

CHALK STREAMS

Hampshire Biodiversity Partnership

HABITAT ACTION PLAN

1 INTRODUCTION

The soft, calcareous, porous rock known as chalk only occurs in England, France, Belgium and New Zealand. The rivers rising from this rock are known as chalk streams. As a result of a combination of climate, geology and human activity, they have several characteristic features that encourage a diverse and particular flora and fauna.

In England, chalk streams are found in hills (downs) and plains within a crescent extending from Dorset, through Kent and Hertfordshire to Norfolk and North Humberside. This collection of watercourses constitutes the most important resource of its type in Europe (UK Biodiversity Steering Group 1995).

Chalk streams are an important habitat in a national and international context. They are a key habitat in the UK Biodiversity Action Plan¹ (BAP). Their inclusion in the Hampshire BAP² is an acknowledgement of this importance and recognition of the fact that the county contains a number of major chalk stream rivers.

The aim of this Action Plan is to reverse the loss and decline in quality and biodiversity of chalk stream habitat in Hampshire.

2 CURRENT STATUS

2.1 Description of Habitat

Chalk rivers have characteristic plant communities, often dominated in mid-channel by river water crowfoot (*Ranunculus penicillatus* var *pseudofluitans*) and starworts (*Callitriche obtusangula* and *C. platycarpa*), and along the margins by watercress (*Rorippa nasturtium-aquaticum*) and lesser water-parsnip (*Berula erecta*). The channels have low banks and a range of associated water-loving plants.

All chalk rivers are fed from groundwater aquifers, producing base-rich water of a good chemical quality, high clarity, and a generally stable flow and temperature regime. These water conditions in conjunction with gravel substrate support an

abundant and diverse invertebrate community. This community contains many specialised and rare species such as the fine-lined pea mussel, *Pisidium tenuilineatum*, and the mayfly, *Paraletophlebia weneri*, which is typically found in winterbournes, due to its egg's ability to survive periodic droughts.

Chalk rivers are also notable for their important fisheries, generally game species such as brown trout (*Salmo trutta*) and Atlantic salmon (*Salmo salar*). Other important fish species include brook lamprey (*Lampetra planeri*) and bullhead (*Cottus gobio*). Additional key species found in chalk streams include otter (*Lutra lutra*), water vole (*Arvicola terrestris*) and white-clawed crayfish (*Austropotomobius pallipes*) – all identified as priority species in the UK Biodiversity Action Plan.

Chalk rivers have four categories of watercourses¹¹:

Winterbournes – streams that have a naturally dry period each year except in unusual circumstances.

Perennial headwaters – first order streams below the perennial head that dry out only in exceptional circumstances.

Classic chalk streams – streams that are normally less than 10 metres in width and never dry out.

Large chalk rivers – rivers that are generally wider than 10 metres.

Most chalk rivers have winterbourne stretches in their headwaters that are important and unique habitats in their own right. A characteristic range of invertebrates and the brook water crowfoot (*Ranunculus peltatus*) have adapted to the ephemeral flow regime of winterbournes. They also provide extensive spawning and nursery areas for salmonid fish species. In addition, the flow derived from winterbourne springs and other spring heads along chalk valley sides has a significant impact on the hydrology and thus ecology of chalk rivers.

The surrounding floodplains of most chalk rivers contain unimproved wet grassland and fen and are of immense importance for

breeding wader birds and wintering wildfowl. Lowland wet grassland, floodplain grazing marsh and fen meadow are together the subject of a separate HAP.

Classification of chalk rivers may be undertaken with respect to macrophyte assemblages. In a recent classification of British rivers based on macrophyte communities, gradient, substrate and hydrology, Holmes et al³ identified two key River Community Types (RCT) for chalk rivers:

- Type III RCT's – classic perennial chalk streams with >80% chalk in their catchment (e.g. Rivers Test and Itchen). These rivers have a higher species richness than any other lowland river community in the UK (>50 species per km).
- Type I RCT's – catchments of mixed geology where chalk is an important component (e.g. River Loddon).

Species such as greater pond sedge (*Carex riparia*), unbranched bur-reed (*Sparganium emersum*) and fennel-leaved pondweed (*Potamogeton pectinatus*) are much more likely to be found in catchments of mixed geology than in Type III rivers. These two main RCT's can be further sub-divided into 6 sub-types with reference to their macrophyte communities.

Since the widespread clearance of forest around 1000 BC, chalk streams have been heavily influenced by man's activities. The Romans and Saxons began the impounding of streams for milling purposes. As a result, gradient and stream flow energy was reduced, with an associated increase in siltation upstream of the impoundments. The mills also presented barriers for the passage and migration of fish, along with some mammals and aquatic invertebrates.

Later, alteration of drainage patterns of fields in the valley bottoms commenced, reaching a peak between 1650 and the early 1900's in the elaborate system of water meadows. These were heavily managed systems that tended to produce a narrow floral community. The remaining water meadows were often managed for their nature conservation interest in a less intensive manner, resulting in biologically rich habitats that support key species such as Southern Damselfly (*Coenagrion mercuriale*).

The rise in popularity of fly-fishing in the mid-late 1800's led to significant changes in the management of many chalk rivers, with associated changes in their habitat. Trees were removed, banks cut and weed cutting

programmes initiated with the aim of promoting the growth of 'desirable' macrophytes such as water crowfoot. Many of these traditional practices continue today. In addition, much recent attention has focused on narrowing and shallowing river channels in response to low flows and previous dredging, and the improvement of spawning gravels for salmonid fish.

As population levels increased, human and animal sewage affected chalk rivers, increasing the amounts of suspended solids and nutrients, particularly phosphate, entering the rivers. The demand for water resulted in increased abstraction of subterranean resources, often at the expense of river flow.

Intensive agriculture in conjunction with drainage has destroyed areas of wetland and degraded river corridors. Urban pressures have led to bank reinforcement and further degradation of river corridor habitat. The establishment of large watercress beds and fish farms have significantly altered both the local water resource regime and water quality.

