

WRA THAMES 255

River Thames (Buscot to Eynsham), Windrush and Evenlode

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.

Catchment Review Final Report

December 1994



RIVER THAMES (BUSCOT TO EYNSHAM), WINDRUSH AND EVENLODE CATCHMENT REVIEW

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<u>RIVER THAMES (BUSCOT-EYNSHAM), WINDRUSH &</u> <u>EVENLODE CATCHMENT REVIEW</u>

1. INTRODUCTION

1.1 The National Rivers Authority (NRA) was established through the Water Act 1989 and has defined it's role in the following 'mission statement':

"We will protect and improve the water environment by the effective management of water resources and by the substantial reductions in pollution. We will aim to provide effective defence for people and property against flooding from rivers and the sea. In discharging our duties we will operate openly and balance the interests of all who benefit from and use rivers, groundwaters, estuaries and coastal waters. We will be businesslike, efficient and caring towards our employees."

1.2 In order to effectively manage the water environment and sustain it for the future, the NRA has adopted the principle of Catchment Management Planning. This entails the preparation of Catchment Management Plans (CMP) for each natural river catchment within England and Wales. Through data evaluation, issue analysis, external liaison and consultation, the CMP provides a vehicle to focus attention on the water environment. The process involves all interested parties, in planning for the future well being of the catchment and establishes an integrated plan of action for managing the catchment over a period of five years, after which it is reviewed.

- 1.3 However, as a precursor to the commissioning of the Catchment Management Plans, brief and succinct Catchment Reviews are being drafted which will:
 - (a) provide a concise summary of the current status of the water environment;
 - (b) make full use of the knowledge of internal staff and their assessments of the value of the catchment to people and wildlife;
 - (c) provide a focus for integrating on-going NRA functional activities;
 - (d) promote region wide awareness of issues and opportunities and priorities for action;
 - (e) facilitate the prioritisation and production of Catchment Management Plans.
- 1.4 The following review will provide a summary of catchment statistics, issues, current and future proposed NRA activity in order to achieve a broad awareness of potential cross functional opportunities and constraints. The document will also form the basis of the full Thames (Buscot-Eynsham), Windrush and Evenlode Catchment Management Plan due to start in January 1996, which will provide a focus for those interested in the future health of the water environment of this Catchment area.

2. <u>CURRENT STATUS OF THE WATER ENVIRONMENT</u>

2.1 OVERVIEW

Within this Catchment Review, the area studied includes the River Thames from Buscot Lock to Eynsham Lock and its associated tributaries, and the Rivers Windrush, Evenlode and Glyme to the north of the catchment (see Figure 1). The catchment area is predominantly rural in nature with the only significant settlement in the area being the expanding town of Witney.

2.2 KEY STATISTICS

Catchment area (sq.km)		1026
Population (1991):-		
Witney		19,030
Carterton		12,420
Total population of Thames (Buscot-Eynsham) Catchment		109,530
Total number of properties in the Catchment		39,170
Average annual rainfall from 1941-70 (mm)	4	736
Average annual effective rainfall from 1941-70 (mm)		302
Lengths of designated Main River (km):-		
River Thames		36
River Windrush		52
River Evenlode		62
Other Tributaries		471
Total Main River Length (km)		621

2.3 GEOLOGY AND HYDROGEOLOGY

The catchment consists of a sequence of geological strata dipping in a south easterly direction towards the River Thames as referred to in Figure 2. In the upper, north western parts of the catchment, the Inferior and the Great Oolite Limestones (Cotswold limestones) outcrop at the surface, forming the escarpment of the Cotswold Hills. Just to the north of Witney, these oolitic limestones dip beneath the extensive Oxford Clay which forms the low lying valley of the River Thames. In the upper part of the catchment in the Upper Evenlode Valley, the oolites are completely absent, exposing the underlying Lias clays. In hydrogeological terms, there are two major aquifers: the Great and Inferior Oolite limestones. These limestones are extensively faulted and highly fissured, allowing rapid movement of groundwater. The River





Windrush originates on the Inferior Oolite to the north of Temple Guiting and is later joined by the Eye and Dickler tributaries, which also originate on the Inferior Oolite. Further downstream, Great Oolite groundwater also contributes to the flow. Further to the east, in the Moreton-in-Marsh area, the Evenlode originates on the gravels and Boulder Clays overlying the Lower Lias clays. Further downstream, after flowing over extensive areas of clay, the Great Oolite aquifer contributes to the flow. Several small tributaries join the river, some of which have originated from the minor Marlstone Rock aquifer at the base of the Upper Lias clays, others, such as the River Glyme, originated on the Great Oolite. Once both the Windrush and Evenlode are flowing on the Oxford Clay, the River Windrush joins the River Thames just south of Standlake, at Newbridge and the River Evenlode joins just north of Eynsham.

Small groundwater abstractions utilise the limestone aquifers, mainly for domestic and agricultural use. Some spring flow from the Inferior Oolite is used for Public Water Supply at Lower Swell and Old Chalford.

2.4 HYDROLOGY

The average annual rainfall in the area is 736mm (data from 1941-70). This varies from over 800mm at the top of the Windrush catchment to 650mm in the flatter area of the Thames valley.

A substantial amount of the rainfall is lost in evaporation and transpiration. The average annual effective rainfall, after allowing for such losses is about 300mm. In the Windrush and lower Evenlode much of the effective rainfall percolates to the groundwater, the remainder becomes runoff into the rivers. Between Buscot and the River Windrush a number of tributaries derive their flows from clay areas and enter the Thames directly. The most significant of these are Langford Brook, Broadwell Brook, Clanfield Brook, Shill Brook, Black Bourton Brook, Highmoor and Brightwalton Cut.

The River Windrush rises at Temple Guiting and gains water from the underlying Oolitic limestones and a number of spring fed tributaries. There is a surface water abstraction at Worsham (Minster Lovell) for public water supply. River flows after this abstraction are measured at Worsham. This site is due to be upgraded to an ultra-sonic flow measuring site to allow river flows to be calculated directly. The effluent is returned to the west arm of the Windrush at Witney and so a section of the river experiences depleted summer flows. There is some urban runoff from Witney. At Witney, the river divides into a west and east arm, the split is not controllable (i.e. there are no gates or moveable structure). The two arms rejoin at Standlake. A hydrograph for the Windrush at Newbridge close to its confluence with the Thames for the period 1982 to 1994 is shown in Figure 3a. Additional flow measuring sites are proposed on the Windrush and Dikler at Bourton-on-the-Water.







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NATIONAL RIVERS AUTHORITY - THAMES REGION

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Figure 3c



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The River Evenlode rises at Moreton-in-Marsh. Initially the river flows over Lias Clay, then receives flow from the groundwater fed Glyme. A flow measuring site is proposed on the Glyme at Woodstock. A hydrograph for the Evenlode at Cassington close to its confluence with the Thames for the period 1982 to 1994 is shown in Figure 3b.

River flows in the Thames are derived from the Upper Thames catchments and so exhibit a fairly strong limestone groundwater component. There is also runoff derived from clay and urban areas. There is a surface water abstraction at Farmoor to fill Farmoor reservoir for public water supply. A hydrograph for the natural (i.e. with the abstractions added back) flows in the River Thames at Eynsham for the period 1982 to 1994 is shown in Figure 3c.

