

# HAMPSHIRE AVON CATCHMENT MANAGEMENT PLAN FINAL REPORT



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NRA

*National Rivers Authority  
South Western Region*

## Foreword

The Hampshire Avon is one of England's most famous rivers, and has been immortalised on canvas or in ink by some of our most illustrious painters and writers.

It is vitally important to all those who live in, work in, or visit this area that its unique character is managed for the benefit of all who use it.

To this end, the Authority, through its Hampshire Avon Catchment Management Plan programme, has invited all those involved in the catchment to contribute towards the production of this Action Plan which, I hope, reflects the wishes of all those concerned.

This will guide our work within the catchment for the forthcoming years.



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ENVIRONMENT AGENCY



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Within the text of this Plan, the Overview briefly outlines the state of the catchment and summarises uses and activities. Where issues are identified, the reader is referred to the appropriate section in the Action Plan, which outlines the NRA's proposals for tackling the issues.

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## 1. Vision for the Catchment

The Hampshire Avon catchment is home to 200,000 people who depend on the water environment in many ways, and value it for the quiet pleasure and enjoyment that it brings their local communities. The upper part of the catchment falls within an Area of Outstanding Natural Beauty, and the river makes an important contribution to the rural economy through tourism as well as through agriculture and recreation.

The catchment provides an important link between three areas; the chalk downland of Wiltshire, the Dorset heathlands and the New Forest. This is reflected in a wide range of semi-natural habitats including good examples of lowland heath, unimproved grasslands and ancient broadleaved woodlands. The river and associated ditch system is one of the most important in Britain for the diversity of plants and animals which it supports.

The chalk aquifer underlying the upper catchment is a major source of water for domestic, agricultural and industrial purposes as well as the source of all major tributaries in the catchment. The rivers also provide the principal method of assimilating treated industrial and domestic effluent, and are therefore subject to considerable pressures.

Our objectives in the management of the catchment will be to:

- *ensure that using the cleansing capacity of the rivers to assimilate treated effluents does not impair the considerable ecological and fishery potential of the Hampshire Avon*
- *develop and implement a water resource strategy which should not only ensure adequate supplies of water for domestic, industrial and agricultural purposes but also maintain sufficient flows in rivers for fisheries, recreation, conservation and effluent dilution purposes*

Establishing strong NRA involvement and links with local communities and their representatives is seen as essential so that local views are respected in future development decisions. It is important that local planning authorities include policies in their local plans which protect and enhance the needs of the water environment. The NRA has a commitment to:

- *work with all relevant parties to implement the principles of sustainable development*

The government has indicated strong support for the conservation interests of the Avon Valley by the implementation of a wide range of conservation designations, including a significant number of SSSI's, the recently confirmed ESA designation, and the

proposed classification as a Special Protection Area for birds (SPA) and a Ramsar Convention site. The complete fulfilment of many of these designations requires suitable management of water levels, but this must also take into account the NRA's Flood Defence role. We will achieve this by:

- *protecting people and property from flooding*
- *developing a water level management strategy to provide a basis for agreed flood plain land use management, recognising the need to conserve and enhance the wetland wildlife interest of the valley*

## 2. Introduction

### The National Rivers Authority

The National Rivers Authority was established by the 1989 Water Act (consolidated by the Water Resources Act 1991) as a Non-Departmental Public Body. It has statutory responsibilities for:

- improving water quality and controlling pollution
- managing water resources and controlling water abstraction
- protecting and improving fisheries and recreation facilities
- providing flood defences and flood warning systems
- conserving and enhancing the nature, landscape, archaeology, geology and amenity interest in inland and coastal waters

The rivers, lakes, estuaries and coastal waters of England and Wales have never before been subject to such large and rapidly increasing demands from the users of water. Many different users interact or compete for water and will inevitably come into conflict with one another. The National Rivers Authority is the major manager of the water environment in England and Wales and has the responsibility to reconcile conflicts between water users.

The NRA Customer Charter contains the following Mission Statement:

*We will protect and improve the water environment by the effective management of water resources and by 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 and coastal waters. We will be businesslike, efficient and caring towards our employees.*

## Catchment Management Planning

The NRA sees Catchment Management Plans (CMPs) as the most effective and efficient way of managing the water environment to meet its statutory responsibilities. CMPs are strategic in nature, bearing in mind the large areas of land, often straddling local authority boundaries, which are covered by individual catchments.

The Hampshire Avon CMP describes our vision for the catchment, identifies problems and issues, and proposes actions that may be taken to resolve them. The plan also forms a management framework to promote consistent and appropriate responses to development proposals and to influence the drafting of local plans.

The strategic nature of the CMP as a long-term planning tool, committing manpower and financial resources to resolving environmental problems, means that the plan is not designed to reflect fully on routine activity within the catchment. Our everyday work commits substantial resources to managing the water environment, and includes:

- monitoring of water quality and discharges
- pollution investigation and prevention activities
- biological monitoring of water quality
- granting and review of discharge consents
- monitoring of water quantity
- granting and monitoring of abstraction licences
- provision of flood warning
- provision of emergency flood defence work
- flood defence work to ensure the safe and effective operation of river control structures
- fisheries survey work
- fisheries surveillance and enforcement work including anti-poaching patrols
- river corridor surveys

The CMP will form a focus for much of our future activity within the catchment but some of our work will remain reactive as we respond to specific events e.g. floods and pollution incidents.

## 3. Review of the Consultation Process

The Authority published the Hampshire Avon CMP Consultation Report in October 1992 seeking comment from all those interested in the water environment. Public meetings were held at Salisbury on 7th December 1992 and at Christchurch on 8th December 1992. As a result of the consultation process we are now able to publish the Hampshire Avon CMP Action Plan for the five year period commencing June 1994.

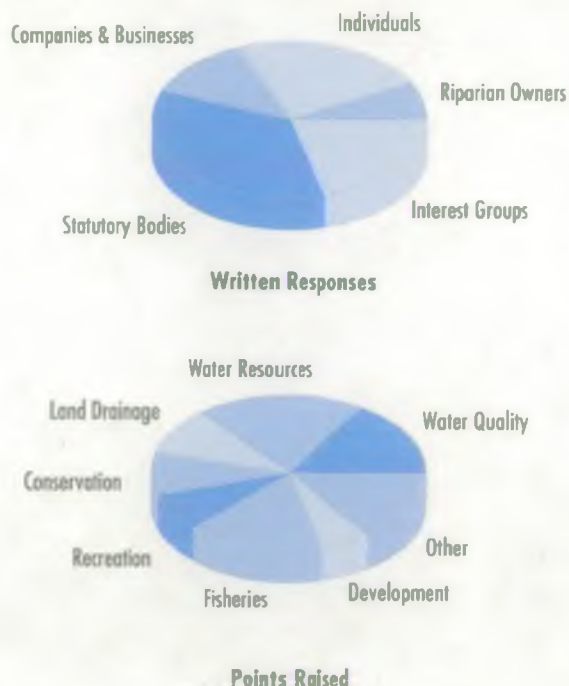
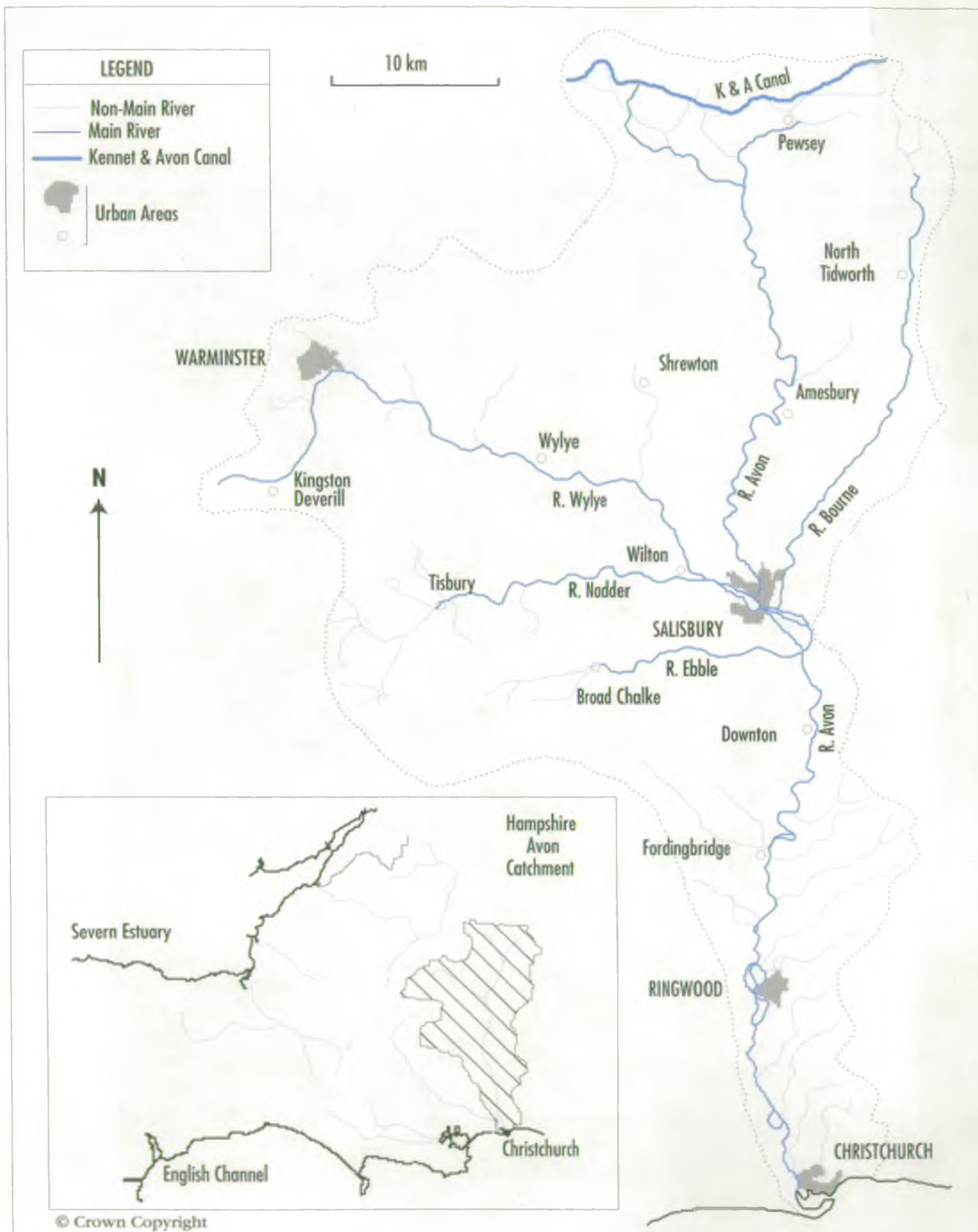


