

Whooper Swan

Cygnus cygnus
(Iceland population) in Britain and Ireland
1960/61 – 1999/2000

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CONTENTS

Summary	v
1 The Whooper Swan	1
1.1 Introduction	1
1.2 Background	1
1.3 Monitoring and population assessment	3
1.3.1 Counts	3
1.3.2 Productivity	3
1.3.3 Ringing	3
1.3.4 Population assessment	4
1.4 Annual cycle	5
1.4.1 Breeding season	5
1.4.2 Autumn migration	6
1.4.3 Winter	6
1.4.4 Spring migration	7
1.5 Conservation and management	7
1.5.1 Legislation and other conservation measures	7
1.5.2 Hunting	8
1.5.3 Agricultural conflict	8
2 Survey of wintering areas	10
2.1 Britain	13
2.1.1 Shetland	13
2.1.2 Orkney	14
2.1.3 Caithness	16
2.1.4 The Moray Basin	20
2.1.5 Aberdeenshire	24
2.1.6 The Hebrides	25
2.1.7 Tayside and Fife	28
2.1.8 Angus	30
2.1.9 Lothian	30
2.1.10 The Clyde Basin	32
2.1.11 Cumbria and Dumfries & Galloway	35
2.1.12 The Borders and Northeast England	41
2.1.13 Lancashire	45
2.1.14 Yorkshire	46
2.1.15 Isle of Man	48
2.1.16 North Wales	50
2.1.17 Dyfed	50
2.1.18 East Anglia	50
2.1.19 Dorset	52
2.2 Northern Ireland	55
2.2.1 The Foyle/Swilly Complex	55

2.2.2	Loughs Neagh/Beg area	60
2.2.3	Upper Lough Erne Area	64
2.2.4	Down	65
2.2.5	Antrim/Londonderry	67
2.2.6	Tyrone	68
2.2.7	Armagh	68
2.2.8	Fermanagh	68
2.3	Republic of Ireland	69
2.3.1	Donegal	69
2.3.2	Leitrim	70
2.3.3	Sligo	71
2.3.4	Mayo	72
2.3.5	Roscommon	75
2.3.6	Longford	77
2.3.7	Galway	79
2.3.8	Clare	82
2.3.9	Limerick	83
2.3.10	Tipperary	85
2.3.11	Kerry	85
2.3.12	Cork	86
2.3.13	Waterford	87
2.3.14	Wexford	89
2.3.15	Carlow	90
2.3.16	Laois	90
2.3.17	Offaly	90
2.3.18	Kildare	91
2.3.19	Wicklow	91
2.3.20	Dublin	93
2.3.21	Meath	93
2.3.22	Westmeath	94
2.3.23	Cavan	96
2.3.24	Monaghan	99
2.3.25	Louth	99
3	Future research needs	100
4	Acknowledgements	101
5	References	102

SUMMARY

The vast majority of the Whooper Swans *Cygnus cygnus* recorded in Britain and Ireland originates from breeding grounds in Iceland. This review aims to assess changes in their abundance and distribution in Britain and Ireland since winter 1960/61, to describe all available historical information prior to that year, to provide current estimates of population size, to review published information on the ecology and biology of this species, and to describe numbers, trends and site use at key resorts in Britain and Ireland.

Most of the Whooper Swans from the Icelandic breeding population migrate to winter at various sites in Ireland and Britain. A small proportion, 500-1,300 individuals, remains in Iceland, perhaps related to weather conditions and food supply in Iceland, while small numbers are encountered in countries bordering the southern North Sea. Whooper Swans from the North mainland Europe population – which winters mainly in Scandinavia, northern Germany and the Low Countries – have also been recorded in Britain in small numbers.

The first co-ordinated census of the entire Icelandic breeding population took place in January 1986 and recorded 16,742 individuals. This was followed by three more midwinter censuses in 1991, 1995 and 2000. Over 20,600 Whooper Swans were recorded during the last of these, an increase of around 30% over the 1995 estimate.

Although this increase in numbers may have been due to an actual increase in the Icelandic population, it is also possible that the substantial increase in the 1990s of the North mainland Europe population may have led to greater numbers of continental Whooper Swans visiting Britain and Ireland during the 1999/2000 winter: it has been estimated that at least 200 Finnish-breeding birds winter in Britain each year.

Historically, most Whooper Swans wintered in Ireland and Scotland. Numbers visiting Ireland are thought to have increased since 1900, but have remained relatively stable since the mid 1950s. In the early 1960s, east central Scotland held the largest concentrations of Whooper Swans in Britain but numbers in this area have since declined, with numbers in the Outer Hebrides also falling over the same period. There has, however, been a large increase in the numbers of birds using Martin Mere in northwest England and the Ouse Washes in southeast England since the 1980s with over 1,000 recorded regularly at each of these sites in the late

1990s. Similarly high numbers occur at the Foyle/Swilly complex, Loughs Neagh & Beg and Upper Lough Erne, all in the north of the island of Ireland.

Twenty sites in Ireland and seven in Britain are internationally important for Whooper Swan, regularly supporting at least 160 individuals; 20 further sites are nationally important in Britain (holding 55 or more birds), and 17 are important in an all-Ireland context (supporting 100 or more birds). Information on numbers, trends and site use at these key resorts is provided within this review

In Britain and Ireland, Whooper Swans traditionally winter on freshwater habitats and agricultural land. In Iceland, they mainly use spring-fed freshwaters both in the northeast and the south, and on the shallow coastal waters of the southwest where ice seldom forms. Some birds also use urban habitats in Reykjavik.

During the early part of the 20th century, Whooper Swans wintering in Britain and Ireland fed mainly on aquatic vegetation during the winter months, particularly *Zostera* and *Chara* species in coastal areas and on the tubers and root stalks of *Potamogeton*, *Elodea canadensis*, *Glyceria*, *Equisetum* and *Rorippa palustre* in freshwater lakes and marshes. However, the use of agricultural land has become far more frequent since the 1960s, partly as a result of agricultural intensification in the wintering areas.

The habitat switch of Whooper Swans on to cropped land (arable and agriculturally-improved pasture), together with an increase in the numbers of birds wintering in Britain and Ireland during the middle of the 20th century, has resulted in some conflict with agricultural interests, particularly in relation to re-seeded grasslands, winter cereals, root crops and oil seed rape.

Future monitoring is required to follow distributional changes in the feeding areas of Whooper Swans around key sites so that adequate protection can be afforded in agricultural habitats. Monitoring throughout the range should be improved further to identify important sites in areas that are poorly covered, e.g. in northern Scotland. New research should focus on understanding population dynamics, predicting the consequences of threats to this population, and improving the understanding of site importance during times of high turnover.

1 THE WHOOPER SWAN

1.1 Introduction

Since Boyd & Eltringham (1962) published the first paper on the status of the Whooper Swan *Cygnus cygnus* in Great Britain, a substantial amount of information has been amassed on the numbers, distribution and ecology of the Icelandic population of Whooper Swans. Much has been published, but many of the primary data remain in 'grey' literature such as internal reports or unpublished databases, which are more difficult to access. This review aims to collate information, to assess changes in the abundance and distribution of the Icelandic Whooper Swan population in Britain and Ireland since the 1960/61 winter, to review all available historical information prior to that year, to provide current estimates of population size and thus to describe our current knowledge and understanding of the ecology of this swan.

The report is split into two sections and broadly follows the format of similar reviews (e.g. Fox *et al.* 1994). The first section considers our current knowledge of the ecology of the Whooper Swan in Britain, Ireland and Iceland, giving the biological context against which the monitoring information can be viewed. In addition, gaps in knowledge are highlighted, as are the conservation threats facing the Icelandic Whooper Swan population.

The second section presents monitoring data at a regional scale for winters 1960/61 to 1999/2000. Spatial and temporal changes in abundance and distribution during the non-breeding season are examined. Furthermore, monthly peak counts are illustrated for those sites which regularly support internationally and nationally important numbers of Whooper Swans, together with information on the phenology of site use by birds.

1.2 Background

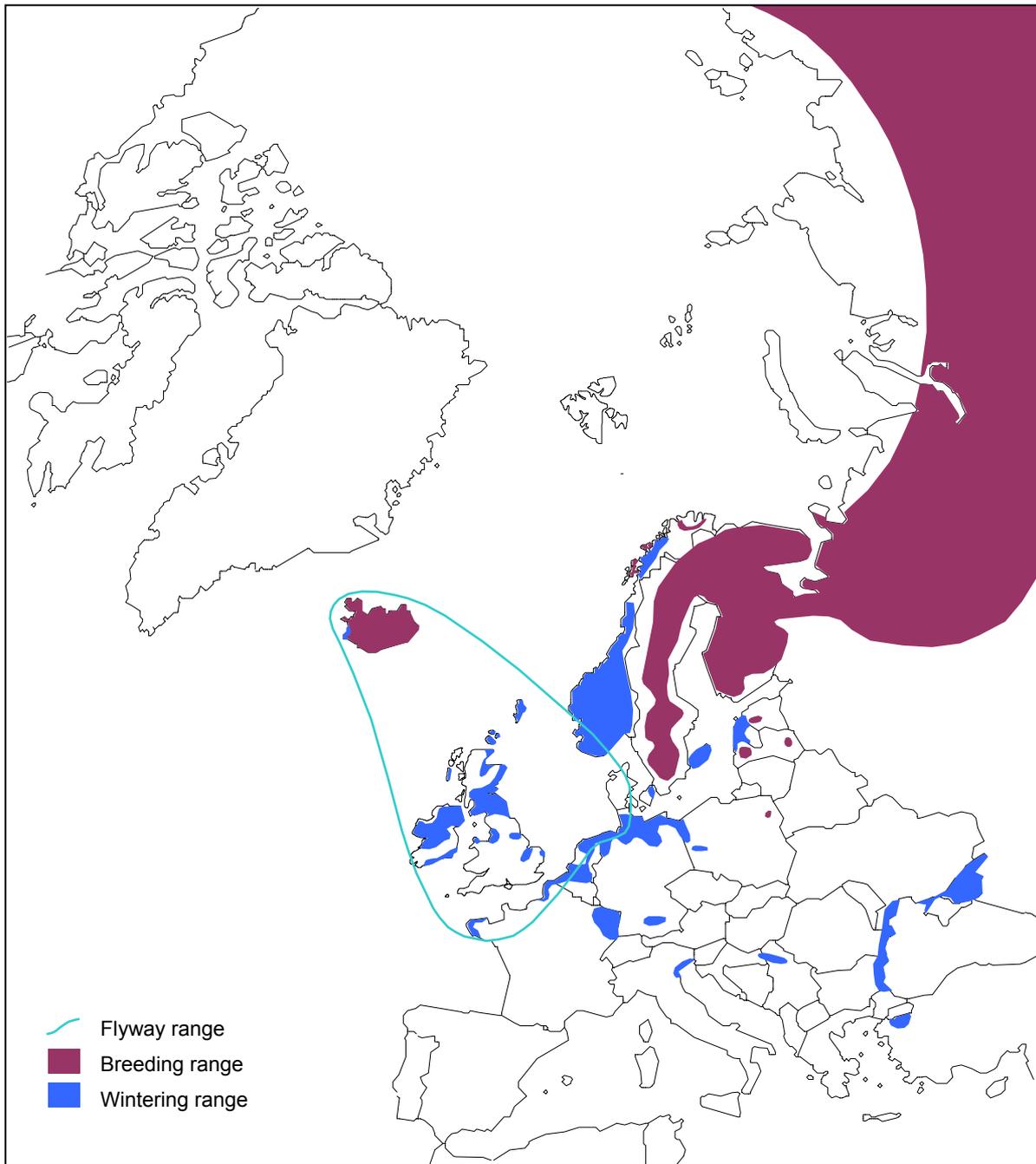
The Whooper Swan has a Palearctic breeding distribution between 50° N and 70° N, extending from Iceland to the Bering Sea (Fig. 1). The species is migratory, spending the winter in northwestern Europe, the Black Sea, the Caspian Sea and Eastern

Asia (Scott & Rose 1996, Miyabayashi & Mundkur 1999). Within Europe, Whooper Swans breed mainly in Iceland, Norway, Sweden, Finland and northern Russia, with smaller numbers breeding in Estonia, Latvia, Lithuania and Poland (Laubek *et al.* 1999). A few pairs also breed sporadically in Britain and Ireland. They winter in Denmark, Germany, The Netherlands, southern Sweden, Britain, Ireland, Belgium, northern France, the northern Black Sea and the Caspian Sea (Laubek *et al.* 1999). A small number of birds move slightly further south in some years. No subspecies have been identified.

Four Whooper Swan populations have been described in the Western Palearctic and Asia (Rose & Scott 1997, Miyabayashi & Mundkur 1999). The Icelandic breeding stock winters in Iceland, Britain and Ireland. Those in the population found in mainland Northwest Europe winter primarily in Denmark, Schleswig-Holstein and Mecklenburg (Germany), and The Netherlands. A third population is thought to occur in western Siberia, the Black Sea and eastern Mediterranean and a fourth in the Central Siberia/East Asia region, although the level of movement between these populations, and the flyways used, remains uncertain (Rees in press).

Most Whooper Swans from the Icelandic population spend the winter in Britain and Ireland (Cranswick *et al.* 2002), although there is evidence of some interchanges between the Icelandic and North mainland European populations. It has been estimated that at least 200 Finnish breeding birds visit Britain (Laubek *et al.* 1998) and that up to 600 Icelandic birds winter in mainland Europe (Gardarsson 1991). The extent of these movements requires further attention. In this report we focus primarily on the Icelandic breeding population, due to the difficulties in delimiting the wintering distribution of the North mainland European population in the western part of its range. A small number of birds that breed in Scotland and Ireland and are thought to be largely sedentary during the winter (Gibbons *et al.* 1993). The small group of breeding birds that used to occur in Orkney up until the 18th century is now extinct, as is the population that bred in Greenland (Cramp & Simmons 1977).

Figure 1. Breeding and wintering ranges of Whooper Swan *Cygnus cygnus* and flyway range of Iceland population (adapted from Lack 1986, Madge & Burn 1988, Scott & Rose 1996 and Snow & Perrins 1998)



1.3 Monitoring and population assessment

1.3.1 Counts

The most accurate and cost-effective time for monitoring Whooper Swan population size, and thus between-year trends, is during the non-breeding season, when birds congregate at traditional wintering sites. Monitoring is more difficult on the breeding grounds because of the dispersed distribution of breeding pairs over much of Iceland, particularly in upland habitats, but surveys of autumn staging sites gave reasonable population estimates in the early 1980s (Gardarsson & Skarphedinsson 1984, Gardarsson 1991).

International censuses

During international censuses, undertaken since 1986, counters are asked to record the total numbers of Whooper Swans, the number of adults and cygnets in as large a sample as possible, brood size, whether the area was being used as a roost or feeding site and the habitat that the birds are using. Leg rings or neck collar codes are read and recorded for use in survival analyses and subsequent population models. The censuses now occur every five years, over a predetermined weekend in mid January.

National monitoring

Annual site-based monitoring in Britain has been on-going since the late 1940s and is now undertaken primarily through the Wetland Bird Survey (WeBS). The scheme was extended to Northern Ireland from 1986. Since 1947, WeBS counts have been made by volunteer ornithologists at a variety of wetland habitats, generally on the middle Sunday of each month, and primarily between September and March (Atkinson-Willes 1963, Owen *et al.* 1986, Cranswick *et al.* 1996a). Count dates are co-ordinated nationwide and are chosen to occur on days when high tide occurs during the morning, thus concentrating waterbirds into a small number of roosting areas at coastal sites (see Gilbert *et al.* 1998). Counters are encouraged to make their count during the morning to ensure co-ordination across sites.

Before the mid 1960s, the counting of Whooper Swans in Ireland was sporadic, localised and the results were largely unpublished (Colhoun 2001). The first comprehensive waterbird-monitoring project in Ireland took place in the winters between 1971 and 1974, and the results were published in *Ireland's Wetlands and Their Birds* (Hutchinson 1979). Over a decade later, a follow-up survey, the Winter Wetlands Survey was undertaken, covering the

period 1984/85 to 1986/87. The results were published in *Ireland's Wetland Wealth* (Sheppard 1993). Given the requirement for more long-term monitoring, the winter of 1994/95 saw the first season of the Irish Wetland Bird Survey (I-WeBS). The methodology for this scheme is identical to that used in WeBS.

Since the early 1990s, the Irish Whooper Swan Study Group (IWSSG) has counted Whooper Swans throughout Ireland. Although these counts are not formally co-ordinated, an extensive database of these counts exists, often covering sites not normally counted under the WeBS and I-WeBS schemes. At many of the more important sites counting is more frequent than monthly and data are collected at individual field level at some locations.

Roost counts

At most sites, Whooper Swans congregate at discrete, generally protected roosting areas during the night and disperse over a wide area to forage during the day. Changes in feeding distribution occur through the winter as food supplies are exhausted and new ones exploited. The birds, therefore, are frequently counted at roost at British sites, because roosting distribution is more predictable and the monitoring of local numbers more accurate. This method also reduces significantly the amount of effort required to find Whooper Swan flocks during the day. Data collected during organised roost counts are now incorporated into the WeBS and I-WeBS data sets.

1.3.2 Productivity

Productivity and brood size assessments are undertaken annually at various sites throughout the UK, most intensively at The Wildfowl & Wetlands Trust (WWT) Centres at Caerlaverock (Dumfries & Galloway), Martin Mere (Lancashire), and Welney (Cambridgeshire). Productivity is usually measured as the proportion of juvenile birds in the population. Productivity and brood sizes are measured in the same way during international censuses (Table 1). In addition, members of the IWSSG routinely collect data on productivity and brood sizes for individual flocks throughout Ireland and across the winter.

1.3.3 Ringing

Regular colour-ringing of Whooper Swans in Britain commenced in 1980, following the building of swan pipes for catching birds at Caerlaverock and Welney. Fewer than 50 birds have been caught at Welney due to the small numbers of Whooper Swans wintering

Table 1. Productivity and brood sizes of Whooper Swans measured during international censuses 1986-2000

Census			Brood size (%)						
	% young	<i>n</i>	6	5	4	3	2	1	<i>n</i>
1986	22.9	-	-	-	-	-	-	-	-
1991	9.8	10,805	0.0	1.0	12.5	22.6	36.2	27.7	522
1995	17.9	10,156	0.1	4.1	12.0	24.1	30.3	29.4	684
2000	16.8	14,627	0.9	4.7	9.3	23.3	34.3	27.5	758

there in the 1980s. In recent years, numbers of Whooper Swans wintering at Welney have increased markedly, but the swan pipe has fallen into disrepair. A large proportion of the birds wintering at Caerlaverock has been marked and several hundred birds have been ringed at Martin Mere, following the construction of a swan pipe in 1990. Small numbers of birds have also been colour-marked in South Uist in the late 1980s, northeast England through the 1990s, southwest Wales in 1991 and in Northern Ireland, particularly at Castle Espie, since the early 1990s (Rees *et al.* 2002).

The first ringing programmes in Iceland were initiated in the 1960s, when 400-500 birds were marked with metal rings. A few hundred birds from Myvatn, Snaefellsnes, Vopnafjordur and Alftafjordur were marked with neck-collars in the early to mid 1980s (Brazil 1983, Gardarsson 1991). Colour-marking of breeding and non-breeding birds at Skagafjordur, Myvatnsheidi and Jokuldalsheidi has been on-going since 1988. Ringing has been less intensive in southern Iceland, but birds overwintering on Tjornin in central Reykjavik have been caught and ringed opportunistically since 1990.

1.3.4 Population assessment

International and national censuses

Although Boyd & Eltringham (1962) and Boyd (1963) provided estimates of the number of Whooper Swans wintering in the UK, the first extensive census was not made until November 1979 (Brazil & Kirk 1981). Boyd & Eltringham suggested that the population did not exceed 4,000 individuals. In contrast, Brazil & Kirk (1981) estimated that the population was much larger, comprising some 6,800 individuals. Coverage during the 1979 survey was also incomplete, however, and therefore may have underestimated the true size of the population size at that time. Surveys of the main autumn staging sites in Iceland gave population estimates of around 11,000 in 1982 and 14,000 in 1984 and 1985

(Gardarsson & Skarphedinsson 1984, Gardarsson 1991).

The first co-ordinated census of the whole of the Icelandic breeding population during the non-breeding season in 1986 recorded 16,742 individuals in the population (Salmon & Black 1986), almost 10,000 higher than Brazil & Kirk (1981) had estimated. This was followed by three more censuses in 1991 (Kirby *et al.* 1992), 1995 (Cranswick *et al.* 1996b) and 2000 (Cranswick *et al.* 2002, Colhoun *et al.* 2002).

The most recent census recorded 20,645 Whooper Swans in January 2000, which exceeded the previous highest total of 18,035 in 1991 by around 15%, and represented a 30% increase on the 15,842 individuals counted in January 1995 (Kirby *et al.* 1992, Cranswick *et al.* 1996b, 2002). This suggests that there was a 5.5% annual increase between 1995 and 2000. Although this may have been due to an increase in the Icelandic population, it is also possible that the substantial increase in the North mainland Europe population in the 1990s (Laubek *et al.* 1999) may have led to a greater influx of the continental Whooper Swans into eastern Britain during the winter of 1999/2000. A census of Whooper Swans in Iceland during the breeding season is being discussed, with a view to validating the recent population estimates.

WeBS indices

Because WeBS sites are not necessarily covered each year, changes in Whooper Swan population size cannot be determined simply by comparing the total number of birds counted in each year. Consequently, indexing techniques have been developed which allow between-year comparisons of numbers, and thus determination of population trends, even if the total population size is unknown. WeBS indices for the Whooper Swan in Britain and Northern Ireland (Fig. 2) show similar trends to those derived from the results of the national censuses.

Productivity

Fig. 3 shows that although productivity varies between years at regularly monitored sites, it generally varies between 10-20%, and is similar for different sites. Data collected during the international censuses puts annual variation in productivity at between 10-20% throughout the winter range, and indicates that the most regularly occurring brood sizes comprise one to three juveniles (Table 1).

1.4 Annual cycle

1.4.1 Breeding season

Nesting habitat in Iceland varies from low-lying marshes and agricultural fields to upland pools, bogs and lakes set in glacial moraine at altitudes of up to 700 m (Gardarsson & Skarphedinsson 1984, Einarsson 1996, Rees *et al.* 1997a). Breeding areas are distributed throughout the country (Gardarsson & Skarphedinsson 1984). Horsetails *Equisetum*, particularly Water Horsetail *Equisetum fluviatile*, are an important part of the diet during the breeding season, with sedges *Carex* and Common Cotton-grass *Eriophorum angustifolium* also selected in spring by birds breeding in the upland regions of Iceland (Einarsson 1996).

A study of the occupancy of territories at Skagafjörður, northern Iceland, between 1988 and 2000 found that the number of years that territories were occupied (by one or more pairs) was bimodal in distribution and averaged 7.5 years, with most territories occupied for either 1-3 years (31%) or for 11-13 years (36%) (Einarsson & Rees 2002). Broods are generally tenacious to their territory yet may move to more profitable feeding grounds in the vicinity (Rees *et al.* 1997a). Site fidelity on the breeding territories has been demonstrated, with pairs returning to the same nest sites for up to 13 years, although 35% of pairs are present for only one season (Einarsson & Rees 2002). Territories occupied for most years not only receive more pairs, but the average duration of occupancy (by the same pair) is also higher for these sites (Einarsson & Rees 2002).

Around 30% of adults in the population breed (Gardarsson & Skarphedinsson 1984, Rees *et al.* 1991). In most years, females lay clutches of 4-5 eggs per nest (Rees *et al.* 1991, Bowler *et al.* 1993, 1994, Einarsson 1996), although there is some evidence that birds nesting in the highlands lay smaller clutches than those in the lowlands, with average clutches of 4.0 and 4.7 eggs respectively between

1988 and 1992 (Einarsson 1996). Onset of laying is dependent on weather conditions but generally occurs during April-May (Einarsson 1996, Rees *et al.* 1997a).

Most clutches hatch in mid June to early July (Einarsson 1996). In 1982, Gardarsson & Skarphedinsson (1984) measured changes in brood sizes of Whooper Swans in Iceland during the summer. Mean brood size in August was 3.2, falling to around 2.6 from mid September onwards. Other studies also have recorded mean brood sizes of between 3-4 cygnets in August (Einarsson 1996, Rees *et al.* 1997a).

Biometric data collected from birds in captivity indicate that Whooper Swan cygnets grow at a rate of 127.3 g per day for the first 7 weeks post-hatching (Bowler 1992). Fledging occurs at around 11.4 weeks, when the birds have reached 79% of mean adult mass.

High nesting densities, 0.17-0.25 breeding pairs/km², are reached in prime habitat such as at Skagafjörður and Jökuldalsheidi; 0.39-0.66 bp/km² when unsuitable habitat within these areas is excluded (Einarsson 1996, Hagemeyer & Blair 1997). Nest-site fidelity is high: for 57% of nest sites occupied by a pair, both members of the pair had nested on the same territory the previous year (Einarsson 1996). Paired birds remain together for many years (Rees *et al.* 1996). Cygnets return to the wintering grounds with their parents in the autumn, and remain with them during the first winter, but may return to Iceland independently in the spring.

Although breeding Whooper Swans are found almost entirely around freshwater, large moulting flocks consisting of non-breeders and failed breeders occur on marine and brackish waters in Iceland during late summer (Brazil 1981, Gardarsson & Skarphedinsson 1984). Around 41% of moulting birds occur on sea bays and estuaries and feed largely on *Zostera*. A further 28% occur on brackish lagoons where *Ruppia maritima* is the main food plant. The remaining 30% stay on freshwater in the lowlands and feed on *Potamogeton filiformis*. A key moulting site is located at Lonsfjörður, a brackish coastal lagoon in east Iceland where up to 8,000 Whooper Swans have been recorded on passage (Einarsson 2000).

After the moult, from late August to September, breeding birds move off the highlands to lowland areas and non-breeders move to freshwaters (Gardarsson & Skarphedinsson 1984). The shifts in distribution may be related to changing food requirements. By early October about three-quarters of the Whooper Swan population is found on lowland freshwaters and only about a fifth in marine

areas. *Potamogeton* species become far more important in the diet of the birds at this time.

1.4.2 Autumn migration

The journey between Iceland and the UK means that there are no migratory staging posts separate from the breeding and wintering ranges. Whooper Swans gather at staging grounds around Iceland and depart directly from these, peaking in mid October to mid November (Gardarsson & Skarphedinsson 1984). Birds leaving northwest Iceland travel about 250 km further than those leaving southern sites (Gardarsson 1991). Sites in northern Britain and Ireland act as major landfalls, e.g. Shetland, Orkney, Loughs Swilly and Foyle (McElwaine *et al.* 1995, Colhoun 1998). Key staging sites in southern Iceland include Lonfjordur (Einarsson 2000).

There is evidence that the first birds to reach Britain and Ireland can arrive simultaneously at sites throughout the wintering range (Rees *et al.* 2002, IWSSG unpubl. data). The fact that birds do not always make landfall at the nearest landmass to Iceland is also borne out by satellite tracking studies (Pennycuik *et al.* 1996), when one bird which over-wintered regularly in Ireland flew directly to a site in County Sligo.

1.4.3 Winter

Range

Colour-marking programmes in Britain and Ireland indicate that most of the Whooper Swans breeding in Iceland migrate to winter in Britain and Ireland (Brazil 1983, Black & Rees 1984, Gardarsson 1991, Rees *et al.* 2002). Only a small proportion (500-1,300 birds) remain in Iceland over winter (Gardarsson & Skarphedinsson 1985), with numbers over-wintering related to weather conditions and food supply in Iceland. Observations of colour-marked birds from this population in continental Europe indicate that an unknown, but presumably small, number spend the winter there.

In the January 2000 census, 18% of the population occurred in Northern Ireland and 43% in the Republic of Ireland, around 14% in Scotland, 19% in England, with Wales and the Isle of Man holding less than 10% of the total. Some 6% of the population remained in Iceland (Cranswick *et al.* 2002). This broad-scale distribution is similar to that recorded during censuses in the previous two decades (Salmon & Black 1986, Kirby *et al.* 1992, Cranswick *et al.* 1996b), although there have been

some changes at the regional level (Colhoun *et al.* 2002, Cranswick *et al.* 2002).

Even historically, most of the Whooper Swans that visited Britain and Ireland wintered in Ireland and Scotland (Owen *et al.* 1986, Thom 1986). Peak numbers in Scotland generally occur during the late autumn and decline gradually through the winter as birds move to Ireland and wintering areas in southern Britain. Numbers of Whooper Swans visiting Ireland are thought to have increased since 1900 (Kennedy *et al.* 1954), but have remained relatively stable since the mid 1950s. Up to around 1900, arrival was exceptional before December (Ruttledge 1966). The appearance of Whooper Swans on a widespread scale in the midlands and west of Ireland was relatively sudden in the early 1940s (Hutchinson 1979). In the early 1960s, east central Scotland held the largest concentrations of Whooper Swans in Britain (Owen *et al.* 1986), but numbers in this area have since declined. Numbers in the Outer Hebrides have also fallen over the same period (Owen *et al.* 1986).

In England, numbers of Whooper Swans using Lindisfarne have fallen gradually since the 1960s, which has coincided with increases in numbers elsewhere in Northumberland and Tyneside, Yorkshire and East Anglia. In the 1800s, the Whooper Swan was a rare visitor to England (Owen 1895). However, there has been substantial growth in the numbers of birds using Martin Mere and the Ouse Washes since the 1980s. Increases at these sites explain, in part, declines in the proportion of the population and, in some cases, total numbers occurring in other parts of the wintering range, with the increase in population size in recent decades being largely accommodated in these two areas. The number of Whooper Swans visiting Wales peaked in the mid 1950s and has since declined.

Early studies showed a high degree of site-fidelity in this species. Black & Rees (1984) found that 78% of Whooper Swans marked in southwest Scotland during the early 1980s returned to the same site for at least one further winter. However, re-sightings of individually marked Whooper Swans in Ireland indicate that these birds can also be highly mobile. Birds move from the northern regions of Scotland in autumn to sites in Ireland, England and southern Scotland in mid winter (Rees *et al.* 1997b). Whooper Swans in Ireland also move southwards through the winter, traveling from the landfall sites to areas around Loughs Neagh & Beg and further south (McElwaine *et al.* 1995). A recent analysis of all ring re-sightings for this population also indicates frequent interchange of birds between Britain and Ireland, and vice versa, during the winter (Rees *et al.* 2002).

Habitat and feeding ecology

In the UK, Whooper Swans traditionally winter on freshwater habitats and agricultural land (Owen & Kear 1972, Owen & Cadbury 1975). In Iceland, they winter mainly on spring-fed freshwaters both in the northeast and the south, and on the shallow coastal waters of the southwest where ice seldom forms (Gardarsson & Skarphedinsson 1985). Some birds have also switched to urban areas, notably in Reykjavik.

During the early part of the 20th century, Whooper Swans wintering in the UK fed mainly on aquatic vegetation during the winter months, particularly *Zostera* and *Chara* species in coastal areas and on the tubers and root stalks of *Potamogeton*, *Elodea canadensis*, *Glyceria*, *Equisetum* and *Rorippa palustre* in freshwater lakes and marshes (Owen & Kear 1972, Owen *et al.* 1986).

Increasing use of agricultural land has been apparent since the 1960s, in part as a result of agricultural intensification in the wintering areas. Whooper Swans were occasionally reported feeding in potato fields during severe weather conditions in the 1940s, have done so regularly since the 1960s (Anderson 1944, Kear 1963, Pilcher & Kear 1966, Owen & Kear 1972), and were first recorded foraging on winter wheat during the late 1960s to early 1970s (MacMillan 1969, Owen & Cadbury 1975). However, recent estimates indicate that 15% of Whooper Swans in Britain and Ireland use arable habitats during the winter (Cranswick *et al.* 2002), highlighting the continued importance of natural and agriculturally-improved pastures: over 80% feed on improved or flooded pastures, or in permanent inland waters, with distribution often limited by flooding levels (Cranswick *et al.* 2002). In general, where such a choice of habitat is readily available, Whooper Swans on arable land select stubbles and waste root crops for foraging from the autumn to the mid winter, changing to feeding on winter cereals and improved grasslands until the spring (Brazil 1981, Colhoun 1998). A similar pattern has been observed in continental Europe, where a much higher proportion (75%) feed on arable sites (Laubek 1995).

Whooper Swans usually feed during the daylight hours and leave the feeding sites at dusk to congregate at evening roosts (Owen *et al.* 1986). Supplemental feeding with grain, provided at WWT centres at Caerlaverock, Welney and Martin Mere, may form a large part of the diet for some individuals at these sites, especially during severe weather conditions when other feeding areas may be frozen or covered in snow. At Caerlaverock, Whooper Swans provided with supplemental barley

spent considerably less time feeding than those at Islesteps, a grassland site (Black & Rees 1984).

The main causes of death of Whooper Swans in Britain and Ireland are flying accidents (e.g. collisions with overhead power-lines), followed by shooting, lead poisoning, adverse weather conditions, and predation (Brown *et al.* 1992, Einarsson 1996).

1.4.4 Spring migration

Departure to the breeding grounds commences in March and April (Rees *et al.* 1997a). The 800-1200 km flight between Britain/Ireland and Iceland is probably the longest sea crossing undertaken by any swan species. Satellite telemetry studies of both autumn and spring migration have shown that the flight can take between 32 and 101 hours (Pennycuick *et al.* 1996, 1999). This work has also provided valuable information on the altitudes of migratory flights and the amount of fat required to complete the journey. During migration, Whooper Swans fly at low altitudes over the sea, sometimes alighting on the water's surface during extreme weather conditions (Pennycuick *et al.* 1996), although there is an early report of them flying at 8,200 m (Stewart 1978, Elkins 1979).

1.5 Conservation and management

1.5.1 Legislation and other conservation measures

1.5.1.1 International

Conservation status

The Whooper Swan is classified as a SPEC 4 species in BirdLife International's Species of European Conservation Concern (Tucker & Heath 1994). This means that it has a favourable conservation status for those populations wintering in Europe. It is also listed under Category A (2) of the Africa-Eurasian Waterbird Agreement (AEWA), prepared under the Bonn Convention on Migratory Species, because it is a population of between 10,000 and 25,000 individuals.

Habitat protection

The EC Directive on the conservation of wild birds requires Member States to classify Special Protection Areas (SPAs). In the UK, the SPA suite comprises 20 sites where Whooper Swan has been listed as a qualifying species, supporting on average 4,247

individuals, representing 44% of the British population and 19% of the all-Ireland population (Stroud *et al.* 2001). In the Republic of Ireland, 110 sites have already been designated as SPAs, with another 26 sites in the process of designation (Dúchas 2002). The Whooper Swan appears as a listed Annex 1 species for 44% of these sites. Further international protection of important wetland habitats for Whooper Swans is provided through the Ramsar Convention on Wetlands of International Importance especially as Waterfowl Habitat and through the Bern Convention on the Conservation of Wildlife and Natural Habitats 1979.

The incidence of the species on arable and agriculturally-improved grassland, some of which are the most productive in Britain and Ireland, has led to problems in including some areas within SPA designations. Many of these issues are being discussed as part of on-going development of the SPA network in Britain and Ireland.

Species protection

The species is listed in Annex 1, but not Annex II and therefore not huntable, of the EC Directive on the conservation of wild birds, which offers it strict protection throughout Europe. The species is also listed in Appendix II of the Bern Convention which offers it strict protection.

Other measures

The AEWA requires signatories to prepare and implement national single-species action plans for populations listed in Category A.

1.5.1.2 National

Conservation status

The Whooper Swan appears on the 'Amber' list of 'The Population Status of Birds in the UK' (Gregory *et al.* 2002) because, there are fewer than 300 breeding pairs in the UK, 20% or more of the population occurs in the UK during the non-breeding season, and 50% or more of the UK non-breeding population can be found at ten or fewer sites. It also appears on the 'Amber' list of the 'Birds of Conservation Concern in Ireland' because more than 20% of the population occurs in Ireland and more than 50% of the Irish non-breeding population can be found at ten or fewer sites (Newton *et al.* 1999).

Habitat protection

The key site designation in Britain is Site of Special Scientific Interest (SSSI) and Area of Special Scientific Interest (ASSI) in Northern Ireland. Guidelines for the selection of sites have been formally published by the Nature Conservancy

Council in 1989 under the title *Guidelines for the selection of biological SSSIs*. National Nature Reserves (NNR) are areas of national and sometimes international importance which are owned or leased by the appropriate statutory conservation body, or bodies leased by them, or are managed in accordance with Nature Reserve Agreements with landowners and occupiers. NNRs are also classified as SSSIs and attract similar protection. Legislative protection for these sites derives from the Wildlife & Countryside Act 1981 and the Nature Conservation and Amenity Lands (Northern Ireland) Order 1985. Under these provisions operations likely to damage the nature conservation interest of SSSIs are subject to control.

In the Republic of Ireland, site protection is offered under the Wildlife Acts 1976 and 2000. Important sites are designated as Nature Reserves, Refuges for Fauna or Natural Heritage Areas.

Species protection

The hunting of Whooper Swans is illegal at all times in Britain and Ireland. In Great Britain it is fully protected under Schedule 1 of the Wildlife & Countryside Act 1981 and in Northern Ireland under Schedule 1 of the Wildlife (Northern Ireland) Order 1985. In the Republic of Ireland, the species is fully protected under the Wildlife Acts 1976 and 2000. The species has also been fully protected in Iceland since 1885; from 1903 this was only during the breeding season, but in 1913 they again received full protection (A. Petersen pers. comm. in Rees *et al.* 1997a).

1.5.2 Hunting

Although the Whooper Swan is protected throughout its range, a recent review of ringing recoveries has shown that 13% had been illegally shot or deliberately taken by humans (Rees *et al.* 2002). X-ray analysis of birds caught in Scotland additionally showed that, although this species is protected throughout its range, some 10% of birds had lead shot in their body tissues (Rees *et al.* 1990). Both bodies of evidence serve to emphasize that illegal hunting occurs in Britain, Ireland or Iceland, and probably in all three. In addition, ingestion of lead shot with grit causes lead poisoning in some birds (Spray & Milne 1988).

1.5.3 Agricultural conflict

The redistribution of Whooper Swans on to arable land, together with increase in the Icelandic population wintering in the UK during the middle of the 20th century, has resulted in some conflict with

agricultural interests, particularly where birds were foraging on re-seeded grasslands, winter cereals and oil seed rape. This conservation problem, and work on similar conflicts in Denmark (Laubek 1995), prompted WWT to conduct a survey on the extent of agricultural use by Whooper Swans. The results of this study indicated that less than 15 % of Whooper Swans occurred on arable land during the winter (Rees *et al.* 1997b), but also noted that most flocks using agricultural land were large. These results indicate that agricultural conflicts are a local rather than a widespread problem in Britain and Ireland.

However, Colhoun (1998) and Colhoun & Day (2002) showed that, in some years, significant reductions in the standing crop of agricultural grassland attributable to Whooper Swans were evident in mid winter, and more particularly during spring, at Irish resorts.

Clearly, continued monitoring should be a priority for further research to assess temporal changes in habitat use and thus the extent of agricultural conflict throughout the range.

Figure 2. WeBS indices for Whooper Swans in Britain (▲) and Northern Ireland (■)

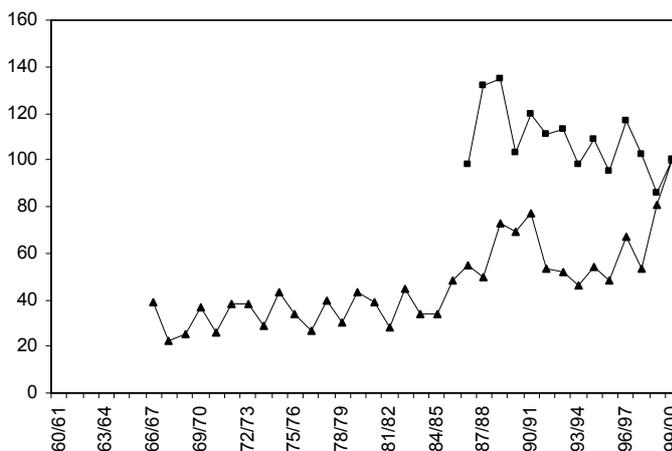
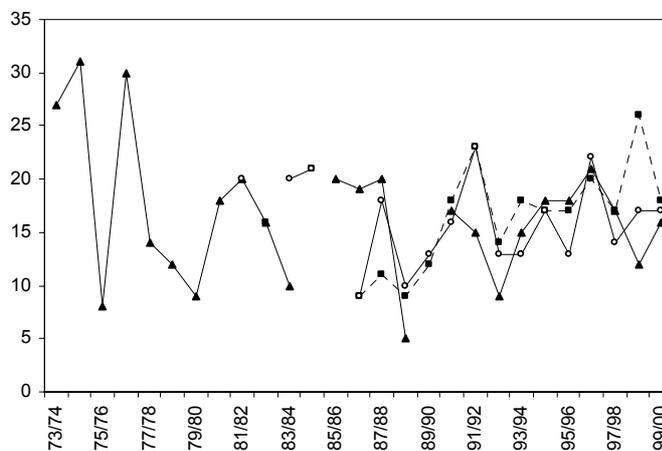


Figure 3. Proportion of young in Whooper Swan flocks at Caerlaverock (▲), Martin Mere (■) and the Ouse Washes (○)



2 SURVEY OF WINTERING AREAS

The following accounts provide a detailed review of the abundance, distribution and phenology of Whooper Swans wintering in Britain and Ireland, based on data collected through international and national monitoring schemes, and roost counts. Some counts were obtained from county bird reports or submitted by regional experts, e.g. members of the Irish Whooper Swan Study Group. Geographically discrete regions of importance for wintering Whooper Swans are considered separately and each is split into four sections, as follows:

Background

This section provides brief information on the current distribution of Whooper Swans in the region and the types of habitats that are used.

Historical status

Based primarily on data collected since 1960/61, this section provides an overview of trends in numbers at a site-based and regional level. However, where data or published information is available, the status prior to 1960/61 is also reviewed. This section highlights those sites which were once important for Whooper Swans, but where numbers have fallen over the review period.

Internationally/nationally important sites

Detailed accounts of internationally and nationally important sites are presented. Wetland sites are considered internationally important if they regularly support 1% of the individuals in the Icelandic-breeding Whooper Swan population following the criteria agreed by the Contracting Parties to the Ramsar Convention on Wetlands of International Importance. A wetland in Britain is considered nationally important if it regularly holds 1% or more of the estimated British population and in the island of Ireland if it holds 1% or more of the estimated all-Ireland population. Provisional assessments of importance are made on the basis of a minimum of three years' data, following the Ramsar Convention.

The threshold for international importance during the five-year period used for site assessment in this review was 160 individuals (Rose & Scott 1997). However, international population estimates, and subsequent thresholds, are revised periodically and that for the Icelandic Whooper Swan now stands at 210 (Wetlands International 2002). In line with accepted practice, we have not retrospectively

applied this threshold and so some sites may be listed in this review as of international importance that may not in future assessments meet the revised international threshold. The threshold for national importance in Britain is 55 birds (Pollitt *et al.* 2003). The all-Ireland 1% threshold is 100 birds (Colhoun 2001, Pollitt *et al.* 2003). Five-year mean maxima for each internationally and nationally important site in Britain and Ireland are shown in Table 2. The locations of each of these sites are illustrated in Fig. 4.

Site accounts contain detailed information on current status and trends, site protection measures, habitats present, and site use. For definitions of site safeguards and selection criteria/guidelines mentioned in the text, see www.english-nature.org.uk and www.ehnsi.gov.uk for Sites/Areas of Special Scientific Interest and National Nature Reserves in England and Northern Ireland, www.heritageireland.ie for site protection measures in the Republic of Ireland, Stroud *et al.* (2001) and Dúchas (2002) for Special Protection Areas (SPAs) in Britain and Ireland, Ramsar (1999) for Ramsar sites, and Heath & Evans (2000) for Important Bird Areas (IBAs).

For each site, figures are presented showing the peak counts recorded in each season since winter 1960/61. Unless otherwise stated, years in which no counts were made at a site are highlighted by a circle. Figures illustrating the phenology of use are presented for those sites with adequate data. Columns represent mean counts made in each month between 1995/96 and 1999/2000. Bars represent maximum and minimum counts over this period.

Other sites

This section lists those sites which regularly support flocks of 20 or more Whooper Swans during peak times in the winter and/or which have a long history of occupancy but which do not support nationally or internationally important numbers according to WeBS or I-WeBS data. For some sites, figures illustrating peak counts since winter 1960/61 are presented.

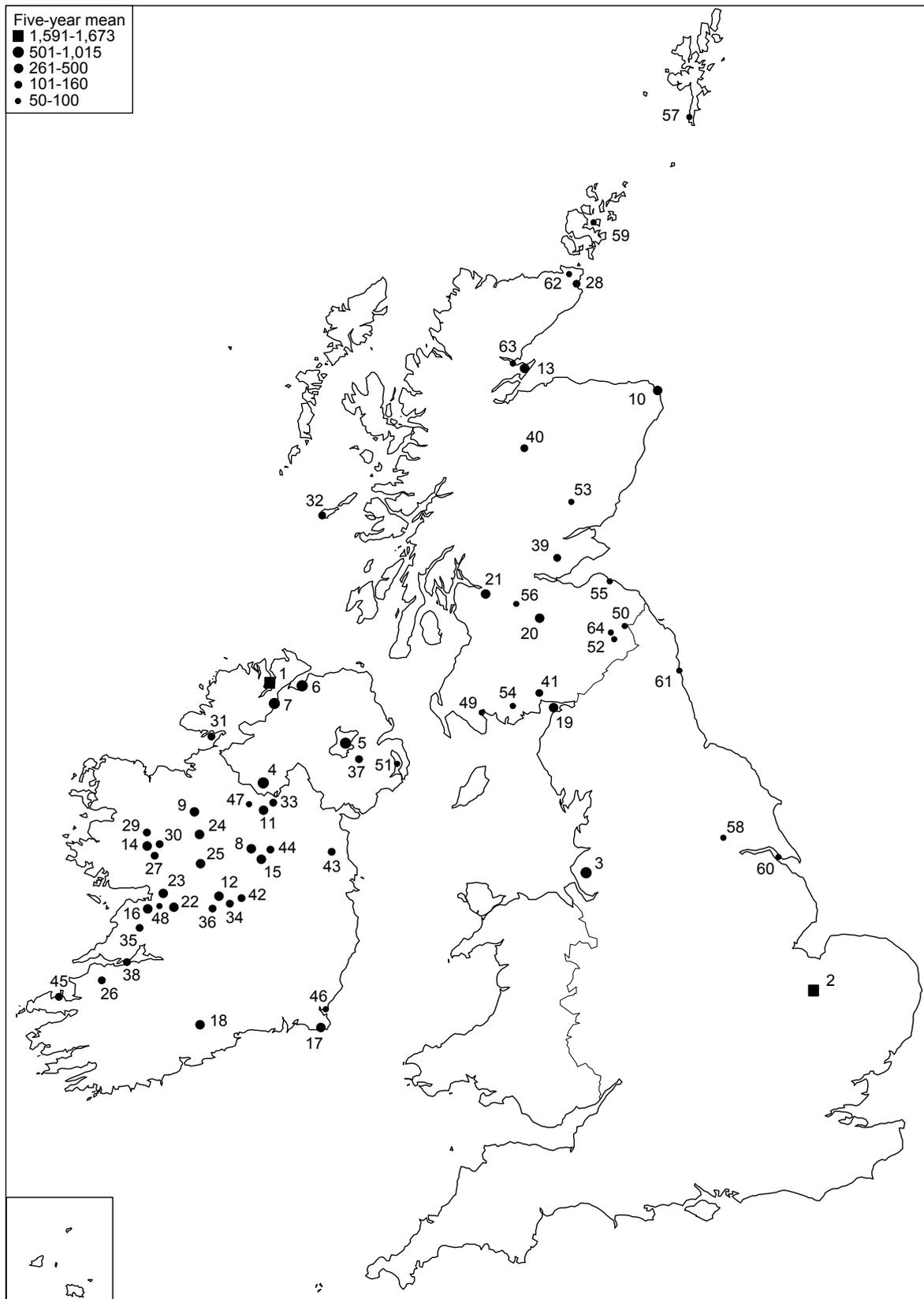
Key references

This section lists the relevant literature and published monitoring data on Whooper Swans in each region.

Table 2 Sites of international and national importance for Whooper Swans in Britain and Ireland (in descending order of importance)

Site name	5-year mean (1995/96-1999/2000)	Site name	5-year mean (1995/96-1999/2000)
1. Lough Swilly	1,673	33. Annalee River	132
2. Ouse Washes	1,591	34. Cloghanhill	130
3. Martin Mere & Ribble Estuary	1,015	35. Corofin Lakes	127
4. Upper Lough Erne	969	36. Little Brosna Callows	122
5. Loughs Neagh & Beg	932	37. River Lagan: Flatfield	121
6. Lough Foyle	917	38. Shannon & Fergus Estuary	118
7. River Foyle	734	39. Loch Leven	114
8. Glen Lough	327	40. River Spey-Insh Marshes	113
9. Lough Gara	321	41. Inner Solway Firth (River Nith)	109
10. Loch of Strathbeg	320	42. Lough Boora Parklands	104
11. Lough Oughter Complex	318	43. River Blackwater	103
12. Shannon Callows	305	44. Lough Derravaragh	102
13. Cromarty Firth & Loch Eye	280	45. Lough Gill	101
14. Greaghans	250	46. Wexford Harbour & Slobs	100
15. Lough Iron	214	47. Ballinamore Lakes	100
16. Coole Lough-Newtown Turlough	214	48. Ballinduff Turlough & Grassland	100
17. Tacumshin Lake	213	49. Wigtown Bay area	88
18. River Blackwater Callows & Lower Blackwater River	212	50. River Tweed (Kelso to Coldstream)	86
19. Inner Solway Firth (Caerlaverock)	200	51. Strangford Lough	84
20. River Clyde, The Meetings	193	52. River Tweed (Rutherford)	71
21. Black Cart Water	184	53. Loch of Lintrathen	71
22. Lough Coy Complex	167	54. Threave area	68
23. Rahasane Turlough	165	55. Tynninghame Estuary	68
24. Castleplunket Turlough	165	56. Merryton/Carbarns area	68
25. Suck Callows	164	57. Lochs of Spiggie & Brow	67
26. Cashen River/Lixnaw Canal	160	58. Lower Derwent Valley	65
27. North Central Galway Lakes	160	59. Mill Dam & Balfour Mains Pools	64
28. Loch of Wester	158	60. Humber Estuary	61
29. Roundfort/Kilglassan Turlough	155	61. Druridge Bay area	60
30. Carras Lough	150	62. Loch Heilen	60
31. Durnesh Lough	140	63. Dornoch Firth	58
32. Loch a'Phuill	137	64. River Tweed (Baron's Folly)	57

Figure 4. Internationally and nationally important sites for Whooper Swans in Britain and Ireland (see Table 2 for key to sites)



2.1 Britain

2.1.1 Shetland

2.1.1.1 Background

The Shetland archipelago comprises 117 islands which are composed of igneous and metamorphosed rock, similar to that found in the Highlands of Scotland. The islands support numerous freshwater lochs, some of which attract large flocks of Whooper Swans. The agriculture land is much less fertile than on nearby Orkney, more than 90% of the land being classified as rough grazing and suitable only for sheep farming (O'Dell & Walton 1962).

