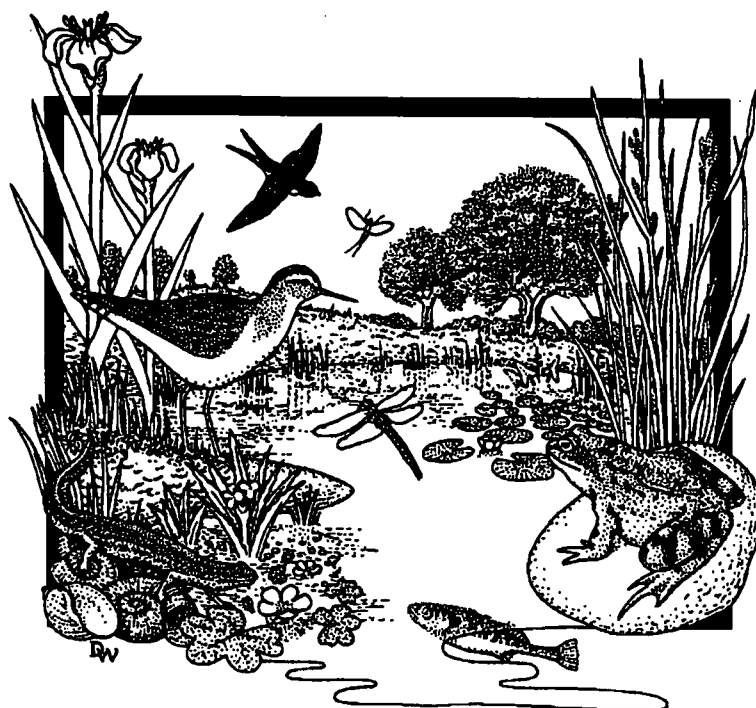


A survey of the macroinvertebrates of the Letcombe Brook at the  
DowElanco Letcombe Laboratory near Wantage, Oxfordshire

A report for DowElanco



April 1997

**Pond Action**

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# **A survey of the macroinvertebrates of the Letcombe Brook at the DowElanco Letcombe Laboratory near Wantage, Oxfordshire**

## **Summary**

Aquatic macroinvertebrates were surveyed at three sites on the Letcombe Brook upstream of (Site 1), within (Site 2) and downstream of (Site 3) the DowElanco Letcombe laboratory.

All sites supported macroinvertebrate assemblages that were of low or moderate conservation value (on a four point scale: Low, Moderate, High, Very High). Only one locally uncommon species was found in the survey, the caddis fly *Notidobia ciliaris*, at Site 3, downstream of the Dow laboratory.

There was some evidence of organic pollution impacts on the stream; Sites 1 and 2 showed slight signs of organic pollution but would be classified by the Environment Agency as Class B ("Good" quality), on a six point scale from a ("Excellent") to e ("Bad"). Site 3 downstream of the Dow Laboratory showed a more marked organic pollution impact and would only be classified as Class c ("Fair").

# **A survey of the macroinvertebrates of the Letcombe Brook at the DowElanco Letcombe Laboratory near Wantage, Oxfordshire**

## **1. Introduction**

This report describes the results of a survey of the aquatic macroinvertebrates of the Letcombe Brook at the DowElanco Letcombe laboratory near Wantage.

The aim of the survey was to assess the conservation value of the invertebrate assemblage in the stream and to assess the extent to which the stream was affected by organic pollution, as evidenced by the invertebrate community.

Surveys were undertaken at a site upstream of the Dow site, within the grounds of the laboratory, and immediately downstream of the Dow site (see Figure 1).

## **2. Methods**

### **2.1 Survey sites**

Standard macroinvertebrate samples were collected from three sites on the Letcombe Brook in spring (31 May 1996), summer (31 August 1996) and autumn (30 November 1996).

Site 1 was located upstream of the Dow laboratory at grid reference SU 377861. The site was approximately 5 m wide and had a mean depth of 0.3 m. Water flow was fairly rapid and substrates were a mixture of coarse gravels, sand and fine silt. There was little submerged aquatic or marginal vegetation in this section of the stream.

Site 2 was located mid-way through the Dow site, immediately downstream of a large pond (grid reference SU 379864). The site was also about 5 m wide but slightly shallower than Site 1 (mean depth 0.25 m). This site was more varied physically than either Site 1 or 3, with a greater range of both submerged and marginal wetland vegetation.

Site 3 was located just downstream of the Dow site boundary at SU 379865. This was the narrowest and shallowest site (mean width 3 m and mean depth less than 0.2 m). There was little aquatic vegetation at this site.

