



WILDFOWL AND WADER COUNTS 1991-92



British Trust for Ornithology



**ENVIRONMENT
SERVICE**

Department of
the Environment
for Northern Ireland

Wildfowl and Wader Counts 1991-92

**The Results of the
National Waterfowl Counts
and
Birds of Estuaries Enquiry
in the United Kingdom**

By

P.A. Cranswick, J.S. Kirby and R.J. Waters

**Published by
The Wildfowl & Wetlands Trust
December 1992
under contract to the
Joint Nature Conservation Committee**

**Design and production by the Publications Unit of The Wildfowl & Wetlands Trust
using Quark Xpress on a Macintosh IIfx**

**© The Wildfowl & Wetlands Trust and
The British Trust for Ornithology 1992**

**ISBN 0 900806 15 X
ISSN 0965-3708**

Printed by Orchard & Ind, Gloucester

NATIONAL WATERFOWL COUNTS

Organized by The Wildfowl & Wetlands Trust
Slimbridge, Gloucester
GL2 7BT

Funded by The Wildfowl & Wetlands Trust
The Joint Nature Conservation Committee
Royal Society for the Protection of Birds
Department of the Environment for Northern Ireland

BIRDS OF ESTUARIES ENQUIRY

Organized by The British Trust for Ornithology
The Nunnery, Nunnery Place,
Thetford, Norfolk IP24 2PU

Funded by The British Trust for Ornithology
The Joint Nature Conservation Committee
Royal Society for the Protection of Birds
Department of the Environment for Northern Ireland

Wildfowl and Wader Counts is provided free to all NWC and BoEE counters, none of whom receive financial rewards for their invaluable work. Further feedback from WWT and BTO HQs is provided in the form of the NWC summer newsletter and BTO newsletter *Estuaries Unit News*, and BTO members can read about BoEE work in the regular *Shorelines* section of *BTO News*.

ACKNOWLEDGEMENTS

This book is the thirteenth combined report of the National Waterfowl Counts and the Birds of Estuaries Enquiry. It provides a national overview of the count information collected under the two schemes, so critical to the conservation of waterfowl populations both within the United Kingdom and internationally. It is thus entirely dependent on the many thousands of dedicated volunteer ornithologists who supply the data and to whom we are extremely grateful. The Regional and Site Organisers who coordinate these counts deserve special mention.

We are also grateful to the following people for providing technical assistance, supplementary information and comments on the draft texts: Arthur Austin (BTO), Catherine Bennett (BTO), Mario Bertuca (WWT), Jeff Black (WWT), Ali Browning (WWT), Lennox Campbell (RSPB), Jackie Clark (BTO), Nigel Clark (BTO), Tim Davis (WWT), Tom Dearnley (WWT), Simon Delany (WWT), Julianne Evans (BTO), Richard Evans (RSPB), Jo Ferns (WWT), Claire Forrest (BTO), Rob Fuller (BTO), André Gilburn (WWT), Baz Hughes (WWT), Tim Jones (IWRB), Rowena Langston (BTO), John Marchant (BTO), Carl Mitchell (WWT), Marie Montesdeoca (WWT), Bernie Morgan (WWT), Rosie Ounsted (WWT), Myrfin Owen (WWT), Joyce Portlock (WWT), Carol Powley (BTO), Mark Rehfish (BTO), Mike Shepherd (BTO), David Stroud (JNCC), Derek Toomer (BTO), John Turner, Sue Vickers, Sue Warbrick (BTO) and Jane Wright (WWT). Many amateur observers also provide us with reports of their studies. These are acknowledged in the text.

Tim Davis, the WWT's Design and Publications Manager, was responsible for the design of the report. The map of NWC coverage was produced using DMAP, written by Dr Alan Morton.

The cover painting is of Black-tailed Godwits by Richard Hull. Other illustrations in this report are by Steve Carter, Mark Hulme, Rob Hume, Darren Rees, Thelma Sykes, Laurel Tucker, Michael Turland and Suzanne Yarnton.

WILDFOWL AND WADER COUNTS 1991-92

CONTENTS

Winter Weather in 1991-92.....	4
Interpretation of Waterfowl Counts.....	4
Important Notices.....	5
WILDFOWL by <i>P.A. Cranswick and J.S. Kirby</i> (WWT)	7
Progress and Developments	7
Research, Conservation and Management.....	10
Coverage in 1991-92.....	11
Data Presentation	13
Total Numbers	13
Monthly Fluctuations	16
Indices	17
Principal Sites	18
Species Accounts.....	20
WADERS by <i>R.J. Waters</i> (BTO).....	57
Progress and Developments	57
Data presentation	60
Coverage in 1991-92.....	60
United Kingdom Population Totals	60
Indices of Wintering Numbers	63
Species Accounts.....	64
Principal Sites	81
WADERS AT INLAND SITES by <i>P.A. Cranswick</i>	85
Total Numbers	85
Principal Sites	87
Species Accounts.....	87
References	93
Appendix 1: National and International Importance.....	99
Appendix 2: Locations of NWC sites	102
Appendix 3: Internationally important UK sites	107

WINTER WEATHER IN 1991-92

The following account refers to the September to March period only and is derived from monthly weather reports produced by the Meteorological Office, Bracknell.

September started dry and very warm, especially in the south, with temperatures in the high twenties. These conditions continued into the second half of the month, with the exception of a brief cold snap in central and eastern Scotland on the 12th. The latter part of the month was unsettled, with cooler air reaching all parts on the 24th. Thundery showers were widespread over central southern and eastern England from the 26th, with rain, heavy in places, over much of the southern half of Britain until the 29th.

Generally unsettled conditions persisted during much of October, being cool and dull in most places. Temperatures rose to around 20°C on the 10th but then fell slowly. Higher than average rainfall was reported in the west and north-east, falling as snow on higher ground in northern England and southern Scotland on the 16th. Central Scotland and eastern England received very little rain. Colder, more settled conditions occurred from the 20th, with ground frost in many places. Heavy rainfall and flooding were reported in the West Midlands and Merseyside during the last two days of the month.

November started unsettled, with widespread thunder over England and Wales on the 3rd, again between the 11th and 14th, and in Scotland on the 12th. Rainfall was generally high in northern Britain, while it was dry in the south. Temperatures fluctuated during the month, starting warm, but with snow in Wales, northern England and Scotland on the 3rd and 4th. There was widespread frost on 6th with wintry showers and snow in Scotland until the 8th. A milder spell intervened before snow fell widely on the 13th and again in more northern areas on the 16th and 17th. Frosts were particularly widespread on the 21st. Milder conditions returned and nearly all areas were dry during the last ten days of the month.

December was dry for the first half of the month in most places in England and Wales, although Northern Ireland had its wettest December for five years. Clear skies and light winds resulted in a cold spell on 11th, with temperatures failing to get above freezing in most places during the day. Cold weather, with dense fog in several areas, continued until 16th when rain was recorded in many areas.

Heavy rain and gales on the 21st caused flooding in several areas. Unsettled wet and windy weather, interspersed with sunny spells continued until the 24th, with snow and sleet reported widely. Settled conditions then returned to much of the UK until the last day of the month.

January began unsettled, with strong winds and heavy rain, especially in north and west Scotland. Sleet was recorded widely during the first eight days, falling as snow on higher ground, as far south as Cornwall. It was generally dry but cooler, with night frosts across most of the UK after the 8th. There was a particularly cold period from the 21st to the 24th, when small amounts of snow were recorded in the Midlands and on high ground in eastern England.

February was generally unsettled but mild. Rain, heavy at times, was recorded in the west and north while several eastern areas had no significant rainfall. Showers were often wintry in the north, falling as sleet or snow in the first few days of the month. Snow was recorded on higher ground from the 9th to the 12th, and covered much of north-east Britain on the 16th. Snow spread to most areas from the 17th to 19th, and was heavy in the Midlands. Unsettled weather continued until the end of the month, although more settled conditions were recorded in southern areas on the 28th.

March continued wet and unsettled, although it was generally mild, with above average temperatures in all places. Rain, heavy at times, was recorded in nearly all areas, notably on the 1st, 18th, 20th and 30th, with thunderstorms over west and northern Scotland on the 10th, although there were some more settled periods in the second half of the month. Snow fell in many areas between the 10th and 15th as far south as Essex and Wiltshire, with further sleet or snow in the south-west and Wales on the 29th.

INTERPRETATION OF WATERFOWL COUNTS

A word of caution is necessary regarding the uses to which waterfowl counts can correctly be applied and the limitations of these data, especially in the summary form, which, of necessity, is used in this booklet. The primary aim here is the rapid feedback of key results to the many participants in both the NWC and BoEE schemes. More detailed information on how to make use of NWC or BoEE data for research or site assessment purposes may be obtained from the appropriate headquarters.

Explanation of the basis for the qualifying levels used for defining both the international and national importance of sites is provided in Appendix 1. Note that, at present, sites in Northern Ireland are considered in terms of what are strictly British qualifying levels, hence use of the term "national importance" for these results is an anomaly which will require clarification when Irish criteria become available. In the Species Accounts and Principal Sites sections, it is necessary to bear in mind the distinction between sites *regularly* holding wintering populations of national or international importance (i.e. based on the mean winter maxima from the last five seasons) and those which may merely happen to exceed the appropriate qualifying levels in occasional winters. Also, the ranking of sites according to the total numbers of birds they support (Tables 6 & 54) should not be taken as a rank order of the conservation importance of these sites. This is because certain sites, perhaps low down in terms of their total numbers, may nevertheless be of critical importance to certain species or populations at certain times e.g. during the main migratory periods or during periods of cold weather when they may act as refuges for birds from other areas. Furthermore, more sites are of international importance than is immediately apparent from the tables, as the 20,000 qualifying level refers to total waterfowl rather than just wildfowl or waders alone (see Appendix 3).

Peak counts based on monthly visits to a particular site in a given season will reflect more accurately the relative importance of the site for the species than do single visits. It is important to bear this in mind since, despite considerable improvements in coverage, data for a few sites presented in this booklet derive from single counts during 1991-92. Similarly, in assessing the importance of a site, peak counts from several winters should ideally be used, as the peak count made in any one year may be unreliable due to gaps in coverage and disturbance or weather-induced problems. The short-term movement of birds between closely adjacent sites may lead to altered assessments of a site's apparent importance for a particular species. More frequent counts than once-monthly visits are necessary to assess more accurately the rapid turnover of waterfowl populations that occurs during times of migration or cold weather movements.

IMPORTANT NOTICES

NWC/BoEE schemes

Please return your counts to the appropriate local organiser as soon as you can. This should be by the end of March at the latest for the National Waterfowl Counts and by end of June in the case of BoEE. For coastal sites, of which many are counted in every month of the year, counters are strongly advised to forward each count to their local organiser soon after the count has been done. This will give the local organisers time to collate the results and summarise them as necessary. The rapid return of information to the relevant headquarters helps to make sure that annual analyses are completed on time and the results presented promptly in this booklet. It also allows data to be submitted to the International Waterfowl and Wetlands Research Bureau in time for the annual reporting of Western Palearctic populations. Many thanks for your help.

It is vital that you consult both the NWC and BoEE organisers before making any changes to the overall site or sector boundaries of your count area. This is so that we can ensure that we are fully aware of the precise details of such changes and can amend our computer files and maps accordingly. This is now especially important since we are beginning to computerise data at the smallest scale, for example individual count sectors on estuaries or individual gravel pits. Please tell us of any changes you may be planning so that we can manage our databases accordingly. We would also be pleased to advise on the positioning of existing SSSI (and other) statutory site boundaries so that the count boundaries can be matched with these, hence increasing the applicability of the count data collected.

NWC scheme

Counters will have noticed a box on the new NWC count form labelled "Site Code". Every count site has been given a unique reference number within the NWC data files that is used by computer programmes when accessing the data. Please treat the site code box as a "for office use only" space. It is our intention, in the long term, to provide these codes to counters so that they can be entered onto the form before it is returned to Slimbridge, although this has not been possible to date. We apologise for any confusion.

Please note that the priority dates for counts at all coastal sites are those set for the BoEE scheme, even if the site is not covered for the BoEE scheme itself. This ensures a coordinated count of coastal

habitats and reduces the possibility of double-counting any birds moving between adjacent sites. BoEE priority dates will be provided in the summer Newsletter at the start of the counting season.

As last year, please remember that we would be grateful for any extra counts additional to those on the specified count weekend. These might be extra autumn or winter counts, made in between the count dates, or summer visits to wetlands. However, we ask you to remember two important points. Firstly, we would prefer that any extra counts are complete ones in the sense that all waterfowl species are counted, rather than just particular ones. Secondly, that the entire area within the boundary used for your winter count is covered i.e. that the boundaries used for both the usual and extra counts at your site are identical. Obviously also, we afford the highest priority to counts on the set dates so that coverage across the whole country can be as synchronous as possible. Many of you provided extra counts in 1991-92 and we are grateful for your extra efforts.

The counting of divers, grebes and seaducks in coastal waters is fraught with difficulties and we are aware that trying to count these on set dates is rarely successful. For these species, we would very much welcome more opportunistic records i.e. counts made when the weather and sea conditions

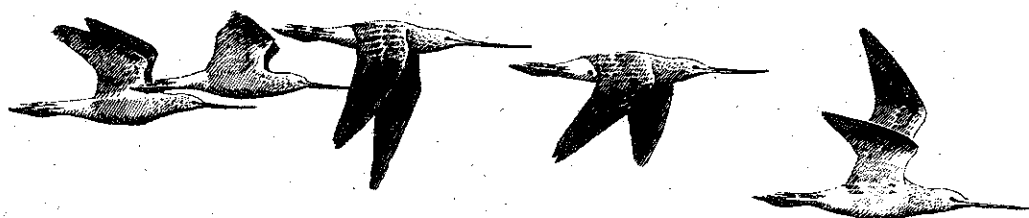
are suitable. Such records will allow important feeding and roosting areas to be identified, and will allow their frequency of use to be examined. So send in all records of these please!

The following changes to the WWT's Regional Organisers have occurred since the production of the July 1992 newsletter:

Avon (North): David Pryce, 13 Kingshill Road, Dursley, Glos GL11 4DQ.

Mid Glamorgan: Steve Moon, Kenfig Nature Reserve Centre, Ton Kenfig, near Pyle, Mid Glamorgan CF33 4PT.

It is with much sadness that we have to report the death of two of our Regional Organisers in the last year. Brian Pashby was the long-standing NWC RO for the Malton/Scarborough/Driffield area of Humberside and North Yorkshire, and was a keen counter and an invaluable organiser. We offer our condolences to his wife, Shirley, who helped Brian with much of his work, and has kindly volunteered to continue in Brian's role as organiser, for which we are very grateful. Joan Addyman was RO for Merionnydd and enthusiastically organised NWC monthly counts and special surveys in the area, as well as participating in many other local ornithological surveys. Both will be sadly missed.



WILDFOWL

by P.A. Cranswick and J.S. Kirby

The National Waterfowl Counts (NWC) programme receives financial support from the Joint Nature Conservation Committee (JNCC), on behalf of English Nature (EN), Scottish Natural Heritage (SNH) and the Countryside Council for Wales (CCW), the Royal Society for the Protection of Birds (RSPB) and the Department of the Environment for Northern Ireland (DoENI), and is organized by the staff of The Wildfowl & Wetlands Trust's (WWT) headquarters at Slimbridge, Gloucestershire. Instigated in 1947 by the British Section of the International Wildfowl Inquiry Committee, the success of the NWC accurately reflects the enthusiasm and dedication of the thousands of volunteer ornithologists throughout the UK who participate.

The 1991-92 season saw the change of the scheme to the National Waterfowl, rather than Wildfowl, Counts as a result of the increase in the number of species monitored by the core activity of the programme, the once-monthly counts. In addition to the wildfowl and associated species counted previously, the scheme now also monitors waders and several other species primarily dependent on wetlands (see below). Counts are conducted at a wide variety of wetlands including lakes, lochs/loughs, ponds, reservoirs, gravel pits, rivers, freshwater marshes, canals, estuaries and other coastal habitats and focus on the period from September to March inclusive, although data from other times of the year are also received. Counts are normally made on the Sunday nearest the middle of the month. Additional surveys of other species, principally geese and swans that are difficult to monitor accurately by the once-monthly counts alone, are also conducted, while Special Surveys, usually of just one or a few species, are made during the breeding and moulting periods.

The WWT works closely with the British Trust for Ornithology (BTO), as both organisations collect information on waterfowl at coastal sites. Results of the Birds of Estuaries Enquiry, organised by the BTO, are presented in the latter half of this report.

PROGRESS AND DEVELOPMENTS

As a consequence of the continuing demand for detailed count information and for the expertise of WWT staff, the Counts & Surveys Unit (CSU) has continued to be very busy. In addition to the many

pieces of research conducted as part of our sizeable contracts with the JNCC and RSPB, the CSU has frequently been approached to conduct both brief and extensive studies on certain species and/or the wetlands in particular regions of the UK by a variety of commercial companies.

The 1991-92 season saw one of the biggest changes to the NWC in recent years, with the expansion of the monitoring to include a larger range of waterfowl species. In addition to the previously counted swans, geese and ducks (Anatidae), divers (Gaviidae), grebes (Podicipedidae), Cormorant *Phalacrocorax carbo* and Coot *Fulica atra*, the numbers of Grey Heron *Ardea cinerea*, Water Rail *Rallus aquaticus*, Moorhen *Gallinula chloropus*, Kingfisher *Alcedo atthis* and, at inland sites, waders (Charadriiformes) are now systematically recorded during monthly NWC counts. Thus there are a number of new species accounts in the "Wildfowl" section, and a new section on waders at inland sites (page 85).

A new recording form was introduced to accommodate the extra species and also to facilitate the collection of standardised information on the accuracy of the count and site conditions on each visit. The form also allowed the observer to record the nature and degree of any disturbance at the site and the effect that this appeared to have on the waterfowl present. Furthermore, instructions for the 1991-92 season asked counters to submit any data collected during counts made in addition to the priority dates.

One of the first events in the 1991-92 count season was a weekend Counters' Conference held at the Cairndale Hotel, Dumfries, at the end of November. A full programme of speakers from the WWT divulged a wealth of information on current research by the Trust, complemented by presentations on related waterfowl and wetland topics by speakers from other organisations, including BTO, IWRB, JNCC and RSPB. Perhaps most importantly, the conference provided the opportunity for close contact between counters and organisers, and a highly successful workshop session resulted in a series of recommendations for several aspects of the counting programmes. These were highlighted in the July 1992 Newsletter and will feature strongly in shaping the future of the counts. The meeting ended with a visit to the nearby WWT Centre at Caerlaverock. Overall, the conference was a big success. Unfortunately, current restrictions upon resources prevent us from confirming the timing of the next conference, but we remain determined that this should become a regular event.

The new count form introduced in 1991-92, the 45th consecutive season of counts, was well received, and there was a good response to the request for wader counts and for disturbance information. The only drawback is the amount of data that now needs to be entered into the WWT databases! Unfortunately, Jo Ferns, who helped introduce the form and was instrumental in the success of the conference, left the Trust in 1992. Jo now works for the Avon Wildlife Trust and we wish her well in her new post. Peter Cranswick succeeded Jo as National Waterfowl Counts Officer, moving back to Slimbridge after being outposted to the Trust's Caerlaverock Centre, from where he helped with the Solway Firth and Annan Catchment Project (see below). To help with the increased workload involved with the counts, the CSU employed a full-time data management assistant, Mario Bertuca, at the start of 1992. Mario provided much technical assistance with databases and computer software. However, he has since returned to the sphere of further education and we wish him well. Marie Montesdeoca joined the CSU on a temporary basis in late 1991 and subsequently secured a permanent post in the Trust's Research Department. Marie provides much support to the Unit and input the majority of wildfowl data for 1991-92. The Trust was also fortunate in being able to secure a full-time statistician, Dr. André Gilburn, who joined the CSU in March 1992. André has already been able to make a large contribution to analyzing NWC data for the JNCC contract and has assisted on other research papers.

The report on relationships between waterfowl census units and statutory sites was completed in 1992 (Cranswick & Kirby 1992a), and documents location information and count boundaries, as well as the relationship between count sites and statutory sites such as Sites of Special Scientific Interest (SSSIs), for many NWC sites. The information was entered onto a large database, maintained by WWT. The report also documents a method of reference for count sites and makes several recommendations that should facilitate data exchange between the four main users, namely WWT, BTO, JNCC and RSPB. Several areas of possible future work that would broaden the scope of the system are highlighted. Further work in this area will be afforded high priority in 1993.

The behaviour and habits of many of the UK's wildfowl mean that additional surveys are required to monitor accurately their numbers and distributions. Often, these involve different methodologies, requiring dawn or dusk roost counts, or the searching of non-wetland areas by

day, usually for geese or swans. Thus, in 1991-92, there were specific surveys of Pink-footed and Icelandic Greylag Geese in October and November (Cranswick & Kirby 1992b) and of native Greylag Geese in the Uists in February (Mitchell 1992) and August 1992. Full censuses of Greenland White-fronted Geese, including birds in Ireland, were undertaken in December 1991 and March/April 1992, and results have been incorporated into the databases held by the Greenland White-fronted Goose Study. Censuses of Greenland Barnacle Geese on Islay were undertaken in December and March/April 1992, and there were regular counts of Svalbard Barnacle Geese on the Solway Firth. The British population of Dark-bellied Brent Geese was censused in January and February (Ferns & Kirby 1992) and fortnightly counts of Light-bellied Brent Geese at Lindisfarne were made throughout the 1991-92 winter. Age-counts of arctic nesting geese are also made to assess the often dramatically varying breeding productivity these birds (e.g. Kirby 1992). The results of these censuses are referred to in the relevant tables and Species Accounts in this report.

A more detailed examination of Pink-footed and Greylag Geese in the Lothians and Borders in 1991-92 was made at the request of Scottish Natural Heritage. Peter Cranswick, in conjunction with the local goose groups, organised a detailed fieldwork programme, centred on key, early-winter roost sites for Pinkfeet in the region. Specifically, the question of what effect shooting at roosts, and by day in fields, had on the numbers and distribution of birds was addressed. The report (Cranswick 1992) documented goose numbers over the last decade and highlighted some of the key factors that affect goose usage of the region. This information is important in ensuring the wise use and management of the internationally important sites in the region. Also, in 1992, the results of the international Whooper Swan census in January 1991 were published (Kirby *et al.* 1992). A brief account of the results of both of these surveys are given later in this report.

"Special Surveys" are conducted by WWT to monitor waterfowl during the breeding and moulting periods and are the responsibility of Simon Delany. Results of the WWT/BTO/Scottish Ornithologists' Club survey of Mute Swans in 1990 were widely publicised at the start of the year (Delany *et al.* 1992), and elicited one of the largest responses from the media and press that WWT has ever had to deal with. A survey of introduced geese was conducted in the summer of 1991, using a similar network of Regional Organisers and site counters to the

monthly counts to obtain comprehensive coverage of Great Britain. A database, designed by Joe Harris from Stroud College, was established to hold the information. Provisional results from this survey have now been published (Delany 1992a), and, as expected, reveal a large increase in the number of Canada Geese in Britain. Numbers of Greylag Geese in England, originally translocated from wild populations in Scotland in the early part of this century, have also grown, although not to the extent that might have been expected. Data on habitat use are currently being computerised for analysis and this aspect will be reported on during 1993.

The summer of 1992 saw the first ever comprehensive survey of breeding Shelduck in the UK. The methodology for obtaining the best results, given the problems of covering large estuaries, was designed with the benefit of two pilot studies (Delany 1992b). Up to six visits were made at different times of the breeding season in an attempt to assess the number of territorial pairs, non-breeding birds and the number of young. Data, as ever, were collected by many hundreds of volunteer counters. Much of the information has now been received and the task of entering counts on to databases is well underway. As in previous seasons, WWT staff conducted a series of counts to assess the breeding status of Shelduck on the Severn Estuary. These data will form an important part of our understanding of the UK's estuaries, which are of considerable international importance. Many thanks to all who contributed.

For the fourth winter running, WWT staff and local volunteer counters conducted mid-week counts at the Cotswold Water Park (Wilts/Glos/Oxon). These counts augment those made during the weekend and allow an examination of the distribution of waterfowl under disturbed (jet-skis, windsurfing etc.) and undisturbed conditions. A recent report to English Nature on the relative importance of the 110 or so pits in the Water Park will facilitate SSSI designation in this area (Fox *et al.* 1992).

There was good coverage of the Somerset Moors and Levels in 1991-92. Fortnightly counts were made at a large number of sites by NWC and other volunteers under the direction of the RSPB Exeter Office and the data have been incorporated into the results presented in this report. Encouragingly, a second season of counting is to be conducted in 1992-93, further improving our knowledge of this important area. Several other surveys of waterfowl in particular areas were conducted in 1991-92, notably counts of sea-ducks in the Moray Firth by the RSPB, sponsored by British Petroleum (Evans

1992), and offshore counts, made from boats, in Cardigan Bay (Green 1992a). We have referred to the results of these surveys in the relevant "Species Accounts".

There were around 80 requests for NWC data during the 1991-92 season. A large number of these were made by the JNCC, the country agencies, and the RSPB. A large number are also received from Universities, often for MSc or PhD studies, as well as private researchers. Local government offices and environmental consultancies also make up a significant proportion of the requests. As usual, results of the January NWC counts were passed to the International Waterfowl & Wetlands Research Bureau (IWRB). The increased coverage in this month, conducted especially for IWRB, is combined with count data from countries in Europe, north Africa and parts of the Middle East. Together, these counts monitor whole populations of waterfowl and allow the proportion that winter in the UK to be viewed in an international context. The results of the Western Palearctic Waterfowl Census were published as an annual report for the first time in 1992 (Rose 1992).

