

STONEFLIES OF GLACIER NATIONAL PARK AND FLATHEAD RIVER BASIN, MONTANA

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Abstract

One hundred stonefly species records were located in the Glacier National Park and Flathead River basin of western Montana. Some 58 species were documented in the Flathead River, 58 from Glacier Park, 95 and 74 species respectively from west and east of the continental divide. Common and uncommon species were documented along with high elevation, lentic and hyporheic species.

Key words: Plecoptera; stoneflies; Montana; Glacier National Park; Flathead River.

Introduction

Descriptions of Montana stoneflies first appeared in Needham and Claassen (1925) and other early papers, Ricker (1952), Petty (1965), Lehmkuhl (1966), Nebeker (1966), Newell (1970) and Baumann (1970). Gaufin et al. (1972) published the first systematic account of the stoneflies of Montana. This work listed 119 species from the entire state. Gaufin's presence at the University of Montana in the late 1960s stimulated an interest in Montana stoneflies that continues today, Robson (1968), Stanford (1975), Howe (1974), Hauer et al. (1980), Perry (1984), Hauer et al. (1989), Jones et al. (1988), Imbert (1990), Gangemi (1991), Varrelman (1992), Case (1995), Wicklum (1998) and Hauer et al. (2000). Roemhild (1986) compiled a list of 110 Montana species and provided some ecological and specific distributional information for each species. In addition many systematic studies listed Montana stonefly records, e.g., Alexander et al. (1999), Baumann et al. (1977), Lyon et al. (1997), Nelson et al. (1989), Stanger et al. (1993), Stark et al. (2001), Stewart et al. (2002), Szczytko et al. (1979) and Van Wieren et al. (2001).

Methods

This document lists all Plecoptera taxa collection records from Glacier National Park (GNP) and the Flathead River Basin, upstream from the confluence with the Clark Fork River in Sanders County. The study area includes all of Flathead and Lake Counties, portions of Glacier, Lincoln, Missoula and Sanders counties in NW Montana. The classification system used in this paper follows that outlined by Stark et al. (1986).

Published and unpublished reports and theses were examined for records of any stonefly records from the study area. Reference collections at the University of Montana and Brigham Young University were also surveyed. Stonefly taxa recorded from the study area were extracted along with information on distribution in the Flathead River system, Glacier National Park, relationship to the continental divide, altitude collected, dates adults collected and number of collection records. All collection records were compared with known distributional records for each taxon. This information is listed in Table 2.

Results

A total of 100 species, representing 45 genera and 9 families were recorded (Table 1). As a comparison, Gaufin et al. (1972) recorded 119 species from all of Montana. The following list enumerates the number of species from each family:

Nemouridae- 16	Pteronarcidae-2
Taeniopterygidae- 3	Perlodidae- 23
Capniidae- 20	Perlidae- 4
Leuctridae- 10	Chloroperlidae- 21
Peltoperlidae- 1	

Glacier National Park (GNP)

GNP is comprised of 4140 km² or 1.4 million acres. The U.S./Canadian border is its northern boundary. Its western boundary is the north fork of the Flathead River and its southern boundary is the middle fork of the Flathead River. The continental divide nearly bisects the park in a northwest-southeast direction. The area of GNP, west of the continental divide, drains into the Columbia River system, the area north east of the continental divide drains into Hudson Bay and the south eastern portion drains into the Missouri River system.

Some 89 species were collected in GNP with some small areas having a diverse stonefly fauna (Table 2). McDonald Creek (west of the divide) and its tributaries had 66 species. The Many Glacier region (east of the divide, 78 km² in area), had 65 species over an elevational gradient of 1480–2580 m, m.s.l. Several lakes in this area have been studied for their Plecoptera fauna. Lehmkuhl (1966) found nine species of stoneflies living in three lakes of this area. The nearby amictic Iceberg Lake is the type locality for *Bolshecapnia spenceri*. Twelve species of stonefly adults have been collected along the shores of this small cirque lake. Wilbur Creek flows out of Iceberg Lake for a distance of only about 9 km. A total of 33 species of stoneflies were found in this small stream.