2.5 WATER QUALITY

Assessment of Surface Water Quality

The NRA uses a range of chemical and biological techniques to assess water quality in our rivers. Until recently, the quality of individual lengths of rivers have been reported according to a classification scheme devised by the former National Water Council (NWC). In this scheme, rivers were assigned to one of 6 classes from Good to Bad based principally on a knowledge of the biochemical oxygen demand (BOD) and the concentrations of dissolved oxygen (DO) and ammonia. A number of problems with the application of the NWC scheme have been identified and it has recently been replaced by a new scheme called the General Quality Assessment (GQA). This consists of a number of separate water quality assessments, each providing a separate 'window' through which water quality can be viewed. The first of these 'windows' to be developed is the chemical component. It is intended that further 'windows' will be added, covering biology, nutrients and aesthetic quality, but this will depend on the successful development of suitable assessment methods and classification systems.

The current GQA chemical quality of rivers in the catchment is given in Figure 4. This portrays the rivers in this catchment to be of predominantly good quality with 23% (by length) in the A grade and 40% (by length) in the B grade. Table 1 details the apportionment of grades in this catchment.

GQA	PERCENTAGE (BY LENGTH)	
Α	23	
В	40	
С	16	
D	9	
E	12	
F	0	

Table 1: Current GQAs Classes in this Catchment:

Water Quality Objectives:

Our rivers are divided into reaches. Water quality objectives are set for each reach to ensure that the water is of sufficient quality to meet agreed uses (eg water for a reach designated as a salmonid fishery should be of a standard suitable to support a salmonid fishery). Whether or not a reach meets its objective is determined by assessing compliance with sets of chemical standards formulated for each objective. River water samples are collected periodically for this purpose at designated sampling sites within each reach.

Since the late 1970s, river quality has been judged against river quality objectives based on the National Water Council (NWC) system and EC Directives. These provided targets for both maintaining current quality and for planning for water quality improvements. Though the EC Directives are statutory, they only apply to the selected designated watercourses. The river quality objectives (RQOs), based on the NWC Classification, are non-statutory.

The Water Resources Act (1991), allows the government to set Statutory Water Quality Objectives (SWQOs). These will replace the RQOs. The objectives will be set in terms of the various uses that the water is put to. Five uses have been proposed for rivers (River Ecosystem; Special Ecosystem; Abstraction for Potable Supply; Industrial or Agricultural Abstraction and Water Sport Activity). To date, regulations have been produced for the River Ecosystem (RE) use. Five classes have been established within this use, and are portrayed in Table 2.

Class RE1	Water of very good quality for all fish species.
Class RE2	Water of good quality suitable for all fish species.
Class RE3	Water of fair quality suitable for high class coarse fish populations.
Class RE4	Water of fair quality suitable for coarse fish populations.
Class RE5	Water of poor quality which is likely to limit coarse fish populations.
Unclassified	Water of bad quality in which fish are unlikely to be present or insufficient data available by which to classify water quality.

 Table 2: Descriptions of the Five River Ecosystem Classes:

Implementation of these regulations is still awaited from government. In the interim period, the River Quality Objectives (RQOs) based on the NWC classification system have been translated into Water Quality Objectives (WQOs) based on the River Ecosystem (RE) classification. For purposes of this review, this was done by translating directly from the NWC system to the RE system i.e. 1A to RE1, 1B TO RE2 etc. This translation is approximate and serves only as a initial guideline for River Ecosystem objectives. The objectives will be reviewed to take into account changes since the objectives were first set and changes proposed for the future (e.g. capital investment). The process of review will be done in phase with the production of the catchment management plans. The directly translated objectives are shown in Table 3.

2.6 **BIOLOGY**

Biological Monitoring Working Party (BMWP) Scores:

The NRA carries out biological monitoring to provide information on river quality. The Biological Monitoring Working Party (BMWP) score system, established in 1980, is a nationally accepted means of assessing water quality. The technique assigns scores to different invetebrates, based on their sensitivity to pollution. The BMWP score for a site is calculated by summing the scores for each invetebrate group present at the site. As a rough guide, a BMWP score of over 100 indicates relatively good quality, whilst the scores of less than 15 indicates poor quality.

Water Quality Objectives Table 3:

