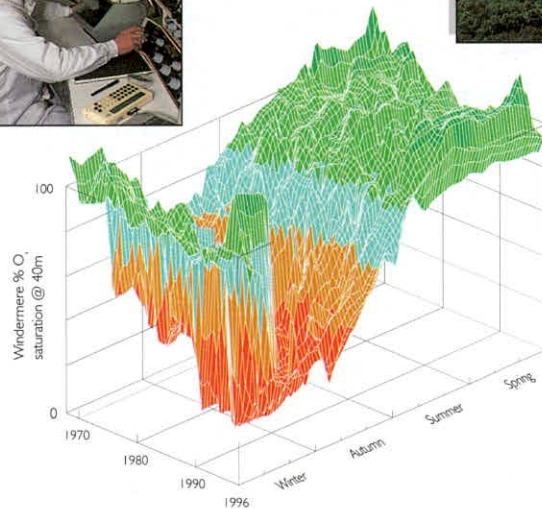


**MACROINVERTEBRATE SAMPLING OF WOODED AND OPEN SECTIONS OF
TRIBUTARIES OF THE R. ITCHEN - OCTOBER 1997**

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**Report to: CEFAS and Environment Agency, Southern Region
IFE Report Ref. No: RL/T04071W7/4**



**Centre for
Ecology &
Hydrology**

Institute of Freshwater Ecology
Institute of Hydrology
Institute of Terrestrial Ecology
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INTRODUCTION

This report on the invertebrates of two tributaries of the River Itchen has been produced as part of a joint CEFAS/Environment Agency study on the production of juvenile salmonids. Two sites, one wooded and one open, from each of two tributaries were chosen for study and the invertebrate fauna were sampled at each site. In 1996, benthic samples taken in May and October showed a significantly greater biomass in the open sections than in the wooded sections.

In an effort to increase the invertebrate production of the wooded sections, the canopy was opened at the wooded sites, Blackbridge A and Falloden B, in December 1996. The samples analysed in this report were taken by CEFAS staff in October 1997 and represent the second series of samples taken since the canopy was opened.

The timing of the sampling was chosen so that the faunal communities could be compared with those expected by using the RIVPACS database if this proved necessary.

IFE were contracted to receive the preserved samples from the four sites, sort and identify the invertebrates to family level and determine the biomasses present at each site.

METHODS

Two Surber samplers of area 0.05 m² were supplied and 30 benthic samples were taken from each site. Subsequently, 120 samples were sorted and invertebrates identified to family level. Each sample was sorted by placing a portion in a tray divided into 16 sections by marks on the base. The number of invertebrates was quickly surveyed and a convenient subsample was decided upon by experience. The same proportion of each sample from a particular site was picked to simplify the statistics. Portions of each subsample were picked until the whole sample had been examined. In addition to picking the determined fraction, the rest of the sample was scanned for invertebrate families not present in that fraction. In this way, a complete family list can be acquired without the need to pick out every individual animal. The invertebrates from each sample were picked into two vials, one for the fraction picked completely (Tube A) and one for the rest of the sample (Tube B). These invertebrates were then identified to family level and the total number of animals of each family was determined by multiplying the number in Tube A by the appropriate factor (1/fraction) and adding the number from Tube B. Although adding the number from Tube B is not strictly correct, the error is small compared to that from the sub-sampling itself and it does have the advantage of ensuring that the most complete family list is compiled for each sample (otherwise those present in small numbers and not appearing in the fraction considered would be missed).

Invertebrate samples were dried in a fan assisted oven at 60°C for 3 hours and weighed to 4 sig figs after cooling in a desiccator.

Although not strictly within the terms of the contract, some simple analysis has been completed, BMWP and ASPT values are given as well as biomass values.

RESULTS

Samples were taken between 4 and 7 October 1997 inclusive.

All benthic samples were sub-sampled and one eighth of each sample was picked for biomass estimates.

The families found at each site are shown in Tables 1-4. In addition, the numbers of animals of each family in each sample are given.

BMWP values for each sample at each site are given in Table 5 and results for ASPT values in Table 6.

Biomass estimates are given in Table 7 and means and 95% CLs are also given. The confidence limits of the means in both streams overlap between wooded and open sites. A t test was therefore performed on the biomass data from both streams. The analysis was performed twice, assuming first equal and secondly unequal variances. In both statistics, the results were the same. In the Blackbridge stream, there was a significant difference between the biomasses of the previously wooded and open sites with a greater biomass in the open site ($t = 2.01$, $p = 0.025$). In the Falloden stream, there was no significant difference between the previously wooded and open sites ($t = 0.53$, $p = 0.30$).