2.2 Distribution and Extent

There are approximately 35 chalk rivers and major tributaries in the UK, from 20 to 90 km in length, located mainly in south and east England. Hampshire supports a significant proportion of this internationally important habitat. The county contains all or part of seven main river systems:

- River Itchen – total catchment area 400 km², of which 360 km² is chalk. The length of the Itchen from source to sea is approximately 42 km but for much of its length it is multi-braided, giving a total length of watercourse nearer 100 km. Main tributary streams include the Candover Brook, River Alre and Tichbourne.
- River Test – total catchment area 1260 km². Total length from source to sea is approximately 50 km. Main tributary streams include the Bourne Rivulet, River Anton, River Dever, Wallop Brook, and River Dun.
- River Avon – total catchment area 1760 km² (not all within Hampshire). The total length is 205 km (approximately 50-60 km in Hampshire). The main chalk tributary stream in Hampshire is the Allen River. Other tributaries drain the New Forest and comprise nutrient poor acid waters.
- River Meon – total catchment area 105 km² and total length approximately 40

- km. The only main tributary is the Whitewool Stream
- River Loddon – main tributary is the River Lyde.
 - River Whitewater.
 - River Wey, North.

2.3 Legislation and Site Designation

The Rivers Avon, Itchen and Test and many of their tributaries have been designated as Sites of Special Scientific Interest (SSSI).

Under the EU Habitats and Species Directive (92/43/EEC), Special Areas for Conservation (SACs) are being designated to protect listed species and habitats. The SAC candidate list includes:

- River Itchen – for floating beds of aquatic plants (including *Ranunculus*) and the southern damselfly (*Coenagrion mercuriale*);
- River Avon – for floating beds of aquatic plants (including *Ranunculus*), Atlantic salmon, bullhead (*Cottus gobio*), sea and brook lampreys (*Petromyzon marinus* and *Lampetra planeri* respectively), and Desmoulins whorl snail (*Vertigo moulinsiana*).

The Avon Valley (Bickton to Christchurch) SSSI is also a Special Protection Area (SPA) under the EC Birds Directive and is a Ramsar Site.

The valleys of the Rivers Avon and Test are designated as Environmentally Sensitive Areas (ESA).

The Rivers Avon, Test, Itchen, Meon and sections of the Wey and Loddon are designated as salmonid fisheries under the EC Freshwater Fish Directive (78/659/EEC). Sections of the Wey and Loddon (including some tributary streams) are designated as cyprinid fisheries under the same legislation. This Directive sets imperative and guideline figures for a number of water quality parameters.

A very small section of the River Itchen, along with the Upper Meon falls within the East Hampshire Area of Outstanding Natural Beauty (AONB).

There are a large number of water dependent SSSIs and Sites of Importance for Nature Conservation (SINCs) associated with Hampshire chalk rivers, chiefly based on the extensive watermeadow systems that characterise the valleys. Examples include:

- Avon Valley (Bickton to Christchurch) SSSI
- Floodplain fen meadows within the Itchen Valley, including Itchen Valley Country Park (SSSI) and Winnal Moors Nature Reserve (SSSI)
- Wet, unimproved grassland at The Moors SSSI, Bishops Waltham
- Greywell Fen SSSI (calcareous valley mire)
- Mapledurwell Fen SSSI (caliculus fen)
- Basing Fen SINC (calcareous peatland, including fens, reed beds and alder carr)
- Warnborough Green SSSI (marshy meadows)
- The Rivers Meon and Anton SINCs
- The River Lyde, Loddon, and Whitewater SINCs are being considered in the next review of the Basingstoke Local Plan

Certain species associated with chalk streams have protection under legislation: for example brook lamprey (*Lampetra planeri*), Atlantic salmon, bullhead (*Cottus gobio*) and otter (*Lutra lutra*) are listed in Annex II of the EC Habitats Directive. Annex V provides the opportunity to regulate exploitation of species such as grayling (*Thymallus thymallus*) and barbel (*Barbus barbus*) at a level compatible with their being maintained at a favourable conservation status.

3 CURRENT FACTORS AFFECTING THE HABITAT

Many interconnected activities affect chalk rivers. The impacts of each activity are indicated in italics.

- Groundwater and surface water abstraction. *Reduction of river flows. Lowering of groundwater levels.*
- Impacts of mineral extraction. *Direct damage to habitat. Indirect damage due to changes in local water regime.*
- Loss and fragmentation of floodplain habitats and inappropriate bank management due to drainage, agricultural practice and building development. *Habitat loss or damage. Changes to species assemblages.*
- Pollution from point and diffuse sources, including eutrophication and synthetic pyrethroids due to effluent from sewage treatment works, industry and agriculture. *Death or injury to a range of species. Changes to species assemblages.*

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- Mill impoundments. *Disruption to fish and mammal migration. Gross modification of habitat.*
- Insensitive fisheries management, including stocking and culling practices, and inappropriate works to banks. *Damage to habitat, genetic and behavioural interaction with wild fish. Changes to fish species assemblages.*
- Impacts of fish farming and cress farming. *Increased risk of local low flows and water quality perturbations.*
- Insensitive land drainage, flood defence works (including weed cutting) and artificial channel modification. *Loss and reduction in quality of habitat. Direct impact on fish fry and invertebrates.*
- Polarisation of management of field drainage systems, with neglect of some and overdredging of others. *Changes in habitat quality and availability.*
- Introduction of invasive plant and animal (including alien fish) species. *Loss of species diversity. Habitat damage.*
- Increasing recreational pressure in sensitive areas. *Disturbance of rare and sensitive species. Direct habitat damage.*
- Reduction in groundwater recharge due to urban development. *Reduced river flows. Lowering of groundwater levels.*
- Climate change. *Impacts unpredictable.*