CA No	HIVER	REACH	U/S NGR	D/S NGR	LENGTH	SPT URN	BAMPUNG POINT	SPT NGA	ROO		RE (OPT)	GOA
110	BROADWELL BROOK	Source - Redoct Cut (Gt Brook)	5P2306.0050	SP2884 0038	9.1	PUTH 0141	BAOADWELL BK FRIARS CRT	SP2828.0100	18	2	2	
	GREAT BROCK	Shill Brook - Themas	5P34600147	5P37390172	27	PUTR 0051	GREAT BK CHIMNEY LANE ASTON	32351 018	TA	333364	diameters?	1- <u>5</u> -1
	GAFAT BROCK	Demes - Shill Brook	SP3208 0032	P3450 0147	3.7	PUTR 0052	GREAT BK ISLE OF WIGHT BR	SP333 008	18	1	2	8
	HALEACRE BROOK	Clasheld - Redoct Out	5P2889 0200	SP3038 0067	21	PUTB 0246	HALFACHE BROOK BELOW CLANFIELD	SP2068 0140	28	Stocker's	2.20000000 B	E
h	HIGHMOOR BROOK	Source - Shill Brook	6P3014 0436	SP3098 0342	6.2	PUTR 0189	HIGHMOOR BROOK DS BRIZE NOATON STREAM	\$P308 057	10	2	2	t ē
	GENCOT BROOK	ource - Shill Brook	SP2461 0636	SP2741 0514	51	PUTR 0247	GENCOT BROOK B4020 ALVESCOT	SP2651 0530	18			- <u>č</u>
l – č	RADCOT CUT	St. Johns - Great Brook	SU2264 9906	6P3318 0083	12.4	PUTR 0259	RADCOT CUT AT MARSH LANE, CLANFIELD	5P3032 0000	18	1 2	2	8
-ă	SHUL BROOK	Historoor Brook - Great Brook	SP3098 0342	P3460 0147	4.6	PLITH 0079	HULL BK FISHERS BR BAMPTON	SP310 020	28			8
	SHILL BROOK	Cartarion STW - Hichmoor Brook	SP280 049	SP3008 0342	43	PUTH 0080	SHUL BK BLACK BOURTON BR	SP285 040	28		<u> </u>	B
	SHILL BROOK	Carterion - Carterion STW	5P2720 0720	SP280 049	35	PUTR OUS1	SHILL BK US CARTERTON STW	BP270 048	16		1 3	
	COLWELL BROOK	Source - Wroev STW	5P3380 0890	SP347 080	14	PWRA 0037	COLWELL BROOK AT A4095	RP3376 0005	18		1	8
10	COLWELL BROOK	Witney STW - Emma's Dyke	5P347 086	SP3552 0851	07	PWAR 0002	COLWELL BK A415 WITNEY	5P352 066	18	10. 2	3	1 <u>-</u>
10	DUGER	tyde Mill Str - Bourton - on - the - Water STW	SP1789 2300	P1810 2000	3.8	PWHR.0003	DIKLER US BATN-ON-THE-WTR STW	SP182 201	11	1 1	1	1 Ā
10	DIALER	Source - Hyde Mill Stream	SP1662 2792	BP1789 2300	8.0	PWRA.0004	DIKLER, DONNINGTON BREWERY	SP174 278	14	-51	126 24	B
110	DIALER	Boungan-on-the-Water STW - Windoush	SP1810 2000	BP1700 1808	1 24	PWRA.0005	DIKLER, BOURTON-ON-THE-WTR BR	SP180 197	11	1		1 1
10	EMMA'S DYCE	Juckington - Windwith	6P3570 0640	SP3500 0805	0.5	PWAR.0007	EMMAS DYNE, MOORS DUCKLINGTON	5P357 084	18	17 1 1 1 2	22.395.00.34	0
10	EMMA'S DYCE	Colwell Brook - Ducklington	SP3552 0851	6P3570 0840	0.2	PWRA.0001	EMMAS DYNE BELOW COLWELL BROOK DUCKLINGTON	6P3554 0847	18	2	1.1.1.1	D
10	EMMAS DYCE	Winey ~ Cowell Brook	SP3502 0979	P3552 0851	1.5	PWRA.0006	EMMAS DYNE, EMMAS BR WITNEY	SP354 067	18	2	··· · · · · · · · · · · · · · · · · ·	D
10	EYE I	Chalk Hill - Olkler	SP1307 2595	SP1802 2068	0.0	PWAR.0006	EYE, LWA BLAUGHTEA MILL	SP164 228	1A	1	1	A
10	HAZLEFORD BROOK	Bource - Windrush	SP2100 1952	SP2332 1331	8.6	PWAR.0000	WZLEFORD BK, TAYNTON BA	SP233 138	TÀ	1	1 1	X
10	RESINCTON DITCH	31 Alasington 8TW - Windwah	SP191 175	SP1837 1688	1.1	PWRR.0010	ASSINGTON DT US WINDRUSH LOOP	SP184 169	18	2	1	
10	BREABOURNE BROOK	Jource - Windrush	SP0665 2137	SP1000 1437	20.0	PWRR.0011.	BHERBORNE BKOS BHERBORNE STW	SP182 147	18	2	1 1	B
1	SHOWELLS BROOK	^a riest Hill – Windrush	SP34631245	BP3413 1174	1.1.1	PWAR.0039	SHOWELLS BROOK AT CRAWLEY	5P3422 1210	2B			
1	DISLADE BARNSTREAM	Slade Barn - Windrush	SP0771 2871	SP0077 2486	5,0	PWRR.0032	SLADE BARN STREAM BELOW GUITTING POWER STW	SP00752490	114	1		A
10	DIMINDRUSH]	Norsham - West Arm Confluence	SP3020 1070	SP4050 0285	22.2	PWRR.0019	MNDRUSH, BEARD MILL	SP306 054	18	2		A
10	DMNDRUSH	4429 Baurton-on-the-Water - Dilder	SP1805 2094	SP1790 1868	3.0	PWRR.0020	MINDRUSH, BOURTON-ON-THE-WTR	SP170 204	114	11	1	
10	MINDRUSH	Dilder – Bherborne Brook	3P17901805	SP1900 1437	8.3	PWRR.0023	MINDRUSH, NEW BR 1KM DS DIKLER	SP178 177	14			
1	DIMNORUSH	Nest Am Confluence Thames	3P4050 0285	BP4037 0140	1.0	PWRR.0021	MINDAUSH, NEWBRIDGE GS	SP402 019	18	2		<u> </u>
<u>1(</u>	MNDRUSH	Taddington ~ A429 Bourton - on - the - Water	5P00243165	SP1605 2004	19.0	PWRR,0029		BU1287 2269	14	1		A
1.1		Burtord STW - Worshern	3P2560 1210	SP3020 1070	7.8	PWRR.0026	MINDRUSH, WORSHAM INTARE	SP302 107	114			
<u>– <u>u</u></u>		Sherborne Brock - Hazleford Brook	SP1909 1437	SP23321331	0.0	-WHH.0025	IMNOHUSH, THE FOX LITTLE BARMINGTON	19-200 131	112			+
1		NETHONG BROOK - DUNDIG 51W	3P23321331	592500 1210	3.7			3P200 124	+ 10-	and second		
H	LADCOURT BOCON	Junia Lind Brook - Insmes	204401 0000	SP 4480 08/8	1 0.8	1121.0215		394407 0003	18	1000235	238.28.3	<u>}</u>
+		Stanton Revount - Lins Brook	DP4126 00/8	DP4317 0747		1110210		SP4245 0052	10	Second S	000000000000000000000000000000000000000	<u>}</u>
	BLEDINGTON BROOK	Bourbe - Eveninde	SP2030 2400	3P4401 0000		DEUG AMA		20060 000	18	-		(
T	BLUE BROOK	Source - Corrwell Brook	SP3203 2671	SP2620 1640	5.5	PEVB.0001	BILLE BK BWAU BEORD BR	1200 220	20		<u>}</u>	
T	CHADUNGTON STREAM	Source - Evenlade	SP3241 2320	3P3318 2002	1.0	PEVR.0041	CHADUNGTON & TREAM ABOVE EVENLODE AT BHORTS	3P331 200	18	+	it	il - E
	CORNWELL BROOK	Bource - Evenlode	SP3304 3219	SP2535 2241	10.5	PEVA.0002	DORNWELL BK, KINGHAM	3P258 232	28	1		8
	2 DORN	Jitle Tew Ditch - Glyme	SP3888 2784	SP4447 1934	16.5	PEVA.0000	DORN US GLYME MILFORD BR	SP448 198	18	1 - 1	21 - 2	2 6
	2 EVENLODE	Charbury STW - Glyma	SP3530 1020	SP4414 1405	18.2	PEVR.0013	EVENLODE OS ASHFORD BR	\$P3660 1552	18			1 8
	2 EVENLODE	Comwell Brock - Charbury STW	SP2535 2241	SP3530 1920	20.0	PEVR.0011	EVENLODE SHIPTN-UNDR-WYCHWOOD	SP280 161	18			8 8
1	2 EVENLODE	Styme - Thanes	SP4414 1465	SP4578 0978	8.3	EVR.0005	EVENLODE, 84449 CASSINGTON	SP448 102	18			2 8
	2 EVENLODE	Moreton In Marsh - Comwell Brook	5P2050 3277	SP2535 2241	17.6	PEVR.0010	EVENLODE, ODDINGTON	SP235 204	18		2	2 0
	2 OUR SHIRE STREAM	Fire College Stream - Evenlade	5P2225 3150	5P2108 3056	1.2	2 PEVR.0018	FOUR SHIRE BTR, CMMN BR	3P219 311	28	-	4	
1 1	2 JJLYME	Source - Woodstock STW	5P3377 2000	3P449 178	21.7	PEVA.0019	SLYME, WOOTTON	SP439 196	14	19. A.C.	- Anderson Co	2 0
1	213LYME	Woodstock STW - Evenlode	15P449 178	SP4414 1405	5.	PEVR.0018	ISLYME, A34 WOODSTOCK	5P442 170	18	4-4	· · · · ·	
1	A DESTUGATION AT A CALL	Linurch Hanborough - Evenlode	SP4227 1267	pr 4366 1100	3.2	2 EVH.0020	HANBOROUGH STR, CITY FM	15P434 111	18	+		
\mathbb{H}^{2}	A PILL T FROM STALLAND	pource - Gyme	DP 1529 2000	pr-3815 2437	+	17EV1.0042	THE TITHUP STREAM ABOVE OLYME, ENSTONE	pr362 243		+	<u>}</u>	<u>\</u>
1	ALITTLE COMPTON STREAM	DCUTCE - EVENICOE	2004501004	202102 3041	- 0.5	EVILUAS	LITTLE CONTINNI DI RIM AL MEATRICHU BRIUGE	20070 104	1 20	+	<u>}</u>	{┼ <u>╠</u>
1-4			20110061-	201040 000		1-EVILOU21	LITTLEDTUCK DK US EVENLUUE	21/240 004	1 20			1 6 –
H	A SICHALOSTEAN BRANN	Deen Court - Themes	102710 V318	5P4432 0720	0.0		FILCHALIPSTEAD BY IN THALICE	10200 VO1	1.8	1	1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1	 - -
1	ATHAMES	Bablock Hythe - Evenlode	SP43500424	5P4578 0074			THAMES FARMOOR INTAKE	5P410 044	14	1 2 3 3	1.000	5 - 5
1	AITHAMES	Shiflard Welr - Beblack Inthe	SP 3035 0000	BP4350 0424	12	PUTR 7000	THAMES, NEWBRIDGE	SP403 014	IIA	+		it ă -
1	OTHANES	Con - Shiftord Wel	SU2040 0004	3P 3635 000	22	SPUTR.0107	THAMES, BUSCOT INTAKE	50220 001	tia	+	; -	8
TI	OWADLEY STREAM	Source - Tharnes	SU2932 9804	3P3093 0012	80	PUTR 0252	WADLEY STREAM AT OUXFORD	5P3660 0000	28		it	1
-	المحجبين المحفاة بالتكريد التكري بالمتعالية		سأدأن المستجر ومسادي						-			

