Fifty years of wildfowl ringing by The Wildfowl & Wetlands Trust

CARL MITCHELL and MALCOLM OGILVIE

When the British section of the International Council for Bird Preservation (ICBP) set up their Wildfowl Inquiry in the late 1930s, their over-riding objective was clear; to establish the reasons for perceived declines in wildfowl numbers. They stimulated the capture and ringing of ducks to answer one simple question; where do our wintering stocks come from? By 1937, responsibility for the ringing scheme had been transferred to the British Trust for Ornithology (BTO) and all subsequent rings bore the address of the British Museum (Natural History). The Wildfowl & Wetlands Trust (WWT) was making a substantial contribution to the ringing effort soon after its establishment in 1946 and, in 1954, responsibility for wildfowl ringing was transferred from the Wildfowl Inquiry Committee to WWT. Peter Scott had realised that, at the outset, it was vital to discover the origins and migration routes of all wildfowl species wintering in Britain and, at the same time, to build up a nationwide team of counters who could simultaneously record wildfowl numbers. Early examination of the ringing and recovery datasets by Hugh Boyd and others, generated mostly by WWT's ringing activities, became the foundation of what was known about flyways and survival of British wintering wildfowl.

Apart from the Mute Swan *Cygnus olor* and Canada Goose *Branta canadensis*, both the subject of several local population studies, and some seaduck species, WWT has been responsible for the vast majority of ducks, geese and swans ringed in Britain (**Table 1**). Expeditions to the Arctic and high-latitude breeding grounds of Barnacle Geese *Branta leucopsis*, Pink-footed Geese *Anser brachyrhynchus* and Whooper Swans *Cygnus cygnus* have added considerably to the total ringed. Most ringed ducks have been marked at WWT trapping stations, although a few species have been the subject of special studies elsewhere; for example, Eiders *Somateria mollissma* and many of the Shelduck *Tadorna tadorna* have been marked in connection with population studies by Aberdeen University on the Ythan Estuary, and Goosanders *Mergus merganser* have been caught largely by a ringing group in Northumberland. The majority of birds have been ringed in the last three decades, as a result of new trapping stations coming into operation and new methods of catching that yielded greater numbers. This is certainly true for inland diving ducks and swans.

The individual marking of wildfowl with engraved plastic leg rings bearing codes which are legible in the field was developed by WWT in the late 1960s (Ogilvie 1972). Their use has revolutionised the world of ringing and provides substantial amounts of information on individual birds without the need to catch them again. Individual marking allows great insights into site loyalty and turnover, family relationships, breeding success and longevity, and has provided the basis for long-term life-history studies on Barnacle Geese,

Table 1. The proportion of wildfowl ringed in Britain and Ireland by WWT

Species	Total ringed[1]	All WWT ringing[2]
Mute Swan *Cygnus olor*	69685	8% *
Bewick's Swan *C.columbianus bewickii*	2075	100%
Whooper Swan *C.cygnus*	931	100%
Pink-footed Goose *Anser brachyrhynchus*	13625	99%
White-fronted Goose[3] *A.albifrons*	1983	34% *
Greylag Goose *A.anser*	5460	55% *
Canada Goose *Branta canadensis*	51146	6% *
Barnacle Goose *B.leucopsis*	3782	81% *
Brent Goose[4] *B.bernicla*	694	38%
Egyptian Goose *Alopochen aegyptiacus*	69	2%
Shelduck *Tadorna tadorna*	7478	19% *
Mandarin *Aix galericulata*	1222	5%
Wigeon *Anas penelope*	14888	63% *
Gadwall *A.strepera*	4713	85%
Teal *A.crecca*	79335	77%
Mallard *A.platyrhynchos*	156321	80%
Pintail *A.acuta*	6248	84%
Garganey *A.querquedula*	468	94%
Shoveler *A.clypeata*	2670	83%
Pochard *Aythya ferina*	10927	90%
Tufted Duck *A.fuligula*	27980	74%
Scaup *A.marila*	196	43%
Eider *Somateria mollissima*	20247	1% *
Goldeneye *Bucephala clangula*	222	24%
Red-breasted Merganser *Mergus serrator*	188	4%
Goosander *M.merganser*	1177	4% *
Ruddy Duck *Oxyura jamaicensis*	195	93%
Grand Total	**483,925**	

