The State of England’s Chalk Rivers

Summary report by the UK Biodiversity Action Plan Steering Group for Chalk Rivers
Chalk rivers should be protected or restored to a quality which sustains the high conservation value of their wildlife, healthy water supplies, recreation opportunities and their place in the character and cultural history of the landscape.
Chalk rivers – an agenda for action

Chalk rivers are a unique and irreplaceable part of our heritage and the landscape of England. They face mounting pressures which threaten to damage them for ever. To make sure we tackle these problems, the UK Biodiversity Action Plan Steering Group for Chalk Rivers has produced the first ever report on The State of England’s Chalk Rivers. The report sets out how we can act to protect and enhance this precious resource. This leaflet is a summary of the report’s main findings.

Chalk rivers and their underground water stores (aquifers) provide significant quantities of water for drinking, industry, effluent dilution and agriculture. They are very important for wildlife. Many chalk rivers are world-famous for their fly-fishing and they are part of our cultural heritage. Their present appearance and character reflects a long history of human intervention from urban development, agriculture, industry and fisheries.

Today these most English of rivers are in a fragile state. They are under increasing pressure from water abstraction, urban and infrastructure development, effluent discharges, agriculture, land drainage and flood defences. Without careful management, these activities threaten the chalk river resources upon which so much wildlife and many people depend.

Our vision is that: “Chalk rivers should be protected or restored to a quality which sustains the high conservation value of their wildlife, healthy water supplies, recreation opportunities and their place in the character and cultural history of the landscape.”

To make this vision a reality, we need to:

• maintain and enhance the characteristic habitats, plants and animals of chalk rivers, including winterbourne stretches;
• restore water quality, flows and habitat diversity;
• identify cost-effective means of restoring damaged river reaches.

There are many people and organisations with a part to play in this. Policy-makers, environmental regulators, businesses and local communities all have a key role in meeting these objectives. Many who live and work alongside chalk rivers – farmers, fishermen and members of the public – are already working to protect our chalk rivers. But more needs to be done.

Despite ever increasing threats, there is optimism for the future: more and more local people are becoming involved in protecting and enhancing their chalk rivers.
The character of chalk rivers

Location
There are 161 chalk rivers and streams identified in the report. They follow the band of chalk that sweeps diagonally across England. They occur nowhere else in the UK, and are very rare in the world as a whole.

Appearance and character
Chalk river water is crystal clear. This is because the rainwater is purified as it percolates through the chalk and emerges as springs in the valley floor. As a result, the water is very alkaline or ‘hard’, with a relatively constant temperature.

>Figure 1 Chalk rivers and their associated wildlife conservation designations
River flow changes seasonally. It rises gradually during the winter as the aquifer is replenished, and gently declines in the summer and autumn as the aquifer diminishes. In some of the headwaters, known as winterbournes, this cycle results in natural drying for a few months in the summer and autumn. Further downstream, classic chalk rivers have relatively constant flows throughout the year.

Culture

England’s chalk rivers are an intrinsic part of our cultural heritage. Several are world-famous for their fly-fishing – Hampshire’s famous Rivers Test and Itchen are heralded as the birthplace of this skilful pursuit. Over the centuries, chalk rivers have inspired several famous writers and artists: Isaac Walton, the father of angling, wrote The Compleat Angler over 350 years ago; John Constable captured the beauty of the Hampshire Avon and its surrounding water meadows in his painting of Salisbury cathedral. The histories of other famous cathedral cities are entwined with the chalk rivers that flow through them: Winchester with the River Itchen; Canterbury with the River Stour; and Norwich with the River Wensum.

History

The chalk rivers we see today reflect a long history of human intervention. Comparatively few remain in a natural state.

After the prehistoric woodland clearances, most of the remaining wet woodlands in the valleys were cleared. Channels were dug, deepened and straightened so that the land could be drained for agriculture. The Romans harnessed the reliable flows to power water mills. From the 17th to the 19th centuries ‘carrier streams’ were created to flood and irrigate the water meadows where sheep and cattle grazed.

Chalk rivers and their aquifers have long provided water for drinking and industry. However over the past 100 years, there have been significant increases in water abstraction, effluent discharges and river engineering works for land drainage and flood defence. As populations expand and commerce grows, we exert ever-greater pressures on our chalk rivers.
Chalk river wildlife

Protection
Ten chalk rivers are designated as river Sites of Special Scientific Interest (SSSIs) for their wildlife interest. Of these, the Rivers Lambourn, Itchen, Wensum and Hampshire Avon are also of European importance and are candidate Special Areas of Conservation (cSACs) under the Habitats Directive.

