ENVIRONMENT AGENCY

A REPORT ON WATER QUALITY ISSUES WITHIN THE MIDFORD BROOK CATCHMENT - JUNE 1996

M FRY/I HALL

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South West Region

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REPORT ON ISSUES AFFECTING THE WATER QUALITY OF THE MIDFORD BROOK AND TRIBUTARIES

M FRY/I HALL 1995/1996

1. Introduction

The Lower Bristol Avon Catchment Management Plan Consultation Report (LBACMP) produced in 1995 highlighted a number of issues relating to water quality within the Midford Brook catchment which were in need of investigation. The aim of this report is to compare the concerns addressed in the consultation document with historical biological, chemical and flow data for sites within the catchment, and also to known activities 'on the ground'. It is hoped that the report will be able to separate statistical anomalies from actual water quality problems, and that a programme of work can be developed to address issues identified within the correct timescale.

The Midford Brook system is shown on the appended maps 1, 2 and 3 and comprises of two major tributaries, the Wellow and Cam Brooks. Of these major tributaries the Wellow Brook is hydrologically the more significant and in turn has important tributaries including the River Somer, Kilmersdon Stream, Snails Brook and Lyde Brook, all of which are routinely sampled.

The Cam Brook by contrast has only one significant tributary, the Clutton Stream which is not routinely sampled.

Water quality is currently classified from routine sample data according to the criteria of the General Quality Assessment (GQA) scheme. This system uses Biochemical Oxygen Demand, Total Ammonia and Dissolved Oxygen data to classify river stretches, and grades them from A (Good) to F (Bad) according to their performance over a calender year . The scheme will be adapted to include biological, aesthetic quality and nutrient status over the coming years.

The 1993/94 classification of the Midford Brook and tributaries is summarised in table 1.

Water quality data is also currently used to ascribe river stretches on River Ecosystem Use Class (RE Class). This takes into account not only water quality parameters but also other activities which go on within the catchment, such as recreation and angling, and will eventually, along with a number of other catchment use issues, form the basis by which Water Quality Objectives are set.

The criteria used to ascribe RE Classes are shown in the appendix. Current RE class classifications as shown in LBACMP consultation report, are indicated in table 2.

TABLE 1

MIDFORD/WELLOW/CAM BROOK GQA CLASSIFICATIONS 1993/4

Watercourse	River Stretch		GQA Classification 1994 (Reason for lowest classification)	GQA Classification 1993 (Reason for lowest classification)	NOTES
Wellow	Stone	- Welton	C (BOD)	C (BOD)	Stable
	Welton	- Somer	C (BOD)	B (BOD/DO)	Decline
	Somer	- Tyning	C (BOD)	C (BOD)	Stable
	Tyning	- Foxcote	C (BOD)	C (BOD/DO)	Stable
	Foxcote - L. Barrow		D (BOD)	C (BOD/DO)	Decline
	L. Barrow	- Wellow	C (BOD)	C (BOD)	Stable
	Wellow	- Conf Midford	C (BOD)	C (BOD)	Stable
Midford	Midford	- Confluence with Avon	B (BOD)	B (BOD)	Stable
Lyde	u/s Hassage	- Conf. Wellow	B (BOD/NH_3)	B (BOD/DO)	Stable
Kilmersdon	Hackmead	- Kilmersdon	D (BOD)	D (BOD)	Stable
	Kilmersdon	- Conf. Snails	C (BOD)	C (BOD)	Stable
Snails	Stratton	- Conf. Westfield	C (BOD)	D (BOD)	Improvement
	Conf. W'Field	- Conf. Kilmersdon	B (BOD)	C (BOD)	Improvement
	Conf. Kilm	- Conf. Wellow	C (BOD)	C (BOD)	Stable
Somer	Chilcompton	- d/s Manor Farm	C (BOD)	C (BOD)	Stable
	d/s Manor	- B3355	C (BOD)	C (BOD)	Stable
	B3355	- Conf. Wellow	C (BOD)	D (BOD)	Improvement
Cam	T'Cloud	- Hallatrow	B (DO/BOD/NH_3)	B (BOD/DO)	Stable
	Hallatrow	- Hanham House	C (BOD)	B (BOD/DO)	Stable
	Hanham House	- Splott	B (BOD/DO)	C (BOD)	Improvement
	Splott Fm	- Combe Hay	B (BOD/DO)	C (BOD)	Improvement
	Combe	- Conf. Midford	C (BOD)	D (BOD)	Improvement

TABLE 2

RIVER ECOSYSTEM CLASSIFICATION COMPLIANCE
MIDFORD BROOK

River Stretch	Current RE Class	Compliance	Visionary RE Class	Compliance
River Somer				
Chilcompton d/s Manor	RE3	Achieve	RE2	Fail Margin BOD
d/s Manor - B3355	RE3	Achieve	RE2	Fail Signif BOD
B3355 - Conf Wel'w	RE3	Fail Margin BOD	RE2	Fail Signif BOD

River Stretch	Current RE Class	Compliance	Visionary RE Class	Compliance
Kilmersdon Stream				
Hackmead-Kilmersdon	RE3	Achieve	RE2	Fail Signif BOD
Kilmersdon - con Snail	RE3	Achieve	RE2	Fail Signif BOD

River Stretch	Current RE Class	Compliance	Visionary RE Class	Compliance
Snails Brook				
Stratton - conf W'fld	RE3	Fail Margin BOD	RE2	Fail Sig BOD/DO
Conf W'fd - conf K'don	RE3	Achieve	RE2	Fail Margin BOD
Conf W'fd - conf W'low	RE3	Achieve	RE2	Achieve

RIVER ECOSYSTEM CLASSIFICATION COMPLIANCE
MIDFORD BROOK

River Stretch	Current RE Class	Compliance	Visionary RE Class	Compliance
Wellow Brook				
Ston E - Welton	RE3	Achieve	RE2	Fail Margin BOD
Welton - Conf Somer	RE2	Achieve	RE2	Fail Margin BOD
Con Somer - Tyning	RE3	Achieve	RE2	Fail Margin BOD
Tyning - Foxcote	RE3	Achieve	N/A	N/A
Foxcote - Long Bar'w	RE2	Fail Sig BOD + DO	N/A	N/A
Long B'w - Wellow	RE2	Fail Margin BOD	N/A	N/A
Wellow - Midford	RE2	Fail Signif BOD	N/A	N/A

River Stretch	Current RE Class	Compliance	Visionary RE Class	Compliance
Cam Brook				
Temple C - Hallatrow	RE3	Achieve	N/A	N/A
Hallatrow - Hanham Ho	RE	Achieve	N/A	N/A
Hanham Ho - Splott Fm	RE3	Achieve	RE2	Fail Margin BOD
Splott Fm - Combe Hay	RE3	Achieve	RE2	Fail Margin BOD
Combe Hay - conf Midford	RE3	Fail Margin BOD	RE2	Fail Signif BOD

In addition, to the actual RE classification scheme, Visionary RE classifications have been set in catchments where salmonid fisheries exist or where it is deemed that salmonid fisheries should exist. Again, these visionary RE Classes are shown in table 2.

The Water Quality Objectives system encompassing RE Classes came in as a non-statutory target scheme on 1 January 1995. Certain stretches where more complex problems are known to impinge upon water quality have been allowed some relaxation of this date, and all sites downstream of Radstock STW to the confluence with the Cam Brook have been given until the year 2000 before compliance must be achieved.

The LBACMP identified a number of sites within the Midford Brook catchment where RE Class compliance, actual or visionary was not being achieved. This report is intended as an in-depth desk study into the Midford Brook catchment and tributary sub-catchments. It is hoped that the report will generate areas for further investigation over the coming years, and that it may even directly result in some areas being targeted for immediate improvement work.

2. Catchment Overviews, Results

Wellow Brook

The Wellow Brook rises from the Limestone at Ston Easton and flows for approximately 20 km before confluencing with the Cam Brook at Midford to form the Midford Brook. Along its course the flow is augmented by additions from major tributaries such as the River Somer, Snails Brook, Kilmersdon Stream and Lyde Brook along with numerous unclassified ones. The river bisects the urban area of Midsomer Norton/Radstock where it receives a major sewage effluent input. Industry in the area is patchily distributed and largely limited to Norton Radstock, although significant operations are based in Farrington Gurney. The catchment is largely used for agriculture, a significant proportion being involved in dairy farming with some pigs and sheep particularly towards the upper catchment. Arable farming predominates on flatter ground, such as the plateaux between the Cam and Wellow Brooks and the River Mells.

The Problem

As with much of the Midford Brook catchment, the Wellow Brook is failing to meet its actual and visionary RE Class as a result of periodic elevated Biochemical Oxygen Demand (BOD) levels over the year.

Routine sample data for the previous two years (1994/1995) was analysed for all sample sites along the Wellow Brook. BOD events over 4.0 mg/l (the cut-off point for RE Class 2/GQA Class B) were noted, as were the ammonia and suspended solid results from these samples. Interpretation of more recent data has not been helped by the fact that suspended solids has now been dropped from the routine analysis suite carried out on samples from sites used solely for GQA monitoring.

3. Results (upstream to downstream) (See table 3)

1. White Bridge

This site has generally very good water quality with only one excursion over 4.0 mg/l in July 1995.