4 CURRENT ACTION

4.1 Site and Species Protection

- Current UK and International designations are described in section 2.3. Under the EC Birds and Habitats Directive and Conservation of Natural Species and Habitats Regulations, the EA has particular responsibilities for SPA and SAC (Natura 2000) sites. A review of all existing authorisations (e.g. consents to discharge, water abstraction licences) and activities (e.g. flood defence work) potentially affecting these sites is currently underway, using a methodology agreed with English Nature (EN). Any applications for new authorisations, which effect Natura 2000 sites, will be subject to a full impact assessment.
- EN and the EA have successfully bid for EU LIFE funding for the Avon cSAC. The

project will focus on safeguarding “floating formations of *Ranunculus*” by developing catchment-based river conservation strategies, identifying conservation measures which meet the ecological requirements of *Ranunculus*, developing techniques to address key issues (such as siltation and channel morphology) and promoting cost effective assessment techniques. In the Itchen cSAC, work to conserve the southern damselfly will include implementing sound management on all extant sites, and restoring and creating new habitats where appropriate.

- The Wildlife and Countryside Act (1981) is the primary legislation by which EN can protect designated sites (SSSI, National Nature Reserves etc) and key species (e.g. white-clawed crayfish, otters). The River Avon Strategy and Consenting Protocol is an agreement between EA and EN which will guide the work of the two organisations in the Avon and ease the administration of consents for third parties. Similar consenting protocols are being developed for the Test and Itchen SSSIs.
- The Environment Act came into force in 1995. Under this act, the Environment Agency has three primary statutory duties in respect of nature conservation:
 - To further, wherever possible, conservation when carrying out water management functions. This duty also applies to the Salmon and Freshwater Fisheries Act 1975, Land Drainage Bylaws and the Water Resources Act 1991, and can be applied to consenting functions.
 - To have regard to conservation when carrying out pollution prevention and control functions.
 - A duty to promote the conservation of aquatic flora and fauna.
- The Conservation (Natural Habitats etc) Regulations 1994 states the importance of rivers as wildlife habitat, and as corridors for the movement and passage of wildlife. As such their protection and management is encouraged. This is also recognised in DOE PPG 9 Nature Conservation.
- Environmental input aimed at protecting key sites from development in Hampshire is undertaken at a regional level through the South East Regional Planning (SERPLAN) strategy and at a county level by input into Development Plans, Structure Plans, Unitary Development Plans, Local Plans, Mineral Local Plans and Waste Local Plans. Hampshire County Structure Plan covers the

period up to 2001, with a review of the plan period to 2011 recently completed.

- The Environment Agency (Thames Region) is promoting the adoption of standardised riverine criteria for Sites of Importance for Nature Conservation (SINCs) with Hampshire County Council.

4.2 *Habitat Management and Programmes of Action*

- Local Environment Agency Plans (LEAPS) have been produced for all river catchments in the county. They replace 'Catchment Management Plans' and reflect the wide range of activities that the EA is involved in. Their key aim is to produce a local agenda of integrated action for environmental improvement following consultation with external organisations and the general public. Parts of this agenda will provide reinforcement and support for the objectives of this Action Plan.
- The EA has submitted its proposals for the National Environment Programme (NEP) to secure environmental investment from the water companies for the period 2000-2005. The water companies are taking action under the NEP, and the River Wey North and the Wallop Brook have been designated as ALF (Alleviation of Low Flow) rivers via this process.
- Environmentally Sensitive Areas (ESAs) and Countryside Stewardship (CS) are the two MAFF agri-environment schemes most likely to have a positive impact on chalk streams. Both schemes are administered locally by the Farming and Rural Conservation Agency (FRCA).

The aim of the Test and Avon ESAs is to maintain the pastoral landscape character and wildlife of the valleys by encouraging appropriate management of damp grassland and watercourses. Tiers of management prescriptions have been established which attract increasing levels of payment as agricultural inputs and grazing intensity decrease. Typically, these prescriptions would include the raising of water levels to encourage surface flooding in winter, and high water tables/shallow pools in spring and early summer. Grants are also available to landowners for capital works such as water management structures and willow pollarding, and for reversion of arable land to extensive permanent grassland.

Countryside Stewardship applications are assessed against their potential to restore appropriate grassland management

(including measures to raise water levels), to establish grass buffer strips on arable land adjacent to watercourses, and to restore typical river valley landscape features such as pollards, hedgerows, ditches and ponds. Both ESA and CS schemes complement the aims of initiatives such as the South-east Otters and Rivers Project, run as a partnership between EA and the county wildlife trusts of Hampshire and the Isle of Wight, Sussex and Kent.

- MAFF have produced a publicity pack highlighting the issue of soil erosion and the Codes of Good Agricultural Practice for Water and Soil have recently been revised and re-launched.
- The Itchen Valley Management Strategy produced by Hampshire County Council in 1995, drew together a range of plans and policies relating to the valley, and makes recommendations for maintaining and enhancing its nature conservation value. The six key elements of the strategy are land use planning and development control, river management, conservation and land management, implementation, information and monitoring, and liaison and consultation.
- EA in partnership with private landowners and others, are promoting 'River Restoration' schemes at a number of locations including the River Avon at Hale and Downton. The latter scheme forms part of a wider proposal to increase floodplain storage and reduce flooding in Downton.
- As statutory planning consultees, the EA are promoting the use of source control measures to ameliorate the impacts of surface water run-off quality and quantity from new developments where appropriate.
- EA is currently working with the Watercress Growers Association and the Horticulture Development Council to develop best practice advice to watercress growers to reduce the impact of their operations on the environment.
- EA has undertaken a number of collaborative enhancement projects on chalk rivers, not only to improve instream habitat for fish, but also to provide wider conservation benefits to other species. Key enhancements include the creation of new gravel riffles and the desilting of existing salmonid spawning gravels using high pressure water jets and the bypassing of impounding structures. Bioengineering techniques using groyne and hazel faggots to narrow over-widened sections of river have also been effective. EA Southern, South Wessex and Thames Regions have



together spent over £250,000 on enhancements in the last 3 years.

