# Macroinvertabrate Assemblages of the Chattahoochee River National Recreation Area: An 11-year Study

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**Reference:** McDowell RJ, CA Pruitt, RA Bahn (eds.), *Proceedings of the 2015 Georgia Water Resources Conference*, April 28-29, 2015, University of Georgia, Athens.

**Abstract.** The Chattahoochee River is one of the most important waterways in Georgia. However, research on the macroinvertebrate diversity is lacking. Since 2001 macroinvertebrates have been collected quarterly along a 65-km stretch of the Chattahoochee River below Buford Dam. In this paper, we present a complete taxa list of the study area including location and seasonality information for each taxon. Macroinvertebrate diversity studies of large rivers in the Georgia Piedmont are rare, and this long-term study contributes a significant amount of data to this area of research.

## INTRODUCTION

The Chattahoochee River is a critically important waterway to the state of Georgia. It provides drinking and irrigation water for a large portion of the state and is a heavily used recreation area for many across the Southeast. Since the construction of Buford Dam in 1956, the river has also been an important source of hydroelectric energy for the metropolitan Atlanta area. As with many other large-scale dams, Buford Dam has significantly altered the natural flows of the Chattahoochee (Poff et al. 1997; Richter and Thomas 2007; Haxton and Findlay 2008). Water releases through Buford Dam are based on electrical demand and can vary greatly (up to 280 kL/s) over short (daily) periods of time (USGS 2013). We investigated the effects of Buford dam on the macroinvertebrate assemblages of a 65-km stretch of river within the Chattahoochee River National Recreation Area (CRNRA).

Two previous studies have indicated Buford Dam may be affecting macroinvertebrate assemblages in the river. One study focused on changes in the macroinvertebrate assemblages between high-flow and low-flow years (Holt et al. in press-a). During low-flow years, non-insect macroinvertebrates were more prevalent, while in the high-flow years insects tended to dominate the assemblages. Insects in the orders Ephemeroptera, Plecoptera, and Trichoptera (EPT) (orders typically considered sensitive to low oxygen levels) were more abundant in high-flow years. Additionally, insect macroinvertebrates are generally considered to be more sensitive to poor water quality than non-insect macroinvertebrates. Thus, this study illustrated that extreme flows can lead to a major shift in the macroinvertebrate assemblage of the river.

In a follow-up study, two other factors were investigated regarding their potential effects on the macroinvertebrate assemblages of the Chattahoochee: distance from Buford Dam and diel amplitude variation (Holt et al. in press-b). Diversity, EPT richness, and richness of sensitive taxa [i.e. those with a tolerance value $< 3$; see Lenat (1993) and Grubaugh and Wallace (1995)] generally increased as distance from the dam increased. In addition, as distance from the dam increased, diel amplitude variation decreased, resulting in less extreme flow fluctuations. Consequently, as diel amplitude variation decreased, the three invertebrate metrics listed above increased as well. These longitudinal patterns along the length of the river suggest Buford Dam has significantly impacted the macroinvertebrate assemblages of the river via flow alteration. One of the primary products of this research on the macroinvertebrates of the CRNRA is the extensive taxa list. Herein, we present this complete taxa list from the 11-year study period.

## METHODS

This study took place over a 65-km stretch of the Chattahoochee River below Buford Dam. Macroinvertebrates were sampled at six sites on a quarterly basis over a period of 11 years. For details on the sampling regime see Holt et al. (in press-a). All macroinvertebrates were identified to the lowest taxonomic level possible (typically genus). For a list of identification keys used, see Holt et al. (in press-a).

## RESULTS

For a comprehensive list of all macroinvertebrate taxa found during this study, see electrong resource [Excel File Link]. Season(s), site(s), and tolerance value for each taxon are also noted, based on Lenat (1993) and Grubaugh and Wallace (1995). Lower tolerance values indicate greater sensitivity to water quality conditions.

## CONCLUSIONS

By providing this extensive taxa list, we have contributed a significant amount of data to the small amount currently available for macroinvertebrate communities of Georgia Piedmont rivers. This study provides one of only two published macroinvertebrate taxa lists for a Georgia Piedmont river [see also Grubaugh and Wallace (1995)]. Further research on the biodiversity of this region's rivers is critical in order to detect unintended consequences of the rapid population growth that this region is currently experiencing.

