

# Glacial stream ecology: structural and functional assets

Leopold Füreder and Georg H. Niedrist

## Supplementary material

Table S1

Order	Family	Taxon	catchment glacier cover (%)		study streams		samples							
			40-80 %	15-39 %	<15 %	0%	18 (6 per stream)	18 (6 per stream)	36 (6 per stream)	36 (6 per stream)				
			3	3	6	6	mean	sd	mean	sd	mean	sd	mean	sd
Coleoptera	Elmidae	Elmidae spp											5.6	13.6
	Empididae	Empididae spp juv	18.5	17.0	33.3	33.3	9.3	22.7					13.0	31.8
		Empididae spp					1.9	4.5						
Diptera	Blephariceridae	Liponeura cinerascens	22.2	29.4	137.0	50.1	77.8	68.1					487.0	801.0
	Chironomidae	Micropsectra atrofasciata -Agg.			88.9	101.8	1896.3	4156.8					9859.3	17167.2
		Micropsectra sp					3.7	9.1					113.0	202.5
		Diamesa bertrami							118.5	290.3				
		Diamesa cin_zer -gr			5022.2	2635.0	2963.0	2217.4	2551.9	1932.2			11187.0	20424.7
		Diamesa cinerellagr			844.4	799.2	470.4	133.5	672.2	682.4			3724.1	5569.1
		Diamesa insignipes							9.3	17.8				
		Diamesa latA -gr			1581.5	1705.1	1051.9	643.7	4631.5	5335.6			1529.6	3567.7
		Diamesa latB -gr			311.1	184.9	207.4	250.0	2187.0	3596.3			1488.9	3484.4
		Diamesa sp			33.3	29.4	151.9	113.5	292.6	557.6			1814.8	3392.2
		Diamesa steinboeckii			2514.8	2652.3	696.3	300.3	1864.8	2193.8			868.5	1311.5
		Diamesa zernyi -gr			2422.2	1205.0	2329.6	1989.6	1835.2	1281.2			7463.0	14976.4
		Pseudodiamesa branickii					7.4	6.4	13.0	22.7			622.2	1507.9
		Pseudokiefferiella parva			107.4	158.0	185.2	186.4	187.0	356.9			755.6	1009.8
		Syndiamesa serratosioi							1.9	4.5				
		Diamesinae spp			481.5	308.8	55.6	77.8	1.9	4.5			100.0	229.0
		Brillia flavifrons							1.9	4.5			5.6	13.6
		Brillia modesta							3.7	9.1			3.7	9.1
		Bryophaenocladus xanthogyne					3.7	6.4						
		Chaetocladus dentiforceps							1.9	4.5			159.3	363.6
		Chaetocladus piger							1.9	4.5				
		COP -gr					51.9	63.2	153.7	293.8			187.0	146.0
		Corynoneura lobata					248.1	327.8	322.2	342.8			10237.0	17386.2