The pattern of results is the same as in the previous May.

Table 3 List of invertebrate families and numbers found from samples at Site A (open) on the Falloden stream on 5 October 1997

	Site number														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Heptageniidae	24				8						8	8	8		
Leptophlebiidae	40														
Ephemerellidae		8											1	1	1
Ephemeridae							1								8
Leuctridae	8														
Odontoceridae			16					1	8	16		8	8	16	16
Leptoceridae															
Goeridae	9	34	24	8	8		16	16	8	24		16	24	56	16
Lepidostomatidae															
Sericostomatidae	33	17	1				1				1				8
Caenidae	16	8		16	8										
Rhyacophilidae	2	26	1	1	1		8	24	8	1	8	8	8	16	16
Polycentropodidae	69										8				8
Limnephilidae	36	8		8									16		32
Ancyliidae			8											8	
Hydroptilidae	8														
Gammaridae	139	90	120	64	48	24	32	176	64	72	120	168	120	296	88
Halplidae															
Dytiscidae															
Gyrinidae												8			8
Elmidae	595	268	176	152	232	104	232	360	48	208	568	344	312	504	288
Hydropsychidae	162	124	16	8	8		1	16		8	384		240	1	
Tipulidae			1	1	16	8		8		8		8		1	208
Simuliidae	257	171		16			8			8	96		48		32
Planariidae		8	8												
Dendrocoelidae		1					8		1	1	16	8		8	16
Baetidae	66	35	88	40	40	24	24	48	16	1	16	48	48	56	72
Sialidae															
Piscicolidae													8		1
Valvatidae	1											1	8		
Hydrobiidae			8												
Lymnaeidae													1		
Physidae	17														9
Planorbidae	1	1													1
Sphaeriidae															
Glossiphoniidae	56	13	8		8	8			24				24		8
Erpobdellidae	19	11	1	1	1	1	1	8	1		32	8	24	32	16
Asellidae	199	221	1	1	32	1	40	64	1	8	144	16	216	200	256
Chironomidae	178	24	1				1		1	8	72	24	9	24	56
Oligochaeta	187	43	24	24	56	24	56	8	16	72	8	40	112	160	56
Nematoda															
Hydracarina	16	8													1
Ceratopogonidae						8									
Empididae	8														
Stratiomyidae							8								
Oribatidae								8							
Succineidae									8						

Table 3 (cont)

	Site number														
	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Heptageniidae					8		8	8	8			8		1	
Leptophlebiidae															
EphemereUidae		1				1						1	1		
Ephemeridae						8									
Leuctridae															
Odontoceridae		8	24		16	1	8	16	1	16	8	1	8	16	16
Leptoceridae		8		8											
Goeridae	88	16	8		24	8	16	8	1	1		8	1		8
Lepidostomatidae						8							8	8	8
Sericostomatidae		8		16				8		8	8				
Caenidae															1
RhyacophUidae		1		8		32	16	1		16		1	16	32	
Polycentropodidae	8	8				8					1				
LimnephUidae	8	1		40		8		1		24				8	1
Ancylidae		8			1				1				1		
HydroptUidae															
Gammaridae	288	56	64	40	64	16	56	96	1	32	8	56	88	16	16
Haliplidae						1									
Dytiscidae				1											
Gyrinidae	8	1	8					24		1					16
Elmidae	352	208	144	88	384	152	320	248	304	56	104	168	976	96	48
Hydropsychidae		1	1	1		32	8	304	24	88	8	112	80	960	16
Tipulidae	8				1										
Simuliidae		16		24		32		88	1	24	8	16		80	1
Planariidae		8				8		8			16	1		48	1
Dendrocoelidae	24	8			1		1							16	
Baetidae	8	16	40	16	8	64	16	16	24	64	1	56	64	24	24
Sialidae				1											
Piscicolidae		8		8		1	1			1					
Valvatidae	16				1					1		1			8
HydrobiUidae	1														1
Lymnaeidae					8										8
Physidae	8	16		8		8				8				8	16
Planorbidae	8	1				1				1					
Sphaeriidae	8	1					1							1	1
Glossiphoniidae	8	32		16	8	8			1	1		24	8		8
Erpobdellidae	40		8	40	24	16	24		1	16	8	16		8	8
Asellidae	248	80	32	72	96	80	224	56	48	136	104	128	64	112	48
Chironomidae	88	136	24	56	24	88	64	72	40	80	64	16	8	48	120
Oligochaeta	56	192	32	176	152	96	72	40	88	24	72	16	1	40	72
Nematoda															
Hydracarina		8							8						
Ceratopogonidae													1		1
Empididae		8												8	
Succineidae									1						

Table 4 List of invertebrate families and numbers found from samples at Site B (wooded) on the Falloden stream on 4 October 1997.

