

**AQUATIC MACRO-INVERTEBRATE SURVEY
OF THE UPPER PARIA RIVER BASIN IN
BRYCE CANYON NATIONAL PARK**

BY

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We conducted a survey of aquatic macro-invertebrates in Bryce Canyon National Park in conjunction with research on fish and invertebrates of the Colorado River tributaries. The eastern slope of Bryce Canyon National Park form a major part of the headwaters of the Paria River, a tributary of the Colorado River. The project was funded by the Bureau of Reclamation through the U.S. Fish and Wildlife Service Pinetop, Arizona.

We collected and identified aquatic macro-invertebrates from areas within Bryce Canyon National Park to provide information on their diversity and distribution in the park. We know of no species list of aquatic macro-invertebrates in Bryce Canyon National Park. We offer this list (Table 1) to researchers who may study aquatic invertebrates in and around the park.

METHODS

Access to aquatic environments was possible by vehicle at the Mossy Cave and Bryce Plateau sites. All other areas were accessible only by foot travel. Data were collected on 6 research trips at 12 sites within the park (Figure 1).

Due to the rarity of permanent surface flow in Bryce Canyon National Park, it was possible to sample a majority of the sites that do have permanent flows. Specimens were collected with aquarium dip nets, "D-frame" benthic sampling nets, forceps, Whirl-paks, and collection pans with an artificial light source. Immature and adult invertebrates were sampled from a variety of habitats at each site. Date, location, and elevation were recorded at each sampling site (Table 2). All specimens were preserved in 95% ETOH and brought back to the University of Arizona for identification.

Assistance with insect identification was provided by Carl Olson and Gene Hall (Department of Entomology, University of Arizona). Identification of crustaceans was verified by Dana DeKoven (assistant curator of the invertebrate collection for the Department of Ecology and Evolutionary Biology, University of Arizona). Invertebrates were identified to at least the family level. Whenever possible, invertebrates identified through taxonomic keys (Table 4) were compared with the collection of the University of Arizona, Department of Entomology Museum for verification.

RESULTS/DISCUSSION

Thirteen orders, 40 families, and 34 genera of aquatic macro-invertebrates were identified. Macro-invertebrates in the orders Ephemeroptera, Plecoptera, Coleoptera, and Diptera were distributed throughout the park in many habitat types. The sample areas that had the greatest species richness were area 1-Mossy Cave and area 5-Yellow Creek Swamp (Table 3). Thirty-five of the 40 families identified were represented in these two areas. Many of the families collected were unique to the Mossy Cave and Yellow Creek Swamp sites. Fifteen of the 40 families identified were found only at these two sites. The Mossy Cave and Yellow Creek Swamp sites were unique in both the richness of species, and in the observed abundance of organisms.

The data presented here represent the first known survey of aquatic macro-invertebrates in Bryce Canyon National Park. This report is presented as baseline data from which to assess environmental changes in aquatic macro-invertebrate fauna and as a reference for future work on the aquatic macro-invertebrate fauna of Bryce Canyon National Park.

Table 1. Aquatic macro-invertebrate taxa collected in Bryce Canyon National Park.

EPHEMEROPTERA (MAYFLIES)**Baetidae***Baetis sp.**Baetis bicaudatus***Heptageniidae***Cinygmula sp.***Siphonuridae***Siphonurus sp.***ODONATA (DRAGONFLIES AND DAMSELFLIES)****Coenagrionidae***Argia sp.***Aeshnidae***Aeshna sp.***Cordulegastridae***Cordulegaster sp.***PLECOPTERA (STONEFLIES)****Perlodidae****Nemouridae***Amphinemoura sp.**Nemoura sp.***Chloroperlidae****Taeniopterygidae***Taenrauema sp.***HEMIPTERA (TRUE BUGS)****Gerridae***Gerris remigis***Corixidae***Corisella sp.***Velidae***Microvelia sp.***TRICHOPTERA (CADDISFLIES)****Hydropsychidae***Ceratopsyche sp.**Parapsyche sp.***Limnephilidae***Hesperophylax sp.**Onocosmoecus sp.**Limnephilus sp.***Brachycentridae****Lepidostomidae***Lepidostoma sp.***Hydroptilidae****Sericostomidae***Gumaga sp.***Phryganeidae**

