TABLE 2.24: (continued)

Date (end of week)	Minimum weekly Air temp. °C	Maximum weekly Air temp. °C	Mean min. weekly Air temp. °C	Mean max. weekly Air temp. °C	Water temp. °C	Rainfall (mm)	pH	Approx. mean weekly flow of water m^3/s	Depth of river at marked point (cm)	Was river flow stopped during week	Duration of shut-downs (hrs)
28 Apr 80	1,5	28,5	4,8	26,8	-	0,0	-	4	-	No	
5 May 80	3,5	28,5	4,9	27,4	-	0,0	-	4	-	No	
12 May 80	-2,0	29,0	3,1	22,6	-	0,0	-	4	-	No	
19 May 80	0,0	28,0	4,6	26,9	-	0,0	-	4	-	No	
26 May 80	-2,0	28,0	4,2	22,6	14,2	0,0	-	5	-13	No	
2 Jun 80	-3,0	22,0	-0,4	19,9	-	0,0	-	5	-	No	
9 Jun 80	-0,5	23,0	0,6	22,0	-	0,0	-	2	-	No	
16 Jun 80	-1,0	24,0	1,0	22,3	-	0,0	-	2	-	No	
23 Jun 80	-5,0	19,0	-1,8	16,4	11,1	0,0	-	3	-18	No	
30 Jun 80	-5,0	23,0	-1,7	17,4	-	0,0	-	4	-	No	
7 Jul 80	-5,0	21,0	-4,4	18,2	-	0,0	-	4	-	No	
14 Jul 80	-5,0	22,5	-3,9	20,3	-	0,0	-	6	-	No	
21 Jul 80	-3,0	22,5	0,6	21,2	13,9	0,0	-	6	-8	No	
28 Jul 80	-2,0	24,0	1,4	22,9	-	0,0	-	6	-	No	
4 Aug 80	3,5	24,0	6,1	22,8	15,4	0,0	-	4	-15	No	
11 Aug 80	2,5	24,5	6,5	22,8	15,9	0,0	-	3	-18	No	
18 Aug 80	-5,0	25,0	0,1	19,4	15,2	0,5	-	4	-17	Yes	72
25 Aug 80	2,0	27,0	4,9	25,6	15,9	0,0	-	6	5	Yes	72
1 Sep 80	0,5	28,5	5,2	22,3	15,9	0,0	-	4	-11	Yes	72
8 Sep 80	2,0	29,5	4,2	26,1	19,0	0,0	-	6	-9	Yes	72
15 Sep 80	3,0	29,0	5,9	25,0	17,5	0,0	-	9	0	Yes	72
22 Sep 80	3,5	30,0	7,5	26,9	20,0	0,0	-	8	-7	Yes	72
29 Sep 80	5,0	27,5	9,5	19,4	16,2	72,0	-	8	11	Yes	72
6 Oct 80	4,0	29,5	6,6	24,9	21,4	0,0	-	2	-16	Yes	72
13 Oct 80	9,5	35,5	13,9	33,4	24,7	0,0	-	8	-18	Yes	34
20 Oct 80	4,0	33,0	8,2	26,2	25,4	0,0	-	7	0	Yes	72
27 Oct 80	3,5	30,5	8,4	27,2	21,9	0,0	-	16	5	No	
3 Nov 80	13,5	35,0	15,5	33,1	26,3	0,0	-	10	-3	No	
10 Nov 80	4,0	33,0	10,6	28,5	26,0	0,0	-	13	-3	No	
17 Nov 80	5,5	31,0	9,6	26,6	25,0	4,8	-	10	-8	No	
24 Nov 80	5,5	33,0	11,1	28,7	23,4	12,2	-	10	-7	No	
1 Dec 80	12,0	30,5	13,7	26,7	25,4	67,6	-	4	-14	No	

TABLE 2.24: (continued)

Date (end of week)	Minimum weekly Air temp. °C	Maximum weekly Air temp. °C	Mean min. weekly Air temp. °C	Mean max. weekly Air temp. °C	Water temp. °C	Rainfall (mm)	pH	Approx. mean weekly flow of water m^3/s	Depth of river at marked point (cm)	Was river flow stopped during week	Duration of shut-downs (hr)
7 Dec 80	11,0	30,5	13,9	28,1	28,2	0,0	-	4	-14	No	
13 Dec 80	10,5	33,5	14,3	30,8	-	25,0	-	6	-	No	
21 Dec 80	10,0	34,5	13,9	30,1	-	17,0	-	7	-	No	
29 Dec 80	13,0	34,5	16,0	32,5	-	16,0	-	9	-	No	
5 Jan 81	11,5	36,0	14,6	34,0	-	12,4	-	9	-	No	
12 Jan 81	14,5	32,5	16,0	31,4	27,8	10,8	-	9	-9	No	
19 Jan 81	10,0	36,0	13,4	32,5	-	8,7	-	12	-	No	
26 Jan 81	15,0	34,0	17,9	30,4	-	75,1	-	15	-	No	
2 Feb 81	15,0	31,0	17,1	29,0	-	6,1	-	4	-	No	
9 Feb 81	15,0	24,5	17,6	30,1	-	25,8	-	6	-	No	
16 Feb 81	14,0	31,0	15,3	29,9	-	32,4	-	4	-	No	
23 Feb 81	13,5	32,5	15,6	28,4	-	12,8	-	4	-	No	
2 Mar 81	16,0	31,5	16,9	29,3	-	3,0	-	-	-	No	
9 Mar 81	10,0	31,0	13,4	28,6	-	0,0	-	-	-	No	

* It was decided that river flow cessation (shut down) occurred when the flow was less than 1 m^3 per second. For a few exceptional cases in 1978 a faulty sluice gate allowed water in excess of 1 m^3 to flow during shut down programmes

2.8 POPULATION DENSITY ESTIMATES OBTAINED FROM FAUNA COLLECTED FROM ARTIFICIAL SUBSTRATES, STONES AND DRIFT SAMPLES

Population estimates of Simuliidae for a particular date and number of substrates are presented as the Sichel mean number of individuals per unit of substrate (Table 2.25). These figures and their 90 per cent confidence intervals were calculated according to the methods described above (Appendix 2.2.1d, pg 2.10ff). The 90 per cent confidence intervals not shown in Table 2.25 are shown in Volume 1 (Ch. 4, Fig. 3).

In retrospect it was interesting to note that by 30 August 1979 larval and pupal numbers of *S. chutteri* on artificial substrates were increasing (Table 2.25). Vandals removed all the rods with artificial substrates from the river between the 31st August and 6th September and no sample was thus collected on that date. By the 13th September when artificial substrates had been left in the river for one week, the Sichel mean number of pupae per substrate had decreased from 9 on the 30th August to 5, and macro-sample larvae from 56 to 27. Micro-sample larvae did not however appear to be affected and they increased from 66 to 167 per substrate. By the 20th September pupae had still not shown the expected increase, but now macro-sample larvae showed a marked increase. On the 28th September the simuliid population structure on artificial substrates had adjusted again and high numbers of pupae were present once more. It was interesting to see that a stable population structure of Simuliidae was only found on artificial substrates which had been left exposed and undisturbed in the river for three weeks.