Fig 1: Summary of Consultation Responses

The responses to the consultation process are summarised in Fig. 1, and a detailed breakdown is given in Appendix 1. All were considered in depth, and they provided an excellent source of opinion on the problems of the river, and in some cases an aid to their solution. New issues have been incorporated into the structure of the plan where appropriate, and responses to issues which had already been identified helped with the prioritisation of our resulting actions.





Map 1: Hampshire Avon Catchment

## 4. Overview of the Catchment

### Description of Catchment

The River Avon rises in the Vale of Pewsey and, with its tributaries the Bourne and Wylye, drains the chalk of Salisbury Plain. The River Nadder, which is joined by the Wylye near Salisbury, drains the escarpment of the South Wiltshire Downs and the Kimmeridge clays of the Wardour Vale. The River Ebble and the Ashford Water also drain the South Wiltshire Downs and join the Avon downstream of Salisbury and Fordingbridge respectively.

Below Fordingbridge, a number of streams drain the tertiary deposits of the New Forest. The Avon itself drains into Christchurch Harbour, where it is joined by the Rivers Stour and Mude before discharging into the English Channel.

The river has a geographical catchment area of some 1,701 km<sup>2</sup>. The total fall of the river from Pewsey to the sea is 110m and the average gradient downstream of Salisbury is approximately 1:1,000.

The catchment covers parts of the counties of Wiltshire, Hampshire and Dorset, and encompasses areas represented by Kennet, West Wiltshire, Salisbury, East Dorset and New Forest District councils, and Christchurch and Test Valley Borough councils.

The catchment is predominantly rural and has a population of approximately 200,000. The largest towns are Christchurch (39,800), Salisbury (36,840), Warminster (16,267), Ringwood (13,150), Amesbury (6,656), Fordingbridge (5,942) and Pewsey (2,831). Some 60% of the population lives in these towns. In addition, there are several major military establishments on Salisbury Plain.

Industry is mainly light in nature and situated in the towns. Tourism is economically important in the catchment, particularly at Salisbury, Fordingbridge and Christchurch, and the water environment is an important feature.

## 4.1

## Water Quality

### Water Quality Classification

References to water quality in the Hampshire Avon CMP Consultation Report were based on the National Water Council (NWC) Classification System. This has been superseded by The Surface Waters (River Ecosystem) (Classification) Regulations 1994. These regulations prescribe a system for classifying the quality of rivers and canals to provide a basis for setting statutory Water Quality Objectives (WQOs) for individual stretches of water.

The River Ecosystem (RE) classification comprises five hierarchical classes, defined in Appendix 2, which broadly represent a neutral translation from the NWC classification system. Water Quality for the Hampshire Avon using RE classes is summarised in Table 1 and illustrated in Map 2.

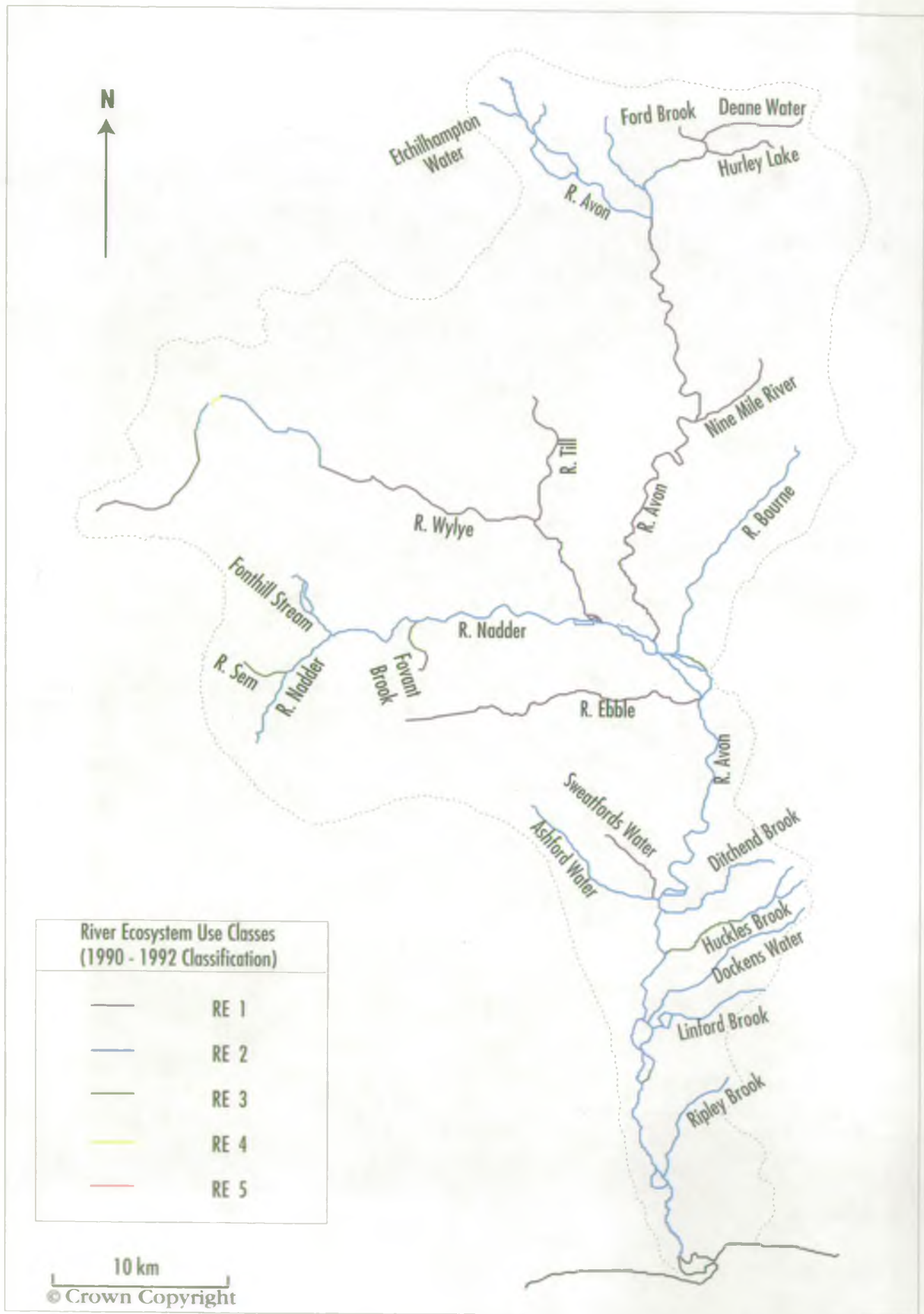
Map 3 contains draft proposals for target RE classes in the Hampshire Avon catchment. The target classes reflect the need to maintain water quality or improve it where necessary, and reflect what the NRA believes are achievable water quality targets, balancing desirability with costs.