## REFERENCES


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Table 1: List of taxa from the 65-km study area of the Chattahoochee River below Buford Dam (from Hester-Dendy and Surber samples) for 2001-2011. Tolerance values (TV) are included based on Lenat (1993) and Grubaugh and Wallace (1995). Presence of each taxon in each season ("Fa" = fall, "W" = winter, "Sp" = spring, "Su" = summer) and at each site is noted by an "x". Site A is closest to Buford Dam; site F is furthest from Buford Dam.

| Phylum, Order, Family | Genus | TV | Season(s) | | | | Site(s) | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Fa | W | Sp | Su | A | B | C | D | E | F |
| PLATYHELMINTHES | | | | | | | | | | | | |
| Tricladida | | - | x | x | x | x | x | x | x | x | x | x |
| NEMATODA | | 8.2 | x | | | | | | | | x | |
| NEMERTEA | | | | | | | | | | | | |
| Hoplonemertea | | | | | | | | | | | | |
| Tetrastemmatidae | *Prostoma* | - | x | | x | x | | | x | x | | x |
| ANNELIDA | | | | | | | | | | | | |
| Haplotaxida | | | | | | | | | | | | |
| Enchytraeidae | | 10 | | | x | | x | | | | | |
| Haplotaxidae | *Haplotaxis* | - | x | x | x | | x | | x | x | | |
| Tubificidae | *Ilyodrilus* | - | | | x | | | | | | | x |
| | *Limnodrilus* | 9.6 | | | x | x | | x | x | | | |
| | *Naidinae* | - | x | x | x | x | x | x | x | x | x | x |
| | *Nais* | 9.1 | x | x | x | x | x | x | x | x | x | x |
| | *Pristina* | 9.9 | | | | x | | | | x | | |
| | *Ripistes* | - | x | x | | x | | x | x | | x | |
| | *Stylaria* | - | x | x | | | x | x | x | x | x | |
| | *Tubificinae* w/o hair cheatae | - | x | x | x | x | x | x | x | x | x | x |
| | *Tubificinae* w/ hair chaetae | - | x | x | x | x | | x | x | | x | |
| | *Vejdovskyella* | - | x | | | | x | | | | | |
| Opisthopora | | - | | | | | | | | | | |
| Lumbricidae | *Lumbricina* | - | x | x | x | x | x | x | | x | | x |
| | *Eiseniella* | - | x | | x | x | x | x | x | | x | x |
| Lumbriculida | | | | | | | | | | | | |
| Lumbriculidae | *Lumbriculus* | 7.3 | x | x | x | x | x | x | x | x | x | x |
| Arhynchobellida | | | | | | | | | | | | |
| Erpobdellidae | *Erpobdella* | - | x | x | x | x | | | x | x | | x |
| Rhychobdellida | | | | | | | | | | | | |
| Glossophoniidae | *Helobdella* | - | x | | | | | | | x | | x |
| | *Placobdella* | - | x | x | | | | | | | x | x |
| MOLLUSCA | | | | | | | | | | | | |
| Gastropoda | | | | | | | | | | | | |
| Hydrobiidae | *Somatogyrus* | 6.5 | | x | | | | | | x | | |
| Physidae | *Physa* | - | x | x | x | x | x | x | x | x | x | x |
| Planorbidae | *Menetus* | - | x | x | x | x | | x | x | x | | x |
| Pleuroceridae | *Pleurocera* | - | x | x | x | x | | | | x | | x |
| Bivalvia | | | | | | | | | | | | |
| Cyrenidae | *Corbicula* | - | x | x | x | x | | x | x | x | x | x |
| Sphaeriidae | *Pisidium* | 6.8 | | | x | | | | | x | | |
| | *Sphaerium* | 7.7 | x | x | x | x | x | x | x | x | | x |