Numbers of Whooper Swans in Shetland peak as birds arrive in Britain in October and early November and around 300 birds may be present in the archipelago at this time. Smaller numbers remain through the winter, with around 100-150 birds during mild Januarys. A second peak in numbers occurs during March when birds return from wintering grounds further south, prior to leaving for the breeding grounds in Iceland. A few birds remain into early May and 1-3 pairs have bred in recent years (D. Okill pers. comm.). Turnover is likely to be high at many sites during the spring and autumn and therefore counts are timed to coincide with peak periods. Therefore, many more Whooper Swans may use Shetland during the autumn than are recorded.

2.1.1.2 Historical status

Numbers of Whooper Swans visiting Shetland have changed little since the early 1950s, although there has been a slow decline over the last decade. The lochs of Spiggie and Brow have been important for Whooper Swans since at least the early 1950s (Atkinson-Willes 1963). The results of the Shetland Bird Club's Whooper Swan census for the whole of the archipelago, conducted in early November, are shown in Fig. 5.

2.1.1.3 Nationally important sites

i) Lochs of Spiggie & Brow

Five-year mean 95/96-99/2000: 67

Site conservation status

SPA (Lochs of Spiggie and Brow: selection stage 1.1)

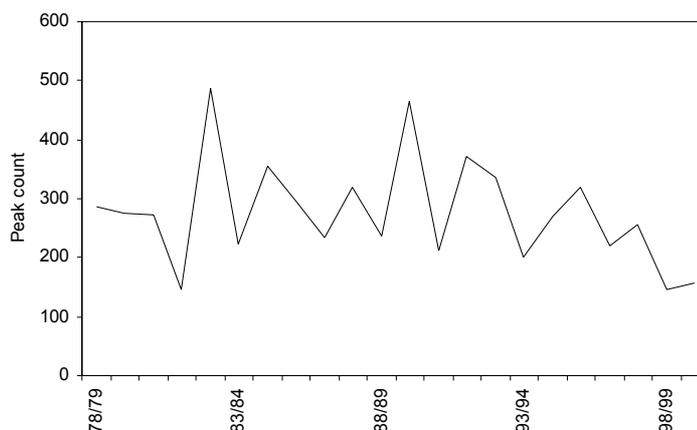
SSSI (Lochs of Spiggie and Brow)

IBA (Lochs of Spiggie and Brow: criterion B3)

Site description and habitat

The Lochs of Spiggie (HU3717) and Brow (HU3815) are located in the south of the mainland of Shetland and are large 'machair type' lochs. Loch of Spiggie was formed through the natural closure of a shallow voe (inlet) by a sand bar. Both lochs are slightly brackish, and the sand and mud substrates are dominated by a range of *Chara* species and aquatic mosses.

Figure 5. Results of the annual Whooper Swan census on Shetland, 1978-2000 (courtesy of the Shetland Bird Club)



Numbers and trends

The Loch of Spiggie acts as a major landfall site for Whooper Swans arriving from Iceland, with maximum numbers present during the late autumn. Although turnover may be high at this site, over 300 Whooper Swans can be present (Fig. 6), peaking in November (Fig. 7). Over 300 Whooper Swans were recorded at Loch of Brow in autumn 1986, which was a high count for this site (Fig. 8). A flock of around 20 birds remains in the area through the winter.

Site use

The lochs and surrounding arable land act as important staging and wintering areas for Whooper Swans in Shetland. In the winter, the flock feeds on submerged macrophytes within the lochs and on surrounding arable fields. In the spring, birds forage on re-seeded grasslands around the edges of the lochs (D. Okill pers. comm.).

2.1.1.4 Other sites

On the mainland, the Lochs of Bardister and Kirkigarth (HU2350) support 20-50 birds during the autumn and Loch of Hillwell (HU3713) hosts up to 40 birds at peak times. Fewer than 30 birds are recorded annually at the Loch of Benston (HU4653), Loch of Clickimin (HU4641), Loch of Strom (HU4049), and Sandwater Loch (HU4154). Numbers of Whooper Swans fluctuate markedly between years at numerous other sites on the Shetland mainland, indicating a high degree of between-year nomadism.

Elsewhere in the archipelago, 50-100 birds are recorded annually on Unst, primarily at Easter Loch (HP5901) (Fig. 9) and Loch of Cliff (HP6012). Yell supports a passage flock of around 30 birds during peak periods and 20 birds are recorded regularly at Papil Water (HU6090) on Fetlar.

2.1.1.5 Key references

Shetland Bird Reports

2.1.2 Orkney

2.1.2.1 Background

The Orkney archipelago consists of approximately 90 islands. It is separated from the northeast coast of Scotland by the Pentland Firth and lies only 80 km south of the latitude of the southernmost tip of Greenland. Although there are blocks of uplands, many of the islands are low-lying, with poor

drainage, and areas of peat. The vegetation community is predominated by large areas of scrub-free herbaceous vegetation (Booth *et al.* 1984); the grazing of domestic animals and climatic factors are thought to be responsible for the creation of this habitat. Much of the agriculture is arable and Whooper Swans make use of stubbles to feed during the late autumn and early winter (Reynolds 1982). Later in the winter, loch-side vegetation and wet grasslands are favoured.

Whooper Swans occur on Orkney as both passage migrants and winter residents. Peak numbers occur during the autumn as birds arrive from Iceland and make use of the freshwater lochs and agricultural land. A smaller peak occurs in March as birds undertake a northwards passage. Monthly fluctuations in Whooper Swan numbers at sites in Orkney have been related to changes in foraging behaviour (Reynolds 1982). Although Mill Dam & Balfour Mains Pools is numerically the most important site on the archipelago, there are numerous lochs which host large numbers of Whooper Swans, especially during October and November when turnover may be high.

Orkney is a key staging area for Whooper Swans moving elsewhere in the winter range: colour-ringed birds sighted in Orkney have subsequently been recorded in Shetland, Caithness, Aberdeenshire, central Scotland, Strathclyde, Dumfries & Galloway, Cumbria, Lancashire, Norfolk and at sites in Northern Ireland and the Republic of Ireland (Scottish Bird Reports).

2.1.2.2 Historical status

Although regular data are lacking from many sites, it would appear that the number of Whooper Swans staging in Orkney might have increased since the 1950s. Atkinson-Willes (1963) predicted that around 100 birds staged on the Orkneys during the autumn. More contemporary data suggest that many hundreds of birds now use the archipelago during autumn migration, although numbers may have declined in the last decade.

2.1.2.3 Nationally important sites

i) Mill Dam & Balfour Mains Pools

Five-year mean 95/96-99/2000: 64

Site conservation status

IBA (Mill Dam, Shapinsay: criterion C7)

Figure 6. Whooper Swans at the Loch of Spiggie, 1960/61-1999/2000: peak counts (bars) and British index (line) (circles denote years with no known data)

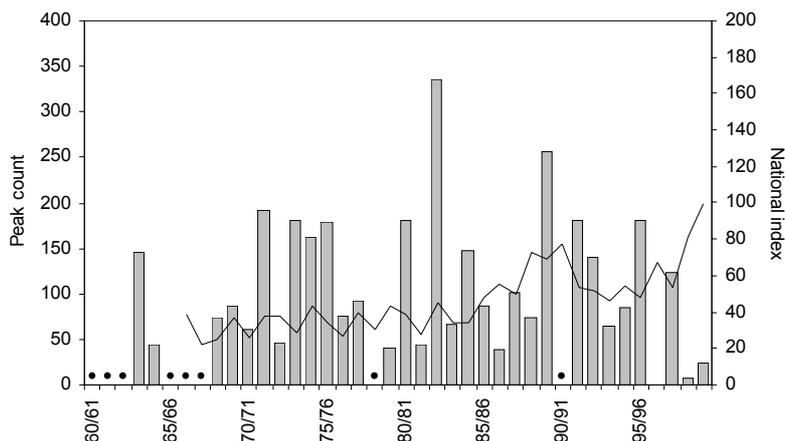


Figure 7. Whooper Swans at the Loch of Spiggie, 1995/96-1999/2000: mean peak counts by month (error bars denote minimum and maximum peak counts during the period)

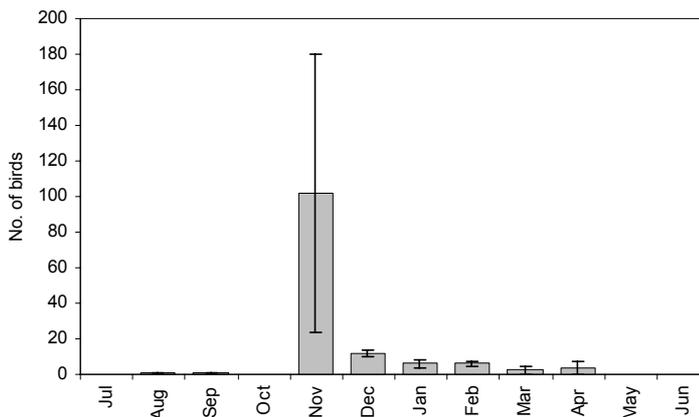


Figure 8. Whooper Swans at the Loch of Brow, 1960/61-1999/2000: peak counts (bars) and British index (line) (circles denote years with no known data)

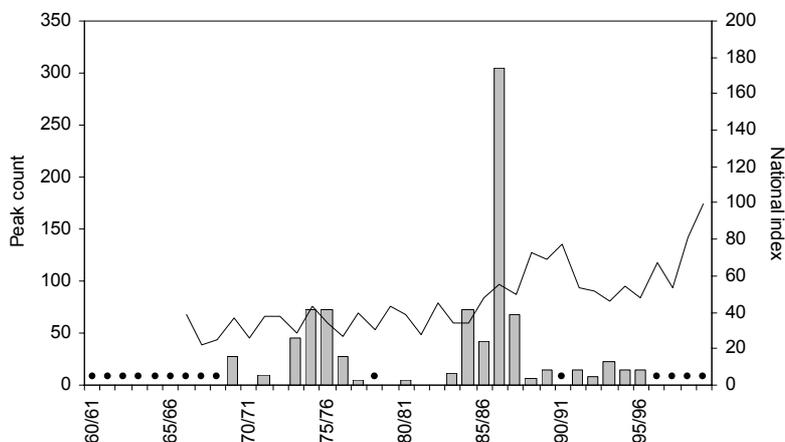
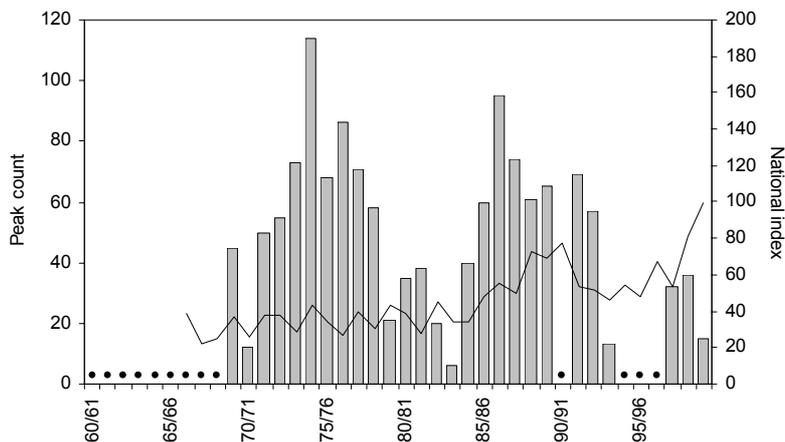


Figure 9. Whooper Swans at Easter Loch, 1960/61-1999/2000: peak counts (bars) and British index (line) (circles denote years with no known data)



Site description and habitat

Mill Dam & Balfour Mains Pools (HY4817) are artificially-created wetland sites covering around 16 ha which lie in a small valley to the north of Elwick Bay on Shapinsay. A 90 m-long stone-built dam spans the lower southern end of the marsh at Mill Dam. This dam was initially built in the 1880s to supply water to a grain mill at Elwick. In the early 1990s, when the area was drained, a small amount of peat was cut during the summer months. The wetland is now choked by encroaching vegetation, with open water appearing only after heavy rain. It is thought that around 100 birds are present throughout Shapinsay at peak periods.

Numbers and trends

Although there was an unusually high peak of 140 birds in winter 1990/91, the site has supported regularly around 60 birds throughout the 1990s (Fig. 10). Peak numbers of Whooper Swans occur at this site during the late autumn, but a flock of around 40 birds remains until February (Fig. 11).

Site use

The Whooper Swan flock that uses Shapinsay generally roosts at Mill Dam and Vasa Loch, and on The Ouse and Lairo Water (HY5119) (P. Hollinglake pers. comm.). The Whooper Swans that roost at Mill Dam feed on surrounding arable fields, especially on barley stubbles and grass leys (P. Hollinglake pers. comm.). The birds take advantage of grain provided by a local farmer to attract quarry species and sacrificial crops of barley and oil seed rape. The birds also feed on submerged macrophytes at Mill Dam and in surrounding freshwaters.

2.1.2.4 Other sites

On the mainland the two largest lochs, Loch of Harray (HY2915) and Loch of Stenness (HY2812), jointly support several hundred birds during peak periods in the autumn (Fig. 12 and 13). Loch of Harray supports the highest numbers, including 500-1,000 during the late 1980s. For this reason, the Lochs of Harray and Stenness IBA has been identified as an important site for Whooper Swans. In the surrounding area, Loch of Skaill (HT2418), Loch of Clumly (HY2516), Loch of Ibister (HY2523), Loch of Boardhouse (HY2725), Loch of Sabiston (HY2922), Loch of Bosquoy (HY3018), Loch of Swannay (HY3127), Loch of Wasdale (HY4314), Loch of Kirbister (HY3608), Loch of Brockan (HY3919), Loch of Ayre (HY4601) and Loch of Graemeshall (HY4802) host flocks rarely exceeding 100 birds each during the autumn. Most of these lochs are located on the west side of the island.

Elsewhere in the archipelago, Loch Saintear (HY4448) on Westray supports regularly around 30 birds during peak periods and similar sized flocks use the lochs on North Ronaldsay (HY7655). North Loch (HY6540) on Sanday is a far more important site, often supporting 50-200 birds during the autumn. Several sites on Sandwick also support several hundred Whooper Swans at times during the autumn.

2.1.2.5 Key references

Reynolds (1982), Booth *et al.* (1984)

2.1.3 Caithness**2.1.3.1 Background**

The numerous freshwater lochs in the Caithness lowlands are rich in food-plants favoured by wildfowl and, as a consequence, support large numbers of species during autumn migration. The lochs are set on a bed of Old Red Sandstone in an area of fertile farmland, interspersed with tracts of moss and bog. Most of these lochs are shallow and have a large amount of marginal cover. Whooper Swans have been recorded on nearly all the lowland lochs in Caithness, with nationally important numbers currently occurring only at Loch Heilen and Loch of Wester in the northeast of the region.

An estimated 600-700 birds currently stage in Caithness during the autumn, but they are very widely dispersed and transient. There is some evidence to suggest that autumn concentrations of Whooper Swans in Caithness and in other parts of northeast Scotland are separate groups, rather than a single group moving from one site to another (Scottish Bird Reports). Around 100-200 birds remain in Caithness throughout the winter.

2.1.3.2 Historical status

Unpredictability of distribution, together with relatively poor monitoring in the early 20th century, has inhibited the study of trends and the assessment of total numbers in Caithness. The only significant fluctuations in numbers at the site level have occurred at Loch of Wester.

Figure 10. Whooper Swans at Mill Dam & Balfour Mains Pools, 1960/61-1999/2000: peak counts (bars) and British index (line) (circles denote years with no known data)

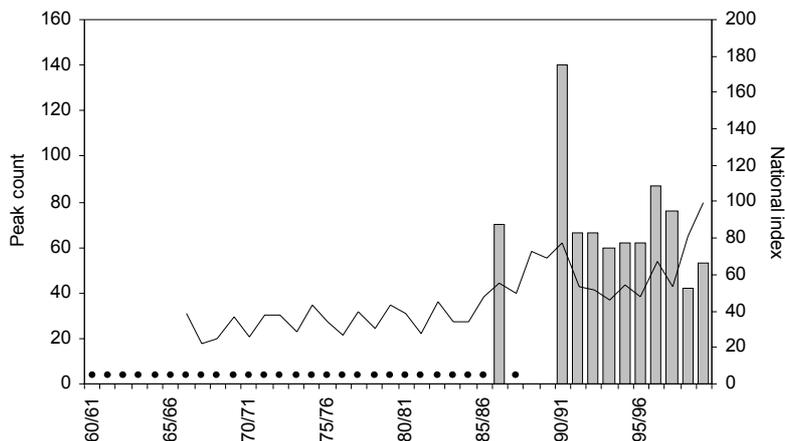


Figure 11. Whooper Swans at Mill Dam & Balfour Mains Pools, 1995/96-1999/2000: mean peak counts by month (error bars denote minimum and maximum peak counts during the period)

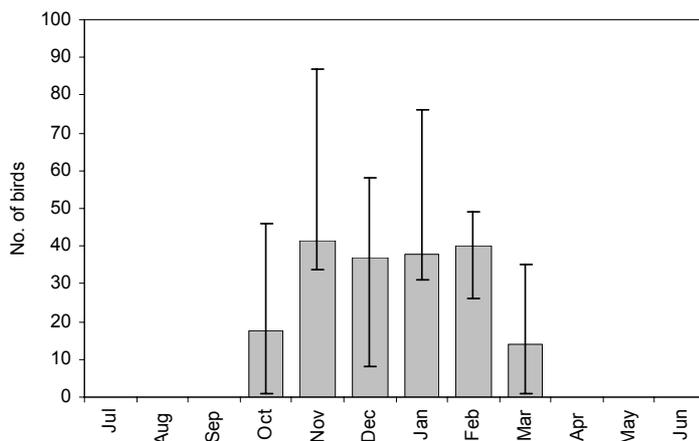


Figure 12. Whooper Swans at the Loch of Harray, 1960/61-1999/2000: peak counts (bars) and British index (line) (circles denote years with no known data)

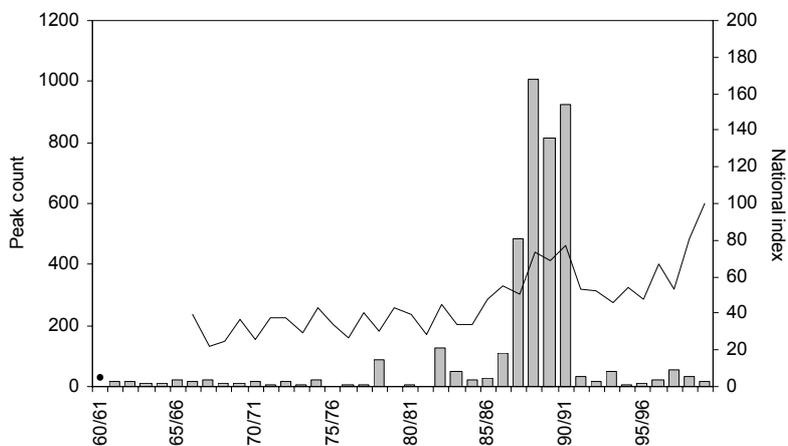
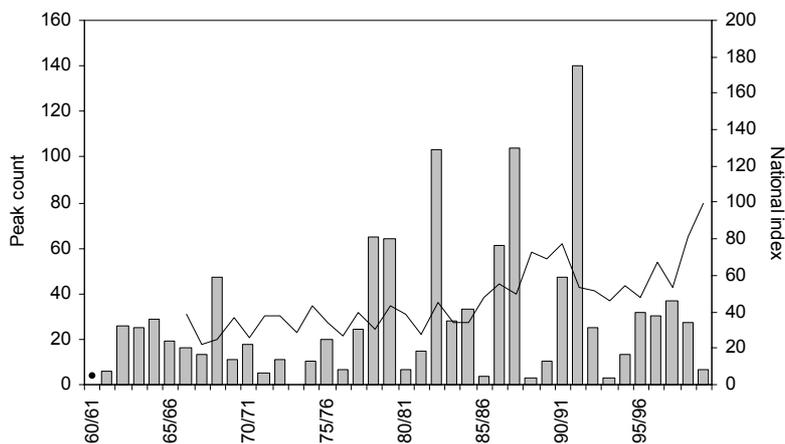


Figure 13. Whooper Swans at the Loch of Stenness, 1960/61-1999/2000: peak counts (bars) and British index (line) (circles denote years with no known data)



2.1.3.3 Nationally important sites

i) Loch of Wester

Five-year mean 95/96-99/2000: 158

Site conservation status

SPA (Caithness Lochs: selection stage 1.1)

Ramsar Site (Caithness Lochs: criterion 6)

SSSI (Loch of Wester)

IBA (Caithness Lochs: criterion B3)

Site description and habitat

Loch of Wester (ND3259) is a shallow mesotrophic loch located 1 km west of Sinclair's Bay in northeast Caithness.

Numbers and trends

Loch of Wester is the only loch in Caithness at which the numbers of staging Whooper Swans have increased since the 1960s (Fig. 14). In the late 1970s and early 1980s, peak counts of between 200 and 300 birds were recorded. Since then, numbers have fallen slightly; with a flock of around 100 birds recorded regularly during the late autumn in recent years. However, this apparent decline in numbers may, in part, be due to counts rarely coinciding with the timing of the main autumn migration in recent years. After the late autumn peak, numbers remain relatively stable throughout the winter and early spring (Fig. 15).

Site use

Whooper Swans roost on the loch during the night. During the day, birds feed on submerged macrophytes within the loch and also fly northwards to agricultural land along the Lyth valley (S. Laybourne pers. comm.). In agricultural areas, the birds feed on stubbles during the autumn and on grasslands in the spring.

ii) Loch Heilen

Five-year mean 95/96-99/2000: 60

Site conservation status

SPA (Caithness Lochs: selection stage 1.1)

Ramsar Site (Caithness Lochs: criterion 6)

SSSI (Loch Heilen)

IBA (Caithness Lochs: criterion B3)

Site description and habitat

Loch Heilen (ND2568), one of numerous freshwater lochs in the Caithness lowlands, is positioned close to the northeast coastline adjoining the Pentland Firth, which separates the mainland from Orkney. This mesotrophic loch is 77 ha in area and rich in submerged macrophytic vegetation.

Numbers and trends

As at most of the freshwater lochs in Caithness, numbers of Whooper Swans counted vary markedly between years at Loch Heilen, with no discernible trend over time. This may, at least, partly be due to the timings of the counts, which only occasionally coincide with peak passage periods. A count of over 300 birds in autumn 1974/75 was notable; maximum counts in most years tend to be of no more than 100 birds (Fig. 16). Peak numbers occur at this site during November with fewer than 20 birds remaining through the winter in most years (Fig. 17). A second peak occurs in March.

Site use

The site acts as an important landfall site for Whooper Swans during the autumn, acting as a roosting and feeding site. The Whooper Swans at Loch Heilen feed on submerged macrophytes within the loch as well as on surrounding agricultural land (S. Laybourne pers. comm.). In agricultural areas, the birds feed on stubbles during the autumn and on grasslands in the spring.

2.1.3.4 Other sites

Along the northern coastline, St John's Loch (ND2272), Loch of Mey (ND2773) and Scrabster Loch (ND0870) often support flocks of 100-200 Whooper Swans during the autumn. To the west of Thurso, Broubster Leans (ND0360), Westfield Marshes (ND0664), Loch Calder (ND0760) and Lough Olginey (ND0957) jointly support around 100 birds at this time, whereas Loch Scarmclate (ND1859) and Loch Watten (ND2256), more centrally located, host around 30 birds each during the autumn peak. In recent years, around 30 birds have remained throughout the winter at Broubster Leans and Westfield Marshes, feeding primarily on natural vegetation (S. Laybourne pers. comm.).

Many of the sites where Whooper Swans are recorded in Caithness lie within the Caithness Lochs SPA, for which the Whooper Swan is a qualifying species. Numbers of birds occurring at most lochs in the area vary markedly between years, but the reasons for this between-year nomadism remain unclear. Movements of birds between lochs within years are probably frequent and also deserve further research.

Figure 14. Whooper Swans at the Loch of Wester, 1960/61-1999/2000: peak counts (bars) and British index (line) (circles denote years with no known data)

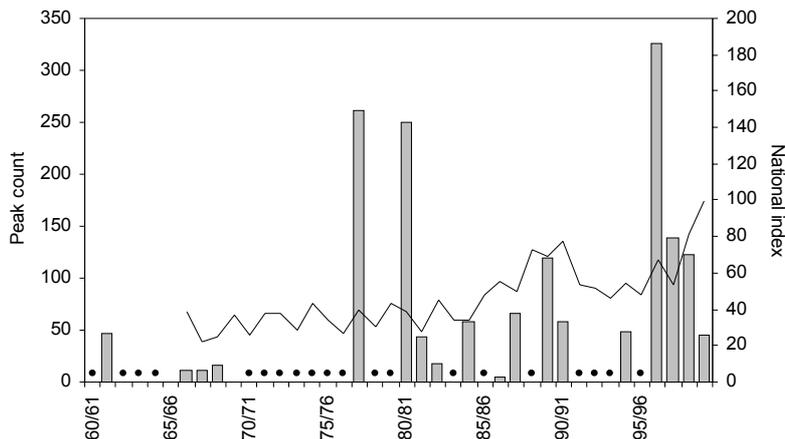


Figure 15. Whooper Swans at the Loch of Wester, 1995/96-1999/2000: mean peak counts by month (error bars denote minimum and maximum peak counts during the period)

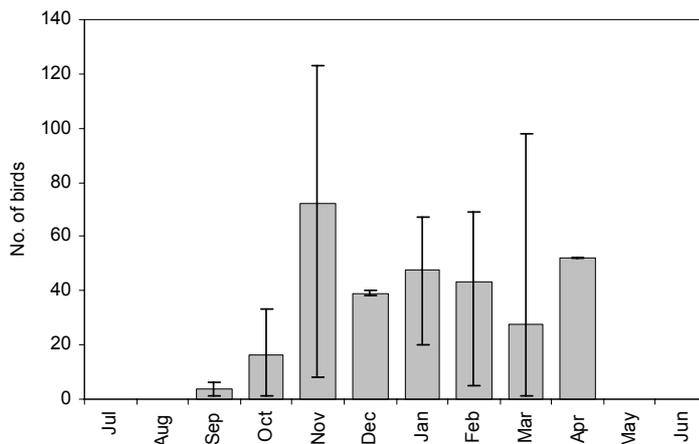


Figure 16. Whooper Swans at Loch Heilen, 1960/61-1999/2000: peak counts (bars) and British index (line) (circles denote years with no known data)

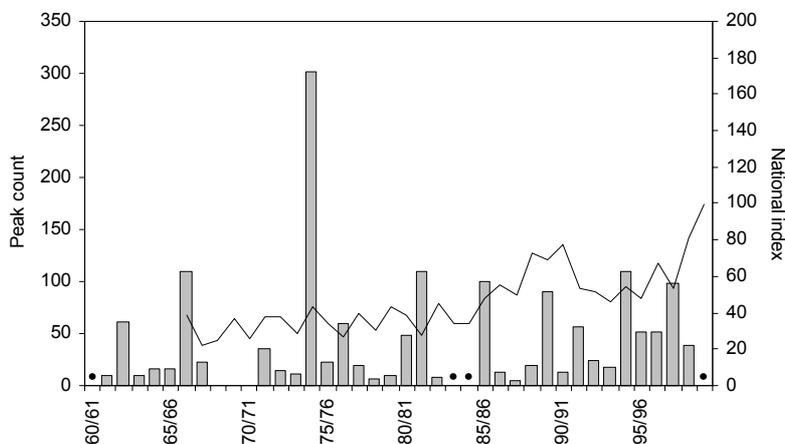
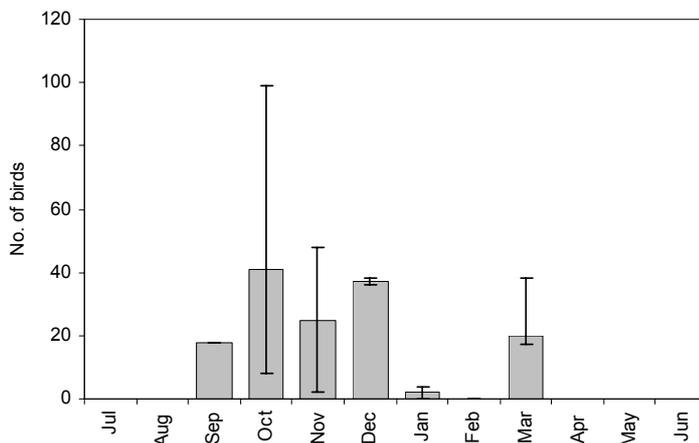


Figure 17. Whooper Swans at Loch Heilen, 1995/96-1999/2000: mean peak counts by month (error bars denote minimum and maximum peak counts during the period)



2.1.4 The Moray Basin

2.1.4.1 Background

The Moray Basin is the largest of the Scottish faunal areas. Topographically it is a region set apart by uplands along the southern and western boundaries. To the east, the two converging arms of the coast form a funnel, concentrating waterbirds onto the sheltered inner firths. The firths provide an important feeding area for swans and geese, having extensive saltmarsh areas adjacent to intertidal flats of sand and silt surrounded by feeding grounds of low-lying arable and pasture land.

The valley of the Spey provides one of the few easy routes for wildfowl through the barrier of the central Highlands. In the middle reaches are numerous lochs and areas of marsh, the most important of which for Whooper Swans is the stretch of the floodplain between Kingussie and Loch Insh. Whooper Swan numbers in the Moray Basin area peak during the autumn, with largest numbers occurring in the vicinity of Loch Eye.

2.1.4.2 Historical status

In the mid 19th century, St John (1863) recorded flocks of around 20 Whooper Swans in the Moray area, although 200 were in Findhorn Bay in October 1844. He was the first to identify that the species was more numerous during autumn passage than in mid winter (St John 1863). Cook (1992) suggested that Whooper Swans have been numerous in the Moray and Nairn regions throughout the last 150 years.

Although numbers fluctuate markedly between years, it is clear that numbers of Whooper Swans increased in this area during the late 1960s in particular. Since then, numbers appear to have stabilised, although the paucity of monitoring data for many sites makes it difficult to describe any trends. Loch Park (NJ3543) and Loch Flemington (NH8152) were key resorts in the past, the former supporting a flock of over 200 birds in the late 1950s, the latter up to around 180 in the late 1980s (Cook 1992). Changes in farming practice, especially the increased growing of cereal crops, may be partly responsible for the improved status and re-distribution of Whooper Swans in this region.

2.1.4.3 Internationally important sites

i) Cromarty Firth & Loch Eye

Five-year mean 95/96-99/2000: 280

Site conservation status

SPA (Cromarty Firth: selection stage 1.1; Loch Eye: selection stage 1.1)

Ramsar Site (Cromarty Firth: criterion 6; Loch Eye: criterion 6)

SSSI (Various)

IBA (Moray basin, firths and bays: criteria B1i, B3, C2, C6)

Site description and habitat

The Cromarty Firth (NH7771) is one of the major firths on the east shore of the Moray Firth. The Firth contains a range of high quality coastal habitats including extensive intertidal mudflats and shingle, bordered by areas of saltmarsh, as well as by reedbeds around Dingwall. The rich invertebrate fauna of the inter-tidal flats, and beds of *Zostera*, *Salicornia* and *Enteromorpha*, all provide important food sources for large numbers of wintering waterfowl, including Whooper Swans.

Loch Eye (NH8379) lies between the Cromarty and Dornoch Firths. It is a relatively large, shallow, nutrient-rich inland waterbody, and is the best example of a eutrophic lowland loch north of the Highland boundary fault.

Numbers and trends

Numbers of Whooper Swans fluctuate markedly between years at Loch Eye (Fig. 18). Around 100-600 birds have been recorded in the mid to late 1990s. Peak numbers of Whooper Swans occur during late autumn, with much smaller numbers remaining through the winter (Fig. 19).

Up to around 300 birds have been recorded at the Cromarty Firth in recent years (Fig. 20). However, numbers vary markedly between years and consistently higher numbers were recorded in the early and late 1980s. Peak numbers are generally recorded in January (Fig. 21).

Site use

Loch Eye is an important roosting site for Whooper Swans. Birds feed on submerged macrophytes at Loch Eye in 'bloom' years (B. Swann pers. com.). However, in most years, newly arrived birds feed in large flocks in stubble fields between Tain, Tarbet Ness and Nigg Bay. Once the spilt grain has been exhausted, generally in November or December, many birds disperse from the area. The remaining birds then switch to feeding on winter-sown oil seed rape, utilising fields to the south of the loch near Arabella, Cullisse and Clay of Allan and further east towards Wester Arboll.

Figure 18. Whooper Swans at Loch Eye, 1960/61-1999/2000: peak counts (bars) and British index (line) (circles denote years with no known data)

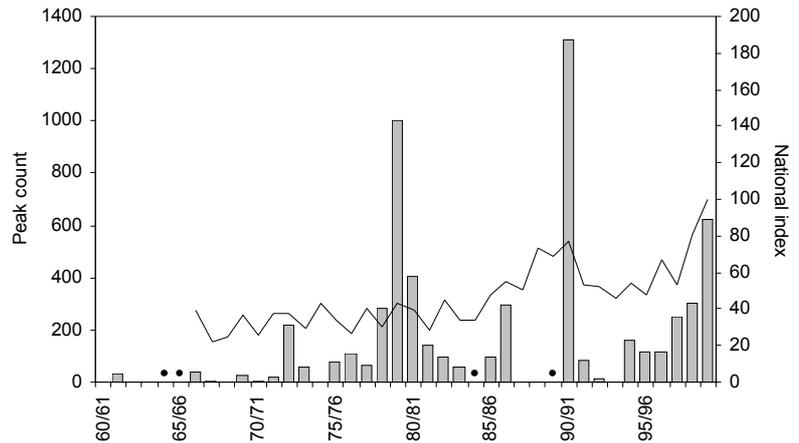


Figure 19. Whooper Swans at Loch Eye, 1995/96-1999/2000: mean peak counts by month (error bars denote minimum and maximum peak counts during the period)

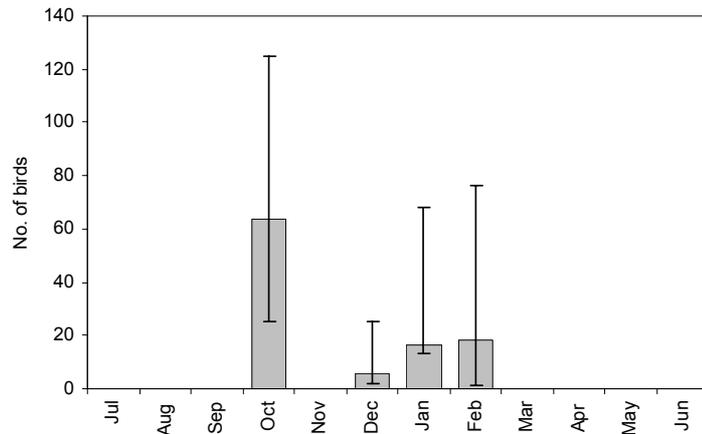


Figure 20. Whooper Swans at the Cromarty Firth, 1960/61-1999/2000: peak counts (bars) and British index (line) (circles denote years with no known data)

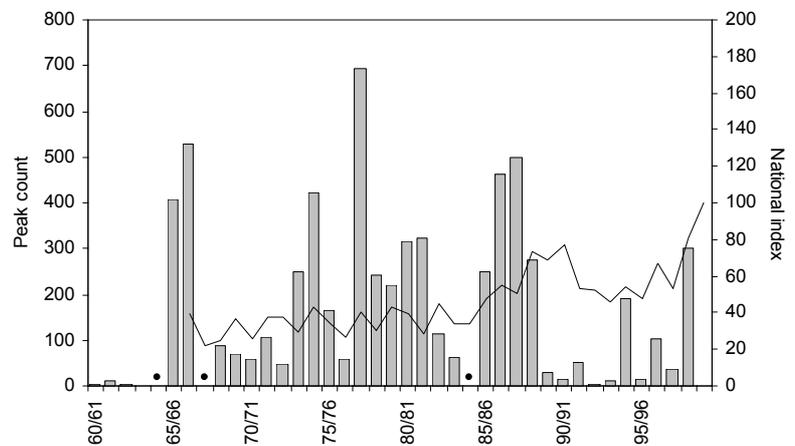
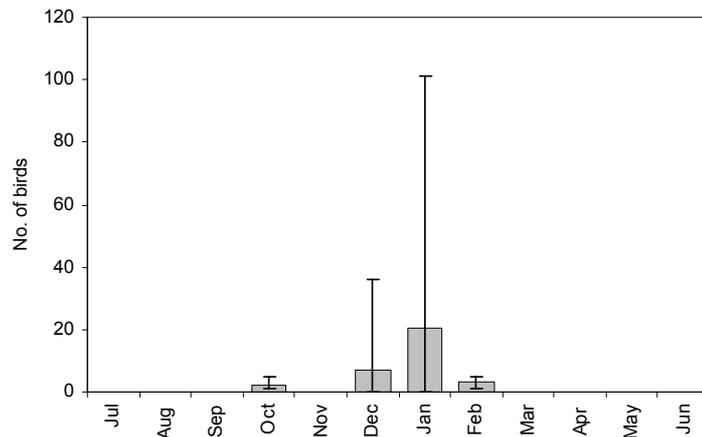


Figure 21. Whooper Swans at the Cromarty Firth, 1995/96-1999/2000: mean peak counts by month (error bars denote minimum and maximum peak counts during the period)



A few birds (<20) also feed in the Barbaraville-Invergordon area and probably roost at Nigg Bay. In the Dingwall area, up to 20 birds feed at Marybank along the Conon, in Strathpeffer just west of Dingwall, or around Alcaig on the east side of the firth.

2.1.4.4 Nationally important sites

i) River Spey-Insh Marshes

Five-year mean 95/96-99/2000: 113

Site conservation status

SPA (River Spey-Insh Marshes: selection stage 1.1)

Ramsar Site (River Spey-Insh Marshes: criterion 6)

SSSI (River Spey-Insh Marshes)

IBA (River Spey-Insh Marshes: criterion B3)

Site description and habitat

The River Spey-Insh Marshes (NH8305) covers over 1000 ha of the floodplain of the River Spey between Kingussie and Kincaig. Flooding and grazing both play an important role in shaping the marshes. Sheep and cattle now graze the marsh between late spring and the onset of wet conditions in autumn. The Whooper Swan flock at this site feeds predominantly on natural vegetation, grazing the sedges, rushes and wetland grasses on the marsh.

Numbers and trends

Peak numbers may have increased since the early 1960s, although differences between years are often marked (Fig. 22). Between 100 and 200 birds now use this site regularly at peak periods. Including the flocks of Whooper Swans recorded elsewhere in Strathspey, it is likely that a maximum of 200-300 Whooper Swans occur in and around this site. Whooper Swans start to assemble at this site in late autumn, peaking in December (Fig. 23).

Site use

The Whooper Swans at the Insh Marshes RSPB reserve feed mainly on *Carex* and other types of vegetation in the middle reaches of the marsh (T. Prescott pers. comm.). Birds also occur on other lochs in Strathspey and small flocks are sometimes recorded foraging in agricultural areas in the upper valley of the Spey, between Kingussie and the Spey Dam (T. Prescott pers. comm.).

ii) Dornoch Firth

Five-year mean 95/96-99/2000: 58

Site conservation status

SPA (Dornoch Firth & Loch Fleet: non-qualifying species)

Ramsar Site (Dornoch Firth & Loch Fleet: non-qualifying species)

SSSI (Dornoch Firth; Loch Fleet)

IBA (Moray basin, firths and bays: criteria B1, B3, C2, C6)

Site description and habitat

The Dornoch Firth (NH7384), although similar in size to the Cromarty Firth, and containing about the same area of foreshore, has less extensive food supplies available to waterbirds. The most productive area of the firth is in the 10 km stretch of the lower basin, between Ardmore Point in the west and Dornoch Point and Morrich More in the east. Extensive sandflats and mudflats are backed by saltmarsh and sand dunes, with transitions to dune heath and alder woodland. It is the most northerly, substantial extent of intertidal habitat for waterbirds in Britain.

Numbers and trends

Although there is marked annual variation in the numbers of Whooper Swans recorded in the Dornoch Firth area, there is some evidence for an increase in peak numbers since the 1970s, with more than 100 birds recorded in winters 1987/88 and 1993/94 (Fig. 24). However, many of the birds counted by WeBS are likely to be linked with the large feeding flocks from the Loch Eye roost, especially those which feed close to Tain and on the fields along the coastal strip around Portmahomack and out towards Tarbat Ness (B. Swann pers. comm.). Furthermore, there is likely to be some movement of birds between this site and the nearby Loch Fleet complex. Numbers of Whooper Swans at the Dornoch Firth begin to build up through the autumn, peaking in December (Fig. 25).

Site use

The key resort for Whooper Swans at the Dornoch Firth is Loch Evelix (B. Swann pers. comm.). Up to 25 birds spend the entire winter at this site. The main feeding site is at Cuthill, but many will fly as far as Ardmore Bay. A few birds have also been recorded on mid Fearn Mere and up as far as Ardgay.

2.1.4.5 Other sites

As the winter progresses flocks of Whooper Swans, often over 100 birds, make use of the saltings and farmland at Tarradale and Lovat Point at the head of

Figure 22. Whooper Swans at the River Spey-Insh Marshes, 1960/61-1999/2000: peak counts (bars) and British index (line) (circles denote years with no known data)

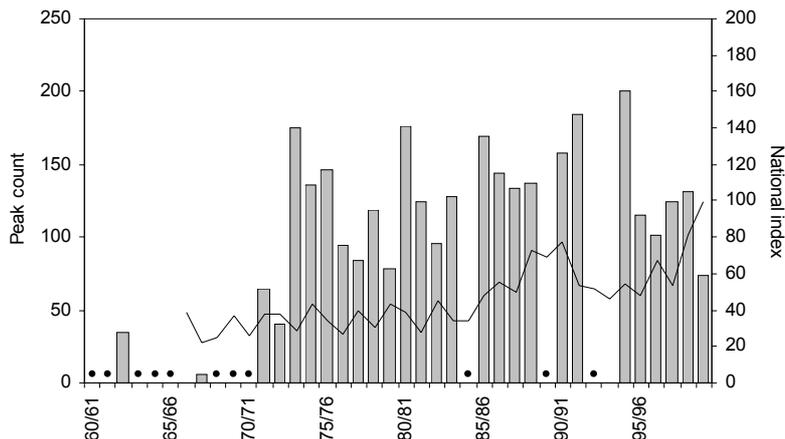


Figure 23. Whooper Swans at the River Spey-Insh Marshes, 1995/96-1999/2000: mean peak counts by month (error bars denote minimum and maximum peak counts during the period)

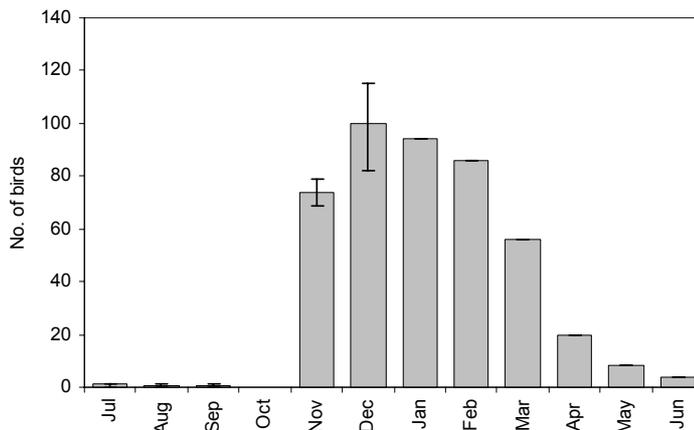


Figure 24. Whooper Swans at the Dornoch Firth, 1960/61-1999/2000: peak counts (bars) and British index (line) (circles denote years with no known data)

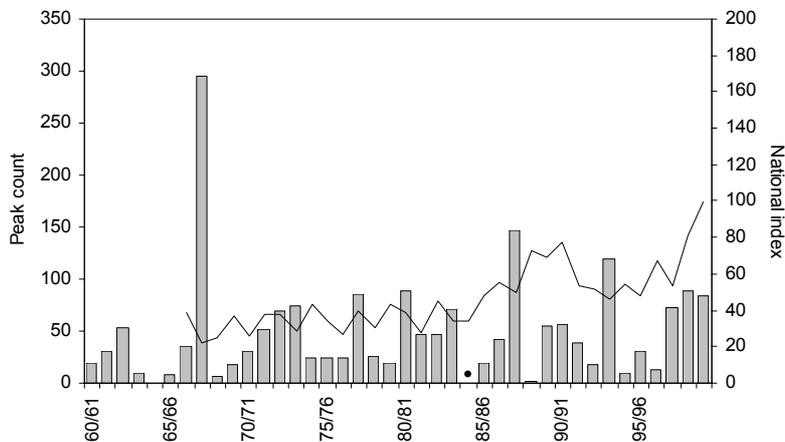
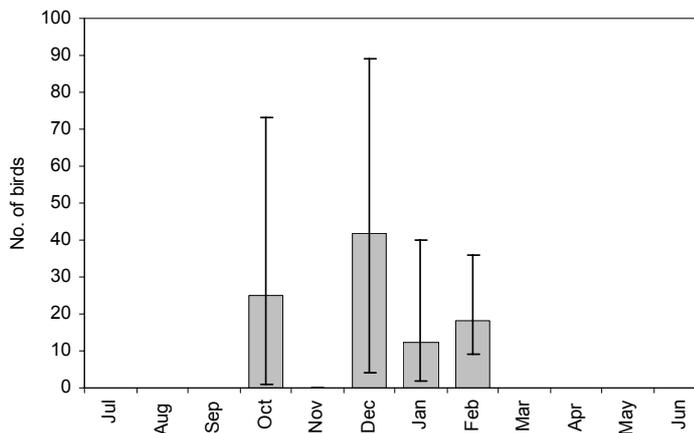


Figure 25. Whooper Swans at the Dornoch Firth, 1995/96-1999/2000: mean peak counts by month (error bars denote minimum and maximum peak counts during the period)



the Beaully Firth (NH5848). Small flocks (<20 birds) also move into the Loch Fleet area (NH7896), the Skibo Estuary (NH7388) near Dornoch, the fields and foreshore near Dingwall, and Loch Ussie (NH5057) (probably the main roosting site for birds from the Dingwall flock).

Away from the Lovat Point areas, numbers fluctuate markedly in the Inner Moray Firth (between the Beaully Firth and Findhorn Bay) during the mid winter months, with flocks comprising 10-100 birds recorded in most years. Larger numbers (100-250 birds) occurred in the area during the late 1980s and early 1990s. To the south of the Moray Firth, small flocks have been recorded at Loch Loy (NH9358), Cran Loch (NH9459), Loch Flemington and Loch Park. These flocks are probably linked to the large Loch Eye flock, which disperses through the winter.

2.1.4.6 Key references

Cook (1992)

2.1.5 Aberdeenshire

2.1.5.1 Background

The areas south of the Dee Valley are dominated by the foothills of the Grampian mountains. Lowland waters are scarce and much of the coast is steep and rocky. To the north of Aberdeen the cliffs give way to a large expanse of dune and beach which stretches for almost 20 km to the outfall of the Ythan Estuary. It is in this area that large numbers of Whooper Swans occur in Aberdeenshire, primarily during the autumn.

Whooper Swans arrive at Loch of Strathbeg, just west of Rattray Head, in September and peak in numbers in October and November (see below). This site has remained the most important, numerically, in the area. Numbers at this site decrease markedly as the winter progresses, leaving around 50-100 birds in mid to late winter.

2.1.5.2 Historical status

Atkinson-Willes (1963) presented data suggesting that numbers of Whooper Swans in Aberdeenshire prior to the early 1960s were as high as those recorded to the early 1980s. However, given the importance of Loch of Strathbeg, and a probable decline in numbers visiting that site since the mid 1980s, the numbers of Whooper Swans visiting the Aberdeenshire area have probably declined since the late 1980s. The Loch of Auchlossan (NH5603), to

the west of the region, was once an important site for Whooper Swans, supporting 80 birds regularly. However, after 200 years of drainage attempts, the loch is now completely dry except in very wet winters, and only a handful of birds are recorded there annually.

2.1.5.3 Internationally important sites

i) Loch of Strathbeg

Five-year mean 95/96-99/2000: 320

Site conservation status

SPA (Loch of Strathbeg: selection stage 1.1)

Ramsar Site (Loch of Strathbeg: criterion 6)

SSSI (Loch of Strathbeg)

IBA (Loch of Strathbeg: criterion B3)

Site description and habitat

The Loch of Strathbeg (NK0758) is a shallow, naturally eutrophic loch with adjoining reedbeds, freshwater marshes and wet woodland. The loch is the largest dune slack pool in the UK, and the largest waterbody in northeast Scotland. It lies within 800 m of the sea just west of Rattray Head, occupies an area of 200 ha and has a mean depth of only 1-1.5 m. On the seaward side, it is flanked by a ridge of calcareous dunes; the water is fresh and rich in lime. Submerged vegetation provides food for many waterbirds, and some of the shores are vegetated. At the northwest end, large areas of *Phragmites* provide some shelter.

Numbers and trends

Counts of Whooper Swans fluctuate markedly between years at Loch of Strathbeg (Fig. 26), primarily because count dates rarely coincide with periods of peak passage. Numbers peak during November (Fig. 27), with a flock of fewer than 100 birds remaining through the winter. Bell (1981) indicated that an average of 316 Whooper Swans was recorded at the loch between 1954 and 1960. A series of high counts through the 1960s and early 1970s, peaking at over 800 in autumn 1967, almost certainly coincided with peak passage periods. Since then, numbers of Whooper Swans recorded at the site have been consistently lower, with an average of only 320 recorded over the last five years.

Site use

The Whooper Swan flock roosts on the loch itself and increasingly on associated lowland wet grasslands within the RSPB reserve boundary (R. Coleman pers. comm.). Birds fly out from the loch to forage in surrounding arable fields, where they feed primarily on winter barley and re-seeded grasslands (R. Coleman pers. comm.). Over the last 10 years, there has been an increase in the number of

duck flight ponds in the area. These are baited with potatoes and cereals, attracting waterbirds including Whooper Swans. Some birds remain on the larger flight ponds to roost when disturbance is limited.

