IP(09)05

Protection, Restoration and Enhancement of Salmon Habitat Focus Area Report

EU-UK (England & Wales)

North Atlantic Salmon Conservation Organisation
FOCUS AREA REPORT ON PROTECTION, RESTORATION AND ENHANCEMENT OF SALMON HABITAT
UK(England and Wales)

1. Overview of salmon rivers within England and Wales

Historical

Prior to the late 18th Century, most of the rivers in England and Wales supported salmon populations, apart from the low gradient rivers of East Anglia. Many then declined considerably up to the early 20th century as a result of the industrial revolution. Now, due to considerable investment and effective regulation together with a decline of extractive and heavy industries, there are more catchments in England and Wales with salmon than at any time for the last 150 years. (Mawle & Milner 2003)

Current

There are 79 rivers in England and Wales that support salmon (Figure 1), although some of these river stocks are very small and sustain minimal catches. These rivers vary significantly in their nature, ranging from spatey upland catchments to stable, groundwater-fed chalk rivers. Salmon Action Plans (SAPs) have been developed for the 64 rivers that have been designated 'principal salmon rivers', as well as one major estuary (the Severn). These plans are drawn up in consultation with local fishery interests and have a jointly agreed list of prioritised actions The 64 'principal' salmon rivers are subject to a Ministerial Direction and their status must be reported annually. There are some rivers shown in Figure 1 that do not have SAPs. These generally have no catch or a very small catch (<15) of salmon and also have a significantly greater (more that 5 times) catch of sea trout. None of these rivers supports a net fishery, and the rod fisheries are managed principally to address the status of the sea trout stocks, although salmon catches are also taken into account.

A number of major rivers have recovered (e.g. River Tyne) or are recovering (e.g. River Tees, River Mersey and the Yorkshire Ouse system) from the effects of pollution and major industry during the early part of the 20th century such that they now support salmon fisheries again. Recovering rivers accounted for 25% of the total salmon rod catch in 2007. Some river systems, including some of significant size, are now in the very earliest stages of recovery from historic degradation, but are not amongst those for which SAPs have been developed; Conservation Limits (CLs) are likely to be developed for these and management actions to improve salmon stocks will be included in Water Framework Directive (WFD) programmes of measures as the recovery progresses. Where salmon are being recorded breeding in these (e.g. River Mersey and Yorkshire Ouse system) there is potential for new and significant populations to develop.

However, English and Welsh salmon rivers still face many challenges associated with water quality, water quantity, and channel structure. Intensive land use and climate change are believed to be amongst the most significant pressures. In addition, there are in excess of 2500 barriers across English and Welsh rivers many of which obstruct or impede salmon migration.

Eighteen salmon rivers have been designated Special Areas of Conservation (SACs), under the EU Habitats Directive 92/43/EEC (see Figure 1) with salmon as a named qualifying species. This places an additional requirement on managers to maintain the habitats in these rivers in a favourable condition for salmon.

Further habitat information is documented in the NASCO habitat inventory database. Detailed information can be found in individual SAPs published for principal salmon rivers between 1998 and 2004.

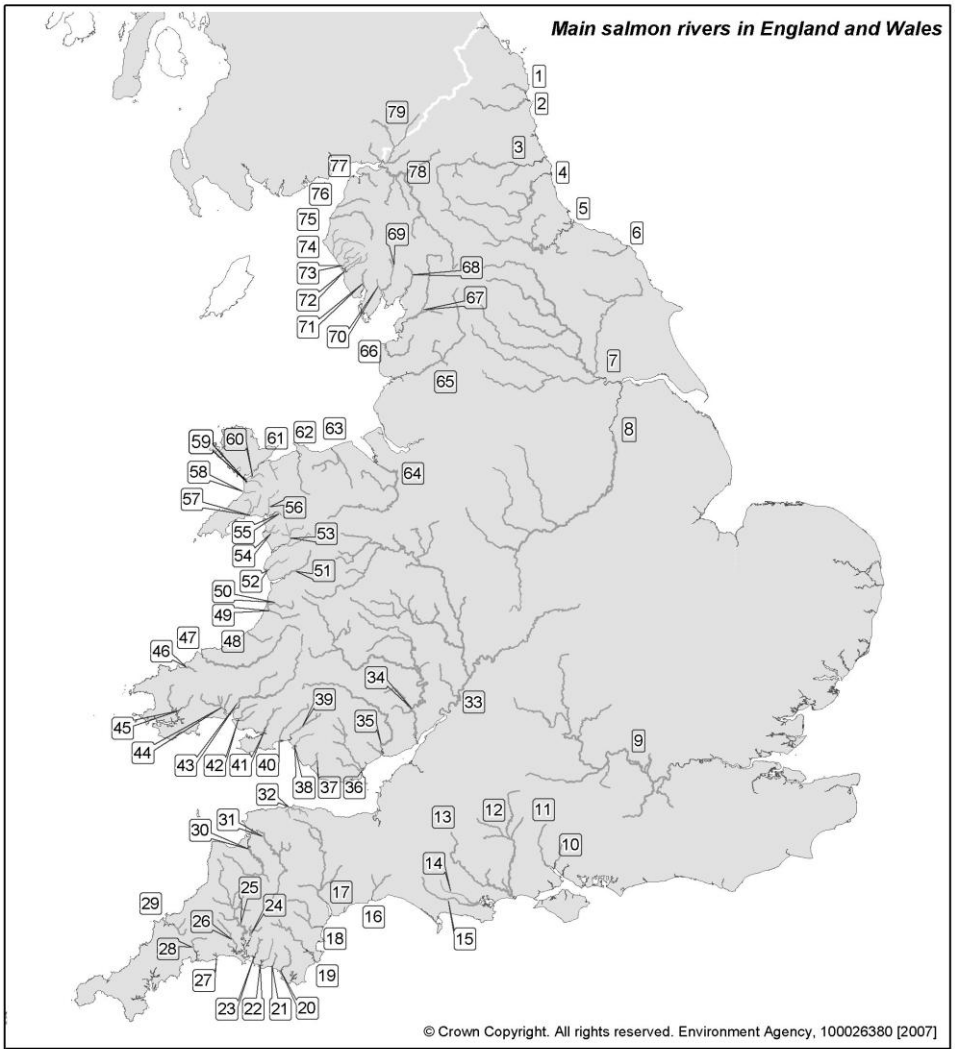


Figure 1 The main salmon rivers of England and Wales.

2. Current status of salmon habitat

2.1 Overview

Although salmon have been returning strongly since the 1960s to historically polluted rivers in the North East and South Wales (e.g. Tyne, Wear and Ogmore), there remains concern about chronic environmental degradation in others, mainly in rural areas, caused by changing land use practices, especially agriculture and forestry.

Issues of particular concern are siltation resulting from soil erosion sometimes leading to concretion of gravels and lack of suitable spawning or juvenile habitat; pesticides from sheep dip chemicals, acidification and changes in river flows. The relative importance of these effects vary around the country, but clusters of high pesticide levels have been found in Welsh upland streams, and acidification still occurs in the uplands of Wales and the North West. Salmon runs in the chalk streams of Southern Region have declined since the 1980s, but the reasons for this are not clear.

Attempts to restore salmon to the Thames have been frustrated by water quality problems in the estuary exacerbated by low flow conditions in many years together with obstructions and lack of suitable spawning habitat in the freshwater environment.

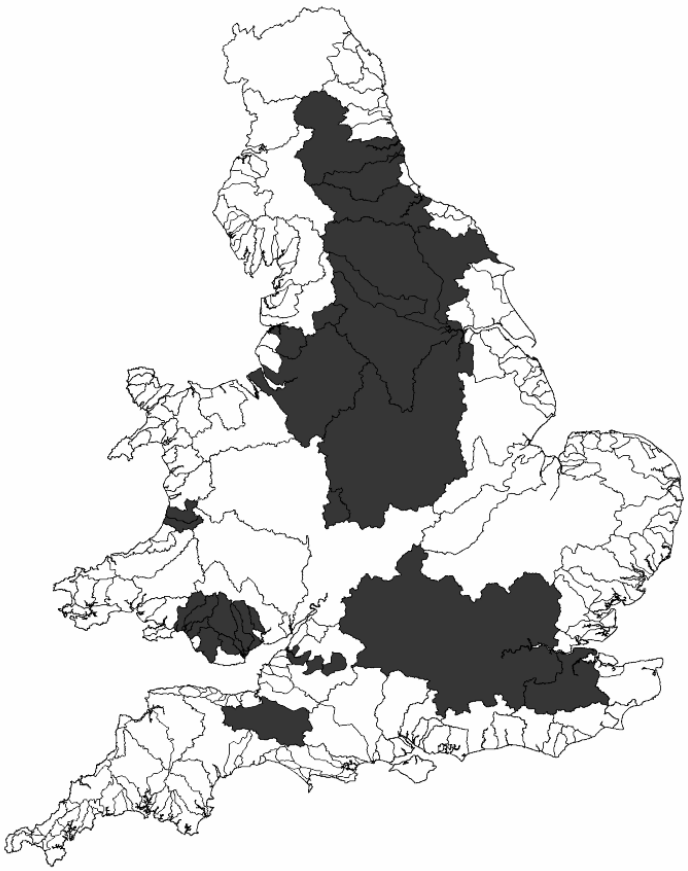


Figure 2: Catchments in England and Wales from which salmon stocks were apparently lost in the 20th century.

Changes in the British climate are predicted to become more pronounced (Hulme et al., 2002), and the most likely scenarios are for higher temperatures, wetter winters, drier summers and more extreme events of flooding and drought. Climate change effects may already be impacting on some salmon populations in the south of England (Solomon & Lightfoot 2009)

2.2 Water Body Status Classification and the Water Framework Directive

At the national scale, the status of water bodies in England and Wales is in the process of being described under eleven Water Framework Directive River Basin Management Plans (as they are across the European Union - see section 3.2) To prepare these plans, the water environment is divided into management units called 'water bodies' and categorised as rivers, lakes, estuaries, the coast and groundwater. Some water bodies have been designated as artificial or heavily modified if they are substantially modified or created for water supply, urban purposes, flood protection or navigation. This designation recognises their uses, whilst making sure that their ecology is protected as far as possible. Draft plans are to be published in December 2008 and so it is too soon to report outputs, but the following gives an overview of how they will describe water body status in future.

