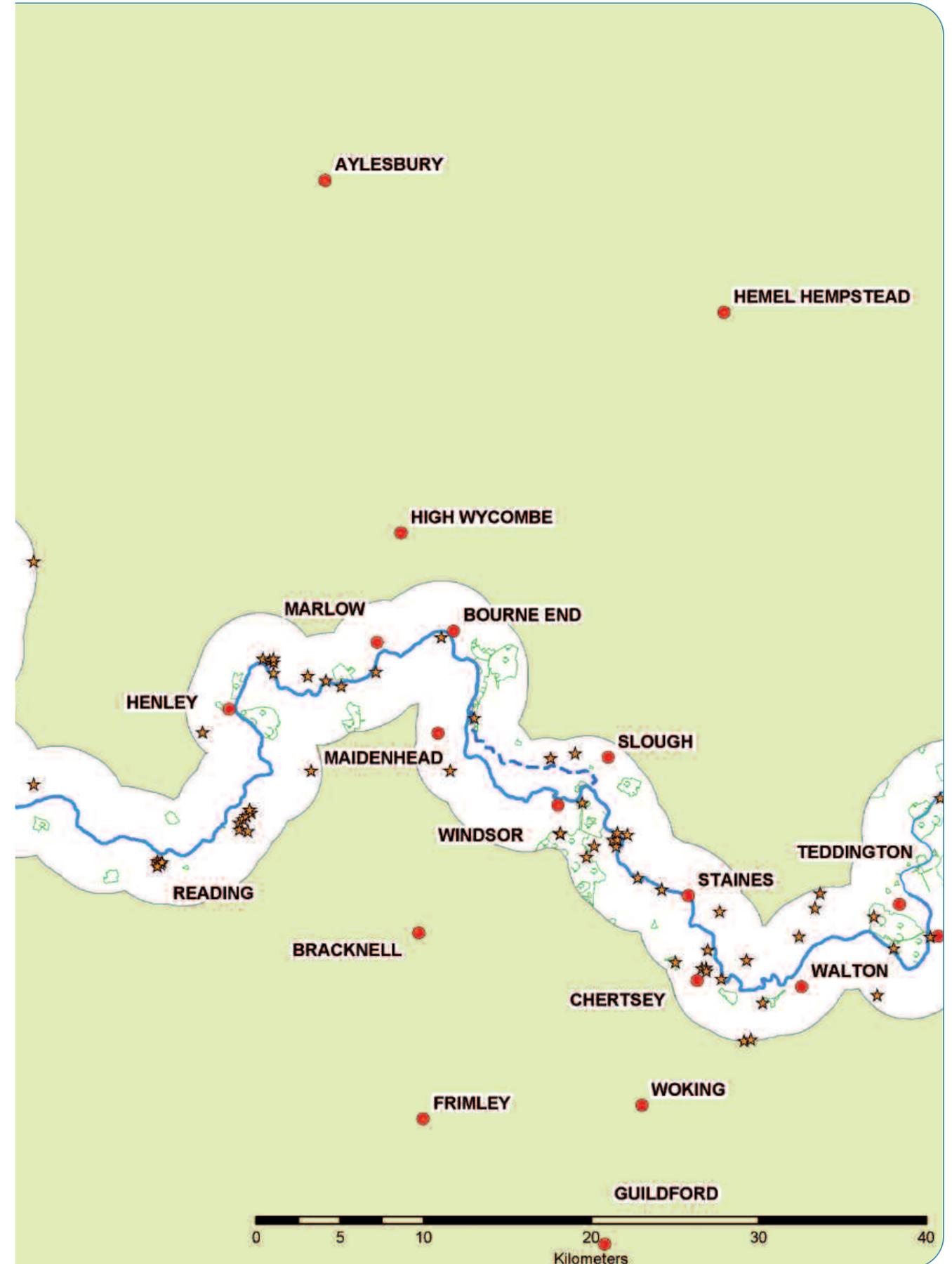


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Kilometers

## 13.0 Water quality and resources

### 13.1 Water quality

Both the chemical and biological water quality of the Thames have improved dramatically over the last 30 years. Generally, the Thames and its tributaries are graded as A or B (very good or good), although two sites have been classified as grade C (fair). Water quality in the Thames is influenced by discharges from sewage works, agricultural run-off, urban run-off and accidental or deliberate pollution. The predicted need for new housing in the region is likely to require significant investment to provide additional capacity for sewage treatment to ensure that improvements in water quality are continued. Consideration should be given to the need for bacteriological monitoring in lengths where water contact sport is popular.

### 13.2 Water resource management

The Environment Agency aims to manage water resources sustainably, recognising the needs of abstractors, river users and the environment.

Using fisheries and angling survey data, physical river corridor surveys, biological sampling and the experienced judgement of its staff, the Environment Agency has assessed how the environment is affected by low river flows.<sup>1</sup>

Map 17 on page 90 shows how sensitive different reaches of the river are to low flows on a scale from A to E. These ratings give a good indication of the ecological and fishery value of the river (A having the most value and E the lowest). The lower reaches of the Thames have less natural banks and greater water abstraction. As a result, less sensitive coarse species of fish such as roach and perch predominate.

Thames Water, who are responsible for meeting future demands for water in London and the Thames Valley, predict that current water resources will be insufficient to support increased demand arising from:

- population growth (a predicted 1 million extra in the Thames Water Region by 2026)
- climate change (hotter and drier summers)

Thames Water is considering the construction of a new reservoir in the upper Thames valley (with a possible phased construction starting in 2010 with completion by 2019). This would store water taken from the Thames in periods of high flow to be released back into the river in drier periods for re-abstraction further downstream to support the lower Thames reservoirs. This could be of benefit in sustaining boating and wetland habitats against the threat posed by low river flows.