DT WOO ~ DIREGTRANSLATION WATER QUALITY OBJECTIVE • - WHERE SET LONG TERM OBJECTIVE USED

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OPTIMISTIC RE CLASS GREATER THAN DIRECT TRANSLATION RE CLASS





Figure 5 shows the biological quality of the catchment for 1993. The main watercourses of this catchment are of exceptional quality with BMWP scores for the Windrush, Evenlode, Glyme and Dorn normally in excess of 150 and occasionally exceeding 200. The main River Thames normally scores about 130 for this section. The tributaries of the catchment are not as biologically diverse as the main rivers, often reflecting poorer water quality. Streams of particular concern are: Kencot Brook, Faringdon Brook, Filchampstead Brook, Highmoor Brook, Fourshire Stream, Colwell Brook and Emmas Dyke. One tributary of extremely high invertebrate diversity, noted during sampling in relation to local development, is the Evenlode Canal Stream at Cassington.

Bacteriological monitoring of the catchment is also being carried out at a number of sites. This monitoring relates to the EC Abstraction Directive and a baseline study in relation to the use of waters for contact sports.

Algal Monitoring:

Algal monitoring is continuing along the River Thames as part of the investigations for the South West Oxford Reservoir proposal. Twelve sites are monitored on a monthly basis and show the marked seasonal changes in algal abundance, but relatively little difference between sites (in this catchment, a site is monitored at Newbridge). This work will also be used to further investigations into the designation of the River Thames as an Eutrophic Sensitive Area under the EC Urban Waste Water Treatment (UWWT) Directive. Reactive algal surveys are instigated at public request in relation to Blue-Green algae blooms. Long term monitoring of the Farmoor reservoirs have shown consistent blooms of Blue-Green algae over the past 3 years.

2.7 POLLUTION CONTROL

Pollution Incidents:

Nationally the number of reported pollution incidents has grown over recent years. This increase appears to be attributable to a range of factors, such as better communication facilities (e.g. setting up and publicising of "Pollution Hotlines"), publicising the NRA and its' functions and greater environmental awareness amongst the general public, rather than a genuine increase in pollution incidents.

There were 86 reported pollution incidents in the Thames (Buscot to Eynsham) catchment area during the year 1993 of which 31% were caused by oil and 22% were caused by sewage. The remainder of the pollution types were split between chemical, natural, agricultural and general pollutants.

The NRA divide these pollution incidents into three classes: Major, Significant and Minor, depending on their severity. During the calendar years 1990-1993 inclusive, there were 345 pollution incidents recorded, of which 323 were classed as Minor, 21 as Significant, and 1 as Major.

Multi Functional Support for Pollution Incidents:

Many parties are involved in Pollution Incidents as well as the Pollution Control field staff who attend the incident and co-ordinate remedial measures to control the pollution, minimise its effect and organise the clean up afterwards. Subsequently enforcement action is taken in appropriate cases. Other parties involved range from NRA functional staff, emergency services and Industry / WSPLC's.

2.8 POLLUTION PREVENTION

Many pollution incidents occur as a result of ignorance and in the mistaken belief that any liquid which passes to a drain goes to a sewage treatment works. This is not generally the case especially in West Area where most drainage systems run directly into watercourses or soakaways. The Pollution Prevention team have a programme of visits which target areas where occasional incidents occur. In this catchment area, the following trading estates have been or will be visited and where necessary, recommendations for remedial work will be made.

Bourton-on-the-Water	:	Station Lane	(11/94)
Witney	:	Windrush Industrial Park	(4/93)
Witney	:	Station Lane, Avenue 1	(6/94)
Witney	:	Station Lane, Avenue 2	(8/94)
Witney	:	Station Lane, Avenue 3	(11/94)
Witney	:	Station Lane, Avenue 4	(12/94)
Brize Norton Aerodrome	:		(12/94)
Mineral Workings	:		(94/95)

2.9 CONSENTED DISCHARGES

There are 151 consented discharges in the study area. Of these consented discharges, 75 involve discharge of greater than $5m^3/d$. The main discharges involving more than $5m^3$ are portrayed in Table 4 along with the relative piechart. Of these discharges, the largest is located at Witney Sewage Works and is owned by Thames Water Utilities Ltd. The number of Consented Discharges over $5m^3/d$ are contained in Table 5 along with the relative piechart.

Table 4 :Maximum Volume of Consented Discharges to Catchment• over 5m³/d.

DISCHARGE	MAX VOLUME m ³ /d	PERCENTAGE (%)
TWUL STW	89280.0	66.8
Mineral	26204.0	19.6
Trade	5833.9	4.4
Storm	11750	8.8
Private STW	571.6	0.4
Total	133639.5	100

MAXIMUM VOLUME OF CONSENTED DISCHARGES OVER 5m3/d TO THAMES (BUSCOT TO EYNSHAM), WINDRUSH & EVENLODE CATCHMENT



TOTAL VOLUME OF CONSENTED DISCHARGES OVER 5m3/d = 133639.5 m3/d

DISCHARGE	NO. DISCHARGES > 5m ³ /d	PERCENTAGE
TWUL STW	36	48.0
Mineral	4	5.3
Trade	3	4.0
Storm	1	1.4
Private STW	31	41.3
Total	75	100

Table 5: Number of Consented Discharges to the Catchment over 5m³/d

NUMBER OF CONSENTED DISCHARGES TO THAMES (BUSCOT TO EYNSHAM). WINDRUSH & EVENLODE CATCHMENT OVER 5m3/d

(48.0%) TWUL STW



(41.3%) PRIVATE STW

TOTAL NUMBER OF CONSENTED DISCHARGES OVER 5m3/d = 75

2.10 GROUNDWATER QUALITY

Groundwater Vulnerability Maps:

The production of Groundwater Vulnerability Maps are one key element in the strategy to protect groundwater resources against the threat of pollution on a regional scale. These maps will show aquifer location and classify the whole country according to the soil, and underlying strata. The maps for this area will be published in 1995 in conjunction with the British Geological Survey.

Nitrate Vulnerable Zones (NVZs):

Under the EC Nitrate Directive (91/676), it is proposed to reduce water pollution by nitrates from agricultural sources. NVZs are designated in areas where water sources are high in nitrates. A consultation period of proposed NVZs led by MAFF ended on 31 August 1994 and of those zones proposed, the following four are within the Thames (Buscot to Eynsham) Catchment:-

> Stow-on-the-Wold The Slaughters Fairford Old Chalford

If these areas are approved by MAFF, then they will become statutory zones in which the use of organic manure and inorganic fertilisers will be restricted

Nitrate Sensitive Areas (NSAs):

NSAs were initially introduced in 1990 when ten pilot NSAs were designated of which Old Chalford, east of Chipping Norton, is one. The main aim of this scheme is to provide opportunities for farmers, in these NSAs, to receive payments from MAFF in return for voluntarily help to protect valuable supplies of drinking water by changing their farming practices to reduce nitrate leaching.

The Old Chalford NSA is a 750 ha catchment area designated to protect a Thames Water Abstraction for potable supply or boreholes. Nitrate levels in the abstracted water vary considerably due to the nature of the fast responding springs to rainfall. Levels of nitrate in the spring water have exceeded 60mg/l in the last few years. The water is currently blended with Farmoor reservoir water to meet the 50mg/l nitrate maximum in supply.