- EA Thames in partnership with others, is developing two significant partnership projects for the River Wey catchment: The 'River Wey Fishery Strategy' and the 'Wey Valley Project'.
- The 'Avon Valley and West Hampshire Project', run by Hampshire Wildlife Trust, is working with landowners in the Avon Valley to improve the conservation status of important nature conservation sites.

4.3 Action For Species

Table 1 (Appendix 1) gives details of priority species in Hampshire found primarily in chalk streams. Action proposed in this Plan is the principal means of conserving most of these species, apart from four species (white-clawed crayfish, southern damselfly, water vole and otter) that have individual Hampshire species action plans (SAPs). In some cases additional action plans and programmes will also contribute to conserving priority species: for example, UK Species Action Plans (UK SAP), and Butterfly Conservation Regional Action Plans (BC RAP).

Table 3 (Appendix 1) lists those Hampshire priority species that occur in chalk streams but whose main habitat is **not** chalk streams. Although action in this chalk streams HAP may contribute to the conservation of these species, other HAPs have key responsibility for their conservation. Ten of the species on Table 3 have been identified as requiring a SAP.

Species Action Plans have been prepared for the following species in Hampshire. Key actions with respect to chalk rivers that are currently being undertaken and are proposed for the future are shown for each species:

- Otter⁴. Intensive monitoring of the River Itchen's population through regular surveying and the initiation of a DNA fingerprinting research project. Fish tissue analysis for the determining the presence of accumulated toxins. Undertaking of habitat improvement schemes and artificial holt construction. Undertaking of a systematic survey of road and railway crossings in Hampshire. Implementation and experimentation with associated mitigation techniques. Co-ordination of this work is undertaken by the South - East Otters and Rivers Project (a

collaboration between the county wildlife trusts of Hampshire, the Isle of Wight, Sussex and Kent, and the EA). The Surrey Otter Project, supported by the EA is undertaken a range of initiatives to encourage otter recolonisation of the River Wey catchment.

- Southern Damselfly⁵. The Hampshire Southern Damselfly Group (HSDG) comprising of representatives from EN, EA, HWT, British Dragonfly Society, Forestry Commission and Eastleigh Borough Council exists to produce, oversee implementation and monitor the Hampshire Southern Damselfly SAP. Eastleigh Borough Council with assistance from the EA continues to implement and refine a plan for Itchen Valley Country Park, with surveys undertaken in 1997 and 1998. EN and EA are currently producing Conservation Strategies for the Rivers' Avon, Test and Itchen SSSI's. The HSDG commissioned an audit of Southern damselfly in Hampshire in 1998. A number of new sites were identified in the Itchen Valley, with more sites recorded during a more comprehensive survey in 1999. As a consequence, the cSAC will be reviewed in the light of these discoveries by EN during 2000.
- Pipistrelle Bat⁶. Wetlands are particularly important for pipistrelle bat feeding. As a consequence, they have a strong affinity with chalk rivers and associated wetland areas, especially when they are in close proximity to pipistrelle roost sites. Field monitoring continues within Hampshire. Survey work is being undertaken by the Bat Conservation Trust, EN Bat Wardens and the HWT Bat Group.
- Water vole⁷. An intensive trapping and radio tracking study carried out by Sparsholt College, with EA support commenced in 1995. Associated studies on feeding ecology, disease, parasitology and winter mortality has since commenced. A full survey and report of the River Itchen catchment was undertaken in 1996, along with an audit of the species in the County. The survey highlighted the Itchen Valley as supporting one of the best riverine water vole populations in the UK. The Wey Mammal project is prioritising water vole initiatives, particularly with respect to the North Wey.
- White-clawed crayfish⁸. The Hampshire Native Crayfish Project (Sparsholt College, EN, EA and East Hants AONB)

was established in 1995. Enhancement work undertaken on the Candover Brook. Captive rearing unit established Sparsholt College. A collaborative project between the EA and Sparsholt College in 1998 found no signs of crayfish on the River Avon in Hampshire.

A number of initiatives aimed at enhancing self-sustaining stocks of fish, particularly brown trout and salmon, are currently in train. These include:

- an investigation of wild trout breeding success by the Game Conservancy
- the loaning of gravel cleaning equipment by the EA to fishery owners in order to enhance hatching success of salmonid eggs
- the production of the Salmon Action Plans⁹ for the Test, Itchen and Avon catchments by the EA
- actions to improve migration conditions for ascending adult salmon and descending smolts (EA)
- actions to increase the accessible spawning range for salmon (scoping study completed by the EA)
- introduction of legislation to reduce exploitation of Atlantic salmon, particularly multi-sea winter (MSW) fish by rod and net (EA)
- implementation of legislation to adequately screen fish farm and other water utility intakes to prevent entrapment of salmonids and coarse fish, and prevent the escape of farmed fish (EA)
- the establishment of a suite of studies to assess the status of coarse fish stocks on the Avon in Hampshire and threats to them (EA)
- the production of a Fisheries Management Strategy for the River Wey (EA).

A partnership project between EA and the Wiltshire Wildlife Trust, has been established with the aim of studying the status of the depressed river mussel (*Pseudanodonta complanata*) in the Avon. In addition, EA and EN are carrying out studies on the large-mouthed valve snail (*Valvata macrostoma*) on the Lower River Avon.

