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**BASELINE ASSESSMENT OF AQUATIC MACRO-INVERTEBRATES IN MELLS  
RIVER SPRINGS 1995**

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## EXECUTIVE SUMMARY

1. Nine springs flowing into the Mells River were sampled for macro-invertebrate fauna on the 18th April 1995 and 27th June 1995. These sites were Hurdlestone, Bector Wood, White Hole Farm, Leigh Wood West, Leigh Wood East, Lower Soho Farm, Finger Stream West, Chantry East and Chantry West springs.
2. The taxa included flat worms, molluscs, worms, leeches, water mites, crustacea, mayflies, stoneflies, bugs, beetles, caddis-flies and true flies. The true flies (Diptera) and caddis-flies (Trichoptera) comprised the largest groups of taxa.
3. Of special interest were the beetles *Hydraena nigrita* Germar and *Riolus subviolaceus* (Muller); the caddis *Rhyacophila septentrionis* McLachlan, *Tinodes unicolor* (Pictet) and *Tinodes dives* (Pictet) all of which were notable species; and the dipteran *Oxycera pardalina* (Meigen) which is classed as vulnerable.
4. The dataset of headwaters sites at the Institute of Freshwater Ecology in Wareham holds additional records for all these notable and vulnerable species; this indicates that the status of at least some of them should be subject to review.
5. The biological indices (BMWP & ASPT) showed that there was a trend towards greater downstream diversity in the faunal communities on the longer streams that were sampled in several places. There was also a general decrease in macro-invertebrate diversity from the streams in the west of the study area to those further east, with the exception of the Chantry springs which are fed from a separate source.
6. The Ecological Quality Indices (EQIs) calculated for the sites still running in summer showed that three of the five sites were Band A (Bector Wood, White Hole Farm and Chantry West) and can be placed with the top 40% of headwaters sites. Bector Wood Stream had the highest ecological quality index for the springs in the study area. Hurdlestone and Chantry East springs were Band B.
7. None of the Band A sites on the Mells River Springs were, statistically speaking, of exceptional quality. 7% of the IFE stage 3 headwaters dataset could be classed as exceptional.
8. The evidence indicates that water quality is not a limiting factor for macro-invertebrates in most of these springs. However, the abundance and variety of animals is likely to be restricted by low and fluctuating water flow.

## 1. INTRODUCTION

Proposed development of the Whatley Quarry near Frome in Somerset by A.R.C. (Southern) Ltd could affect nearby small watercourses. To make a baseline biological assessment of these watercourses, nine springs flowing from a southerly direction into the Mells River were selected for study. These were Hurdlestone, Bector Wood, White Hole Farm, Leigh Wood West, Leigh Wood East, Lower Soho Farm, Finger Stream West, Chantry East and Chantry West springs. The locations of these springs is shown in Figure 1.

These springs were sampled for aquatic macro-invertebrates in two seasons. Spring samples were taken on 18th April 1995 with the aim of obtaining as broad a sample of aquatic macro-invertebrates as possible and determining any downstream zonation of the organisms. Samples were collected in various locations on each watercourse, using techniques that would minimise the possible impact of the sampling activities on the stream beds.

One summer sample was obtained from each of the five springs still flowing on 27th June 1995. These samples were taken using a standard procedure that would enable the sites to be compared with other headwater streams already sampled by the Institute of Freshwater Ecology. Environmental information was also recorded for each site in the field, and also by extrapolation from maps.

The types of macro-invertebrate families present during the summer, together with the collated environmental data, enabled predictions to be made regarding the quality of the watercourses - indicating whether they could be considered under stress and thereby suggesting their current conservation value. Additionally, specific level identifications were made wherever practicable for both spring and summer samples to determine whether these tufa-depositing streams supported a characteristic fauna.

## 2. METHODS

### 2.1 Location of sampling sites

The spring sampling points were chosen to provide information about any downstream zonation of benthic macro-invertebrates. Depending on the length and character of the stream, samples were taken at approximately 50 metres, 250 metres and 1000 metres downstream from the source. The source itself was sampled on selected streams. Some flushes and small areas of standing water adjacent to, and feeding into, streams were also sampled. The position of the sampling sites is indicated in Figures 2 to 6. In the summer, the most down-stream of the sites that were sampled in the spring were chosen for sampling. Of the nine springs visited in April only five were still flowing in June.

### 2.2 Sampling techniques

In the spring, fifteen one-minute kick samples were taken with a pond net on the main watercourses. Eight non-standard samples of upto fifteen seconds duration were taken in other locations by scooping the surface of the water with the pond net and by collecting by hand from beneath stones and plant debris.

In the summer, three-minute kick samples were taken using the methodology described by Furse et al (1981) whereby substrate is disturbed upstream of a net (230 x 255 mm frame, 900 µm mesh). All available habitats were sampled in proportion to their occurrence. The sampling strategy is shown in Table 1.

**Table 1 Aquatic macro-invertebrate sampling strategy for Mells River Springs**

WATERCOURSE	SPRING	SPRING	SUMMER
	STANDARD	NON-STANDARD	STANDARD
	1 minute	15 seconds	3 minutes
Hurdlestone	1	1	1
Bector Wood	3	4	1
White Hole Farm	2	1	1
Leigh Wood West	1	0	1
Leigh Wood East	2	1	1
Lower Soho Farm	1	0	1
Finger Stream West	3	1	1
Chantry East	1	0	1
Chantry West	1	1	1
TOTALS	15	9	9

### 2.3 Environmental recording

At each site, in both seasons when sampling took place, time variant physical data such as flow, the water width in the sample area, and the mean depth calculated from measurements taken at one quarter, one half and three quarters distance across the water width, were collected. An estimate of the percentage cover of the different components of the substratum in the sample area was also made. Substrate types included boulders (> 256 mm) and cobbles (≤ 256 mm), pebbles (< 64 mm) and gravel (< 16 mm), sand (< 2 mm), and silt and clay. The particle size categories follow the Wentworth system and substratum estimation is described in Furse et al (1986).

Additional time invariant data such as altitude, slope, distance from source, and grid reference were derived from Ordnance Survey maps. Discharge categories were obtained from National Rivers Authority water quality maps. Mean temperature, temperature range, latitude and longitude were obtained from the RIVPACS II programme by entering the other environmental variables. The environmental data relating to the Mells Rivers Springs sites can be seen in Table 2.

### 2.4 Identification

The samples were preserved in 4% formalin solution on site and returned to the laboratory for processing. The animals were identified to the level used in RIVPACS (River Invertebrate Prediction and Classification System) which is normally to species but some juvenile organisms, dipteran larvae and animals for which no taxonomic keys are available were identified to family or genus level (Furse et al 1986) Chironomids and Oligochaetes were identified to subfamily or tribe level, and Hydracarina and Sphaeriidae were not identified further because the identification of these groups is considered to be unduly time-consuming at this stage. Each name category is referred to as a taxon.



### 3. RESULTS

#### 3.1 Species lists

The total number of aquatic macro-invertebrate taxa identified in the samples from the nine Mells River Springs sites for both seasons is listed in Tables 3a and 3b. One hundred and twelve separate taxa were recorded. The distribution of the taxa for the 24 spring sampling sites is presented in Tables 4a, 4b, 5a & 5b; and the distribution of the taxa for the five summer sample sites is shown in Table 6. Individual taxa lists for each site in spring can be seen in Appendices 1 - 24, and for each summer sampling site in Appendices 25 - 29.

The majority of these species are typical of headwater streams within 2.5 km of their source. There are no species of the type which are more frequently found in small winterbourne streams where the water regularly dries up.

#### 3.2 Species of special interest

There are several species of special interest. Five notable and one vulnerable (Red Data Book 2) species were identified from the Mells River springs. These are listed below.

Table 7 Species of special status from Mells River Springs

<b>Coleoptera</b> (beetles)	
<i>Hydraena nigrita</i> Germar	Notable b
<i>Riolus subviolaceus</i> (Muller)	Notable b
<b>Trichoptera</b> (caddis-flies)	
<i>Rhyacophila septentrionis</i> McLachlan	Notable
<i>Tinodes unicolor</i> (Pictet)	Notable
<i>Tinodes dives</i> (Pictet)	Notable
<b>Diptera</b> (true flies)	
<i>Oxycera pardalina</i> (Meigen)	Vulnerable

##### 3.2.1 Status levels

The definitions of the different status levels assigned to organisms are given in Appendix 30. The categories are: extinct, endangered (RDB 1), vulnerable (RDB 2), rare (RDB 3), insufficiently known (RDB K), notable, regionally notable (NR), local, and common.

The category 'notable' describes taxa which do not fall within Red Data Book categories 1 - 3 but which are nonetheless scarce in Great Britain and thought to occur in fewer than a hundred 10 km squares of the National Grid. For some well-recorded groups of invertebrates 'notable' has been subdivided into 'notable A' (thirty or fewer 10 km squares) and 'notable B' (thirty-one to one hundred 10 km squares), but this has not been attempted for Trichoptera.

'Vulnerable' (Red Data Book 2) describes taxa likely to move into the endangered category (present in five or fewer 10 km squares) in the near future if causal factors continue to operate. It includes taxa of which most or all of the populations are decreasing and those

with populations which are still abundant but are under threat from serious adverse factors throughout their range.

The distribution of the species with special status collected from Mells River Springs sites is shown in Table 7. *Hydraena nigrita* was recorded from Leigh Wood East (250 m). *Riolus subviolaceus* was recorded at Bector Wood 2 (250 m). *Rhyacophila septentrionis* was recorded at White Hole Farm 2 (250 m). *Tinodes unicolor* was recorded from Bector Wood 2, Bector Wood 3 and White Hole Farm 2. *Tinodes dives* occurred only at Bector Wood 3. *Oxycera pardalina* was collected from Bector Wood 2, White Hole Farm 2 and Leigh Wood West 1.

### 3.2.2 Habitat preferences and distribution

#### *Hydraena nigrita* Germar

This beetle typically lives amongst the gravel and stones in rivers, often in shaded areas. It has been recorded occasionally from, Scotland, Northern England, South-west England and Wales, South-eastern England (including East Anglia) and Ireland (Friday, 1988). *Hydraena nigrita* has also been recorded three times during Stages 2 and 3 of the Faunal Richness of Headwaters project from the Rivers Lugg, (Dorset) Stour, and Cam systems (Furse et al 1993 & 1995), that is, at 1.4% of sites.

#### *Riolus subviolaceus* (Muller)

The larvae and adults of this beetle live under stones and in moss in base-rich (calcareous) streams and rivers. They have been recorded occasionally in Scotland, Northern England, South-west England and Wales, and South-eastern England including East Anglia. Sixty four headwater sites studied by the IFE (29.9%) on forty-three different rivers have been noted with this beetle.

*Rhyacophila septentrionis* McLachlan has been recorded previously from Gloucestershire; north Clwydd; limestone areas of Yorkshire; Crawfordwalls Burn, Carlisle, Lanarkshire; and at Longniddry, Aberlady, and Bangower, Lothian. More recently, this caddis-fly has been recorded from six headwater sites by the IFE, one on the Yorkshire Derwent system, and five on the River Lugg system in the Welsh borderlands. This species has been identified at 2.8% of sites used in the Faunal Richness of Headwater study (Furse et al 1995).

Typically this species lives in stony streams with a high calcium carbonate content, usually precipitating to some extent. *Rhyacophila* are likely to be restricted to conditions of high current-speed. The larvae do not spin nets or build fixed galleries but are completely free-living. They appear to be actively foraging predators. Major sources of prey are chironomid larvae and larvae of *Baetis* and *Simulium* but it seems that the larvae sometimes actively feed on the algae and moss on stones.

*Tinodes unicolor* (Pictet) is a caddis-fly with a restricted distribution in England and Wales in highly calcareous small streams which are depositing travertine (calcium concentration > 60 mg l<sup>-1</sup>). This type of stream is commonest in limestone country but is also found where stream water is enriched by marl bands in the rock. The IFE has four additional site records for this species on the Rivers Lathkill, Dorset Stour, Lugg and Nene systems.

*Tinodes dives* (Pictet) has been recorded in headwater streams in Scotland (Perthshire and Lothian), Yorkshire, Derbyshire, Staffordshire, Breconshire, and Cumbria where this caddisfly it is thought to require calcareous water. I.D.Wallace (1991) writes that the scarcity of records could be due to the fact that it is a small, often upland caddis but that if it was common, there would be many more records. Six new sites have been noted for this species by the IFE in recent years, mostly in Yorkshire on the Derwent system but also on the River Dove in the Severn-Trent region.

Both *Tinodes unicolor* and *Tinodes dives* belong to the Psychomyiidae family. These gallery-building caddis larvae are particularly characteristic of streams running over easily weathered rocks, and lakes with stony substrata. Psychomyiid galleries are fixed, tunnel-like, structures constructed from fragments of mineral or other materials held together by silk (Edington and Hildrew (1981). In thin water films running over rocks, however, the galleries of *Tinodes dives* and *Tinodes unicolor* consist largely of faecal pellets. They differ from the nets or transportable cases of other caddis larvae.

The larva partially emerges from the front of the gallery and grazes material from the substratum. There is evidence that some psychomyiid species are associated with particular algal communities (Alderson, 1969). *Tinodes unicolor* feeds on the blue-green alga *Phormidium incrustatum*. This alga is to be found embedded in calcite incrustations and is involved in their deposition (Fritsch 1950). The larvae appear to gain access to the algal filaments by using an acid secretion which dissolves the surrounding calcite.

*Oxycera pardalina* Meigen larvae occur in mossy habitats where thin films of water flowing down inclined rocks or over stones but the flow of water is generally slight (Brindle, 1964). This dipteran is also known to favour limestone waters. This species has been recorded recently from four new headwater sites on the River Lugg system by the IFE.

### 3.3 Biological indices

#### 3.3.1 BMWP Scores

As well as considering the individual macro-invertebrate taxa recorded from a watercourse, it is possible to consider the families to which the animals belong. Each family is more or less tolerant of a stressed environment and has been allocated a score accordingly. Families that are least tolerant, that is, they occur only in stress-free conditions, have a high score of 10 at the top end of the scale. Families that are most tolerant and are found in almost any conditions are given a low score of 1 at the bottom of the scale. Appendix 31 gives the scores for the different families. This system was devised by the Biological Monitoring Working Party (Biological Monitoring Working Party 1978, Chesters 1980, Armitage et al 1983). The scores for each family recorded in a sample are totalled to give the BMWP score which is used as an indicator of water quality.

### 3.3.2 ASPT Scores

Since a high BMWP score can result from either a few high scoring families or many low scoring families, another index is derived from the BMWP by dividing this score with the number of taxa. This gives the Average score per taxon (ASPT) which is a better indicator of the types of animals found at the site, and hence the water quality; whereas the BMWP score is more an indication of abundance and diversity.

### 3.3.3 Mells River Springs scores

The number of taxa, the BMWP and ASPT scores for the Mells River Spring sites are seen in Table 8. For the samples collected in the spring, only those resulting from one-minute kick samples can be compared with each other. Of these, Bector Wood 3 (1000 m) had the highest number of taxa (21) and the highest BMWP score (133) of the nine springs studied. White Hole Farm had the second highest scores (15 taxa and 89 BMWP respectively). The lowest number of taxa was found at Finger Stream West site 1 which also had the lowest BMWP score (33) of all the one-minute kick sampled sites.

A zonation is apparent from the samples taken in spring, particularly in the Bector Wood stream with 18, 19, and 21 taxa; and 105, 111, and 133 BMWP, recorded respectively for the 50 m, 250 m and 1000 m sites - demonstrating an progressive increase in diversity downstream from source. This can also be clearly seen in the Finger Stream West figures.

