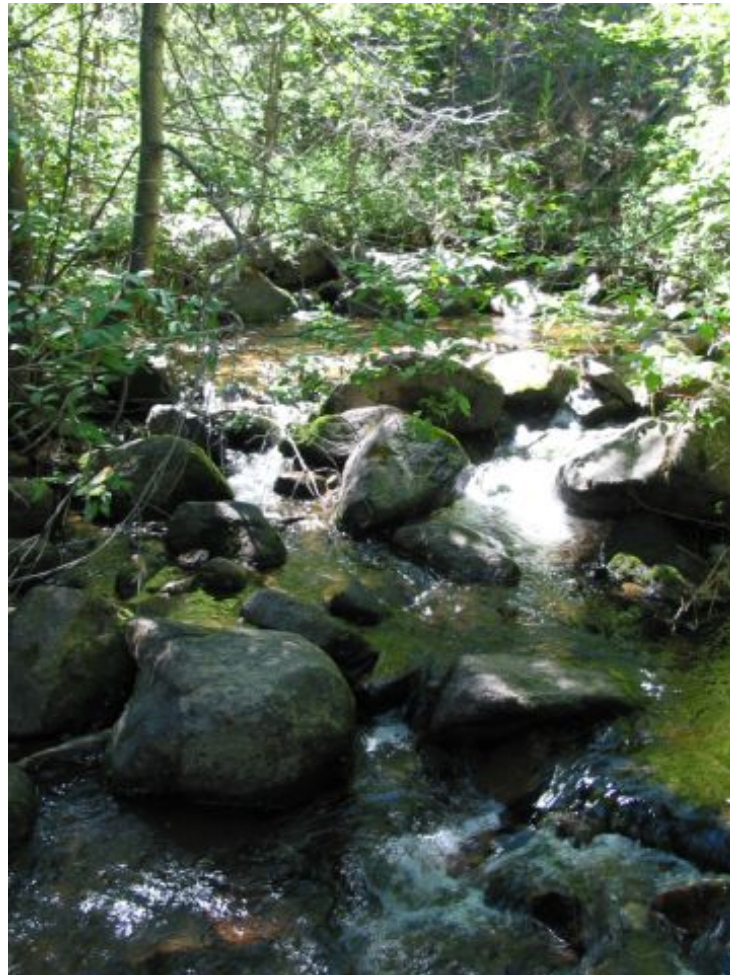


Aquatic Macroinvertebrate Assessment and SOC Species of Elkhorn Creek, Gallatin Co., MT

**Prepared for the USFS Northern Region Gallatin Forest District
by**

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Elkhorn Creek Macroinvertebrate Assessment

Project goals of the Aquatic Macroinvertebrate Survey of Elkhorn Creek were to: **1)** have the Montana Natural Heritage Program (MTNHP) analyze macroinvertebrate samples collected by the Gallatin District Fisheries Biologist, **2)** assess aquatic community integrity and potential macroinvertebrate Species of Concern (SOC) in relation to future Westslope Cutthroat Trout introductions (Pers. comm. Bruce Roberts, 7/10/2006). This report represents the local reach-scale, macroinvertebrate assessment that included fish surveys by the USFS biologist.

Methods

Macroinvertebrate samples were taken at 2 Elkhorn Creek sites: the Middle Meadow site, hereafter, Elkhorn Creek Site #1, and a Lower Meadow site, Elkhorn Creek #2. Macroinvertebrate samples were sampled 28 July 2006 using the DEQ traveling kick method with a 500 micron mesh D-frame dip-net (MT DEQ 2005). Samples were preserved in 95% ETOH and delivered to MTNHP in Helena. Sample processing and bioassessment metrics were performed by David Stagliano at the MTNHP lab in Helena following MT Department of Environmental Quality standardized protocols (MT DEQ 2005). Macroinvertebrates were identified to the lowest taxonomic level, imported into EDAS (Jessup 2006), and biological metrics were calculated from the data using the Montana Dept. of Environmental Quality's multimetric macroinvertebrate (MMI) protocols (Jessup et al. 2005, Feldman 2006). Metric results were then scored using the Montana DEQ bioassessment criteria and each sample categorized as non-impaired or impaired according to threshold values (Table 1).

Table 1. Impairment threshold determinations of the DEQ MMI results.

