RIVER TORRIDGE
CATCHMENT MANAGEMENT PLAN
FINAL REPORT

NRA

National Rivers Authority
South Western Region

Foreword

The River Torridge is one of England's best known and loved waters.

Now - thanks to the effort of the National Rivers Authority, NRA, and numerous others who live by or use the river - years of decline are being reversed.

This follows a period in the late 1970s and early 1980s when such was the concern about poor water quality and low fish catches that many feared for the future of "Tarka's River".

Acting in partnership, official bodies and local people started to address the deterioration with a series of positive initiatives.

Now, following a period of extensive public consultation, the River Torridge Catchment Management Plan Final Report has been published by the NRA to drive the progress forward.

For the first time the NRA has integrated all of the identified actions that need to be taken by the Authority and others to sustain the improvement into the next century.

I commend the programme of action to protect and enhance this special water environment. It stands as a tribute to the hard work of everyone involved in the past and represents a challenge for the future.

G. R Bateman.

Geoff Bateman
Area Manager (Devon)

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Introduction

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. Our Mission Statement expresses the following principles.

- *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, estuaries and coastal waters. We will be businesslike, efficient and caring towards our employees.*

We have chosen to use the **Catchment Management Planning Process** to translate those principles into action. The Catchment Planning Process within the NRA includes the production of two documents - the Consultation Report and the Final Report, together with a period of extensive consultation. The Consultation Report describes our vision for each catchment, identifies problems and acts as a focus for consultation between the NRA and other interested parties in the catchment. The Final Report identifies actions, following consultation, to resolve the problems and issues. The report provides background data for NRA responses to development plans.

Following production of the River Torridge Catchment Management Plan Consultation Report and the consultation period we are now presenting the River Torridge Catchment Management Plan Final Report. It includes an action plan to address the vision and primarily covers the five year period from July 1994 to July 1999. The action plan will form the basis for improvements to the water environment by outlining the areas of work and investment proposed by the NRA and others. However, a number of projects may take longer to achieve, due to funding availability, government policy and local priorities. Achievement of the action plan will be monitored and reported annually.

Vision for the Catchment

The River Torridge Catchment is predominantly rural in character providing a valued water environment and natural resource for the 33,300 people who live in the catchment and many others who work in or visit the area.

The River Torridge rises near the north-west coast of Devon and flows at first south-eastwards through sparsely populated agricultural areas. As it turns northwards it is joined by the Okement, a tributary draining part of Dartmoor, and heads through less isolated terrain towards the estuary and the North Devon coast at Bideford.

The River Torridge Catchment was immortalised by Henry Williamson's "Tarka the Otter" at a time when pressures on the environment were less intense. However, concern has been expressed in recent years about the apparent decline in environmental quality. Changes in land use, the demands of development and tourism and the pressures to sustain a viable rural economy have all had an impact on the water environment and quality of life for those living, working and visiting the catchment.

The NRA continues to work on improvement programmes and this Catchment Management Plan offers the opportunity to extend this work in order to achieve a sustainable use of the River Torridge Catchment.

We will endeavour to balance the legitimate uses of the catchment in the context of our fundamental duty to protect and enhance the natural environment.

Key objectives will be to:

- increase understanding of the effects of rural land use on water quality, fisheries and the river ecosystem enabling the development and promotion of practical solutions to problems identified
- ensure that by utilising the natural capacity of the river to dispose of treated effluents does not result in a loss of the river's ecological and fishery potential
- reverse the decline of salmon, sea trout and trout stocks
- develop and implement a water resources strategy that ensures adequate supplies and sufficient flows for the environment
- develop and implement a flood defence (including land drainage) strategy that meets agreed land uses in an environmentally acceptable way.

The views of local people and their representatives will be respected. We will need the help of the local community. Building upon existing relationships and developing new ones will be essential in pursuing these goals.

Close liaison, regular reporting on our progress and our determination to fulfil our role will maintain the impetus for action.

Review of the Consultation Process

The River Torridge Catchment Management Plan Consultation Report was published on 24 June 1993.

The Consultation Report consisted of an assessment of the current state of the catchment, the uses that are made of it and discussion of the objectives and options for its improvement.

The Consultation Report was distributed to industry, local authorities, environmental groups, sport and recreation groups and the public.

The consultation aimed to obtain agreement on the catchment uses; consensus on the environmental objectives and standards required; and detailed comment on the issues and options in the report. A two month consultation period followed.

One hundred and twenty four Consultation Reports and a large number of leaflets were sent out during the consultation period. In total, thirty one consultation responses were received (see Appendix 1).

A meeting was held with the consultees on 23 September 1993 at the Eric Palmer Community Centre, Great Torrington, to discuss comments which had arisen from the Consultation Report.

All the responses received have been considered and have provided an invaluable contribution to the formulation of the Final Report.

The lack of detail concerning the ecology, conservation, recreation and amenity "uses" was highlighted during the consultation phase and resulted in further consideration of these sections.

Overview of the Catchment

Physical Features

The River Torridge drains a large part of north-west Devon and covers an area of 838 km^2. The main river rises on a gently rolling plateau near the coast at Baxworthy Cross at a level of 200 m AOD (Above Ordnance Datum). The River Okement, a major tributary, rises on the granite massif of Dartmoor at a level of 600 m AOD. The landscape of the lower catchment is characterised by steep sided valleys with extensive wooded slopes. These valleys contrast with the high culm farmland on either side.

The limited temperature range and high winter rainfall experienced in the River Torridge Catchment are typical of Atlantic Britain. In summer the climate is warm and moderately dry. Winters are typically wet and mild. However, over the past fifteen years, there have been six significant droughts (1975, 1976, 1984, 1989, 1990 and 1991).

The majority of the River Torridge Catchment is underlain by rocks with generally low permeability and primary porosity. These include Carboniferous rocks and Dartmoor Granite. In these rocks groundwater flow is effectively restricted to weathered zones and rock fractures (secondary porosity), yielding relatively small amounts of water to boreholes. Despite the restricted underground flow, groundwater still plays a role in the catchment hydrology by helping to maintain river baseflow during dry weather. However, the scale of this baseflow support is limited and river flows in the catchment can recess to very low levels in extended periods of dry weather. Groundwater flow through the fracture networks in such rocks can be rapid, and any pollutants can travel over moderate distances in relatively short periods, weeks to months in some cases.

Water is abstracted from both surface and groundwater sources in the River Torridge Catchment for a variety of purposes including public and private potable supply, industrial use, agricultural production, fish farming and for recreational/amenity use.

Widespread use is made of small-scale abstractions from boreholes, wells and springs, for potable and agricultural supplies. The size of the abstractions, generally less than 20 m^3/day, is limited primarily by poor transmissivity rather than the volume of groundwater held in storage. Licensed resources, including non-consumptive uses which return water to the catchment, represent less than 3% of the total catchment resource. Information on groundwater sources is sparse, as much of the catchment forms part of an excluded area, within which most groundwater abstraction is exempt from licensing. Though there are a number of licences of right, none produce impacts of such severity that low flow alleviation investigations are warranted.