4.4 Survey, Research and Monitoring

- Water resources and water quality management play a key role in determining the value of the chalk stream habitat and which species are associated with it. The following studies and initiatives have been

instigated by the EA, working with the water companies, in order to address these issues:

- Investigations of the impact of abstractions on the Avon at Knapp Mill and the River Itchen and on the Wallop Brook at Broughton. The main purpose of the study on the Avon is the facilitation of the migration of Atlantic salmon, although significant knock-on benefits can be expected for a range of species and habitats.
- Actions to improve the collection and reporting of groundwater data in catchments with a view to contributing to the 4-yearly review process of 'Nitrate Vulnerable Zones' in 2001.
- Requisition of septic tanks (many poorly maintained) by the First Time Sewerage scheme under the AMP process. However, this can lead to low flows and should not be promoted until a full impact on water flows has been considered in each case.
- An investigation into the causes of water quality failures in the Avon. The Avon in Hampshire has been designated as a Sensitive Area (eutrophic) under the Urban WasteWater Treatment Directive. The EA will be working in partnership with EN and the water companies under AMP3 to ensure that, where appropriate, a reduction in some nutrients occurs prior to the discharge of treated sewage effluent. Monitoring will be undertaken to assess the effectiveness of point source nutrient reduction.
- An investigation of abstraction on the North Wey at Alton as part of the AMP3 process.
- Routine water quality surveys (General Quality Assessments) and biological quality (Biological Monitoring Working Party) surveys are undertaken by the EA. These are used to assess current water quality and compare it with recorded historic data.
- The EA and other organisations undertake River Habitat Surveys (RHS) and River Corridor Surveys (RCS). These are used both to protect conservation interests with respect to planning proposals, water resource applications, effluent discharge applications and routine river maintenance operations. In addition, RHS data is inputted into a national data base, which has applications at both a local and strategic level.
- Research aimed at studying impacts on riverine habitat includes:



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- Significant input from the EA and Hampshire Biodiversity Partnership into the national chalk stream research and development project¹¹.
- A study by the Ministry of Agriculture, Fisheries and Food, and the EA to assess the impact of large flocks of unmated mute swans on *Ranunculus*⁸
- The development and implementation of a programme of winterbourne surveys.
- The identification and implementation by the EA of water quality, flow and management requirements in order to maintain the favourable conservation status of species/habitats within Habitats Directive sites.
- In response to concerns regarding the health of the Test and Itchen, the EA commenced monitoring (in 1991) of the seasonal dynamics of macrophytes at a number of reference sites. Computer models have been constructed to analyse these survey data. In a further study, an audit of the impacts of weed cutting on the Avon in Hampshire is being undertaken. Findings from these studies will be used by EA to modify weed management practices to reduce detrimental impacts on river ecology.
- The development of Strategic Water Level Management Plans (WLMP) by the EA for all water dependent SSSI's in Hampshire.
 - Specific studies to research fish stocks in Hampshire chalk rivers include:
 - Research and development project (EA South Western and Southern Regions) to improve the understanding of the mechanisms controlling chalk stream salmon populations.
 - Improved monitoring of salmon stocks using fish counters, radio-tracking, electrofishing studies, tagging and smolt counting (feasibility study undertaken).
 - An investigation into why the Avon between Downton and Fordingbridge is under-used by salmon.
 - An EA Thames Region funded study has been undertaken to evaluate rivers for BAP priority invertebrate species. This study revealed good populations of *Psidium tenuilineatum* in the lower River Loddon.

5 OBJECTIVES

The overall aim of this Plan is to protect and enhance the biodiversity of chalk streams in Hampshire. This broad aim translates into the specific objectives set out below. Where feasible, objectives have been allocated targets against which achievement can be measured: for example, total areas to be restored or dates for completion. The 'Proposed Action' table in section 6 identifies the action to be taken to meet these objectives.

	OBJECTIVE	PROPOSED ACTIONS
A	Protect and maintain the characteristic habitats and associated species of chalk rivers in Hampshire, including the winterbourne reaches	1, 6-13, 16, 28, 36
B	Improve the condition of chalk streams and their characteristic habitats and species, and specifically:	6, 10, 11, 13, 16, 17, 19-21, 23
B1	▪ enhance water quality and water flow to bring all SSSI rivers into favourable conservation status by 2010 .	2-5, 7, 12, 22
B2	▪ restore and enhance the physical habitat of <u>30km</u> of chalk stream by 2010 .	14, 24, 29
C	Ensure that the needs of Hampshire Priority Species associated with chalk rivers are met	25
D	Improve knowledge of the chalk stream habitat and associated species through survey, research and monitoring.	5, 15, 16, 22, 26, 27, 29-33
E	Promote the value of chalk streams, associated species and threats to them. Communicate with and provide information to key sectors including statutory agencies, NGO's, landowners, angling organisations, schools and community groups	9, 15, 18, 20, 21, 26, 27, 30, 34-37

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6 PROPOSED ACTION

The following table lists the actions required to achieve the objectives set out in this Plan. Each action has been assigned to one or more 'Key Partners'. **Key Partners** are those organisations that are expected to take responsibility for the delivery of the actions assigned to them, according to the targets set in this Plan. Other organisations may also be involved in the delivery of action, and they have been indicated in the 'Others' column.

Key to symbols in Action Table:

- ◆ To be completed by the indicated year. Work can commence at any time before the due date, at the discretion of the Key Partner.
- ◆⇄ Design or production of a plan/strategy to be completed by this year and then followed by its implementation.
- ➡ To start by the indicated year and usually followed by ongoing work. A start arrow in year 2000, can indicate a new action or a new impetus to existing work.
- ⇄ Work that has already begun and is ongoing.