Some 95 species of stoneflies were recorded from west of the continental divide and 74 species were found east of the divide. Four species collected, *Amphinemura banksi*, *Bolshecapnia spenceri*, *Isoperla longiseta* and *Zapada glacier* were only found east of the divide and 25 species collected were only found west of the divide (Table 2).

Flathead River

The main stem Flathead River is comprised of three forks, the north, middle and south forks. The south fork flows out of the Bob Marshall Wilderness area and is impounded by Hungry Horse Dam. The three forks and the main stem comprise about 365 km (219 mi) of river and drain an area of 22,241 km² in southeast British Columbia and western Montana. The main stem river eventually empties into 496 km² Flathead Lake. A total of 58 species were found in the three forks and main stem above Flathead Lake (Stanford, 1975) and others. Two species are known to occur in Flathead Lake (*Capnia confusa* and *Suwallia salish*).

Six kilometers below the lake outlet, the river is impounded by Kerr Dam, which regulates the upper 3 m of Flathead Lake and creates flow fluctuations in the lower river and seasonal changes in lake levels. The river then flows for 100 km before merging with the Clark Fork River. Only five species have been collected in the lower Flathead River (*Pteronarcys californica*, *Taenionema pacificum*, *Claassenia sabulosa*, *Isoperla fulva* and a Nemourid).

General Distribution Data

The most infrequently reported species in the study area were (Table 2):

<i>Amphinemura banksi</i>	<i>Utacapnia columbiana</i>
<i>Capnia cheama</i>	<i>Isoperla longiseta</i>
<i>Isocapnia hyalite</i>	<i>Megaleuctra kincaidi</i>

The most frequently reported species in decreasing order were (Table 2):

Sweltsa fidelis
Sweltsa coloradensis
Suwallia pallidula
Zapada columbiana
Eucapnopsis brevicauda
Suwallia lineosa

Those species collected at extreme elevation were (Table 2):

<i>Bolshecapnia spenceri</i> - 2216 m	<i>Zapada frigida</i> - 2195 m
<i>Lednia tumana</i> - 2195 m	<i>Megarcys signata</i> - 2121 m
<i>Paraperla wilsoni</i> - 2195 m	

Collection records noted that over half of all species (51) were collected along lake shores. Lentic habitats that yielded emerging stoneflies were: Lake McDonald, Flathead Lake, Iceberg Lake, Grinnell Lake, Swiftcurrent Lake, and Lake Josephine.

Stoneflies recorded from hyporheic habitats (pumped wells) included: *Alloperla severa*, *Capnia confuse*, *Claassenia sabulosa*, *Diura knowltoni*, *Hesperoperla pacifica*, *Isocapnia crinita*, *I. grandis*, *I. integra*, *I. vedderensis*, *Isoperla fulva*, *Kathroperla*, *Paraperla frontalis*, and *P. wilsoni*.

Table 1. Systematic listing of the stoneflies (Order Plecoptera) of the study area.

Family Nemouridae

- Genus *Amphinemura*
 - Amphinemura banksi* Baumann & Gaufin
- Genus *Lednia*
 - Lednia tumana* (Ricker)
- Genus *Malenka*
 - Malenka californica* (Claassen)
 - Malenka flexura* (Claassen)
- Genus *Podmosta*
 - Podmosta decepta* (Frison)
 - Podmosta delicatula* (Claassen)
- Genus *Prostoia*
 - Prostoia besametsa* (Ricker)
- Genus *Soyedina*
 - Soyedina potteri* Baumann & Gaufin
- Genus *Visoka*
 - Visoka cataractae* (Neave)
- Genus *Zapada*
 - Zapada cinctipes* (Banks)
 - Zapada columbiana* (Claassen)
 - Zapada cordillera* (Baumann & Gaufin)
 - Zapada frigida* (Claassen)
 - Zapada glacier* (Baumann & Gaufin)
 - Zapada haysi* (Ricker)
 - Zapada oregonensis* (Claassen)

Table 1 (continued)

