

# **CHEW VALLEY LAKE Biodiversity Action Plan 2008**



# 1 INTRODUCTION

This report is the third document to deal with the land management of Chew Valley Lake for nature conservation reasons, following a Conservation Strategy prepared in 1987 and a Biodiversity Action Plan prepared in 1998.

The production of these plans is a reflection of the lake's designation as a Site of Special Scientific Interest (SSSI) and Special Protection Area (SPA), and of Bristol Water's statutory obligation to further the aims of nature conservation. This obligation was first laid out in Section 3 of the 1991 Water Industry Act, which states that "*A water company must exercise any proposals relating to any functions of the company so as to further the conservation and enhancement of natural beauty and the conservation and enhancement of natural beauty and the conservation of flora, fauna and geological or physiographical features of special interest*". The 2006 Natural Environment and Rural Conservation Act re-iterated these obligations. Bristol Water plc reflect this obligation in their Environment Policy, which includes: "[We] *recognise our general duty to care for the environment...Pledge ourselves to the management of our reservoirs and land in ways which achieve positive gains both for wildlife and people.*" These policies are reflected in a specific commitment: "*On the land and reservoirs we own, to maintain and improve habitats for wildlife, so as to further the conservation of the natural environment and to preserve biodiversity.*"

This Biodiversity Action Plan contains: a brief description of the lake; a summary of features of prime biodiversity value; and biodiversity action plans for key habitats. Each plan includes a list of associated species of importance, management rationale, a review of the progress made in reaching targets in the 1998 plan and a list of new targets and management proposals.

## **2 DESCRIPTION**

### **2.1 Location**

Chew Valley Lake is situated approximately 12 miles to the south of Bristol, within the unitary authority of Bath and North-east Somerset. The central grid reference of the lake is ST 570 600.

### **2.2 History**

Chew Valley Lake was created as a drinking water reservoir by damming the River Chew and flooding farmland. Its construction was completed in 1956.

### **2.3 Ownership**

The freehold of Chew Valley Lake, together with the surrounding land with which this plan is concerned, is owned by Bristol Water plc.

### **2.4 Land Use**

The primary land-use is as a drinking water supply. The lake is also extensively used for recreation with facilities including: a large trout game fishery; occasional pike fishing; a private sailing club; six bird hides, access to five of which is restricted to permit holders; two picnic sites; a nature trail; a shop; a café and a visitor centre; and a fishing lodge incorporating a restaurant. Some of the land around the lake is under agricultural management, producing crops of hay, in some cases followed by aftermath grazing. The primary aim of management of these areas, however, is enhancement of nature conservation and landscape value with agricultural management being a secondary consideration and a means of achieving nature conservation ends.

There have been some significant changes in land use since 1998. Public use of Woodford Bank has increased, and trees have been planted here as a small memorial woodland. Pike fishing has commenced, usually in two seasons in October / November and February. A cycle trail, linking to a new trail on the roadside just outside the lake's western margin, is proposed between Woodford Lodge and the dam. There has been external pressure for further routes within the lake enclosure, but these have been resisted to date.

### **2.5 Biological Interest**

Chew Valley Lake has significant examples of three UK Biodiversity Action Plan priority habitats: Eutrophic Standing Water, Lowland Meadows and Reedbeds, and less significant examples of a further four: Hedgerows, Wet Woodland, Lowland Mixed Deciduous Woodland and Ponds. Many Biodiversity Action Plan Priority Species, listed at Appendices 1 and 2, are associated with these habitats. In addition, the lake supports an internationally important population of shoveler and the numbers of black-headed gull and lesser black-backed gull roosting at the lake are of international importance. There are nationally important populations of a further six wildfowl species and of reed warbler, and roosting numbers of common gull are of national importance.

## **2.6 Nature Conservation Designations**

Chew Valley Lake, including much of the surrounding land considered here, has been designated a Site of Special Scientific Interest (SSSI) and Special Protection Area (SPA). It is also a Site of Nature Conservation Interest (SNCI) and the southern end of the lake, including Herriotts Pool, is an Avon Wildlife Trust nature reserve.

## **2.7 Management for Nature Conservation**

Management for nature conservation has been carried out by Bristol Water plc since the early 1980s. Capital items have included creation of islands in Herriotts Pool and Stratford Bay; creation of ditches and associated bunds in the main reedbed; and creation of pools on the margins of Herriotts Pool. Many of these features have required ongoing management, which has included vegetation control on islands and in ditches, replacement of gravel on islands and mitigation of the impacts of wave erosion. Established habitats have also required ongoing management, for example hay-cutting and grazing of grasslands, hedge cutting and thinning of plantations. A conservation committee, including representatives of Avon Wildlife Trust and local ornithological organisations, advises Bristol Water plc on management.

Management of the site has always been informed by the large amounts of data, particularly bird counts, gathered by amateur naturalists. Since the 1998 Biodiversity Plan was produced this has been supplemented by professionally produced reports. In particular, invertebrate surveys of areas of grassland around Herons Green and Villice Bay were carried out in 2003 and the results of waterbird counts were summarised and analysed in reports produced in 2001 and 2007. Amateur surveying continues, however, and in particular the moth fauna of the lake is now well covered.

Several new projects have been carried out since 1998, including:

- Pond creation in a field just outside the reservoir enclosure, to the north of Sutton Wick Lane;
- Pond restoration on Woodford Bank;
- Creation of a new area of reedbed on the western side of Herriotts Pool;
- Provision of an osprey nesting platform and sand martin nesting boxes at Herriotts Pool and owl-nesting and bat boxes around the lake;
- Gravelling of a spit at Herons Green Pool; and
- Installation of common tern nesting platforms at Herons Green Pool.

## **2 BIODIVERSITY AUDIT**

### **2.1 Introduction**

The purpose of this section is to identify the wildlife features for which Chew Valley Lake is of importance in an international, national and regional context and to focus on the contribution which management here can make to national and local biodiversity policies. Priority species and habitats are described under the Key Species and Key Habitats sections. A Trends section identifies changes in the lake's biodiversity interest that have occurred since the 1998 BAP was produced. There then follows a Conclusions section which briefly assesses the wildlife value of the lake and identifies priorities for nature conservation management.

Lists of priority species are published by the UK Biodiversity Partnership and have recently been revised, and the Bath and North-east Somerset BAP includes a list of priority species. Some species are included in the lists because, although they remain widespread, they are less abundant than previously. The contribution that an individual site such as Chew Valley Lake makes to the conservation of most of these species is limited, and this has been reflected in the setting of management priorities. Species that are not included in BAP lists have been considered in setting management priorities where the populations at Chew Valley Lake are of value in a wider context.

### **2.2 Key Species**

A list of species occurring at Chew Valley Lake and identified in the UK BAP is included as Appendix 1 and in the Bath and North-east Somerset BAP at Appendix 2. For the sake of completeness these include species that have been recorded at the lake as vagrants. The lake is not of conservation significance for these species and they are not considered in this section.

#### **2.2.1 Birds**

Chew Valley Lake is one of the most important inland waters for birds in Britain, and there is a large volume of data describing the lake's bird populations, summarised in the 2000 and 2007 reports. Assessment of significance for birds is assisted by a recognised system for describing international and national importance. A site supporting in excess of 1% of a defined population (usually the north-eastern Atlantic population) is considered to be of international importance, whilst a site supporting in excess of 1% of the national population is considered to be of national importance. These criteria are usually applied to water birds, but in this report they have also been applied to other species where the data allow.

#### Internationally Important Species

The population of shoveler (*Anas clypeata*) at Chew Valley Lake is internationally important and the lake is currently ranked fourth for this species in Britain (Waterbirds in the UK 2005/06). Numbers peak in the August to December period and fluctuate significantly from year to year, with the largest numbers occurring in

years when the water level drops. The largest count since 1998 was of 805 in December 2001, whilst the lowest annual maximum was 180 in 2007. Flocks of shoveler are most often seen on Herriott's Pool and in Stratford Bay, with smaller concentrations around Twycross, on Moreton Point, in Heron's Green (including Heron's Green Pool) and in Villice Bay. However, birds probably disperse more widely around the lake in the hours of darkness. The lake was previously an important breeding site for shoveler but breeding had not been proved since 1993 until a brood of eight was reared on Heron's Green Pool in 2007.

Roosting numbers of lesser black-backed gull and black-headed gull are of international significance. Numbers of both species peak between October and March, and the roost forms in the centre of the lake. Chew has the third largest roost of both species in the UK.