The areas in which non-standardised sampling procedures were used, that is the sources, flushes, and areas of standing water, make a significant contribution to the faunal composition of the aquatic environment. The area at the source of Hurdlestone spring, for example, yielded 12 taxa (BMWP 60) compared with Hurdlestone site 1 at 50 m from source with its 10 taxa and BMWP of 50. Similarly, Bectorwood Flush C had 14 taxa and BMWP 85 - the same number of taxa as White Hole Farm 2 (250 m at the cascade) for which a lower BMWP of 73 was noted.

The five summer three-minute kick samples similarly showed range in diversity and quality, although the number of taxa was reduced in some cases compared with springtime levels. Bector Wood 3 again had the highest scores followed by White Hole Farm 2, Chantry West/ Chantry East and Hurdlestone.

The average score per taxon reflected the same pattern as the other parameters but with lower ASPT being achieved for the summer samples at Bector Wood, Hurdlestone and Chantry East while a slight increase can be observed for White Hole Farm 2 and Chantry East.

## 3.4 Predictions

### 3.4.1 Headwaters classification

In order to compare the Mells River springs samples with other samples collected in headwater streams by the Institute of Freshwater Ecology, the groups of different taxa recovered in each sample were considered as an entity together with site specific

environmental data. The biological and environmental data from 214 headwaters samples collected using standardised procedures have been used to create a classification system for headwaters sites (Furse et al 1993, 1995). These headwaters sites are divided into 19 groups on the basis of their macro-invertebrate fauna. The groups show a gradual shift from group 1 to 19 associated with declining altitude, slope, substratum particle size and latitude. The probability of the Mells sites belonging to each of the 19 groups was calculated. The Mells springs were allocated to groups 11 or 14 which sites had a wide geographical distribution in England and the Welsh borders and typically had a high average level of calcium (mean 183 mg l CaCo<sub>3</sub>).

### 3.4.2 Ecological Quality Indices

To determine the ecological quality of each site, the probabilities of the Mells River Springs belonging to each of the 19 groups in the classification were used to calculate the ASPT which you would expect for each site. The ecological quality index (EQI) is a means of determining the degree to which each site might be stressed and hence their current conservation value. Two types of EQI value were calculated, one using the ASPT, and the other the number of taxa, using the single summer samples.

### 3.4.3 Quality bands

EQI scores are grouped into 4 bands: A good, B fair, C poor, and D bad.

**Table 9** Single season band ranges for Ecological Quality Indices (EQI)

ASPT	
A	≥ 0.84
B	0.68 - 0.83
C	0.52 - 0.67
D	≤ 0.51
Number of taxa	
A	≥ 0.67
B	0.34 - 0.66
C	0.01 - 0.33
D	0.00

The biological and environmental data obtained during the single season sampling indicated that all 5 Mells sites belonged to Band A when comparing the observed (actual) ASPT with the predicted ASPT.

**Table 10** Single season EQIs for Mells River Springs sites

SITE	EQI(ASPT)	BAND	EQI(TAXA)	BAND
1. Hurdlestone	0.9048	A	0.5172	B
2. Bector Wood	1.0711	A	1.1364	A
3. White Hole Farm	1.0240	A	0.9659	A
8. Chantry East	0.8811	A	0.6250	B
9. Chantry West	1.0066	A	0.6897	A

In comparisons of the observed number of taxa with the predicted number of taxa, three of the Mells sites fell into Band A and two into Band B. The combined bands from the two types of EQI are normally used, with the lower of the two EQIs being selected. Therefore the quality bands for the Mells River Springs sites are the same as the Taxa EQI.

#### 3.4.4 Evaluation of the quality banding for Mells River Springs

Using combined quality bands, the Bector Wood Spring, White Hole Farm Spring, and Chantry West Spring are included in the top 40% of headwaters sites which are classed as Band A (based on 131 Stage 3 headwater sites surveyed by the IFE in 1993). Hurdlestone and Chantry East belong to a group of 30.5% that were Band B in the same dataset. Fifteen of the Stage 3 sites (11.5%) had a higher ASPT EQI than the Bector Wood Spring. 18 (13.7%) had higher ASPT EQI than White Hole Farm Spring. 25 (19.1%) had an equal or greater ASPT EQI than Chantry West.

These EQIs mean that in terms of the kinds of invertebrates (ASPT) found in the springs, the water quality is good. However, the values are not exceptional. The observed value would have to exceed the predicted figure by a defined amount to be considered outstanding, ie to belong to Band A the EQI (using ASPT) needs to be equal to or greater than 0.84 but for a site to be thought exceptional, in statistical terms, it would need an EQI of 1.16. The Mells site EQIs for ASPT ranged from 0.88 at Chantry East to 1.07 at Bector Wood. Nine sites (6.9%) of the Stage 3 headwater streams surveyed in four major river catchments in 1993 achieved exceptional quality status with the maximum Taxa EQI of 1.44 and ASPT EQI of 1.20. Maximum BMWP score was 158.

The values for Band A sites (EQI based on taxa) ranged from 0.6897 at Chantry West to 1.1364 at Bector Wood. On the basis of the EQIs obtained from the number of taxa, the values obtained would need to be 1.33 or more in order to categorise the site as exceptional. Only 2.3% of the Stage 3 headwater sites met this criterion. 9.9% of sites had a higher Taxa EQI than Bector Wood.

ASPT scores indicate that water quality is not a limiting factor for the macroinvertebrate organisms in the Mells River Springs. However, the number of taxa suggests that there is a factor limiting the potential variety of animals. Numbers of actual animals recovered in the standard three minute kick samples were also relatively small. The limiting factor is likely to be the small and fluctuating quantity of water flowing in these springs. On 18.4.95 it was observed that the sources of the springs had in several instances moved downstream by distances between 1 and 25 m in comparison with the situation on 29.3.95. On 27.6.95 flow was further reduced in Hurdlestone, Bector Wood, White Hole Farm, Chantry East and Chantry West. Leigh Wood West, Leigh Wood East, Lower Soho Farm and Finger stream were dry right down to their confluences with the Mells River.

#### 4. DISCUSSION

One hundred and twelve taxa of macro-invertebrate animals in all were identified from the nine Mells River springs in the spring and autumn. These taxa belonged to 44 family groupings. Many of these animals were typical of small headwaters streams close to their source and none of the species were characteristic of the winterbourne type of stream which regularly dries up. The animals identified show that in general the streams are of good quality with no obvious stressing factors influencing the invertebrate types that inhabit them but that there is some factor, which is influencing the diversity of animals and their abundance, which is considered to be the low and fluctuating water levels.

The springs on the western side of the study area were of a higher quality than those to the east. Hurdlestone, Bector Wood and White Hole Farms streams came into this category with Bector Wood having the greatest number of taxa and highest ASPT values and White Hole coming a close second. Both streams were allocated to Band A for ecological quality on the basis of their summer samples for both number of taxa and ASPT. Hurdlestone achieved Band B status overall but on the basis of its ASPT alone its belonged to Band A.

The two notable and high scoring psychomyiid caddis *Tinodes unicolor* and *Tinodes dives*, and the relatively low scoring (notable B) beetle *Riolus subviolaceus*, were all recovered from Bector Wood stream, together with the dipteran larva *Oxycera pardalina*. Not all families are used in the BMWP scoring system, and non-scoring families are not regularly identified from routine water-quality monitoring samples (see Appendix 30). Many of the Dipteran families are non-scorers on the BMWP system; these include Psychodidae, Ptychopteridae, Dixidae, Ceratopogonidae, Stratiomyidae, Empididae, Dolichopodidae, Muscidae, Fannidae, Thaumaleidae and Syrphidae. Hydracarina, and Veliidae are also non-scoring families. *Oxycera pardalina* belongs to the non-scoring Stratiomyidae family. *Tinodes unicolor* and *Oxycera pardalina* also occurred at the cascade on White Hole Farm stream with the addition of the rhyacophilid *Rhyacophila septentrionis*. These species have in common their preference for stony or gravelly streams flowing with calcareous water and in some cases the water need only be a thin, slow flowing film.

Further eastwards, Leigh Wood East and Leigh Wood West streams proved to be of poorer quality than Hurdlestone, Bector Wood and White Hole streams. Because they dried up in the summer, it was not possible to work out their ecological quality banding. The numbers of taxa and ASPT were lower than for the latter group of streams. However, the single specimen of *Hydraena nigrita* which has notable B status was recorded from Leigh Wood East (250 m).

Lower Soho Farm showed yet a further decrease in quality although its number of taxa and ASPT were not the lowest recorded for one-minute kick samples. The upstream sample from Finger Stream West site 1 had the lowest scores for this type of sample. Finger Stream West had plenty of water in the spring but, despite this, the number of taxa was low (although the ASPT obtained for the lowermost site beneath the waterfall and after the input from the Cobby Wood stream was comparable with ASPTs obtained for some of the Bector Wood sites - due to a few high scoring families). The fauna of this stream probably reflects the augmentation of its water from upstream, and also the fact that it may dry out completely in summer.

Chantry East and Chantry West springs which are located in the eastern part of the study area are fed from a different groundwater source. Chantry West was accorded Band A status for ecological quality but with the lowest EQI of the sites belonging to that band. The joint EQIs for Chantry East placed it in Band B along with Hurdlestone spring which had a higher EQI. No macro-invertebrate taxa of special interest were noted at the Chantry sites but it is possible that the quality of the Chantry East site may be higher than indicated by these results. Much further downstream than the sampling point, close to the confluence with the Whatley Brook, electro-fishing revealed the presence of isolated native crayfish and trout.

The three Band A springs in the study area place the sites in the top 40% of headwater streams so far recorded by the Institute of Freshwater Ecology. However, none of these Mells River Springs sites is exceptional within the banding requirements - although approximately 7% and 10% of the IFE database sites met these requirements for ASPT EQI and Taxa EQI respectively.

Regarding the species which have been recorded as having special conservation status, it should be noted that attribution to a threatened status group may be revised when the species has previously been under-recorded, either because of identification difficulties or where the type of habitat the animal occupies has been insufficiently sampled. The IFE headwater sites dataset contains new records for all the insects of special interest identified in this Mells River Springs study. It is likely that these additional records may change the status of some of these species.

A recent example of such a change in status concerns the caddis *Hydropsyche saxonica* McLachlan. John Blackburn (Blackburn and Forrest, 1995) writes that this insect had been designated as Red Data Book 1, ie taxa which are known only as a single population in only one 10 km square, but that it has now been recorded from 34 new sites on mostly small, first order streams in 30 km squares.

## 5. REFERENCES

Alderson, R. (1969)

Studies on the larval biology of caddis flies of the family Psychomyiidae. Unpublished Ph.D Thesis, University of Wales.

Armitage, P.D., Moss, D., Wright, J.F. & Furse, M.T. (1983)

The performance of a new biological water quality score system based on macro-invertebrates over a wide range of unpolluted running-water sites, *Water Research* 17, 333-347.

Ball, S.G. (1986)

Terrestrial and Freshwater Invertebrates with Red Data Book, Notable or Habitat Indicator Status. Invertebrate Site register Report No. 66 Peterborough: Nature Conservancy Council.

Biological Monitoring Working Party (1978)

Final report: Assessment and presentation of the biological quality of rivers in Great Britain. December 1978. Unpublished report, Department of the Environment, Water Data Unit, 37 pp.



Blackburn, J.H. and Forrest, M.B. (1995)

New records of *Hydropsyche saxonica* McLachlan (Trichopt., Hydropsychidae) from small streams in Great Britain, *Entomologist's Monthly Magazine* 20th March, 1995 Vol.131.

Brindle, A. (1964)

Taxonomic notes on the larvae of British Diptera. No. 17 - The Clitellarinae (Stratiomyidae), *The Entomologist*, 97, 134-135

Chesters, R.K. (1980)

Biological Monitoring Working Party. The 1978 national testing exercise. Department of the Environment, Water Data Unit, Technical Memorandum 19, 1-37.

Clarke, R.T., Furse, M.T. and Wright, J.F. (1992)

A comparison of single, paired and 3 season combined macro-invertebrate samples for the biological banding of river quality. A report (R&D Document 243/2/Y) to the National Rivers Authority, R&D Project 243.

Edington, J.M. and Hildrew, A.G. (1981)

A key to the caseless caddis larvae of the British Isles with notes on their ecology. Freshwater Biological Association Scientific Publication No. 43

Friday, L.E. (1989)

A key to the adults of British Water Beetles, *Field Studies* 7, 1-151.

Fritsch, F.E. (1950)

*Phormidium incrustatum* (Naeg.) Gom., an important member of the lime encrusted communities of flowing water. *Biol. Jaarb.* 70, 27-39.

Furse, M.T., Moss, D., Armitage, P.D. and Gunn, R.J.M. (1986)

A practical manual for the classification and prediction of macro-invertebrate communities in running water in Great Britain, pp147, FBA River Laboratory, East Stoke, Wareham.

Furse, M.T., Symes, K.L., Winder, J.M., Clarke, R.T., Blackburn, J.H., Gunn, R.J.M., Grieve, N.J., and Hurley, M. (1995)

The faunal richness of headwater streams: Stage 3 - Impact of agricultural activity Volume 1 Main Report, Volume 2 Appendices. National Rivers Authority R&D Note 392

Furse, M.T., Winder, J.M., Symes, K.L., and Clarke, R.T., Gunn, R.J.M., Blackburn, J.H. and Fuller, R.M. (1993)

The faunal richness of headwater streams. Stage 2 - Catchment Studies. Volume 1 Main Report, Volume 2 Appendices. National Rivers Authority R&D Note 221, National Rivers Authority: Bristol.

Furse, M.T., Winder, J.M., Symes, K.L., and Clarke, R.T. (1991)

The faunal richness of headwater streams. A preliminary report (R&D Document 08Y) to the National Rivers Authority by the Institute of Freshwater Ecology, R&D Project 242. [NRA publication reference P-96]

Furse, M.T., Wright, J.F., Armitage, P.D. and Moss, D. (1981)  
An appraisal of pond-net samples for biological monitoring of lotic macro-invertebrates.  
Water Research 15, 679-689.

Furse, M.T., Moss, D., Wright, J.F., Armitage, P.D. and Gunn, R.J.M.(19??)  
A practical manual for the classification and prediction of macro-invertebrate communities  
in running-water in Great Britain.

Holland, D.G. (1972)  
A key to the larvae, pupae and adults of the British species of Elminthidae, Freshwater  
Biological Association Scientific Publication No. 26.

Wallace, I.D. (1991)  
A Review of the Trichoptera in Great Britain. Research and Survey in Nature Conservation,  
No. 32. Peterborough: Nature Conservancy Council.

Wells, S.M., Pyle, R.M. and Collins, N.M. (1983)  
The IUCN Invertebrate Red Data Book. Gland: International Union for Conservation of  
Nature and Natural Resources.