Ecoregion	RIVPACS	MMI	Impairment Determination
Mountain	≥ 0.8	≥ 63	Unimpaired
	< 0.8	< 63	Impaired

Macroinvertebrate taxa identified from both Elkhorn Creek sites will be compared to the Montana Species of Concern list (MT NHP 2006) to determine if any threatened or endangered invertebrates would be potentially harmed by future trout introductions.

Results

58 total macroinvertebrate taxa were identified from both Elkhorn Creek sites, none are currently ranked as Montana Species of Concern (MT NHP 2006). Elkhorn Creek Sites #1 and 2 had 42 and 39 taxa, respectively (Table 2, Appendix A). Both sites were ranked unimpaired (high biological integrity) by the MT MMI (scores >63) (Table 2). Expected indicator species for a Pristine Mountain Stream Ecosystem were present in high numbers and by total individual percentages for both samples (Table 2, Appendix A).

Table 2. Site Macroinvertebrate Info: Taxa Richness, Total Individuals, DEQ Mtn MMI Index Scores, # and % of Individuals of Expected Indicator Species (based on Stagliano 2005).

Waterbody Name:	Coll Date:	Total Taxa Richness	Total Indiv	Mtn MMI Index	# of Expected Indicator Species	% of Expected Indicator Species
ELKHORN CREEK #1	28-Jul-06	42	350	67.4	24.0	84.9
ELKHORN CREEK #2	28-Jul-06	39	398	67.8	23.0	82.9

In previous analyses, the Pristine Mountain Stream Ecosystem (Aquatic Ecological System D004) contained Westslope or Yellowstone Cutthroat Trout (depending on the drainage basin) as the expected fish community co-occurring with this macroinvertebrate community (Appendix C, Stagliano 2005). Three “rare or unique macroinvertebrate species” were found (Appendix A), but the only one having the potential to be on the MT SOC list in the future is *Cryptochia furcata*, a Trichoptera caddisfly, currently ranked a G3 (globally-vulnerable), but unranked by MT (see text box, Nature Serve, 2006).

Cryptochia furcata (Trichoptera-caddisfly)- Denning, 1953

Global Status: G3G4

Global Status Last Reviewed: 01 Aug 2005

Rounded Global Status: G3 - Vulnerable

State Status: SU- unranked by the Montana Natural Heritage Program

Range Map No map available.

Global Range Comments: Known to occur in Washington, British Columbia, and western Montana with new records from Missoula Co., Montana (Denning, 1975; Newell and Potter, 1975).

Other recent MT State Records (after 2001): West Fork Denny Creek (Madison River), West Fork Gallatin River, Beehive Basin (Gallatin River), Rattlesnake Creek, Missoula County; Dog Creek, Powell County

This caddisfly species has been reported at other sites that contain good populations of Westslope Cutthroat Trout, Brook Trout or Bull Trout, so it’s co-occurrence with insectivorous fish species would not cause its elimination from the reach or extirpation from the stream. The abundance and biomass of other caddisfly, mayfly and stonefly taxa will sustain the insectivory of a healthy Westslope trout population.

Conclusions and Recommendations

Currently, from the macroinvertebrate data analyzed, we find no legitimate reason not to proceed with the introduction of native Westslope Cutthroat Trout into this currently fish-less reach of Elkhorn Creek. This stream contains typical high-quality, mountain stream macroinvertebrate communities that I've personally sampled and identified in hundreds of other streams containing Westslope and Yellowstone cutthroat trout. Therefore, even though there are a couple of "infrequently collected, unique" species (1 potential Species of Concern), these co-exist with similar trout species in other streams, and we conclude that no detrimental effects would be incurred by the macroinvertebrate populations with an introduced native-trout population.

We do recommend an additional rapid assessment of the macroinvertebrate populations (basically--repeat this sample effort) within a year after the introduced trout population has been established or stabilized to test macroinvertebrate community structure similarity before and after the trout introduction.

Literature Cited

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Appendix A. Macroinvertebrate taxa abundance and indicator taxa reported from the 2 Elkhorn Creek Sites. Rare or unique taxa are bolded and underlined in red.