	Site number														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Heptageniidae					8							8	8	8	
Leptophlebiidae		40			24										
Ephemerellidae		8			1										
Ephemeridae	8	8	1	8				8							
Leuctridae															
Odontoceridae	8	8		16	8	16	8				1	24	1	1	1
Leptoceridae	96														
Goeridae	48		32	24	8	104	32	16	32		16	96	16	40	1
Lepidostomatidae															
Sericostomatidae										40					
Calopterygidae															
Cordulegasteridae															
Psychomyiidae															
Caenidae	8	8												8	
Rhyacophilidae			8		8	8	8		1		1			1	1
Polycentropodidae	8	1			16										
Limnephilidae	16		1			8				1					
Ancyliidae															
Hydroptilidae															
Gammaridae	120	40	184	112	472	400	168	136	88	40	112	576	104	288	88
Haliplidae		1													
Dytiscidae	24														
Gyrinidae		16	1		8	1						1	1		
Elmidae	216	168	384	256	600	312	128	224	248	8	168	560	80	256	160
Chrysomelidae															
Curculionidae															
Hydropsychidae					208		8					1	1		
Tipulidae	8		24	8		16	8		24		16	24	8	8	24
Simuliidae	24		8		8										1
Planariidae												8			
Dendrocoelidae	8													8	
Baetidae	88	16	8	8	1216	16	24	8	56	8	40	88	32	1	40
Sialidae															
Piscicolidae															
Hydrobiidae			8	24	24			24	16		8				
Planorbidae					1										
Glossiphoniidae	1	8	16	1	64	1	1	16			1	1		8	8
Erpobdellidae	1	1	8	8	8		16	1		16	8	24		8	16
Asellidae	24	32	48	8	264	8		1		8	16	80		16	
Chironomidae	144	48	16		136		8	16	16	48				8	1
Oligochaeta	32	16	120	176	40	120	96	48	136	360	72	80	64	24	32
Hydracarina	8														
Ceratopogonidae															
Empidae					8										
Sisyridae															
Nematoda												16			

Table 4 (cont)

	Site number														
	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Heptageniidae		8													
Leptophlebiidae			24		1	8			8						8
EphemereIIDae						8					16				8
Ephemeridae			8						8			8			
Leuctridae															
Odontoceridae	1	1	8		8		16	1	8	8		1	1	16	8
Leptoceridae						8			16		8				
Goeridae	24	16	32		16	32	8	16	1	8	8	24	40	32	8
Lepidostomatidae															
Sericostomatidae									1		48	1			8
Calopterygidae						1									
Cordulegasteridae											1				
Psychomyiidae											8	1			
Caenidae		8											8	8	
Rhyacophilidae	1		24		16	1	8	8	1	1	8			1	24
Polycentropodidae			8			16			16						8
Limnephilidae			1			8			24	8	24	1			8
Ancyliidae															1
Hydroptilidae						8			8						
Gammaridae	136	208	352	32	384	144	152	160	48	176	264	144	176	280	272
Haliplidae															
Dytiscidae			1			8			1		8				16
Gyrinidae	8		8				1	1	8	1	1			8	1
Elmidae	472	392	688	144	432	336	304	144	240	256	480	224	432	360	392
Chrysomelidae													8		
Curculionidae															
Hydropsychidae	8	1	168		8	40		8	16	1		1	8	16	32
Tipulidae	8	1	1	1	8		8	1		16	8		8	1	
Simuliidae			544	8	8	104			16		208			8	208
Planariidae											8		8		8
Dendrocoelidae	8				1			8							
Baetidae	64	128	88	8	96	72	88	48	48	16	80	16	72	24	40
Stalidae															
Piscicolidae						1					8				
Valvatidae			1									8			
Hydrobiidae	16	8	16		16	1	16			16		40			
Lymnaeidae		8										8			
Physidae						8									
Planorbidae											1	1			
Glossiphoniidae		8	8			16			1	8	8	1	8	8	1
Erpobdellidae	8	1	24	8	8	16	1	8	24		16	8	16	32	8
Asellidae	1	16	184		8	88	8	16	16	16	144	48	24	40	240
Chironomidae	8		208	8	8	208	1	16	80	16	112	40	8	8	88
Oligochaeta	88	40	128	16	80	168	56	16	160	96	184	40	32	48	208
Hydracarina			16												
Ceratopogonidae	8						8								
Empidae									8						
Sisyridae												1			
Nematoda									1				1		