		Corynoneura scutellata							25.9	63.5				
		Corynoneura sp							5.6	13.6			101.9	249.5
		Cricotopus curtus					7.4	12.8						
		Cricotopus sp			33.3	57.7	137.0	237.4	3.7	9.1			196.3	475.4
		Cricotopus tremulus -gr			7.4	12.8	7.4	12.8	90.7	133.0			4601.9	10995.5
		Diplocladius cultriger					3.7	6.4	16.7	40.8				
		Eukiefferiella brehmigr.							146.3	352.9				
		Eukiefferiella brevicalcar					422.2	683.8	29.6	48.5			2516.7	5915.5
		Eukiefferiella brevicalcar agg.					3.7	6.4					33.3	81.6
		Eukiefferiella claripennis							3.7	9.1			94.4	69.8
		Eukiefferiella coeruleascens			33.3	29.4	125.9	198.9	42.6	58.5			159.3	283.9
		Eukiefferiella cyanea -gr			3.7	6.4	3.7	6.4	138.9	340.2			20.4	49.9
		Eukiefferiella fuldensis			7.4	6.4	200.0	173.6	659.3	1065.7			1451.9	1651.9
		Eukiefferiella lobifera			3.7	6.4	188.9	327.2	31.5	58.1			22.2	54.4
		Eukiefferiella minor/fittkaui -gr			37.0	46.3	463.0	274.3	524.1	635.4			5250.0	9028.7
		Eukiefferiella sp			11.1	11.1	107.4	140.7	105.6	87.4			870.4	1266.4
		Heleniella sp											390.7	935.5
		Heterotrissocladus sp											83.3	204.1
		Krenosmittia boreoalpina					3.7	6.4	3.7	5.7				
Krenosmittia camptophleps			3.7	6.4	40.7	33.9	716.7	1598.8			125.9	190.9		
Krenosmittia sp							9.3	22.7						
Orthocladus frigidus					611.1	563.8	79.6	57.7			235.2	276.6		
Orthocladus luteipes					3.7	6.4	35.2	80.9			5.6	13.6		
Orthocladus rivicola			325.9	208.6	607.4	187.4	583.3	521.2			570.4	969.7		
Orthocladus sp C							13.0	31.8			11.1	27.2		
Orthocladus sp B			7.4	12.8							42.6	104.3		
Orthocladus sp			3.7	6.4	29.6	42.1	175.9	350.1			125.9	200.0		
Orthocladus sp			3.7	6.4	451.9	782.6	174.1	332.7			385.2	800.0		
Parakiefferiella sp											1.9	4.5		
Parametriocnemus sp					7.4	12.8	1.9	4.5						
Parametriocnemus stylatus			55.6	96.2	170.4	92.5	731.5	946.7			672.2	867.8		
Paratrichocladus nivalis							11.1	27.2			111.1	166.1		
Paratrichocladus rufiventris			3.7	6.4			51.9	83.6			14.8	36.3		