### 13.3 Flood risk management (map 16)

Flood risk management is an important part of the Environment Agency's business. Awareness of this element of waterway use is essential in producing sustainable and fully-integrated policies for the River Thames.

The capital value of assets in the Environment Agency's Thames Region that could be flooded by rivers amounts to approximately £28.9 billion. (Out of a total value of £81.7 billion at similar risk in the whole of England and Wales.)<sup>2</sup> There are approximately 272,000 properties within the floodplain of Thames Region. Of these, 144,900 are within the Thames basin above Teddington.

Within the Thames Basin, there are concentrations of high flood risk in major towns (namely Reading, Oxford and Swindon), but these tend to be separated by large areas of rural floodplain where there are comparatively few properties at risk.

Widespread floods tend to occur when there is heavy and prolonged rainfall when the catchment is either frozen or saturated. However, because of the size of the Thames catchment, storms may affect only part of the region and flooding is more localised as a result.

Localised storms can also lead to flooding, particularly in urban areas, which have a higher level of response to rainfall and are generally at greater risk from surface water and sewer flooding.

#### Case study 7



### The Jubilee River

*created by man with nature in mind*

The Jubilee River is a flood relief channel designed to protect 5,500 homes at risk in Maidenhead, Windsor and Eton. Flood flows are put into the channel at Taplow Weir when water in the adjoining River Thames approaches a critical level.

It is 11.6 kilometres long and opened in 2002 after five years of major engineering and landscaping works. These included taking the channel under the M4 motorway, the A4 and the main western railway lines.

Extensive new habitats have been created along the length of the new river. Dorney Wetlands provides a breeding and feeding habitat for many birds, such as reed bunting, little grebe, great crested grebe, skylark and meadow pipits. In winter, large flocks of wintering birds such as golden plover and lapwing visit. The Jubilee River is being developed as a fishery. It provides a spawning and nursery area that will also help fish stocks in the River Thames.