SITE	ALT	SLP	DCH	DST	WID	DEP	BCB	PGR	SND	SCL	MTP	TRG	LAT	LNG
1. HURDLESTONE	150	200	1	0.05	0.37	1	0	15	20	65	10.30	12.40	51.22	2.45
2. BECTORWOOD	125	100	1	0.75	0.55	7	0	20	30	50	10.30	12.40	51.22	2.45
3. WHITE HOLE FARM	125	200	1	0.25	0.74	4	7	7	14	72	10.30	12.40	51.22	2.45
4. LEIGH WOOD WEST	140	100	1	0.05	0.00	0	0	5	5	90	10.30	12.41	51.22	2.45
5. LEIGH WOOD EAST	125	100	1	0.25	0.00	0	15	40	5	40	10.29	12.41	51.23	2.45
6. LOWER SOHO FARM	125	66.6	1	0.10	0.00	0	0	50	0	50	10.28	12.43	51.23	2.43
7. FINGER STREAM WEST	115	25	1	1.50	0.00	0	10	90	0	0	10.27	12.46	51.22	2.40
8. CHANTRY EAST	150	50	1	0.05	0.40	3.7	0	10	0	90	10.27	12.47	51.22	2.40
9. CHANTRY WEST	160	33	1	0.05	0.70	1.7	15	20	30	35	10.27	12.46	51.22	2.40

KEY

ALT altitude  
 SLP slope  
 DCH discharge  
 WID width water  
 DEP depth water  
 BCB boulders/cobbles  
 PGR pebbles/gravel  
 SND sand  
 SCL silt/clay  
 MTP mean temperature  
 TRG temperature range  
 LAT latitude  
 LNG longitude

Table 2 ENVIRONMENTAL VARIABLES FOR MELLS RIVER SPRINGS SUMMER SAMPLING SITES

COMMON NAME	ORDER	FAMILY	SPECIES
Flat worms	Tricladida	Planariidae	<i>Polycelis felina</i> (Dalyell) <i>Crenobia alpina</i> (Dana)
Molluscs	Mollusca	Hydrobiidae Lymnaeidae	<i>Potamopyrgus jenkinsi</i> (Smith) <i>Lymnaea truncatula</i> (Muller) <i>Lymnaea peregra</i> (Muller) <i>Pisidium</i> sp.
Worms	Oligochaeta	Sphaeriidae Naididae Tubificidae Enchytraeidae Lumbriculidae Lumbricidae Indet	
Leeches	Hirudinea	Glossiphoniidae	<i>Glossiphonia complanata</i> (L.) Indet sp.
Water mites	Hydracarina		
Crustacea	Malacostraca	Gammaridae	<i>Gammarus pulex</i> (L.) <i>Baetis vernus</i> Curtis <i>Baetis rhodani</i> (Pictet) <i>Baetis muticus</i> (L.) <i>Rhithrogena semicolorata</i> gp. <i>Ecdyonurus</i> sp. <i>Paraleptophlebia submarginata</i> (Stephens)
Mayflies	Ephemeroptera	Baetidae	<i>Ephemereilla ignita</i> (Poda) <i>Brachyptera risi</i> (Morton) <i>Amphinemura standfussi</i> Ris <i>Nemurella picteti</i> Klapalek <i>Nemoura</i> sp. <i>Nemoura cinerea</i> (Retzius) <i>Nemoura cambrica</i> gp. <i>Nemoura erratica</i> Classen <i>Leuctra nigra</i> (Olivier) <i>Leuctra fusca</i> (L.) <i>Isoperla grammatica</i> (Poda) <i>Chloroperla torrentium</i> (Pictet) <i>Velia caprai</i> Tamanini <i>Agabus</i> sp. <i>Agabus guttatus</i> (Paykull) <i>Hydraena nigrita</i> Germar <i>Helophorus brevipalpis</i> Bedel <i>Helophorus grandis</i> Illiger <i>Anacaena globulus</i> (Paykull) <i>Cercyon</i> sp. Indet
Stoneflies	Plecoptera	Heptageniidae Leptophlebiidae Ephemerellidae Taeniopterygidae Nemouridae	
Bugs	Heteroptera	Leuctridae	
Beetles	Coleoptera	Perlodidae Chloroperfidae Veliidae Dytiscidae	
Caddis-flies	Trichoptera	Hydrophilidae Helocidae Elminthidae Rhyacophilidae Philopotamidae Polycentropodidae Psychomyiidae Hydropsychidae Limnephilidae Beraeidae Lepidostomatidae	<i>Elodes</i> sp. <i>Cyphon</i> sp. <i>Elmis aenea</i> (Muller) <i>Riolus subviolaceus</i> (Muller) <i>Rhyacophila septentrionis</i> McLachlan <i>Rhyacophila</i> indet juvenile <i>Agapetus</i> sp. <i>Wormaldia</i> sp. <i>Plectrocnemia</i> sp. <i>Plectrocnemia conspersa</i> (Curtis) <i>Plectrocnemia geniculata</i> McLachlan <i>Tinodes unicolor</i> (Pictet) <i>Tinodes dives</i> (Pictet) <i>Lype</i> sp. <i>Hydropsyche instabilis</i> (Curtis) <i>Drusus annulatus</i> Stephens <i>Limnephilus lunatus</i> Curtis <i>Potamophylax latipennis</i> (Curtis)/ <i>cingulatus</i> (Stephens) <i>Potamophylax</i> gp./ <i>Halesus</i> sp. <i>Halesus</i> sp. <i>Micropterna sequax</i> McLachlan <i>Chaetopteryx villosa</i> (Fabricius) <i>Beraea maurus</i> (Curtis) <i>Crunoecia irrorata</i> (Curtis)

TABLE 3a TAXON LIST FOR ALL MELLS RIVER SITES IN SPRING & SUMMER (Planariidae to Lepidostomatidae)

COMMON NAME	ORDER	FAMILY	SPECIES
True flies	Diptera	Tipulidae (crane-flies)	Tipula montium gp. Pedicia sp. (not rivosa) Dicranota sp. Pilaria filata gp. Pilaria/Oxydiscus? Limnophila (Elaeophila) sp. Molophilus sp. Indet.
		Psychodidae (moth-winged flies)	Pericoma calcilega Feuerborn Pericoma (cf calcilega Feuerborn) Pericoma neglecta Eaton Pericoma pulchra Eaton Pericoma trifasciata (Meigen) Pericoma trivialis gp. Pericoma sp. (trivialis gp/canescens) Psychoda severini Tonnoir Indet.
		Ptychopteridae	Ptychoptera sp.
		Dixidae (meniscus midges)	Dixa maculata complex Dixa puberula Loew
		Ceratopogonidae (biting midges)	Indet. sp.
		Chironomidae (non-biting midges)	Indet. sp.
		Tanypodinae	Indet. sp.
		Diamesinae	Indet. sp.
		Prodiamesinae	Indet. sp.
		Orthoclaadiinae	Indet. sp.
		Chironomini	Indet. sp.
		Tanytarsini	Indet. sp.
		Simuliidae (black-flies)	Simulium venum gp. Simulium cryophilum gp. Simulium costatum Friederichs Simulium angustitarse gp. Simulium aurem gp. Simulium ornatum gp. Simulium ornatum gp. (prob. spinosum)
		Stratiomyidae (soldier-flies)	Oxycera formosa Meigen Oxycera pardalina Meigen Indet.
		Empididae (dance-flies)	Chelifera gp. Hemerodromia gp. Clinocera gp.
		Dolichopodidae (long-legged flies)	Indet. sp.
		Muscidae	Indet. sp.
		Fannidae	Indet. sp.
		Thaumaleidae	Indet. sp.
		Syrphidae (hover-flies)	Chrysogaster sp.

TABLE 3b TAXON LIST FOR ALL MELLS RIVER SPRINGS SITES IN SPRING & SUMMER (Tipulidae to Syrphidae)

	HURDLESTONE SOURCE	HURDLESTONE 50m	BECTOR WOOD FLUSH A	BECTOR WOOD FLUSH B	BECTOR WOOD FLUSH C	BECTOR WOOD SOURCE	BECTOR WOOD 50m	BECTOR WOOD 250m	BECTOR WOOD 1000m	WHITE HOLE FARM 50m	WHITE HOLE FARM 250m	WHITE HOLE ADJ. 250m
<i>Polycelis felina</i> (Dalyell)			+	+	+	+	+	+	+	+	+	+
<i>Crenobia alpina</i> (Dana)												
<i>Potamopyrgus jenkinsi</i> (Smith)												
<i>Lymnaea truncatula</i> (Muller)												
<i>Lymnaea peregra</i> (Muller)												
<i>Pisidium</i> sp.	+	+	+	+	+	+	+	+	+	+	+	+
Naididae												
Tubificidae												
Enchytraeidae	+											
Lumbriculidae	+	+										
Lumbricidae												
Indet. Oligochaeta	+	+	+	+	+	+	+	+	+	+	+	+
<i>Glossiphonia complanata</i> (L.)												
Indet. Hydracarina												
<i>Gammarus pulex</i> (L.)	+	+	+	+		+	+	+	+	+	+	+
<i>Baetis vernus</i> Curtis												
<i>Baetis rhodani</i> (Pictet)	+	+				+	+	+	+	+	+	+
<i>Baetis muticus</i> (L.)								+		+	+	+
<i>Rhithrogena semicolorata</i> gp.										+		
<i>Ecdyonurus</i> sp.								+				
<i>Paraleptophlebia submarginata</i> (Stephens)									+			
<i>Ephemerella ignita</i> (Poda)												
<i>Brachyptera risi</i> (Morton)	+					+			+			
<i>Amphinemura standfussi</i> Ris						+			+			
<i>Nemurella picteti</i> Klapalek				+	+							
<i>Nemoura</i> sp.	+											
<i>Nemoura cinerea</i> (Retzius)						+						
<i>Nemoura cambrica</i> gp.					+		+			+		+
<i>Nemoura erratica</i> Classen									+			
<i>Leuctra nigra</i> (Olivier)		+	+	+	+		+	+	+			
<i>Isoperla grammatica</i> (Poda)					+		+	+	+			
<i>Chloroperla torrentium</i> (Pictet)										+		
<i>Agabus</i> sp.												
<i>Agabus guttatus</i> (Paykull)		+			+							
<i>Hydraena nigrita</i> Germar												
<i>Helophorus grandis</i> Illiger			+									
<i>Anacaena globulus</i> (Paykull)						+						
<i>Cercyon</i> sp.												
<i>Elodes</i> sp.				+	+		+	+	+		+	+
<i>Cyphon</i> sp.												
<i>Elmis aenea</i> (Muller)								+	+	+		
<i>Riolus subviolaceus</i> (Muller)								+				
<i>Rhyacophila septentrionis</i> McLachlan											+	
<i>Agapetus</i> sp.		+	+	+	+	+	+	+	+	+		
<i>Wormaldia</i> sp.							+	+	+	+	+	
<i>Plectrocnemia</i> sp.							+					
<i>Plectrocnemia conspersa</i> (Curtis)		+	+	+	+		+	+	+		+	
<i>Plectrocnemia geniculata</i> McLachlan				+			+			+		
<i>Tinodes unicolor</i> (Pictet)								+	+		+	
<i>Tinodes dives</i> (Pictet)								+				
<i>Lype</i> sp.				+					+			
<i>Hydropsyche instabilis</i> (Curtis)								+	+		+	
<i>Drusus annulatus</i> Stephens								+		+		
<i>Limnephilus lunatus</i> Curtis												
<i>Potamophylax latipennis</i> (Curtis)/ <i>cingulatus</i> (Stephens)								+	+			
<i>Halesus</i> sp.									+			
<i>Micropterna sequax</i> McLachlan	+	+	+	+		+	+		+			
<i>Chaetopteryx villosa</i> (Fabricius)												
<i>Potamophylax</i> gp/ <i>Halesus</i> sp.												
<i>Beraea maurus</i> (Curtis)				+					+			
<i>Crunoecia irrorata</i> (Curtis)			+	+		+						

TABLE 4a DISTRIBUTION OF SPRING TAXA FOR HURDLESTONE, BECTOR WOOD AND WHITE HOLE FARM

	HURDLESTONE SOURCE	HURDLESTONE 50m	BECTOR WOOD FLUSH A	BECTOR WOOD FLUSH B	BECTOR WOOD FLUSH C	BECTOR WOOD SOURCE	BECTOR WOOD 50m	BECTOR WOOD 250m	BECTOR WOOD 1000m	WHITE HOLE FARM 50m	WHITE HOLE FARM 250m	WHITE HOLE ADJ. 250m
Tipula montium gp.	.	.	.	.	.	.	.	.	.	.	.	.
Pedicia sp. (not rivososa)	.	.	.	.	.	.	.	.	.	.	.	.
Dicranota sp.	.	.	.	.	.	.	.	.	.	.	.	.
Limnophila (Elaeophila) sp.	.	.	.	.	.	.	.	.	.	.	.	.
Molophilus sp.	+	.	.	.	.	.	.	.	.	.	.	.
Indet. Tipulidae	.	.	+	.	.	.	.	.	.	.	.	.
Pericoma (cf calcilega Feuerborn)	.	.	.	.	.	.	.	.	.	.	.	.
Pericoma pulchra Eaton	.	.	.	.	.	.	.	.	.	.	.	.
Pericoma trivialis gp.	.	.	.	.	.	.	.	.	.	.	.	.
Pericoma sp. (trivialis gp/canescens)	.	.	.	.	.	.	.	.	.	.	.	.
Indet. Psychodidae	.	.	.	.	.	.	.	.	.	.	.	.
Ptychoptera sp.	.	.	+	+	+	.	.	.	.	.	.	.
Dixa maculata complex	+	+	+	.	.	.	.	.	.	.	.	.
Indet. Ceratopogonidae	+	.	+	.	.	+	.	.	.	.	.	.
Indet. Chironomidae	+	+	+	+	+	+	+	+	+	+	+	+
Tanypodinae	.	.	+	+	+	.	.	.	.	.	.	.
Diamesinae	+	+	.	.	.	.	.	.	.	.	.	.
Prodiamesinae	.	.	.	.	.	.	.	.	.	.	.	.
Orthoclaadiinae	+	+	.	+	+	+	+	+	+	+	+	+
Chironomini	.	.	+	+	+	.	.	.	.	.	.	.
Tanytarsini	+	+	+	.	+	+	+	+	+	+	+	+
Simulium vernum gp.	.	.	.	.	.	.	.	.	.	.	.	.
Simulium cryophilum gp.	+	.	.	.	.	.	.	.	.	.	.	.
Simulium costatum Friederichs	+	.	.	.	.	.	+	.	.	.	.	.
Simulium angustitarse gp.	.	.	.	.	.	.	.	.	.	.	.	.
Simulium ornatum gp.	+	.	.	.	.	.	.	.	.	.	.	.
Simulium ornatum gp. (prob. spinosum)	.	.	.	.	.	.	.	.	.	.	.	.
Oxycera formosa Meigen	.	.	.	.	.	.	.	+	.	.	.	.
Oxycera pardalina Meigen	.	.	.	.	.	.	.	.	+	.	.	.
Indet. Stratiomyidae	.	.	.	.	.	.	.	.	.	.	.	.
Chelifera gp.	.	.	+	.	.	.	.	+	.	.	.	.
Hemerodromia gp.	.	.	.	.	.	.	.	.	?	.	.	.
Indet. Dolichopodidae	.	.	.	.	.	.	.	.	.	.	.	.
Indet. Thaumaleidae	+	+	.	.	.	.	.	.	.	.	.	.
Chrysogaster sp.	.	.	.	.	.	.	.	.	.	.	.	.