		Paratrichocladius skirwithensis		51.9 86.3	37.0 90.7
		Paratrichocladius sp B		20.4 31.0	31.5 62.2
		Paratrichocladius sp A	7.4 12.8	3.7 6.4	5.6 9.3
		Paratrichocladius sp		3.7 6.4	7.4 18.1
		Parorthocladius nudipennis	3.7 6.4		42.6 89.0
		Pseudosmittia holsata	29.6 51.3	3.7 6.4	
		Rheocricotopus effusus	3.7 6.4		63.0 116.3
		Rheocricotopus sp			1025.9 1636.8
		Rheosmittia spinicornis			33.3 81.6
		Smittia sp	3.7 6.4		1.9 4.5
		Stilocladius montanus		3.7 6.4	1.9 4.5
		Synorthocladius semivirens		3.7 6.4	1.9 4.5
		Thienemanniella clavicornis	7.4 12.8	63.0 81.9	88.9 142.5
		Thienemanniella sp			53635.2 130710.2
		Tvetenia bavarica		207.4 215.8	159.3 105.8
		Tvetenia calvescens	37.0 54.8	44.4 29.4	74.1 109.2
		Tvetenia sp			3.7 9.1
		Orthoclaadiinae spp	155.6 136.5	529.6 416.1	492.6 837.7
		Krenopelopia binotata			1722.2 3492.3
		Larsia sp			177.8 435.5
		Macropelopia notata/fittkau			66.7 163.3
		Zavreliomyia barbatipes			172.2 421.9
		Chironomidae spp			9.3 22.7
					3.7 9.1
	Dolichopodidae	Dolichopodidae spp		3.7 6.4	
	Empididae	Chelifera sp juv			5.6 9.3
	Limoniidae	Antocha spp		3.7 6.4	
	Pediciidae	Dicranota sp juv		37.0 28.0	18.5 29.5
		Dicranota sp	7.4 12.8	25.9 17.0	16.7 27.9
		Pedicia sp juv			1.9 4.5
		Pedicia sp			1.9 4.5
		Pediciidae spp juv			7.4 18.1
		Pediciidae spp			1.9 4.5
	Psychodidae	Psychodidae sp		3.7 6.4	
	Rhypholophus	Rhypholophus spp		3.7 6.4	1.9 4.5
	Simuliidae	Prosimulium hirtipes juv	11.1 19.2		7.4 18.1
		Prosimulium latimucro juv		63.0 99.6	1.9 4.5
		Prosimulium latimucro		111.1 182.9	3.7 5.7
		Prosimulium rufipes pupa			44.4 98.4
		Prosimulium rufipes juv		18.5 6.4	3.7 9.1
		Prosimulium rufipes	33.3 33.3	125.9 90.5	22.2 49.2
		Prosimulium sp juv	14.8 25.7	7.4 12.8	109.3 133.8
		Prosimulium sp		18.5 23.1	140.7 117.3
		Simulium aurem -gr			4840.7 8633.0
		Simulium bertrandi juv		7.4 12.8	3.7 9.1
		Simulium bertrandi cf			87.0 176.3
		Simulium bertrandi			18.5 16.7
		Simulium carpaticum cf			24.1 26.7
		Simulium costatum P			24.1 53.7
		Simulium sp juv	11.1 19.2	140.7 168.3	494.4 766.6
		Simulium sp			7.4 18.1
		Simulium venum -gr	3.7 6.4		155.6 381.0
		Simuliidae spp juv	22.2 38.5	14.8 25.7	9.3 22.7
	Thaumaleidae	Thaumaleidae spp	11.1 11.1	37.0 64.2	5.6 13.6
					11.1 22.2
		Diptera spp juv			1.9 4.5
Ephemeroptera	Baetidae	Baetis alpinus juv	29.6 17.0	196.3 275.4	155.6 320.2
		Baetis alpinus	211.1 317.6	544.4 876.5	514.8 548.1
		Baetis sp juv	66.7 115.5	166.7 160.2	248.1 506.8
		Baetis sp			616.7 1338.9
		Baetidae spp juv	51.9 89.8	7.4 12.8	137.0 257.3
		Baetidae spp	3.7 6.4	7.4 12.8	3.7 5.7
	Heptageniidae	Ecdyonurus Gr venosus			3.7 9.1
		Ecdyonurus picteti			3.7 9.1
		Ecdyonurus sp juv		7.4 12.8	18.5 25.0
		Ecdyonurus zelleri			1.9 4.5
		Epeorus sp juv			1.9 4.5
		Epeorus sp			1.9 4.5
		Rhithrogena alpestris juv			5.6 13.6
		Rhithrogena alpestris -gr			5.6 13.6
		Rhithrogena alpestris		18.5 32.1	7.4 9.1
		Rhithrogena endenensis/puthzi			5.6 13.6
		Rhithrogena Gr loyolea juv			1.9 4.5
		Rhithrogena hercynia juv			3.7 9.1
		Rhithrogena loyolaea juv	22.2 29.4		1.9 4.5
		Rhithrogena loyolaea	14.8 25.7	18.5 6.4	40.7 59.9
		Rhithrogena nivata		11.1 19.2	1.9 4.5