### **2.2 Invertebrate sampling methodology**

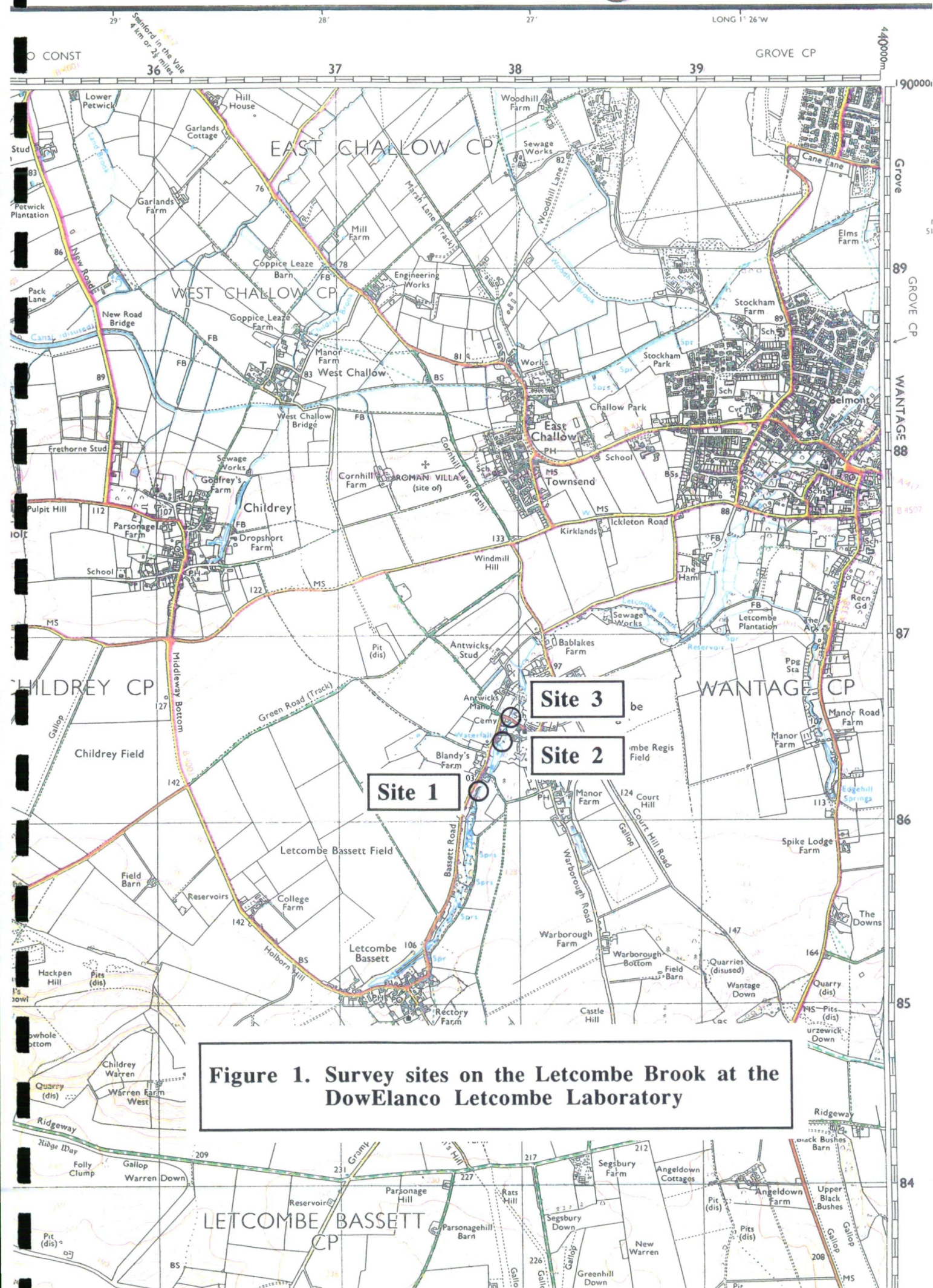
A single three minute hand-net sample was collected at each site on each sampling occasion. The sampling methodology followed standard Environment Agency procedures.

Samples were laboratory sorted and animals identified to either species or family level for the calculation of:

- (i) conservation index values
- (ii) organic pollution indices (BMWP score, ASPT).

Invertebrate groups that were identified to species levels for conservation assessments purposes are listed in Table 1.