Order	Taxa ID	Elkhorn #1	Elkhorn #2	Indicator Taxa (D004)
Coleoptera	<i>Cleptelmis</i>	0	1	x
Coleoptera	<i>Heterolimnius</i>	24	10	x
Coleoptera	<i>Optioservus</i>	1	0	
Coleoptera	<i>Hydrophilidae</i>	0	1	
Diptera	<i>Chelifera</i>	0	1	
Diptera	<i>Dicranota</i>	1	0	
Diptera	<i>Hexatoma</i>	1	0	
Diptera	<i>Glutops</i>	4	0	x
Diptera	<i>Limnophila</i>	1	0	
Diptera	<i>Oreogeton</i>	0	1	
Diptera	<i>Prosimulium</i>	3	0	
Diptera	<i>Brillia</i>	2	0	x
Diptera	<i>Cricotopus</i>	5	8	
Diptera	<i>Cricotopus (Nostococladius)</i>	5	4	
Diptera	<i>Diamesa</i>	0	3	
Diptera	<i>Eukiefferiella Devonica Gr.</i>	16	2	
Diptera	<i>Eukiefferiella Gracei Gr.</i>	3	0	
Diptera	<i>Micropsectra</i>	3	1	
Diptera	<i>Parametriocnemus</i>	0	4	
Diptera	<i>Pagastia</i>	1	0	
Diptera	<i>Parakiefferiella</i>	1	0	
Diptera	<i>Stempellinella</i>	1	0	
Diptera	<i>Tvetenia Bavarica Gr.</i>	0	5	
Ephemeroptera	<i>Ameletus</i>	7	28	x
Ephemeroptera	<i>Baetis bicaudatus</i>	10	2	x
Ephemeroptera	<i>Baetis tricaudatus</i>	0	14	
Ephemeroptera	<i>Cinygmula</i>	7	2	x
Ephemeroptera	<i>Drunella coloradensis</i>	12	26	x
Ephemeroptera	<i>Drunella doddsi</i>	1	0	x
<u>Ephemeroptera</u>	<u><i>Drunella spinifera</i></u>	<u>2</u>	<u>0</u>	<u>x</u>
Ephemeroptera	<i>Epeorus grandis</i>	2	0	x
Ephemeroptera	<i>Epeorus longimanus</i>	0	2	x
Ephemeroptera	<i>Serratella tibialis</i>	4	4	
Plecoptera	<i>Sweltsa</i>	4	3	x
Plecoptera	<i>Doroneuria</i>	6	1	x
Plecoptera	<i>Isoperla</i>	1	1	x
Plecoptera	<i>Kogotus</i>	0	1	
Plecoptera	<i>Megarcys</i>	6	5	x
Plecoptera	<i>Zapada columbiana</i>	11	12	x

Plecoptera	<i>Zapada Oregonensis gr.</i>	4	12	
Trichoptera	<i>Cryptochia furcata</i>	0	2	x
Trichoptera	<i>Neothremma alicia</i>	108	155	x
Trichoptera	<i>Dicosmoecus gilvipes</i>	1	4	x
Trichoptera	<i>Micrasema</i>	12	34	x
Trichoptera	<i>Oligophlebodes</i>	0	3	x
Trichoptera	<i>Parapsyche elsis</i>	0	1	x
Trichoptera	<i>Psychoglypha</i>	0	1	x
Trichoptera	<i>Rhyacophila alberta gr.</i>	1	4	
Trichoptera	<i>Rhyacophila Brunnea Gr.</i>	4	10	x
Trichoptera	<i>Rhyacophila hyalineata gr.</i>	1	0	
Trichoptera	<i>Rhyacophila narvae</i>	1	2	x
Trichoptera	<i>Rhyacophila verrula</i>	1	0	x
Trichoptera	<i>Visoka cataractae</i>	1	0	x
Trichoptera	<i>Yoraperla brevis</i>	1	0	x
Tricladida	<i>Polycelis cornuta</i>	69	24	x
Veneroida	<i>Pisidium</i>	0	3	
Non-Insect taxa	Tubificidae	1	0	
Non-Insect taxa	Ostracoda	0	1	x
Total Taxa Richness		42	39	
Total Individuals		350	398	
Total # of Indicator Spp		24	23	
Total % of Indicator Spp Individuals		84.9	82.9	