		Rhithrogena sp juv	14.8 17.0	14.8 25.7	50.0 96.8	22.2 49.2
		Heptageniidae spp juv	22.2 19.2	237.0 227.8	377.8 499.8	101.9 167.5
		Heptageniidae spp	3.7 6.4			1.9 4.5
		Ephemeroptera spp juv			1.9 4.5	
		Ephemeroptera spp				1.9 4.5
Plecoptera	Capniidae	Capnioneura bifons juv		7.4 12.8		
		Capnioneura nemuroides				1.9 4.5
	Chloroperlidae	Chloroperla susemicheli juv			7.4 13.5	
		Chloroperlidae spp juv		3.7 6.4	5.6 13.6	
	Leuctridae	Leuctra braueri juv				9.3 22.7
		Leuctra sp juv	18.5 32.1	100.0 135.2	18.5 34.9	105.6 163.1
		Leuctra sp				
		Leuctra sp	7.4 12.8			27.8 44.3
		Leuctridae spp juv				1.9 4.5
	Nemouridae	Nemoura mortoni juv		11.1 11.1	38.9 89.9	11.1 27.2
		Nemoura mortoni			5.6 13.6	1.9 4.5
		Nemoura uncinata juv				9.3 22.7
		Nemoura uncinata				5.6 13.6
		Protonemura auberti juv	59.3 93.2	14.8 25.7	16.7 26.1	20.4 49.9
		Protonemura auberti		3.7 6.4		5.6 13.6
		Protonemura auberti				7.4 18.1
		Protonemura brevistyla juv	18.5 32.1	14.8 6.4	11.1 27.2	20.4 49.9
		Protonemura brevistyla			1.9 4.5	101.9 238.8
		Protonemura nimborum juv	22.2 38.5	7.4 6.4		13.0 22.7
		Protonemura nimborum			5.6 13.6	7.4 18.1
		Protonemura risi juv	7.4 12.8	29.6 51.3		7.4 13.5
		Protonemura risi			5.6 9.3	14.8 36.3
		Protonemura sp juv	151.9 234.7	55.6 33.3	75.9 48.4	270.4 286.3
		Protonemura sp			5.6 13.6	11.1 18.6
		Protonemura sp			1.9 4.5	1.9 4.5
		Nemouridae spp juv	3.7 6.4			16.7 40.8
	Nemouroidea	Nemouroidea spp juv	40.7 70.6	3.7 6.4	1.9 4.5	16.7 40.8
	Perlidae	Perlidae spp juv			38.9 44.3	
	Perlodidae	Dictyogenus alpinum/fontium juv			1.9 4.5	9.3 22.7
		Dictyogenus alpinum/fontium		3.7 6.4	1.9 4.5	
		Isoperla sp juv				1.9 4.5
		Isoperla sp	3.7 6.4		11.1 27.2	20.4 44.7
		Perlodidae spp juv	37.0 64.2	44.4 67.6	9.3 10.9	138.9 175.8
	Perloidea	Perloidea spp juv		14.8 25.7	125.9 179.0	14.8 36.3
	Taeniopterygidae	Brachyptera risi juv	88.9 135.2	288.9 500.4		
		Brachyptera risi	3.7 6.4			
		Brachyptera sp juv	3.7 6.4	140.7 243.8		11.1 27.2
		Rhabdiopteryx alpina	7.4 12.8			
		Taeniopterygidae spp juv	22.2 38.5			1.9 4.5
		Plecoptera spp juv	185.2 196.4	303.7 497.4	172.2 241.5	172.2 160.2
		Plecoptera spp	7.4 12.8	3.7 6.4	5.6 9.3	9.3 10.9
Trichoptera	Lepidostomatidae	Lepidostomatidae spp juv			13.0 20.4	20.4 49.9
	Limnephilidae	Allogamus uncatus				1.9 4.5
		Chaetopteryx major	3.7 6.4	14.8 25.7	1.9 4.5	1.9 4.5
		Drusus annulatus				9.3 22.7
		Drusus biguttatus		3.7 6.4	25.9 63.5	
		Drusus destitus		3.7 6.4		1.9 4.5
		Drusus discolor			20.4 31.0	42.6 60.6
		Drusus mixtus cf		3.7 6.4		
		Drusus monticola				1.9 4.5
		Melampophylax melampus		3.7 6.4	3.7 9.1	3.7 5.7
		Micropterna sequax				3.7 5.7
		Pseudopsilopteryx zimmeri		7.4 12.8		1.9 4.5
		Limnephilidae spp juv			18.5 35.6	22.2 38.5
		Limnephilidae spp		3.7 6.4		3.7 5.7
	Rhyacophilidae	Rhyacophila glareosa				1.9 4.5
		Rhyacophila hirticornis		11.1 19.2		1.9 4.5
		Rhyacophila intermedia		3.7 6.4		7.4 13.5
		Rhyacophila laevis		3.7 6.4		1.9 4.5
		Rhyacophila pubescens				1.9 4.5
		Rhyacophila sp juv	3.7 6.4			9.3 8.4
		Rhyacophila sp			1.9 4.5	1.9 4.5
		Rhyacophila tristis				14.8 36.3
		Trichoptera spp juv				1.9 4.5
		Trichoptera spp			5.6 9.3	1.9 4.5