COLEOPTERA (BEETLES)**Dytiscidae***Agabus sp.**Agabus cordatus**Agabus semivittatus**Hydroporous sp.***Hydrophilidae***Cymbiodyta sp.***Haliplidae***Peltodytes sp.***Scritidae****Staphylinidae****Carabidae****Elmidae***Heterelmis sp.***DIPTERA (TRUE FLIES)****Chironomidae****Tabanidae****Tipulidae***Ctenophora sp.**Tipula sp.***Simuliidae****Culicidae****Ceratopogonidae***Bezzia sp.***Cecidomyidae****ARANEA (SPIDERS)****Thomisidae****Lycosidae****PULMONATA (SNAILS)****Physidae***Physa gyrina***PELECYPODA (CLAMS AND LIMPETS)****Sphaeriidae***Sphaerium sp.**Pisidium casertanum***AMPHIPODA (SCUDS AND SIDESWIMMERS)****Talitridae***Hyaella azteca***ANOSTRACA (FAIRY SHRIMP)****Brachinectidae***Brachinecta lindahl***CLADOCERA (WATER FLEAS)****Daphnidae**

Table 2. Location code for invertebrate samples.

Code All sites located on figure 1.

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|-------------------------|--|
| 1- Mossy Cave | Spring sites within Mossy Cave and the spring flow to the confluence with Tropic Ditch. Elev. 7,290'. Dates sampled: 08-31-1992, 10-05-92, 06-03-93, 06-30-93. |
| 2- Bryce Canyon Plateau | Ephemeral flows and pools near park road between Swamp Canyon trailhead and Bryce Point. Elev. 8,200'. Dates sampled: 06-03-1993, 07-02-1993. |
| 3- Bryce Canyon Creek | Ephemeral flow at Bryce Canyon Creek near its junction with Fairy Castle trail. Elev. 7,200'. Date sampled: 09-02-1992. |
| 4- Yellow Creek | Yellow Creek below Yellow Creek Swamp. Elev. 7,220'. Dates sampled: 05-30-1992, 10-04-1992, 05-31-1993, 06-01-1993. |
| 5- Yellow Creek Swamp | Yellow Creek Swamp and springs. Elev. 7,220'. Dates sampled: 10-04-1992, 05-31-1993. |
| 6- Sheep Creek | Sheep Creek below its confluence with Swamp Canyon. Elev. 7,250'. Date sampled: 06-01-1993. |
| 7- Sheep Creek Swamp | Swamp and spring sites at the confluence of Swamp Canyon and Sheep Creek Canyon. Elev. 7,250'. Date sampled: 06-01-1993. |
| 8- Swamp Canyon Creek | Swamp Canyon Creek above Sheep Creek Swamp. Elev. 7,750'. Date sampled: 06-02-1993. |
| 9- Ponderosa Canyon | Ponderosa Canyon ephemeral flows above the canyon intersection with the Under-The-Rim trail. Elev. 7,250'. Date sampled: 07-01-1993. |
| 10- Iron Spring | Iron Spring and the South Fork of Ponderosa Canyon. Elev. 7,950'. Date sampled: 07-01-1993. |
| 11- Birch Spring | Birch Spring and Black Birch Canyon above the Under-The-Rim trail. Elev. 7,950'. Date sampled: 07-01-1993. |
| 12- Riggs Spring | Riggs Spring including the Coral Hollow Area and Yovimpa Pass. Elev. 7,600'. Date sampled: 07-02-1993. |

Table 3. Distribution of invertebrate taxa taken from Bryce Canyon National Park.