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**Table 1. Invertebrate groups identified to species level for conservation assessments**

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Tricladida	(Flatworms)
Hirudinea	(Leeches)
Gastropoda	(Snails)
Bivalvia	(Freshwater mussels)
Malacostraca	(Shrimps and Slaters)
Arachnida	(Spiders)
Ephemeroptera	(Mayflies)
Odonata	(Dragonflies and Damselflies)
Plecoptera	(Stoneflies)
Heteroptera	(Water Bugs)
Coleoptera	(Water Beetles)
Megaloptera	(Alderflies)
Trichoptera	(Caddis flies)

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### 2.3 Assessment of conservation value

Conservation value was assessed using the system developed by Pond Action (Pond Action 1994). In this system, the conservation value of the invertebrate assemblage at each site is assessed on the basis of the number of local or rare species recorded. All species present are given a numerical value depending on their national distribution (see Table 2). The values of all the species present are summed to give a total Species Rarity Score. This score is divided by the number of species present to give the Species Rarity Index (SRI).

Sites are ranked low, moderate, high or very high conservation value on the basis of their Species Rarity Index values (see Table 3).

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**Table 2. Invertebrate conservation scores**

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Description	Score	Invertebrates
Common	1	Generally regarded as common
Local	2	Species which, whilst not rare, are restricted in occurrence
Nationally Notable B	4	Recorded from 31-100 10 x 10 km grid squares in Britain
Nationally Notable A	8	Recorded from 16-30 10 x 10 km grid squares in Britain
Red Data Book 3	16	Rare
Red Data Book 2	32	Vulnerable
Red Data Book 1	64	Endangered

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**Table 3. Conservation value of macroinvertebrate assemblages**

Conservation value of macroinvertebrate assemblage	Species Rarity Index
Very high	1.50
High	1.20 - 1.49
Moderate	1.01 - 1.19
Low	1.00

#### 2.4 Degree of organic pollution

The influence of organic pollutants in the stream was assessed by calculating BMWP (Biological Monitoring Working Party) scores and the ASPT (Average Score per Taxon) value for each site. The BMWP system scores macroinvertebrate families according to their tolerance of organic pollution, with scores ranging from 1 (tolerant of pollution) to 10 (intolerant of pollution).

Field observations were compared with predictions from the RIVPACS system (the River Invertebrate Prediction and Classification System), developed by the Institute of Freshwater Ecology for the Environment Agency. This system uses measurements of the physical features of streams to predict the invertebrate fauna to be expected in relatively unpolluted conditions. Differences between the observed and predicted fauna provide an objective measure of the impact of organic pollution using Environmental Quality Indices (EQIs). For BMWP score, for example, the EQI is calculated as:

$$\frac{\text{Observed BMWP}}{\text{Predicted BMWP}} = \text{BMWP.EQI}$$

The RIVPACS system is the standard used by the Environment Agency to assess the impact of organic pollutants on river invertebrate communities. For RIVPACS calculations the three seasons of invertebrate sampling are combined to generate a single combined season taxa list.

The EQI values are then used to place sites into one of six water quality bands, a to f (a being "Excellent" and f "Bad") (see Table 4).

**Table 4. Organic pollution banding of river sites on the basis Environmental Quality Indices**

Band	Description	ASPT EQI	TAXA EQI
a	Excellent	1.00>	0.85>
b	Good	0.90-0.99	0.70-0.84
c	Fair	0.77-0.89	0.55-0.69
d	Moderate	0.65-0.76	0.45-0.54
e	Poor	0.50-0.64	0.30-0.44
f	Bad	<0.50	<0.30



## 2.5 Comparison of conservation value above and below the Dow laboratory site

Differences in conservation value between site were tested statistically using the non-parametric Mann-Witney U test.

## 3. Results and discussion

### 3.1 Introduction

Table 5 summarises the results of the study giving conservation value data (number of species recorded, Species Rarity Score and Species Rarity Index) and organic pollution data (no of scoring taxa, BMWP score and ASPT). Predicted values from the RIVPACS system are also given (predicted BMWP, predicted TAXA number, predicted ASPT). Note that when calculating the water quality band, only the TAXA.EQI and ASPT.EQI are taken into consideration (see Table 4).

A full list of all invertebrate families and species recorded in the study is given in Appendix 1.

**Table 5. Conservation value of the invertebrate community and organic pollution scores and indices**

**Key:** S/S/A indicates spring, summer and autumn combined samples which were used for the comparison of observed and predicted BMWP scores. Note that the combined season sample is a cumulative list for all three seasons, not the average of the individual seasons.