	ACTION	DELIVERY BY		YEAR						MEETS OBJ.
		Key Partner	Others	2000	2001	2002	2003	2004	2010	
◆ = complete by ◆⇄ = design by and implement ➡ = start by ⇄ = ongoing										
Habitat Protection										
1	Review the selection of riverine SACs and SSSIs and ensure all sites containing key habitats and species are appropriately designated	EN						◆		A
2	Assess the need for improvements to consented discharges into SSSI rivers, including the need to reduce point source phosphate discharge as part of the LEAP process (SACs via Habitat Regulations review). Pursue changes required through the AMP3 and AMP4 programmes.	EA, WC	EN	◆⇄				◆		B1
3	Review consents for current abstractions and mineral operations in SSSI catchments in order to optimise water resources to benefit nature conservation interests as part of the LEAP and WLMP processes (SACs via Habitat Directives review). Pursue changes required through the Alleviation of Low Flow scheme, AMP3/AMP4 programmes and Environment Act review of minerals permissions	EA, WC	EN	◆⇄				◆		B1
4	Prepare Water Level Management Plans for all sections of the SSSI rivers by December 2000 and a plan for implementation by March 2001.	EA	EN, HCC, MAFF	◆	◆⇄					B1

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5	As part of the WLMP process, map the location and ownership of all sluice and level control structures in SSSI chalk rivers. Where possible, develop operating agreements with owners that optimise nature conservation interests, whilst taking account of existing water users and legislation	EA, EN	HCC, MAFF					◆		B1, D
6	Through the statutory planning process, seek to protect and enhance chalk river habitat and associated species wherever appropriate.	LAs, EA EN	HWT	⇔	⇔	⇔	⇔	⇔	⇔	A, B
7	Implement the EU LIFE project for the River Avon	EA, EN	HWT	◆⇔				◆		A, B1
8	Undertake a review of the criteria for Sites of Importance for Nature Conservation for chalk streams and implement.	HCC	EA, EN, HWT, DCs		◆⇔					A
9	Develop and implement actions to address the impacts of recreational demands on biodiversity.	EA, HCC	EN, HWT				◆⇔			A, E
10	Review/develop site acquisition policies and purchase sites of conservation value in chalk river corridors where appropriate.	HCC, EN	HWT	➡						A, B
11	Promote actions to protect and restore minor chalk watercourse, springs and winterbournes.	EA	EN, HWT, HCC, S&TA	⇔	⇔	⇔	⇔	⇔		A, B
Habitat Management, Incentive Schemes and Other Resources										
12	Review management of all chalk stream SSSIs and cSACs to ensure favourable management	EN/EA	MAFF	◆⇔						A, B1
13	Ensure favourable management of all non-SSSI (e.g. SINCs) chalk streams	EA	HCC, HWT, MAFF/FRCA	➡						A, B
14	Address the impacts of riparian habitat damage, including non-point source (diffuse) pollution, along 30km of chalk river by 2010	EA, EN	MAFF/FRCA						◆	B2
15	Promote the incorporation of biodiversity criteria into the scoring system for evaluating applications for Countryside Stewardship.	EN, EA, HWT	MAFF/FRCA		◆					D, E
16	Review targets for Test and Avon valley ESAs for next 5 years to encourage protection and enhancement of chalk river habitat	MAFF/ FRCA	EN, EA, HWT	◆						A, B, D
17	Under agri-environment schemes, promote a reduction in stocking rates where significant bank damage is occurring and where this will not damage existing nature conservation interests, in order to reduce the ingress of silt (see also HAP for Lowland Wet Grassland ¹⁰).	MAFF/ FRCA	FWAG, EA, EN	➡						B

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	ACTION	DELIVERY BY		YEAR						MEETS OBJ.
		Key Partner	Others	2000	2001	2002	2003	2004	2010	
				◆ = complete by ◆⇄ = design by and implement ➡ = start by ⇄ = ongoing						
Habitat Management, Incentive schemes and Other Resources (continued)										
18	Provide advice to riparian owners and fishery organisations regarding the management of their reach of chalk river.	EN, EA, HWT	MAFF/FRCA, FWAG	⇄	⇄	⇄	⇄	⇄	⇄	E
19	Extend the LANDCARE programme to cover the Rivers Meon, Test and Itchen catchments.	EA, EN, LAs	HWT, MAFF/FRCA, FWAG	➡						B
20	Work in partnership with the Test and Itchen Association, Game Conservancy, Wild Trout Society, Wessex Chalk Streams Project, Salmon and Trout Association and individual landowners to agree (2002) and implement (2004) fishery management guidelines compatible with nature conservation interests of chalk rivers.	EA, EN	GC, WTS, T&I, S&TA			◆⇄				B, E
21	Maximise uptake of agri-environment schemes to landowners adjacent to chalk streams	MAFF/FRCA, EA	EN, HCC, HWT, RWP	⇄	⇄	⇄	⇄	⇄	⇄	B, E
22	Collate findings of the Avon, and Test and Itchen macrophyte studies, the EA <i>Ranunculus</i> R&D project and the MAFF study of the impacts of grazing swans on <i>Ranunculus</i> , and. develop and implement guidelines for macrophyte management, including cutting, in chalk rivers.	EA				◆⇄				B1, D
23	Promote the inclusion of the River Wey valley into the target areas for Countryside Stewardship Scheme	EA, MAFF/FRCA		➡						B
24	Using RHS, RCS and hydro-geomorphological data, identify opportunities for site specific instream and riparian enhancement to fulfil Objective B2. This will not include the Avon which is covered by the LIFE study.	EA, EN	HWT						◆	B2
Species Action										
25	Prepare Species Action Plans (SAPs) for species associated with chalk streams which are not adequately covered by this Plan or others, as identified in Appendix 1.	EA, HWT, EN	HCC			◆				C
26	Develop and implement actions to address the impact of alien species on chalk river biodiversity.	EA	EN, MAFF	➡						D, E
27	Provide support to, and implement the findings of Salmon Action Plans.	EA	EN	➡						D, E

