The Faunal Richness of Headwater Streams

Progress Report for the Period
July 1993 - September 1993

M.T. Furse
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1. INTRODUCTION

This project is in four stages:-

- A review of existing data.
- Catchment studies.
- An evaluation of the impact of agricultural activities.
- The development of a catchment strategy.

Stage 1 is complete and has been fully documented in previous reports.

All field work and analyses for Stage 2 have been completed and an R & D Note, reporting on this Stage is being completed.

The principal work undertaken during the reporting period has been the completion of the Stage 3 fieldwork.

This report summarizes the outstanding work to be completed for Stage 2 and the progress to date with the third stage.

2. TECHNICAL PROGRESS

2.1 Objectives

The overall and specific objectives of each stage are detailed in the Project Investment Appraisal (PIA) which is Schedule 2 of the Memorandum of Agreement for Research Contract (ref:54015000) between the National Rivers authority (NRA) and the Institute of Freshwater Ecology (IFE).

2.2 Work programme

2.2.1 Stage 2

The Stage 2 work programme has been fully documented in previous progress reports. The production of the relevant R&D Note is the only outstanding element of this programme.

2.2.1 Stage 3

Stage 3 activities outlined in Schedule 2 of the PIA comprise:-

- Establish which agricultural practices have not been sufficiently well covered by the catchment studies for a range of geological and geographical catchments.
- Consult the NRA and other sources of land use/pollution information and in consultation with the project leader establish further headwater stream sites to fill these gaps.
- Utilize the same field methodologies as Stage 2 in order to obtain biological, land cover and river corridor data for these sites.
- Analyse the data as appropriate.
- Identify taxa which may be used as indicators of environmental damage due to agricultural activity.
- Produce an R&D note reporting on this stage of the work.

In earlier discussions between the Project Leader (NRA) and the Project Manager (IFE) an agreed interpretation of the first two elements of the work programme was formulated. This is detailed in the previous report.

In summary a stratified random selection process was devised in order to ensure an adequate coverage of all major agricultural practices in each of the four study catchments. The strata were five major aggregate land cover types. The selection matrix was the national OS 1 km square grid of Great Britain. Further details are given in Appendix I.

2.3 Progress achieved

2.3.1 Stage 2

A revised, second draft of the R&D note was completed in June. It incorporated most of revisions suggested by the Project Leader. These included splitting the report into two volumes.

Volume 1 contained the main text. Volume 2 contained the bulk of the raw data (excluding site and sample taxon lists), more detailed accounts of land cover, river corridor and satellite imagery definitions and data collection procedures, summary descriptions of each sample site and all bibliographic data on historical land use and land cover changes. These were presented as a series of appendices.

Fifteen copies of each volume were forwarded to the Project Leader on 5th August. These were circulated within the NRA regions for review and suggested amendments.

Annotated draft volumes and recommended changes received from the Project Leader on the 15th September. In the opinion of the Project Leader, "Overall the report was well received and people thought it was interesting and useful."

The principal recommendations concerned changes to the Executive Summary and Recommendations sections. A series of other suggested changes included improving the quality and accuracy of the geological data and the incorporation of more basic macro-invertebrate data in the Appendix Volume.

The Project Leader recommended that hydrogeologists in the appropriate NRA regions be asked to provide solid and drift geology information on each headwater catchment. This information was requested by letter, from the Project Leader, accompanied by site location maps provided by the Project Manager. Requests were sent out in the last week of September and no replies were received during the reporting period.

It was recognized by the Project Leader and Manager that these requests would delay the completion of the final revision but that all efforts would be made by both parties to minimize this delay.

Revision of the report is in progress and will be completed in the next reporting period.

2.3.2 Stage 3

Site selection

No further site selection was required because few difficulties were encountered with site access or suitability in either the Derwent or Lugg catchments.

Preparation of Field Assessment Booklets

Preparation of Field Assessment Booklets (FABs) was a slow and time-consuming process which began in late May and continued into the current reporting period. All booklets were eventually produced just in advance of their need in the field.

In total, 243 FABs, containing 1215 catchment maps were produced for the Stage 3 field surveys.

Staffing

The field surveyors complete all surveying within their period of appointment and their contracts ended on 13th August as anticipated. Their standard of work, as perceived by the Project Manager, was thought to be high. Completion of field maps was generally neat, accurate and comprehensive.