As trends in population levels of Simuliidae on stones followed those on artificial substrates reasonably closely (Appendix 2.2.1e, Fig. 2.2) it was assumed that the $\log_e$ transformation used to normalise counts from artificial substrates was also applicable to the counts of Simuliidae and other fauna obtained from the stones-in-current samples. Population estimates of the simuliid fauna collected from monthly samples of five stones-in-current were therefore determined after the data had been transformed. As this data was extensively used in Chapter 8, the actual figures are presented in Appendix 5, Table 5.1. Again this Table shows only the Sichel mean counts of Simuliidae per 1 000 cm^2 of stone surface area, the 90 per cent confidence intervals can again be calculated according to the methods above (Appendix 2.2.1d).

TABLE 2.25: The number of Simuliidae per artificial substrate expressed as Sichel means. Figures in parentheses for species other than *S. chutteri* refer to pupae. All values rounded to unity except for mean counts <0,5 which were then indicated. Samples collected from March 1979 to March 1980

Dates	4 Mar	8 Mar	15 Mar	22 Mar	29 Mar	5 Apr	12 Apr	19 Apr	26 Apr	3 May
First instar larvae	3	2	1	1	1	3	3	4	9	15
Small larvae	71	35	88	76	85	63	109	68	78	72
S. chutteri larvae	43	6	37	34	68	26	69	32	54	27
S. chutteri pupae	21	5	14	7	13	10	10	11	14	8
S. adersi	1(0,3)	0,1(0,1)	3(1)	0,1(0,1)	0,1(0,1)	1(0,3)	2(1)	1(0,4)	3(1)	4(0,3)
S. mcmahoni	0,1(0,1)	0(0)	0(0,1)	0(0)	0,1(0,1)	0,1(0,1)	0,3(0,3)	0,4(0,2)	1(1)	0,4(1)
S. damnosum	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	0,1(0)	0,1(0,1)
Number of substrates	28	27	25	30	28	27	28	19	24	28

Dates	10 May	17 May	24 May	31 May	7 June	14 June	21 June	28 June	5 July	12 July
First instar larvae	20	6	6	5	18	10	14	16	33	6
Small larvae	166	116	139	147	143	106	162	123	259	116
S. chutteri larvae	62	28	36	56	53	33	18	5	23	9
S. chutteri pupae	17	7	7	5	8	15	7	1	2	1
S. adersi	12(1)	16(2)	24(4)	14(4)	8(4)	9(2)	6(2)	3(1)	10(2)	4(1)
S. mcmahoni	2(0,3)	1(1)	2(0,2)	3(1)	1(1)	1(2)	2(1)	2(1)	3(2)	2(1)
S. damnosum	0,1(0)	0,1(0)	0,4(0,1)	1(0,1)	0,2(0,1)	0,4(0,1)	0,4(0,2)	0,3(0,1)	1(0,1)	1(0,1)
Number of substrates	29	28	28	28	28	29	30	30	30	28

TABLE 2.25: (continued)

Dates	21 July	26 Jul	2 Aug	9 Aug	16 Aug	23 Aug	30 Aug	6 Sep	13 Sep	20 Sep
First instar larvae	5	2	4	4	4	3	0,4	VANDALS NO DATA	9	11
Small larvae	124	78	64	61	73	56	66		167	322
S. chutteri larvae	19	24	15	13	35	29	56		27	87
S. chutteri pupae	1	1	1	2	6	4	9		4	3
S. adersi	11(1)	6(1)	7(1)	11(1)	15(2)	5(3)	1(2)		1(0,3)	2(1)
S. mcmahoni	2(1)	1(0,4)	1(1)	1(1)	3(1)	3(1)	2(3)		0,2(0,4)	1(0,1)
S. damnosum	0,4(0,2)	0,4(0,2)	0,2(0,2)	0,3(0,1)	0,3(0,1)	1(0,1)	1(0,1)		1(1)	0,2(0,1)
Number of substrates	27	30	28	28	28	28	29		27	27

Dates	28 Sep	5 Oct	11 Oct	18 Oct	25 Oct	1 Nov	8 Nov	16 Nov	22 Nov	29 Nov
First instar larvae	5	8	12	18	14	8	10	6	7	15
Small larvae	443	1337	1267	1227	1214	421	441	468	560	324
S. chutteri larvae	175	450	440	360	374	110	149	155	245	150
S. chutteri pupae	14	103	128	121	88	23	32	32	44	29
S. adersi	2(0,3)	1(1)	0,4(0,2)	2(1)	2(2)	0,2(0,2)	1(0,1)	4(1)	1(1)	2(1)
S. mcmahoni	1(0,1)	0,4(1)	1(1)	0,3(0,2)	1(0,2)	0,2(0,3)	1(0,1)	1(0,1)	0,4(0,1)	0,3(0,1)
S. damnosum	1(0,1)	1(1)	3(0,1)	4(1)	5(1)	1(1)	2(0,2)	3(0,1)	1(1)	1(0,3)
Number of substrates	25	23	26	30	24	23	26	20	27	29

TABLE 2.25: (continued)

Dates	6 Dec	13 Dec	19 Dec	30 Dec	3 Jan	10 Jan	17 Jan	25 Jan	31 Jan	7 Feb
First instar larvae	7	3	2	1	2	1	2	3	4	6
Small larvae	367	189	188	146	183	123	174	207	278	483
S. chutteri larvae	220	80	71	82	98	109	108	117	117	216
S. chutteri pupae	49	21	25	37	26	31	29	43	30	72
S. adersi	5(1)	1(1)	0,2(0,2)	1(1)	0,2(0,1)	0,1(0,1)	0,1(0,1)	0,1(0,2)	0,2(0,1)	0,2(0,1)
S. mcmahoni	0,4(0)	0,2(0,2)	0,1(0,1)	0,1(0,2)	0,2(0)	0,1(0)	0(0,1)	0,1(0,2)	0,2(0,2)	0,2(0)
S. damnosum	3(0,2)	0,4(0,1)	1(0,1)	1(1)	1(0,2)	0,3(0,1)	0,1(0)	0,4(0,1)	0,3(0)	1(0,1)
Number of substrates	21	26	25	21	23	26	22	24	21	25

Dates	14 Feb	21 Feb	28 Feb	6 Mar	13 Mar	20 Mar
First instar larvae	2	1	8	10	3	11
Small larvae	328	217	444	205	114	314
S. chutteri larvae	151	96	321	96	43	94
S. chutteri pupae	52	35	51	26	13	9
S. adersi	0,1(0)	0,1(0,1)	0,2(0,1)	1(0,1)	6(0,4)	3(1)
S. mcmahoni	0,1(0)	0,3(0,1)	0,1(0,1)	0,4(0,3)	1(0)	1(0,1)
S. damnosum	1(0,1)	1(0,1)	1(0,4)	5(1)	1(0,3)	2(1)
Number of substrates	22	24	27	25	27	27

Population estimates of the other fauna from stones-in-current samples at monthly intervals were also determined as the Sichel mean number of animals per 1 000 cm^2 of stone surface and a selection of data is presented in Appendix 5, Tables 5.2 and 5.3. These figures were used to determine important predictors of the simuliid population size (Ch. 8). Animals only encountered occasionally on stones from the rapid are presented in Table 2.26.