The Water Framework Directive sets a target of aiming to achieve at least 'good status' in all waters by 2015. For surface waters, good status has an ecological and a chemical component. Good ecological status is defined as 'a slight variation from undisturbed natural conditions in natural water bodies' and is measured on the scale high, good, moderate, poor and bad. Good chemical status is measured as pass or fail. For groundwater, good status has a quantitative and a chemical component, which together provide a single final classification: good or poor status. 'Artificial and heavily modified' water bodies are those unable to achieve natural conditions. The target for these water bodies is to achieve 'good ecological potential', also measured on the scale high, good, moderate, poor and bad. The chemical status of these artificial and heavily modified water bodies is measured in the same way as natural water bodies.

This water body classification system employs a principle of 'one out, all out' - the poorest individual result sets the overall classification. Each of the components of classification in turn comprises several different elements. For example the ecological components for surface waters include fish and invertebrates; and the chemical component includes a range of substances that are harmful to human health and the environment. The elements are measured against a series of specific standards and targets that have been developed by the UK governments, supported by the Water Framework Directive UK Technical Advisory Group.

Within England and Wales, a Fisheries Classification Scheme (FCS2) is being developed to report the fisheries element within this classification system (see Figure 3 – fish are one of the "biological elements") It uses monitoring data for 23 fish species, including salmon and is one of the four biological classifications against which Ecological Status will be assessed for the Directive. The Scheme has been accepted for use by the WFD Technical Advisory Group for the UK and the Republic of Ireland. Intercalibration of the Scheme will continue during 2008/09 to achieve commonality with the fish classifications used across Europe

The overall assessment process is illustrated below in Figure 3. Draft classification maps are due to be published in December 2008.

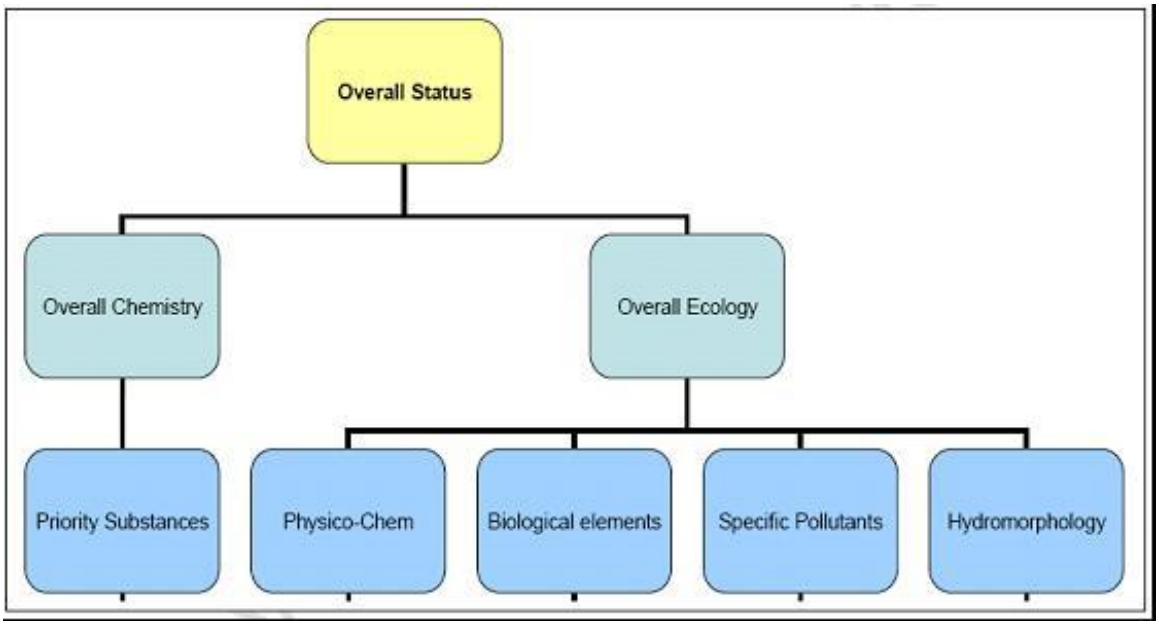


Figure 3 – defining the status of a water body in England and Wales under the WFD River Basin Management Plans

2.3 NASCO Habitat inventory and Salmon Action Plans

The main salmon rivers in England and Wales are described in the NASCO habitat inventory. The 64 principal salmon rivers have a combined total accessible wetted area of 11,834 hectares

Based on the outputs from individual Salmon Action Plans, a salmon stock conservation review in 2004 identified - through expert local opinion - the main factors (within catchments) thought to be responsible for either the failure of principal salmon rivers in England and Wales to comply with their conservation limits, or threatening continued compliance - see Table 1. Subjective analysis within the review described the relative importance of these impacts acting on the 42 rivers failing their Conservation Limits in 2003. These were: channel structure and siltation (83%), water quality (52%), in-river obstruction (36%), exploitation (29%) and water quantity (29%)

The review concluded that concerted and integrated action is required at a broad scale to address these problems. Much of this is expected to be delivered through the River Basin Management Plans.

Table 1 – The main factors within catchments thought to be responsible for either the failure of principal salmon rivers in England & wiles to comply with their Conservation Limits or threatening continuing compliance in 2003

River ENGLAND	Exploitation	Water Quality	Water Quantity	Channel structure & siltation	Obstructions
Coquet		x			x
Tyne		x			x
Wear		x		x	x
Tees		x			x
Esk-Yorks				x	
Thames		x			
Test			x	x	
Itchen				x	x
Avon-Hants			x	x	x
Stour		x	x	x	
Piddle			x	x	x
Frome				x	x
Axe		x		x	
Exe		x		x	x
Teign	x	x		x	
Dart	x			x	x
Avon-Devon				x	x
Erme			x	x	x
Yealm		x	x	x	
Plym	x		x	x	
Tavy	x		x		
Tamar	x	x		x	
Lynher	x			x	
Fowey*	x		x	x	
Camel	x	x	x	x	
Taw		x		x	
Torridge		x		x	
Lyn	x				
Severn	x				
Ribble	x	x		x	
Wyre				x	
Lune		x		x	
Kent				x	
Leven		x			x
Duddon (and Lickle)	x	x			
Cumbrian Esk	x	x			
Irt	x				
Ehen	x	x			
Derwent		x	x	x	
Eden				x	
Esk-Border				x	

River WALES	Exploitation	Water Quality	Water Quantity	Channel structure & siltation	Obstructions
Wye		x		x	x
Usk		x		x	
Taff & Ely		x			x
Ogmore		x		x	
Tawe				x	x
Tywi	x	x		x	
Taf		x		x	
E&W Cleddau		x		x	
Teifi		x		x	
Rheidol		x		x	
Nevern	x	x		x	
Dyfi				x	
Dysinni		x		x	
Mawddach		x		x	
Dwyryd					
Glaslyn				x	x
Dwyfawr	x	x		x	
Seiont		x		x	
Ogwen				x	
Conwy				x	x
Clwyd				x	x
Dee			x	x	x

3 Process for identifying and designating priority/key habitat areas or issues to be addressed.

3.1 Delivery of salmon habitat improvement in England and Wales

Historically, habitat restoration, protection and enhancement has been through either the Environment Agency and its predecessors or local fishery interests or a partnership of both in parallel with wider environmental improvements brought through investment in land and water management.

Some of the most significant expansions of salmon stocks have followed the removal of water quality barriers brought about by major improvement schemes. For example, the recovery of the River Tyne salmon fishery over the last 30 years to produce the highest rod catches in England and Wales (annually 3 to 4,000 in recent years) followed major investment in improved sewerage infrastructure and treatment. This was driven in significant part by the European Union Urban Waste Water Treatment Directive. Strategic schemes in the Humber (catchment area approximately 21,000 Km^2) and Mersey (catchment area approximately 2,400 Km^2) river systems also offer the potential for access to salmon habitat again - although physical habitat issues in these catchments (including many weirs and dams) are also currently constraining recovery.

The Environment Agency's approach to sea trout and salmon management is set out in "Better sea trout and salmon fisheries: our strategy for 2008-2021" (Environment Agency 2008) . This document sets out the Environment Agency's priorities which include:

- Ensure that its broad environmental programmes deliver for sea trout and salmon by effective use of its expertise and the information it collects;

- Minimise obstacles to migration through regulation and by working in partnership with others;
- Carry out monitoring sufficient to inform its delivery of regulation and improvement;
- Publish regular authoritative reports on stock and fisheries status;
- Reserve part of its resource to support partnership, match funding or pump-priming initiatives.

Increasingly, a significant amount of local habitat protection and restoration work is organised by private interests and, in particular, by various Rivers Trusts. The Association of Rivers Trusts (ART) is a registered environmental charity representing the Rivers Trust Movement in England and Wales. It works by supporting around 30 regional community based Rivers Trusts across the UK in promoting practical and sustainable solutions to environmental issues and the delivery of catchment restoration projects. ART is a member of Wildlife & Countryside Link in England and Environment Link in Wales. Details on its work can be found on www.associationofriverstrusts.org.uk

Many Rivers Trusts have a strong fisheries management and improvement focus and are active in the protection, restoration and enhancement of salmon habitat. Such work is frequently undertaken in collaboration with the Environment Agency and may be designed to improve the freshwater and riparian habitat for a wide range of species. Examples of this work includes riparian fencing, gravel flushing, bank protection, removal of obstructions and reducing diffuse water pollution from agriculture..

In Wales, the Welsh Assembly Government (WAG) provide additional support for fisheries, through the 'Sustainable Fisheries Programme'. Environment Agency Wales have received an additional £800k pa from WAG since 2001. This funds a programme of activities aimed at sustainably enhancing fish stocks, through habitat and fish passage interventions, increasing angling tourism in Wales, promoting participation in fishing and increasing access to fishing.

In Wales, ART in cooperation with the Environment Agency, Countryside Council for Wales and Welsh Assembly Government have recently established 6 new Rivers Trusts and a Welsh coordinating body (Afonydd Cymru) which will promote and deliver a range of improvements for migratory fish.

3.2 The Water Framework Directive and River Basin Management Plans

Management of salmon habitat is now delivered at a strategic level through the Water Framework Directive (WFD). The WFD obliges all countries throughout the European Union to manage the water environment to consistently high standards. The principal environmental objectives for surface and ground waters are to:

- prevent any further deterioration in the classification status of aquatic ecosystems, protect them and improve the ecological condition of waters;
- aim to achieve at least good status for all waters;
- promote sustainable use of water as a natural resource;
- conserve habitats and species that are directly dependant upon water;
- progressively reduce or phase out release of individual pollutants or groups of pollutants that present a significant threat to the aquatic environment
- progressively reduce the pollution of groundwater; and
- contribute to mitigating the effects of floods and droughts.