2.1.5.4 Other sites

Away from the Loch of Strathbeg, Whooper Swan numbers peak in the late autumn at other sites in Aberdeenshire. Pitfour Lake (NJ9748), south of the Loch of Strathbeg, supports a small flock of around 20 birds in most winters. Small numbers also occur at the Ythan Estuary (NK0026), with large mid winter flocks recorded at this site only in the early 1970s and early 1980s (Fig. 28), attracted by the dumping of waste potatoes (Buckland *et al.* 1991). This practice has now ceased. Large, transient flocks (50-300 birds) have been recorded feeding on agricultural land in the vicinity of Mintlaw, Teuchan, Kintore, Irlaw, Hythie, Strichen and Newburgh.

Further south, large flocks have been recorded at the Loch of Skene (NJ7807), most notably 200-400 birds in the late 1980s and early 1990s (Fig. 29). The nearby stretch of the River Don between Kemnay and Inverurie (NJ7216), holds fewer than 100 birds. Although the Whooper Swan is listed as a qualifying species for the Loch of Skene SPA and IBA, the site no longer qualifies as nationally important for this species on the basis of WeBS data. The Nigg Estuary (NJ9705) has supported over 100 Whooper Swans during spring passage in recent years.

2.1.5.5 Key references

Bell (1981), Buckland *et al.* (1991)

2.1.6 The Hebrides

2.1.6.1 Background

The Western Isles, or Outer Hebrides, cover about 290,000 ha, and stretch from north to south for more than 200 km. Within this span of coastline are numerous inlets and 'sounds', while in places the abundance of lochs is such that almost half the land is under water. The Inner Hebrides lie to the east and south and include the island groups of Islay/Jura, Mull, Tiree/Coll, Skye and The Small Isles. The importance of individual islands for Whooper Swans varies according to their topography and the amount of disturbance from farming and other activities. Peak numbers occur in the late autumn as birds arrive from their migratory flight from Iceland.

2.1.6.2 Historical status

Whooper Swans were probably once more abundant in the Hebrides than they are today (Thom 1986), with early writers describing the area as the key wintering grounds in Scotland. At North Uist, Whooper Swans were numerous in the 1930s and 1950s, when a flock of 200-300 birds wintered regularly at Loch an Duin (NF8974) and the surrounding area. This site is now rarely used by Whooper Swans. The species started using sites on South Uist and Benbecula during the early part of the century. They were particularly abundant at Loch Bee (NF7743), where as many as 400 were recorded on one occasion (Baxter & Rintoul 1953). Loch Bee is no longer a stronghold, and numbers in this island group have declined markedly since the peak in the early part of this century.

The occurrence of large flocks of Whooper Swans on Tiree and Islay dates from the end of the last century. As in the Outer Hebrides, numbers of Whooper Swans increased dramatically in the Inner Hebrides at this time (Baxter & Rintoul 1953). For example, on Tiree numbers rose from a dozen birds in 1886 to around 200 in 1898. Numbers have remained relatively stable throughout the archipelago since then.

2.1.6.3 Nationally important sites:

1) Loch a'Phuill

WeBS five-year mean 95/96-99/2000: 137

Site conservation status

SPA (Sleibhtean agus Cladach Thiriodh (Tiree Wetlands & Coast): non-qualifying species)
Ramsar Site (Sleibhtean agus Cladach Thiriodh (Tiree Wetlands & Coast): non-qualifying species)
SSSI (Sleibhtean agus Cladach Thiriodh (Tiree Wetlands & Coast))
IBA (Tiree and Coll: criterion B3)

Site description and habitat

Loch a'Phuill (NL9541) is a freshwater loch on the mainland of Tiree and acts as a reservoir for the island. The loch is mesotrophic and shallow and submerged vegetation is abundant.

Numbers and trends

The site currently supports over 100 Whooper Swans at peak times, although throughput of birds is likely to be high (Fig. 30; J. Bowler pers. comm.)
Loch a'Phuill is a key landfall site for Whooper

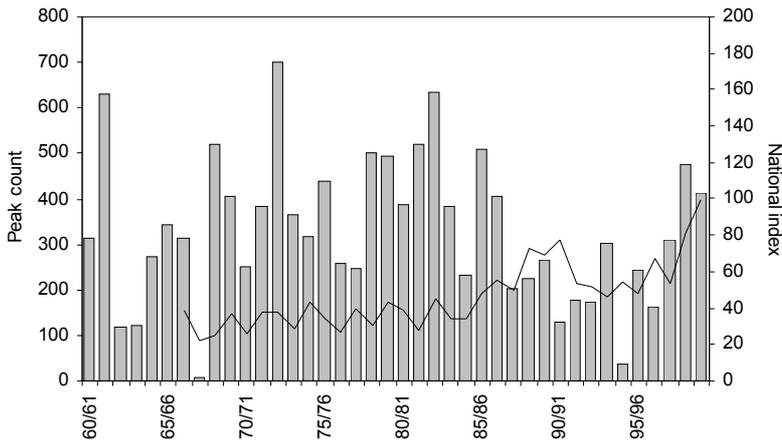


Figure 26. Whooper Swans at the Loch of Strathbeg, 1960/61-1999/2000: peak counts (bars) and British index (line) (circles denote years with no known data)

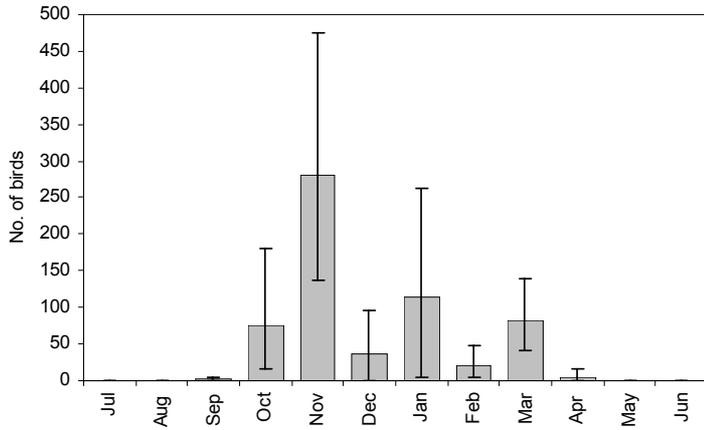


Figure 27. Whooper Swans at the Loch of Strathbeg, 1995/96-1999/2000: mean peak counts by month (error bars denote minimum and maximum peak counts during the period)

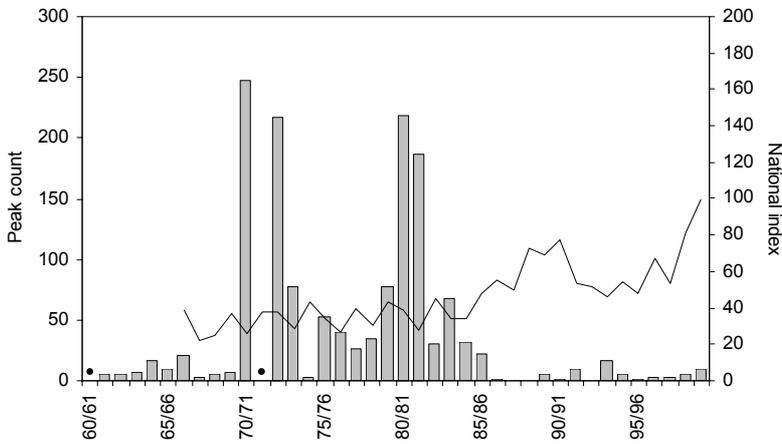


Figure 28. Whooper Swans at the Ythan Estuary, 1960/61-1999/2000: peak counts (bars) and British index (line) (circles denote years with no known data)

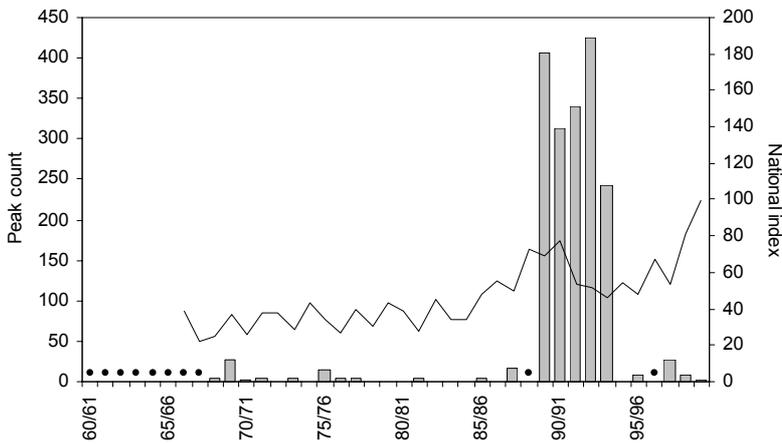


Figure 29. Whooper Swans at the Loch of Skene, 1960/61-1999/2000: peak counts (bars) and British index (line) (circles denote years with no known data)

Swans during the autumn; maximum numbers are generally recorded in November, with a second peak occurring during the spring (Fig. 31). Low counts in the late 1980s and early 1990s may have simply reflected the fact that the timing of peak counts during the autumn migration and WeBS counts rarely coincide. It is known that the numbers of Whooper Swans throughout Tiree have remained relatively stable over the last half century. The site also holds small numbers of over-summering birds and, given appropriate water levels, is a potential breeding site.

Site use

The Whooper Swan flock generally feeds and roosts on the loch itself, foraging on submerged macrophytic vegetation, with some occasional use of adjacent grass pasture, particularly when flooded (J. Bowler pers. comm.).

2.1.6.4 Other sites

A study of Whooper Swans in Lewis and Harris in the winter of 1979-80 identified five main centres of population, of which three were on the northwest coast of Lewis at Loch Stiapavat (NB5264), Loch Ordais (NB2848) and Loch a'Bhaile (NB2547); the other two were of the east coast on the Coll marshes (NB4638) near Stornoway and on Loch Cromore. The peak count in late October amounted to only 83 birds, and during the late winter to fewer than 45 (Buxton & Cunningham 1980).

At the Sound of Harris are the four main island groups of North Uist, Benbecula, South Uist and Barra. The east coastlines of these small archipelagos are rocky and rise steeply from the deep water of the Minch to moorland and peat bog. Sea lochs penetrate far inland and provide a system of salt and brackish feeding grounds for Whooper Swans. There is also a myriad of moorland lochs associated with the western machair, which support small flocks of Whooper Swans through the autumn and winter. In North Uist, the RSPB reserve at Balranald (NF7169), Loch na Magarlan (NF7270), Loch Eaval (NF7271), Loch Hosta (NF7272) and Loch Sandray (NF7368) each support flocks of around 30 birds at peak periods during the autumn (Hopkins & Coxon 1979), although large flocks can occur at some sites, such as 118 birds at Clachan-a-Luid in spring 1997. Similar flock sizes occur at the principal resorts in the South Uists: Loch Hallan (NF7322), Loch Aird an Sgairbh (NF7326) and Loch Bee, and on Benbecula: Loch Fada and Loch Mor (NF7752). However, sites on South Uist (e.g. Grogarry and Loch Ollay) can support flocks of up to 200 birds temporarily during the autumn. For this reason, the South Uist Machair and Lochs IBA has been

identified as an important area for the Whooper Swan in winter. Approximately 200-300 Whooper Swans spend the entire winter in this island group.

Tiree is the westernmost of the Inner Hebrides and supports around 100-300 birds during the winter, with smaller numbers present on nearby Coll (Hopkins & Coxon 1979). Away from Loch a'Phuill, flocks of around 20 birds are recorded regularly at Loch Bhasapoll (NL9747), Loch an Eilein and Loch Riaghain (NM0347) with smaller numbers present on many other small lochans and marshy areas. Site occupancy varies markedly between years and counts only rarely coincide with periods of peak passage. For example, in the autumn of 1997, Loch Bhasapoll hosted a flock of 263 Whooper Swans. Tiree sites also support large flocks (up to 100 birds) during the spring.

Up to 100 birds stage on Colonsay during the autumn. Freshwater and saltwater lochs on Islay, mainly on the Rinns, support up to 200 Whooper Swans for varying periods during the autumn migration, the numbers and their length of stay partly dependent upon the availability of stubbles. A minimum 400-500 different birds have been noted in one or two years passing through in October-November. Loch Gruinart (NR2971), Loch Gorm (NR2366) and Loch Indaal (NR3060) are the key Whooper Swan resorts on the island, the last-named often hosting the largest number of birds and usually holding them for longest, helped presumably by the *Zostera* beds on which the swans feed. Although the site does not currently qualify as being nationally important, the Whooper Swan is a qualifying species for the Rinns of Islay SPA and is listed as an important species within the Loch Gruinart IBA. By mid December, numbers are greatly reduced as birds move south. Fewer than 50 birds remain on Islay throughout the winter, usually spread between a number of different lochs. There is only a very small return passage in spring, with a few flocks of 20-40 birds in most years, none stopping for long.

2.1.6.5 Key references

Hopkins & Coxon (1979), Buxton & Cunningham (1980)

2.1.7 Tayside and Fife

2.1.7.1 Background

On the north side of the Firth of Forth, the region of Fife is comprised mainly of rolling arable land. From a waterbird perspective, the region is dominated by Loch Leven, which covers some 14 sq. km. This is the key site for the large flock of Whooper Swans that winters in the area.

2.1.7.2 Historical status

Apart from the decline in numbers of Whooper Swans recorded in the Loch Leven area over the last three decades, the winter population of Whooper Swans in Tayside and Fife as a whole appears to have remained relatively stable over the last century. Numbers increased at the Lomond Hills reservoirs, possibly explaining the decline in numbers at Loch Leven, but have declined recently. Numbers have also declined at Loch Ore (NT1695), a site that used to support around 70 birds in the 1970s, yet hosts fewer than 10 currently, and on the stretch of the River Devon between Alva and Menstrie where a flock of around 100 birds was regular in the 1970s but has since declined to a handful of birds. In Fife, Harvie-Brown (1906) regarded the Whooper Swan as a common winter visitor and said it was occasionally abundant in the late 1800s. Numbers were particularly high in the 1970s when a count of 310 was recorded at Leslie (NO2402) in November 1971.

2.1.7.3 Nationally important sites

i) Loch Leven

Five-year mean 95/96-99/2000: 114

Site conservation status

SPA (Loch Leven: selection stage 1.1)

Ramsar Site (Loch Leven: criterion 6)

NNR (Loch Leven)

SSSI (Loch Leven)

IBA (Loch Leven: criterion B3)

Site description and habitat

Loch Leven (NO1401) lies mid way between the Forth and Tay Estuaries and is the largest naturally eutrophic loch in Britain. It is relatively shallow and is surrounded by farmland, with a diverse aquatic flora and shoreline vegetation. The effects of eutrophication have seriously reduced the amount of submerged vegetation at the site over recent years.

Numbers and trends

Changes in the numbers of Whooper Swans at Loch Leven reflect corresponding changes in their food supplies. Numbers have fallen sharply since the early 1970s, when flocks of 300-400 birds were recorded regularly (Fig. 32). Eutrophication has reduced the amount of aquatic vegetation in the loch, and birds have switched to feeding on surrounding agricultural land. Since the introduction of measures to reduce the effects of eutrophication, Whooper Swan numbers have not recovered, suggesting other factors may have also been responsible for the reduction in the use of this site by this species. Numbers of Whooper Swans peak at Loch Leven during late winter (Fig. 33).

Site use

Whooper Swans generally use the north side of the loch to roost, flying to feeding grounds in the surrounding area during the daylight hours (P. Brooks pers. comm.). Flocks feed on arable land up to 2-3 km to the east of the loch. Some birds also roost on these fields overnight when they are flooded.

2.1.7.4 Other sites

Individuals from the Loch Leven flock probably contribute to the fluctuating, but generally declining, numbers of birds recorded at the Ballo, Harperlees and Holl reservoir complex (NO2205), less than 10 km to the east. In mid December, around 50-100 birds have been recorded at this complex.

Several freshwater bodies between the Forth and the Tay Estuaries also support, periodically, flocks comprising 10-50 Whooper Swans: Cameron Reservoir (NO4701), Lindores Loch (NO2616), Cleish Gravel Pits (NT0998), Loch Fitty (NT1291) and Carnbee Reservoir (NO5206). In recent years, Clatto Reservoir (NO3607) has supported a flock of over 50 birds. The area around Kingskettle (NO2907/NO2908) is a favoured feeding location for the birds that roost at Clatto Reservoir although some birds have remained at the reservoir in recent years, feeding on *Elodea canadensis* (A. Brown pers. comm.). Up to 50 birds have occurred at Rossie Bog (NO2711), with a peak of 103 in November 1998. Interchange of birds between Clatto Reservoir and Rossie Bog is probably high.

Figure 30. Whooper Swans at Loch a'Phuill, 1960/61-1999/2000: peak counts (bars) and British index (line) (circles denote years with no known data)

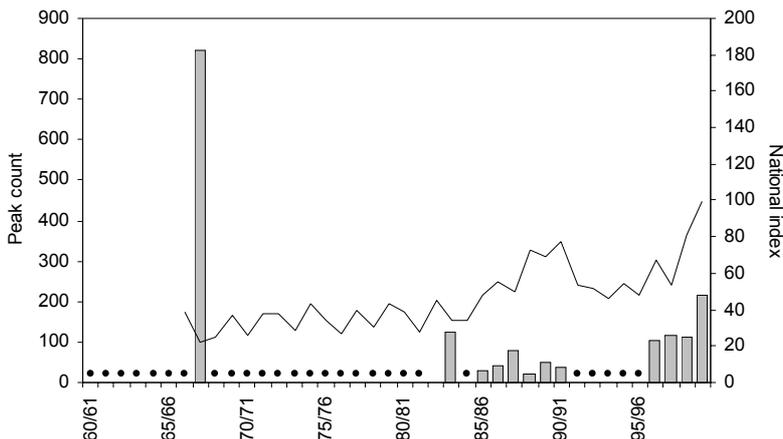


Figure 31. Whooper Swans at Loch a'Phuill, 1995/96-1999/2000: mean peak counts by month (error bars denote minimum and maximum peak counts during the period)

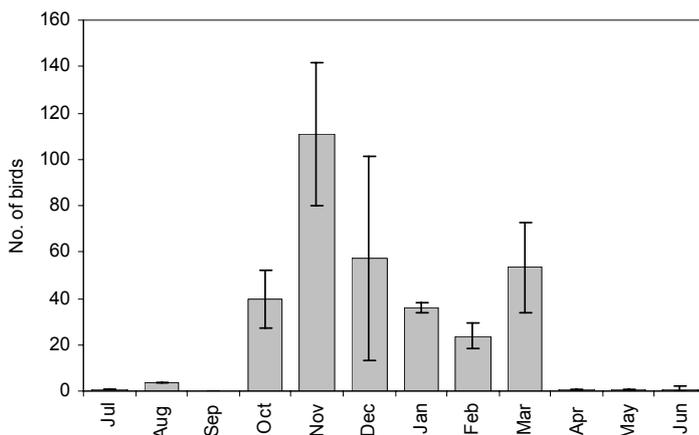


Figure 32. Whooper Swans at Loch Leven, 1960/61-1999/2000: peak counts (bars) and British index (line) (circles denote years with no known data)

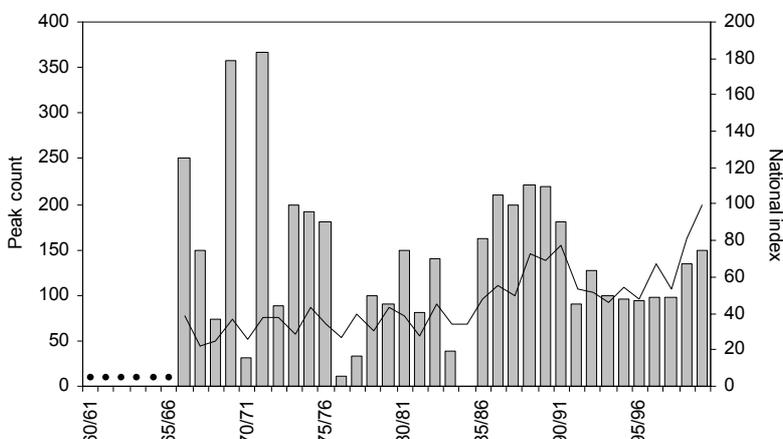
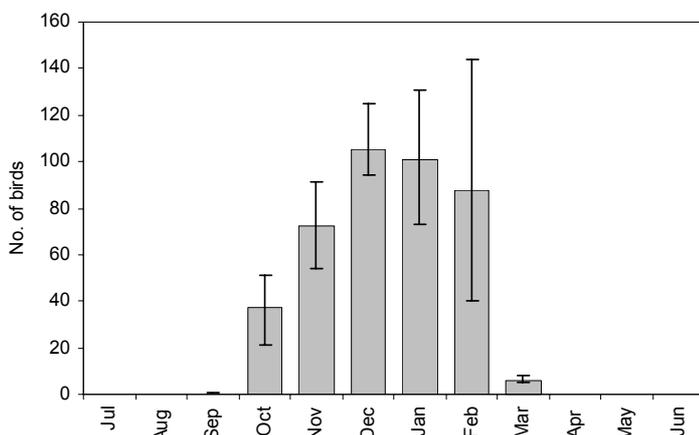


Figure 33. Whooper Swans at Loch Leven, 1995/96-1999/2000: mean peak counts by month (error bars denote minimum and maximum peak counts during the period)



The inner parts of the Forth Estuary support a small number of Whooper Swans in the winter, being numerically more important in the 1960s and 1970s than today (Fig. 34). The River Teith from Stirling to Dounne (NS7697) also supports a flock of around 30 Whooper Swans annually. A flock of up to 40 birds is also found in the vicinity of the Eden Estuary, feeding on stubble and oil seed rape fields by the River Eden up river from Guardbridge (NO4317/NO4417).

A small and mobile Whooper Swan flock (up to 50 birds) winters around the stretches of the River Tay between Shochiemouth and Almondmouth (NO1125) and at Haughs of Kercock. Foraging birds have also been recorded on agricultural land around Monk Myre (N02042).

2.1.7.5 Key references

Brazil (1981), Smout (1986)

2.1.8 Angus

2.1.8.1 Background

In the Sidlaw Hills, southwest of Coupar Angus, are a group of lochs, mostly lying above the 200 m contour, which support a small wintering flock of Whooper Swans. Of these, the Loch of Lintrathen currently attracts the largest concentration of Whooper Swans in the region.

2.1.8.2 Historical status

Numbers of Whooper Swans wintering at Loch of Lintrathen have increased markedly since the mid 1940s, when 30 birds was considered a large flock (Boase 1955). In contrast, the nearby Loch of Kinnordy (NO3654) was once more attractive to Whooper Swans than it is today (Fig. 35), although birds probably move between these two sites within and between years. Backwater Reservoir (NO2559) was first flooded in 1969 and since then has supported a flock of around 20 birds. In contrast, the Loch of Forfar (NO4450), which used to support around 50 birds during the 1960s, has not been used by Whooper Swans in recent decades.

2.1.8.3 Nationally important sites

a) Loch of Lintrathen

Five-year mean 95/96-99/2000: 71

Site conservation status

SPA (Loch of Lintrathen: non-qualifying species)
Ramsar Site (Loch of Lintrathen: non-qualifying species)
SSSI (Loch of Lintrathen)
IBA (Loch of Lintrathen: non-listed species)

Site description and habitat

Loch of Lintrathen (NO2754) is a mid-altitude, oligotrophic-mesotrophic loch, occupying a glacial basin, and now used as a water supply reservoir. The reservoir is c. 120 ha and is screened by conifer plantations. It contains no emergent vegetation.

Site use

A large flock of Whooper Swans roosts at the north end of the loch and feeds on vegetation exposed when water levels are low (R. Goater pers. comm.). They have also been recorded feeding on surrounding agricultural land.

Numbers and trends

Although the numbers of Whooper Swans fluctuate markedly between years at this site, winter maxima of around 70 birds have been recorded in recent years (Fig. 36). Peak counts are generally recorded in November and a smaller flock remains throughout the winter (Fig. 37). Only once have more than 100 birds been recorded at this site.

2.1.8.4 Other sites

The Loch of Kinnordy currently supports far fewer Whooper Swans (<20 birds) than in previous decades (Fig. 35). Of the other freshwater bodies in the region, only Backwater Reservoir regularly holds a flock of more than 20 birds.

Away from inland areas, the Montrose Basin (NO6958), the almost totally enclosed estuary of the River South Esk, attracts a small number of Whooper Swans during the winter. A high count of 501 birds was made at this site in February 1991. The Montrose Basin IBA has been identified as important for Whooper Swans during the winter.

2.1.9 Lothian

2.1.9.1 Background

The Scottish coast northwestwards from St Abb's Head has very few suitable areas for waterbirds, until one reaches the estuary of the River Tyne, between North Berwick and Dunbar. Nationally important

Figure 34. Whooper Swans at the Inner Forth Estuary, 1960/61-1999/2000: peak counts (bars) and British index (line) (circles denote years with no known data)

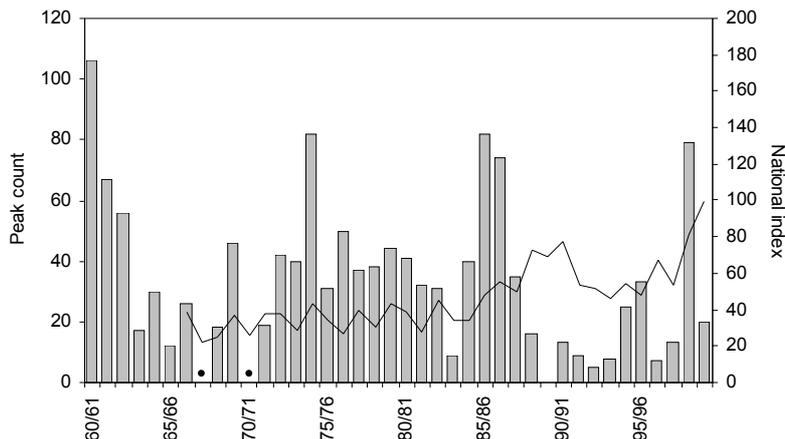


Figure 35. Whooper Swans at the Loch of Kinnordy, 1960/61-1999/2000: peak counts (bars) and British index (line) (circles denote years with no known data)

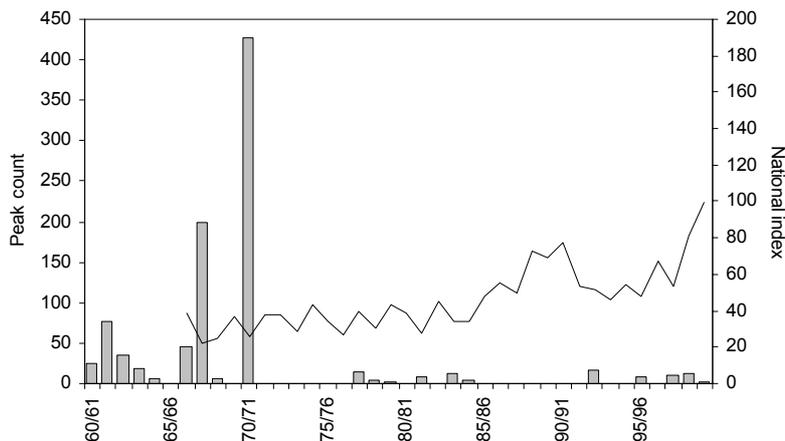


Figure 36. Whooper Swans at the Loch of Lintrathen, 1960/61-1999/2000: peak counts (bars) and British index (line) (circles denote years with no known data)

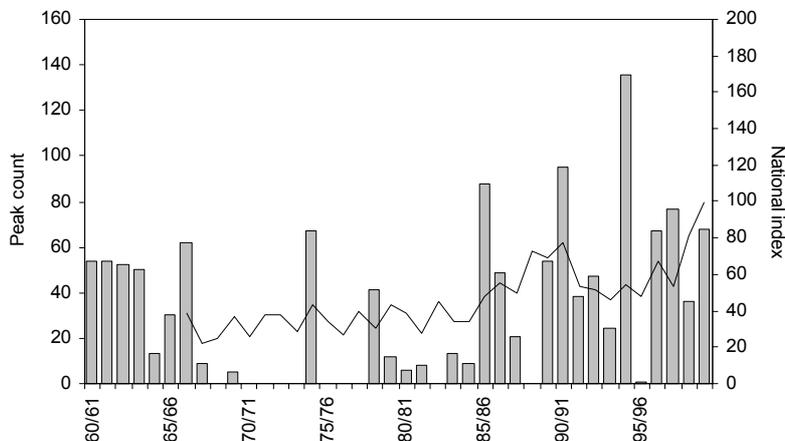
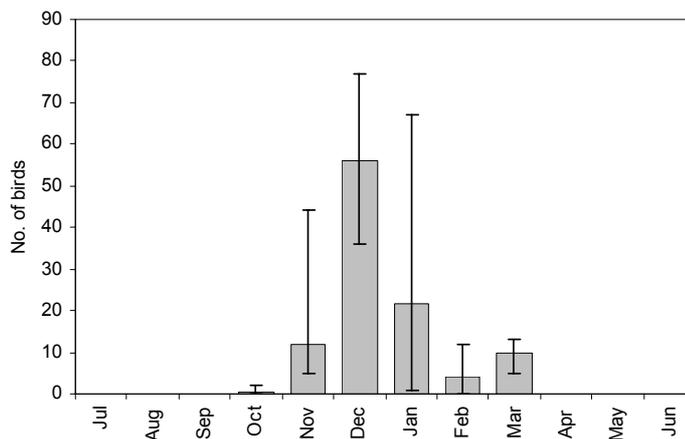


Figure 37. Whooper Swans at the Loch of Lintrathen, 1995/96-1999/2000: mean peak counts by month (error bars denote minimum and maximum peak counts during the period)



numbers of Whooper Swans occur around the Tynninghame Estuary in the vicinity of North Berwick. Numerous lochs around the Forth Estuary also support small flocks of Whooper Swans.

2.1.9.2 Historical status

The East Lothian flock has increased in number since the early 1990s, over the same period that numbers in the inner Forth Estuary have declined. Trends for the whole of the region are more difficult to identify given the dispersed and transient nature of flocks and high levels of interchange with the large East Lothian flock.

2.1.9.3 Nationally important sites

i) Tynninghame Estuary

Five-year mean 95/96-99/2000: 68

Site conservation status

SPA (Firth of Forth: non-qualifying species)
Ramsar Site (Firth of Forth: non-qualifying species)
SSSI (Various)
IBA (Firth of Forth: non-listed species)

Site description and habitat

The Tynninghame Estuary (NT6379) and Aberlady Bay (NT4581) comprise extensive areas of sand and mud exposed at low water, situated in the outer Firth of Forth.

Numbers and trends

Numbers of Whooper Swans recorded in East Lothian have increased markedly through the 1990s, from a flock of around 20 birds in the early 1990s to current peaks of around 70 birds (Fig. 38). The reservoirs at Lochhouses and East Fenton usually support around 50 birds each at peak periods. Numbers of Whooper Swans build up through the winter, peaking in March (Fig. 39) when numbers are likely to be augmented by birds on migration northwards.

Site use

Whooper Swans roost at Aberlady Bay and occasionally at the reservoirs at Lochhouses (NT6181) and East Fenton (NT5281). However, the principal roost is at Tynninghame. A farmer at East Fenton provides supplemental food for wildfowl, attracting Whooper Swans to this site. Whooper Swans sometimes roost at nearby Scoughall Reservoir (NT6183), a deep sheltered reservoir, when there are suitable feeding conditions in the area, such as in the vicinity of Gleghornie (NT5980).

When the Whooper Swans first arrive, they make use of both Tynninghame and Aberlady Bay, with a preference for Tynninghame. Initially they stay in the vicinity of Tynninghame, feeding in the estuary, probably on *Zostera*, and in stubble fields in the nearby Kirklandhill area (NT6178, NT6278) in the late autumn. Other areas between Aberlady and Lochhouses are used according to food availability. Stubble fields are ploughed early, and the Whooper Swans then switch to flooded potato fields away from Tynninghame. Generally, wheat is sown in the potato fields after they have been harvested. However, the Whooper Swans continue to use these fields, feeding on the remains of potatoes, but surprisingly not taking the wheat. In January and thereafter, the flock tends to feed on oil seed rape and turf grown around Lochhouses.

2.1.9.4 Other sites

Around the Forth Estuary the most important sites for Whooper Swans are Bangour Reservoir (NT0171) and associated feeding areas in the Bathgate Hills, Cobbinshaw Reservoir (NT0158), Morton Reservoir (NT0763), Threipmuir Reservoir and Harlaw Reservoir (NT17640), each supporting around 10-30 birds at peak times.

2.1.9.5 Key references

Andrews (1986), Murray (1986)

2.1.10 The Clyde Basin

2.1.10.1 Background

Throughout the Clyde region there is a wide diversity of landscape and habitat. In the south, large areas of fertile farmland extend over much of Ayr and Lanark. The central part of the region is dominated by Glasgow and its industrial satellites. The north is mountainous, with sea lochs penetrating well inland. The Clyde itself is 50 km wide at its mouth, between the Mull of Kintyre and the Ayrshire coast. The region supports several flocks of Whooper Swans.

2.1.10.2 Historical status

Over recent decades, there have been many changes in the numbers of Whooper Swans recorded at sites in the Clyde Basin. A flock at Lochwinnoch (NS3558) was well established in the early 1960s (Boyd & Eltringham 1962). Since the late 1970s, the flock at Black Cart Water has grown from around 50 to 180 birds, with higher numbers in some years.

Over the same period, the flock at Lochwinnoch fell from around 200 to fewer than 20 birds, suggesting a redistribution of birds from this site to Black Cart and other sites on the Clyde. Flocks of 60-70 birds at Gadloch (ND6471) and Hamilton Low Parks & Strathclyde Park (NS7257) recorded during the 1970s have also declined, now comprising fewer than 20 birds annually. However, total numbers of Whooper Swans in the Clyde region have remained relatively stable through this period of redistribution.

2.1.10.3 Internationally important sites

i) River Clyde, The Meetings

Five-year mean 95/96-99/2000: 193

Site conservation status
None

Site description and habitat

The Meetings (NS9744) lies in the floodplain of the River Clyde and the River Medwin. It includes a large area of arable land which is planted primarily with spring-sown cereals.

Numbers and trends

The only counts of Whooper Swans at this site are 157 in 1997/98, 125 in 1998/99 and 393 in 1999/2000. It remains unknown whether birds were present in other years given the poor level of coverage.

Site use

In the late autumn, the Whooper Swan flock feeds on spilt grain on the large expanses of stubble. Once the grain is exhausted, the flock disperses and birds begin to feed on submerged vegetation in the rivers and on the adjacent pasture.

It is thought that the flock probably roosts on the River Clyde and on flooded pools in the area. Given the paucity of information available, more systematic monitoring of this site is required.

ii) Black Cart

Five-year mean 95/96-99/2000: 184

Site conservation status

SPA (Black Cart: selection stage 1.1)
SSSI (Black Cart)
IBA (Inchinnan, Renfrew: criteria B1i, B3, C2, C6)

Site description and habitat

Black Cart (NS4767) is located in Renfrewshire. The stretches of Black Cart Water and its associated floodplain are located directly north of Glasgow

Airport. This stretch of Black Cart Water supports abundant submerged aquatic vegetation, typical of brackish conditions. The floodplain consists mostly of semi-intensified pasture, but also includes small creeks, small stands of reed and areas of *Juncus* dominated grassland. Most of the land is used for low-intensity cattle and sheep grazing. Much of the damp pasture along the southern bank of the river is liable to flooding in the winter, and livestock are removed during this time.

Numbers and trends

Since the late 1970s, the Whooper Swan flock at Black Cart has grown in size from a peak of around 50 to 250 birds in the late 1990s (Fig. 40). The site supports the largest numbers of Whooper Swans during November, although a flock of 90-130 birds remains throughout the winter (Fig. 41; Rees & White 2001). A second, slightly lower, peak has been recorded in the spring (Rees *et al.* 1998, 1999, 2000), but is not highlighted by WeBS data.

Site use

Whooper Swans roost on Black Cart Water, the Clyde Estuary, and small waterbodies nearby, especially Linwood Pond and Candren Pool, at night. The once regularly used roost site at Stanely Reservoir seems to have been abandoned: no birds were recorded there in the late 1990s.

The flock feeds on agricultural land, both arable and rough grazing, east and west of the M8 motorway between Linwood and the confluence of the Black and White Cart Waters east of Glasgow Airport. Flocks forage primarily on spilt grain and shooting plants in barley stubbles during autumn, grass ley and winter cereals in mid winter, moving on to improved grassland in the spring (Waltho *et al.* 1995, 1996, Rees *et al.* 1998, 1999, 2000). The birds also feed on *Potamogeton* and other macrophytes within Black Cart Water when available, particularly in the autumn and mid winter. Potatoes dumped on the river banks by farmers are also taken.

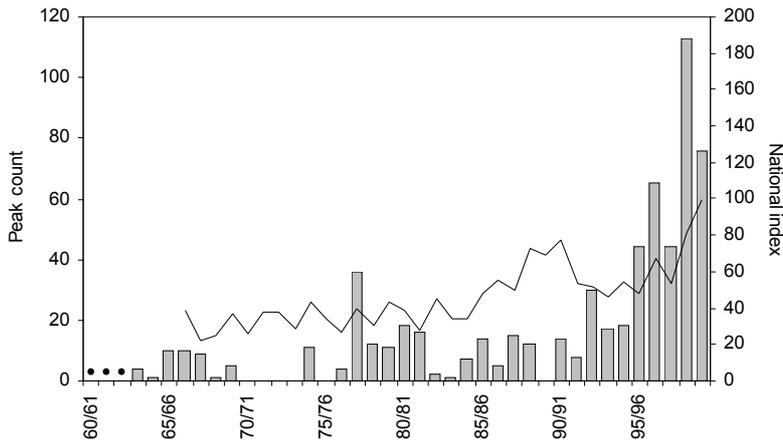


Figure 38. Whooper Swans in East Lothian, 1960/61-1999/2000: peak counts (bars) and British index (line) (circles denote years with no known data)

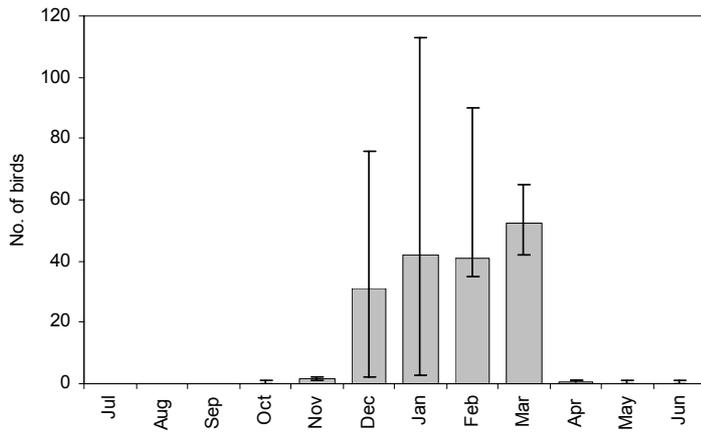


Figure 39. Whooper Swans in East Lothian, 1995/96-1999/2000: mean peak counts by month (error bars denote minimum and maximum peak counts during the period)

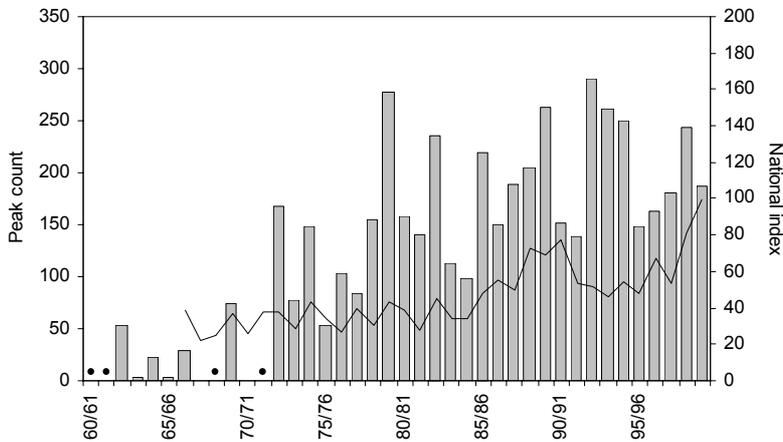


Figure 40. Whooper Swans at Black Cart, 1960/61-1999/2000: peak counts (bars) and British index (line) (circles denote years with no known data)

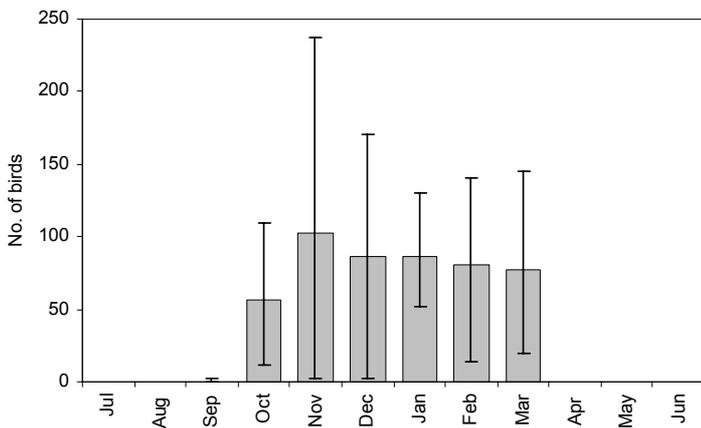


Figure 41. Whooper Swans at Black Cart, 1995/96-1999/2000: mean peak counts by month (error bars denote minimum and maximum peak counts during the period)

2.1.10.4 Nationally important sites

i) Merryton/Carbarns area

Five-year mean 95/96-99/2000: 68

Site conservation status

None

Site description and habitat

A large flock of Whooper Swans winters on the flooded pastures adjacent to the River Clyde upstream of Motherwell and roosts on pools in the Merryton/Carbarns area (NS7654).

Numbers and trends

The flock of Whooper Swans at Merryton/Carbarns has grown from around 40 birds in the mid 1970s to around 70 in the late 1990s (Fig. 42). Numbers often peak in December, and remain relatively stable through until March (Fig. 43).

Site use

On arrival, Whooper Swans feed on submerged vegetation in the river and in the flooded areas of Carbarns and Merryton. They are occasionally recorded at Baron's Haugh (NS7555), but this movement appears to be a consequence of disturbance on the favoured areas at Carbarns/Merryton. As the winter progresses, and especially in March, the flock feeds on the agriculturally intensified grasslands adjacent to the river.

At night, the Whooper Swan flock roosts at the pools at Carbarns and Merryton and on the River Clyde.

2.1.10.5 Other sites

Away from the internationally and nationally important sites, Whooper Swans are plentiful in many other parts of the Clyde region. There are several freshwater bodies lying in the low rolling hills of south Ayrshire which support small flocks. Bogton Loch (NS4605) and Belston Loch (NS4716), for instance, regularly host around 30 Whooper Swans through the winter. Upstream, the lochs of Martnaham (NS3917), Fergus (NS3918) and Kerse (NS4214), can hold up to 50 birds between them. About 15 km to the east is another collection of waters, lying in the shallow valley between Cumnock and New Cumnock. Of these, Black Loch (NS5916) and Loch o' the Lowes (NS6014) support regularly a flock of around 20 birds between them.

In the north of Ayrshire, large numbers of Whooper Swans concentrate regularly at traditional sites. A flock of around 40 birds occurs regularly at sites between Irvine Bay in the south and Fairlie to the north (NS3038).

Gadloch, Castle Sempole & Barr Lochs (Lochwinnoch), and sites on the Inner Firth of Clyde (NS3080) now host only small Whooper Swan flocks, rarely comprising more than 20 birds, although numbers at Lochwinnoch do rise to c. 40 birds during cold weather spells. Further west along the Clyde, Hamilton Low Parks & Strathclyde Park support a small flock comprising fewer than 10 birds, which are probably linked to the Merryton flock.

To the north of the region, Loch Lomond (NS4090) supports a small flock of Whooper Swans, rarely comprising more than 30 birds.

2.1.10.6 Key references

Waltho *et al.* (1995, 1996), Rees & White (1998, 2001), Rees *et al.* (1998, 1999, 2000)

2.1.11 Cumbria and Dumfries & Galloway

2.1.11.1 Background

The Solway Basin, lying partly in England and partly in Scotland, comprises great expanses of foreshore and merse. Although the firth is the primary centre of interest, the numerous inland waters and marshes are used extensively by a large number of Whooper Swans.

2.1.11.2 Historical status

The substantial increase in the number of Whooper Swans using the Inner Solway Firth, and to some extent at Wigtown Bay, from the early 1970s to mid 1980s improved the status of this region for Whooper Swans considerably, with numbers stabilising in more recent years. Small declines recorded at the western lochs and Islesteps have been more than compensated for by the increases elsewhere.

2.1.11.3 Internationally important sites

i) Inner Solway Firth

Five-year mean 95/96-99/2000: Caerlaverock 200;
River Nith (Keltonbank-Nunholm) 109

Site conservation status

SPA (Upper Solway Flats & Marshes: selection stage 1.1)
Ramsar Site (Upper Solway Flats & Marshes: criterion 6)
NNR (Caerlaverock)
SSSI (Upper Solway Flats & Marshes)
IBA (Upper Solway Flats & Marshes: criterion B3)

Site description and habitat

The Solway Estuary (NY0566) lies on the west coast, on the border between England and Scotland. The flats and marshes of the Inner Solway Firth form one of the largest continuous areas of intertidal habitat in Britain. The geomorphology and vegetation of the estuarine saltmarshes or merses are of international importance, with broad transitions to mature 'upper-marsh' being particularly well represented.

Numbers and trends

Prior to 1971, when the first pool at Eastpark Farm, Caerlaverock was excavated, there was a single large flock of Whooper Swans at Islesteps (NX9772) (Fig. 44). In subsequent years, the Whooper Swan flock at Caerlaverock increased to around 200 birds at peak periods, and stabilised at this level in the 1990s (Fig. 45). The flock at Islesteps still remains and interchange between these two groups is limited. Whooper Swans begin to arrive on the Solway at the end of September, increasing in number through October and November and, although the birds disperse locally in mid winter, similar numbers are retained in the area from late November to March. The apparent March peak, illustrated by WeBS data (Fig. 46), therefore probably reflects local distribution, although re-sightings of ringed birds suggest that March counts are augmented by birds heading north from wintering grounds in southern Britain and Ireland.

Site use

Whooper Swans traditionally roost at artificial pools at WWT Caerlaverock (especially at Folly Pond), Newmains Pond and on the River Lochar.

Grain is distributed regularly along the edges of the artificial pools at WWT Caerlaverock in winter, and this attracts Whooper Swans to feed and to roost. Birds also forage on agricultural land surrounding the reserve, feeding on stubble fields (particularly in

the autumn), re-seeded grasses (particularly in spring), and waste potatoes, turnips and oil seed rape (Black & Rees 1984). Occasionally, Whooper Swans feed on aquatic plants in the River Lochar.

Flocks also travel up the Nith valley to arable feeding grounds between Nunholm and Keltonbank (NX9775). The latter site supports up to 150 birds during the winter.

Whooper Swans foraging on grass in the Solway take predominantly *Lolium*, *Phleum* and *Alopecurus* (Black & Rees 1984). On the merse, the diet is composed almost entirely of *Trifolium repens* stolons and merse grasses, e.g. *Festuca*.

2.1.11.4 Nationally important sites

i) Wigtown Bay area

Five-year mean 95/96-99/2000: 88

Site conservation status

SSSI (Cree Estuary)
IBA (Wigtown Bay: non-listed species)

Site description and habitat

Wigtown Bay (NX4456) is a large, southeast facing estuary at the extreme west end of the Solway Firth, draining the Rivers Cree and Bladnoch. Extensive areas of intertidal mudflats and adjacent grazed saltmarsh predominate.

Numbers and trends

Up until the early 1980s, Wigtown Bay rarely hosted more than 50 Whooper Swans during the winter (Fig. 47). However, large increases in the use of this site during the early 1980s led to numbers surpassing 200 in the mid 1980s. The flock size has since fallen to around 100 birds. However, not all birds in the Wigtown Bay complex are counted by WeBS annually (P. Collin pers. comm.). Like the Inner Solway flock, Whooper Swan numbers at Wigtown Bay increase through the winter months, peaking in March (Fig. 48).

Site use

Although the flock can be dispersed, the majority of Whooper Swans roost at Glenamour Loch and a newly created flooded area at Wigtown Harbour. Additional smaller flocks also roost on flooded fields at Whauphill, at the Wood of Cree RSPB nature reserve and at several small lochs in the area (P. Collin pers. comm.).