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28	Ensure that Hampshire Priority Species are taken into account in the planning process.	LAs	EA, EN, HWT	↔	↔	↔	↔	↔	↔	A
Survey, Research and Monitoring										
29	Monitor the impacts of site specific river /riverside restoration schemes	EA, EN, MAFF/FRCA	HWT	➔						B2, D
30	Support and develop the existing research of the brown trout and Atlantic salmon populations of chalk rivers.	EA, MAFF	S&TA, EN	↔	↔	↔	↔	↔	↔	D, E
31	Develop catchment specific targets or generic targets for all rivers, for a range of physical and chemical parameters that type a chalkstream's wellbeing.	EN, EA	HWT, HCC			◆				D
32	Produce and implement a survey and monitoring programme to assess progress towards action plan targets	EA	EN, HWT, HCC		◆↔					D
33	Assess the potential effects of climate change on chalk stream habitat. Develop actions to address these changes.	EA,EN	HCC, HWT, MAFF	➔						D
Communication and Publicity										
34	Support actions identified in the Education and Awareness Action Plan relevant to chalk streams.	ALL		➔						E
35	Promote the production of an educational package via the National Chalk River BAP, directed at secondary school level, detailing the value of, threats to and actions being taken to protect chalk rivers. Seek to have package adopted as part of curriculum for geography or environmental science at a National Level.	LAs, HCC, EN	EA, EN, HWT	➔						E
36	Provide specialist advice to planning authorities, institutions etc.	EA, EN, HWT	HCC, MAFF/FRCA	↔	↔	↔	↔	↔	↔	A, E
37	Establish or build upon existing networks for the exchange of information relating to chalk streams and their conservation	EA	HCC, EN, HWT	➔						E

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KEY TO ORGANISATIONS

EA Environment Agency
 EN English Nature
 FRCA Farming and Rural Conservation Agency
 FWAG Farming and Wildlife Advisory Group
 GC Game Conservancy
 HCC Hampshire County Council
 HWT Hampshire Wildlife Trust

LAs Local Authorities
 MAFF Ministry of Agriculture, Fisheries and Food
 RWP River Wey Project
 S&TA Salmon and Trout Association
 WLMP Water Level Management Project
 T&I Test and Itchen Association
 WTS Wild Trout Society

APPENDIX 1

Key to abbreviations in Tables 1 and 2 – see ‘Action in addition to HAP’ and ‘Status/Protection’

Abbreviation	Definition
ACTION IN ADDITION TO HAP (Other Plans Relevant to Priority Species)	
UK SAP	Species Action Plan prepared under UK Biodiversity programme
UK Grouped SAP	Species catered for by a grouped Species Action Plan prepared under UK Biodiversity programme
UK Species Statement	Conservation of species generally achieved through HAPs. Statement prepared under UK Biodiversity programme to link the relevant Plans.
No Plan	Species removed from revised UK priority list. No Action Plan / Species Statement produced
BC RAP	Butterfly Conservation Regional Action Plan
BC NAP	Butterfly Conservation National Action Plan
PROTECTION: European (EC Habitats Directive)	
Annex II	Designation of protected areas for animals and plants listed
Annex IV	Special protection for animals and plants listed
Annex V	Control of exploitation of animals and plants listed
PROTECTION: British (Wildlife and Countryside Act 1981)	
Sch. 1	Special protection for birds listed
Sch. 5	Special protection for animals listed
Sch. 5 (sale)	Protection against sale for animals listed (Schedule 5 section 9 (5))
Sch. 8	Special protection for plants listed
STATUS: International (International Union for the Conservation of Nature)	
IUCN VU	Vulnerable – Species facing high risk of extinction
IUCN LR/cd	Lower Risk / conservation dependent species – Species that do not satisfy the criteria for ‘Critically Endangered’, ‘Endangered’ or ‘Vulnerable’. They are ‘conservation dependent’ if they are the focus of specific conservation programmes, which if stopped, would result in the taxon qualifying for one of the threatened categories within a period of five years.
IUCN LR/nt	Lower Risk / near threatened species – Species that do not qualify for ‘conservation dependent’ but are close to ‘Vulnerable’ status
IUCN DD	Data Deficient – Insufficient data to make a direct or indirect assessment of a species status, based on its distribution and/or population status.
STATUS: British – Mammals (Red Data Book)	
RDB	Mammal species listed in the British Red Data Book
STATUS: British – Plant and Fungi (Red Data Book and associated)	
RDB Cr	Critically Endangered – Extremely high risk of extinction in the near future
RDB En	Endangered – Very high risk of extinction in the near future
RDB V	Vulnerable – High risk of extinction in the medium-term future
RDB K	Insufficient data to assess status
NS	Nationally Scarce – Plants not on red list but occurring in 16 to 100 10x10 km squares
NT	Near Threatened – Plants not on red list but occurring in 15 or fewer 10x10 km squares
STATUS: British – Invertebrates (Red Data Book and associated)	
RDB En	Endangered – In danger of extinction
RDB V	Vulnerable – Declining or occurring in a vulnerable habitat. Usually occurs in less than 16 10x10 km squares
RDB R	Rare – Not declining but occurring in less than 16 10x10 km squares
RDB K	Insufficiently known – Suspected, but not definitely, Endangered, Vulnerable or Rare
NS (a)	Nationally Scarce – Occurring in 16 to 30 10x10 km squares (for well recorded species)
NS (b)	Nationally Scarce – Occurring in 31 to 100 10x10 km squares (for well recorded species)
STATUS: Royal Society for the Protection of Birds (Birds of Conservation Concern)	
Red List	Various criteria, including a 50% decline in breeding population or range over last 25 years
Amber List	Various criteria, including a 25-49% decline in breeding population or range over last 25 years