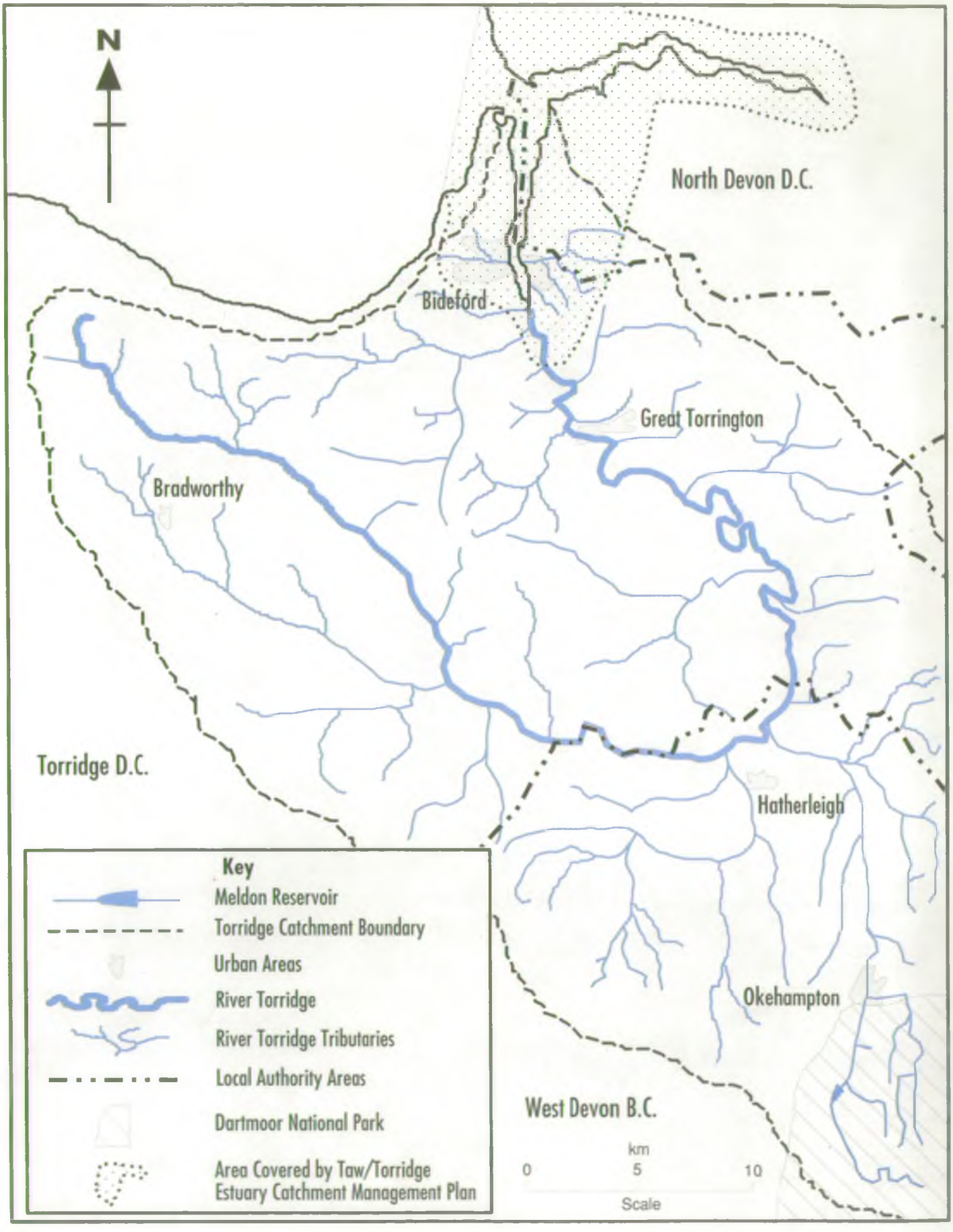
Land Use

The River Torridge Catchment is predominantly rural in nature and is sparsely populated with a few small towns, villages, hamlets and isolated farmsteads. The largest concentrations of people are at Great Torrington, Hatherleigh and Okehampton. Other urban areas are small and for the most part remote from the floodplain (Bideford and the urban areas that lie along the estuary are covered in the Taw/Torridge Estuary Catchment Management Plan). The residential population of the catchment based on the 1991 census is approximately 33,300 (including Bideford) although this can increase to around 44,000 during the peak of the holiday season.

The River Torridge Catchment is predominantly agricultural in character the main activities being dairying, sheep and beef rearing. There is some quarrying for stone and ball clay, and a limited amount of light industry mainly associated with industrial estates around the larger urban areas.

The rivers receive effluent discharges from a variety of sources including fish farms, sewage treatment works and trade discharges from industrial activity. Discharges are regulated by effluent discharge consents issued by the NRA and its predecessors.

The River Torridge Catchment



Tourism, which is concentrated mainly around the North Devon coast and on Dartmoor, increases the summer population. This places added pressure on potable water supply and sewage treatment and disposal.

There are eleven waste disposal sites in the catchment which are used for a variety of wastes including domestic, inert, industrial and toxic materials. Devon Waste Regulatory Authority control these sites through a licensing system.

The River Torridge is a major salmon, sea trout and brown trout fishery. The major spawning and nursery areas for salmonids are to be found in the upper reaches of the main river and its major tributaries the Lew, Okement and Waldon.

The River Torridge Catchment contains areas of regional, national and international importance for wildlife. A range of semi-natural habitats support a variety of species, many of which now have restricted distributions. Several formal designations apply to parts of the catchment; these relate to nature conservation, landscape and heritage. The absence of specific designations, however, neither implies a lack of value or removes the need to consider that value. Many important features in the catchment remain without designation.

Perhaps the most important habitat is the remaining area of Culm grassland; this marshy grassland habitat occurs on the gley soils of the Culm Measures and is of international importance for the plant and animal communities it supports. In England it is almost entirely restricted to north-west Devon and north Cornwall, with approximately half the Devon resource lying in the River Torridge Catchment. It is estimated that only about 10% remains of the area that existed at the turn of the century.

The River Torridge Catchment supports one of the best populations of otters in England. This population is of international importance and shows evidence of a gradual and continuing increase. This success is dependent on a number of factors including retention of suitable habitat and food supplies.

Heritage is also well represented in the area; a number of formal designations apply, indicating national or local importance. Many buildings, structures and other sites are Scheduled Ancient Monuments, while several of the older towns and villages contain Conservation Areas and listed buildings.

In recent years rail infrastructure has declined to one branch-line from Exeter to Barnstaple, but the development of the Tarka Trail and the reopening of the old railway routes to pedestrian and cycle traffic, has added a new opportunity for access to the countryside. The Tarka Trail forms a strong recreational focus within the catchment, bringing people into contact with the river and its environs. Other popular activities include angling, swimming and canoeing.

Environmental Quality

Over the last decade in particular, concern has been expressed about the apparent decline in the environmental quality of the River Torridge. Traditional Culm grasslands have been drained, there has been an increase in the use of fertilizers and a switch from hay to silage production. The view is widely held that this intensive use of grassland has allowed more cattle within the catchment. As a result, the production of waste associated with dairy and beef farming has increased and caused pollution of watercourses throughout the catchment. Between 1952 and 1982 dairy cattle numbers increased by 160%. The current total of 83,900 cattle has the potential to create a water pollution loading equivalent to 589,000 people.