Notes:

1. Ringing totals taken from: Clark *et al.* (1996)
2. WWT ringing totals (all WWT projects). Totals to the end of 1981 taken from Owen *et al.* (1986) (**Table 1**, page 8). Annual totals up to 1993 taken from ringing totals given in WILDFOWL. * - includes a small number of birds ringed since 1986 which have been caught on behalf of WWT by other ringing groups.
3. WWT has marked 95% of the 612 *Anser a.albifrons* caught in Britain.
4. In addition, WWT caught 968 Brent Geese but marked them with plastic leg rings only (i.e. BTO rings were not used). These are not included in the totals here.

Bewick's Swans *Cygnus columbianus bewickii* and, more recently, Whooper Swans, Pink-footed, Greylag *Anser anser* and Greenland White-fronted Geese *Anser albifrons flavirostris*.

Catching and ringing of wildfowl provides the opportunity for other data to be collected. The age and sex composition of the sample can be determined, and it is usual for the caught birds to be weighed and measured before release. Body weight is a useful measure, especially for energetic studies, and to some extent for taxonomic purposes. Body measurements are useful as indicators of size in studies of body condition. The standard measurements are wing (length of flattened chord), the length of the head including the bill, and tarsus (the length of the tarso-metatarsal bone).

Duck ringing

Most ducks ringed in Britain have been caught in decoys that were constructed to catch birds for the market. Peter Scott refurbished the Berkeley New Decoy at Slimbridge, Gloucestershire in 1946; this four pipe decoy was originally completed in 1843 (Scott 1949) and had been used commercially until 1929 but, although partly reconditioned in 1937, was little used until WWT's establishment in 1946. It is still run today by a volunteer decoyman (Richard Chappell) using a traditional piper dog. The decoy at Borough Fen in Northamptonshire, operating since 1640, is the most ancient decoy still in continuous use in Britain. WWT operated the decoy from 1950, employing a full time decoyman (Tony Cook) until 1978. The site was designated by the Department of the Environment as an Ancient Monument in 1976 and, by arrangement with the owners, continues to be maintained by WWT and used for ringing on a small scale. The decoy at Nacton, Suffolk was acquired by WWT in 1968 and was the last decoy to be used commercially in Britain. Ringing the ducks (rather than killing them) had begun a year earlier. Well over a quarter of a million ducks have been caught at Nacton since 1895 and over 15,000 ringed. The total catch of 9,303 in 1925-26 is the highest authenticated annual total for any British decoy (Matthews 1969). WWT was also closely involved in the operation of decoys at Abbotsbury in Dorset, Dersingham in Norfolk and Orielton in Dyfed (see Kear 1990 for a review).

Over the last 30 years, the duck trapping effort has shifted gradually from decoys to cage traps. No fewer than 4,000 ducks were caught annually in decoys during the 1960s, with a peak of nearly 11,000 in 1967. The proportion of the total caught has declined from about two-thirds in the 1960s to about 10% recently, in spite of the fact that as many decoys are still operating as at any time in the last 50 years. Decoys were successful because they were quiet havens for resting birds amid heavily disturbed areas. With disturbance now reduced in many places, and with new safe roosts being provided in the form of gravel pit nature reserves and reservoirs, the importance of decoys has diminished.

At Abberton Reservoir, Essex, Major General C.B.Wainwright designed traps and established a small ringing station in 1949. The 4 m square traps were so successful that, within a few years, more than 1,000 ducks were being caught annually, most of which were Teal *Anas crecca*. WWT became involved with the ringing there in 1954 and a full time Ringing Officer (Roy King), who had assisted the Major General since 1952, was appointed in 1967 after Wainwright's death. Catching continued and the station remained the most effective of the catching stations into the early 1980s. A large cage trap built by Arnold Zwetsloot in a gravel pit at Blunham, Bedfordshire has made a substantial contribution to the numbers ringed since it began operation in 1979. Up to 1993, 21% of the Tufted Ducks *Aythya fuligula* and 40% of the Pochard *Aythya ferina* caught in Britain were trapped at Blunham.

Cage traps were (or are) also operated by, or in collaboration with, WWT at Newburgh (Aberdeenshire), Derwent Ings (Yorkshire), Icklesham (Sussex), Mahee Island (County Down), Pensthorpe (Norfolk) and Loch Eye (Inverness-shire).