TABLE 4b DISTRIBUTION OF SPRING TAXA FOR HURDLESTONE, BECTOR WOOD AND WHITE HOLE FARM

	LEIGH WOOD WEST 50m	LEIGH WOOD EAST SOURCE	LEIGH WOOD EAST 50m	LEIGH WOOD EAST 250m	LOWER SOHO FARM Site 1	FINGER STREAM WEST FLUSH	FINGER STREAM WEST Site 1	FINGER STREAM WEST Site 2	FINGER STREAM WEST Site 3	CHANTRY EAST Site 1	CHANTRY WEST SOURCE	CHANTRY WEST 50m
<i>Polycelis felina</i> (Dalyell)	.	.	.	.	.	.	.	.	.	.	.	.
<i>Crenobia alpina</i> (Dana)	.	.	.	.	.	.	.	.	.	.	.	.
<i>Potamopyrgus jenkinsi</i> (Smith)	+	.	.	.	.	.	.	.	.	.	.	.
<i>Lymnaea truncatula</i> (Muller)	.	.	.	.	.	.	.	.	.	.	.	.
<i>Lymnaea peregra</i> (Muller)	.	.	.	.	.	.	.	.	.	.	.	.
<i>Pisidium</i> sp.	+	.	.	.	.	.	.	.	.	.	.	.
Naididae	+	.	.	.	.	.	.	.	.	.	.	.
Tubificidae	.	.	.	.	.	.	.	.	.	.	.	.
Enchytraeidae	.	.	.	.	.	.	.	.	.	.	.	.
Lumbriculidae	+	.	.	.	.	.	.	.	.	.	.	.
Lumbricidae	+	.	.	.	.	.	.	.	.	.	.	.
Indet. Oligochaeta	+	.	.	.	.	.	.	.	.	.	.	.
<i>Glossiphonia complanata</i> (L.)	.	.	.	.	.	.	.	.	.	.	.	.
Indet. Hydracarina	.	.	.	.	.	.	.	.	.	.	.	.
<i>Gammarus pulex</i> (L.)	.	.	.	.	.	.	.	.	.	.	.	.
<i>Baetis vernus</i> Curtis	.	.	.	.	.	.	.	.	.	.	.	.
<i>Baetis rhodani</i> (Pictet)	.	.	.	.	.	.	.	.	.	.	.	.
<i>Baetis muticus</i> (L.)	.	.	.	.	.	.	.	.	.	.	.	.
<i>Rhithrogena semicolorata</i> gp.	.	.	.	.	.	.	.	.	.	.	.	.
<i>Ecdyonurus</i> sp.	.	.	.	.	.	.	.	.	.	.	.	.
<i>Paraleptophlebia submarginata</i> (Stephens)	.	.	.	.	.	.	.	.	.	.	.	.
<i>Ephemerella ignita</i> (Poda)	.	.	.	.	.	.	.	.	.	.	.	.
<i>Brachyptera risi</i> (Morton)	.	.	.	.	.	.	.	.	.	.	.	.
<i>Amphinemura standfussi</i> Ris	+	+	+	+	+	+	+	+	+	+	+	+
<i>Nemurella picteti</i> Klapalek	.	.	.	.	.	.	.	.	.	.	.	.
<i>Nemoura</i> sp.	.	.	.	.	.	.	.	.	.	.	.	.
<i>Nemoura cinerea</i> (Retzius)	+	+	+	+	+	+	+	+	+	+	+	+
<i>Nemoura cambrica</i> gp.	.	.	.	.	.	.	.	.	.	.	.	.
<i>Nemoura erratica</i> Classen	.	.	.	.	.	.	.	.	.	.	.	.
<i>Leuctra nigra</i> (Olivier)	.	.	.	.	.	.	.	.	.	.	.	.
<i>Isoperla grammatica</i> (Poda)	+	.	.	.	.	.	.	.	.	.	.	.
<i>Chloroperla torrentium</i> (Pictet)	.	.	.	.	.	.	.	.	.	.	.	.
<i>Agabus</i> sp.	.	.	.	.	.	.	.	.	.	.	.	.
<i>Agabus guttatus</i> (Paykull)	+	.	.	.	.	.	.	.	.	.	.	.
<i>Hydraena nigrita</i> Germar	.	.	.	.	.	.	.	.	.	.	.	.
<i>Helophorus grandis</i> Illiger	.	.	.	.	.	.	.	.	.	.	.	.
<i>Anacaena globulus</i> (Paykull)	.	+	.	.	.	.	.	.	.	.	.	.
<i>Cercyon</i> sp.	.	.	.	.	.	.	.	.	.	.	.	.
<i>Elodes</i> sp.	.	.	.	.	.	.	.	.	.	.	.	.
<i>Cyphon</i> sp.	.	.	.	.	.	.	.	.	.	.	.	.
<i>Elmis aenea</i> (Muller)	.	.	.	.	.	.	.	.	.	.	.	.
<i>Riolus subviolaceus</i> (Muller)	.	.	.	.	.	.	.	.	.	.	.	.
<i>Rhyacophila septentrionis</i> McLachlan	.	.	.	.	.	.	.	.	.	.	.	.
<i>Agapetus</i> sp.	.	.	.	.	.	.	.	.	.	.	.	.
<i>Wormaldia</i> sp.	+	.	.	.	.	.	.	.	.	.	.	.
<i>Plectrocnemia</i> sp.	.	.	.	.	.	.	.	.	.	.	.	.
<i>Plectrocnemia conspersa</i> (Curtis)	.	.	.	.	.	.	.	.	.	.	.	.
<i>Plectrocnemia geniculata</i> McLachlan	.	.	.	.	.	.	.	.	.	.	.	.
<i>Tinodes unicolor</i> (Pictet)	.	.	.	.	.	.	.	.	.	.	.	.
<i>Tinodes dives</i> (Pictet)	.	.	.	.	.	.	.	.	.	.	.	.
<i>Lype</i> sp.	.	.	.	.	.	.	.	.	.	.	.	.
<i>Hydropsyche instabilis</i> (Curtis)	.	.	.	.	.	.	.	.	.	.	.	.
<i>Drusus annulatus</i> Stephens	.	.	.	.	.	.	.	.	.	.	.	.
<i>Limnephilus lunatus</i> Curtis	.	.	.	.	.	.	.	.	.	.	.	.
<i>Potamophylax latipennis</i> (Curtis)/ <i>cingulatus</i> (Stephens)	.	.	.	.	.	.	.	.	.	.	.	.
<i>Halesus</i> sp.	.	.	.	.	.	.	.	.	.	.	.	.
<i>Micropterna sequax</i> McLachlan	.	+	+	+	+	+	+	+	+	+	+	+
<i>Chaetopteryx villosa</i> (Fabricius)	.	.	.	.	.	.	.	.	.	.	.	.
<i>Potamophylax</i> gp/ <i>Halesus</i> sp.	.	.	.	.	.	.	.	.	.	.	.	.
<i>Beraea maurus</i> (Curtis)	.	.	.	.	.	.	.	.	.	.	.	.
<i>Crunoecia irrorata</i> (Curtis)	.	.	.	.	.	.	.	.	.	.	.	.

TABLE 5a DISTRIBUTION OF SPRING TAXA FOR LEIGH WOOD EAST & WEST, LOWER SOHO FARM, FINGER STREAM WEST AND CHANTRY EAST & WEST



	LEIGH WOOD WEST 50m	LEIGH WOOD EAST SOURCE	LEIGH WOOD EAST 50m	LEIGH WOOD EAST 250m	LOWER SOHO FARM Site 1	FINGER STREAM WEST FLUSH	FINGER STREAM WEST Site 1	FINGER STREAM WEST Site 2	FINGER STREAM WEST Site 3	CHANTRY EAST Site 1	CHANTRY WEST SOURCE	CHANTRY WEST 50m
Tipula montium gp.	.	.	.	.	.	.	.	.	.	.	.	.
Pedicia sp. (not rivosa)	.	.	.	.	.	.	.	.	.	.	.	.
Dicranota sp.	.	.	.	.	.	.	.	.	.	.	.	.
Limnophila (Elaeophila) sp.	.	.	.	.	.	.	.	.	.	.	.	.
Molophilus sp.	.	.	.	.	.	.	.	.	.	.	.	.
Indet. Tipulidae	.	.	.	.	.	.	.	.	.	.	.	.
Pericoma (cf calcilega Feuerborn)	.	.	.	.	.	.	.	.	.	.	.	.
Pericoma pulchra Eaton	.	.	.	.	.	.	.	.	.	.	.	.
Pericoma trivialis gp.	.	.	.	.	.	.	.	.	.	.	.	.
Pericoma sp. (trivialis gp/canescens)	.	.	.	.	.	.	.	.	.	.	.	.
Indet. Psychodidae	+	.	.	.	.	.	.	.	.	.	.	.
Ptychoptera sp.	.	.	.	.	.	.	.	.	.	.	.	.
Dixa maculata complex	.	.	+	.	.	.	.	.	.	.	.	.
Indet. Ceratopogonidae	+	.	+	+	+	.	+	.	.	+	.	.
Indet. Chironomidae	+	+	+	+	+	.	+	+	+	+	+	+
Tanypodinae	.	.	.	.	.	.	.	.	.	.	.	.
Diamesinae	.	.	.	.	.	.	.	.	.	.	.	.
Prodiamesinae	.	.	.	.	.	.	.	.	.	.	.	.
Orthoclaadiinae	+	+	+	+	+	.	+	+	+	+	+	+
Chironomini	.	.	.	.	.	.	.	.	.	.	.	.
Tanytarsini	+	.	+	+	.	.	+	.	+	+	+	+
Simulium venum gp.	+	.	+	+	.	.	.	.	.	.	.	.
Simulium cryophilum gp.	.	+	+	+	.	.	.	.	.	.	.	.
Simulium costatum Friederichs	.	.	+	+	.	.	.	.	+	.	.	.
Simulium angustitarse gp.	.	.	.	+	.	.	.	.	.	.	.	.
Simulium ornatum gp.	.	.	.	.	.	.	.	.	+	.	.	.
Simulium ornatum gp. (prob. spinosum)	.	.	.	.	.	.	.	.	.	.	.	.
Oxycera formosa Meigen	.	.	.	.	.	.	+	.	.	.	.	.
Oxycera pardalina Meigen	+	.	.	.	.	.	.	.	.	.	.	.
Indet. Stratiomyidae	.	.	+	.	.	.	.	.	.	.	.	.
Chelifera gp.	.	.	.	.	.	.	.	.	.	.	.	.
Hemerodromia gp.	.	.	.	.	.	.	.	.	.	.	.	.
Indet. Dolichopodidae	.	.	.	.	.	.	.	+	+	.	.	.
Indet. Thaumaleidae	.	.	.	.	.	.	.	.	.	.	.	.
Chrysogaster sp.	.	.	.	.	.	.	.	.	+	.	.	.

TABLE 5b DISTRIBUTION OF SPRING TAXA FOR LEIGH WOOD EAST & WEST, LOWER SOHO FARM, FINGER STREAM WEST AND CHANTRY EAST & WEST

	HURDLESTONE	SECTOR WOOD	WHITE HOLE FARM	CHANNY EAST	CHANNY WEST
<i>Polycelis felina</i> (Dalyell)	.	.	+	+	+
<i>Crenobia alpina</i> (Dana)	.	.	+	+	+
<i>Pisidium</i> sp.	.	+	+	+	+
Indet. Tubificidae	.	.	.	.	.
Indet. Oligochaeta	+	+	+	+	+
<i>Glossiphonia complanata</i> (L.)	.	+	+	+	+
<i>Hydracarina</i> indet. sp.	.	+	+	+	+
<i>Gammarus pulex</i> (L.)	+	+	+	+	+
<i>Baetis vernus</i> Curtis	.	.	+	.	.
<i>Baetis rhodani</i> (Pictet)	+	+	.	.	.
<i>Baetis muticus</i> (L.)	.	.	+	.	.
<i>Paraleptophlebia submarginata</i> (Stephens)	.	+	.	.	.
<i>Nemoura cambrica</i> gp. (erratica)	.	.	+	.	.
<i>Leuctra nigra</i> (Olivier)	.	+	.	.	.
<i>Leuctra fusca</i> (L.)	.	+	.	.	.
<i>Isoperla grammatica</i> (Poda)	.	+	.	.	.
<i>Velia caprai</i> Tamanini	.	+	+	.	.
<i>Agabus</i> sp.	+	.	+	.	.
<i>Helophorus brevipalpis</i> Bedel	.	+	+	.	+
<i>Anacaena globulus</i> (Paykull)	.	+	.	.	+
Indet. Hydrophilidae	.	.	.	+	.
<i>Elodes</i> sp.	.	+	+	+	.
<i>Elmis aenea</i> (Muller)	.	+	.	.	.
<i>Riolus subviolaceus</i> (Muller)	.	+	.	.	.
<i>Rhyacophila</i> indet. juvenile	.	+	.	.	.
<i>Wormaldia</i> sp.	.	+	+	.	+
<i>Plectrocnemia conspersa</i> (Curtis)	.	+	+	.	+
<i>Tinodes unicolor</i> (Pictet)	.	.	+	.	.
<i>Lype</i> sp.	+	+	.	.	+
<i>Hydropsyche instabilis</i> (Curtis)	.	+	.	.	.
<i>Potamophylax latipennis</i> (Curtis)/ <i>cingulatus</i> (Stephens)	.	.	+	.	.
<i>Micropterna sequax</i> McLachlan	+	+	.	.	.
<i>Chaetopteryx villosa</i> (Fabricius)	+	+	.	+	.
<i>Beraea maurus</i> (Curtis)	.	.	+	+	.
<i>Crunoecia irrorata</i> (Curtis)	.	.	.	.	+
<i>Tipula rufina</i> Meigen	.	.	.	.	+
<i>Pedicia</i> sp. (not <i>rivosa</i> )	+	.	.	.	.
<i>Dicranota</i> sp.	+	+	+	.	.
<i>Pilania filata</i> gp.	.	.	.	+	.
<i>Pilania/Oxydiscus</i> ?	.	+	.	+	.
<i>Limnophila</i> (Elaeophila) sp.	.	.	.	.	.
<i>Molophilus</i> sp.	+	.	.	.	.
<i>Pericoma calcilega</i> Feuerborn	.	.	+	.	.
<i>Pericoma neglecta</i> Eaton	.	.	+	.	.
<i>Pericoma pulchra</i> Eaton	.	.	.	+	.
<i>Pericoma trifasciata</i> (Meigen)	+	.	+	.	.
<i>Pericoma trivialis</i> gp.	.	.	.	+	+
<i>Pericoma</i> sp. ( <i>trivialis</i> gp/ <i>canescens</i> )	+	.	.	+	.
<i>Psychoda severini</i> Tonnoir	.	.	.	+	+
<i>Ptychoptera</i> sp.	.	.	.	.	+
<i>Dixa maculata</i> complex	+	.	+	+	+
<i>Dixa puberula</i> Loew	.	.	+	.	.
Indet. Ceratopogonidae	+	+	+	.	.
Indet. Chironomidae	+	+	+	+	+
Tanyptodinae	+	+	+	+	.
Diamesinae	+	.	.	.	.
Prodiamesinae	.	+	+	.	.
Orthocladinae	+	+	+	+	+
Chironomini	.	+	+	+	+
Tanytarsini	+	+	+	+	+
<i>Simulium cryophilum</i> gp.	+	.	+	.	.
<i>Simulium costatum</i> Friederichs	.	.	+	+	.
<i>Simulium angustitarse</i> gp.	+	.	.	+	.
<i>Simulium aureum</i> gp.	+	.	.	.	.
<i>Simulium ornatum</i> gp.	+	.	+	+	.
<i>Oxycera pardalina</i> Meigen	.	.	+	.	.
<i>Chelifera</i> gp.	.	.	+	.	.
<i>Hemerodromia</i> gp. ?	.	+	.	.	.
<i>Clinocera</i> sp.	+	.	+	.	.
Indet. Muscidae	.	.	.	?	.
Indet. Fanniidae	.	.	.	+	.
Indet. Thaumaleidae	.	+	.	.	+