### Nationally Important Species

The lake is of national importance for great crested grebe, little grebe, gadwall, pochard, tufted duck and coot. The thresholds for national importance are exceeded in some years by cormorant, teal and smew. Common gull roosts at the lake in nationally important numbers.

Great crested grebe and little grebe both feed on fish and the populations at the lake of both peak in the late summer to early autumn. The number of great crested grebes fluctuates and some recent years have seen low counts, but the period under review has seen two of the three highest counts on record: 690 in September 2000 and 665 in September 2007. Little grebes are less numerous, usually peaking at around 100 birds. The lake is the fifth most important nationally for great crested grebe, and the third most important for little grebe. Both species breed around the lake in significant numbers, which fluctuate according to water levels and food supply, with high levels normally favourable.

Gadwall numbers at the lake peak in June or July, when a moulting flock of non-breeding birds forms, typically peaking at 300. Smaller numbers breed around the lake, mostly on Herriott's Pool.

Pochard numbers fluctuate greatly, presumably influenced by the availability of the submerged weeds on which they feed. In a good season, such as 2005/2006, the peak may reach 1,600. Maximum numbers are usually seen in December or January, later than the peak counts of most wildfowl. The most important areas of the lake are usually Stratford Bay, Moreton and Heron's Green Bay. Pochard breed around the lake in most years, with broods being seen at Herriott's Pool and around Hollow Brook. The total of up to six broods is low, but pochard is a scarce breeding species in Britain and in a good year Chew is a significant breeding site. Tufted duck numbers at the lake have risen significantly (see the Trends section below) and in recent years have typically peaked at between 1,200 and 1,500, with an exceptional 2,100 in October 2005.

Coot numbers have also fluctuated. Historically, the peak counts were in the region of 1,000 but they rose gradually to reach over 3,000 in both 2003 and 2004, but have now fallen back to about 2,000. Coot breed in good numbers around the lake, with up to fifty broods produced in good years when water levels remain high until mid-summer.

Numbers of cormorant, like those of the grebe species, fluctuate according to the availability of suitable fish and in some years reach the threshold for national importance. The number of teal at the lake is heavily influenced by water levels. In years with low levels large flocks form in the late autumn and early winter, for example in excess of 3,000 in September and December 2005, whilst years with high water see much lower counts, for example a maximum of 360 in 2007. Smew was a regular wintering visitor to the lake until recently (see Trends section below) and although numbers were small they were of national significance for this scarce species.

The population of breeding reed warblers at the lake is estimated at between 500 and 1,000 pairs and is of national importance for this species, if the criteria used for assessing waterfowl are applied. Pairs breed around the lake wherever reedbeds are present, with a large concentration in the main reeds. The lake's margins are also used by large numbers of both reed and sedge warblers on passage, but quantification of the significance of these numbers is not possible although they are listed in the SSSI citation.

### Locally Important Species

In a more local context, Chew Valley Lake is the most important site in the Bristol area for many other wildfowl species, including mute swan, mallard, pintail, garganey, goldeneye and goosander. It is also the most important site in the Bristol area for water rail, cettis warbler and water pipit.

### UK BAP Species

Eighteen bird species listed as priorities for conservation in the UK BAP occur regularly at Chew Valley Lake (see Appendix 1). The populations of most of these species, such as bullfinch and song thrush, at the lake are insignificant in comparison with the populations in the wider area. Species on the UK BAP list for which the lake is of particular interest are aquatic warbler, bittern, linnet, cuckoo, reed bunting, herring gull, black-tailed godwit (continental race) and starling.

There are very few records of aquatic warbler at the lake, and although its elusive nature means that many birds must be missed, the numbers that visit Chew are certainly very small. It is, however, a globally threatened species and any site that it uses is of some significance. Aquatic warbler occurs at the lake as an autumn passage migrant, in reedbeds and associated patches of sedge.

Bittern has bred successfully at the lake once, in 1997, and probably bred the following year. It is also a winter visitor to the lake. One or two are recorded most winters, with one exceptional count of six. The species' secretive nature means that these counts may be under-estimates. Bitterns occur at the southern end of the lake, in the main reeds and in the reedbeds around Herriott's Pool.

Linnet does not breed at the lake, and in many years numbers present are very small. When the water level drops early in the summer, however, allowing abundant growth of seed-bearing plants on exposed mud, substantial flocks of linnet gather to feed on these seeds in the autumn and early winter.

The national populations of cuckoo have been in rapid decline in recent years, and Chew is now the one of the few sites in the local area that regularly supports a population, although this now numbers only one or two pairs.

Reed bunting is a resident at the lake, breeding in patches of reed around the lake's margins, and often remaining in these throughout the year. The breeding population is typically of the order of 20 pairs and is the largest in the Bristol area.

Herring gull roosts at Chew in large numbers, and although not of national importance the roost at the lake is the 16<sup>th</sup> largest in Britain, and the third most important inland site.

There have been several accepted records of the continental race of black-tailed godwit at the lake in recent years. It probably occurs occasionally in small numbers on spring, usually on Herriott's Pool.

Numbers of starling around the lake are not usually of any significance, but in some years a large roost, probably numbering tens of thousands of birds, forms in the reedbed. Such numbers are locally significant.

#### Bath and North-east Somerset BAP Species

Thirty three bird species listed as priorities in the B&NES BAP occur regularly at the lake (see Appendix 2). Chew is the most important, or only, site in B&NES for twenty of these species. Notable populations, in addition to those described above, include those of garganey, water rail, grey heron, sand martin and barn owl.

Garganey is a scarce passage visitor to the lake, and has bred in the past. In some years, particularly when water levels are low, numbers in autumn can be amongst the largest in Britain.

Estimation of water rail numbers is difficult, but Chew supports the most important population in the Bristol area. In some years wintering numbers, which reach 40, are amongst the highest in Britain. Breeding probably occurs every year, with records suggesting between one and three pairs.

The heronry on Denny Island is the largest in B&NES, but although it typically contains 30 pairs very few herons are seen feeding around the lake.

Sand martin does not breed at the lake, despite the provision of nesting barrels, but large numbers visit the lake during the spring. As with other hirundine species and common swift, numbers are largest during spells of adverse weather when the lake is an important source of insects. At such times a significant proportion of the UK population of sand martin feeds over the lake.

Despite a partial recovery in its national population, barn owl remains a scarce breeding species and any site that supports the species is significant. Two pairs have bred at the lake in some years, generally with a good degree of success.

### **2.2.2 Mammals**

#### UK BAP Species

Seven species of mammal included in the UK BAP list of priority species are known to visit the lake regularly, and one or two occur irregularly.

Hedgehog, included in the BAP list because of declining populations, occurs in unknown numbers – droppings are occasionally seen, as are road casualties.

Otter was previously extinct at the lake, but both actual animals and signs are now seen occasionally, and it may be resident at the lake.

There is a small population of harvest mice behind the main reedbed.

Four species of bat on the list- lesser horseshoe, brown long-eared, noctule and soprano pipistrelle – forage over the lake and soprano pipistrelle breed. There is a feeding roost of lesser horsehoe bats in Sutton Wick hide.

Brown hare is not resident at the lake but occasional individuals are seen around The Parkland. There have been recent sightings of polecat around the lake, and a roadkill corpse nearby was confirmed, so it is possible that a population is becoming established.

#### B&NES BAP Species

Nine species of mammal listed in the B&NES BAP occur at Chew: otter, harvest mouse, daubenton's bat, water shrew, noctule bat, common pipistrelle, soprano pipistrelle, brown long-eared bat and pygmy shrew.

As detailed, the bat species are known to forage over the site and may breed.

Water shrew and pygmy shrew have both been recorded on a small number of occasions and their true status at the lake is unknown. The Chew population of

pygmy shrew is unlikely to be of significance in the wider context of B&NES, but that of water shrew may be.

### **2.2.3 Herptiles**

#### UK BAP Species

One species of amphibian on the national BAP list, common toad, and two species of reptile, grass snake and common lizard, have been recorded at Chew.

Large numbers of toads migrate towards the lake across the road to Woodford Lodge and in the Twycross area. They breed in ponds and ditches around the site and probably in the lake itself.

Grass snakes are widely distributed around the lake, with favoured areas including Moreton Bank, the main reeds and around Herriott's Pool. The population here is probably one of the largest in B&NES.

There are no recent records of common lizard.

#### B&NES BAP Species

Common toad, common frog and grass snake are listed in the B&NES BAP. The status of common frog at the lake is similar to that of common toad.