The situation lead to the launch of the farm inspection campaign in 1984 by the former South West Water Authority, the National Farmers Union and the Country Landowners Association under the slogan 'Pollution - Together We Can Beat It'. This campaign together with improvements made to the effluent disposal systems of the major dischargers in the catchment has resulted in an apparent improvement in water quality along the main River Torridge and a reduction in the number of pollution incidents causing fish mortalities in the last few years. In addition the major potable supply abstractions at Great Torrington (which has since closed), and Meldon Reservoir (which has now been returned to full prescribed flow), were considered to be contributing factors to poor water quality in low flow periods.

This improvement has paved the way for fish rehabilitation schemes and again there are promising signs of recovery in the salmonid fishery in the River Torridge Catchment. Recent fish population surveys have revealed an increase in the numbers of salmon fry in areas subject to intensive farming.

Data from a wide range of sources suggest that species such as the otter will also benefit from the improved water quality as will other biota, potable and agricultural supplies and recreation and amenity value.

The Final Report details the further actions necessary to endorse the steps already taken and progress towards a sustainable use of the River Torridge Catchment.

Key Statistics for the Entire River Torridge Catchment

Catchment Area	838 km² (331 sq miles)
Population (1991)	33,288
Major Towns	Great Torrington, Okehampton, Hatherleigh Bideford
Average Annual Rainfall	900 mm (near Bideford) 2000 mm (high Dartmoor)
Main River Length (Maintained by NRA for flood defence purposes)	100.71 km
Length of River Torridge	76.7 km
Length of River Okement	33.0 km
Length of River Waldon	20.5 km
Length of River Lew	17.8 km
Total	148.0 km
Number of SWWSL Sewage Treatment Works	43
Number of SWWSL Potable Supply Abstraction Licences (as at 20/6/94)	9
Total licensed annual volume (Ml/y)	12,325.00
Average daily flow	17.391 m³/sec
Q95 Flow	1.470 m³/sec
Controlled Water Length (Monitored by NRA for water quality purposes)	322.7 km

Action Plan

The action plan is the means by which the vision for the River Torridge Catchment is turned into reality. The following tables detail the proposals for resolving the issues previously identified in the Consultation Report that still require action. Additional issues have been identified during the consultation process and as a result of further consideration of the conservation and recreation sections. The details provided for each proposal include the parties responsible, the costs incurred by the NRA and other parties, where known, with the proposed timescale.

Our everyday work also commits substantial resources to managing the water environment. The scope of this work is explained in the Consultation Report.

The costs identified in the following tables represent the planned timetable of expenditure over the next five years. However, NRA policy and priorities may change in this time which will be reflected in our actual expenditure.

As considerable time has passed since the consultation period some of the issues previously identified have been resolved and others newly identified. Therefore, the issues contained in these tables are not an exact replica of those contained in the Consultation Report.

This action plan replaces the existing River Torridge Catchment Action Plan.

1. Improved Farm Waste Management Practices

Pollution from livestock farms has been recognised as a significant cause of the deterioration in environmental quality in the River Torridge Catchment.

However, following substantial effort by the farming community, the former South West Water Authority and the NRA there are signs of an environmental recovery.

This work has been fully reviewed in an NRA report - Benefits of the Farm Inspection Campaign in the River Torridge Catchment.

The NRA needs to continue to take steps in its farm visit programme to ensure the environmental improvement is maintained. Specific investigations are needed to counter the more subtle problems in wet weather where farm waste can runoff from the land to nearby watercourses.

Furthermore, the NRA will enforce the Control of Pollution (Silage, Slurry and Agricultural Fuel Oil) Regulations 1991 to ensure adequate storage of farm waste.

Resolution of this issue will also benefit from the actions on buffer zones in Issue 3 and loss of semi-natural habitats in Issue 16.

No	Issues	Actions	Responsibility		Cost to NRA	Financial Years					Future
			Lead	Other		94	95	96	97	98	
1.	Improved Farm Waste Management Practices	**Review Farm Visit Programme**									
		• Identify target areas.	NRA		£200 p.a.	•	•	•	•	•	
		• Undertake farm visit programme.	NRA		£6000 p.a.	•	•	•	•	•	
		• Enforce farm waste legislation and secure improvements.	NRA	Landowners	£6000 p.a. Cost to Landowners	•	•	•	•	•	
		• Recommend suitable procedure to report on the work and environmental benefit achieved.	NRA		£1000		•				
		– Implement this procedure.	NRA		Not known		•				
		• Continue to liase with the planning authorities to ensure that they are aware of NRA concerns and priorities with respect to all agricultural developments.	NRA	LPA		•	•	•	•	•	

2. Impact of Conifer Plantations

The use of land for coniferous forestry has increased over the past forty years. The NRA recognises that well-managed forestry, in appropriate areas, can have a minimal impact on the water environment and can benefit the overall environment. However, in certain circumstances conversion of land to forest and subsequent activities can have serious impacts on the water environment.

The NRA is particularly concerned about the potential for forestry to increase acidification, in areas such as Dartmoor, and also the potential impact of timber harvesting in all areas as many plantations in the River Torridge Catchment are now reaching maturity.

Progress with this issue may also benefit from the actions on buffer zones in Issue 3 and loss of semi-natural habitats in Issue 16.

No	Issues	Actions	Responsibility		Cost to NRA	Financial Years					Future
			Lead	Other		94	95	96	97	98	
2.	Impact of Conifer Plantations	• Review internal NRA procedures for liaising with Forestry Authority/Local Authorities and other landowners for planting and felling schemes with a view to standardise procedures and implement national guidance.	NRA	FA LPA	£1000	•					
		• National R&D project on 'The Impacts of Fine Particulate Outputs Associated with Timber Harvesting' (Project Number 465).	NRA/ IoH		Total £90,000	•	•	•			
		– Impact assessment of clear felling on Whiteleigh Water.	NRA	FE Landowner	£1000				•	•	•
		• Review results of above R&D work and recommend best land use practice.	NRA		Unknown				•		
		• Set up project to identify whether forestry practices on Dartmoor cause acidification of watercourses.	NRA	FE FA DNP EN Landowner	Unknown		•	•			

3. Nutrient Enrichment

The lower reaches of the River Torridge may be subject to eutrophication particularly at times of low flow. Eutrophication results from nutrient inputs from both point source discharges and diffuse inputs. The process of eutrophication can result in the increased production of algae and plants and this in turn can effect water and aesthetic quality. The combination of these effects is undesirable and can come into conflict with many of the water uses in the catchment.

The NRA is seeking to identify and minimise the sources of excessive nutrient enrichment in the lower reaches of the River Torridge.

This issue may also benefit from actions relating to improved effluent control in Issue 4, loss of semi-natural habitats in Issue 16 and improved farm waste management practices in Issue 1.