Appendix B. Macroinvertebrate taxa, metrics and MMI results for each Elkhorn site analyzed. Tolval= Tolerance Values (0-10, 0 most sensitive-10 least sensitive), FFG=Functional Feeding Group (SC=scrapers, CG=collector/gatherers, CF=collector/filterers, PR=predators, SH=shredders), Habit (CN=clingers, SP=sprawlers, Bu=Burrowers, SW=swimmers)

Montana Bioassessment Report

Waterbody Name: ELKHORN CREEK 1

Benthic Sample ID: 14926

Site Classification: Mountain D004

Collection Date:

07/28/2006

Sample Taxa List

<i>Order:</i>	<i>OTU name:</i>	<i>FinalID:</i>	<i>Individuals</i>	<i>Tol Val:</i>	<i>FFG:</i>	<i>Habit:</i>
Coleoptera	Heterlimnius	Heterlimnius	24	3	SC/CG	"CN/50%, BU/50%"
Coleoptera	Optioservus	Optioservus	1	5	SC	"CN/50%, BU/50%"
Diptera	Chironominae	Micropsectra	3	4	CG	CN/SP
Diptera	Chironominae	Stempellinella	1	4	CG	BU
Diptera	Diamesinae	Pagastia	1	1	CG	SP
Diptera	Dicranota	Dicranota	1	0	PR	SP
Diptera	Hexatoma	Hexatoma	1	2	PR	BU
Diptera	Limnophila	Limnophila	1	3	PR	BU
Diptera	Orthoclaadiinae	Brillia	2	4	SH	BU/SP
Diptera	Orthoclaadiinae	Cricotopus	5	8	CG/SH	CN
Diptera	Orthoclaadiinae	Cricotopus	5	8	CG/SH	BU
Diptera	Orthoclaadiinae	Eukiefferiella Devonica	16	4	CG	SP
Diptera	Orthoclaadiinae	Eukiefferiella Gracei Gr.	3	4	CG	SP
Diptera	Orthoclaadiinae	Parakiefferiella	1	6	CG	SP
Diptera	Pelecorhynchidae	Glutops	4	1	PR	SP
Diptera	Simuliidae	Prosimulium	3	3	CF	CN
Ephemeropte	Ameletus	Ameletus	7	0	SC	"SW/10%, CN/90%"
Ephemeropte	Baetis	Baetis bicaudatus	10	2	CG	"SW/10%, CN/90%"
Ephemeropte	Cinygmula	Cinygmula	7	0	SC	CN
Ephemeropte	Drunella	Drunella coloradensis	12	0	SC	"CN/75%, SP/25%"
Ephemeropte	Drunella doddsi	Drunella doddsi	1	1	SC	"CN/75%, SP/25%"
Ephemeropte	Drunella spinifera	Drunella spinifera	2	0	PR	"CN/75%, SP/25%"
Ephemeropte	Epeorus	Epeorus grandis	2	0	unk	CN
Ephemeropte	Serratella	Serratella tibialis	4	2	CG	CN
Haptotaxida	Oligochaeta	Tubificidae	1	10	CG	BU
Plecoptera	Chloroperlidae	Sweltsa	4	0	PR	CN
Plecoptera	Doroneuria	Doroneuria	6	0	unk	CN
Plecoptera	Isoperla	Isoperla	1	2	PR	CN
Plecoptera	Megarcys	Megarcys	6	1	PR	CN
Plecoptera	Visoka	Visoka cataractae	1	0	SH	CN
Plecoptera	Yoraperla	Yoraperla brevis	1	0	SH	unk
Plecoptera	Zapada	Zapada columbiana	11	2	SH	CN
Plecoptera	Zapada	Zapada Oregonensis gr.	4	2	SH	CN
Trichoptera		Neothremma alicia	108	1	unk	unk
Trichoptera	Dicosmoecus	Dicosmoecus gilvipes	1		SC	CN
Trichoptera	Micrasema	Micrasema	12	1	SH	CN
Trichoptera	Rhyacophila	Rhyacophila alberta gr.	1	0	PR	CN
Trichoptera	Rhyacophila	Rhyacophila Brunnea Gr.	4	0	PR	CN
Trichoptera	Rhyacophila	Rhyacophila hyalineata gr.	1	0	PR	CN
Trichoptera	Rhyacophila	Rhyacophila verrula	1	0	PR	CN
Tricladida	Turbellaria	Polycelis	69		PR	unk

Appendix B (cont.) Taxa Lists and MMI Metric Scores reported in the Elkhorn Creek samples.