The setting of water quality objectives based upon the target classes will be a formal process involving public consultation. The objectives, which will become statutory WQOs, will be set by the Secretary of State for the Environment following the consultation. The timetable for setting statutory WQOs on individual catchments has yet to be determined.

**Table 1: River Ecosystem Classification of Hampshire Avon Catchment Reaches (1992)**

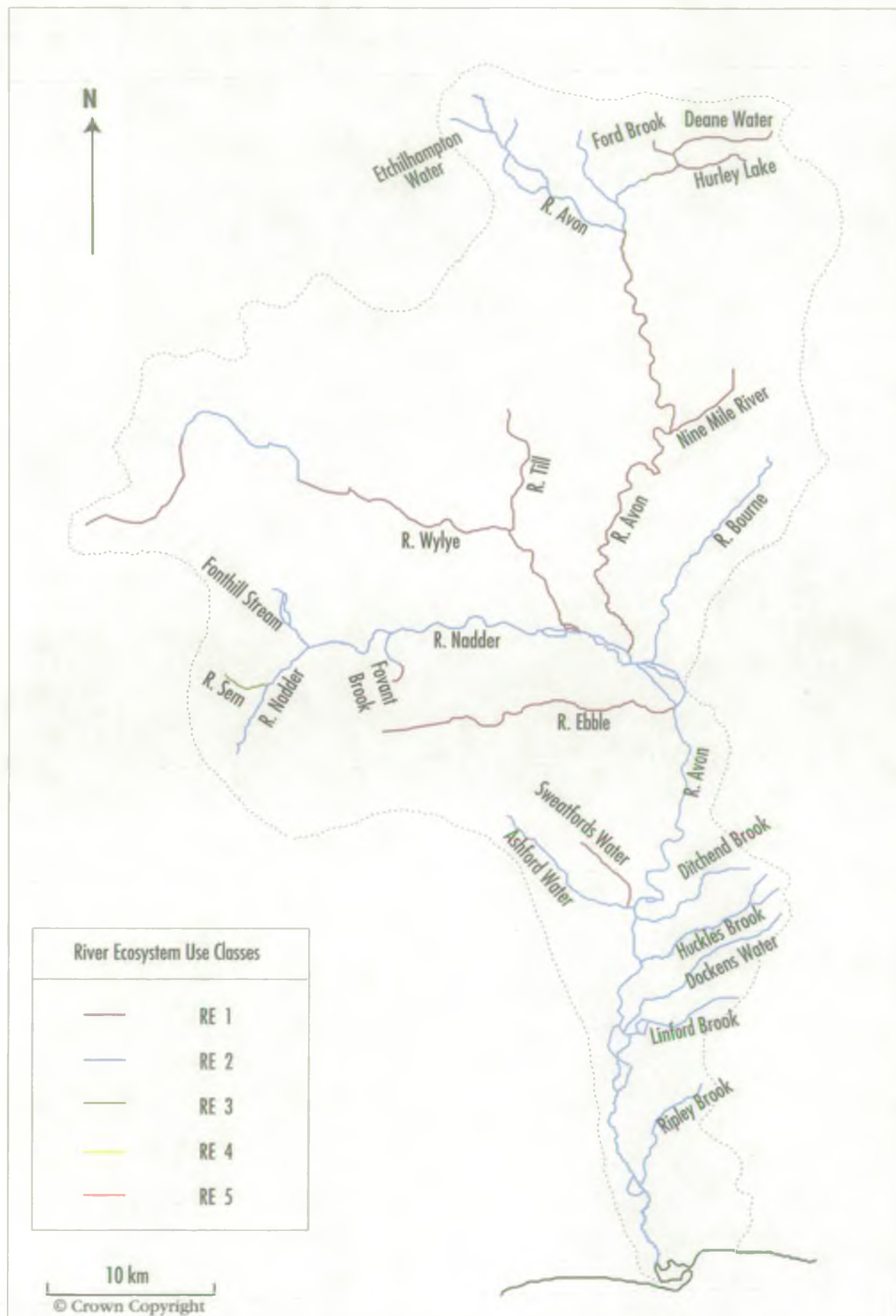
RE Class	Length of Watercourse (km)	Description
RE 1	145.5	Water of very good quality suitable for all fish species
RE 2	208.5	Water of good quality suitable for all fish species
RE 3	12.9	Water of fair quality suitable for high class coarse fish populations
RE 4	1.9	Water of fair quality suitable for coarse fish populations
RE 5	0.0	Water of poor quality which is likely to limit coarse fish populations
Total	368.8	





Map 2: Hampshire Avon Catchment. 1992 River Ecosystem Classes





Map 3: Hampshire Avon Catchment. Proposed Target River Ecosystem Classes

## Effluent Disposal

Treated sewage effluents from 32 sewage treatment works (STWs) with dry weather flows (DWFs) greater than 20m<sup>3</sup>/d are discharged to watercourses in the catchment. The two largest STWs are Salisbury (23,500m<sup>3</sup>/d) and Christchurch (19,000m<sup>3</sup>/d) which contribute 67% of the total DWF of treated sewage effluent discharged. These effluents are predominantly domestic in origin and contain only a small trade effluent component.

Intermittent overflows, which occur on most sewerage systems in the catchment, are subject to discharge consents which aim to limit the frequency of the discharge to occasions when intense rainfall occurs (see Actions 1.1c, 1.2e, 1.4d).

Common causes of intermittent pollution where unconsented pollutants escape into the river system are from urban areas (particularly industrial estates) and from farms (the Western Avon and the upper reaches of the Nadder are most frequently affected) (see Action 1.5).

The discharge from Downton Tannery (160m<sup>3</sup>/d) is the only significant industrial process effluent discharged directly to the river.

## Aquaculture

Watercress, crayfish and fish production are undertaken on a commercial basis, and an important feature of these uses is that they are virtually non-consumptive, that is most abstracted water is discharged to the catchment close to the point of abstraction. There are 15 fish farms, 9 cress farms and at least 1 crayfish farm which discharge to watercourses in the catchment.

Cress is predominantly produced on the headwaters of spring-fed chalk streams, where plants are raised from seedlings on gravel beds. Much of the water used in production is abstracted from boreholes. Activities such as bed cleaning, disinfection and pest control can give rise to local pollution problems (see Action 1.8).

Fish farms typically divert a licensed proportion of the river flow through the farm, returning it to the river downstream; in the upper tributaries, some also use springs and boreholes. Effluents from fish farms are controlled by discharge consents; the concentration of contaminants in these effluents is low, but because of the volumes of water used in fish production it represents a significant organic load on the river.

The effect of fish farms on the lower Avon is a cause of public concern, and the NRA commits considerable resources to monitoring fish farms to ensure compliance with discharge consents and abstraction licences, and to ensure that fish do not become trapped within fish farm systems (see Action 12).

The native crayfish populations of the catchment have been severely affected by a fungus disease which is suspected to have originated from farmed American Signal Crayfish.

## Diffuse Sources of Pollution

Diffuse pollution is by its definition not attributable to any one location, and is therefore principally influenced by land use and land management.

At times of highest concentrations (during winter high flows), the major source of nitrate is leachate from agricultural land. Land runoff from the irrigation of farm wastes is of concern in some upper tributary catchments (see Action 1.5). The use of buffer zones may have further benefits in reducing the impact from diffuse sources of pollution (see Action 16).

Levels of nitrate in the river waters of the catchment have not exceeded the EC Drinking Water Maximum Acceptable Concentration (MAC) of 11.3mg/l (measured as N) at potable abstraction points. No groundwater sources in the catchment have exceeded the MAC.

Levels of total pesticides in the lower Avon and Nadder catchments comply with the EC Surface Water Abstraction Directive but on occasions exceed the EC Drinking Water standards. EC Drinking Water standards have also been exceeded on occasions in some groundwater sources in the upper Avon catchment. The pesticide found in highest concentrations is atrazine.

Historically, public authorities (British Rail, MoD and local Authorities) have used atrazine for general weed control. From August 1993, the use of atrazine for non-agricultural purposes has been banned, but it is still approved for use on maize which is grown extensively in the upper catchment. The continuing presence of pesticides in surface and groundwaters is of concern and is the subject of an investigation by the NRA (see Action 2).

Groundwater is particularly at risk from diffuse sources of pollution which accumulate over many years. Once polluted, they may be virtually impossible to clean up, even when the source of the pollution is removed. For this reason, the protection of groundwater quality and yield is of paramount importance to the NRA (see Action 4a).

## Eutrophication

The combination of nutrient inputs from point source discharges and diffuse inputs means that the Hampshire Avon catchment may be undergoing eutrophication. The process of eutrophication can result in the increased production of algae and a deterioration of water quality. The combination of these effects is undesirable and can interfere with other water uses (see Action 3).