Table 1 - Hampshire priority species found primarily in chalk streams

Scientific name	Common name	Group	Status/Protection	Habitat/Ecology	Hants Distribution	Specific management requirements	Action in addition to HAP	Hants SAP?
<i>Orthotrichum sprucei</i>	a moss	Bryophytes	NS	On Alnus and Salix, stream/river banks at flood level	National stronghold, rare in Hants	-	UK Species Statement	no
<i>Ithytrichia clavata</i>	a caddisfly	Caddisflies	RDB R	Fast flowing rivers	National stronghold, found at one site only	-	no	no
<i>Austropotamobius pallipes</i>	white-clawed crayfish	Crustaceans	IUCN VU, Annex II, Annex V, Sch. 5 (taking/sale),	Clean, calcareous streams, rivers and lakes	Six isolated populations in the rivers Test, Itchen and Rother.	-	UK SAP	yes
<i>Cottus gobio</i>	bullhead	Fishes	Annex II	Rivers (chalk and non-chalk); high velocity and cobbles	Very common in most unpolluted streams and riverst	Unpolluted streams and rivers	no	no
<i>Lampetra planeri</i>	brook lamprey	Fishes	IUCN, LR/nt, Annex II	Clean chalk rivers	Test, Itchen, Avon catchment areas and River Lymington	-	UK SAP	no
<i>Thymallus thymallus</i>	grayling	Fishes	Annex V	Stream riffles; gravel and high velocity calcareous rivers	Test, Itchen, Avon catchment areas	-	no	no
<i>Atrichops crassipes</i>	an aquatic snipe fly	Flies	RDB R	Meandering middle sections of rivers with moderate flow	Chalk stream nr Romsey	Unpolluted waters with undisturbed banks	UK SAP	no
<i>Oenanthe fluviatilis</i>	river water-dropwort	Flw Plants	NS	Slow- to swift-flowing rivers and streams, usually in calcareous water of moderate depth.	Local - Test, Itchen, Avon and Basingstoke Canal	-	no	no
<i>Ranunculus penicillatus</i>	stream water-crowfoot	Flw Plants	-	Rivers of swift flow-rate, usually calcareous	Locally common, rivers Itchen, Test, Avon, Whitewater. Basingstoke Canal at Greywell.	-	UK SAP	no
<i>Arvicola terrestris</i>	water vole	Mammals	Sch. 5, RDB	Riparian habitats, well vegetated streams and rivers.	Uncommon, Itchen Valley stronghold, scattered on other rivers	-	UK SAP	yes
<i>Lutra lutra</i>	otter	Mammals	Annex II, IV Sch. 5, RDB	Riparian	Rare, Itchen Valley stronghold	-	UK SAP	yes
<i>Pisidium tenuilineatum</i>	Fine-lined pea mussel	Molluscs	RDB R	Clean calcareous lowland rivers, streams and canals	National stronghold; Itchen, Test, Avon, Loddon and Wey Brook	-	UK SAP	no
<i>Pseudanodonta complanata</i>	depressed river mussel	Molluscs	IUCN, LR/nt, NS (b)	Large quietly flowing rivers, with deep sediment and clean hard water.	Avon, Whitewater	-	UK SAP	no

Table 2 - Priority species, thought to be extinct in Hampshire, which are primarily associated with chalk streams

No extinct species primarily associated with chalk streams.

Table 3 - Priority species, found primarily in other habitats, but which occur in chalk streams

Scientific name	Common name	Group	Primary HAP	Hants SAP?
<i>Acrocephalus palustris</i>	marsh warbler	Birds	Fen, carr, marsh, swamp, reedbed	no
<i>Acrocephalus scirpaceus</i>	reed warbler	Birds	Fen, carr, marsh, swamp, reedbed	no
<i>Anas strepera</i>	gadwall	Birds	Open standing water	no
<i>Anser albifrons</i>	white-fronted goose	Birds	Lowland wet grassland	no
<i>Aythya ferina</i>	pochard	Birds	Open standing water	no
<i>Cettia cetti</i>	Cetti's warbler	Birds	Fen, carr, marsh, swamp, reedbed	yes
<i>Emberiza schoeniclus</i>	reed bunting	Birds	Fen, carr, marsh, swamp, reedbed	no
<i>Mergus merganser</i>	goosander	Birds	Open standing water	no
<i>Coenagrion mercuriale</i>	southern damselfly	Dragonflies	Lowland wet grassland	yes
<i>Libellula fulva</i>	scarce chaser	Dragonflies	Rivers and streams	no
<i>Platycnemis pennipes</i>	white-legged damselfly	Dragonflies	Rivers and streams	no
<i>Petromyzon marinus</i>	sea lamprey	Fishes	Marine	no
<i>Salmo salar</i>	Atlantic salmon	Fishes	Marine	no
<i>Oxycera analis</i>	a soldier fly	Flies	Fen, carr, marsh, swamp, reedbed	no
<i>Leucojum aestivum</i>	summer snowflake (Loddon lily)	Flw Plants	Fen, carr, marsh, swamp, reedbed	no
<i>Barbastellus barbastellus</i>	barbastelle bat	Mammals	Dependent on many habitats, mosaic/landscape species	yes
<i>Neomys fodiens</i>	water shrew	Mammals	Fen, carr, marsh, swamp, reedbed	no
<i>Pipistrellus pipistrellus</i>	pipistrelle bat	Mammals	Dependent on many habitats, mosaic/landscape species	yes
<i>Rhinolophus ferrumequinum</i>	greater horseshoe bat	Mammals	Dependent on many habitats, mosaic/landscape species	yes
<i>Vertigo moulinsiana</i>	Desmoulin's whorl snail	Molluscs	Fen, carr, marsh, swamp, reedbed	no
<i>Xanthorhoe biriviata</i>	balsam carpet	Moths	Lowland wet grassland	no

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- 4 'Species Action Plan: Otter', in ***Biodiversity Action Plan for Hampshire: Volume Two***, Hampshire Biodiversity Partnership, HCC, 2000.
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- 9 ***Salmon Action Plans for Rivers Avon, Itchen and Test***, Environment Agency, South West and Southern Regions.
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- 11 ***Chalk Rivers - Nature Conservation and Management***, WRc, EN and EA, 1999.

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This Plan is one of many Habitat, Species and Topic Action Plans being prepared by the Hampshire Biodiversity Partnership. It will be monitored by the Partnership and fully reviewed and updated in 2004.

This habitat action plan has been prepared by Vaughan Lewis, Windrush AEC and the Chalk Streams HAP Working Group on behalf of the Hampshire Biodiversity Partnership.

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