Montana Bioassessment Report

Waterbody Name: ELKHORN CREEK1

Station ID: UMUSFSQ111

Site Classification: Mountain D004

Latitude:

Longitude:

Benthic Sample ID: 14926

Rep. Num: 0

Collect. Date: 07/28/2006

Collect Method: MTkick500

Total Number of Individuals in Sample: 350

	<i>Metric:</i>	<i>Value</i>	<i>Score</i>
<i>Mountain MMI:</i> 67.4	Ephemeroptera Taxa:	7.8	78.2
	Plecoptera Taxa:	6.6	94.0
	EPT Percent:	28.1	31.2
	Non-Insect Percent:	20.1	28.4
	Predator Percent:	28.4	72.7
	Burrower Taxa %:	21.4	86.8
	HBI:	2.65	80.8

Appendix B (cont.) Taxa Lists and MMI Metric Scores reported in the Elkhorn Creek samples.

Montana Bioassessment Report

Waterbody Name: ELKHORN CREEK 2

Benthic Sample ID: 14927

Station ID: UMUSFSQ112

Rep. Num: 0

Site Classification: Mountain D004

Collection Date: 07/28/2006

Sample Taxa List

<i>Order:</i>	<i>OTU name:</i>	<i>FinalID:</i>	<i>Individuals</i>	<i>Tol Val:</i>	<i>FFG:</i>	<i>Habit:</i>
Coleoptera	Cleptelmis	Cleptelmis	1	4	CG	"CN/50%, BU/50%"
Coleoptera	Heterlimnius	Heterlimnius	10	3SC/CG		"CN/50%, BU/50%"
Coleoptera	Hydrophilidae	Hydrophilidae	1	5	PR	"CN,SP,CM,BU(la)
Diptera	Chelifera_Metache	Chelifera	1	5	unk	SP
Diptera	Chironominae	Micropsectra	1	4	CG	CN/SP
Diptera	Diamesinae	Diamesa	3	5	CG	SP
Diptera	Oreogeton	Oreogeton	1	4	PR	SP
Diptera	Orthoclaadiinae	Cricotopus	8	8	CG/SH	CN
Diptera	Orthoclaadiinae	Cricotopus (Nostococladus)	4	8	CG/SH	BU
Diptera	Orthoclaadiinae	Eukiefferiella Devonica	2	4	CG	SP
Diptera	Orthoclaadiinae	Parametriocnemus	4	5	CG	SP
Diptera	Orthoclaadiinae	Tvetenia Bavarica Gr.	5	5	CG	SP
Ephemeropte	Ameletus	Ameletus	28	0	SC	"SW/10%, CN/90%"
Ephemeropte	Baetis	Baetis bicaudatus	2	2	CG	"SW/10%, CN/90%"
Ephemeropte	Baetis	Baetis tricaudatus	14	4	CG	"SW/10%, CN/90%"
Ephemeropte	Cinygmula	Cinygmula	2	0	SC	CN
Ephemeropte	Drunella	Drunella coloradensis	26	0	SC	"CN/75%, SP/25%"
Ephemeropte	Epeorus	Epeorus longimanus	2	1	CG	CN
Ephemeropte	Serratella	Serratella tibialis	4	2	CG	CN
Non-Insect	Ostracoda	Ostracoda	1		unk	SW
Plecoptera	Chloroperlidae	Sweltsa	3	0	PR	CN
Plecoptera	Doroneuria	Doroneuria	1	0	unk	CN
Plecoptera	Isoperla	Isoperla	1	2	PR	CN
Plecoptera	Kogotus	Kogotus	1	1	PR	CN
Plecoptera	Megarcys	Megarcys	5	1	PR	CN
Plecoptera	Zapada	Zapada columbiana	12	2	SH	CN
Plecoptera	Zapada	Zapada Oregonensis gr.	12	2	SH	CN
Trichoptera		Cryptochia furcata	2	1	unk	unk
Trichoptera		Neothremma alicia	155	1	unk	unk
Trichoptera	Dicosmoecus	Dicosmoecus gilvipes	4		SC	CN
Trichoptera	Micrasema	Micrasema	34	1	SH	CN
Trichoptera	Oligophlebodes	Oligophlebodes	3	3	SC	CN
Trichoptera	Parapsyche	Parapsyche elsis	1	1	CF	CN
Trichoptera	Psychoglypha	Psychoglypha	1	0	CG	SP
Trichoptera	Rhyacophila	Rhyacophila alberta gr.	4	0	PR	CN
Trichoptera	Rhyacophila	Rhyacophila Brunnea Gr.	10	0	PR	CN
Trichoptera	Rhyacophila	Rhyacophila narvae	2	0	PR	CN
Tricladida	Turbellaria	Polycelis	24		PR	unk
Veneroida	Pisidiidae	Pisidium	3	8	CF	BU