Designated areas are provided for anglers, with a length leased to the Thames Valley Angling Association. Day tickets are available from local tackle shops. There are platforms for anglers using wheelchairs immediately adjacent to the car park at Dorney.

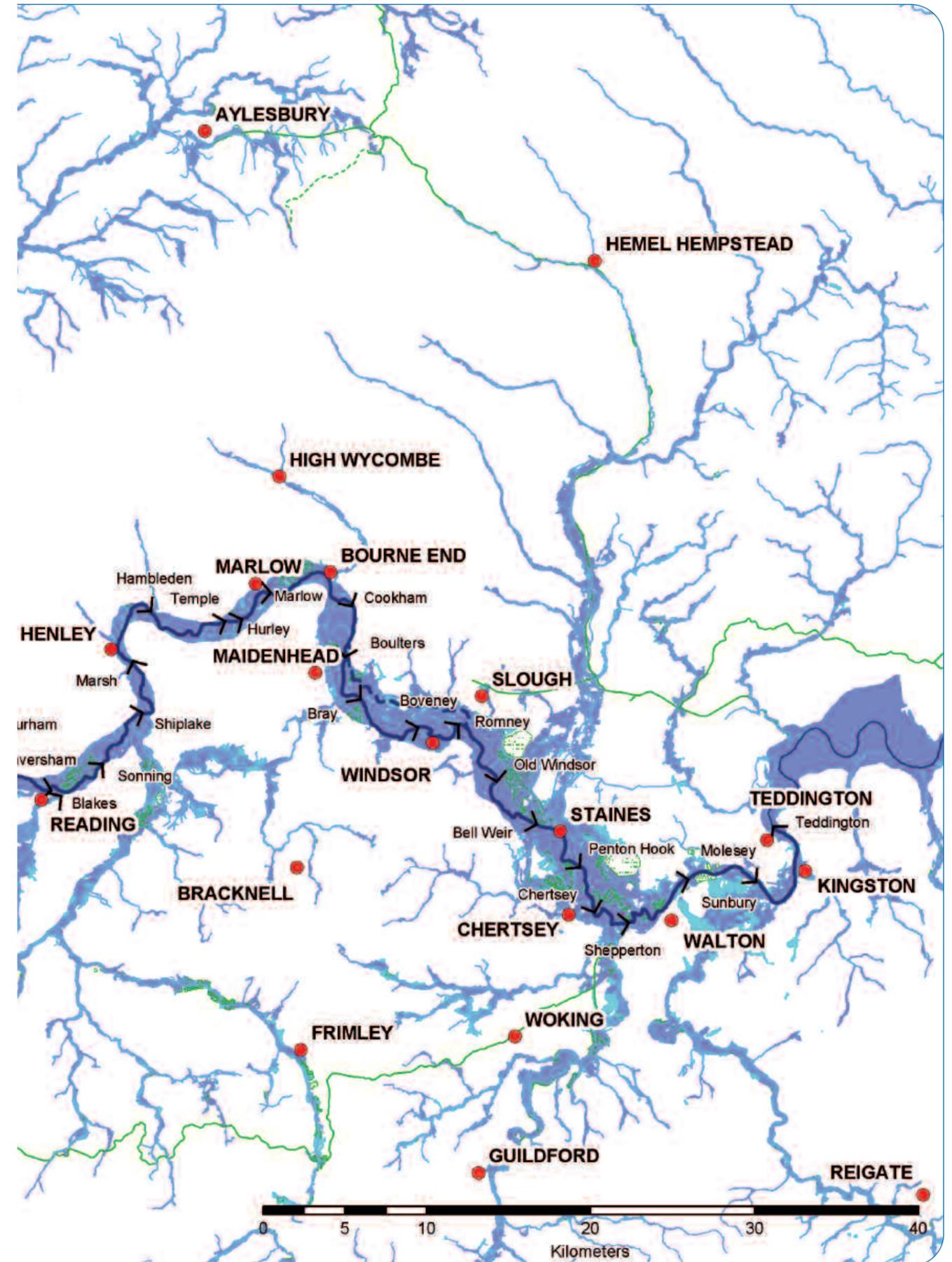