Aims of the NSA: to ensure that no field receives more than its economic optimum amount of fertiliser for yield in any year.

2.11 WATER RESOURCES

In June 1994 the NRA-TR published "Future Water Resources in the Thames Region: a Strategy for Sustainable Management". This report reviewed the resource-demand balance in the Region for the next 30 years. Three scenarios of future demand: high, medium and low; have been developed which reflect varying levels of success in managing growth in demand and different assumptions of domestic, and Industrial growth.



There are fourteen major water abstraction points within the catchment area as shown in Figure 6 along with flow gauging stations. Abstractions of greater than 1Ml/day are listed in Table 6 below.

LOCATION	SOURCE	PURPOSE	VOLUME (Ml/day)
Standlake . Gravel		Sand and Gravel Washing	3.1
Pinnock PS (Severn-Trent Water plc)	Pinnock PS (Severn-Trent Water plc)		1.6
Seven Springs PS	Inferior Oolite	Public Water Supply	3.3
Upper Swell PS	Great Oolite	Public Water Supply	4.5
Witney Mill	R. Windrush	Cooling, Laundry, Manufacture	2.5
Worsham PS	R. Windrush	Public Water Supply	11.4
Hardwick .	Gravel	Sand and Gravel Washing	2.1
Donnington .	Inferior Oolite	Fish Farming	2.5
Old Chalford PS	Inferior Oolite	Public Water Supply	1.8
Farmoor	R. Thames	Public Water Supply	140.1

 Table 6: Details of Licensed Ground/Surface Water Abstractions

 of Greater than 1MI/day.

Key:

. These abstractions are returned locally and do not affect the water balance.

2.12 FLOOD DEFENCE

Flooding in the catchment area:

Standlake Village at Rack End:

The flooding at Rack End was thought to be caused by gravel workings; removal of flood defences; and a combination of peak runoff with peak river flows (there is uncertainty over the effects of the gravel pits on the flooding at Rack End. Main Road through Standlake Village:

Flooding from an old gravel pit due to a high water table and poor highway drainage. This flooded the main road at Standlake.

Flood Defence and Alleviation Schemes in the area:

- River Windrush at Early's Mill Overfall constructed/restored in 1993/4
- River Windrush at Standlake
 Work is being undertaken on a two foot high flood protection bund and associated works (1994/5). The Windrush at Standlake is also subject to a NRA Hydraulic and Hydrological study in medium term and (possibly) a major scheme in longer term.

2.13 FISHERIES

Overall Status of Catchment Fisheries:

• River Windrush:

Downstream of Harford Bridge, the watercourse is designated as an EC salmonid fishery (see Figure 7).

Upstream of the river from its source to Bourton-on-the-Water, the dominant fish species is trout. From Bourton to Witney, there is generally a mixture of fish types, whereas downstream of Witney, the fishery type is dominantly coarse fish.

Native Crayfish (Austropotamobius pallipes) are widespread in the Windrush and Evenlode. This species is under threat in the UK from introduced exotic crayfish species and measures are being considered to protect native populations.

• River Evenlode:

From Oddington downstream, this is designated as an EC salmonid fishery (see Figure 7). Generally, the fish species are mixed along this watercourse with a dominant coarse fish population.

• River Thames:

This is designated as an EC cyprinid fishery for the whole of its length from Buscot to Eynsham (see Figure 7). It is an excellent watercourse for coarse fish.

• Great Brook:

Due to this brook being a distributary of the River Thames, it is classed as an EC designated cyprinid fishery. The dominant species are coarse fish.



Shill Brook:

Upstream of Bampton, there are minor trout fishery types; downstream of Bampton, this is predominantly coarse fishery.

Main Stillwater Fisheries:-

The main stillwater fishery areas are located at Stanton Harcourt Gravel Pit and Bourton-on-the-Water Gravel Pit. Both of these areas are coarse and game fisheries.

RIVER	DETAILS OF WORK COMPLETED
R. Windrush at Upton	Enhancement of old mill stream and gravel spawning area.
R. Windrush at Church Mill, Standlake	Creation of spawning weir.
R. Windrush at Worsham	Channel narrowing and creation of spawning weir.
R. Windrush at Sherbourne	Instream works.
R. Windrush at Crawley	River narrowing and shelf creation.
R. Evenlode at Greintley Hill	Creation of Off River Supplementation Units (ORSU).
R. Evenlode at Cassington	Creation of marginal shelves and stream narrowing.
R. Glyme	Channel narrowing and substrate replacement.

Table 7: Fishery Habitat Enhancement Schemes (completed since 1989)

2.14 CONSERVATION

Sites of Special Scientific Interest (SSSIs):

SSSIs are designated in order to protect sites which are of special regional or national interest due to their ecological, physiographical or geological characteristics. Within the Thames (Buscot to Eynsham), Windrush and Evenlode catchment area there are 35 SSSI's as shown in Figure 8.

Environmentally Sensitive Areas (ESAs):

ESAs are designated by the Ministry of Agriculture, Fisheries and Food (MAFF). Designated areas are usually extensive landscapes of a distinct topographical and/or land-use type which hold much current ecological interest but where that interest is being eroded or threatened by changes in land management practices and habitat destruction. Landowners within ESAs are eligible for support payments in order to conserve or restore the desired

habitats and land-use practices in order to maintain and improve the conservation value of the target areas.

The Upper Thames ESA was officially launched in April 1994, and includes the whole of the River Thames along with the majority of the Rivers Windrush and Evenlode within the catchment area. The Upper Thames ESA has been designated in order to conserve and enhance river corridor habitats with the emphasis upon lowland wet grassland and certain species of wading birds, eg, redshank, snipe, curlew and lapwing. These species have declined in number throughout lowland Britain and the aim is to conserve the remaining residual population in the ESA and to encourage the reestablishment of suitable habitats in order to boost the populations.

The NRA is an active and vital partner in the ESA project, and our cooperation and advice will be crucial where the aims are to raise water levels in order to benefit nature conservation (one of the options which landowners can consider in return for funding). The ESA Project Officer has already received c.120 applications in the first year of the project, over 30 of which include an element of raising water levels. The number of applications for the River Windrush have been quite encouraging. However, few applications have been received for the River Evenlode, where there is, at present, very little remaining wet grassland habitat suitable for breeding waders. A recent survey of the Upper Thames ESA by the RSPB confirmed, however, that there are still a few sites along the Windrush which support a few pairs of the target species.

The ESA project has a number of potential benefits for the NRA, including a general de-intensification of river corridor agricultural activities.

Habitat Enhancement Schemes:

- Combe : Three artificial log-pile otter holts have been placed in various locations in conjunction with the Fisheries ORSU scheme.
- Sherbourne Water Meadow Restoration Scheme on National Trust land. This is the largest water meadow scheme in the country and demonstrates an effective collaboration between the NRA, Countryside Commission and the National Trust.
- Pinkhill Meadow alongside the River Thames. A major wetland creation scheme has been undertaken in conjunction with Thames Water. This site has already become a significant ornithological site in Oxfordshire.
- Backwater restoration alongside the River Thames upstream of Pinkhill lock.
- Bat box scheme at several lock sites, the most successful being at Shifford.



Upper Thames Otter Habitat Project:

This project was launched in 1992 to encourage the return of the otter, which became extinct in Oxfordshire in the early 1970s. The project was devised and is funded by the NRA in collaboration with British Telecom, and is coordinated by BBONT in conjunction with the Gloucestershire Wildlife Trust. All the rivers within the Upper Thames have been surveyed and the Project Officer, Tim Sykes, is in the process of agreeing habitat enhancement proposals with landowners which the NRA can then take on in future enhancement programmes.