No	Issues	Actions	Responsibility		Cost to NRA	Financial Years					Future
			Lead	Other		94	95	96	97	98	
3.	Nutrient Enrichment	The River Torridge between Great Torrington STW and the Tidal Limit has been identified for specific monitoring.									
		• Chemical and biological monitoring data will be collected to investigate the potential nomination of the stretch as a "Sensitive Area" to be designated under the EC Urban Waste Water Treatment Directive (UWWTD) (91/271/EC). Successful designation will provide the legal requirement to install nutrient removal facilities at Great Torrington STW.	NRA	DoE	£21,000 Potential cost to SWWSL	•	•	•			
		• Continue to operate the continuous monitors at Coxhillhayes and Beam to support the above investigation and monitor any improvement if nutrient control is brought in.	NRA		£7500 p.a.	•	•	•	•?	•?	
		• Set up project to identify nutrient pathways from agriculture and to identify specific remedial measures such as the use of buffer zones.	NRA		Unknown	•	•				
		• Attendance at national workshop to provide guidance on buffer zone management application to River Torridge.	NRA		£400	•					
		• National R&D project to develop land management techniques including the use of buffer zones. Once completed the findings from this project will be reviewed to assess their relevance for the River Torridge Catchment.	NRA		£200,000	•	•	•	•	•	
		• Produce a national NRA position statement with regard to buffer zones and permanent set-aside against which the concerns in the Torridge can be considered.	NRA		£4000		•				

No	Issues	Actions	Responsibility		Cost to NRA	Financial Years					Future
			Lead	Other		94	95	96	97	98	
3.	(Continued)	• Develop a national protocol to identify suitable catchments where buffer zones and set-aside can best be applied.	NRA		£4000		•				
		– Implement for the Torridge where appropriate.	NRA		Unknown and potential cost to riparian owners				•	•	•

4. Improved Effluent Control

The River Torridge Catchment is used for the disposal of effluents. These comprise continuous and intermittent discharges of treated sewage, trade wastes, storm and emergency sewage overflows.

The NRA seeks to control the discharge of effluent via the consenting process and consent enforcement in order to protect the water environment.

The actual and potential for pollution incidents arising from industrial and sewage premises is of concern to the NRA.

The NRA is also developing contingency plans to reduce and mitigate against the environmental impact of discharges during extreme weather conditions (see Issue 5).

Improvements to SWWSL STWs over the next ten to fifteen years are subject to available funding to be approved by OFWAT. Strategic Business Plans for these investments (AMP2) have been developed based on guidelines agreed between Water Services Companies, NRA, DoE and OFWAT. In priority sequence, AMP2 includes the criteria listed below.

(i) Schemes required to meet and maintain *current* EC and domestic statutory obligations.

(ii) Schemes required to meet and maintain *new* EC and domestic statutory obligations.

(iii) Schemes which have been separately justified, and are required to maintain river quality relative to the 1990 survey or to achieve river or marine improvements.

Strategic Business Plans have been submitted and OFWAT will declare the associated customer charging base in July 1994. Details of individual works will not be known until November 1994. It should be emphasised, therefore, that the improvements identified for the River Torridge Catchment (marked +) under AMP2 are provisional until a financial commitment is established.

Furthermore the timing of any improvement works will depend on a priority rating system agreed between SWWSL and the NRA.

No	Issues	Actions	Responsibility		Cost to NRA	Financial Years					Future
			Lead	Other		94	95	96	97	98	
4.	Improved Effluent Control	• Pursue the early determination of Meldon Quarry's consent.	NRA	DoE Meldon Quarry	£500	•					
		• Pursue improvements to the effluent disposal system of Peninsular Proteins Ltd and St Merryn Meat Ltd.	NRA	Peninsular Proteins Ltd & St Merryn Meat Ltd	£2000 + cost to discharger	•	•	•			
		• Monitor West Devon Meats Ltd. undertaking not to discharge and measure the environmental improvement.	NRA	West Devon Meat Ltd	£2000	•	•	•			
		• Review the performance of North Devon Ball Clay consented discharges against river needs and consent.	NRA	ECC WBB			•	•			
		• Deep Moor Landfill – ensure that leachate disposal is diverted to sewer and STW.	DWRA	NRA DWM SWWSL	£1000 + cost to discharger and DWRA	•	•				

No	Issues	Actions	Responsibility		Cost to NRA	Financial Years					Future
			Lead	Other		94	95	96	97	98	
4.	(Continued)	– Undertake an in depth survey of Deep Moor Landfill and nearby watercourses to ensure that all polluted drainage is intercepted and directed to the new foul sewer connection.	NRA	DWM	£3000		•	•			
		• Carry out a risk assessment survey at the major industrial sites, promote 'good housekeeping' arrangements and enforce pollution control legislation.	NRA	Owners	Unknown	•	•	•	•	•	
		Review SWWSL consents to discharge specifically:									
+	Folly Gate STW Descriptive Consent	• Issue a numeric consent based on current performance to meet the requirements of the EC Urban Waste Water Treatment Directive (appropriate treatment).	NRA		£1415 per consent	•	•	•	•	•	By 2005
+	Petrockstowe STW Descriptive Consent	• Issue a numeric consent to require more stringent secondary treatment to meet the requirements of the EC Urban Waste Water Treatment Directive (appropriate treatment).	NRA		£1415 per consent	•	•	•	•	•	By 2005
		• Carry out improvement works at STW to comply with new consent standards.	SWWSL	NRA	Cost to SWWSL	•	•	•	•	•	By 2005
+	Okehampton STW	• Negotiate with SWWSL for investment under AMP2 to rectify the problem from the premature operation of a CSO at works inlet.	NRA/ SWWSL		Unknown costs to NRA & SWWSL	•	•	•	•	•	By 2005
+	Roborough STW Little Torrington STW Milton Damerel STW Broadwoodkelly STW	• The four STWs have an impact on aesthetic quality of the receiving watercourse downstream of STW.									
		• Issue a descriptive consent requiring preliminary aesthetic improvements to works under EC UWWTD (appropriate treatment).	NRA		£5660						
		• Carry out improvement works at STW to bring about compliance with new consents to ameliorate the impact on aesthetic quality downstream.	SWWSL		Cost to SWWSL						By 2005
	Great Torrington	• Complete works to sewerage system currently being undertaken.	SWWSL		Cost to SWWSL	•					
	Bradworthy STW	The flow to STW exceeds the conditions specified in the current consent.									
		• Review the current consent to reflect increased flow to the works to maintain discharge load.	NRA		£1415						By 2005
		• Carry out improvement works at STW to comply with new consent standards.	SWWSL		Cost to SWWSL						By 2005
		• Continue to liaise with the planning authorities to ensure that they are aware of NRA concerns and priorities with respect to sewage and trade waste disposal.	NRA	LPA		•	•	•	•	•	

+ These actions must be read in conjunction with the text relating to Asset Management Plan 2 (AMP2) on page 9.

5. Acidic and Metalliferous Runoff

The River Okement subcatchment, in the vicinity of Dartmoor, is prone to acidic and metalliferous pollution after long periods of dry weather. For example, fish kills occurred in 1976, 1978, 1984 and 1989.

Dry weather leads to the acidification of soils when certain minerals are present. At the break of droughts, acidic runoff containing high metal concentrations is flushed into watercourses causing exceptionally poor water quality.

The problem is particularly acute at Meldon Quarry and due to a land drainage scheme in the Brightley Stream.