TABLE 6 DISTRIBUTION OF SUMMER TAXA FOR MELL'S SPRINGS SITES

+ present  
- absent  
? tentative identification



SITE	SPRING	SUMMER	SPRING	SUMMER	SPRING	SUMMER
	TAXA	TAXA	BMWP	BMWP	ASPT	ASPT
Hurdlestone Source	12	*	60	*	5.00	*
Hurdlestone 1 (50m)	10	9.00	50	43	5.00	4.80
Bector Wood Flush A	11	*	56	*	5.09	*
Bector Wood Flush B	13	*	82	*	6.31	*
Bector Wood Flush C	14	*	85	*	6.07	*
Bector Wood Source	9	*	53	*	5.88	*
Bector Wood 1 (50m)	18	*	105	*	5.83	*
Bector Wood 2 (250m)	19	*	111	*	5.84	*
Bector Wood 3 (750m)	21	20.00	133	116	6.33	5.80
White Hole Farm 1 (50m)	15	*	89	*	5.93	*
White Hole Farm 2 (250m)	14	17.00	73	93	5.21	5.50
WHF Standing water adj. 2	5	*	27	*	5.40	*
Leigh Wood West 1 (50m)	10	*	54	*	5.40	*
Leigh Wood East Source	5	*	26	*	5.20	*
Leigh Wood East 1 (50m)	12	*	58	*	4.83	*
Leigh Wood East 2 (250m)	11	*	53	*	4.82	*
Finger Stream West Flush	DRY	*	*	*	*	*
Finger Stream West 1 (U/S)	8	*	33	*	4.13	*
Finger Stream West 2 (mid)	9	*	52	*	5.78	*
Finger Stream West 3 (D/S)	12	*	70	*	5.83	*
Lower Soho Farm 1	9	*	38	*	4.22	*
Chantry East 1	12	11.00	53	52	4.42	4.70
Chantry West Source	9	*	49	*	5.40	*
Chantry West 1 (50m)	11	12.00	69	63	6.27	5.30

TABLE 8 BIOLOGICAL INDICES FOR SPRING AND SUMMER SAMPLES

\* not sampled

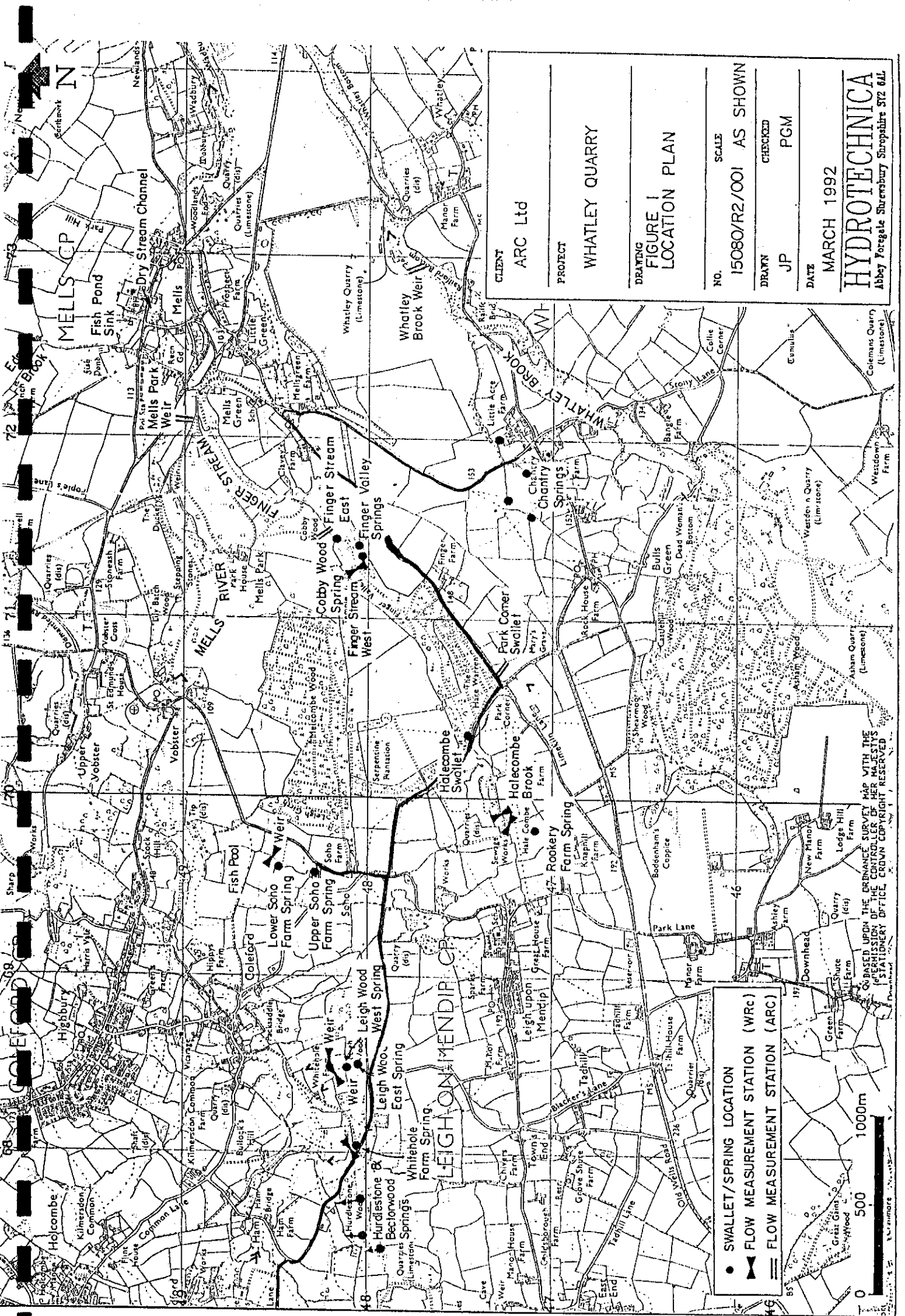


FIGURE 1 LOCATION OF SPRINGS SAMPLED FOR MACRO-INVERTEBRATES

CLIENT	ARC Ltd
PROJECT	WHATLEY QUARRY
DRAWING	FIGURE 1 LOCATION PLAN
NO.	15080/R2/001 AS SHOWN
SCALE	
DRAFTER	JP
CHECKED	PGM
DATE	MARCH 1992
<b>HYDROTECHNICA</b> Abbey Foregate Shrewsbury Shropshire ST2 6LL	

● SWALLET/SPRING LOCATION  
 ▲ FLOW MEASUREMENT STATION (WRC)  
 ≡ FLOW MEASUREMENT STATION (ARC)

0 500 1000m

BASED UPON THE ORDNANCE SURVEY MAP WITH THE PERMISSION OF THE CONTROLLER OF HER MAJESTY'S STATIONERY OFFICE. CROWN COPYRIGHT RESERVED