Draft River Basin Management Plans (RBMPs) are about to be published for consultation (December 2008). These focus on achieving the protection, improvement and sustainable use of the water environment - surface freshwaters (including lakes, streams and rivers),

groundwater, ecosystems such as some wetlands that depend on groundwater, estuaries and coastal waters out to one nautical mile. The first River Basin Management Plans will be finalised in December 2009 with the plans being reviewed and revised every six years.

At the River Basin Management scale, the RBMPs will set out where the aim is to meet good water body status and good potential by 2015 or, where these targets cannot be met by 2015, the reasons for this (e.g. because the actions required would not be technically feasible or would be disproportionately costly, or because the environment will take longer to recover). For these latter waters, the aim is to achieve good status and good potential over a longer timescale, or in exceptional circumstances to set less stringent objectives

ART and the Rivers Trust movement are working closely with Defra and the Environment Agency in the delivery of catchment ecological improvements in this process.

Examples of a draft catchment component for the Kent and Leven Rivers together with the River Mersey of the North West (NW) RBMP are given in Appendix I.

3.3 Local Catchment Scale

Factors affecting individual river salmon stocks have been identified and prioritised in the SAPs developed for the 'principal salmon rivers' between 1998 and 2004 in line with the NASCO Plan of Action for the Application of the Precautionary Approach to the Protection and Restoration of Atlantic Salmon Habitat.

These actions are, where possible, based on surveys identifying degraded area including geo-morphological audits. The Rivers Trust movement has built on data gathered by the Environment Agency to determine where improvement techniques may be best applied. Rivers Trusts are increasingly using their own techniques and data to support this process by applying data from redd counting, electro-fishing (e.g. up to 300 sites per year on the river Eden), invertebrate sampling and other methods including data-loggers, snorkel surveys etc. Catchment wide surveying techniques also include walkovers, aerial mapping systems and GIS based decision support systems, e.g. RARE[1] and Scimap.[2]

With the advent of the RBMPs, actions from SAPs (together with any new ones identified both for salmon and sea trout) will be reviewed. In future, these prioritised actions will be identified in a technical sea trout and salmon document to support the RBMPs.

Priority will continue to be given to improving those fisheries that are below conservation limits where they have been set. Prioritisation will also take into account the probability of the water body achieving good ecological status and will give particular weight to those

[1] 'Rapid Assessment of River Environments'

[2] 'The Sensitive Catchment Integrated Modelling Platform'

both 1 &2 are described at www.associationofriverstrusts.org.uk/projects/utdr/appx/appx_46_rare.pdf
They use a combination of GIS and aerial photography based land use data to determine connectivity and risk to target land use improvements

Notes

- Black boxes (boxes 1 – 5) represent the annual cycle of salmon management as it sits in relation to general WFD activity.
- Purple boxes represent WFD activities undertaken on a 6-yearly basis.
- Green text show where habitat protection and restoration is considered

Figure 4 Salmon Management in the Environment Agency

1 - Characterise stocks

- Confirm that CL is still appropriately set.
- Recalculate or produce CL if necessary
- Predict risk of failing management objective at target date (currently 2008, 2011 (corporate targets) then 2015, 2021 etc., i.e. WFD targets).
- Report to ICES.
- Assess current adult and juvenile stock status and compliance with management objective where set.

2 - Confirm targets (assess compliance if long-term impacts are identified)

No significant long-term impact

- Use assessment as reported to ICES.

Permanent significant long-term impact

- Calculate and assess compliance with derogated target.

Solvable significant long-term impact

- Calculate and assess compliance with interim target.

3 - Review environmental factors

Until 2009

- Review limiting environmental factors (within control of Environment Agency & partners) using SAP
- Estimate degree of effect & draw up annual SAP 'Action milestones' list.

From 2009

- Implement WFD River Basin Management Plan.
- Draw up annual 'Action milestones' list using sea trout & salmon technical documents.

4 - Review exploitation controls

- Identify appropriate management actions to control exploitation of salmon stocks by rods and/or nets (using the 'Developing fishing controls for salmon fisheries in England & Wales' Decision Structure).
- Ensure any newly identified controls are added to the relevant 'Action milestones' list.

5 - Ongoing delivery and progression to Good Ecological Status

- Operational delivery of identified actions.
- Development of projects and/or business plans.

In 2008 & every subsequent 6 years; determine salmon measures

- Focus on key factors.
- Identify those that will deliver real practical differences.
- Address the big issues and ensure they are in the Programme of Measures

Every 6 years from 2006, identify WFD Potential Measures

- Review social & economic benefits and assess cost-effectiveness.
- Contribute to Significant Water Management Issues report.
- Consult with stakeholders as part of WFD River Basin Planning process.

designated as Special Areas of Conservation (SACs) and to those actions likely to generate the most gain. A prioritisation model to assist this is in development. Feasibility and opportunity are also considered.

3.4 Summary of the overall salmon habitat protection and improvement planning process within the Environment Agency

This is illustrated in Figure 4 which also shows the linkage to the Environment Agency's Decision Structure for Developing fishing controls for salmon fisheries in England & Wales (see NASCO Implementation Plan 2008 for explanation of the 'Decision Structure').

4. Activities and approaches used to share and exchange information on habitat issues

A range of systems have been put in place in UK(England and Wales) to encourage collaborative working and the spread of best practice for the conservation and protection of salmon habitat. These include partnership working, workshops and similar meetings, advice centres, and the preparation of technical guidance documents.

4.1 Partnership working

(i) RBMP Liaison Panels and Catchment Steering Groups

The Water Framework Directive encourages the active involvement of everyone with an interest in water and who is keen to protect and improve it for the benefit of current and future generations. The Environment Agency has created liaison panels in each River Basin District. These panels make decisions regarding the River Basin Management Plans and have representatives from key sectors. There are also national stakeholder panels for England and Wales, made up of representatives from national organisations. These national panels gather views and concerns from a national perspective.

Stakeholders and members of the public can contribute to consultations at different stages in the preparation of River Basin Management Plans. The internet and other channels will be used to make sure that anyone can obtain information about what is being done.

(ii) Local consultation on SAPs

As mentioned in section 1.2, SAPs are drawn up in consultation with local fishery interests and have a jointly agreed list of prioritised actions.

(iii) Environment Agency Sea Trout and Salmon Strategy

This Environment Agency Strategy (Better sea trout and salmon fisheries – Environment Agency 2008) places strong emphasis on partnership working. One of the three key results that the strategy aims to achieve is " widespread and positive partnerships, producing benefit". The strategy sets out suggested contributory roles for the various groups – including individuals with an interest in the river environment; fishing representative bodies; industries and developers who impact on the river; and several government agencies. The strategy pledges that the Environment Agency 'will seek strong and effective engagement with partners so that all available resources and all with an interest come together to deliver optimal benefits' It also says that the Environment Agency will reserve part of its resource to support partnership, match funding or pump priming initiatives.

(iv) Association of Rivers Trusts

ART has a strategic National Partnership Agreement with the Environment Agency to develop practical joint working initiatives and an MOU with its sister body in Scotland, Rivers and Fisheries Trusts Scotland (RAFTS).

ART promotes the Ecosystem Approach applied at the river basin or catchment scale and has many Rivers Trusts working on the improvement of access for migratory fish, water quality issues, including acidification and diffuse pollution together with habitat restoration as part of an overall programme. This includes projects working with farmers and riparian owners to develop detailed whole farm plans and river corridor protection measures to improve water quality, habitat and bio-diversity including specific measures for salmonids.

(v) Wales Sustainable Fisheries Programme

This project was mentioned in Section 3.1. It has been used successfully to match external funding bids, and so has enabled more work to be done. Notable successes have been the Objective 1 funded Fishing Wales project (£5.2 million) and, more recently, the Financial Instrument for Fisheries Guidance (FIFG) funded Migratory Fish Habitat Enhancement Project (£1.8 million).

(vi) Environment Agency's 'Better ways of working with farmers'

A new way of working to help farmers tackle diffuse water pollution has recently been developed by the Environment Agency. Internally a group of agricultural 'ambassadors' are working on ideas such as an inter-regional workshop and externally are working with groups such as the Dairy Group and the National Trust. Their message is that good soil and nutrient management will ultimately save farmers money and avoid pollution. This is supported with two key products, 'Best Farming Practices' to help farmers across the country protect their environment, and 'thinksoils', which provides more detail about assessing soil (see section d below for reference).

4.2 Recent Conferences and Workshops

(i) ART conference on 'Salmonids in the 21st Century'

:
http://www.associationofriverstrusts.org.uk/salmonid_conf/sponsor_conf.htm

ART also runs at least 2 annual seminars with field visits to exchange Best Practice.

(ii) AST (Atlantic Salmon Trust) 40th Anniversary conference:

International Conference on Freshwater Habitat Management for Salmonid Fisheries, 18-21 September 2007, Southampton.

(iii) HDMAR Habitats workshop

Habitat Description, Measurement and Assessment in Rivers (HDMAR) Workshop Pitlochry 8-9 March 2006
http://www.ifm.org.uk/conference/hdmar/

4.3 Dedicated advice centres

(i) River Restoration Centre:

The Centre provides a focal point for the exchange of information and expertise relating to river restoration and enhancement in the UK Its primary role is to disseminate information on river restoration and enhancement projects and to provide advice on site-specific technical issues through a network of experienced river restoration practitioners. website: www.therrc.co.uk

(ii) Salmonid 21C

Salmonid 21C is an initiative to develop agreement on how to manage and conserve wild salmon, trout and sea trout stocks in the UK and Ireland in the twenty first century. A conference was held in July 2000 and the following website has subsequently been set up:

http://www.associationofriverstrusts.org.uk/projects/salmonid_21c/live-4/html/home.htm

ART now administers this initiative which includes a booklet, video and Power-point presentations on salmon stock enhancement and habitat improvement techniques.

4.4 Recent technical guidance

(i) Manual on Salmon Habitat Restoration: Hendry, K., Cragg-Hine, D., 1997. 'Restoration of riverine salmon habitats'. Fisheries Technical Manual 4. Environment Agency, Bristol.

(ii) 'Best Farming Practices' Environment Agency 2008, - helps farmers across the country protect their environment.

(iii) 'thinksoils– soil assessment to avoid erosion and runoff', Davis, M. and Smith, R. published by Environment Agency 2008 - provides more detail about assessing and recognising problems of erosion and runoff.