The Wetlands Advisory Service (WAS), the consultancy wing of the Trust, continues to attract many contracts from the commercial world. Several of these have been from water companies and the National Rivers Authority (NRA) and have resulted in a number of long and short term contracts for staff of the CSU. A number of one or two day studies were also carried out. Six of the larger of these projects, completed or commenced in 1991-92, are outlined below.

A comprehensive survey of wetland sites in north-west England was completed under contract to North West Water plc, analyzing the importance of all sites owned by them in a regional context. John Quinn, with the help of many volunteers in the region, conducted both winter and summer surveys, of virtually all wetlands in the area. The data from these surveys have been analyzed, and the results, including an evaluation of NWW sites, recommendations for management procedures and individual accounts of all sites owned by NWW, have recently been published (Quinn & Kirby 1992a, b).

Detailed studies of birds using the Solway Firth, the River Annan catchment, and a number of reservoirs in Dumfries & Galloway were undertaken on behalf of British Nuclear Fuels Ltd to provide baseline ornithological data in relation to a proposed nuclear power station at Chapelcross. This two year project will investigate the numbers of birds and identify

key areas within the Firth, at high and low tide, and during both day and night! The work programme is the responsibility of John Quinn, assisted, until the end of 1991-92, by Peter Cranswick. Peter has now moved back down to Slimbridge and Liz Still was appointed as project officer to work alongside John. Jeff Stenning was employed in the initial stages of the project, especially for his extensive experience in fieldwork. Jeff has since started work for the RSPB in Wales monitoring Nightjars. Mike Carrier and Jonathan Drew also assist with fieldwork. A preliminary analysis and the first season of winter surveys have already been completed (Kirby *et al.* 1991a, Quinn *et al.* 1992).

Two analyses have been conducted on fish-eating birds, namely Cormorants, Red-breasted Mergansers and Goosanders, under contract to the NRA. Dr Simon Pickering joined the CSU while investigating numbers and distribution of these birds in Britain, and in particular the north-west region (Pickering *et al.* 1992). Simon has since become the Conservation Policy Officer for the Trust. Dr Anne Starling joined the Trust in spring 1992 to undertake the second analysis, focusing particularly on the Welsh NRA region (Starling *et al.* 1992).

Anne had barely completed her study before moving to the WWT Washington Centre in Tyne & Wear, where she is responsible for survey of sites in north-west England under contract to Northumbrian Water plc. Andrew Donnison will assist Anne on a part-time basis in this work, which will investigate especially the effects of disturbance on waterfowl numbers and distributions at their sites.

Thames Water plc and English Nature have commissioned the WWT to conduct a survey of all waterbodies in a region outlying south-west London, including parts of Surrey and Berkshire. The study area includes such sites as Staines Reservoirs and Wraysbury Gravel Pits, which will be well known to many counters and feature in several of the "Species Accounts" in this report. The study involves intensive counts of sites to elucidate movements of birds within the area, and will also investigate night-time distribution and activity. Mark Underhill joined the Trust in the middle of 1992 and has already completed a first assessment of the area (Underhill & Kirby 1992). Many local volunteers have been enlisted to help with the fieldwork programme.

RESEARCH, CONSERVATION AND MANAGEMENT

NWC data make an important contribution to the work of the Trust as a whole and continue to feature prominently at many meetings and in many publications. The most relevant of these are mentioned in the Species Accounts but important contributions to a number of conferences, workshops and reviews are worthy of special mention here.

Myrfyn Owen, now the Trust's Director General, made important contributions to a conference in California called "Wildlife 2001" in August 1991. This meeting was called to review aspects of the population dynamics of species worldwide, to see what is known and what has yet to be studied. In particular, Myrfyn, with a co-author, presented a review of the status of waterfowl populations throughout the world (Johnson & Owen 1992). Myrfyn also provided expert input to a major international meeting on waterfowl and crop damage in The Netherlands in October 1991. This meeting was convened by the Dutch Ministry of Agriculture, Nature Management and Fisheries and IWRB in the light of increasing goose/agricultural conflict in Europe. The proceedings, including contributions from Slimbridge staff, have recently appeared as an IWRB Special Publication and contain information on the extent, prevention and alleviation of crop damage (Van Roomen & Madsen 1992).

Staying with geese, a number of WWT staff travelled to California in January 1992 to participate in a major, international symposium on arctic geese. The Trust took a very prominent position in the symposium, presenting four papers and five posters on the WWT's goose studies. Closer to home, at a workshop in Wexford in March 1992, WWT staff and representatives from the Range States of the Greenland White-fronted Goose met to discuss the formulation of an international conservation plan for the population as a whole. A draft of the plan, produced by David Stroud of the JNCC on behalf of IWRB, was discussed at Wexford. All representatives at the international workshop agreed the need to work closely together on the conservation and management of this shared, international resource. The initiative has broken new ground in the formalisation of links between countries that are responsible for migratory waterfowl. As so many species occur in many countries in the course of a year, it is hoped that the White-front initiative will give a model for other such agreements. Count data are crucial to the

identification of important sites and the monitoring of trends that are instrumental to the successful formulation of such plans.

In September, in Hungary, Jeff Kirby participated in IWRB's 9th International Waterfowl Ecology Symposium. Data from the 1990-91 survey of wintering swans in Britain and Ireland were used to examine the factors affecting site selection by swans in winter (Rees, Kirby & Gilburn, in prep.), whilst Tony Fox presented WWT studies on pre-nesting feeding ecology of Pink-footed Geese in southern Iceland. In the same month, but in The Netherlands, CSU staff contributed to the 12th International Conference of the International Bird Census Committee and European Ornithological Atlas Committee. Contributions included an appraisal of NWC coverage and counting practises (Kirby *et al.*, in press, a), methods for estimating Mute Swan breeding populations (Greenwood *et al.*, in press) and applying waterfowl census data to wetland conservation (Cranswick *et al.*, in press).

Retaining his link with waders from his BTO days, Jeff Kirby attended a conference on the Migration and International Conservation of Waders, in Odessa in April, where he presented a paper on waterfowl monitoring in the UK (Kirby in prep.). An agreement, known as the "Odessa protocol", was drafted at the conference, regarding the exchange of scientific experience on wader research and conservation.

COVERAGE IN 1991-92

The priority dates scheduled for monthly winter counts in 1991-92 were September 15th, October 13th, November 10th, December 15th, January 12th, February 16th and March 15th. Counts made at coastal sites were sometimes undertaken on different dates to correspond with appropriate tidal conditions and to correspond with counts made for the BoEE. As in earlier years, there was a special effort in January aimed at covering as many extra sites as possible to correspond with the International Census organised by IWRB.

Waterfowl were counted at a total of 2,173 wetland sites in the UK in 1991-92. This is fewer than the record number which were counted in January of last season as a result of intensive coverage in north-west England under the direction of John Quinn (see "Progress and Developments"). However, with the exception of January, the number of sites counted in each month of 1991-92 was higher than in 1990-91 by about 100. Some of this

increase was, as last season, due to the computerisation of data from large or complex sites e.g. estuaries and gravel pits, at the level of their constituent count units. A total of 1,309 sites was covered in England, with Lancashire (85 sites), Derbyshire (65), Hampshire (61) and Cumbria (57) returning the largest number of sites counted. As in previous years, the number of sites covered in Derbyshire, in view of its lack of coast, is most impressive. In total, 473 sites were covered in Scotland, with Strathclyde (106), Borders (68) and Highland (60) contributing heavily to this number. Counts in Wales were received from 142 sites, with Dyfed (28) and Gwynedd (25) being notable. Twelve sites were counted on the Isle of Man and welcome returns were received for 11 sites on the Channel Islands. A total of 229 sites was covered in Northern Ireland. The large number of counts received from Tyrone (100) and County Down (97) do particular credit to the counters and organisers in these regions.

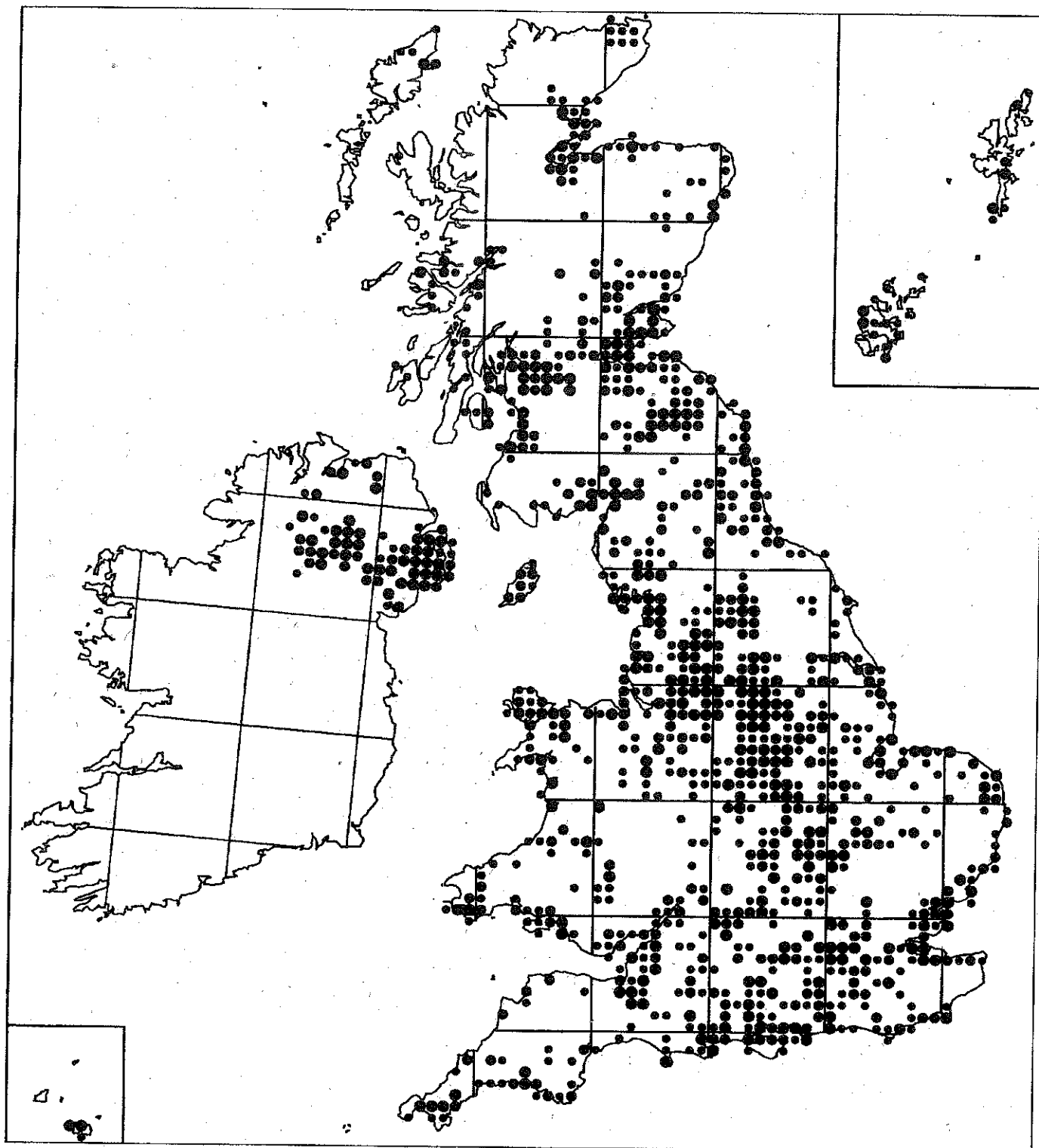
Numerous supplementary surveys of geese were accomplished in 1991-92 (see Progress and Developments) and extra information for seaducks in the Moray Firth was again supplied by the RSPB, courtesy of British Petroleum.

All 10 km squares containing NWC sites visited in 1991-92 are signified by a dot in Figure 1. The location of a count unit (either the site or its constituent sectors, where data for these are stored individually) is shown using only its central grid reference, so that, for example, Loughs Neagh and Beg are represented by just one dot even though they stretch over several 10 km squares.

A total of 1,049 10 km squares contained NWC count units that were visited in 1991-92. Of these, 494 (47%) contained one count unit, 265 (25%) contained two count units and the remaining 290 (28%) held three or more count units. Ten squares held 10 or more units and an amazing total of 17 sites was visited in one 10 km square in County Tyrone.

The map highlights some gaps in coverage, such as parts of south-west England, Hereford and central Wales, upland and north-west areas of Scotland, that are largely a result of the sparseness of the human population in these areas. The absence of data from an area running north from Essex to Yorkshire reflects the paucity of wetland habitat in this part of eastern England.

Figure 1. COVERAGE BY 10-KM GRID SQUARES FOR THE NATIONAL WATERFOWL COUNTS IN 1991-92.
Small dots represent 1 NWC unit, medium dots represent 2 NWC units and large dots represent 3 or more NWC units.



DATA PRESENTATION

The format of data presentation follows closely that of the last report (Kirby *et al.* 1991b). Data derived from sources outwith the routine monthly counts are clearly identified throughout, either by means of specific references or by use of an asterisk (*) to identify counts derived from the Trust's goose censuses. The flagging of goose counts in this way is important as such surveys rely on different methodology (e.g. dawn/evening flight counts, field searching) from that adopted in the mid-monthly visits to wetlands. Furthermore, the dates of goose surveys have frequently differed from those used for basic wetland monitoring.

In Tables 1 & 2, total counts for all species have been presented except for hybrid and domestic wildfowl. This enables an assessment of the true scale of NWC monitoring with regard to particular species. In order to save space, the following abbreviations for wetland types have been used in all tables that include site names:

Br. = Broad(s)	Hbr = Harbour
Est. = Estuary	Lo. = Loch(s) or Lough(s)
Fth = Firth(s)	R. = River
GP = Gravel pit(s)	Rsr = Reservoir(s)

In order to facilitate the matching of count information at coastal sites with that collected for waders through the BoEE, both the names of coastal sites and the areas included in them correspond with those used in the second section of this report (see Figure 2, p. 61). As in previous reports, counts made outwith the September to March period have been used in cases where they represent the maxima for the count season (June to May).

TOTAL WINTER NUMBERS

Tables 1 & 2 show the total numbers of each species of wildfowl, divers, grebes, Cormorant, rails, Grey Heron and Kingfisher recorded in September to March of 1991-92 for Britain (including the Isle of Man and the Channel Isles) and Northern Ireland respectively. Figures in these tables are derived from the NWC monthly counts and goose censuses only. Higher totals for certain species (e.g. some sea-ducks) can be calculated by including counts from special surveys made by other organisations, and these are highlighted in the Species Accounts.

The numbers of both common species of grebes and Cormorant counted in 1991-92 were similar to those from last season. Mute Swan numbers were slightly

down on 1990-91's record total. Bewick's Swans reached an all time high in Britain, with 9,118 in February, considerably higher than 1990-91, though, conversely, numbers of Whoopers were much reduced, with 1,000 fewer birds in Britain and a smaller reduction in Northern Ireland. Peak counts of migratory geese were recorded, as usual, during their respective census months. Pink-footed Geese and Dark-bellied Brent Geese were recorded in numbers exceeding any previous total by a considerable margin, while the small Svalbard population of Barnacle Geese also increased. European White-front numbers were also high compared with recent years, although both Greenland populations of White-fronts and Barnacles wintering in Britain were much lower. Numbers of Svalbard Light-bellied Brents reaching Britain were lower in 1991-92 than usual, while Canadian birds in Northern Ireland fared much as last season. Numbers of Icelandic Greylags were surprisingly low. Canada Goose and feral Greylag numbers both appear to be increasing in Britain.

Mallard and especially Teal numbers in Britain and Northern Ireland in 1991-92 were noticeably smaller than in 1990-91, although British maxima were no doubt boosted by the extra coverage resulting from intensive surveys last season. Wigeon numbers reached a staggering 342,412 in Britain, an increase of some 70% on 1990-91, although numbers in Northern Ireland were not noticeably different. Shoveler were also recorded in very high numbers, with a record total of 10,480 in October. Pochard and Tufted Duck numbers have remained fairly stable in recent years, while Goldeneye were about 1,000 fewer both in Britain and in Northern Ireland. Ruddy Ducks showed a smaller than normal increase.

Sea-duck numbers were again very variable as a result of the inherent monitoring problems for these species, although there was a large count of Eider in September. On the whole, counts of the larger sawbills were lower than in 1990-91, although peak counts were similar. Coot numbers were similar to last season's.

Table 1. TOTAL NUMBERS OF DIVERS, GREBES, CORMORANT, GREY HERON, WILDFOWL, RAILS AND KINGFISHER RECORDED BY THE NWC IN GREAT BRITAIN DURING WINTER 1991-92.

	Sep	Oct	Nov	Dec	Jan	Feb	Mar
Number of sites counted	1,672	1,798	1,841	1,872	1,932	1,927	1,819
Red-throated Diver	85	273	112	604	354	201	300
Black-throated Diver	10	7	6	21	20	6	9
Great Northern Diver	4	23	39	43	50	18	72
Little Grebe	2,546	2,597	2,107	2,140	1,997	1,796	1,486
Great Crested Grebe	8,121	8,011	8,083	6,791	6,646	6,863	6,849
Red-necked Grebe	15	32	19	29	23	28	39
Slavonian Grebe	26	102	85	104	94	79	86
Black-necked Grebe	18	12	28	22	26	8	27
Cormorant	11,149	13,034	12,493	12,207	11,802	11,170	9,862
Grey Heron	3,160	2,546	2,062	2,066	2,264	2,055	1,986
Mute Swan	13,550	13,632	13,577	13,293	12,589	10,998	9,723
Bewick's Swan	0	73	3,241	7,475	8,002	9,118	1,147
Whooper Swan	39	874	3,158	3,549	3,289	3,126	2,872
Bean Goose	1	56	9	68	195	25	13
Pink-footed Goose	4,809	*232,962	*178,736	92,192	64,566	72,915	54,961
European White-fronted Goose	7	132	535	2,371	5,607	6,804	258
Greenland White-fronted Goose	4	559	617	*15,420	801	480	*15,670
Lesser White-fronted Goose	0	0	1	0	3	2	0
Greylag Goose (Icelandic)	0	*39,919	*88,272	29,461	29,725	23,311	22,451
Greylag Goose (feral)*	12,301	12,599	11,605	10,979	13,697	8,655	7,559
Snow Goose	9	3	11	4	7	9	11
Canada Goose	42,308	37,355	34,141	32,045	34,693	28,657	20,393
Barnacle Goose**	287	11,888	11,055	9,083	13,477	5,479	*38,647
Dark-bellied Brent Goose	104	31,590	114,494	112,175	137,944	133,470	39,362
Light-bellied Brent Goose	4	1,484	1,419	1,534	587	122	8
Red-breasted Goose	1	0	0	0	0	0	1
Egyptian Goose	246	237	106	61	48	60	69
Shelduck	20,155	51,246	63,433	66,756	84,017	69,936	58,010
Mandarin	100	72	128	240	185	116	128
Wigeon	26,426	220,773	286,247	342,412	301,703	264,816	120,144
American Wigeon	0	0	1	0	0	0	0
Gadwall	6,344	6,403	7,696	7,266	7,336	5,642	3,541
Teal	57,510	82,312	111,001	116,732	112,409	75,770	36,216
Mallard	141,258	152,669	157,086	171,617	170,083	104,864	61,373
Pintail	5,317	27,297	19,886	27,505	22,979	13,768	3,956
Garganey	49	10	0	0	1	0	9
Shoveler	8,716	10,480	8,323	6,764	6,225	6,500	6,062
Red-crested Pochard	68	80	53	36	43	67	49
Pochard	12,846	23,391	31,022	30,878	38,227	29,431	10,134
Ring-necked Duck	1	1	1	3	1	2	0
Tufted Duck	41,209	39,053	45,081	47,560	50,527	42,596	38,075
Scaup	450	1,163	1,863	2,975	3,595	3,246	1,212
Eider	36,522	24,806	19,530	21,753	18,378	17,235	18,637
King Eider	0	0	0	2	0	2	0
Common/Velvet Scoter***	563	2,232	7,224	5,845	3,969	3,382	4,047
Surf Scoter	0	0	0	0	0	2	2
Long-tailed Duck	37	384	971	2,441	1,752	1,401	622
Goldeneye	275	1,908	7,263	13,595	16,039	15,958	11,531
Smew	0	3	7	55	84	70	35
Red-breasted Merganser	1,867	2,464	3,114	3,611	3,183	3,254	3,147
Goosander	726	915	1,729	2,818	3,276	2,832	1,542
Ruddy Duck	1,653	2,104	2,583	2,635	3,060	2,477	2,236
Water Rail	69	94	100	240	155	100	141
Moorhen	7,884	8,165	8,324	7,607	8,079	7,135	7,029
Coot	78,887	84,041	85,165	83,144	77,123	55,998	39,815
Kingfisher	171	161	150	82	76	77	101

Notes to Table 1:

+ In all months except September, the feral component of this species is approximated by totalling counts from English (excl. Northumberland) and Welsh sites only and 1500 (after Shimmings *et al.* 1989) for the feral birds in Dumfries & Galloway.

++ Includes mainly birds from the Greenlandic and Svalbard breeding populations, with a few feral birds also.

+++ These species are indistinguishable under certain conditions.

Table 2. TOTAL NUMBERS OF DIVERS, GREBES, CORMORANT, GREY HERON, WILDFOWL, RAILS AND KINGFISHER RECORDED BY THE NWC IN NORTHERN IRELAND DURING WINTER 1991-92.

	Sep	Oct	Nov	Dec	Jan	Feb	Mar
Number of sites counted	114	133	156	141	145	133	136
Red-throated Diver	3	3	12	28	20	10	4
Great Northern Diver	2	0	20	0	10	1	0
Little Grebe	694	806	687	661	467	521	360
Great Crested Grebe	1,791	1,679	292	1,433	1,452	469	904
Slavonian Grebe	0	0	0	0	10	1	0
Cormorant	1,172	1,076	672	1,207	772	903	619
Grey Heron	260	341	195	200	214	135	162
Mute Swan	2,229	2,278	1,872	1,789	1,892	1,729	1,461
Bewick's Swan	0	0	185	257	436	252	19
Whooper Swan	5	468	1,559	928	1,510	1,647	1,433
Greenland White-fronted Goose	0	9	3	57	55	5	0
Greylag Goose ⁺	179	203	226	586	776	723	429
Light-bellied Brent Goose	14,341	15,412	12,211	6,832	3,149	1,328	2,428
Canada Goose	282	122	136	31	82	87	100
Barnacle Goose	71	79	72	73	77	73	68
Shelduck	111	227	381	2,687	2,447	2,431	1,924
Wigeon	8,077	19,676	5,953	5,243	5,249	5,779	2,433
Gadwall	187	204	200	231	215	214	181
Teal	2,344	2,322	2,470	4,167	4,849	3,122	1,499
Mallard	9,584	11,240	6,831	7,874	7,216	4,889	2,091
Pintail	48	104	207	265	369	245	45
Shoveler	184	172	185	208	197	183	129
Pochard	4,883	4,917	15,966	23,310	39,953	13,668	2,786
Tufted Duck	3,443	12,981	19,785	15,934	26,177	17,042	11,107
Scaup	2	102	140	802	1,165	3,504	3,573
Eider	721	1,146	60	924	709	557	348
Common/Velvet Scoter ⁺⁺	0	2	2,963	5	19	0	0
Long-tailed Duck	0	3	9	53	18	4	5
Goldeneye	26	361	3,478	11,503	14,641	12,832	6,771
Red-breasted Merganser	513	404	212	383	455	384	402
Goosander	0	0	0	0	1	0	0
Ruddy Duck	24	58	12	0	12	38	23
Water Rail	4	4	1	5	2	4	1
Moorhen	566	712	377	450	432	302	390
Coot	7,855	7,978	6,189	4,834	3,815	4,813	3,297
Kingfisher	0	1	0	0	1	0	0

+ It is not possible to separate the feral from the wild component of this population in Northern Ireland.

++ These species are indistinguishable under certain conditions.

MONTHLY FLUCTUATIONS

Since the number of sites counted is not the same in all months, monthly count totals may not necessarily reflect true changes in relative abundance during the season. However, these can be examined by using only counts from sites counted in all seven months (September until March). Once these totals are calculated, the number present in each month can be expressed as a percentage of the maximum numbers present, thus revealing patterns of seasonality for the considered species. This is shown in Tables 3 & 4, for Britain and Northern Ireland separately. Non-migratory, scarce and irregularly counted species are omitted. Prior to this report, figures presented for Northern Ireland have used only data from the current season and the previous season. Since there is now sufficient information, the running five year average of the proportion present in each month has been provided for comparison, as is the case for Britain.

Peak numbers of most wildfowl species occurred in December or January, especially in Northern Ireland. The grebes and Cormorants were generally most abundant at the start of the winter, with numbers declining slowly as the winter progressed. The pattern in Northern Ireland was generally more erratic, which may result partly from the considerably smaller numbers present. Migratory swan numbers showed a rapid rise to their respective peaks in late winter, and, for Bewick's, a rapid exodus immediately after. In Britain, many of the dabbling duck species reached peak numbers in December, although the early peak of Shoveler was an obvious exception as birds progressively departed for more southern climes, and there was an early peak of Pintail. There was a similar pattern of occurrence in Northern Ireland. Diving duck numbers peaked in mid-winter, with only a small fluctuation in Tufted Ducks, more pronounced in Pochard, especially in Northern Ireland, and particularly so in Goldeneye. Coot numbers throughout the UK fell steadily from an October peak.

Table 3. PROPORTIONS IN EACH MONTH OF THE PEAK WINTER POPULATION PRESENT ON 1,385 BRITISH SITES THAT WERE COUNTED IN ALL SEVEN MONTHS OF 1991-92.

(Bracketed figures give averages for the 1987-88 to 1991-92 period. Little Grebe and Cormorant averages are calculated using the last four seasons only.)