## 4.2 Water Resources

### Hydrology and Rainfall

The river flow in the Hampshire Avon is characterised by a high groundwater component derived from springs rising in the headwaters of the Avon and its major tributaries.

There are nine gauging stations within the catchment which continuously monitor river levels and flows. Flows in the Rivers Till, Nadder, Bourne and Ebble are monitored by monthly current meter gaugings.

At Amesbury the mean annual flow is 3.4cumecs (1965–92) and the Q95 low flow (that flow which is equalled or exceeded for 95% of the time) is 1.1cumecs (1965–91). Lower down the catchment at Knapp Mill, the mean annual flow is 19.2cumecs (1975–92) and the Q95 low flow is 6.04cumecs (1975–91).

In order to obtain a more comprehensive understanding of flows throughout the catchment, work is currently nearing completion on a new gauging station at Stockton Park on the Wylfe, downstream of the Chitterne Brook confluence, which will enable the NRA to intensify scrutiny of any changes in flow due to groundwater abstraction (see Action 5.4a). A feasibility study is nearing completion regarding a new gauging station on the Ebble as a control station to monitor flows in this largely unexploited chalk stream (see Action 5.4b, c).

Long term average rainfall (1961–90) is recorded as 815mm at Wilton, 954mm at Warminster, 831mm at Bisterne and 753mm at Alton Barnes.

Figure 2 shows sample hydrometric data for the catchment.

### Water Resources Usage

Surface and groundwater is abstracted for a wide range of uses including public water supply, agricultural spray irrigation, aquaculture, gravel washing and industrial uses; much of it is returned at some point in the catchment.

There are three water companies which operate public supply licences, Wessex Water Services Ltd., Bournemouth & West Hants Water Co and Cholderton & District Water Co.

**Table 2: Hampshire Avon Catchment.  
Total Licensed Abstraction Quantities**

Use	Number of Licences	Daily Licensed Quantities (MI)	Yearly Licensed Quantities (MI)
Public Supply	32	450.2	116,459.2
Private Supply	16	0.5	182.2
Spray Irrigation	76	39.2	1,649.9
General Agriculture	338	9.7	2,745.1
Industrial	23	11.4	3,048.4
Fish Farms	23	896.2	294,373.6
Watercress	9	54.7	15,441.9

There are 541 licensed abstractions in the Hampshire Avon Catchment. Total licensed abstraction quantities are 1,459.2 MI/d and 439,027MI/y. Table 2 summarises the main licensed users of water (it should be noted that abstractions by fish farms are essentially non-consumptive). All licensed abstractions are currently being audited in line with national NRA policy to ensure compliance with the licence conditions, and also to make abstractors aware of the NRA's commitment to licence enforcement (see Action 5.3d, e).

### Groundwater Abstraction

The major groundwater abstractions are from the chalk and greensand aquifers in the upper catchment including specifically the upper Avon, Nadder, Wylfe, and Bourne, and to a lesser extent the Ebble

Recent concerns over the impact of abstraction on flows in the upper catchment tributaries are the subject of a current NRA investigation (see Action 5.1).

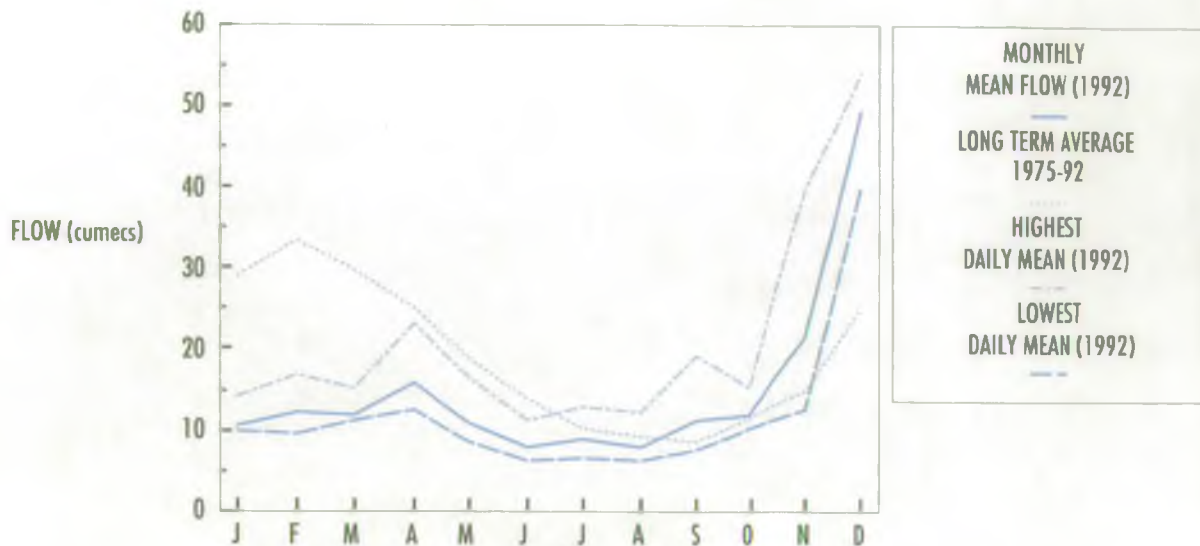
### Surface Water Abstraction

Consumptive uses of water which result in the effective loss of water from the catchment include the three EC Designated Public Water Supply Surface Water Abstractions at Blashford Lakes, Matchams and Knapp Mill. These represent nearly 18% of the surface water abstracted from the Avon. Some of the water is returned to the river lower down in the form of treated sewage effluents. Spray irrigation, which represents 1.8% of the annual surface water licensed quantity, represents a virtual loss to the catchment as most of this water evaporates.

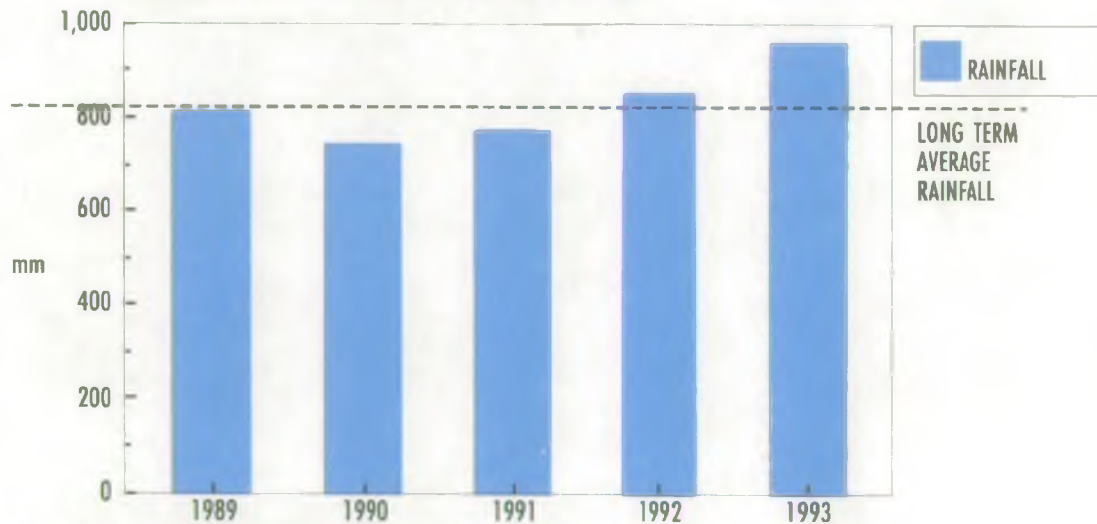
Non-consumptive uses are those which return the abstracted water to the watercourse very close to the point of abstraction. Fish farms account for approximately 80% of the total surface water abstracted in the catchment, and although they are not generally of major water resources significance, their local impact on other uses may be substantial (see Action 12).

Surface water abstraction in the lower Avon, its possible impact on migratory salmonids, and future resource development are currently under investigation by the NRA (see Action 5).