(iv) Forest and water guidelines. 4th edition - Forestry Commission - provides advice for owners and managers on how woodlands and forests influence freshwater ecosystems

4.5 Other relevant strategies

(i) Catchment Abstraction Management Strategies (CAMS)

The Environment Agency is responsible for managing water resources in England and Wales. One of the ways that this is done is through licensing water abstraction. Catchment Abstraction Management Strategies (CAMS) have been developed to inform the public on water resources and licensing practice; provide a consistent approach to local water resources management and to help to balance the needs of water users and the environment

(ii) Sheep Dip Pollution Reduction Programme

Sheep dip products, especially those containing cypermethrin (now suspended from the market), are having unacceptable impacts on the environment. The Environment Agency and the Veterinary Medicines Directorate (VMD) have produced a Pollution Reduction Programme (PRP). The actions in the PRP will help prevent further damage to the environment and establish a sound basis for determining the future of sheep dip products.

The objectives of the PRP are to find and implement an overall solution that protects the environment, animal health and the health, social well being and economic viability of rural communities; minimise the environmental risks from sheep dip chemicals and prevent further environmental damage and to ensure that 'good ecological status' can be met in water courses affected by these chemicals.

(iii) Metal Mine Strategy for Wales

Non-ferrous metal mining has taken place across Wales over the last four thousand years. Metal mine sites present significant sources of land contamination, water and sometimes air pollution. Consequently habitats are affected, valuable fishing rivers are loaded with toxic metals and there have been instances of the metal rich dusts from old spoil heaps presenting a risk to human health through inhalation and ingestion by local populations.

One of the principal roles of the Environment Agency is to ensure the protection of the aquatic environment, therefore to better understand the scale of the impact from metal mines

a database of sites was commissioned in 1996. This database consists of 1,311 known non-ferrous metal mine sites in Wales and describes the extent of environmental information currently available. It also ranked 204 of the most problematic sites by their level of aquatic and environmental impact.

This strategy document for the first time brings together these sometimes differing views on the top 50 sites recognised as having the greatest environmental impact. A total of 50 sites were selected for this strategy in order to maintain a workable and manageable number of sites for the planned time-scales. The strategy is designed to explore common ground, identify potential site constraints, enable a clear assessment of all the issues at each site and develop future site management options.

(iv) The Environment Agency's strategy for protecting, managing and restoring soil

This strategy document ('Soil: a precious resource') published in 2007, sets out the Environment Agency's priorities, role and actions for soil management, protection and restoration for the next 5 years.

5. Description of Plans

5.1 National and RBMP scale:

The UK and Welsh governments, working with other agencies, control substantial funds directed towards agriculture and land management. The water companies apply major sums to benefit the environment within their investment programmes. How these resources are used and directed can have significant influence on the environment for salmon. RBMPs contain a list of measures designed to deal with particular environmental problems that may be applied locally or across a much wider area, including nationally. They are referenced to the pressures that give rise to the problems, and the sectors and their activities that are associated with these.

In practice this process has operated at three different but over lapping levels, of both spatial scale and time in England and Wales:-

a. national strategic level led by Defra for England and WAG for Wales
b. national/river basin district led by the Environment Agency
c. river basin district led by the Environment Agency and the Liaison Panels

The national strategic level has to date consisted of consultations by Defra and/or WAG on new or amended powers (delivery mechanisms) to control diffuse pollution and morphology and preliminary cost effectiveness analysis.

The national/river basin district level has to date consisted of the application of a range of existing approaches (e.g. application of routine water quality planning methods to determine new discharge consent limits for sewage treatment works) and the development and application of new methods such as those for the identification and designation of heavily modified water bodies and associated morphological mitigation measures

The Environment Agency has also worked with Liaison Panels and other stakeholders to identify a range of locally applied measures. Examples from the draft NW RBMP are given in Appendix II

The Environment Agency annually spends significant levels of funding on its work to protect and improve the water environment. In 2006/07, £119 million raised from charges and

Government grant was spent on water quality protection and £125 million from abstraction charges was used to fund the management of water resources

5.2 Local salmon rivers scale:

Within the existing Salmon Action Plans, specific habitat related actions are already underway – many in partnership with others. Over the last 5 years, the Environment Agency has spent £1.75M in England on pump priming initiatives (aiming for 3 to 1 gearing) to tackle obstructions and improve habitat. Part of the annual £800K grant from WAG to Environment Agency Wales has been similarly spent. In addition, the Environment Agency routinely acts to protect and improve salmon (and other fish) habitats in a number of ways often with partners, including:

- by ensuring appropriate measures are included in: consents to **discharge** to watercourses, licences issued for water **abstraction** and **impoundment**, **consents for developers** to undertake physical works in rivers and responses to **planning consultations**.

  A recent example of ensuring appropriate measures are included comes from work by the Environment Agency on the River Itchen SAC which was developed using a methodology developed under a LIFE[3] project which supported flow sensitivity work on salmon. The LIFE methodology establishes flow requirements based on the needs of indicator biological groups using aquatic invertebrates. It has proved a particularly successful tool for this. This study also indicated that the frequency of low flow years significantly impacts on aquatic species and, therefore, that routine use of Drought Orders extending abstraction beyond viable flow conditions for salmonids (both juvenile and migrating adults) should be made a rare event.

- through enforcing laws requiring **fish passes** to be installed where developments result in obstacles to fish migration. Work to overcome migratory fish passage has been a major feature of Environment Agency fisheries work for decades assisted by local partnerships. The Environment Agency has contributed to 85 fish pass projects in England since 2003 and Environment Agency Wales through the Sustainable Fisheries Programme (SFP) has opened up 320 Km of spawning area since 2001.

  A recent example can be found on the River Yealm in Devon, where a new fish pass has opened up 15 kms of new habitat for both sea trout and salmon. The majority of the work was completed in October 2007 and 50 sea-trout and a few salmon were seen to ascend in the first day. This joint initiative was funded by a partnership including the Environment Agency, Action for Wildlife: the Dartmoor Biodiversity Project (Dartmoor National Park) , Westcountry Rivers Trust and the Yealm River Association.

- by investing each year in **specific projects to improve physical habitat**. Most of these works are undertaken in partnership with other local interests so increasing the resources available to support salmon Since 2003, the Environment Agency has contributed to 78 habitat improvements schemes on salmon rivers in England and the SFP has delivered more than 340 km of habitat restoration since 2001

[3] A project, run by a partnership of government agencies responsible for water quality and the protection of fresh water habitats **LIFE** is the **EU**'s financial instrument supporting environmental and nature conservation projects throughout the **EU**.

The S&TA has just joined ADAS and Defra in a project gauging the effectiveness of certain measures on SW streams to combat sediment inputs – in conjunction with the Westcountry Rivers Trust, who first conducted the fingerprinting research on fine sediment inputs four years ago, and identified the silt sources. This follow-up project will look at the current sediment loads entering these watercourses to gauge how effective the measures might be in delivering WFD sedimentation objectives, so that they can be included in planning cycle 2 of WFD.

- through developing publicity material to **raise awareness** and provide guidance on good practices relating to river management.

For examples – see Section 4

The above examples given in the text boxes are only a small selection of the hundreds of actions carried out annually on salmon rivers in England and Wales. Further examples of actions completed on Salmon Action Plans on four selected rivers are given in Appendix III. Similar actions are completed every year on all the principal salmon rivers by the Environment Agency and its partners. In future, many of these will be undertaken through the RBMPs. Specific examples to illustrate this from the draft NW RBMP are given in Appendix II.

5.3 The extent to which a combination of the WFD's RBM planning approach supported by technical sea trout and salmon documents together with local scale activities through ART and others delivers the following:

a) Identifies impacts and potential risks to the productive capacity;

RBMPs identify underlying pressures which are leading to failure of good water body status. Salmon Action Plans, supplemented by locally gathered information from groups such as the Rivers Trusts, identify specific degraded habitat. Impacts on habitat for other salmon rivers will be identified in future through a combination of the RBMPs, the technical sea trout and salmon documents that will support them and work by local groups such as Rivers Trust.

An example of good baseline information can be seen in the Eden Rivers Trust RARE project, which used aerial photography and GIS mapping to identify potential land management and connectivity impacts throughout the entire catchment, so enabling prioritisation of remedial measures to have greatest cost effective benefits in the shortest timescale. For further information go to:
http://www.associationofriverstrusts.org.uk/projects/utdr/appx/appx_46_rare.pdf.

b) Includes procedures for implementation, in a timely fashion, of corrective measures;

RBMPs have a 6 year planning cycle with provision to give actions a longer timescale. This first round of draft RBMPs aim to meet good water body status and good potential by 2015 but, where these targets cannot be met by 2015, the reasons for this are set out. These include: the actions required not being technically feasible, or disproportionately costly, or because the environment will take longer to recover.

The Environment Agency annually assesses the status of the principal salmon stocks in England and Wales against its management objective of a river meeting its CL four years out of five. Those that have a high probability that they will fail this objective in five years time are given higher priority for action with exploitation control measures put in place in the meantime. The latter employs the Environment Agency's "Decision Structure" (see

NASCO Implementation Plan 2008 for explanation) but recognises that exploitation is often not the main cause of failure.

c) Places the burden of proof on proponents of an activity which may have an impact on habitat;

Within RBM planning, a process is used to help identify or confirm:

- which sectors may be contributing to particular environmental problems and pressures;
- what measures could be used to tackle these;
- what mechanisms exist to bring about the action;
- which existing processes may help to implement these mechanisms;
- what to consider in selecting mechanisms - in some cases the same measure could be implemented via more than one mechanism;
- how to assess and compare the effectiveness of measures.

An example of the key contributions from different sectors of the community that have been identified in the draft NW RBMP is given in Appendix IV.

The Environment Agency's sea trout and salmon strategy (Environment Agency 2008) states that it will 'seek to ensure that bodies and individuals whose actions affect sea trout and salmon fisheries fund the full costs of proposals including monitoring, restitution and mitigation'. In the section of the Strategy that sets out how the various interest groups can contribute, it suggests that businesses, industries and developers who impact on rivers have a role in:

- 'integrating protection and improvement of the environment into business activities
- fully funding measures to protect fish where rivers are affected
- considering helping to support or sponsor fisheries improvements'

d) Addresses how the risks and the benefits to the Atlantic salmon stocks are weighed with the socio-economic implications of any given project;

The default objectives of the WFD for surface waters are 'good status' or 'good potential'. However, it may not be possible to achieve these objectives by 2015 for a variety of reasons and so 'alternative objectives' will have to be provided in the first RBMP. Alternative objectives are determined through the wider process of measures appraisal and objective setting. This process is at the heart of river basin planning, and includes technical assessments (including consideration of the technical infeasibility of measures), economic assessment (to consider issues of disproportionate expense) and public consultation.