Two work experience schoolchildren and one voluntary worker assisted with the non-skilled aspects of FAB production in order to minimize the staff costs incurred by this laborious process.

2.3.3 General and administrative

The Project Leader and Project Manager have liaised, as necessary, throughout the reporting period.

A three-way dialogue was opened up between the Project Leader, the NRA R&D Project Co-ordinator and the Project Manager on the extent to which colour should be used in project reports and how any additional costs arising from the use of colour should be met. In the interim it was agreed that the number of colour figures in Stage 2 should be substantially reduced, to a set of approximately eight. These should include plates, copied from colour prints, showing example sites from each of the four major river systems studied.

3. INTERIM RESULTS

3.1 River Stour

All field sampling and surveying and laboratory water analyses were completed in the previous reporting period.

Information on site names, locations, field codes, biological sampling dates and results of chemical analyses have been collated (Appendix I). Details are still subject to checking, particularly grid references and may change slightly.

No samples were sorted or identified during the reporting period.

3.2 River Cam

All field sampling and surveying and laboratory water analyses were completed in the previous reporting period.

Information on site names, locations, field codes, biological sampling dates and results of chemical analyses have been collated (Appendix II). Details are still subject to checking, particularly grid references and may change slightly.

No samples were sorted or identified during the reporting period.

3.3 River Derwent

Biological, chemical and instream environmental sampling began on 22nd June, in the previous reporting period. It was completed on the 7th July.

Forty-two sites were visited in order to obtain the 39 samples required for Stage 3 analyses. Of the three remaining sites, two were dry and the third was an additional sample taken at the request of a landowner (see previous Progress Report).

Largely as a result of pre-planning contacts made by the Project Leader, no refusals of access were encountered. However, in one case refusal was fully anticipated, following comments from adjacent landowners, and no attempt was made to access that site.

Land cover and river corridor surveying, which began on 30th June was completed on the 9th July.

All water samples from the Derwent system were analysed for alkalinity (mg l^{-1} $CaCO_3$) and nitrate (mg l^{-1} NO_3) between late June and mid-July.

Information on site names, locations, field codes, biological sampling dates and results of chemical analyses have been collated (Appendix III). Details are still subject to checking, particularly grid references and may change slightly.

Ten samples were sorted but none identified during the reporting period.

3.4 River Lugg

Biological, chemical and instream environmental sampling was undertaken between 13th and 23rd July.

The full number of 39 samples were obtained from 44 site visits. Permission to sample was refused at only one site and four others were dry.

Land cover and river corridor surveying took place between 16th July and 2nd August.

All water samples from the Lugg system were analysed for alkalinity (mg l^{-1} $CaCO_3$) and nitrate (mg l^{-1} NO_3) during the reporting period.

Information on site names, locations, field codes, biological sampling dates and results of chemical analyses have been collated (Appendix IV). Details are still subject to checking, particularly grid references and may change slightly.

No samples were sorted or identified during the reporting period.

4. WORK PROGRAMME FOR THE NEXT REPORTING PERIOD

4.1 Stage 2

- The R&D Note will undergo a final revision and will be re-submitted to the Project Leader for approval to undertake production.
- The way forward concerning the use of colour in reports and the method of covering the resultant costs will be clarified.

4.2 Stage 3

- Sorting and identification of biological samples will continue.
- The collated lists of site details will be checked for accuracy.
- Liaison with the Project Leader will be maintained and progress with the project will be reported to the NRA.

5. COST OF WORK DURING THE REPORTING PERIOD

The cost of the work during the reporting period is likely to be generally in line with cost-base adjusted budget in the Memorandum of Agreement.

Detailed costings will be made available to the NRA, via the IFE Finance Office.

6. ESTIMATE OF THE TOTAL COSTS OF THE WORK

The total cost of the work is likely to be generally in line with the cost-adjusted budget listed in Section 10 of the PIA and Schedule 8 of the project contract.

The two exceptions referred to in the previous Progress Report still apply. Each relates to the Stage 2 R&D Note and are:

- Additional production costs incurred through the greater than anticipated use of colour figures.
- The production of three, rather than the anticipated two drafts of the Note.