2. Upstream of Midsomer Norton STW

Poor results have been identified on two occasions:-

a. December 1994 which appears to have resulted from an input between this site and Whitebridge. BOD levels of 11.9 mg/l were associated with a suspended solids result of 900 mg/l. BOD failures were experienced at all downstream sites on the Wellow Brook sampled on that day, again associated with high suspended solid levels, but this site was the worst.

b. July 1995. Sites in the upper catchment appear to have been affected by a plug of pollution. It is thought that there were heavy, localised showers in the area on this day and that failures at White Bridge, this site and the next site downstream, were all affected by the 'first flush' emerging from drains following a dry spell.

3. Upstream of Radstock STW

Three excursions of BOD > 4.0 mg/l recorded in 1994/95.

a. November 1994. A value of 4.0 mg/l was associated with a solids result of 93 mg/l following significant rainfall.

b. December 1994. A BOD result of 6.9 mg/l was associated with a suspended solids result of 332 mg/l (see previous comments).

c. July 1995. A BOD of 24.9 mg/l associated with an ammonia result of 0.7 mg/l (no solids data available). It is thought that this result represents pollutants flushed from drain gulleys by rain following a prolonged dry period, but more significantly, the resuspension of sewage derived solids resulting from the Midsomer Norton STW overflow pollution on 6/7/95 some days earlier. Comments made by the Sampler suggest that there were localised showers in the area at the time and that discolouration of the water for this reason was apparent.

4. Writhlington

Five BOD excursions observed from this site which lies downstream of Radstock STW, a discharge which can comprise up to 1/5 of the flow in the Wellow Brook under low summer flow conditions. Comparison of the upstream and downstream sample results show 4 separate occasions in 1994/95 where BOD levels > 4.0 mg/l were recorded at Writhlington but not at the upstream site. In the absence of other known problem discharges between the two sites, it is assumed that differences between them are attributable entirely to the storm sewage and final effluent discharges from Radstock STW.

a. BOD of 5.0 mg/l associated with a suspended solids of 59 mg/l and an ammonia of 0.27 mg/l. No failure upstream.

b. August 1994. BOD of 4.1 mg/l with no significant ammonia/solids increases. No failure upstream.

c. November 1994. BOD of 4.9 mg/l associated with a solids result of 122
mg/l and an ammonia of 0.19 mg/l. Results down the catchment on this day were seen to deteriorate in terms of progressive increases in BOD and suspended solids from White Bridge to Single Hill, with the lower 3 sites exceeding 4.0 mg/l BOD. This trend was associated with moderate to heavy rainfall. Failure recorded at upstream site.

d. December 1994. BOD 8.7 mg/l associated with an ammonia of 0.48 mg/l and suspended solids of 256 mg/l. Failure recorded at upstream site.

e. April 1993. BOD 4.6 mg/l. No other significant results and no failure recorded at upstream site.

f. May 1995. BOD 4.2 mg/l. No other significant results and no failures recorded at upstream site.

5. Single Hill

Three excursions outside limits have been recorded for BOD and there was also a dissolved oxygen low of 42% recorded in August 1995 which is not thought to be related to any specific pollution incident, more a combination of time of day and the extended oxygen depletion area which occurs below Radstock STW.

a. March 1994. Associated with a suspended solids level of 139 mg/l was a BOD of 4.6 mg/l (following moderate rainfall).

b. November 1994. A BOD of 6.1 mg/l was associated with a suspended solids result of 200 mg/l following moderate/heavy rainfall in the previous 24 hours.

c. December 1994. A BOD of 4.3 mg/l was associated with a suspended solids result of 124 mg/l.

No excursions outside class limits were recorded in 1995, despite the very dry summer.

6. Wellow Monitor

NB. Sites downstream of Single Hill are on separate sample rounds than those upstream and hence very rarely sampled on the same day. Whilst making this easy for sampling, it does have the effect of making data interpretation difficult as it is not possible to ascertain whether the problems observed are localised or have been affecting the catchment as a whole.

Two BOD results above 4.0 mg/l have been recorded from this site, both in late 1995.

a. September 1995. BOD of 4.2 mg/l. Solids results not available. Ammonia 0.12 mg/l. Associated with moderate to heavy rain in previous 24 hours.

b. November 1995. BOD of 4.3 mg/l. Solids results not available. Ammonia 0.19 mg/l. Associated with moderate to heavy rain in the previous 24 hours. Upstream data available and suggests a progressive rise in BOD down the catchment.

4. <u>Downstream of Wellow STW</u>

Five failures have been recorded.

a. August 1994. BOD of 9.5 mg/l associated with ammonia of 0.37 mg/l and a suspended solids of 17 mg/l. Upstream site BOD was 1.4 mg/l. Light/moderate rainfall.

b. August 1994. BOD 5.0 mg/l associated with ammonia of 0.25 mg/l and suspended solids of 13 mg/l. Light/moderate rainfall. Upstream site BOD was 1.9 mg/l.

c. September 1995. BOD 4.4 mg/l. No other significant results. Immediate upstream site failed.

d. October 1995. BOD 5.4 mg/l associated with ammonia of 0.91 mg/l. No immediate upstream data available but no problems observed higher up in the catchment.

e. November 1995. BOD 4.5 mg/l. No other parameters elevated. Deterioration occurred gradually down the whole catchment, and was associated with moderate/heavy rainfall.

WELLOW BROOK SAMPLE DATA 1994/95

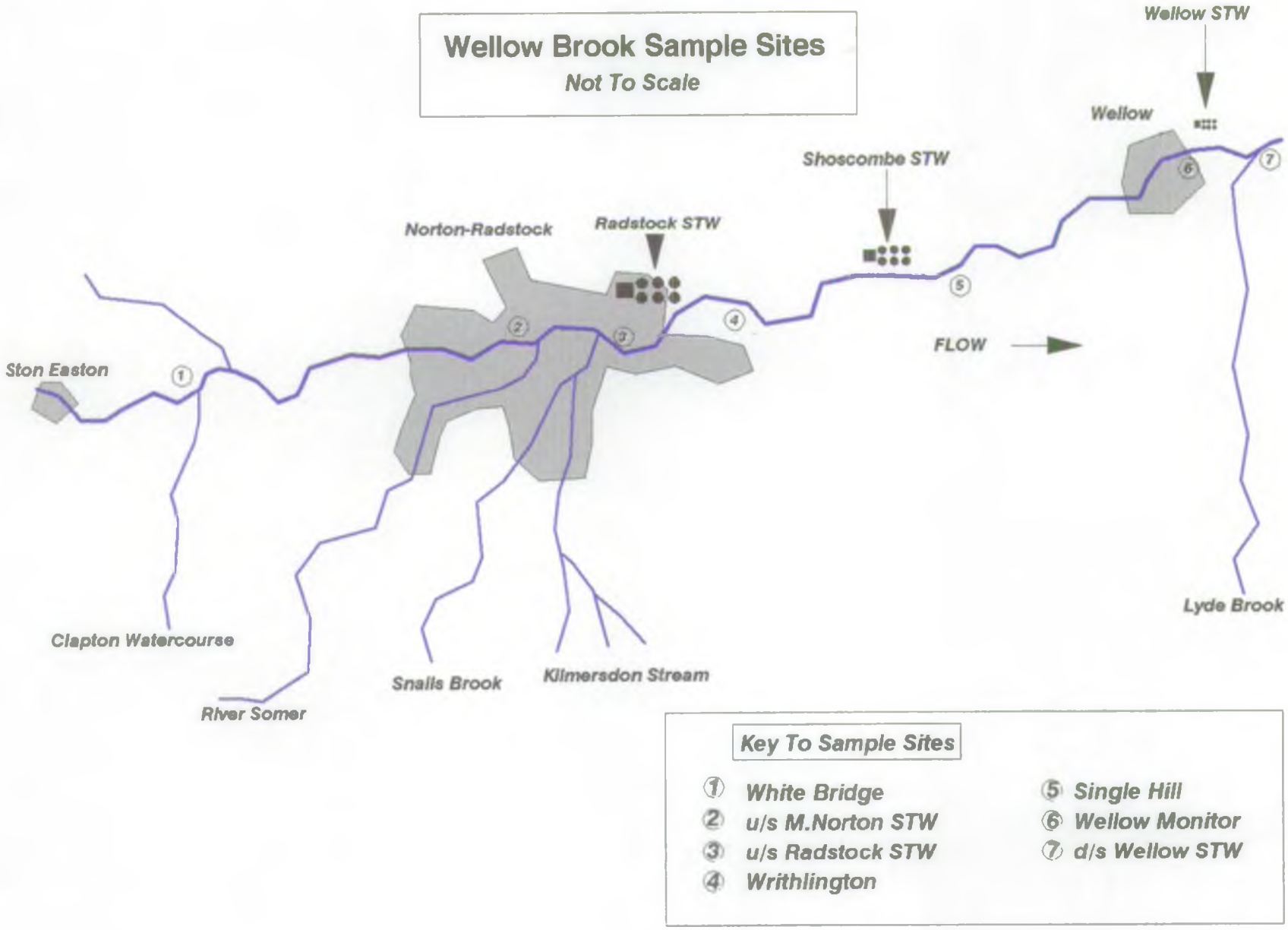
Date	White Bridge				u/s MSN STW				u/s Rad STW				Writhlington				
	BOD	NH3	SS	DO	BOD	NH3	SS	DO	BOD	NH3	SS	DO	BOD	NH3	SS	DO	Rainfall
2.2.94	2.0	0.5	14	99	2.2	0.04	12	98	1.9	.04	23	97	2.4	.06	28	95	Moderate
21.3.94	1.5	0.4	14	102	2.4	0.19	26	99	2.4	0.09	25	105	**5.0**	**.27**	**59**	**95**	Moderate
3.8.94	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Moderate
19.8.94	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Low
8.9.94	1.7	0.4	6.9	91	2.4	.03	26	89	2.4	.05	15	89	**4.1**	**.13**	**10**	**81**	**Moderate**
9.11.94	2.5	0.5	30	130	3.2	0.7	67	91	**4**	**.13**	**93**	**96**	**4.9**	**.19**	**122**	**96**	**High**
7.12.94	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	High
8.12.94	1.7	0.7	49	97	**11.9**	**0.3**	**900**	**93**	**6.9**	**.24**	**332**	**94**	**8.7**	**.48**	**256**	**91**	**3 previous days high**
25.4.95	1.7	0.4	-	111	1.3	0.3	-	95	1.3	.09	-	100	**4.6**	**.2**	-	**89**	**Low**
15.5.95	1.6	0.3	-	114	1.5	0.3	-	99	2.1	.03	-	100	**4.2**	**0.1**	-	**95**	**Trace**
10.7.95	**5.8**	**0.3**	-	**86**	**10.8**	**0.05**	-	**80**	**24.9**	**.71**	-	**74**	3.6	.08	-	**62**	Trace
7.9.95	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Moderate/High
2.10.95	1	0.3	-	99	1.1	0.03	-	97	1	.03	-	102	2.1	0.1	-	95	None
27.11.95	1.8	0.6	-	98	3.1	.22	-	94	3	.17	-	94	3.6	.24	-	91	High