Family Taeniopterygidae

Genus *Doddsia*

Doddsia occidentalis (Banks)

Genus *Taenionema*

Taenionema pacificum (Banks)

Taenionema pallidum (Banks)

Family Capniidae

Genus *Bolshecapnia*

Bolshecapnia milami (Nebeker & Gaufin)

Bolshecapnia sasquatchi (Ricker)

Bolshecapnia spenceri (Ricker)

Genus *Capnia*

Capnia cheama Ricker

Capnia confusa Claassen

Capnia gracilaria Claassen

Capnia nana Claassen

Capnia petila Jewett

Capnia sextuberculata Jewett

Genus *Eucapnopsis*

Eucapnopsis brevicauda Claassen

Genus *Isocapnia*

Isocapnia crinita (Needham & Claassen)

Isocapnia grandis (Banks)

Isocapnia hyalita Ricker

Isocapnia integra Hanson

Isocapnia vedderensis (Ricker)

Genus *Mesocapnia*

Mesocapnia oenone (Neave)

Genus *Utacapnia*

Utacapnia columbiana (Banks)

Utacapnia distincta (Frison)

Utacapnia poda (Nebeker & Gaufin)

Utacapnia trava (Nebeker & Gaufin)

Table 1 (*continued*)

Family Leuctridae

Genus *Despaxia**Despaxia augusta* (Banks)Genus *Megaleuctra**Megaleuctra kincaidi* Frison*Megaleuctra stigmata* (Banks)Genus *Paraleuctra**Paraleuctra forcipata* (Frison)*Paraleuctra jewetti* Nebeker & Gaufin*Paraleuctra occidentalis* (Banks)*Paraleuctra projecta* (Frison)*Paraleuctra vershina* Gaufin & RickerGenus *Pomoleuctra**Pomoleuctra purcellana* (Neave)Genus *Perlomyia**Perlomyia utahensis* Needham & Claassen

Family Peltoperlidae

Genus *Yoraperla**Yoraperla brevis* (Banks)

Family Pteronarcidae

Genus *Pteronarcys**Pteronarcys californica* NewportGenus *Pteronarcella**Pteronarcella badia* (Hagen)

Family Perlodidae

Genus *Cultus**Cultus aestivalis* (Needham & Claassen)*Cultus pilatus* (Frison)*Cultus tostonus* (Ricker)Genus *Diura**Diura knowltoni* (Frison)Genus *Isogenoides**Isogenoides colubrinus* (Hagen)*Isogenoides elongatus* (Hagen)

Table 1 (*continued*)Genus *Isoperla*

- Isoperla fulva* Claassen
- Isoperla fusca* Needham & Claassen
- Isoperla longiseta* Banks
- Isoperla mormona* Banks
- Isoperla petersoni* Needham & Christenson
- Isoperla quinquepunctata* (Banks)
- Isoperla sobria* (Hagen)
- Isoperla sordida* (Banks)

Genus *Kogotus*

- Kogotus modestus* (Banks)
- Kogotus nonus* (Needham & Claassen)

Genus *Megarcys*

- Megarcys signata* (Hagen)
- Megarcys subtruncata* (Needham & Claassen)
- Megarcys watertoni* (Ricker)

Genus *Pictetiella*

- Pictetiella expansa* (Claassen)

Genus *Setvena*

- Setvena bradleyi* (Smith)

Genus *Skwala*

- Skwala americana* (Frison)
- Skwala curvata* (Hanson)

Family Perlidae

Genus *Calineuria*

- Calineuria californica* (Banks)

Genus *Claassenia*

- Claassenia sabulosa* (Banks)

Genus *Doroneuria*

- Doroneuria theodora* (Needham & Claassen)

Genus *Hesperoperla*

- Hesperoperla pacifica* (Banks)

Table 1 (*continued*)