The use of the alternative objectives is the mechanism which the WFD provides for considering, amongst other things, other environmental, social and economic priorities alongside water management priorities; and prioritising action over successive river basin planning cycles. The alternative objectives and their conditions are the only relevant considerations when justifying the prioritisation of action under the WFD.

The types of alternative objective are:

- an extended deadline, e.g. good ecological status by 2027;
- a less stringent objective, e.g. moderate ecological status by 2015;

Examples illustrating this can be found under the various 'Scenario C' in Appendix IV.

Under the England and Wales programme of Water Company investment (in domestic water supply and waste water treatment), the Environment Agency proposes what improvements are needed and when for the environment (incorporating the needs of fisheries, including salmon). The Water Company regulator, OFFWAT balances the ambition to achieve these improvements with the impact on Water Company investment and on customers.

e) Considers the effects of habitat activities on biodiversity in the area affected

Each RBMP will require an assessment of its likely effect on any Natura 2000 sites – important wildlife sites identified under the European Habitats and Birds Directives and protected areas under the Water Framework Directive. Whilst it is unlikely that any parts of the plan will have a significant effect, an initial assessment will determine if the objectives and actions contained within the RBMP passes a number of tests.

These tests will look at whether the RBMP contains actions to support the achievement of objectives for Natura 2000 sites in the time required; that the objectives within the RBMP are not less stringent than those already used to determine consents and licences as part of previous Habitats Directive assessments; and that the plans contain no exemptions, derogations or less stringent objectives for Natura 2000 sites other than those that are compatible with the Habitats and Birds Directives.

If the RBMP does not pass these tests and does not appear to be meeting its obligations for Natura 2000 sites, then a fuller assessment may be required. As mentioned in Section 1, eighteen salmon rivers in England and Wales are protected by this provision.

Additionally, existing SAPs are all subject to Strategic Environmental Assessment (SEA). SEA is European Community Directive on 'the assessment of the effects of certain plans and programmes on the environment' (2001/42/EC). It is a tool for integrating wider environmental considerations into the preparation and adoption of plans.

The Environment Agency has a duty under the Environment Act 1995 to have a regard for conservation with respect to its pollution control and waste management functions and to further conservation with respect to all of its other functions. In this way it is obliged to review biodiversity needs in any of its actions.

f) Takes into account other biological factors affecting the productive capacity of Atlantic salmon populations.

Performance of salmon stocks against conservation limits and the assessment of water bodies against WFD Good Ecological Status guides where action is needed, taking into account all impacts. The type of action taken is determined following review and analysis of key factors so as to prioritise action on principal limiting factors where the fishery or environment is below expected standards.

The Environment Agency's sea trout and salmon strategy commits to securing 'the best protection for our fisheries against the introduction of high-risk species, including parasites and diseases'. An example of this in practice is its contribution to the UK Government's *Gyrodactylus salaris* contingency plan.

The strategy also considers the pressures from predators on salmon populations. It notes that, historically, the culling of predators has been considered a legitimate management option. However, many of these predators are now protected under UK and European legislation and managers are tending to take a more holistic view whereby the various problems facing particular stocks are evaluated and prioritised. Killing of some predators under licence is still possible, but only as an aid to scaring and where there is evidence of 'serious damage' to the fishery. Thus, for some predator species, alternative management measures are being sought and trialled and these also feature in SAPs.

River basin management gives an opportunity to work on a long-term programme of environmental improvement. Through this, ability to adapt to changing conditions caused by climate change and development, and extremes such as drought and floods can be built in.

Climate change is likely to have a significant effect on underlying environmental conditions, the impact of human activity on the water environment and the effectiveness of the actions put in place to manage these impacts. Through the adoption of catchment and sub-catchment based initiatives under RBMPs it may be possible to restore ecosystem function through strategic changes in land use and agricultural practices including restoration of wetlands and more natural flow regimes together with habitat improvements like improving shade cover and accumulation of woody debris.

6. Overview of Ongoing Habitat Activities

6.1 National Scale – ongoing activities feeding into and resulting from water body pressure issues identified through RBMPs

Future Water

The UK Government's water strategy for England, "Future Water", signals a roll-out of initiatives over the next three years to continue to support farmers on catchment sensitive farming as described in the next few paragraphs.

The England Catchment Sensitive Farming Delivery Initiative

ECSFDI is a key measure in tackling diffuse water pollution from agriculture. Soil, nutrient and pesticide losses through runoff are costing farmers more than £50 million a year. The ESSFDI aims to help farmers to reduce this through a range of advice and incentives. Modelling indicates that, at a local scale, significant reductions in agricultural nutrient, sediment and pathogen losses can be expected. At the catchment scale predicted reductions are between 5-10% although in some catchments these could be as large as 20-40%. Benefits are also predicted for pesticide pollution.

In its first two years (2006-08), the ECSFDI delivered advice to over 6,000 farmers, representing 15 per cent of farm holdings (23 per cent by area) within forty priority catchments. It includes a Capital Grant Scheme. New catchments and extensions to existing catchments have recently been announced. This means that the area covered by the ECSFDI is now about 40% of the agricultural area of England. The new areas were identified through the River Basin Planning process.

The ECSFDI is currently negotiating with five national partners - including The Association of Rivers Trusts and Water UK [4]- to set up strategic partnerships to deliver advice to farmers and land managers. As part of the ECSFDI, activities such as workshops, seminars and farm demonstrations will be taking place in each of the 50 priority catchments.

Each of these current priority catchments has a Catchment Sensitive Farming Officer, who will perform catchment appraisals to determine areas most at risk of diffuse water pollution from agriculture, and where to target their advice. Each catchment will also have a Catchment Steering Group who will steer the advice delivery. Nine Regional Coordinators will enhance delivery and link the Initiative with River Basin Management Planning for the Water Framework Directive, and with other regional initiatives.

The England and Wales Water Companies Periodic Review 2009 - PR09

In November 2009 the Water Services Regulation Authority - Ofwat - will set the price limits that water companies can charge their customers for the supply of water and the treatment of

[4] Water UK is the representative organisation which brings together all of the UK's water and wastewater utilities.

waste water for the following five years. This Periodic Review 2009 or 'PR09' also determines how much investment water companies can spend on maintaining their services as well as improving them.

This is the fifth price review for the water industry since it was privatised in 1989 and billions of pounds have been spent across the country reversing many years of under-investment. For example, the River Mersey estuary was not much more than an open sewer two decades ago. Sewage from Liverpool was flushed directly into the river and the fish had all but died out. Following a massive investment programme by the water company United Utilities, with direction from the Environment Agency, this situation has now been turned around.

However, last year (2007), water companies were responsible for one fifth of all serious pollution incidents - many of which were caused by poorly maintained, overloaded or ageing sewerage infrastructure, and the Environment Agency is working with them to ensure that future investment is in the right areas to protect the environment and that it will deliver value for money.

National approach to overcoming barriers to fish migration

There are in excess of 2,500 barriers to (all) fish in England and Wales. The Environment Agency holds a database of the main ones and is developing a prioritisation model for identifying where the greatest benefit (in conservation and socioeconomic terms) lies from their removal or the installation of fish passes.

A project is currently underway (using GIS) which will accurately identify and link the location of in-stream structures to a hydrologically correct river network. This will allow better modelling of the impacts of these structures and the benefits associated with their removal. The model will assist in a proposed national multi-million pound bid to remove the highest priority barriers. This proposal is a continuation of work over several decades undertaken by the Environment Agency and its predecessors, often with partners where many major obstructions to salmon have already been removed as mentioned in Section 5.

Extension of the fish pass legislation in England and Wales

Current legislation in England and Wales requires installation of fish passes in salmon rivers where a new structure is installed or an existing structure is significantly raised. Approval of these fish passes is by the Environment Agency who also have powers to require screening of certain water intakes and outfalls to prevent migrating salmon being diverted and trapped.

Proposals to extend these powers are currently being progressed. This is to support the achievement of WFD objectives to reduce barriers to fish migration and so help achieve good ecological status.

The proposed extended powers require that the migration of salmon (and other fish) is permitted in a wider range of circumstances than now. This is expected to mean that all new structures in rivers must cater for the passage of fish and that, progressively and using a risk-based approach, the impact of existing structures is reduced. The aim is also for the new provisions to cover obstructions with natural causes (land slips, fallen timber etc) and other, non-physical factors such as sound and light that seriously disrupt fish movements. The new legislation is also intended to consolidate requirements on owners and occupiers to maintain fish passage provisions. It is expected that requirements relating to fish screens will also be broadened to a wider range of circumstances.

The Sustainable Fisheries Project (SFP) in Wales

Up to the end of 2007, the Environment Agency Wales through the SFP has delivered more than 340km of habitat restoration and more than 350km of improved fish access. The

Environment Agency Wales has also supported other projects which have delivered in excess of 200km improved habitat and 500km of access. Environment Agency Wales have habitat targets of 20 more km of improvements per year and 20 more fish passes. The latter will increase access to over 100km of river such as the River Ely (Llantrisant) and Llwyd (Pontymoel).

6.2 Local Scale – ongoing specific habitat restoration activities

Work led by the Environment Agency

Specific activities on which the Environment Agency is leading are identified through local SAPs and include fish pass construction, fencing, spawning bed creation, installing screens and supporting the local Catchment Sensitive Farming officers. Examples of actions carried out in 2007/8 on the Rivers Hampshire Avon, Tamar, Severn and Thames are given in Appendix III. This is just a small sample of the Environment Agency's annual programme of works to improve salmon habitat across England and Wales often undertaken in partnership with others. More detail is given in Section 5.2. Since 2004, the number of salmon rivers considered to be "at risk" has declined from 35 to 27. Whilst this will have been a result of several factors including exploitation controls, the £10.9M invested by the Environment Agency annually on the overall management of salmon in England and Wales together with the significantly larger expenditure on water quality and quantity improvements will have made a major contribution.

Work led by ART

Between 1995 and 2005, members of ART excluding the Eden Rivers Trust spent a total of £11M on their work. This contributed to 630 obstacles eased or removed making 3078 Km of river available. In addition, 314km of fencing was erected and 334km of other banks were protected or restored. Examples of some of the work of the Trust's members are given in Appendices V and VI and this work continues apace.

6.3 Evaluation of effectiveness of work undertaken to restore, protect and enhance salmon habitat in England and Wales.

Habitat restoration and enhancement techniques used in England and Wales tend to be best practice and some schemes are monitored to determine local and immediate effects which can often be positive and sometimes dramatic. Fish passage easements in particular are monitored by counters, redd counts and juvenile electric fishing. .However, there is a need for longer term evaluation of habitat restoration and enhancement schemes although experimental design can be difficult given the differing contributions from other factors.