A third possible source of additional costs may be anticipated. Geographic Information System technology is now available within IFE. This will greatly enhance the ease of interpretation of the land cover and river corridor survey maps. However digitization of base maps from Ordnance Survey sources currently attracts quite high costs. IFE has a digitization licence and fully adheres to the terms of the licence. Possible costs are as yet uncertain but will be reported to the Project Leader once known.

7. ESTIMATE OF COSTS FOR THE NEXT REPORTING PERIOD

Stage 3 data acquisition and processing remains on schedule and costs for the next three months will be in line with expectation.

Anticipated overspends on the preparation and production of the Stage 2 R&D Note are referred to in the previous section.

8. FACTORS LIKELY TO AFFECT THE SATISFACTORY COMPLETION OF THE WORK

With the exception of the Stage 2 R&D Note the work is currently on schedule and completion of the work within the stipulated contract period is still anticipated.

APPENDIX I Names, locations, field site codes, sampling dates and alkalinity and nitrate concentrations for the Stage 3 headwater sites on the River Stour. Names and locations of unsampled sites are also given together with the reasons for non-sampling.

BIOLOGICAL, CHEMICAL AND SURVEY DATA COLLECTED

Watercourse name	Site name	NGR	Code	Date	Alk'y	Nitrate	
Un-named watercourse	Noon Hill	SU 109 089	WF1	09-06-93	0.0	0.04	
Un-named watercourse	West Knoyle	ST 858 317	WF2	02-06-93	150.5	0.46	
Un-named watercourse	Middlemarsh	ST 668 069	WF3	05-06-93	42.0	0.32	
Un-named watercourse	Cranborne Common	SU 106 116	WF4	09-06-93	23.0	1.47	
Un-named watercourse	Cockroad Wood	ST 747 317	WF5	01-06-93	77.5	1.66	
Un-named watercourse	Ferndown	SU 080 018	WFR2	14-06-93	2.0	0.00	
Un-named watercourse	Cannon Hill	SU 048 015	WFR4A	08-06-93	1.0	2.75	
Un-named watercourse	Holt Heath	SU 0640357	DS1A	10-06-93	1.5	0.00	
Un-named watercourse	Marsh Farm	ST 778 086	AG1	07-06-93	174.5	4.77	
Un-named watercourse	Lymburghs Farm	ST 809 187	AG3	03-06-93	644.0	0.00	#
Un-named watercourse	Barrow Lane	ST 723 322	AG5	01-06-93	232.5	1.43	
Un-named watercourse	Stour Row	ST 815 210	AG6	03-06-93	359.5	3.84	#
Un-named watercourse	Stour Provost	ST 800 210	AG7	03-06-93	334.0	4.72	#
Un-named watercourse	West End *	ST 911 032	AG8	08-06-93	240.5	7.87	
Un-named watercourse	Hammond Street Farm	ST 734 070	AG10	05-06-93	322.5	1.56	
Un-named watercourse	Knackers' Hole	ST 780 108	AG11	07-06-93	260.5	2.96	
Un-named watercourse	Gold Hill	ST 820 135	AG12	10-06-93	222.5	0.89	
Un-named watercourse	Lugmarsh Farm	ST 860 311	AG13	02-06-93	102.0	1.84	
Un-named watercourse	Marsh Court	ST 735 257	AG14	01-06-93	231.0	0.28	
Un-named watercourse	Thornhill	ST 735 150	AG16	04-03-93	319.0	1.97	
Un-named watercourse	Belchalwell	ST 790 095	AG17	07-06-93	223.5	8.79	
Un-named watercourse	Hays	ST 875 286	AG19	03-06-93	96.5	25.60	
Un-named watercourse	Sharnhill Green	ST 713 050	AG20	05-06-93	248.5	1.85	
Un-named watercourse	Bedchester	ST 856 171	AG21	03-06-93	237.5	5.53	
Un-named watercourse	The Middles	ST 846 319	AG23	02-06-93	209.0	2.35	
Un-named watercourse	Rivers' Corner	ST 784 130	AGR4	07-06-93	276.0	4.38	
Un-named watercourse	Canning's Court	ST 714 077	AGR5	05-06-93	244.0	1.43	
Un-named watercourse	Shapwick *	ST 929 023	AGR6	14-06-93	251.5	9.00	#
Un-named watercourse	Mill Farm	ST 814 110	AGR7	08-06-93	242.0	0.00	
Un-named watercourse	Little Pamphill	ST 996 003	AGR9	08-06-93	89.0	8.74	
Un-named watercourse	Wilkin Throop	ST 692 234	AGR10	15-06-93	273.5	0.50	#
Un-named watercourse	Sedgehill	ST 863 278	AGR11A	17-06-93	68.0	0.99	#
Un-named watercourse	East Stour	ST 810 227	AGR12	15-06-93	219.0	2.44	#
Un-named watercourse	Charnage	ST 836 321	A1	02-06-93	192.0	9.86	
Un-named watercourse	Holtwood Farm	ST 700 143	A5	04-06-93	302.5	3.72	
Un-named watercourse	Witchampton	ST 984 055	A6	11-06-93	254.5	8.79	#
Un-named watercourse	Wimborne St.Giles	SU 024 133	A8	09-06-93	204.5	6.15	
Un-named watercourse	White Kennels	ST 930 120	A9	10-06-93	231.5	7.48	#