	Site 1				Site 2				Site 3			
Conservation value	Spr	Sum	Aut		Spr	Sum	Aut		Spr	Sum	Aut	
No. of species	28	21	28		30	26	33		28	27	28	
Species Rarity Score (SRI)	28	21	28		30	26	33		28	28	28	
Species Rarity Index (SRI/no. of species)	1.00	1.00	1.00		1.00	1.00	1.00		1.00	1.04	1.00	
Conservation Value	Low	Low	Low		Low	Low	Low		Low	Mod	Low	
	Site 1				Site 2				Site 3			
Degree of organic pollution	Spr	Sum	Aut	S/S/A	Spr	Sum	Aut	S/S/A	Spr	Sum	Aut	S/S/A
BMWP score	125	110	122	150	124	118	130	166	107	112	103	126
Predicted BMWP				149.2				151.0				167.5
No. of TAXA recorded	24	23	26	30	26	26	27	33	22	24	23	27
Predicted no. of TAXA				29.2				29.3				29.9
ASPT	5.21	4.78	4.69	5.00	4.77	4.54	4.81	5.03	4.86	4.67	4.48	4.67
Predicted ASPT				5.11				5.13				5.59
TAXA.EQI				1.03				1.13				0.90
ASPT.EQI				0.98				0.98				0.84
Water Quality Band				b (Good)				b (Good)				c (Fair)

### 3.2 Conservation value

Overall 60 species of macroinvertebrates were recorded in the three seasons of the study. At the individual sites numbers of species recorded within the groups identified to species level varied from 21 to 33 in each season. However, there was no significant difference in the number of species recorded at the three sites (Mann-Witney U test:  $p > 0.05$ )

All but one of the species recorded were common and widespread animals. One caddis fly, *Notidobia ciliaris*, which is nationally local was recorded at Site 3 downstream of the Dow site. Overall the invertebrate assemblages at Sites 1 and 2 would be regarded as of Low conservation value (on a four point national scale low, moderate, high, very high) (see Table 3). The assemblage at Site 3 was graded Low to Moderate conservation value due to the presence of the local caddis fly.

Overall, the results indicate that there was little change in the conservation value of the invertebrate assemblages as the stream passed through the Dow site, with the upstream Site 1 being of similar conservation interest to the sites on and below the Dow laboratory.

Although the conservation value of the stream was not high, this is fairly typical of smaller stream in the Upper Thames. For example, in an Environment Agency survey undertaken by Pond Action of rivers and stream in the R. Ock catchment (which included some sites further down the Letcombe Brook, as well as the Ginge Brook and the Childrey Brook), all sites were either of low or moderate conservation value (Pond Action, 1992a,b).

### 3.3 Organic pollution

At Site 1 and Site 2 the Environmental Quality Indices indicated that the stream was only slightly affected by organic pollution, with EQIs only slightly below those predicted by RIVPACS. Between seasons at each site, the BMWP system scores (BMWP score, no. of TAXA and ASPT) were relatively consistent, with individual sites showing little variation. For example, BMWP scores at each site all had ranges which were about 10% of the seasonal mean values.

Site 3 had BMWP scores and ASPT values which were more markedly below the predicted values and ASPT EQI was sufficiently low (Band c of the Environment Agency system) to suggest that the site was significantly affected by organic pollution.

Despite this some organic pollution sensitive taxa were still recorded at Site 3 (e.g. mayflies in the family Ephemerellidae, caddis flies in the family Leptoceridae).

## 4. Conclusions and recommendations

### 4.1 Assemblage conservation value

The conservation value of the invertebrate assemblage was similar at all three sites in the study. Almost all species found were common and widespread and the conservation value of the assemblages was either low or moderate (on a four point national scale: low, moderate, high, very high).

One locally uncommon caddis fly was recorded in the study, at Site 3, the most downstream location.



Sites 1 and 2 were in water quality Band b ("Good") suggesting some slight impacts due to organic pollution.

Site 3 was more markedly impacted and fell into Band c ("Fair"), which indicates that the invertebrate assemblage was worse than would be expected.

However, reasons for this difference are not immediately clear. There were no obvious effluent discharges entering the stream between Sites 2 and 3, and some pollution intolerant taxa were still present at Site 3. Site 3 is an area where waterfowl are regularly fed and it is possible that they are having some impact on water quality at this site.

We recommend that the reasons for the apparent deterioration in water quality at Site 3 are investigated further. Ideally the sampling programme should be partially repeated in 1997 (perhaps focusing just on Site 3), to determine whether the stream continues to show reduced EQI values. Further investigation of the physical and chemical environment of the stream at Site 3 might also be warranted to investigate the factors responsible for a decline in the quality of the invertebrate fauna.