WELLOW BROOK SAMPLE DATA 1994/95

Date	Single Hill				Wellow Monitor				d/s Wellow STW				
	BOD	NH3	SS	DO	BOD	NH3	SS	DO	BOD	NH3	SS	DO	Rainfall
2.2.94	2.4	.09	31	94	2.2	.08	27	99	2	.08	28	102	Moderate
21.3.94	4.6	.29	139	94	-	-	-	-	-	-	-	-	Moderate
3.8.94	-	-	-	-	1.4	.05	5.2	86	9.5	.37	17	80	Moderate
19.8.94	-	-	-	-	1.9	.02	5.1	100	5.0	.25	13	90	Low
8.9.94	2.8	0.14	8.6	71	-	-	-	-	-	-	-	-	Moderate
9.11.94	6.1	.19	200	96	-	-	-	-	-	-	-	-	High
7.12.94	-	-	-	-	-	-	-	-	-	-	-	-	High
8.12.94	4.3	0.21	124	93	-	-	-	-	-	-	-	-	3 previous days high
25.4.95	2.2	.15	-	90	-	-	-	-	-	-	-	-	Low
15.5.95	2.5	0.09	-	90	-	-	-	-	-	-	-	-	Trace
10.7.95	3	0.08	-	61	-	-	-	-	-	-	-	-	Trace
7.9.95	-	-	-	-	4.2	.12	-	88	4.4	.11	-	86	Moderate/High
2.10.95	1.1	-.03	-	101	-	-	-	-	5.4	.91	-	87	None
27.11.95	3.5	.18	-	94	4.3	.19	-	95	4.5	.19	-	94	High

WELLOW BROOK TRIBUTARIES - WATER QUALITY DATA 1994/95

	6.1.94			8.9.94			10.10.94			31.10.94			8.12.94			23.1.95			15.5.95			10.7.95			7.9.95			27.11.95		
Snails	BOD	NH3	SS	BOD	NH3	SS	BOD	NH3	SS	BOD	NH3	SS	BOD	NH3	SS	BOD	SS	NH3	BOD	SS	NH3	BOD	SS	NH3	BOD	SS	NH3	BOD	NH3	SS
u/s Stratton STW	1.5	0.016	13	-	-	-	-	-	-	-	-	-	7.5	1.0	77	-	-	-	n/s	n/s	n/s	-	-	-	-	-	-	-	-	-
At B3139	4.7	0.13	31	-	-	-	-	-	-	-	-	-	5.2	0.5	150	-	-	-	6.9	0.09	-	-	-	-	-	-	-	-	-	-
Radstock	1.6	0.12	17	-	-	-	-	-	-	-	-	-	3.6	0.13	146	-	-	-	1.4	0.03	-	-	-	-	-	-	-	-	-	-
Kilmersdon																														
Trib at B3139	1.5	0.07	24	1.1	0.07	24	-	-	-	-	-	-	2.2	0.04	145	-	-	-	n/s	n/s	n/s	-	-	-	-	-	-	-	-	-
At B3139	4.4	0.26	38	4.6	0.27	19	-	-	-	-	-	-	6.2	0.29	316	-	-	-	n/s	n/s	n/s	-	-	-	-	-	-	-	-	-
Radstock	2.4	0.15	37	1.9	0.02	16	-	-	-	-	-	-	7.5	0.11	862	-	-	-	4.7	0.03	-	-	-	-	-	-	-	-	-	-
Somer																														
Chilcompton	-	-	-	-	-	-	1.7	1.6	5.3	3.2	1.00	32	5.3	0.43	154	2.2	0.48	0.16	-	-	-	n/s	n/s	n/s	-	-	-	n/s	n/s	n/s
d/s Chilcompton	-	-	-	-	-	-	-	-	-	4.5	0.99	31	4.8	0.25	157	8.5	0.65	69	-	-	-	>8.9	0.05	-	-	-	-	2.7	0.42	-
u/s Confluence	-	-	-	-	-	-	-	-	-	2.5	0.07	6.6	7.1	0.28	375	n/s	n/s	n/s	-	-	-	n/s	n/s	n/s	-	-	-	4.4 4.8	0.14 0.10	- -
Lyde																														
Norton	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	n/s	n/s	n/s	n/s	n/s	n/s
Kingsfield	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5.9	0.46	-	4.7	0.17	-
Rainfall																														
Notes	Moderate			High			None			High			Moderate			High			Dry			Low			High			Moderate		


Wellow Brook Sample Sites
Not To Scale
Wellow STW
Wellow
Shoscombe STW
Norton-Radstock
Radstock STW
Ston Easton
FLOW
Clapton Watercourse
Snails Brook
Kilmersdon Stream
River Somer
Lyde Brook
Key To Sample Sites
① White Bridge
② u/s M.Norton STW
③ u/s Radstock STW
④ Writhlington
⑤ Single Hill
⑥ Wellow Monitor
⑦ d/s Wellow STW

WELLOW BROOK TRIBUTARIES

Snails Brook, Kilmersdon Stream, Lyde Brook

All these three tributaries drain steep sided valleys where the land is predominantly used for dairy farming. The catchments are largely rural, although all receive small sewage inputs and the Kilmersdon Stream and Snails Brook are affected by the urban environment just above their confluence with the Wellow Brook.

River Somer

The Somer, although draining from a rural area, has a history of pollution incidents from the agricultural activities which go on in the Chilcompton area. The honours have historically been shared between pig farms, dairy farms and a cheese factory. Recent form does not suggest that the trend has changed, although the magnitude of pollution incidents has tended to be less in recent years.

The Problem

The criteria used to examine the data for 1994/1995 were the same as that for the Wellow Brook with BOD results greater than 4.0 mg/l being scrutinised along with associated data.

Unusual sample results for the River Somer, Snails Brook, Kilmersdon Stream and Lyde Brook are illustrated in table 4.

Results (see table 4)

Snails Brook

Upstream of Stratton-on-the Fosse STW

A failure on BOD of 7.5 mg/l was recorded in December 1994 and is linked to elevated ammonia and suspended solids results of 1.0 mg/l and 77 mg/l respectively.

The sample point was dropped from the routine sample round in March 1995.

At B3139

Two fliers have been recorded at this site.

1. December 1994 - BOD 5.2 mg/l, ammonia 0.5 mg/l and suspended solids of 150 mg/l. Possibly linked to problems at the upper end (see above result) although it should be noted nearly every sample site within the Wellow Brook catchment had a BOD > 4.0 mg/l and high suspended solids on this day.

2. May 1995 - BOD 6.9 mg/l, ammonia 0.09 mg/l.

Radstock

No 'failures' have been recorded from this site.

Kilmersdon Stream

Tributary at B3139

No samples showing poor water quality were obtained during 1994/95. The sample site was dropped as of March 1995.

At B3139

Three 'failures' have been recorded.

1. January 1994 - BOD of 4.4 mg/l associated with an ammonia of 0.26 mg/l.

2. September 1994 - BOD of 4.6 mg/l associated with an ammonia of 0.27 mg/l.

3. December 1994 - BOD of 6.2 mg/l associated with an ammonia of 0.29 mg/l, and a suspended solids of 312 mg/l.

The sample site was dropped as of March 1995.

At Radstock

Two poor samples have been recorded.