Population density estimates from drift samples were converted to present the number of animals per 1 000 litres of water sampled at weekly intervals. All data on drift densities collected at weekly or longer intervals is presented in Table 2.27. A selection of this data was used to construct Table 5.4 in Appendix 5.

TABLE 2.26: Fauna collected from stones-in-current samples but not presented in Appendix 5

Fauna	Months and years collected
Hirudinea	
Salifa perspicax	Aug 1979; Oct, Dec 1980
Ephemeroptera	
Austrocaenis capensis	Dec 1980; Jan 1981
Trichoptera	
Catoxyethira sp.	Nov 1978; Jan - Jul 1979; Apr, Jul, Oct, Dec 1980; Jan, Feb 1981
Ecnomus thomasseti	Jan, Nov 1980; Jan 1981
Pseudoleptocerus sp.	Nov, Dec 1978; Jan, Feb, Oct 1979
Macronema capensis	Jan 1979
Eggs of Hydropsychidae	Sep, Oct 1979; Oct 1980
Mollusca	
Pisidium sp.	May 1979

TABLE 2.27: Analysis of afternoon drift samples taken from above the rapids at Witrand at weekly or monthly intervals from 18 June 1978 to 13 March 1981. Counts expressed as numbers per 1 000ℓ of water sampled

Date	1978 18 Jun	6 Jul	1 Aug	17 Aug	30 Aug	28 Sep	12 Oct	19 Oct	26 Oct	30 Oct	9 Nov	16 Nov
Coelenterata												
Hydra sp.												
Oligochaeta												
Mollusca												
Juvenile bivalves												
Pisidium sp.												
Burnupia sp.												
Diptera												
Simuliidae eggs		2	14	56	90	229	226	223	160	171	158	61
First instar larvae		89	234	136	170	195	187	184	240	131	123	188
Small larvae		128	117	132	154	89	39	147	97	166	183	97
Other micro-sample larvae		5	23	26	6	7		8			5	
Macro-sample larvae												
Simulium chutteri												
Simulium adersi												
Simulium nomahoni												
Simulium damnosum												
Male flies						17	13	8	1			
Female flies						10	9	1				
Chironomidae												
Orthocladinae		57	66	69	67	63	67	42	59	52	30	30
Corynoneura sp.				1	3		4	5				
Pentaneura sp.		2	2	4			7					
Ceratopogonidae												
Bezzia sp. larvae												
Ephemeroptera												
Juvenile nymphs		14	56	22	19	53	46	34	63	48	57	61
Exuviae		24	42	68	61	93	49	57	55	44	75	70
Baetis glaucus												
Centroptilum sp.												
Tricorythus sp.												
Austrocaenis sp.												
Choroterpes sp.												
Trichoptera												
Cheumatopsyche thomasseti												
Amphipsyche scottae												
Hydropsychidae larvae				1		30	46	55	34	39	25	18
Hydroptilidae larvae		2					4	3	8	4		
Hydropsychidae eggs												
Neuroptera												
Sisyridae larvae												
Plecoptera												
Neoperla sp. eggs												
Coleoptera												
Elmidae larvae												
Nematoda												
Water volume sampled (ℓ)	662	1707	738	1248	1207	1134	1523	951	915	1621	1318	
Duration (mins)	24	59	23	32	25	30	29	25	24	43	33	
Time sample removed	16h15	16h36	17h08	16h40	16h25	16h30	16h27	16h31	15h54	16h45	17h23	
Temp (°C) at approx. 16h00	11,9	12,0	16,0	17,8	22,2	22,2	24,4	22,6	24,4	26,6	26,2	

TABLE 2.27: (continued)

Date	1978 23 Nov	30 Nov	7 Dec	21 Dec	28 Dec	1979 4 Jan	11 Jan	18 Jan	25 Jan	1 Feb	8 Feb	15 Feb
Coelenterata												
Hydra sp.												
Oligochaeta												
Mollusca												
Juvenile bivalves												
Pisidium sp.	2	1						1				
Burnupia sp.												1
Diptera												
Simuliidae eggs	46	24	23	62	41	19	34	13	10	10	20	9
First instar larvae	107	49	28	16	16	6	3	2	8	10	11	2
Small larvae	71	60	45	49	19	11	3	7	6	8	5	3
Other micro-sample larvae	6	6	8		3						1	
Macro-sample larvae												
Simulium shuttleri												
Simulium adersi												
Simulium nyanhoni												
Simulium damnosum												
Male flies												
Female flies												
Chironomidae												
Orthocladinae	6	4	3	11	10	5	3	9	6	0	5	6
Corynoneura sp.		1										
Pentaneura sp.	2	3		3								
Ceratopogonidae												
Bezzia sp. larvae												
Ephemeroptera												
Juvenile nymphs	63	27	24	28	29	29	18	9	14	20	13	10
Exuviae	62	62	55	11	32	11	34	29	27	63	60	18
Baetis glaucus									*			
Centroptilum sp.												
Tricorythus sp.												
Austrocaenis sp.												
Choroterpes sp.	11	1	1					2		P	1	
Trichoptera												
Cheumatopsyche thomasseti												
Amphipsyche scottae												
Hydropsychidae larvae	31	10	8	3	3	8	2	4	6	3	5	5
Hydroptilidae larvae	1	6										
Hydropsychidae eggs												P[1]
Neuroptera												
Sisyridae larvae	11	1	1	3	6							
Plecoptera												
Neoperla sp. eggs												
Coleoptera												
Elmidae larvae			3	3								
Nematoda												
Water volume sampled (ℓ)	2094	2763	2613	980	1260	2206	2453	3110	2046	1583	2996	2034
Duration (mins)	49	66	61	42	53	63	63	71	54	44	78	50
Time sample removed	16h27	16h58	16h46	17h40	16h56	16h53	16h50	16h56	16h44	17h06	17h03	16h41
Temp (°C) at approx. 16h00	26,9	27,8	29,4	25,2	-	24,3	26,1	24,5	24,6	28,3	27,4	27,1

TABLE 2.27: (continued)