BIOLOGICAL & CHEMICAL SAMPLE TAKEN CORRECTLY - SURVEY PERMISSION REFUSED

Watercourse name	Site name	NGR	Code	Date	Alk'y	Nitrate	
Un-named watercourse	Longburton U/S STW	ST 6381267	WFR3A	15-06-93	319.5	1.19	#
Un-named watercourse	Etheridge Farm	ST 800 109	AG9	07-06-93	199.0	3.00	

FIRST BIOLOGICAL & CHEMICAL SAMPLES TAKEN FROM WRONG PLACE - NO SURVEY

Watercourse name	Site name	NGR	Code	Date	Alk'y	Nitrate	
Un-named watercourse	Longburton D/S STW *	ST 638 126	WFR3B	17-06-93	361.5	4.46	#
Un-named watercourse	Cannon Hill	SU 0480157	WFR4B	08-06-93	1.5	3.41	
Un-named watercourse	Holt Heath	SU 064 035	DS1B	09-06-93	2.5	0.00	
Un-named watercourse	Sedgehill $	ST 863278	AG11B	17-06-93	Not sampled		

BIOLOGICAL & CHEMICAL SAMPLE TAKEN FROM STANDING WATER - NO SURVEY

Watercourse name	Site name	NGR	Code	Date	Alk'y	Nitrate
Un-named watercourse	Combe Throop	ST 717 235	AG2	02-06-93	217.5	4.82
Un-named watercourse	Hammoon	ST 808 138	AGR8	10-06-93	255.5	0.00

* = Sample in two pots $ = No Sample or Survey Area forms # = Unfiltered

APPENDIX I, River Stour (continued)

SAMPLING PERMISSION REFUSED OUTRIGHT

Watercourse name	Site name	NGR	Code
Un-named watercourse	Westrow House	ST 692 110	AG15
Un-named watercourse	Stanbridge	SU 010 040	AG18
Un-named watercourse	West Hill Cottage	ST 646 140	A3
Un-named watercourse	Hunger Hill	ST 685 279	A19

WRITTEN REQUEST FOR SAMPLING REQUIRED - NO TIME AVAILABLE TO DO SO

Watercourse name	Site name	NGR	Code
Un-named watercourse	Stalbridge	ST 720 179	AG22
Un-named watercourse	Stalbridge Weston	ST 717 172	A4
Un-named watercourse	Haydon	ST 670 155	A7

SAMPLING PERMISSION ASSUMED UNLIKELY TO BE GRANTED - NO ACTION TAKEN

Watercourse name	Site name	NGR	Code
Un-named watercourse	Sturt Farm	ST 721 164	AG4
Un-named watercourse	Gaunt's Common	SU 027 059	AGR3

SITE CHARACTER FOUND TO BE UNSUITABLE WHEN VISITED FOR SAMPLING

Watercourse name	Site name	NGR	Code	
Un-named watercourse	Dudsbury	SZ 070 979	AGR1	
Un-named watercourse	St.Leonard's	SU 125 030	WFR1	Urban

SITE DRY

Watercourse name	Site name	NGR	Code
Un-named watercourse	Thickthorn Down	ST 960 127	A2

SITE REJECTED PRIOR TO SAMPLING VISIT BECAUSE OF URBAN CHARACTER

Watercourse name	Site name	NGR	Code
Un-named watercourse	Stock Hill	ST 790 267	AGR2

REASON FOR NOT SAMPLING NOT KNOWN

Watercourse name	Site name	NGR	Code
Un-named watercourse	Canford Heath	SZ 029 960	WFR5

APPENDIX II Names, locations, field site codes, sampling dates and alkalinity and nitrate concentrations for the Stage 3 headwater sites on the River Cam. Names and locations of unsampled sites are also given together with the reasons for non-sampling.