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| Phylum, Order, Family | Genus | TV | Season(s) | | | | Site(s) | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Fa | W | Sp | Su | A | B | C | D | E | F |
| ARTHROPODA | | | | | | | | | | | | |
| Isopoda | | | | | | | | | | | | |
| Asellidae | *Lirceus* | 7.7 | x | x | x | x | x | x | x | x | x | x |
| | *Caecidotea* | - | x | x | x | x | x | x | x | x | x | x |
| Amphipoda | | | | | | | | | | | | |
| Crangonyctidae | *Crangonyx* | 8 | x | x | x | x | x | x | x | x | x | x |
| Dogielinotidae | *Hyalella* | 7.9 | x | x | x | x | | x | x | x | x | x |
| Gammaridae | *Gammarus* | - | | | x | | | | | | x | |
| Decapoda | | | | | | | | | | | | |
| Cambaridae | *Cambarinae* | | x | x | | x | | | | | x | x |
| | *Procambarus* | 9.5 | | x | x | | | | | | x | x |
| Trombidiformes | | | | | | | | | | | | |
| Lebertiidae | *Lebertia* | - | x | x | x | x | x | x | x | x | x | x |
| Collembola | | - | | x | x | x | x | x | | x | | x |
| Ephemeroptera | | | | | | | | | | | | |
| Baetidae | *Acentrella* | - | x | x | | | | | | | | x |
| | *Baetis* | - | x | x | x | x | | x | x | x | x | x |
| | *Heterocloeon* | 3.6 | x | | | x | x | | | | | x |
| | *Iswaeon* | - | x | x | x | x | x | x | x | x | x | x |
| | *Plauditus* | - | x | | | | | | | x | | |
| Ephemerellidae | | 2.7 | x | | | x | | | x | x | | x |
| | *Attenella* | - | | | | x | | | | x | | |
| | *Dannella* | - | x | x | | x | | x | x | | x | x |
| | *Ephemerella* | - | | | x | x | | x | x | | | x |
| | *Eurylophella* | - | | x | | x | | x | | | | |
| | *Serratella* | - | x | x | x | | | | | | | x |
| | *Teloganopsis* | - | x | x | x | x | | | x | x | | x |
| Ephemeridae | *Hexagenia* | 4.7 | x | x | | x | | x | | | x | x |
| Heptageniidae | *Heptagenia* | 2.8 | x | x | | | | | | | x | x |
| | *Maccaffertium* | - | x | x | x | x | x | x | x | x | x | x |
| | *Stenacron* | - | x | x | x | x | x | x | | | x | x |
| | *Stenonema* | 7.1 | x | | | | | | | | | x |
| Isonychiidae | *Isonychia* | 3.8 | x | | | x | x | x | | | | |
| Leptophlebiidae | *Leptophlebia* | 6.4 | | | x | | | x | x | | | |
| Odonata | | | | | | | | | | | | |
| Aeschnidae | *Boyeria* | - | x | x | x | | | | | | x | x |
| Calopterygidae | *Calopteryx* | 8.3 | | | | x | | | | | x | |
| Coenagrionidae | *Argia* | 8.7 | x | x | x | x | | x | x | | x | x |
| | *Enallagma* | 9 | | | x | | | | | | x | |
| Gomphidae | *Progomphus* | - | | | | x | | | | | | x |
| Plecoptera | | | | | | | | | | | | |
| Capniidae | *Allocapnia* | 2.8 | | x | x | | x | x | x | x | x | |
| | *Nemocapnia* | - | | | x | | | | | x | | |
| Chloroperlidae | *Haploperla* | - | | x | x | x | x | x | | x | | |
| Leuctridae | *Leuctra* | 0.7 | x | | x | x | x | x | | x | | x |