Date	1979 22 Feb	8 Mar	15 Mar	22 Mar	29 Mar	5 Apr	12 Apr	19 Apr	26 Apr	3 May	10 May	17 May
Coelenterata												
Hydra sp.			1			4						
Oligochaeta												
Mollusca												
Juvenile bivalves												
Pisidium sp.							1					
Burnupia sp.												
Diptera												
Simuliidae eggs	12	25	13	9	6	10	14	12	4	17	3	4
First instar larvae	3	20	4	7	17	22	19	42	61	62	50	62
Small larvae	8	5	4	6	11	29	16	16	19	21	23	27
Other micro-sample larvae		2	1	4		6	5	6	1	2	2	
Macro-sample larvae												
Simulium chutteri												
Simulium adersi												
Simulium nomahoni												
Simulium damnosum												
Male flies												
Female flies												
Chironomidae												
Orthocladinae	5	17	12	13	6	17	23	12	23	25	19	17
Corynoneura sp.												
Pentaneura sp.				7	1	6	4		7	1		3
Ceratopogonidae												
Bezzia sp. larvae												
Ephemeroptera												
Juvenile nymphs	9	52	10	27	46	50	54	58	84	26	28	19
Exuviae	14	71	30	53	124	83	123	78	108	61	40	34
Baetis glaucus			1						1	1	1	
Centroptilum sp.						1			1		1	
Tricorythus sp.												
Austrocaenis sp.			1		1							
Choroterpes sp.							4					
Trichoptera												
Cheumatopsyche thomasseti												
Amphipsyche scottae										1		
Hydropsychidae larvae	8	33	10	17	13	20	20	28	29	18	7	1
Hydroptilidae larvae	1			2		1	6		1		1	
Hydropsychidae eggs		P^2	P^3	P^1	P^1	P^5	P^1		P^1	P^1		P^2
Neuroptera												
Sisyridae larvae	1	2			1		1		4	2		
Plecoptera												
Neoperla sp. eggs												
Coleoptera												
Elmidae larvae												
Nematoda												
Water volume sampled (ℓ)	1435	2543	2302	2424	1434	1574	1672	1334	693	1137	1238	1028
Duration (mins)	52	62	58	61	66	67	69	72	65	72	60	56
Time sample removed	16h32	17h30	16h45	16h48	17h18	17h22	17h16	17h15	17h15	17h02	16h54	16h35
Temp (°C) at approx 16h00	25,2	28,6	23,8	24,7	24,4	23,3	24,5	22,6	21,8	21,0	15,9	17,6

TABLE 2.27: (continued)

Date	1979 24 May	31 May	7 Jun	14 Jun	21 Jun	5 Jul	12 Jul	21 Jul	26 Jul	2 Aug	9 Aug	16 Aug
Coelenterata												
Hydra sp.									1	5	17	9
Oligochaeta												
Mollusca												
Juvenile bivalves												
Pisidium sp.												
Burnupia sp.												
Diptera												
Simuliidae eggs	2	12	3	2	0	3	0	4	5	13	29	20
First instar larvae	33	31	85	31	68	100	26	23	17	32	34	47
Small larvae	40	31	39	29	37	89	20	23	16	37	8	27
Other micro-sample larvae	2	2	21	2	3	11	4	6	9	13	29	3
Macro-sample larvae												
Simulium chutteri		2			3			1				
Simulium adersi				1								
Simulium nomzhoni			3			1			1			
Simulium damnosum												
Male flies				1								
Female flies								3				
Chironomidae												
Orthocladinae	35	17	17	16	20	62	47	66	41	74	94	82
Corynoneura sp.				1					1	2	5	9
Pentaneura sp.	3			2	3			3			2	
Ceratopogonidae												
Bezzia sp. larvae												
Ephemeroptera												
Juvenile nymphs	26	28	16	10	9	16	7	12	2	8	2	13
Exuviae	40	50	52	24	23	29	51	63	36	35	56	88
Baetis glaucus												
Centroptilum sp.						3			1		2	
Tricorythus sp.												
Austrocaenis sp.												
Choroterpes sp.		2										
Trichoptera												
Cheumatopsyche thomassetti											2	
Amphipsyche scottae												
Hydropsychidae larvae				1								
Hydroptilidae larvae												
Hydropsychidae eggs	P[3]											
Neuroptera												
Sisyridae larvae												
Plecoptera												
Neoperla sp. eggs												
Coleoptera												
Elmidae larvae												
Nematoda												
Water volume sampled (ℓ)	1444	1715	1192	1152	1176	990	1403	1405	2022	1590	1561	1455
Duration (mins)	60	63	62	54	75	69	68	50	65	63	60	52
Time sample removed	16h25	17h08	16h46	16h27	17h00	16h57	16h28	16h52	16h37	16h45	16h30	16h37
Temp (°C) at approx. 16h00	16,9	17,1	16,0	10,3	12,2	12,0	10,0	12,0	11,4	13,8	14,7	16,6

TABLE 2.27: (continued)

Date	1979 23 Aug	30 Aug	6 Sep	13 Sep	20 Sep	27 Sep	4 Oct	11 Oct	25 Oct	1 Nov	8 Nov	16 Nov
Coelenterata												
Hydra sp.	17	6	10	3	1							
Oligochaeta												
Mollusca												
Juvenile bivalves												
Pisidium sp.												
Burmupia sp.												
Diptera												
Simuliidae eggs	12	8	4	81	98	52	46	66	79	61	65	28
First instar larvae	76	73	79	117	101	24	44	73	162	26	21	26
Small larvae	22	46	35	77	150	63	76	111	112	84	54	73
Other micro-sample larvae	5	8	6	15	26	13	7	28	24	14	6	12
Macro-sample larvae												
Simulium chutteri								3				
Simulium adersi												
Simulium mamahoni												
Simulium damnosum												
Male flies								1				
Female flies								2				
Chironomidae												
Orthocladinae	76	79	117	182	163	76	57	74	67	23	11	20
Corynoneura sp.	8			2	1	2	4	9	12	3	2	1
Pentaneura sp.		6				4			2	3		1
Ceratopogonidae												
Bezzia sp. larvae				2								
Ephemeroptera												
Juvenile nymphs	22	30	10	15	9	7	4	31	43	22	16	35
Exuviae	47	73	58	38	47	29	51	88	49	37	39	62
Baetis glaucus												
Centroptilum sp.							2					
Iniocorythus sp.												
Austrocaenis sp.												
Choroterpes sp.				3								
Trichoptera												
Cheumatopsyche thomasseti												
Amphipsyche scottae												
Hydropsychidae larvae					1	4	10	13	18	14	14	19
Hydroptilidae larvae							4		14	3		
Hydropsychidae eggs									P[1]	P[1]		
Neuroptera												
Sisyridae larvae							4		4	2	3	
Plecoptera												
Neoperla sp. eggs												
Coleoptera												
Elmidae larvae									2	2	2	
Nematoda							2					
Water volume sampled (ℓ)	949	991	776	2455	2062	1780	1832	1874	1313	1929	1763	1637
Duration (mins)	50	53	43	65	53	54	57	58	52	61	53	60
Time sample removed	16h32	16h38	16h15	16h44	16h53	16h56	16h05	16h49	17h03	17h01	17h02	16h59
Temp (°C) at approx. 16h00	16,0	19,4	17,2	19,5	21,0	19,4	23,0	23,7	25,0	25,2	24,5	28,2