BIOLOGICAL, CHEMICAL AND SURVEY DATA COLLECTED

Watercourse name	Site name	NGR	Code	Date	Alk'y	Nit
Un-named watercourse	Harcamlow Way	TL 359 580	AG1	16-06-93	325.0	3.91
Un-named watercourse	Near Whaddon	TL 334 473	AG2	15-06-93	199.5	0.39
Un-named watercourse	Exning	TL 622 650	AG3	15-06-93	250.0	12.80
Un-named watercourse	Croyden	TL 319 490	AG4	17-06-93	319.5	18.90
Un-named watercourse	Trinity Conduit	TL 422 599	AG5	16-06-93	271.5	6.27
Un-named watercourse	Harlton	TL 379 526	A1	15-06-93	292.0	7.41
Un-named watercourse	Bowsers	TL 573 428	A2	15-06-93	293.5	5.07
Un-named watercourse	Church End	TL 575 419	A4	15-06-93	342.0	2.60
Un-named watercourse	Longstowe	TL 305 553	A5	16-06-93	194.5	2.77
Un-named watercourse	East Hatley	TL 290 250	A6	17-06-93	371.0	16.00
Un-named watercourse	Reach	TL 561 658	A7	14-06-93	209.0	9.23
Un-named watercourse	Poor's Fen	TL 572 694	A8	14-06-93	403.0	0.00
Un-named watercourse	Highbridge Farm	TL 552 658	A9	14-06-93	228.5	4.43
Un-named watercourse	Gill's Hill	TL 332 562	AR2	16-06-93	279.5	5.62
Un-named watercourse	North End	TL 293 442	AR3	17-06-93	254.5	2.79

DRY SITES

Watercourse name	Site name	NGR	Code
Un-named watercourse	Building End	TL 435 375	A3
Un-named watercourse	Chiswick Hall	TL 443 370	A10

UNUSED RESERVE SITES

Watercourse name	Site name	NGR	Code
Un-named watercourse	Thriplow	TL 453 470	AR1
Un-named watercourse	West Wickham	TL 604 492	AR4
Un-named watercourse	Comberton	TL 386 559	AR5
Un-named watercourse	Great Eversden	TL 354 535	GR1
Un-named watercourse	Woodstone	TL 590 397	GR2
Un-named watercourse	Little Walden	TL 553 406	GR3
Un-named watercourse	Gatley End	TL 296 416	GR4
Un-named watercourse	Shingay	TL 307 459	GR5
Un-named watercourse	The Roos	TL 553 362	GR6

APPENDIX III Names, locations, field site codes, sampling dates and alkalinity and nitrate concentrations for the Stage 3 headwater sites on the River Derwent. Names and locations of unsampled sites are also given together with the reasons for non-sampling.