## 5. References

- Pond Action 1992a. *Macroinvertebrate study related to Thames Water Utilities Limited (TWUL) reservoir development proposal: Phase 1 surveys in the Ginge catchment. A report for the national Rivers Authority and Thames Water Utilities Limited.* Pond Action, Oxford.
- Pond Action 1992b. *Macroinvertebrate study related to Thames Water Utilities Limited (TWUL) reservoir development proposal: Phase 1 survey of the Ock and Thames catchments. A report for the national Rivers Authority and Thames Water Utilities Limited.* Pond Action, Oxford.
- Pond Action 1994. *The Oxfordshire Pond Survey.* 2 Vols. Pond Action, Oxford.

## Appendix

# Appendix 1

## Families and species recorded in the Letcombe Brook at the DowElanco Letcombe laboratory

### Key

BMWP families in UPPER CASE

Numbers (1-10) indicate BMWP score

Species in lower case (+ = present)

X = individual specimens which could not be determined beyond genus/family level

	D1 Spr	D1 Sum	D1 Aut	D2 Spr	D2 Sum	D2 Aut	D3 Spr	D3 Sum	D3 Aut	D1 Total	D2 Total	D3 Total
	Number of seasons species found											
DENDROCOELIDAE			5									
Dendrocoelum lacteum			+							1	0	0
PLANARIIDAE	5	5	5		5	5	5	5	5			
Polycelis felina	+									1	0	0
Polycelis tenuis	+	+	+		+	+	+	+	+	3	2	3
ERPOBDELLIDAE	3	3	3	3	3	3	3	3	3			
Erpobdella octoculata	+	+	+	+	+	+	+	+	+	3	3	3
GLOSSIPHONIIDAE	3	3	3	3	3	3	3	3	3			
Glossiphonia complanata	+	+	+	+	+	+	+	+	+	3	3	3
Glossiphonia heteroclita					+	+				0	2	0
Helobdella stagnalis	+	+		+	+	+	+	+	+	2	3	3
Theromyzon tessulatum	+		+		+	+	+	+	+	2	2	3
PISCICOLIDAE	4	4	4		4		4	4				
Piscicola geometra	+	+	+		+		+	+		3	1	2
ANCYLIDAE			6	6	6	6	6		6			
Acroloxus lacustris			+	+		+			+	1	2	1
Ancylus fluviatilis					+	+	+		+	0	2	2
PLANORBIDAE	3	3	3	3	3	3	3	3	3			
Anisus leucostoma	+									1	0	0
Anisus vortex	+	+	+	+	+	+	+	+	+	3	3	3
Armiger crista						+				0	1	0
Bathynomphalus contortus		+	+	+	+	+	+	+	+	2	3	3
LYMNAIDAE	3	3	3	3	3	3	3	3	3			
Lymnaea palustris		+	+	+	+	+	+	+	+	2	3	3
Lymnaea peregra	+		+		+	+	+			2	2	1
PHYSIDAE		3	3			3			3			
Physa fontinalis		+	+			+			+	2	1	1
HYDROBIIDAE			3	3	3	3	3	3	3			
Potamopyrgus jenkinsi			+	+	+	+	+	+	+	1	3	3
SPHAERIIDAE				3		3						
Sphaerium corneum				+		+				0	2	0
VALVATIDAE			3	3	3	3	3	3	3			
Valvata cristata				+		+	+			0	2	1
Valvata piscinalis			+	+	+	+	+	+	+	1	3	3
ASELLIDAE	3	3	3	3	3	3	3	3	3			
Asellus aquaticus	+	+	+	+	+	+	+	+	+	3	3	3
GAMMARIDAE	6	6	6	6	6	6	6	6	6			
Gammarus pulex	+	+	+	+	+	+	+	+	+	3	3	3
BAETIDAE				4	4	4	4	4				
Baetis rhodani				+					+	0	1	1
Baetis vernus								+		0	0	1
Baetis sp.					X	X	X					
EPHEMERELLIDAE	10	10		10	10		10	10				
Ephemerella ignita	+	+		+	+		+	+		2	2	2
CORIXIDAE		5	5		5							
Sigara dorsalis		+	+							2	0	0
Sigara lateralis			+							1	0	0
Corixid nymphs					X							
VELIIDAE	5	5		5	5							
Velia sp. (nymphs)	X	X		X	X							
SIALIDAE	4	4	4	4	4	4		4	4			
Sialis lutaria	+	+	+	+	+	+		+	+	3	3	2
HYDROPTILIDAE	6	6	6	6	6	6	6	6	6			
Agraylea multipunctata					+	+				0	2	0
Hydroptilidae	X	X	X	X	X	X	X	X	X			
LEPTOCERIDAE				10		10	10	10	10			
Athripsodes aterrimus							+			0	0	1