### **2.2.4 Fish**

#### UK BAP Species

There is a small natural population of common eel at the lake, which has been supplemented by introductions. They are only able to leave the lake in years when high water levels overtop the spillway.

### **2.2.5 Invertebrates**

Invertebrates are less well recorded than the other groups considered here. There are reasonably complete records of Lepidoptera (butterflies and moths), Odonata (dragonflies and damselflies) and Orthoptera (grasshoppers and related insects). Records of other groups are almost entirely based on two surveys of limited areas carried out in the summer of 2003 and should be regarded as indicative of the lake's potential value only. By comparison with similar surveys the surveyor concluded that Chew Valley Lake is of exceptional value for rare and scarce invertebrates. Of the areas surveyed, grassland at the western end of Villice Bay proved the most valuable.

#### Nationally Rare Species

Five Red Data Book Species were found in the course of the 2003 survey, one moth and four flies, together with a further species of fly whose status is unclear. The moth (*Endothenia pullana*), is associated with marsh woundwort, which grows in marginal vegetation and reedbed edges. The flies are: *Oxyna nebulosa*, which is associated with ox-eye daisy in grassland; *Anticheta brevipennis*, a snail-killing species associated with marginal vegetation; *Coenosia vibrissata*, which is probably associated with marginal vegetation; and *Sarcophaga villeneuvei*, which probably feeds on carrion in marginal vegetation.

A further ten nationally scarce species were recorded: two moths, two beetles and six flies. Five of these species are associated with species-rich grassland and five with marginal vegetation. Other surveys around the lake have recorded a further four nationally scarce moth species, three associated with hedges and one with marginal vegetation.

#### UK BAP Species

One species of bumblebee, moss carder bee (*Bombus muscorum*), included in the national BAP has been recorded at Villice Bay. It requires large expanses of species-rich grassland, with a preference for swards that are tall but not rank.

Two species of butterfly listed in the national BAP occur at Chew Valley Lake. They are: small heath, which occurs in small numbers in grasslands; and white-letter hairstreak, which occurs in elm trees on the eastern side of the lake.

A further species, pearl-bordered fritillary, has occurred as a vagrant. Wall brown was formerly resident but no longer occurs at the lake, a trend typical of the population crash the species has suffered nationally.

Thirty three species of moth listed in the national BAP occur at the lake. Most of these species are widespread and are listed because they are much less abundant than they were formerly. For most of these moths, the Chew populations are probably of little significance in any wider context. Those for which Chew may be of some significance include: feathered gothic and ear, which are associated with grassland; and powdered quaker, shoulder-striped wainscot and dusky brocade which are associated with marginal vegetation.

#### B&NES BAP Species

The B&NES BAP list includes one species of butterfly that occurs at Chew: A small population of green hairstreak is present around old quarries on Woodford Bank.

There are seven moth species on the B&NES BAP list at Chew. The populations of three of these species, brown-veined wainscot, twin-spot wainscot and obscure wainscot, are the largest (or only) in the district. They are all associated with the reedbeds. The population of dingy shell at Chew is probably significant in a B&NES context: it is frequent in the alder plantations.

Three Odonata on the B&NES BAP list have been recorded at Chew. However, one of these, scarce chaser, was recorded as a vagrant only and there are no recent records of the other two, white-legged damselfly and red-eyed damselfly.

Two Orthopterans on the B&NES BAP list have been recorded at Chew. Long-winged conehead was first recorded in 2003 and is now frequent. It has become much more widespread nationally and is not currently of conservation concern. Rufous grasshopper has only been recorded as a vagrant, presumably from the Mendips and there is no suitable habitat for this species at the site.

## **2.2.6 Plants**

### Nationally Rare Species

The Red Data Book starry stonewort (*Nitellopsis obtusa*) was recorded by Environment Agency surveyors in 2003, although this record has not been confirmed. This alga has been recorded from a very small number of sites nationally.

### Nationally Scarce Species

The only nationally scarce plant species that are present at Chew are mudwort and broad-leaved spurge, both of which appear only intermittently.

A small population of mudwort appears on exposed mud at Moreton when water levels drop.

Broad-leaved spurge appears occasionally on disturbed soil, particularly in the Heron's Green / Villice Bay area, indicating that a viable seed source of this arable weed survives in soils.

Two other nationally scarce species have not been seen for over twenty years. Bithynian vetch was formerly present in the hedge on the northern side of The Parkland. Cornflower appeared on a newly excavated island in Herriott's Pool, and might reappear following similar soil disturbance.

### Locally Scarce Species

Chew supports a total of 77 plant species that are defined in the Flora of the Bristol Region as Avon Notable Species. Of particular note are: large populations of unimproved grassland indicator species such as dyers greenweed, grass vetchling, bitter vetchling and green winged orchid; large populations of species of wetland margins such as marsh cudweed and sea club-rush; and large populations of water plants such as the various pondweeds and water-crowfoots.

### BAP Species

Starry stonewort (see above) is a UK BAP species.

No other UK BAP plant species, which are defined on the basis of extreme rarity rather than population decline as in most animal groups, have been recorded at

Chew. Twenty six species listed in the B&NES BAP are present. Of the 24 that still occur (the exceptions are bithynian vetch and cornflower), eight are primarily associated with wetland margins, four with grassland, seven with open water, four with woodlands and hedges and one with disturbed soil. The lake is of particular significance for 19 of these species, with particularly important populations of sea club-rush, brown sedge, green-winged orchid, golden dock and horned pondweed. For many water plants the populations at Chew Valley and Blagdon Lakes are the largest, or only, in the district. The population of green-winged orchid is also notably large, and is probably amongst the largest in south-western England.

## **2.3 Key Habitats**

This section describes the main habitat types represented at Chew Valley Lake, and evaluates their biodiversity value.

### **2.3.1 Open Water**

The open water at the lake is an example of Eutrophic Standing Water, a UK BAP priority habitat. It is a prime part of the lake's biodiversity interest and supports many of the site's most important plant and animal populations.

Some areas of the lake support little or no macrophyte vegetation, but abundant growths occur in some years in areas such as Roman Shallows and dense growths are more regular in sheltered areas such as Heron's Green, Stratford and Villice Bays. Frequent species include various species of stonewort, pondweed, especially small pondweed, spiked water milfoil and rigid hornwort, with dense growths of mare's-tail and water-crowfoots in more shallow water.

The open water is the key habitat for many of the species of bird for which the site is of importance. Important species include those that feed on fish, such as great crested grebe and cormorant; weed-eating species, such as pochard and coot; species that dive for insects, such as tufted duck and goldeneye; species that feed on seeds and insects in shallow water, such as teal and shoveler; and the gull species, which use the water as a roosting site. The insects produced by the open water are an important food source for aerial feeders such as common swift and sand martin.

Fish in the lake include several coarse species, including a very large population of roach and the recently introduced pike, as well as large introduced populations of trout. Otter has recently returned to the lake to feed on the fish.

Bare mud is exposed in years when the water level drops. This mud supports a wide diversity of plants, including species frequent on bare soils such as fat-hen and scentless mayweed, as well as specialist wetland plants such as water mint, marsh cudweed, trifid bur-marigold and water chickweed. Some of these species, such as golden dock and mud-wort, are rare, and the large population of the

North American slender mugwort is unique in Britain. When mud is exposed it attracts large numbers of birds. At such times numbers of wildfowl are high, wading birds are present, flocks of seed-eating birds such as linnet are attracted to fruiting plants and the lake is one of the best sites in Britain for water pipit.

### **2.3.2 Reedbeds**

Reedbeds are a UK BAP Priority Habitat.

The reedbed at Chew Valley Lake is the largest in south-western England, although recently established reedbeds in the Somerset Levels may soon be larger. The main reedbed at Chew is in the south-eastern corner of the lake, but smaller stands are found virtually all around the lake's margins.

The reedbeds are overwhelmingly dominated by dense stands of common reed. Understorey plants that co-exist with the reeds include water chickweed, water forget-me-nots and common duckweed. The drier parts of the reedbeds are invaded by hedge bindweed, stinging nettle, bramble and willow species.

The population of reed warblers at Chew is probably the largest in Britain. Other breeding bird species include water rail, sedge warbler and reed bunting. Great crested grebe, pochard, coot and other water birds nest in the wetter parts of the reedbeds, whilst the drier margins support an increasing population of cettis warbler. Rare species that have bred on one or two occasions include bittern, black-necked grebe and bearded tit.