Appendix B (cont.) Taxa Lists and MMI Metric Scores reported in the Elkhorn Creek samples.

Montana Bioassessment Report

Waterbody Name: ELKHORN CREEK2

Station ID: UMUSFSQ112

Site Classification: Mountain D004

Latitude:

Longitude:

Benthic Sample ID: 14927

Rep. Num: 0

Collect. Date: 07/28/2006

Collect Method: MTkick500

Total Number of Individuals in Sample: 398

	<i>Metric:</i>	<i>Value</i>	<i>Score</i>
<i>Mountain MMI:</i> 67.8	Ephemeroptera Taxa:	5.9	58.8
	Plecoptera Taxa:	5.2	74.9
	EPT Percent:	43.2	48.0
	Non-Insect Percent:	7.0	74.9
	Predator Percent:	13.3	34.1
	Burrower Taxa %:	18.7	90.5
	HBI:	1.91	93.1

Appendix C. Expected indicator species for a Pristine Mountain Stream Ecosystem (Stagliano 2005). FFG=Functional Feeding Group.

Indicator Taxa (D004)	Tolerance Value	Species Assemblage #	FFG
<i>Ameletus</i>	4	58	Gatherers
<i>Apatania</i>	1	58	Scrapers
<i>Baetis bicaudatus</i>	4	58	Gatherers
<i>Brillia</i>	5	90	Shredders
<i>Caudatella</i>	0	90	Scrapers
<i>Caudatella hystrix</i>	0	90	Scrapers
<i>Cinygmula</i>	0	58	Scrapers
<i>Cleptelmis</i>	4	90	Gatherers
<i>Clinocera</i>	6	90	Predators
<i>Doroneuria</i>	1	58	Predators
<i>Drunella coloradensis</i>	2	58	Scrapers
<i>Drunella doddsi</i>	1	58	Scrapers
<i>Drunella grandis</i>	0	90	Scrapers
<i>Epeorus albertae</i>	2	58	Scrapers
<i>Epeorus deceptivus</i>	2	58	Scrapers
<i>Epeorus grandis</i>	2	58	Scrapers
<i>Epeorus longimanus</i>	2	58	Scrapers
<i>Glutops</i>	6	90	Gatherers
<i>Heterlimnius</i>	4	90	Gatherers
<i>Leuctridae</i>	0	90	Shredders
<i>Limnophora</i>	7	90	Gatherers
<i>Megarcys</i>	1	58	Predators
<i>Micrasema</i>	1	90	Shredders
<i>Micropsectra</i>	7	90	Gatherers
<i>Neophylax rickeri</i>	3	90	Scrapers
<i>Neothremma</i>	3	90	Scrapers
<i>Orthocladius</i>	6	90	Gatherers
<i>Ostracoda</i>	8	90	Gatherers
<i>Pagastia</i>	1	90	Gatherers
<i>Parapsyche elsis</i>	1	58	Filterers
<i>Perlodidae</i>	2	90	Predators
<i>Polycelis cornutus</i>	4	90	Predators
<i>Pseudodiamesa</i>	5	90	Gatherers
<i>Psychoglypha</i>	1	90	Shredders
<i>Rhabdomastix</i>	6	58	Gatherers
<i>Rhithrogena</i>	0	58	Scrapers
<i>Rhyacophila brunnea grp</i>	2	90	Predators
<i>Rhyacophila iranda grp</i>	0	58	Predators
<i>Rhyacophila narvae</i>	0	90	Predators
<i>Rhyacophila verrula</i>	0	58	Predators
<i>Sweltsa</i>	0	90	Predators
<i>Yoraperla</i>	0	90	Shredders
<i>Zapada cinctipes</i>	2	58	Shredders
<i>Zapada columbiana</i>	1	58	Shredders