Figure 42. Whooper Swans in the Merryton/Carbarns area, 1960/61-1999/2000: peak counts (bars) and British index (line) (circles denote years with no known data)

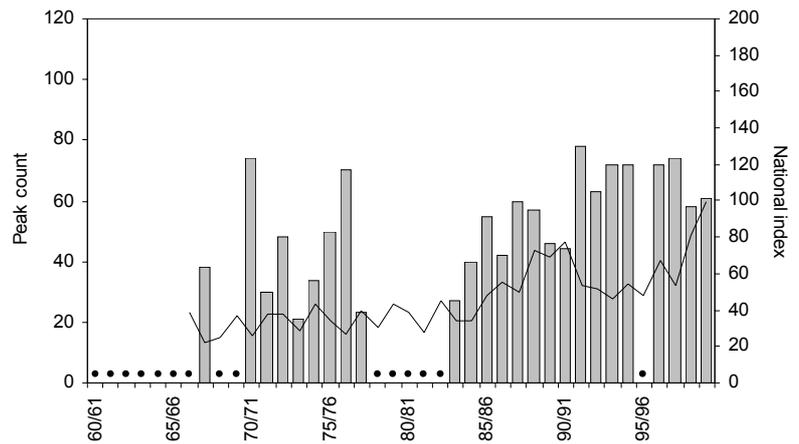


Figure 43. Whooper Swans in the Merryton/Carbarns area, 1995/96-1999/2000: mean peak counts by month (error bars denote minimum and maximum peak counts during the period)

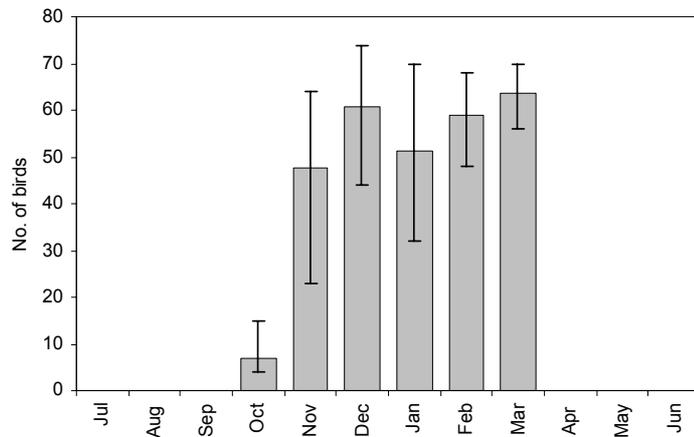
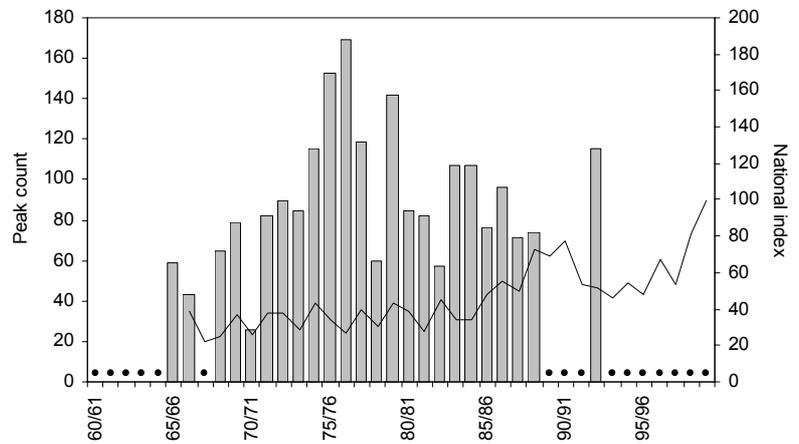


Figure 44. Whooper Swans at Islesteps, 1960/61-1999/2000: peak counts (bars) and British index (line) (circles denote years with no known data)



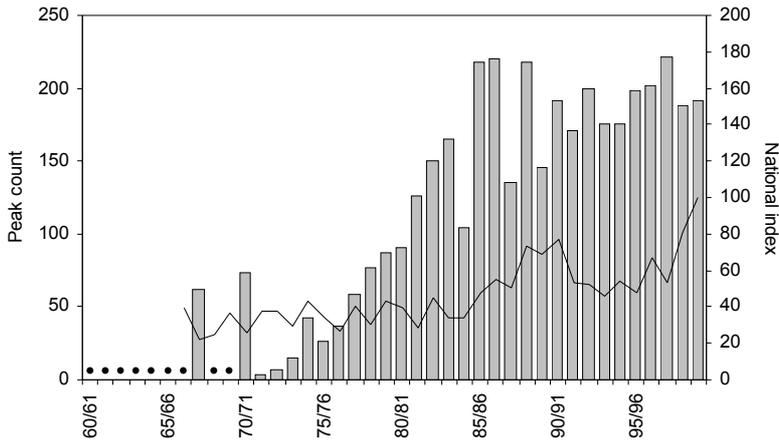


Figure 45. Whooper Swans at Caerlaverock, 1960/61-1999/2000: peak counts (bars) and British index (line) (circles denote years with no known data)

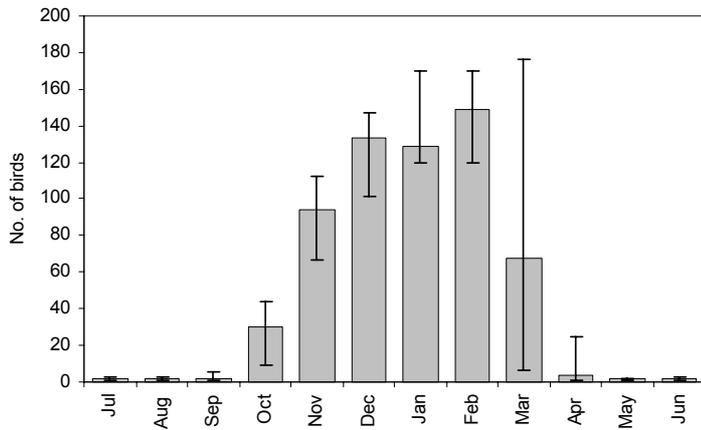


Figure 46. Whooper Swans at Caerlaverock, 1995/96-1999/2000: mean peak counts by month (error bars denote minimum and maximum peak counts during the period)

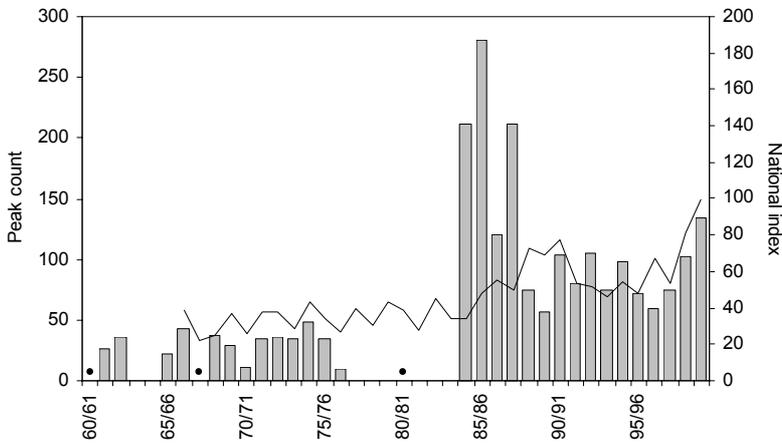


Figure 47. Whooper Swans in the Wigtown Bay area, 1960/61-1999/2000: peak counts (bars) and British index (line) (circles denote years with no known data)

The Whooper Swans at Wigtown Bay feed predominantly on arable land up to 8-9 km to the north of the key roost sites (P. Collin pers. comm.). Most birds feed on improved grass ley and occasionally on winter barley. Birds also feed on submerged macrophytes in nearby rivers.

ii) Threave area

Five-year mean 95/96-99/2000: 68

Site conservation status

SPA (Loch Ken & River Dee Marshes: non-qualifying species)

Ramsar Site (Loch Ken & River Dee Marshes: non-qualifying species)

SSSI (Various)

IBA (Loch Ken and Dee marshes: non-listed species)

Site description and habitat

The Threave Estate (NX7462) is an area of grazed pasture in the vicinity of Castle Douglas and lies in the Loch Ken & River Dee Marshes SPA. It is located on the River Dee, in an area of rich agricultural lowland.

Numbers and trends

This site has only been monitored regularly since the mid 1980s, but over this period it has supported a flock of around 70 Whooper Swans (Fig. 49). Peak numbers are recorded in March (Fig. 50).

Site use

Whooper Swans roost on the River Dee, flying to feeding grounds in surrounding agricultural areas during the day. The flock feeds predominantly on grasses grown for silage in arable land adjacent to the River Dee.

Further west, Loch Ken (NX6870) supports a flock rarely comprising more than 20 birds. Flocks of around 30 birds also frequent nearby Milton Loch (NX8471) and Auchenreoch Loch (NX8171). Yet further west, Loch Connell (NX0168) supports 90+ birds, and is particularly important during September/October (P. Collin pers. comm.).

2.1.11.5 Other sites

Whooper Swans occur with some regularity on several of the lakes and tarns of northern Cumbria, especially Bassenthwaite (NY2128), Derwent Water (NY2520) and Tindale Tarn (NY6058), but only rarely in flocks of more than 20 birds. These flocks are highly nomadic within the area through the winter. Around 50 birds use the Eden valley around Culgaith between November and March. They have several favourite feeding areas, spread over 15 km of the valley floor, the most important of which are located at Langwathby, Watersmeet and Kirby Thore. A separate flock of around 200 birds uses the Eden valley between Carlisle and Rockliffe. These birds feed primarily in the low-lying land between Warwick Bridge and the M6 motorway, especially near Aglionby, Crosby and Linstock. Peak counts are generally recorded during January and February. A flock of around 20 birds also occurs at Siddick Pond (NY0030), near Maryport. These birds have been known to spend the summer at this site and are presumably feral.

In the vicinity of the flock at Caerlaverock, around 40 birds also forage in the Annan valley around Smallholm (NY1077) and Hightae Loch (NY0880) and a further 30 birds are recorded regularly at Oakbank Farm Gravel Pits (NY3770) to the east.

2.1.11.6 Key references

Black & Rees (1984), Rees & Bowler (1996)

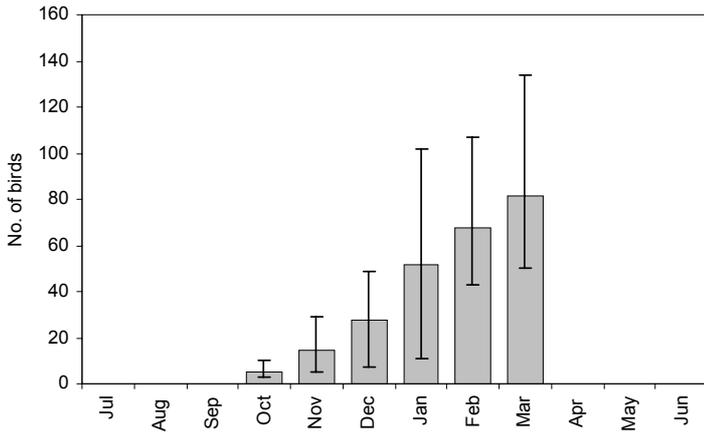


Figure 48. Whooper Swans in the Wigtown Bay area, 1995/96-1999/2000: mean peak counts by month (error bars denote minimum and maximum peak counts during the period)

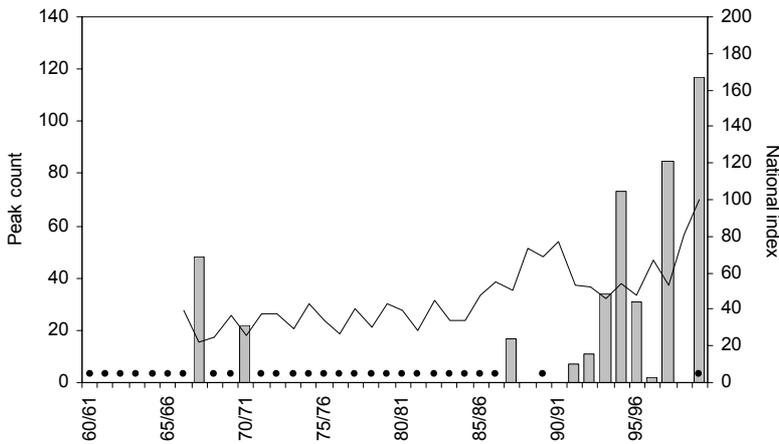


Figure 49. Whooper Swans in the Threave area, 1960/61-1999/2000: peak counts (bars) and British index (line) (circles denote years with no known data)

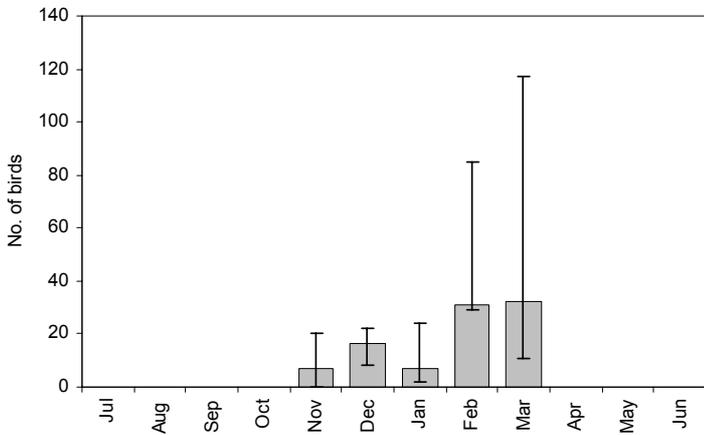


Figure 50. Whooper Swans in the Threave area, 1995/96-1999/2000: mean peak counts by month (error bars denote minimum and maximum peak counts during the period)

2.1.12 The Borders and Northeast England

2.1.12.1 Background

The River Tweed runs inland between the Lammermuir Hills and the Cheviots. Until it is joined by the River Teviot at Kelso, the river is flanked by low-lying agricultural land which is attractive to several large flocks of Whooper Swans. Numerous inland freshwater bodies also support small flocks of Whooper Swans during the winter months.

The eastern border regions of England and Scotland present sharp contrasts. The narrow bands of lowland in the south of the area are heavily industrialised and much of the natural habitat has been lost. However, the coal mining industry has left behind it a legacy of subsidence that has led to the creation of new wetland sites. Further to the west there are resorts along the foothills of the Pennine chain, and beyond a zone of remote moorland, with numerous reservoirs and lochs.

2.1.12.2 Historical status

Stricter protection from wildfowling at Lindisfarne (NU1041) in the mid 1960s led to a substantial increase in the numbers of most waterbirds at this site. However, the large numbers of Whooper Swans that used to occur there in the 1960s (635 in 1962/63) have declined markedly over recent decades (Fig. 51). The reason for this change is unclear, but is most likely due to the increasing cultivation of cereals in the Tweed Valley; this area has become increasingly attractive to Whooper Swans as numbers at Lindisfarne have diminished. Currently, fewer than 100 birds are recorded at Lindisfarne annually, although the Whooper Swan is listed as a qualifying feature for the Lindisfarne SPA and IBA. Numbers at most other sites have remained consistent between years, with no net decline in total numbers in the region over the review period.

2.1.12.3 Nationally important sites

i) River Tweed

Five-year mean 95/96-99/2000: Kelso-Coldstream 86; Rutherford 71; Baron's Folly: 57

Site conservation status

SSSI (River Tweed (various))

Site description and habitat

The Tweed runs inland between the Cheviot and Lammermuir Hills and is surrounded by agricultural land on both sides before it joins the Teviot at Kelso.

Numbers and trends

The stretch of the River Tweed between Kelso and Coldstream has supported a flock of around 100 Whooper Swans regularly since the early 1980s (Fig. 52). There are few data to support speculation on changes prior to this time, although there is some evidence that numbers have increased at this site since the 1960s (A. Bramhall pers. comm.). Numbers at Rutherford, further upstream, fluctuate markedly between years (Fig. 53). Baron's Folly has only been monitored regularly since the mid 1990s, and supports around 60 birds.

Around 150-200 birds currently occur within the Tweed floodplain. Numbers increase from September onwards, peaking in the Rutherford areas during November and December (Fig. 54). Numbers of birds at that site fall at the same time as those in the Kelso to Coldstream area increase, peaking in December and remaining high through until March (Fig. 55). It is most likely that the birds from the Rutherford flock move to the area between Kelso and Coldstream during the winter, and there is some evidence from re-sightings of colour-marked birds to support this.

Site use

Three distinct Whooper Swan flocks occur on the Tweed. The first is located at Wark, on the stretch of the river between Kelso and Coldstream (NT7938), which roosts on Hirsell Lake and the River Tweed. The second occurs at Rutherford (NT6431), roosting at Bemersyde Loch. The Lower Teviot also supports a flock that roosts at Baron's Folly (NT6725) and Ploughlands Pond above Nisbet. A fourth, little known group, comprising around 20-30 birds, is often recorded on land between Norham and Duns.

In general, Whooper Swans wintering along the Tweed feed on arable land, preferring oil seed rape to traditional stubble and waste potatoes in recent years.

1. *Kelso-Coldstream*: The Wark flock feeds on stubbles and autumn-sown cereals adjacent to the lower Tweed. A flock of 30-40 birds has also been recorded feeding on waste potatoes dumped on the river bank at Redden Haugh, close to the Wark area.

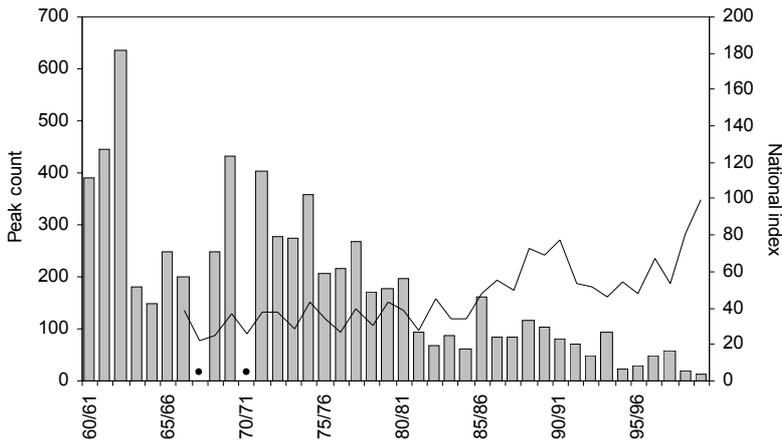


Figure 51. Whooper Swans at Lindisfarne, 1960/61-1999/2000: peak counts (bars) and British index (line) (circles denote years with no known data)

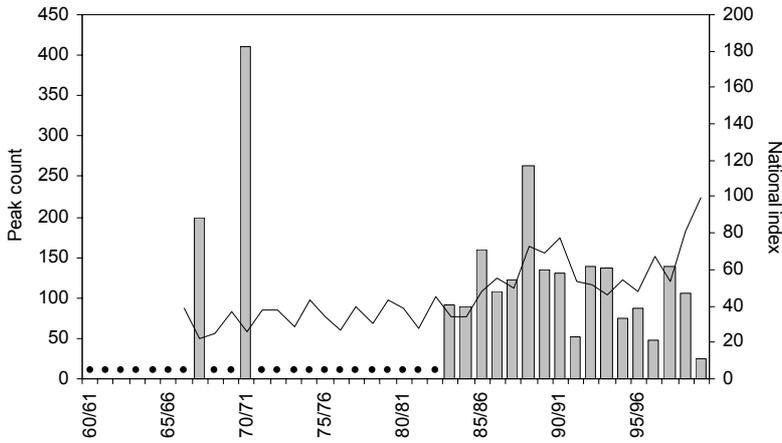


Figure 52. Whooper Swans in the Tweed valley, between Kelso and Coldstream, 1960/61-1999/2000: peak counts (bars) and British index (line) (circles denote years with no known data)

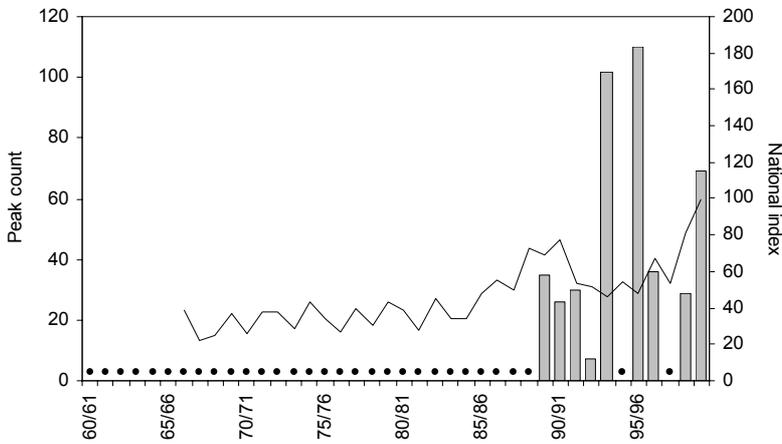


Figure 53. Whooper Swans in the Tweed valley at Rutherford, 1960/61-1999/2000: peak counts (bars) and British index (line) (circles denote years with no known data)

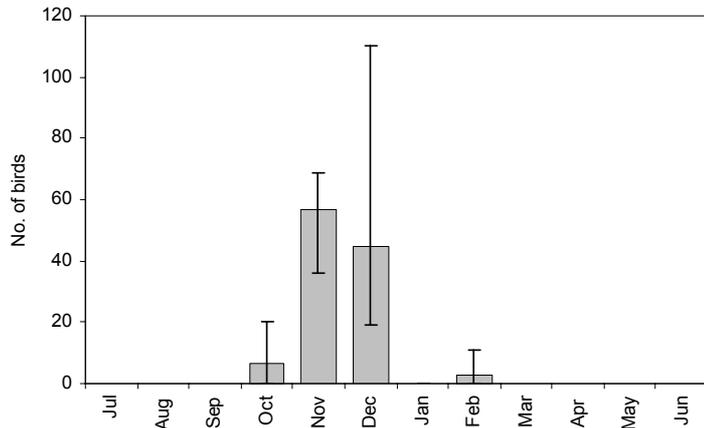


Figure 54. Whooper Swans in the Tweed valley at Rutherford, 1995/96-1999/2000: mean peak counts by month (error bars denote minimum and maximum peak counts during the period)

2. *Rutherford*: The Whooper Swans at Rutherford feed on similar crops to the Wark birds, on the north and south sides of the river.

3. *Lower Teviot*: The Teviot flock flies east from the roost sites to feed on stubbles, oil seed rape and cereals on the upper Haughs, especially Peniel Haugh.

4. *Norham*: The small flock located in the Norham area has been recorded feeding on waste potatoes in heavily flooded land. In the spring, Whooper Swans also use Selkirk Common where they feed on upland pastures.

ii) Druridge Bay area

Five-year mean 95/96-99/2000: 60

Site conservation status

SPA (Northumbria Coast: non-qualifying species)

Ramsar Site (Northumbria Coast: non-qualifying species)

SSSI (Various)

IBA (Northumberland Coast: criterion C6)

Site description and habitat

The Whooper Swan flock that occurs in the Druridge Bay area currently roosts and feeds in an area of lowland agricultural land (NZ2793) interspersed with flooded mining subsidences.

Numbers and trends

Prior to the mid 1970s, the Druridge Bay area supported fewer than 50 Whooper Swans at peak times (Fig. 56). Since then numbers have fluctuated, yet flocks of around 100 birds are not unusual. Data for the most recent five-year period are sparse. However, they indicate that numbers peak in January (Fig. 57).

Site use

The flock roosts on permanently flooded mining subsidences at Warkworth Lane, with smaller numbers congregating at Linton and Cresswell Ponds and East Chevington Burn.

In most years the Whooper Swans that roost at Warkworth Lane feed in surrounding arable land (J. Martin pers. comm.). Oil seed rape and winter wheat fields are favoured. There are plans to provide supplemental grain at East Chevington to attract larger numbers of Whooper Swans to roost at that site.

2.1.12.4 Other sites

In the Borders, Whooper Swans are recorded regularly at Synton Pond (NT4820) (c. 20 birds), Bemersyde Moss (NT6134) (up to 50), Whitrig Bog (NT5734) (c.30 over the last decade), Upper Nisbet Pond (NT6826) (c. 25), Whitton Loch (NT7519) (c. 30, especially in 1970s), Hirsell Lake (NT8240) (over 300 in the mid 1980s) and Broomdykes Scrape (NT8753) (c. 30, with 210 in 1980/81). Numbers have fluctuated markedly at each of these sites over the review period. Overall, 150-200 birds winter in the Teviot and Tweed Haughs (A. Brown pers. comm.).

Further south along the coast, Lindisfarne currently supports a flock of fewer than 100 birds. Further south, a number of small waters associated with the River North Tyne west of Morpeth support a flock of around 30 Whooper Swans. Angerton (NZ0686) and Bolam Lakes (NZ0882) are the key resorts here. In the vicinity of the River Tyne around Newcastle-upon-Tyne, there are several freshwater bodies that support regularly around 30 birds each, including Big Waters (NZ2273), Holywell Pond (NZ3175), and Warkworth Lane Ponds (NZ2793).

2.1.12.5 Key references

Galloway & Meek (1980), Chisholm & Spray (2002)

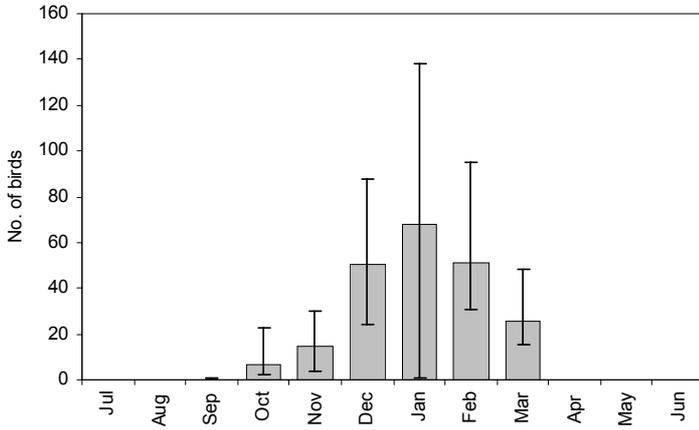


Figure 55. Whooper Swans in the Tweed valley between Kelso and Coldstream, 1995/96-1999/2000: mean peak counts by month (error bars denote minimum and maximum peak counts during the period)

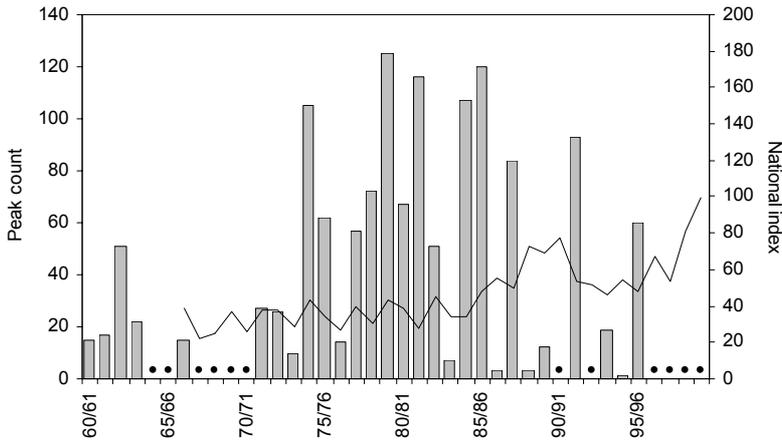


Figure 56. Whooper Swans in the Druridge Bay area, 1960/61-1999/2000: peak counts (bars) and British index (line) (circles denote years with no known data)

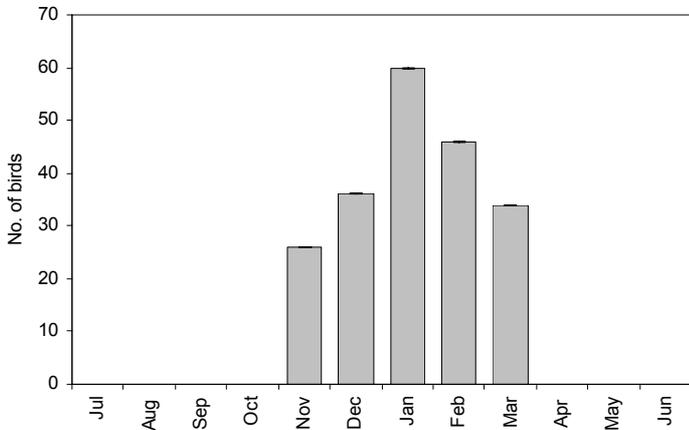


Figure 57. Whooper Swans in the Druridge Bay area, 1995/96-1999/2000: mean peak counts by month (error bars denote minimum and maximum peak counts during the period)

2.1.13 Lancashire

2.1.13.1 Background

In Northwest England, Whooper Swans generally occur in the industrial areas of south Lancashire and the reclaimed fenland around the mouth of the River Ribble. The main flock roosts at Martin Mere and feeds in adjacent agricultural areas. Smaller numbers feed and roost on the Ribble Estuary and its tributary, the River Douglas, some of which move to Martin Mere to roost.

2.1.13.2 Historical status

Up to the mid 1980s, the Whooper Swan was an uncommon visitor to Lancashire. The re-creation of a freshwater lake at Martin Mere and supplemental feeding by WWT has led to a large increase in the numbers of Whooper Swans using the Ribble area during the winter since then. The intensive arable farming around Martin Mere close to a large and secure roost probably made this area particularly attractive to these birds. Numbers recorded at the reservoirs to the west of Bolton have declined over the same period. These reservoirs, jointly, used to host around 70 birds during the winter in the 1970s and 1980s; numbers now rarely surpass 20 birds in total.

2.1.13.3 Internationally important sites

i) Martin Mere & Ribble Estuary

Five-year mean 95/96-99/2000: 1,015

Site conservation status

SPA (Martin Mere; Ribble & Alt Estuaries: selection stage 1.1)

Ramsar Site (Martin Mere; Ribble & Alt Estuaries: criterion 6)

NNR (Ribble Marshes)

SSSI (Various)

IBA (Martin Mere: criteria B1i, B3, C2, C6; Ribble & Alt Estuaries: criteria B3, C6)

Site description and habitat

Martin Mere (SD4215) occupies part of a former lake and mire that extended over some 1,300 ha of the Lancashire coastal plain during the 17th Century. The land was purchased by WWT and development of the reserve began in 1972. The complex comprises open water, seasonally flooded marsh and damp, neutral hay meadows overlying deep peat. Large areas of semi-improved damp grassland and

rush pasture have been maintained and enhanced through appropriate grazing management.

The Ribble Estuary (SD3825) is a large estuary opening into the Irish Sea between Blackpool and Southport. The estuary comprises large intertidal mudflats and a very large area of open grazed saltmarsh with bordering arable land used by feeding Whooper Swans.

Numbers and trends

Prior to WWT's acquisition of Martin Mere in 1972, Whooper Swans were uncommon around the Ribble Estuary (Fig. 58). However, since the early 1980s, there has been a large increase in Whooper Swan numbers, with well over 1,000 birds now using the area regularly. Whooper Swans begin to arrive during September and increase in number through until January and February, when peak WeBS counts are generally recorded (Fig. 59).

Site use

Whooper Swans generally use Martin Mere for roosting, flying to agricultural areas in and around the reserve to feed, although waste potatoes and grain are provided for birds on the reserve.

1. *Martin Mere area:* The Whooper Swans that roost at Martin Mere generally feed in and around the reserve. Birds congregate at the reserve in the evenings to take advantage of supplemental grain and potatoes supplied by WWT. In agricultural feeding areas, birds forage on spilt grain and sprouting shoots in barley stubbles, remains of potato and carrot harvests, re-seeds and newly-sown winter wheat. They tend to avoid crops grown by market gardeners, such as cabbages and leeks.

2. *Ribble Estuary:* Whooper Swans also forage in areas south of the Ribble Estuary. **Site Reviews\Paul's working version**
Longton and farmland a short distance inland at Hesketh Bank.

2.1.13.4 Other sites

Away from Martin Mere and the Ribble, small flocks, comprising fewer than 20 birds, occur in the southern lakes of Cumbria and at the complex of lakes to the west and northwest of Bolton: Anglezarke Reservoir (SD6117), Rivington Reservoir (SD6213) and Rumworth Lodge Reservoir (SD6708).

2.1.13.5 Key references

Rees & Bowler (1996)

2.1.14 Yorkshire

2.1.14.1 Background

Above its confluence with the River Aire, the Yorkshire Ouse is joined by the River Derwent, draining from the Cleveland Hills and the North Yorkshire Moors. This area is generally rural and its lower reaches are notable for the low-lying grassland adjacent to the river, known locally as 'Ings'. These areas, which are flooded during the winter, are the favoured haunts of Whooper Swans in Yorkshire.

The Aire basin is a low-lying arable plain, dotted with flooded mining subsidences. Although mining and tipping render some of these subsidences unattractive to Whooper Swans, several small flocks have developed on these sites.

The Humber drains a vast area of England, some 26,000 km², or around 20% of land area. It is formed by the confluence of the Trent and Yorkshire Ouse with other minor tributaries. The estuary itself is relatively narrow. In the lower reaches, thousands of hectares have been reclaimed from the estuary yet, in the shelter of Spurn Head, large expanses of mud and sandflats remain.

2.1.14.2 Historical status

Away from the Lower Derwent Valley, which has become important since the early 1980s, numbers of Whooper Swans in Yorkshire have fluctuated markedly since at least the early 1800s (Nelson 1907). Atkinson-Willes (1963) indicated that herds of Whooper Swans occurred at Hornsea Mere (TA1947) in the late 1950s, yet only small flocks (<20 birds) are recorded there today. Whooper Swans generally occur in high numbers in Yorkshire during cold weather events on the continent, suggesting that a proportion of those visiting the area may be from the North mainland European population.

The most important site in the region in recent times, Lower Derwent Valley, has increased in attractiveness since the early 1980s, from around 30 birds to a present day flock of just under 70 birds. Exceptional counts of over 100 birds were recorded in the winters of 1969/70 and 1971/72 (C. Ralston pers. comm.). Nelson (1907) identified these floodlands as a regular haunt since the late 1800s. Reasons for the recent increase in numbers remain unclear but may be related to a concurrent decline in numbers at nearby Fairburn Ings (Fig. 60). Numbers at the latter site have fallen from peaks of over 100

birds in the mid 1980s to present day totals of around 30 birds.

2.1.14.3 Nationally important sites

i) Lower Derwent Valley

Five-year mean 95/96-99/2000: 65

Site conservation status

SPA (Lower Derwent Valley: non-qualifying species)

Ramsar Site (Lower Derwent Valley: non-qualifying species)

NNR (Derwent Ings)

SSSI (Lower Derwent Valley)

IBA (Lower Derwent Valley: criterion C6)

Site description and habitat

The Lower Derwent Valley (SE6938) is a major floodplain system composed of a series of neutral alluvial flood meadows, fens, swamp valley mires, alder woodlands and other freshwater habitats lying adjacent to the River Derwent, Pocklington Canal and The Beck. The site is one of the largest and most important examples of traditionally managed species-rich alluvial flood meadow habitat remaining in the UK. The character and species composition of the grassland, fen and swamp communities is largely controlled by topography, differences in the extent of winter flooding, and by the type of agricultural management.

Numbers and trends

Numbers of Whooper Swans visiting the Lower Derwent Valley in the winter have increased markedly since the mid 1980s, with around 70 birds recorded in recent years (Fig. 61). This increase is thought to be due to a biological increase in numbers and improved coverage by counters (C. Ralston pers. comm.). Numbers build up through the late autumn and peak during December (Fig. 62). Most birds depart before the end of March.

Site use

Whooper Swans roost and feed in and around North Duffield Carrs and Wheldrake Ings.

The flock feeds on the Ings in the early autumn, taking soft grasses, favouring North Duffield Carrs and two sites at East Cottingwith (C. Ralston pers. comm.). However, by December, the flock moves to feed primarily on waste sugar beet, oil seed rape and winter cereals in fields surrounding the site.

Figure 58. Whooper Swans at Martin Mere & Ribble Estuary, 1960/61-1999/2000: peak counts (bars) and British index (line) (circles denote years with no known data)

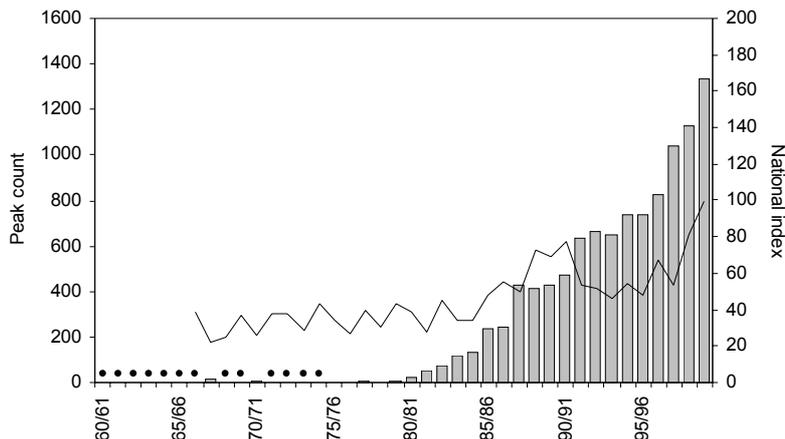


Figure 59. Whooper Swans at Martin Mere & Ribble Estuary, 1995/96-1999/2000: mean peak counts by month (error bars denote minimum and maximum peak counts during the period)

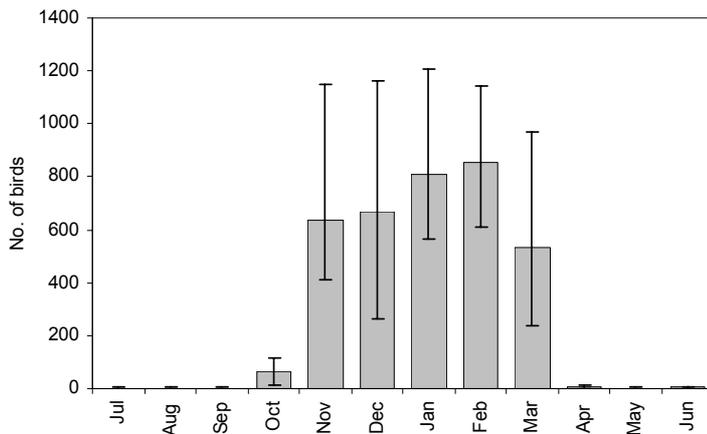


Figure 60. Whooper Swans at Fairburn Ings, 1960/61-1999/2000: peak counts (bars) and British index (line) (circles denote years with no known data)

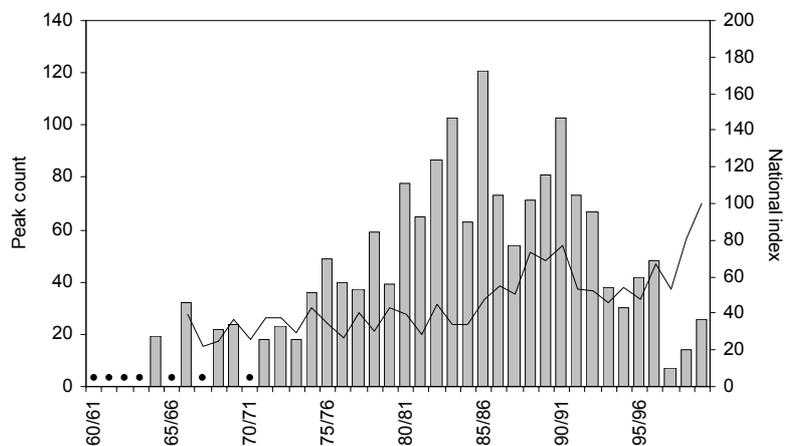
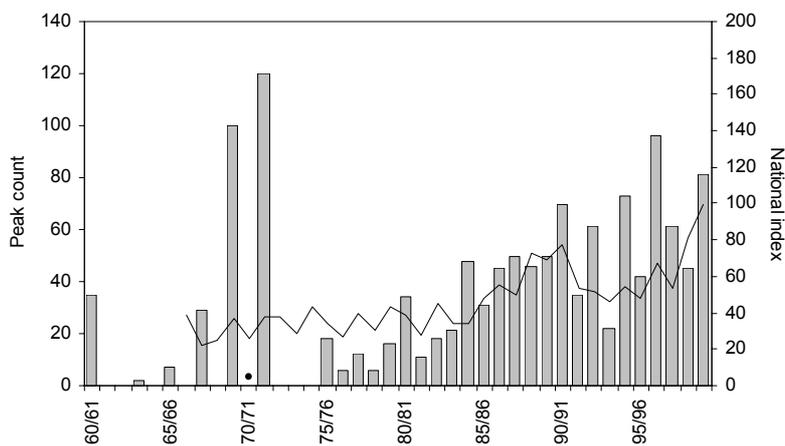


Figure 61. Whooper Swans in the Lower Derwent Valley, 1960/61-1999/2000: peak counts (bars) and British index (line) (circles denote years with no known data)



ii) Humber Estuary

Five-year mean 95/96-99/2000: 61

Site conservation status

SPA (Humber Flats, Marshes and Coast: non-qualifying species)

Ramsar Site (Humber Flats, Marshes and Coast: non-qualifying species)

SSSI (Various)

IBA (Humber Flats, Marshes and Coast: non-listed species)

Site description and habitat

The Humber Estuary (TA0020) drains a catchment of 26,000 square kilometres and is the largest single input of freshwater from Britain into the North Sea. It has the second highest tidal range in Britain (7.2 m) and approximately one third of the estuary is exposed as mud or sand flats at low tide. The inner estuary supports extensive areas of reedbed with areas of mature and developing saltmarsh backed by grazing marsh in the middle and outer estuary. On the north Lincolnshire coast, the saltmarsh is backed by low sand dunes with marshy slacks and brackish pools.

Numbers and trends

Numbers of Whooper Swans in the Humber Estuary vary markedly between years, yet rarely exceed 30 birds (Fig. 63). A peak count of 155 in March 2000, including a flock of 106 birds at Read's Island flats, means that this site now qualifies as nationally important for the Whooper Swan, based on the WeBS five-year mean. Peak numbers are recorded in the spring, highlighting the potential importance of this site as a temporary staging site (Fig. 64).

Site use

A flock of around 20 Whooper Swans roosts and feeds regularly in the New Holland area, with larger flocks recorded only during passage periods.

The Whooper Swan flock at New Holland feeds primarily on spilt grain and animal feeds, occasionally moving to arable land where they have been recorded feeding on oil seed rape and winter cereals (G. Catley pers. comm.). Large flocks of passage birds are transient and generally do not stop to feed.

2.1.14.4 Other sites

The RSPB nature reserve at Fairburn Ings (SE4627), over 275 ha of shallow pools, marshy depressions and flood pools, currently supports around 30 Whooper Swans during the winter months (Fig. 60). Slightly further south, similarly flooded mining subsidence at Old Moor (SE4302) and the Wath Ings (SE4102) complex, on the banks of the River Dearne to the east of Barnsley, support flocks of around 20 birds each.

2.1.14.5 Key references

Nelson (1908)

2.1.15 Isle of Man

2.1.15.1 Background

The Isle of Man is of little importance for most waterbirds. Much of the land is steep with few wetland areas, other than some small reservoirs on the Cambrian rocks. A flock of around 30 Whooper Swans occurs in the marshy areas near Ballaugh (SC3696) and the Curraghs. The flock size peaks during the periods of autumn and spring passage, presumably as birds move between Britain and Ireland. Small numbers remain throughout the winter.

2.1.15.2 Historical status

Prior to 1930, Whooper Swans were very scarce on the island; the Bewick's Swan *C. columbianus bewickii* was by far the commoner of the two migratory swan species at that time (Cullen & Jennings 1986). Numbers began increasing during the 1950s, yet the small numbers of Whooper Swans that are currently recorded in the Isle of Man have changed little since the 1960s.

2.1.15.3 Key references

Cullen & Jennings (1986)

Figure 62. Whooper Swans in the Lower Derwent Valley, 1995/96-1999/2000: mean peak counts by month (error bars denote minimum and maximum peak counts during the period)

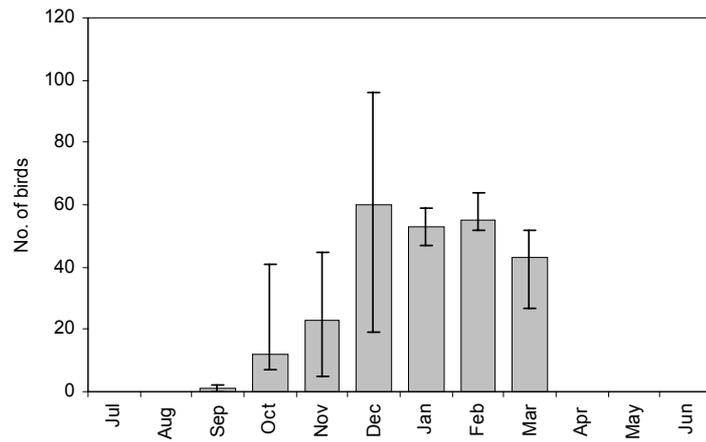


Figure 63. Whooper Swans at the Humber Estuary, 1960/61-1999/2000: peak counts (bars) and British index (line) (circles denote years with no known data)

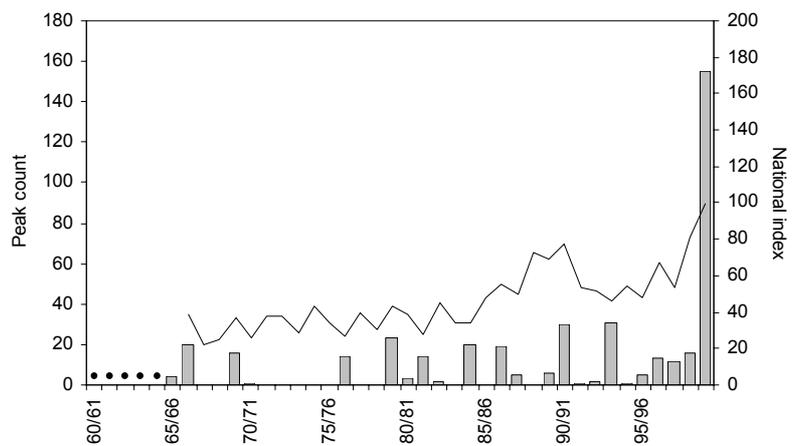
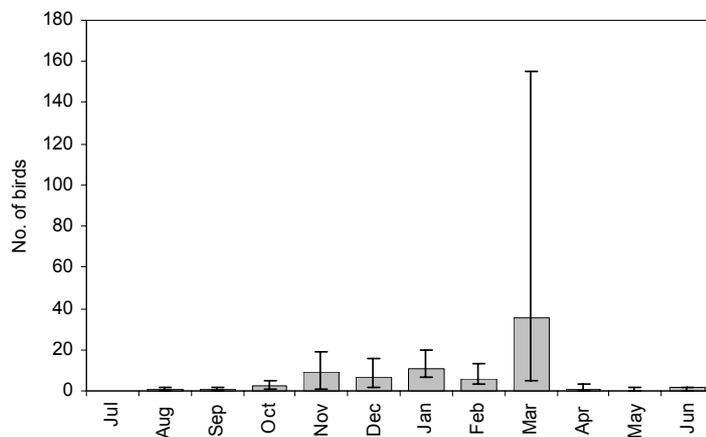


Figure 64. Whooper Swans at the Humber Estuary, 1995/96-1999/2000: mean peak counts by month (error bars denote minimum and maximum peak counts during the period)



2.1.16 North Wales

2.1.16.1 Background

Anglesey attracts larger numbers of Whooper Swans than most other areas of north Wales, primarily because it is dotted with inland marshes, pools and reservoirs. At the head of the River Cefni, in the heart of Anglesey, lies the Cefni Reservoir (SH4477), built in 1950. This sheltered lake, surrounded by conifer plantations, supports regularly a flock of 30-50 Whooper Swans during late winter. The 314 ha Llyn Alaw (SH3986) was formed by damming the River Alaw in 1966. This shallow waterbody attracts a flock of around 10-30 Whooper Swans at peak times.

On the mainland of Wales, the confluent estuaries of the Glaslyn and Dwyryd (SH5736) support up to 100 Whooper Swans between them at peak periods during the late winter. In addition, some of the numerous lakes in Snowdonia also support small numbers of Whooper Swans at that time. It is unknown whether these birds are spring migrants returning from sites elsewhere in Wales and Ireland.

2.1.16.2 Historical status

Prior to the 1950s, the Whooper Swan was a rare winter visitor to north Wales (Forrest 1907, Lovegrove *et al.* 1994). Numbers increased during the 1950s and 1960s. Flock sizes of Whooper Swans on Anglesey have remained relatively stable over the past 40 years, with the Cefni Reservoir supporting increasing numbers in recent years with concurrent reductions in the numbers of birds recorded at Llyn Alaw. On the mainland, numbers of birds in the Glaslyn/Dwyryd area have also remained relatively stable since the early 1980s (Fig. 65), although the Glaslyn Estuary and its marshes have been favoured more than Traeth Bach since the mid 1990s. A large flock of over 50 Whooper Swans used to be present at Llyn Tystumlyn (SH5238) during the early 1950s (maximum 65 in 1952-53), but has declined markedly since then. In the 1990s, fewer than 10 birds were recorded annually at this site.

2.1.16.3 Key references

Forrest (1907), Lovegrove *et al.* (1994)

2.1.17 Dyfed

2.1.17.1 Background

The only site worthy of mention for Whooper Swans in Dyfed is Cors Caron (SN6863), which supports the most southerly flock in Wales. This raised bog is a National Nature Reserve and Ramsar Site and occupies 792 ha. The site currently supports a flock of around 10 birds during the late winter.

2.1.17.2 Historical status

Numbers of Whooper Swans in Dyfed increased during the 1950s and 1960s, with Cors Caron supporting a flock of 20-50 birds during the 1970s. However, numbers have fallen at this site in recent years and only a handful of birds are now recorded annually.

2.1.17.3 Key references

Lovegrove *et al.* (1994)

2.1.18 East Anglia

2.1.18.1 Background

The Wash is a large expanse (23700 ha) of sand/silt flats and 2,600 ha of saltmarsh. It incorporates the estuaries of the East Anglian Ouse, the Nene and the Welland flowing in from southerly directions, and the Witham from the northwest.

Inland lie the Norfolk Broads. Many of the inland marshes and fens along the River Yare and around Breydon Water have now disappeared and the Broads remain threatened by human pressure and nutrient enrichment from surrounding agricultural land. Important sites for Whooper Swans in the Broads occur in the vicinity of tributaries feeding into the River Bure.

The flat arable expanses of the Fens, a network of canals and ditches covering some 3400 km², is the drained part of the Wash basin. The courses of the main fenland rivers - the Great Ouse, Nene, Welland and Witham - have been so changed and supplemented by drainage operations that their original courses are obscure. Straight, embanked canals were cut through the marshes and water pumped into them from low-lying farmland alongside. To allow for seasonal floods, two such canals were cut parallel and the land between left as floodplains, into which sudden surpluses of water

could be directed, stored and later removed. The result is the Ouse Washes, numerically the most important site for Whooper Swans in Britain and Ireland during the winter.

2.1.18.2 Historical status

Pre-1934, Whooper Swans were uncommon inland in Cambridgeshire and Norfolk (Lack 1934), occurring occasionally during hard weather. A flock of 40 birds was recorded moving along the coast at Horsey during the severe winter of 1870/71 (Taylor *et al.* 2000). However, bones in post-glacial deposits suggest that the species occurred in the Cambridgeshire fens about two thousand years ago (Milne-Edwards 1868).

Regular flocks started to appear at the Ouse and Nene Washes from the 1940s onwards (Bircham 1989). There has been a particularly large increase in the numbers of Whooper Swans using the Ouse Washes since the mid 1970s.

Regular overwintering in Broadland started in the mid 1970s (Taylor *et al.* 2000) and increased markedly through the 1990s (S. Linsell pers. comm.).

2.1.18.3 Internationally important sites

i) Ouse Washes

Five-year mean 95/96-99/2000: 1,513

Site conservation status

SPA (Ouse Washes: selection stage 1.1)

Ramsar Site (Ouse Washes: criterion 6)

SSSI (Ouse Washes)

IBA (Ouse Washes: criteria A4i, B1i, B3, C2, C6)

Site description and habitat

The Ouse Washes (TL5394) is located in eastern England, on one of the major tributary rivers of The Wash. It is an extensive area of seasonally-flooded wet grassland, lying between the Old and New Bedford Rivers, acting as a flood water storage system during the winter. The cycle of winter storage of floodwaters from the river, summer grazing by cattle, and hay production, have given rise to a mosaic of rough grassland and wet pasture.