Family Chloroperlidae

Genus *Alloperla**Alloperla medveda* Ricker*Alloperla serrata* Needham & Claassen*Alloperla severa* (Hagen)Genus *Kathroperla**Kathroperla perdita* BanksGenus *Paraperla**Paraperla frontalis* (Banks)*Paraperla wilsoni* RickerGenus *Plumiperla**Plumiperla diversa* (Frison)Genus *Suwallia**Suwallia autumnna* (Hoppe)*Suwallia dubia* (Frison)*Suwallia forcipata* (Neave)*Suwallia lineosa* (Banks)*Suwallia pallidula* (Banks)*Suwallia salish* Alexander & Stewart*Suwallia starki* Alexander & StewartGenus *Sweltsa**Sweltsa albertensis* (Needham & Claassen)*Sweltsa borealis* (Banks)*Sweltsa coloradensis* (Banks)*Sweltsa fidelis* (Banks)*Sweltsa revelstoka* (Jewett)Genus *Triznaka**Triznaka signata* (Banks)Genus *Utaperla**Utaperla sopladora* Ricker

Table 2. Distributional data of the stoneflies in the study area, the Flathead River, Glacier National Park (GNP), East and West of the continental Divide, altitude collected, dates adults collected and number of collection records.

Species	Flat. R.	GNP *	West **	East* *	ALT(m)	dates-adult	No. coll.#
<i>Amphinemura banksi</i>		x		x			1
<i>Lednia tumana</i>		x	x	x	2195–1677	3-VIII to 16-X	9
<i>Malenka californica</i>	x	x	x	x	890–1623	11-VII to 26-X	19
<i>Malenka flexura</i>		x	x	x	883–2057	21-IV to 11-XII	64
<i>Podmosta decepta</i>		x	x	x	1006–1589	21-VI to 17-VII	15
<i>Podmosta delicatula</i>		x	x	x	1220–1519	1-VII to 4-VIII	13
<i>Prostoia besametsa</i>	x	x	x	x	963–1170	12-IV to 13-VIII	47
<i>Soyedina potteri</i>	x	x	x	x	1049–1858	12-IV to 24-VII	5
<i>Visoka cataractae</i>	x	x	x	x	975–2200	28-III to 27-VII	38
<i>Zapada cinctipes</i>	x	x	x	x	794–1460	20-II to 17-VII	54
<i>Zapada columbiana</i>	x	x	x	x	882–2195	3-I to 6-VIII	72
<i>Zapada cordillera</i>	x		x		939–1104	25-III to 4-IV	4
<i>Zapada frigida</i>		x	x	x	882–2195	4-IV to 9-VIII	26
<i>Zapada glacier</i>		x		x	1525–1830	9-VII to 3-VIII	12
<i>Zapada haysi</i>	x	x	x	x	1095–2100	11-IV to 24-VII	32
<i>Zapada oregonensis</i>		x	x	x	882–1525	26-IV to 22-VII	24
<i>Doddsia occidentalis</i>	x	x	x	x	960–1350	18-III to 9-VII	39
<i>Taenionema</i>	x	x	x	x	774–1487	26-III to 20-XI	22
<i>pacificum</i>							
<i>Taenionema pallidum</i>	x	x	x	x	957–1800	27-IV to 30-VII	59
<i>Bolshecapnia milami</i>	x	x	x		963–1050	13-III to 18-III	9
<i>Bolshecapnia</i>	x	x	x	x	1050–1890	6-III to 26-III	5
<i>missiona^a</i>							
<i>Bolshecapnia spenceri</i>		x		x	1858–2216	27-VII to 3-VIII	4
<i>Capnia cheama</i>	x		x		1190	25-III	1
<i>Capnia confusa</i>	x	x	x	x	882–1439	27-II to 17-VII	33
<i>Capnia gracilaria</i>	x	x	x		963–1006	24-II to 14-V	14
<i>Capnia nana</i>	x	x	x		963–1090	30-I to 28-III	33
<i>Capnia petila</i>	x	x	x	x	990–1975	16-II to 28-VI	19
<i>Capnia</i>	x	x	x		964–1090	19-II to 28-III	19
<i>sextuberculata</i>							
<i>Eucapnopsis</i>	x	x	x	x	963–2057	8-V to 14-VII	71
<i>brevicauda</i>							
<i>Isocapnia crinita</i>	x	x	x		948–1026	20-III to 17-V	7
<i>Isocapnia grandis</i>	x	x	x	x	957–1525	10-III to 8-V	9
<i>Isocapnia hyalita</i>		x	x		1086	17-V	1
<i>Isocapnia integra</i>	x	x	x	x	963–2195	24-II to 27-VII	9