The increasing use of cage traps has the advantage that they can be sited in a variety of places and a much wider diversity of ducks, especially diving ducks, can be caught.

WWT has been involved also in the catching of breeding ducks. A five year study of ducks nesting at Loch Leven, Kinross, began in 1966 and this included catching incubating females using a hand net as well as cage trapping. A total of 1,919 ducks was caught, about half of which were Mallard *Anas platyrhynchos* and most of the remainder Tufted Ducks with a few Gadwall *A. strepera*, Wigeon *A. penelope* and Shoveler *A. cypeata*. In recent years, small numbers of breeding and young Wigeon have been caught in Aberdeenshire and ducklings of several species have been caught in Yorkshire.

The 'swan pipes' developed at WWT Centres (see *Swan ringing* below) have incidently caught ducks, sometimes in great numbers. Examination of WWT ringing totals published annually in *Wildfowl* reveals the diverse range of ducks caught at Slimbridge; for example, good numbers of Gadwall, Shoveler and Pintail *A. acuta* are usually caught amongst the intended Bewick's Swans. On occasions, over 400 Pochard have also been caught during swan catches. The very first swan catch in the Martin Mere swan pipe in 1990 produced 78 Bewick's Swans, one Whooper Swan and over 1,000 Mallard; the largest single wildfowl catch recorded in Britain.

A recent development has been the use of small 'Teal traps' at Slimbridge and other sites. These are scaled-down replicas of a 'Wainwright trap', but only 2 m by 1 m in size. Despite their small size, careful siting and baiting proves irresistible to Teal, and over 500 have been trapped in a single autumn.

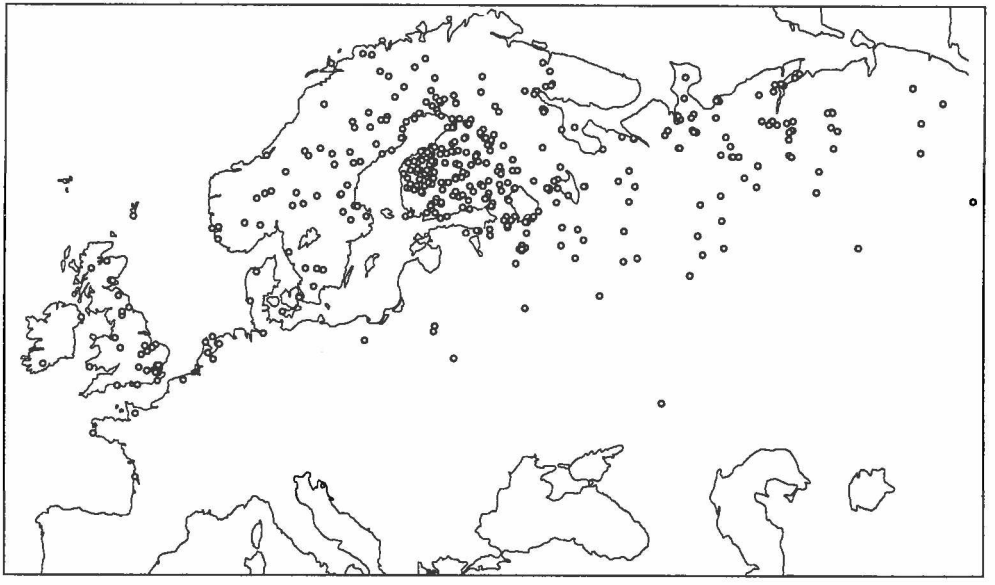
Wigeon were formerly caught in decoys and in cage traps, although few were being ringed with any regularity in the early 1980s. A WWT project established in 1987, looking at the within-winter movements of this migratory duck, involved the use of cannon-nets (see *Goose ringing* below) fired over grazing flocks. During six winters, over 4,500 Wigeon were caught, increasing the total ringed in Britain by one third.