In the meantime, evidence of improved salmon stocks- both juvenile and adult - is an indicator of scheme efficacy, although (as noted above) it is difficult to separate out the various contributory factors. The Environment Agency routinely monitors these stock levels and reports annually to ICES on performance of the principal salmon rivers against their management target of meeting CL four years out of five (Environment Agency & Cefas 2008). Since 2004, there has been an increase in the number of rivers moving towards this target as illustrated below:

Table 2 - % principal salmon rivers in each risk category reflecting probability of meeting CL four years out of five.

Salmon stock status (% principal salmon rivers in each category)	2004	2005	2006	2007
Not at risk	18	16	18	16
Probably not at risk	11	19	19	24
Probably at risk	15	11	19	16
At risk	56	53	44	44

7. References:

Environment Agency (2008) -Better sea trout and salmon fisheries – Our strategy for 2008-2021

Environment Agency & Centre for Environment, Fisheries & Aquaculture Science (2008) – 'Annual assessment of salmon stocks and fisheries in England and Wales 2007'

HULME, M., JENKINS, G. J., LU, X., TURNPENNY, J. R., MITCHELL, T. D., JONES, R. G., LOWE, J., MURPHY, J. M., HASSELL, D., BOORMAN, P., MCDONALD, R. AND HILL, S. 2002. Climate Change Scenarios for the United Kingdom: The UKCIP02 Scientific Report. Tyndall Centre for Climate Change Research, School of Environmental Sciences, University of East Anglia. Norwich, U.K. 112 pp.

Mawle, G.W. and Milner, N.J. (2003) The Return of Salmon to Cleaner Rivers - England and Wales. In Salmon at the Edge (Ed. D. Mills). Blackwell Science, Oxford. Chapter 16, pp 186-199.

NASCO Implementation Plan (2008) - European Union – UK (England and Wales) February 2008

Solomon D.S and Lightfoot G.W. (2009) "Variation in salmon abundance in the Hampshire Avon-influences of climate throughout the life cycle." in preparation

Appendix I Examples of catchment specific plans extracted from the draft NW River Basin District Management Plan.

These examples have been chosen because of the different status of the salmon stocks in the three rivers in question. The Rivers Kent and Leven are principal salmon rivers. The former is considered to be "not at risk" and the latter "at risk" in terms of their probability of meeting salmon conservation limits 80% of the time. The Mersey is a recovering river for salmon and its salmon performance is not currently assessed.

Progress towards achieving good ecological status and good ecological potential: Kent/ Leven catchment

Nestled in the Lake District National Park, the Kent Leven catchment is home to Windermere, the longest lake in England. The catchment is characterised by designated Areas of Outstanding Natural Beauty like Arnside, the limestone town of Kendal with an industrial heritage, the historic towns of Hawkeshead and Coniston and the picturesque coast of Grange over Sands.

A modest growth of just over 5000 new homes is planned for the catchment by 2020, mainly around Ulverston and Kendal which are outside of the Lake District National Park. Those parts of the Kent Leven catchment which fall within the Lake District National Park will see very minor levels of housing and other growth. However, growth targets in the rest of the North West region will result in pressure on local public water supplies and associated infrastructure.

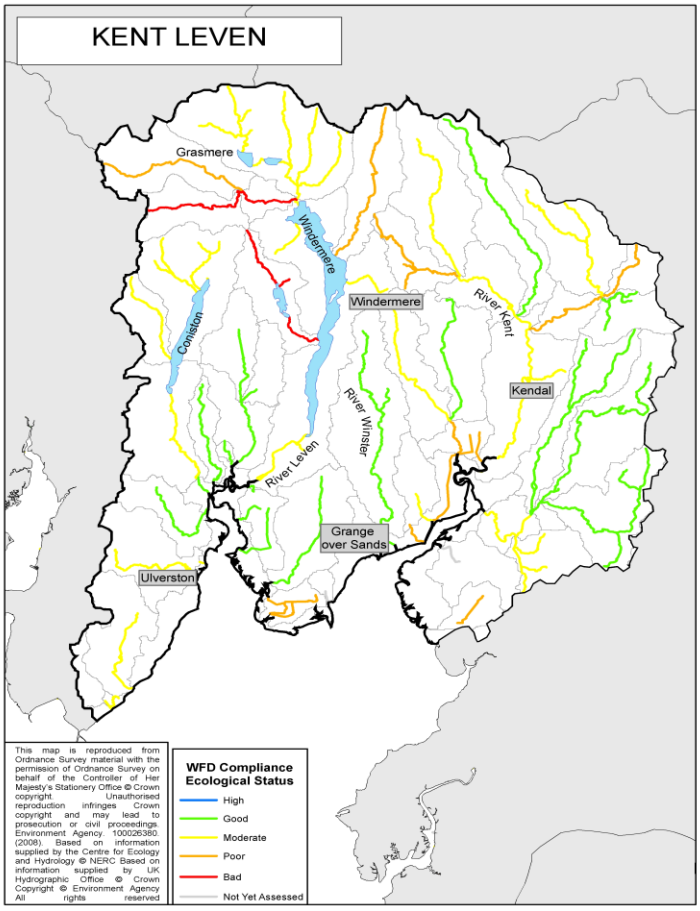
Many areas around Grange over Sands are designated as Special Areas of Conservation, Special Protection Areas, Ramsar sites and Sites of Special Scientific interest. The watercourses have populations of migratory salmon, otters and bullhead and Lake Windermere support a population of the rare Arctic Char.

Currently 33% of surface water bodies and 6% of heavily modified water bodies in this catchment are achieving either good or potentially good status. We are proposing that by 2015 we would achieve 45% compliance and this would have improved to 100% by 2027.

Proposed local actions include:

- Delivery of 2008-09 South Cumbria fisheries plan
- Habitat improvement on the River Eea
- Provide support and funding to the work of Morecambe Bay Wetlands Network which works towards enhancing tourism potential

Bad
Poor
Moderate
Good
High



	Assessed	Not Assessed	Total WB
A/HMWB	6	7	13
Natural WB	30	1	31
Total	36	8	**44**

Progress towards achieving good ecological status and good ecological potential: Mersey estuary catchment

Home to the Regional centre of Liverpool and several key Regional towns and cities, the Mersey Estuary catchment is set to see significant growth. Upwards of 70,000 new homes are proposed to be built by 2021 and some of the underperforming historic urban locations are regeneration priorities. This has led to them being designated as Housing Market Renewal areas. The catchment also contains two new growth points which will aim to increase the rate of housing delivery. The catchment contains 10 of the 25 Regional Strategic Investment Sites.

The impact of planned development in the Mersey Estuary catchment is likely to place high pressures on the water environment, particularly water quality and effects on the Mersey Estuary Special Protection Area and Ramsar site.

Populations of migratory salmon pass through the Mersey Estuary and lower Mersey on their way to spawning grounds in the upper catchments and there are various angling clubs and also a sailing club near Warrington.

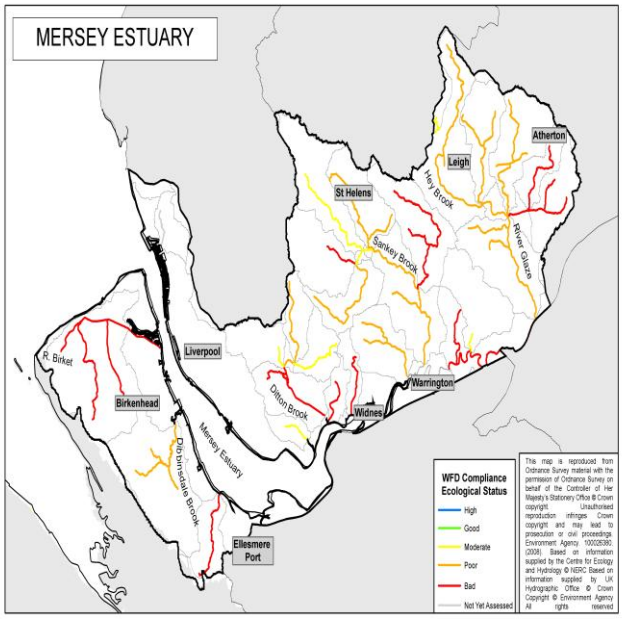
Currently there are no surface water bodies in this catchment achieving either good or potentially good status. We are proposing that by 2015 we would achieve 4% compliance and this would have improved to 100% by 2027

Proposed local actions include:

- Enacting Regional Eel Management Plan, focusing on removal of migratory barriers and stock assessments.
- Research into salmon behaviour via tagging studies to look at preferred migratory routes and the impact of the Manchester Ship Canal on salmon recovery.
- Refuge project for creating suitable juvenile habitat in downstream reaches of modified rivers.
- Identification of cost effective pollution remediation methods to reduce impact of Gatewarth and Hoolebank Landfill sites on controlled waters.
- Provide support and funding to the work of the Mersey Life Project, which aims to enhance the area through river restoration projects.
- Physical weed removal on the Sankey Canal, which is harming the fish stock, recreation opportunities and public Health and Safety.
- Provide support and funding to the work of the Mersey Basin Campaign

Bad
Poor
Moderate
Good
High

	Assessed	Not Assessed	Total WB
A/HMWB	17	3	20
Natural WB	10	1	11
Unknown			
Total	27	4	**31**



Progress towards achieving good ecological status and good ecological potential: Upper Mersey catchment

Covering a significant part of the Manchester City area, the Upper Mersey catchment is set to see significant growth. Upwards of 70,000 new homes are proposed by 2021, many of these in the urban areas of the catchment which cover the Greater Manchester Boroughs of Trafford, Manchester, Stockport and Oldham. The catchment also contains the key town of Macclesfield which is likely to see reasonable levels of new housing development. The thriving smaller towns of Knutsford, Wilmslow and Poynton are also likely to see more modest levels of new development. This part of the North West Region makes a very significant contribution to the Regional economy.

The catchment contains four of the 25 Regional Strategic Investment Sites and there is a desire to develop jobs and facilities at Manchester Airport. There is a goal to achieve a high level of economic development activity alongside the proposed housing development.

The growing impact of planned development in the Upper Mersey catchment is likely to place high pressures on the water environment. Large developments and general pressure from growth on the ageing wastewater infrastructure could have major impacts on the water environment, particularly water quality. The catchment is largely reservoir fed with the supply of clean water coming via an aqueduct from the Lake District.