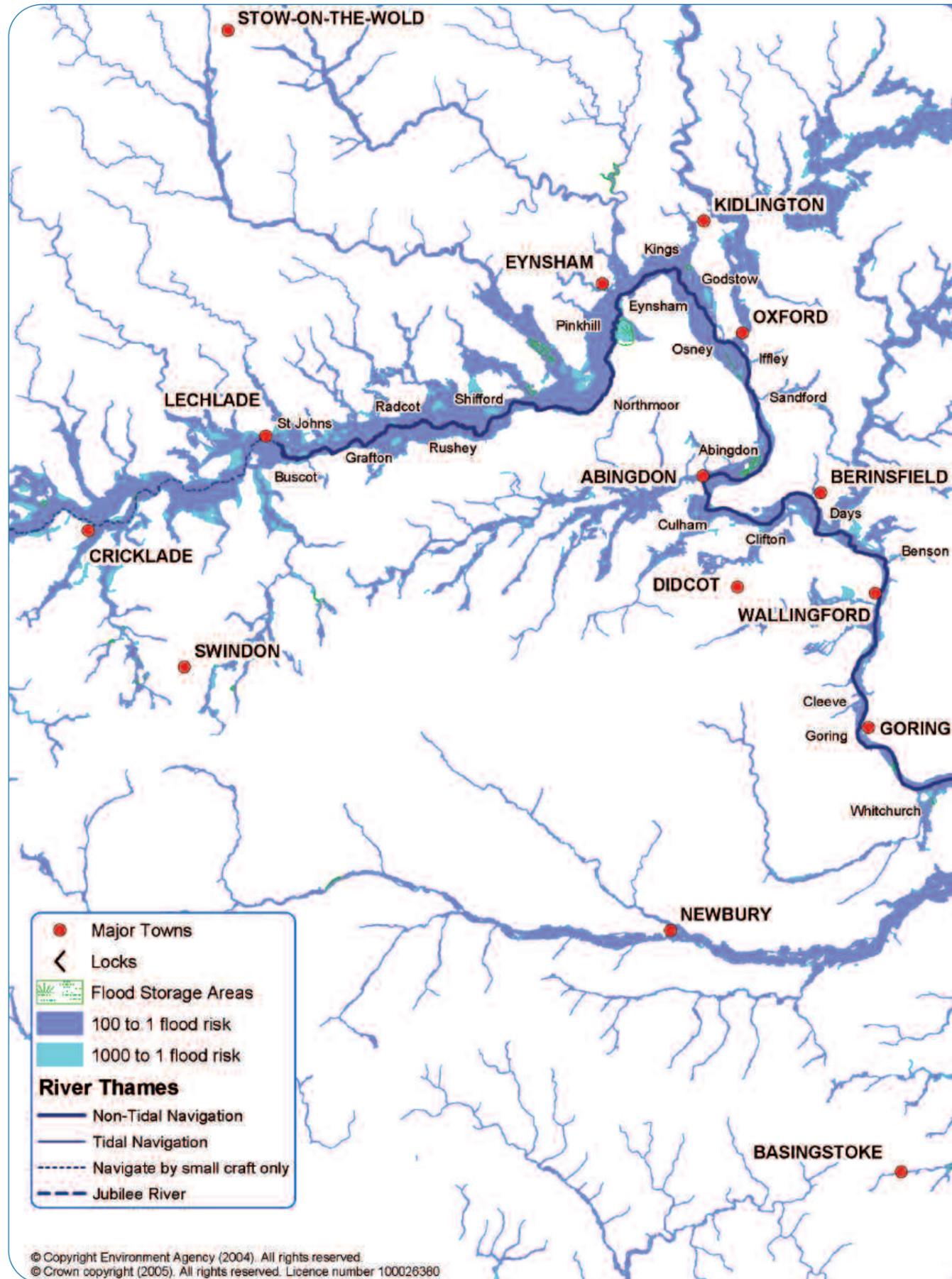
The single-track pathway along the river is designed for wheelchair users, walkers and cyclists on a shared basis. It is part of route 61 of the National Cycle Network. Small unpowered boats can be used on the river.