	Sep	Oct	Nov	Dec	Jan	Feb	Mar
Little Grebe	100 (100)	100 (90)	78 (84)	78 (77)	66 (74)	58 (63)	55 (60)
Great C. Grebe	100 (100)	98 (94)	97 (89)	85 (74)	78 (74)	85 (76)	86 (81)
Cormorant	93 (94)	100 (100)	93 (96)	94 (90)	90 (90)	97 (90)	80 (81)
Bewick's Swan	0 (0)	1 (1)	37 (42)	83 (83)	88 (97)	100 (79)	13 (12)
Whooper Swan	1 (1)	23 (33)	92 (91)	100 (75)	94 (96)	88 (84)	84 (71)
E. White-fronted Goose	0 (0)	2 (1)	5 (9)	30 (52)	80 (93)	100 (93)	2 (24)
Dark-bellied Brent Goose	0 (1)	26 (52)	82 (77)	86 (91)	100 (97)	96 (95)	33 (40)
Shelduck	17 (17)	68 (56)	79 (73)	78 (81)	100 (95)	83 (94)	70 (78)
Wigeon	8 (19)	60 (61)	93 (84)	100 (97)	92 (98)	83 (76)	41 (41)
Gadwall	96 (80)	90 (88)	100 (93)	98 (98)	93 (88)	75 (71)	53 (48)
Teal	49 (50)	67 (67)	97 (80)	100 (98)	88 (88)	64 (69)	32 (34)
Mallard	86 (87)	92 (89)	97 (91)	100 (97)	95 (95)	60 (63)	37 (35)
Pintail	19 (33)	100 (87)	74 (78)	99 (97)	73 (75)	49 (58)	14 (12)
Shoveler	86 (90)	100 (96)	79 (75)	65 (67)	62 (62)	64 (65)	59 (54)
Pochard	34 (31)	63 (63)	81 (88)	83 (95)	100 (98)	75 (89)	26 (34)
Tufted Duck	93 (82)	84 (80)	95 (95)	100 (98)	99 (99)	85 (88)	78 (74)
Goldeneye	2 (1)	13 (12)	48 (55)	90 (82)	91 (93)	100 (99)	80 (90)
Goosander	23 (26)	26 (26)	53 (51)	86 (89)	100 (94)	91 (76)	48 (57)
Coot	96 (90)	100 (96)	96 (95)	96 (92)	87 (84)	63 (64)	46 (43)

Table 4. PROPORTIONS IN EACH MONTH OF THE PEAK WINTER POPULATION PRESENT ON 80 NORTHERN IRELAND SITES THAT WERE COUNTED IN ALL SEVEN MONTHS OF 1991-92.

(Bracketed figures give averages for the 1987-88 to 1991-92 period.)

	Sep	Oct	Nov	Dec	Jan	Feb	Mar
Little Grebe	86 (89)	100 (88)	86 (86)	85 (75)	57 (64)	60 (59)	41 (41)
Great C. Grebe	100 (94)	67 (68)	24 (49)	25 (51)	46 (41)	44 (43)	97 (79)
Cormorant	95 (83)	100 (87)	66 (74)	91 (89)	65 (67)	88 (60)	63 (58)
Bewick's Swan	0 (0)	0 (3)	47 (64)	65 (88)	66 (80)	100 (82)	8 (12)
Whooper Swan	0 (0)	32 (46)	76 (79)	61 (73)	90 (82)	100 (92)	87 (84)
Shelduck	2 (3)	6 (8)	12 (33)	100 (83)	77 (83)	76 (86)	68 (68)
Wigeon	13 (21)	63 (81)	86 (78)	100 (59)	91 (67)	99 (53)	53 (27)
Gadwall	84 (81)	92 (75)	90 (87)	100 (82)	94 (84)	95 (71)	81 (63)
Teal	36 (30)	60 (51)	62 (65)	92 (93)	100 (93)	81 (62)	37 (39)
Mallard	88 (95)	100 (81)	65 (69)	76 (71)	59 (60)	46 (57)	22 (22)
Pintail	20 (19)	32 (35)	73 (78)	85 (92)	100 (84)	98 (78)	17 (38)
Shoveler	89 (51)	84 (82)	90 (81)	100 (72)	92 (72)	83 (53)	81 (63)
Pochard	12 (6)	12 (28)	40 (66)	59 (90)	100 (63)	34 (23)	7 (5)
Tufted Duck	13 (16)	49 (50)	76 (65)	61 (77)	100 (90)	88 (56)	46 (61)
Goldeneye	1 (2)	2 (6)	24 (63)	78 (89)	100 (73)	88 (76)	46 (61)
Coot	98 (96)	100 (97)	78 (85)	57 (69)	44 (59)	55 (46)	37 (35)

INDICES

Because not all sites are counted in every year, population changes cannot be derived from simply comparing total numbers counted in each year. Consequently, a simple method of indexing population change has been devised and has been applied to wildfowl and wader counts for many years.

Table 5 gives index values for individual species in Britain for each of the 1988-89 to 1990-91 seasons, and for earlier five-year periods for comparison. Indices are not, as yet, calculated for Northern Ireland. The values are obtained by comparing only counts for sites covered in the relevant month in consecutive years, and by relating the ratio of the two monthly totals to an arbitrary standard, nominally 1970-71, when the index was set at 100. The months chosen for each species are those in which the greatest numbers are usually present. For species which may peak in either of two months, the average indices for these months are given, and for those with significant populations at different times of the year (usually autumn and mid-winter), separate sets of indices are given. Species for which complete censuses are attempted each year (e.g. Pink-footed Goose) and species counted irregularly (e.g. sea-ducks) are omitted.

Indices for 1991-92 point to large increases for several species, notably European White-fronts (+27%), Dark-bellied Brent Geese (+33%), Wigeon

(+21% in October, 23% in January) and Pintail (+21%), although the index for this last species remains well below former levels. Goosander also showed a large rise in its January index (+26%), but a large decline in February (-17%), a reverse of the situation last season. Shelduck and Tufted Duck showed more modest increases of around 15%. There were also some notable declines, particularly of Whooper Swans (-20% in January), Gadwall (-20% in October) and a decrease of 45% in Scaup, although the small numbers recorded by the NWC and the difficulties in obtaining accurate counts of this species are predominantly responsible for such apparently large fluctuations. Only seven of the 27 indices calculated exhibited a change of less than 10%, either increase or decrease, from 1990-91.

As previously mentioned in *Wildfowl and Wader Counts*, a new method of indexing waterfowl populations has been developed (Underhill 1989). The applicability of the index to different waterfowl groups is currently being investigated and the results of these studies are expected in 1993. The index has already been used in its current form for some of the analyses undertaken by WWT staff and it is hoped that we shall be sufficiently familiar with the advantages and limitations of this technique for its full use in the next report.

Table 5. INDICES FOR WINTER WILDFOWL POPULATIONS IN BRITAIN, 1960-61 TO 1991-92.

		Mean 60/61 -64/65	Mean 65/66 -69/70	Mean 70/71 -74/75	Mean 75/76 -79/80	Mean 80/81 -84/85	Mean 85/86 -89/90	89/90	90/91	91/92
Mute Swan	-Sep	105	96	103	93	119	145	169	174	174
	-Jan	88	106	90	85	89	99	113	124	106
Bewick's Swan	-Jan	15	50	72	153	215	272	244	218	227
Whooper Swan	-Nov	69	77	104	148	164	188	225	178	155
	-Jan	202	146	118	114	116	160	174	159	128
E. White-front. G.	-Jan	62	85	56	39	40	59	43	37	47
Canada Goose	-Sep/Jan	47	72	127	175	275	407	451	438	474
Dark-b. Brent G.	-Jan	61	87	134	305	455	475	406	445	590
Shelduck	-Jan	92	106	102	132	133	128	125	123	141
Wigeon	-Oct	111	112	138	149	183	194	219	219	266
	-Jan	83	91	84	85	97	113	96	107	132
Gadwall	-Oct	42	50	146	149	259	461	515	599	480
	-Dec	86	81	164	336	781	1275	1488	1562	1404
Teal	-Dec/Jan	94	76	115	150	193	188	259	251	231
Mallard	-Sep	73	83	92	82	92	93	101	97	81
	-Dec	78	89	86	80	90	95	91	90	86
Pintail	-Dec	27	54	151	177	147	129	123	75	91
Shoveler	-Oct/Nov	91	97	144	193	201	204	208	211	228
	-Jan	50	63	113	139	127	99	123	141	124
Pochard	-Jan	64	105	124	122	101	93	114	93	95
Tufted Duck	-Sep	44	64	110	122	134	122	122	111	127
	-Dec	73	91	119	123	123	142	130	131	136
Scaup	-Jan	64	110	114	33	11	16	6	11	5
Goldeneye	-Jan	115	92	126	109	98	107	104	127	116
Red-b. Merganser	-Jan	49	101	115	245	222	210	129	107	92
Goosander	-Jan	92	80	121	285	213	311	363	174	219
	-Feb	171	115	153	123	171	186	148	184	153

PRINCIPAL SITES

Table 6 lists all UK sites holding an average of 10,000 or more wildfowl, Great Crested and Little Grebes, Cormorants and Coots, ranked according to their average maxima over the five-year period 1987-88 to 1991-92. However, it should be noted that the table deals with wildfowl only, and that many of these sites qualify as internationally important since they regularly hold a total of 20,000 or more waterfowl (i.e. divers, grebes, wildfowl, waders, etc.), as agreed by the Contracting Parties to the Ramsar Convention (Ramsar Convention Bureau 1988). For this and other reasons, Table 6 must not be used to rank the conservation importance of the included sites as some, which are perhaps low down the list in terms of their total numbers, may nevertheless be of critical importance to certain species or populations, for example during the migratory periods or in severe weather. The total waterfowl populations of all internationally important sites in the UK, including those which qualify under criteria in Appendix 1, are given in Appendix 3.

For each winter in turn, the peak counts for each site are calculated by listing the highest count for each species, irrespective of the month in which it was made, and then totalling these counts. The peak total for 1991-92 is given in the first column, and average figures for the most recent five year period are provided for comparison. The locations of these sites, together with those included in subsequent tables, are given in Appendix 2.

At nine sites, peak counts in 1991-92 exceeded their respective five year averages by more than 30%, indicating considerable increases in the importance of these sites. These were: Castle Loch, Lochmaben (+63%), Dupplin Lochs (+58%), the Ribble Estuary (+55%), the Fleet/Wey (+49%), the Forth Estuary (+34%), North Norfolk Marshes (+33%), Mersey Estuary (+33%), Morecambe Bay (+31%), Hule Moss (+32%). Significantly, the two sites with the largest increases are primarily Pink-footed Goose roosts. Large decreases were recorded from four sites: Wigtown Bay (-44%), Loch Eye (-43%), the Cromarty Firth (-43%) and the Tay Estuary (-37%), although the absence of a complete count of Eider at this last site will have greatly influenced the count.

Table 6. SITES WITH AVERAGE WINTER MAXIMA OF MORE THAN 10,000 WILDFOWL, GREBES, CORMORANT AND COOT OVER THE 1987-88 TO 1991-92 PERIOD.

	Peak Count 1991-92	Average Count 1987-88 to 1991-92
Lo. Neagh/Beg	104,249	95,701
Ribble Est.	134,548	86,699
Wash	84,408	73,935
Ouse Washes	59,863	59,809
Lo. of Strathbeg	31,525	40,326
North Norfolk Marshes	52,963	39,718
Solway Est.	38,795	39,684
Dupplin Lo.	57,500	36,360
Abberton Rsr	28,882	34,732
Thames Est.	36,256	34,666
Montrose Basin	35,327	33,446
West Water Rsr	32,865	31,789
Mersey Est.	40,309	30,301
Lo. Leven	34,193	30,048
Morecambe Bay	39,177	29,938
Dee Est. (Eng/Wales)	37,343	29,857
Lindisfarne	19,443	27,015
Forth Est.	34,166	25,521
Martin Mere	29,311	25,461
Lo. Foyle	26,686	24,741
Inner Moray Fth	19,586	23,961
Strangford Lo.	19,309	22,440
Severn Est.	24,640	22,317
Medway Est.	22,503	22,201
Swale Est.	21,305	21,952
Slains Lochs	-	21,548
Rutland Water	21,096	21,427
Dornoch Fth	22,955	21,302
Humber Est.	20,969	19,217
Blackwater Est.	21,246	18,109
Dinnet Lo./R. Dee	20,021	17,739
Chichester Hbr	17,545	16,446
Tay Est.	9,791	15,575
Carsebreck/Rhynd Lo.	12,733	15,369
Hule Moss	19,443	14,770
Lo. Eye	7,601	14,432
The Fleet/Wey	21,443	14,322
Cromarty Fth	7,615	13,352
Lo. of Harray	9,492	12,693
Lo. of Skene	9,305	12,542
Hamford Water	13,353	12,185
Langstone Hbr	10,887	11,427
Wigtown Bay	6,110	10,926
Crouch/Roach Est.	13,862	10,763
Castle Lo. Lochmaben	17,327	10,640
Alde Complex	10,093	10,519
Burry Inlet	9,209	10,198
Colne Est.	12,574	10,170

SPECIES ACCOUNTS

The tables in the following accounts rank the principal sites for each species according to average maxima calculated from counts received in any month (June to May) during the last five seasons, 1987-88 to 1991-92. Crosses indicate missing counts and incomplete counts are bracketed. In the first instance, averages were calculated using only complete counts, but if any incomplete counts exceeded this initial average they were then also incorporated and the averages recalculated.

The sites included in the tables are in most cases those that exceed the appropriate GB qualifying level for national importance. However, where this

would produce a list too long for presentation, a convenient higher level has been used. International and national qualifying levels are given for each species (see Appendix 1), except where the British population is too small for a meaningful figure to be obtained, indicated by a "+". Qualifying criteria have not been applied to some species (e.g. rare species, Canada Goose). Qualifying levels are currently being revised to take account of the changing size of some populations e.g. Pink-footed Geese. As in Table 6, the locations of sites included in the accounts are given in Appendix 2.

The "month" column shows when the maximum count in 1990-91 was made, an asterisk "*" denotes counts made during WWT and other goose surveys. Other sources of information are cited accordingly.

Red-throated Diver *Gavia stellata*

The maximum of 604 in December (Table 1) greatly exceeds the counts of between 200 and 350 more commonly recorded in 1991-92. A maximum of only 28 birds was recorded in Northern Ireland. These figures represent only a small proportion of the 12,000 to 15,000 birds estimated to winter in the British Isles (Parrack 1986a). Birds are derived from British (mainly from the Shetlands), Icelandic, Greenlandic and Scandinavian breeding populations, and concentrate mostly on the east coast of Britain. The following sites held more than 30 birds in 1991-92: Minsmere (213, December), the

Dengie (150, March), the Forth Estuary (101, October), the Wash (63, January), Murcar (45, October), Loch Fleet (38, October), Morecambe Bay (35, January) and the Swale Estuary (31, January). RSPB/BP counts in the Moray Firth recorded a peak of 248 in October, well below the normal population for this area which is estimated to number between 400 and 550 birds (Evans 1992). A large count of 495 birds in Cardigan Bay in January was considerably less than the 994 recorded there in 1990-91 (Green 1992a).

Black-throated Diver *Gavia arctica*

A maximum of 21 was recorded in Britain in 1991-92, only a very small proportion of the British and Irish wintering population estimated at around 1,300 birds (Parrack 1986b). The species favours large bays, and the Scottish firths and south-west England provide the best opportunity for seeing Black-throated Divers in winter, although nowhere in Britain are there large concentrations. The species

is less gregarious than the Red-throated Diver and records from Machrie Bay, Arran (9, January) and the Forth Estuary (6, August) were the largest gatherings in 1991-92. No Black-throated Divers were seen in Northern Ireland in 1991-92. RSPB/BP counts in the Moray Firth peaked at 20 in February. The average over the last five seasons is 32, with the Dornoch Firth being a favoured site.

Great Northern Diver *Gavia immer*

The British and Irish wintering population has been estimated at 3,500 to 4,500 birds, around 75% of the Western Palaearctic total (Parrack 1986c). The Orkneys, the Shetlands and the west coast of Scotland support the majority of British birds while the species is relatively abundant all around Ireland except for the coast of the Irish Sea. Great Northern Divers are often found in deeper water and out of sight of land, posing considerable difficulties for counting. There was a mid-winter peak of 50 birds

in Britain and 20 in Northern Ireland. A total of 72 was recorded in March and probably represents passage birds *en route* to breeding areas. The following sites held more than five birds in 1991-92: Loch Na Keal (27, March), Loch Indaal (22, March), Dundrum Bay (20, November), Lough Foyle (10, January) and Machrie Bay, Arran (8, January). A peak of 17 birds was recorded in the Moray Firth in 1991-92 during RSPB/BP counts of sea-ducks.

Little Grebe *Tachybaptus ruficollis***Internationally important: ?****Nationally important: ?**

The habitat choice and inconspicuous behaviour of this species results in only a small proportion of the population being recorded by the NWC scheme. A maximum of 3,403 was counted in the UK in October, mostly in Britain (Tables 1 & 2), on a par with recent years. In both Britain and Northern Ireland, peak numbers occurred at the start of the winter and declined steadily thereafter (Tables 3 & 4).

Table 7 lists sites with average maxima of more than 50 birds. Despite the difficulties of counting Little Grebes, there is a high degree of consistency in the counts at many sites. Lochs Neagh/Beg, holding

well in excess of 10% of the total counted in the UK in recent years, is by far the most important site. However, the large numbers recorded on comparatively small stretches of river or canal, such as the River Soar, illustrate the degree of undercounting which must occur due to lesser coverage of this habitat by the NWC scheme. Kings Mill Reservoir (64, October), Cameron Reservoir (54, September) and Chichester Harbour (53, November) were the only other sites in addition to those in Table 7 at which 50 or more birds were recorded during 1991-92.

Table 7. LITTLE GREBE: WINTER MAXIMA AT MAIN RESORTS

	1987/88	88/89	89/90	90/91	91/92	(Mth)	Average
Lo. Neagh/Beg	x	412	480	324	324	(Oct)	385
Strangford Lo.	98	x	103	122	105	(Oct)	107
Thames Est.	19	146	104	88	108	(Dec)	93
Swale Est.	x	x	71	108	94	(Feb)	91
Chew Valley Lake	80	42	83	100	80	(Sep)	77
R. Soar: Leicester	x	62	67	68	64	(Dec)	65
Deben Est.	39	45	84	87	69	(Dec)	65
Medway Est.	x	39	60	100	53	(Jan)	63
Upper Lo. Erne	x	62	57	67	49	(Mar)	59
Wash	25	17	56	112	56	(Dec)	53
Rutland Water	46	73	69	40	27	(Nov)	51

Great Crested Grebe *Podiceps cristatus***Internationally important: ?****Nationally important: 100**

The peak total of this species recorded in Britain (8,121 in September) numbered over eight thousand birds for the third season in succession, although it was down on the record total of 1990-91 (8,803). Peak numbers of Great Crested Grebes are usually recorded in September and thereafter show a steady decline through the winter. Numbers in 1991-92, however, remained high until December (Table 3), with over 8,000 birds recorded as late as November (Table 1). Total monthly counts in Northern Ireland mirrored this pattern, although the peak of 1,791 recorded in September is still several hundred less than those from two and three winters ago. The low number recorded in November was due to the absence of counts from Belfast Lough in this month.

While Loughs Neagh/Beg remains the highest ranking site for Great Crested Grebes based on the five year average (Table 8), the site appears to be

declining in importance in recent years. Conversely, numbers at Belfast Lough have grown steadily, although it is not possible to say whether these events are linked. At the present rate of increase, Belfast Lough will soon become the most important site in the UK for this species. Although counts at many sites vary quite considerably from one year to the next, numbers at Rutland Water appear to be increasing while those on the Forth, the Swale and the Medway are declining. Counts at the Stour Estuary and Abberton Reservoir were low in comparison with the most recent winters, while a good count was made at Hanningfield. Of sites not listed in Table 8, the Dengie (312, December), Cotswold Water Park West (200, October) and Blithfield Reservoir (166, November) held significant numbers of birds and 315 were recorded during a boat-based survey of Cardigan Bay in December.

Table 8. GREAT CRESTED GREBE: WINTER MAXIMA AT MAIN RESORTS

	1987/88	88/89	89/90	90/91	91/92	(Mth)	Average
Lo. Neagh/Beg	1,356	1,605	1,188	612	753	(Mar)	1,103
Belfast Lo.	703	776	886	1,162	1,141	(Dec)	937
Rutland Water	382	605	544	1,038	878	(Dec)	689
Forth Est.	795	311	849	524	341	(Sep)	564
Chew Valley Lake	430	560	490	440	550	(Aug)	494
Grafham Water	288	179	264	744	522	(Dec)	399
Queen Mary Rsr	413	251	360	526	359	(Nov)	382
Upper Lo. Erne	446	404	306	137	195	(Jan)	298
Morecambe Bay	128	277	236	229	332	(Jan)	240
Colne Est.	255	100	322	214	207	(Dec)	220
Medway Est.	143	357	254	206	110	(Jan)	214
Carlingford Lo.	164	106	216	259	279	(Jan)	205
Pitsford Rsr	189	202	142	243	243	(Nov)	204
Minnis Bay to Reculver	x	x	x	x	200	(Feb)	200
Swale Est.	(68)	346	160	(28)	89	(Nov)	198
Borth/Ynyslas	(103)	190	x	186	x		188
Stour Est.	119	127	322	200	161	(Sep)	186
Conwy Bay	189	164	x	x	x		177
Hanningfield Rsr	128	130	142	186	233	(Nov)	164
Abberton Rsr	93	44	303	161	63	(Nov)	133

Red-necked Grebe *Podiceps grisegena*

Some 20 to 30 birds were recorded in Britain in each month from September to March in 1991-92, with a peak of 39 in March. The British and Irish wintering population is believed to number only 120 to 170 birds (Chandler 1986a). Most birds are found on the east and south coasts between the Firth of Forth and Poole Harbour, this distribution reflecting the east and central European breeding origins. Ireland

is only very rarely visited by this species. Red-necked Grebes favour sheltered coastal waters although they also occur on large, inland waters. The Forth Estuary held 32 birds in March, and five were recorded in the Moray Firth during RSPB/BP surveys. These were the only sites to support five or more birds.

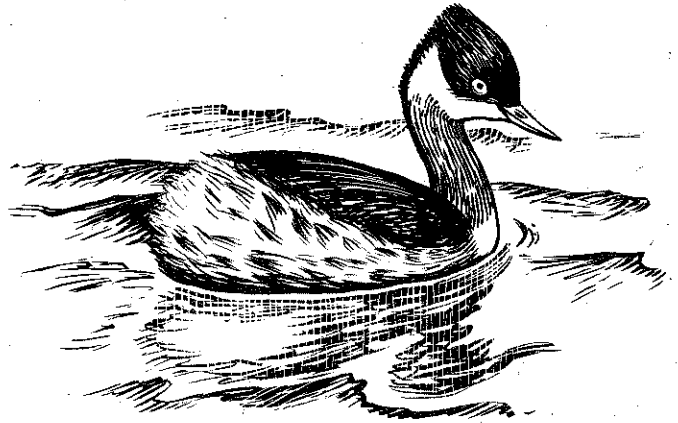
Slavonian Grebe *Podiceps auritus*

A peak of 104 birds was recorded in December, although numbers were fairly constant throughout the winter of 1991-92 with the exception of a low count in September. This represents around one quarter of the estimated British wintering population (Chandler 1986b). Slavonian Grebes were only recorded in two months in Northern Ireland, with a peak of 10 birds in January. However, the species is much less common in Ireland as a whole and this number probably accounts for most of the regularly occurring birds in Northern Ireland. The Slavonian Grebe exhibits a particularly coastal distribution and, unlike the two other rare British grebes, a large component of the population is located in Scottish waters, including

Orkney and Shetland. Birds favour sheltered waters, and a few traditional sites often support comparatively large numbers. The following sites held more than five birds in 1991-92: Loch Indaal (36, October), Loch of Harray (29, March), Loch Na Keal (24, March), the Blackwater Estuary (18, February), the Forth Estuary (17, December), Lough Foyle (8, January), the Exe Estuary (7, March), Pagham Harbour (7, December and January), the Wash (7, November), Loch Linnhe (7, March) and Poole Harbour (6, January). There was a winter peak of 42 birds in February in the Moray Firth, 32 of which were in the outer Dornoch Firth (Evans 1992), which rose to 57 and 42, respectively, in April.

Black-necked Grebe *Podiceps nigricollis*

The November peak of 28 birds represents around one quarter of the estimated British and Irish wintering population of 120 (Chandler 1986c). Black-necked Grebes are less tolerant of cold weather than other grebe species and have a more southerly distribution. The London reservoirs and sheltered estuaries and harbours on the south coast are areas that traditionally attract more than two birds. Wexford Harbour is the only site in Ireland to have regularly held birds in the last decade or so. Peak numbers often occur during migration in late autumn as birds pass through *en route* to wintering areas further south in Europe, although this was not evident from NWC data in 1991-92. Langstone Harbour held a peak of 20 birds in March and was the only site to support in excess of five birds.



Cormorant *Phalacrocorax carbo*

The peak total count of Cormorants in 1991-92 reached 13,034 in Britain (Table 1) and 1,207 in Northern Ireland (Table 2). The British maximum count was similar to that recorded in 1990-91, whilst the peak for Northern Ireland was more than 300 birds fewer than in the previous winter. Cormorants were most abundant in October (Tables 3 & 4).