The drier parts of the reedbeds support a population of harvest mice. Insect species of note include the largest populations in the region of twin-spotted and brown-veined wainscot moths. These have been the object of an intensive scientific study at the lake, which has yielded information on population dynamics and predator impacts.

### **2.3.3 Margins (excluding reedbeds)**

This heading covers a variety of vegetation types. Most of this vegetation does not fall under a BAP habitat type heading, but it should be considered an integral part of the Eutrophic Standing Water element of the lake. It supports some of the most notable species found at the site.

The marginal vegetation at Chew is diverse, and includes substantial stands of lesser pond sedge, greater pond sedge, bulrush, sea club-rush, soft rush and mixed tall herb vegetation, usually dominated by water mint. The plant species growing here are notable in the context of the Bristol region, and include large populations of otherwise uncommon species such as water chickweed, round-fruited rush, marsh cudweed and the naturalised slender mugwort.

This habitat is important for breeding species such as sedge warbler and most migrant aquatic warblers probably use this vegetation. It is also used by cettis warbler, and when inundated by species such as snipe, jack snipe and teal.

Several of the nationally rare and scarce invertebrate species recorded at the lake are associated with this habitat. These include four of the five Red Data Book species and five of the ten nationally scarce species recorded in 2003 (see 2.2.5 above). Further survey would doubtless reveal additional rare species.

The population of harvest mice at the lake is partly dependent on this habitat type, as well as the reedbeds, and it is probably also used by water shrew.

### **2.3.4 Grasslands**

The grasslands at Chew Valley Lake include several exceptionally rich examples of a UK BAP Priority Habitat Type, Lowland Meadows.

The underlying soil around the lake is a calcareous clay, which supports a grassland type that is largely neutral but has a marked calcareous influence. The frequent grass species, including crested dog's-tail, meadow fescue and Yorkshire fog, are largely typical of neutral soils, but upright brome, a characteristic grass of limestone soils, is frequent in several places. The assemblage of herb species is exceptionally rich, particularly in the area around Villice Bay and Heron's Green. Many, including devil's-bit scabious, dyer's greenweed, tormentil, grass vetchling, bitter vetchling, strawberry clover, saw-wort and betony, have become scarce due to agricultural intensification and their populations at Chew are of importance in a B&NES context.

The Parkland and the associated field to the west support an exceptionally large population of green-winged orchids, probably amongst the largest in south-western England. Other species of note found here include heath grass, common spotted orchid, heath spotted orchid and adder's tongue fern.

Small quarry workings on Woodford Bank support a small area of limestone grassland, with abundant upright brome and herb species such as great woolly thistle and purging flax.

The grasslands support exceptional populations of invertebrates. These include large numbers of species such as marbled white, common blue and small copper butterflies; short-winged and long-winged conehead bush-crickets; and six-spot and narrow-bordered five-spot burnet moths. The 2003 survey found one Red Data Book species and five nationally scarce species in the grasslands around Villice Bay, as well as the BAP Priority Species moss carder bee (see 2.2.5 above). It suggested that the wetter grasslands are less valuable for invertebrates than those that are seldom flooded.

There are no significant breeding bird species in the grasslands but it is an important feeding habitat for two BAP priority species: barn owl and kestrel.

### **2.3.5 Hedgerows**

The hedges around the lake are all examples of a BAP priority habitat; the most important are species-rich or ancient hedgerows.

Those hedges that are ancient are characteristically dominated by hazel, with species present in smaller quantity including wild privet, dogwood, field maple and holly. The ground flora of these hedges is generally rich, and includes large quantities of plants normally associated with woodlands, including bluebell, primrose, moschatel, sweet violet and various ferns. Many hedges include a hedge bank, some of which support grassland plants. These include wild basil and bee orchid, which are not found in other habitats at Chew.

The other hedges are mostly those that were planted when the lake was created, or have been planted in the last twenty years. The former are mostly dominated by either hawthorn or hornbeam, whilst the more recently planted hedges are more diverse. The ground flora of both groups of hedges is much less diverse than that of the ancient hedges.

The bird populations of the hedges are generally restricted to widespread species although some of these, such as song thrush and dunnock, are of conservation concern. Bullfinches breed in hedges around The Parkland and on the east shore. Marsh tits are present in hedges around Twycross. The lake's hedges attract large flocks of redwing and fieldfare outside the breeding season.

The invertebrates associated with the hedges are generally common species, such as holly blue and brimstone butterflies. Hedgerow trees support some more scarce species, such as mocha and centre-barred sawfly moths and purple hairstreak butterfly on field maple, ash and oak respectively.

### **2.3.5 Woodlands, Scrub and Trees**

A number of habitats are considered here. Two of these, wet woodland and lowland mixed deciduous woodland are BAP priority habitat types. Parkland trees around the lake are of interest in a local context, but they do not qualify as a priority habitat since there is no evidence that they pre-date the nineteenth century. Other woodland and scrub types are of lower nature conservation value.

Areas of willow carr that have developed on the east shore, particularly to the north of Twycross, qualify as wet woodland. The dominant tree species is goat willow, with smaller quantities of other willow species. Some of these trees are now very old and there are large quantities of both fallen and standing dead wood. The ground flora is dominated by common reed, reed canary grass and greater pond sedge and is not particularly diverse, a reflection of the relatively

recent origin of these woodlands. The trees support abundant growths of lichens, including locally uncommon species such as *Usnea articulata*.

Most of the other woodlands around the lake are plantations dating from the lake's establishment. The dominant species vary, but include Norway maple, alder, sycamore and silver birch. Other species, especially ash, have colonised some plantations. The ground flora of the plantations is generally dominated by ivy and is not diverse, but includes some woodland plants such as primrose, dog's mercury and male fern. Broad-leaved helleborine has recently been found in a plantation by the lane to the Sailing Club.

There are no extensive areas of scrub, but there are small stands of willows and sallows in various areas, and small patches of other species including English elm, dogwood and hawthorn. There are also patches of exotic species such as ornamental dogwood, especially on the east shore.

Isolated trees in areas of grassland, especially on and around The Parkland, support significant growths of lichens. Most are pedunculate oaks.

The bird populations of these habitats are generally restricted to common species, but ravens have recently bred in the plantation to the south of Moreton Point and a large heronry is present on Denny Island. Other breeding species in the plantations include sparrowhawk, buzzard, tawny owl and great spotted woodpecker, and woodcock are present in the winter. Breeding birds in scrub include cettis warbler as well as large populations of more common species, including some that are of conservation concern, such as sedge warbler.

The invertebrate fauna of these habitats has not been well surveyed. Lunar hornet moths are present in sallows in several areas, and the diversity of more common moths is good. The large quantities of dead wood and abundant growths of lichen in the wet woodlands suggest that they are likely to be of interest for invertebrates.

### **2.3.6 Ponds**

The ponds around the site cover a much smaller area than the lake itself, but they support a distinctive range of species and are an example of a BAP priority habitat type.

There are small ponds on Woodford Bank, to the north of Wick Green Lane, in the field behind Moreton Bank, to the north of Hollow Brook, around Herriott's Pool and on Nunnery Point (although these are a temporary feature). Most have been either created or re-excavated as part of conservation management. The ponds are not as diverse in wetland plant species as the main lake, but species such as yellow flag and purple loosestrife occur around several. The ponds on Nunnery Point, which in the long term will be infilled as part of the engineering works that created them, have populations of flowering rush and stoneworts.

The main value of the ponds is in the habitat they provide for species that are either absent or less frequent in the lake itself. These include large populations of breeding amphibians. Newly dug ponds are colonised by dragonflies such as four-spotted chaser and black-tailed skimmer, followed by emperor and broad-bodied chaser as they mature.

## **2.4 TRENDS**

Several significant changes in the flora and fauna of the lake have been identified since the 1998 BAP was produced. Many of these are the result of wider trends over which site management has no influence, but some are more site-specific.

The 2000 and 2007 bird reports considered changes in the water bird populations of the lake. The following key points were identified:

- A marked tendency for populations of most species, including those of conservation significance such as shoveler, gadwall and teal, to be higher in years of low water level;
- An ongoing decline in mallard numbers, mirroring a national trend;
- The virtual loss of wigeon, a previously abundant species, as a result of habitat change and, to a lesser extent, increased disturbance;
- A general increase in weed-eating species, which is most marked in coot, for reasons that are not clear;
- A tendency for bird numbers to remain higher in the late winter, due to a reduced frequency of extreme cold weather;
- A decline in fish-eating species such as great crested grebe and goosander caused by changes in fish populations, although in the last two years this trend has reversed as small fish have become more abundant;
- A dramatic increase in tufted duck numbers. This was linked to the decline in fish populations reducing competition for invertebrate prey items, but numbers have remained high through the recovery of fish populations;
- A possible decline in shoveler populations due to increased disturbance;
- A dramatic decline in, and eventual disappearance of, smew. This was predicted as a result of the ruddy duck cull, with which it coincided;
- A dramatic decline in ruddy duck numbers, as a consequence of the Defra cull; and
- A decline in wader numbers, for reasons that are unclear but may be linked to habitat change.