A healthy otter population is the sign of a healthy river ecosystem as this mammal comes at the top of the foodchain. The presence of otters is perhaps the best indicator we have that rivers are receiving wise and careful stewardship.

2.15 LANDSCAPE

Landscape Assessment:

A strategic Landscape Assessment was undertaken as a fore-runner to the Thames Environment Design Handbook in order to give planning and design guidance.

Areas of Outstanding Natural Beauty (AONB):

In 1966, 1555 km² of the Cotswolds was designated as an Area of Outstanding Natural Beauty, with a further 483 sq km added in 1990. Therefore, this AONB is now the largest in the country. Roughly 50% of this catchment area is contained within the Cotswold AONB which is mainly located in the northern part of the catchment (see Figure 8). AONBs require careful protection and management to prevent damage to their special features and to ensure their survival for future generations.

2.16 LAND USE PLANNING

The Local Authorities involved in this catchment area are in the process of producing and revising their statutory land use Development Plans. The current Development Plans for this area are as follows:

Structure Plans (County Councils):

- Oxfordshire (Alterations 5 and explanatory memo) December 1992.
- Oxfordshire Minerals Plan Deposit version 1993 (Public Inquiry took place Summer 1994).
- Gloucestershire (Alteration 1) approved January 1992.
- A Replacement Structure Plan for Gloucestershire is currently being prepared.
- Gloucestershire Minerals Local Plan (Upper Thames)- adopted 1989.

Local Plans (District Councils):-

- West Oxfordshire Deposit Version (October 1993) Public Inquiry to be held 17th January, 1995.
- Vale of White Horse Public Consultation Draft (November 1993).
- Cotswold Deposit Version (August 1993) Public Inquiry to be held 17th January, 1995.

Planning Applications:

The Planning Liaison department receive approximately 25-30 planning applications for this area each month from the Cotswold and West Oxfordshire District Councils. These planning authorities are two of the most active authorities consulting the NRA in the West Area over planning applications.

2.17 NAVIGATION AND RECREATION

Navigation:

The NRA has full responsibility in this catchment area for navigating the Thames as within this catchment area no other public navigation exists. On the Rivers Evenlode and Windrush, navigation has to be negotiated with the riparian owners. A form of visitors' licence (in accordance with the legal requirements of all boats needing to be licenced) was introduced in 1989 to be issued at the key locks which were mainly only Kings and Osney (outside this catchment area). The introduction of the locks Eynsham and Godstow to this visitors licence in 1992 has resulted in a progressive increase in the amount of traffic using the Upper Thames above Eynsham. There are currently 245 main channel moorings and 130 backstream moorings from Buscot to Eynsham. The number of larger vessels using this stretch of water is considerably reduced by the height restrictions imposed on craft further downstream at Osney Bridge.

Recreation:

The main recreational watercourse within this catchment area is the River Thames (see Figure 9). It is used for angling, walking (including the Thames Path), cruising, canoeing, rowing, picnicking and generally relaxing along its banks. This section of the Thames contains a number of established boat clubs most notably the "Anchor Inn" site at Eaton Hastings, the Swan Hotel at Radcot and the canoe centre at Tadpole Bridge. The "Oxford Cruises" boatyard is based below Pinkhill Meadow where a hire fleet is moored.

Another valuable water based recreation resource is the Lower Windrush south of Witney (the Stanton Harcourt gravel area). This area has long been associated with the production of gravel and restoration to form lakes. Within this area over 260 hectares of water have been produced so far accommodating a variety of recreational uses. These recreational uses are largely club activities and include windsurfing, fishing, power boating, waterskiing and sailing. Water based activities including sailing, angling etc. are also undertaken at Farmoor Reservoir.



"Honeypot" Sites:

The main "honeypot" sites include Bourton-on-the-Water and Moreton-in-Marsh to the north and Witney and the lock sites along the River Thames to the south especially Radcot and Eynsham where the local inns provide a focal point for visitors. As part of the Thames Path initiative, a new footbridge has been constructed by Oxfordshire C.C. (completely funded by the Countryside Commission) at Shifford Lock. A further two footbridges have been rebuilt at Tenfoot (within the Shifford Reach) and Old Mans (within the Rushey Reach).

3. CATCHMENT ISSUES

3.1 This section discusses the main issues relating to the water environment within the study area. It includes current problems and issues known by the NRA and those which are anticipated to become issues or problems in the future.

3.2 WATER QUALITY

Moreton-in-Marsh:

• The fire training college is based in this part of the catchment. The foam used to extinguish fires contains zinc and waste water which drains overland and into the River Evenlode thus polluting the watercourse causing it to fail its EC Directive. The long-term solution is currently being addressed by the foam manufacturers and it is hoped that this problem can soon be resolved.

Farmoor Reservoir

• The poor quality of water at the Filchampstead Brook. The Water Quality department are currently reviewing the discharge consent from Farmoor WTW.

3.3 **BIOLOGY**

- The poor quality of the water in the following watercourses: Kencot Brook, Faringdon Brook, Highmoor Brook, Emmas Dyke, Fourshire Stream, Filchampstead Brook and Colwell Brook.
- Turbidity of the waters in flyfishing areas of the Windrush above Worsham.
- Recovery of the headwaters of the River Eye following a recent silt pollution.
- The very high diversity of inveterate fauna requires consideration as an area of special protection.
- The protection of native crayfish in this catchment area.

3.4 GROUNDWATER QUALITY

Farm Waste:

• Due to the rural nature of the catchment area, one of the key issues is the effective treatment of farm waste, which if unregulated can pollute the water table.

- The effective management of NSAs and NVZs in this catchment area as described in section 2.10.
- Organic solvents have been identified in groundwater beneath an industrial area in Witney. Work is currently being carried out to attempt to identify the source of the contamination.
- There are currently numerous discharges of sewage effluent, particularly from single dwellings, into underground strata within the catchment area. Any consents for discharges into the ground which support spring flow require careful consideration in order to ensure that the springs or watercourses are not subject to pollution.
- A former landfill site at Slade Farm Cottages, Gloucestershire is showing evidence of tip leachate contaminating the springflow.

3.5 WATER RESOURCES

Low Flows south of Witney:

Below Witney, the Windrush divides into a number of channels. At Witney, flow initially splits into two arms, with the eastern arm carrying most of the flow. These two arms subdivide and interconnect resulting in 3 or 4 channels running parallel to each other for 5 to 6 kms below Witney. This results in the flow being subdivided and so sections of the river suffer from low flows.

Demand Management:

• "Future Water Resources in the Thames Region: a Strategy for Sustainable Management" outlines the NRAs view of water resources in the region for the next 30 years. The area covered by this catchment review is part of a wider Upper Thames supply area in which a number of resources are used conjunctively to aid flexible management of water resources particularly during dry periods. The report shows that demand for water is unlikely to exceed available resources in this area until beyond 2016 (medium scenario, see section 2.11).

Severn Thames Transfer:

• One of the options identified in the strategy, should additional strategic water resources be required within Thames Region, is a water transfer from the River Severn to the River Thames. The potential impact of transferring water from the River Severn by pipeline to the River Thames near Buscot is a major issue requiring further evaluation. A thorough investigation needs to be undertaken to ensure that the effects of introducing

water from the River Severn will not have serious ecological effects on the upper reaches of the River Thames or bring with it persistent toxic substances or undesirable biological impacts.