BIOLOGICAL, CHEMICAL AND SURVEY DATA COLLECTED

Watercourse name	Site name	NGR	Code	Date	Alk'y	Nitrate
Muffles Dike	Low Muffles	SE 766 941	WF1	27-06-93	1.5	2.36
White Mires Dike	White House	SE 764 964	WF4	02-07-93	15.5	0.55
Oak Rigg Gill	High Dales	SE 949 933	WF5	27-06-93	79.5	0.16
Un-named watercourse	North Side	SE 906 928	WFR1	01-07-93	0.0	0.01
Grain Beck	Blakey Topping	SE 876 944	WFR4	07-07-93	1.5	0.00
Mickle Sike	Prod Hills	SE 518 971	WFDS1	30-06-93	3.0	0.00
Un-named watercourse	Hazel Green	SE 617 918	DS2	01-07-93	0.5	0.00
Loskey Beck	Spaunton Moor	SE 713 940	DS3	02-07-93	0.0	0.00
Un-named watercourse	Slape Wath Moor	SE 596 983	DS4	01-07-93	1.5	0.00
Mucky Hole Slack	Fylingdales Moor	NZ 914 001	DS5	06-07-93	10.0	0.03
Un-named watercourse	Hagg House	SE 584 973	HG1	30-06-93	13.0	0.00
Un-named watercourse	Hole of Horcam	SE 845 934	HG2	06-07-93	80.0	0.10
Locker Beck	Locker Wood	SE 507 935	HG3	30-06-93	50.5	0.68
Shortsha Beck	Lowna	SE 693 914	HG4	02-07-93	0.0	0.00
Un-named watercourse	High Horcam	SE 847 934	HG5	06-07-93	75.0	0.21
Un-named watercourse	Place Newton	SE 888 727	AG1	25-06-93	170.0	16.30
The Washdike	Lairs	SE 865 497	AG2	24-06-93	164.5	9.90
Sutterland Beck	Peat Rigg	SE 768 899	AG3	29-06-93	59.0	5.07
Un-named watercourse	Coulton	SE 637 746	AG4	25-06-93	97.0	33.90
Un-named watercourse	Cock Flat	NZ 553 000	AG5	28-06-93	35.5	0.08
Bloody Beck	Ebberston	SE 896 826	AG6	25-06-93	162.5	7.37
Un-named watercourse	Cross Holme	SE 565 973	AG7	28-06-93	4.5	0.29
Un-named watercourse	Folkton Carr	TA 047 808	AG8	28-06-93	224.0	0.38
Gundale Beck	Saintoft Brow	SE 794 890	AG9	29-06-93	59.5	2.19
Un-named watercourse	Spout House	SE 645 997	AG10	29-06-93	13.5	0.22
Un-named watercourse	Scagglethorpe	SE 828 736	A1	24-06-93	216.5	3.98
Un-named watercourse	Low Gaterley	SE 730 703	A2	05-07-93	173.5	4.85
Un-named watercourse	Snargate	SE 605 716	A3	24-06-93	199.0	11.00
Charity Drain	Great West Wood	SE 740 425	A4	23-06-93	402.5	0.03
Un-named watercourse	Sommerfield	SE 663 807	A5	25-06-93	211.5	0.32
Un-named watercourse	Fangfoss Grange	SE 753 527	A6	22-06-93	229.0	1.55
Winter Beck	Full Sutton	SE 747 559	A7	22-06-93	435.0	34.15
Un-named watercourse	Sutton Wood	SE 710 479	A8	22-06-93	230.5	36.05
Un-named watercourse	Warren House	SE 761 464	A9	23-06-93	204.5	3.71
Un-named watercourse	Thornton le Clay	SE 686 664	A10	23-06-93	259.5	0.00
Mill Beck	Aldmoor	SE 782 650	A11	24-06-93	133.0	17.90
Keld Spring Beck	Wombleton	SE 680 834	A12	25-06-93	202.0	6.49
Millsike Beck	Minster Way	SE 725 548	A13	22-06-93	220.5	8.75
Black Dike	Thornton	SE 751 449	A14	23-06-93	131.5	11.55

ADDITIONAL BIOLOGICAL AND CHEMICAL SAMPLING SITE WITH NO LAND SURVEY DATA

Watercourse name	Site name	NGR	Code	Date	Alk'y	Nitrate
West Beck	?	?	None	24-06-93?	131.0	13.15

DRY SITES

Watercourse name	Site name	NGR	Code
Un-named watercourse	Little Hills Green	SE 938 899	WF2
Un-named watercourse	Acre Grain Plantation	SE 590 887	WF3

APPENDIX III, River Derwent (continued)