Breeding waterfowl populations continue to fluctuate according to water levels, with high early summer levels favouring most species; availability of prey, with high coarse fish populations favouring species such as great crested grebe; and unidentified factors. Mallard populations show a downward trend, mirroring a more widespread decline. The first brood of shoveler for 15 years was seen on Heron's Green Pool in 2007. The reed-lined ditches at the back of the pool are a

good breeding habitat for this species, and the fact that eight young fledged may reflect the absence of pike from the pool.

Most trends in other bird populations mirror wider trends and are probably not linked to changes at the lake itself. These include dramatic declines in cuckoo and willow warbler, the increase in cettis warbler and colonisation by raven. Other trends are probably linked to changes at the lake. The installation of barn owl boxes has probably aided colonisation by that species, which represents a significant increase in the biodiversity value of the lake. The increased legginess of some hedges and the growth of young trees have led to declines in birds that breed in scrub or dense herbaceous vegetation, such as garden warbler and sedge warbler.

The colonisation of the lake by otter and possible colonisation by polecat are part of a national trend, and are significant additions to the lake's biodiversity interest. A decline in the mink population, due to a programme of trapping and perhaps because of colonisation by otter, is a beneficial trend. No other trend in mammal distributions has been detected, and neither has any in herptile populations.

One change in fish populations has been the unauthorised introduction, presumably by anglers, and subsequent increase of pike. Predation by pike has probably contributed to poor duckling survival. Occasional periods of pike fishing now take place. There has been increased disturbance to birds as a result of this, although no linkage between this and overall bird numbers has been shown.

Most changes in invertebrate populations are the result of increased recording effort, and identification of genuine trends is difficult. Many trends are almost certainly linked to climate change. These include colonisation by hornet and long-winged conehead bush-cricket and several recent records of lesser emperor dragonfly. Some known declines mirror national trends, in particular the loss of wall butterfly and a decline in small heath butterfly populations. Dragonflies such as four-spotted chaser and black-tailed skimmer have benefited from the creation of ponds, although the populations here tend to be transitory only. None of the other changes that have been observed in the lake's insect population can be definitively attributed to site management, although this may be a reflection of lack of survey of some groups.

Plants are better studied on the whole, with a history of over twenty years' fairly constant survey effort (on an amateur basis). There have been few losses to the lake's flora. Water avens appears to be rarer around the site than previously, possibly due to shading of wetland habitat.

The populations of many other species fluctuate with water level, so that significant species such as mud-wort and golden dock are only seen when water levels are low. Other species, such as cornflower and broad-leaved spurge, only appear when soil has been disturbed.

Some apparent additions to the plant list may be the result of ongoing survey effort. Examples may include lady's mantle, a significant indicator species of unimproved grassland, on Moreton Bank. Some additions, however, are almost certainly the result of colonisation or at least population growth. The most significant example is the appearance of heath spotted orchid, together with a large population of common spotted orchid, in the northern part of The Parkland. Inputs of manure to this area have been reduced and this has led to a gradual, but marked, diversification of the flora of the area.

Many non-native plants have been recorded in several habitats around the lake. Most are transitory introductions from bird seed or other sources and others, although permanently established, do not pose a threat to biodiversity. There are two species that present a potential threat, however. These are bamboo (species not known) at the edge of the main reeds and himalayan balsam on the northern side of Heron's Green. The bamboo is a long-established introduction but has spread rapidly in recent years; Himalayan balsam is a more recent introduction and is a potential threat to diverse marginal vegetation.

## **2.5 Conclusions**

The key features of biodiversity importance at Chew Valley Lake are:

- The open water, which has internationally and nationally important bird populations, is a UK BAP priority habitat and has locally important populations of water plants;
- The reedbed, which supports nationally important bird populations, is a UK BAP priority habitat and has locally important populations of invertebrates;
- The species-rich grasslands, which are a UK BAP priority habitat and support nationally rare invertebrates and locally important populations of plants; and
- The marginal vegetation, which forms part of the habitat of internationally and nationally important populations of birds, has an exceptional assemblage of rare invertebrates and is locally important for plants.

Secondary features of biodiversity importance are:

- Species-rich hedgerows, which are a UK BAP priority habitat;
- Wet woodlands, which are a UK BAP priority habitat;
- Scrub, which supports populations of breeding birds;
- Parkland trees; and
- Ponds.

### 3 ACTION PLANS

#### 3.1 Open Water

The following species of conservation importance are found on the open water in significant numbers:

Internationally Important Populations	Nationally Important Populations	UK BAP Species	B&NES BAP Species
Shoveler	Great crested grebe	Bewick's swan (in some years)	Kingfisher
Lesser black-backed gull	Little grebe	Herring gull	Pintail
Black-headed gull	Gadwall	Otter	Shoveler
	Pochard	Common eel	Teal
	Tufted duck	Common toad	Wigeon
	Coot		Garganey
	Cormorant (in some years)		Gadwall
	Teal (in some years)		Pochard
	Common gull		Tufted duck
	Starry stonewort (unconfirmed)		Goldeneye
			Bewick's swan
			Great crested grebe
			Black-necked grebe
			Shelduck
			Otter
			Water shrew
			Common toad
			Common frog
			Various-leaved water starwort
			Rigid hornwort
			Ivy-leaved duckweed
			Small pondweed
			Lesser pondweed
			Fan-leaved water-crowfoot
			Horned pondweed

#### 1998 Targets

*"Maintain populations of water birds to at least current levels."*

The 2007 bird report shows that this target has been met. Numbers fluctuate from year to year, with most species favouring years when water levels drop, and some species have fared better than others, but numbers now are comparable to those of ten years ago. Shoveler numbers remain of international importance, although in years of high water levels numbers fall below the threshold.

### 1998 Management Proposals

*“Maintain existing controls on recreational activities.”*

Control has largely been maintained. However, there are two significant exceptions. The trout season has been extended from mid-October to the end of November and sessions of pike angling have been introduced, resulting in increased pressure in the late autumn and a new season in February in some years. These measures have caused some concern over disturbance, particularly in October and November when bird numbers are high, and some mitigation measures have been taken including a ban on bank angling on Moreton Bank during the extended season and an extension to the exclusion area for boats in February. Some concern remains, however. There is inconclusive evidence that disturbance, especially from pike anglers, has led to a decline in shoveler numbers in November, formerly a peak month for the species. During February 2008 pike angling was responsible for a drop in goosander numbers from 65 to ten. These observations suggest that further controls on recreation may be required to maintain the lake’s biodiversity interest.

Sailing does not by and large appear to have a significant adverse impact on bird numbers. It is restricted to a part of the lake that is of relatively low importance and those birds that do use these areas re-locate to other parts of the lake. Some adverse impact has been noted, however, when large sailing events coincide with high levels of boat angling, as in October 2006.

A significant potential threat is the possibility of construction of a cyclepath around the southern end of the lake, which could have a significant adverse impact depending on the route chosen. Pressure for such a route passing through or adjacent to sensitive areas should continue to be resisted.

General public use of the lake has not resulted in additional problems since 1998, but continued vigilance is required, for instance to maintain the prohibition on dog walking on the Bittern Trail.

*“Prevent access to the banks around the north-west corner of Villice Bay between April 1<sup>st</sup> and August 1<sup>st</sup>.”*

This has generally been enforced, although there are occasional instances of unauthorised entry. The area does not appear to be used by nesting ducks, which was one of the objectives of this proposal, but it is used by nesting little grebe, great crested grebe and coot in significant numbers, and as a refuge area by non-breeding birds.

*“Continue management of vegetation on the islands in Herriott’s Pool and Stratford Bay in September and, if necessary, in February.”*

This has generally taken place and major works to rebuild the islands and to improve erosion barriers were carried out in autumn 2006.

### Revised Targets

Maintain populations of water birds at least at current levels.

Ensure that shoveler population remains of international importance.

Maintain populations of water plants.