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| Phylum, Order, Family | Genus | TV | Season(s) | | | | Site(s) | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Fa | W | Sp | Su | A | B | C | D | E | F |
| Perlidae | | | x | | | x | | x | | | | x |
| | *Agnetina* | - | | x | x | | | | x | | | x |
| | *Eccoptura* | - | x | | | x | | x | x | | | |
| | *Paragnetina* | 1.7 | x | | | | | | | | | x |
| | *Perlesta* | 0 | x | x | x | x | | x | | | | x |
| Perlodidae | | | | x | | x | x | | x | | | |
| | *Helopicus* | - | | | x | | | | x | | x | x |
| | *Remenus* | - | | | | x | x | x | | | | |
| Pteronarcyidae | *Pteronarcys* | 1.7 | x | x | x | x | x | | x | x | x | x |
| Taeniopterygidae | *Taeniopteryx* | 6.3 | | x | x | x | x | x | x | x | x | x |
| Hemiptera | | | | | | | | | | | | |
| Corixidae | *Trichocorixa* | 9 | | | x | x | | | | | x | x |
| Veliidae | *Rhagovelia* | - | x | | | | | | | | | x |
| Neuroptera | | | | | | | | | | | | |
| Corydalidae | *Chauliodes* | - | | | | x | | | x | | | |
| | *Nigronia* | - | | x | x | x | | x | x | | | x |
| Sialidae | *Sialis* | 7.5 | | | x | | x | | | | | |
| Trichoptera | | | | | | | | | | | | |
| Brachycentridae | *Brachycentrus* | 2.2 | x | x | x | x | x | x | x | x | x | x |
| | *Micrasema* | - | x | x | | x | | | x | x | | x |
| Glossosomatidae | *Glossosoma* | 1.5 | x | x | x | x | | | x | x | | x |
| Hydropsychidae | *Ceratopsyche* | - | x | x | x | x | x | x | x | x | x | x |
| | *Cheumatopsyche* | 6.6 | x | x | x | x | x | x | x | x | x | x |
| | *Diplectrona* | - | | x | | | x | | x | | | |
| | *Hydropsyche* | - | x | x | x | x | x | x | x | x | x | x |
| Hydroptilidae | *Hydroptila* | 6.2 | x | x | x | x | | x | x | x | x | x |
| Lepidostomatidae | *Lepidostoma* | 1 | x | x | x | x | | x | x | x | x | x |
| Leptoceridae | *Ceraclea* | - | | | x | | | | | | x | x |
| | *Oecetis* | 5.7 | x | x | | x | | | x | | x | |
| Limnephilidae | *Pycnopsyche* | 2.3 | | | | x | x | x | | | | |
| Philopotamidae | *Chimarra* | 2.8 | x | x | x | | | x | x | x | x | x |
| Polycentropodidae | *Neureclipsis* | 4.4 | x | x | | | | | | | x | |
| Psychomyiidae | *Lype* | - | x | x | x | x | x | x | x | x | x | x |
| Coleoptera | | | | | | | | | | | | |
| Dytiscidae | *Neoporus* | - | | | | x | | | | | | x |
| Elmidae | *Ancyronyx* | - | | x | x | | | x | | | x | |
| | *Macronychus* | - | x | x | x | x | | x | x | | x | x |
| | *Optioservus* | 2.7 | x | | | | | | | | | x |
| | *Promoresia* | - | x | | | x | | x | | x | | |
| | *Stenelmis* | 5.4 | x | | | x | x | | | x | | x |
| Staphylinidae | | - | x | | | | | | | x | | |
| Diptera | | | | | | | | | | | | |
| Ceratopogonidae | *Forcipomyia* | | x | x | x | x | | | | | | x |
| Chironomidae | *Ablabesmyia* | - | x | | | x | | | | | x | x |
| | *Brillia* | 5.2 | | | | x | | | | | | |