Relevance to plan policies:

- enhanced biodiversity and fisheries quality
- access for people with disabilities
- provision of facilities for active recreation
- creation of open space

<sup>1</sup> Thames Corridor Catchment Abstraction Management Strategy (CAMS) Technical Document, Environment Agency November 2003

<sup>2</sup> National Appraisal of Assets at Risk from Flooding and Coastal Erosion. Halcrow Group Ltd, 2001



## 14.0 Climate change

Global warming is likely to have an increasing effect upon our climate. The severity will depend on the amount of greenhouse gases released into the atmosphere from now on, and how the climate system responds.

However, we are likely to experience:

- more frequent and dangerous extreme weather events
- heavier winter rainfall
- warmer summers.

Warmer, drier and sunnier summers could benefit domestic summer tourism. But they could also result in low river flows hampering recreation and damaging wetlands and aquatic habitats. A reduction in dilution of effluents could cause poor water quality and increase the likelihood of harmful algal blooms.<sup>1</sup>

Hotter weather will lead to increased importance of green spaces as people seek open-air recreation. Heavier rainfall would increase the risk of flooding and make dangerously strong stream conditions more frequent.

The South East Regional Plan sets out a framework for addressing climate change. It suggests that mitigation, through reducing greenhouse gas emissions, will primarily be addressed through greater resource efficiency. One measure is of particular relevance to this plan:<sup>2</sup>

‘Reducing the need to travel and ensuring good accessibility to public and other sustainable modes of transport.’

If this plan is successful in attracting greater use of the Thames, it could contribute to a reduction in greenhouse gas emissions. This would be the case if recreation and tourism in the Thames corridor was an alternative to overseas travel or longer trips, for example to the coast.

### Policy 26 - climate change

#### We will plan how the river is managed to respond to climate change

##### Possible actions

- 1 identify how best to adapt to climate change, minimising the negative effects, whilst taking advantage of more positive aspects
- 2 plan how to protect the interests of recreation and navigation whilst meeting the demands of flood risk management, water supply and protection of key water dependent environmental sites
- 3 consider the management implications arising from possible lower flows in summer and higher flows in winter
- 4 provide space for wildlife to adapt to climate change (buffer zones, wildlife corridors etc).

Our climate is changing and instances of violent storms, droughts in summer and floods in winter seem set to increase. This is likely to have a significant impact on river levels.

<sup>1</sup> The most common and visible are the cyanobacteria (often referred to as blue-green algae) that form a toxic scum on the surface of the water.

<sup>2</sup> Policy CC2: Climate Change, Draft South East Regional Plan, South East England Regional Assembly, July 2005

## 15.0 Biodiversity and fisheries (map 14 and map 17)

### 15.1 Biodiversity

The non-tidal Thames, particularly in its lower reaches, is heavily modified and impounded by weirs. Nonetheless, the river and its immediate corridor include a diverse range of habitats including meadows, wetlands and reed beds that contain rare and protected species. These include sites designated for international and national importance, as well as areas afforded a regional or local status.

The presence of locks and weirs protect some important sites that are water flow and/or level dependent. The richest areas are the shallow margins where plants like the yellow water lily and the common reed are established and provide habitats for invertebrates, fish and birds.

The river is a vital corridor for wildlife, linking fragmented habitats, and providing a route for migration.