Numbers and trends

There has been a large increase in the number of Whooper Swans using the Ouse Washes since the mid 1970s (Fig. 66). Prior to the early 1970s, fewer than 100 birds were recorded annually. In recent years, over 1,500 birds have wintered in the area. Ring re-sightings and the colouration of some

cygnets indicate that some of the birds present originate from the North mainland European population, which has increased concurrently (Laubek *et al.* 1999). Numbers begin to build up from late September onwards, peaking in mid to late winter (Fig. 67). Large numbers are still present into March, yet most birds have left the site by the third week of April.

Site use

Whooper Swans return to the Ouse Washes to roost at night, primarily at the WWT reserve at Welney, but also at other smaller satellite sites. Flocks tend to favour the Norfolk section of the Ouse Washes but will, under certain conditions, such as deep flooding, range into Cambridgeshire.

Whooper Swans used to feed exclusively on the Ouse Washes, chiefly grazing soft grasses, but they have increasingly taken to flying to arable farmland within a 5 km radius of the site, returning there to roost. The commonest crops used are barley stubbles, waste potatoes and winter wheat, but birds have also taken to feeding on sugar beet tops and even waste peas in recent years. However, large flocks still remain on the Washes at times, feeding on *Glyceria maxima*, *Agrostis stolonifera* and especially *Rorippa palustre*, when available. A small amount of supplemental feeding of grain and potatoes is provided at WWT Welney.

2.1.18.4 Other sites

Numbers of Whooper Swans using The Wash (TF6020) fluctuate markedly between years, with peak flocks exceeding 120 birds in the mid 1990s (Fig. 68). However, average flock size does not usually exceed 40 birds. Nevertheless, the Whooper Swan has been identified as a qualifying feature for The Wash SPA and is listed for the IBA. Peak counts generally occur at The Wash during the mid winter months.

Broadland sites jointly support large numbers of Whooper Swans, and the species is listed as a qualifying feature for the Broadland SPA under selection stage 1.1. Birds have tended to occur in two main groups: the St Benet's Levels group and the Horsey/Hickling group. The largest flock in Broadland occurs around the St Benet's Levels (TG3916) (Fig. 69), where around 80 birds were recorded in the mid 1990s. This flock often feeds on waste potatoes and sugar beet around Ludham, Catfield, Wood Street, Horning, and Potter Heigham.

Horsey Mere (TG4422) lies within a couple of miles from the sea, is distinctly saline and has an unusually

high Calcium level. A flock of around 40-150 Whooper Swans have roosted at this site and at nearby Hickling Broad (TG4121), flying to arable land to forage during the day. However, fewer than 30 birds have been recorded at these sites since 1998. Martham Broad (TG4520), 2 km to the south of Horsey, became of conservation note when government funding was provided for water contaminated with ochre and salt to be pumped and channeled away downstream. This site now supports a flock of around 30 Whooper Swans annually which is linked to the Horsey/Hickling group. The level of interchange of birds between the main flocks at Hickling/Horsey and St Benet's Levels is also likely to be very high. The Broadland sites often host larger numbers of birds during periods of low temperatures on the continent, suggesting that some birds from the North mainland European population may be present at these times.

Despite the dramatic increase in Whooper Swans using the Ouse Washes, relatively few occur at the Nene Washes (TF3300). This site supports a flock only rarely exceeding 50 birds, peaking during December or January (Fig. 70). Large numbers of Whooper Swans usually occur at the Nene Washes when conditions at the Ouse Washes are unfavourable, e.g. when water levels are very high.

2.1.18.5 Key references

Cadbury (1975), Owen & Cadbury (1975), Rees & Bowler (1996)

2.1.19 Dorset

2.1.19.1 Background

In Dorset, Whooper Swans have only ever been recorded in large numbers at the Chesil Fleet and Poole Harbour (SY9988). The Fleet is a tidal lagoon, running parallel to the sea for 14 km and covering around 480 ha. Most of the Fleet is separated from the sea by a high pebble ridge. The constricted entrance to the Fleet means that the tidal range is smaller than outside. The salinity of the water decreases towards the upper end, where the Fleet is joined by many freshwater streams. The predominant plants here are *Ruppia* and *Zostera*, which provide food for swans and ducks. Poole Harbour is a shallow tidal basin of around 3,000 ha of inter-tidal habitat and saltmarsh. Fewer than 20 birds were recorded in the county in the late 1990s.

2.1.19.2 Historical status

Prior to the 1950s, the Whooper Swan was a rare visitor to Dorset (Prendergast & Boys 1983). Most reports since then have come from the Fleet and parts of Poole Harbour. Cold weather throughout Europe coincided with large numbers of Whooper Swans occurring in Dorset during the 1950s and 1960s. In January and February 1963, there were 200 birds recorded at the Fleet, and a further 54 in Poole Harbour. Numbers have never reached these levels in the recent decades, and fewer than 20 birds, if any, are recorded in the county annually.

2.1.19.3 Key references

Prendergast & Boys (1983)

Figure 65. Whooper Swans in the Glaslyn/Dwryd area, 1960/61-1999/2000: peak counts (bars) and British index (line) (circles denote years with no known data)

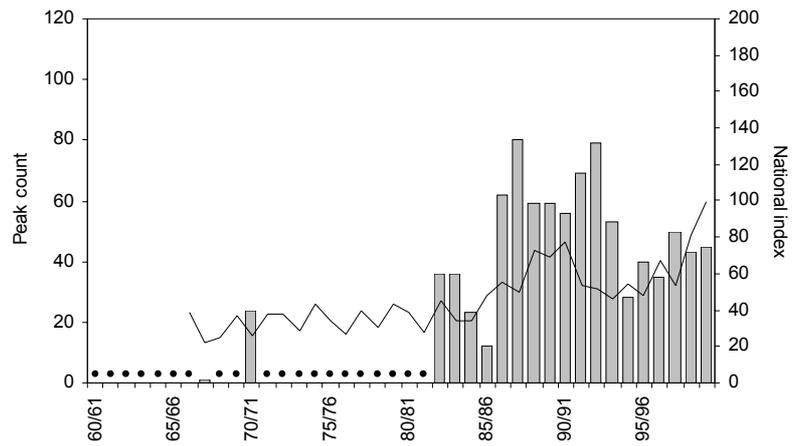


Figure 66. Whooper Swans at the Ouse Washes, 1960/61-1999/2000: peak counts (bars) and British index (line) (circles denote years with no known data)

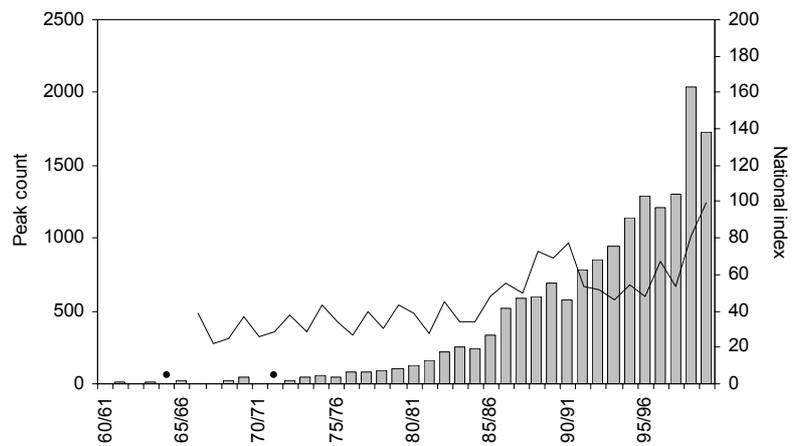
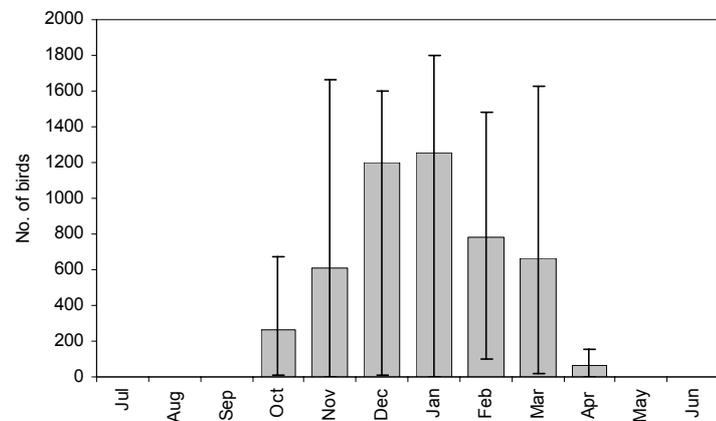


Figure 67. Whooper Swans at the Ouse Washes, 1995/96-1999/2000: mean peak counts by month (error bars denote minimum and maximum peak counts during the period)



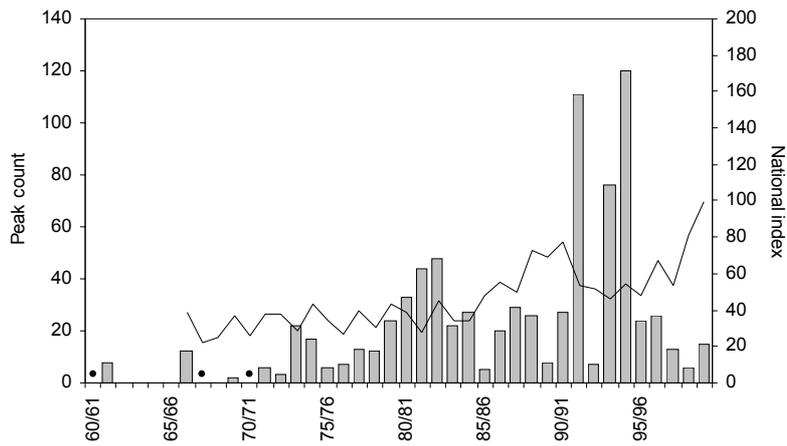


Figure 68. Whooper Swans at The Wash, 1960/61-1999/2000: peak counts (bars) and British index (line) (circles denote years with no known data)

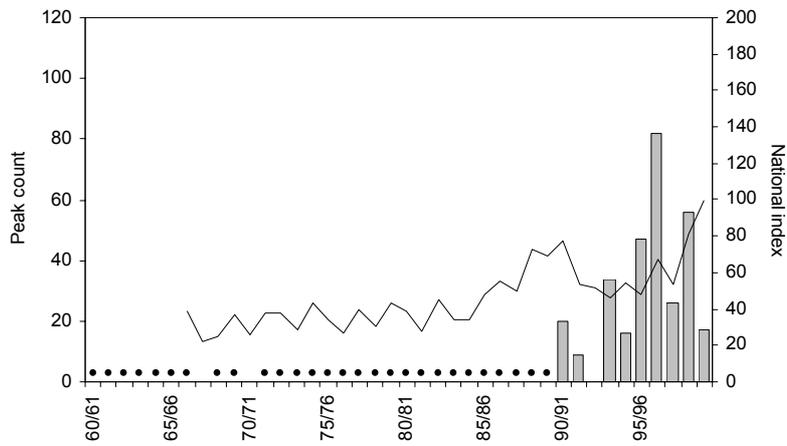


Figure 69. Whooper Swans at St Benet's Levels, 1960/61-1999/2000: peak counts (bars) and British index (line) (circles denote years with no known data)

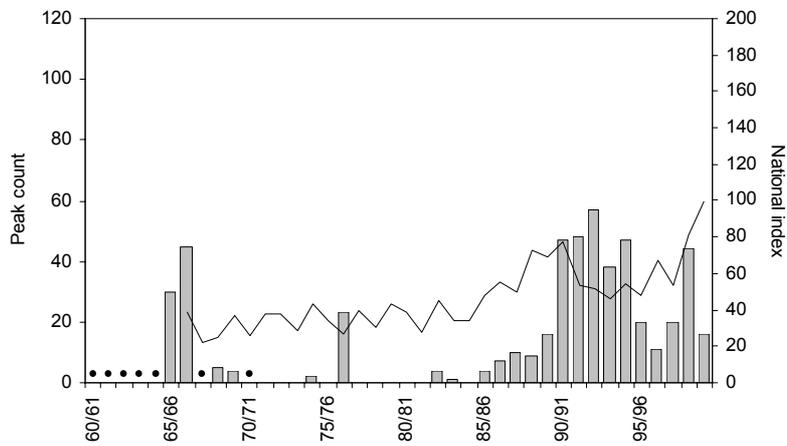


Figure 70. Whooper Swans at the Nene Washes, 1960/61-1999/2000: peak counts (bars) and British index (line) (circles denote years with no known data)

2.2 Northern Ireland

2.2.1 The Foyle/Swilly Complex (also located partly within Donegal, Republic of Ireland)

2.2.1.1 Background

The Foyle/Swilly complex in north-western Ireland comprises two large estuaries (Lough Foyle (C5025) and Lough Swilly (C3020)), and the River Foyle basin (C3610), encompassing some 1,100 km² of estuarine, riverine and agricultural habitats.

Loughs Foyle and Swilly are extensive estuaries on the north coast, separated by the Inishowen peninsula, but possessing quite different characteristics. Lough Swilly, in Donegal, comprises a mix of estuarine and non-estuarine habitats in what is a relatively narrow glaciated inlet, no more than 4 km at its widest point. In contrast, Lough Foyle is almost entirely enclosed, over 15 km wide at its widest point, with much more extensive mudflats than Lough Swilly. The River Foyle, flowing from the south into Lough Foyle, marks the border between Northern Ireland and the Republic of Ireland.

Both estuaries underwent extensive reclamation on their southern margins during the mid 1800s and the resultant polders have added to the extensive rich mixed farming landscape, characteristic of the area. The widespread availability of suitable habitat is undoubtedly one of the primary factors contributing to the outstanding importance of the area for Whooper Swans. Its northern location may also contribute to the areas' particular importance during staging periods: average annual peaks of over 2,000-3,000 birds typically occur in late October/early November. Around 1,000 birds are recorded in January and December and typically increase through February and March to around 1,500 birds. Intensive studies of flock distribution and colour-marked birds in the area have led to a detailed understanding of local movement patterns, staging phenology and large-scale movement patterns (McElwaine *et al.* 1995, Colhoun 1998, Frederiksen *et al.* 2001). Estimates of total turnover suggest that 5,000 or more individual birds may use the area during October and November (Frederiksen *et al.* 2001). The high levels of interchange between flocks within the overall complex mean that the major sites cannot be considered in isolation.

Whilst numbers of Whooper Swans recorded in the complex vary markedly within and between winters,

a number of established sites regularly support numbers of international importance.

2.2.1.2 Historical status

Ussher & Warren (1900) indicated that small numbers of Whooper Swans occurred annually at Lough Swilly in the late 1800s. Hutchinson (1979) noted the importance of northwest Ireland for Whooper Swans in the early 1970s, especially in October when he estimated that over 2,000 occurred, numbers falling to around 1,000 in mid winter. More recently, mean annual peaks for Lough Swilly have been 403 in the mid 1970s, 750 in the mid 1980s and 498 in the early 1990s (Sheppard 1993).

2.2.1.3 Internationally important sites

i) Lough Swilly

Five-year mean 95/96-99/2000: 1,673

Site conservation status

Ramsar (Lough Swilly)

SPA (Lough Swilly; Inch Lough)

Wildfowl Sanctuary (Blanket Nook)

IBA (Lough Swilly including Blanket Nook and Inch Lake: criteria A4i, B1i, B3, C2)

Site description and habitat

Lough Swilly is a long, narrow estuarine inlet formed by glacial activity, which runs 50 km north to south yet is only 4 km wide at its maximum. A mixture of estuarine and non-estuarine habitats are present, with the greatest extent of intertidal and shingle habitats in the upper parts of the estuary (around Big Isle C2314) and the Leannan Estuary (C2522). The brackish lakes of Blanket Nook (C3019) and Inch Lough (C3422) contribute to habitat diversity and its attractiveness to waterbirds. A highly productive mixed-farming landscape dominates the eastern fringe of the Swilly, extending inland to the low-lying corridor running southeast from Blanket Nook to the River Foyle at St Johnstown (see Carrigans valley in River Foyle section). The availability of habitat is further enhanced by extensive areas of polder at Big Isle, Blanket Nook and Inch. These sites in particular provide rich, diverse feeding habitats in close proximity to suitable roosting sites and thus generally support the highest numbers of Whooper Swans in the Lough Swilly area.

Numbers and trends

Around 1,000-3,000 Whooper Swans have been recorded annually at Lough Swilly during the 1990s (Fig. 71). Since the complex is used as both a staging

and wintering area, numbers peak in spring (typically March) and autumn (late October/early November). Historical data indicate that the area has been important for autumn migrants for many decades (Hutchinson 1979).

It is difficult to examine site-specific trends in isolation because Whooper Swans move frequently within the complex. Although there is variation between years in the numbers recorded in autumn, around 1,000 birds remain through the winter. However, the numbers of birds recorded at Lough Swilly in the mid winter have declined in recent years, primarily due to adverse management at Inch Levels. Since the mid 1990s, much of the grasslands favoured by feeding flocks have been converted to arable and, as a result, numbers present in mid to late winter are now related to the availability of waste potatoes. It appears likely that the areas around Swilly Burn and Grange (see River Foyle) now accommodate some of these birds.

Site use

Feeding areas for Whooper Swans at Lough Swilly can be split into three discrete areas. Flocks occur regularly at each of these and large flocks in excess of several hundred are present at least once during the season. Usage, however, is primarily a function of the relative availability of seasonally-preferred food types which leads to large inter and intra-annual variation in numbers at core areas. Foraging flocks are most widely distributed from the early autumn to mid winter period. At this time, large flocks can be encountered almost anywhere in the area between the Swilly and Foyle basins, feeding in cereal stubbles and on waste potatoes.

1. *Big Isle* (C2313): An area of c. 150 ha of polder adjacent to the largest intertidal areas in the upper reaches of Lough Swilly. Although all farmland habitats are represented, cereal stubbles and potatoes typically predominate and are the major attraction to large flocks of Whooper Swans. The timing and intensity of use is dependent on habitat availability. In recent years, numbers have been high due to the presence of waste barley and potato crops. Large peak counts were recorded in 1992/93 (840) and 1999/2000 (600). Although the primary feeding areas are on the polder itself, birds also use feeding sites at nearby Plea Isle (C2312), Farsetmore/Trimragh (C2112) and Rossbracken (C2211). Birds roost on the adjacent estuary.

A number of alternative feeding areas are used by this flock, including:

(a) *Sallybrook/Galdonagh* (3 km east-southeast of Big Isle; C2710): Midwinter/spring flocks numbering 40-50 birds feed here, primarily on potatoes and grass.

(b) *Moneyhaughley/Ballyeeghan* (2.5 km east-northeast of Big Isle; C2614): This site is used infrequently yet up to around 60 birds have been recorded, feeding in a variety of habitats.

(c) *Ballybeghy/Ballylawn* (6 km northeast of Big Isle; C2717): A grassland site used infrequently by around 70 birds in mid winter/spring.

2. *Blanket Nook* (C3019): A small brackish lake (c. 40 ha), separated from Lough Swilly by a disused railway embankment. An extensive area (c. 550 ha) of reclaimed land lies to the south and drains into Blanket Nook. The farmland area comprises a mix of pasture and arable habitats attractive to feeding Whooper Swans. The lake is used for roosting or refuge during periods of disturbance. Birds generally use the fields immediately to the northwest of Colehill (C3117), to the west of Castle Hill (C3118), and to the west and east of Moylemoss (C3017).

Peak counts have typically fluctuated in the range of 100-300 birds. The availability of cereal stubble is a major factor determining numbers in autumn. Birds take waste potatoes in mid winter and utilize agriculturally-improved grasslands in the spring. Temporary peaks of over 1,200 birds were recorded in 1999/2000. Recent agricultural improvement of grasslands around Tonyhabhoc has made this area attractive to flocks in late winter/spring, but only for a relatively short period.

Alternative feeding areas for birds roosting on Blanket Nook pondage include:

(a) *Mulleny Near/Tonyhabhoc* (2 km east-southeast of Blanket Nook; C3219): Two areas in close proximity to Blanket Nook and on flight-path between this site and Inch. Large flocks occur infrequently, typically on stubbles or waste potatoes.

(b) *Dooish area* (5 km south of Blanket Nook; C3114): An area of elevated ground used infrequently by large flocks. Birds typically feed in stubble fields in autumn for a short period only.

(c) *Newtown/Killyverry* (3 km south of Blanket Nook; C2915): Infrequently used site although several hundred birds have been recorded feeding in stubble fields during the autumn.

(d) *Hungersmother/Milltown* (5 km south of Blanket Nook; C2813): This site is used infrequently but large numbers (up to 400 recorded in 1993) occur in some autumns, feeding in stubble fields.

3. *Inch Lough & Levels* (C3422): Like Blanket Nook, a brackish lake created by impoundment with adjoining reclaimed farmland to the south and east, although on a much larger scale. Inch Lough (c. 250

ha), and in particular the northern and eastern sections, is an important feeding and roost site, used primarily for feeding by early autumn migrants and less so in spring. The adjoining reclaimed land comprises some 800 ha of prime agricultural land, currently dominated by arable habitats but formerly of a more mixed type.

Up to 2,370 birds have been recorded during the autumn and typically over 500 birds are present throughout the mid winter period, numbers peaking again during spring (Feb-May). Numbers recorded in the autumn and mid winter appear to be related to the availability of stubble habitats and waste potatoes, respectively. A change of land ownership, and resultant changes in farm management, has led to a dramatic reduction in the availability of grassland habitats since 1996/97. This has reduced the attractiveness of the area for spring migrants and recent numbers have been much lower than the peaks recorded in 1992/93 (925: March), 1994/95 (697: March) and 1995/96 (679: Feb.). Similarly, numbers recorded during mid winter have declined by around 50% since the mid 1990s.

When food availability is reduced, a number of alternative feeding areas are utilised including:

(a) *Inch Island*: Used occasionally, particularly by flocks feeding on waste potatoes when similar crops have been exhausted on Inch Levels. The fields at Moress Point (C3325), 1 km north-northwest of Inch Lough, are favoured.

(b) *Bridgend/Bunrana Road* (C4021): The fields along the main Londonderry road at the border between Donegal and Londonderry are generally used by fewer than 100 Whooper Swans, feeding on grass in mid winter/spring. Large flocks have frequented an area further to the east at Ballynagalliagh (Co. Londonderry; C4321) in recent winters. The suitability of the Bunrana Road site may have been reduced through reclamation for development and associated disturbance, and through increased fencing within the area.

(c) *Inch approach fields* (C3523): A small group of intensively managed pastures on a dairy farm. This site has become increasingly important as it provides some of the best late winter/spring grassland swards close to Inch Lough.

(d) *Black Bridge* (C3320): A large field adjacent to Mullery House is regularly used by up to 100 birds. Mainly this field has been kept as agriculturally-improved grassland, but recently it has been converted to winter cereal.

ii) Lough Foyle

Five-year mean 95/96-99/2000: 917

Site conservation status

SPA (Lough Foyle: selection criteria 1.1)

Ramsar Site (Lough Foyle: criterion 6)

ASSI (Lough Foyle)

IBA (Lough Foyle and River Foyle: criteria A4i, B1i, B3, C2, C6)

Site description and habitat

Lough Foyle (C5025) is a large, shallow narrow-mouthed estuary on the northern Irish coast which has shorelines bordering both the Republic of Ireland and Northern Ireland. The most extensive mud and sandflats occur on the southern margin and much of the waterbird interest on the site occurs here or in the adjacent polder areas. Similar to equivalent reclaimed areas bounding parts of Lough Swilly, much of the agricultural land is highly productive and dominated by cereal and potato growing, although in recent years the production of grass for lawns and golf courses has increased radically. The entire southern margin of Lough Foyle between the mouths of the River Faughan (C4922) and River Roe (C6429), but especially those areas of reclaimed land, provides rich feeding habitat for grazing Whooper Swans.

Numbers and trends

The peak counts of Whooper Swans at Lough Foyle vary markedly between years, primarily because count dates often do not necessarily coincide with peak periods of passage and because of movements of flocks within the Foyle/Swilly complex (Fig. 72). Although the five-year peak mean is 811, flocks of around 1,300 birds have been recorded twice in the last five years. Peak counts are recorded in October, with a second smaller peak in early spring (Fig. 73).

Site use

Lough Foyle provides ample roosting opportunities, although preferred roost sites are associated with freshwater entrances of rivers and streams. Three discrete feeding areas have been identified:

1. *Black Brae/Donnybrenver/Longfield*. These two polders form a continuous stretch from the western point of reclamation on the lough (at the entrance of the River Faughan) to Longfield Bank to the east. Whilst the fields between the sea embankment and the railway line are typically the most important for feeding Whooper Swans, areas south of the railway at Lower Campsey, Willsborough (C5122) and Lower Airfield Road (C5222) are also used.

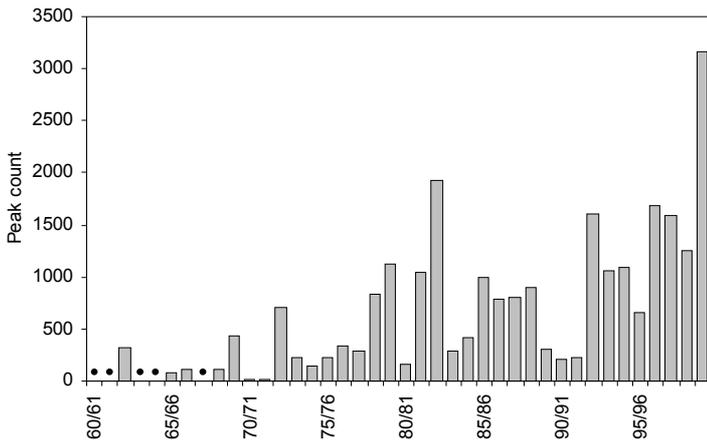


Figure 71. Whooper Swans at Lough Swilly, 1960/61-1999/2000: peak counts (bars) (circles denote years with no known data)

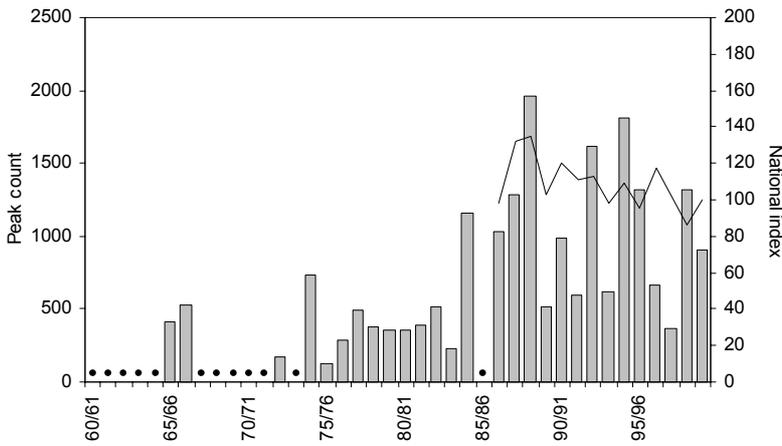


Figure 72. Whooper Swans at Lough Foyle, 1960/61-1999/2000: peak counts (bars) and Northern Ireland index (line) (circles denote years with no known data)

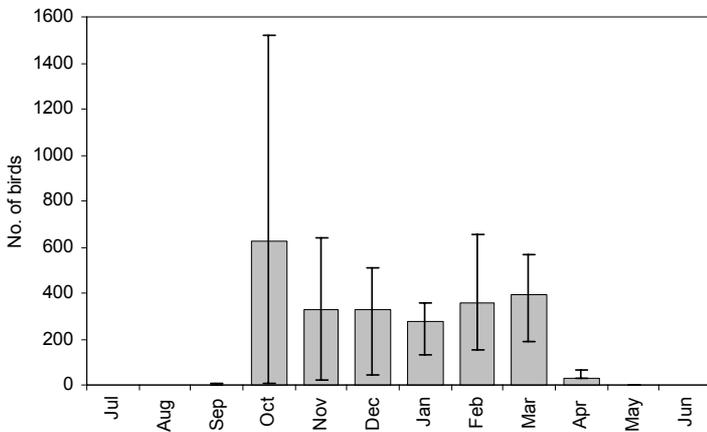


Figure 73. Whooper Swans at Lough Foyle, 1995/96-1999/2000: mean peak counts by month (error bars denote minimum and maximum peak counts during the period)

In recent years, Black Brae (C5024) has been the most important site within this area during the autumn and mid winter periods, reflecting the predominance of arable (stubble and potato) habitats used by foraging flocks. Up to 1,320 birds have been recorded at this site.

Donnybrewer level is dominated by agriculturally semi-improved grassland. Further east, Longfield Level is similar and includes some winter-sown cereals. Peak numbers occur in the late winter and spring periods. Roost sites occur offshore, especially at Black Brae and Longfield Bridge (C5422).

2. *Longfield Beg/Greysteel/Faughanvale*: Although this area was designated for land-claim in the 19th century, none occurred and the stretch largely comprises small fields with more grassland than those areas to the west and east. Up to 150 birds have been recorded feeding in this area in recent winters. The Longfield Beg (C5521) and the Greysteel Bridge (C5621) areas are the most frequently used.

3. *Ballykelly/Myroe*: These two areas of polder, together with Black Brae, are the most intensively farmed in the Lough Foyle area. Of the two, Ballykelly is the less frequently used. Early ploughing of stubbles at Walworth (C6122), and on the polder itself, often reduces habitat availability in autumn. Numbers appear to be related to the presence of stubbles and waste potatoes. Although up to 926 birds have been recorded at this site, around 350 birds have been recorded more regularly in recent years.

Myroe is probably the most consistently and intensively used site by Whooper Swans on Lough Foyle. This is because it contains a high diversity and relative abundance of suitable habitats; the availability of stubbles and waste potatoes in autumn and mid winter coinciding with large numbers of autumn migrants. In addition, the Roe Estuary nearby provides the most suitable roost site on Lough Foyle.

Although the fields between the railway line and embankment are traditionally the most frequently used, an extensive area inland, as far back as the River Roe, provides suitable feeding opportunities, albeit further from the main roost site.

Sites on the other side of the railway line from the Ballykelly and Myroe levels are regularly used, but spasmodically. These include Walworth (C6122), Foyle View Farm (C6123), Broharris (C6424), Thistlefield (C6426), Wheatfield (C6626), Carrowclare/Carrowreagh/Carrowmenagh (C6427), Ballyhenry West/East (C6628) and Crindle (C6627).

Any of these sites can be used by up to 1,000 birds on occasions. The former use of land at Dowland (C6726) appears to have ceased since the expansion of the Aghanloo Industrial Estate, and the increased use of the remaining grassland for sheep grazing.

iii) River Foyle

Five-year mean 95/96-99/2000: 734

Site conservation status

SPA (Lough Foyle: selection criteria 1.1)

Ramsar Site (Lough Foyle: criterion 6)

ASSI (Lough Foyle)

IBA (Lough Foyle and River Foyle: criteria A4i, B1i, B3, C2, C6; River Foyle: Carrigans and Swilly Burn Valleys: criteria B1i, B3, C2)

Site description and habitat

The River Foyle forms at the confluence of the Rivers Mourne and Finn at Lifford/Strabane and from there, northward, forms the boundary between Donegal to the west and counties Tyrone and Londonderry to the east. The river is tidal over all of this length and comprises some mudflat, saltmarsh and reedbed habitat. The land adjacent is predominantly agricultural with a mix of arable, wet meadow and improved grassland. Two tributary river valleys (Carrigans River C3513 and Swilly Burn C3203), which can hold significant numbers of birds, join the main river on the Donegal side. These comprise mixed and agriculturally semi-improved grasslands respectively, and are subject to periodic flooding.

Numbers and trends

Within years, numbers of Whooper Swans vary markedly at this site and appear to be related to food availability (Fig. 74). Over 1,000 birds are, however, normally encountered in this area during autumn, if only for a short time. WeBS counts made in the area around Grange indicate the importance of that area during spring (Fig. 75). The relative abundance of grass on some intensively managed dairy farms has increased its attractiveness to Whooper Swans in mid winter and spring. In recent years, numbers have increased along the River Foyle. This may be a consequence of redistribution within the Foyle/Swilly complex, following the change in land management patterns elsewhere.

Site use

The area of interest for grazing Whooper Swans is confined to the river stretch from Carrigans (C3611) south to just south of Corkan Isle (C3502), and the adjoining Carrigans and Swilly Burn valleys.

Three relatively discrete areas have been identified, usage of which varies within and between seasons:

1. *Carrigans Valley* (C3513): This area lies within Donegal and is of greatest importance in the autumn/winter period when, periodically, large numbers of Whooper Swans occur. Around 500-1,400 birds are recorded annually. The availability of stubbles and waste potatoes in large, relatively flat fields and safe roost sites make this site particularly attractive. Sites used away from the direct river valley include fields at Leitrim (C3515), Todds Knowe/Monglass (C3514) and Dernacally (C3411). The dispersed flocks at this site can best be located by scanning from the elevated road at Holywell Hill (C3716) to the north. Roost locations vary between the adjacent river (at Carrigans C3611) and Port Lough (C3415) and also at Inch (C3422) and Blanket Nook (C3019). The Carrigans Valley provides a corridor for birds moving between sites at Lough Swilly and along the River Foyle and further into Tyrone and Fermanagh, with large flocks observed flying south in autumn.

2. *Thornbill/Dunnalong* (C3710): This area lies on the Tyrone side of the river, directly opposite the Carrigans Valley sites. Site use is normally limited to the late winter/spring period, with relatively small numbers (c. 50 birds) feeding on agriculturally-improved grasslands immediately adjacent to the river.

3. *Grange/Swilly Burn* (C3505): These two sites, one on either side of the Northern Ireland/Republic of Ireland border, should be considered together as movements of birds occur daily and the riverine roost area divides the two. The Grange site extends from Gortmessan (C3607) to fields to the south of the road at South Grange (C3605). Whilst birds on the Swilly Burn are normally located in fields just to the north of Swilly Bridge (C3404), they can occur anywhere along the river to a point 1 km to the west of the bridge on route N14 at Feddyglass (C2902). Sites remote from the watercourse which have been used in recent winters are north of Drumearn (C305) where flocks have exploited potato fields in mid-winter, and Corkan Isle (C3502).

The area is dominated by agriculturally-improved (wet) grasslands and has become increasingly important in the mid winter and spring periods. Around 400-500 birds use the site annually. Large autumn concentrations occur periodically; flock size is probably related to habitat availability here and in the wider Foyle/Swilly area.

2.2.1.4 Key references

McElwaine *et al.* (1995), Colhoun (1998), Frederiksen *et al.* (2001)

2.2.2 Loughs Neagh & Beg area

2.2.2.1 Background

Lough Neagh (383 km²) is the largest freshwater lake in the UK. Despite its large size, the lough is relatively shallow, with a mean depth of just 8.9 m (Wood & Smith 1993). The shoreline is largely exposed with wave-beaten rocks and stones but there are also some sheltered, sandy bays with well developed areas of marginal vegetation, including some reedbeds.

To the north, Lough Beg is much smaller (1,125 ha) and shallower (1-2 m). About 200 ha of the west shore is natural wet grassland, largely inundated with freshwater during the winter. The River Bann, which enters Lough Neagh on its southern margin, connects the two loughs through a relatively narrow land-bridge, and exits Lough Beg as it divides the counties of Antrim and Londonderry before reaching the north coast. Numerous other rivers enter Lough Neagh.

Around 15 relatively distinct sites, distributed around the two loughs, are used regularly by Whooper Swans. Although a number of sites hold significant numbers of birds on autumn passage, the area is most important in mid winter and spring, holding around 1,000 birds. Arable habitats are relatively limited in extent, and occur at Toomebridge and Gartree Point. However, the majority of the Whooper Swans feed in the wet grassland habitats.

2.2.2.2 Historical status

Loughs Neagh & Beg have been important for this species, at least since the 1960s, but little information is available on numbers and distribution. Sheppard (1993) quotes a figure of 600 birds for the area in the early 1970s. Counts made between 1964/65 and 1968/69 varied between 400 and 800 birds (Hutchinson 1979). D'Arcy (1978) indicated that around 300 birds were present at Lough Beg, with around 450 present in December 1962.

2.2.2.3 Internationally important sites

i) Loughs Neagh & Beg

Five-year mean 95/96-99/2000: 932

Site conservation status

SPA (Lough Neagh and Lough Beg: selection stage 1.1)

Ramsar Site (Lough Neagh and Lough Beg: criterion 6)

NNR (Lough Neagh-Oxford Island; Lough Beg)

ASSI (Lough Neagh; Lough Neagh-Oxford Island; Lough Beg; Portmore Lough)

IBA (Lough Neagh and Lough Beg: criteria A4i, B1i, B3, C2, C6)

Site description and habitat

Lough Neagh (JO575) is an extensive waterbody whose shores border five counties (Antrim, Down, Armagh, Tyrone and Londonderry). At 383 km², it is the largest freshwater body in the UK. The majority of the shoreline is exposed and rocky, with less than 25% (29 km of the 125 km shoreline length) comprising sheltered sandy bays.

Lough Beg is a shallow lake linked to Lough Neagh by a short length of the River Bann, which passes through the lake and exits at Newferry (J9897). The lake itself is surrounded by extensive marsh and surrounding farmland is largely devoted to grazing pasture.

Numbers and trends

Numbers of Whooper Swans have remained relatively stable at Lough Neagh and Lough Beg since the mid 1980s (Fig. 76). Around 1,000 birds use the site regularly through the winter, peaking in January and again in March (Fig. 77).

Site use

Although Whooper Swans occur in the shallow lake margins of Loughs Neagh & Beg, the principal sites are mostly in adjacent, predominantly grassland habitats concentrated along the south and east shores. Three established sites are located at abandoned airfields: Toome (J9990), Kinrush (H9475) and Gartree (J0975).

Sites contributing to the overall Loughs Neagh & Beg Whooper Swan totals can conveniently be split into 15 main areas by both geographical isolation and the limited degree of interchange between neighbouring sub-sites which has been shown by ring reading of marked individuals:

1. *Carlane* (J0286): An area of low-lying grassland, approximately 5 km from the nearest established site

at Toome. Flocks of up to 150 birds utilise an area of c. 5 km², extending from Ballynamullan (J0286) westward to Doss Tree (H9986). Birds also occasionally use Brockish Bay (H9989) to the north, and adjacent grassland in that area.

2. *Gartree Point* (J0975): An abandoned airfield site around halfway down the eastern shore of Lough Neagh. The presence of arable habitats may contribute to its importance particularly in the autumn and early winter period. Although around 150 birds are regularly recorded, up to 380 birds have occurred. Birds also use the Ardmore area (J1078) to the north. Public access to the area is restricted.

3. *Portmore Lough Complex* (J1169): A number of sites surrounding the key roost site at Portmore Lough RSPB Reserve, including established feeding areas at Deer Park/Derryola Bridge (J0968), Tunny Cut (J1069), Diamond Lane (J1066) and Ballymacilrany (J1166). The site largely comprises lowland wet grassland, used primarily in mid winter and spring by up to 200 birds.

4. *Cranagh/Annaghdroghal* (J0863): A wet grassland area centred on a disused canal with numerous drainage ditches. Peaks of over 90 birds frequently occur, with around 75 birds recorded regularly.

5. *Closet Meadows/Derrymacash* (J0460): This area comprises a mix of arable and grassland habitats in a flat low-lying area surrounding the Closet River. Peaks in excess of 150 birds have been recorded but around 100 birds occur more regularly.

6. *Ardmore* (J0262): An area of grassland immediately adjacent to Lough Neagh. Around 60 birds use this site and fields to the north on the northwestern shore of Ardmore Point (J0163).

7. *Derrycrow* (H9864): Birds utilise agriculturally-improved grassland fields between the Shallow Flat (H9963) and the mouth of the River Bann (H9663). Around 45 birds use the area regularly.

8. *Bann Meadows/Muckery* (H9861): The Bann Meadows complex comprises an extensive area of wet grassland surrounding the lower reaches of the Upper River Bann. This site is amongst the most important around the entire Loughs Neagh & Beg complex, supporting on average over 160, and up to 267, birds. Sub-sites used on a regular basis are Motorway Fields (J0158), Ballynery Bridge (J0258), Bann Meadows (H9961), Muckery (H9861), Derrylard Bridge/Greenisland (H9860) and Derrylard (H9662).

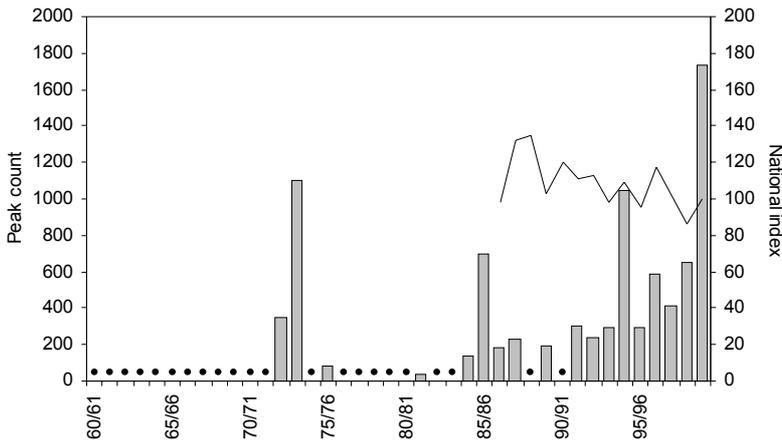


Figure 74. Whooper Swans at the River Foyle, 1960/61-1999/2000: peak counts (bars) and Northern Ireland index (line) (circles denote years with no known data)

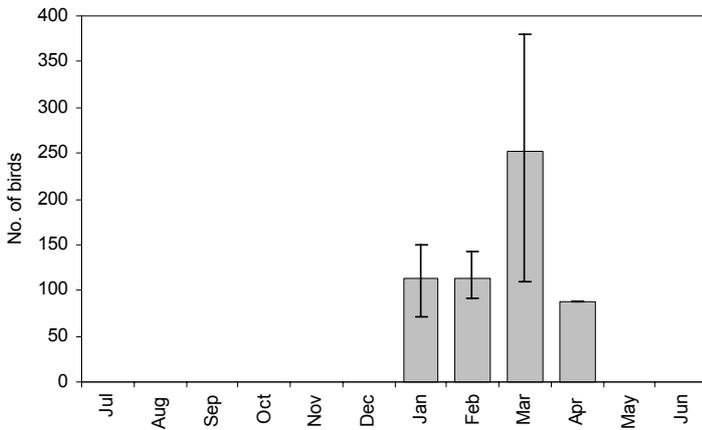


Figure 75. Whooper Swans at the River Foyle, Grange, 1995/96-1999/2000: mean peak counts by month (error bars denote minimum and maximum peak counts during the period)

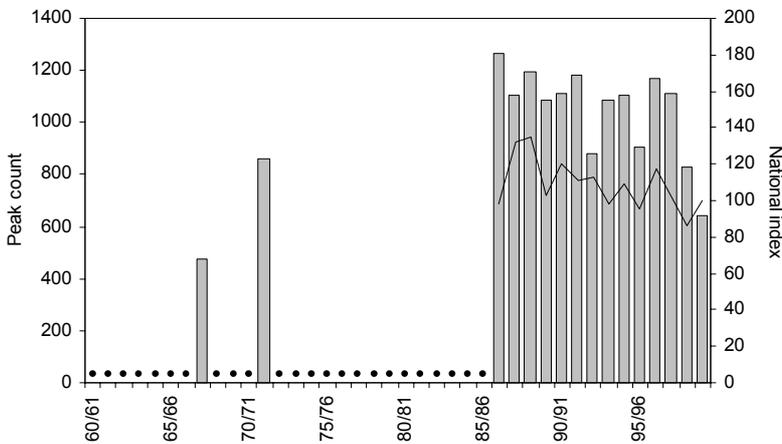


Figure 76. Whooper Swans at Loughs Neagh & Beg, 1960/61-1999/2000: peak counts (bars) and Northern Ireland index (line) (circles denote years with no known data)

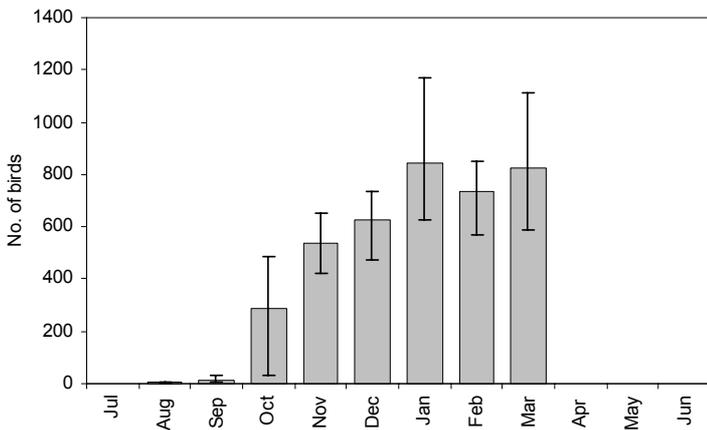


Figure 77. Whooper Swans at Loughs Neagh & Beg, 1995/96-1999/2000: mean peak counts by month (error bars denote minimum and maximum peak counts during the period)

9. *Derrymarragh Island* (H9263): A flock of up to 20 birds feeds on grasslands at a headland of this small island.

10. *Kinrush Airfield/Ardboe* (H9475): Kinrush is a disused airfield site on the western side of Lough Neagh. Flocks use the airfield itself and adjacent grassland sites at Ardboe (H9575) and Kilmascally House (H9574). Annual peaks at this relatively isolated site are amongst the most consistent on Lough Neagh, varying between 50 and 70 birds. Small numbers also regularly use grassland at Kells Point (H9370) to the south.

11. *Salterstown* (H9582): This site lies on the western shores of Lough Neagh, between Kinrush and Ballyronan. It is used infrequently by small numbers of birds (<20 birds).

12. *Ballyronan/Traad Point/Water Foot* (H9586): This area at the northwest corner of Lough Neagh is used regularly by significant numbers of birds, but only by first arrivals at the start of the autumn period. Up to 170 birds have been recorded and almost always use the area to rest and to feed on aquatic vegetation.

13. *Nenferry* (H9897): An area of agriculturally semi-improved and improved grassland at the northern end of Lough Beg where the River Bann exits the Lough. Grazing flocks utilise fields on both sides (Londonderry and Antrim) of the river with the fields on the western side being most frequently used. This site is typically utilised from December onwards, with a recorded maximum peak of 238 birds recorded in March 1997. However, around 120 birds are more frequently recorded. There are unquantified historical records of flocks using fields to the north of Bellaghy village (H9597).

14. *Church Island/Annagh/Ballyscullion House* (H9694): Birds often gather at the marshy lake shoreline adjacent to Church Island (H9794) during the early winter. Flocks are increasingly using agriculturally-improved grasslands in the nearby Annagh (H9694) and Ballyscullion House (H9696) areas. Around 100-200 birds use this site annually.

15. *Toome* (J9990): This area, to the west of Toomebridge, separates Loughs Neagh & Beg and forms one of the most extensive areas of flat low-lying grasslands in the entire Loughs Neagh & Beg area. The areas to the north, which bound the southern margin of Lough Beg (Creagh and Mullagh

(H9792)), are subject to periodic inundation depending on water levels. The fields to the north and south of the main road (A6) are of a more agriculturally-improved nature with a limited area under cultivation sometimes providing suitable feeding opportunities on stubbles and potato crops. Recent agricultural improvement has increased the area of available re-seeded pasture for grazing Whooper Swans. Recent local reports indicate that fields at Gortgill (H9992) on the eastern side of the River Bann are also frequently used, but these have yet to be substantiated. This area is amongst the most important in the entire Neagh/Beg area, holding on average 306 birds and peak of over 398 birds. Unlike other Lough Beg sites, Toome holds autumn concentrations from October onwards and numbers generally remain at around 200 birds throughout the mid winter and spring periods.

Recording of flocks at Toome is often at individual field level. The presence of major power lines across the site has been the subject of a study of the extent of line strikes on the flocks in the area. The area is being subject to industrial development, and the new Toome Bypass, which is under construction, traverses many of the traditional fields which have historically been used by Whooper Swans.

Other sites (associated with Loughs Neagh & Beg)

A number of other sites not immediately adjacent to Lough Neagh have been shown by ring-reading of marked individuals to be directly linked to sites on the main lake:

1. *Flatfield* (J1860) is a large area of flood meadow on the River Lagan, generally only used during flood conditions, when up to 160 birds have been recorded. Nearby grassland fields at Balloonigan (J1760), adjacent to the same river, are also used occasionally.

2. *Derryscollop/Tullyroan Corner* (H8755) is an area of hinterland floodplain meadows affected by water levels in the River Blackwater, and only used by Whooper Swans when inundated. Derryscollop always attracts large numbers of birds under these conditions, whilst Tullyroan is used infrequently.

2.2.2.4 Key references

McElwaine *et al.* (1995)

2.2.3 Upper Lough Erne Area

2.2.3.1 Background

Upper Lough Erne, in Fermanagh, forms part of a broader extensive wetland complex in a drumlin belt, which extends south and east into counties Cavan and Monaghan. The Upper Lough forms at a widening of the River Erne on the Cavan/Fermanagh border and comprises a myriad of small inter-drumlin lakes with many islands adjacent to the main body of the lake, especially at the southern end. Lower Lough Erne forms a deeper waterbody to the north.

Despite the difficulties in surveying such a fragmented site, Upper Lough Erne is well established as one of the most important areas for Whooper Swans in Northern Ireland. Recent WeBS maxima average at almost 970 birds but, like Loughs Neagh & Beg, this total comprises summed totals from many sub-sites. Around 1,250 birds were recorded during the 2000 international census (Colhoun *et al.* 2000)

The close proximity of a number of significant Whooper Swan sites immediately across the border suggests that both areas should be considered together, but the absence of intensive surveying on a regular basis in Cavan renders this impractical to date.

2.2.3.2 Historical status

Little historical information is available for the area.

2.2.3.3 Internationally important sites

i) Upper Lough Erne

Five-year mean 95/96-99/2000: 969

Site conservation status

SPA (Upper Lough Erne: selection stage 1.1)
Ramsar Site (Upper Lough Erne: criterion 6)
ASSI (Upper Lough Erne (various); Inishroosk; Corraslough Point; Dernish Island, Killymackan Lough; Finn Floods)
IBA (Upper Lough Erne: criteria A4i, B1i, B3, C2, C6)

Site description and habitat

Upper Lough Erne (H3231) forms an extensive complex freshwater system incorporating a mixture of islands, bays and many lakes bordered by damp pastures, fens, reedswamp and wet woodland. The

shorelines are sheltered and shallow, attracting large numbers of Whooper Swans that feed in both aquatic and terrestrial habitats. The majority of established feeding sites comprise periodically flooded agriculturally-improved grasslands adjacent to tributary rivers or to the small inter-drumlin lakes.