Table 9 lists the 26 sites that have supported at least 200 Cormorants according to average five year maxima. Many of Britain's major estuaries rank highly in the table, as do Loughs Neagh and Beg in Northern Ireland. Also of major significance to wintering Cormorants were some of the large inland waters in southern England, such as Queen Mary and Abberton Reservoirs, Rutland Water and parts of the Norfolk Broads. There was evidence of marked increases at some sites (e.g. Rutland Water, Queen Elizabeth II Reservoir), though the 1991-92 maxima from the majority of sites were down on 1990-91 levels. This perhaps indicates that Cormorant numbers are reaching capacity in some areas. In addition to the sites in Table 9, Cardigan Bay held 211 birds in December and the Dysynni supported 200 birds in August.

Analyses of NWC data for Britain and for North-west England and Wales (Pickering *et al.* 1992 and Starling *et al.* 1992, respectively) were undertaken under contract to the National Rivers Authority, focusing on winter status, trends and distribution of Cormorants, Red-breasted Mergansers and Goosanders (see below). The data for Cormorants were further analyzed to form part of a special issue of the journal *Ardea* scheduled to appear in 1993 (Kirby *et al.*, in press). The greatest concentrations

of Cormorants were in south-east and north-west England and south-west Scotland, and birds have increased their use of inland waters earlier in the winter than used to be the case. The British population was estimated to be 18,679 and to have increased by a staggering 74% overall during the 1987-88 to 1990-91 period. The population of North-west England increased between 1987-88 and 1989-90, but fell in 1990-91, despite the excellent coverage achieved there in that season (Pickering *et al.* 1992). A similar situation was apparent in Wales (Starling *et al.* 1992), indicating that the 1990-91 drop in numbers was quite widespread. However, the overall increase in the British population as a whole, and the fact that Cormorants are making more use of inland waters in winter, must surely mean that the potential for conflict with the managers and users of inland fisheries will continue to grow.

Researchers from the University of Ulster have reported on their studies of the diet of roosting and breeding Cormorants in Northern Ireland (Warke & Day, in press). Birds breeding on Sheep Island were found to feed mostly on freshwater fish species, often travelling to Lough Neagh to do so. Birds feeding on the River Bush took large numbers of salmonids, and predation on the older Salmon parr was particularly significant. In Britain, Sellers (in press) has examined the racial identity of Abberton Reservoir's tree-nesting Cormorants. Using evidence from ringing and observations on plumage gloss, the whiteness of the head, size of white thigh patches and shape of the gular pouch, the Abberton birds were considered to have originated from British cliff-nesting birds rather than the continental tree-nesting race *P. c. sinensis*.

Table 9. CORMORANT: WINTER MAXIMA AT MAIN RESORTS

	1987/88	88/89	89/90	90/91	91/92	(Mth)	Average
Morecambe Bay	544	733	1,497	991	1,113	(Sep)	976
Lo. Neagh/Beg	x	591	951	904	446	(Feb)	723
Forth Est.	414	479	766	962	684	(Sep)	661
Inner Clyde	x	x	663	408	810	(Oct)	627
Solway Est.	570	483	600	492	606	(Sep)	550
Medway Est.	219	415	920	659	417	(Oct)	526
Inner Moray Fth	940	641	354	112	117	(Oct)	439
Poole Hbr	426	615	232	417	377	(Sep)	413
Loch Leven	117	270	330	800	390	(Feb)	381
Queen Mary Rsr	278	438	315	467	226	(Dec)	349
Abberton Rsr	117	x	570	320	380	(Jan)	347
Ranworth/Cockshoot Br.	354	368	325	329	327	(Oct)	341
Rutland Water	x	280	250	350	445	(Feb)	331
Belfast Lo.	x	235	369	284	343	(Dec)	308
Swale Est.	301	394	228	263	238	(Oct)	285
Grafham Water	200	325	74	450	350	(Dec)	280
Alt	95	159	334	502	252	(Nov)	268
Dee Est.	210	290	291	286	201	(Aug)	257
Tees Est.	144	113	337	480	211	(Oct)	257
Outer Ards	374	379	197	153	146	(Oct)	250
Blackwater Est.	252	345	219	208	210	(Mar)	247
Ouse Washes	169	182	533	163	182	(Feb)	246
Colne Est	245	108	409	169	286	(Jan)	243
Wash	198	294	224	263	206	(Nov)	237
Queen Elizabeth II Rsr	124	99	138	320	430	(Oct)	222
Upper Lo. Erne	181	131	316	192	194	(Jan)	203

Grey Heron *Ardea cinerea*

The British and Irish population of Grey Herons is largely resident (Marquiss 1986), suggesting that the decline from the peak of over 3,100 birds in September to around 2,000 for most of the winter was due to dispersal to quiet backwaters. There was a similar, though less clear, pattern of numbers



in Northern Ireland, with a peak of 341 in November, but around 200 or fewer birds for the rest of the winter. First year mortality is known to be high in cold winters, although the mild nature of 1991-92 precludes such an explanation for the observed decline. The Grey Heron has a very widespread winter distribution in the British Isles, occurring in all parts except the higher and most northern parts of mainland Scotland. Their use of streams and rivers is probably responsible for only a small proportion of the wintering population, estimated to number up to 30,000 birds, being recorded on NWC sites. The largest counts were made mainly on estuaries. The following sites held more than 50 birds: Loughs Neagh/Beg (208, October), the Thames Estuary (177, January), Holme Pierrepont Gravel Pits (128, September), Morecambe Bay (99, September), Strangford Lough (89, October), Montrose Basin (66, September), the Taw/Torridge Estuary (66, September), the Ouse Washes (56, March), West Sedgemoor (55, February), the Dee Estuary (England/Wales) (51, September) and Poole Harbour (51, September).

Mute Swan *Cygnus olor***Internationally important: 1,800****Nationally important: 180**

After the recent increases, the peak count of Mute Swans in Britain (13,632 in October) was considerably lower than the record total of 1990-91 (15,220), although numbers were still well above earlier levels. While the smaller peak reflects to some extent the lower number of sites covered compared with January 1991, the January index (Table 5) also indicates a decline in numbers. Counts in other months were largely similar to last season. Although this suggests that the population may be levelling out after the recent rise, the long-term effect of lead fishing weights in the environment means that it will be several years before the full effect of the ban on their use will be reflected in the population. Numbers in Northern Ireland peaked at 2,278 in October, slightly higher than in 1990-91 (2,184).

Brown *et al.* (1992) investigated the cause of death in 366 Mute, Whooper and Bewick's Swans collected at or around WWT Centres between 1951 and 1989. The main cause of death was flying accidents, notably collision with power lines, accounting for 22% of adult and 23% of juvenile deaths. Second was lead poisoning, being the primary cause of death in 22% of all adult and 10% of juvenile mortalities, although only juvenile Mute Swans were

recorded with lead poisoning. A further 3.4% of adult and 1.1% of juvenile swans were shot by hunters, despite full protection by law in the UK. Thus, combined, 48.3% of adult and 36.0% of juvenile swan deaths were attributable to man-made hazards. Predation (e.g. by Foxes *Vulpes vulpes*) was the cause of death in only 5% or less of cases in both adults and juveniles with the remaining diagnosed cases a result of disease or trauma.

Sites with five year averages exceeding the number required for national importance are given in Table 10. Numbers at Loughs Neagh/Beg continue to exceed those at any other site by a considerable margin, although the Fleet/Wey has recorded over 1,000 birds in two successive seasons, continuing the steady rise over recent years. The peak count at Upper Lough Erne has also shown a continued and dramatic increase. Numbers at several sites were lower than expected in recent years, notably Loch of Harray, the Ouse Washes and Strangford Lough. Sites supporting more than 180 birds but with a five year average below that required for inclusion in Table 10 were Loch of Skene (329, December), Montrose Basin (251, August), Morecambe Bay (248, December) and Loch of Strathbeg (212, October).

Table 10. MUTE SWAN: WINTER MAXIMA AT MAIN RESORTS

	1987/88	88/89	89/90	90/91	91/92	(Mth)	Average
Lo. Neagh/Beg	1,269	1,120	1,465	1,205	1,601	(Sep)	1,332
The Fleet/Wey	836	(571)	891	1,029	1,173	(Nov)	982
Lo. of Harray	456	655	683	1,205	564	(Sep)	713
Abberton Rsr	481	440	599	635	562	(Aug)	543
Ouse Washes	586	399	544	414	365	(Jan)	462
Upper Lo. Erne	229	336	430	470	520	(Jan)	397
Christchurch Hbr	341	402	538	150	352	(Jul)	357
Colne Est.	618	306	316	255	278	(Jan)	355
Tweed Est.	268	240	360	368	370	(Sep)	321
Lo. Bee	x	x	254	307	x		281
Somerset Levels	286	271	332	256	252	(Feb)	279
Stour Est.	290	357	233	207	218	(Oct)	261
Rutland Water	229	258	205	246	299	(Sep)	247
Lo. Eye	x	x	x	324	143	(Oct)	234
Thames Est.	248	260	298	159	162	(Feb)	225
R. Avon: Fordingbridge	153	215	208	211	146	(Feb)	187

Bewick's Swan *Cygnus columbianus bewickii***Internationally important: 170****Nationally important: 70**

The count of 9,118 Bewick's Swans in February was the highest yet recorded by the NWC scheme in Britain, occurring rather later than the December or January peak recorded in recent years (Table 3). This represents an increase of almost 8% over the previous highest total (8,444 in January 1990) and is 15% more than the 1990-91 maximum (7,905). Numbers in Northern Ireland were slightly down on 1990-91, with 436 recorded in January. Age counts of birds using the WWT Centres at Welney and Martin Mere indicated a below average breeding season, with only 10-12% young (Bowler *et al.* 1992), although the 22.5% young recorded at Slimbridge suggests that there is a bias in the distribution of family parties in the wintering grounds.

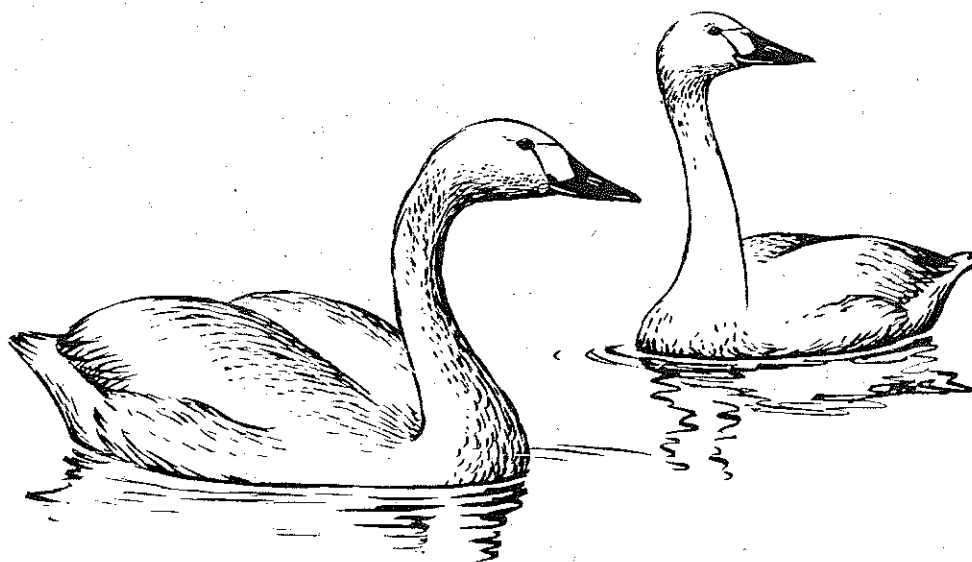
Numbers at the three principal sites for this species all exceeded their respective five year averages

(Table 11), though at none of the top nine sites was the count a site record. Numbers at St Benet's Levels and Berney Marshes were considerably higher than the average of recent years. The flock that uses both the latter site and Breydon Water is comfortably the fourth largest in the UK, although the high counts at Berney Marshes appear to have been at the expense of Breydon Water. Although only a comparatively modest number of birds was recorded at Loughs Neagh/Beg, this site now surpasses Slimbridge on the basis of its five year average. No counts were made at Walmore Common (a field site that, when flooded, attracts birds from Slimbridge) because the site was generally dry during the winter with no significant standing water. The Somerset Levels held 160 birds in February.

Table 11. BEWICK'S SWAN: WINTER MAXIMA AT MAIN RESORTS

	1987/88	88/89	89/90	90/91	91/92	(Mth)	Average
Ouse Washes	3,787	3,834	5,984	5,100	5,542	(Jan)	4,849
Nene Washes	1,400	1,137	270	653	1,189	(Feb)	930
Martin Mere/Ribble Est.	552	639	660	+1046	+848	(Dec)	747
Breydon Water	691	698	528	167	394	(Feb)	496
Lo. Neagh/Beg	264	246	303	523	232	(Feb)	314
Severn Est.	+240	250	+339	340	320	(Feb)	298
Walland Marsh	225	269	231	x	x		242
Berney Marshes	x	x	187	121	292	(Feb)	200
St Benet's Levels	23	x	266	182	294	(Feb)	191
Walmore Common	200	112	137	164	x		153
R. Avon: Ringwood	136	167	158	169	109	(Feb)	148

+ from WWT annual swan reports (e.g. Bowler *et al.* 1992).



Whooper Swan *Cygnus cygnus***Internationally important: 170****Nationally important: 60**

The number of Whooper Swans in Britain was well down on previous years, with the peak of just over 3,500 birds in December (Table 1) fully one thousand birds fewer than the peak of the previous season. Both the November and January indices were the lowest for several years (Table 5) and extremely poor numbers were recorded at several of the most important sites. Numbers in Northern Ireland were also reduced, but to a lesser degree. The presence of 22-25% young at WWT Centres supporting the largest herds of Whoopers (Bowler *et al.* 1992) suggests that the low figures nationally may have resulted from birds using other countries within the wintering range during 1991-92.

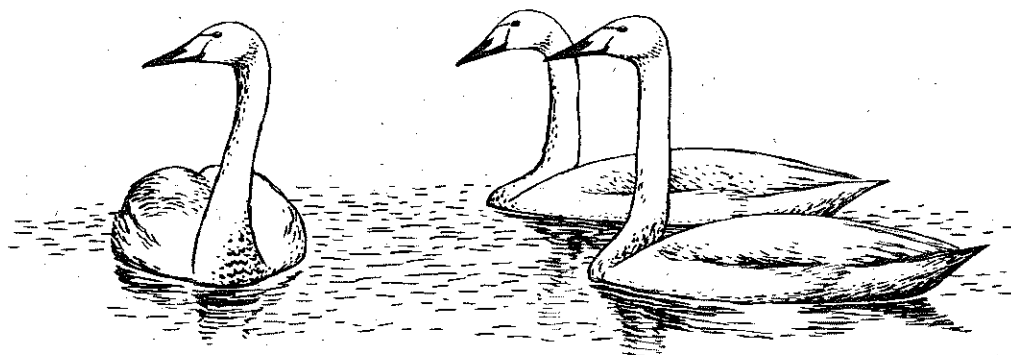
The top 11 sites for this species, all holding internationally important numbers of Whooper Swans, are given in Table 12. The remarkably consistent number of birds recorded at Loughs Neagh/Beg affords this site the primary position. Although numbers at several sites exceeded their respective five year averages, the most notable feature of the season was the apparent crash at several sites, with over 500 fewer birds than

expected at each of Lough Foyle, the former principal site for this species, and at Loch of Harray and Loch Eye, resulting in a virtual absence of birds at these last two sites.

The international census by WWT, the Irish National Parks and Wildlife Service and the University of Iceland in January 1991 (Kirby *et al.* 1992) revealed a total of 18,035 birds in Britain, Ireland and Iceland. Of these, 5,225 were recorded in Britain, 3,484 in Northern Ireland and 8,490, almost 50% of the total, in the Irish Republic. These figures represent an increase of 8% on the total recorded by the previous census in January 1986 (Salmon & Black 1986). If missed birds are accounted for, the true population is estimated to be 19,000 birds. The census also revealed regional differences in the proportion of young, with flocks in east/central England, south-west Scotland and south-west Ireland supporting the largest proportion of young. The most common brood size in Britain was just one cygnet, in the Republic and Northern Ireland two birds, and three in Iceland. Further analyses are planned to investigate the reasons for these differences.

Table 12. WHOOPER SWAN: WINTER MAXIMA AT MAIN RESORTS

	1987/88	88/89	89/90	90/91	91/92	(Mth)	Average
Lo. Neagh/Beg	1,105	1,192	1,088	1,110	1,182	(Feb)	1,135
Lo. Foyle	1,288	1,960	519	988	596	(Nov)	1,070
Lo. Eye/Cromarty Fth	500	275	+1,695	+1,792	83	(Oct)	869
Upper Lo. Erne	669	582	726	896	889	(Jan)	752
Lo. of Harray	485	1,010	817	927	32	(Feb)	654
Ouse Washes	582	603	686	578	707	(Jan)	631
Martin Mere/Ribble Est.	429	406	572	538	619	(Feb)	513
Lo. of Skene	16	x	406	314	340	(Nov)	269
Solway Est.	132	446	277	96	190	(Feb)	228
Lo. of Strathbeg	202	225	264	129	176	(Dec)	199
Lo. Leven	222	222	220	180	90	(Dec)	187

+R.J. Evans *in litt.*

Bean Goose *Anser fabalis***Internationally important: 800**
Nationally important: +

Only 195 birds were counted by the NWC scheme in 1991-92, considerably fewer than in previous years. The species generally favours non-wetland habitat by day during the winter and can range over a wide area even within a known wintering "site" so that, ideally, specific searches for this species are required to obtain accurate counts. Only three sites held 10 or more birds counted by the NWC scheme. The principal site remains the Yare Valley, with 190 in January; 55 birds were recorded at Carron Valley Reservoir in October, and 10 were at Stodmarsh in February.

Although the most important site since the 1970s has been the Yare Valley, as highlighted in last year's *Wildfowl and Wader Counts*, a smaller but equally consistent flock is present in the Central and Strathclyde Regions. Previously centred on Carron Valley Reservoir, the flock has largely used a small plateau around Fannyside in recent years, some 10 km south-west of Carron Valley Reservoir (Simpson 1992). Since 1984-85, this site has held 23-32% of the national total of Bean Geese, with the flock usually numbering between 100 and 120. In 1990-91 this rose to 147 and a maximum of at least 146 was recorded in 1991-92. Ringing data have shown that some birds in the flock originate from the Swedish captive breeding and release programme started in 1947. The birds have been identified as a separate sub-population from the Yare birds, usually arriving earlier in the winter. There is strong evidence that the small flocks recorded infrequently in Dumfries & Galloway represent cold weather movements of

parts of the Fannyside flock. The birds feed mainly on the plateau muirs used for livestock grazing and limited data suggest that they favour grassland over arable land. A method of identifying individual birds, using a combination of features such as the presence of rings and facial and bill patterns, will be used to investigate movements in greater detail. This is all the more important in view of possible threats to the site used by the geese, including a recent proposal for a clay pigeon shoot on the muirs. It is hoped that sympathetic farming and the opportunities for suitable management available under reformed EC agricultural policy will ensure that the flock remains at Fannyside.

The number of birds in the Yare Valley was less than in 1990-91, with a maximum of 405 from mid December onwards (Parslow-Otsu 1992). The flock arrived in Norfolk in mid November and had departed by mid February. Observations of birds with neck collars has shown that the smaller flock size was due to some birds overwintering in the Jutland area of Denmark. This area is used as a staging post by the whole of the Yare flock during spring and autumn migration. Coordinated observations in both Norfolk and Denmark timed the departure of one flock of geese from the Yare and observed the same flock arriving in Jutland. They had covered c.650 km in just 7 hrs 39 mins: an average speed of 54 mph. Further observations are planned in 1993 to identify the next staging site *en route* to the breeding grounds.

Pink-footed Goose *Anser brachyrhynchus***Internationally important: 1,100**
Nationally important: 1,100

The numbers of Pink-footed Geese wintering in Britain increased for the seventh consecutive year to just under 233,000 birds, counted in October by the national census (Cranswick & Kirby 1992b). The 22% increase over the 1990 total is in part due to the thorough coverage achieved and appears to confirm suggestions by Newton *et al.* (1990) that the population can be more comprehensively surveyed shortly after arrival from Iceland. That two thirds of the birds counted in October were found at just seven sites also lends weight to this theory. The November count, by comparison, only found around 179,000 birds. Breeding success in 1991 was moderate compared with recent years, with 18.1% young and a brood size of 2.2 young per pair from overall observations on autumn flocks. No spring census was conducted in 1992 but a total of 54,961

birds was counted in March. The survey of introduced geese in the summer of 1991 (Delany 1992a) produced only 101 Pink-footed Geese, which were widely distributed within Britain. Their presence is insignificant compared with the migrant population and may indeed include injured or sick birds unable to return to Iceland.

Table 13 lists sites holding in excess of 2,000 birds, calculated as the average maxima of the last five seasons. A staggering count of 57,500 birds (almost 25% of the population) was recorded at Dupplin Lochs and places this site at the top of the table. Numbers in south-west Lancashire, at West Water Reservoir and Loch of Strathbeg continue to hover at or around the 30,000 mark, around 10,000 more than the next largest counts. Loch Leven and

Montrose Basin both held in excess of 20,000 birds while the increased number of regional censuses, often including a count in September, have highlighted the importance of some sites early in the season: a record 16,410 birds were recorded at Fala Flow while numbers at Hule Moss in the most recent seasons have greatly exceeded previous counts. Cameron Reservoir and Castle Loch, Lochmaben, both held numbers well in excess of their five year averages. Other sites holding more than 2,000 birds (all in October unless stated) were Watch Water Reservoir (6,670), the Tay Estuary (5,344), Drummond Pond (3,450), Ardoch Loch (2,620) the Inner Forth (2,155, November) and Upper Glen Devon Reservoir (2,100).

In 1991 the former Nature Conservancy Council for Scotland (now Scottish Natural Heritage) commissioned WWT to conduct a three month study to investigate the effects of disturbance, especially shooting, on the numbers and distribution of Pink-footed and Greylag Geese in the Lothians and Borders region. Fieldwork concentrated on the

roosts at Gladhouse Reservoir, where there was a marked decline in the number of roosting birds in the mid 1980s, and West Water, which rapidly became one of the most important sites for Pink-footed Geese after its construction in 1966 (Brown & Brown 1992). Other roosts in the area, notably Fala Flow, Aberlady Bay and Hule Moss were also investigated. Although shooting pressure appears to have been responsible for the initial decline at Gladhouse, numbers have not recovered despite a voluntary regime of regulated shooting now in operation at the site. It is suggested that a combination of factors, including the changes in the surrounding agricultural landscape, especially the loss of stubbles early in the winter, shooting pressure on the surrounding land, water levels and vegetation immediately around the roost may prevent the roost regaining its former importance (Cranswick 1992). The number of birds in the Lothians and Borders as a whole has increased in line with the national population and appears to have compensated for the loss of Gladhouse by the use of "satellite" roosts in the region.

Table 13. PINK-FOOTED GOOSE: WINTER MAXIMA AT MAIN RESORTS

	1987/88	88/89	89/90	90/91	91/92	(Mth)	Average
Dupplin Lo.	*11,300	40,000	31,000	42,000	*57,500	(Sep)	36,360
SW Lancashire	26,695	30,545	*37,550	*31,805	*38,240	(Nov)	32,967
West Water Rsr	22,400	40,000	36,250	*24,700	*32,636	(Oct)	31,197
Lo. of Strathbeg	*20,900	30,200	*32,150	*37,100	*23,350	(Oct)	28,740
Montrose Basin	*35,000	*22,000	12,000	15,000	*25,000	(Oct)	21,800
Slains Lo.	*21,700	*21,000	*30,300	13,190	x		21,548
Lo. Leven	*9,700	12,200	*18,000	16,000	*21,880	(Oct)	15,556
Hule Moss	5,000	5,100	25,735	16,755	*18,500	(Sep)	14,218
Solway Est.	*11,467	*9,006	16,408	17,421	16,210	(Mar)	14,102
Wash	6,621	9,382	*8,505	25,330	17,804	(Dec)	13,528
Carsebreck/Rhynd Lo.	*11,100	15,090	11,200	*9,900	*9,250	(Nov)	11,308
Aberlady Bay	*11,000	*7,300	*5,600	17,500	*9,995	(Oct)	10,279
Fala Flow	*6,800	3,000	11,920	9,908	*16,410	(Oct)	9,608
Scot Head	4,000	10,180	11,500	8,200	14,000	(Dec)	9,576
Fylde/Morecambe Bay	8,700	7,900	9,150	+8,240	+9,000	(Feb)	8,598
Castle Lo., Lochmaben	950	2,000	x	16,380	14,000	(Feb)	8,333
Cameron Rsr	*6,000	*7,000	*9,500	3,820	*12,270	(Nov)	7,718
Wigtown Bay	*7,000	*14,000	6,007	6,776	3,810	(Feb)	7,519
Findhorn Bay	*2,211	9,800	*5,276	x	x		5,762
Lo. of Kinnordy	*4,550	*2,000	8,240	6,980	*6,120	(Nov)	5,578
Lo. Eye/Cromarty Fth	*6,306	*7,000	*1,194	5,500	1,527	(Feb)	4,305
Lour	*7,660	*3,410	*1,800	x	x		4,290
Crombie Lo.	*6,000	6,244	1,391	1,000	*4,250	(Nov)	3,777
Lo. Mahaick	x	*6,531	5,250	4,515	1,471	(Oct)	3,553
Lo. Tullybelton	*1,650	*3,050	*3,000	*5,500	*4,500	(Oct)	3,540
Gladhouse Rsr	*2,500	3,400	5,400	3,200	*2,700	(Oct)	3,440
Lake of Menteith	*2,056	6,000	1,885	*3,600	1,725	(Oct)	3,053
Cowgill Rsr	2,000	3,000	x	*3,700	*2,800	(Oct)	2,875
Beaully Fth./Munlochy	*5,050	*2,560	*2,585	1,500	951	(Feb)	2,529

* from Lancashire Goose Report (e.g. Forshaw 1992).