### Management Rationale

Water bird populations are affected by several variables, many of them beyond control. Those under at least partial control by Bristol Water plc are:

- Water quality;
- Water levels;
- Disturbance; and
- The condition of islands.

Growths of water plants, and therefore the populations of birds and invertebrates that depend on them, require good water quality. At present algal blooms occur, but these alternate with periods of dominance by macrophytes. Algal dominance, which would have an adverse impact on water plants and several bird species, is encouraged by high levels of phosphates. There is no evidence that there is at present any adverse impact caused by water quality, but there is potential for adverse impact and monitoring and mitigation (if required) of inputs should continue. Catchment management may be required to limit levels of inputs, which may include diffuse and point sources of agricultural origin and properties with septic tanks in the catchment.

Water levels at the lake depend on the level of rainfall and the volume of water extracted. The ideal situation at Chew is that levels should remain high until July, and then drop through the autumn and early winter. Extraction decisions will be dictated by supply requirements and rainfall, but it is recommended that biodiversity impacts are taken into account as an additional consideration.

Disturbance levels at the lake have increased and there are likely to be further pressures. Definite impacts on bird populations have not been proven but further studies may justify additional restrictions on activities.

Control of vegetation on islands and measures to reverse the effects of erosion are likely to be required. A gravel spit has been formed on the northern edge of Heron’s Green Pool. This is attractive to birds, for example as a roosting site for lapwing, and its extension would be beneficial.

## Management Proposals

- 3.1.1 Maintain existing controls on disturbance.
- 3.1.2 Ensure that signs and barriers restricting access remain in good condition.
- 3.1.3 Give higher profile to guidelines to anglers on minimising disturbance to birds.
- 3.1.4 Continue to exclude boats from the nature reserve at the southern end of the lake during February.
- 3.1.5 Manage draw down of the lake to benefit bird populations, when other considerations allow.
- 3.1.6 Continue management of vegetation on islands, and carry out measures to protect from erosion as required.
- 3.1.7 Extend the gravel spit in Heron's Green Pool.
- 3.1.8 Monitor water plant populations, using a methodology based on that employed by the Environment Agency.
- 3.1.9 Monitor levels of phosphate.
- 3.1.10 Monitor impacts of recreational activities on bird populations.

## **3.2 Reedbeds**

The following species of conservation importance are found in the reedbeds in significant numbers:

Nationally Important Populations	UK Species	BAP Priority	B&NES Species	BAP Priority
Reed warbler	Bittern		Reed warbler	
	Cuckoo		Sedge warbler	
	Reed bunting		Pochard	
	Starling (roost)		Bittern	
	Grass snake		Cettis warbler	
	Harvest mouse		Reed bunting	
			Great crested grebe	
			Black-necked grebe	
			Water rail	
			Harvest mouse	
			Grass snake	
			Brown-veined wainscot	
			Twin-spotted wainscot	
			Obscure wainscot	
			Grey willow	
			Purple willow	

## 1998 Targets

*“After five years the reedbeds at Chew Valley Lake will support both wintering and breeding populations of bittern and water rail; at least 1000 pairs of reed warbler; and will continue to be used by nesting ducks and grebes. The reedbeds will continue to support a range of reedbed specialist moths.”*

Success in meeting these targets has been variable. Bitterns continue to winter in the reedbeds, but have not bred since 1998. The reasons for this failure are unclear – the habitat appears as suitable as it was when breeding took place, and further habitat has been created. The water rail population is difficult to quantify, but appears to have increased. One thousand pairs is at the upper end of populations of reed warbler populations. The reedbeds continue to be extremely important for this species although there may have been some decline. Nesting ducks continue to use the reedbeds, and the populations of reedbed moths are similar to those in 1998.

### 1998 Management Proposals

*3.3.1 Monitor the amount of scrub in the reedbeds and where necessary control, having regard for the habitat requirements of cettis warbler, which need some scrub."*

Willows and other scrub have been removed from the reedbeds when water levels allow, although scrub encroachment remains a problem.

*3.3.2 Flail the reedbeds shown on map 2 in September on a three-yearly rotation so that one third of the area is mown every year. Leave a narrow fringe of uncut reed on the landward edge of each block unmown in order to retain a visual screen."*

This has been carried out when water levels allow, which in practice has led to a lower frequency of management than recommended. The cut areas have proved attractive to duck and snipe and to nesting reed warblers in subsequent years.

*3.3.3 Cut the reeds along one side only of the southern two ditches in the reedbed. Carry out the work on one ditch in one year and the other ditch the next year.*

*3.3.4 Dig out the northernmost ditch through the reedbed as and when water levels allow."*

These measures have been undertaken, although water levels do not allow regular management as specified at 3.3.3.

*3.3.5 Encourage reed growth in the area of Herriott's Pool shown on map 2. When water levels allow, deposit spoil gained from the adjacent land on the bottom of the pool to give a uniform depth of 250mm to allow the spread of reed."*

This pool now has a vigorous growth of reed.

*3.3.6 Encourage further growth of the main reedbed by raising the level of the lake bottom adjacent to the reedbed by winning spoil from nearby parts of the lake bed. Protect the area with clay bunds. Work to be carried out when water levels allow."*

This proposal has not been followed through, partly because water levels are rarely low enough to allow the works, and partly due to engineering problems.

*3.3.7 Investigate the possibility of creating an additional area of reedbed in the field to the south-west of Herriott's Pool."*

An area on the western side of Herriott's Pool has been bunded off to create a further area of reedbed. Establishment of reed was more difficult here than envisaged, partly due to grazing by Canada geese and other birds, but is now well under way.

### Revised Targets

To maintain wintering population of bittern, and to re-establish breeding population.

To maintain nationally important breeding population of reed warbler.

To maintain breeding and wintering population of water rail.

To maintain populations of reedbed moths.

### Management Rationale

Some areas of reedbed are maintained by water levels, but the upper parts of some, including the main reeds, are suffering a trend towards drying out and scrub invasion. This has an adverse impact on breeding bird populations. Management to reverse this trend is problematic. Large scale excavation would produce large volumes of spoil with resulting disposal problems and there is a population of grass snakes here. Grass snake is a protected species and Chew has a significant population, so any works would require measures to avoid killing grass snakes, which would add to the expense and difficulty. Cutting the reeds stimulates new growth, but unless arisings can be removed does not combat drying out. Burning would combat the trend to some extent, but could have adverse impacts on invertebrates, harvest mice and grass snakes. Increasing the water supply to the reedbed would help reverse this trend. There are ditches that flow into the reedbed from adjacent land, but the flow in these is inadequate. The only supply of sufficient volumes of water would be via a pipe from Herriott's Pool. This has some potential, but implementation would require further investigation.

Continued scrub control within the reedbeds is required to prevent invasion. If willows can be either dug or winched out then this would create small depressions, which would improve reedbed quality. Some control of trees behind the reedbed may also help to slow the trend towards drying out.

The patch of bamboo should also be removed – excavation is the only viable means of achieving this and would create a small pool.

The ditches through the reedbed are important in providing access to open water for a range of species and should be maintained, together with the bunds that keep them damp when water levels drop.

### Management Proposals

3.2.1 When water levels allow, dig or winch willows out of main reeds and Stratford Bay reedbed, leaving small hollows and removing spoil to the back of the reedbeds. If digging carry out under supervision of ecologist to avoid killing grass snakes.

3.2.2 Repeat 2006 cut at back of reeds in 2010, set blades high to avoid killing grass snakes. Pile cut material at back of reedbed.

3.2.3 Fell front row of pines at back of reedbed.

3.2.4 Investigate feasibility of piping water from Herriott's Pool under the road to the main reeds.

3.2.5 Dig out patch of bamboo at rear of main reeds and dispose of roots off site. Leave depression to fill with water.

3.2.6 Flail compartments in reedbed on Moreton Bank in late September, when water levels allow. Leave a narrow fringe on the landward edge uncut to provide a visual screen.

3.2.7 Cut vegetation back from the southern side of the ditches through the main reeds on a two-yearly rotation, so that each ditch is cut every other year when water levels allow.