Numbers and trends

Peak numbers of Whooper Swans recorded at Upper Lough Erne have remained relatively stable since the mid 1980s, peaking at just under 1,000 birds in most years (Fig. 78). Numbers begin to build up in the autumn and continue to increase through the winter (Fig. 79). The site probably acts as a staging area for Whooper Swans moving north in the spring.

Site use

Although the complexity of the system leads to a degree of variability in usage of sites, especially in relation to water levels, these primarily influence distribution at local scales only. The eastern portion of the lough has a much broader area of low-lying wetland and grassland habitat than that on the western boundary. As a result, the majority of sites are located here, concentrated to the west of Lisnaskea and Newtownbutler. Around eight favoured sites have been identified:

1. *Colebrooke River/Ross Lough* (H3433): This extensive area to the west of the town of Lisnaskea forms one of the most important areas for Whooper Swans around the lough with a peak of up to 200 birds being present in most winters. Much of the area is low-lying agriculturally-improved grassland, interspersed with marshy areas and lakes. The whole site is very sensitive to changes in levels in the adjacent main lake and is subject to regular flooding during the winter months. Whilst birds can be recorded from anywhere within this complex, most frequently used locations are: Ross Lough/Drumroosk Lough/Cleenriss (H3433), Lough Digh/Inishroosk (H3233), Kilmore Lough (particularly in spring) (H3331), Rossgad Bridge (H3531) and Lough Head (H3532).

2. *Moorlough Lough* (H3929): A flock of up to 103 Whooper Swans feeds regularly on the agriculturally-improved grassland fields to the east of this reed-fringed lake. An outlying flock of around 20 birds also uses similar habitat adjacent to nearby Lough-a-hache (H4531).

3. *Derryany Bridge* (H3628): Around 50 birds are recorded regularly on agriculturally-improved grassland which, although adjacent to a small watercourse, is sufficiently elevated not to be subject to flooding.

4. *Lough Corby* (H3825): Whilst this lake (H3925), lying to the west of Newtownbutler town, is marshy near the waterbody, much of the surrounding area is managed as agriculturally-improved grassland. A flock of around 50 Whooper Swans is present here throughout the winter. The adjacent Sand Lough (H3726) also attracts birds (up to 40) on re-seeded grassland on its western shore, with smaller numbers recorded regularly at Landbrook Crossroads (H4023).

5. *River Finn* (H4320): Up to 70 Whooper Swans regularly use the marshy edges/adjacent rough pasture downstream of both Gortnacarrow Bridge (H4320) and Wattle Bridge (H4220). Around 40 birds also utilise agriculturally-improved grassland at Crockerahoas (H4222) on an irregular basis. The River Finn upstream in Cavan is frequently used by around 45 birds when water levels are high.

6. *Drumderg Lough* (H2922): A flock of around 50 birds regularly use agriculturally-improved grassland to the northern edge of this lake. The site is somewhat unusual in that there are adjacent houses and farms. Nearby, smaller numbers of birds also use land at Knockarevan (H3323).

7. *Swanlinbar River/Knockninny* (H2532): Around 130 Whooper Swans regularly use the agriculturally-improved grassland in this area throughout the winter. Fields utilised are either adjacent to the Swanlinbar River downstream of Thompson's Bridge (H2532) or beside the main body of the lough at Knockninny (H2731).

8. *Tamlaght* (H2741): Around 45 Whooper Swans frequent the agriculturally-improved grassland field to the north of Drumcullion Lough.

2.2.4 Down

2.2.4.1 Background

Down is interspersed with a large number of small inter-drumlin lakes, which, together with other dry sites, currently support around 200 Whooper Swans. Most birds either feed on submerged macrophytes or on agriculturally-improved grassland adjacent to the lake or river with which each flock is associated.

Strangford Lough (J5662) dominates the east of the County, and is a large tidal inlet, which is fringed by many small islands and rocky outcrops. Whilst Whooper Swans roost on the lough at the northern end in the Comber Estuary area, the extensive mudflats there are nowadays seldom utilised for feeding (formerly a flock used to frequent the

Maltings area (J5072), but were presumably affected by the closure of the distillery which gave the site its name). The widespread availability of stubble and vegetables in the Comber to Newtownards area is largely replaced by agriculturally-improved grassland with occasional stubble fields as one moves south down both sides of the Lough. The Quoile Pondage NNR at the southwestern end is a freshwater pondage formed by a barrage constructed in the 1950s to alleviate flooding of the town of Downpatrick. Little is known about the movements of Whooper Swans between Strangford Lough and the numerous hinterland lakes in Down.

2.2.4.2 Historical Status

The data-set for Strangford Lough for winter waterbird counts is the most extensive in Ireland and comprises summed totals from many sites. Hutchinson (1979) recorded 400-600 Whooper Swans in the early 1970s, and Prater (1981) gives a highest average monthly count for 1969-1975 of 440.

2.2.4.3 Nationally important sites

i) Strangford Lough

Five-year mean 95/96-99/2000: 84

Site conservation status

SPA (Strangford Lough: non-qualifying species)
Ramsar (Strangford Lough: non-qualifying species)
ASSI
IBA (Strangford Lough and Islands: non-listed species)
Strangford Lough Wildlife Scheme (National Trust)

Site description and habitat

Strangford Lough (J5560) is located on the east coast of County Down. It is a shallow sea lough with an indented shoreline and a wide variety of marine and intertidal habitats. The lough, although almost completely land-locked, contains extensive areas of mudflat, saltmarsh and rocky coastline with many islands resulting from flooded drumlins.

Numbers and trends

Numbers of Whooper Swans have been increasing at Strangford Lough in recent years following a decline in the 1980s and early 1990s (Fig. 80). Over 250 birds now visit the area regularly. The largest concentration of birds is at the northern end, where the availability of stubble and vegetables proves an attraction in early winter (Fig. 81).

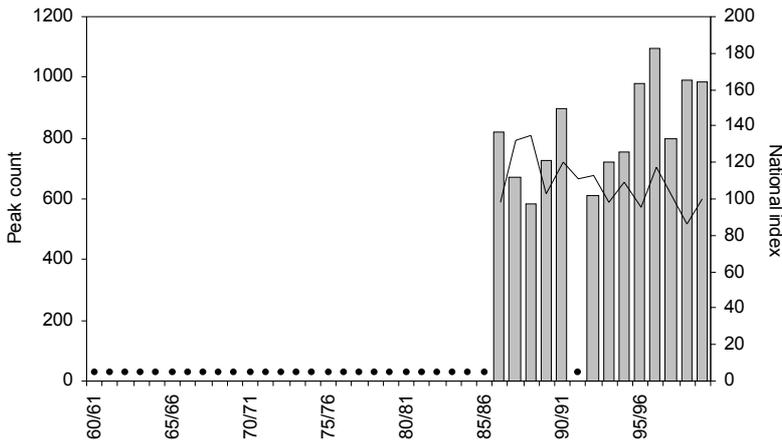


Figure 78. Whooper Swans at Upper Lough Erne, 1960/61-1999/2000: peak counts (bars) and Northern Ireland index (line) (circles denote years with no known data)

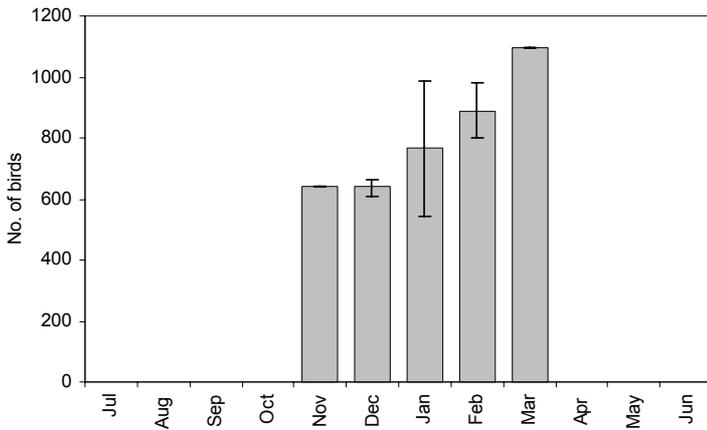


Figure 79. Whooper Swans at Upper Lough Erne, 1995/96-1999/2000: mean peak counts by month (error bars denote minimum and maximum peak counts during the period)

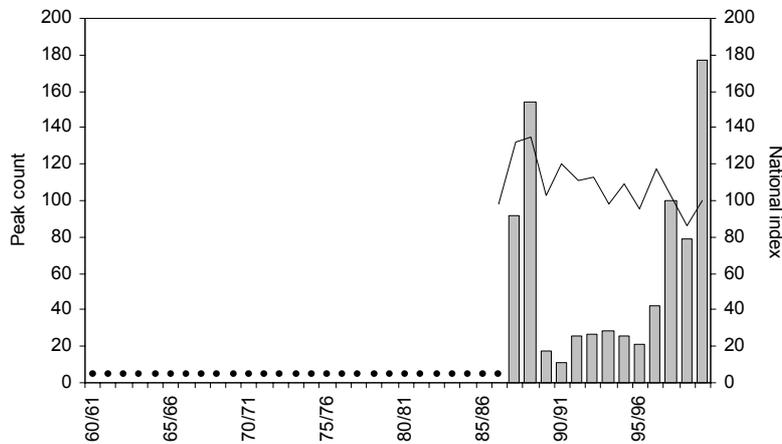


Figure 80. Whooper Swans at Strangford Lough, 1987/88-1999/2000: peak counts (bars) and Northern Ireland index (line) (circles denote years with no known data)

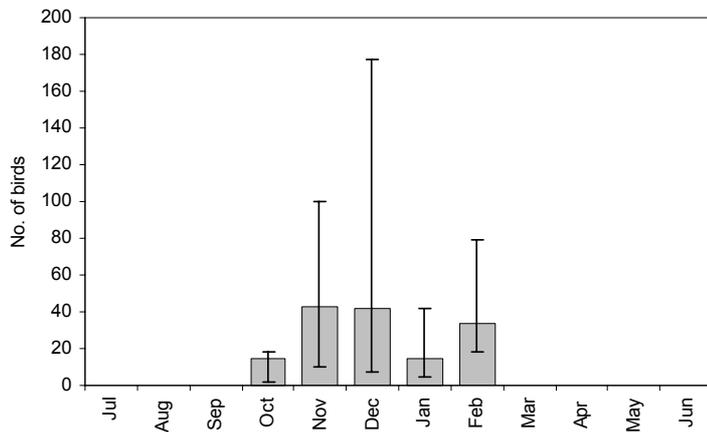


Figure 81. Whooper Swans at Strangford Lough, 1995/96-1999/2000: mean peak counts by month (error bars denote minimum and maximum peak counts during the period)

Site use

There are two main areas now used around the lough:

1. *Comber area* (J4768): Feeding flocks of Whooper Swans arriving in early winter are attracted to this area by the abundance of stubbles and vegetable crops, such as potatoes. Birds tend to disperse once these supplies have exhausted. Around 100 birds are recorded regularly. Sites used regularly are Ringcreevy (J4768), Longlands (J4870) and Ballyhenry (J4770). Re-sightings of marked individuals indicate that, soon after their arrival, these flocks occasionally use stubble fields to the west and south of the town of Donaghadee (J5878), some 15 km to the northeast.

2. *Quoile Pondage NNR* (J5048): Birds pass through this freshwater habitat in the early winter months, and do not generally stay for long. Whilst there, they either compete with the local Mute Swans *Cygnus olor* for pondweeds or fly out to graze on local stubbles during the daytime. The peak count in recent years has been 44 birds in winter 1999/2000.

Birds also use the Quoile River further upstream at Inch Abbey (J4745) and at the remnant Downpatrick Marshes (J4645), although these sites are not counted regularly.

2.2.4.4 Other sites

The abundance of small lakes and agriculturally-improved grassland throughout the County means that the area is scattered with sites which are used from time to time by Whooper Swans.

During the period 1986/87-1990/91, when the lakes alone were last intensively studied as an entity over the winter months, a maximum annual peak of 121 Whooper Swans was recorded, with birds being found on 34 out of the 115 lakes surveyed (McElwaine 1991). During the period 1992/93-1999/2000, peak counts of over 20 birds were recorded at the following sites: Begny Lake (J3049) (92 birds); River Bann/Corbet (J1743) (49); Glasker (J1336) (46); Ballyrone Lake (J2238) (40); Magill's Dam (J1849) (37); Monlough (J3964) (34); Tullyratty Great Dam (J5647) (24) and McAuley's Lake (J3648) (20). Peak numbers at many of these sites vary between winters. In addition, a site in the hills above Holywood (J4378) which was not counted regularly during that period, normally holds 30-40 birds, which feed on agriculturally-improved grassland and roost on an adjacent reservoir.

2.2.5 Antrim/Londonderry (excluding the Foyle/Swilly Complex)

2.2.5.1 Background

There are several sites in the north of the Province that regularly hold significant numbers of Whooper Swans. Some of these are river-based and most are located in areas rich in dry, agriculturally-improved grassland, autumn stubble or potatoes. Records of ringed birds in these flocks confirm that some of these sites may act as staging areas for migrating birds. Many of these sites are only counted on an irregular and uncoordinated basis, but it is considered likely that the combined mid winter population comprises around 250 birds.

The River Bush is a relatively small watercourse which runs through habitat which is generally improved dry grassland. In its lower reaches, fields adjacent or near to the river between Deepstown/Benvardin (C9433) and Seneirl Bridge (C9435) are favoured, with elevated stubble/potato fields at Seneirl and Townend (C9237) also being used increasingly in recent years. The average maximum flock size for this part of the river is 90 birds. Further upstream, potato fields downstream of Stranocum Bridge (D0030) can support around 130 birds in mid winter. The adjacent tributary, the Stracam River, between Ballynagar Bridge (D0032) and Dervock, and nearby fields at Derrykeighan (C9633) can also hold similar numbers. Many individuals move between these flocks.

A series of small lakes within the wooded Lisanoure Estate at Lough Guile (D0624) are used by both Whooper and Bewick's Swans as a roost site. Due to its relative isolation, this site is rarely counted, but a peak of 93 birds was recorded during the 2000 international census. A regular feeding area for these birds, on mixed farmland at Ballynagashel House (D0327), has only just been discovered.

Along the River Lower Bann, a flock of about 60 birds uses agriculturally-improved grassland fields upstream of Agivey Bridge (C9120). Most frequently used are Landagivey/Ballaghbeddy (C9120) (otherwise known as Vow Meadows), and an elevated dry agriculturally-improved grassland field on the other side of the road from Eden School (C9121). Occasionally, small numbers of birds are recorded adjacent to Agivey Bridge itself (C9022). Despite birds being recorded regularly from the Kilrea area at Portna (C9312) during survey work for the *Atlas of Wintering Birds in Britain and Ireland* (Lack 1986), this site appears to have been abandoned. There are infrequent reports of Whooper Swans

from the tidal Bann area, including a flock of 50 birds at Ballywoollen (C7835) in January 1999.

Boghill (C8734) is located on the outskirts of Coleraine. Around 70 Whooper Swans forage in the stubble fields, which are often partly flooded, across the B17 from the hotel and, more frequently, in dry grassland adjacent to Renwick House. These birds are reported to roost on a nearby reservoir. To the north of this site at Hopefield, Portstewart, up to 130 birds are sometimes recorded feeding on stubble.

2.2.5.2 Historical Status

Most of these sites are not covered by WeBS, and there are no known historical data.

2.2.6 Tyrone (excluding River Foyle)

2.2.6.1 Background

The River Blackwater, which forms the boundary between Counties Tyrone and Armagh, was subjected to a major drainage scheme in the mid 1980s. In addition to the flood-dependent Derryscollop site, which is covered under Lough Neagh, a separate flock of up to 60 birds frequents the river between Battleford Bridge (H7854) and Annaghroe Bridge (H7343). Much of the landscape is dominated by agriculturally-improved grassland lying behind earth floodbanks. The flock can be difficult to locate, suggesting that it may also use habitat elsewhere across the border in Monaghan.

Feeding flocks are usually located at Stragrane (H7749), Kedew (H7648), or less frequently at Glenabb (H7647) or Caledon (H7645). At Annaghroe (H7344), an area of marshland is actively managed/flooded as part of the compensatory measures for the drainage scheme, and Whooper Swans can be located either in the flooded marsh or the adjacent grassland.

Elsewhere in the county, small flocks of up to 20 birds can occur at Cullentra Lough (H4747), Lough More (H548), Lough na blaney bane (H5747), Mayheralough (H3081) and Lough Arh (C4800).

2.2.6.2 Historical Status

There is no known historical information for this area.

2.2.7 Armagh

2.2.7.1 Background

Whilst none of the sites in Armagh are nationally important for Whooper Swans, collectively they attract around 150-200 birds each winter. Typically, the sites used are agriculturally-improved grasslands. In the middle of the county, most are associated with rivers or with the abandoned Newry Canal which forms the boundary with Down. To the south, the sites continue the series of inter-drumlin lakes already discussed under Down, and reach down to the border with Monaghan. Sites supporting regularly around 20 birds include Mountnorris (H9935), Newry Canal (J0737), Aughnagurgan Lough (H8731), Tullynowood Lough/Darkley Lough/Gentleowens Lough (H8629) and Camlough (J0225).

2.2.7.2 Historical Status

There are no known historical data available for this region.

2.2.8 Fermanagh (excluding Upper Lough Erne)

2.2.8.1 Background

Given the dominance of Upper Lough Erne as suitable Whooper Swan habitat, and the length of time it takes to check that site by observers who mainly live in the east of the Province, it is perhaps unsurprising that the flocks situated in the remainder of the county are sparsely recorded.

A number of flocks were encountered in the early to mid 1990s, however, although their current status known. These include a flock in the Tempo area, which has been recorded from Lough Eyes (H3243), Lough Skale (H3044) and Derrin Lough (H3348) where up to 20 birds may be involved. In relation to Lower Lough Erne, birds have been recorded at Bannu Lough (H0865), in the Boa Island (H1163) and at Ross Lough, Derrygonnelly (H1346), although these flocks are not thought to be large. A small number of birds, including one neck-collared in 1994, use Muckeneigh Bay (G9154) on Lough Melvin on a regular basis. On the Arney River just east of Lough MacNean Lower, up to 50 birds use grass at Cushrushen (H1337), or more recently improved grassland at Brockagh (H1737).

2.2.8.2 Historical status

There is no known historical information for these small sites.

2.3 Republic of Ireland

2.3.1 Donegal

2.3.1.1 Background

Although rich in wetland habitats, the majority of Donegal's lakes are unattractive to waterbirds. The county's location, in the extreme northwest, means that many of these lakes hold Whooper Swans newly arrived from Iceland in October and November. The numbers involved are, however, relatively small and birds stay for short periods. However, large flocks are recorded at a number of coastal freshwater sites.

Away from the key resorts at the Foyle/Swilly complex (see above), a further seven coastal freshwater sites hold large flocks of Whooper Swans during the autumn staging periods. Durnesh Lough (Donegal Bay), in the southwest of the county, is the only other nationally important site in the county.

2.3.1.2 Historical status

Durnesh Lough was described by Hutchinson (1979) as one of Ireland's main Whooper Swan haunts during the middle of the 20th century, with over 200 birds recorded regularly. Peak counts were made in October, including 400 in 1966, 250 in 1969, 223 in 1972 and 323 in 1979. Around 100 birds were recorded during the mid 1980s (Sheppard 1993) indicating a decline during the early 1980s. In more recent years numbers have fluctuated markedly between years. The results of international censuses since 1986 have shown that Donegal regularly supports around 1,100 individuals, more than any other county on the island of Ireland.

2.3.1.3 Internationally important sites

i) The Foyle/Swilly complex

See Foyle/Swilly complex, Northern Ireland

2.3.1.4 Nationally important sites

i) Durnesh Lough (Donegal Bay)

Five-year mean 95/96-99/2000: 140

Site conservation status

IBA (Durnesh Lough: criteria B1i, B3, C2)

Site description and habitat

Donegal Bay (G8070) contains a mix of intertidal habitats in the enclosed inner bay and non-estuarine, predominantly sandy, coast in the outer bay. Freshwater and terrestrial habitats used by Whooper Swans are restricted primarily to Durnesh Lough (G8769), surrounding smaller lakes and adjacent areas of agriculturally semi-improved grassland.

Durnesh Lough itself is a relatively large freshwater lake separated from outer Donegal Bay by dunes and bounded by wet grassland, marsh and extensive reedbeds. The site acts as an important wintering and staging area, especially in autumn.

Numbers and trends

In the 1990s, around 50-200 birds were recorded at this site annually, with 277 birds recorded in 1997/98 (Fig. 82). Peak counts are generally recorded in the autumn. Given the variability in the size of counts, it is likely that more frequent counts during the peak autumn passage periods would yield higher numbers. Around 30-120 birds remain through the winter.

Site use

In the autumn, flocks occur most frequently on Durnesh Lough. In late autumn/early winter, smaller flocks occur at the lough or surrounding grasslands to the northeast at Lacklom (G9071).

2.3.1.5 Other sites

Dunfanaghy New Lake (C0036), on the north coast, holds around 40-80 birds in autumn. Flock size decreases to around 20-30 birds through the remainder of the winter. Clooney Lough (G7299) on the west coast near Portnoo holds around 20-60 birds in October. Single counts in excess of 20 birds at the Drowes River mouth on the Leitrim border (G7958) and Dungloe Lake (B7811) involve transient flocks on autumn passage. Elsewhere, small, relatively sedentary, wintering flocks of 10-20 birds occur at Lough Fern (C1824), or on agriculturally-improved grassland on the River Teannan downstream, and Kiltorris Lough (G6797).

2.3.1.6 Key references

Hutchinson (1979), Sheppard (1981), McElwaine *et al.* (1995), Colhoun (1998), Colhoun *et al.* (2000), Frederiksen *et al.* (2001)

2.3.2 Leitrim

2.3.2.1 Background

Leitrim is characterised by mountain lakes in the northern half of the county which develop into numerous small lakes in the low-lying southern half of the county. These occur in the poorly drained drumlin area which is an extension of that in neighbouring north midland counties of Cavan, Monaghan and Fermanagh.

An average of 315 Whooper Swans has been recorded in the county during the international censuses since 1991. However, there is only one nationally important site, although numbers recorded at a further two sites fall just below the qualifying threshold for national importance. Improved coverage of the latter two sites would almost certainly elevate their status.

The Ballinamore Lakes (H1211), centred on Ballinamore in south Cavan, is the most important area for Whooper Swans in the county. These are part of a large number of inter-drumlin lakes which continue eastwards into the important sites at Lough Oughter in Cavan and Upper Lough Erne in Fermanagh.

2.3.2.2 Historical status

Ruttledge (1974) noted that the species was present in the county and was more abundant than the Bewick's Swan before the early 1970s, yet there is little information on numbers and distribution. Fewer than 50 birds were recorded regularly at the key resort at Ballinamore Lakes in the mid to late 1970s. E. Mayes (in Sheppard 1993) recorded 100-140 birds at this site during a survey in the early 1990s.

2.3.2.3 Nationally important sites

i) Ballinamore Lakes (also Cavan)

Five-year mean 95/96-99/2000: 100

Site conservation status

None

Site description and habitat

The Ballinamore Lakes are situated in east Leitrim/west Cavan along the Ballinamore/Ballyconnell Canal and centred on Ballinamore (H1211). The group consists of over 50, mostly small (<0.1 ha), lakes, most of which lie in Leitrim.

Numbers and trends

Some records are available from the late 1970s, especially from the larger Garadice Lough, but the status of Whooper Swans in the area was unclear at that time because count coverage was so poor. The present situation appears similar to that for the mid 1980s when flocks occurred in small numbers on most lakes. At this time, highest numbers were recorded on Ballymagauran, Templeport and Garadice Loughs. Around 60-120 Whooper Swans have been recorded in this area in recent years (Fig. 83).

Site use

Whooper Swans are widely distributed in small numbers throughout this complex of lakes. However, since 1994/95, the species has been recorded at just 20 of the 58 lakes that have been counted through I-WeBS.

Ballymagauran Lake (H2112; also Cavan) is by far the most important of these lakes, supporting up to 126 birds. The flat grassland area northwest of the lake (H2011) is the main feeding area for these birds.

Templeport Lough (H2116) lies 4 km north of Ballymagauran, and wholly within Cavan, and holds around 30-40 birds. Flocks of 20-40 birds have also been recorded at St John's Lough (H0910), Garadice Lough (H1811), Keenheen Lough (H1607), fields near Newton Gore (H2110), Corgar Lough (H1512) and Lough Reane (H0909), all of which occur in Leitrim.

2.3.2.4 Other sites

The Northwest Leitrim mountain lakes (also Sligo/Leitrim) are a group of ten lakes of varying size. Around 50-170 Whooper Swans have been recorded at Lough Allen (G9619) in recent years. Flocks also move between the smaller lakes of Carrigeencor (G8333) and Nahoo (G8131) and the adjacent River Bonet (G3081).

Further south, the Rinn Lough group, centred on Lough Rinn (N1092; also Sligo), holds 50-150 birds. However, the most recent five-year mean of 96 falls just short of the threshold for national importance. Whooper Swans also occur at Kiltogher Lough (G9745), which supports 20-40 birds, and the Eslin River (N0597) and Lough Bofin (N0488), which hold around 20 birds each.

2.3.2.5 Key references

Sheppard (1993)

2.3.3 Sligo

2.3.3.1 Background

Although Sligo contains a wealth of wetland habitat types, its importance for wintering waterbirds is primarily associated with the non-estuarine coast and the three estuaries centred on Sligo itself (G6936). The numerous lakes are less important yet collectively hold numbers of Whooper Swans comparable to those recorded in Leitrim. Flocks, however, tend to be more concentrated (mean flock sizes of 20 in Sligo and 10 in Leitrim in January 2000; Colhoun *et al.* 2000), with the largest numbers recorded at those lakes which form part of wider complexes bordering other counties. Those treated elsewhere include: North West Leitrim Mountain Lakes (see Leitrim), Ballinamore Lakes (see Cavan) and Rinn Lough Lakes (see Leitrim). Within Sligo, Lough Gara is numerically the most important site.

2.3.3.2 Historical status

Little published information exists on the status of Whooper Swans in Sligo. Rutledge (1974) recorded the species' presence but made no specific mention of its distribution in the county. Counts made since the 1970s indicate that numbers of Whooper Swans have changed little over the last three decades (Hutchinson 1979, Sheppard 1993). Successive international censuses have recorded around 100-200 birds in the county between 1986 and 1995. A high count of 362 birds was made in January 2000 (Colhoun *et al.* 2000), and was probably the result of improved coverage.

2.3.3.3 Internationally important sites

i) Lough Gara (also Roscommon)

Five-year mean 95/96-99/2000: 321

Site conservation status

SPA (Lough Gara)
Ramsar Site (Lough Gara)
Wildfowl Sanctuary (Lough Gara)
IBA (Lough Gara: criterion B3)

Site description and habitat

Lough Gara is a shallow limestone lake divided into two main parts (upper M6897 and lower lakes M7099) and a third less well-defined area at the southern margin, which merges into the upper lake when water levels are high. Several rivers enter the lake from the south - the River Lung in the southwest and the Breedoge in the southeast - and the River Boyle exits the lower lake in the northeast where it flows to eventually join the Upper River Shannon via Lough Key (G8305). The lake margins comprise a number of small peninsulas interspersed with small sheltered bays, which are fringed with reedbed, marsh and agriculturally semi-improved grassland. Much of the isthmus between the two main parts of the lake and the area to the south of the upper lake comprise raised bog with some afforestation. The surrounding land comprises a mix of intensively managed and agriculturally semi-improved grassland.

Numbers and trends

Although very large numbers of Whooper Swans have been recorded, most notable among which was a count of over 650 in January 1997, average mid winter counts generally range between 100 and 200 birds (Fig. 84). Large counts, such as that described, tend to occur during periods of cold weather when the availability of ice-free water attracts birds from surrounding frozen sites.

Site use

The lake margins support dispersed groups of feeding Whooper Swans and are particularly attractive when water levels are raised, flooding surrounding summer-grazed pasture and marsh. Favoured feeding areas immediately around or on the margins of the lake include Cuppanagh Bridge (G7301), the northern end of the lower lake (G7002), Inchmore (M7098), Rathtermon (M7198) and the eastern arm of the upper lough (M7097).

A number of sites associated with the Lung River to the south are probably used by birds that roost on Lough Gara. The primary feeding areas are at Coollena/Magheraboy (M6495; M6595) and on the southern floodplain of the Lung, east of Ballaghaderreen (M6294), at Banada (M645950). Two further sites are located upstream east and west of Crunaun Bridge at M6092 and M5992, respectively.

2.3.3.4 Other sites

Coastal areas in Sligo Bay and further north hold small numbers of Whooper Swans regularly during mid winter and, occasionally, large numbers of autumn migrants. Sligo Bay (G6040) has held up to 177 birds. Elsewhere in the Sligo Bay area, the flooded grassland in the Ballintemple area (Drumcliff Bay G6042) at the Yellow Strand dunes at Ballintemple (G5743) and Cloughcor (G6043) are the only other areas which frequently hold flocks of more than 30 birds.

Further to the north, the Bunduff Lakes (G7155) comprise a cluster of three small coastal freshwater lakes. These normally hold a flock of 10-15 birds during mid winter and larger flocks have been recorded during the autumn. Up to 170 birds have been recorded, but flocks normally pass through quickly in October.

Ballygawley Lough (G6928), 2 km east of Ballysadare, holds around 30 birds.

2.3.3.5 Key references

Hutchinson (1979), Sheppard (1993)

2.3.4 Mayo

2.3.4.1 Background

Mayo contains a large and complex range of wetland habitats important for waterbirds, including mudflats, non-estuarine coast, freshwater lakes, bogs, turloughs, rivers and coastal lagoons. Whooper Swans occur in most of these habitats and it is convenient to subdivide the region into three zones: (1) a coastal belt comprising estuarine and coastal freshwater sites, (2) the large central lakes, and (3) the low-lying eastern and southeastern portion comprising smaller lakes and turloughs. Numbers of Whooper Swans are generally highest in the latter area.

2.3.4.2 Historical status

Ruttledge (1974) suggested that Whooper Swans were scarce in Mayo during the early 1900s, confined chiefly to the Mullet, Lough Carrowmore and Keel Lake (Achill). The species became much more widespread in 1943 (Ruttledge 1950). Since the mid 1980s, successive international censuses have recorded 700-900 birds in the county.

2.3.4.3 Internationally important sites

i) Greaghans

Five-year mean 95/96-99/2000: 250

Site conservation status

None

Site description and habitat

Greaghans (M2962) is a turlough and associated grassland site between Carras Lake and Headfort/Kilglassan Turlough. Large numbers of Whooper Swans feed on fertilised swards at local dairy farms.

Numbers and trends

Two counts of 250 birds have been made in recent years. It is unknown whether birds were recorded here before the 1990s.

Site use

Greaghans is by far the most important site for Whooper Swans in the area. When water levels are high, numbers generally decrease as birds disperse more widely. There are six discrete feeding locations in the area between the Robe River and Greaghans (J. Small pers. comm.). A smaller site at Gortshehy (M3266) holds a flock of around 50 birds.

2.3.4.4 Nationally important sites

i) Roundfort/Kilglassan Turlough

Five-year mean 95/96-99/2000: 155

Site conservation status

None

Site description and habitat

Roundfort Turlough (M2765) is a complex of turloughs, 1 km southeast of the River Robe.

Numbers and trends

Between 100 and 250 Whooper Swans have been recorded between 1995/96 and 1999/2000 (Fig. 85). Within this period, two counts have exceeded the threshold for international importance. This site, and others in the vicinity, probably attain such levels frequently in mid winter and spring when conditions are favourable.

Figure 82. Whooper Swans at Durnesh Lough, 1960/61-1999/2000: peak counts (bars) (circles denote years with no known data)

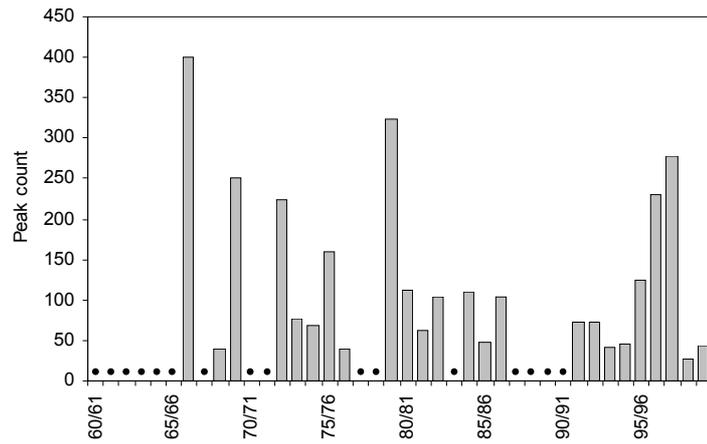


Figure 83. Whooper Swans at the Ballinamore Lakes, 1960/61-1999/2000: peak counts (bars) (circles denote years with no known data)

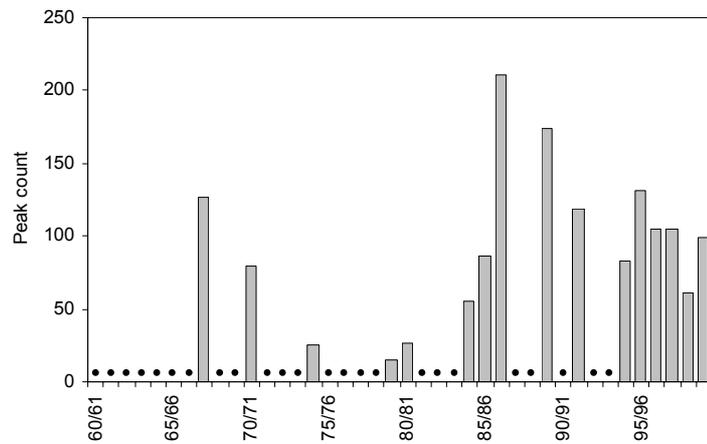


Figure 84. Whooper Swans at Lough Gara, 1960/61-1999/2000: peak counts (bars) (circles denote years with no known data)

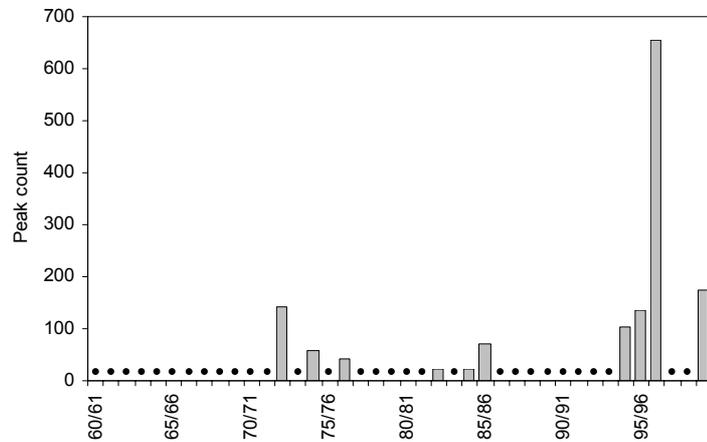
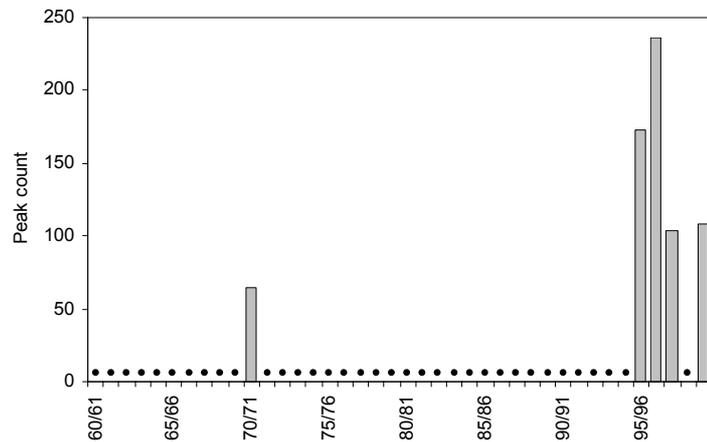


Figure 85. Whooper Swans at Roundfort/Kilglassan Turlough, 1960/61-1999/2000: peak counts (bars) (circles denote years with no known data)



Site use

The distribution of standing water and flooded grassland determines feeding locations of Whooper Swans. The four small turloughs and associated grassland areas are all used. There may be some interchange between birds from this flock and those recorded at Greaghans (M2962) and sites associated with the River Robe.

ii) Carras Lough

Five-year mean 95/96-99/2000: 150

Site conservation status

None

Site description and habitat

Carras Lough (M3162) is a small lake 6 km southeast of Hollymount and is one of a few lakes among an area of turloughs.

Numbers and trends

This site qualifies as nationally important because of one notably high count of 250 birds in 1998/99 (Fig. 86). No count data are available prior to winter 1995/96.

Site use

Flocks have been observed feeding on adjacent grassland and it appears likely that a network of sites within around a 5 km radius may be utilised. Interchange between birds from this flock and those recorded at Greaghans and Roundfort is likely to be high.

2.3.4.5 Other areas

The coastal belt extending from the Mullet peninsula (F7030) south to the Galway border at Killary Harbour (L7964) includes estuarine, non-estuarine and coastal freshwater habitats, and broadly consists of the Mullet peninsula, Achill Island and the South Mayo Coast. The most important sites on the Mullet peninsula are Termoncarragh Lake (F6634) and Cross Lough (F6429) both on the Mullet peninsula. Both account for the majority of birds on the broader 'Mullet, Broadhaven and Blacksod Bays' site which supports around 30-60 birds. High counts are generally recorded during the autumn, although up to 191 birds have been recorded in mid winter.

Keel Lough (F6405) on Achill Island holds birds throughout the winter, yet numbers are highest during the autumn. Peaks of around 70 birds have been recorded, yet many fewer birds are recorded in most years.

The small coastal lagoons on the South Mayo Coast from Emlagh (L7479) to Tonakeera (L7368) hold around 30 Whooper Swans. Over 40 birds have been recorded, mostly in October, at Dooaghtry/Corragaun Loughs (L7469), Cross Lough (Killadoon; L7474) and Roonah Lough (L7576).

A chain of large lakes effectively separates the western mountainous coastal portion of Mayo from the eastern low-lying part of the county. These include, from north to south, Loughs Conn and Cullin (G1510) and Loughs Carra and Mask (M1060), 20 km further south. The River Moy enters the sea north of Ballina (G2418) and runs to the east of Lough Cullin. A number of sites along the Moy hold grazing Whooper Swans in mid winter; these probably roost on Lough Cullin and some interchange is likely between these birds and those recorded at the lakes to the east (Attymass G2812) and west (Derrymannin Lough G2111; Lough Alick G2114). Flocks of around 60 birds have been recorded at Tonybaun on the Moy floodplain (G2510) and Pollagh (G2501). Smaller numbers occur on Lough Conn (G2007), Cullin (G2303), Lough Muck (G3003), Callow Lakes (G3103), Levally Lough (G1404), Lough Alick, Derrymannin Lough and the Attymass Lakes.

Between Loughs Cullin and Carra lie the Castlebar Lakes (centred on the towns of Castlebar M1589 and Balla M2584), which have supported nationally important numbers in some years. The lakes and turloughs around Balla, especially at Pollavaddy (M2784), Lough Aveely (M2785), and nearby Tawny Lough (M3083) are particularly important, the latter site supporting around 40-50 birds.

Loughs Carra (M1771) and Mask (M1166; also Galway) hold relatively few Whooper Swans, averaging around 54 birds for the period since 1995/96. Large flocks also occur in the clusters of smaller lakes and turloughs along the River Robe east of Ballinrobe (M1064).

The low-lying smaller lakes and turloughs of eastern Mayo are the most important areas for Whooper Swans in the county and include the only sites attaining international and national importance. The Ballyhaunis complex comprises some 50 small to medium-sized lakes centred on Ballyhaunis (M4979) which continue eastwards into Roscommon. Annual peaks generally fall in the range 50-70 birds and are made up of many small flocks.

The turlough and lake complex in southeast Mayo collectively holds large numbers of Whooper Swans. They continue into the North Central Galway Lake complex (see Galway). Interchange between the 30-

40 birds recorded at Shrulle (M2752) and Skealogan Turloughs (M2463), east and south-east of Ballinrobe, and those at the key resorts at Carras Lough, Roundfort Turlough and Greaghans, is likely to be high.

2.3.4.6 Key references

Ruttledge (1950), Ruttledge (1974)

2.3.5 Roscommon

2.3.5.1 Background

Roscommon is a mainly low-lying county with many small lakes and turloughs providing a range of potential feeding and roosting habitats for Whooper Swans. The eastern county boundary is marked by the River Shannon. Three wetland complexes in the northern half of the county consist of around a hundred lakes and turloughs. To the west, the Ballyhaunis Lakes (see Mayo) extend eastwards to the headwaters of the River Suck from Mayo.

In central and northeast Roscommon, the Annaghmore and Castleplunket Turlough complexes are the dominant wetlands. The latter complex of almost 20 small turloughs regularly supports nationally important numbers of Whooper Swans.

To the south and west of Roscommon Town (M8764), the River Suck Callows hold nationally important numbers of Whooper Swans. The sites along the Suck and the Shannon, into which the Suck flows further south, hold the most significant concentrations of Whooper Swans in the county. The Shannon Callows are internationally important and several frequently used and identifiable sites on the Roscommon side of the callows have been identified.

2.3.5.2 Historical status

Historically, the Castleplunket area has been important for Whooper and Bewick's Swans for many decades, the latter outnumbering the former until the early 1970s (Hutchinson 1979, Sheppard 1993). Peak counts in the mid 1970s and mid 1980s indicated that 100-120 birds were using the area. An average of 576 birds have been recorded in Roscommon during the international censuses since 1986.

2.3.5.3 Internationally important sites

i) Shannon Callows (also Galway, Westmeath, Offaly & Tipperary)

Five-year mean 95/96-99/2000: 305

Site conservation status

SPA (River Shannon Callows: Portumna-Athlone)
IBA (River Shannon Callows: Portumna-Athlone: criteria A4i, B1i, B3, C2)

Site description and habitat

The section of the Shannon between Lough Ree and Lough Derg and the contiguous Brosna and Suck Callows are outstanding wetlands with unmodified floodplains subject to periodic flooding. These seasonally flooded lowland wet grasslands (callow) provide rich feeding for a variety of waterbirds but are less attractive when the Shannon is not in flood. The river demarcates the boundary between Roscommon and Galway to the west, and Westmeath and Offaly to the east.

Numbers and trends

Up to 901 birds have been recorded in the Shannon Callows as a whole, yet peaks of 100-500 are recorded more frequently (Fig. 87). Table 3 shows the results of I-WeBS aerial censuses (undertaken primarily in January) of the entire area, illustrating the relative importance of each section, and highlighting the particular importance of the section from Athlone to Clonmacnoise.

Because many of the areas used by Whooper Swans are inaccessible during high water levels, data collected during aerial censuses provide the best overview of the distribution of Whooper Swans in the Shannon Callows. However, additional land-based counts have contributed to our understanding of the number of birds using the area and are listed below.

The results of the aerial censuses indicate that around 61% (265 birds) of the Whooper Swans in the Shannon Callows occur in the section from Athlone south to Shannonbridge (bordering Westmeath, Roscommon and Offaly). On average 170 birds, or 39% of the overall site peak mean, have been recorded on the Shannon Bridge to Portumna section (which borders counties Galway, Offaly and Tipperary).

Table 3 Results of aerial surveys of Whooper Swans at the Shannon Callows

Section	94/95	95/96	96/97	97/98	98/99	99/2000	Mean
Athlone - Clonmacnoise ¹	586	144	270	0	50	174	245
Clonmacnoise - Shannonbridge ²	0	0	92	0	10	0	20
Shannonbridge - Shannon Harbour ³	205	12	5	0	7	80	62
Shannon Harbour - Banagher Bridge ⁴	110	75	15	0	0	26	45
Banagher Bridge - Meelick Weir ⁵	0	0	0	0	0	0	0
Meelick Weir - Portumna ⁶	0	11	25	0	62	221	64
Total	901	242	407	0	129	501	436

*Site use*1. *Roscommon*

The stretch of the Shannon which forms the boundary between Roscommon and Westmeath/Offaly as far south as the confluence of the Suck and Shannon (Shannonbridge) (M9624) is probably the most important section of the Callows for Whooper Swans and includes many of the most important sites.

In Roscommon, the most favoured sites are the 3 km section south of Cloonown (N0435) and Coolumber/Derrineel (N0031) (J. Small pers. comm.). Water levels play an important role in determining flock distribution and some feeding sites probably remain to be located. However, when water levels are high, Bigmeadow/Doovoge (N0340) is especially favoured. Recent land-based peak counts include (numbers in superscript refer to aerial census areas listed in Table 3): 400 birds at ¹Bigmeadow/Doovoge (N0340), 95 at ¹Cloonown (N0435), 83 at ¹Long Island (N0535), 120 at ¹Inchinallee (N0332), 180 at ¹Coolumber/Derrineel (N0031), and 28 at ²Devenish Island (M9828).

2. *Galway*

Recent land-based peak counts include (numbers in superscript refer to aerial census areas listed in Table 3): 50 birds at ⁵Meelick/Big Island (M9312) and 30 at ⁶Meeneen (M9011).

3. *Offaly*

Recent land-based peak counts include (numbers in superscript refer to aerial census areas listed in Table 3): 46 at ¹Boor River/Bloomhill (N0534), and 111 at ³Derryholmes (N0022).

ii) Suck Callows

Five-year mean 95/96-99/2000: 164

Site conservation status

SPA (River Suck Callows: Shannon Bridge-Athleague)
Nature Reserve (Muckanagh Wildfowl Sanctuary)
IBA (River Suck Callows: Shannon Bridge-Castlecoote: criterion B3)

Site description and habitat

The most important features of the River Suck (M8050) for waterbirds are the adjacent areas of lowland wet grassland which periodically flood. This area is similar to the contiguous Shannon and Brosna Callows further south. The seasonally flooded grasslands along the river floodplain and surrounding agriculturally-improved grasslands provide attractive feeding habitat for Whooper Swans.

Numbers and trends

Numbers typically range between 100 and 200 birds, peaking in mid winter and spring (Fig. 88). When floodwaters are high, large areas become inaccessible and Whooper Swans become difficult to monitor from the ground.

Site use

The most important feeding areas occur along the c. 40 km stretch from just north of Athleague (M8357) to the confluence of the Rivers Suck and Shannon at Shannonbridge (M9625).

Whilst feeding flocks have been recorded along many sections, probably the most important and consistently used occur in the upper section north of Ballinasloe (M8430) at Castlestrange (M8160; maximum count: 150), Athleague (M8357; maximum count: 147) and Clooncannon (M7956; maximum

count: 55). In this section, flocks of around 10-100 birds also occur at Cloonfaghna, Correal Cross/Ballygalda (M8560), Ballinturly Turlough (M8360) and Cloonakilleg (M8151). It is probable that many of these sites relate to the same flocks reacting to different water levels.

To the south, between Ballyforan (M8146) and Ballinasloe (M8531), 10-20 birds have been recorded at Thomas Street Turlough (4 km east of Ballyforan M8646), Bellagill Bridge (M8334); between Ballinasloe and Shannonbridge, peak counts of eight, 105 and 176 have been recorded at Culliagh (M8827), Correen (M9125) and Sugarloaf Hill (M9524), respectively.

iii) Castleplunket Turloughs

Five-year mean 95/96-99/2000: 165

Site conservation status
None

Site description and habitat

The Castleplunket Turlough group consists of two permanent lakes and almost 20 turloughs 6 km south of Tusk (M8381), centred on Castleplunket village (M7777), in central Roscommon.

Numbers and trends

Given the proximity and ephemeral nature of many of the component areas, it is likely that the Whooper Swan flock moves widely, and probably on a daily basis. The site currently qualifies as internationally important and 251 birds were recorded during the 2000 international census (Fig. 89; Colhoun *et al.* 2000). However, because the flock is highly mobile, counts probably underestimate the total number of birds using this area.

Site use

Water levels are so variable in the area that waterbirds, including Whooper Swans, move frequently between the various waterbodies, few of which are marked on maps. Around 50-110 birds have been recorded at Mullygollan East (M8078), Mullygollan South East (M8079), Brierfield/Tonbaun (M8076), Rathnalulleagh (M7875) and Carrowduff Turloughs (M7773).

2.3.5.4 Other sites

The Annaghmore complex and the lakes eastward towards the Upper Shannon (Lough Elia M978; Tully Lough M9891; Lough Acrick N0185; Kilglass Lough M9886) hold around 20-50 birds each at peak times.

The Southern Roscommon Lakes occupy the area between the Suck and Lough Ree on the Shannon system. This group of turloughs and permanent lakes, of which Lough Croan (M8848) is probably the most important, hold around 20-50 Whooper Swans during the winter.

Lough Ree (N0251), which forms at a widening of the Shannon on the eastern boundary of the county, holds relatively small numbers of Whooper Swans. Although around 60-80 birds are regularly recorded at this site, the most important individual areas are the bays (in Westmeath) and adjacent turloughs/lakes (in Longford) in adjoining counties.

2.3.5.5 Key references

Heery (1990), Sheppard (1993)

2.3.6 Longford

2.3.6.1 Background

Longford shares similar habitat characteristics with most of its neighbouring counties. The drumlin lakes in the north of the county are relatively limited in extent, certainly compared to the large numbers in Leitrim of which they are a continuation. Apart from Kinale/Derragh, it also lacks the large lakes so characteristic of Westmeath to the east.

Away from the latter site, important wetland habitat for waterbirds is located in the western half of the county where the Upper Shannon forms the border with Roscommon and flows into Lough Ree south of Lanesborough (N0068). This section of the Shannon is not as important as the Shannon Callows further south (see Roscommon) and few sites are known to hold large numbers of Whooper Swans. Lough Forbes (N0881) forms at a widening of the Upper Shannon. It is amongst the most important sites in the county, holding around 30-70 Whooper Swans.

Counts from Cordara (N0263), Turreen (N0165) and Fortwilliam Turloughs (N0163), adjacent to Lough Ree, contribute significantly to the overall totals for the Shannon Callows. Movements of birds between these sites are probably frequent. Peak counts of 60-70 birds have been recorded.