European White-fronted Goose *Anser albifrons albifrons***Internationally important: 3,000**
Nationally important: 60

The count of 6,804 birds in February was the largest count of this species in Britain for several years. However, with a large proportion of the population overwintering in the Netherlands and West Germany in recent times, the British count remains below previous levels (Table 5). As usual, the number of birds in the country rose steadily from November to a peak in February, followed by a rapid exodus in March (Table 3).

The principal sites for this sub-species are given in Table 14. As usual, the majority of birds resided at the WWT Centre at Slimbridge where they occur in internationally important numbers. The maximum

count of 5,100 on 7th March was the highest for many years, and exceeded the peak national total of 1990-91 by 27%. However, numbers fell overnight to just 4,000 on the 8th (D. Paynter pers. comm.). Apart from the Severn Estuary, all of the remaining sites held less than average numbers of birds. However, the use of non-wetland areas makes the species difficult to census and the flocks in some areas are undercounted by a considerable amount by the NWC e.g. birds in the Yare Valley numbered some 300 in 1991-92 (Parslow-Otsu 1992). No other sites held in excess of 100 birds in 1991-92.

Table 14. EUROPEAN WHITE-FRONTED GOOSE: WINTER MAXIMA AT MAIN RESORTS

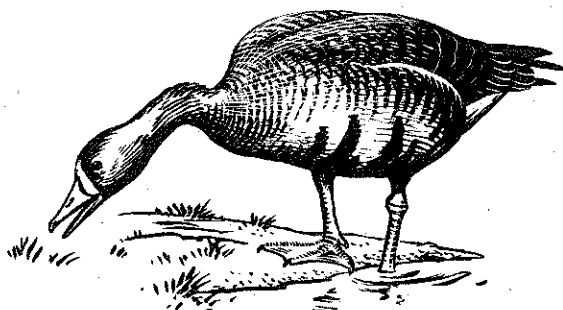
	1987/88	88/89	89/90	90/91	91/92	(Mth)	Average
Severn Est.	4,600	3,770	3,200	2,600	5,100	(Feb)	3,854
Swale Est.	1,400	2,050	1,660	2,280	1,500	(Dec)	1,778
Thames Est.	640	300	157	85	178	(Feb)	272
North Norfolk Marshes	290	281	264	215	163	(Dec)	243
Middle Yare Marshes	210	138	x	295	165	(Feb)	202
R. Avon: Sopley	205	245	(80)	105	172	(Jan)	182
R. Avon: Blashford	180	245	64	50	114	(Feb)	131
Minsmere	142	180	45	x	108	(Feb)	119

Greenland White-fronted Goose *Anser albifrons flavirostris***Internationally important: 220**
Nationally important: 100

The distribution of this species, concentrated in western and northern Scotland, and its use of non-wetland areas during the day, means that only a small proportion of the population is recorded by the NWC. Some 15,420 were recorded during an autumn survey of key sites on behalf of the Greenland White-fronted Goose Study (GWGS), with 250 added to this total during a spring survey. The majority of Greenland White-fronted Geese in the UK winter on Islay, and over 10,000, the largest count to date, were recorded there during surveys of the whole island.

Work on Islay by Clive McKay identified over 60 roosts used by at least 100 birds, with 16 holding 300 or more birds and thus qualifying as internationally important (McKay 1992). An image intensifier and radio telemetry were used in this investigation as birds often flighted to roosts in poor light, leaving progressively later, and thus in darker conditions, when day length was shortest. That birds were actively feeding up until departure suggests that food may be limiting at this time of year. Transect counts of the island produced a

slightly larger total of 10,676 than the WWT/SNH island count. Age counts showed variation between different locations, with between 10% and 33% young. Further observations in 1992-93 will investigate whether these differences are consistent or due to chance.



WWT staff joined an expedition to west Greenland in July 1992 which caught and ringed 90 White-fronts, with a further five birds being retraps of birds previously ringed in the same area in 1989. As well as lettered plastic rings, most birds were also fitted with neck collars. Interestingly, 10 Canada Geese were also caught, the first of this species to be darvic-ringed in Greenland.

A Greenland White-fronted Goose Workshop was convened by the Irish National Parks and Wildlife

Service, with the cooperation of IWRB, in Wexford in March 1992. Participants from Greenland (Denmark), Iceland, Ireland and the UK discussed the draft international conservation plan that has been developed for this population. Steady progress is being made, including a memorandum of understanding to be signed by the four governments, and it is hoped that this plan will be a model for others to be produced as part of the Western Palearctic Waterfowl Agreement being developed under the Bonn Convention.

Table 15. GREENLAND WHITE-FRONTED GOOSE: WINTER MAXIMA AT MAIN RESORTS

	1987/88	88/89	89/90	90/91	91/92	(Mth)	Average
Islay	7,888	7,588	8,826	8,857	10,676	(Dec)	8,767
Rhuna/haorine	817	1,116	914	797	1,499	(Dec)	1,029
Machrihanish	944	907	1,005	1,240	1,023	(Mar)	1,024
Tiree	759	728	987	941	1,101	(Mar)	903
Stranraer	550	393	770	600	438	(Feb)	500
Coll	400	647	671	792	621	(Nov)	626
Loch Ken	370	342	550	306	382	(Jan)	390
Danna/Keills	197	200	224	245	287	(Nov)	231
Appin/Eriska/Benderloch	215	76	120	314	270	(Apr)	199
Westfield Marshes	163	200	209	180	x		188
Endrick Mouth	240	300	300	350	350	(Jan)	186
Loch Hellen	157	162	305	160	148	(Jan)	186
Colonsay/Oronsay	137	165	120	250	210	(Mar)	176
Lismore	215	76	120	181	72	(Nov)	133
Ynyshir	127	124	111	152	142	(Nov)	131
Jura (2 flocks)	138	90	90	157	x		119
Loch Calder	146	0	176	172	45	(Mar)	108
Scarmclate	x	95	130	192	0		104

N.B. including data extracted from the GWGS reports.

Greylag Goose *Anser anser*

Internationally important: 1,000 (Icelandic)
Nationally important: 1,000 (Icelandic)

The number of Icelandic Greylag Geese counted in Britain slumped to around 90,000 birds in 1991-92, a decrease of over 20% from the previous winter. The 88,272 birds counted by the national census in November was an underestimate of at least 3,000 birds (from comments received from regional organisers) and no doubt there were further, unknown omissions. However, the census also included several thousand native and feral birds from areas such as the Western Isles and Dumfries & Galloway and perhaps 1,000 from other areas of Scotland (Delany 1992a, Brown & Dick 1992). The census figure is thus believed to be no more than a few thousand short of the true size of the Icelandic stock. Despite a relatively poor breeding season in 1991, with only 14.9% young, the large decrease in the population suggests that the mortality rate must now exceed the previous estimate of 10% (Fox *et al.* 1989).

Mortality in Pink-footed and Greylag Geese in Britain is almost entirely a result of shooting. The number of foreign shooting parties visiting Scotland appears to be on the increase, and they have recently received some criticism for their practices. The number of geese shot each year is currently being investigated as part of a joint WWT/British Association for Shooting and Conservation (BASC) project. The first stage, involving a survey of BASC members using a questionnaire, has already been completed and the second stage, investigating shooting kills outwith the BASC membership, is underway. Certainly the current status of the Icelandic Greylag Goose gives cause for concern, especially since it is now less numerous than it was a decade ago, since when the Pink-footed Goose population has more than doubled. Shooters have been informed of WWT's and BASC's concerns through the press (Owen 1992).

The 1991 summer census of introduced geese (Delany 1992a) found 18,914 Greylag Geese in Britain, with the major concentrations of birds in Norfolk and adjacent areas of eastern England, notably Buckinghamshire, Northamptonshire, Bedfordshire and Cambridgeshire. Large numbers were also found in Dumfries & Galloway, Cumbria, parts of Yorkshire, Anglesey and south-east England. The Norfolk Broads supported almost 1,400 birds, Holkham Park and Castle Loch, Kirkcowan, both held in excess of 500 birds, and each of the top 50 sites held 99 or more birds. Overall, the proportion of juveniles was 31% with a mean brood size of 4.0. On the evidence of these results, the feral Greylag population has increased at a rate of 5.5% per annum since in 1985-86, when it was estimated to number 13,700 birds (Owen &

Salmon 1988). The population was then found to be increasing at the much greater rate of 13% per annum. Further analyses will compare the results with the historical data in more detail.

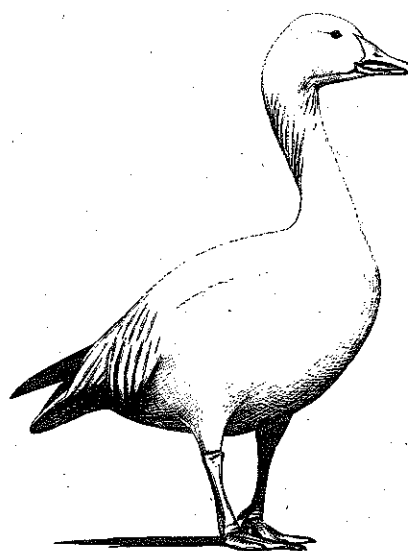
Sites supporting an average maximum of more than 2,000 birds from the last five seasons are given in Table 16. Counts at all sites listed are of Icelandic birds, with the exception of Stranraer Lochs which holds c.1,500 feral birds. Despite the decline in the population, several sites held birds in numbers exceeding their respective five year average. The count at Dinnet Lochs was particularly noteworthy. However, many sites held considerably fewer birds than expected, notably Loch Eye, Loch of Skene and the Inner Moray Firth, and several sites held less than 1,000 birds.

Table 16. GREYLAG GOOSE: WINTER MAXIMA AT MAIN RESORTS

	1987/88	88/89	89/90	90/91	91/92	(Mth)	Average
Dinnet Lo./R. Dee	10,800	*18,000	15,800	*16,000	*18,400	(Nov)	15,800
Lo. Eye/Cromarty Fth	*4,042	*19,259	*11,193	*18,593	*4,659	(Oct)	11,549
Lo. of Skene	10,000	*8,700	13,305	19,150	*5,298	(Nov)	11,291
Inner Moray Fth	*17,450	*12,311	9,271	*8,525	*7,000	(Nov)	10,911
Lo. Spynie	9,000	12,000	3,350	*6,100	*6,600	(Oct)	7,410
Lo. of Strathbeg	9,700	6,900	*7,050	925	900	(Dec)	5,095
Haddo House Lo.	3,500	5,000	*4,700	*5,900	*6,000	(Nov)	5,020
Tay/Isla Valley	*3,663	*6,331	*2,959	*6,262	*4,889	(Nov)	4,821
Caithness Lo.	*4,995	*2,787	*2,958	*3,064	*4,216	(Nov)	3,604
Drummond Pond	5,000	*4,160	*1,800	*3,600	*1,840	(Nov)	3,280
Lindisfarne	3,800	*5,000	*1,700	2,000	2,450	(Jan)	2,990
Lo. of Lintrathen	*1,800	3,050	2,490	*3,600	*3,950	(Oct)	2,978
Stranraer Lo.	*2,800	*(1,000)	*2,400	*2,140	*3,300	(Nov)	2,660
Holburn Moss	*3,000	*2,500	3,200	*740	2,750	(Mar)	2,438
Fedderate Rsr	*2,750	*3,300	*2,700	*2,950	*250	(Nov)	2,390
Dornoch Fth	*3,406	*4,261	2,407	*1,407	927	(Jan)	2,296
Hoselaw Lo.	220	3,600	3,200	*1,270	*1,750	(Oct)	2,008

Snow Goose *Anser caerulescens*

Snow Geese were recorded at 12 sites, mainly in south and eastern England, with a maximum of 11 birds in November and March. This compares with 25 sites during the 1991 survey of introduced geese, when 140 birds were recorded (Delany 1992a). The only sites holding in excess of five birds in 1991-92 were the Medway Estuary (13, April) and Farnham Gravel Pits (7, September).



Canada Goose *Branta canadensis*

Despite the introduction of control measures in some areas, the population of Canada Geese in Britain continues to grow at a steady rate. The peak count of 42,308 birds in September represents an increase of over 11% on last season, while the combined September/January index is approaching double the early 1980s value.

The 1991 summer survey of introduced geese (Delany 1992a) revealed 60,834 birds in Britain, although the total is thought to be larger still due to the absence of data from a few regions. The species was most abundant in a band extending from Hampshire, Sussex and Kent to West Yorkshire and Cumbria. East Anglia and parts of north Wales also held notable concentrations of birds. The highest densities of birds were recorded in the lower Thames catchment. Scotland, with the exception of the Beaulieu Firth, and mid and south Wales held very few birds. The species was highly dependent on man-made waterbodies, especially reservoirs, gravel pits and city parks. Lackford Wildfowl Reserve and Walthamstow Reservoir both held over 1,100 birds while 50 sites each held at least 250 birds. Of those birds aged, 23% were juveniles, a much smaller proportion than in feral Greylag Geese, although this figure needs to be viewed in the light of control measures. The average brood size was 4.0, the same as Greylag. The population has grown at an increasing rate of 6.8% to 8.0% per annum between

the national surveys of 1953, 1967-68, 1975-76 and 1991, and has more than tripled in number from the 19,190 birds in the previous survey (Ogilvie 1977). One of the major effects of the increase since 1976 is an increase in density, from 44 geese per occupied 10 km square in 1976 to 111 birds in 1991. Although the rate of increase has varied between the regions used in the analysis, only south-east England and a wide corridor along the Thames support a substantially larger proportion of the population than in 1976, with the west Midlands supporting a far smaller proportion than previously, although this latter case may be partly the effect of the regions used for comparison of the surveys. Possible control measures are being investigated in response to the perceived problems posed by increasing Canada Goose populations and may influence future numbers of this species.

Sites supporting the largest numbers of birds during the last five winters are given in Table 17. The massive count at Stratfield Saye makes interesting comparison with the count of only 263 birds recorded by the 1991 summer survey. Other sites at which 600 or more birds were recorded in 1991-92 were Pentney Gravel Pits (1,054; October), Port Meadow (725, January), Chew Valley Lake (695 August), Arundel WWT (607, January) and Gunthorpe Gravel Pits (600, November).

Table 17. CANADA GOOSE: WINTER MAXIMA AT MAIN RESORTS

	1987/88	88/89	89/90	90/91	91/92	(Mth)	Average
Stratfield Saye	1,400	400	1,350	1,701	2,350	(Nov)	1,440
Kedleston Park Lake	2,000	1,000	1,080	1,060	570	(Dec)	1,142
Lackford GP	x	x	x	x	1,000	(Dec)	1,000
Rutland Water	1,181	1,102	483	740	1,118	(Sep)	925
Abberton Rsr	1,122	1,156	1,240	618	398	(Aug)	907
Bewl Water	1,150	1,100	1,000	546	660	(Sep)	891
Blithfield Rsr	830	365	560	896	930	(Nov)	716
Twyford GP	1,202	792	847	182	353	(Sep)	675
Dorchester GP	484	758	447	767	860	(Sep)	663
Drakelow GP	785	650	505	650	227	(Mar)	563

Barnacle Goose *Branta leucopsis***Internationally important: 320 (Greenland), 100 (Svalbard)****Nationally important: 200 (Greenland), 100 (Svalbard)**

The numbers of birds on Islay, originating from the Greenland breeding population, returned to more normal levels after the high counts in 1990-91 (Table 18). The smaller count will have resulted partly from the worst breeding season on record, with only 4.6% young. Unusually, the peak was recorded in March, when a total of 25,947 birds was counted. A flock of 400 was recorded on the Keills Peninsula in January and may relate to wandering Islay birds.

The Svalbard population that winters almost entirely in the Solway Firth reached a total of 12,700 in 1991-92, counted early in the winter at the WWT Centre at Caerlaverock. However, the population is believed to be limited to around 12,000 birds, and thus is not thought to be increasing (Owen & Black 1992). Indeed, it is one of the few populations of geese in Britain in which numbers have been stable in recent years. There were 12% young in 1991, indicating moderate breeding success. Very few large flocks were recorded away from the Solway. A flock of 100 birds at Lindisfarne in November was probably from this population, although the vast majority of the birds arrive at Caerlaverock before the end of October, making this sighting rather later than would be expected.

Owen & Shimmings (1992) investigated the

occurrence of leucistic Barnacle Geese in the Solway birds. In the last 21 years, 11 white birds have been observed at Caerlaverock, compared with only one leucistic bird in the other, much larger populations in the last 30 years. Although the lifespan of white birds is much reduced due to hunting pressure upon these "exotic" birds, one ringed bird is now 18 years old and has fathered 13 young. The high prevalence of white birds suggests that the Svalbard population was founded recently by relatively few birds, probably from the Siberian population.

Black *et al.* (1992) found that birds positioned on the edge of foraging flocks spent more time involved in vigilance and agonistic encounters than centre birds. To counter for reduced foraging time, edge birds pecked faster during feeding bouts and obtained a higher energetic intake as a result of the increased nutrient value of the ungrazed vegetation, especially clover *Trifolium repens*, in this position. Families and paired birds predominated in edge positions and attacked their neighbours more frequently than did single birds. Females and goslings benefited from this arrangement at the cost of their protective males, which probably compensated by increasing their feeding rates when in central positions. Birds thus attempted to monopolise edge positions to obtain a greater net energetic intake.

Table 18. BARNACLE GOOSE: WINTER MAXIMA AT MAIN RESORTS

	1987/88	88/89	89/90	90/91	91/92	(Mth)	Average
Islay	*21,900	*20,800	*25,297	*30,208	*25,947	(Mar)	24,830
Solway Est.	*11,400	*12,100	*11,700	*12,100	*12,700	(Oct)	12,000

Dark-bellied Brent Goose *Branta b. bernicla***Internationally important: 1,700****Nationally important: 900**

Numbers in Britain were already known to have reached record levels in 1991-92, with at least 132,000 birds counted by the NWC January census of Dark-bellied Brents (Ferns & Kirby 1992). Supplementary information received from additional sites has boosted this total to 137,944 birds (Table 1). Searching for birds at inland feeding sites that are not normally covered by the monthly counts ensures a high degree of accuracy in the January and February census of this sub-species. A high count was to be expected in view of the good breeding season in 1991, with 31.2% juveniles recorded in sample flocks in autumn and early winter (Kirby 1992). However, as in previous years, there was considerable variation between different

sites, with in excess of 50% young in the Deben Estuary but only 16% in Poole Harbour. Overall, the average brood size was 2.9 birds, although again there were geographical differences: most broods on the Humber Estuary were of just one bird while many on the nearby Wash contained five birds.

Summers & Underhill (1991) examined the growth of the world population of Dark-bellied Brents and concluded, contrary to several previous studies, that there were no density-dependent factors limiting numbers. Survival rate of adult birds (>6 months) was calculated at 85.7%, and, using age-count data, they identified years where errors in counts had occurred. Breeding success fluctuates

in a three year cycle of one excellent year, with more than 30% young, one poor year, with virtually no young, and one year in which breeding success is unpredictable. They suggest that the apparently slower growth rate in the 1980s was due to poor breeding success in the unpredictable year, compared with a rapid increase during the 1970s, when there was high breeding productivity in two of the three years for several consecutive cycles.

Ebbingge (1992) compared numbers of Brent Geese using the Boschplaat salt-marsh on the island of Terschelling with those on improved grassland on Texel in the Dutch Wadden Sea over the last 30 years. As spring progresses, the local population switches from the grassland to the salt-marsh to obtain the best feeding. The increase in the world population over the last 30 years was initially mirrored by an increase in numbers on the Boschplaat. However, numbers in the last decade have levelled out at almost 12,000 birds as the site has reached carrying capacity. Numbers of birds on Texel have continued to rise, indicating that the saltmarsh is the preferred feeding habitat. Bird censuses, the number of juveniles, resighting of colour ringed birds and the survival estimates derived from these data have been used to estimate the numbers of birds that should return to the two feeding sites in the following year. Following a good breeding season, when there has been a substantial increase in the population, competition on the salt-marsh is high and male birds of lower body mass are less likely to return. No significant difference was found for females of different body size classes. However, after a poor breeding season, when the population has declined, there is immigration of new birds to the Boschplaat from the grassland on Texel. The carrying capacity of the salt-marsh was calculated at 15 birds per hectare for the whole of

the site and at 30 birds per hectare for a cattle-grazed part of the site that was particularly favoured by the geese. These figures, combined with habitat data, are important in considering the size of reserves needed to accommodate the Brent Goose population.

A recent phenomenon of gulls associating with Brent Goose flocks has been documented by Summers (1992). The numbers of Black-headed *Larus ridibundus* and Common *L. canus* Gulls feeding in amongst Brent flocks was directly proportional to the number of geese. The gulls favoured the area just behind the front line of the geese, where the flock is particularly dense, in a similar vein to when following a plough. It is suggested that the high concentration of geese disturbs or uncovers food for the gulls and that this association is precluded with grey geese because of the comparatively loose feeding flocks found in those species.

The Wash and the Thames Estuary remain by far the most important sites for this species, although numbers at the latter were boosted by the extremely large total from 1990-91 (Table 19). As would be expected, numbers at many sites exceeded their respective five year averages, with counts on the Blackwater Estuary, the Crouch Estuary, the Colne Estuary, Pagham Harbour, the North-west Solent and the Humber Estuary being notable. The total of 4,355 on the Fleet/Wey in November was a particularly large count for this site in view of the variable numbers in recent years. Other sites supporting more than 1,700 birds in 1991-92 but not qualifying as internationally important over the last five years were the Deben Estuary (3,000, February), the Stour Estuary (1,979, February) and Poole Harbour (1,711 February).

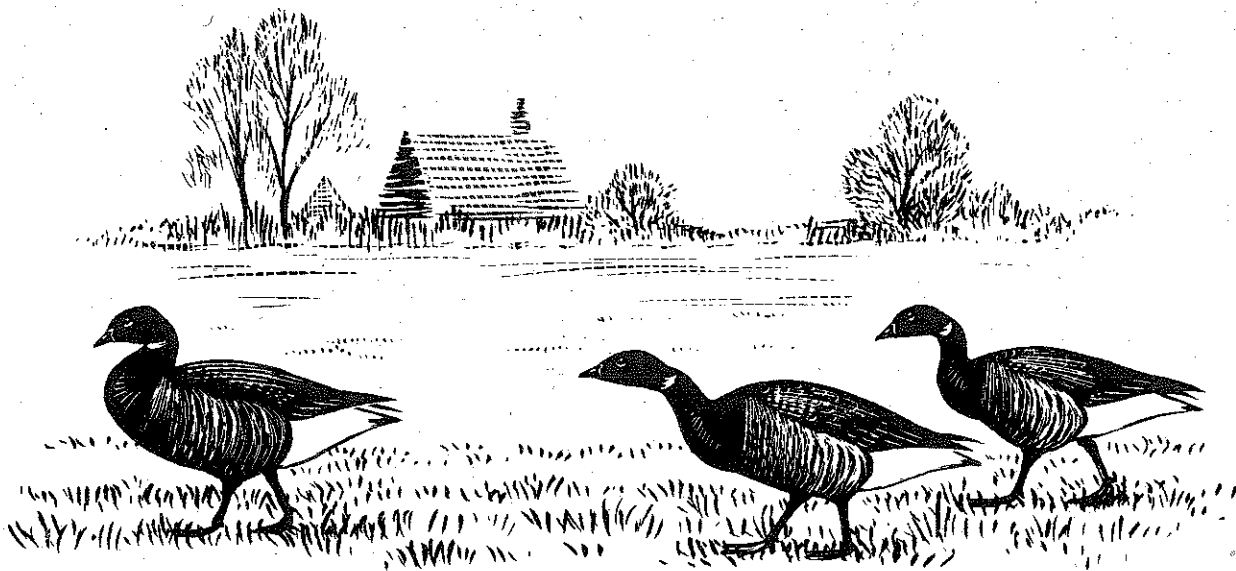


Table 19. DARK-BELLIED BRENT GOOSE: WINTER MAXIMA AT MAIN RESORTS

	1987/88	88/89	89/90	90/91	91/92	(Mth)	Average
Wash	23,166	27,612	19,309	21,273	27,742	(Jan)	23,820
Thames Est.	18,551	17,263	12,555	33,109	17,211	(Jan)	19,739
North Norfolk Marshes	9,450	12,711	6,711	11,888	11,128	(Feb)	10,378
Chichester Hbr	9,721	10,473	9,484	9,406	11,582	(Feb)	10,133
Blackwater Est.	7,709	8,363	6,370	9,918	11,445	(Nov)	8,761
Langstone Hbr	6,800	8,050	7,821	6,133	7,860	(Feb)	7,333
Crouch/Roach Est.	2,853	5,333	3,109	8,388	7,978	(Jan)	5,532
Colne Est.	5,487	5,494	3,966	4,924	6,705	(Feb)	5,315
Hamford Water	3,750	3,942	(150)	6,889	4,008	(Feb)	4,647
Medway Est.	2,910	6,868	1,200	6,809	4,484	(Jan)	4,454
Pagham Hbr	2,551	2,965	2,755	3,181	4,750	(Jan)	3,240
Portsmouth Hbr	2,129	2,062	2,567	5,318	3,580	(Feb)	3,131
Swale Est.	2,789	3,032	1,769	4,823	2,101	(Feb)	2,903
NW Solent	1,750	2,400	1,600	3,335	4,868	(Jan)	2,791
Humber Est.	1,263	(2,000)	1,631	2,733	3,773	(Nov)	2,350
Exe Est.	1,724	2,795	2,510	2,665	2,020	(Nov)	2,343
Fleet/Wey	1,000	(0)	850	2,800	4,355	(Nov)	2,251
Dengie	2,598	2,445	1,900	1,950	2,350	(Nov)	2,249

Light-bellied Brent Goose *Branta bernicla hrota***Internationally important: 200****Nationally important: +**

The British total of Light-bellied Brent Geese, which almost wholly occurs at the principal site of Lindisfarne, was much lower than in previous years. The peak at the Northumberland site reached 1,440 in October, only half the normal number, with many birds having remained at Danish sites throughout the winter (S. Percival, pers. comm). The majority of birds had departed Lindisfarne by the relatively early date of mid January. Birds in Northern Ireland, originating from the Canadian arctic and Greenland, peaked at 15,412 in October, a similar number to that recorded in the last few seasons. The population exhibited the regular pattern of an October peak followed by steady decline through to March. Numbers at Strangford Lough were slightly lower than might be expected, and although the count at Lough Foyle was lower than in 1990-91, there still appears to be an increasing trend at this site. Several sites in Northern Ireland recorded

more than 200 birds in 1991-92, including most of the large estuaries: Dundrum Bay (407, January), Carlingford Loch (267, January), Outer Ards (238, February) and Larne Lough (227, March). Although single birds are recorded at many other sites throughout the UK, a flock of 43 at Loch Ryan in January, probably relating to Irish birds, is notable.