UNUSED RESERVE SITES

Watercourse name	Site name	NGR	Code
Un-named watercourse	Deep Gill Wood	SE 552 870	WFR2
Un-named watercourse	Whisperdales	SE 956 934	WFR3
Un-named watercourse	Hern Head House	SE 914 875	WFR5
Un-named watercourse	Money Howe	SE 586 952	DSR1
Un-named watercourse	Head House	SE 535 970	DSR2
Un-named watercourse	Little Blakey Howe	SE 673 990	DSR3
Un-named watercourse	Owlet Moor	SE 762 972	DSR4
Un-named watercourse	Tom Cross Rigg	SE 852 970	DSR5
Un-named watercourse	Rosedale Moor	NZ 691 007	DSR6
Un-named watercourse	Beak Hills	NZ 544 022	HGR1
Un-named watercourse	Wilton Carr	SE 873 821	AGR1
Un-named watercourse	South Ings	SE 699 842	AGR2
Un-named watercourse	Bulmer	SE 692 677	AGR3
Un-named watercourse	Ampleforth	SE 599 780	AGR4
Un-named watercourse	High Coppice	SE 755 864	AGR5
Un-named watercourse	Harwood Dale	SE 967 956	AGR6
Un-named watercourse	Rosedale Abbey	SE 730 955	AGR7
Un-named watercourse	West Heslerton Carr	SE 902 777	AGR8
Un-named watercourse	Wintringham	SE 879 732	AGR9
Un-named watercourse	Barthorpe	SE 773 593	AGR10
Un-named watercourse	Airyholme	SE 674 728	AR1
Un-named watercourse	Londesborough	SE 695 525	AR2
Un-named watercourse	Catton Park	SE 735 522	AR3
Un-named watercourse	The Sykes	SE 666 671	AR4
Un-named watercourse	Grimston Brow	SE 828 667	AR5
Un-named watercourse	High Catton	SE 720 541	AR6
Un-named watercourse	St.Leonard's Well	SE 780 535	AR7
Un-named watercourse	Snainton Ings	SE 934 808	AR8
Un-named watercourse	Terrington	SE 679 719	AR9
Un-named watercourse	Kirk Lands	SE 763 550	AR10

APPENDIX IV Names, locations, field site codes, sampling dates and alkalinity and nitrate concentrations for the Stage 3 headwater sites on the River Lugg. Names and locations of unsampled sites are also given together with the reasons for non-sampling.

BIOLOGICAL, CHEMICAL AND SURVEY DATA COLLECTED

Watercourse name	Site name	NGR	Code	Date	Alk'y	Nit
Un-named watercourse	Wigmore Rolls	SO 396 691	WF1	18-07-93	223.5	1.13
Un-named watercourse	Rhiw Lawr	SO 210 656	WF2	17-07-93	52.5	0.99
Un-named watercourse	Checkley	SO 596 376	WF3	23-07-93	194.0	0.26
Un-named watercourse	Cwm y Gerwyn	SO 192 669	WF4	17-07-93	91.0	1.13
Un-named watercourse	Nash Scar	SO 301 622	WFR2	23-07-93	161.5	0.82
Un-named watercourse	Gwauncestre Hill	SO 169 552	DS2	16-07-93	20.5	0.04
Un-named watercourse	Black Hill	SO 169 519	DS3	15-07-93	21.0	0.00
Un-named watercourse	Cwmynace	SO 204 540	HG1	13-07-93	50.5	0.13
Un-named watercourse	Mawn Pools	SO 169 515	HG2	15-07-93	42.5	0.07
Un-named watercourse	Bwlch	SO 193 530	HG3	13-07-93	53.0	2.55
Un-named watercourse	Black Yatt	SO 199 567	HG5	16-07-93	27.5	0.38
Un-named watercourse	Dreavour Farm	SO 180 523	HGR2	15-07-93	22.0	0.05
Un-named watercourse	Beilibedw Mawn Pool	SO 183 560	HGR3	16-07-93	24.0	0.00
Un-named watercourse	Bircher	SO 480 660	AG1	19-07-93	137.0	4.83
Un-named watercourse	Crowther's Pool	SO 217 488	AG2	14-07-93	111.5	2.55
Un-named watercourse	Moseley Common	SO 380 581	AG3	18-07-93	215.5	6.81
Un-named watercourse	Elsdon	SO 326 545	AG4	18-07-93	181.0	8.00
Un-named watercourse	Crungoed	SO 194 718	AG5	17-07-93	155.0	3.38
Un-named watercourse	Siluria	SO 230 585	AG6	17-07-93	121.5	0.00
Un-named watercourse	Knapton Green	SO 447 524	AG7	21-07-93	252.0	11.00
Un-named watercourse	Winslow Green	SO 646 570	AG8	22-07-93	291.5	2.16
Un-named watercourse	Hope Under Dinmore	SO 500 527	AG9	20-07-93	240.5	8.40
Un-named watercourse	Hegdon Hill	SO 596 537	AG11	21-07-93	257.5	3.98
Un-named watercourse	Pentre-draen	SO 242 518	AG12	14-07-93	59.0	2.27
Un-named watercourse	Lynch Court	SO 417 422	AG13	19-07-93	159.0	6.81
Un-named watercourse	Newhouse	SO 223 553	AG14	13-07-93	62.5	0.33
Sour Brook	Holme Marsh	SO 353 550	AG15	20-07-93	190.5	7.94
Un-named watercourse	New Radnor	SO 212 612	AG16	16-07-93	88.5	1.90
Un-named watercourse	Lower Woodbatch	SO 386 680	AGR2	23-07-93	243.5	2.59
Un-named watercourse	Lower Kinsham	SO 357 639	A1	18-07-93	140.0	8.13
Un-named watercourse	Hawkhurst	SO 610 547	A2	22-07-93	243.5	7.78
Un-named watercourse	Hyatt Sarnesfield	SO 383 500	A3	19-07-93	236.0	8.55
Blue Ditch	Mousenatch	SO 474 605	A4	19-07-93	162.5	5.31
Un-named watercourse	Elms Green	SO 503 568	A5	20-07-93	196.5	7.17
Un-named watercourse	Thornby Court	SO 616 600	A6	22-07-93	247.0	7.84
Un-named watercourse	Hope Farm	SO 655 589	A7	22-07-93	260.5	7.67
Un-named watercourse	Marsh Court	SO 576 521	A9	20-07-93	311.0	4.22
Un-named watercourse	Butthouse	SO 435 489	A10	21-07-93	259.5	9.90
Un-named watercourse	Lower Chadnor	SO 432 527	AR5	23-07-93	241.5	18.40