No	Issues	Actions	Responsibility		Cost to NRA	Financial Years					Future
			Lead	Other		94	95	96	97	98	
5.	Acidic and Metalliferous Runoff	• Develop a contingency plan to reduce any environmental impact at the 'break' of droughts, involving full consultation with interested parties, at:	NRA	Meldon Quarry Landowners DNP MAFF SWWSL							
		– Meldon Quarry			£500	•					
		– Brightley Stream			£400	•					
		– Fowley Stream.			£400	•					
		• Implement (in part or full) contingency plans at appropriate times (weather dependant).	NRA	As above	Up to £40,000 per incident		•	•	•	•	
		• Review contingency plans after implementation.	NRA		£400		•	•	•	•	

6. Contamination of Groundwater

The protection of aquifers from pollution is of great importance, as the clean up of contaminated groundwater is a difficult and expensive operation, and may prove to be only partially effective. As well as putting large numbers of private water supplies at risk, contamination of groundwater may impact on surface water quality, particularly during dry weather periods when river baseflow is entirely dependant on groundwater discharges.

Groundwater quality within the River Torridge Catchment is generally good. However, certain activities in local areas are known or are likely to yield poor quality water. These include:

- disposal of liquid effluents, sludges or slurries to land - disposal of such wastes may exceed nutrient requirements of crops or vegetation, or contain mobile pollutants
- landfilling - poor control of drainage will result in escape of pollutants to groundwater
- urban and industrial development - such areas have frequently been found to result in contaminated ground. The redevelopment of such areas may exacerbate groundwater pollution if poorly controlled, but may also provide the opportunity for mitigation
- discharges to underground strata - most commonly from septic tank soakaways
- disturbance of ground affected by sulphide mineralisation, this can allow mineral oxidation with subsequent release of metals and acid to percolating waters (see Issue 6).

The NRA published its 'Policy and Practice for the Protection of Groundwater' in December 1992. This document provides comprehensive national general policies relating to each of the above concerns.

No	Issues	Actions	Responsibility		Cost to NRA	Financial Years					Future
			Lead	Other		94	95	96	97	98	
6.	Contamination of Groundwater	• Seek adoption of the NRA policy and practice for the protection of groundwater.	NRA	Planning Authorities WRA Developers Landowners Farmers SWWSL	Ongoing	•	•	•	•	•	•

No	Issues	Actions	Responsibility		Cost to NRA	Financial Years					Future
			Lead	Other		94	95	96	97	98	
6.	(Continued)	• Provide guidance to Waste Regulation and planning authorities as statutory consultees on waste management proposals.	NRA	Planning Authorities WRA Waste Operators	In part ongoing recoverable from waste management licence application fees	•	•	•	•	•	•
		• Annual review of DWM audit reports to assess any impact of waste disposal sites on the water environment.	NRA	DWM		•	•	•	•	•	•
		• Provide guidance to planning authorities and developers on redevelopment of potentially contaminated land.	NRA	Planning Authorities Developer Landowner	Ongoing	•	•	•	•	•	•
		• Consent new discharges to underground strata under the Water Resources Act 1991.	NRA	Developer Landowner	Recover from consent application fees	•	•	•	•	•	•

7. Water Resources Strategy

A Regional Water Resources Strategy is required to ensure water resources are developed where necessary to meet future needs, particularly for public water supplies, without conflicting with other uses of the water environment and also to ensure the priorities for development are justified.

Using the national and regional water resource strategies as frameworks, the NRA will promote demand management and water conservation within the River Torridge Catchment by the public, water companies and other abstractors.

No	Issues	Actions	Responsibility		Cost to NRA	Financial Years					Future
			Lead	Other		94	95	96	97	98	
7.	Develop Water Resources Strategy to Meet Future Needs										
	1. Produce a Regional Water Resources Strategy	• The consultation document for Cornwall and Devon Area was published in August 1992 with consultation until 31 October 1992.	NRA		Completed						
		• Regional Water Resources Strategy will be published by the end of 1994.	NRA		Not available	•					
	2. Implement Strategy Locally for the Torridge	• The implications of the strategy for the Torridge will be reviewed.	NRA		Not available		•				
		• The Torridge Final Report will be updated accordingly during the annual review.	NRA		£200		•				
		• The CAP Steering Group will be briefed annually.	NRA		£400		•				
	3. Drought Strategy	• The need for any specific drought strategy will be considered following the publication of the Water Resources Strategy.	NRA		Unknown						

No	Issues	Actions	Responsibility		Cost to NRA	Financial Years					Future
			Lead	Other		94	95	96	97	98	
7.	(Continued)										
	4. Review of the Meldon Operating Agreement (to include specific details for drought management)	• The timing of this review will be considered again following the publication of the Water Resources Strategy.	NRA		Unknown						
	5. Development Control	• Continue to liaise with the planning authorities to ensure that they are aware of NRA concerns and priorities concerning water resource status in the River Torridge Catchment.	NRA	LPA		•	•	•	•	•	

8. Additional Water Resources Monitoring

The water resources situation in the River Torridge Catchment, including reservoir levels, needs to be effectively monitored to provide information for both long term planning and resource management, particularly at times of low flow and in droughts.

Current water resource monitoring arrangements have been assessed.

No	Issues	Actions	Responsibility		Cost to NRA	Financial Years					Future
			Lead	Other		94	95	96	97	98	
8.	Additional Water Resources Monitoring										
	Review Need For Upper Torridge River Gauging Station	• The current gauging station network on the Upper River Torridge has been reviewed and is considered to be sufficient. Therefore, there are no plans to open further sites.			No further action						
	Groundwater Level Monitoring	• The lack of significant groundwater resources or major aquifers, and the fact that most groundwater abstractions are exempted from control because of the Devon River Authority (Exceptions from Control) Order 1970, preclude the need for specific groundwater level information in this catchment for water resources management and control purposes.			No further action						

9. Impact from Water Abstraction

The scale of exploitation in the River Torridge Catchment for abstractive uses is low. Moreover, during 1993 the licence held by SWWSL to abstract 10.23 Ml/d from the River Torridge at Great Torrington expired. The compensation release from Meldon Reservoir was returned to 7.78 Ml/d, double that which applied over the last ten years under the Meldon Discharge Order 1983.

In addition all licensed abstractions are currently being audited in line with national NRA policy to ensure compliance.

Therefore, the former issues concerning public water supply abstraction, that were discussed in the River Torridge Catchment Management Plan Consultation Report, have now been resolved. However, should the situation change, as with a proposal for future resource exploitation, a significant monitoring 'lead in' period and impact assessment will be required.

No	Issues	Actions	Responsibility		Cost to NRA	Financial Years					Future
			Lead	Other		94	95	96	97	98	
9.	Impact From Water Abstraction Assess Impact of Excluded Area (i.e. of non-licensed groundwater abstractions)	Consideration of the situation suggests that this issue does not require action because: – exploitable groundwater resources are limited, as is the scale of demand – if the excluded area was removed the NRA would be required to grant 'licence of right' to existing currently exempted groundwater abstractors under the normal 'no detriment' rule for change to legislation – many such abstractors could switch to direct abstraction from watercourses on their land under existing common law abstraction rights without the need for a licence – proposals to remove exemption would be costly and would increase bureaucratic controls on minor domestic and agricultural abstractors – contrary to current government policy.			No further action at present					

10. Reverse Decline of Salmon, Sea Trout and Trout Stocks

In common with many rivers in the South West the River Torridge has seen a decline in salmon, sea trout and trout stocks. In order to redress this decline several recovery programmes have been developed and the current fishery rehabilitation plan has been operating since 1990.