Table 2 (continued)

Species	Flat. R.	GNP *	West **	East* *	ALT(m)	dates-adult	No. coll.#
<i>Isocapnia vedderensis</i>	x	x	x		963–1026	21-IV to 11-VI	14
<i>Mesocapnia oenone</i>		x	x		975–1158	6-IX to 25-X	6
<i>Utacapnia columbiana</i>	x		x		1095	5-II to 20-III	2
<i>Utacapnia distincta</i>	x	x	x		945–1020	21-II to 15-III	18
<i>Utacapnia poda</i>	x	x	x		964–1198	27-III to 22-IV	5
<i>Utacapnia trava</i>	x	x	x	x	948–1525	10-II to 2-VI	13
<i>Despaxia augusta</i>		x	x		882–1350	31-VIII to 11-XI	17
<i>Megaleuctra kincaidi</i>		x	x		1049	13-V	1
<i>Megaleuctra stigmata</i>			x		883	15-IV-17-VII	4
<i>Paraleuctra forcipata</i>	x	x	x	x	882–2100	5-V to 27-VII	30
<i>Paraleuctra jewetti</i>		x	x	x	1975	28-VI	2
<i>Paraleuctra occidentalis</i>	x	x	x	x	882–1858	4-IV to 10-VII	54
<i>Paraleuctra projecta</i>		x	x	x	895–1770	8-VI to 25-VI	2
<i>Paraleuctra vershina</i>	x	x	x	x	882–1615	17-V to 24-VII	68
<i>Pomoleuctra purcellana</i>		x	x	x	882–1975	9-V to 28-VIII	27
<i>Perlomyia utahensis</i>	x	x	x	x	882–1525	26-IV to 10-VII	31
<i>Yoraperla brevis</i>		x	x	x	778–1982	2-VI to 28-VII	39
<i>Pteronarcys californica</i>		x	x	x	774–1140	17-IV to 4-VIII	9
<i>Pteronarcella badia</i>	x	x	x	x	945–1490	4-VI to 24-VII	21
<i>Cultus aestivalis</i>	x		x		804–1830	4-VI to 20-VII	7
<i>Cultus pilatus</i>		x	x	x	774–1950	16-IV to 25-VII	9
<i>Cultus tostonus</i>	x	x	x	x	948–1384	5-VI to 1-VIII	7
<i>Diura knowltoni</i>	x		x		948–1198	20-IV to 18-V	10
<i>Isogenoides colubrinus</i>	x	x	x	x	948–1008	20-VI to 7-VII	8
<i>Isogenoides elongatus</i>			x		774	17-IV to 25-IV	2
<i>Isoperla fulva</i>	x	x	x	x	795–1490	25-IV to 20-VIII	35
<i>Isoperla fusca</i>	x	x	x	x	1370–1950	6-VII to 13-VIII	13
<i>Isoperla longiseta</i>		x		x	1384	10-VII	1
<i>Isoperla mormona</i>			x		794–800	30-VI to 19-VII	4
<i>Isoperla petersoni</i>		x	x		963–1103	15-VIII to 9-X	4
<i>Isoperla quinquepunctata</i>	x	x	x	x	794–1487	26-V to 24-VII	17
<i>Isoperla sobria</i>	x	x	x	x	963–1800	2-VI to 27-IX	15
<i>Isoperla sordida</i>		x	x	x	1010–2100	13-VIII	7