DRY SITES

Watercourse name	Site name	NGR	Code
Un-named watercourse	Lyngham Vallet	SO 453 666	WFR1
Un-named watercourse	Busnant	SO 150 515	DS1
Un-named watercourse	Upper Ffynnonau	SO 189 540	HG4
Back Brook	Callow Marsh	SO 653 461	A8

ACCESS REFUSED

Watercourse name	Site name	NGR	Code
Un-named watercourse	Sychcwm	SO 179 530	HGR1

REJECTED SITES THAT WERE FOUND TO BE UNSUITABLE ON VISITING

Watercourse name	Site name	NGR	Code	
Un-named watercourse	The Plantation	SO 602 392	WF5	Pheasant rearing area
Un-named watercourse	Lower Bilfield	SO 592 584	AG10	Severe recent pollution

APPENDIX IV, River Lugg (continued)

UNUSED RESERVE SITES

Watercourse name	Site name	NGR	Code
Un-named watercourse	Cwm Mawr	SO 213 647	WFR3
Un-named watercourse	Knill	SO 290 616	WFR4
Un-named watercourse	Wicton Farm	SO 619 557	AGR1
Un-named watercourse	The Dovehills	SO 681 512	AGR3
Un-named watercourse	Rhos-y-meirch	SO 275 692	AGR4
Un-named watercourse	Wolfpits	SO 221 590	AGR5
Un-named watercourse	Hopton Dingle	SO 636 501	AGR6
Un-named watercourse	Yarpole	SO 464 649	AGR7
Un-named watercourse	Upper Wintercott	SO 468 548	AGR8
Un-named watercourse	Woodbrook	SO 306 550	AGR9
Un-named watercourse	Treburvaugh	SO 240 698	AGR10
Un-named watercourse	Sizebrook	SO 465 484	AR1
Un-named watercourse	Portway	SO 491 460	AR2
Un-named watercourse	The Whittern	SO 344 573	AR3
Un-named watercourse	Lower Hope	SO 585 506	AR4
Un-named watercourse	Hillend	SO 636 460	AR6
Un-named watercourse	Lyvers Ocle	SO 578 472	AR7
Un-named watercourse	Gott's Gardens	SO 482 562	AR8
Un-named watercourse	Arrow Green	SO 434 584	AR9
Un-named watercourse	Staunton on Arrow	SO 373 600	AR10

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