The upper Thames flood plain supports a number of key habitats. These include a number of unimproved and semi-improved meadows with a high variety of plant species, the most outstanding of which are North Meadow, Cricklade (Wiltshire) and Chimney Meadows (Oxfordshire). Both are designated National Nature Reserves.<sup>1</sup>

North Meadow, is a traditionally managed hay meadow, internationally important for its many different plants, including the largest British population of snake's head fritillaries, a flower which is now mainly restricted to a small number of unimproved flood meadows.

Chimney Meadow is one of the largest surviving areas of unimproved grassland in the Thames valley. The grassland is very species-rich, with large populations of characteristic plants such as adder's tongue fern, pepper saxifrage and meadow rue. The meadows are important for waders, including curlew, snipe and redshank.

The river itself provides a habitat for a range of plants and animals, including priority species in the UK Biodiversity Action Plan (BAPS). These include the otter (now spreading from the upper part of the catchment), water vole (restricted to very few sites on the main Thames), and depressed river mussel. The birdlife of the Thames is a more accessible component of its wildlife, including the mute swan and moorhen, the kingfisher, great crested grebe, reed warblers and sedge warblers, which nest in marginal vegetation.

In addition, the upper Thames and its Cotswold tributaries support rare species such as dippers and the river water-dropwort.

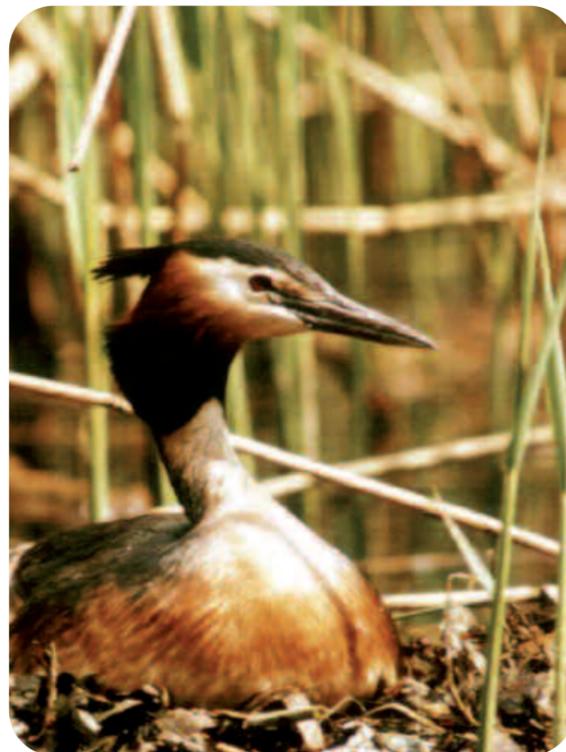


<sup>1</sup> There are 200 National Nature Reserves in England. Each represents a nationally important example of a particular habitat. They are either owned or controlled by English Nature or held by approved bodies such as Wildlife Trusts.

Further downstream, the flood plain contains a number of internationally important herb-rich meadows at Oxford such as Iffley Meadows, Pixey Mead and Yarnton Mead. In addition, Port Meadow, an extensive area of pasture on the edge of Oxford, is the last remaining British site for the rare creeping marshwort plant. The reach of the Thames in the vicinity of Oxford is a particularly important length ecologically, because of the flow-dependent watercourses fed from the Thames. There are a number of other important flow-sensitive sites elsewhere, such as St. Patrick's Stream and Sunbury Creek. Wetland creation schemes have been undertaken adjacent to the Thames at a number of sites, including at Iffley, near Oxford, and Cholsey Marsh, downstream from Wallingford.



From Wargrave to Maidenhead, the river corridor is well-defined by wooded scarp slopes, which are rich in woodland species (such as at Bisham Woods). In areas of wet woodland adjacent to these reaches, the nationally rare summer snowflake (Loddon Lily) is found. Further downstream, the river corridor broadens and contains traces of old flood plain meadows such as Chertsey Meads. This part of the river is also characterised by a large number of adjacent water bodies. Gravel pits such as Wraysbury and Thorpe Park, and Knights & Bessborough Reservoirs are important sites for wintering wildfowl, including gadwall, shoveller, golden-eye and smew.