Species	Flat. R.	GNP *	West **	East* *	ALT(m)	dates-adult	No. coll.#
<i>Kogotus modestus</i>	x	x	x	x	939–1525	4-IX to 14-IX	20
<i>Kogotus nonus</i>		x	x	x	963–1525	21-VIII to 24-X	7
<i>Megarcys signata</i>		x	x	x	939–2121	25-VI to 28-VIII	12
<i>Megarcys subtruncata</i>			x		959	21-VI	2
<i>Megarcys watertoni</i>		x	x	x	778–2100	13-VI to 27-VIII	55
<i>Setvena bradleyi</i>		x	x	x	883–1952	5-VI to 8-VIII	22
<i>Skwala curvata</i>		x	x	x	963–1525	26-IV to 17-V	6
<i>Skwala americana</i>	x	x	x	x	778–1341	21-III to 3-VIII	18
<i>Calineuria californica</i>		x	x	x	940–1490	22-VI to 6-VIII	22
<i>Claassenia sabulosa</i>	x	x	x		778–1280	11-VII to 22-IX	17
<i>Doroneuria theodora</i>	x	x	x	x	959–1341	21-VIII to 2-IX	17
<i>Hesperoperla pacifica</i>	x	x	x	x	778–2100	13-V to 23-VIII	36
<i>Alloperla medveda</i>		x	x	x	975–1982	6-VII to 28-VII	26
<i>Alloperla serrata</i>		x	x	x	963–2100	17-VI to 10-VIII	36
<i>Alloperla severa</i>	x	x	x	x	959–1487	18-VI to 4-VIII	64
<i>Kathroperla perdita</i>	x	x	x	x	883–1783	15-IV to 28-VI	29
<i>Paraperla frontalis</i>	x	x	x	x	778–1975	24-V to 9-VIII	55
<i>Paraperla wilsoni</i>		x	x	x	882–2195	16-V to 9-VIII	12
<i>Plumiperla diversa</i>	x	x	x	x	794–1490	15-VI to 6-VIII	18
<i>Suwallia autumnia</i>		x	x	x	882–1490	13-VII to 12-X	12
<i>Suwallia dubia</i>		x	x	x	1370–1525	20-VII to 22-VII	4
<i>Suwallia forcipata</i>		x	x		963–1073	29-VIII to 25-IX	7
<i>Suwallia lineosa</i>	x	x	x	x	959–1951	23-VI to 1-X	71
<i>Suwallia pallidula</i>	x	x	x	x	794–1950	23-VI to 8-X	79
<i>Suwallia salish</i>			x		882	1-VII	2
<i>Suwallia starki</i>	x	x	x	x	963–1490	15-VII to 30-VIII	6
<i>Sweltsa albertensis</i>		x	x	x	963–1525	2-VI to 15-VII	32
<i>Sweltsa borealis</i>	x	x	x	x	882–1858	15-V to 23-VII	60
<i>Sweltsa coloradensis</i>	x	x	x	x	794–2100	17-V to 19-IX	98
<i>Sweltsa fidelis</i>	x	x	x	x	883–1975	1-VI to 15-VIII	157
<i>Sweltsa revelstoka</i>		x	x	x	882–2134	7-VII to 10-IX	60
<i>Triznaka signata</i>	x	x	x	x	925–1384	5-VI to 25-VII	19
<i>Utaperla sopladora</i>	x	x	x	x	963–1490	16-VI to 22-IX	15
TOTALS - 100	58	89	95	74			

^a Formerly *Bolshecapnia sasquatchi*, see Baumann and Potter 2007.

*= GNP, Glacier National Park

**= East and West of the Continental Divide

#= Number of collection records

Discussion

The stonefly fauna, 100 species, of Glacier National Park and the Flathead River Basin, Montana had never been concisely reported prior to this work. Gaufin et al. (1972) was the last to document all of the stonefly records from Montana proper and he listed 119 species. A large volume of stonefly research and aquatic invertebrate research in general has resulted in a thoroughly studied geographic area. This thorough range of studies has created a record of stonefly distribution, flight patterns, and altitude and drainage information greatly increasing our knowledge of stonefly ecology. The possible number of Lentic stoneflies is a possible area for further research. The knowledge of the hyporheic stonefly fauna continues to grow. This research should make additional studies of stonefly ecology in this geographic area easier and more involved.

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