TABLE 2.27: (continued)

Date	1979 22 Nov	29 Nov	6 Dec	13 Dec	19 Dec	30 Dec	1980 3 Jan	10 Jan	17 Jan	25 Jan	31 Jan	7 Feb
Coelenterata												
Hydra sp.				1	1	1						
Oligochaeta					1			2				
Mollusca												
Juvenile bivalves												
Pisidium sp.		1							5	5		
Burnupia sp.												
Diptera												
Simuliidae eggs	62	87	24	43	35	15	6	38	31	17	26	38
First instar larvae	45	42	30	14	5	5	14	13	5	17	6	28
Small larvae	64	55	44	28	15	13	11	19	13	24	22	22
Other micro-sample larvae	6	5	8	4	6	4	4	5	5	10	4	10
Macro-sample larvae												
Simulium chutteri										2		1
Simulium adersi												
Simulium nomahoni												
Simulium damnosum												
Male flies		2										
Female flies												
Chironomidae												
Orthocladinae	10	9	21	11	6	5	6	7	9	7	15	5
Corynoneura sp.	2	2										2
Pentaneura sp.		1						1				
Ceratopogonidae												
Bezzia sp. larvae							2					
Ephemeroptera												
Juvenile nymphs	22	28	39	28	24	24	26	19	23	11	21	24
Exuviae	62	90	92	67	65	29	41	33	62	64	61	69
Baetis glaucus										1		
Centroptilum sp.					1							
Tricorythus sp.								2				
Alatrocaimis sp.												
Choroterpes sp.						2						
Trichoptera												
Chaumatopsyche thomasseti											1	
Amphipsyche scottae												
Hydropsychidae larvae	15	15	14	6	3	4	3	7	2	2	4	9
Hydroptilidae larvae	2	5	1				3		1		2	
Hydropsychidae eggs	P[1]	P[1]		P[1]						P[1]		
Neuroptera												
Sisyridae larvae		2	1	1	2			1				
Plecoptera												
Neoperla sp. eggs												
Coleoptera												
Elmidae larvae												
Nematoda												
Water volume sampled (ℓ)	1246	2276	2309	2703	3326	2124	1874	2290	2066	2169	2170	2033
Duration (mins)	60	56	49	53	62	44	51	56	52	53	55	56
Time sample removed	16h58	17h08	17h06	16h56	17h0	17h00	16h56	17h10	17h10	17h08	17h01	17h05
Temp (°C) at approx. 16h00	28,5	28,9	24,4	25,0	26,9	27,9	27,6	25,1	25,5	27,9	25,8	27,9

TABLE 2.27: (continued)

Date	1980 14 Feb	21 Feb	28 Feb	6 Mar	13 Mar	20 Mar	18 Apr	26 May**	25 Jun	10 Jul	23 Jul***	6 Aug
Coelenterata												
Hydra sp.						2						2
Oligochaeta								1				
Mollusca												
Juvenile bivalves			4	4		39	P[m]	1				
Pisidium sp.												
Bunnupia sp.												
Diptera												
Simuliidae eggs	17	16	35	82	11	37	5	2	4	3	6	2
First instar larvae	14	14	8	53	50	44	12	14	21	7	8	2
Small larvae	17	32	9	22	50	31	16	15	13	24	16	18
Other micro-sample larvae	2	6	1	2	11	9	1	4	4	7	11	1
Macro-sample larvae												
Simulium chutteri								1				
Simulium adersi												1
Simulium nomahoni												
Simulium damnosum								1				
Male flies								1				
Female flies												
Chironomidae												
Orthocladinae	13	11	13	24	18	39	23	15	13	15	37	34
Corynoneura sp.	1	2	1				1	3	2			2
Pentaneura sp.		2			4					1		
Ceratopogonidae												
Bezzia sp. larvae												
Ephemeroptera												
Juvenile nymphs	16	20	16	36	26	17	12	7	2	3	5	5
Exuviae	75	82	58	170	98	135	51	7	13	6		
Baetis glamous			1									
Centroptilum sp.	1											
Tricorythus sp.			1			3						
Austrocaenis sp.												
Choroterpes sp.	1											
Trichoptera												
Cheumatopsyche thomassetti												
Amphipsyche scottae							1					
Hydropsychidae larvae	4	5	5	7	26	8	5	2	1			
Hydroptilidae larvae	1		7	2	7				2			
Hydropsychidae eggs				P*								
Neuroptera												
Sisyridae larvae	1					3						
Plecoptera												
Neoperla sp. eggs								1			1	
Coleoptera												
Elmidae larvae												
Nematoda												
Water volume sampled (ℓ)	2722	1761	2056	1208	736	1445	1326	1917	1354	1162	877	879
Duration (mins)	64	51	48	53	38	61	48	60	?	53	30	54
Time sample removed	17h12	17h01	16h48	17h07	17h03	17h08	17h02	16h44	?	16h17	16h16	16h24
Temp (°C) at approx. 16h00	27,4	27,8	24,6	29,7	24,8	26,3	18,3	14,2	11,1	10,8	13,9	15,9

TABLE 2.27: (continued)

Date	1980 13 Aug	20 Aug	27 Aug	3 Sep	10 Sep	17 Sep	24 Sep	1 Oct	8 Oct	15 Oct	22 Oct	29 Oct
Coelenterata												
Hydra sp.	3		1		2		P			P		
Oligochaeta										P		
Mollusca												
Juvenile bivalves											1	
Pisidium sp.												
Burnupia sp.												
Diptera												
Simuliidae eggs	5	42	19	61	64	64	29	16	90	124	101	66
First instar larvae	4	7	10	3	17	26	7	16	36	43	40	30
Small larvae	16	13	2	3	15	16	5	43	57	67	27	46
Other micro-sample larvae	1	1	3	2	9	1	3		6	7	7	21
Macro-sample larvae												
Simulium chutteri		1								1		1
Simulium adersi												
Simulium mamahoni												
Simulium damnosum						P						
Male flies	1	1										
Female flies	3											
Chironomidae												
Orthocladinae	26	41	20	68	45	46	35	23	55	72	63	52
Corynoneura sp.	1				1	P					2	
Pentaneura sp.								1				P
Ceratopogonidae												
Bezzia sp. larvae		2			1					P		
Ephemeroptera												
Juvenile nymphs	6	1	1	9	6	3	1	1	2	12	4	12
Exuviae												
Baetis glaucus												P
Centroptilum sp.												
Tricorythus sp.			1									
Austrocaenis sp.												
Choroterpes sp.						P						
Trichoptera												
Cheumatopsyche thomasseti												P
Amphipsyche scottae												
Hydropsychidae larvae						1		2	18	5	14	16
Hydroptilidae larvae									2	3		
Hydropsychidae eggs										P[1]	P[1]	P*
Neuroptera												
Sisyridae larvae		1							3	P	1	1
Plecoptera												
Neoperla sp. eggs												
Coleoptera												
Elmidae larvae												
Nematoda												
Water volume sampled (ℓ)	794	1200	1013	1847	2077	2411	2117	1216	1256	2300	2218	2243
Duration (mins)	35	53	66	58	58	62	51	64	55	68	56	62
Time sample removed	16h35	15h30	17h10	16h42	16h17	16h04	16h16	16h46	16h21	17h05	16h18	17h13
Temp (°C) at approx. 16h00		15,9	15,9	19,0	17,5	20,0	16,2	21,4	24,7	25,4	21,9	26,3