### SAMPLE YEARLY HYDROGRAPH FOR KNAPP MILL



### RAINFALL RECORD FROM WILTON STATION



### GROUNDWATER LEVEL RECORD FROM CHITTERNE OC2 BOREHOLE DATUM 109.541m

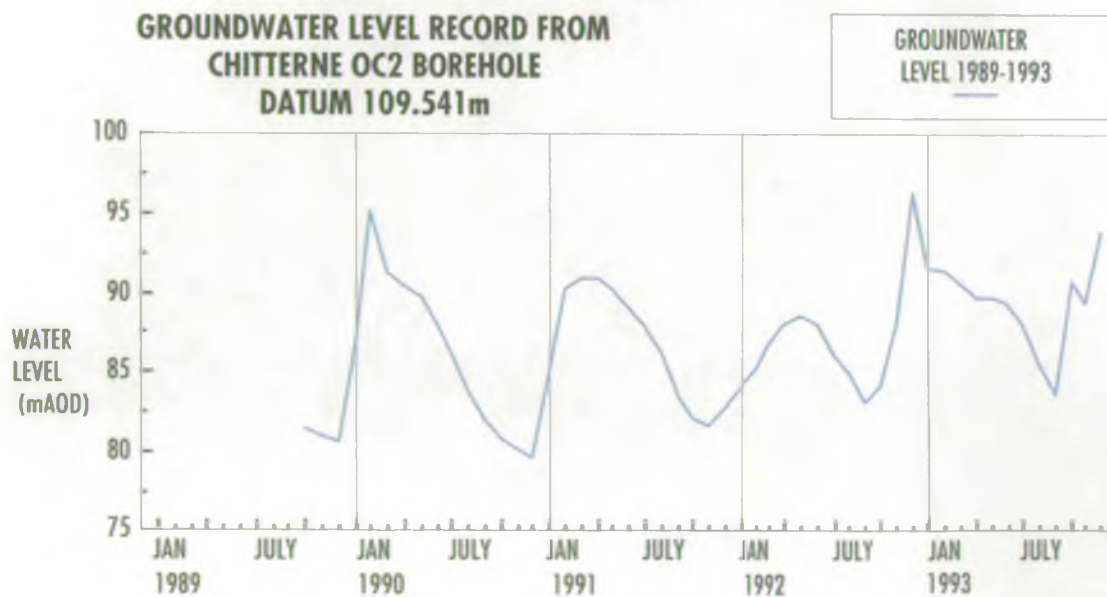


Fig 2: Hampshire Avon Catchment. Sample Hydrometric Data



## **Demand Management**

Through consultation, the NRA will promote demand management and water conservation within the Hampshire Avon Catchment by the public, water companies and other abstractors, using the national and regional water resource strategies as frameworks.

These strategies will also aid the assessment of environmental gains that could be incorporated within new schemes, optimising the use of available resources, and maximising the cost effectiveness of resource development (see Action 5.1, 5.3).

The results of a national Research & Development (R&D) project will be reviewed concerning the value of designating Minimum Acceptable Flows (MAFs) for the Hampshire Avon to enable more effective management of river resources (see Action 5.2).

### **4.3**

### **Fisheries**

#### **Fisheries Monitored by NRA**

The total length of EC Designated Salmonid Fishery in the Hampshire Avon Catchment is 230.4km. There are no EC Designated Cyprinid Fisheries.

#### **Recreational Migratory Salmonid Fishery**

The Hampshire Avon is of major importance as a salmon fishery, and there is a significant sea trout fishery in the lower river around Christchurch and in Christchurch Harbour. The main emphasis of the fishery is concentrated in the river below Salisbury, though salmon do ascend all the major tributaries for considerable distances.

There has been a decline in the runs of large, spring-running salmon which can be traced back for about 40 years, and may be associated with patterns of exploitation by anglers, changes in sea temperature and possibly other environmental changes. In the past few years there has also been a dramatic decline in returns for all classes of salmon, which is thought to have been caused by two years of particularly high mortality at sea in combination with an extended period of reduced river flows between 1988–91.

The NRA is taking action to improve the migratory Salmonid fishery in a number of ways. Alterations to by-laws have been implemented to reduce the proportion of fish caught with particular emphasis on spring-running fish (see Action 7a, b, c, d). These will be reviewed after three years.

Work is also being carried out to improve spawning conditions in the river, and there is an ongoing program to facilitate migration through known problem areas (see Actions 6, 7e, f, g).

## **Recreational Brown Trout Fishery**

The Avon above Salisbury, along with much of the Nadder and Wylye and the lower reaches of the Bourne, Ebble and other tributaries, are brown trout fisheries of national repute. The physical and chemical properties of the watercourse, being derived primarily from chalk groundwater, provide an ideal habitat both for the fish themselves and for the preferred methods of angling. Grayling are also present in significant numbers.

The natural spawning in these fisheries is supplemented by stocking, but reduced spawning success may be attributable to siltation of the spawning sites (see Action 8c, d, e), or in some cases the loss of tributaries in recent drought years. Large scale introductions of hatchery bred trout may also have played a role in the perceived reduction in breeding success (see Action 8b).

Loss of weed, siltation and loss of water clarity, along with a perceived decline in hatches of aquatic insects, are major factors in the reported decline in fishing quality (see Action 8a).

#### **Recreational Coarse Fishery**

While there are some stocks of coarse fish above Salisbury, the main coarse fishery is in the lower part of the river. The Avon is nationally famous, and holds considerable numbers of fish of specimen size for a range of species, most notably chub, barbel, roach and pike.

There have been repeated claims for at least 20 years that this fishery was suffering a decline in numbers if not quality of coarse fish. This may be due to the loss of nursery areas in water meadows, loss of spawning and nursery habitat because of weedcutting practice in carrier streams, entrapment at fish farms or predation of fry by escaped rainbow trout.

The NRA has invested considerable resources in the construction of specialised survey craft and electro-fishing equipment in order to monitor the coarse fish stocks more accurately (see Action 9).

#### **Recreational Sea Fishery**

Christchurch Harbour has a considerable reputation as one of the best sport fisheries for both thick- and thin-lipped mullet, which spend the summer in the harbour and lower reaches of the river and over-winter at sea. There is also some bass angling within and just outside the Harbour, and the Harbour is a bass nursery area of considerable local importance, though it is not protected by MAFF designation.

## **Commercial Fishery for Migratory Salmonids and Eels**

Licensed netting for salmon and migratory trout takes place at the seaward end of Christchurch Harbour using draft or seine nets. By-laws have recently been introduced in an attempt to give added protection to spring-running salmon (see Action 7c).

There is some commercial fishing for eels, both in the harbour using fyke nets, and at 9 fixed eel traps at various locations on the river. This fishery is regulated by an NRA licensing system.

## **Commercial Sea Fishery**

There is some ring netting for mullet in the lower Harbour, and commercial bass fishing at the entrance. Within the confines of Christchurch Harbour, the NRA has the powers of a local Sea Fisheries Committee.

## **Swans and Cormorants**

Elevated populations of swans or cormorants may have impacts on the fisheries or the fish stocks in the rivers. Since these are both protected species of birds, the NRA is investigating strategies to reduce the occurrence of conflict situations (see Action 19).

## **4.4 Flood Defence and Land Drainage**

### **Flood Defences**

The Avon valley floodplain is an important feature of the river system and in major flood events allows the temporary storage of water thereby reducing flood peaks downstream.

There is 366.3km of designated statutory main river in the catchment, where the NRA has permissive powers to carry out flood defence and agricultural drainage schemes, together with maintenance and general control of the river channel; on non-main river these responsibilities lie with the riparian owner and the planning authority. The responsibility for surface water sewerage rests with District Councils, and that for surface water disposal rests with the NRA and the planning authority.

A number of flood alleviation schemes have been undertaken within the catchment to protect people and property from flooding; further schemes are planned (see Action 11b, d).

### **Tidal Flooding**

Properties in Christchurch are subject to flooding as a result of extreme tidal surges, or the combination of high tides and flood flows in the Rivers Stour and Avon; this is being addressed by flood defence schemes (see Action 11a, c).

The issue of global warming and predicted rise in sea level is increasingly becoming a consideration in sea and tidal defence strategy (see Action 17).

## **Changes in Catchment Land Use**

The agricultural land in the river valleys of the Hampshire Avon catchment was historically managed as wet grassland, with considerable areas operated as water meadow systems. This system is of significant conservation and historic interest.

In the recent past, there has been considerable draining of the valley land to foster more intensive agriculture, with the incorporation of extensive land drains, abandonment of water meadow systems, and the implementation of drainage practices which lower the water table and reduce winter and summer flooding. This has supported the agricultural trend towards arable crops, autumn cultivation, and improved pasture with repeated silage cuts.

The loss of wet grassland has had a detrimental impact upon the numbers of wintering wildfowl and waders in the valley, and associated populations of invertebrates and plants. There is also some evidence that the increased rate of drainage into the rivers has increased their silt content and turbidity, and the amount of nutrient leaching into the watercourse and associated problems with eutrophication.

## **Weirs and Hatches**

There are 55 control structures on the main river, 8 of which are operated by the NRA. The remainder are privately operated to divide river flows down multiple channels or to aid abstraction.

The NRA has produced a Weirs and Hatches Policy to aid riparian owners in the operation of their control structures, and will coordinate and promote good practice to help riparian owners in their efforts to effectively operate control structures to maintain flows and river levels (see Action 13).

## **The Britford Programme**

The successful collaboration between the NRA and riparian owners to effectively operate control structures to maintain flows and river levels is illustrated by the work at Britford.

The NRA, with the cooperation of riparian owners, supervised the operation of hatches to apportion flows in the Navigation, Carrier and River Avon channels and were able to successfully balance flows to satisfy the many demands for water within the system.