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| Phylum, Order, Family | Genus | TV | Season(s) | | | | Site(s) | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Fa | W | Sp | Su | A | B | C | D | E | F |
| | *Cardiocladius* | 6.2 | x | x | x | x | x | x | x | x | x | x |
| | *Chironomus* | 9.8 | x | x | x | x | x | x | x | x | x | x |
| | *Conchapelopia* | | x | | | | x | | x | | | |
| | *Corynoneura* | 6.2 | x | x | x | x | x | | x | x | x | x |
| | *Cricotopus* | - | x | x | x | x | x | x | x | x | x | x |
| | *Cricotopus/Orthocladius* | - | x | x | x | x | x | x | x | x | x | x |
| | *Cryptochironomus* | - | | | x | x | | | | x | | x |
| | *Demicryptochironomus* | 2.1 | | | | x | | | | x | | |
| | *Diamesa* | 7.7 | | | | x | | x | | | | |
| | *Dicrotendipes* | 7.9 | x | x | x | x | x | x | x | x | x | x |
| | *Endochironomus* | - | | | x | | | | | | x | |
| | *Eukiefferiella* | - | x | x | x | x | x | x | x | x | x | x |
| | *Glyptotendipes* | 8.5 | | | | x | | | | | x | |
| | *Limnophyes* | - | | | | x | | x | | | | |
| | *Micropsectra* | 1.4 | | x | x | | x | x | | | | |
| | *Microtendipes* | 6.2 | x | | x | | | | x | x | | |
| | *Nanocladius* | 7.2 | x | x | x | x | x | x | x | x | x | x |
| | *Nilotanypus* | 4 | | x | | x | x | | | | x | |
| | *Odontomesa* | - | | | | x | | | | x | | |
| | *Orthocladius* | - | x | x | x | x | x | x | x | x | x | x |
| | *Parakiefferiella* | 5.9 | x | x | x | x | x | x | x | x | x | x |
| | *Parametriocnemus* | - | x | x | x | x | x | x | x | x | x | x |
| | *Paratanytarsus* | 7.7 | | | x | | | | x | | | |
| | *Paratendipes* | 5.3 | x | x | x | x | | x | | x | x | x |
| | *Pentaneura* | 4.6 | x | | | | | | | | x | |
| | *Phaenopsectra* | 6.8 | x | x | x | x | x | x | x | x | x | x |
| | *Polypedilum* | - | x | x | x | x | x | x | x | x | x | x |
| | *Potthastia* | - | x | x | x | x | x | x | x | x | x | x |
| | *Prodiamesa* | - | x | x | | x | | x | | | | |
| | *Psectrocladius* | 3.8 | x | x | x | x | x | x | x | | x | |
| | *Rheocricotopus* | - | x | x | x | x | | x | x | | x | x |
| | *Rheotanytarsus* | 6.4 | x | x | x | x | x | x | x | x | x | x |
| | *Smittia* | - | | | | x | | | x | | | |
| | *Stenochironomus* | 6.4 | x | x | x | x | | x | x | x | x | x |
| | *Stictochironomus* | 6.7 | x | x | x | x | x | x | x | x | x | |
| | *Synorthocladius* | 4.7 | x | x | x | x | x | x | x | x | x | x |
| | *Sublettea* | - | x | | | | | x | | | | |
| | *Tanytarsus* | 6.7 | x | x | x | x | | x | x | x | x | x |
| | *Thienemanniella* | 6 | x | x | x | x | x | | x | x | x | x |
| | *Thienemannimyia* group | - | x | x | x | x | x | x | x | x | x | x |
| | *Tribelos* | 6.6 | x | x | x | x | x | x | x | x | x | x |
| | *Tvetenia* | - | x | x | x | x | x | x | x | x | x | x |
| | *Xylotopus* | - | | x | | | | | | x | | |
| Empididae | *Hemerodromia* | 8.1 | x | | | x | | | | x | x | |
| | *Neoplasta* | 8.1 | x | x | x | x | x | x | x | x | x | |

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| Phylum, Order, Family | Genus | TV | Season(s) | | | | Site(s) | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Fa | W | Sp | Su | A | B | C | D | E | F |
| Muscidae | cf. *Limnophora* | 7 | x | x | x | x | x | x | x | x | | |
| Simuliidae | *Simulium* | 4.4 | x | x | x | x | x | x | x | x | x | x |
| Tipulidae | *Antocha* | 4.6 | x | x | x | x | | x | x | x | x | x |
| | *Erioptera* | - | | x | | | | x | | | | |
| | *Hexatoma* | 4.7 | | | | x | x | | | | | |
| | *Limnophila* | - | | | x | | x | | | | | |
| | *Limonia* | 10 | x | x | | | | | | x | | x |
| | *Ormosia* | - | | | | x | | x | | | | |
| | *Tipula* | 7.7 | x | x | x | x | | x | x | x | x | x |