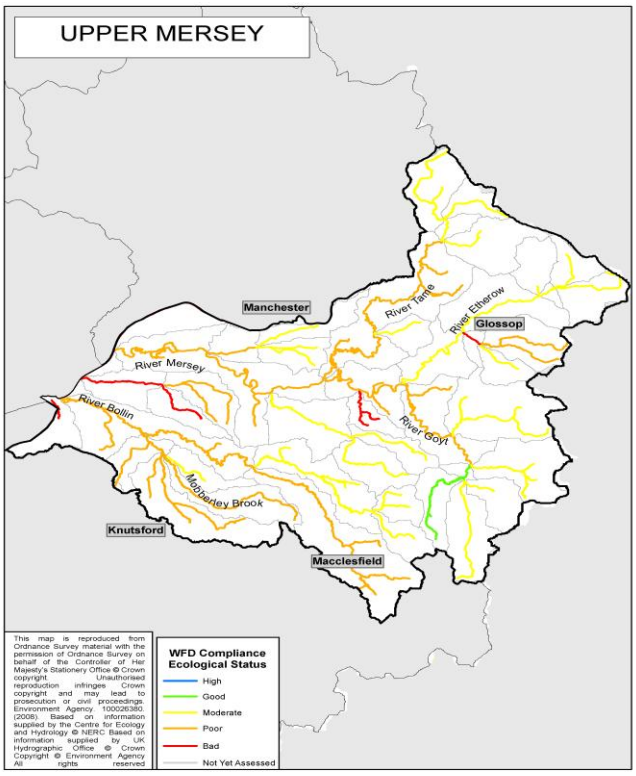
Water voles are present on the upland moorland streams within in the areas designated as South Pennine Moors SAC, SPA and SSSI. Lower in the catchment, the River Tame supports populations of brown trout and bullhead. Angling, walking and cycling are popular recreational activities within the catchment.

Currently 5% of surface water bodies in this catchment are achieving either good or potentially good status. We are proposing that by 2015 we would achieve 20% compliance and this would have improved to 100% by 2027.

Proposed local actions include:

- Provide support and funding to the work of the Mersey Life Project, which aims to enhance the area through river restoration projects. For example design and construction of fish passes on the Rivers Goyt and Bollin.
- Schemes arising out of the Manchester Ship Canal Investigation to address Freshwater Fish Directive compliance issues. Schemes include aeration of the Canal
- Renovation of Heaton Canal Mersey reservoir to provide improved urban fishery and habitat improvements.
- River Goyt Woody Debris project. Improve in-channel habitat for the benefits of invertebrates, fish and riparian mammals.

	Assessed	Not Assessed	Total WB
A/HMWB	19	4	23
Natural WB	22		22
Total	41	4	**45**



Bad
Poor
Moderate
Good
High

Appendix II Examples from the draft NW RBMP of locally applied measures to move water bodies in the North West of England towards good status

- ***Improving rural land management***

Extending Catchment Sensitive Farming, extending Nitrate Vulnerable Zone (NVZ) designation and action programmes, revising the Code of Good Agricultural Practice; creating new Water Protection Zones (WPZ); and partnerships offering land management advice. Responsibility for the implementation of measures aimed at improving rural land management falls largely on the agricultural sector

- ***securing sustainable amounts of water***

Demand management and the review of abstraction licences under the Habitats Directive. The main responsibility for implementing measures that secure sustainable use and availability of water falls on several different sectors including the water industry, agriculture, navigation and consumers (the public).

- ***improving wildlife habitats***

Implementing measures that secure improvement to wildlife habitats when linked to the following types of physical modifications:

- *land drainage for agricultural improvement, reclamation for agriculture and urban development, historical structure;*
- *navigation due to associated weirs, bank protection, dredging, bank erosion, river traffic;*
- *river re-sectioning, straightening, realignment, channelisation, substrate manipulation;*
- *flood defence;*
- *culverting to allow development;*
- *a small group of invasive and non-native species known to cause problems at specific sites.*

The main responsibility will fall to the Environment Agency as the body responsible for flood risk management, and to the navigation sector and conservation and riparian owners.

Specific examples to benefit salmon are given below:

- *Commitment to deliver Biodiversity Action Plans, Sea Trout & Salmon Actions, Fisheries Action Plans, Wetland Management Plans etc which detail the actions required to preserve species and create habitats.*
- *Design, construct and maintain fish and eel passes including incorporating them into planned developments such as hydroelectric power schemes.*
- *Modification or revocation of all abstraction licences adversely affecting the conservation objectives of Natura 2000 sites (by 2015)*
- *Investigations into the need for measures required to modify abstraction licences for those surface and groundwater bodies where there is a high risk that abstraction maybe limiting the achievement of good ecological or good quantitative status (by 2015)*
- *Modification of abstraction licences to ensure no adverse effect on conservation objectives of Sites of Special Scientific Interest, by 2021*

- ***addressing point source pollution***

Making provision for tighter control on discharges. A lot of the actions proposed in this plan are linked to the Water Companies Price Review 2009 (see Section 6.1).The main causes of the problem have been identified as:

- *effluent from sewerage systems, private sewage treatment works and industry*
- *pollution from diffuse sources (for example agricultural run off) can enter sewerage systems and become localised or 'point source'*
- *industrial point sources*
- *commercial fisheries*

The main responsibility for implementing measures to address localised sources of pollution will fall on the water industry, agriculture and large industry.

Appendix III Examples of progress with implementing habitat related issues in SAPs in 2007/8 from sample Environment Agency river reports – the Hampshire Avon, Severn, Tamar and Thames

These are chosen to illustrate some of the many hundreds of actions carried out on salmon rivers each year by the Environment Agency and its partners. The selected rivers are the Hampshire Avon (a river whose salmon stock is considered "at risk"); the Tamar ('probably at risk'), the Severn ('probably not at risk') and the Thames (a recovering river)

Name of River: Hampshire Avon ("At Risk")	
Key outcome during the year	**Brief Details**
Significant physical habitat improvements	Creation of an island downstream of Burgate weir to improve channel diversity and salmonid spawning habitat in this previously dredged channel. Ongoing gravel cleaning programme to improve intra-gravel survival of salmon. EU funded Life project to improve salmon spawning and parr habitat at 6 sites in the catchment. Construction phase is now complete and monitoring is underway to assess project effectiveness.
Water quality improvements	Ongoing involvement in the Hants Avon Review of Consents work. Continuation of Catchment Sensitive Farming (CSF) initiative to control impact of intensive farming practices on quality and quantity of run-off.
Water quantity improvements	Ongoing involvement in the Hants Avon Review of Consents work.
Outcome of any special investigations	Ongoing investigations as to the effect of climate change on chalk stream salmon. Emerging evidence on the effects of Fish Farm discharges.
Name of River: Tamar ("probably at risk")	
Key outcome during the year	**Brief Details**
Barriers removed or eased	Ashmill Fish Pass completed in 2006. Significant improvement in salmon juvenile production upstream was shown in 2007 surveys.
Other significant physical habitat improvements	3 salmon new spawning beds installed at Tetcott, on the main Tamar. An excellent increase in salmon fry abundance has been seen since the first spawning bed was installed at Tetcott last year. 9km of bankside has been protected by fencing within the Tamar catchment in 2007.
Water quality improvements	We are actively working with the Catchment Sensitive Farming officer to secure improvements. We are also involved with the development of a number of funding bids for projects to improve water quality in the Tamar catchment. A successful prosecution resulted from a case at Lydford STW.
Water quantity improvements	Good fish screening has been installed on the Inny at Basil Manor hydropower after a long negotiation process.

Outcome of any special investigations	An investigation into foul drainage near the A30 has led to significant investment in drainage infrastructure to prevent pollution.

Name of River: River Severn & Severn Estuary ("probably not at risk")	
Key outcome during the year	**Brief Details**
Barriers removed or eased	We removed a redundant weir on the Mochdre Brook, near Newtown to re-establish 10km of historic spawning area. This project was funded by the Welsh European Funding Office (WEFO). We completed the final two deep vertical pools on the refurbished fish pass on Shrewsbury Weir. This fish pass is now able to pass all species of fish at a far greater range of flows than previously. The refurbishment was funded by GiA and some area budget. We are just about to receive feasibility studies for fish pass options at Felindre Weir (the last stopper on the main river Severn) and Pont dol Gogh on the River Carno. This will inform if fish passes are appropriate at these sites. The tidal flap gates on the River Leadon were removed (FRM) and free passage of salmon is once again possible into the river after 50+ years.
Other significant physical habitat improvements	We have continued a programme of fencing key areas within the Catchment Sensitive Farming area of the River Vyrnwy (River Cain). Trout and coarse rod licence money was used to continue a programme of tree management on the River Teme improving juvenile habitat for trout and salmon
Water quality improvements	Water quality is considered at least good throughout the whole catchment. Some of the tributaries in Wales suffer from acidification and sheep dip problems. Routine liming and monitoring of sheep dip incidents continues and it is pleasing to report that sheep dip incidents were the lowest since regular monitoring began.
Water quantity improvements	Comments provided on two drought orders on the river Severn. Comments designed to safe guard migration flows and in-river survival if a drought occurs.
Name of River: Thames (recovering river - not assessed)	
Key outcome during the year	**Brief Details**
Barriers removed or eased	Larinier fishpass installed at Shepperton weir in the lower Thames. Trap also installed to assess effectiveness in the future. Previous fishpass operated at <70% efficiency for adult salmon.
Water quality improvements	Agreement obtained for the London Super Sewer that should remove storm sewage discharges into the Thames from 2020. Work to begin in 2009. Improvements made to Beckton STW which have improved dry weather water quality in the tideway
Outcome of any special investigations	Investigation into entrainment of fish at Thames water intakes due to be completed at the end of March. Enormous numbers of fish thought to be currently removed from the river, including salmon. Aerial habitat survey of the salmon breeding areas of the River Kennet carried out.