This approach has realised improvements in water quality, helped to protect fish, and maintained the conservation value of the Britford system, particularly during the low flow summer months (see Action 13).



## Operational Maintenance

The NRA has carried out many flood defence improvement works over the years, and these need to be maintained to ensure that they function as designed to protect people and property from flooding. The flood defence and land drainage standards are also maintained by other general maintenance work such as weed cutting and blockage removal. All such work has to show a clear benefit and a return on investment, and must take into account important environmental issues. The NRA consults widely on this work with all conservation bodies (see Action 10).

## 4.5 Development Control

### Development

The NRA has wide-ranging responsibilities for the protection and enhancement of the water environment. While the NRA is well placed to discharge many of its statutory responsibilities, it recognises that it has limited control over the mechanisms which determine land use change and allocation on a catchment-wide basis. This is largely the responsibility of local planning authorities through the implementation of the Town & Country Planning Acts and specifically through the production of statutory Development Plans.

The three relevant county structure plans all contain policy statements related to NRA interests. The seven District and Borough Councils which are wholly or partly in the Hampshire Avon Catchment are currently producing District Wide Local Plans which must be in place by 1996.

The policies in these plans set out the framework for land use change and, since the enactment of the Planning and Compensation Act 1991, provide the key reference in determining development applications. The NRA is a consultee to the production of such policy, and will work closely with local planning authorities to ensure that policies to protect and enhance the water environment are included in statutory development plans (see Action 14) and to ensure that the allocation of land in the plans does likewise.

### New Roads and Bypasses

A number of new roads and improvements to existing main roads are proposed in the Avon Valley, including the Salisbury bypass. On new road schemes, the NRA will specify their requirements to the promoters at an early stage to enable them to be incorporated into the design of the road and implemented during the construction stage.

The NRA is concerned about new road schemes from the water quantity and quality points of view, and will also seek to ensure that conservation aspects of the natural history, archaeology and landscape of river corridors are protected in all new road schemes.

## Development and Flood Risk

There is great pressure for increasing development within the catchment and particularly the flood plain. The NRA is consulted by developers and local planning authorities to ensure that proposed developments (including road schemes) do not present a flood risk to themselves or others, or involve a loss in flood plain thereby creating a flood risk elsewhere (see Action 14).

Permitted development within a flood plain which results in the construction of a structure or other obstruction on or close to the river requires formal consent from the NRA. Following agreement with the Association of County Councils, the NRA will provide up-to-date information on the extent of the flood plain for use in planning decisions and development land allocation (see Action 14d).

### Contaminated Land

Contaminated land has not been identified as a problem in the catchment. If any sites are identified they must be assessed and the remedial action required will be decided on a site by site basis.

## 4.6 Conservation and Recreation

### Conservation

The Hampshire Avon Catchment has a major conservation interest, with a wide variety of water-related habitats supporting a number of nationally rare insect and plant species. It is an internationally important area for overwintering waders and wildfowl, and qualifies as an SPA and as a Ramsar Site.

The exceptional conservation value of the catchment is recognised by the existence of over 60 Sites of Special Scientific Interest, several Local Nature Reserves and one National Nature Reserve in the catchment. The flood plain of the lower river itself is designated an SSSI, as are Christchurch Harbour and the Blashford Lakes complex, and there is a proposal for the upper river to be similarly designated.

The Avon flood plain below Netheravon has been designated an Environmentally Sensitive Area, which offers financial incentives for farmers to adopt or maintain traditional land use practices, and most important of these is the restoration of the high summer water table, and increasing the frequency of shallow winter and early summer flooding of the riverside meadows (see Action 10).

The flood plains of the Nadder, Wylye and the upper Avon have been included in a MAFF pilot scheme, the Water Fringe Option, which is designed to create, protect or enhance riverside habitats by managing land in an environmentally beneficial way, and may produce a variety of improvements within the river channel (see Action 16).

The distinctive character of the Avon valley has been, and still is, an inspiration to artists, and there is considerable archaeological interest in the remnants of the historical landscape, including ridge and furrow, sluices, ditches, hatches and channels.

### **Recreation and Navigation**

Water-based recreation other than angling is very limited on the Avon, with no general navigational use of the catchment apart from Christchurch Harbour, due primarily to the opposition of riparian owners, conservation and fishing interests.

At Salisbury, rowing boats can be hired (Easter–September) over a 1.5km stretch; this is also used by the Salisbury Canoe club as is a 0.5km stretch of the Nadder, though this is only for members and there is no public right of navigation

Christchurch Harbour is used for various water sports, primarily sailing and motor cruising; Ringwood Canoe

Club also practice here. Water skiing is excluded by the speed limit.

There are a number of lakes within the catchment which provide water sports facilities, including New Forest Water Park (water and jet skiing), Spinnaker Lake at Blashford (sailing and wind surfing clubs), Ivy Lake at Blashford (water skiing), Warminster Pleasure Gardens (rowing boats can be hired), and Shearwater Lake at Warminster (sailing for members of Shearwater Sailing Club).

The Avon valley is highly regarded in terms of amenity value both in rural and urban localities although, in general, public access to the river is very limited. For example the existing 'Avon Valley Walk' only has relatively short stretches close or adjacent to the river.

There is and will be increasing demand for water based recreation and public access to the Avon catchment, which will have to be addressed in an appropriate manner by taking account of all interests (see Action 15).



## 5.

## Action Plans

The Action Plan is the means by which the Vision for the Hampshire Avon Catchment is turned into reality. It outlines detailed proposals for resolving the issues identified from the Consultation Report and the public consultation which preceded this Catchment Management Plan, and sets out the NRA's objectives clearly and specifically in a way which will allow it to monitor their implementation.

### **Future Review and Monitoring**

The NRA will be jointly responsible, with other identified organisations and individuals, for implementing this Action Plan. Progress will be monitored and normally reported annually. These reviews will examine the need to update the CMP in the light of changes in the catchment. The period between major revisions will normally be five years.

## Caveat

Improvements to Wessex Water Services installations are subject to available funding approved by OFWAT. Strategic Business Plans for the next 10 to 15 years

investment (AMP2) have been submitted and OFWAT will declare the associated customer charging base in July 1994. It should be emphasized therefore that any improvements identified under AMP2 can only be provisional until a financial commitment is established.

No	Issue	Actions	Lead	Others	Cost £K	94	95	96	97	98	Future
1.1a	Local impacts on water quality from STW discharge at Warminster	Issue a more stringent consent to limit the effluent load in the face of increasing contributions from the 'Center Parcs' development	NRA			*					
1.1b		The STW is being extended to meet the new consent standards	WWS			*					
1.1c		Carry out a Drainage Area Study to identify sewerage problems	WWS	NRA		*	*				
1.2a	Local impacts on water quality from STW discharge at Salisbury	Seek approval from DoE & OFWAT for the inclusion of this STW within the AMP2 priority list as a 'High Profile' works (see AMP2 caveat)	NRA	DoE OFWAT		*	?				
1.2b		If approval is gained, negotiate and implement the best option to reduce the impact of the effluent on the river	WWS	NRA	£4,500		?	?	?	?	?
1.2c		Review the impact of the Britford flow apportionment scheme on dilution flows (see Action 13)									
1.2d		Collect data according to NRA national Urban Waste Water Treatment Directive guidelines (see Action 3a)									
1.2e		Perform option appraisal for sewerage problems highlighted in the completed Drainage Area Plan and effect improvements	WWS			*	?				
1.3a	Local impacts on water quality from STW discharge at Ringwood	Investigate the impact of the Ringwood STW discharge on the Bickerley Mill Stream	NRA			*	?				
1.4a	Local impacts on water quality from STW discharge at Pewsey	Renovations to filter beds and humus tanks at Pewsey STW are being carried out	WWS			*	?				
1.4b		Seek approval from DoE & OFWAT for the inclusion of the STW within the AMP 2 priority list as a 'High Profile' works (see AMP2 caveat)	NRA	DoE OFWAT		*	?				
1.4c		If approval is gained, negotiate and implement the best option to reduce the impact of the effluent on the river	WWS	NRA			?	?	?	?	?