Table 5 BMWP values for each sample at each site

SAMPLE	Fallden A BMWP	Fallden B BMWP	Blackbridge A BMWP	Blackbridge B BMWP
1	130	108	69	87
2	101	91	57	121
3	88	79	47	51
4	68	63	23	128
5	69	112	99	94
6	30	71	35	108
7	76	61	73	71
8	59	50	75	73
9	59	41	88	68
10	68	41	81	83
11	73	60	49	39
12	69	75	70	86
13	101	61	72	59
14	92	81	71	76
15	131	61	59	61
16	81	74	58	93
17	139	78	110	66
18	54	119	33	49
19	87	31	88	81
20	79	84	60	110
21	128	127	123	83
22	78	64	107	132
23	95	71	65	61
24	73	134	73	90
25	99	76	82	81
26	66	129	55	93
27	92	99	132	68
28	82	74	70	132
29	99	87	84	36
30	101	123	58	99
MEAN	85.57	80.83	72.20	82.63

Table 6 ASPT values for each sample at each site

SAMPLE	Falloden A ASPT	Falloden B ASPT	Blackbridge A ASPT	Blackbridge B ASPT
1	5.2	5.4	4.9	6.2
2	5.1	5.7	5.7	5.8
3	5.2	4.9	5.2	4.6
4	5.2	5.3	3.8	6.1
5	5.3	5.3	5.8	5.9
6	3.3	5.9	4.4	5.7
7	4.8	5.1	5.6	5.1
8	4.9	4.6	5.0	5.2
9	4.9	4.6	5.9	5.2
10	5.2	4.6	6.2	5.5
11	5.2	5.0	4.9	4.3
12	4.9	5.0	5.0	5.4
13	5.3	6.1	5.5	4.5
14	5.8	5.4	5.5	5.1
15	5.5	5.1	4.9	5.1
16	4.3	4.6	5.3	5.8
17	5.2	5.2	5.8	5.5
18	4.9	5.2	4.7	6.0
19	4.8	3.9	5.5	5.8
20	4.9	5.3	4.6	6.5
21	5.6	5.5	5.6	5.5
22	5.2	4.6	5.6	6.0
23	5.9	4.7	4.6	5.6
24	4.6	5.8	4.6	6.0
25	5.0	5.1	5.1	5.4
26	5.1	5.6	4.6	5.8
27	5.4	5.0	5.7	5.7
28	5.5	4.9	5.0	5.7
29	5.0	5.1	4.9	4.5
30	4.6	5.9	4.8	5.5
MEAN	5.05	5.14	5.16	5.69

Table 7 Biomass estimates (individual, means and 95% CLs) at each site with mean biomasses expressed as g per metre squared

SAMPLE	Falloden A weight (g)	Falloden B weight (g)	Blackbridge A weight (g)	Blackbridge B weight (g)
1	1.3200	0.4968	1.6832	0.2824
2	0.6976	0.2384	0.2720	0.6840
3	0.4008	0.6880	0.4784	0.9064
4	0.3280	0.4896	0.1968	2.0720
5	0.4224	1.6392	0.3848	1.0024
6	0.1208	1.1136	1.0640	1.4632
7	0.2344	0.3784	0.3488	0.3920
8	0.2992	0.3848	1.1288	0.8296
9	0.1752	0.3936	0.6016	0.1760
10	0.4792	0.5504	0.6120	1.1608
11	1.0400	0.2512	0.5368	0.7576
12	0.5904	1.2712	0.6120	1.8088
13	0.7256	0.1640	0.7192	1.1448
14	0.9616	0.3464	1.0128	1.1240
15	0.6344	0.2848	0.6352	0.6904
16	1.1984	0.5936	0.7512	1.5488
17	0.5200	0.4944	0.6792	0.5392
18	0.4704	1.0808	0.7232	1.6824
19	0.6504	0.0936	0.7976	0.6304
20	0.9336	1.0560	1.0616	1.3672
21	0.5744	0.6016	0.4720	1.3656
22	0.6064	0.5048	0.8880	1.0448
23	0.5072	0.2808	0.4632	0.1464
24	0.1888	0.2328	0.5392	0.5208
25	0.4792	0.4512	1.5288	1.1600
26	0.1640	0.7352	0.8768	0.4008
27	0.3560	0.6192	0.7920	0.1736
28	0.3328	1.3736	0.3760	1.0376
29	0.7536	0.5912	0.3048	0.8640
30	0.3208	0.6096	0.2800	0.6104
TOTAL	16.49	18.01	20.82	27.59
MEAN	0.55	0.60	0.69	0.92
95%CL	0.11	0.14	0.13	0.19
BIOMASS	10.99	12.01	13.88	18.39