Goose ringing

In early attempts at goose catching before the Second World War, Peter Scott had used clap nets, but had not had much success until he pioneered the use of rocket propelled nets in the early 1950s. These were developed in co-operation with the Schermuly brothers who invented the Schermuly Pistol Rocket Apparatus for saving life at sea. The first rocket net catch of geese was made in the 100 acre field at the New Grounds, Slimbridge in January 1948. Thirty White-fronted Geese and one Pink-footed Goose were caught. In later developments, with the help of the Army at Shrivenham, cordite rockets were used to carry nets that covered half an acre, and more than 500 geese were once captured at a single firing. Pink-footed Geese were the major study species in the early years and more than 10,000 individuals were caught with rocket nets in England and Scotland during the late 1950s and early 1960s. Greylags, White-fronted Geese, Barnacle and Brent Geese *Branta bernicla* have also been caught by this method.

In 1951, WWT organised its first expedition to the Icelandic breeding grounds of the Pink-footed Goose, in order to round them up during the summer flightless period. Over 1,000 Pink-footed Geese were caught and, in 1953, no fewer than 9,000 geese were ringed, the majority in ten days of catching. Altogether, during the intensive study, 25,000 Pink-footed Geese were ringed and our knowledge of the migration and population dynamics of the species was greatly advanced. Since the 1960s, the Barnacle Goose has been studied intensively. Catching expeditions in Svalbard have yielded catches of 1,241 in 1977, 881 in 1981, over 2,000 in 1986 and, most recently, over 1,000 in 1995. This population spends the winter at WWT's Caerlaverock Reserve on the Solway Firth, and maintaining a large proportion of individually ringed birds, sometimes in excess of 30%, in this distinct group of Barnacle Geese has been of vital importance to the research objectives.

Figure 1. Recoveries in May and June (when on the breeding area) of Teal *Anas crecca*, ringed by WWT in Britain.



In 1959, Hugh Boyd took the WWT rocket nets to the Wash to catch waders. An exploratory catch was made at Terrington, in late August, and showed that, under special circumstances, large numbers of waders could be caught. In the same areas in August 1960, seven catches resulted in 2,893 waders being marked. The catches were undertaken at the request of, and with the active assistance of The Wash Wader Ringing Group (WWRG) organised by Clive Minton. The WWRG developed the use of nets propelled by projectiles (cannon-nets) and, to date, over a quarter of a million waders have been newly-ringed on the Wash. The smaller cannon-nets were easier to site and handle and, eventually, replaced rocket nets; they are now used by WWT for catching geese and ducks.

Swan ringing

For catching swans, WWT developed special 'swan pipes' based on the principle of a decoy pipe which could be baited, with doors that could be closed with a rope or a drop gate. During the summer moult, flightless swans have also been rounded-up, often in large numbers. The Mute Swan, being easy to catch, has been extensively ringed. Most have been caught in baited traps, while being fed by hand, or in mass round-ups of moulting birds. At Loch Leven, over 200 were ringed in the late 1960s and early 1970s, and at Abbotsbury, Dorset, the largest swan catch in Britain (and probably also in the Northern Hemisphere) was made in 1980, when 831 flightless birds were caught. This last catch was part of a long-term population study undertaken by WWT in collaboration with the Edward Grey Institute at Oxford.

WWT has marked Bewick's Swans wintering at Slimbridge with plastic leg rings since 1967, Whooper Swans at Caerlaverock since 1980 (with 43 Bewick's Swans also caught and ringed in the early years), and both migratory swan species at Welney (since 1980) and Martin Mere (since 1990). The ringing of Bewick's Swans at Slimbridge and of Whooper Swans at Caerlaverock provides much baseline information for WWT's long-term studies; in particular, the ringing of cygnets at these sites enables us to study the swans' longevity, heritability of fitness

and lifetime pairing and breeding success.

The Slimbridge swan-pipe has been replaced recently, thanks to subscriptions from Swan Supporters and WWT Members; the Caerlaverock swan-pipe was severely damaged by a heavy snowfall during the 1995-96 winter and also needs to be replaced. The swan-pipe at Welney fell into disrepair in the late 1980s, and no swans have been caught at the site since 1992.

In 1988, WWT embarked on an ongoing study of Whooper Swan breeding biology, in collaboration with Icelandic colleagues, which involved catching and marking family parties and also birds in non-breeding flocks. Again, the emphasis was on marking breeding pairs and their cygnets in order to study site fidelity, natal dispersal, cygnet survival rates and recruitment to the breeding population. In 1991, WWT embarked on a study of Bewick's Swans nesting in arctic Russia to determine factors affecting the swans' breeding success.