No	Issue	Actions	Lead	Others	Cost £K	94	95	96	97	98	Future
1.4d		Perform option appraisal for any sewerage problems emerging from the completed Drainage Area Plan	WWS			•	?				
1.5a	Local impacts on water quality from inadequate farm waste storage facilities and irrigation of farm waste to land especially in the Western and Eastern Avon, Sem and Nadder catchments	Visit all farms in the target catchments to assess pollution risk from farm waste storage facilities		NRA	£15		•	•			
1.5b		Farmers to improve farm waste storage facilities where necessary to comply with control of pollution (Silage, Slurry & Agricultural Fuel Oil Regulations 1991)	Farmers	NRA		•	•	•	•	•	
1.5c		Farmers to produce effluent management plans where necessary	Farmers	NRA		•	•	•	•	•	
1.5d		Promote the use of buffer zones where appropriate (see Action 16)									
1.6a	Local impacts on water quality from discharges from MoD bases	Formalise discharge arrangements by setting consent conditions	NRA			•	?				
1.6b		Monitor the impacts of MoD discharges (costs being recoverable from the discharger through the Charging for Discharge system) and review the compliance with conditions	NRA			→					
1.6c		Promote awareness through full liaison with base representatives. The negation of consent enforcement by Crown immunity means that exerting influence in this way is the best available alternative	NRA	MoD		→					
1.6d		Advise those responsible for the maintenance of MoD sites on good surface water management practice (drainage from vehicle wash areas and the control of herbicide applications are particularly important issues)	NRA	MoD		→					
1.7a	Local impacts on water quality from Blashford Lakes Intake	Formalise a satisfactory operating regime for backwashing within the framework of a consent	NRA	WWS		•	?				

No	Issue	Actions	Lead	Others	Cost £K	94	95	96	97	98	Future
1.8a	Local impacts on water quality from discharges from watercress farms	Protect water quality in the receiving water course by issuing discharge consents which allow the control of discharge quality	NRA			*	*	*			
1.8b		Monitor and review discharge consents	NRA			→					
1.8c		Joint R&D project to produce watercress strains with improved resistance to the crook root fungus and water cress yellow spot virus in order to reduce the need to treat with zinc	NRA Cress Growers Assoc		£24	*	*	*			
1.8d		Monitor the effect of off-label use of pesticides on the receiving water	NRA			*	*	*	*	*	
1.9a	Water quality problems in Christchurch Harbour	Seek approval from DoE and OFWAT for the inclusion of installation of UV disinfection with all-year operation at Christchurch STW to reduce the bacteriological impact on the Harbour and nearby bathing waters (see AMP2 caveat)	WWS		£2,000		?	?	?	?	?
1.9b		Rectify the problem of premature use of storm tanks and overflow at Christchurch STW by effecting work to increase the flow to full treatment	WWS			*					
1.9c		Perform option appraisal for sewerage problems highlighted in the completed Drainage Area Plan and effect improvements	WWS			*	?				
1.9d		Collect data according to NRA national Urban Waste Water Treatment Directive guidelines (see Action 3a)									
2a	The occurrence of atrazine in both groundwater and surface waters is of concern	Farm campaign to raise awareness of the issue and promote best practice for the safe use of pesticides	NRA		£11	*	?	?	?	?	?
2b		Continued monitoring to establish extent and trend of atrazine occurrence	NRA		£35	*	*	*	*		
2c		National R&D Project to develop best practice guidelines to ensure that waste pesticides are efficiently disposed of	NRA		£40	*	*				



No	Issue	Actions	Lead	Others	Cost £K	94	95	96	97	98	Future
2d		National R&D Project to develop more environmentally friendly methods of rotational arable farming to reduce pesticide usage	NRA MAFF		£105	*	*	*	*		
2e		The NRA National Centre of Expertise on Toxic and Persistent Substances to raise atrazine nationally with MAFF and HSE	NRA	MAFF HSE		*					
3a	Eutrophication	Collect data according to NRA National guidelines to investigate the potential nomination of 'Sensitive Waters' to be designated under the Urban Waste Water Treatment Directive	NRA		£15	*	*	*			
4a	Groundwater contamination	Implement NRA Policy and Practice for the protection of groundwater	NRA			→					
5.1a	Water resource investigations on the Hampshire Avon	Results of current investigations on the Hampshire Avon (Upper and Lower) to be assessed and strategy defined	NRA		£25	*					
5.1b		Regional water resource strategy to be produced for the area. <i>Options listed in the consultation document will be reviewed in the course of these investigations</i>	NRA			*					
5.2a	Define environmental flow need	Develop flow recommendations using fish suitability curves with IFIM PHABSIM studies to provide a firm scientific basis for identifying detrimental impacts and determining in-river flow requirements for the upper Avon and tributaries	NRA			*					
5.2b		Continue investigations regarding the definition of environmental flow needs for the lower Avon	NRA			→					
5.3a	Managing abstraction in the catchment	Develop groundwater management strategy in areas where resources are already fully or significantly allocated	NRA				→				
5.3b		Resolve concern over sustainability of existing environmental needs and other legal uses	NRA				→				
5.3c		Plan resource management arrangements for droughts	NRA								

No	Issue	Actions	Lead	Others	Cost £K	94	95	96	97	98	Future
5.3d		Continue water abstraction licence enforcement in Avon catchment as per national policy	NRA			→					
5.3e		Project identifying means by which water abstraction licence of entitlement holders can monitor their abstraction has been completed and will be implemented by the end of the calendar year. <i>The cost of and responsibility for installation and maintenance of measuring devices is with the licence holder</i>	NRA	Licence holders		•					
5.4a	Flow monitoring	Completion of Stockton Park gauging station on the Wylye	NRA		£155	•					
5.4b		Feasibility study for a new gauging point on the River Ebble			£6	•					
5.4c		Design and construct Ebble Gauging Station if resources allow	NRA		£200		?				
6a	Assess the extent and impact of siltation and compaction of Salmonid spawning gravels.	Report produced for NRA on salmon spawning gravels in the Wessex region	NRA		£20	•					
6b		Gravel improvement project	NRA		£5	→					
6c		Gravel improvement evaluation (subject to funding)	NRA	Game Cons		→					
6d		Assess potential of buffer zones (see Action 16)									
7a	Decline in catches of large spring salmon	Rod fishing restricted to fly only before May 15th	NRA			→					
7b		Angling season shortened by 1 month (September)	NRA			→					
7c		Netting season restricted to 15 April - 31 July	NRA			→					
7d		Review the effect of the above bylaw changes	NRA					•			
7e		NRA has produced R&D note 202 "Genetic aspects of spring run salmon"	NRA			•					
7f		Ongoing work within national program to increase spring salmon stocks	NRA			→					



No	Issue	Actions	Lead	Others	Cost £K	94	95	96	97	98	Future
7g		Install fish counter at Knapp Mill to improve data on status of spring salmon stocks and allow improved management	NRA		£9.5	*					
8a	Decline of the brown trout fishery in the upper catchment	Survey of upper Avon trout populations & invertebrates	NRA		£6	*					
8b		Investigation of wild trout breeding success	Game Cons		£75	*	*	*	*		
8c		Gravel improvement work in co-operation with fishery keepers	NRA	Owners	£2	→					
8d		Flow recommendations for tributaries using brown trout suitability curves (see Action 5.2a)									
8e		Assess habitat benefits from buffer zones (see Action 16)									
9a	Decline in coarse fisheries	Investigate anomalies in length distribution of River Avon coarse fish identified in 1991 NRA survey	NRA								
9b		Investigate possibility of improved migration conditions at obstructions (subject to funding)	NRA		£10	*	*	*			
9c		Further stock survey	NRA		£25		*				
9d		Improve coarse fish habitat by water level management (see Action 10)									
10a	Water level management, current land use and operational activities are perceived to be compromising the wetland and aquatic wildlife interest of the valley	Develop a sustainable water level management strategy for the river and flood plain to provide a basis for future management, assist with the implementation of ESA schemes and establish demonstration ESA Tier 2 sites	NRA	MAFF EN Owners	£70	*	*	*			
10b		Review existing operational and maintenance plan for Avon Valley SSSI in light of strategy findings	NRA	MAFF EN			*	*			
10c		Continue to use Weedcutting Liaison Group to resolve short-term weedcutting decisions. Review activity of this group in the light of strategy	NRA			→					
10d		Continue with development of 'ONDA' river management model to aid objective development of strategy	NRA			→					

No	Issue	Actions	Lead	Others	Cost £K	94	95	96	97	98	Future
10e		Prepare Water Level Management Plan to MAFF national guidelines	NRA	MAFF EN Owners			•	•			
11a	NRA program of flood defence improvements to protect people and property	Tidal defence scheme on the lower Avon at Christchurch	NRA	MAFF	£1,147	•	•	•	•		
11b		Flood alleviation scheme on the lower Avon at Downton	NRA	MAFF	£200					•	
11c		Tidal defences at Christchurch Harbour	NRA	MAFF	£750			•			
11d		Flood alleviation scheme on the lower Avon at Ringwood	NRA	MAFF	£100						•
11e		Due to recent flooding, a capital flood alleviation scheme is being evaluated for Tisbury	NRA			→					
11f		Annual review of capital program	NRA			→					
11g		Implementation of Flood Defence Standards of Service Management System including flood warning	NRA				•	•	•	•	•
12a	Impact of large trout farms	Seek to work with the fish farms to encourage support for the objectives of the NRA	NRA								
		Assess fisheries issues as part of other studies (see Action 9b)									
12b		Monitor compliance with discharge consent conditions	NRA			→					
12c		Monitor compliance with abstraction licence conditions	NRA			→					
13a	The Britford flow apportioning initiative	Provide structural improvements and security measures at Drawing Hatches, Wire Hatches and Sluice House and construct fixed by-pass weir	NRA		£23	•	•	•			
13b		Repair Drawing Hatches	Owners		?	•	•				
13c		Monitor the effect of agreed hatch settings from June to November 1994 on the operation and use of the Britford system	NRA			•					
13d		Installation of telemetry to allow the remote monitoring and operation of key parts of the system	NRA		£22	•	•	•			