### 3.3 Margins (excluding reedbeds)

The following species of conservation importance are found in the margins in significant numbers:

Nationally Important Populations	UK BAP Priority Species	B&NES BAP Priority Species
Teal (in years of low water level)	Aquatic warbler	Sedge warbler
Little grebe	Lapwing	Aquatic warbler
Great crested grebe	Grass snake	Teal
Coot	Harvest mouse	Garganey
<i>Endothenia pullana</i> (moth)	Shoulder-striped wainscot	Water pipit
<i>Aniticheta brevipennis</i> (fly)	Ear moth	Linnet (in years of low water level)
<i>Coenosia vibrissata</i> (fly)		Great crested grebe
<i>Sarcophaga villeneuveva</i> (fly)		Lapwing
		Harvest mouse
		Water shrew
		Grass snake
		Nodding bur-marigold
		Sea club-rush
		Brown sedge

		Fen bedstraw
		Bristle club-rush
		Mud-wort
		Golden dock
		Brooklime

### 1998 Targets

*“To maintain the population of harvest mice at its existing population or greater.”*

As far as survey information allows assessment, this target has been met.

*“To maintain the diversity of wetland plant species at the lake.”*

No losses of species to the lake are known, and the overall diversity of the marginal vegetation has remained high.

### 1998 Management Proposals

*“3.4.1 Flail the areas shown on map 3 in September every year, as water levels allow.”*

This has been carried out as physical conditions allow, and has maintained important areas of diverse vegetation.

*“3.4.2 Cut down willow scrub in the areas shown on map 3 and pile branches under nearby trees.”*

This has been carried out and has been important in maintaining open stretches of shoreline, as at Moreton Bank.

*“3.4.3 Monitor the development of marginal vegetation around Heron’s Green Pool and manage if necessary (eg if species such as soft rush or greater reedmace become too dominant).”*

There has been no formal monitoring of the vegetation, but informal assessments have been made and have informed management measures, including topping of rushes and cattle grazing regime. This has maintained an important habitat for species such as little grebe, snipe, shoveler and spotted crane.

*“3.4.4 Extend the current grazing by cattle to the area of rush-dominated vegetation along the western edge of Heron’s Green Pool.*

*3.4.5 Graze the north-western corner of the margin of Heron’s Green Pool with cattle whilst these are present in the adjoining pool.”*

This has been done, and is key to maintaining open vegetation here.

### Revised Targets

To maintain population of harvest mouse.

To maintain diverse populations of marginal plants.

To maintain diverse populations of insects.

### Management Rationale

Some management intervention is required to prevent encroachment by common reed and trees, especially willows, across areas supporting this habitat type. Whilst these are valuable habitat features in their own right, the importance of the marginal vegetation for birds, plants and invertebrates justifies their removal.

Heron's Green Pool provides cattle-grazed water margins, a habitat that is unique at Chew. No invertebrate survey has been carried out here, but it is likely to be important for invertebrates and is of known importance for birds, for instance providing the only successful nesting site for shoveler in 15 years. The provision of further ditches through this area would provide additional habitat for this and other species.

Himalayan balsam has become established and is likely to spread, threatening more diverse vegetation, in the absence of management.

### Management Proposals

3.3.1 Flail areas of marginal vegetation as shown on map 3 in September as water levels allow.

3.3.2 Remove willows from areas shown on map 3 - if possible winch or dig out, if not cut to base.

3.3.3 Continue to graze margins of Heron's Green Pool with cattle, monitor effect on vegetation and modify grazing regime or top rushes if necessary.

3.3.4 Create blind-ended ditches linking to existing ditch network on western edge of Heron's Green Pool.

3.3.5 Eliminate Himalayan balsam on northern side of Heron's Green by pulling out plants and disposing of outside site. Eliminate any further populations.

3.3.6 Monitor harvest mouse and grass snake populations.

## **3.4 Grasslands**

The following species of conservation importance are found in the species-rich grasslands in significant numbers:

Nationally Important Populations	UK Species	BAP Priority	B&NES Species	BAP Priority
<i>Oxya nebulosa</i> (fly)	Lapwing		Kestrel	
	Small heath		Barn Owl	
	Feathered gothic		Lapwing	

	Ear moth	Green hairstreak
		Brown sedge
		Green-winged orchid
		Spreading meadow-grass
		Devil's-bit scabious

### 1998 Targets

*"At least one pair of barn owls should be breeding at the site."*

This target has been met, with two pairs breeding in some years.

*"The population of green-winged orchids in the northern part of the largest field on The Parkland should have expanded by at least 20% [by 2003]."*

Quantitative survey of the population is difficult, but this target does not appear to have been met, with numbers of flowering spikes fluctuating from year to year. Other species including adder's-tongue fern and both common and heath spotted orchids have colonised the area.

*"The area of unimproved grassland should be no less than it is in 1998."*

There have been minor losses, for example when gravel was deposited on one area by the dam in preparation for the lake's golden jubilee, but by and large this target has been met.

*"The distribution of marbled white should be no less than it is in 1998."*

No changes in the distribution of this species have been noted, and this target appears to have been met.

### 1998 Management Proposals

*"3.5.1 No artificial fertilisers or herbicides should be applied to any of the grasslands."*

This has been complied with, and is important if biodiversity is to be maintained.

*"3.5.2 The areas shown on map 4 should be mown annually after July 15<sup>th</sup>. The mowings must be removed."*

*3.5.3 The areas shown on map 4 should be mown after July 15<sup>th</sup> in years ending in an even digit. The mowings must be removed."*

*3.5.4 The areas shown on map 4 should be mown after July 15<sup>th</sup> in years ending in an odd digit. The mowings must be removed."*

There has been difficulty achieving this in some years, but the grasslands have generally been mown.

*"3.5.5 Encroaching scrub should be removed from the edges of the grassland shown on map 4."*

This has been done (check).

*"3.5.6 White poplar suckers and seedlings should be removed from the area shown on map 4."*

This has been done (check).

*“3.5.7 The Parkland should be mown for hay and the aftermath grazed as at present. Well rotted farmyard manure should be applied following the hay cut once very four years at a rate not exceeding 20 tonnes per hectare. The manure should have been in storage for a minimum of 12 months before application.”*

*“3.5.8 Graze the area around the pumping station with sheep between July and November.*

*3.5.9 Graze the field on Moreton Bank with cattle, following the existing regime.”*  
These have been done.

### Revised Targets

Barn owls should continue to breed at the lake.

Species-diversity in the northern part of The Parkland should increase, and other areas should retain their diversity.

The existing extent of species-rich grassland should be retained.

Populations of small heath butterfly at the lake should be maintained.

### Management Rationale

The grasslands require management in order to maintain their diversity. The field on Moreton Bank, The Parkland and the area around the pumping station can be grazed but this is not possible within the lake enclosure so management here relies on mowing. Grassland management for nature conservation involves striking a balance between maintaining features that invertebrates require and preventing unfavourable habitat succession. The grasslands at Chew are of importance for invertebrates and these should be accommodated by mowing some areas on a rotation and leaving features such as ditch edges unmown.

The existing management of the grasslands at Chew has been successful in maintaining biodiversity, and no significant changes are proposed.

The area of erosion control on Nunnery Point offers the opportunity to create an additional area of species-rich grassland.

### Management Proposals

3.4.1 No artificial fertilisers or herbicides should be applied to any of the grasslands.

3.4.2 The areas shown on map 4 should be mown annually after July 15<sup>th</sup>. The mowings must be removed. In these areas, with the exception of the eastern side of Nunnery Point, the area between the two picnic sites, at Wick Green and along

Walley Bank, a strip one metre wide should be left unmown on one edge of each area each year on a rotational basis, so that the strip unmown in the previous year is mown the next and a different strip is left unmown.

3.4.3 The areas shown on map 4 should be mown after July 15<sup>th</sup> in years ending in an even digit. The mowings must be removed.

3.4.4 The areas shown on map 4 should be mown after July 15<sup>th</sup> in years ending in an odd digit. The mowings must be removed.

3.4.5 Encroaching scrub should be removed from the edges of the grassland shown on map 4.

3.4.6 The Parkland should be mown for hay and the aftermath grazed until 1<sup>st</sup> October, when stock should be removed. Well rotted farmyard manure should be applied following the hay cut once every four years at a rate not exceeding 20 tonnes per hectare. The manure should have been in storage for a minimum of 12 months before application.

3.4.7 Graze the area around the pumping station with sheep between July and November.

3.4.8 Graze the field on Moreton Bank with cattle, following the existing regime.

3.4.9 Once engineering works are complete at Nunnery Point, ensure that the area is surfaced with a nutrient poor substrate and free of compaction. Spread with green hay taken from species-rich grasslands at the lake. Mow regularly in the year following establishment, and then take annual hay cut.

3.4.10 Monitor the vegetation in the northern part of The Parkland and small heath butterfly populations around the lake annually.