# Appendix 1

## Families and species recorded in the Letcombe Brook at the DowElanco Letcombe laboratory

### Key

BMWP families in UPPER CASE

Numbers (1-10) indicate BMWP score

Species in lower case (+ = present)

X = individual specimens which could not be determined beyond genus/family level

	D1 Spr	D1 Sum	D1 Aut	D2 Spr	D2 Sum	D2 Aut	D3 Spr	D3 Sum	D3 Aut	D1 Total	D2 Total	D3 Total
	Number of seasons species found											
Athripsodes cinereus						+	+		+	0	1	2
Mystacides azurea				+				+		0	1	1
Mystacides longicornis							+	+	+	0	0	3
HYDROPSYCHIDAE				5		5	5		5			
Hydropsyche siltalai				+		+	+		+	0	2	2
POLYCENTROPODIDAE				7	7		7	7	7			
Polycentropus flavomaculatus				+	+		+	+	+	0	2	3
Cymus trimaculatus				+						0	1	0
PSYCHOMYIDAE	8											
Lype reducta	+									1	0	0
GLOSSOSOMATIDAE	7	7	7	7		7						
Agapetus fuscipes	+	+	+							3	0	0
Rhyacophila dorsalis		+	+	+		+				2	2	0
GOERIDAE	10	10	10			10						
Silo pallipes	+	+	+							3	0	0
Goeridae						X						
LIMNEPHILIDAE	7	7	7	7	7	7	7	7	7			
Halesus radiatus	+									1	0	0
Glyptotaelius pellucidus				+		+				0	2	0
Limnephilus lunatus	+			+			+	+	+	1	1	3
Notidobia ciliaris								+		0	0	1
Limnephilidae (tiny)		X	X		X	X						
SERICOSTOMATIDAE	10		10			10						
Sericostoma personatum	+		+			+				2	1	0
HALIPLIDAE	5	5	5	5	5	5	5	5	5			
Brychius elevatus				+	+	+		+	+	0	3	2
Haliplus immaculatus	+									1	0	0
Haliplus lineatocollis	+	+	+	+	+	+	+		+	3	3	2
Haliplus sp. (larvae)							X					
DYTSICIDAE	5	5	5	5	5	5	5	5	5			
Agabus sturmii	+									1	0	0
Hydroporus palustris			+							1	0	0
Laccophilus hyalinus	+									1	0	0
Hyphydrus ovatus				+			+			0	1	1
Nebrioporus depressus					+		+		+	0	1	2
Oreodytes sanmarkii	+	+	+	+	+	+	+	+	+	3	3	3
Platambus maculatus	+	+	+		+	+	+	+	+	3	2	3
Stictotarsus duodecimpustulatus				+						0	1	0
ELMIDAE	5	5	5	5	5	5	5	5	5			
Elmis aenea	+	+	+	+	+	+		+	+	3	3	2
Oulimnius tuberculatus	+			+		+		+	+	1	2	2
Elmidae (larvae)							X		X			
OLIGOCHAETA	1	1	1	1	1	1	1	1	1			
CHIRONOMIDAE	2	2	2	2	2	2		2	2			
SIMULIIDAE	5			5	5	5		5				
TIPULIDAE	5	5	5		5			5	5			
No. of species	28	21	28	30	26	33	28	27	28	39	43	38
Species Rarity Score (SRI)	28	21	28	30	26	33	28	28	28			
Species Rarity Index (SRI/no. spp.)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.04	1.00			