Most of these sites are designated Sites of Special Scientific Interest (SSSI). In total, there are 58 within three kilometres of the river. Some, like Oxford Meadows, are Special Areas of Conservation (SACs). These are the highest priority sites considered to be most in need of conservation at a European level that are designated for strict protection by the EC Habitats Directive.

Backwaters (such as those in the Little Wittenham SSSI)<sup>1</sup> often provide habitats for damselflies and dragonflies. The Thames valley is important for the club-tailed dragonfly and white-legged damselfly. Little Wittenham's ponds also support the UK's largest breeding population of great crested newt.

River gravels are important to habitats upon which many protected birds, invertebrates,

plant communities and fish depend. The Environment Agency will not normally permit removal of gravel from the river. Where it is essential to remove gravel shoals to maintain navigable depths, we will seek to re-deploy the gravel elsewhere within the catchment for the benefit of fisheries and wildlife.

## 15.2 Fisheries

From the source of the River Thames to Teddington Lock, a wide range of aquatic habitats supports over 25 species of fish. Over the last two decades, improvements in water quality in the river have contributed to an increase in fish abundance.

Despite these improvements, certain native fish species are still suffering from loss of habitat caused by the historical river management practices of dredging and impoundment, as well as possible impacts from water abstractions. Fish such as barbel, trout, dace, bullhead, and gudgeon rely upon clean gravel, shallow water and oxygenated, flowing water to spawn successfully. In many reaches, these conditions are only found in weir pools, weir streams, side channels, some tributaries, or natural gravel shoals. Therefore it is important to protect, maintain and wherever possible, enhance or restore them.

Similarly, fish such as roach, bleak, pike, bream, tench and carp require weedy areas of the river to spawn. These often include backwaters, millstreams, marinas and channel margins.

These same areas provide a refuge for juvenile fish during high winter flows, when the force of the river would otherwise wash them downstream.

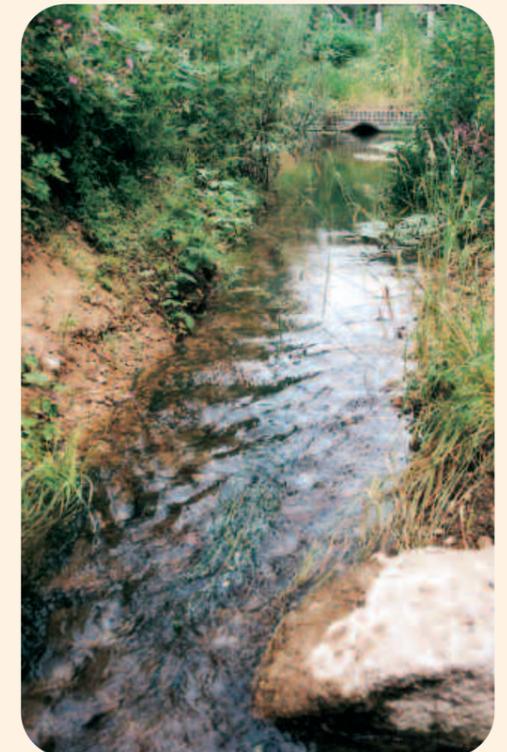
Almost all species of fish in the Thames require the presence of cover in the river channel at one or more of their life-stages. Weed, tree branches, roots and man-made structures can offer protection from predation and can also harbour food supplies such as invertebrates and zooplankton.

The numerous impounding structures on the river pose major obstructions to upstream fish movement. Between 1986 and 2000 fish passes were installed at most of the Lower Thames weir sites, but with few exceptions, these were aimed at providing passage to a single species, the salmon. It has since been accepted that the majority of Thames fish species have significant migratory requirements. There is a need, therefore, to reduce the impact of these barriers to fish movement through the provision of natural by-pass channels and appropriate fishways.