TABLE 2.27: (continued)

Date	1980 5 Nov	12 Nov	26 Nov	5 Dec	1981 15 Jan	12 Feb	13 Mar
Coelenterata							
Hydra sp.	1						
Oligochaeta							
Mollusca							
Juvenile bivalves				4	1		
Pisidium sp.							
Burnupia sp.							
Diptera							
Simuliidae eggs	102	42	24	377	21	31	12
First instar larvae	48	40	32	88	9	4	2
Small larvae	58	69	39	76	11	18	8
Other micro-sample larvae	19	31	12	14	2		2
Macro-sample larvae							
Simulium chutteri		P					
Simulium adersi							
Simulium nomahoni							
Simulium damnosum							
Male flies							
Female flies							
Chironomidae							
Orthocladinae	69	28	25	47	7	40	34
Corynoneura sp.							
Pentaneura sp.		P		2			
Ceratopogonidae							
Bezzia sp. larvae	P						
Ephemeroptera							
Juvenile nymphs	65	5	6	15	6	13	17
Exuviae							
Baetis glaucus							
Centroptilum sp.							
Tricorythus sp.							
Austrocaenis sp.							
Choroterpes sp.							
Trichoptera							
Chaematopsyche thomasseti							
Amphipsyche scottae							
Hydropsychidae larvae	6	10	12	4	6	4	8
Hydroptilidae larvae	12	1	1	2			3
Hydropsychidae eggs		P					
Neuroptera							
Sisyridae larvae	1	2	1	4	1	9	4
Plecoptera							
Neoperla sp. eggs			3		47	4	2
Coleoptera							
Elmidae larvae							
Nematoda							
Water volume sampled (ℓ)	2054	2088	1776	1951	2161	226	1120
Duration (mins)	60	64	50	60	60	57	54
Time sample removed	16h45	16h20	17h16	17h02	17h07	17h25	17h04
Temp (°C) at approx. 16h00	26,0	25,0	25,4	28,2	27,8	29,6	25,7

* 4 October 1979 = 24 h drift sample done, took 16h00 sample for this as the 17h00 was unreliable

P^m = Present many

** = From this date onwards noted *Neoperla* sp. eggs

*** = From this date onwards did not note Ephemeroptera exuviae any more

P^n where N = 1, 2, 3, 4 etc.

APPENDIX 3

3. ANALYSIS OF SAMPLES COLLECTED IN A SMALL STREAM FLOWING INTO THE VAAL RIVER

The fauna collected from the small stream was sorted, enumerated and counts of species on each date were converted to percentages. All the more abundant fauna are presented in Table 3.1 and the rarer fauna and months when they were encountered are presented in Table 3.2.

TABLE 3.1: The relative abundance of the faunal groups sampled at the small stream caused by a leakage in the main irrigation canal. The animals are presented as a percentage of the total animals counted

	1977							1978			
	9 Jun	27 Jul	25 Aug	29 Sep	25 Oct	24 Nov	2 Jan	31 Mar	9 Mar	13 Apr	30 May
Coelenterata											
Hydra sp.		1,1	2,0	0,3							
Turbellaria											
Planarilidae		2,1	2,5	1,9	P	1,2	0,8	6,9			
Ephemeroptera											
Baetis glaucus	P[1]		0,1		0,8	1,1	0,2		0,8		1,7
Centroptilum excisum	P[1]	0,4	0,2		0,2	0,3					0,1
C. medium					P	0,3	1,2	3,4			
Chorotarpes sp.	P[1]	0,6				1,0	0,1		1,3	0,3	0,1
Afronurus sp.						0,1					
Austrocaenis capensis	P[1]	0,1	0,1			0,1		13,8			0,3
Tricorythus sp.				0,8	0,1					1,3	
Juvenile ephemeroptera	P[1]	2,8	0,2	7,0	0,1	1,6	0,4	3,4		0,3	2,8
Trichoptera											
Somoma thomassetti		0,1		0,3		0,1					
Chaumatopsyche thomassetti	P[1]	10,8	11,4	3,0	0,1	0,4		3,4	3,0		2,9
Hydropsychidae juveniles		0,6									
Orthotrichia sp.		2,0	1,8	1,1		0,4					
Catoxyethira sp.		0,3	0,2			0,5					0,1
Hydroptilidae juveniles										0,3	
Diptera											
Simulium nigritarse	0,9*		0,6*	0,6*	2,3*	5,3*	0,3			0,3	0,2
S. nomahoni	0,7	0,4		0,3	0,8*	6,4*	0,4*		0,5	2,2	0,5*
S. ruwenzori	98,0*	0,4*			0,4*	5,8*	29,5*	31,0*	9,4*	11,2*	6,6*
S. shuttari	0,2*	1,1	0,1		0,1		0,3				0,2
S. hargreavesi	0,2	0,3		0,3							
S. damnosum											
Small simuliid larvae	P[4]	0,9	0,5	2,1	13,6	12,2	52,2	6,9	71,6	50,3	45,0
Chironomidae	P[4]	75,9	80,2	82,0	81,5	61,6	14,2	24,1	13,4	33,2	39,2
Mollusca											
Burnupia sp.			0,3	0,2	0,1	1,6	0,3	6,9		0,3	0,2
pH											
Water temperature late afternoon °C		10,5	12,5	18,5	21,0	24,2	24,8	26,8	25,5	20,0	13,9
Range of water velocity cm/s	23-69			16-32	26-59	20-56	21-44	Flood	23-51	18-46	18-39
Mean water velocity cm/s	38			27	39	31	32		32	28	29
Total number of individuals	570**	1138	1875	629	5643	1459	997	29	395	304	2407

TABLE 3.1: (continued)