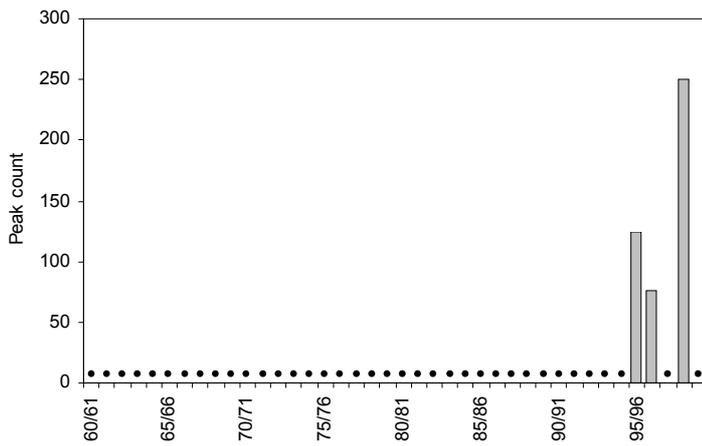


Figure 86. Whooper Swans at Carras Lough, 1960/61-1999/2000: peak counts (bars) (circles denote years with no known data)

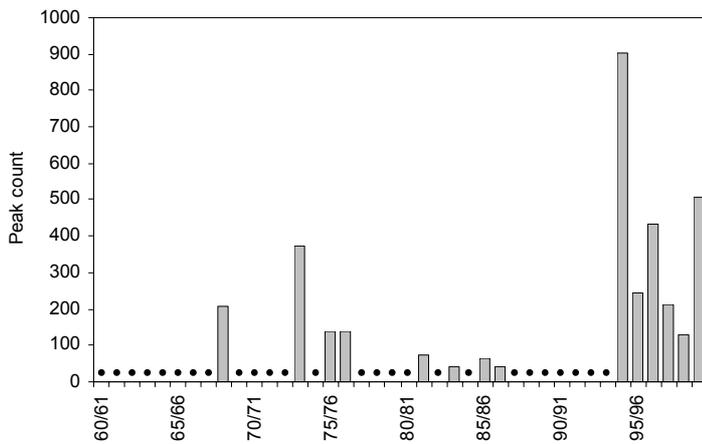


Figure 87. Whooper Swans at the Shannon Callows, 1960/61-1999/2000: peak counts (bars) (circles denote years with no known data)

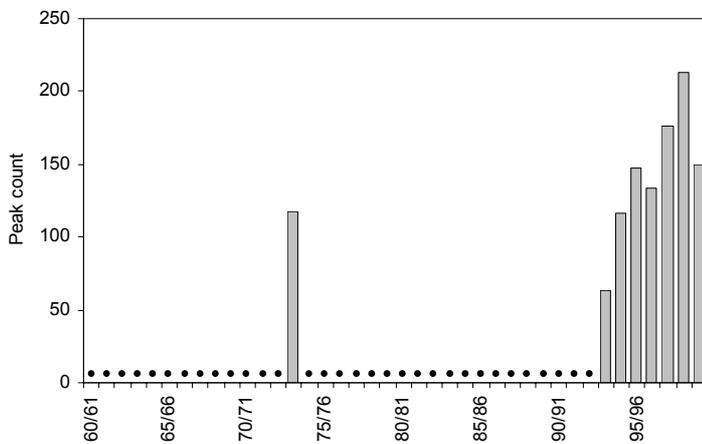


Figure 88. Whooper Swans at the Suck Callows, 1960/61-1999/2000: peak counts (bars) (circles denote years with no known data)

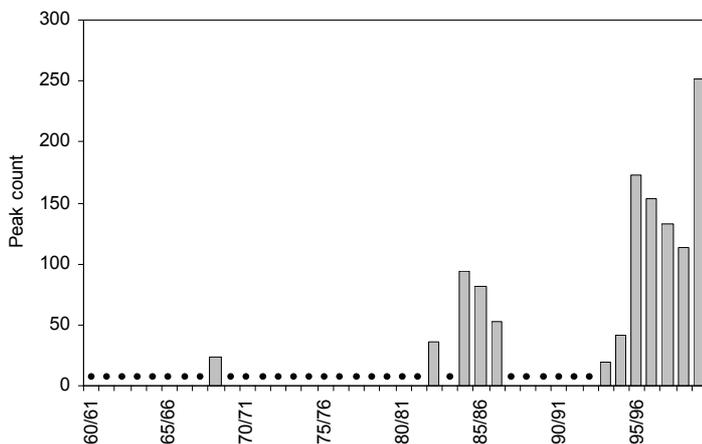


Figure 89. Whooper Swans at the Castleplunket Turloughs, 1960/61-1999/2000: peak counts (bars) (circles denote years with no known data)

Lough Gowna (N3089), in the northeast of the county (also Cavan), resembles Lough Oughter further north, and supports flocks of Whooper Swans. Up to 89 birds have been recorded at this site. The area around Scrabby Bridge (N3290), particularly to the south and east (N3289) and Cornagran (N3090), technically in Cavan, are the most frequently used, and numerically important, areas for Whooper Swans.

2.3.6.2 Historical status

The results of previous waterbird surveys in the 1970s and 1980s suggest that there have been similarly low numbers of Whooper Swans in Longford in recent decades (Hutchinson 1979, Sheppard 1993). The average of January totals at four key sites, taken from the results of the four international censuses since 1986, is just 76 birds.

2.3.7 Galway

2.3.7.1 Background

Galway consists of indented non-estuarine coast, bounded inland by many small unproductive lakes in blanket bogland, very similar to the habitats present in Mayo. This area is separated from the eastern half of the county by Loughs Mask and Corrib (also Mayo); east Galway has a wealth of permanent lakes and turloughs which continue eastward to the Suck and Shannon Callows. Galway provides suitable feeding areas for Whooper Swans and supports a large number of birds during the winter. Five internationally and one nationally important sites are located in the county, all in the eastern portion.

Given the large number of sites involved, it is useful to group clusters of sites into regions.

The North Central Galway Lakes between Tuam (M4352) and Lough Corrib consist of several turloughs and permanent lakes and support internationally important numbers of Whooper Swans. Other sites not used to calculate site totals, but which occur in the same region, include Kilglassan Turlough (see Mayo M2765), River Clare (various locations - M3732) and Lough Corrib (M2832), each of which hold 30-90 Whooper Swans each during the winter.

A further group of lakes in northeast Galway lie between Tuam and the River Suck (M6060). These hold fewer birds (c. 50) than the western complex. However, Lough Nalarsagh (M6147), not covered by I-WeBS but studied intensively, is a numerically

important site. Over 120 birds have been recorded here in recent winters.

Of the small group of lakes along the Mayo border centred on Williamstown (M6269), only Corralough (M6169) has held more than 20 birds in recent years. The southern group, running from Athenry (M5028) south, are largely an extension of the fen and lake system of north Clare. This area holds three internationally important sites: Coole/Newtown complex (M4204), Lough Coy complex (M4907) and Rahasane Turlough (M4719), and one of national importance, Ballinduff Turlough & Grassland (M4607). Numerous other sites in the county support around 20-60 birds. These include Castleboy Grassland (M5210) northeast of Lough Coy, Pollnagarragh Marshes (M4816), Termon Turloughs (M4197) and Cahermore Turlough (M4207).

2.3.7.2 Historical status

The Whooper Swan was first recorded in Galway on Kylemore Lake in March 1939. Ruttledge (1974) indicated that the species was relatively scarce species in Galway until after the 1940s, outnumbered and with a more restricted distribution than the Bewick's Swan. The situation was reversed by the 1970s and numbers of Whooper Swans have remained relatively stable since the then, especially those in the north central and southern lake complexes. Galway has supported the highest number of Whooper Swans of any county in successive national censuses, with a mean count of over 900 birds.

2.3.7.3 Internationally important sites

i) Shannon Callows

See Roscommon

ii) Coole Lough-Newtown Turlough

Five-year mean: 95/96-99/2000: 214

Site conservation status

SPA (Coole Park and Garryland complex)
Ramsar Site (Coole Lough and Garryland Complex)
Nature Reserve (Coole-Garryland)
Wildfowl Sanctuary (Coole Lough)
IBA (Coole Park and Garryland complex: criteria C7)

Site description and habitat

The Coole complex of turloughs is part of an extensive area of fenland and lakes which continue into north Clare. The area contains a mix of grasslands, turloughs, rivers and permanent water (Coole Lough M4204).

Numbers and trends

Up to 648 birds have been recorded here, yet the most recent five-year mean is just over 200 birds (Fig. 90). Peak numbers are generally recorded in December and January.

Site use

Whooper Swans use wet grasslands around the cluster of small turloughs in the area (J. Small pers. comm.). An elevated area of grassland north of Ballyloughan (M4507) was used extensively in 1996/97, and Caherglassaun Lough (M4106) is used on a regular basis.

iii) Lough Coy Complex

(Blackrock/Bullaunagh/Ballylee)

Five-year mean 95/96-99/2000: 167

Site conservation status

None

Site description and habitat

This is a complex of grassland and turlough, similar to that found at Coole.

Numbers and trends

Few historical data are available for this site, but Whooper Swans were certainly present in the mid 1980s (Fig. 91). Although the most recent five-year mean is just below 170, up to around 300 Whooper Swans have been recorded in recent years.

Site use

Whooper Swans utilise turlough and grassland habitats in the area. Turloughs at Bullaunagh (M5009), Blackrock (M5008), Ballylee (M4707) and Castleboy (M5111) are all frequented.

iv) Rahasane Turlough

Five-year mean 1995/96-1999/2000: 165

Site conservation status

SPA (Rahasane Turlough)

IBA (Rahasane Turlough: criteria B1i, B3, C2)

Site description and habitat

Rahasane Turlough (M4819) lies in the Dunkellin catchment and is Ireland's largest remaining turlough. It comprises marshes, seasonally flooded

wet meadows, with limestone outcrops and scrub at its margins.

Numbers and trends

Counts of Whooper Swans vary markedly between years at this site yet have regularly exceeded 100 birds since the early 1970s. Recent peaks of 248 and 250 were recorded in November and February, respectively (Fig. 92). The timing of peaks, re-sightings of marked birds, and the relatively low numbers present in January, around 20 birds, suggest that this site may be particularly important during autumn and spring migration.

Site use

Re-sightings of marked birds indicate that this site frequently holds birds moving to and from sites in the south and east, with only a few birds remaining through the winter. When water levels are high, food availability is reduced and birds will feed for a short period at the western end of the turlough (J. Small pers. comm.).

v) North Central Galway Lakes

Five-year mean 95/96-99/2000: 160

Site conservation status

None

Site description and habitat

The North Central Galway Lakes are a complex wetland area consisting of turloughs in north central Galway, between Tuam and Lough Corrib. Whooper Swans favour turloughs for feeding and roosting. They also feed on surrounding grasslands in this pastoral farming landscape.

Numbers and trends

Recent peak counts at this site have ranged between 100 and 150 birds, although around 340 were recorded in January 2000 (Fig. 93). Similar numbers were recorded in the early 1980s. Numbers typically peak in December and January.

Site use

Large flocks (30-150 birds) occur at Blindwell (M3461), Belclare (M3949), Gardenfield Turloughs (M4255), with smaller flocks (5-30 birds) at Altore Lake (M3662), Lough Hackett (M3049) and Castlegrove Lake (M3857). Grazing Whooper Swans use these sites and adjacent grasslands.

Figure 90. Whooper Swans at Coole Lough-
Newtown Turlough, 1960/61-
1999/2000: peak counts (bars)
(circles denote years with no known
data)

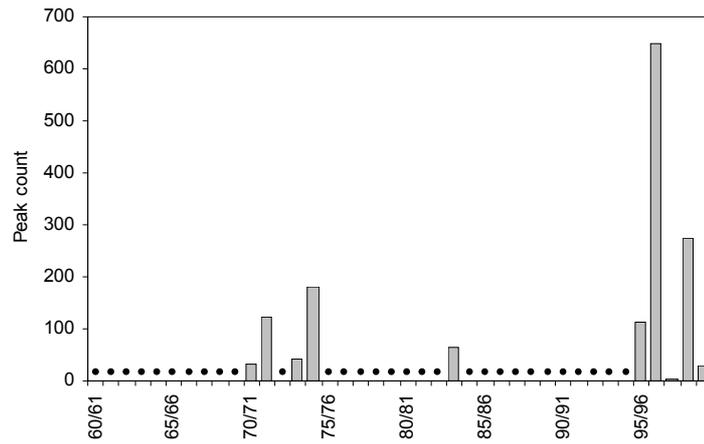


Figure 91. Whooper Swans at the Lough Coy
complex, 1960/61-1999/2000: peak
counts (bars) (circles denote years
with no known data)

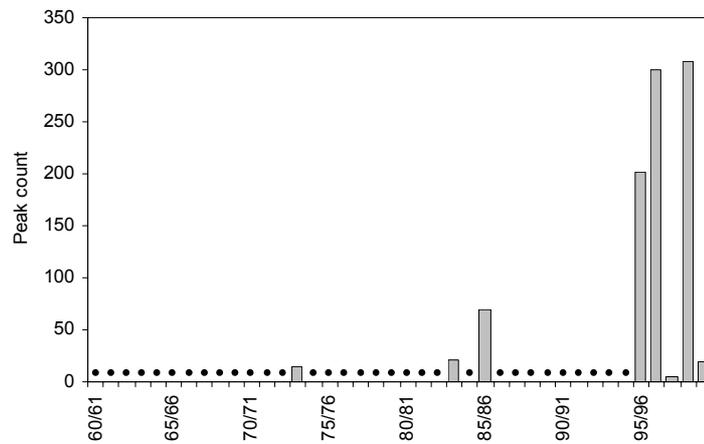


Figure 92. Whooper Swans at Rahasane
Turlough, 1960/61-1999/2000: peak
counts (bars) (circles denote years
with no known data)

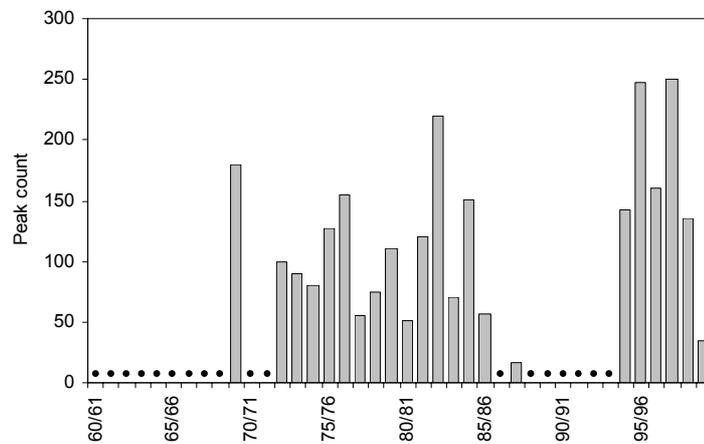
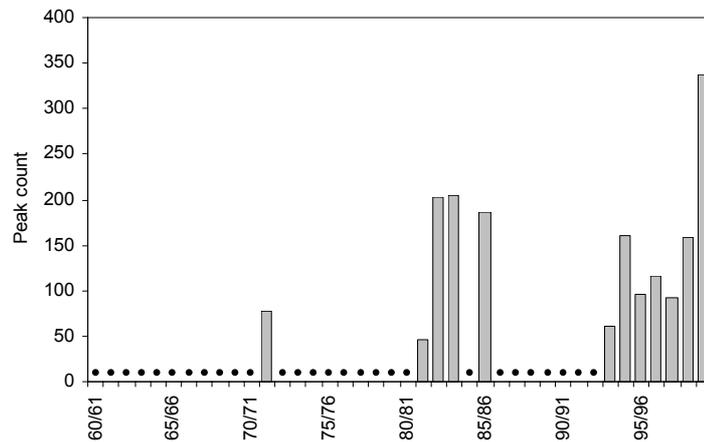


Figure 93. Whooper Swans at the North
Central Galway Lakes, 1960/61-
1999/2000: peak counts (bars)
(circles denote years with no known
data)



2.3.7.4 Nationally important sites

i) Ballinduff Turlough & Grassland

Five-year mean 95/96-99/2000: 100

Site conservation status

None

Site description and habitat

The Ballinduff area comprises Ballinduff Turlough and adjacent grassland.

Numbers and trends

No data exist for this site before 1995/96. Although around 200 Whooper Swans were recorded in 1995/96, counts have tended to be lower in more recent years (Fig. 94). The close proximity of the site to the Coole, Lough Coy and Castleboy areas (all within a radius of 5 km) suggests that Whooper Swans probably move between all these sites on a regular basis.

Site use

Feeding areas are located in the immediate vicinity of the turlough.

2.3.7.5 Other sites

Whooper Swans are known to use sites along the River Clare due south of Claregalway and Levally Lough (M5353).

2.3.7.6 Key references

Hutchinson (1979), Buckley & McCarthy (1987), Sheppard (1993)

2.3.8 Clare

2.3.8.1 Background

Clare contains a wealth of wetland habitat and the presence of extensive limestone bedrock has given rise to a large number of turloughs and lakes. Whooper Swans are abundant but generally in smaller numbers than in either Mayo, Roscommon or Galway.

Two nationally important sites have been identified: The Corofin Lakes and The Shannon & Fergus Estuary. Both sites regularly host around 120 Whooper Swans at peak times. There are no other sites that attain national importance levels regularly, but small flocks are quite widespread, mostly in the

areas of highest lake density in the northern and southeastern areas of the county.

2.3.8.2 Historical status

Records suggest that Whooper Swans were present in the western and central parts of the county from the middle of the 20th century. Since 1986, the county has supported an average of 510 individuals, as recorded during international censuses.

2.3.8.3 Nationally important sites

i) Corofin Lakes

Five-year mean: 95/96-99/2000: 127

Site conservation status

None

Site description and habitat

The Corofin complex comprises a mix of fen, lake and turlough habitats northeast of Corofin and form part of a 'chain' of wetland habitats that continue northeast towards the Coole complex in Galway.

Numbers and trends

In recent years, around 130-150 Whooper Swans have been recorded at this site, with a peak of 225 birds in 1994/95 (Fig. 95). Lough Atedaun (R2988) has supported the majority (c. 90-110) of birds in the area in recent winters. Fewer birds (c. 10-20) use the other lakes of Cullaun (R3290) and Inchiquin (R2690), and even fewer at Loughs Muckanagh (RR3792) and George (R3491).

Site use

Away from the areas mentioned above, the area between Inchiquin and Atedaun at Curraghkeel (R2788) along the River Fergus is also used when flooded.

ii) Shannon & Fergus Estuary (also Kerry and Limerick)

Five-year mean 95/96-99/2000: 118

Site conservation status

SPA (Shannon & Fergus Estuary)
IBA (Shannon & Fergus Estuary: criteria B1i, B3, C2)

Site description and habitat

The Shannon & Fergus Estuary is the largest estuary in Ireland (c. 230 km²), bordering Clare to the north, and Limerick and Kerry to the south. The site is internationally important for a variety of waterbirds

that are attracted by the vast areas of intertidal mudflat. Adjacent grassland areas on both sides of the estuary are used by grazing Whooper Swans.

Numbers and trends

Around 50-160 Whooper Swans have been recorded in the area in the late 1990s (Fig. 96). Slightly lower numbers were recorded in the 1970s and 1980s. Numbers appear to be increasing in recent years.

Site use

Islandavanna (R3269) is a favoured haunt of Whooper Swans (G. Murphy pers. comm.). This is an area of c. 7 km² of low-lying grassland at the mouth of the River Fergus. Birds also use fields on either side of Latoon Creek (R3671) and increasingly at Ballysallagh West/Islandmacnevin (R3666). These birds roost on the Fergus Estuary (R3367).

Smaller groups occur in many other sections, particularly to the west of Shannon (R3861). Shannon Airport Lagoon (R3860) has held up to 138 birds and peaks are generally recorded in the autumn months. These birds probably disperse within the estuary or even further afield.

Clonderlaw Bay (R1254) supports a flock of around 30-50 birds, with birds primarily using grassland areas along the Crompaun River (R1256).

Around half of the Whooper Swans counted at the Shannon & Fergus Estuary occur on the upper estuary section near Mungret, between the Maigne Estuary (R4557) and Limerick City (R5757). The grasslands at Cooperhill (R5157), Scarlet Reach (R4757) and Newtown (R4957) are protected from the estuary by embankments. Birds use these fields for feeding, with average flocks comprising 75 birds. The birds use two cement factory lagoons within the sea wall for roosting. Relatively few birds occur elsewhere. Flocks have been recorded infrequently at Tarbert Bay (R0848) and various sections west of the Maigne Estuary to Courtbrown Point (R3254).

The portion of the Shannon & Fergus Estuary within Kerry is limited to that from Tarbert Bay (R0748) to Beal Point (Q9048) and is not important for Whooper Swans.

2.3.8.4 Other sites

The Kilfenora area holds 86 birds on average, though up to 137 have been recorded. Two key sites are Ballybreen (R1793) and Lisket (R2093), on either side of Kilfenora.

Other inland sites regularly holding flocks of around 20-80 birds include Knockaunroe (R3193), Carran

Polje (R2898), Ballyallia Lake and adjacent feeding areas at Drumcliff (R3380), Lough O'Grady (R6183) and Doo Lough (R1272).

Elsewhere in the county, flocks are generally located along the coastal southwest. The lakes of Moanmore (Q9861) and Tullaher (Q9561) between them hold 20-40 birds. These birds feed on adjacent land at Tullabrack (R0060) and Tullaher (Q9462), respectively. Similar numbers have been recorded at Farihy Lough (Q9164), 2.5 km to the northwest, Lough Donnell (R0070) and occasionally at Doonbeg Bay (Q9666).

2.3.8.5 Key references

Murphy (2003)

2.3.9 Limerick

2.3.9.1 Background

Limerick has relatively few wetlands and this is reflected in the fact that just two core areas support large numbers of Whooper Swans regularly. During the January 2000 international census, just over 220 birds were recorded at seven sites. Two thirds of these birds were at just two sites: near Mungret, along the Shannon Estuary, and around the Lough Gur/Camoge River area, 16 km to the southeast (Colhoun *et al.* 2000, Murphy 2003).

The Camoge River flock uses a number of sites north of Lough Gur (R6440). Up to 128 birds have been recorded although 100 birds are more regular. The most important areas are the grasslands along the Camoge River between Fedamore (R6043) and Herbertstown (R6741); the area of the river between Longford Bridge (R6443) and Herbertstown is generally the most frequently used. Birds use Lough Gur to roost.

An additional flock of around 30 birds utilise sections of the Morningstar River between Athlacca (R5634) and Bruff (R6236), with preferred sites at R5836 and east thereof in the area known as Rathcannon Bog.

2.3.9.2 Historical status

The species was present in the county by the 1970s but few data exist on its status and distribution.

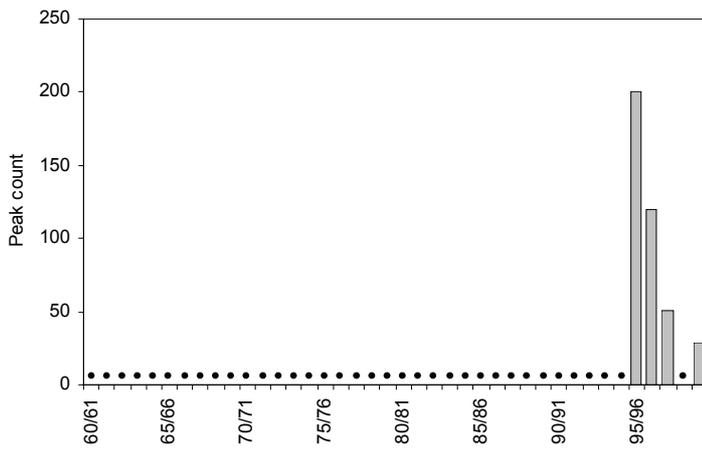


Figure 94. Whooper Swans at Ballinduff Turlough & Grassland, 1960/61-1999/2000: peak counts (bars) (circles denote years with no known data)

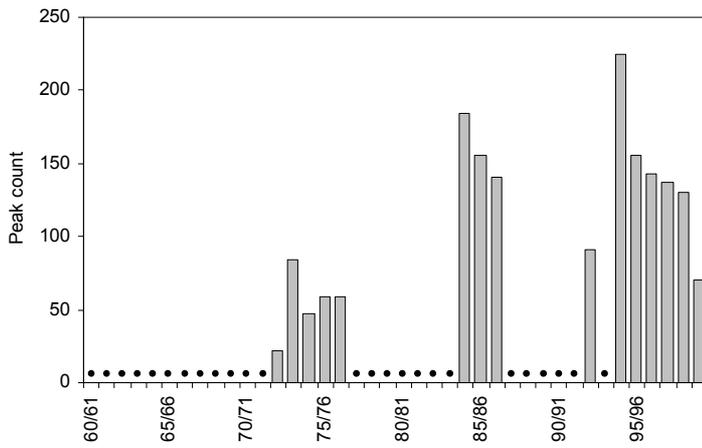


Figure 95. Whooper Swans at Corofin Lakes, 1960/61-1999/2000: peak counts (bars) (circles denote years with no known data)

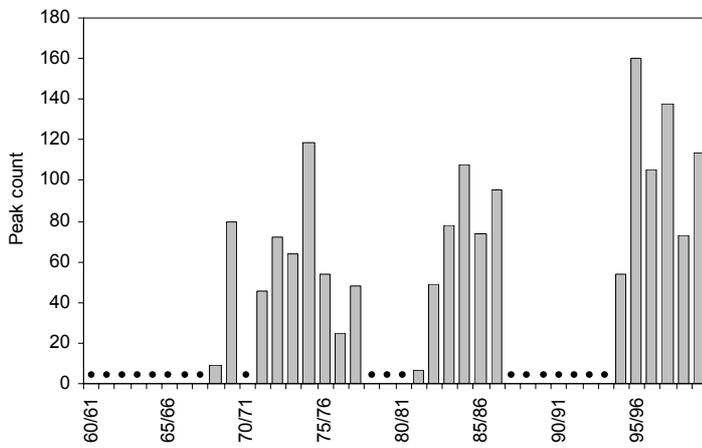


Figure 96. Whooper Swans at the Shannon & Fergus Estuary, 1960/61-1999/2000: peak counts (bars) (circles denote years with no known data)

2.3.9.3 Nationally important sites

i) Shannon & Fergus Estuary

See Clare

2.3.9.4 Key references

Murphy (2003)

2.3.10 Tipperary

2.3.10.1 Background

Although Tipperary has few wetlands relative to its size, it nevertheless has a wide range of wetland types widely distributed over the entire county. The southern half of the county is mountainous and has few wetlands apart from those associated with the River Suir, which flows through much of the county.

The area north of Nenagh (R8679) has the highest density of small lakes. Lough Derg and the Shannon Callows are located at the western county boundary with Galway and Offaly. This area holds the majority of the 200-300 Whooper Swans recorded in the county. Although Little Brosna and Shannon Callows are nationally important sites for Whooper Swans, only small numbers are recorded within the Tipperary sections.

The River Suir is an important site in Tipperary, supporting around 100 Whooper Swans at peak times. The upper section, between Caher (S0524) and Brittas (S1162), holds around 60 birds, with flocks of around 30 birds at Brittas (S1362) and between Camus Bridge (S0443) and Ballycamusk (S0649), south of Thurles (S1258). Small numbers also occur further north at Cabragh (S1055).

The Lower Suir, south of Caher (S0524) holds high numbers, with the area north of Newcastle at Kilmaneen (S1114) being the most reliable site for Whooper Swans on the Suir. Up to 120 birds have been recorded in this area, but numbers are generally in the range 50-70 birds. An area at Clashganny East (S1413), to the east of Newcastle, is also utilized by the same flock.

Most of the other important sites are located east of Lough Derg. These include flocks using areas adjacent to Gurteen/Ballingarry Agricultural College (R9998) (up to 125 birds) at Munlusk (R9699), Ballylina (R9597) and Lismaline (R9695), and Lough Aran (S8594). Pat Reddan's Lake (R8996) and

adjacent grasslands at Kyle Park (R8896) are used by up to 60 birds.

Lough Duff (R9081) holds around 15-30 birds annually. The shores of Lough Derg bordering Tipperary hold very few birds, but may be used by some birds for roosting.

2.3.10.2 Historical status

Whooper Swans were recorded in Tipperary in the late 1800s (Ussher & Warren 1900) and counts are available from 1969. Few records exist other than observations on the Shannon Callows during the 1970s. Systematic recording in the 1980s showed that Whooper Swans were well established at many of the sites mentioned above (Sheppard 1993). Up to 130 birds were recorded at Ballingarry during this period. Numbers of birds occurring at Lough Aran and on the River Suir have changed little since the 1980s.

2.3.11 Kerry

2.3.11.1 Background

Away from several important coastal sites, the vast majority of Kerry's inland wetlands are unattractive to waterbirds. Two sites are of particular importance for Whooper Swans in Kerry: the Cashen River and Lough Gill. A small flock of around 30 birds occurs in the Meanus area of the River Laune (Castlemaine Harbour V8094), presumably roosting on Castlemaine Harbour some 4 km to the northwest.

2.3.11.2 Historical status

Whooper Swans were recorded in the county in the 1900s (Ussher & Warren 1900) but no significant concentrations were noted by authors up to the mid 1900s, when the species became more abundant generally. Numbers recorded in the four international censuses between 1986 and 2000 have risen from around 100 to in excess of 250 birds, suggesting that the species is increasing in the county. Annual site-based counts also show this pattern.

2.3.11.3 Internationally important sites

i) Cashen River/Lixnaw Canal

Five-year mean 95/96-99/2000: 160

Site conservation status

None

Site description and habitat

This area comprises wet grassland on either side of Cashen River, River Feale and Lixnaw Canal c. 8 km west of Listowel (Q9833), in north Kerry. The area used by Whooper Swans for feeding is located near the mouth of the Cashen River. The estuary is probably used for roosting.

Numbers and trends

Up to 222 birds have been recorded in the area, and peaks in excess of 150 birds have been recorded in four of the last five years (Fig. 97). Little information is available on the history of use of this site. One record exists of 52 birds in January 1986, indicating numbers may have increased since then.

Site use

A number of favoured sites are within the home range of this flock (Murphy 2003). Ballyouneen (Q9034) has been the most frequently used area in recent years but flocks also use the areas near the Lixnaw Canal at Ballynagare Bridge (Q9030) and Ballynagare townland (Q8832).

2.3.11.4 Nationally important sites

i) Shannon & Fergus Estuary

See Clare

ii) Lough Gill

Five-year mean: 95/96-99/2000: 101

Site conservation status

Wildfowl Sanctuary (Lough Gill)

SPA (Lough Gill)

IBA (Lough Gill: criteria B3)

Site description and habitat

Lough Gill (Q6014) is a shallow coastal lagoon on the Maghree peninsula, with a modified inlet and sluice gate which drains into Tralee Bay. The lagoon is fringed by reedbeds and separated from the sea by dunes and machair to the north. Intensive farmland borders much of the southern side.

Numbers and trends

Up to 165 birds have been recorded at Lough Gill in the late 1990s, with around 100-150 birds recorded in most recent winters (Fig. 98). Although numbers were similarly high in the early 1970s, they fell to around 20-50 birds during the 1980s. The phenology of site use indicates highest numbers are present in the autumn and spring, suggesting that the site may be an important staging area during migration.

Recent counts are similar to those recorded during the 1960s and 1970s, but are higher than the 20-30 birds recorded regularly during the 1980s. Bewick's Swans were formerly numerous at this site but are now uncommon.

Site use

Whooper Swans roost on the lake and feed on submerged or marginal vegetation. They also utilize agriculturally-improved grassland, especially in the Killiney/Ballingowan area to the south (Q6113) (Murphy 2003). There is thought to be some movement of birds between this and the River Cashen herd.

2.3.11.5 Key references

Murphy (2003)

2.3.12 Cork

2.3.12.1 Background

Although it is the largest county in Ireland, Cork notably lacks natural lakes and, as a consequence, supports relatively few Whooper Swans. The main sites are, therefore, associated with the major river systems. Around 150-200 birds are regularly recorded during international censuses.

The primary site at the River Blackwater (W9098) borders Waterford. Although primarily based in Waterford, flocks move freely across the county boundary, thereby affecting Waterford and Cork totals. Of the six additional sites regularly holding 20 or more birds, all but two are associated with rivers. Kilcolman Marsh (R5811), east of Buttevant, is a site monitored regularly and has supported over 100 birds during the late 1990s (Fig. 99). The Inishcarra Reservoirs (W3371) form an impounded area on the River Lee. Up to 105 birds have been recorded here at the Gearagh (W3270) but around 70 birds are more regular.

Elsewhere, smaller flocks (c. 20-50 birds) occur on the Bandon River at Baxter's Bridge (W4454) and

Manch Bridge (W2952), the River Bride at Mogeely Bridge (W9594), Argideen River at Rossmore (W3246) and Awbeg River near Ballyhea (R5216).

2.3.12.2 Historical status

Up until the mid 1940s, Whooper Swans were considered very scarce in southern Ireland, especially in Cork (Kennedy *et al.* 1954). The species was first recorded at Kilcolman in the late 1940s (Ridgway & Hutchinson 1990) and numbers there increased at a rate of around 6% per annum between 1970 and 1990 (O'Halloran *et al.* 1993).

2.3.12.3 Internationally important sites

i) River Blackwater Callows & Lower Blackwater River (also Waterford)

Five-year mean 95/96-99/2000: 212

Site conservation status

SPA (River Blackwater Callows)

Wildfowl Sanctuary (River Blackwater Callows)

IBA (River Blackwater Callows: criteria B1i, B3, C2)

Site description and habitat

The River Blackwater runs east through Fermoy (W8198) and then southwards at Cappoquin to the Blackwater Estuary at Youghal (X1077). Between Fermoy and Cappoquin, the river is confined to a relatively narrow valley. In some stretches, especially between Ballyduff (W9996) and Lismore (X0499), lie some of the best callow habitat (seasonally flooded wet grassland) away from the Shannon. When flooded, this area can hold large numbers of waterbirds.

Numbers and trends

Up to 255 Whooper Swans have been recorded in this area in the late 1990s, with counts regularly exceeding 150 (Fig. 100). Numbers typically build up through November and peak during January and February. This area was formerly important for Bewick's Swans, but Whooper Swans have become the most numerous of the two species since the mid 1980s. In the late 1960s and 1970s fewer than 50 Whooper Swans were recorded annually.

Site use

Whooper Swans occur over some of the Cork sections of the Blackwater Callows, moving in response to changing availability of feeding areas. The most frequently used sections are those at Kilmurry (W8898) and Ballynerroon (W9399).

In the Waterford section, Whooper Swans are widespread and also move in response to the changing availability of feeding areas. The most frequently used sections are those at Kilmurry (W8898; Cork) and Ballynerroon (W9399; Waterford). Areas further downstream around Glencair Abbey (W9999), Lismore (X0398) and Camphire (X0899) are also used.

2.3.12.4 Key references

Ridgway & Hutchinson (1990), O'Halloran *et al.* (1993)

2.3.13 Waterford

2.3.13.1 Background

Like Cork, Waterford has relatively few inland wetlands and the few important sites for Whooper Swans are restricted to the river valleys of the Blackwater and Bride.

The River Blackwater holds regularly in excess of 200 birds (see Cork) but the Bride is less important except for the site at Camphire (X0892) at the confluence of the two watercourses. Although more than 100 birds have been recorded at this site, around 40 birds are more regular. Large counts at this site presumably include birds which have moved from the large Blackwater group.

Whilst most of the relatively few lakes in the county occasionally support small flocks, Ballyshunnock Reservoir (S4509) is the most important, holding around 40 birds in recent years.

2.3.13.2 Historical status

Bewick's Swans were more numerous than Whooper Swans in Waterford until the early 1980s. Since then, Whooper Swan numbers have stabilised at around 200 birds and numbers of Bewick's Swan have decreased markedly.

2.3.13.3 Internationally important sites

i) River Blackwater Callows & Lower Blackwater River

See Cork

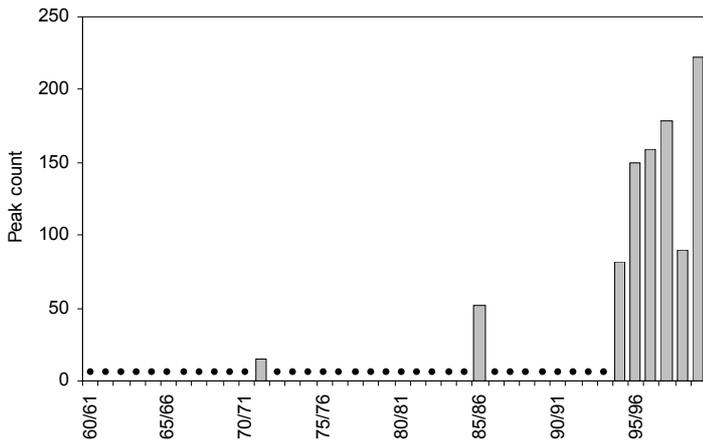


Figure 97. Whooper Swans at the Cashen River/Lixnaw Canal 1960/61-1999/2000: peak counts (bars) (circles denote years with no known data)

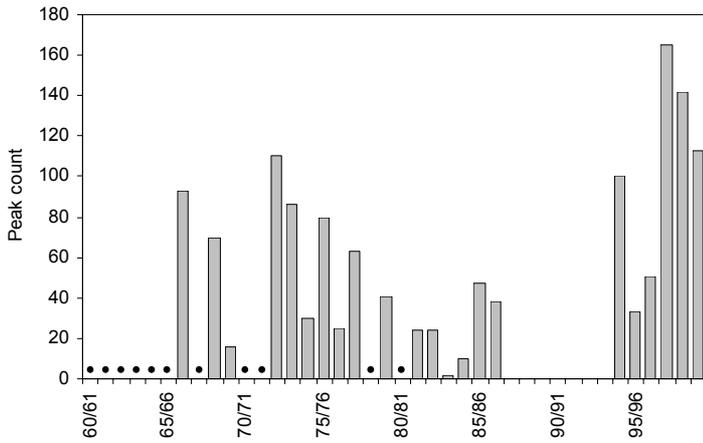


Figure 98. Whooper Swans at Lough Gill, 1960/61-1999/2000: peak counts (bars) (circles denote years with no known data)

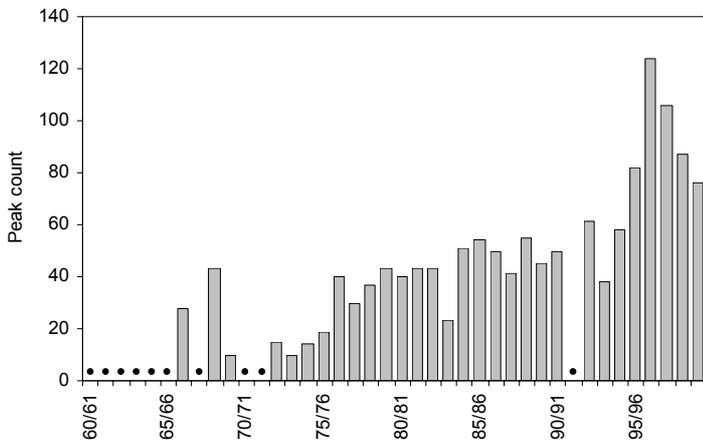


Figure 99. Whooper Swans at Kilcolman Marsh, 1960/61-1999/2000: peak counts (bars) (circles denote years with no known data)

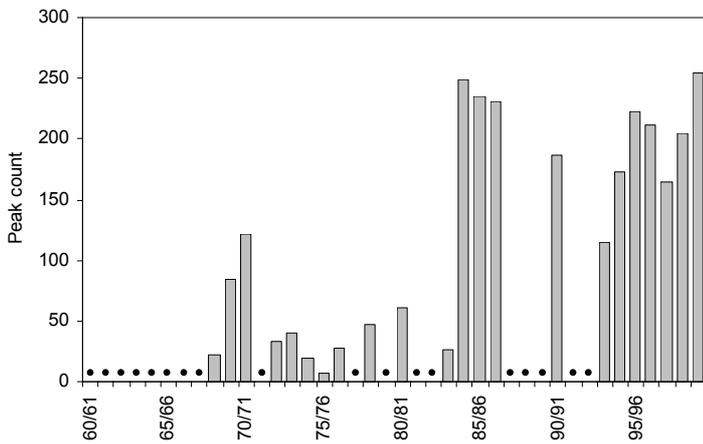


Figure 100. Whooper Swans at the River Blackwater Callows & Lower Blackwater River, 1960/61-1999/2000: peak counts (bars) (circles denote years with no known data)

2.3.14 Wexford

2.3.14.1 Background

The wetlands in southern and southeastern Wexford are amongst the most important in the country for a wide range of waterbirds, yet play host to relatively few Whooper Swans. Around 100-200 birds are recorded annually in Wexford and re-sightings of marked individuals indicate that birds often move between sites. Wexford has been the stronghold for Bewick's Swans in the country since the early 1970s.

Flocks sizes at the key resorts have increased in recent years, especially at Tacumshin Lake (T0825) and the Wexford Slobs (T0824), peaking at over 370 in 1998/99 and 150 in 1995/96, respectively.

2.3.14.2 Historical status

Whooper Swans were present in Wexford in relatively low numbers through the 1960s and 1970s. However, by the mid 1980s, several hundred birds were present, concentrated at Wexford Harbour & Slobs, Lady's Island Lake (T1006) and Tacumshin Lake (T0506).

2.3.14.3 Internationally important sites

i) Tacumshin Lake

Five-year mean 95/96-99/2000: 213

Site conservation status

Wildfowl Sanctuary (Tacumshin Lake)
SPA (Tacumshin Lake)
IBA (Tacumshin Lake: non-listed species)

Site description and habitat

Tacumshin Lake (T0506) is a shallow coastal lagoon situated along the south Wexford coast. The site was formerly a shallow bay which became separated from the sea in the mid 1970s and is surrounded to the east and west by agricultural land.

Numbers and trends

Mean peak counts for the 1970s, 1980s and 1990s (including those prior to 1994/95) were 14, 66 and 167 birds, respectively, indicating a steady increase in numbers. Although the current five-year mean is only 213, particularly large counts were made in the winters 1997/98 (346 birds), 1998/99 (372) and 1999/2000 (218) (Fig. 101).

Site use

Whooper Swans use the lake (roosting/feeding), and farmland (feeding) on the east side at Ballymurry (T0605) (A. Walsh pers. comm.). Birds also use a site at Greenfield Crossroads (T0609), some 3 km to the northeast.

2.3.14.4 Nationally important sites

i) Wexford Harbour & Slobs

Five-year mean 95/96-99/2000: 100

Site conservation status

SPA (Wexford Wildfowl Reserve)
Ramsar Site (Wexford Wildfowl Reserve)
Nature Reserve (Wexford Wildfowl Reserve)
IBA (Wexford Harbour & Slobs: criterion B3)

Site description and habitat

Wexford Harbour & Slobs comprises an extensive estuary at the mouth of the River Slaney dominated by sand and mudflats and bounded to the north and south by reclaimed land. This slob-land is of greatest significance for wintering geese and swans that find rich feeding on the extensive areas of grassland and arable farmland.

Numbers and trends

Like the situation at Tacumshin Lake, numbers of Whooper Swans have shown a steady increase since the 1960s, at a rate of approximately 40% in each decade (Fig. 102). Around 50-140 birds have been recorded annually since the mid 1990s.

Site use

Though both the North (T0924) and South Slobs (T0717) are utilised, most feeding Whooper Swans occur on the North Slob (A. Walsh pers. comm.). These birds roost on the enclosed tidal river, part of which lies within the Wildfowl Reserve, and sometimes in Wexford Harbour. Birds feed primarily on sugar beet and grasslands, the latter having been managed specifically for geese and swans since the mid 1980s.

2.3.14.5 Other sites

Away from the two key resorts, around 30-40 birds are regularly recorded at The Cull & Killag (S9506) and Lady's Island Lake (T1006) and Cahore Marshes (T2045). Around 100-140 birds were present at Lady's Island Lake between November 1999 and March 2000, although it is unusual for such a large flock to be present at this site through the winter.

2.3.15 Carlow

2.3.15.1 Background

Carlow has few wetlands and its primary resource is the River Barrow which runs along part of the western county boundary. Although Whooper Swans are recorded along this river, they generally favour sites further upstream in county Kildare. Very few Whooper Swans have been recorded in Carlow in recent years; the most recent count refers to a flock of eight birds in January 1991.

2.3.15.2 Historical status

There are few historical records of Whooper Swans in the county. However, up to 50 birds were recorded in winter 1983/84.

2.3.16 Laois

2.3.16.1 Background

Like Carlow, Laois has relatively few wetlands. The Leith stretch of River Barrow supports some Whooper Swans, but most flocks occur along the stretches in Kildare. Durrow Curragh (S3778) has supported around 50-100 birds in recent years. Other birds have been recorded near Ballycolla at Coolery (S3881) and Gully Bridge (S3882), with a further flock of fewer than 20 birds in marshland associated with the River Nore at Foxburrow (S4088).

2.3.16.2 Historical status

Historic records indicate that the Whooper Swan has never been common in Laois. Cullahill (S3576) is the only site for which records exist prior to the 1990s.

2.3.17 Offaly

2.3.17.1 Background

The wetland habitats associated with the Rivers Shannon and Brosna are the most important features for waterbirds in Offaly. The remainder of the county is dominated by bogland although newly created artificial lakes within these areas have been used by Whooper Swans in recent years.

The Shannon Callows are international important for the species and are treated elsewhere (see

Roscommon). The Little Brosna Callows (N0555), Cloghanhill (N1017) and Lough Boora Parklands (N1820) are all nationally important and a further three sites hold birds annually. Due to the movement of birds in response to changing conditions along the Shannon, it is difficult to estimate how many birds typically occur in the county.

2.3.17.2 Historical status

Whooper Swans have been locally abundant in Offaly since the 1960s, with most records coming from the Shannon and Little Brosna Callows.

2.3.17.3 Internationally important sites

i) Shannon Callows

See Roscommon

2.3.17.4 Nationally important sites

i) Cloghanhill

Five-year mean 95/96-99/2000: 130

Site conservation status

None

Site description and habitat

Cloghanhill (N1017) lies approximately 3 km east-southeast of Cloghan (N0719), about 8 km east of the Shannon Callows at Shannon Harbour.

Numbers and trends

Only two counts have been made at this site: 83 in 1997/98 and 178 in 1999/2000.

Site use

Given the proximity of this site to the Shannon Callows and Boora, it seems likely that individuals move between these sites. However, relatively little is known about the use of the Cloghanhill area itself.

ii) Little Brosna Callows

Five-year mean 95/96-99/2000: 122

Site conservation status

SPA (River Little Brosna Callows: New Bridge-River Shannon)

IBA (River Little Brosna Callows: New Bridge-River Shannon: criteria B1i, B3, C2)

Site description and habitat

The Little Brosna Callows is one of Ireland's premier wetlands for waterbirds. The site adjoins the

Shannon at Meelick (M9413), runs 8 km southeast to just beyond New Bridge (N0109), and forms the county boundary between Offaly and Tipperary. The predominant habitat is similar to that of the Shannon Callows, comprising seasonally flooded lowland wet grassland, which provides rich feeding for a variety of waterbirds during the winter months.

Numbers and trends

Peak counts of 177 (1999/2000) and 178 (1994/95) birds have been recorded in recent years, both occurring in January (Fig. 103). Long-term trends indicate that numbers increased through the late 1970s and 1980s and have been stable since then. Around 50-180 birds have been recorded in recent winters.

Site use

Whooper Swans use most areas within the Callows with Ashton's Callow (M9910) and Redwood Bog (M9611) being particularly favoured during periods of flooding.

iii) Lough Boora Parklands

Five-year mean 95/96-99/2000: 104

Site conservation status

None

Site description and habitat

The predominantly artificial wetlands in the area of Boora (Lough Boora Parklands; N1820) comprise four main sites: Boora/Leabeg Lake (N1718), Turraun Nature Reserve (N1621), Finnamoses (N2120) and Tumduffmore (N1917). These lie in an area that has suffered intensive peat extraction. Some reclaimed areas are now pastures.

Numbers and trends

Around 60-120 Whooper Swans have been recorded in the area since the mid 1990s (Fig. 104). Counts indicate that flocks of Whooper Swans move between these four areas on a regular basis through the winter. Boora and Finnamoses Lakes are the most frequently used lakes, holding, on average, just over 50 birds. Since these sites were created in the early 1990s, no historic data exist.

Site use

Flocks use grassland areas in surrounding farmland. This includes recently reclaimed bogland.

2.3.17.5 Other sites

Raheen Lough, a permanent lake (N4618) in a relatively isolated position in southeast Offaly, holds around 10-20 birds. Blackwater Railway Lake

(N1026) is 4 km east of the Shannon Callows at Shannonbridge and holds around 30-40 birds. Similar numbers use Derryounce/Lough Lurgan (N5315) which lies close to the Kildare border in close proximity to the established site in that county of Derrylea on the River Barrow (see Kildare).

2.3.18 Kildare

2.3.18.1 Background

The results of the last four international censuses indicate that around 120 Whooper Swans occur in the county. The two most important areas (Vicarstown/Lowton; N6300 and Derrylea/Inchacool; N6113) are associated with the upper River Barrow and support around 100 and 80 Whooper Swans, respectively. At this point, the River Barrow broadens into a relatively extensive floodplain, providing suitable feeding conditions on periodically flooded and dry grassland.

2.3.18.2 Historical status

No known data are available for Kildare prior to the mid 1980s and Sheppard (1993) stated that Whooper Swans have only used this area in recent decades. Over the three winters 1984/85-1986/87, an average of 85 birds were recorded along the section of the Barrow between Athy (S6893) north to Monasterevin (N6310), which encompasses the Vicarstown/Cloney site. Numbers appear to have remained stable since then. Bewick's Swans formerly outnumbered Whooper Swans in this area but numbers have since declined.

2.3.19 Wicklow

2.3.19.1 Background

Wicklow's most important wetlands are largely restricted to the coastal strip from Wicklow (T3193) north to Greystones (O2911). Whooper Swans are, however, not abundant in the county as a whole (normally 50-80 birds) and the highest numbers (around 50 birds) are generally restricted to Broad Lough (T3095) and Kilcoole (O3106), which collectively form the North Wicklow Coastal Marshes. Around 35 birds also occur annually on Poulaphoua Reservoir, the most important inland site in the county for waterbirds (N9909).