Appendix IV –Summary of key contributions from different sectors in the draft NW RBMP

Key: Scenario A = What is already happening and what will happen
Scenario B = Additional actions that will happen if this plan is approved
Scenario C = Additional actions that could happen if we were more certain

Sector - Angling & Conservation

Action	What this does	Where	When
What is already happening and what will happen - scenario A			
Deliver Salmon and Sea Trout Action Plans	Sets out the actions required to support and restore populations of Salmon and Sea Trout.	NW RBD	Ongoing
Re-stocking coarse fish in recovering rivers	Establishes populations of species like Chub, Dace, Roach and Barbel, in appropriate catchments.	NW RBD	Ongoing
Implement Net Limitation Orders as a means of controlling the legal exploitation of salmon and sea trout.	Restricts the number of licences, type of equipment and locations that are available for netsmen operating in a given net fishery.	Ribble, Lune, Kent Leven, Cumbrian Coast	Ongoing
Carry out compliance & enforcement work for existing fisheries byelaws	Manages exploitation of fish stocks by anglers & commercial fishermen	NW RBD	Ongoing
Habitat improvement projects / Fish pass projects	Local projects, in priority locations, that address fisheries habitat issues.	NW RBD	Ongoing
Audit high risk fish movements to and from the wild.	Enforces against illegal activity and helps stop spread of alien species and disease.	NW RBD	Ongoing
Promotion of catch & release fishing method	Maximises the fish available stock for spawning	NW RBD	Ongoing
Additional actions that will happen if this plan is approved - scenario B			
Design and construct fish and eel passes	Opens up watercourses to a full range of species as appropriate for the location	NW RBD	2015
Promotion / training of best practice in fishery management	Delivers improved management of fisheries and hence improves the sustainability of the stock, along with less emergency incidents.	NW RBD	2015
Additional actions that could happen if we had more certainty that they would be proportionate and feasible - scenario C			
Establish training, guidance and education campaigns on invasive non-native species	Improve awareness of risks and early detection, limit release of invasive species to the wild. To do this we need a partnership to co-ordinate putting this in place	Across the river basin district	2015
Continue protecting key habitats and species such as saltmarsh, sandbanks, estuaries etc. through exclusion of specific activities.	Implementation of the Marine Bill will help to protects important coastal habitats.	NW RBD	2013

Sector - Agriculture and rural land management

Action	What this does	where	when
What is already happening and what will happen - Scenario A			
Implement and enforce cross-compliance (inc. Sludge Directive, SSAFO, and Nitrates Directive requirements)	Helps to achieve WFD priorities by reducing pollution from agriculture, at farms receiving subsidies	Nationally	2009
Enforcement of existing Nitrate Vulnerable Zone Action Plan	Reduces pollution from agriculture and complies with protected area objectives	in Nitrate Vulnerable Zones	Ongoing
Compliance with best practice on fertiliser use	Limits pollution from nutrients and reduces incidence of eutrophication; limits entry into waters of cadmium	Weaver/Gowy	Ongoing
Marketing and Use restrictions for specific substances e.g. isoproturon	Restricts use of priority substances, priority hazardous substances or specific pollutants within agriculture	Across EU	Ongoing
Catchment Sensitive Farming, including advice to farmers on best practice and small grants for capital investment	Helps to achieve WFD priorities by reducing pollution from agriculture	Bassenthwaite and Wyre	2009
Additional actions that will happen if this plan is approved - Scenario B			
Improve compliance with code of practice on protection of groundwater from sheep dip	Helps to prevent and limit inputs of pollutants to groundwater	Nationally	2015
Enforcement of revised Nitrate Vulnerable Zone Action Plan	Reducing pollution from agriculture and complies with protected area objectives	New Nitrate Vulnerable Zones	From 2008
Partnership Project at Hesketh Out Marsh East to restore 135ha of agricultural land to salt marsh	Reduces pollution from agriculture into surface water bodies.	Ribble	2027
Additional actions that could happen if we had more certainty that they would be effective - Scenario C			
Where appropriate, and subject to local consultation, designate a limited number of Water Protection Zones from 2009 and apply appropriate measures within them to control high risk activities. Further WPZs may be designated, subject to evidence and local consultation, from 2012	Regulatory tool to control diffuse pollution in high risk areas where other mechanisms are not working or unlikely to work	Initially around 8 WPZs in locations to be decided across England & possibly Wales	from 2009 with possibility of further WPZs from 2012
Extend Sustainable Catchment Management	Reduces diffuse pollution to surface water bodies, so	NW RBD	2013

Action	What this does	where	when
Programme (SCaMP) to other United Utilities owned land.	protecting water resources and wildlife		

Sector - Water Industry

Action	What this does	where	when
What is already happening and what will happen - Scenario A			
Complete the current round of water company asset investment	Deliver water quality improvements and reduce the impact of abstraction across the river basin district	NW RBD	2009
Modify abstraction licences in regard to Natura 2000 sites and Sites of Special Scientific Interest	Ensures no adverse impact on Natura 2000 site integrity and on conservation objectives of Sites of Special Scientific Interest	NW RBD	2015
Reduce leakage through active leakage control and customer supply pipe repair policies	Helps ensure sufficient water for people and wildlife	NW RBD	Ongoing
Extension of abstraction control to previously unlicensed areas	Limits unsustainable abstraction, protects river flows and groundwater dependent conservation sites	NW RBD	2013
Additional actions that will happen if this plan is approved - Scenario B			
Investigate discharge impacts and appraise options for action - coordinated under PR09 by Defra/WAG/Ofwat/EA	Confirms the nature of the problem and the action we need to take to deal with this to prevent and limit inputs of pollutants to groundwater and surface water	NW RBD	2015
Manage demand for and use of water through leakage reduction, provision of household meters, seasonal tariffs and education programmes	Ensures more efficient use of water; helps prevent unsustainable abstraction; protects river flows and groundwater levels; protects water dependent ecology and conservation sites	NW RBD	2015
Investigate emissions from STWs and appraise options for action - coordinated under PR09 by Defra/WAG/Ofwat/EA	Identifies sources of priority substances, priority hazardous substances or specific pollutants to allow development of effective programmes of actions	Alt Crossens, Derwent, Douglas, Irwell, Upper Mersey, Ribble, Lune, Weaver Gowy	2015
Additional actions that could happen if we had more certainty that they would be proportionate and feasible - Scenario C			
Additional measures under PR09 for phosphate discharges when biological evidence is available and provides corroboration of need.	Reduction of phosphates in ground and surface waters. • To do this we need to demonstrate that it is effective	NW RBD	2027
Extension of Sustainable	Works with farmers and land	To be	2027

Catchment Management Programme to additional water company assets	managers, with local authorities and decision makers, with Government and other conservation organisations to influence how drinking water catchment areas are managed and properly funded	defined	

Appendix V Examples of progress with implementing habitat related issues led by members of ART

Rivers Trusts' Improvement Projects									
Trust Name & contact details	Project name	Duration / Time-table	Total Budget	Funding sources	Partners	Area & scale	Project aims	Project delivery method	Project outcomes
Westcountry Rivers Trust Gillian Dixon Gillian@wrt.org.uk www.cornwallriversproject.org.uk	Cornwall Rivers Project	Complete Jan 02– Mar 06	£2.6 million	Objective 1 EAGGF Defra	EA Wetland Ecosystem Research Group BDB Assoc	15 catchments in Cornwall, 2455km^2	▪ Address diffuse pollution by promotion of Farming Best Practice ▪ Economic development ▪ Fishery improvements	Cold calling Farm advisory visits Written farm management plans Grant for improvement works GIS management of data	871 farm plans 169km fencing + others Educational resources 8 Demonstration Sites 130 Information Sheets £1,369 savings/farm/yr
Yorkshire Dales Rivers Trust Nick Buck nickg@buck700.fsnet.co.uk www.yorkshiredalesriverstrust.org.uk	River Habitat Improvement Demonstration Project	June 06 – June 07	£50k estimate	DEFRA Rural Enterprise Scheme Pending approval	DEFRA FWAG YDNPA EN EA	12 sites on four tributaries Yorkshire Ouse	▪ Demonstration of bankside habitat improvements compatible with ELS & HLS schemes	Farm advisory visits Grant for improvement Works	12 Demonstration sites Educational resources Information sheets
Wye and Usk Foundation Dr Stephen Marsh-Smith stephen@wyeuskfoundation.org	Wye Access Project	Dec 1996-Jan 1998	£120k	CCW, EAW, private	CCW EAW Wye salmon fishery owners association	Welsh Wye 2000km^2	Restore salmon access to Upper Wye tribs	Survey, cost benefit analysis then action	518 blocking debris dams removed 17 fish passes 19 weirs removed 1000km of stream reopened
Eden Rivers Trust Will Cleasby Will@edenriverstrust.org.uk	*Trout Beck Project*	*2004-05*	*£30,000*	*Defra RES Private*	*EN, EA, Defra*	*4 farms within Trout Beck sub-catchment*	*Physical improvements in bank side habitats Improvement in animal welfare and husbandry*	*Farm Visits, Habitat restoration carried out by ERT sub-contractors*	*3,106 metres of fencing 2,670 trees managed 8 watering points provided*

Appendix VI Examples of research projects and studies by ART members

Rivers Trusts' Research & Studies										
Trust Name & contact details	Project name	Duration / Time-table	Total Budget	Funding sources	Partners	Area & scale	Research aims	Project delivery method	Project outcomes	Availability of reports
Yorkshire Dales Rivers Trust Nick Buck nickg@buck700.fsnet.co.uk www.yorkshiredalesriverstrust.org.uk	Yorkshire Dales Rivers Trust Foundation Project	Mar 06 – Feb 09	£50k	Sustainable Development Fund Yorkshire Dales Millennium Trust	YDNA YDMT Durham University	Primarily upper Catchment R Ure	Review of the science needs of YDRT Development of more sustainable land management practices, Particular reference to diffuse pollution	Post graduate student making farm visits GIS mapping to define areas generating higher risk (SCIMAP) Educational material	PhD graduate Improved farm advisory material Educational material for Yorkshire Dales National Park Authority	Not yet available
Wye and Usk foundation Dr Stephen Marsh-Smith Stephen@wyeuskfoundation.org	pHish Powys Habitat Improvement Project	Sept 02-Dec 07	£2.2m	Ob 2 ERDF	EAW CCW FC Cardiff Uni CEH Local Wildlife Trusts	Mid Wales	Amelioration of acid waters	Hydrological source liming, WQ analysis, Diatoms, fisheries, inverts	Developing and testing a novel method for correcting acid waters on a catchment scale	2 PhD's due to report summer 06
Eden Rivers Trust Lucy Dugdale lucy@edenriverstrust.org.uk	RARE Rapid Assessment of River Environments	2003-06	£90,000	RRC	Durham University, Lancaster University EA	Catchment wide	Prioritising catchment restoration options through aerial photography and computer modelling	Aerial photography Digital terrain model GIS, electro fishing, Scimap diffuse pollution model, Land use data	A method for rapidly assessing habitat across the catchment (in-stream, riparian, and catchment diffuse pollution risk).	End of project written thesis (not yet available)