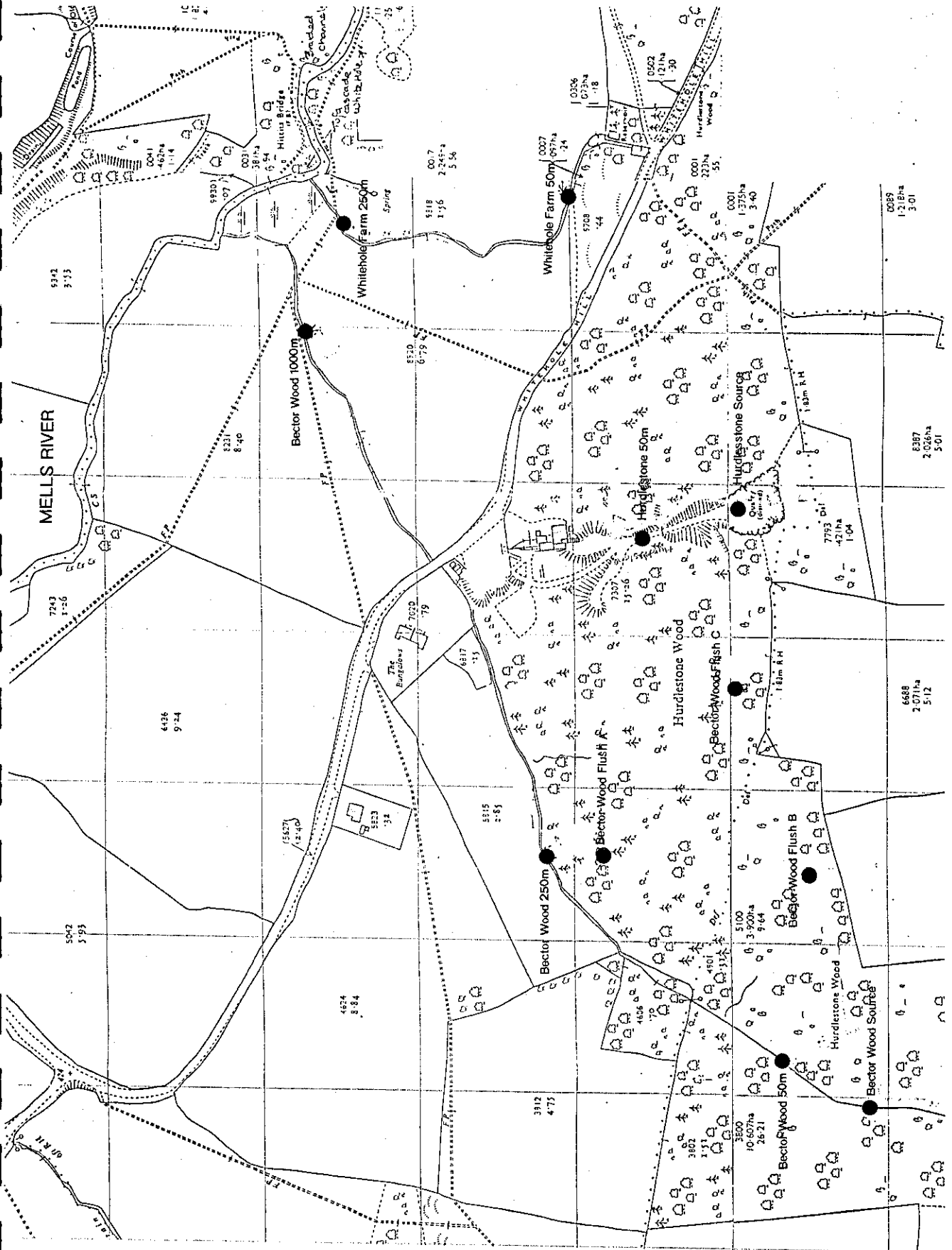


FIGURE 2 HURDLESTONE, BECTOR WOOD AND WHITEHOLE FARM SPRING SAMPLING POINTS

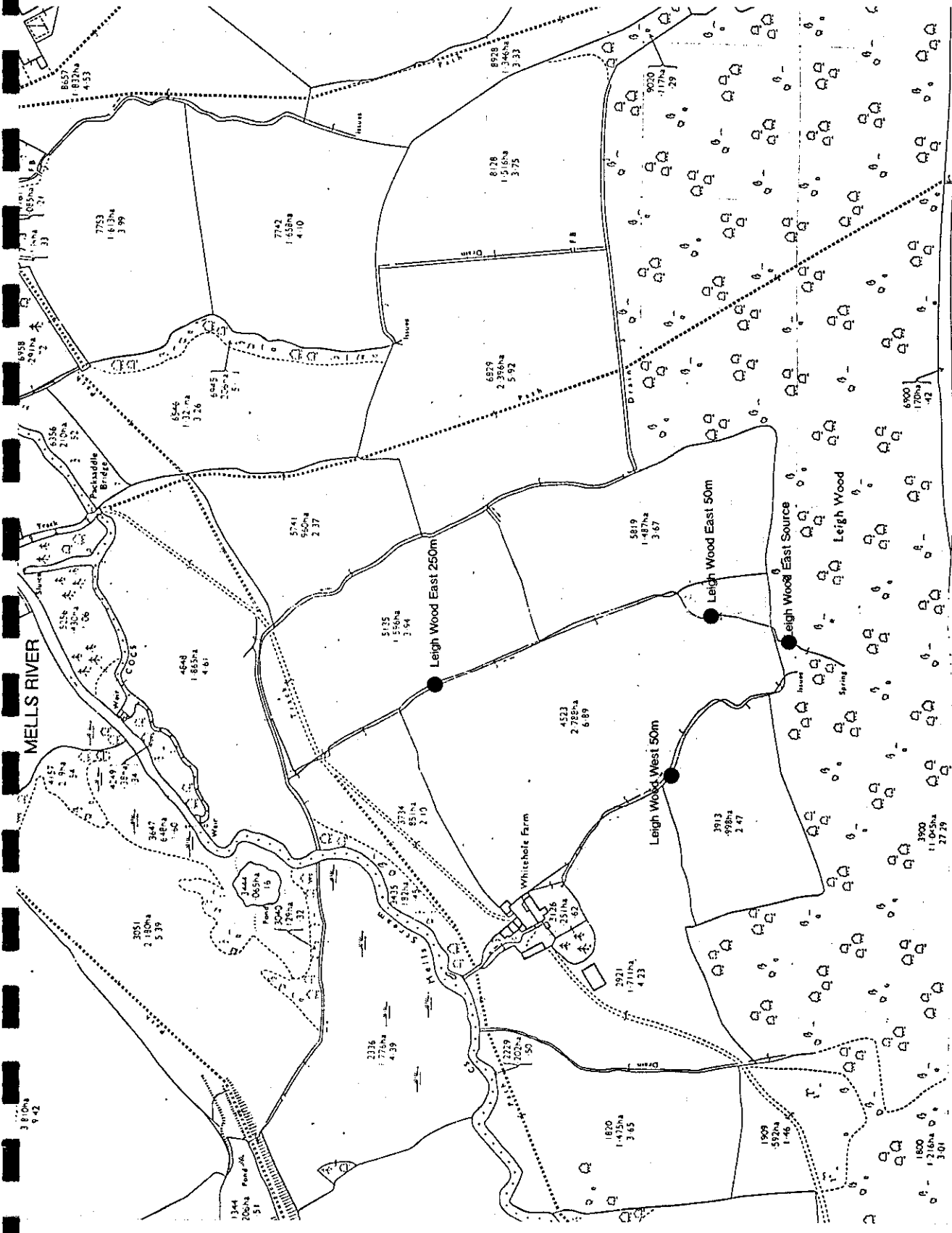


FIGURE 3 LEIGH WOOD WEST AND LEIGH WOOD EAST SAMPLING POINTS

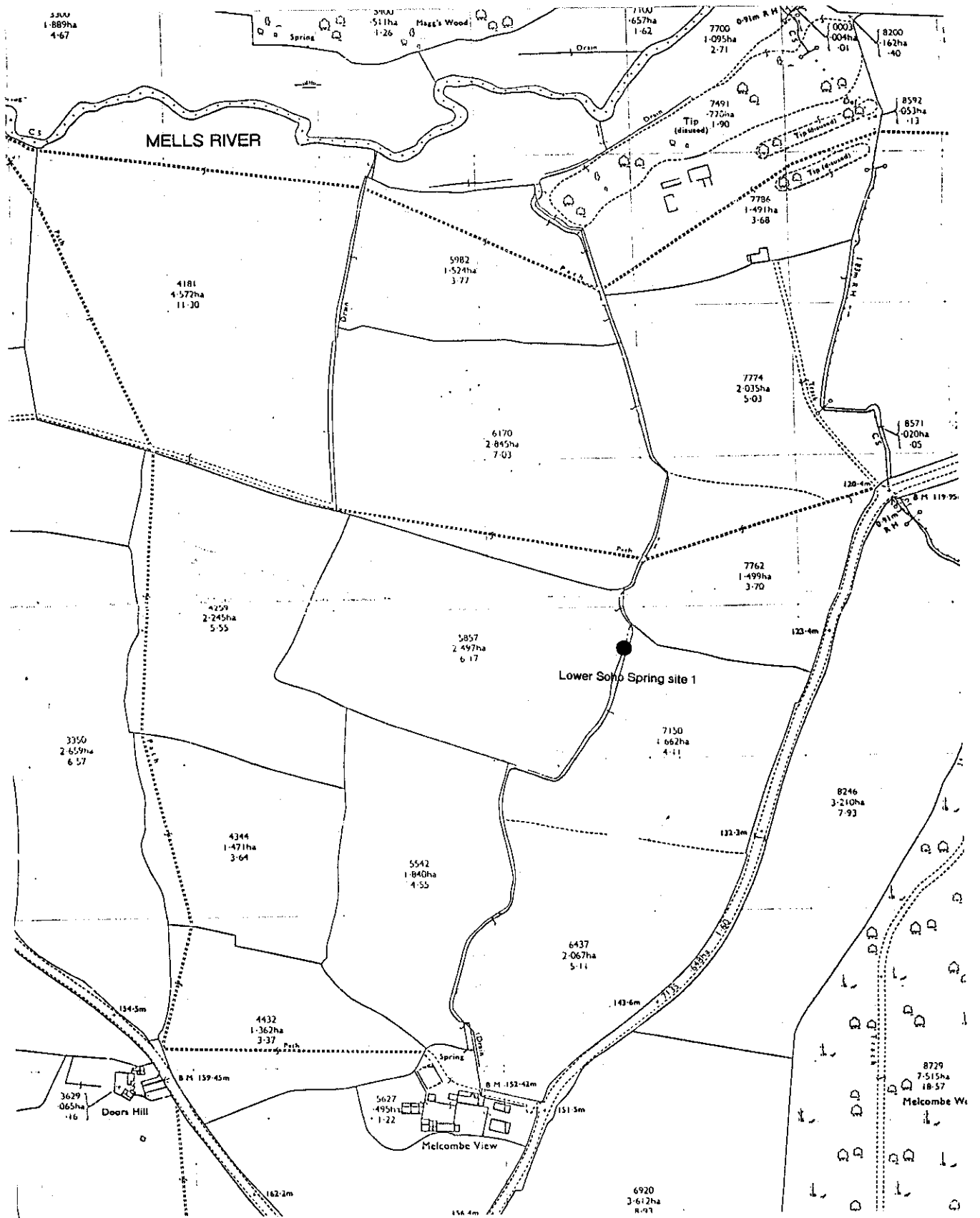


FIGURE 4 LOWER SOHO FARM SPRING SAMPLING POINT



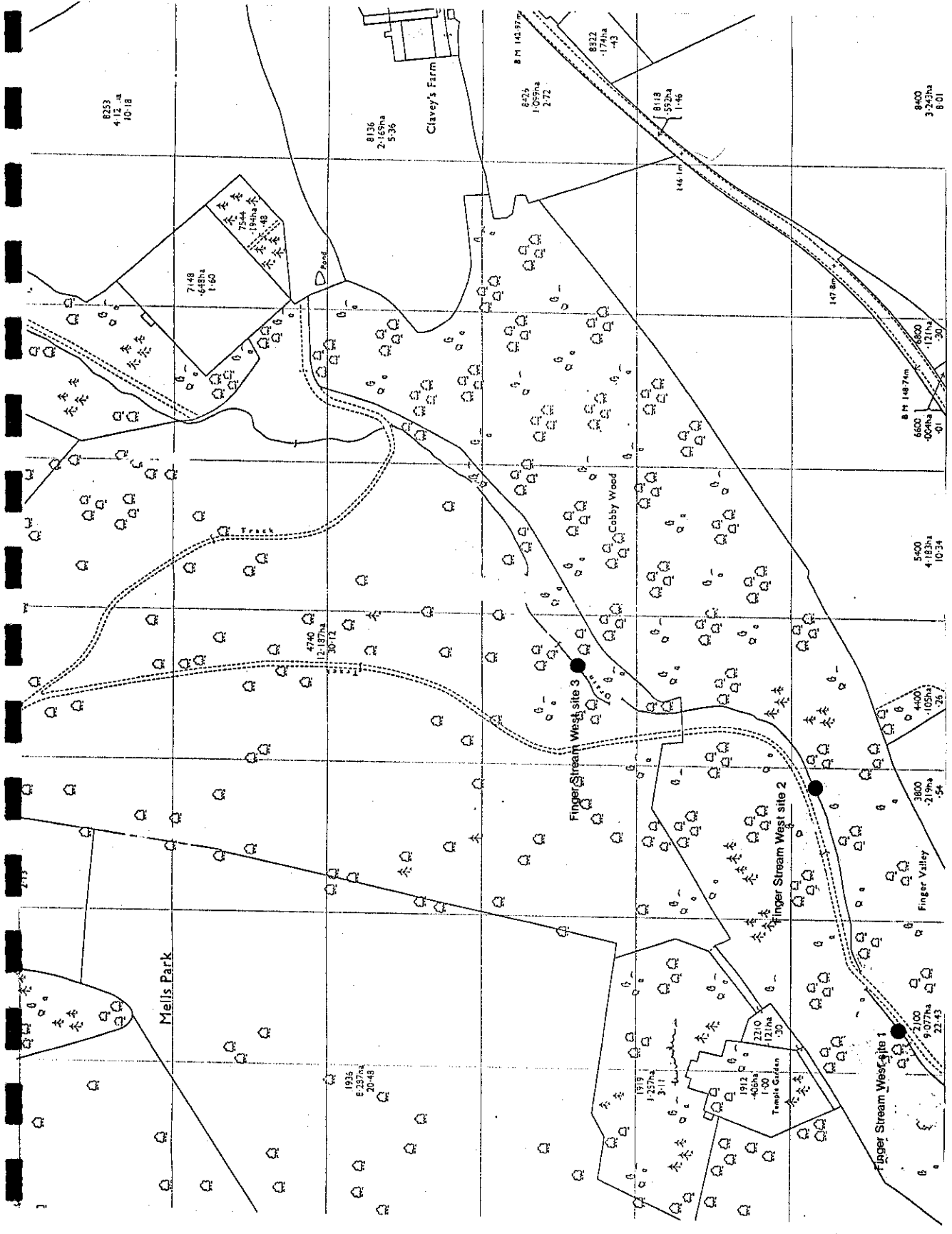


FIGURE 5 FINGER STREAM WEST SAMPLING POINTS

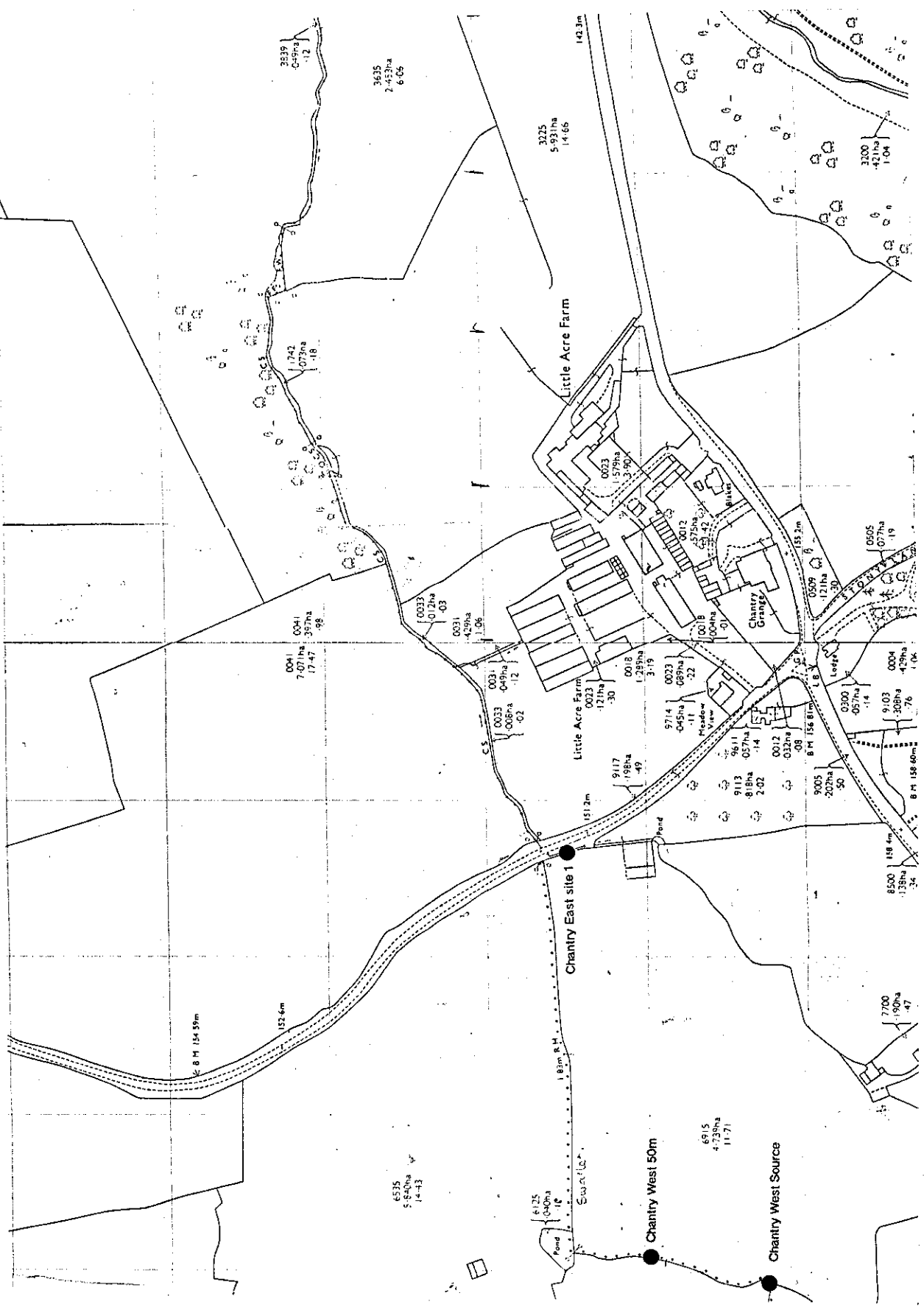


FIGURE 6 CHANTRY EAST AND CHANTRY WEST SAMPLING POINTS

COMMON NAME	FAMILY	SPECIES
Molluscs	Sphaeriidae	Pisidium sp.
Worms	Oligochaeta	
	Enchytraeidae	
	Lumbriculidae	
Crustacea	Gammaridae	Gammarus pulex (L.)
May flies	Baetidae	Baetis rhodani (Pictet)
Stone flies	Taeniopterygidae	Brachyptera risi (Morton)
	Nemouridae	Nemoura sp.
Caddis flies	Limnephilidae	Micropterna sequax McLachlan
Flies	Tipulidae	Molophilus sp.
	Dixidae	Dixa maculata complex
	Ceratopogonidae	Indet. sp.
	Chironomidae	
	Diamesinae	
	Orthocladiinae	
	Tanytarsini	
	Simuliidae	Simulium cryophilum gp. Simulium costatum gp. Simulium ornatum gp.
	Thaumaleidae	

#### APPENDIX 1 SPRING TAXON LIST FOR HURDLESTONE SOURCE

COMMON NAME	FAMILY	SPECIES
Molluscs	Lymnaeidae	Lymnaea truncatula (Muller)
	Sphaeriidae	Pisidium sp.
Worms	Oligochaeta	
	Lumbriculidae	
Crustacea	Gammaridae	Gammarus pulex (L.)
May flies	Baetidae	Baetis rhodani (Pictet)
Stone flies	Leuctridae	Leuctra nigra (Olivier)
Beetles		Agabus guttatus (Paykull)
		Helophorus grandis Illiger
Caddis flies	Rhyacophilidae	Agapetus sp.
	Polycentropodidae	Plectrocnemia conspersa (Curtis)
	Limnephilidae	Micropterna sequax McLachlan
	Dixidae	Dixa maculata complex
	Chironomidae	
	Diamesinae	
	Orthocladiinae	
	Tanytarsini	
Thaumaleidae		

#### APPENDIX 2 SPRING TAXON LIST FOR HURDLESTONE 50m

COMMON NAME	FAMILY	SPECIES
Flat worms	Planariidae	Polycelis felina (Dalyell)
		Crenobia alpina (Dana)
Molluscs Worms	Sphaeriidae	Pisidium sp.
	Oligochaeta	
	Tubificidae	
Crustacea	Gammaridae	Gammarus pulex (L.)
	Leuctridae	Leuctra nigra (Olivier)
Stone flies	Rhyacophilidae	Agapetus sp.
Caddis flies	Polycentropodidae	Plectrocnemia conspersa (Curtis)
	Limnephilidae	Micropterna sequax McLachlan
Flies	Tipulidae	Indet Tipulid
		Elaeophila sp.
	Ptychopteridae	Ptychoptera sp.
	Dixidae	Dixa maculata complex
	Ceratopogonidae	Indet. sp.
	Chironomidae	
	Tanypodinae	
	Chironomini	
	Tanytarsini	
	Empididae	Chelifera gp.

#### APPENDIX 3 SPRING TAXON LIST FOR BECTOR WOOD FLUSH A

COMMON NAME	FAMILY	SPECIES
Flat worms	Planariidae	<i>Polycelis felina</i> (Dalyell)
		<i>Crenobia alpina</i> (Dana)
Molluscs	Sphaeriidae	<i>Pisidium</i> sp.
Crustacea	Gammaridae	<i>Gammarus pulex</i> (L.)
Stone flies	Nemouridae	<i>Nemurella picteti</i> Klapalek
	Leuctridae	<i>Leuctra nigra</i> (Olivier)
Beetles	Helodidae	<i>Elodes</i> sp.
Caddis flies	Rhyacophilidae	<i>Agapetus</i> sp.
	Polycentropodidae	<i>Plectrocnemia conspersa</i> (Curtis)
		<i>Plectrocnemia geniculata</i> McLachlan
Flies	Psychomyiidae	<i>Lype</i> sp.
	Limnephilidae	<i>Micropterna sequax</i> McLachlan
	Lepidostomatidae	<i>Crunoecia irrorata</i> (Curtis)
	Tipulidae	<i>Elaeophila</i> sp.
	Psychodidae	<i>Pericoma</i> sp. ( <i>trivialis</i> gp/ <i>canescens</i> )
	Ptychopteridae	<i>Ptychoptera</i> sp.
	Chironomidae	
	Tanypodinae	
	Orthocladiinae	
Chironomini		

#### APPENDIX 4 SPRING TAXON LIST FOR BECTOR WOOD FLUSH B

COMMON NAME	FAMILY	SPECIES
Flat worms	Planariidae	Polycelis felina (Dalyell)
		Crenobia alpina (Dana)
Molluscs	Hydrobiidae	Potamopyrgus jenkinsi (Smith)
	Sphaeriidae	Pisidium sp.
Worms	Oligochaeta	
	Tubificidae	
	Lumbriculidae	
	Nemouridae	
Stone flies	Nemouridae	Nemurella picteti Klapalek
		Nemoura cambrica gp.
Beetles	Leuctridae	Leuctra nigra (Olivier)
	Perlodidae	Isoperla grammatica (Poda)
	Dytiscidae	Agabus guttatus (Paykull)
	Helodidae	Elodes sp.
Caddis flies	Rhyacophilidae	Agapetus sp.
	Polycentropodidae	Plectrocnemia conspersa (Curtis)
	Beraeidae	Beraea maurus (Curtis)
	Lepidostomatidae	Crunoecia irrorata (Curtis)
Flies	Ptychopteridae	Ptychoptera sp.
	Chironomidae	
	Tanypodinae	
	Orthoclaadiinae	
	Chironomini	
	Tanytarsini	