3.4.11 Repeat 2003 invertebrate surveys periodically.

### **3.5 Hedgerows**

The following species of conservation importance are found in the species-rich hedgerows in significant numbers:

UK BAP Priority Species	B&NES BAP Priority Species
Cuckoo	Kestrel
Marsh tit	Marsh tit
Bullfinch	Bullfinch
	Madder
	Bithynian vetch (formerly)

#### 1998 Targets

*“The breeding population of dunnock and bullfinch will be 50% higher [in 2003] than at present.”*

The populations of these species, and in particular of bullfinch, remain healthy at Chew and there has been some increase in numbers of bullfinch, but this target has not been consistently met. The populations of both species have recovered to some extent throughout the Avon area.

*“The breeding population of song thrush will be the same as at present.”*

This target has not been met. There has been some decline in the song thrush population, despite a partial recovery in the Bristol region.

### 1998 Management Proposals

*“3.6.1 All hedge management should be carried out outside the bird nesting season.”*

This has been complied with, as is required by the law.

*“3.6.2 Flail the hedges shown on map 5 into an A shape.*

*3.6.3 Lay hedges as shown on map 5.*

*3.6.4 Plant additional hedges, using locally native species obtained from a local source if possible, at the locations shown on map 5.”*

Check on ground.

### Revised Targets

Ensure that population of bullfinch remains at current level.

Ensure that cuckoo, marsh tit and kestrel survive as breeding species at the lake.

### Management Rationale

Most (check) of the opportunities for enhancement identified previously have been met and the requirement now is for ongoing management. The main requirement here is to ensure that hedges retain a dense shrubby structure, which is suitable for nesting birds, whilst retaining sufficient growth for invertebrates and to provide winter food for birds.

### Management Proposals

3.5.1 Carry out all hedgerow management outside the bird nesting season.

3.5.2 Flail the hedges shown on map 5 into an A shape, flail each hedge every other year.

3.5.3 Lay hedges as shown on map 5.

3.5.4 Plant additional hedges, using locally native species obtained from a local source, at the locations shown on map 5.

### 3.6 Woodlands, Scrub and Trees

The following species of conservation importance are found in woodlands, scrub and trees in significant numbers:

UK BAP Priority Species	B&NES BAP Priority Species
Cuckoo	Marsh tit
Marsh tit	Bullfinch
Bullfinch	Barn owl
White-letter hairstreak	Dingy shell
	Grey sallow
	Purple willow

#### 1998 Targets

*“Support an increased population of songbirds in woodlands.”*

There have been mixed results in reaching this target. Numbers of scrub-breeding warblers in particular give some cause for concern, with a decline in populations of species such as blackcap and garden warbler. Declines in chiffchaff and willow warbler are part of more widespread trends.

*“Continue to support a rich lichen flora.”*

The wet woodland around Twycross still has a rich lichen flora.

*“Support at least ten singing cettis warblers.”*

This target was reached in 1999, and the number of singing males has remained at over ten in every subsequent year.

*“Support bithynian vetch on the edge of the Villice Bay / Parkland plantation.”*

Bithynian vetch has not re-appeared at Chew and the population is probably now lost, possibly as a result of maturation on the plantation.

#### 1998 Management Proposals

*“3.7.1 Continue the existing programme of management of the plantations under the guidance of Landmark Environmental Consultants.”*

There have been ongoing management works to several plantations, including those at Moreton Bank and on the southern side of Villice Bay, and more substantial work includes creation of a large clearing at Nunnery. The Woodland Grant Scheme has now ceased and Landmark Environmental Consultants are no longer involved.

*“3.7.2 Clear-fell blocks of the poplar plantation as shown on map 6 and replant with mixed native tree and shrub species.”*

This has not been carried out, partly because of concerns over the existing bird populations of the plantation.

*“3.7.3 Widen the ride across Denney Island to 150% of its existing width. Create log piles on the edge of the ride as a nesting habitat for ducks.”*

Clearance works here have been carried out, although they have been more selective than prescribed above. The value of Denny Island for nesting wildfowl has been significantly reduced as a result of colonisation by fox and badger.

*“3.7.4 Selectively coppice the willows between Hollow Brook and Twycross. Work only on those trees close to the edge of the lake. Leave any mature specimens and coppice only medium-aged trees.”*

Little work has been carried out here.

*“3.7.5 Coppice the patch of dogwood near Twycross as shown on map 6.”*

This has been done.

*“3.7.6 Cut scallops into the edge of plantations as shown on map 6.”*

This has not been carried out, but clearings have been created in some plantations.

*“3.7.7 Plant small groups of apple, plum and pear trees at the locations shown on map 6. Use local varieties.”*

These locations have not been planted, partly due to concerns over impacts on species-rich grassland, but more significant areas have been planted to the north of Wick Green Lane and on Woodford Lodge.

### Revised Targets

Ensure that song bird populations remain at the same level overall.

Ensure that populations of scrub warblers recover to at least their 1998 levels.

Ensure that at least fifteen singing cettis warblers are present.

Ensure that the willows between Hollow Brook and Twycross continue to support a rich lichen population.

Ensure that parkland trees remain, with standing dead wood as appropriate.

### Management Rationale

There is an ongoing trend of plantations maturing to stands of even aged trees with little or no shrub layer. This has produced good stands of timber trees in places, but the habitat is of limited value for wildlife. Stands of dense scrub and rank tall herb vegetation are more valuable, particularly for breeding birds and invertebrates. This habitat has been most successfully created in the clearing at Nunnery, where works on a relatively large scale have created a succession of

habitats from grassland to tall scrub. Similar measures elsewhere, on a larger scale than those proposed in 1998, would be useful in creating similar habitats. There is the opportunity to coppice recently planted blocks of trees whilst these are young to maintain areas of scrub and young tree growth. Other plantations should be managed to promote a dense understorey and a varied age range of trees.

The willow woodland between Hollow Brook and Twycross is an unusual habitat and an example of Wet Woodland, recognised as a priority in BAPs. Collapse of trees and natural succession is maintaining a diverse structure here and the woodland should be retained as a non-intervention area.

The resource of parkland trees at Chew is important and although none as yet qualifies as a veteran they have the potential to mature to this status. At present, the only tree that appears to require work is the oak on Walley Bank, to the north of the Sailing Club. Standing dead wood is an important feature of these trees and should be removed only if absolutely necessary.

### Management Proposals

3.6.1 Clear compartments on edges of plantations at Moreton, to rear of Heron's Green Pool and at Villice Bay, as shown on map 6, to create scrubby regrowth.

3.6.2 Re-coppice tree regrowth in the clearing at Nunnery, starting work in 2010.

3.6.3 Coppice planted trees at rear of main reeds, by Sutton Wick car-park and in field to north of Sutton Wick Lane to create scrub habitat.

3.6.4 Widen the ride on Denny Island and create substantial clearings, with associated scrubby fringes. Retain trees used by nesting herons.

3.6.5 Retain the woodland between Twycross and Hollow Brook as a non-intervention area.

3.6.6 Commission an arboriculturalist to assess the tree on Walley Bank and carry out necessary works.

3.6.7 Repair and replace barn owl boxes as necessary.

3.6.8 Monitor populations of song birds.

## **3.7 Ponds**

The following species of conservation importance are found in the ponds in significant numbers:

UK BAP Priority Species	B&NES BAP Priority Species
Common toad	Common toad
	Common frog
	Various-leaved water-starwort
	Ivy-leaved duckweed

The 1998 management plan did not include either targets or management proposals for ponds. However, in the intervening period new ponds have been created in the field to the north of Wick Green Lane and the pond on Woodford Bank has been excavated and extended.

### Targets

Ensure that ponds continue to support amphibians and dragonflies.

### Management Rationale

There are several existing ponds. Two ponds between The Parkland and Heron's Green are partially silted and choked with vegetation and a pond in the field on Moreton Bank provides water for cattle. Such habitats, even if they appear neglected, can be of significant value for invertebrates and no works should be carried out to these ponds unless they are preceded by invertebrate surveys. The newly created ponds do not require management at present. The ponds to the north of Wick Green Lane should be reviewed to assess management requirements. Willows on the edge of the pond to the east of Herriott's Pool have been coppiced, and further coppicing will be required to maintain open margins.

### Management Proposals

3.7.1 Review the ponds to the north of Wick Green Lane in 2010 to identify any need for management.

3.7.2 Re-coppice willows around pond to the east of Herriott's Pool in the 2010/2011 winter.