More than 140 Light-bellied Brents from the Svalbard population have been ringed in the last two seasons (Clausen and Percival 1992). A high resighting rate of over 95% has helped identify movements between Lindisfarne and some of the five Danish sites that comprise the only regular wintering locations for this small population. However, spring observations in Denmark failed to locate some of the Lindisfarne-ringed birds that were seen again in Northumberland the following winter, suggesting that a further staging area is used by some birds. Ringing of some Dark-bellied Brents wintering at Lindisfarne has resulted in resightings in the Netherlands, indicating that these birds are quite distinct from the population that uses estuaries in southern Britain. Further ringing of Light-bellied Brents will help to model the dynamics of the vulnerable Svalbard population, estimated to number only 5,000 birds, and will be important in investigating the effects of possible competition from the increasing number of Dark-bellied Brents at Lindisfarne.

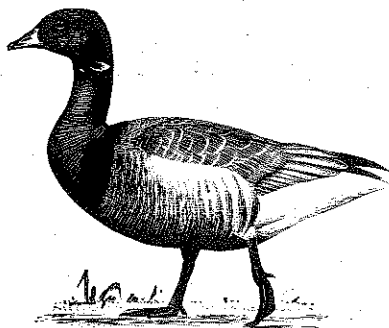
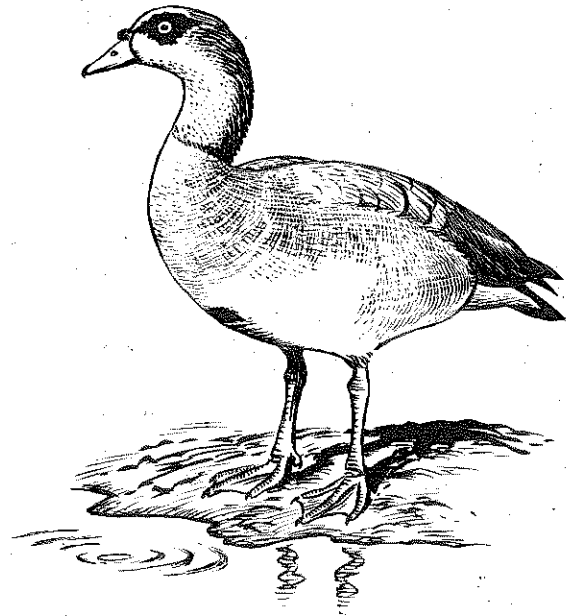


Table 20. LIGHT-BELLIED BRENT GOOSE: WINTER MAXIMA AT MAIN RESORTS

	1987/88	88/89	89/90	90/91	91/92	(Mth)	Average
Strangford Lo.	15,031	8,478	12,423	13,237	10,359	(Oct)	11,906
Lo. Foyle	2,495	3,700	4,105	6,007	5,395	(Sep)	4,340
Lindisfarne	2,000	3,000	3,000	2,700	1,440	(Oct)	2,428

Egyptian Goose *Alopochen aegyptiacus*

A maximum of 246 was recorded in September, with a steady decline towards mid winter, followed by a slight recovery. This is only around one quarter of the 907 recorded by the 1991 summer survey of introduced geese (Delany 1992a). Norfolk held 91% of the total at the time of the survey and, similarly, nearly all birds were found in Norfolk in 1991-92. Feral breeding was recorded in Norfolk almost 200 years ago, but the species has shown little inclination to spread from its East Anglian stronghold and only in the latter half of this century have birds been recorded regularly in other counties (Taylor 1986a). The following sites held more than 10 birds in 1991-92: Pentney Gravel Pits (88, October), the North Norfolk Marshes (71, October), St Benet's Levels (29, October), Blickling Lake (23, September), Ormesby Broad (18, September) and Gunton Park Lake (11, December).

**Shelduck *Tadorna tadorna*****Internationally important: 2,500****Nationally important: 750**

The British population peaked at 84,017 in January, just over 4,000 more than in 1990-91. The January index rose also, to its highest level for seven years. As in previous years, monthly fluctuations showed a small number of birds in September rising quickly in October and then more steadily to a January or February peak (Table 3). Numbers counted in March are around three quarters of the peak. Numbers in Northern Ireland were well down, with the peak of 2,687 birds in December over 1,000 birds fewer than the February peak of 1990-91. Monthly fluctuations in Northern Ireland showed that the influx of birds normally expected in mid and late winter did not occur (Table 4).

All sites with a five year peak mean in excess of 2,000 Shelducks are listed in Table 21. Nine of these sites regularly support over 2,500 Shelduck and are internationally important. Large counts were made at many sites, notably the Wash, Morecambe Bay, the Dee Estuary and the Mersey Estuary. The size of the flock of moulting birds on the Forth has grown markedly in recent years. Two further sites held peaks of over 2,000 birds in 1991-92, although their

averages over five years are not sufficient for inclusion in the table. These were the Stour Estuary (2,822, February) and the Swale Estuary (2,286, February). These counts represent the margins of the birds centred on the Kent and Essex estuaries nearest the Thames and perhaps point to an expansion of the population in this area.

Meininger and Snoek (1992) investigated the effect of habitat change on the numbers and distribution of Shelducks in the Delta region of the south-west Netherlands. Barrages have partially or wholly enclosed estuarine sea arms, forming brackish and freshwater lagoons in an area inhabited by 8,000 to 10,000 birds. A barrage across the most important estuary for wintering Shelducks resulted in the loss of 22% of the habitat used by the birds. Numbers declined by 52% in the estuary as a whole between the early and late 1980s, and by 40% in the area that remained tidal. The decline is thought to be due to the loss of *Hydrobia* snails, a favoured food, but high Shelduck mortality in winters during the mid 1980s will also have affected numbers. Peak numbers on freshwater lagoons now occur in spring, coinciding

with the peak in Chironomid larvae and pupae favoured by Shelduck in this habitat. Moulting concentrations of several thousand birds in the Delta occur on undisturbed sites away from principal winter feeding areas and it is suggested that a safe haven at this time may be more important than the availability of food. Unfortunately, with the threats facing many of our estuaries, it may not be long before we witness similar displacements of Shelducks in Britain.

The first comprehensive survey of breeding Shelduck in the UK was conducted in 1992. The

methodology for the survey had been tested at a sample of sites in 1990 and was further revised in 1991. Results from the 19 sites covered in the two years showed the Dee Estuary, the Solway Firth, the Ribble Estuary, Lough Neagh, the Swale Estuary and the Severn Estuary to be key sites, with each producing over 100 juveniles (Delany 1992b). All indications are that the survey in 1992 was a success. The results will be published in 1993, and, with the Shelduck's dependence on estuaries, will provide valuable data as to the state of this important habitat in Britain.

Table 21. SHELDUCK: WINTER MAXIMA AT MAIN RESORTS

	1987/88	88/89	89/90	90/91	91/92	(Mth)	Average
Wash.	16,332	15,613	19,460	16,275	20,194	(Jan)	17,575
Morecambe Bay	4,433	3,345	5,208	6,143	6,972	(Oct)	5,220
Dee Est.	4,600	4,896	6,924	1,149	6,487	(Nov)	4,811
Medway Est.	3,300	5,805	5,092	3,298	6,068	(Jan)	4,713
Humber Est.	2,943	4,681	4,245	5,856	4,680	(Sep)	4,481
Mersey Est.	2,225	2,602	4,040	5,757	7,946	(Oct)	4,514
Ribble Est.	6,037	3,534	3,162	3,113	4,849	(Nov)	4,139
Severn Est.	2,707	2,819	+3,332	3,598	3,644	(Jan)	3,220
Forth Est.	++2,470	++2,400	2,670	++4,025	++4,420	(Aug)	3,197
Thames Est.	1,749	2,351	3,137	2,535	2,515	(Mar)	2,457
Blackwater Est.	1,168	2,000	2,599	3,398	2,960	(Feb)	2,425
Chichester Hbr	2,451	2,514	2,717	2,321	1,863	(Dec)	2,373
Strangford Lo.	1,579	3,973	1,867	2,311	1,950	(Dec)	2,336
Poole Hbr	1,439	2,230	2,179	3,451	2,086	(Feb)	2,277

+ Counts of breeders and non-breeders from Jones (1989).

++ Counts in August of moulting birds (D.M. Bryant, *in litt.*).

Mandarin *Aix galericulata*

The counts of 240 Mandarin in December and 185 in January formed an obvious peak, compared with the average of around 100 in other months in Britain (Table 1). Unusually, this species was also recorded in Northern Ireland, with one in November and three in February. Ten sites held 10 or more birds, with

the largest concentration at Woburn Park Lakes (53, December). Cannop Ponds (41, December) and Cuttmill Ponds (40, January) also held high numbers while Virginia Water (37, November), normally the premier site in the country, held rather fewer than expected.

Wigeon *Anas penelope*

Internationally important: 7,500

Nationally important: 2,500

An enormous peak of 342,412 Wigeon was recorded in Britain in December, fully 100,000 more than in 1990-91, with over 300,000 still present in January. This is well in excess of recent British population estimates (e.g. Owen 1986). It is also the largest total for any species of wildfowl recorded by the NWC. Both the October and December indices for Wigeon showed large increases of over 20%. Peak counts in Northern Ireland are, oddly, very small by

comparison with the British population, perhaps, in part, because of continuing management problems at Strangford Lough. Although numbers were also up on last season, with 19,676 in October, count totals in other months were generally lower than in 1990-91. Monthly fluctuations were largely similar to the running five year average in Britain, rising steadily to a December or January peak (Table 3). Numbers in Northern Ireland in 1991-92 mirrored

the pattern in Britain, with high numbers also recorded in February, rather than the more normal October or November peak (Table 4).

The numbers of Wigeon on the Ribble have continued their meteoric rise, and an astonishing 88,612 were counted in November, undoubtedly the largest count of any single wildfowl species ever recorded at a site in the UK. This is 60% larger than the peak count of all wildfowl combined at this site from just five years ago. Large numbers were present at Lough Foyle and the Dornoch Firth, and a high count was also obtained at Martin Mere, which

receives birds from the Ribble, especially during rough weather, resulting in dramatically fluctuating numbers from year to year. Numbers on the North Norfolk Marshes have grown to the extent that the site is now of international importance for Wigeon. Conversely, although large numbers are still present at Lindisfarne, they are much lower than the 30,000 recorded in the 1980s. The Wey/Fleet (8,245, December) and the Mersey Estuary (11,500, January) both held numbers that, if maintained over a period of years, would qualify them for international importance for Wigeon.

Table 22. WIGEON: WINTER MAXIMA AT MAIN RESORTS

	1987/88	88/89	89/90	90/91	91/92	(Mth)	Average
Ribble Est.	35,000	41,809	43,541	59,187	88,612	(Nov)	53,630
Ouse Washes	38,672	30,968	53,615	24,715	37,064	(Jan)	37,007
Lindisfarne	22,000	28,000	7,500	9,040	9,580	(Oct)	15,224
Lo. Foyle	11,997	22,000	7,797	15,584	16,662	(Oct)	14,808
Dornoch Fth	14,194	10,299	13,861	10,251	17,637	(Oct)	13,248
Martin Mere	3,200	18,000	8,000	2,200	16,630	(Feb)	9,606
Swale Est.	9,750	6,801	8,625	11,671	9,731	(Jan)	9,316
N. Norfolk Marshes	3,540	6,580	6,825	12,779	14,898	(Dec)	8,978
Cromarty Fth	8,392	8,158	9,686	6,512	6,598	(Oct)	7,869

Gadwall *Anas strepera*

Internationally important: 120
Nationally important: 50

Although the peak total of 7,696 Gadwall recorded in November, and counts in most other months, were fractionally up on the equivalent 1990-91 figures, both the October and December indices indicate that there was a decline in the British population of this duck in 1991-92 (Table 5). The total, however, remains well above 1980s levels. Monthly fluctuations showed a less pronounced peak than usual, with at least 90% of the peak present from September to January inclusive, before falling to half

this number in March. Northern Ireland supports only a very small population of Gadwall. As in Britain, counts were, on the whole, larger in each month compared with 1990-91, although the peak count of 231 birds in December was 10 fewer than last season. A similarly high proportion of the peak was present in all months, with 81% of the total still present in March.

Many of the principal sites for Gadwall (Table 23) showed a slight decline compared with numbers that might be expected, based on the average of the last five years. The River Avon at Blashford and a high count at Chew Valley Lake were the only notable exceptions. The peak count at Abberton was particularly low, although numbers at this site are quite variable. Whilst the number of sites of national importance for Gadwall has not risen in recent years, numbers at many sites fluctuate, often quite dramatically, just below this level. The following sites all held in excess of 150 birds in 1991-92: Blashford Lakes (350, February), Thorpe Water Park (285, December), Hanningfield Reservoir (245, October), Buckden/Stirtloe Gravel Pits (209, November) and Fen Drayton Gravel Pits (181, December).

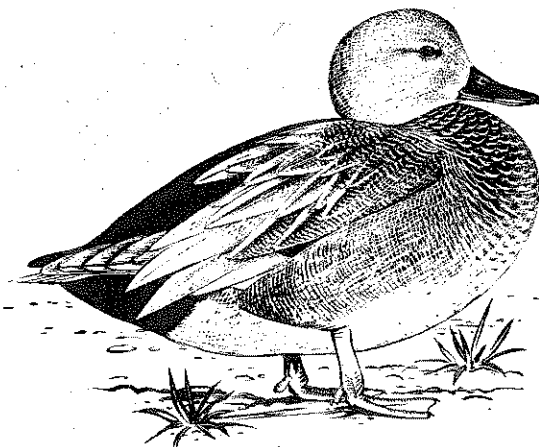


Table 23. GADWALL: WINTER MAXIMA AT MAIN RESORTS

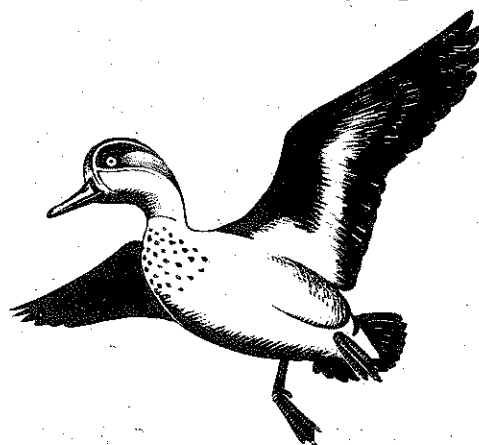
	1987/88	88/89	89/90	90/91	91/92	(Mth)	Average
Rutland Water	1,387	1,805	1,606	1,323	1,369	(Sep)	1,498
Abberton Rsr	160	784	846	402	218	(Sep)	482
Gunton Park Lake	389	461	496	325	450	(Sep)	424
Severn Est.	322	290	384	345	296	(Jan)	327
R. Avon: Blashford	90	333	366	364	416	(Nov)	314
Ouse Washes	277	229	379	352	249	(Feb)	297
Chew Valley Lake	152	160	351	190	425	(Sep)	256
Cheshunt GP	185	200	335	290	205	(Nov)	243
Lackford	x	x	x	x	217	(Jan)	217
Lo. Leven	140	154	163	258	120	(Sep)	167
Thrapston GP	186	181	106	123	168	(Dec)	153

Teal *Anas crecca***Internationally important: 4,000****Nationally important: 1,000**

The peak count of Teal (Table 1) was almost 20,000 less than recorded last season and the combined December/January index for this species also showed a large decrease compared with the last two seasons (Table 5). Monthly variations in the numbers of Teal in Britain (Table 3) mirrored the average of the last five years almost exactly except for a larger proportion of the peak numbers being present in November. In Northern Ireland numbers peaked at 4,849 in January, again considerably fewer than the number recorded in 1990-91 (6,133). As with Britain, the pattern of monthly fluctuations in the numbers of Teal was consistent with previous years (Table 4).

Despite the low national figure, record counts were made at some of the most important sites for Teal, with the north-west estuaries of the Mersey, the Dee and the Ribble holding well in excess of their respective five year averages. Although less important in terms of total numbers, a notable increase was also recorded at Morecambe Bay. Other sites at which the number of Teal in recent years exceeds the level required for national importance are given in Table 24. The relatively low count at Woolston Eyes reflects the loss of habitat that resulted from draining one of the beds, and the site already seems to have lost its former importance for this species. Other sites supporting in excess of 1,750 birds but not listed in the Table were Loch of Strathbeg (2,931, October), Mere Sands Wood (2,664, December), Pulborough Levels (2,124, February), Horsey Mere (2,000, January) and Rutland Water (1,917, September).

Two recent analyses by WWT research staff have focused on Teal. Gilburn & Kirby (1992) estimated the current British winter population to number at



least 164,000 birds. The population has increased in line with that of north-west Europe, having grown on average at 3.1% per annum since 1960, although there were declines in the late 1970s and mid/late 1980s and a dramatic increase over the last few years. Distribution in Britain mirrored the distribution of wetlands, although the major concentrations were on estuarine sites, especially in north-west England, around the Firth of Forth, the Moray Firth, in Essex and Kent and along the south coast in West Sussex, Hampshire and Dorset. North and south-west Wales also held large numbers of birds. Teal had increased in numbers across all wetland habitats, most notably at coastal sites but also, especially recently, on mineral workings e.g. gravel pits. Where data were available, the effect of environmental factors on numbers of Teal at a site were investigated. Numbers were found to be highly significantly and positively correlated with the size of the site. Birds also favoured sites with muddy shores and a high density of surrounding vegetation. Numbers of Teal at a site showed a negative correlation with the depth of the water and with the level of disturbance resulting from human access and boating.

Bell *et al.* (1992) tested the hypothesis that the physical condition of Teal affected their vulnerability to hunting. Using Teal ringed at Abberton Reservoir between 1967-68 and 1990-91, they found no evidence that the condition of a bird, measured by its weight adjusted for body size, time of capture or sex, was related to the probability of its being shot. This conclusion differed from findings for Mallard in North America, where it is

suggested that shooting kills are biased towards birds in poor physical condition. The possibility that Teal trapped using the baited cages were not representative of the population as a whole was investigated, but no bias was found. Further analyses are needed in this field in order to test the hypothesis that the mortality resulting from hunting is partially or completely compensatory.

Table 24. TEAL: WINTER MAXIMA AT MAIN RESORTS

	1987/88	88/89	89/90	90/91	91/92	(Mth)	Average
Mersey Est.	12,730	9,670	12,300	10,375	13,450	(Dec)	11,705
Dee Est.	3,640	4,670	9,825	4,824	10,715	(Dec)	6,735
Ribble Est.	3,435	6,417	1,709	9,078	9,500	(Nov)	6,028
Abberton Rsr	1,042	1,850	4,225	11,483	4,245	(Sep)	4,569
Ouse Washes	2,753	3,870	4,920	5,225	5,157	(Feb)	4,385
Hamford Water	1,700	1,975	(677)	7,211	4,048	(Oct)	3,734
Woolston Eyes	3,500	3,500	4,000	4,500	1,500	(Jan)	3,400
Martin Mere	4,700	4,300	2,600	1,900	2,600	(Sep)	3,220
N. Norfolk Marshes	770	2,337	5,538	3,223	2,740	(Dec)	2,922
Cleddau Est.	2,688	3,243	2,586	3,148	2,188	(Nov)	2,771
Somerset Levels	1,002	(500)	4,514	2,808	1,908	(Jan)	2,558
Thames Est.	2,393	1,996	3,342	3,407	1,627	(Jan)	2,553
Medway Est.	1,523	3,523	1,827	2,992	2,360	(Jan)	2,445
Severn Est.	2,451	1,253	3,402	1,820	2,711	(Jan)	2,327
Loch Leven	1,400	1,400	3,270	3,614	1,873	(Sep)	2,311
Morecambe Bay	1,944	2,349	2,410	1,421	3,036	(Dec)	2,232
Lo. Neagh/Beg	2,619	2,155	1,576	2,915	1,805	(Feb)	2,214
Blackwater Est.	1,933	3,897	1,779	1,341	2,002	(Jan)	2,208
Alde Est.	2,051	2,362	1,695	2,160	2,378	(Jan)	2,129
Swale Est.	3,030	2,353	2,040	1,846	1,311	(Nov)	2,116
Inner Moray Fth	1,335	1,780	2,087	2,800	2,225	(Jan)	2,045
Humber Est.	1,241	2,875	1,425	1,795	2,480	(Oct)	1,963
Dornoch Fth	1,666	2,307	1,761	1,831	1,406	(Dec)	1,794

Mallard *Anas platyrhynchos*

Internationally important: 50,000
Nationally important: 5,000

The peak count of 171,617 in January was well down on the record count of 214,458 in 1990-91. However, last season's total was influenced heavily by the blanket coverage of the north-west, especially in January (see "Progress and Developments") when more than 16,000 Mallard were counted as a result of extra coverage (Quinn 1992a). However, the 1991-92 December index for Mallard was lower than in recent years and the September index showed a large decrease (Table 5) confirming a genuine decline. Monthly fluctuations in numbers followed the established pattern of a slow increase from September to December and January, followed by a rapid decline in February and March, with numbers decreasing by about one third of the peak in both months. In Northern Ireland, numbers peaked at 11,240 in October, slightly up on the count from the

previous season. The seasonal pattern of numbers in Northern Ireland differs markedly from Britain, with an early winter peak (usually in September), followed by a steady decline through the winter to less than one quarter of the peak in March. The 1991 counts in November and December were, respectively, slightly lower and higher than expected, but the pattern was otherwise similar.

Numbers at most of the principal sites (Table 25), while fluctuating from year to year, appear to remain fairly stable over a longer period. However, low counts were made on the Humber Estuary, the Ouse Washes, Morecambe Bay and Loch of Strathbeg, with all of these sites showing declines in four of the last five years. No other sites held in excess of 2,000 Mallard in 1991-92.

Table 25. MALLARD: WINTER MAXIMA AT MAIN RESORTS

	1987/88	88/89	89/90	90/91	91/92	(Mth)	Average
Lo. Neagh/Beg	4,054	5,560	6,438	5,318	5,499	(Oct)	5,474
Humber Est.	10,040	4,940	4,184	4,373	2,975	(Oct)	5,302
Wash	5,448	2,910	4,254	5,200	4,499	(Jan)	4,462
Ouse Washes	5,553	4,905	4,856	3,530	3,203	(Jan)	4,409
Morecambe Bay	4,527	4,670	4,496	3,400	3,504	(Oct)	4,119
Severn Est.	4,263	3,916	3,074	3,186	4,864	(Jan)	3,861
Martin Mere	3,200	3,900	3,600	4,170	3,000	(Sep)	3,574
Dee Est.	3,880	4,105	3,505	1,947	3,720	(Oct)	3,431
Forth Est.	2,609	2,434	2,182	2,425	2,405	(Jan)	2,411
Solway Est.	3,188	2,666	2,185	1,511	2,422	(Dec)	2,394
Lo. of Strathbeg	3,450	3,300	1,460	1,626	1,017	(Jan)	2,171
Lo. Foyle	2,274	2,000	1,889	2,309	1,799	(Oct)	2,054

Pintail *Anas acuta*

Internationally important: 700
Nationally important: 250

Numbers of Pintail recovered after a poor season in 1990-91, with a peak of 27,505 in December. The population, however, remains below the level recorded in the 1980s (Table 5). Monthly fluctuations in recent years have shown that a large proportion of the total arrives in October, with a peak in December or January followed by a steady decline to low numbers in March (Table 3). Northern Ireland was host to over 100 more birds than last season, with 369 in January. Monthly fluctuations in Northern Ireland show that most birds arrive and depart one month later than in Britain (Table 4).

Table 26 lists all sites supporting nationally important numbers of Pintail (700). The estuaries of north-west England support the vast majority of the UK's total. The Mersey and the Dee Estuaries remain the most important sites. There has been a steady increase in numbers recorded at Morecambe Bay in recent years, possibly at the expense of the nearby Duddon Estuary, while there was a remarkable count of over 6,500, the second highest in the UK in 1991-92, on the Ribble Estuary. These five sites between them support over one quarter of the 70,000 birds in the north-west European population (Monval & Pirot 1989). Numbers at the Wash may point to a recovery after a marked decline. A high count was also made on the North Norfolk Marshes, while Martin Mere held comparatively few birds for the second year running. No other sites held more than 700 Pintail in 1991-92.

ABTO study that involved radio-tracking of Teal and Pintail on the Mersey has revealed how these ducks use the estuary during the day and at night. None of

the tagged Pintail left the Mersey between November and early March. They showed little change in their use of saltmarsh and intertidal habitats between day and night, although a less disturbed section of the Mersey was used as a refuge only during the day. Pintail were opportunistic and would feed in saltmarsh when flooded, but mostly fed on the intertidal areas of the estuary. Radio-tracking of Teal over two winters, 1990-91 and 1991-92, showed that there were at least three different sub-groups of Teal and no single individual was located outside the estuary. Each Teal sub-group used different parts of the Mersey but they did not differ in their habitat selection (Rehfishch *et al.* 1991a; Holloway *et al.* 1992). These studies confirm that the Mersey populations of Pintail and Teal were dependent on the estuary through the winter.