No	Issue	Actions	Lead	Others	Cost £K	94	95	96	97	98	Future
13e		Review the operation of the Britford system	NRA		£0.5	*					
13f		Recognise and support the conservation value of Petersfinger lakes.	NRA			→					
13g		Publicise "Weir, Hatches, and Silt policy" using Britford as a good cooperative venture	NRA		£0.5	*	*				
13h		Agreement reached to enable the two water meadow tenants to share water; determine water meadow flow needs and check for leaks	NRA	Owners EN		*	*				
14a	Future development will impact upon the water environment	Seek the inclusion of policies to protect and enhance the water environment in relevant Structure Plans	NRA	Local Planning Auth		→					
14b		Seek the inclusion of policies to protect and enhance the water environment in relevant District Wide Local Plans	NRA	Local Planning Auth		*	*	*			
14c		Encourage cross-boundary consistency between planning authorities within the catchment	NRA			→					
14d		Survey all main river flood plains to provide planning authorities with maps outlining indicative 1 in 100 year flood risk areas to assist with development land allocation	NRA			→					
15a	Investigation of scope for a balanced development of public access on river Avon	Collaborative project to investigate scope for increased access as an appropriate component of balanced river valley use (subject to funding)	NRA	?	£20						
16a	The potential for buffer zones to improve river corridor habitats and contribute to an improvement in water quality should be assessed	Upper Avon, Nadder and Wylfe catchments have been identified as a pilot scheme for a MAFF Water Fringe Option	MAFF	Land owners NRA EN	?	→					

No	Issue	Actions	Lead	Others	Cost £K	94	95	96	97	98	Future
16b		Collaborative project to maximise the benefits of the Water Fringe Option by targeted promotion of the scheme and demonstration of best practice techniques	NRA		£12.5	•					
16c		National R&D Project to develop land management techniques including the use of buffer zones	NRA		£200	•	•	•	•		
16d		National workshop to provide guidance on buffer zone management	NRA		£2	•					
17a	Potential sea level rise and the impact on rivers as a result of global warming	Allow for a forecast 5mm per year sea level rise in all sea defence schemes	NRA			→					
17b		The NRA will produce detailed flood risk maps (see Action 14d)									
18a	Habitat enhancement in the upper river channel	Collaborative project to promote MAFF Water Fringe schemes (see Action 16)									
19.1	Conflict between swans and anglers	Work with all interest groups to develop and implement strategies to reduce occurrence of conflict situations	NRA	EN MAFF Owners	£2	•	•	•			
19.2a	Cormorant predation of fish	The NRA will support licensed killing when serious damage has been established and killing proven to be the most effective means for preventing significant loss to fish stocks									
19.2b		The NRA will cooperate with the licensing authority to progress further research into this issue, and will continue to work positively with owners and anglers to establish the full facts in each situation	NRA	MAFF Owners		→					



## Appendix 1: Detailed Breakdown of Consultation Responses

116 written responses were received, classified as follows

Riparian owners and representatives	9
Individuals	27
Companies and businesses	15
Statutory bodies	41
Interest groups	24

A total of 692 points were raised in these responses, and they can be categorised as follows (numbers indicate percentages)

Water quality issues	12
Low flows in upper Avon tributaries	9
Management of water levels, ESA, weirs, hatches	8
Increased public access and navigation	8
Presentation and style of report, factual errors	8
Water resources in lower Avon and migratory fish	7
NRA management, strategies and attitudes	5
Decline in catches of large spring salmon	5
Impact of large trout farms	4
Development, roads and bypasses	3
Land use and agricultural practices	3
Eutrophication	2
Britford	2
Decline in the brown trout fishery	2
Siltation and compaction of spawning gravels	2
Impact of swans, cormorants etc	2
Buffer zones	2
Out-of-catchment water transfer	2
Specific weedcutting issues	2
Water use, metering and education	2
Climate	1
Archaeology	1
Pesticides in water	1
Landscape	1
Decline in coarse fisheries	1
Restoration of upper river channel	1
Coastal defences, dredging and flood defences	1
Choice of name for river	1
Groundwater contamination	1
Crayfish, insect life and biology	1

## Appendix 2: The River Ecosystem Classification

Class	Dissolved Oxygen % saturation	BOD (ATU) mg/l	Total Ammonia mg N/l
	10 percentile	90 percentile	90 percentile
RE1	80	2.5	0.25
RE2	70	4.0	0.6
RE3	60	6.0	1.3
RE4	50	8.0	2.5
RE5	20	15.0	9.0



Un-ionised Ammonia mg N/l	pH lower limit	Hardness mg/l CaCO <sub>3</sub>	Dissolved Copper µg/l	Total Zinc µg/l
95 percentile	5 percentile to 95 percentile		95 percentile	95 percentile
0.021	6.0–9.0	≤ 10 >10 and ≤ 50 >50 and ≤ 100 > 100	5 22 40 112	30 200 300 500
0.021	6.0–9.0	≤ 10 > 10 and ≤ 50 >50 and ≤ 100 > 100	5 22 40 112	30 200 300 500
0.021	6.0–9.0	≤ 10 > 10 and ≤ 50 >50 and ≤ 100 > 100	5 22 40 112	300 700 1,000 2,000
—	6.0–9.0	≤ 10 > 10 and ≤ 50 >50 and ≤ 100 > 100	5 22 40 112	300 700 1,000 2,000
—	—	—	—	—

### Appendix 3: Glossary of Terms and Units

<b>ADAS</b>	Agricultural Development Advisory Service
<b>AMP</b>	Asset Management Plan
<b>Cyprinids</b>	All non-salmonid freshwater fish
<b>DoE</b>	Department of the Environment
<b>DWFs</b>	Dry Weather Flows
<b>EC</b>	European Community
<b>EN</b>	English Nature
<b>ESA</b>	Environmentally Sensitive Area
<b>HSE</b>	Health and Safety Executive
<b>IFIM</b>	Instream Flow Incremental Methodology
<b>LTA</b>	Long Term Average
<b>MAC</b>	Maximum Acceptable Concentration
<b>MAFF</b>	Ministry of Agriculture Food and Fisheries
<b>MAFs</b>	Minimum Acceptable Flows
<b>mAOD</b>	metres Above Ordnance Datum
<b>MoD</b>	Ministry of Defence
<b>NRA</b>	National Rivers Authority
<b>NWC</b>	National Water Council
<b>OFWAT</b>	Office of Water Services
<b>OS</b>	Ordnance Survey
<b>PHABSIM</b>	Physical Habitat Simulation
<b>Q95</b>	Flow which is equalled or exceeded for 95% of the time
<b>R&amp;D</b>	Research and Development
<b>Ramsar Site</b>	Identified under the Ramsar Convention on Wetlands of International Importance
<b>RE</b>	River Ecosystem
<b>Salmonids</b>	Salmon, Brown and Sea Trout and Rainbow Trout
<b>SPA</b>	Special Protection Area
<b>SSSI</b>	Site of Special Scientific Interest
<b>STW</b>	Sewage Treatment Works
<b>UV</b>	Ultra Violet
<b>WQO</b>	Water Quality Objectives
<b>WWS</b>	Wessex Water Services Ltd

#### UNITS

m <sup>3</sup> /s	cubic metres per second
m <sup>3</sup> /d	cubic metres per day
l/s	litres per second
Ml/d	megalitres per day
Ml/y	megalitres per year
Mgd	millions of gallons per day
mg/l	milligrams per litre
µg/l	micrograms per litre
ng/l	nanograms per litre

1 cubic metre = 1,000 litres  
 1 cubic metre = 220 gallons  
 1 gallon = 4.54 litres  
 1 megalitre = 1,000,000 litres  
 1 hectare = 2.471 acres



Telephone the emergency hotline to report all environmental incidents, such as pollution, poaching and flooding, or any signs of damage or danger to our rivers, lakes and coastal waters. Your prompt action will help the NRA to protect water, wildlife, people and property.

**NRA emergency hotline**

**0800 80 70 60**

**24 hour free emergency telephone line**



Further copies can be obtained from:

National Rivers Authority  
South Western Region  
South Wessex Area Office  
Rivers House  
Sunrise Business Park  
Higher Shaftesbury Road  
Blandford Forum  
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