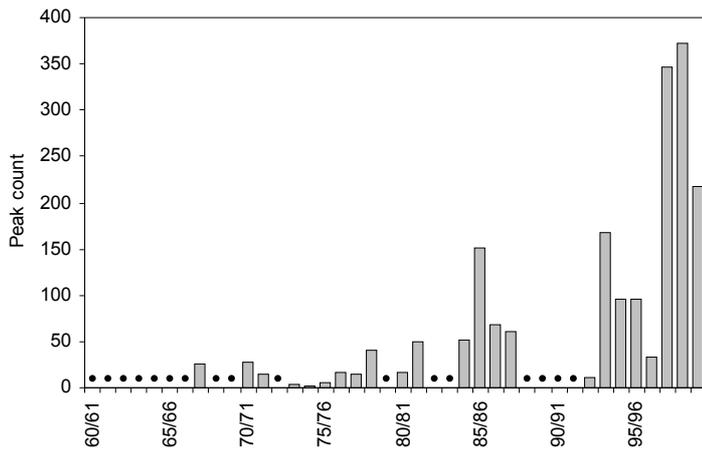


Figure 101. Whooper Swans at Tacumshin Lake, 1960/61-1999/2000: peak counts (bars) (circles denote years with no known data)

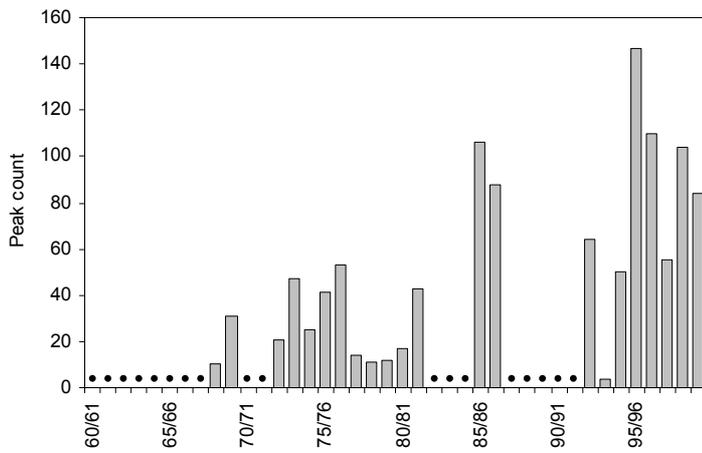
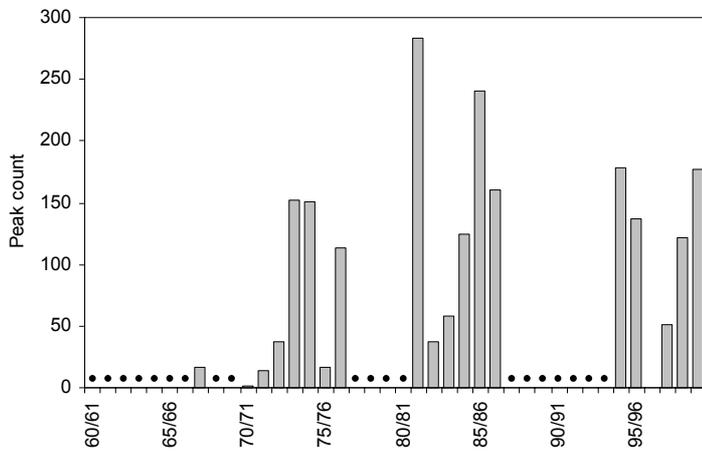


Figure 102. Whooper Swans at Wexford Harbour & Slobs, 1960/61-1999/2000: peak counts (bars) (circles denote years with no known data)



2.3.19.2 Historical status

Whooper Swans have been recorded in Wicklow since the 1960s at least, and numbers have remained relatively stable since then.

2.3.20 Dublin

2.3.20.1 Background

Although rich in estuarine sites, the relative lack of inland wetlands in the county make it unattractive for Whooper Swans. No more than 19 birds have been recorded in the county during any of the international censuses since 1986. However, Brittas Pools (O0322) and Knock Lake (O1961) hold birds annually, supporting around 25 birds between them.

2.3.20.2 Historical status

Whooper Swans have been uncommon in Dublin since the late 1960s at least. The peak count during this period was just 20 birds at Brittas in January 1971.

2.3.21 Meath

2.3.21.1 Background

The inland waterbodies of Meath are largely confined to the borders with counties Westmeath and Louth. The most important habitats for waterbirds occur along the rivers that flow eastwards through the county. Despite this lack of habitat, the county holds reasonable numbers of Whooper Swans and four sites are noteworthy, including one of national importance. The mean number of birds recorded in the county during the four international censuses is over 230 birds.

2.3.21.2 Historical status

Very little is known about the Whooper Swans in Meath before the mid 1980s. Numbers have remained relatively stable since then and there have been few changes in the locations of key sites. However, the number of birds recorded at the River Boyne has declined over the 1990s; around 100-130 birds were recorded in the mid 1980s and early 1990s (Sheppard 1993). A single count of 367 birds at Wilkinstown (N8377) in January 1986 was exceptionally high although the site is still used spasmodically. However, it is likely that these birds were from an established site on the River

Blackwater between Kells east to Navan which was, until recently, unknown.

2.3.21.3 Nationally important sites

i) River Blackwater

Five-year mean 95/96-99/2000: 103

Site conservation status

None

Site description and habitat

The River Blackwater flows eastwards to join the River Boyne at Navan (N8767). The area is dominated by low-lying intensively-managed agricultural land with mixed arable and grassland. Some small remnant marshy habitats and recent plantations occur in this otherwise flat agricultural habitat, particularly north of Oristown (O8075). There are small lakes at Headfort Demense (O7576) and the man-made Tara Mines Tailing Ponds northwest of Navan (O8471).

Numbers and trends

Very few counts of Whooper Swans have been made along the River Blackwater. However, the presence of large flocks on occasional visits, including peaks of over 360 birds in 1986 and 182 in 1997, indicate that large numbers probably use this site on a regular basis.

Site use

Flocks have been recorded in a variety of locations including Grange (O7777), Emlagh (O7978), Sedenrath (O7675), Barfordstown (O7273) around Kells, and also along the Yellow River (N8377) between Tara Mines and Wilkinstown. The location of these feeding sites would suggest that birds roost at the permanent waterbodies at Headfort (when feeding around Kells) and Tara Mines Tailings Ponds (from Yellow River feeding areas).

2.3.21.4 Other areas

Around 40 birds occur regularly on the River Boyne, principally at Newgrange (O0172). Clooney Lough (N8281) and adjacent to the River Lajan in the area between Rahans Lough (N8397) and Ballyhoe Lough (N8595); each holds an average peak of around 28 birds although the latter sites (which are also in Monaghan) can hold more than twice this number.

2.3.22 Westmeath

2.3.22.1 Background

Westmeath is dominated by a number of large lakes centred on Mullingar (N4352) that collectively form a unique wetland complex in Ireland due to their scale and attractiveness to waterbirds. The western boundary of the county bounds the Shannon Callows over a short length of their northern part and the southwest corner of Lough Ree. There are many Whooper Swan haunts in the county, including three internationally and one nationally important sites.

2.3.22.2 Historical status

Little is known about the status of the Whooper Swan in Westmeath before the 1970s. By this time, Loughs Iron, Glen Lough and Lough Derravaragh held around 150 birds between them, Lough Iron being the most favoured. Since the early 1980s, Glen Lough has held the largest numbers of birds annually, with over 300 birds recorded. Lower numbers were recorded at Loughs Owel, Ree and Ennell during the 1980s.

2.3.22.3 Internationally important sites

i) Shannon Callows

See Roscommon

ii) Glen Lough

Five-year mean 95/96-99/2000: 327

Site conservation status

SPA (Glen Lough)

Ramsar Site (Lough Iron - Glen Lough)

IBA (Lough Iron - Glen Lough: criteria B1i, B3, C2)

Site description and habitat

Glen Lough (N2866) is now merely a marsh on the Longford border, c. 6 km northwest of Lough Iron. The site floods periodically during the winter, when it becomes attractive to Whooper Swans which gather from the surrounding area.

Numbers and trends

The numbers of Whooper Swans using Glen Lough have increased since the 1970s, with around 250-400 birds recorded in recent years (Fig. 105). In the 1970s, fewer than 100 birds were recorded at this site

Site use

Birds feed mostly in the flooded marshland.

Movements of birds between this site and others in the vicinity, especially those at Lough Iron and the River Inny, are probably regular.

iii) Lough Iron

Five-year mean 95/96-99/2000: 214

Site conservation status

SPA (Lough Iron)

Ramsar Site (Lough Iron-Glen Lough)

Wildfowl sanctuary (Lough Iron)

IBA (Lough Iron-Glen Lough: criteria B1i, B3, C2)

Site description and habitat

Lough Iron (N3461) is much smaller than most of the very large lakes neighbouring it. Like Glen Lough (to which it is connected via the Black River), Lough Iron has suffered from drainage works in the 1960s. This has resulted largely in a reduction in open water and increase in freshwater marsh; rainfall levels in winter do, however, increase the extent of open water. Human access is also difficult at this site. The nearby feeding areas at Piercefield (N3560) and Ballinalack (N3464) comprise agriculturally semi-improved and improved grassland.

Numbers and trends

In the 1970s and 1980s, Lough Iron supported around 90-100 birds at peak times (Fig. 106). During the 1990s, this number has almost doubled, probably reflecting a general increase in the county during the period.

Site use

The favoured feeding site lies to the southeast at Piercefield (N3560). An additional feeding site, presumably used by birds roosting on Lough Iron, or perhaps Derravaragh, is that at Ballinalack (N3464) on the nearby River Inny, just 1.5 km to the north.

Figure 104. Whooper Swans at Lough Boora Parklands, 1960/61-1999/2000: peak counts (bars) (circles denote years with no known data)

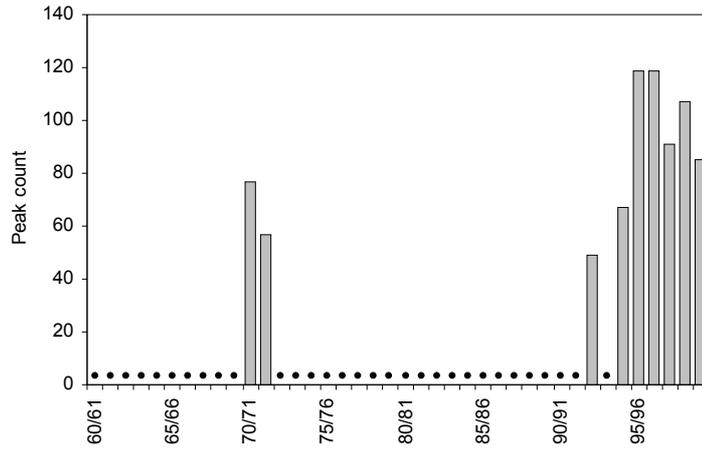


Figure 105. Whooper Swans at Glen Lough, 1960/61-1999/2000: peak counts (bars) (circles denote years with no known data)

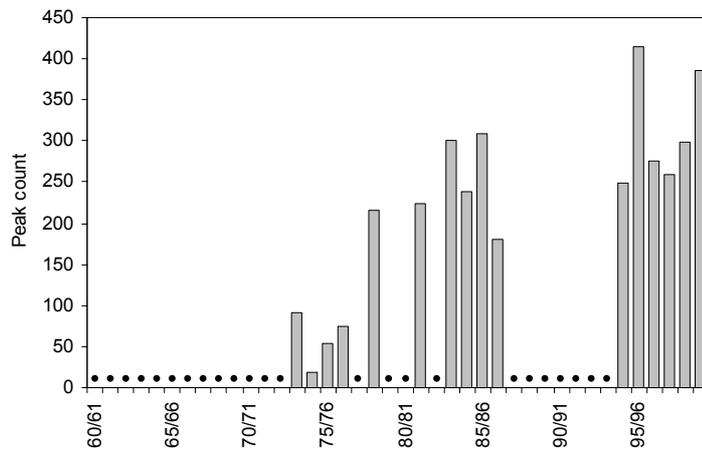
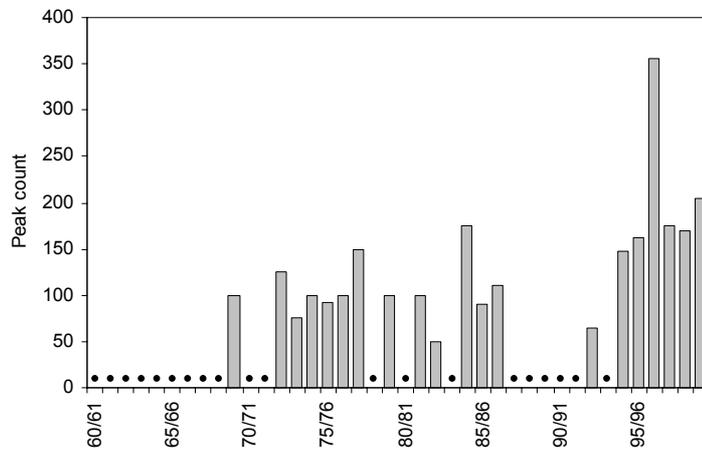


Figure 106. Whooper Swans at Lough Iron, 1960/61-1999/2000: peak counts (bars) (circles denote years with no known data)



2.3.22.4 Nationally important sites

i) Lough Derravaragh

Five-year mean 95/96-99/2000: 102

Site conservation status

SPA (Lough Derravaragh)

Ramsar Site (Lough Derravaragh)

IBA (Lough Derravaragh: criterion B3)

Site description and habitat

Lough Derravaragh (N4366) is an elongated lake with a broader end towards the northwest where the River Inny drains from it. The lake is extensively reed-fringed, particularly in its wider northern half. The narrow southern arm contains freshwater marsh and fen.

Numbers and trends

Recent annual peaks of around 100 birds are almost double the size of those recorded during the 1970s and 1980s (Fig. 107).

Site use

The northern basin is shallow and is the most frequently used area. Adjacent feeding areas remain largely unknown but birds have been observed feeding at the northern end at Donore (N4065) and on grassland in the estate near Williamstown (N4370).

2.3.22.5 Other sites

The southeastern bays of Killnure (N0746), Coosan (N0545) and Ross Lough/Creggan Lough (N0651) in Lough Ree are the most frequently used parts of this large lake by Whooper Swans. Flocks have been recorded recently on grassland in the Cleraun/Portanure area (N0455). Overall, Lough Ree supports a flock of around 80 birds (see also Roscommon and Longford).

The Rivers Tang and Inny, which flow into Lough Ree east of Saint's Island (N1055), are feeding areas for Whooper Swans. Before these two rivers converge just east of Lough Ree, the Tang at Noughaval (N1553) holds around 50-120 birds. The Inny, which lies to the north and flows eastwards to drain Lough Derravaragh, runs in close proximity to both Glen Lough and Lough Iron. A small airfield adjacent to the river at Abbeyshrule (N2359) holds around 10-15 birds.

2.3.23 Cavan

2.3.23.1 Background

Cavan has probably the highest density of inter-drumlin lakes of any county in Ireland. These number almost 200 and most are less than 0.1 ha in size. The abundance of permanent wetlands for feeding and roosting, and adjacent grasslands, provide a wealth of suitable areas for Whooper Swans.

The catchment of the River Erne is the dominant feature in the west and central portion of the county. To the north, the Erne flows into a dense cluster of drumlin lakes south of Belturbet (H3616), forming Lough Oughter. This complex, and the River Erne, are amongst the most important areas for Whooper Swans in the county, the former being the only internationally important site in the county. The Annalee River and Ballinamore Lakes are nationally important sites. The latter site comprises over 50 lakes, most of which are located in neighbouring Leitrim. The site most favoured by Whooper Swans, Ballymagauran Lake, lies on the Cavan/Leitrim border (see Leitrim).

2.3.23.2 Historical status

Rutledge (1974) states that the species first occurred in the county in 1943. Thereafter, the species became more widespread and abundant. An average of 738 birds has been recorded in the international censuses since 1986, making it the third most important county, numerically, in the Republic of Ireland (after Donegal and Galway). Combined with Fermanagh, there is little doubt that this area of the north midlands is extremely important for the species.

2.3.23.3 Internationally important sites

i) Lough Oughter Complex

Five-year mean 95/96-99/2000: 318

Site conservation status

SPA (Lough Oughter)

Ramsar Site (Lough Oughter)

Wildfowl Sanctuary (Lough Oughter)

IBA (Lough Oughter: criteria B1i, B3, C2)

Site description and habitat

Lough Oughter (H3407) is a complex of small inter-drumlin lakes along the River Erne in north Cavan, south of Upper Lough Erne. These lakes are convoluted and closely resemble the habitat present

at nearby Upper Lough Erne (see Fermanagh) of which they form a southern extension. The area comprises a mix of basins, inter-drumlin lakes and small islands with swamp, marsh, flooded grassland and agriculturally-improved grassland.

Numbers and trends

Sheppard (1993) noted that maximum counts fell marginally short of the international threshold in the four years to 1987. Between then and 1991, around 210 birds were recorded annually. Since then, counts have regularly exceeded 300 birds, with a maximum count of 457 in 1999/2000 (Fig. 108). This site is, however, very difficult to cover fully and its close proximity to other important sites to the north (Upper Lough Erne) and east (Annalee River) probably means that movements of birds between sites occur regularly. Additionally, the difficulty in defining the outer limits of the site (due to the many adjacent lakes which radiate outwards) gives rise to variability in coverage and site totals. One apparently complete census in December 1971 recorded 563 birds.

Site use

Whooper Swans are typically dispersed widely in the area and move in response to changes in food availability and flood conditions. The lakes in the southern portion of the lake (east of Killashandra) are especially important and a number of favoured areas have been identified. Around 50-150 birds have been recorded at Killashandra Town Lake (H3007), Lough Inchin (H3808) and nearby Derryheen Bridge (H3910).

2.3.23.4 Nationally important sites

i) Annalee River

Five-year mean 95/96-99/2000: 132

Site conservation status

None

Site description and habitat

The River Annalee flows westward from the Cavan/Monaghan border and joins Lough Oughter at Butler's Bridge (H4010). The river is confined to a narrow valley over much of its length but gets progressively wider towards the west, where periodically inundated wet grassland habitats are available. Habitats present include agriculturally semi-improved and improved grasslands, with the area at Ballyhaise (H4411) comprising intensively managed grassland.

Numbers and trends

Although count data are sparse, this site has probably been important for Whooper Swans since the mid 1980s. The area has been more regularly monitored since the early 1990s and 100-200 birds are now recorded annually (Fig. 109).

Site use

Apart from an area upstream of Corick Bridge (H5712), east of the confluence between the Dromore and Annalee Rivers, most Whooper Swans occur in the areas east and west of Ballyhaise. In this area the river widens into a broader floodplain and birds feed in flooded grassland areas along the river and adjacent fields. The primary feeding areas are Ballyhaise Agricultural College near Curraghanoe (H4312) and Broomfield (H4411) and to the east of the town (H4611), and at Corcloghan (H4711). However, almost any area of grassland along the river between the Agricultural College and Butler's Bridge can also hold flocks.

2.3.23.5 Other sites

Eleven additional sites hold average peaks in excess of 20 birds. The River Erne is most important amongst these, supporting around 90 birds in recent years. Favoured sites along the river and its floodplain are concentrated in the stretch between Loughs Oughter and Gowna and include Bellahillan Bridge (H3501), Monnery Upper (H3602) and Corlismore (N3597). The Dromore River (H6014) near Cootehill continues from Monaghan and most of the birds occur in that county (see Monaghan).

The other noteworthy sites are widely distributed around the county. Lough Ramor (N6086) is one of the few large lakes in Cavan and holds a flock of around 60 birds. Around 45 birds occur in the southern half of the county at Omard Lough (N4389) and Kilmore Lough (N6091). In the Lough Oughter/River Erne area, Tonymore Marsh (H3904), Bawn Lough (H3007) and Killylea Lough (H3920) support 20-40 birds. The latter site lies amongst the numerous lakes which adjoin Upper Lough Erne (Fermanagh) and Lough Oughter. Corranary Lough (H6405), Kilbrackan House/Bridge River (H2604) and Woodford River & Lakes (H2515) hold 20-30 birds.

2.3.23.6 Key references

Sheppard (1993)

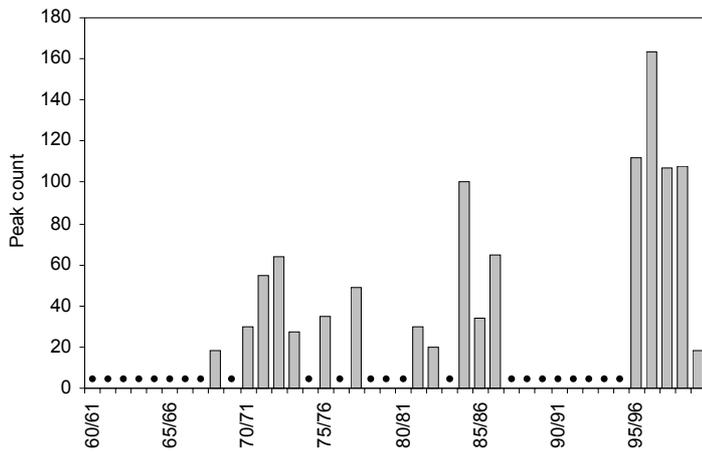


Figure 107. Whooper Swans at Lough Derravaragh, 1960/61-1999/2000: peak counts (bars) (circles denote years with no known data)

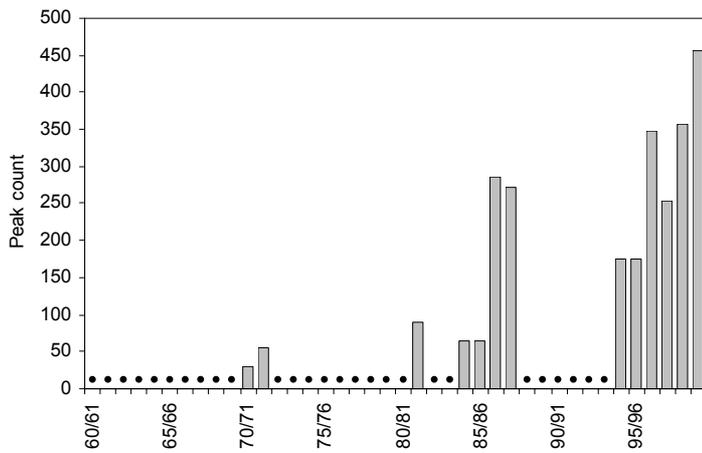


Figure 108. Whooper Swans at the Lough Oughter Complex, 1960/61-1999/2000: peak counts (bars) (circles denote years with no known data)

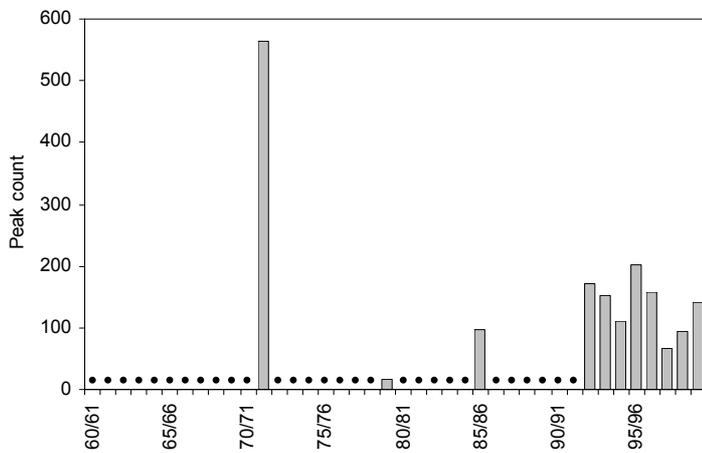


Figure 109. Whooper Swans at the Annalee River, 1960/61-1999/2000: peak counts (bars) (circles denote years with no known data)

2.3.24 Monaghan

2.3.24.1 Background

Monaghan lies in the drumlin belt, which runs west from counties Down to Roscommon. The abundance of small inter-drumlin lakes is similar to that seen in Cavan, Armagh and Fermanagh. Collectively, the county holds 400-500 birds, which are dispersed widely around the many lake and river systems.

The Drum Lakes (H5617), in the west of the county, form one of the most important groups of lakes for Whooper Swans in Monaghan. This complex is made up of around 20 lakes along and north of the county border which hold around 70-130 birds. The most important lakes within the group are Quarry Lough (H5517) and Long Lough (H5616). To the north, Loughs Feagh and Drumate (H5922), Corlougharoe Lough (H5622) and Annagose Lough (H5825) support around 30-50 birds each annually.

The Dromore Lakes (H6316) lie northeast of Cootehill (H6014), and just 5 km southeast of the Drum Lakes, forming the border between Cavan and Monaghan just east of Cootehill. They are a group of around eight lakes, strung out along the length of the Dromore River between Cootehill and Ballybay (H7120). These sites collectively hold around 70-130 birds and the main sites include White Lough (H6618), Mullanary South Lough (H6717), Mullanary Lough (H6717) and Ballycoghill Bridge (H6517).

A number of further sites, spread throughout the county, hold 20-60 birds. These include: Rahans Lough (N8397) and Monalty Lough (H8602) along the Louth border, and Muckno Mill Lough (H8422), Laragh Lough (H7922) and Lough Egish (H7913) near the Armagh border. The Bawn Lakes (H7110) and Blackwater Catchment (H6435) are also used frequently, holding around 20-40 birds each, and the elevated Greeve Loughs (H7216) holds similar numbers, particularly in autumn.

2.3.24.2 Historical status

Although the species was first recorded in Monaghan during the mid 1940s (Ruttledge 1974), little is known about the status of Whooper Swans in the county prior to the 1980s. In the 1980s, the

status and distribution of the species appears to have been similar to that recorded in the late 1990s. The species was certainly abundant by 1986 when 569 birds were counted in the county during the international census. Subsequent censuses in 1991, 1995 and 2000 recorded 527, 336 and 385 birds, respectively.

2.3.24.3 Key references

Ruttledge (1974)

2.3.25 Louth

2.3.25.1 Background

Louth is a small county with few inland wetlands. The most important sites for Whooper Swans are associated with the few rivers that traverse the county. Stabannan/Braganstown (O0294) is the most important site in the county numerically, with an average of around 80 birds recorded in recent years, and a maximum count of 258 birds. This site comprises arable and grassland habitats in a former marsh (since reclaimed) on the River Glyde southwest of Castlebellingham (O0595). Around 50-60 birds also occur frequently on the Glyde further upstream at Tullygowan (N9199).

The Stabannan flock roosts at Dundalk Bay at Annagassan, 5 km to the east (O0894); the Tullygowan flock (13 km further inland) probably roosts on small lakes nearby, but this is uncertain.

The River Boyne forms part of the boundary with Meath to the south. Flocks also occur along this river (see Meath), but are generally absent from the sections bordering county Louth.

2.3.25.2 Historical status

Few historical data exist for the county. It appears that the Stabannan/Braganstown site was first occupied during the mid 1980s. No Whooper Swans were recorded during counts made in the 1970s and early 1980s, and the first published count was of 138 birds in winter 1984/85. The results of the international censuses since 1985 indicate that numbers are declining in the county, from 470 birds recorded in 1986 to 51 birds in 2000.

3 FUTURE RESEARCH NEEDS

Although much is known about the ecology and dynamics of the Icelandic population of Whooper Swans, it is clear that many questions still need to be answered to inform the management of this population. Future research should, in part, be aimed at underpinning a Flyway Management Plan (Colhoun 1998).

For example, although there are many demographic data available, we still do not have the ability to predict the impacts of future conservation threats on this population of swans, e.g. climate change, habitat loss etc. Clearly, there is a need to develop individuals-based population models, which can predict the impacts of novel circumstances. Studies of the effects of density-dependence, resource depletion dynamics and state-dependent behaviour will be required to develop these models.

The assessment of the importance of migratory staging sites for waterbirds is typically based on the counts of staging birds, which underestimate the volume of the site (i.e. the total number of birds using a site over a season) because of turnover of

individuals. Frederiksen *et al.* (2001) provide a novel technique for estimating turnover based on counts and re-sightings of individually-marked birds. The method could markedly improve our understanding of the true importance of staging sites for Whooper Swans, and the re-sightings and count data for such an analysis are available. This would, in turn, enhance the identification of sites that may be suitable for statutory protection because of their importance to staging Whooper Swans.

In light of continued changes to the agricultural land use throughout Britain and Northern Ireland, it will become increasingly important that changes in the distribution of feeding areas at key sites be monitored. In general, agricultural feeding areas used by Whooper Swans are not protected, and therefore benefit only from wider countryside measures, such as stewardship schemes and set-aside. Effective monitoring will be required to identify key feeding areas on agricultural land so that agri-environmental schemes can be designed to conserve Whooper Swans in agricultural areas.

4 ACKNOWLEDGEMENTS

This review of monitoring information would not have been possible without the efforts of dedicated volunteer and professional ornithologists who monitor and research Whooper Swans throughout their range. We are extremely grateful for their efforts and strongly encourage them to continue their valuable work into the future. We would also like to thank Helen Baker, Mark Pollitt, Colette Hall, Peter Cranswick, Richard Hearn, David Stroud, Paul Marshall, Nancy Robb and Robin Ward for their

support and assistance during the production of this review and Ralph Sheppard who reviewed an earlier draft.

The authors have made every effort to include all known data in this review. Given, however, that a number of unpublished reports and databases may have been overlooked, we urge readers to submit new and additional data to the authors, especially where there are apparent gaps in our datasets.

5 REFERENCES

- Anderson, J.A. 1944. Whooper Swans grazing. *British Birds* 38: 37.
- Andrews, I.J. 1986. *The Birds of the Lothians*. Scottish Ornithologist's Club.
- Atkinson-Willes, G.L. 1963. *Wildfowl in Great Britain*. HMSO.
- Baxter, E.V. & Rintoul, L.J. 1953. *The Birds of Scotland*. Oliver & Boyd, Edinburgh.
- Bell, M.V. 1981. Wintering wildfowl at the Loch of Strathbeg 1954-1980. *North-east Scotland Bird Report* 1980: 37-43.
- Bircham, P.M.M. 1989. *The Birds of Cambridgeshire*. Cambridge University Press, Cambridge.
- Black, J.M. & Rees, E.C. 1984. The structure and behaviour of the Whooper Swan population wintering at Caerlaverock, Dumfries & Galloway, Scotland: an introductory study. *Wildfowl* 35: 21-36.
- Boase, H. 1955. *Birds of Angus*. Unpubl. report.
- Booth, C., Cuthbert, M. & Reynolds, P. 1984. *The Birds of Orkney*. The Orkney Press, Kirkwall.
- Bowler, J.M. 1992. The growth and development of Whooper Swan cygnets *Cygnus cygnus*. *Wildfowl* 43: 27-39.
- Bowler, J.M., Butler, L. & Rees, E.C. 1993. Bewick's and Whooper Swans *Cygnus columbianus bewickii* and *C. cygnus*: the 1992-93 season. *Wildfowl* 44: 191-199.
- Bowler, J.M., Butler, L., Liggett, C. & Rees, E.C. 1994. Bewick's and Whooper Swans *Cygnus columbianus bewickii* and *C. cygnus*: the 1993-94 season. *Wildfowl* 45: 269-275.
- Boyd, H. 1963. *Whooper Swans seen in aerial surveys in parts of Iceland in early July 1963*. Slimbridge, Unpubl. Report.
- Boyd, H. & Eltringham, S.K. 1962. The Whooper Swans in Great Britain. *Bird Study* 9: 217-241.
- Brazil, M.A. 1981. *The behavioural ecology of the Whooper Swan* (*Cygnus cygnus*). Unpubl. PhD thesis, University of Stirling.
- Brazil, M.A. 1983. Preliminary results from a study of Whooper Swan movements using neck collars. *Journal of the College of Dairying* 10: 79-90. Ebetsu, Hokkaido, Japan.
- Brazil, M.A. & Kirk, J. 1981 *The current status of Whooper Swans in Great Britain and Ireland*. University of Stirling, Unpubl. Report.
- Brown, M.J., Linton, E. & Rees, E.C. 1992. Causes of mortality among wild swans in Britain. *Wildfowl* 43: 70-79.
- Buckland, S.T., Bell, M.V. & Picozzi, N. 1991. *The Birds of North-East Scotland*. North-East Scotland Bird Club, Aberdeen.
- Buckley P. & McCarthy T.K. 1987. *Bird communities in the Dunkellin/Lavally catchments: a predrainage survey and environmental impact assessment*. Report to Wildlife Service of Office of Public Works, Dublin.
- Buxton, N.E. & Cunningham, W.A.J. 1980. The status of the Whooper Swan in Lewis and Harris, Outer Hebrides. *Journal of the Western Isles NHS*.
- Cadbury, C.J. 1975. Populations of swans at the Ouse Washes, England. *Wildfowl* 26: 148-159.
- Chisholm, H. & Spray, S. 2002. Habitat usage and field choice by Mute and Whooper Swans in the Tweed Valley, Scotland. In E.C. Rees, S.L. Earnst & J.C. Coulson (eds.) Proceedings of the Fourth International Swan Symposium, 2001. *Waterbirds* 25, Special Publication 1: 177-182.
- Cook, M. 1992. *The Birds of Moray and Nairn*. The Mercat Press, Edinburgh.
- Colhoun, K. 1998. *The wintering ecology of Icelandic Whooper Swans* *Cygnus cygnus* (L.) in north-west Ireland. Unpubl. PhD thesis, University of Ulster.
- Colhoun, K. 2001. *I-WeBS Report 1998-99*. BirdWatch Ireland/NPW/WWT, Dublin.
- Colhoun, K. & Day, K.R. 2002. Effects of grazing on grasslands by wintering Whooper Swans. In E.C. Rees, S.L. Earnst & J.C. Coulson (eds.) Proceedings of the Fourth International Swan Symposium, 2001. *Waterbirds* 25, Special Publication 1: 168-176.

- Colhoun, K., McElwaine, J.G., Cranswick, P.A., Enlander, I. & Merne, O.J. 2000. Numbers and distribution of Whooper *Cygnus cygnus* and Bewick's *C. columbianus bewickii* Swans in Ireland: results of the International Swan Census, January 2000. *Irish Birds* 6: 485-494.
- Cramp, S. & Simmons, S.E.L. 1977. *Birds of the Western Palearctic. Vol. I.* Oxford University Press, Oxford.
- Cranswick, P.A., Kirby, J.S., Salmon, D.G., Atkinson-Willes, G.L., Pollitt, M.S. & Owen, M. 1996a. A history of wildfowl counts by WWT. *Wildfowl* 47: 217-230.
- Cranswick, P.A., Bowler, J.M., Delany, S.N., Einarsson, O., Gardarsson, A., McElwaine, J.G., Merne, O.J., Rees, E.C. & Wells, J.H. 1996b. Numbers of Whooper Swans *Cygnus cygnus* in Iceland, Ireland and Britain in January 1995: results of the international Whooper Swan census. *Wildfowl* 47: 17-30.
- Cranswick, P.A., Colhoun, K., Einarsson, O., McElwaine, J.G., Gardarsson, A., Pollitt, M.S. & Rees, E.C. 2002. Numbers of Whooper Swans in Iceland, Ireland and Britain in January 2000: results of the international Whooper Swan census. In E.C. Rees, S.L. Earnst & J.C. Coulson (eds.) Proceedings of the Fourth International Swan Symposium, 2001. *Waterbirds* 25, Special Publication 1: 37-48.
- Cullen, J.P. & Jennings, P.P. 1986. *Birds of the Isle of Man.* Bath Press, Avon.
- D'Arcy, G. 1978. *Birds at Lough Beg.* Blackstaff Press, Belfast.
- Dúchas 2002. *Special Protection Areas for Birds in Ireland.* Dublin.
- Einarsson, O. 1996. *Breeding biology of the Whooper Swan and factors affecting its breeding success, with notes on its social dynamics and life cycle in the wintering range.* PhD thesis, University of Bristol.
- Einarsson, O. 2000. Iceland. In Heath, M.F. & Evans, M.I. (eds.) *Important Bird Areas in Europe: Priority sites for conservation:* 341-363. Birdlife International, Cambridge.
- Einarsson, O. & Rees, E.C. 2002. Occupancy and turnover of Whooper Swans on territories in northern Iceland: results of a long-term study. In E.C. Rees, S.L. Earnst & J.C. Coulson (eds.) Proceedings of the Fourth International Swan Symposium, 2001. *Waterbirds* 25, Special Publication 1: 202-210.
- Elkins, N. 1979. High altitude flight by swans. *British Birds* 72: 238-239.
- Forrest, H.E. 1907. *The Vertebrate Fauna of North Wales.*
- Fox, A.D., Norriss, D.W., Stroud, D.A. & Wilson, H.J. 1994. *Greenland White-fronted Geese in Ireland and Britain 1982/83-1993/94.* Greenland White-fronted Goose Study Research Report No. 8.
- Frederiksen, M., Fox, A.D., Madsen, J. & Colhoun, K. 2001. Estimating the total number of birds using a staging site. *Journal of Wildlife Management* 65: 282-289.
- Galloway, B. & Meek, E.R. 1980. *Northumberland Birds.* Northumbria Natural History Society.
- Gardarsson, A. 1991. Movements of Whooper Swans *Cygnus cygnus* neck banded in Iceland. In J. Sears & P.J. Bacon (eds.) Proceedings of the 3rd IWRB International Swan Symposium, Oxford 1989. *Wildfowl Special Supplement* 1: 189-194.
- Gardarsson, A. & Skarphedinsson, K.H. 1984. A census of the Icelandic Whooper Swan population. *Wildfowl* 35: 37-47.
- Gardarsson, A. & Skarphedinsson, K.H. 1985. Veturseta alfta a Islandi. *Bliki* 4: 45-56.
- Gibbons, D.W., Reid, J.B. & Chapman, R.A. 1993. *The New Atlas of Breeding Birds in Britain and Ireland: 1988-1991.* Poyser, London.
- Gilbert, G., Gibbons, D.W., & Evans, J. 1998. *Bird Monitoring Methods.* RSPB, Sandy.
- Gregory, R.D., Wilkinson, N.I., Noble, D.G., Robinson, J.A., Brown, A.F., Hughes, J., Procter, D., Gibbons, D.W. & Galbraith, C.A. 2002. The population status of birds in the United Kingdom, Channel Islands and Isle of Man: an analysis of conservation concern 2002-2007. *British Birds* 95: 410-448.

- Hagemeyer, W.J.M. & Blair, M.J. 1997. *The EBCC Atlas of European Breeding Birds: Their Distribution and Abundance*. Poyser, London.
- Harvie-Brown, J.A. 1906. *A Fauna of the Tay Basin and Strathmore*. Edinburgh.
- Heath, M.F. & Evans, M.I. (eds.) 2000. *Important Bird Areas in Europe: Priority sites for conservation. I: Northern Europe*. Cambridge, UK: Birdlife International (BirdLife Conservation Series No. 8).
- Heery S. 1990. *The Shannon floodlands - a natural history of the Shannon callows*. Kinvara. Tír Eolas.
- Hopkins, P.G. & Coxon, P. 1979. Birds of the Outer Hebrides: waterfowl. *Proceedings of the Royal Society of Edinburgh* 77B: 431-444.
- Hutchinson, C. 1979. *Ireland's Wetlands and their Birds*. IWC, Dublin.
- Kear, J. 1963. Wildfowl and agriculture. In G.E.L. Atkinson-Willes (ed.) *Wildfowl in Great Britain*: 315-328. HMSO.
- Kennedy, P.G., Ruttledge, R.F. & Scroope, C.F. 1954. *The Birds of Ireland*. Oliver & Boyd, Edinburgh.
- Kirby, J.S., Rees, E.C., Merne, O.J. & Gardarsson, A. 1992. International census of Whooper Swans *Cygnus cygnus* in Britain, Ireland and Iceland: January 1991. *Wildfowl* 43: 20-26.
- Lack, D. 1934. *The Birds of Cambridgeshire*. Severs, Cambridge.
- Lack, P. 1986. *The Atlas of Wintering Birds in Britain and Ireland*. Poyser, London.
- Laubek, B. 1995. Habitat use by Whooper Swans *Cygnus cygnus* and Bewick's Swans *Cygnus columbianus bewickii* wintering in Denmark: increasing agricultural conflicts. *Wildfowl* 46: 8-15.
- Laubek, B., Knudren, H.L. & Ohtonen, A. 1998. Migration and winter range of Whooper Swans *Cygnus cygnus* breeding in different regions of Finland, In Laubek, B. *The Northwest European Whooper Swan (Cygnus cygnus) population: ecological and management aspects of an expanding waterfowl population*. Unpubl. PhD thesis, University of Aarhus, Denmark.
- Laubek, B., Nilsson, L., Wieloch, M., Koffijberg, K., Sudfelt, C. & Follested, A. 1999. Distribution, numbers and habitat choice of the NW European Whooper Swan *Cygnus cygnus* population: results of an international census in January 1995. *Vogelwelt* 120: 141-154.
- Lovegrove, R., Williams, G. & Williams, I. 1994. *Birds in Wales*. Poyser, London.
- MacMillan, A.T. 1969. Scottish Bird Report 1968. *Scottish Birds* 5:317.
- Madge, S. & Burn, H. 1988. *Wildfowl: an identification guide to the ducks, geese and swans of the world*. Christopher Helm, London.
- McElwaine, J.G. 1991. *Wintering Wildfowl on the County Down Lakes*. Irish Birds, IWC, Dublin.
- McElwaine, J.G., Wells, J.H. & Bowler, J.M. 1995. Winter movements of Whooper Swans visiting Ireland: preliminary results. *Irish Birds* 5: 265-278.
- Milne-Edwards, A. 1868. On the former existence of a large Pelican in the English Fens. *Ibis* 16: 361-370.
- Miyabayashi, Y. & Mundkur, T. 1999. *Atlas of key sites for Anatidae in the East Asian Flyway*. Wetlands International - Japan, Tokyo and Wetlands International - Asia-Pacific, Kuala Lumpur.
- Murphy, G. 2003. *The status of Icelandic Whooper Swans Cygnus cygnus (L.) wintering in counties Limerick, Kerry and South Clare, South-west Ireland*. Diploma in Field Ecology 2nd year report, University College, Cork.
- Murray, R. 1986. *The Birds of the Borders*. Scottish Ornithologist's Club.
- Nelson, T.H. 1907. *The Birds of Yorkshire*. Brown & Sons, London.
- Newton, S., Donaghy, A., Allen, D. & Gibbons, D. 1999. Birds of Conservation Concern in Ireland. *Irish Birds* 6: 333-342.
- O'Dell, A.D. & Walton, K. 1962. *The Highlands and Islands of Scotland*. London, Nelson.
- O'Halloran J., Ridgway M. & Hutchinson C.D. 1993. A Whooper Swan *Cygnus cygnus* population wintering at Kilcolman Wildfowl refuge, Co. Cork, Ireland: trends over 20 years. *Wildfowl* 44: 1-6.

- Owen, J.A. (ed.) 1895. *The Wild-fowl and Sea-fowl of Great Britain*. Chapman & Hall, London.
- Owen, M. & Cadbury, C.J. 1975. The ecology and mortality of swans at the Ouse Washes, England. *Wildfowl* 26: 31-42.
- Owen, M. & Kear, J. 1972. Food and feeding habits. In P. Scott & The Wildfowl Trust. (eds.) *The Swans*. Michael Joseph, London.
- Owen, M., Atkinson-Willes, G.L. & Salmon, D. 1986. *Wildfowl in Great Britain - Second Edition*. Cambridge University Press, Cambridge.
- Pennycuik, C.J., Einarsson, O., Bradbury, T.A.M. & Owen, M. 1996. Migrating Whooper Swans *Cygnus cygnus*: satellite tracks and flight performance calculations. *Journal of Avian Biology* 27: 118-134.
- Pennycuik, C.J. & Bradbury, T.A.M., Einarsson, O. & Owen, M. 1999. Response to weather and light conditions of migratory Whooper Swans *Cygnus cygnus* and flying height profiles, observed with the Argos satellite system. *Ibis* 141: 434-443.
- Pilcher, R.E.M. & Kear, J. 1966. The spread of potato eating in Whooper Swans. *British Birds* 59: 160-161.
- Pollitt, M.S., Hall, C., Holloway, S.J., Hearn, R.D., Marshall, P.E., Musgrove, A.J., Robinson, J.A. & Cranswick, P.A. 2001. *The Wetland Bird Survey 2000-01: Wildfowl & Wader Counts*. BTO/WWT/RSPB/JNCC, Slimbridge.
- Prater, A.J. 1981. *Estuary birds of Britain and Ireland*. Poyser, London.
- Prendergast, E.D.V. & Boys, J.V. 1983. *The Birds of Dorset*. David & Charles, London.
- Ramsar. 1999. *Strategic Framework for the List of Wetlands of International Importance*. Ramsar Bureau, Gland, Switzerland.
- Rees, E.C. 1998. *Enhancement and mitigation measures within the Black Cart Water river corridor at Inchinnan*. WWT Wetlands Advisory Service report to Renfrewshire Enterprise.
- Rees, E.C. In press. Whooper Swan. In J. Kear (ed.) *Ducks, Geese & Swans (Anseriformes)*. (Bird Families of the World). Oxford University Press, Oxford.
- Rees, E.C. & Bowler, J.M. 1996. Fifty years of swan research and conservation by the Wildfowl & Wetlands Trust. *Wildfowl* 47: 248-263.
- Rees, E.C. & White, G.T. 1998. *Whooper Swans in the Black Cart floodplain: 1994-95 to 1997-98 perspective*. WWT Wetlands Advisory Service report to Renfrewshire Enterprise.
- Rees, E.C. & White, G.T. 2001. *Whooper Swans wintering in the Black Cart floodplain: winter 2000-2001*. WWT Wetlands Advisory Service report to Glasgow Airport Ltd.
- Rees, E.C., Bowler, J.M. & Butler, L. 1990. Bewick's and Whooper Swans: the 1989-90 season. *Wildfowl* 41: 176-181.
- Rees, E.C., Black, J.M., Spray, C.J. & Thorisson, S. 1991. Comparative study of the breeding success of Whooper Swans *Cygnus cygnus* nesting in upland and lowland regions of Iceland. *Ibis* 133: 365-373.
- Rees, E.C., Lievesley, P., Pettifor, R.A. & Perrins, C. 1996. Mate fidelity in swans: an interspecific comparison. In J.M. Black (ed.) *Partnerships in Birds: the Study of Monogamy*: 118-137. Oxford University Press, Oxford.
- Rees, E., Einarsson, O. & Laubeck, B. 1997a. *Cygnus cygnus* Whooper Swan. *BWP Update* 1: 27-35.
- Rees, E.C., Kirby, J.S. & Gilburn, A. 1997b. Site selection by swans wintering in Britain and Ireland: the importance of habitat and geographic location. *Ibis* 139: 337-352.
- Rees, E.C., White, G.T. & Bruce, J. 1998. *Whooper Swans wintering in the Black Cart floodplain: non-technical summary, 1997-98 winter*. WWT Wetlands Advisory Service report to Renfrewshire Enterprise.
- Rees, E.C., White, G.T., Bruce, J. & Hall, C. 1999. *Whooper Swans wintering in the Black Cart floodplain: winter 1998-1999*. WWT Wetlands Advisory Service report to Renfrewshire Enterprise.
- Rees, E.C., White, G.T. & Bruce, J. 2000. *Whooper Swans wintering in the Black Cart floodplain: winter 1999-2000*. WWT Wetlands Advisory report to Renfrewshire Enterprise.
- Rees, E.C., Colhoun, K., Einarsson, Ó., McElwaine, G., Petersen Æ. & Thorstensen, S. 2002. Whooper Swan *Cygnus cygnus*. In C. Wernham, M.P. Toms, J.H. Marchant, J.A. Clark, G.M. Siriwardena, S.R. Baillie (eds.) *The Migration Atlas: Movements of the Birds of Britain and Ireland*. Poyser, London, pp 154-157.

- Reynolds, P. 1982. Wintering Whooper Swans. *Orkney Bird Report, 1981*: 49-54.
- Ridgway, M. & Hutchinson, C.D. 1990. *The Natural History of Kilkoman*. O'Brien Printing, Dublin.
- Rose, P.M. & Scott, D.A. 1997. *Waterfowl Population Estimates - Second Edition*. Wageningen, The Netherlands, Wetlands International Publication No. 44.
- Rutledge R.F. 1950. A list of the birds of the counties Galway and Mayo. *Proc. Royal Irish Academy* 52, Sect. B, No. 8.
- Rutledge, R.F. 1966. *Ireland's Birds*. Witherby, London.
- Rutledge R.F. 1974. Winter distribution of Whooper and Bewick's Swans in Ireland. *Bird Study* 21: 141-145.
- St John, C. 1863. *Natural History and Sport in Moray*. Edmonstone & Douglas, Edinburgh.
- Salmon, D.G. & Black, J.M. 1986. The January 1986 Whooper Swan census of Britain, Ireland and Iceland. *Wildfowl* 37: 172-174.
- Scott, D.A. & Rose P.M. 1996. *Atlas of Anatidae Populations in Africa and Western Eurasia*. Wetlands International Publication No. 44. Wetlands International, Wageningen, The Netherlands.
- Sheppard J.R. 1981. Whooper and Bewick's Swans in North West Ireland. *Irish Birds* 2: 48-59.
- Sheppard, R. 1993. *Ireland's Wetland Wealth: the birdlife of the estuaries, lakes, coasts, rivers, bogs and turloughs of Ireland*. IWC, Dublin.
- Smout, A.-M. 1986. *The Birds of Fife*. John Donald.
- Snow, D.W. & Perrins, C.M. 1998. *The Birds of the Western Palearctic Concise Edition*. Oxford University Press, Oxford.
- Spray, C.J. & Milne, H. 1988. The incidence of lead poisoning amongst Whooper and Mute Swans *Cygnus cygnus* and *Cygnus olor* in Scotland. *Biological Conservation* 44: 265-281.
- Stewart, A.G. 1978. Swans flying at 8,000 metres. *British Birds* 71: 459-460.
- Stroud, D.A., Chambers, D., Cook, S., Buxton, N., Fraser, B., Clement, P., Lewis, I., McLean, I., Baker, H. & Whitehead, S. 2001. *The UK SPA network: its scope and content*. JNCC, Peterborough.
- Taylor, M., Seago, M., Allard, P. & Dorling, D. 2000. *The Birds of Norfolk*. Pica Press, London.
- Thom, V. M. 1986. *Birds in Scotland*. Poyser, London.
- Tucker, G.M. & Heath, M.F. 1994. *Birds in Europe: their Conservation Status*. BirdLife International, Cambridge, UK (BirdLife Conservation Series No. 3).
- Ussher R.J. & Warren R. 1900. *Birds of Ireland*. London.
- Waltho, C.M., Gibson, I.P. & White, G.T. 1995. *The distribution and habitat use by Whooper Swans Cygnus cygnus of the Black Cart water floodplain, Linwood to Inchinnan during winter 1994/5*. Unpubl. Scottish Ornithologist's Club report.
- Waltho, C.M., Gibson, I.P. & White, G.T. 1996. *The distribution and habitat use by Whooper Swans Cygnus cygnus of the Black Cart water floodplain, Linwood to Inchinnan during winter 1995/6*. Unpubl. Scottish Ornithologist's Club report.
- Wetlands International. 2002. *Waterbird Population Estimates – Third Edition*. Wetlands International Global Series No. 12, Wageningen, The Netherlands.
- Wood, R.B. & Smith, R.V. 1993. (eds.) *Lough Neagh: The Ecology of a multipurpose water resource*. Kluwer Academic Press, The Netherlands.