## **Dow: Length 1**

	<b>Spring</b>	<b>Summer</b>	<b>Autumn</b>
<i>Dendrocoelum lacteum</i>	-	-	+
<i>Polycelis felina</i>	+	-	-
<i>Polycelis tenuis</i>	+	+	+
<i>Oligochaeta</i>	+	+	+
<i>Erpobdella octoculata</i>	+	+	+
<i>Glossiphonia complanata</i>	+	+	+
<i>Helobdella stagnalis</i>	+	+	-
<i>Piscicola geometra</i>	+	+	+
<i>Theromyzon tessulatum</i>	+	-	+
<i>Acroloxus lacustris</i>	-	-	+
<i>Anisus leucostoma</i>	+	-	-
<i>Anisus vortex</i>	+	+	+
<i>Bathymphalus contortus</i>	-	+	+
<i>Lymnaea palustris</i>	-	+	+
<i>Lymnaea peregra</i>	+	-	+
<i>Physa fontinalis</i>	-	+	+
<i>Potamopyrgus jenkinsi</i>	-	-	+
<i>Valvata piscinalis</i>	-	-	+
<i>Asellus aquaticus</i>	+	+	+
<i>Gammarus pulex</i>	+	+	+
<i>Ephemerella ignita</i>	+	+	-
<i>Sigara dorsalis</i>	-	+	+
<i>Sigara lateralis</i>	-	-	+
<i>Velia</i> sp. (nymphs)	+	+	-
<i>Sialis lutaria</i>	+	+	+
<i>Agapetus fuscipes</i>	+	+	+
<i>Halesus radiatus</i>	+	-	-
<i>Hydroptilidae</i>	+	+	+
<i>Limnephilus lunatus</i>	+	-	-
<i>Limnephilidae</i> (tiny)	-	+	+
<i>Lype reducta</i>	+	-	-
<i>Rhyacophila dorsalis</i>	-	+	+
<i>Sericostoma personatum</i>	+	-	+
<i>Silo pallipes</i>	+	+	+
<i>Agabus sturmi</i>	+	-	-
<i>Elmis aenea</i>	+	+	+
<i>Halipus immaculatus</i>	+	-	-
<i>Halipus lineatocollis</i>	+	+	+
<i>Hydroporus palustris</i>	-	-	+
<i>Laccophilus hyalinus</i>	+	-	-
<i>Oreodytes sanmarkii</i>	+	+	+
<i>Oulimnius tuberculatus</i>	+	-	-
<i>Platambus maculatus</i>	+	+	+
<i>Chironomidae</i>	+	+	+
<i>Simuliidae</i>	+	-	-
<i>Tipulidae</i>	+	+	+
<b>Total numbers of species (per season)</b>	<b>28</b>	<b>21</b>	<b>28</b>
<b>Overall number of species recorded:</b>	<b>39</b>		
<b><u>BMWPs:</u></b>	<b>125</b>	<b>110</b>	<b>122</b>
<b><u>ASPTs:</u></b>	<b>5.208</b>	<b>4.783</b>	<b>4.692</b>

## Dow: Length 2

	Spring	Summer	Autumn
<i>Polycelis tenuis</i>	-	+	+
<i>Oligochaeta</i>	+ 1	+	+
<i>Erpobdella octoculata</i>	+ 3	+	+
<i>Glossiphonia complanata</i>	+ 3 7	+	+
<i>Glossiphonia heteroclita</i>	-	+	+
<i>Helobdella stagnalis</i>	+	+	+
<i>Piscicola geometra</i>	-	+	-
<i>Theromyzon tessulatum</i>	-	+	+
<i>Acroloxus lacustris</i>	+ 8 13	-	+
<i>Ancylus fluviatilis</i>	- 8 11	+	+
<i>Anisus vortex</i>	+ 8	+	+
<i>Armiger crista</i>	-	-	+
<i>Bathyomphalus contortus</i>	+	+	+
<i>Lymnaea palustris</i>	+ 8 19	+	+
<i>Lymnaea peregra</i>	-	+	+
<i>Physa fontinalis</i>	-	-	+
<i>Potamopyrgus jenkinsi</i>	+ 8 22	+	+
<i>Sphaerium corneum</i>	+ 8 25	-	+
<i>Valvata cristata</i>	+ 8 27	-	+
<i>Valvata piscinalis</i>	+	+	+
<i>Asellus aquaticus</i>	+ 8 31	+	+
<i>Gammarus pulex</i>	+ 8 37	+	+
<i>Baetis rhodani</i>	+ 4 41	-	-
<i>Baetis</i> sp.	-	+	+
<i>Ephemerella ignita</i>	+ 18 51	+	-
<i>Corixid</i> nymphs	-	+	-
<i>Velia</i> sp. (nymphs)	+ 7	+	-
<i>Sialis lutaria</i>	+ 4 60	+	+
<i>Agraylea multipunctata</i>	-	+	+
<i>Athripsodes cinereus</i>	-	-	+
<i>Cyrnus trimaculatus</i>	+ 7	-	-
<i>Glyptotaelius pellucidus</i>	+ 7 74	-	+
Goeridae	-	-	+
<i>Hydropsyche siltalai</i>	+ 5 75	-	+
Hydroptilidae	+ 6 85	+	+
<i>Limnephilus lunatus</i>	+	-	-
Limnephilidae (tiny)	-	+	+
<i>Mystacides azurea</i>	+ 10 95	-	-
<i>Polycentropus flavomaculatus</i>	+	+	-
<i>Rhyacophila dorsalis</i>	+ 7 102	-	+
<i>Sericostoma personatum</i>	-	-	+
<i>Brychius elevatus</i>	+ 5	+	+
<i>Elmis aenea</i>	+ 5 112	+	+
<i>Haliplus lineatocollis</i>	+	+	+
<i>Hyphydrus ovatus</i>	+ 5 117	-	-
<i>Nebrioporus depressus</i>	-	+	-
<i>Oreodytes sanmarkii</i>	+	+	+
<i>Oulimnius tuberculatus</i>	+	-	+
<i>Platambus maculatus</i>	-	+	+
<i>Stictotarsus duodecimpustulatus</i>	+	-	-
Chironomidae	+ 2 119	+	+
Simuliidae	+ 5 124	+	+
Tipulidae	-	+	-