1. December 1994 - BOD 7.5 mg/l, suspended solids 862 mg/l.

2. May 1995 - BOD 4.7 mg/l, no other unusual results.

River Somer

Chilcompton High Street

One 'failure' of 5.3 was recorded in December 1994 and associated with an ammonia of 0.43 mg/l and a solids of 154 mg/l.

Elevated ammonia results have been recorded on two separate occasions without significantly elevated BOD results.

The sample site was dropped as of March 1995.

Downstream Chilcompton STW

1. October 1994 - A BOD of 4.5 mg/l was associated with an ammonia of 0.99 mg/l.

2. December 1994 - A BOD of 4.8 was associated with a solids of 157 mg/l.

3. January 1995 - A BOD of 8.5 was associated with an ammonia of 0.65 mg/l and solids of 69 mg/l.

4. July 1995 - A BOD of > 8.9 mg/l was not associated with any other parameters in elevated amounts.

Upstream Confluence with Wellow

1. December 1994 - BOD of 7.1 associated with a solids of 375 mg/l.

2 & 3. November 1995. BOD of 4.4 and 4.8 mg/l achieved from two routine samples taken on the same day.

Lyde Brook

Norton St Philip

Sample site was dropped as of March 1995. No failures recorded in 1994/95.

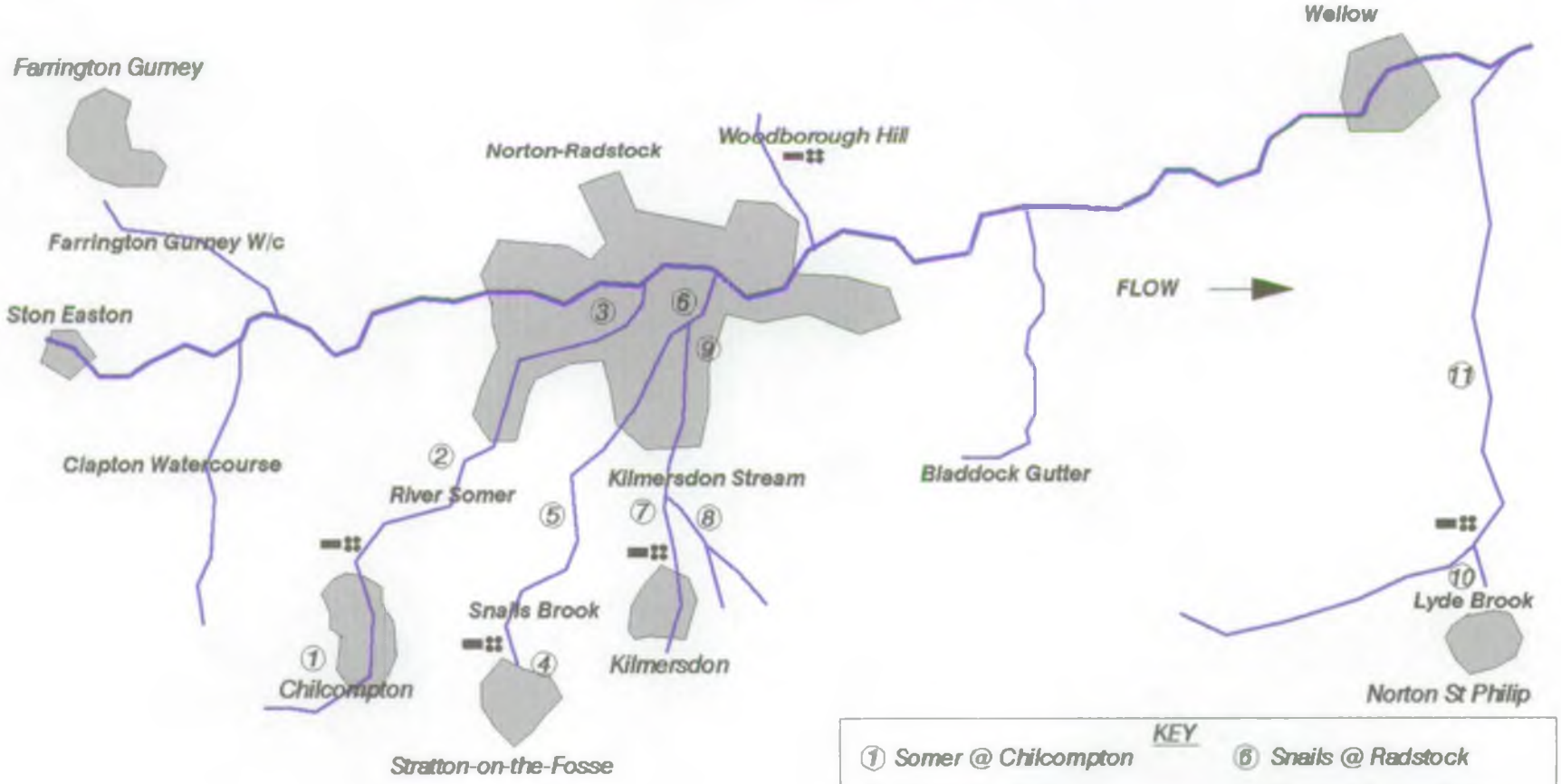
Kingsfield

Failures recorded:-

1. September 1995 - BOD of 5.9 mg/l associated with an ammonia of 0.46 mg/l.

2. November 1995 - BOD of 4.7 mg/l.

Wellow Brook Tributaries Sample Sites.
(Not To Scale)



KEY

① Somer @ Chilcompton	⑥ Snails @ Radstock
② Somer d/s STW	⑦ Kilmersdon @ B3139
③ Somer u/s confluence	⑧ Trib K.S @B3139
④ Snails u/s S-O-F STW	⑨ Kilmersdon u/s confluence
⑤ Snails d/s S-O-F STW	⑩ Lyde Brook @ Norton
Sewage Treatment Works	⑪ Lyde Brook @ Kingsfield

Cam Brook

The source of the Cam Brook is at Hinton Blewitt and the watercourse drains partially from the limestone around this area. At Hallatrow, the flows are augmented by the Clutton Stream, the only significant tributary of the Cam. The Catchment is an important one for dairy farming, particularly in the upper and middle reaches, with agriculture becoming more extensive and arable orientated in the lower zones. The only urban area of significance draining to the Cam Brook is that of Paulton and it is also around this area that a major industrial input discharges to the watercourse.

The Problem

Elevated BOD levels have been observed from routine sample data to periodically affect the Cam Brook catchment and bring the watercourse out of its actual and visionary River Ecosystem Classes.

Similar criteria to the Wellow Brook has been used when examining the water quality data for 1994/1995 and the results are tabulated in table 5.

Cam Brook (see table 5)

Hallatrow

The upper site at Hallatrow shows no BOD results of > 4.0 mg/l for 1994/95.

Goosard Bridge

This site shows three occasions when BOD levels rose above 4.0 mg/l.

1. January 1994 - BOD of 4.7 mg/l, no other parameters elevated.
2. March 1995 - BOD of 5.1 mg/l associated with an ammonia of 0.42 mg/l.
3. September 1995 - BOD of 5.2 mg/l, no other parameters elevated.

Radford

There are three samples taken in 1994/95 which show BOD levels above 4.0 mg/l.

1. November 1994 - BOD of 4.9 mg/l associated with ammonia of 0.7 mg/l.
2. March 1995 - BOD of 4.4 mg/l associated with an ammonia of 0.41 mg/l.
3. March 1995 - BOD of 5.6 mg/l associated with an ammonia of 0.43 mg/l.

The sample site was dropped as of March 1995.

Splott Farm

There is one poor sample for the 1994/95 period.