Plants
The water plants growing in most chalk rivers are characterised by water-crowfoot, water-starwort and lesser water-parsnip. These dominate in spring and early summer. As summer progresses, watercress and water forget-me-not encroach from the margins.

To grow healthily, water-crowfoot needs clean, swift-flowing water and silt-free gravels. It became less common in the dry years of the mid-1990s. However, in the last five years river flows have increased, and it is now coming back on many rivers.

The spread of non-native invasive plants such as Japanese knotweed, giant hogweed and Himalayan balsam is an increasing threat to native bankside plants. Local attempts to eradicate them have had little success.

Invertebrates
In high-quality chalk rivers, there is a great diversity of aquatic invertebrates, with a wide range of insects such as caddisflies, mayflies, and stoneflies.

Over the past few years, anglers have become increasingly concerned about declining fly life, citing low summer flows, high winter flows, silt and water quality problems.

The southern damselfly is one of Europe’s most endangered insects. It can still be found in old water-meadow ditches and shallow channels, notably in the Test and Itchen valleys.

The white-clawed crayfish used to be extremely common in most chalk rivers. They have declined to very low levels in recent years, and have been virtually lost from many rivers, including the Hampshire Avon, Dorset Frome and the Kennet. The main reason for the decline is a fungal disease which is carried and transmitted by American signal crayfish which was introduced into the UK in the mid-1970s.
Chalk rivers support a variety of fish species. These include brown trout, salmon, grayling, bullhead and lamprey. Numbers of salmon in southern chalk rivers declined in the late 1980s and have stayed at very low levels.

Much of today’s fly-fishing on chalk rivers is dependent on stocked trout. Stocking too many trout in a river may affect populations of wild trout and alter the balance of the fish community.

> Figure 2 Return of adult salmon to three chalk rivers, 1988-2001

![Graph showing salmon return numbers for Test, Itchen, and Frome rivers from 1988 to 2000.](image)

*Estimated from electronic fish counters*.

*Source: Environment Agency, Centre for Ecology and Hydrology*.
Mammals
Chalk rivers are important for water voles and otters. Otters are recovering well from the brink of a pollution-related extinction in the 1970s. However, water voles have declined dramatically in the UK. Despite strongholds on some chalk rivers, they remain vulnerable to attack from escaped American mink.

Birds
Wetlands – such as wet woodlands, flower-rich fens and wet grasslands – depend on a supply of clean water from springs, and on high water levels. They once occurred widely alongside chalk rivers. Birds such as lapwing, redshank and snipe need these wetlands for nesting and feeding. As wetlands have disappeared, often due to drainage, these birds have been lost from their traditional breeding areas.
Land use and river habitats

The character of chalk rivers today reflects a long history of management. Evidence of dredging work carried out decades ago can still be seen. The drainage of wetlands and abandonment of water meadows reflect the changing patterns of agriculture in the valleys. Today, intensive agricultural practices and urban development have become more prominent in many chalk river catchments.

Land use

Compared with England as a whole, chalk river catchments have a higher proportion of arable land and less grassland: 49% of chalk river catchments are now in arable use (36% for England as a whole); 27% is grassland (38% for England); and 10% is urbanised. Woodland covers only 5% of chalk river catchments.

>Figure 4 Proportion of arable land in chalk river catchments in 2000

Source: Environment Agency and Centre for Ecology and Hydrology
The potential effects from cultivated and urbanised land include increased run-off of rainwater and soil erosion. These in turn increase the risk of sediments, fertilisers and pesticides entering rivers. Also, urban land increases local pollution risks from oil and other chemicals.

A widespread problem in chalk rivers is that river-bed gravels are clogged up with sediment. This reduces the survival of eggs and fry of salmon and trout. About 90% of fine sediment in salmon spawning gravels in the Test, Itchen and Kennet rivers comes from surrounding land.

**Habitat quality of chalk rivers**

A top quality chalk river has a mosaic of habitats; gravel runs and glides, water-crowfoot beds, side channels, wet woodland and marshes.

Results from the national River Habitat Survey (RHS) during 1994-1997 showed that half of the chalk river sites surveyed have high or very high channel habitat quality. However, nearly one-third have poor habitat quality, because of the cumulative effects of urban land use, intensive agriculture and increased demand for water.

**Farming practices**

At many chalk river locations, environmental schemes and landowners with fishing interests have improved damaged habitats. Steps taken include reducing livestock numbers and erecting bankside fencing. Several Countryside Stewardship scheme agreements on chalk rivers are helping to raise groundwater levels and return arable land to
pasture. There are also ‘Landcare’ projects in the Test, Itchen, Wensum, Kennet and Avon catchments. These enable farmers to reduce the impacts on chalk rivers of diffuse pollution, such as silt, pesticides and nutrients.