Resolution of this issue will also receive benefit from actions detailed in Issues 1, 2, 3, 4, 5 and 16.

No	Issues	Actions	Responsibility		Cost to NRA	Financial Years					Future
			Lead	Other		94	95	96	97	98	
10.	Reverse the Decline of Salmon, Sea Trout and Trout Stocks										
	– Population Controls	• Maintain catch controls (including netting) for the agreed period and then review.	NRA			•	•				
		• Continue pilot study to develop broodstock (salmon and trout) and review.	NRA		£60,000	•	•				
		• Plant out juveniles – progeny from the broodstock pilot study.	NRA		£32,000	•	•	•	•		
		• Conduct a review of NRA SW policy on spring fish in South West (cropping controls etc).	NRA			•					
		• Introduce a byelaw to control estuary sea fishing – gather data and review.	NRA		£16,000 p.a.	•	•				
		• Control fishing methods through routine enforcement.	NRA		£18,000 p.a. (in River only)	•	•	•	•	•	
	– Impacts of Predators	The NRA will not support licensed killing of predators until and unless proof of serious damage has been established and killing proven to be the most effective means for preventing significant loss to fish stocks.									
		• The NRA will co-operate 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.	MAFF	NRA		•	•	•	•	•	
	– Siltation and Compaction of Gravels	• Identify appropriate sites on an annual basis that could benefit from gravel rehabilitation after fully considering wider ecological impact.	NRA		£1000 p.a.	•	•	•	•	•	
		• Maintain gravels according to the agreed Devon Area procedure.	NRA	TROFA	£5000 p.a.	•	•	•	•	•	
		• Monitor improvements in spawning success through redd counts and juvenile surveys. Review 1998.	NRA			•	•	•	•	•	
		• Promote riparian fencing and planting schemes to stabilise banks, reduce stock ingress to streams and reduce silt inputs.	NRA	MAFF NFU Farmers Landowners TEF TROFA	Cost to riparian owners	•	•	•	•	•	
		• Review existing hydrological data to assess whether the River Torridge has become more 'flashy'.	NRA		£1600		•				

No	Issues	Actions	Responsibility		Cost to NRA	Financial Years					Future
			Lead	Other		94	95	96	97	98	
10.	(Continued)										
	– Physical Barriers to Fish Migration	• Identify impassable barriers. – Meldon Dam, West Cleave, Jacobstowe and Yeo Vale.	NRA		Completed						
		• Maintain present fish passes.	NRA			•	•	•	•	•	
		• Install fish passes – dependant on capital availability.	NRA								
		• Remove trash dams and other obstacles after fully considering wider ecological impact and according to the agreed Regional procedure.	NRA	Riparian Owners	£7500 p.a.	•	•	•	•	•	
	– Development Control	• Continue to liaise with the planning authorities to ensure that they are aware of NRA concerns and priorities concerning fish stocks.	NRA	LPA		•	•	•	•	•	

11. Determine Fishery Targets

The development and setting of targets for the fishery has long been debated and the NRA is making a proposal. A target will allow better planning, but in view of the exigencies of nature, it is sensible to adopt a flexible scheme which can be regularly reviewed. The proposed scheme is based on the use of juvenile fish densities as an indicator of the fishery quality, developed from survey data gathered in 1964. A national fishery classification system is also being developed and it is anticipated that this method will eventually be adopted for the River Torridge.

No	Issues	Actions	Responsibility		Cost to NRA	Financial Years					Future
			Lead	Other		94	95	96	97	98	
11.	Determine Fishery Targets	• Adopt suggested system of juvenile density targets and assess with three year rolling survey programme.	NRA		Unknown		•			•	
		• Consider alternatives and assess as above – notably the proposed national system for fisheries classification.	NRA		Unknown	•	•			•	

12. Monitor and Assess Recreation Use

There is a limited amount of historical data on the use of the catchment for most forms of recreation.

Monitoring of recreation activity in the catchment by NRA wardens has recently commenced. It is too soon to know the real levels of, or any change in recreation use, but monitoring will enable this to be kept under review, and highlight further opportunities as well as identifying recreation activities which could potentially damage other uses, in particular conservation.

No	Issues	Actions	Responsibility		Cost to NRA	Financial Years					Future
			Lead	Other		94	95	96	97	98	
12.	Monitor and Assess Recreation Use	• Continue warden surveys of recreation use of the water environment and associated lands.	NRA		£1000 p.a.	•	•				

13. Promote Recreation Initiatives

There is existing low-key recreation use of the catchment waters and associated land. This use includes activities which bring people in close proximity to and in intimate contact with the water. The catchment has great recreation value and provision for any increased demand should be through selective and informal recreation development.

The demand for watersports in the catchment has increased with the rising popularity of sports such as canoeing and windsurfing. The level of canoeing in the district is monitored by the British Canoe Union (BCU). The current levels of use in the catchment are still low, with less than 100 people using the river per season, and are not expected to expand dramatically.

SWWSL currently have licences to abstract water for potable supply from Upper and Lower Gammaton, Jennetts and Melbury Reservoirs, although the reservoirs have not been used for some time. The licence for Darracott Reservoir has been revoked. If these sites are no longer to be used for public water supply then there may be opportunities to develop appropriate recreation at these sites.

No	Issues	Actions	Responsibility		Cost to NRA	Financial Years					Future
			Lead	Other		94	95	96	97	98	
13.	Promote Recreation Initiatives	• Clarify the NRA position on the possibility of safety improvements at Beam and Darkham weirs for canoe passage in light of other concerns.			£600		•				
		• Facilitate discussions between interested parties to:	NRA	BCU Other canoeists Riparian owners							
		1. Investigate the possibility of extending the canoeing access agreement to include summer spates.			£400		•				
		2. Investigate the location of a canoe slalom within an area without incurring adverse impacts on the conservation status.			£400		•				
		• Liaise with SWWSL over the future use of the little used reservoirs.	NRA	SWWSL	£600		•				
		• Continue to liaise with the planning authorities to ensure that they are aware of NRA concerns and priorities concerning recreation development in the River Torridge Catchment.	NRA	LPA		•	•	•	•	•	

14. Improve Ecological Monitoring

Changes in the ecology of the river catchment resulting from land use changes (physical disturbance, water quality and quantity) will influence the conservation status of the area. There is a recognised need for the NRA to monitor changes at both a strategic and site-specific level. The resulting information will inform the NRA and others of the need to modify direct actions or consents to take account of these changes.