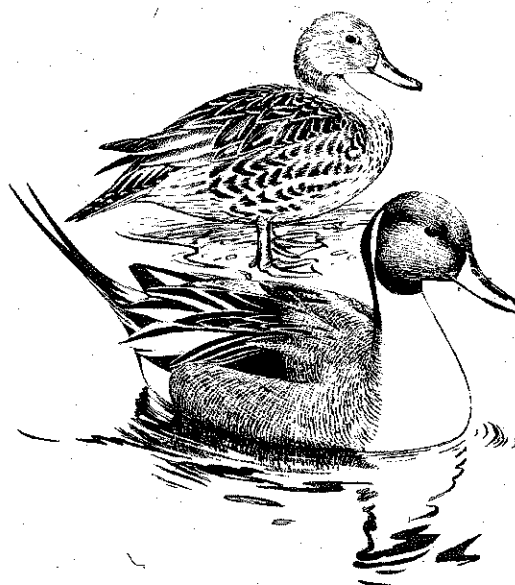


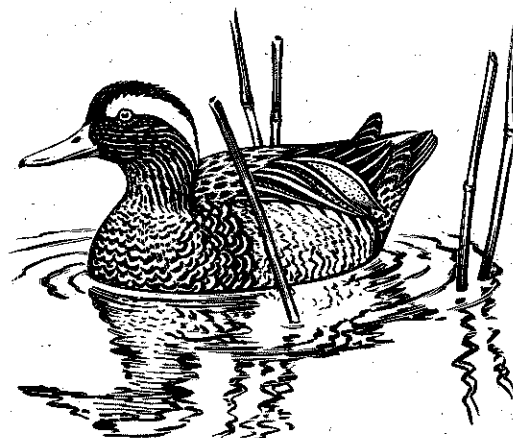
Table 26. PINTAIL: WINTER MAXIMA AT MAIN RESORTS

	1987/88	88/89	89/90	90/91	91/92	(Mth)	Average
Dee Est.	9,550	8,435	11,945	8,706	10,001	(Oct)	9,727
Mersey Est.	8,050	4,288	8,000	3,200	6,089	(Dec)	5,925
Wash	7,715	6,541	2,757	1,910	3,509	(Jan)	4,486
Morecambe Bay	2,140	1,662	1,962	3,190	3,979	(Oct)	2,587
Ribble	235	830	1,621	556	6,507	(Dec)	1,950
Burby Inlet	2,017	1,800	2,306	1,784	1,657	(Jan)	1,913
Ouse Washes	1,080	1,228	1,818	1,332	1,969	(Oct)	1,485
Martin Mere	1,370	2,600	1,500	640	612	(Sep)	1,344
Duddon Est.	1,289	2,200	873	830	1,189	(Dec)	1,276
Solway Est.	1,003	1,165	550	2,208	1,200	(Oct)	1,225
Medway Est.	1,011	927	700	1,243	1,233	(Jan)	1,023
North Norfolk Marshes	490	569	616	1,714	1,568	(Dec)	991

Garganey *Anas querquedula*

Internationally important: ?
Nationally important: +

This summer visitor was recorded at 36 NWC sites, all in England with the exception of one site in Wales and one in Scotland. The majority of birds were recorded in the autumn, with a maximum of 49 in September (Table 1), and a smaller peak of birds returning from the wintering grounds in March. Chew Valley Lake held a remarkable 12 birds in August, whilst Broomhill Flash and Rutland Water both held six in September. A further 12 sites held between two and five birds while single birds were recorded at the remaining sites. The most recent estimates suggest that around 50 pairs of Garganey may breed in the UK, although fewer than ten instances of breeding were confirmed annually in the late 1980s (Spencer *et al.* 1990).

**Shoveler *Anas clypeata***

Internationally important: 400
Nationally important: 90

The total count of 10,480 Shoveler in October was the first count in Great Britain to exceed 10,000 birds and was over 1,500 more than counted in 1990-91. The combined October/November index has shown a small but steady increase in recent years although the January index was down on 1990-91. The peak of 208 in Northern Ireland in December was slightly smaller than the 274 recorded in 1990-91 although monthly fluctuations showed at least 80% of the peak numbers to be present from September to March (Table 4).

Kirby & Mitchell (in press) examined the distribution and status of Shoveler wintering in Britain. Numbers showed a marked decline in the early to mid 1960s, rose sharply to a peak in the early 1970s and have since shown a shallow but

steady decline. The British wintering population originates largely from Russian, Baltic and Fennoscandinavian breeding birds, but a notable component, at least in early winter, is derived from British breeders. As winter progresses, birds move south and west to France, Ireland and the Iberian peninsula. This emigration is heightened during cold winters when the shallow mesotrophic and eutrophic waters favoured by this species are prone to freezing. Regional patterns of numbers within Britain also reflect these movements, with a progressively later peak in numbers in regions further south and west. Northern regions also show a more marked decline in midwinter with a small peak in spring, when birds pass through *en route* to the breeding grounds. Shovelers are well represented on all wetland habitat types, with

seasonal patterns of occurrence on natural lakes, reservoirs and mineral workings mirroring the early winter peak followed by a steady decline recorded nationally. Numbers at coastal sites peak in midwinter, as birds vacate inland sites during colder weather, while the pattern on floodlands (rivers, freshwater marshes etc.) showed a steady rise to a peak in March, perhaps as a result of birds returning to breeding sites, although the number of sites available for analysis of this habitat was small. Reservoirs and mineral workings have been increasingly used by Shovelers in recent years, perhaps reflecting the maturation of these recent, man-made sites, and also conservation management and protection.

Although higher numbers of Shoveler in Britain might have been expected in the mild winter of 1991-92, the large peak count was obtained early in the winter, when cold weather was unlikely to have affected movements, and the proportion of the population remaining in Britain in subsequent months was no larger than usual (Table 3). This suggests a genuine increase in the population. Over 50 sites currently support nationally important numbers of Shoveler (90), the most important of which are listed in Table 27. Five are internationally important, holding in excess of 400 birds. In addition to those listed, counts at Blithfield Reservoir (441, October) and Queen Mary Reservoir (318, December) exceeded 250 birds in 1991-92.

Table 27. SHOVELER: WINTER MAXIMA AT MAIN RESORTS

	1987/88	88/89	89/90	90/91	91/92	(Mth)	Average
Ouse Washes	1,443	523	696	625	567	(Mar)	771
Abberton Rsr	240	418	829	1,085	608	(Oct)	636
Rutland Water	285	729	372	680	490	(Sep)	511
Chew Valley Lake	440	475	490	465	630	(Oct)	500
Lo. Leven	391	540	285	540	576	(Oct)	466
Swale Est.	603	348	224	276	447	(Feb)	380
Woolston Eyes	230	167	300	260	420	(Sep)	275

Red-crested Pochard *Netta rufina*

This large and colourful duck has bred regularly in Britain since the late 1960s, almost certainly as a result of birds escaping from waterfowl collections, and most birds are located in southern England (Cox 1986). The wintering population was estimated at 100 birds in the early 1980s. However, the growth of feral populations, such as that in the Cotswold Water Park which has increased by around 1.5 birds per year since 1970 (Baatsen 1990), probably means that the population is now somewhat higher. A total of 80 birds was recorded in October but this declined steadily to a mid-winter low before recovering slightly. The pattern of a late autumn

peak was also found for counts in six counties in the Midlands in the mid 1980s (Harrop 1991), and has been used to support the argument for genuine vagrancy of birds migrating between moult assemblies in the Netherlands and wintering areas in south-west Europe, although it is now deemed almost impossible to identify such birds. Despite the use of small sites fringed by emergent vegetation, where birds may be missed, the mid winter decline of this conspicuous bird is somewhat paradoxical. Pensthorpe Lakes (33, November) and Cotswold Water Park West (31, February) were the only sites to support more than 10 birds.

Pochard *Aythya ferina*

Internationally important: 3,500
Nationally important: 500

Numbers in Britain were similar to 1990-91, although the peak count of 38,227 in January was around 3,000 less than the maximum in 1989-90. This is also borne out by the January index (Table 5). As usual, numbers climbed steadily to the peak and thereafter declined rapidly to around one quarter of this figure by March (Table 3). Northern Ireland again supported fractionally more birds than Britain, although almost the entire population is found at

Loughs Neagh/Beg, where numbers in many months are usually only around one quarter of the peak that occurs in November, December or January (Table 4).

Numbers of Pochard at Loughs Neagh/Beg rose rapidly in the mid and late 1980s, from an average of under 20,000 to their current level of nearer 40,000. The Pochard has now become *the* species at this site, which alone holds over 10% of the 350,000

estimated for the north-west European population (Monval & Pirot 1989). Numbers at all except two of the key sites were lower than might be expected (Table 28). There were low counts of both *Aythya* species at Abberton Reservoir and the Ouse Washes (see Tufted Duck) while numbers at Rostherne Mere were much lower than expected for the second time in three years. The peak counts at Loch of Harray, Cotswold Water Park West and Loch Leven were all less than 1,000. Loch Watten (1,438, January) was the only other site in the UK to support more than 1,000 birds.

Berry (1989), using a series of coordinated counts, demonstrated that birds using Rostherne Mere and Chorlton Water Park by day commuted to feed on the River Irwell at Salford Docks by night. Peak numbers, in excess of 3,000 birds in recent years, were present in January and February and "marker" birds such as Ferruginous Ducks confirmed that the same birds were using the different sites, and, in varying numbers, also Woolston Eyes. More recently, large numbers of Tufted Ducks found by day at Heaton Water Park have also been observed feeding at Salford Docks by night (P. Berry in litt.),

and it is suspected that the birds may be feeding on dense concentrations of Chironomids. Worryingly, there are development proposals for the Salford Docks area, which would undoubtedly have dire consequences for *Aythya* ducks in north-west England, which have only recently suffered the loss of Woolston Eyes.

Pochard, and also many other species of diving duck, exhibit a bias in the winter distribution of the sexes, with males predominating in the north of Europe and females in the south. Choudhury & Black (1991) investigated the hypothesis that males exclude females where food is limited. In a flock of feeding Pochard, three times as many attacks were made on females as males, even though males outnumbered females by almost 5:1. The proportion of males was higher still in the study area that had been artificially fed. It took a longer time for the male:female ratio to return to the norm in areas in which more food had been supplied. It is suggested that females incur a higher energetic cost in having to wait until males have left the feed site before feeding themselves and that this may cause them to migrate to areas without males.

Table 28. POCHARD: WINTER MAXIMA AT MAIN RESORTS

	1987/88	88/89	89/90	90/91	91/92	(Mth)	Average
Lo. Neagh/Beg	24,072	39,811	36,380	40,928	38,998	(Jan)	36,038
Abberton Rsr.	2,102	2,739	2,271	4,064	2,058	(Aug)	2,647
Ouse Washes	3,750	1,129	2,964	1,135	1,596	(Feb)	2,115
Lo. of Boardhouse	3,755	723	1,327	1,594	1,864	(Nov)	1,853
Severn Est.	1,701	2,026	1,742	1,616	1,666	(Jan)	1,750
Cotswold WP East	3,291	1,352	1,147	1,113	1,462	(Nov)	1,673
Rostherne Mere	2,395	1,151	120	2,703	635	(Dec)	1,401
Kingsbury/Coton Pools	1,775	1,408	1,387	1,099	1,275	(Jan)	1,389
Lo. of Harray	1,043	1,372	1,011	2,245	846	(Jan)	1,303
Cotswold WP West	1,119	1,538	1,329	1,046	811	(Oct)	1,169
Poole Harbour	+1,177	+685	+1,020	1,311	1,026	(Jan)	1,044
Loch Leven	1,270	770	1,510	895	701	(Jan)	1,029

+ collated from county records by S. Aspinall.

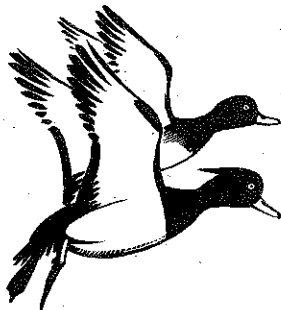
Tufted Duck *Aythya fuligula*

Internationally important: 7,500

Nationally important: 600

Numbers of Tufted Ducks in Britain appear to have remained fairly stable in recent years, and the peak of 50,527 in January was about average. The September and December indices for this species confirm this stability, although the September value was higher than the depressed figure of 1990-91. Although a large component of the wintering population comprises British-bred birds, numbers are greatly inflated by birds from northern latitudes

(Ogilvie 1986). There is comparatively little fluctuation between months during the winter, with, on average, at least 80% of the peak present in all months except March (Table 3). Numbers in Northern Ireland peaked at 26,177 in January, around 3,000 higher than 1990-91. However, numbers here tend to fluctuate markedly e.g. over 30,000 in 1990-91 but less than 20,000 the season before, with the 1991-92 figure being about average.



Ringling has shown that the population wintering in Ireland contains the birds that breed in Scotland, although the rest of the British Isles' birds are comparatively sedentary (Ogilvie 1986). There is a much more marked fluctuation in numbers between months in Northern Ireland, with only a half of the peak number present by October (Table 4).

Numbers of Tufted Duck at the key sites appear to fluctuate considerably from year to year (Table 29). Peak numbers at Abberton Reservoir, Rutland

Water, Kingsbury/Coton Pools, Besthorpe/Girton, the Severn Estuary, Kilconquhar Loch and the Ouse Washes were all below their respective five year averages. Conversely, numbers at Loughs Neagh/Beg, Loch Leven, Wraysbury Gravel Pits and especially Hanningfield Reservoir were higher than average. This fluctuation is also highlighted by the large number of sites, 10 in all, that supported over 600 birds in 1991-92 despite numbers in recent years being insufficient for their inclusion in the table. These were Heaton Park Reservoir (1,312, December), South Muskham & North Newark Gravel Pits (884, December), Queen Mother Reservoir (829, November), Barn Elms Reservoirs (759, December), Farmoor Reservoirs (749, December), Thorpe Water Park (742, October), Leybourne/New Hythe Gravel Pits (688, December), Loch Watten (674, November), Dungeness (610, September) and Cotswold Water Park East (605 January).

Table 29. TUFTED DUCK: WINTER MAXIMA AT MAIN RESORTS

	1987/88	88/89	89/90	90/91	91/92	(Mth)	Average
Lo. Neagh/Beg	19,603	16,642	29,393	22,278	25,283	(Jan)	22,640
Abberton Rsr	3,463	3,987	4,387	3,550	2,428	(Sep)	3,563
Rutland Water	3,237	5,582	3,709	2,097	2,397	(Sep)	3,404
Lo. Leven	2,580	3,180	2,700	3,120	4,064	(Sep)	3,129
Lo. of Harray	1,142	1,920	1,992	1,643	1,570	(Oct)	1,653
Kingsbury/Coton Pools	2,271	1,405	1,794	1,431	1,177	(Dec)	1,616
Walthamstow Rsr	760	721	721	1,589	1,035	(Feb)	965
Wraysbury GP	(426)	1,447	683	470	1,229	(Mar)	957
Besthorpe/Girton GP	560	1,100	557	1,801	678	(Nov)	939
Severn Est.	1,101	990	997	817	786	(Jan)	938
King George V Rsr	302	430	530	2,500	862	(Sep)	925
Kilconquhar Lo.	477	1,570	1,250	725	596	(Feb)	924
Hanningfield Rsr	870	655	530	537	1,463	(Aug)	811
Cotswold WP West	524	1,322	464	593	694	(Sep)	719
Ouse Washes	1,847	470	528	365	273	(Jan)	697
Pitsford Rsr	435	501	697	764	766	(Sep)	633

Scaup *Aythya marila*

Internationally important: 1,500
Nationally important: 40

The number of Scaup in Britain remains at a much lower level than the large numbers recorded in the late 1960s and early 1970s (Table 5). The peak of 3,595 in Britain in January is considerably lower than the 6,492 recorded in 1990-91, although the methodology of once monthly counts used by the NWC exacerbates the difficulties involved in recording this species. For example, it is known from counts made at low tide that around 5,400 Scaup were present on the Solway (Quinn *et al.* 1992), compared with a high tide maximum of only 1,459, and counts in the Moray Firth area made by the RSPB sea-duck monitoring scheme usually

record higher figures than on the monthly priority count dates. Numbers in Northern Ireland were considerably higher than usual in recent years, with a peak of 3,573 in March, the vast majority of which were at Loughs Neagh/Beg. Although numbers fluctuate at this, the only freshwater site to support appreciable numbers of birds, the general trend appears to be of an increase in recent years. The principal sites for Scaup are listed in Table 30. Other sites supporting in excess of 130 birds were Loch Stenness (243, December), the Inner Moray Firth (239, March) and Irvine/Garnock Estuary (200, February).

In a recent review by Kirby *et al.* (in press, c), the current population in Britain and Ireland is estimated at 11,000 birds, less than 1% of the north-west European population. British wintering birds were thought to have originated from breeding areas in Iceland and Russia, although the majority of birds are now thought to be from Iceland. Peak numbers normally occur in late December or January but decline rapidly thereafter. Cold weather is thought to be responsible for influxes of small numbers of birds from Europe in some winters. In the past, major concentrations of Scaup

occurred on the east and south-west coasts of Scotland (e.g. 20,000-30,000 on the Firth of Forth) and were often associated with waste outfalls, especially of sewage and grain from distilleries. Flocks also numbered in the thousands at several sites in Northern Ireland but, with the exception of the Solway Estuary and Loughs Neagh/Beg, numbers at all of these sites are much reduced. The disappearance of these flocks pre-empted the reduced discharge from outfalls and the precise reasons for the decline remain unclear.

Table 30. SCAUP: WINTER MAXIMA AT MAIN RESORTS

	1987/88	88/89	89/90	90/91	91/92	(Mth)	Average
Solway Est.	4,000	3,092	1,562	3,803	++5,400	(Feb)	3,571
Lo. Neagh/Beg	1,432	2,150	1,215	1,539	3,516	(Mar)	1,970
Lo. Indaal	1,198	1,230	442	660	1,430	(Dec)	992
Forth Est.	861	762	135	381	185	(Feb)	465
Carlingford Lo.	178	140	150	352	500	(Jan)	264
Loch Ryan	120	200	409	200	300	(Jan)	246
Dornoch Fth	107	266	149	+368	140	(Feb)	206
Cromarty Fth	155	151	+126	+247	+211	(Dec)	178
Lo. of Harray	137	219	164	240	95	(Feb)	171
Inner Clyde	80	174	267	144	146	(Jan)	162

+ RSPB/BP studies.

++ WWT/WAS studies.

Eider *Somateria mollissima*

Internationally important: 20,000
Nationally important: 700

The peak count of 35,522 Eider in September was well down on the 44,232 recorded in 1990-91. However, the total is heavily influenced by counts at the Firth of Tay which supports around half of the NWC total, and is thus dependent on the prevailing counting conditions at this site. The comparatively large national total, despite incomplete counts at the Tay in 1991-92, points to improved coverage or increased numbers at other sites. The largest count of Eider was made at Morecambe Bay, which appears to have grown steadily in importance over the last five years (Table 31). A large number of these will be derived from the breeding colonies on Walney and Foulness Islands, which have also increased in recent years to almost 1,600 pairs (Callion 1992). Large numbers of birds were also found between Seahouses and Budle Point (3,200, October), Moray Firth (2,842, October (RSPB/BP)) and the Irvine/Garnock Estuary (1,600, March).

The Eider is the commonest sea-duck in British waters (Kirby *et al.* in press, c) but, as with many other sea-ducks around our coasts, numbers in

Britain only account for a very small proportion of the north-west European population. The British wintering population is estimated to number around 77,500 birds, mainly derived from British breeding colonies, although swollen by influxes from the north and east during cold weather. The Eider moves to deeper water to moult in late summer and peak numbers at winter resorts are normally recorded in November. Birds disperse in March to return to the breeding colonies. Winter distribution is similar to that during the breeding season, with birds concentrated on the east coast of Scotland, especially the Firth of Tay, the Firth of Forth and the Aberdeen coast. A large number, between 16,500 and 19,500, are found in the Shetlands, the Orkneys and the Western Isles. The Firth of Clyde is the only site supporting notable numbers of Eiders on the west coast of Scotland, while Morecambe Bay and Lindisfarne are the only significant resorts in England. Only small numbers are recorded in Northern Ireland. Current figures suggest that the British population is stable or increasing.

Ydenberg & Guillemette (1991) investigated the length of time spent on the surface between successive dives by foraging Eiders. Eiders were expected to spend sufficient time on the surface to allow the body's physiological processes to recover to the full after the exertions of each individual dive. Eider feed on sessile prey (principally gastropods e.g. Mussels *Mytilus* spp.) and thus there should be no benefit in diving before recovering from a previous dive as found in a similar study by the authors on Western Grebes *Aechmophorus occidentalis* which exploit schools of fish that would quickly escape. However, like the Grebes, Eider were found to alternate between periods of hard

work, when the rest between a successive number of dives was insufficient for complete recovery, and periods of rest, with greater pauses between dives, although this behaviour was less extreme than in the Grebes. Eider were observed to have feeding periods of 10-20 minutes, with similar rest periods, during which birds processed caught food in their muscular gizzards. It is suggested that Eiders purposely build up a net energy debt in anticipation of the enforced period of inactivity required while processing food. The behaviour was accentuated since the activities of individual Eiders were co-ordinated with other flock members.

Table 31. EIDER: WINTER MAXIMA AT MAIN RESORTS

	1987/88	88/89	89/90	90/91	91/92	(Mth)	Average
Tay Est.	20,000	x	30,000	20,300	(5,000)	(Sep)	23,433
Morecambe Bay	6,247	5,773	7,604	8,183	8,089	(Sep)	7,179
Forth Est.	4,941	3,977	10,798	7,836	6,219	(Sep)	6,754
Inner Clyde	4,325	4,384	4,674	2,939	4,164	(Oct)	4,097
Lindisfarne	2,505	2,300	2,000	2,600	1,750	(Dec)	2,351
Montrose Basin	2,230	2,000	2,960	2,100	1,898	(Oct)	2,238
Ythan Est.	1,831	1,315	1,013	2,322	2,586	(Sep)	1,813
Murcar	1,000	1,000	2,000	x	2,500	(Sep)	1,625
Troon	3,000	(402)	153	x	x		1,577

Long-tailed Duck *Clangula hyemalis*

Internationally important: 20,000
Nationally important: 200

The distribution and coastal habits of this species make it notoriously difficult to monitor. The principal concentration is found in the Moray Firth, although the flocks may range over a wide area. Numbers obtained by the RSPB/BP counts are given in Table 32 although even these are believed to underestimate the true number present. "Best estimates", produced by summing the monthly

totals for each section within the Firth, suggested 10,650 birds, giving a five year "best estimate" average of around 9,000. Of the other key sites for this species, the only count of a significant number of birds was made at the Firth of Forth. The Ythan Estuary held 78 birds in November while a count of 53 birds at Holme, North Norfolk Marshes, in December is noteworthy in view of its southerly location.



The British wintering population is currently thought to number around 23,500 birds (Kirby *et al.* in press, c), only 1% of the two million birds estimated for the north-west European population. British birds are thought to originate from Fennoscandinavian and Russian breeding grounds, with winter numbers peaking in late December or early January. About half of the British population is found in the Moray Firth, whilst Orkney, Shetland and the Western Isles hold the majority of the remaining birds. The remote nature of the favoured haunts combined with their dispersed day-time distribution makes Long-tailed Ducks particularly difficult to census. Consequently, long term trends in the British population are unclear.

Table 32. LONG-TAILED DUCK: WINTER MAXIMA AT MAIN RESORTS

	1987/88	88/89	89/90	90/91	91/92	(Mth)	Average
Moray Fth	(3,900)	10,500	+6,270	+8,037	+9,300	(Dec)	7,777
Forth Est.	898	1,037	465	451	640	(Dec)	698
Lindisfarne	386	800	294	420	(42)	(Nov)	475
Water Sound	240	++219	206	365	x		303
Broad Bay	210	x	100	x	x		155

+ RSPB/BP studies.

++ from Christer (1989).

**Common Scoter *Melanitta nigra* and
Velvet Scoter *Melanitta fusca***

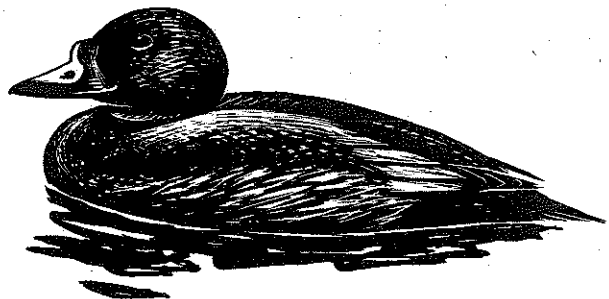
**Common Internationally important: 3,500
Nationally important: 350
Velvet Internationally important: 2,500
Nationally important: 30**

The NWC scheme recorded 10,187 scoter in the UK in November (Tables 1 & 2). Although Common and Velvet Scoter may be indistinguishable under some conditions, 9,933 Common Scoters were identified in this total. In view of the many difficulties involved in counting this species, this is an admirable proportion of the total, estimated at c.25,000 (Kirby *et al.* in press, c). The Firth of Forth held a maximum of 1,330 Common Scoters in March, with Aberlady and Gullane Bays and Largo Bay supporting a large proportion of birds at this site. Several large flocks were noted off the English north-east coast, notably at Lindisfarne (600, November), Cresswell (400, November), Seahouses (350, October), and slightly further south, 364 were recorded between the River Tyne and Sunderland in November. Very large numbers were present off the North Norfolk coast in mid-winter, peaking at 3,133 in November. A remarkable 3,000 were present in Holkham Bay, North Norfolk Marshes, in December. A maximum of 392 was recorded in the Thames Estuary, with 390 birds off the North Kent Marshes in October. The Clwyd Estuary held 640 birds in March. In Northern Ireland, Dundrum Bay held 2,962 birds in November.