ORDER FAMILY Genus spp.	1	2	3	4	5	6	7	8	9	10	11	12
EPHEMEROPTERA	X	X	X	X	X	X				X		
BAETIDAE	X	X	X		X					X		
<i>Baetis sp.</i>	X				X							
<i>Baetis bicaudatus</i>	X											
HEPTAGENIIDAE	X											
<i>Cinygmula sp.</i>	X											
SIPHONURIDAE				X	X	X						
<i>Siphonurus sp.</i>				X	X	X						
ODONATA	X			X	X					X		
COENAGRIONIDAE				X	X					X		
<i>Argia sp.</i>				X						X		
AESHNIDAE					X							
<i>Aeshna sp.</i>					X							
PLECOPTERA	X			X				X		X	X	X
PERLODIDAE								X				
CHLOROPERLIDAE	X			X								
TAENIOPTERYGIDAE				X							X	
<i>Taenraeuema sp.</i>				X								
NEMOURIDAE				X						X	X	X
<i>Amphinemoura sp.</i>				X								X
<i>Nemoura sp.</i>										X		
HEMIPTERA	X		X	X		X						
GERRIDAE	X		X	X		X						
<i>Gerris remigis</i>	X		X	X		X						
CORDIDAE	X											
<i>Corisella sp.</i>	X											
VELLIDAE	X			X								
<i>Microvella sp.</i>	X			X								
TRICHOPTERA	X			X	X	X	X					X
HYDROPSYCHIDAE	X			X	X							

ORDER FAMILY Genus spp.	1	2	3	4	5	6	7	8	9	10	11	12
<i>Ceratopsyche sp.</i>	X			X								
<i>Parapsyche sp.</i>	X											
LIMNephilidae	X			X	X	X	X					X
<i>Hesperophylax sp.</i>	X					X	X					X
<i>Onocosmoecus sp.</i>						X						
<i>Limnephilus sp.</i>	X											
PHRYGANEIDAE	X											
BRACHYCENTRIDAE					X							
LEPIDOSTOMIDAE	X											
<i>Lepidostoma sp.</i>	X											
HYDROPTILIDAE					X							
SERICOSTOMIDAE					X							
<i>Gumaga sp.</i>					X							
COLEOPTERA	X			X	X	X	X	X		X		X
DYSTISCIDAE	X			X	X	X	X			X		X
<i>Agabus sp.</i>	X			X								
<i>Agabus cordatus</i>	X			X	X							
<i>Agabus semivittatus</i>	X											
<i>Hydroporus sp.</i>	X											
HYDROPHILIDAE	X											
<i>Cymbiodyta sp.</i>	X											
HALIPLIDAE	X											
<i>Peltodytes sp.</i>	X											
SCRITIDAE	X											
STAPHYLINIDAE				X								
CARABIDAE	X			X								
ELMIDAE	X				X							
<i>Heterelmis sp.</i>					X							
DIPTERA	X	X		X	X	X		X	X	X	X	X
CHIRONOMIDAE	X			X	X							
TABANIDAE					X							

ORDER FAMILY <i>Genus spp.</i>	1	2	3	4	5	6	7	8	9	10	11	12
TIPULIDAE	X	X	X		X	X						X
<i>Ctenophora sp.</i>		X										X
<i>Tipula sp.</i>	X											
SIMULIIDAE	X	X		X	X			X	X			
CULICIDAE	X	X							X	X		X
CECIDOMYIDAE	X											
CERATOPOGONIDAE					X							
<i>Bezzia sp.</i>					X							
ARANEAE	X				X	X		X				
LYCOSIDAE					X							
THOMISIDAE	X											
PULMONATA					X							
PHYSIDAE					X							
<i>Physa gyrina</i>					X							
PELECYPODA	X				X							
SPHAERIIDAE	X				X							
<i>Sphaerium sp.</i>	X											
<i>Pisidium casertanum</i>	X				X							
AMPHIPODA					X							
TALITRIDAE					X							
<i>Hyalella azteca</i>					X							
CLADOCERA					X							
DAPHNIDAE					X							
ANOSTRACA					X							
BRANCHINECTIDAE					X							
<i>Branchinecta lindahli</i>					X							

Table 4. List of invertebrate taxonomic keys.

Johannsen, O.A. 1973. Aquatic diptera. Cornell University Press, Ithaca, New York. 210 pp.

Merrit, W.R., and K.W. Cummins. 1988. An introduction to the aquatic insects of North America. Kendall Hunt Publishing Company, Dubuque, Iowa. 722 pp.

Pennak, R.W. 1953. Fresh-water invertebrates of the United States. The Ronald Press Company, New York, New York. 769 pp.

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Figure 1.