APPENDIX 5 SPRING TAXON LIST FOR BECTOR WOOD FLUSH C

COMMON NAME	FAMILY	SPECIES
Flat worms	Planariidae	Polycelis felina (Dalyell)
		Crenobia alpina (Dana)
Crustacea	Gammaridae	Gammarus pulex (L.)
May flies	Baetidae	Baetis rhodani (Pictet)
Stone flies	Taeniopterygidae	Brachyptera risi (Morton)
	Nemouridae	Amphinemura standfussi Ris
		Nemoura cinerea (Retzius)
		Anacaena globulus (Paykull)
Beetles	Hydrophilidae	Anacaena globulus (Paykull)
Caddis flies	Rhyacophilidae	Agapetus sp.
	Limnephilidae	Micropterna sequax McLachlan
	Ceratopogonidae	indet. sp.
Flies	Chironomidae	
	Orthoclaadiinae	
	Tanytarsini	

#### APPENDIX 6 SPRING TAXON LIST FOR BECTOR WOOD SOURCE



COMMON NAME	FAMILY	SPECIES
Flat worms	Planariidae	Polycelis felina (Dalyell)
		Crenobia alpina (Dana)
Molluscs Worms	Sphaeriidae	Pisidium sp.
	Oligochaeta	
	Lumbriculidae	
Crustacea	Gammaridae	Gammarus pulex (L.)
	Baetidae	Baetis rhodani (Pictet)
May flies	Nemouridae	Nemoura cambrica gp.
	Leuctridae	Leuctra nigra (Olivier)
Stone flies	Perlodidae	Isoperla grammatica (Poda)
	Helodidae	Elodes sp.
Beetles	Rhyacophilidae	Agapetus sp.
	Philopotamidae	Wormaldia sp.
Caddis flies	Polycentropodidae	Plectrocnemia sp.
		Plectrocnemia conspersa (Curtis)
Flies		Plectrocnemia geniculata McLachlan
	Limnephilidae	Micropterna sequax McLachlan
	Lepidostomatidae	Crunoecia irrorata (Curtis)
	Tipulidae	Elaeophila sp.
	Ptychopteridae	Ptychoptera sp.
	Dixidae	Dixa maculata complex
	Chironomidae	
	Orthoclaadiinae	
	Chironomini	
	Tanytarsini	
	Simuliidae	Simulium costatum gp.
	Stratiomyidae	Oxycera formosa Meigen
Empididae	Chelifera gp.	
Thaumaleidae		

APPENDIX 7 SPRING TAXON LIST FOR BECTOR WOOD 50m

COMMON NAME	FAMILY	SPECIES
Flat worms	Planariidae	Polycelis felina (Dalyell)
Molluscs	Hydrobiidae	Potamopyrgus jenkinsi (Smith)
Molluscs	Sphaeriidae	Pisidium sp.
Worms	Oligochaeta	
	Tubificidae	
	Lumbriculidae	
	Lumbricidae	
Crustacea	Gammaridae	Gammarus pulex (L.)
May flies	Baetidae	Baetis rhodani (Pictet)
		Baetis muticus (L.)
	Heptageniidae	Ecdyonurus sp.
Stone flies	Leuctridae	Leuctra nigra (Olivier)
	Perlodidae	Isoperla grammatica (Poda)
Beetles	Helodidae	Elodes sp.
	Elminthidae	Elmis aenea (Muller)
		Riolus subviolaceus (Muller)
Caddis flies	Rhyacophilidae	Agapetus sp.
	Philopotamidae	Wormaldia sp.
	Polycentropodidae	Plectrocnemia conspersa (Curtis)
	Psychomyiidae	Tinodes unicolor (Pictet)
	Hydropsychidae	Hydropsyche instabilis (Curtis)
	Limnephilidae	Drusus annulatus Stephens
		Potamophylax latipennis/cingulatus gp.
		Micropterna sequax McLachlan
Flies	Tipulidae	Pedicia sp. (not rivosia)
		Dicranota sp.
		Elaeophila sp.
	Ptychopteridae	Ptychoptera sp.
	Chironomidae	
	Tanypodinae	
	Orthoclaadiinae	
	Tanytarsini	
	Stratiomyidae	Oxycera pardalina Meigen
	Thaumaleidae	

APPENDIX 8 SPRING TAXON LIST FOR BECTOR WOOD 250m

COMMON NAME	FAMILY	SPECIES
Flat worms	Planariidae	Polycelis felina (Dalyell)
Molluscs	Sphaeriidae	Pisidium sp.
Worms	Oligochaeta	
	Tubificidae	
	Enchytraeidae	
	Lumbriculidae	
	Lumbricidae	
Crustacea	Gammaridae	Gammarus pulex (L.)
May flies	Baetidae	Baetis rhodani (Pictet)
	Leptophlebiidae	Paraleptophlebia submarginata (Stephens)
Stone flies	Taeniopterygidae	Brachyptera risi (Morton)
	Nemouridae	Amphinemura standfussi Ris
		Nemoura cambrica gp.
		Nemoura erratica Classen
	Leuctridae	Leuctra nigra (Olivier)
	Perlodidae	Isoperla grammatica (Poda)
Beetles	Helodidae	Elodes sp.
	Elminthidae	Elmis aenea (Muller)
Caddis flies	Philopotamidae	Wormaldia sp.
	Polycentropodidae	Plectrocnemia conspersa (Curtis)
	Psychomyiidae	Tinodes unicolor (Pictet)
		Tinodes dives (Pictet)
		Lype sp.
	Hydropsychidae	Hydropsyche instabilis (Curtis)
	Limnephilidae	Potamophylax latipennis/cingulatus gp.
		Halesus sp.
Flies	Beraeidae	Beraea maurus (Curtis)
	Tipulidae	Dicranota sp.
		Elaeophila sp.
	Ptychopteridae	Ptychoptera sp.
	Dixidae	Dixa maculata complex
	Ceratopogonidae	Indet. sp.
	Chironomidae	
	Tanypodinae	
	Diamesinae	
	Prodiamesinae	
	Orthocladiinae	
	Chironomini	
	Tanytarsini	
	Simuliidae	Simulium cryophilum gp.
		Simulium costatum gp.
	Empididae	Hemerodromia gp.

APPENDIX 9 SPRING TAXON LIST FOR BECTOR WOOD 1000m

COMMON NAME	FAMILY	SPECIES
Flat worms	Planariidae	Polycelis felina (Dalyell) Crenobia alpina (Dana)
Worms	Oligochaeta	
Crustacea	Gammaridae	Gammarus pulex (L.)
May flies	Baetidae	Baetis vernus Curtis Baetis rhodani (Pictet) Baetis muticus (L.)
Stone flies	Heptageniidae	Rithrogena semicolorata gp.
	Nemouridae	Nemoura cambrica gp.
	Chloroperlidae	Chloroperla torrentium (Pictet)
Beetles	Elminthidae	Elmis aenea (Muller)
Caddis flies	Rhyacophilidae	Rhyacophila septentrionis McLachlan Agapetus sp.
	Philopotamidae	Wormaldia sp.
Flies	Polycentropodidae	Plectrocnemia geniculata McLachlan
	Limnephilidae	Drusus annulatus Stephens Micropterna sequax McLachlan
	Tipulidae	Dicranota sp.
	Ceratopogonidae	Indet. sp.
	Chironomidae	
	Orthoclaadiinae	
	Chironomini	
Tanytarsini		
Simuliidae	Simulium vernum gp.	

APPENDIX 10 SPRING TAXON LIST FOR WHITE HOLE FARM 50m

COMMON NAME	FAMILY	SPECIES
Flat worms	Planariidae	Polycelis felina (Dalyell) Crenobia alpina (Dana)
Molluscs	Sphaeriidae	Pisidium sp.
Worms	Oligochaeta	
	Enchytraeidae	
	Lumbriculidae	
	Lumbricidae	
Crustacea	Gammaridae	Gammarus pulex (L.)
May flies	Baetidae	Baetis vernus Curtis Baetis rhodani (Pictet) Baetis muticus (L.)
Stone flies	Nemouridae	Nemoura cambrica gp.
Beetles	Helodidae	Elodes sp.
Caddis flies	Rhyacophilidae	Rhyacophila septentrionis McLachlan
	Philopotamidae	Wormaldia sp.
	Polycentropodidae	Plectrocnemia conspersa (Curtis)
	Psychomyiidae	Tinodes unicolor (Pictet)
	Hydropsychidae	Hydropsyche instabilis (Curtis)
Flies	Tipulidae	Dicranota sp.
	Psychodidae	Pericoma (cf calcilega Feuerborn)
	Dixidae	Dixa maculata complex
	Chironomidae	
	Diamesinae	
	Orthocladiinae	
	Tanytarsini	
	Simuliidae	Simulium costatum Friederichs Simulium ornatum gp.
	Stratiomyidae	Oxycera pardalina Meigen

APPENDIX 11 SPRING TAXON LIST FOR WHITE HOLE FARM 250m (CASCADE)

COMMON NAME	FAMILY	SPECIES
Flat worms	Planariidae	Polycelis felina (Dalyell) Crenobia alpina (Dana)
Crustacea	Gammaridae	Gammarus pulex (L.)
Mayflies	Baetidae	Baetis rhodani (Pictet)
Stone flies	Nemouridae	Nemoura cambrica gp.
Beetles	Helodidae	Elodes sp.
Flies	Dixidae	Dixa maculata complex

APPENDIX 12 SPRING TAXON LIST FOR WHITE HOLE FARM adjacent 250m

COMMON NAME	FAMILY	SPECIES
Molluscs	Hydrobiidae	Potamopyrgus jenkinsi (Smith)
	Sphaeriidae	Pisidium sp.
Worms	Oligochaeta	
	Naididae	
	Lumbriculidae	
	Lumbricidae	
Stone flies	Nemouridae	Amphinemura standfussi Ris Nemoura cinerea (Retzius)
	Perlodidae	Isoperla grammatica (Poda)
		Agabus guttatus (Paykull)
Beetles		Wormaldia sp.
Caddis flies	Philopotamidae	
	Lepidostomatidae	Crunoecia irrorata (Curtis)
Flies	Psychodidae	Indet.
	Ceratopogonidae	Indet. sp.
	Chironomidae	
	Orthocladiinae	
	Tanytarsini	
	Simuliidae	Simulium vernum gp.
	Stratiomyidae	Oxycera pardalina Meigen

APPENDIX 13 SPRING TAXON LIST FOR LEIGH WOOD WEST

COMMON NAME	FAMILY	SPECIES
Stone flies	Nemouridae	Amphinemura standfussi Ris Nemoura cinerea (Retzius)
Beetles	Hydrophilidae	Anacaena globulus (Paykull)
Caddis flies	Limnephilidae	Micropterna sequax McLachlan
Flies	Chironomidae	
	Orthocladiinae	
	Simuliidae	Simulium cryophilum gp.

APPENDIX 14 SPRING TAXON LIST FOR LEIGH WOOD EAST SOURCE



COMMON NAME	FAMILY	SPECIES
Molluscs	Lymnaeidae	Lymnaea truncatula (Muller)
	Sphaeriidae	Pisidium sp.
Worms	Oligochaeta	
	Naididae	
	Tubificidae	
	Enchytraeidae	
Crustacea	Gammaridae	Gammarus pulex (L.)
	Baetidae	Baetis vernus Curtis Baetis rhodani (Pictet)
May flies		Baetis rhodani (Pictet)
		Brachyptera risi (Morton)
		Amphinemura standfussi Ris Nemoura cinerea (Retzius)
Stone flies	Taeniopterygidae	Brachyptera risi (Morton)
	Nemouridae	Amphinemura standfussi Ris Nemoura cinerea (Retzius)
Beetles	Dytiscidae	Agabus sp. Agabus guttatus (Paykull)
		Hydrophilidae
	Limnephilidae	Micropterna sequax McLachlan
		Dixidae
Caddis flies Flies	Ceratopogonidae	Indet. sp.
	Chironomidae	
	Orthoclaadiinae	
	Tanytarsini	
	Simuliidae	Simulium venum gp. Simulium cryophilum gp. Simulium ornatum gp. (prob. spinosum)
		Stratiomyidae

APPENDIX 15 SPRING TAXON LIST FOR LEIGH WOOD EAST 50m

COMMON NAME	FAMILY	SPECIES
Molluscs	Sphaeriidae	Pisidium sp.
Worms	Oligochaeta	
	Tubificidae	
	Lumbriculidae	
	Lumbricidae	
Crustacea	Gammaridae	Gammarus pulex (L.)
Mayflies	Baetidae	Baetis rhodani (Pictet)
Stone flies	Nemouridae	Amphinemura standfussi Ris
		Nemoura cinerea (Retzius)
Beetles	Hydrophilidae	Hydraena nigrita Germar
Caddis flies	Philopotamidae	Wormaldia sp.
	Limnephilidae	Micropterna sequax McLachlan
Flies	Tipulidae	Molophilus sp.
	Ceratopogonidae	Indet. sp.
	Chironomidae	
	Orthocladiinae	
	Tanytarsini	
	Simuliidae	Simulium venum gp. Simulium cryophilum gp. Simulium angustitarse gp.

APPENDIX 16 SPRING TAXON LIST FOR LEIGH WOOD EAST 250m

COMMON NAME	FAMILY	SPECIES
Molluscs	Lymnaeidae	Lymnaea truncatula (Muller)
	Sphaeriidae	Pisidium sp.
Worms	Oligochaeta	
	Tubificidae	
	Lumbriculidae	
Crustacea	Gammaridae	Gammarus pulex (L.)
May flies	Baetidae	Baetis rhodani (Pictet)
Stone flies	Nemouridae	Amphinemura standfussi Ris
		Nemoura cinerea (Retzius)
Beetles	Helodidae	Elodes sp.
Caddis flies	Limnephilidae	Micropterna sequax McLachlan
Flies	Ceratopogonidae	Indet. sp.
	Chironomidae	
	Orthocladiinae	

APPENDIX 17. SPRING TAXON LIST FOR LOWER SOHO FARM SITE 1

COMMON NAME	FAMILY	SPECIES
Moluscs	Lymnaeidae	Lymnaea peregra (Muller)
Worms	Oligochaeta	
	Naididae	
	Enchytraeidae	
Crustacea	Gammaridae	Gammarus pulex (L.)
May flies	Baetidae	Baetis rhodani (Pictet)
Stone flies	Nemouridae	Amphinemura standfussi Ris
Beetles	Dytiscidae	Agabus sp.
Flies	Tipulidae	Tipula montium gp.
	Psychodidae	Pericoma trivialis gp.
	Ceratopogonidae	Indet. sp.
	Chironomidae	
	Orthoclaadiinae	
	Tanytarsini	
	Stratiomyidae	Oxycera formosa Meigen

APPENDIX 18 SPRING TAXON LIST FOR FINGER STREAM WEST SITE 1

COMMON NAME	FAMILY	SPECIES
Worms	Oligochaeta Naididae	
Crustacea	Gammaridae	Gammarus pulex (L.)
May flies	Baetidae	Baetis rhodani (Pictet)
	Ephemerellidae	Ephemerella ignita (Poda)
Stone flies	Nemouridae	Nemoura cinerea (Retzius)
	Perlodidae	Isoperla grammatica (Poda)
Beetles	Dytiscidae	Agabus sp.
Caddis flies	Limnephilidae	Micropterna sequax McLachlan
Flies	Chironomidae	
	Orthocladiinae	
	Dolichopodidae	Indet.