1. February 1995 - BOD of 4.7 mg/l. No other elevated levels.

Dunkerton and Midford

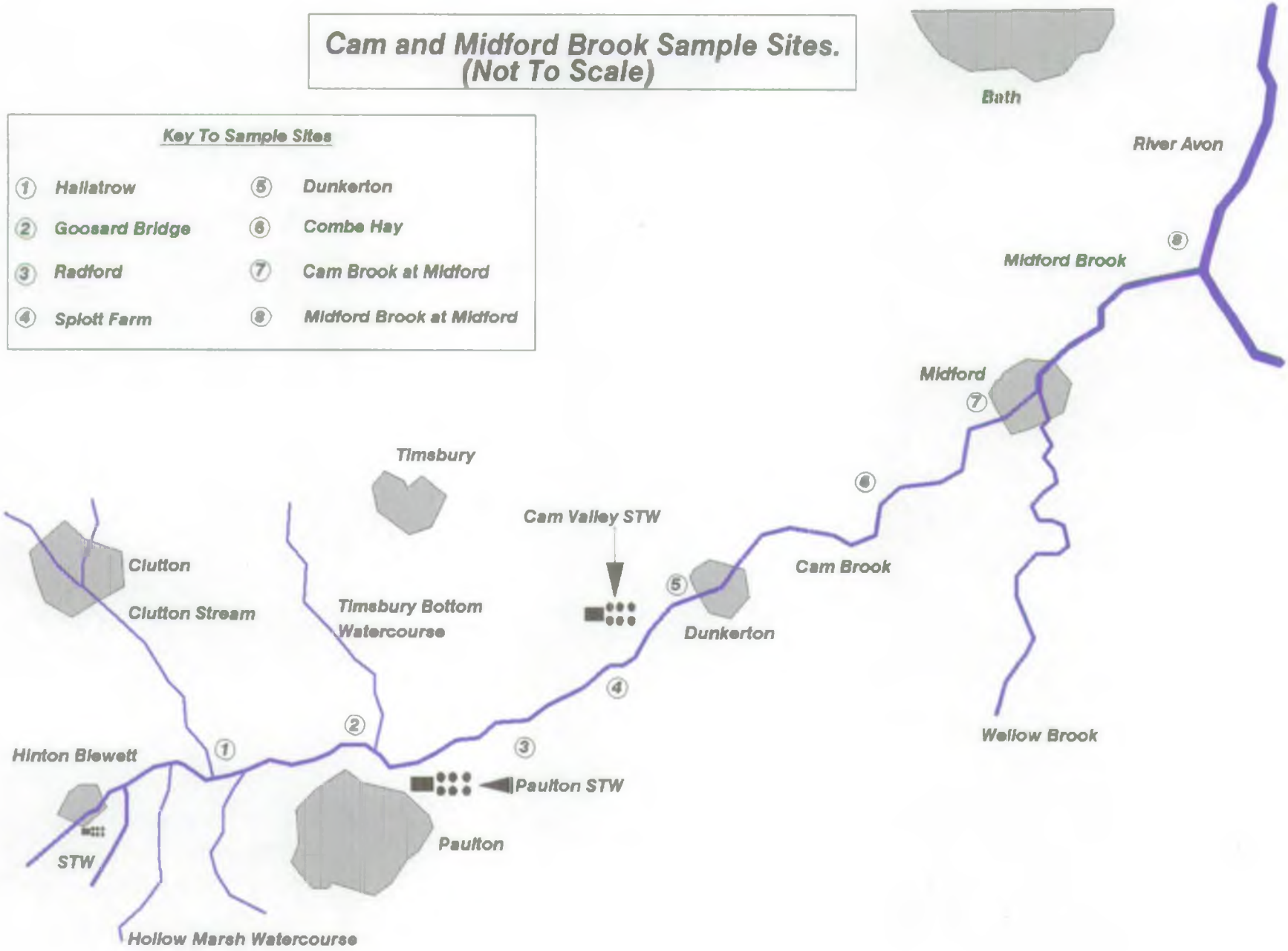
No 'failures' from these sites in 1994/95.

Midford Brook

Midford

A BOD of 4.8 was recorded in August 1994. All subsequent samples have been < 4.0 mg/l.

Cam and Midford Brook Sample Sites. (Not To Scale)



ANALYSIS OF BIOLOGICAL DATA

Historical data for sample sites within the Midford Brook catchment is scarce, but what was available is illustrated along with the 1995 GQA survey results in table 6.

Comparison of the 1995 and historic data suggests that the water quality at all sites where data is available, has improved, in many cases significantly.

For the purposes of this discussion, data collected for the 1995 GQA survey has been used. As GQA biological sample sites have been selected to mirror routine chemical monitoring sites as closely as possible, it is possible to compare biological and chemical observations more closely than has previously been the case.

At the time of writing this report it is not possible to compare the observed scores with those predicted by the RIVPACS system based on the physico-chemical characteristics of the site. It has therefore been assumed that decreases in score are as a result of water quality stress rather than other factors, although habitat and low flows have been taken into account where applicable.

Wellow Brook

There would appear to be a marked decreased in water quality from White Bridge (excellent) to upstream of Midsomer Norton STW (good/moderate). This could be due to a number of factors including farming, industrial activities and increasing urbanisation between the 2 sites, and also due to the fact that the site is immediately downstream of a culverted section of the Wellow Brook which may exert some slight effect on biological score.

The next downstream site, upstream of Radstock STW, exhibits a slight recovery to good despite increasing urbanisation and industrial activity between the 2 sites. Below Radstock STW at Writhlington the biological classification falls to good/moderate as a result of this large sewage input and resultant dissolved oxygen sag. A gradual recovery is observed at Single Hill where a classification of good is achieved once more.

Downstream at Wellow Ford the quality fluctuates between excellent and moderate with a marked difference between the spring and autumn scores. On examination it appears that this site is located approximately 50 metres downstream of the consented farm discharge from Weavers Farm, Wellow which is known to cause occasional problems in the area. It would appear that the discharge is exerting a significant effect on local water quality, albeit still within the good-excellent class range.

Bearing this in mind, it is interesting to see that the next site downstream (also downstream of Wellow STW) exhibits the same kind of seasonal variation (BMWP 107 spring, 191 autumn). Whether this pattern reflects the impact of the farm discharge, the sewage treatment works or some unknown discharge is certainly an area which merits future attention.

River Somer

Biological data indicates that water quality falls only within the good to moderate range.

The upstream site at Riverside Gardens (d/s Chilcompton STW) achieves only a moderate classification at best, and given the number of factors which could be impinging upon water quality upstream, this area definitely merits further investigation works.

The second site, located upstream of the confluence with the Wellow Brook, achieves a good/moderate classification. In the opinion of the biology department, this site is probably habitat limited being an artificial channel and in the absence of these constraints would almost certainly achieve a better classification.

Kilmersdon Stream

The biological sample site is located towards the lower end of the catchment, and whilst the water quality classification comes out as good, it is possible that minor problems in the upper reaches are being missed.

Snails Brook

Both sites sampled came out as good water quality although the lower catchment site was marginally better than their upper. It is possible that the upper site is slightly limited due to low flows in the summer months.

Lyde Brook

This watercourse came out as moderate/good with only low seasonal fluctuation being observed. It would be expected that a better classification than this would be achieved and again this watercourse could merit some investigation.

Cam Brook

The uppermost site at Hallatrow came out as good biological quality, although possibly not as good as might be expected given the good habitat.

Scores dropped noticeably at Goosard Bridge to good/moderate, which could be as a result of a number of upstream potentially polluting discharges including sewage pumping stations, a combined sewer overflow, farming activity and of course BPC Purnell Ltd.

The site at Dunkerton and Midford both achieve an excellent classification which is very encouraging given that both fail to meet their RE Classification based on chemical parameters.

Midford Brook

The Midford Brook at Midford monitoring station achieves an excellent classification with BMWP scores in excess of 200 being recorded on in both spring and autumn.

Further Work

Biological monitoring has been requested at approximately 35 sites in the Midford Brook catchment for 1996/97 in order to investigate further the water quality of specific areas. It is envisaged that the results from this in-depth survey work will be used to quantify the scale of any water quality problems within the catchment, and that this will be used to drive further survey's and investigation work.

TABLE 6

				BMWP SCORE									
WATERCOURSE	SITE	GRID REF	REF	AUT 95	SPR 95	SUM 92	SPR 92	AUT 91	SUM 91	SPR 91	AUT 90	SUM 90	SPR 90
Lyde Brook	Kingsfield	ST 761 571	5604	106	99								
	Cleaves Wood	ST 757 574									107	105	107
Kilmesdon Str	u/s Wellow Brk	ST 691 548	5612	107	130								
Snails Brk	Radstock	ST 688 545	5613	130	120	116	138				92	88	82
	B3139	ST 682 524	5618	107	124								
Somer	Wheelers Road	ST 677 546	5615	114	81								
	d/s Chilcompton STW	ST 656 533	5617	64	85								
Wellow Brk	d/s Wellow STW	ST 751 582	5603	191	107								
	Wellow	ST 742 581	5605	171	112	93	115	142	95	125	112	96	55
	Single Hill	ST 721 562	5607	137	108			102	74	46			
	Writhlington	ST 706 554	5608	110	72	60	46	54	62	35	38	55	63
	u/s Radstock STW	ST 699 551	5609	125	104								
	u/s Midsomer Norton STW	ST 676 548	5614	115	100								
	White Bridge	ST 545 577	5616	172	184								
Cam Brk	Cam Midford	ST 759 606	5602	201	167								
	Dunkerton	ST 711 594	5606	161	150								
	Goosard Bridge	ST 654 577	5610	91	133								
	Hallatrow	ST 639 573	5611	131	121	118	166				105	114	82

TABLE 6

				BMWP SCORE									
WATERCOURSE	SITE	GRID REF	REF	AUT 95	SPR 95	SUM 92	SPR 92	AUG 91	SUM 91	SPR 91	AUT 90	SUM 90	SPR 90
Midford Bk	Monitor	ST 763 611	5601	203	200								
	BMWP Score	Class											
	151+	Excellent											
	101 - 150	Good											
	51 - 100	Moderate											
	16 - 50	Poor											
	<15	V.Poor											

Discussion of Results

Wellow Brook

The results show that there is no clear pattern to the elevated BOD results obtained from routine sampling on the Wellow Brook, either in terms of distribution, timing or association with other chemical constituents. In the absence of specific trends, it is probably best to consider the results in terms of catchment uses and how these could be affecting specific reaches of the watercourse.