No	Issues	Actions	Responsibility		Cost to NRA	Financial Years					Future
			Lead	Other		94	95	96	97	98	
14.	Improve Ecological Monitoring	• Continue wardens surveys of rare and typical species and invasive species.	NRA		£600 p.a.	•	•	•	•	•	
		• Undertake a full land use analysis of catchment using aerial photograph interpretation.	NRA		£26,000		•				
		• Continue invertebrate, plant and River Corridor Surveys.	NRA		£1200	•	•				
		• Analyse five years data and report.	NRA		£1600			•			
		• Continue trials of River Habitat Survey Methodology:	NRA								
		Trials			£400	•					
		Adopt Method.			Unknown		•	•	•	•	
		• Develop and implement an audit process for monitoring the effectiveness of conservation measures incorporated into the NRA's regulatory and operational activities.	NRA		£600 p.a.	•	•	•	•	•	
		• Seek collaborative survey opportunities with other environmental organisations.	NRA	DWT/EN CoCo DNP	£600 p.a.	•	•	•	•	•	
		The Torridge is of prime status for otters (National Otter Survey 1990–1993):									
		• survey and monitor those areas of the Torridge Catchment not already covered in national survey.	NRA		£1000		•				
		• continue present practice of post-mortem examination and toxicological analysis of otter casualties.	NRA		£100/animal	•	•	•	•	•	

15. Promote Conservation Initiatives

As the water environment continues to improve opportunities to promote conservation initiatives will increase. This area of NRA work in the catchment has yet to be fully developed although land use assessments are now being undertaken to support earlier river corridor surveys. Aerial surveys and the 'Torridge Nature Conservation and Landscape Assessment' will identify land use and enable sensitive development of water fringe habitats.

No	Issues	Actions	Responsibility		Cost to NRA	Financial Years					Future
			Lead	Other		94	95	96	97	98	
15.	Promote Conservation Initiatives	• Introduce control programmes for invasive species, e.g. Himalayan balsam and Japanese knotweed on NRA owned land where ecological and conservation interests require. Encourage other land and riparian owners to do the same.									
		1. Investigate extent of problem.	NRA	Riparian Owners	£600 p.a.	•	•				
		2. Develop control programmes.	NRA	Riparian Owners			•	•	•	•	
		• Develop and promote a collaborative project with the Tarka Project to raise awareness of the water environment and associated habitats using staff and relevant resources from the NRA and Tarka Project.	Tarka Project & NRA		Unknown costs to NRA & Tarka Project		•	•			
		• Support initiatives that encourage less intensive land management – particularly those targeted on wetlands, such as MAFF waterside fringe options, Countryside Stewardship and Wildlife Enhancement Schemes.	NRA MAFF EN CoCo		Costs to MAFF & CoCo	•	•	•	•	•	
		• Seek to implement buffer zones as appropriate when findings on research work are known and financial incentives are in place.	NRA MAFF		Costs to NRA & MAFF						
		• Encourage and co-operate with the setting of standards for wetland habitat and species conservation recovery based on the recommendations of the UK Biodiversity Action Plan and other initiatives.	EN NRA		£1000 p.a. + cost to EN	•	•	•	•	•	
		• Participate in a collaborative project to produce a joint landscape and nature conservation assessment for the area covered by Torridge District Council.	TDC CoCo EN DCC		£1200 £15,000 (TDC, CoCo, EN & DCC)	•					

16. Loss of Semi-natural Habitats

In the River Torridge Catchment one habitat, in particular, where loss has been identified is Culm grassland. Surveys show a dramatic loss during the century to agricultural improvement, forestry and scrub encroachment. In the period from 1900 to 1978, 22,400 ha were lost (mostly since 1957) leaving 7100 ha remaining across the Culm Measures area. Since 1984 further losses left 1120 ha remaining within the River Torridge Catchment. Overall this is put at a 76% loss of area between 1900-1978, and between 1984 and 1990, a 65% loss of the remaining area, excluding SSSI.

Culm grassland is regarded as an irreplaceable wetland and is especially important for species like curlew and marsh fritillary whose populations are restricted by the existence of suitable habitats.

The prime responsibilities for action on this issue rests with nature conservation agencies. The NRA, however, will support initiatives by other bodies and through all its own activities to prevent further loss and enhance the conservation value of the river corridor and other wetland habitats, where possible.

Promotion of conservation initiatives detailed in Issue 15 will also benefit the following actions.

No	Issues	Actions	Responsibility		Cost to NRA	Financial Years					Future
			Lead	Other		94	95	96	97	98	
16.	Loss of Semi-natural Habitats	Where areas of wetland or associated habitat of conservation value occur, the NRA will continue to safeguard through its regulatory role and will support initiatives which maintain and extend areas of value.	NRA	EN/DWT/ CoCo/FWAG LPA MAFF		•	•	•	•	•	
		• National R&D project into 'Resource Evaluation and the NRA's Role in Wetland Conservation' (Project Number 474). Once completed the findings from this project will be reviewed to assess their relevance for the River Torridge Catchment.	NRA		Phase 1 £39,000 Phase 2 £75,000 £600	•	•	•	•	•	

17. Provide New Flood Defence Works

To protect people and property from flooding, the NRA will provide new flood defence schemes subject to established technical, environmental and financial criteria.

Design of all new tidal schemes take into account the predicted effect of rising sea level due to global warming. Current predictions indicate that a rate of rise of 5mm a year should be allowed. As sea level rise is routinely accounted for the issue planning for climatic change, as identified in the Consultation Report, has not been considered further in this report.

No	Issues	Actions	Responsibility		Cost to NRA	Financial Years					Future
			Lead	Other		94	95	96	97	98	
17.	Provide New Flood Defence Works	• No schemes planned in the current five year programme.									
		• Continue to liaise with the planning authorities to ensure that they are aware of NRA concerns and priorities with respect to flood defence in the River Torridge Catchment.	NRA	LPA		•	•	•	•	•	

18. Improve Efficiency and Effectiveness of Maintenance Operations

Flood Defence Management Framework

The NRA is to introduce this framework during the plan period. The Flood Defence Management Framework (FDMF) has been devised with the objective of improving the NRA's physical management of main rivers.

The Framework considers the main river system, its control structures and its flood defences to be assets. These assets need to be managed in a consistent cost effective and environmentally sensitive way which is commensurate with the use of the land which is influenced by those assets and the way in which they are managed. In this context land uses may range from natural geomorphological or ecological uses through agricultural uses to development uses. The management of these assets includes such things as water level and flow management, diversion of flows, gravity irrigation, flood alleviation, land drainage etc.

Current land uses are surveyed and a Standard of Service (SoS) for the land, which is to be provided by the asset, is assigned. The SoS needed now or in the future (the target SoS) is compared with the SoS which is currently provided (the current SoS). Where a mismatch occurs the need to achieve a match and the action required to achieve it will be considered in consultation with interested parties.

The process also involves:

(i) a survey of the assets to assess their condition and what maintenance or renewal may be required.

(ii) a survey of flood risks, which includes floodplain mapping and a survey of flooding problems, to assist in both the management of the flood defence assets and in giving advice to planning authorities on development and flood risk issues.

The SoS survey, the asset survey and the flood risk survey are carried out under Section 105 of the Water Resources Act for the purpose of carrying out flood defence functions and are collectively referred to as the Section 105 Surveys. The S105 Surveys will be a major data base which will be of significant benefit.

It will be noted that the FDMF and the S105 surveys which support the FDMF process are linked to the use of the land, which is influenced by the physical management of the river system, that is the physical management of the assets. The management of water levels and gravity flows (which flood defence legislation or actions directly influence or control) is particularly important. Accordingly, a critical part of the process to determine how the river system will be physically managed will be to consider these land uses in consultation with interested parties. In addition the physical management of the river will also need to be considered in the light of all river uses.