APPENDIX 19 SPRING TAXON LIST FOR FINGER STREAM WEST SITE 2

COMMON NAME	FAMILY	SPECIES
Molluscs Worms	Lymnaeidae	Lymnaea truncatula (Muller)
	Oligochaeta	
	Naididae	
	Enchytraeidae Lumbricidae	
Crustacea May flies	Gammaridae	Gammarus pulex (L.)
	Baetidae	Baetis vernus Curtis Baetis rhodani (Pictet)
Stone flies	Ephemerellidae	Ephemerella ignita (Poda)
	Taeniopterygidae	Brachyptera risi (Morton)
	Nemouridae	Amphinemura standfussi Ris Nemoura cinerea (Retzius)
	Perlodidae	Isoperla grammatica (Poda)
Beetles	Dytiscidae	Agabus sp.
	Limnephilidae	Micropterna sequax McLachlan
Caddis flies Flies	Chironomidae	
	Orthocladiinae	
	Tanytarsini	
	Simuliidae	Simulium costatum Friederichs Simulium ornatum gp.
	Dolichopodidae	Indet.
	Syrphidae	Chrysogaster sp.

APPENDIX 20 SPRING TAXON LIST FOR FINGER STREAM WEST SITE 3

COMMON NAME	FAMILY	SPECIES
Flat worms	Planariidae	Polycelis felina (Dalyell)
		Crenobia alpina (Dana)
Molluscs Worms	Sphaeriidae	Pisidium sp.
	Oligochaeta	
	Naididae	
Leeches	Glossiphoniidae	Glossiphonia complanata (L.)
Crustacea	Gammaridae	Gammarus pulex (L.)
May flies	Baetidae	Baetis rhodani (Pictet)
Beetles	Helodidae	Elodes sp.
		Cyphon sp.
Caddis flies	Polycentropodidae	Plectrocnemia conspersa (Curtis)
	Limnephilidae	Limnephilus lunatus gp.
		Chaetopteryx villosa (Fabricius)
		Potamophylax gp/Halesus sp.
		Elaeophila sp.
Flies	Psychodidae	Pericoma pulchra Eaton
	Ptychopteridae	Ptychoptera sp.
	Dixidae	Dixa maculata complex
	Ceratopogonidae	Indet. sp.
	Chironomidae	
	Tanypodinae	
	Prodiamesinae	
	Orthocladiinae	
	Chironomini	
	Tanytarsini	
Simuliidae	Simulium costatum gp.	

APPENDIX 21 SPRING TAXON LIST FOR CHANTRY EAST SITE 1

COMMON NAME	FAMILY	SPECIES
Flat worms	Planariidae	Polycelis felina (Dalyell)
		Crenobia alpina (Dana)
Molluscs	Sphaeriidae	Pisidium sp.
Crustacea	Gammaridae	Gammarus pulex (L.)
Stone flies	Nemouridae	Nemoura cambrica gp.
Beetles	Helodidae	Elodes sp.
Caddis flies	Rhyacophilidae	Agapetus sp.
	Polycentropodidae	Plectrocnemia conspersa (Curtis)
	Limnephilidae	Drusus annulatus Stephens
	Chironomidae	
Flies	Orthoclaadiinae	
	Chironomini	

APPENDIX 22 SPRING TAXA LIST FOR CHANTRY WEST SOURCE



COMMON NAME	FAMILY	SPECIES
Molluscs	Sphaeriidae	Pisidium sp.
Water mites	Hydracarina	Indet sp.
Crustacea	Gammaridae	Gammarus pulex (L.)
Stone flies	Nemouridae	Nemoura cambrica gp.
Beetles	Helodidae	Elodes sp.
Caddis flies	Rhyacophilidae	Agapetus sp.
	Polycentropodidae	Plectrocnemia conspersa (Curtis)
	Limnephilidae	Potamophylax latipennis/cingulatus gp.
		Micropterna sequax McLachlan
	Lepidostomatidae	Crunoecia irrorata (Curtis)
Flies	Tipulidae	Elaeophila sp.
	Psychodidae	Pericoma pulchra Eaton
	Ptychopteridae	Ptychoptera sp.
	Chironomidae	
	Orthoclaadiinae	
	Chironomini	
	Tanytarsini	
	Simuliidae	Simulium costatum gp.

APPENDIX 23 SPRING TAXON LIST FOR CHANTRY WEST 50m

COMMON NAME	FAMILY	SPECIES
Worms	Oligochaeta	
Crustacea	Gammaridae	Gammarus pulex (L.)
May flies	Baetidae	Baetis rhodani (Pictet)
Beetles	Dytiscidae	Agabus sp.
Caddis flies	Psychomyiidae	Lype sp.
	Limnephilidae	Micropterna sequax McLachlan Chaetopteryx villosa (Fabricius)
Flies	Tipulidae	Pedicia sp. (not rivosia)
		Dicranota sp.
		Molophilus sp.
	Psychodidae	Pericoma trifasciata (Meigen)
		Pericoma sp. (trivialis gp/canescens)
	Dixidae	Dixa maculata complex
	Ceratopogonidae	Indet. sp.
	Chironomidae	
	Tanypodinae	
	Diamesinae	
	Orthoclaadiinae	
	Tanytarsini	
	Simuliidae	Simulium cryophilum gp.
Simulium angustitarse gp.		
Simulium aureum gp.		
Simulium ornatum gp.		
Empididae	Clinocera sp.	

APPENDIX 24 SUMMER TAXON LIST FOR HURDLESTONE

COMMON NAME	FAMILY	SPECIES	
Flat worms	Planariidae	Polycelis felina (Dalyell)	
	Sphaeriidae	Pisidium sp.	
Worms	Oligochaeta		
	Glossiphoniidae	Glossiphonia complanata (L.)	
Water mites	Hydracarina	Indet sp.	
Crustacea	Gammaridae	Gammarus pulex (L.)	
May flies	Baetidae	Baetis rhodani (Pictet)	
	Leptophlebiidae	Paraleptophlebia submarginata (Stephens)	
	Leuctridae	Leuctra nigra (Olivier)	
		Leuctra fusca (L.)	
		Perlodidae	Isoperla grammatica (Poda)
	Bugs	Veliidae	Velia caprai Tamanini
Beetles	Hydrophilidae	Helophorus brevipalpis Bedel	
		Anacaena globulus (Paykull)	
	Helodidae	Elodes sp.	
	Elminthidae	Elmis aenea (Muller)	
Caddis flies		Riolus subviolaceus (Muller)	
	Rhyacophilidae	Rhyacophila indet juv.	
	Philopotamidae	Wormaldia sp.	
	Polycentropodidae	Plectrocnemia conspersa (Curtis)	
	Psychomyiidae	Lype sp.	
	Hydropsychidae	Hydropsyche instabilis (Curtis)	
	Limnephilidae	Micropterna sequax McLachlan	
Chaetopteryx villosa (Fabricius)			
Flies	Tipulidae	Dicranota sp.	
		Pilaria/Oxydiscus?	
		Elaeophila sp.	
			Indet. sp.
	Ceratopogonidae		
	Chironomidae		
	Tanypodinae		
	Prodiamesinae		
	Orthocladiinae		
	Chironomini		
	Tanytarsini		
	Empididae	Hemerodromia gp. ?	
	Thaumaleidae		

APPENDIX 25 SUMMER TAXON LIST FOR BECTOR WOOD

COMMON NAME	FAMILY	SPECIES
Flat worms	Planariidae	Polycelis felina (Dalyell) Crenobia alpina (Dana) Pisidium sp.
	Sphaeriidae	
	Oligochaeta	
Worms	Hydracarina	Indet sp.
Water mites	Gammaridae	Gammarus pulex (L.)
Crustacea	Baetidae	Baetis vernus Curtis Baetis rhodani (Pictet) Baetis muticus (L.)
May flies		
	Nemouridae	Nemoura cambrica gp. (erratica)
Bugs	Veliidae	Velia caprai Tamanini
Beetles	Dytiscidae	Agabus sp.
	Hydrophilidae	Helophorus brevipalpis Bedel
	Helodidae	Elodes sp.
Caddis flies	Philopotamidae	Wormaldia sp.
	Polycentropodidae	Plectrocnemia conspersa (Curtis)
	Psychomyiidae	Tinodes unicolor (Pictet)
	Limnephilidae	Potamophylax latipennis/cingulatus gp.
	Beraeidae	Beraea maurus (Curtis)
Flies	Tipulidae	Dicranota sp.
	Psychodidae	Pericoma calcilega Feuerborn
		Pericoma neglecta Eaton
		Pericoma trifasciata (Meigen)
		Pericoma trivialis gp.
		Dixa maculata complex
	Dixa puberula Loew	
	Dixidae	Indet. sp.
	Ceratopogonidae	
	Chironomidae	
	Tanypodinae	
	Prodiamesinae	
	Orthocladiinae	
	Chironomini	
	Tanytarsini	
Simuliidae	Simulium cryophilum gp.	
	Simulium costatum gp.	
	Simulium ornatum gp.	
Stratiomyidae	Oxycera pardalina Meigen	
Empididae	Chelifera gp.	
	Atalanta/Clinocera gp.	

APPENDIX 26 SUMMER TAXON LIST FOR WHITE HOLE FARM

COMMON NAME	FAMILY	SPECIES
Flat worms	Planariidae	Polycelis felina (Dalyell) Crenobia alpina (Dana)
	Sphaeriidae	Pisidium sp.
Worms	Oligochaeta	
	Glossiphoniidae	Glossiphonia complanata (L.)
Crustacea	Gammaridae	Gammarus pulex (L.)
Beetles	Hydrophilidae	Indet.
	Helodidae	Elodes sp.
Caddis flies	Limnephilidae	Chaetopteryx villosa (Fabricius)
	Beraeidae	Beraea maurus (Curtis)
Flies	Tipulidae	Pilaria filata gp. Pilaria/Oxydiscus? Elaeophila sp.
	Psychodidae	Pericoma pulchra Eaton Pericoma trivialis gp. Pericoma sp. (trivialis gp/canescens) Psychoda severini Tonnoir
	Ptychopteridae	Ptychoptera sp.
	Dixidae	Dixa maculata complex
	Chironomidae	
	Tanypodinae	
	Orthoclaadiinae	
	Chironomini	
	Tanytarsini	
	Simuliidae	Simulium costatum gp. Simulium angustitarse gp. Simulium ornatum gp.
	Muscidae	Indet.
	Fannidae	Indet.

#### APPENDIX 27 SUMMER TAXON LIST FOR CHANTRY EAST

COMMON NAME	FAMILY	SPECIES
Flat worms	Planariidae	Polycelis felina (Dalyell)
	Sphaeriidae	Pisidium sp.
Worms	Oligochaeta	
	Tubificidae	
	Glossiphoniidae	Glossiphonia complanata (L.)
Crustacea	Gammaridae	Gammarus pulex (L.)
Beetles	Hydrophilidae	Helophorus brevipalpis Bedel
		Anacaena globulus (Paykull)
Caddis flies	Philopotamidae	Wormaldia sp.
	Polycentropodidae	Plectrocnemia conspersa (Curtis)
	Psychomyiidae	Lype sp.
	Lepidostomatidae	Crunoecia irrorata (Curtis)
Flies	Tipulidae	Tipula rufina Meigen
	Psychodidae	Pericoma trivialis gp.
		Psychoda severini Tonnoir
	Dixidae	Dixa maculata complex
	Chironomidae	
	Orthocladiinae	
	Chironomini	
	Tanytarsini	
Thaumaleidae		

#### APPENDIX 28 SUMMER TAXON LIST FOR CHANTRY WEST

## Appendix 29 THREAT CATEGORY DEFINITIONS AND CRITERIA

### **Extinct**

Taxa formerly had breeding populations in Britain but which it is now believed have completely died out.

### **Endangered (RDB 1)**

Taxa in danger of extinction and whose survival is unlikely if the causal factors continue operating. Taxa whose numbers have been reduced to a critical level or whose habitats have been so dramatically reduced that they are deemed to be in immediate danger of extinction. Included are taxa which are known only as a single population in only one 10 km square, taxa which only occur in habitats known to be especially vulnerable, or taxa which have shown a continuous decline over the last twenty years and now exist in five or fewer 10 km squares.

### **Vulnerable (RDB 2)**

Taxa believed likely to move into the Endangered category in the near future. Included are taxa of which most or all of the populations are decreasing because of over-exploitation, extensive destruction of habitat or other environmental disturbance; taxa with populations that have been seriously depleted and whose ultimate security is not yet assured; and taxa with populations that may still be abundant but are under threat from serious adverse factors throughout their range.

### **Rare (RDB 3)**

Taxa with small populations which are not at present Endangered or Vulnerable, but are at risk. These taxa are usually localised within restricted geographical areas or habitats, or are thinly scattered over a more extensive range. Usually, such taxa are not likely to exist in more than fifteen 10 km squares of the National Grid. This criterion might be relaxed where populations are likely to exist in over fifteen 10 km squares but occupy small areas of especially vulnerable habitat.

### **Insufficiently Known (RDB K)**

Taxa suspected of falling within categories RDB 1 - RDB 3, but about which there is insufficient information to be certain. For example, such taxa may be recently discovered or recognised; be particularly difficult to identify; or live in habitats where they are likely to be overlooked. There may be doubts about whether a recently discovered species is native or has been recently introduced by man, and this uncertainty could result in the species being placed in category K.

### **Notable**

Taxa which do not fall within RDB categories 1 - 3 but which are nonetheless scarce in Great Britain and thought to occur in fewer than a hundred 10 km squares of the National Grid. For some well-recorded groups of invertebrates Notable has been subdivided into Notable A (thirty or fewer 10 km squares) and Notable B (thirty-one to one hundred 10 km squares), but this has not been attempted for Trichoptera.

### **Regionally Notable (NR)**

Taxa which are too common nationally to fall within the Notable category but which are uncommon in some parts of the country. Uncommon in this case means found in five or fewer localities. The region to which this status applies is described for each species.

**Local**

Those species not uncommon enough to fall within any of the preceding categories, but which are nonetheless of some interest. A species may qualify by being, for example, very widely distributed but nowhere common; by being restricted to a specialised habitat such as brackish pools but being a common component of this habitat; or simply by being uncommon but not uncommon enough to be a Notable. Species with few records but which are suspected of being badly unrecorded are likely to be placed in the Local category. Local species may also be Regionally Notable.

**Common**

Sufficiently frequently recorded from a wide area not to signify any particular conservation significance to sites where it occurs. Common species may also be Regionally Notable.



Families	Score
Siphonuridae Heptageniidae Leptophlebiidae Ephemerellidae Potamanthidae Ephemeridae Taeniopterygidae Leuctridae Capniidae Perlodidae Perlidae Chloroperlidae Aphelocheilidae Phryganetidae Molannidae Beraeidae Odontoceridae Leptoceridae Goeridae Lopidostomatidae Brachycontridae Sericostomatidae	10
Astacidae Lestidae Agrilidae Gomphidae Cordulogasteridae Aeshnidae Corduliidae Libellulidae Psychomyiidae Philopotamidae	8
Caenidae Nemouridae Rhyacophyllidae Polycentropodidae Limnephilidae	7
Neritidae Viviparidae Ancylidae Hydroptilidae Unionidae Corophidae Gammaridae Platycnemididae Coenagrilidae	6
Mesoveliidae Hydrometridae Gerridae Nepidae Naucoridae Notonectidae Pleidae Corixidae Halplidae Hygrobiidae Dytiscidae Gyrinidae Hydrophilidae Clambidae Helodidae Dryopidae Elmthidae Chrysomelidae Curculionidae Hydropsychidae Tipulidae Simuliidae Planariidae Dendrocoelidae	5
Beetidae Sialidae Pisicolidae	4
Valvatidae Hydrobiidae Lymnaeidae Physidae Planorbidae Sphaeriidae Glossiphoniidae Hirudidae Erpobdellidae Asellidae	3
Chironomidae	2
Oligochaeta (whole class)	1

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