Date	1978						1979			
	27 Jun	31 Jul	29 Aug	29 Sep	27 Oct	1 Dec	3 Jan	2 Feb	6 Mar	3 Apr
Coelenterata										
Hydra sp.									0,4	0,8
Turbellaria										
Planariidae		0,1	0,1	0,4	0,8		2,5	0,4	0,1	0,2
Ephemeroptera										
Baetis glaucus		1,0	1,2		0,5	0,7			0,3	2,1
Centroptilum exotinum									0,2	
C. medium			0,2						0,1	
Choroterpes sp.				0,4		0,2				0,2
Afronurus sp.										
Austrocloeon japansis					0,1		0,3	0,4	0,4	0,3
Tricorythus sp.						0,2			0,1	
Juvenile ephemeroptera	1,0	1,2	3,4	2,3	0,1	0,5	1,5	0,4	0,1	7,0
Trichoptera										
Simonus thomassetti										0,1
Cheumatopsyche thomassetti	1,4	4,8	4,6	0,3	0,4				0,1	
Hydropsychidae juveniles									1,0	1,0
Orthotrichia sp.		0,1					0,5		0,3	
Oxyethira sp.	0,2				0,1	0,2				
Hydroptilidae juveniles										
Diptera										
Simulium nigritarse	2,0	1,2*	4,7*	3,8*	5,8		0,5	0,4		
S. monahoni	8,5*	2,5*	0,6*	0,9*	1,5*	0,2*	2,0*	1,5*	1,8*	1,0*
S. adersi	15,0*	8,3*	1,1	1,3*	1,9*	0,2	13,5*	12,0*	42,6*	9,2*
S. chutteri	2,2	4,7*	0,6*	0,3	0,9			1,8	1,2	12,3*
S. hargreavesi										0,5
S. damnosum									0,4	0,2
Small simuliid larvae	17,4	13,2	18,8	13,8	18,0	17,1	17,8	7,7	16,6	40,8
Chironomidae	52,2	62,8	64,6	76,2	69,0	78,8	61,1	74,1	33,9	29,3
Mollusca										
Pumupia sp.	0,1	0,1	0,1	0,4	0,7	1,0	0,3	1,5	0,4	
pH						7,7		6,8	7,1	8,0
Water temperature late afternoon °C	9,8	12,0	15,4	17,6	21,6	25,0	22,8	24,7	23,6	21,4
Range of water velocity cm/s	19-55	22-54	19-67	24-59	16-47		19-45	39-96	18-55	
Mean water velocity cm/s	31	36	35	39	32		34	68	32	
Total number of individuals	1976	2015	1000	782	738	406	393	274	994	970

TABLE 3.1: (continued)

Date	1979								1980	
	1 May	8 Jun	10 Jul	8 Aug	11 Sep	3 Oct	6 Nov	7 Dec	8 Jan	8 Jan.***
Coelenteraca										
Hydra sp.		1,4	0,7	6,4	8,0					1,1
Turbellaria										
Planarildae	P	0,2	0,1	0,8	4,7	0,4	0,4	1,5	1,3	0,1
Ephemeroptera										
Baetis glaucus	1,1		0,1	0,1		1,3	0,6	0,8	0,6	0,3
Centroptilum azoiaum	0,1		0,1		0,1	1,9	1,3	0,5		
C. medium			0,1		0,3					0,3
Choroterpes sp.										
Afronurus sp.										
Austrocaenis capensis	P		P	0,1	1,0	0,4	0,1	0,2	3,8	0,1
Tricorythus sp.										
Juvenile ephemeroptera	1,7	0,7	0,6	0,4	1,1	1,1	0,5	2,5	7,6	2,1
Trichoptera										
Somoma thomasseti				0,1	0,1			0,2		
Chewmatopsyche thomasseti	0,4	0,7	0,2	1,2	0,4		0,7	0,9		0,1
Hydropsychidae juveniles	1,1						0,8	0,8		1,1
Orthotrichia sp.		P	0,1	0,3			0,1	0,3	1,3	0,1
Cataoyethira sp.	0,1	0,2	0,9	0,9		0,5		1,1	15,2	0,1
Hydroptilidae juveniles	2,9	2,4	0,5	0,1			1,6			
Diptera										
Simulium nigritarse			0,4*	0,4*		1,7*	0,5*	1,7	1,3	1,1
S. nomahoni	0,2*	3,9*	1,0*	0,4*		1,9*	1,6*	0,9*	0,6	3,4*
S. adersi	3,3*	14,1*	40,0*	6,3*		1,6*	1,8*	9,6*	4,4	21,9*
S. chutteri	P	3,6			0,1		0,1			
S. hargreavesi		1,0*								
S. damnosum		0,3*	P				3,0			2,9*
Small simuliid larvae	16,0	46,0	21,3	2,7		12,8	15,5	26,3	32,9	40,1
Chironomidae	72,8	25,3	33,9	79,8	83,1	76,3	71,2	52,6	31,0	24,9
Mollusca										
Burnupia sp.	P	0,3	P	0,3	0,1	0,1		0,4		
pH	7,7	8,3	8,0	8,2	8,2	8,2		7,9	8,2	8,2
Water temperature late afternoon °C	18,2	14,7	9,8	12,5	16,2	19,4	22,9	24,4	23,9	23,9
Range of water velocity cm/s	13-39	18-56	16-52	19-48	15-32		21-62	17-37	21-59	43-67
Mean water velocity cm/s	24	39	33	33	22		32	23	30	59
Total number of individuals	2804	2355	3488	1920	709	755	970	1916	158	700

** = Only Simuliidae were counted on this date
* = Indicates that pupae were present in sample
P[1] = Present but numbers not counted
P = Present but less than 0,05 per cent of total
*** = A sample taken slightly upstream of usual sampling site. Water flow was faster at this second site

TABLE 3.2: The fauna not recorded in Table 3.1 and the months and years in which they occurred in samples from the small stream caused by a leak in the canal

Group	Occurrence
Porifera	Jan, March 1978
Oligochaeta	Jul 1977, Jan, Jun, Sep 1978, Mar, Apr 1979
Cladocera	Sep, Nov 1977
Copepoda	Jul, Aug, Sep, Oct, Nov 1977, Jan, May 1978
Ostracoda	Jul, Aug, Nov 1977, Jan, May, Sep, Oct, Dec 1978, Mar 1979
Decapoda	
Caridina nilotica	Mar, Aug, 1978, Jan 1980
Potamon sp.	Jan 1980
Hydracarina	
Hydrachnellae	Jul, Aug, Nov 1977, Jan, June 1978
Odonata	
Anisopteran nymphs	Nov 1977, Jan 1978, Dec 1979
Zygopteran nymphs	Sep 1979
Hemiptera	Nov 1977, Dec 1978
Neuroptera	
Sisyridae larvae	Jan 1978
Trichoptera	
Amphipsyche scottae	Feb, Apr, May 1979
Coleoptera	
Gyrinidae	
Aulonogyrus sp.	Jun, Jul 1978
Elmidae	Aug 1977, Jan, Jul, Aug 1978
Hydraenidae	Nov 1977, Apr, Aug 1978, Oct 1979
Thysanoptera	Jul, Aug, Nov 1977, Jan, Apr 1978
Diptera	
Ceratopogonidae	
Forcipomyia sp.	Nov 1977
Bezzia sp.	Jan, Jul, Dec 1978
Tipulidae	Nov 1977
Culicidae	Jan 1978
Simuliidae	
Simulium ruficorne	Jan, Dec 1979
Anthomyidae	Nov 1977, Jan 1978
Ephydridae	Dec 1978
Mollusca	
Pisidium sp.	Jul, Aug, Sep 1977, Jan 1978
Corbicula sp.	Nov 1977, Jan, Aug 1978, Jan, Apr, Jun, Aug, Dec 1979

APPENDIX 4

4. ANALYSIS OF DATA REFERRED TO IN CHAPTER 7

Tables 4.1 and 4.2 refer to drift samples collected upstream and downstream of the study rapid at Witrand. Table 4.3 gives detailed data used for current velocity preference studies and Table 4.4 shows data collected for depth preference studies conducted on Simuliidae.