No	Issues	Actions	Responsibility		Cost to NRA	Financial Years					Future
			Lead	Other		94	95	96	97	98	
18.	Improve Efficiency and Effectiveness of Flood Defence Operations	• Adopt SoS for defining maintenance needs on 'main river'.	NRA		£3000	•	•				
		• Prepare technical contracts for all maintenance operations, incorporating environmental constraints and enhancement opportunities and implement.	NRA		£75,000	•	•	•	•	•	
		• Undertake S105 flood risk surveys.	NRA		Not known yet		•	•	•	•	
		• Carry out S105 asset surveys.	NRA		Not known yet	•	•	•	•	•	

19. Ensure Adequate Provision of Flood Warning in the Catchment

The NRA operates a flood warning service which aims to provide:

- a 24 hour monitoring service of weather forecasts, weather radar, rainfall, river levels, sea levels and tidal surges to detect and forecast possible main river fluvial and tidal floodings
- colour coded flood warnings to the police for dissemination to local authorities, other bodies and the general public.

No	Issues	Actions	Responsibility		Cost to NRA	Financial Years					Future
			Lead	Other		94	95	96	97	98	
19.	Ensure Adequate Provision Of Flood Warning In The Catchment	• Review flood risk areas within the River Torridge Catchment.	NRA		£1000	•					
		• Review existing provisions of flood warning with respect to Emergency Response Levels of Service.	NRA		£400	•	•				
		• Recommend improvements and produce a programme of future work and cost implications as appropriate.	NRA		£400	•	•				

Future Review and Monitoring Programmes

The NRA is responsible, with other identified organisations and individuals, for implementing this Final Report. The actions contained within this action plan are clear, specific and time bounded as far as possible, allowing ourselves, as well as external organisations and individuals, to monitor progress. This process will enable the particular issues identified in this action plan to be resolved and move us closer to the vision for the River Torridge Catchment. This progress will be reviewed annually in a short report through a forum for which the Catchment Action Plan Steering Group and the Torridge Environmental Forum will form the focus. These are existing groups with representatives from a number of different local organisations all with an interest in the River Torridge.

These reviews will examine the need to update the Consultation Report in the light of changes in the catchment. The period between major revisions will normally be five years.

Appendix 1: Responses Received Through Consultation

National Organisations

Council for the Protection of Rural England
House Builders Federation
Soil Survey and Research Centre
Royal Society for the Protection of Birds
British Canoe Union
Royal Commission on Environmental Pollution
Confederation of British Industry
Ministry of Agriculture, Fisheries and Food
Countryside Commission
English Nature
National Farmers Union

Local Organisations

Devon Wildlife Trust
Meldon Quarry
South West Water Services Limited
Taw/Torridge Estuary Forum
Torridge Environmental Forum
Tarka Project
River Torridge Riparian Owners and Fisheries Association

Local Authorities

Dartmoor National Park
Great Torrington Town Council
Torridge District Council
Weare Giffard Parish Council
Mid Devon District Council
Little Torrington Town Council
Devon County Council
Northam Town Council

A number of responses were also received from members of the public.

Appendix 2: Glossary

Baseflow The flow in a river derived from emergent groundwater and spring discharges - often the major component of river flow in dry weather.

Carboniferous The fifth geological period of the Palaeozoic era, extending from 345 to 280 million years ago. Mainly alternating sequences of siltstone and mudstone.

Excluded Area Area falling within the Devon River Authority (Exceptions from Control) Order 1970. This Order exempts all groundwater abstraction, other than that from specified areas of valley gravel, from abstraction licensing control.

Eutrophication The enrichment of water by nutrients especially compounds of nitrogen and/or phosphorous, causing an accelerated growth of algae and higher forms of plant life to produce an undesirable disturbance to the balance of organisms present in the water and to the quality of the water concerned.

Fissure A crack or open break in rocks - important contribution to water transmitting properties of hard rocks.

Fracture A clean break in a rock due to strain and stress from faulting or folding (i.e. from extension or compression of the rock).

Gley Soils One of the seven major groups in the soil classification of England and Wales. They are characteristically affected by periodic or permanent saturation by water in the absence of effective artificial drainage.

Licensed Waste Disposal Sites Included all sites used for waste disposal since 1974, some of which are now closed.

OD Ordnance Datum, the mean sea-level used as a datum for calculating absolute height of land on official British maps.

Operating Agreement A formal agreement between the NRA and a water company relating to public water supply schemes which significantly affect the catchment to ensure proper management and operations.

Permeability A measure of the rate at which water can move (m/day) through rock, the relative resistance to flow through the rock.

Porosity Primary/intergranular porosity: The original void space between grains of unconsolidated or poorly consolidated formations. Secondary/ fracture porosity: The void space derived within fissures, fractures and joints within 'hardrock' formations.

Q95 The flow that on average, is equalled or exceeded for 95% of the time.

River Catchment The total area from which a single river collects surface runoff.

Semi-natural Habitat Habitats which although not planted by man have been modified to some extent by human activity. (No examples of completely natural habitat are considered to remain in Britain).

Transmissivity The flow (m^3/day) which can be induced through the formation as a whole taking the saturated thickness of the aquifer into consideration.

Unlicensed Waste Disposal Sites Includes all sites used for waste disposal prior to 1974 which are no longer used, and all identified illegal dump sites.

Abbreviations

AOD	Above Ordance Datum
AMP2	Asset Management Plan 2
AONB	Area of Outstanding Natural Beauty
CAP	Catchment Action Plan
CoCo	Countryside Commission
CSO	Combined Sewer Overflow
DCC	Devon County Council
DoE	Department of the Environment
DNP	Dartmoor National Park
DWM	Devon Waste Management
DWRA	Devon Waste Regulation Authority
DWT	Devon Wildlife Trust
EC	European Commission
ECC	ECC Ball Clays Ltd
EN	English Nature
FA	Forestry Authority
FE	Forestry Enterprise
FDMF	Flood Defence Management Framework
FWAG	Farm Waste Advisory Group
IoH	Institute of Hydrology
LPA	Local Planning Authority
MAFF	Ministry of Agriculture, Fisheries and Food
NFU	National Farmers Union
NRA	National Rivers Authority
OFWAT	Office of Water Services
R & D	Research and Development
SoS	Standards of Service
SSSI	Sites of Special Scientific Interest
STW	Sewage Treatment Work
SWWSL	South West Water Services Limited
TDC	Torridge District Council
TEF	Torridge Environmental Forum
TROFA	Torridge Riparian and Fishermen's Association
UWWTD	Urban Waste Water Treatment Directive
WBB	Watts, Blake, Bearne and Co Plc
WRA	Waste Regulation Authority

Units

Ml/y	megalitre(s) per year
Ml/d	megalitre(s) per day
m^3/day	cubic metre(s) per day
m	metre(s)
mm	millimetre(s)
km	kilometre(s)
km^2	squared kilometre(s)
ha	hectare(s)
m^3/sec (cumec)	cubic metres per second

Telephone the emergency hotline t
such as pollution, poaching and flo
danger to our rivers, lakes and coas
help the NRA to protect water, wil

NRA emergency hotline

0800 80 70 60

24 hour free emergency telepho

Further copies can be obtained from:

Malcolm Newton
(Area Regulation Officer - Devon Area)
NRA South Western Region
Manley House
Kestrel Way
Exeter
Devon
EX2 7LQ