**Habitat rehabilitation**

The future of wildlife in chalk rivers depends on us. We need to tackle problems of river flow, water quality and damaged habitats. There is good evidence that a diverse habitat within river systems is more efficient at counter-acting effects of polluted water and low flows. The problems are complex, but rehabilitation schemes show that much can be done.

Flood defences now use environmentally sympathetic engineering techniques to minimise impacts. Water level management plans aim to ensure a balance between conservation, landscape and agricultural activities.

*Figure 5* The quality of chalk river habitats as assessed using River Habitat Survey data

River flows and water quality

River flows
Chalk rivers are reliant on adequate autumn and winter rainfall to recharge groundwater aquifers. These maintain flows throughout the year. Winter flows help to keep river-bed gravels clean. When flows are reduced by abstraction, the duration of flow in winterbournes is shortened; suitable habitat for fish and other animals is lost; and algae frequently choke the channel as a result of increased nutrient levels.

Most chalk rivers are located in the densely populated South East of England, where rainfall is relatively low. In some river catchments, there are no other sources of water for abstraction. For the River Piddle in Dorset, abstractions have caused reduced summer flows and increased siltation. The summer dry period of some winterbournes, such as the River Misbourne in Buckinghamshire, has been extended by months and more of the upper reaches of the rivers have become dry.

The Environment Agency is currently investigating 37 chalk river sites to tackle problems caused by abstractions. There could be more. Of these, 12 have plans for low-flow alleviation schemes. On the River Misbourne, a low-flow alleviation scheme has already been implemented. This has shown that when flows are restored the ecology can soon recover.

Water quality
High-quality chalk rivers have low concentrations of nutrients such as phosphate and nitrate. This limits the growth of algae and improves water clarity.
Water quality can be measured by using biological and chemical indicators. In 2000, 89% of chalk rivers were of good or very good biological quality – up from 72% in 1990. Using chemical measures, 83% were graded as good or very good in 2000, compared with 64% in 1990. These trends are good news, but there is still need for improvement – only 37% are very good quality in both biological and chemical terms.

The main threats to water quality are sediment-laden run-off and nutrients from farmland and sewage works. Also a cause for concern are toxic pollutants from industrial effluent, sewage, urban run-off, and pesticides from agriculture and watercress farms.

Plant communities on chalk rivers are greatly affected by the levels of nutrients, especially phosphate. Too much phosphate disrupts the natural balance of plant and animal communities, and unsightly algae may smother underwater plants and coat the river-bed. There is now a guideline phosphate standard (60 µg P/l) for designated wildlife sites to protect the natural ecology of chalk rivers. In 2000 only 23% of chalk rivers were below this figure: 10% exceeded it several times over.

In some catchments the majority of phosphate comes from sewage works. Water companies are installing phosphate removal at several sites, which is expected to reduce phosphate levels by as much as 75%. This reduction has already been achieved on the Kennet and Wensum rivers.
What needs to be done?

**Restore habitats and control run-off**
- We need to develop a programme of river restoration which coordinates work on diffuse pollution, flood risk and aquifer recharge.
- Planning authorities should take full account of the need to protect chalk rivers, and find ways to enhance them.
- If we are to tackle diffuse sources of sediments and nutrients, we must give more support and advice to farmers.

**Maintain river flows**
- Target flows should be set for all chalk rivers that take account of the needs to protect their ecology.
- Practical solutions are needed to help restore and protect natural hydrological processes within rivers affected by abstraction.
- We must actively promote more efficient use of water to help reduce demands by industry and the public.

**Improve water quality**
- More rivers should be of very good status for both biological and chemical quality.
- We will investigate and take action to help overcome sources of enrichment when phosphate levels are exceeded.
- We need to work together to reduce diffuse pollution from land.

**Protect wildlife**
- We need to target our monitoring to check the effectiveness of management actions.
- Further studies are needed to improve our understanding of the factors affecting plants and animals in chalk rivers.
- We need to investigate, contain and reduce the impacts of invasive, non-native plants and animals.

Chalk rivers – a magnificent part of our natural and cultural heritage

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Conclusions

Our chalk rivers are still a precious part of the landscape, but they continue to be at risk. The pressures on chalk rivers are many and varied: water abstraction, urban and infrastructure development, effluent discharges, agriculture, land drainage and flood defences. These pressures remain intense. Without careful management, these activities threaten the chalk river resources upon which so much wildlife and many people depend. Several practical examples point the way to successful protection and restoration. Policy-makers, environmental regulators, businesses and local communities must together take up the challenge to restore our chalk rivers. Much work is being undertaken to protect chalk rivers designated for nature conservation; more needs to be done for all chalk rivers. Let us work together to ensure that generations to come are able to enjoy this unique heritage.

How can I find out more?