Table 4.5 is a list of Odonata species collected along the river banks of the Vaal River and Table 4.6 a species list of diatoms that were fed on by the larvae of *S. chutteri* and *S. adersi*.

TABLE 4.1: Analysis of drift samples collected over twenty-four hours below a rapid on the farm Witrand from 4 to 5 October 1979. Faunal counts converted to numbers per 1 000 ℓ of water

Simuliidae										
Simulium eggs	57	52	44	47	33	58	68	41	45	22
First instars	0	5	5	5	5	12	9	6	6	
Small larvae 92 µm	70	11	10	15	15	21	20	6	7	27
Large larvae 256 µm		28	33	32	33	40	54	34	21	
Adults	2	1	2	2	2	2	-	-	-	-
S. chutteri larvae	2	2	3	5	5	2	4	3	2	1
S. adersi larvae	1									
S. mcmahoni larvae		1								
Chironomidae										
Orthocladinae	108	74	79	70	53	84	89	50	47	42
Corynoneura sp.		3	7	1		7	3	5	7	
Pentaneura sp.				1	1	1	1			
Ephemeroptera										
Juveniles	23	4	6	2	2	6	12	8	6	9
Baetis glaucus						1	1	1		
3 *Centroptilum* spp.				1			3	4	3	
Euthraulus sp.	10						1	2	1	4
Hydropsychid larvae	2	5	7	5	5	9	7	5	5	1
Sisyridae larvae		1		1		1				
Hydra sp.	1	1	1						1	1
Time started	11h30	12h00	12h58	14h57	16h02	17h03	17h59	20h02	22h00	23h00
Duration (mins)	27	58	59	64	59	53	60	58	59	62
Water volume (ℓ)	3359	8047	8187	8887	8257	7417	8397	8117	8257	8677
FRASS mℓ/1000ℓ	1,6*	3,12	8,28	3,03	*	3,67	3,36	3,62	3,37	3,34

Simuliidae									
Simulium eggs	45	?	53	38	31	44	50	50	49
First instars	6	?	4	3	4	3	3	3	5
Small larvae 92 µm	8	?	8	5	2	4	4	13	12
Large larvae 256 µm	12	20	17	18	17	19	21	21	15
Adults								3	2
S. chutteri larvae	2	?	2	1	1	1	2	2	2
S. adersi larvae					1				
S. mcmahoni larvae						1			
Chironomidae									
Orthocladinae	41	19	43	36	33	35	44	67	67
Corynoneura sp.	2		4	5	2	4	3	5	2
Pentaneura sp.				1	1		1		
Ephemeroptera									
Juveniles	8	4	4	4	4	5	6	3	2
Baetis glaucus			1						
3 *Centroptilum* spp.	2		3	1	2	3			
Euthraulus sp.	2		1	2	1				
Hydropsychid larvae	6	1	6	2	1	4		2	3
Sisyridae larvae			1				1		3
Hydra sp.	1		1						
Time started	00h04	00h59	02h06	05h00	04h09	04h59	06h05	07h00	09h00
Duration (mins)	54	66	53	68	49	61	54	59	58
Water volume (ℓ)	7557	9236	7417	9516	6857	8537	7557	8257	8117
FRASS mℓ/1000ℓ	3,41	1,84*	4,07	3,26	3,73	3,12	3,53	3,96	3,33

* Samples not carefully handled for collection of FRASS

TABLE 4.2: The number of animals collected per 1 000 ℓ of drifting river water from samples collected wi' paddle wheel samplers upstream and downstream of a rapid on farm Witrand from 10 July to 5 November 1980

Drift upstream of rapid	10 Jul	23 Jul	6 Aug	13 Aug	20 Aug	23 Aug	25 Aug	27 Aug
Simuliidae								
Eggs	3	6	2	5	42	9	52	19
First instars	7	8	2	4	7	9	1	10
92 µm netting larvae	24	16	18	16	13	38	13	2
256 µm netting larvae	7	11	1	1	1	9	5	3
Large macro larvae	0	0	1	0	1	0	0	0
Chironomidae	16	37	36	27	41	28	56	20
Time started	15h24	15h45	15h30	16h00	14h37	13h10	11h16	16h04
Duration (mins)	53	31	54	35	53	35	64	66
Water volume (ℓ)	1162	877	879	794	1200	106	2623	1013

Drift downstream of rapid	10 Jul	23 Jul	6 Aug	13 Aug	20 Aug	23 Aug	25 Aug	27 Aug
Simuliidae								
Eggs	7	6	15	2	23	4	79	15
First instars	23	4	4	0	2	4	2	3
92 µm netting larvae	2	2	7	2	2	4	0	1
256 µm netting larvae	1	6	7	2	8	11	17	11
Large macro larvae	5	2	0	7	3	30	2	0
Chironomidae	23	19	100	33	3	71	175	59
Time started	15h15	15h30	15h12	15h10	14h30	12h54	11h05	16h04
Duration (mins)	53	23	62	56	58	46	64	66
Water volume (ℓ)	1162	528	270	425	913	267	2341	744

TABLE 4.2: (continued)

Drift upstream of rapid	3 Sep	10 Sep	24 Sep	1 Oct	22 Oct	29 Oct	5 Nov
Simuliidae							
Eggs	61	64	29	16	101	66	102
First instars	3	17	7	16	40	30	48
92 µm netting larvae	3	15	5	16	27	46	58
256 µm netting larvae	2	9	3	24	7	21	19
Large macro larvae	0	0	0	0	0	1	0
Chironomidae	68	46	35	24	65	52	69
Time started	15h44	15h19	15h25	15h42	15h22	16h11	15h45
Duration (mins)	58	58	51	64	56	62	60
Water volume (ℓ)	1847	2077	2117	1216	2218	2243	2054

Drift downstream of rapid	3 Sep	10 Sep	24 Sep	1 Oct	22 Oct	29 Oct	5 Nov
Simuliidae							
Eggs	59	43	27	9	56	40	40
First instars	4	5	1	5	9	0	7
92 µm netting larvae	12	3	1	0	9	31	41
256 µm netting larvae	9	29	18	0	22	56	26
Large macro larvae	3	1	3	9	1	4	5
Chironomidae	107	66	22	78	8	35	41
Time started	15h36	15h11	15h15	15h33	15h06	16h02	15h40
Duration (mins)	58	58	52	66	64	64	55
Water volume (ℓ)	1365	1765	1698	218	2623	1542	1474

Author De Moor F C
Name of thesis A Community of simulium species in the Vaal River near Warrenton 1982

PUBLISHER:
University of the Witwatersrand, Johannesburg
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