RSPB/BP counts in the Moray Firth recorded good mid-winter numbers of around 3,000 birds and positively identified 4,250 birds in April, the highest count for almost 10 years, with a further 365 birds not identified to species. Spey Bay, Burghead Bay and the coast off Dornoch were the main strongholds. A series of offshore counts was conducted in Cardigan Bay for the second season running (Green 1992a). Coverage from Aberystwyth to Barmouth was extended to include the area to Pwllheli in 1991-92. A peak count of 10,397 Common Scoters was recorded in December, by far the largest concentration in the UK, with 8,683 still

present in January. Funding has been confirmed for a further season of work to study this important site.

Velvet Scoter numbers recorded by the NWC reached a maximum of 371 in Britain (Table 1), but no birds were recorded in Northern Ireland. The largest count was of 180 in the Firth of Forth and 160 were associating with the large flock of Common Scoters in Holkham Bay. Numbers in the Moray Firth, from RSPB/BP counts, reached 487 in April, and possibly as many as 592 were present in October, although only 316 were positively identified. As for Common Scoter, Burghead Bay, Spey Bay and the coast of Dornoch, held the principal concentrations of birds. Only 26 Velvet Scoters were identified in the large numbers of Common Scoters in Cardigan Bay.



Goldeneye *Bucephala clangula***Internationally important: 3,000****Nationally important: 150**

The peak count of 16,039 Goldeneyes in January in Britain was just over 1,000 fewer than in 1990-91, and the total in Northern Ireland of 14,641 was also down on last season's figure (15,201). Although part of this difference may be explained by the large number of sites covered last season in January, when Goldeneye numbers approach their maximum (Tables 3 and 4), the January index for this species also showed a slight decline this season (Table 5). Numbers were also slow to build in Northern Ireland. However, the population still remains at around the highest level recorded since the large counts of the early 1970s. The increasing UK population, now in excess of 30,000 birds, accounts for 10% of the estimated 300,000 in north-west Europe (Monval & Pirot 1989). However, the presence of large numbers of Goldeneyes on rivers,

a habitat receiving comparatively little coverage by the NWC scheme, suggests that the UK population is no doubt significantly larger still.

The most important sites for Goldeneye are given in Table 33, each supporting a five year average in excess of 250 birds. Whilst Loughs Neagh/Beg is the only internationally important site, holding over 4% of the north-west European population, all of the other sites comfortably exceed the 150 birds required for national significance. The following sites also held over 250 birds in 1991-92: Loch of Strathbeg (338, October), Larne Lough (316, February), Irvine/Garnock Estuary (300, March), Fleet/Wey (259, January) and Lavan Sands (269, February).

Table 33. GOLDENEYE: WINTER MAXIMA AT MAIN RESORTS

	1987/88	88/89	89/90	90/91	91/92	(Mth)	Average
Lo. Neagh/Beg	10,463	12,239	11,408	13,591	13,565	(Jan)	12,253
Forth Est.	1,425	1,608	991	1,831	2,451	(Dec)	1,661
Inner Moray Fth	559	682	+680	+993	+1,101	(Jan)	803
Abberton Rsr	389	1,002	362	707	673	(Mar)	627
Inner Clyde	580	607	413	609	541	(Feb)	550
Belfast Lo.	580	320	578	634	283	(Dec)	479
Maidens Hbr/Turnberry	x	x	625	462	312	(Feb)	466
Morecambe Bay	313	430	480	425	538	(Feb)	437
Tweed Est.	290	408	360	351	590	(Feb)	400
Rutland Water	272	385	345	505	412	(Jan)	384
Strangford Lo.	725	289	240	290	373	(Mar)	383
Windermere	246	256	292	329	501	(Nov)	324
Blackwater Est.	228	172	518	424	236	(Feb)	316
Loch Leven	279	330	310	265	330	(Dec)	303
Colne Est.	275	181	150	477	227	(Feb)	262
R. Tweed: Coldstream	223	315	238	228	295	(Mar)	260
Tay Est.	144	41	214	210	677	(Jan)	257

+ RSPB/BP studies.

Smew *Mergus albellus***Internationally important: 150****Nationally important: +**

The numbers of Smew that winter in Britain is largely dependent on the severity of the winter, which is responsible for birds emigrating from the continent. The number of birds in 1991-92, reaching a maximum of just 84 in January (Table 1), reflects the generally mild winter. Only 25 sites held more than one bird, and only at Wraybury Gravel Pits

was there a count of more than 10 birds (17, December). Although south-east England is the noted stronghold for this species, records of Smew were widespread, with both the Loch of Strathbeg and Hamilton Park Lakes being host to three birds, and a further four sites in Scotland and one site in Wales holding two birds.

Red-breasted Merganser *Mergus serrator***Internationally important: 1,000****Nationally important: 100**

The peak British count of Red-breasted Mergansers was 3,611 in 1991-92 (Table 1), some 280 birds fewer than in 1990-91. A maximum of 513 was recorded on NWC sites in Northern Ireland (Table 2). The January index for Britain fell slightly against the level recorded in the previous year, thus continuing the apparent long-term decline in this species (Table 5).

The British wintering population was estimated at 8,100 birds, the population index having increased mainly between 1962-63 and 1979-80, remaining relatively constant since (Starling *et al.* 1992). Indices calculated for north-west England revealed an overall increase between 1963-64 and 1976-77 but an overall decline since, though index values reached relatively high levels in 1987-88 and 1989-90 (Pickering *et al.* 1992). An index for Wales revealed a continuing, long-term increase (Starling *et al.* 1992).

The principal resorts for Red-breasted Merganser are ranked in Table 34. The Inner Moray Firth remains as the key UK site for this species, with numbers in 1991-92 at a relatively high level. Across the Moray Firth as a whole, RSPB/BP surveys produced a maximum count of 2,012 in January. There were relatively large counts from Poole Harbour and Larne Lough in 1991-92, whilst numbers at many of the other sites in the table were comparatively low. Particularly noticeable are the currently low counts from Lindisfarne which represent only a fraction of previous totals. Other sites supporting relatively large concentrations in 1991-92, but not qualifying for inclusion in the table, were the Exe (158, November) and Irvine/Garnock (141, September) Estuaries. Boat-based surveys of Cardigan Bay recorded 202 birds in December.

Table 34. RED-BREASTED MERGANSER: WINTER MAXIMA AT MAIN RESORTS

	1987/88	88/89	89/90	90/91	91/92	(Mth)	Average
Inner Moray Fth	1,374	+1,777	+1,255	+1,440	+1,789	(Jan)	1,527
Tentsmuir	1,102	420	200	220	x	(Sep)	485
Forth Est.	316	437	472	478	459	(Sep)	432
Cromarty Fth	584	332	+194	+340	+227	(Oct)	335
Poole Hbr	309	387	168	338	389	(Nov)	318
Morecambe Bay	222	250	371	256	354	(Jan)	291
Strangford Lo.	213	371	303	274	222	(Oct)	277
Duddon Est.	267	262	281	271	291	(Aug)	274
The Fleet/Wey	144	x	259	280	260	(Jan)	236
Lo. Indaal	102	106	342	x	336	(Sep)	222
Belfast Lo.	209	181	234	204	142	(Jan)	194
Langstone Hbr	214	234	185	186	111	(Nov)	186
Lindisfarne	310	198	132	81	(21)	(Feb)	180
Larne Lo.	165	181	218	125	207	(Sep)	179
Lo. Ryan	460	50	104	130	115	(Oct)	172
Inner Clyde	253	118	112	113	146	(Feb)	148
Dundrum Bay	93	255	119	196	74	(Aug)	147

+ RSPB/BP studies.

Goosander *Mergus merganser***Internationally important: 1,250****Nationally important: 50**

The total number of Goosanders counted in Britain reached 3,276 in January (Table 1), a level which was remarkably similar to the peak count of 3,249 birds in 1990-91. Only one bird was recorded in Northern Ireland (Table 2). The numbers counted in Britain increased sharply from month to month to reach maximum levels in January and declined appreciably in March (Table 3). Population indices

for Britain increased in January but fell in February, an opposite pattern to the changes which occurred between 1991 and the previous year.

The British wintering population of Goosanders was estimated at 5,500 birds (Starling *et al.* 1992). Examination of long-term trends revealed an overall increase between 1969-70 and 1979-80, but relatively

little overall change since. In North-west England, the number counted changed relatively little from 1960-61 to 1984-85 but has increased significantly since (Pickering *et al.* 1992). In contrast, the Welsh population has changed relatively little during the last decade (Starling *et al.* 1992).

Table 35 includes all sites exceeding the qualifying level for national importance (50 birds) over the last five seasons. The Inner Moray Firth supported by far the largest number, though the 1991-92 maximum count was low compared with earlier winters, and the overall trend at this site remains a downward one. Compared with 1990-91, there were

declines in 1991/92 at the next six sites in the table, a situation which must clearly be monitored closely over the coming winters. Other localities supporting over 50 Goosanders in 1991-92 that are not included in the table were: Belvide Reservoir (75, January), Abbots Moss (65, November), Abberton Reservoir (60, January), Stantling Craigs and Bunting Craigs Reservoirs (60, November), Hamner Mere (59, November), Caban Coch Reservoir (58, September), Morecambe Bay (57, December), Talkin Tarn (55, December), Pawston Lake (54, October), Loch Ken (53, January) and Essenside Loch (50, January).

Table 35. GOOSANDER: WINTER MAXIMA AT MAIN RESORTS

		1987/88	88/89	89/90	90/91	91/92	(Mth)
Inner Moray Fth	1,900	1,490	273	+610	291	(Oct)	913
Hirsel Lake	79	124	202	290	170	(Oct)	173
Tay Est.	225	8	26	206	191	(Sep)	131
Hay-a-Park GP	25	53	195	166	165	(Jan)	121
Chew Valley Lake	55	107	110	163	114	(Jan)	110
R. Tweed: Kelso/Coldstream	102	91	88	147	109	(Jan)	107
Leighton/Roundhill Rsr	90	82	x	x	120	(Jan)	97
Thrapston GP	66	101	44	149	97	(Feb)	91
R. Tyne: Corbridge-Blaydon	x	x	x	x	90	(Jan)	90
Lo. of Skene	92	x	99	40	104	(Jan)	84
Eccup Rsr	62	105	55	101	85	(Feb)	82
Hamilton Low Parks	97	65	68	42	132	(Feb)	81
Lo. Leven	16	73	79	94	120	(Dec)	76
Ryton Willows	x	x	x	x	74	(Jan)	74
Castle Lo.	81	82	69	52	56	(Feb)	68
R. Eden: R'cliffe/A'waite	29	60	111	110	x	(Jan)	62
Castle Howard Lake	57	95	25	84	45	(Feb)	61
Blithfield Rsr	48	73	61	88	34	(Mar)	61
Pitsford Reservoir	46	27	69	67	84	(Dec)	59
Besthorpe/Girton GPs	97	55	44	x	31	(Dec)	57
Rutland Water	44	56	45	89	31	(Dec)	53
Montrose Basin	7	17	89	80	56	(Aug)	50

Ruddy Duck *Oxyura jamaicensis*

Internationally important: n/a

Nationally important: n/a

The number of Ruddy Duck peaked at 3,060 in January, and although only 27 birds fewer than last season, it is well below the expected number in view of the continued growth of the British population of this species. Counts in most of the months of 1991-92 were higher than the respective figures for 1990-91 and, although no NWC indices are available, it is likely that the population is still increasing. Numbers in Northern Ireland also appear to be increasing, although the number there is still small. The maximum of 58 in October is the highest yet recorded. Breeding birds are confined to the south-

east corner of Lough Neagh (O'Sullivan & Smiddy 1992), although their secretive nature during the breeding season means they often prove difficult to locate.

Sites supporting average five year maxima of 80 or more birds are given in Table 36. The number of sites featured in this list has grown steadily in recent years. As recently as 1988-89 just seven sites qualified for inclusion. The list now numbers 15, with three of these being added in 1991-92. Numbers at the reservoirs of Blithfield and Belvide

were much lower than usual, although the reverse was true of the three remaining top five sites. These numbers are somewhat contrary to normal distribution pattern, with a southern bias usually exhibited only in cold winters. In addition to sites listed in the table, Swillington Ings (120, February) and Walston Reservoirs (82, December) both held in excess of 80 birds, suggesting a northwards expansion of the wintering range.

As the British population of Ruddy Ducks increases, there has been a corresponding rise in the number of records from the continent. Although there is no evidence to suggest that they compete directly with any of Britain's waterfowl (Hughes 1991), the occurrence of the Ruddy Duck in Spain has far greater implications for its European congener, the

White-headed Duck *Oxyura leucocephala*, as reported recently in the media. Conservation efforts have resulted in an increase in the Spanish population of White-headed Ducks, from 22 birds in 1977 to 786 in 1992 (Green 1992b). However, Ruddy Ducks compete and hybridise with their European cousins and recent observations of hybrids in Spain have highlighted the threat that they pose to the already endangered White-heads. A Ruddy Duck Working Group has recently been created, chaired by JNCC. The WWT has been awarded a research contract by the UK Department of the Environment, to investigate a range of possible control methods. Baz Hughes of the WWT, who has recently completed a PhD on Ruddy Ducks in Britain, will test the feasibility of a control programme for Ruddy Ducks in the future.

Table 36. RUDDY DUCK: WINTER MAXIMA AT MAIN RESORTS

	1987/88	88/89	89/90	90/91	91/92	(Mth)	Average
Blithfield Rsr	909	640	508	899	402	(Nov)	672
Chew Valley Lake	610	785	470	435	760	(Jan)	612
Rutland Water	305	468	398	750	756	(Dec)	535
Eyebrook Rsr	230	218	302	304	352	(Jan)	281
Belvide Rsr	156	340	348	248	109	(Jan)	240
Farmwood Pool	104	79	166	106	124	(Oct)	116
Woolston Eyes	116	137	152	56	96	(Sep)	111
Stanford Rsr	142	57	195	37	110	(Jan)	108
Blagdon Lake	121	173	61	108	71	(Mar)	107
Swithland Rsr	48	55	81	184	192	(Mar)	112
Llyn Traffwll	107	81	97	84	100	(Oct)	94
Llyn Penrhyn	74	71	118	101	x		91
Kingsbury/Coton Pools	64	57	85	133	106	(Nov)	89
Hanningfield Rsr	25	55	80	123	127	(Jan)	82
Hillfield Park Rsr	40	51	91	114	109	(Dec)	81

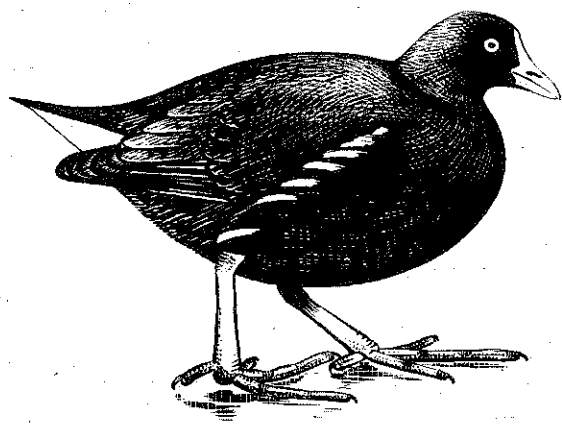
Water Rail *Rallus aquaticus*

The Water Rail must contend for the title of being one of Britain's least seen birds, remaining well hidden in reedbeds and other dense vegetation for the majority of the time. Sightings are more a result of chance or much patience, although birds are more likely to be seen venturing out when waters are frozen. It is perhaps surprising then that there was a steady increase in the number of sightings to a December peak of 240 birds before a decline in the latter half of the winter. Further years of observation are required to elucidate whether such a pattern is real or due to chance. The Water Rail shows a rather southerly distribution, with a

tendency for more birds in the south-west in winter as opposed to summer (Flegg 1986). The size of the wintering population is understandably conjectural, with perhaps 5,000 or more birds. Suffice to say that only a very small number of these will be seen in even the most comprehensive of surveys. Sites at which more than five birds were recorded were: Stodmarsh (100, December), Pannel Valley (44, February), Westhay Heath (15, March), Strumpshaw Fen (12, March), Fleet Pond (10, January), Doxey Marshes (8, October), Upton Warren (8, January), Westhay Moor (7, October), Alvecote Pools (6, December) and Bosherston Lake (6, December).

Moorhen *Gallinula chloropus*

Moorhens are common and widespread in the British Isles but show a marked avoidance of upland areas in winter. Birds use a wide variety of wetland types, but particularly favour riparian habitat, especially where there is bankside vegetation (Taylor 1986b). Although resident and often remaining territorial during the winter, Moorhens



may form groups on neutral ground when forced to move during cold weather. The British and Irish winter population is swelled by continental immigrants and is estimated to exceed one million birds. The NWC recorded a peak of over 8,300 birds in Britain in November, with numbers remaining at around 8,000 in most months, falling to around 7,000 in February and March. A peak of only 712 was recorded in Northern Ireland in October. Their use of quiet backwaters and, at larger sites, vegetation fringes, will mean that many birds are missed by the monthly counts. The following sites held more than 100 birds: Slimbridge, Severn Estuary (c.750, February), Martin Mere (250, September), Loughs Neagh/Beg (209, October), Lancaster Canal (157, January), Broomhill Flash (150, November), Chew Valley Lake (150, September), Leighton Moss (130, January), Arundel WWT (129, December), Washington WWT (125, November), Chesnut Gravel Pits (120, December), the Ouse Washes (117, January), River Avon: Fordingbridge (116, September), River Soar (111, December), Ardeigh Reservoir (109, November), Blenheim Park Lake (104, November) and Clumber Park Lake (103, January).

Coot *Fulica atra*

The peak number of Coot in Britain (85,165 in November) was very similar to that counted in 1990-91 but remains well down on the record figures of 1989-90. Numbers in Northern Ireland decreased for the second consecutive season to a peak of 7,978 in October, almost 500 birds fewer than in 1990-91. Monthly fluctuations (Tables 3 & 4) showed a similar pattern to previous years. In Britain, there was an early winter peak, with numbers remaining more or less constant until the new year, after which there was a steady decline. The picture in Northern Ireland was similar, although numbers started to decline almost immediately after the September or October peak.

Numbers at Abberton Reservoir, the principal site in the UK for this species, have shown a marked decline after the record count in 1989-90, with numbers in 1991-92, as with several other species at this site, well below the expected number based on the average over the last five years. Numbers at Loughs Neagh/Beg, supporting the vast majority of birds in Northern Ireland, have shown an overall increase in recent years. At many of the other sites supporting nationally important numbers of Coot (Table 37), numbers were similar to running five year averages, although the large counts on the Fleet/Wey, at Chew Valley Lake and Little Paxton

Internationally important: 15,000
Nationally important: 1,000

Gravel Pits are noteworthy. The count at Fairburn Ings was poor by recent standards. Only three further sites to those featured in the table held over 1,000 birds in 1991-92. These were the Thames Estuary (1,148, January), Blithfield Reservoir (1,145, October) and Thorpe Water Park (1,135, January).

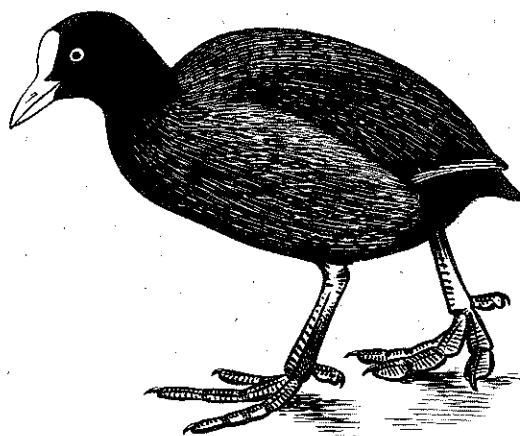
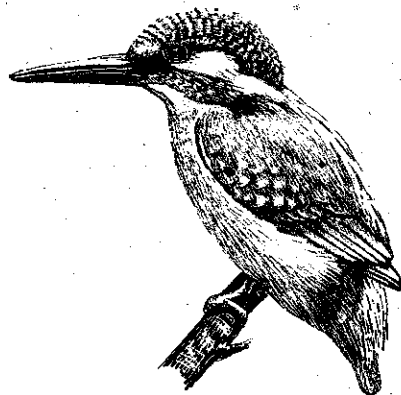


Table 37. COOT: WINTER MAXIMA AT MAIN RESORTS

	1987/88	88/89	89/90	90/91	91/92	(Mth)	Average
Abberton Rsr	10,274	12,510	16,790	9,252	7,817	(Sep)	11,329
Lo. Neagh/Beg	5,008	4,821	7,696	6,685	7,097	(Oct)	6,261
Rutland Water	3,062	4,160	5,502	3,743	3,639	(Nov)	4,021
Cotswold WP West	2,731	3,033	2,924	3,608	3,068	(Oct)	3,073
Hanningfield Rsr	1,450	1,983	4,350	3,668	2,870	(Oct)	2,864
Cotswold WP East	2,112	1,680	1,760	2,396	2,645	(Dec)	2,119
Ouse Washes	3,005	1,537	2,345	x	1,940	(Feb)	2,027
The Fleet/Wey	2,169	(1,750)	1,561	2,647	3,489	(Dec)	1,973
Lo. Leven	1,150	2,270	1,630	1,515	1,250	(Sep)	1,563
Kingsbury/Coton Pools	1,747	1,936	1,459	1,310	1,296	(Jan)	1,550
Stanford Rsr	400	1,750	2,115	1,118	1,800	(Nov)	1,437
Chew Valley Lake	1,180	1,055	1,290	1,070	1,945	(Aug)	1,308
Fen Drayton GP	1,021	1,112	2,090	950	1,300	(Dec)	1,295
R. Avon: Blashford	550	1,250	1,255	1,625	1,692	(Dec)	1,274
Cheddar Rsr	1,300	1,000	1,491	1,416	1,085	(Oct)	1,258
Chichester GP	1,210	1,011	1,118	1,099	1,584	(Dec)	1,204
Fairburn Ings	1,053	1,511	1,275	1,151	564	(Sep)	1,111
Little Paxton GP	750	855	1,136	900	1,548	(Dec)	1,039

Kingfisher *Alcedo atthis*

The distribution of the Kingfisher closely reflects that of slow flowing rivers, and is biased towards southern England (Taylor 1986c). Birds are often resident in the same territory throughout the year, except when forced to move during cold weather when ice prevents feeding. Kingfishers are particularly susceptible to cold winters and there have been dramatic declines in the population following the coldest winters in recent decades. A high proportion of birds is found in coastal areas where suitable feeding conditions persist in all but the coldest winters. Their territorial behaviour and habitat



preference mean that only small numbers were recorded by the NWC. There was a peak of 171 in September with a steady decline through mid-winter before rising again in March. Naturally, there were few multiple sightings, and only the following sites held more than three birds: Wraysbury Gravel Pits (8, November), Cheshunt Gravel Pits (5, March), Frensham Ponds (4, November), Kingsbury/Coton Pools (4, January), the River Avon: Fordingbridge (4, November) and the River Severn: Shrewsbury (4, November).

Rarities

A number of species that do not occur regularly in Britain and which are classified as rarities by the British Birds Rarities Committee (see e.g. Rogers and the Rarities Committee 1992) were recorded by the NWC and BoEE schemes in 1991-92. The authenticity of these records has not been checked, although it is believed that the duck species records are of genuine vagrants. The occurrence in the feral state in Britain of several species of geese that also occur as genuine vagrants means that these records are highly suspect.

Lesser White-fronted Goose *Anser erythropus*

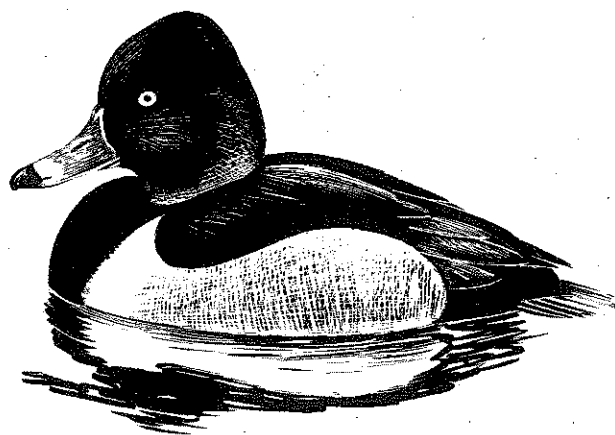
Morecambe Bay and Chew Valley both held one bird while two were recorded at Alton Water. A total of 29 was recorded during the 1991 summer survey (Delany 1992a), with a flock of 15 in Suffolk, two in Gloucestershire and one in Cumbria.

Red-breasted Goose *Branta ruficollis*

One bird over-wintered on the Solway Firth with the Barnacle Goose flock while another was recorded on the Wash in September. Only two birds were recorded in the 1991 summer survey (Delany 1992a), one of which was on the Wash.

American Wigeon *Anas americana*

One was recorded at Montrose Basin in November.



Ring-necked Duck *Aythya collaris*

Single birds overwintered at Drift Reservoir and Looe Pool. Single birds were recorded at Ranworth and Cockshoot Broads and Wayoh Reservoir in December, and at Holden Wood Reservoir in February.

King Eider *Somateria spectabilis*

Single birds were recorded at Loch Fleet in December and February, on the Tay Estuary in February and on the Forth Estuary in December.

Surf Scoter *Melanitta perspicillata*

This species was only recorded on the Forth Estuary, with two in February and March, and an amazing five in April.