(pto)



**Dow: Length 2 (cont.)**

	<b>Spring</b>	<b>Summer</b>	<b>Autumn</b>
<b>Total numbers of species (per season)</b>	<b>30</b>	<b>26</b>	<b>33</b>
<b>Overall number of species recorded:</b>	<b>43</b>		
<b><u>BMWPs:</u></b>	<b>124</b>	<b>118</b>	<b>130</b>
<b><u>ASPTs:</u></b>	<b>4.769</b>	<b>4.538</b>	<b>4.815</b>

### Dow: Length 3

	Spring	Summer	Autumn
<i>Polycelis tenuis</i>	+	+ 5	+
<i>Oligochaeta</i>	+	+ 1	+
<i>Erpobdella octoculata</i>	+	+ 3 9	+
<i>Glossiphonia complanata</i>	+	+ 3 12	+
<i>Helobdella stagnalis</i>	+	+ 4 16	+
<i>Piscicola geometra</i>	+	+	-
<i>Theromyzon tessulatum</i>	+	+	+
<i>Acroloxus lacustris</i>	-	-	+
<i>Ancylus fluviatilis</i>	+	-	+
<i>Anisus vortex</i>	+	+ 3 19	+
<i>Bathyomphalus contortus</i>	+	+	+
<i>Lymnaea palustris</i>	+	+ 3 22	+
<i>Lymnaea peregra</i>	+	-	-
<i>Physa fontinalis</i>	-	-	+
<i>Potamopyrgus jenkinsi</i>	+	+ 3 25	+
<i>Valvata cristata</i>	+	-	-
<i>Valvata piscinalis</i>	+	+ 3 28	+
<i>Asellus aquaticus</i>	+	+ 3 31	+
<i>Gammarus pulex</i>	+	+ 6 37	+
<i>Baetis rhodani</i>	-	+ 4 41	-
<i>Baetis vernus</i>	-	+	-
<i>Baetis</i> sp.	+	-	-
<i>Ephemerella ignita</i>	+	+ 10 51	-
<i>Sialis lutaria</i>	-	+ 4 55	+
<i>Athripsodes aterrimus</i>	+	-	-
<i>Athripsodes cinereus</i>	+	-	+
<i>Hydropsyche siltalai</i>	+	-	+
<i>Limnephilus lunatus</i>	+	+ 7 62	+
<i>Mystacides azurea</i>	-	+ 16 72	-
<i>Mystacides longicornis</i>	+	+	+
<i>Notidobia ciliaris</i>	-	+	-
<i>Polycentropus flavomaculatus</i>	+	+ 7 79	+
<i>Hydroptilidae</i>	+	+ 6 85	+
<i>Brychius elevatus</i>	-	+ 5 90	+
<i>Elmis aenea</i>	-	+ 5 95	+
<i>Haliphus lineatocollis</i>	+	-	+
<i>Haliphus</i> sp. (larvae)	+	-	-
<i>Hyphydrus ovatus</i>	+	-	-
<i>Nebrioporus depressus</i>	+	-	+
<i>Oreodytes sanmarki</i>	+	+	+
<i>Oulimnius tuberculatus</i>	-	+	+
<i>Elmidae</i> (larvae)	+	-	+
<i>Platambus maculatus</i>	+	+ 5 100	+
<i>Chironomidae</i>	-	+ 2 102	+
<i>Simuliidae</i>	-	+	-
<i>Tipulidae</i>	-	+ 5 112	+
<b>Total numbers of species (per season)</b>	<b>27</b>	<b>27</b>	<b>28</b>
<b>Overall number of species recorded:</b>	<b>38</b>		
<b>BMWPs:</b>	<b>107</b>	<b>122</b>	<b>103</b>
<b>ASPTs:</b>	<b>4.864</b>	<b>4.88</b>	<b>4.478</b> (Pto)

**Note:** The caddis species *Notidobia ciliaris*, recorded in Length 3 in the summer sample, is of some interest. The larva inhabits the roots of marginal vegetation in slowly flowing rivers and canals, and is said to be 'fairly difficult to find'. Its range is southern England, where it is local; it is Notable elsewhere. (Wallace 1991.)