGA, GRSM ^(L) , LIRI, OBRI, SHIL	ME, NB, NC, NF, NH, NS, NY, ON, PA, QC, TN, VA, VT, WV	140-1311 m	G5	1.6	29 September - 18 October (September - October)
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 51 collections and 284 specimens of 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 (September - October)
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 30 collections and 115 specimens of this species. Larva up to 10 mm in length, case up to 11 mm, adult up to 11 mm.						

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