1. Agriculture

Historically agriculture and, in particular, dairy farming, has been responsible for a number of problems in the catchment, particularly in the upper and middle reaches. Farm waste handling and disposal on the plateau between Ston Easton and Chewton Mendip caused problems in the headwaters of the Wellow Brook for many years although this appears to have been solved to all intents and purposes. It may well be valuable, however, to maintain a high profile in this area to keep the farmers vigilant and also, given the recent problems in the Chewton Mendip area, to make them aware that the whole area can be vulnerable to pollution and not just the Wellow Brook catchment.

Visits by water quality staff in the Clapton area in 1994/1995 appear to have cleared up pollution in a tributary of the Wellow Brook which was suffering from a variety of organic inputs from agricultural sources. It is possible that the quality of this tributary could have influenced downstream sample results on the main brook in the past.

It is also possible that farming in the Farrington Gurney area could affect the site upstream of Midsomer Norton STW and it is intended to keep a closer eye on the quality of the tributary draining this area in future.

Further down the catchment, it would appear that Weavers Farm consented discharge at Wellow may well be exerting water quality effects now that Radstock STW has been upgraded and that the masking effects of this have been removed. It is suggested that investigations into the effects of this discharge be initiated with a view to revoking the consent should the findings dictate this action.

As with many catchments within the Bristol Avon area, maize is finding increasing favour with farmers as a forage crop. Maize tends to be planted in March/April and is generally harvested in October or November, a cropping pattern which leaves maize fields uncultivated over the winter months. Maize also has a high nutrient requirement as a crop, a fact which encourages farmers to utilise maize fields extensively for waste disposal over the winter months, particularly given that there is no grass sward to damage as would be the case with pasture land.

Unless applications of muck and slurry are ploughed in immediately, which is rare, maize fields represent a significant risk in terms of generating run-off as a result of:

a. compaction of the soil due to rainfall onto bare earth

b. compaction of the land due to repeated passage of spreaders and tractors

c. low breakdown rates of farm waste as a result of decreased biological activity during the cold winter months. Muck applications can therefore represent a potential pollution risk for months after spreading

d. rutting of field gateways leaving a convenient exit route for run-off generated from the land. Any natural slope present will exacerbate problems.

It is interesting to note that some of the failures recorded for BOD are associated with high suspended solids results, and there are days following heavy rain when this is recorded almost uniformly throughout the catchment, indicating a general land use influence rather than a specific problem. Run-off from maize fields will almost certainly be associated with significant soil erosion due to their uncultivated nature and where elevated BOD and solids results are recorded together, this could well implicate agricultural run-off from this source. An example of this would be the sample on 8 December 1994 when, following three days of heavy rain, almost the whole catchment including tributaries saw BOD levels elevated above 4.0 mg/l in association with solids levels ranging from 77 mg/l to 900 mg/l.

Further work into the impact of waste disposal from farms growing maize within the catchment may well prove to be a worthwhile initiative, particularly given the fact that its popularity as a crop would appear to be on the increase within South Western region.

2. Sewage Treatment Works

By far the most significant impact on the water quality of the Wellow Brook is Radstock STW which, although producing a consistently good quality of effluent, does exert effects in terms of elevated BOD and depressed dissolved oxygen for several kilometres downstream. Indeed three kilometres of RE Class 3 have been designated below Radstock STW and at least one sample site is failing because it currently lies within this zone.

All other STWs discharging to the Wellow Brook are thought to perform well and none are currently on the Formal Audit list. It is not thought likely that Shoscombe, Wellow or even Woodborough Hill STW are contributing to any water quality problems being picked up on.

3. Sewerage

The Midsomer Norton DAP lists six combined sewer overflows to the Wellow Brook along its length, with most being concentrated in Norton Radstock. Although most have been known to operate prematurely at some stage, none are thought to cause problems on a regular basis.

Improvement works scheduled are:

a. Midsomer Norton STW. Work should have been undertaken in March 1996 to redesign overflow and decrease spill frequencies and volume.

b. Terrace Wood CSO at Ston Easton. This overflow operates prematurely due to infiltration of river water where the sewer has been laid under the bed of the Wellow Brook. Operation of this overflow has never been reported as an incident but conversations with locals suggest that it does operate prematurely. Wessex have identified this as an issue and are investigating ways of alleviating the infiltration problem.

Whilst not on the whole problematic, combined sewer overflow operation during wet weather may still play a part in observed high BOD results, particularly when taken along with storm sewage discharge from Radstock STW and also urban run-off from Norton Radstock. Examination of the sample results shows that deterioration in water quality often occurs progressively down the catchment with each downstream site being a little worse than the upstream (for example 9.11.94 and 27.11.95 both of which were associated with rainfall).

Additionally the old Midsomer Norton STW site caused a major pollution incident in July with upwards of 500 trout dying as a result of a prolonged sewage discharge.

3. Urbanisation

Drainage from urban areas will never be totally clean and is always liable to become contaminated with oils, rubber dust, grit, detergents and faecal material. The impact of these minor pollutants is exacerbated when rainfall follows a prolonged dry spell. Under these circumstances, the first flush discharged to the watercourse can approach the strength of an organic pollutant such as crude sewage and will certainly cause elevation in BOD.

It is thought that this was responsible for the poor quality of samples taken on at least one occasion, namely 10.7.95, when high BOD results were observed in the upper catchment as a result of the flushing out of drains by localised showers following a prolonged dry period. The site upstream of Radstock STW showed up as being particularly poor because of resuspension of material following the sewage pollution of 7th July 1995, due to localised heavy showers.

There are also known to be several surface water outfalls/culverted watercourses in Norton Radstock which suffer from misconnection problems. Again, under dry weather conditions it is possible that solid materials will accumulate in these sewers, ready to be flushed out during periods of rainfall.

4. Industry

Most of the industry located within the Wellow Brook Catchment is engineering based and problems tend to be linked to the handling and disposal of oils and fuels rather than any compounds likely to elevate BOD levels. It is possible however that problems experienced with a solvent discharge to the lower River Somer in 1993 could have elevated BOD levels at sites immediately below the confluence.

It is also possible that minor discharges from BOCM Pauls site have had some impact in the past and site drains have been diverted to the foul sewer in recent years. BOCM Pauls has a consent to discharge yard water and boiler blowdown water and is currently having problems in meeting its consent. The volumes involved, however, are very small and will not have significant downstream influence. Meetings are scheduled to try and sort out problems at this site.

Welton Packaging (now Rexham) has the Wellow Brook culverted beneath the site and also has the legacy of old unmapped drainage systems serving the factory, including old mine shafts. It is not thought that Welton Packaging has much influence on the water quality of the Wellow Brook, but biological work has been requested to try and confirm this. The fact that there is a healthy trout population located immediately downstream of the site suggests that problems, if any, are minor.

Other pockets of industry are located out towards Farrington Gurney, but it is not thought that discharges from this area causes any problems in terms of downstream water quality.

5. Other Factors

It cannot be ruled out that problems perceived on the main Wellow Brook are as a result of problems on the tributaries which are not being picked up by routine monitoring. This is unlikely as the lowest monitoring point on the Somer, Kilmersdon Stream and Snails Brook are not far upstream of the confluence with the Wellow. In the case of the Lyde Brook, the lowest monitoring point is some way upstream of the confluence, but catchment use downstream of the monitoring point is not thought to represent much in the way of risk.

Wellow Brook Tributaries

Snails Brook

1. Agriculture

The Upper Snail's Brook catchment would appear to be periodically affected by elevated BOD and occasionally ammonia levels, suggesting either agricultural activities or sewerage problems. As the uppermost site (upstream of the sewage works) is almost at the top of the watercourse, the problem must be local and therefore should not be too arduous to find. The number of farms involved in the survey would be low (approximately two). Needless to say the upper sample site has now been dropped.

Further down, the catchment becomes increasingly steep sided and it is possible that occasional problems perceived at the B3139 sample site are as a result of farm waste handling and disposal. Again, the catchment involved is a narrow one and a survey of farms not yet visited may well be worthwhile, given the low number involved.

2. Sewage Treatment Works

The sewage treatment works at Stratton-on-the-Fosse has been upgraded within the last 5 years and has not caused any problems in terms of water quality in this time. The works consistently produces a high quality of effluent and has not been on the formal audit programme since upgrading.

3. Sewerage

There has been one incident of a surcharging sewer in Stratton-on-the-Fosse which did involve sewage being discharged to the headwaters of the watercourse. It is not thought that this is a regular occurrence, and agricultural practice is a more likely candidate for any poor results observed. There are also combined sewer overflows in the lower catchment, discharging direct and one via the tributary taking drainage from Westfield Trading Estate. This latter overflow is unconsented and was not known about prior to a blocked sewer causing it to operate.

Two overflows discharge adjacent to a primary school at Radstock (Victoria Hall and Kilmersdon) and both of these have caused problems in the past. As a result of their out of the way location, it is possible for these to run for a considerable time without being picked up on.

These overflows have been highlighted as potential problems through the Midsomer Norton DAP and improvements are being driven through this.

4. Industrial

The lower Snail's Brook takes drainage from the large trading estate at Westfield and it is possible that diffuse inputs from this site can have an impact on the water quality of the Westfield Stream, and possibly the Snail's Brook downstream of the confluence. Biological work has been requested in order to quantify the scale of any problems associated with this area.

Many of the industries based on the estate are of low risk and historically pollution incidents from this source have been rare. It is possible however, that given the size of the estate, that it is still giving rise to a sufficiently 'urban' quality of drainage, particularly after spells of dry weather, to be exerting a water quality effect on the main watercourse.