3.6 FLOOD DEFENCE

High Flows at Bampton:

- High flows are recorded each winter along the Shill Brook at Bampton although an improvement scheme was undertaken 20 years ago. Previously, each winter the NRA would place sandbags in the area so as to prevent damage to the neighbouring properties. However, due to reductions in the budget and available man-power, this process no longer takes place. The residents and West Oxfordshire District Council are aware of this issue and it is now the responsibility of W.O.D.C. to provide these sandbags in the future.
- Flooding at Standlake due to post gravel extraction.

3.7 FISHERIES

River Windrush:

- Low Flows between Worsham and Witney during the summer months whereby up to 45% of the flow can be abstracted at Worsham in very dry years. At other times, the percentage is much less.
- Split of flows between the western and eastern channels of the Windrush at Witney whereby a greater flow tends to go along the eastern channel leaving the western channel with a low flow (see section 3.5). Level fluctuations occur in the western arm especially in the summer.
- Concern regarding intermittent pollution from Witney Sewage Works.
- General habitat degradation along the river banks.
- Loss of native crayfish.
- Poor recruitment of brown trout upstream of Witney due to previous dredging removing most of the gravel substrate.

River Evenlode:

- Lack of juvenile fish recruitment.
- Lack of ORSUs.
- Habitat degradation.

River Glyme:

• Unconsented lakes constructed without planning permission are present at Wootton, thus reducing flows in a section of the river.

River Thames:

- Habitat degradation.
- Long term concern regarding the Severn-Thames transfer effect on the fish population in the Thames.
- Loss of ORSU's.
- Loss of gravel spawning areas.
- Management of flows during winter by the use of weirs.

3.8 CONSERVATION

River Glyme:

• Upstream of Wootton, there are a number of unconsented online lakes (see section 3.7). This may be affecting flows in the river particularly in the summer. As the river channel is natural, there is a high potential for high quality habitats given natural flow regimes.

Lack of Floodplain Wet Grassland:

• Within this catchment area, there is a general lack of floodplain wet grassland. The intention is to reinstate these grasslands in conjunction with the ESA project.

River Evenlode:

• A general poor diversity of channel and bankside habitats.

Gravel Extraction:

• Protection of existing sites of conservation value and the opportunity for habitat creation in the Lower Windrush Valley and the Eynsham-Cassington area.

3.9 LANDSCAPE

Landscape Surveys:

• The majority of the catchment area has not been surveyed so there is a need for base-line surveys in order to guide capital works and programmes of activities. The issue of sensitivity regarding the use of funding for capital works on lock and weir sites should be readdressed in conjunction with the Regional Policy as set in the Thames Environment Design Handbook.

3.10 LAND USE PLANNING

North east Witney:

• It is proposed by West Oxfordshire District Council that a major area for comprehensive development be designated in North-East Witney between Woodstock Road and Oxford Hill. This development will comprise of 33.5 hectares of housing (approximately 850 dwellings), 1.2 hectares of commercial use,

a primary school, provision for a linear park through the development including provision for balancing ponds (7.0 hectares) and an outer distributor road.

Carterton:

Within the North east Carterton Development Area, 1200 new dwellings are proposed to be built with 72% estimated to be constructed by the year 2001. One of the main issues of this development is the proposal that all surface water will drain into an ordinary watercourse in the catchment of the Shill Brook. A high degree of surface water attenuation will be required on account of restricted culverts which pass underneath the Brize Norton air base adjacent to the site.

Cogges Link Road, Witney:

• A new link road has been proposed between Cogges and Witney town centre, crossing the floodplain and the River Windrush which splits into two channels at this location. The bridge design over the river has been agreed in principle, however, amendments to the road alignment are now being considered, and the designs will need to be reevaluated to allow for any significant variations.

Mineral Extractions:

Land is proposed to be released for sharp sand and gravel workings in the following areas:-

- The Stanton Harcourt Area (Lower Windrush Valley) (a) to the south east of Ducklington; and (b) to the north of Hardwick;
- The Eynsham Cassington Yarnton Area (a) between Eynsham and Cassington, from the A40 in the north to near the River Thames in the south, and (b) a small area at the eastern end of the existing permission south of Worton Rectory Farm. The main area of workings is between Eynsham and Cassington south of the A40 within the floodplain of the River Thames/Evenlode.

3.11 NAVIGATION AND RECREATION

Ribbon Moorings:

• Along the River Thames, there are a number of "ribbon development" crafts moored at various locations creating a disorganised appearance. The intention is to prevent these haphazard moorings by encouraging off channel moorings especially the building of purpose-built marinas located within the gravel pits south of Witney.

The Thames Path:

The Thames Path in this area is 95% complete, although there is still local controversy concerning a bridge which is proposed to be constructed across the River Thames at Bloomers Hole. This bridge will be constructed from carbon fibre compound and the local objections are mainly concerned with the aesthetic nature of the bridge.

KEY CATCHMENT ISSUES:

The key issues are portrayed in Figure 10 and these are as follows:-

- A) foam used by Moreton-in-Marsh Fire Training College;
- B) the poor quality water at the Filchampstead Brook;
- C) distribution of flows south of Witney;
- D) a possible Severn Thames Transfer at Buscot;
- E) high flows at Bampton;
- F) flooding at Standlake;
- G) low flows between Worsham and Witney;
- H) intermittent pollution from Witney Sewage Works;
- I) unconsented lakes at Wootton;
- J) development at North east Witney;
- K) mineral extraction in the Stanton Harcourt area (Lower Windrush valley);
- L) mineral extraction in the Eynsham-Cassington-Yarnton area.



4. RECENT AND CURRENT NRA ACTIVITIES WITHIN THE CATCHMENT (1989/95)

4.1 WATER QUALITY

All the activities listed below are routine and so will be continued into the future:

- chemical sampling programme;
- consenting of discharges;
- studies of failures of watercourses to meet objectives;
- setting of the new system of water quality objectives;
- compliance monitoring for all discharges;
- processing and storage of all chemical monitoring data.

4.2 **BIOLOGY**

All the activities listed below are routine and so will be continued into the future:

- routine Invertebrate monitoring;
- rolling programme of bacteriology;
- quarterly monitoring of bacteriology in relation to EC Abstraction Directive;
- macrophyte monitoring in relation to UWWT;
- monitoring of STW consent failures on a reactive basis;
- algal study of the River Thames for SWORPS and UWWT;
- long term algal monitoring at Farmoor reservoir.

4.3 POLLUTION PREVENTION

• Each farmer in the Sherbourne Brook sub catchment has been visited during 1993 in order that the farming facilities could be checked to help prevent pollution.

4.4 GROUNDWATER QUALITY

- Continuing work on the NSA pilot scheme at Old Chalford.
- Awaiting MAFFs decision on the proposed NVZs.

4.5 WATER RESOURCES

Routine activities:

• Routine measurement of rainfall, river flows and groundwater levels.

A Possible Severn-Thames Transfer:

• A study was undertaken during 1993 to investigate the engineering feasibility and broad environmental impacts of this

option. Routes to the Upper Thames tributaries have been rejected as a result of this work. Additional studies, concentrating upon the potential environmental impacts, are now under consideration and are discussed in section 5.

4.6 FLOOD DEFENCE / LAND DRAINAGE

Flooding at Standlake:

• A study has been commissioned by the NRA to determine the long-term solutions to prevent flooding at Standlake. On a short-term basis, work has been carried out on the River Windrush at Standlake which includes weed-cutting and selective dredging.

General River Maintenance:

• The Flood Defence Section carry out a rolling programme of general river maintenance which includes selective dredging, raising of flood banks and obstruction removal. The projected estimate for this routine work in the catchment area is approximately £200,000 per annum.

Memorandum of Understanding (MoU):

Further to the Department of the Environment's Circular 30/92, the Memorandum of Understanding (MoU) has been developed between the NRA and Local Planning Authorities in the area. A programme of studies to determine the 100 year floodplain has been commissioned under Section 105 of the Water Resources Act 1992 with the intention of hydraulically modelling the floodplain. A programme is being produced which will prioritise the catchments and subcatchments based on a number of issues which includes development pressures.