### Case study 8

#### Penton Hook spawning channel

The Environment Agency has created a new channel near the western edge of the island at Penton Hook lock that provides a passage for fish around the existing weir. The channel is also designed to provide conditions for fish to spawn and to support the growth of newly hatched fish.



#### Relevance to plan policies:

- enhances sustainability of fish stocks by improving access to spawning areas and by restoring habitats lost as result of navigation and flood defence operations
- restores the natural river environment aiding the diversity of flora and fauna
- enhances the landscape value of the site

<sup>1</sup> These are sites designated by English Nature that are of particular conservation interest because of the wildlife they support or because of the geological features that are found there.

The lower reaches of the Thames are the most heavily impacted by physical modification and abstraction and therefore, less sensitive coarse species such as roach and perch predominate.

Detailed proposals to improve fisheries are developed through Fishery Action Plans. They are a partnership between the Environment Agency and angling, fisheries and conservation interest

groups, including the Thames Fishery Consultative Council.

There is a special Salmon Action Plan for the river, building upon the success of the recent introduction of improved fish passes that encourage adult salmon to return to their spawning areas in the River Kennet.

Policy 27- biodiversity and fisheries

**We will enhance biodiversity and fisheries quality along the Thames and its corridor**

**Possible actions**

- 1 minimise the potentially damaging developments to biodiversity interests and wherever possible, maximise opportunities for habitat enhancement and creation
- 2 conserve and enhance valued species and habitats with particular reference to river-based Biodiversity Action Plan (BAP) species such as water vole, otter, white-clawed crayfish, depressed river mussel, Loddon Lily and fish BAP species, including barbel, salmon, lamprey, shad, grayling, brown trout and bullhead
- 3 conserve and enhance designated sites such as Special Areas of Conservation, Sites of Special Scientific Interest and County Wildlife Sites
- 4 conserve and enhance key features of particular wildlife importance including flood meadows, backwaters, islands, natural banks, weir streams and pools
- 5 raise awareness amongst users of the importance of such features and encourage behaviour that would avoid damage to them
- 6 identify key areas for habitat protection and enhancement and manage to promote biodiversity
- 7 use soft bank protection, with hard edge works introduced only when essential and that incorporate compensation for loss of natural habitat when possible
- 8 where possible, introduce bank enhancement to existing lengths with predominantly hard-edge treatments
- 9 improve access for fish to reach spawning areas by modifying existing fish passes where necessary and by introducing new passes or more natural by-pass channels around weirs
- 10 protect and restore the natural river environment, including valuable in-stream features such as gravel shoals, emergent reed beds and islands
- 11 protect underwater plant and fish communities
- 12 balance the recreation needs with the need to protect key water-dependent sites when managing water levels
- 13 ensure that works and activities do not result in the transfer and colonisation of invasive non-native plant and animal species
- 14 raise wider awareness of the threat of invasive non-native plants and animals to the river's natural environment and character
- 15 produce site management plans, which include biodiversity and fisheries considerations, for every lock

Case study 9



**Restoration of natural riverbank at Hampton Court Palace**

The Environment Agency introduced new soft-edge treatments to recreate natural habitats opposite Hampton Court.

Two sections of old concrete walling were removed and the underlying earth smoothed back to form a gentle slope with a shallow margin.

New beaches have been created by bringing in river gravel. The beaches and lengths of earth bank were stabilised with willow. New plants were introduced to the river margin using coir fibre rolls to help them get established without being washed away.

Relevance to plan policies:

- enhanced biodiversity and fisheries quality
- restoration of natural habitats including gravel shoals
- bank enhancement to previously hard-edge treatment

The wildlife and habitats of the Thames are intrinsically linked to its character and thus, to the aesthetic, social and economic value of the river and its corridor.

There is a direct link between fisheries quality and the value of the Thames for angling.