Kilmersdon Stream

1. Agriculture

It is suspected that problems observed within the catchment, particularly the upper catchment, are associated with farming operations, particularly from Hackmead Farm which despite improvements may still represent a significant risk to water quality. Total number of working farms within the catchment is low, and therefore it is thought that a survey of the upper catchment would be worthwhile.

Farm waste disposal is of particular concern in this area, given the steep sided valley and limited land available for this purpose.

2. Sewage Treatment Works

A small descriptive consent works is present at Kilmersdon. This is not thought to cause any problems.

3. Sewerage

There are no known problem sewage issues in this catchment.

4. Industrial

There are no known problems with industrial drainage to the Kilmersdon Stream.

River Somer

1. Agriculture

Agriculture in and around Chilcompton is thought to play a major part in any water quality problems perceived on the Somer. A thorough survey of all dairy, beef and pig farming operation in the upper catchment is recommended and improvements driven in terms of waste handling and disposal.

2. Sewage Treatment Works

The Wessex Water works at Chilcompton has been recently added to the formal audit failure as a result of a solids failure in Spring 1996. Prior to this time, the works is thought to have maintained a good standard of treatment and no problems from this source are suspected.

Failures in terms of ammonia from the Chilcompton sample site have previously been traced back to the package sewage treatment plant at the Mulberry factory site. Historically, this unit has a good record of compliance, but on one occasion, a loss of nitrification was seen to result in elevated ammonia levels at Chilcompton High Street. The problem stems at least partially from the mode of discharge which is via a large collection sump/pumping arrangement designed for the disposal of sewage effluent and site drainage. In dry spells, the sewage effluent is allowed to accumulate becoming increasingly anaerobic and deteriorating in quality, until the pumps cut in and discharge it as a batch.

The current arrangement is not satisfactory and it has been requested that monitoring equipment is deployed to assess the impact of this discharge on the upper reaches of the Somer. The work has been requested for spring/summer 1996 so that any necessary improvement works can be smuggled in during a large upgrading of the site proposed for later this year.

3. Sewerage

It is not thought that sewerage issues within the catchment are a high priority, contrary to the comment made in the LBACMP regarding storm overflows influencing water quality in the lower stretches.

The only known problems with the sewerage infrastructure within the catchment relate to a pumping station emergency overflow at Saddlestone in Midsomer Norton. This has not operated out of consent within recent years and is no longer thought to be a significant issue.

4. Industry

A solvent discharge from leaking underground feed lines at a large industrial site in Westfield did contaminate the River Somer and significantly elevate BOD levels in the lower reaches of this watercourse in 1993. This could possibly be the cause of recently perceived deterioration in water quality from this point, although
J J Saunders cheese factory at Emborough has caused numerous problems in the past both through opertional problems, disposal of whey to a nearby piggery, and also disposal of waste from their farming operations and factory byproducts. It is recommended that liaison is set up with the company in order to try and improve practice with regards to preventing water pollution.

5. Other

It can be seen from the sample results that on 27 November 1995, two samples were taken from the lower sample site on the River Somer within a matter of hours of each other. Unfortunately, both samples had BOD levels in excess of 4.0 mg/l.

Whilst accepting that operational difficulties will result in a certain, unavoidable number of missed samples and catch-up rounds, this kind of situation should not be able to occur. All other samples from this site within 1995 were of good quality, yet it is likely that the sample site will end up being downgraded in terms of quality class as a result of the events of this day.

Lyde Brook

1. Agriculture

It is possible that agricultural activities within the catchment do periodically affect the water quality within this catchment, although there are no specific incidents of such. A brief investigation into farming activities within the catchment may be beneficial as occasional high BOD results are recorded from the Kingsfield sample site, usually associated with moderate/heavy rainfall.

2. Sewage Treatment Works

Norton St Philip sewage treatment works has previously shown erratic performance in terms of effluent quality. In 1994/95, improvements were made at site which have brought the works consistently within consent. Although it cannot be ruled out, the STW is not considered to be the primary cause of any problems observed within the catchment.

3. Sewerage

Norton St Philip is known to have various existing septic tank discharges dotted around. It is possible that a summation of these diffuse inputs may be sufficient to cause problems observed, but again this is not considered likely.

4. Industry

The consented discharge from Hinton Poultry in Norton St Philip is routed to the Somerset Frome. They do have the option however of irrigating to land at times of poor effluent quality, and the land utilised is within the Lyde Brook catchment. Over-irrigation of effluent has been known, and this in turn would run off to the brook. Additionally, it emerged during the course of last year (1995) that there is an unconsented cooling water discharge from the site which enters the Lyde Brook. It is recommended that a review of site practice is undertaken with regards to possible inputs to the Lyde Brook catchment/irrigation of effluent in order to assess threats posed to water quality in the catchment.

Discussion

Cam Brook

1. Agriculture

The Cam Brook catchment is a mixture of intensive dairy/beef farming and some arable on the flatter areas. The most intensive agriculture is located towards the upper and middle catchment, particularly around the Hinton Blewitt, Farrington Gurney and Camerton areas.

The frequency of agricultural pollution incidents within the catchment is low although occasional problems have been experienced with Field Farm, Hinton Blewitt through both waste handling and disposal practices.

It is thought that the low recorded number of agricultural incidents may reflect:

a. good farming practice within the catchment

b. the 'mixed' nature of many farms within the catchment meaning that there are few problems with waste disposal due to the availability of arable land for spreading

c. the isolated nature of some of the tributaries which may escape notice if polluted (for example the Clutton Stream/Hinton Blewitt tributary).

Elsewhere in the catchment it has emerged that the Goosard Bridge sample point is located downstream of a small dairy farm (Honey Gaston Farm) which has no containment system for wastes and discharges via a small ditch tributary to the Cam Brook. During 1994/95 the site at Goosard Bridge "failed" three times on BOD criteria, when the upstream site at Hallatrow did not on the same day. The site has now ceased to operate as a dairy unit and is farmed as a low intensity beef operation. A follow-up visit will be conducted shortly to see if further work on site is required. It is possible however, that, given the location of the site with regards to the sample point (ie within the mixing zone and on the same bank as the discharge) that this discharge may have exerted some influence on the perceived water quality at this site.

Many of the farms around Camerton and Dunkerton are located some distance away from the Cam Brook on the higher ground and it is also thought that this may play a part in preventing them causing pollution. Farms around this area also undertake "cross catchment" farming in the Newton/Conygre Brook catchments and it is known that a significant amount of waste is disposed of to land in these catchments. Whether the Newton/Conygre Brooks are suffering at the expense of the Cam Brook in this area is not known, although there is certainly one recent record of a muck application from a farm in Camerton to a maize field in Timsbury causing a problem in the Priston Stream.

2. Sewage Treatment Works

All works on the Cam Brook now operate well within their consent limits, although Hinton Blewitt has had to be recently upgraded in order to achieve this.

Paulton STW has a similar, although smaller scale, effect to that of Radstock STW on the Wellow, and almost certainly causes a significant drop in water quality due to the volume of the discharge and the nature of the Cam Brook at this point. Historic chemical and biological data suggests this to be so, although it is very disappointing that the monitoring point for Paulton STW was changed from Radford (1.5 km downstream) to Dunkerton (6.0 km downstream, and also downstream of Cam Valley STW) as a result of the GQA reshuffle. This is clearly not a satisfactory point from which to be monitoring the works and the point at Radford has been re-instated.

Analysis of the data for the Radford site showed there to be potential correlation between the results above 4.0 mg/l BOD and the operation of the storm overflows at Paulton STW. At present it is uncertain as to the exact nature of the storm sewage discharges from the works at Paulton and an attempt is currently being made to sort this out. The Environment Agency currently sample:

a. crude storm overflow from the balancing tanks at the inlet works

b. settled storm discharge from the storm tanks.

The confusion at present is whether the crude discharge is a direct one to the Cam Brook, or whether, as plans show, it also discharges to the storm tanks. If it is the former scenario, there would appear to be a correlation between the Radford site 'failing' and the operation of this overflow. If it is the latter, then we would appear to be taking unnecessary samples and overcharging Wessex Water for a separate discharge that does not exist.

Cam Valley STW has consistently produced a good quality of effluent, but of late problems have been experienced which have lead to its inclusion on the Formal Audit list. Wessex have attributed the problems to strong incoming crude from an unknown source. The significance of this discharge is likely to rise as it is proposed to take the majority of sewage from the developments up at Peasedown St John in years to come.

3. Sewerage

Problems have now been rectified at the pumping station at Temple Cloud which has been upgraded as a result of NRA pressure. Premature discharges from this source have not been recorded since improvement works were undertaken. Prolonged discharges from this pumping station are known to have caused the sample site at Hallatrow to have 'failed' in the past and it is to be hoped that this risk has now been removed from the equation.

Hallatrow pumping station has been similarly upgraded to cope with the greater volumes being passed on from Temple Bridge PS. It is not thought that this facility has caused as many problems as the one at Temple Bridge although given the location it is possible that discharges may not be observed as easily.