4.7 **FISHERIES**

- Fish surveys on the River Evenlode have been completed.
- Between July 1993 and May 1994, 22 sites were electrofished on the River Windrush between Kineton and Standlake, 4 sites on the River Dikler and 1 site on each of the following: the Slade Barn Stream, River Eye, Emmas Dyke and Medley Brook.
- Habitat enhancement projects were undertaken on both the Rivers Windrush and Evenlode.
- Collaboration with the Upper Thames Otter Habitat Project which is an on-going project.
- Shill Brook and Great Brook fish surveys along with an enhancement scheme on the Great Brook.
- NRA student project investigation of brown trout spawning on the River Windrush was started in July 1994.

4.8 CONSERVATION

Pinkhill Meadows:

- A wetland area has been created here to benefit a variety of wildlife, particularly birds. This project has created one of the best wetland habitats in the area.
- Upper Thames Otter Habitat Project launched in 1992.
- Habitat Enhancement Schemes at Combe, Cassington, Crawley Upton, Worsham and Sherbourne, and at various sites along the River Thames.
- Detailed input to all Flood Defence routine maintenance activities to ensure compliance with NRAs statutory conservation duties.

4.9 LANDSCAPE

• Tree planting at Rushey, Shifford and Pinkhill Meadows.

4.10 LAND USE PLANNING

- Regular consultation on planning applications and Land Drainage Consents in the catchment area.
- An Area Specific Study has been commissioned by the NRA 1994/95, which targets the Mineral Extraction Sites in the Lower Windrush Valley.

4.11 NAVIGATION AND RECREATION

- Effectively introduce the new Navigation and General Byelaws which take effect on the 1st November, 1994. These bye-laws include the new maximum speed limit of 8km/hour.
- The production of the River Thames Recreation Strategy for the Non Tidal Thames. This report is currently in its draft consultation stage.

4.12 MULTI-FUNCTIONAL ACTIVITIES

• Seacourt Stream Investigation:

This study has been commissioned by the NRA to determine the cause of the variations in flow experienced in the Seacourt Stream. Flow monitors on the abstraction point from the River Thames at Farmoor were installed in August 1994 and are linked to the ARGUS system. Level recorders were installed on the Seacourt Stream at Hagley Pool and Wytham Bridge, and on the Thames at Kings Lock Head in September 1994. River levels and flows are already monitored on the Thames at Farmoor (after the abstractions) and the River Evenlode at Cassington.

5. PLANNED NRA ACTIVITIES WITHIN THE CATCHMENT (1995/96 AND BEYOND)

5.1 **POLLUTION PREVENTION**

In the rural parts of this catchment, the pollution risk from agricultural sources is always present. The Pollution Prevention team plan to visit every farmer in the Upper Windrush and Upper Evenlode sub catchments in order that farm facilities can be checked and improvements made.

5.2 GROUNDWATER QUALITY

- Groundwater Vulnerability Maps at 1:100,000 scale are intended to be published in 1995 for this catchment area (the vulnerability map for the UK is available at 1:1,000,000 scale).
- Further investigatory work needs to be carried out in order to identify the source of contamination of these organic solvents in the Witney area.
- Further assessment of leachate contaminating the spring flow at Slade Farm Cottages, Gloucestershire needs to be undertaken.

5.3 WATER RESOURCES

• Enhancement of the Hydrometric Network:

The work for this enhancement of the hydrometric network especially new flow gauging stations is scheduled for 1994/5 and 1995/6.

• A Possible Severn Thames Transfer:

Water Resources are coordinating a programme of investigations regarding this proposed interbasin (pipeline) transfer of water, with studies taking place in conjunction with Fisheries, Biology, Conservation and Water Quality. A decision will be made within the next five years as to whether to support this option and/or the South West Oxfordshire Reservoir Proposal.

5.4 FLOOD DEFENCE

- It is intended to use a greater amount of telemetred information especially river flows in order to aid the flood warning and monitoring station at Wallingford. To enable this, WAMACS system should be installed by December 1994 at Wallingford to allow direct access to VAX and ARGUS data.
- Continue to finance and implement Habitat Enhancement Schemes by the Fisheries and Conservation departments.
- Broadwell Brook at Little Clanfield minor flood alleviation works are proposed from 1994/5.
- Hydraulics study of the Lower Windrush.
- Routine maintenance to an annual value of c.£100k will continue.

5.5 FISHERIES

- Fish surveys of the River Glyme and the River Thames and its associated tributaries by the end of 1995.
- Promote habitat enhancement projects as appropriate on the above rivers after the survey results have been analysed.

5.6 CONSERVATION

- One of the priorities for the NRA is to help the Upper Thames ESA meet its full potential. This will be achieved not just solely by the Conservation department but also by crossfunctional collaboration with other departments within the NRA.
- Continue to encourage the recolonisation of otters to the Upper Thames through the Otter Habitat Project.
- The reinstatement of degraded channel habitats particularly along the River Evenlode and other habitat restoration projects (see section 5.4).
- Doctors Island Habitat Improvement Scheme.
- Strategic River Corridor Surveys of the Rivers Windrush and Evenlode.

5.7 LANDSCAPE

- Landscape assessments will be completed in either 1995/96 or 1996/97.
- The Landscape Master Plan for Rushey will be completed in March 1995 in order to guide future capital works.
- It is intended to produce Landscape Master Plans for all lock and weir sites in this catchment to facilitate the coordination of capital and revenue work at these sites, with environmental improvement projects.

5.8 LAND USE PLANNING

In order to encourage local planning authorities to promote and support initiatives which seek to conserve, restore or enhance the natural elements of river valleys and the water environment, it is important that each of the stages of the development plans is commented upon by the NRA. In addition, it is hoped that Catchment Management Plans can be complimentary to the Statutory Plans of Local Authorities so that the NRA can make further contributions to the land use planning process. The development plans which are currently at their consultation stage are the West Oxfordshire Local Plan and the Cotswold Local Plan.

5.9 NAVIGATION AND RECREATION

- Continue to work with the Pollution Prevention team to encourage boat yards and marinas to upgrade sewage and fuel installation in order to prevent ingress of pollutants into the river.
- The harmonised boat specification is to be introduced on January 1st 1995. The main purpose of this specification is to ensure that all existing crafts are upgraded to a modern safety standard and that local boat builders adopt this national safety standard as proposed in the specification. It is the Navigation department's responsibility to inspect all inland crafts within the catchment area for safety, fuel, gas and electricity specifications once every four years (hire fleets are to be inspected every year).
- Rebuilding the weir at Northmoor using modern materials but keeping the design to the original paddle and rymer style.
- The NRA in conjunction with the Countryside Commission are working on the implementation of the Thames Path which will be officially opened in 1996. This includes the possible construction of a footbridge at Bloomers Hole near to Buscot Lock to which the NRA is proposing a possible contribution to the cost.
- Recreation, Navigation and Conservation are currently involved in developing a site plan for Rushey lock.
- At Pinkhill Meadows, opportunities exist to develop the educational and recreational potential of the site without affecting the wildlife habitat of the reserve.

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6. CONCLUSIONS

6.1 There are clearly a wide range of catchment issues that exist within this study area. Some of these issues only affect certain departments within the NRA whereas other issues are universal. As our mission statement reinforces, it is the NRA's duty to "protect and improve the water environment". In order to address these current catchment issues, it is important that all departments of the NRA work together as a team in order to eliminate these problems. This is by the use of firstly, making sure that the planned and routine activities are carried out, and secondly, highlighting any further actions that are required in order to "protect and improve the water environment".

NOTES

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