The Goosard Bridge sample point is also downstream of the only CSO in Paulton which discharges to the Cam Brook via a small tributary. At one time the aim was to seal this overflow but recent talk has been more along the lines of bringing it up to formula A standards. Again, this is another possible reason why the Goosard Bridge sample site consistently fails to achieve its objectives, particularly following rainfall events.

Storm and emergency overflows are also present on the sewerage system at Clutton and it is possible that these can impact on the quality of the main brook via the Clutton Stream. This area is as yet an 'unknown' and biology work has been requested for 1996 to attempt to quantify problems on this tributary. It is known, however, that the sewerage of Clutton is not complete and that there are septic tanks, package plants and even crude discharges in existence to the Clutton Stream and its tributaries.

Problems have occasionally been experienced with sewer blockages and emergency overflows from pumping stations to the Clutton Stream. Whether these events occur frequently and whether their magnitude is sufficient to cause water quality problems in the Cam Brook is not known.

Further down the catchment, the pumping station at Stoneage Lane, Carlingcott has traditionally caused problems, particularly when handed back from Wansdyke to Wessex. No problems have been recorded from the area of late and it is thought that improvements made by Wessex in this time have solved previous problems.

4. Industry

The majority of problems within the Cam Brook catchment are associated with BPC Catalogues Ltd who have a history of polluting the Cam Brook on a regular basis and with a variety of substances. Formal action has been taken against them for two recent pollution incidents involving toluene and chromium respectively and fines were imposed of £6000 and £9000.

Recent liaison appears to have improved the culture on site dramatically and positive proposals are now being voiced for future improvements on site incorporating a significant amount of environmental engineering.

Whilst responsible for many of the more serious pollution incidents on the Cam Brook it is unlikely that the site is implicated in elevating BOD levels in the catchment. Site drainage has been known to show occasional high BOD values, but this is thought to be more due to the flushing of drains than any contaminated discharge. Having said that; a new development on site has led to water treatment chemicals being discharged in small volumes to the Cam Brook, a situation which should by now have been rectified. It is not thought that the BODs observed in site drainage are significant to wholly cause the elevated results observed at Goosard Bridge, but as with the other factors mentioned previously, it may be contributing to problems. Proposed improvements to site drainage, including a silt trap and bioinfiltration pond, will hopefully tackle these problems at source.

There is little other significant industry within the Cam Brook catchment and certainly nothing which is known to cause problems.

5. Urbanisation

Although primarily a rural catchment, a significant population centre is based around Paulton and some of the drainage arising from this town enters the Cam Brook via a small tributary (which also takes a CSO discharge). Again this is thought to be a possible factor contributing to BOD results at downstream sites rather than a primary cause.

Summary

This report has highlighted a number of different factors which are contributing to the periodic unsatisfactory results which are being picked up in the Midford Brook catchment. In certain cases it has been possible to attribute poor quality to definite water quality issues, but in others it has been necessary to employ a degree of educated guesswork based on local knowledge.

As has been mentioned previously, intensive biological sampling has been requested to attempt to quantify water quality problems within the catchment, and it is envisaged that the results from this survey, when available, will generate some investigation work directly.

Suggested areas of work which have come out of this desk study are listed below.

Areas For Further Work

Wellow Brook

1. Biological survey requested for 1996/97. Any issues raised by this work to be followed up.

2. Farm survey in Ston Easton/Clapton area.

3. Assess impact of Weavers Farm, Wellow discharge.

4. Investigation of impact of maize growing/associated agricultural practice within the Wellow Brook catchment.

5. Further work to highlight the continued impact of Radstock STW on the water quality of the Wellow Brook.

Need to relocate monitoring point 13200209 — see WQP

IS THERE? Radstock was modelled on RE3 + the stretch it discharges to is RQO RE3

Cam Brook

1. Biological survey requested for 1996/97. Any issues raised by this work to be followed up.

2. Survey of the impact of Paulton STW on the water quality of the Middle Cam Brook.

3. Purnell's liaison. Maintain pressure on the company to continue environmental improvements.

IS THIS NECESSARY RADSTOCK STW?

River Somer

1. Farm survey in and around Chilcompton.

2. J J Saunders liaison.

3. Other follow-up work as dictated by biological results.

Kilmersdon Stream

1. Farm survey upstream of B3139.

2. Other follow-up work as dictated by biological results.

Snails Brook

1. Farm survey upstream of B3139.

2. Other follow-up work as dictated by biological results.

Lyde Brook

1. Hinton Poultry liaison.

2. Other work as dictated by biological results.

Additionally, a number of other possible issues have emerged from analysis of the workings of the sampling programme.

a. The splitting of river catchments between separate sample rounds as, for example, with the Wellow Brook. Whilst making for convenient sample runs, it does limit the use of some of the data which can only be studied in isolation from upstream results. Is there any reason why sample runs cannot be based to include whole river catchments, particularly now that so many sites have been dropped?

b. Catch up runs leading to multiple samples being taken from sites on the same day.

c. Catch up runs leading to sample results being clumped within the year rather than evenly spread. Seasonal trends may be missed as a result of this.

It is also worth pointing out that of those sites which have been assigned, and are currently failing to meet visionary River Ecosystem classes, nearly all currently support healthy salmonid fisheries. Taking the BOD data in isolation of the dissolved oxygen data is leading to this failure based on the classification criteria. Would not some form of dissolved oxygen override be applicable where, as in this case, the high natural reaeration capacity of the streams in question is limiting the effects of organic inputs? This is not intended as an argument against pursuing improvements within these river catchments, more a suggestion to prevent an unnecessarily black picture being painted of the water quality in this area.

Ian Hall
18-6-96.

M.L.
18-6-96

CAN'T SET ASIDE BOD IN THIS CASE

CHEMICAL COMPONENT OF THE GENERAL QUALITY ASSESSMENT SCHEME FOR RIVERS AND CANALS

Grade	Dissolved Oxygen % Saturation	BOD (ATU) mg/l	Total Ammonia mg N/l
	10 percentile	90 percentile	90 percentile
A	80	2.5	0.25
B	70	4	0.6
C	60	6	1.3
D	50	8	2.5
E	20	15	9.0
F	<20	-	-

STANDARDS FOR THE FIVE RIVER ECOSYSTEM USE CLASSES

Use Class	DO % sat 10%ile	BOD (ATU) mg/l 90%ile	Total Ammonia mgN/l 90%ile	Un-ionised Ammonia mgN/l 95%ile	pH 5%ile & 95%ile	Hardness mg/l $CaCO_3$	Dissolved Copper µg/l 95%ile	Total Zinc µg/l 95%ile	Class Description
1	80	2.5	0.25	0.021	6.0 - 9.0	≤10 >10 and ≤50 >50 and ≤100 >100	5 22 40 112	30 200 300 500	Water of very good quality suitable for all fish species
2	70	4.0	0.6	0.021	6.0 - 9.0	≤10 >10 and ≤50 >50 and ≤100 >100	5 22 40 112	30 200 300 500	Water of good quality suitable for all fish species
3	60	6.0	1.3	0.021	6.0 - 9.0	≤10 >10 and ≤50 >50 and ≤100 >100	5 22 40 112	300 700 1000 2000	Water of fair quality suitable for high class coarse fish populations
4	50	8.0	2.5	-	6.0 - 9.0	≤10 >10 and ≤50 >50 and ≤100 >100	5 22 40 112	300 700 1000 2000	Water of fair quality suitable for coarse fish populations
5	20	15.0	9.0	-	-	-	-	-	Water of poor quality which is likely to limit coarse fish populations

MIDFORD BROOK, RIVER CAM, SOMER AND WELLOW

SITE	BOD,SS,NH,	VOLUME BANDING (M^3/DAY)	RECEIVING WATER
Cam Valley	30,30,10	500-1999	Cam
Paulton STW Paulton S.Storm	30,40,10 200,200	500-1999	Cam
Wellow STW Wellow S.Storm	25,40,10 200,200	100-499	Wellow
Shoscombe STW Shoscombe S.Storm	30,70,15 200,200	500-1999	Wellow
Radstock STW Radstock S.Storm	1 Dec - 31 Mar (30,40,10) 1 Apr - 30 Nov (20,30,6)	>2000	Wellow
Kilmersdon	Descriptive	20-99	Kilmersdon
Chilcompton STW Chilcompton S.Storm	30,45,15 200,200	100-499	Somer
Stratton-on-Fosse STW Stratton-on-Fosse S.Storm	25,50,15 200,200	100-499	Snails
Hinton Blewitt	20,30,10	20-99	Cam
Woodborough Hill	Descriptive	5-20	Wellow
Norton St Philip		100-499	
Package Plants			
Cholwell House	30,30,10	5-20	Cam
Warrington Homes (Midford)	30,30,10	5-20	Midford
Hunters Rest, Clutton	20,30,20	5-20	Cam
Mulberry, Chilcompton	20,30,10	5-20	Somer
Others			
Pauls Agriculture, Radstock			Wellow
Yard Water	30,30,-		
Boiler Blowdown/Interceptor	30,30,-		
Purnells			
Cooling Water	30,30,-		Cam
Site Drainage	T = <25°c		

	Ph	Cl,	Cr	Cu	Zn
Site Drainage	5.9	-	<.4	<.1	<.4
Cooling Water	5.9	<.1	<.4	<.1	<.4