Over the years, the swans' tail feathers have been dyed yellow with picric dye to increase visibility and thus the amount of information obtained from the ringing programmes; the colour draws the attention of ornithologists on the Continent to ringed birds, and more data about the Bewick's Swans' use of spring staging areas are collected.

Since 1994, ten satellite transmitters have been fitted to Whooper Swans caught at Caerlaverock or in Iceland to obtain more precise information on spring and autumn migrations, including the direction, timing and height of migration in relation to prevailing weather conditions. On several occasions the transmitters were retrieved upon recapturing the swans; only one transmitter has failed. Transmitters were also fitted to two Bewick's Swans caught at Slimbridge in 1996, mainly to determine the timing and frequency of staging during autumn migration, although information concerning spring migration and sites used in the breeding range would also be gathered. The satellite-tracking of migratory swans has been carried out in collaboration with Professor Colin Pennycuick of Bristol University.

The future

Some 50 years on, WWT is still ringing wildfowl, but the reaons for this have been augmented by new demands for information. It is easy to ask the question 'haven't we ringed enough?'. Certainly we have come a long way since questions were posed by the ICBP in the 1930s. The tremendous efforts of wildfowl ringers, their patience, skill and dedication, have revealed the major migration flyways of wildfowl wintering in Britain and Ireland. We now have a much better understanding of their patterns of movement (e.g. Fox & Mitchell 1988), breeding ranges (e.g. Boyd 1956; see also **Figure 1**), seasonal phenology (e.g. Owen & Mitchell 1988), movements in relation to adverse weather (e.g. Ridgill & Fox 1990), fidelity to key areas (e.g. Mitchell *et al.*1995), population dynamics (e.g. Boyd 1957), and changes in body condition through the winter season (e.g. Owen & Cook 1977). The identification of individually marked geese and swans by WWT has facilitated pioneering studies of behaviour and ecology, and in the case of the population study of Svalbard Barnacle Geese, has resulted in over 100 scientific papers and contributions to several books (e.g. Owen 1980).

Technological change has opened new avenues of research though the use of miniature radio and satellite tracking devices. It is now possible to track precisely individual Whooper and Bewick's Swans on their spring and autumn migrations with the observers having to do no more than collate data from a computer; soon it will be possible to use such devices on species no bigger than Teal.

Knowledge of the origins and movements of wildfowl (and any changes in these) is still essential if they are to be managed and conserved effectively. Marking with BTO rings alone is still vital to our understanding of migration patterns (e.g. cold-weather movements), within-winter movements and morphometric and other analyses (e.g. vulnerability to hunting). The recovery information from metal ringing is also fundamental to our understanding of

population dynamics. Wetlands International (formerly IWRB) now has count networks that span the Western Palaearctic, and can begin to define changes in overall populations of some waterfowl. We know that some species, such as Shoveler, may be declining at the flyway level, but others such as the Gadwall, are showing rapid increases and expanding their range. Are declining populations suffering higher mortality because of wetland loss or over-exploitation? Or are the declines due to reduced breeding performance? Ringing and recovery data can be used to address questions about changes in mortality. Using statistical models it is possible to estimate mortality from ringing returns and to question whether there have been changes over time. Such data on mortality rates, when used in conjunction with measures of breeding success (such as counting the proportion of young in goose flocks), are basic tools in explaining observed changes in population size.

The simple key to the successful application of the research outlined above is the ability to capture a bird safely and to release it after ringing, unharmed and unhindered by its experience. WWT pioneered most of the wildfowl catching techniques employed today and used traditional decoys to their full. The duck, goose and swan catchers have helped to provide a wealth of information about our wintering wildfowl and this has been converted into conservation action. The results from ringing wildfowl have been disseminated to the ornithological world through the publication of scientific papers and reports, and our ringing data have been used extensively in major publications such as the *Birds of the Western Palaearctic* (Cramp & Simmons 1977) and *Wildfowl in Great Britain* (Owen *et al.*1986). The techniques and skills of the wildfowl catcher are being passed on to others. Today, some of the ringing of wildfowl carried out in Britain is done in close collaboration with other ringing groups, and this will continue into the future. There is still much to be learned about wildfowl movements, and population dynamics, and WWT should perhaps extend its ringing effort to other waterbird species (e.g. seaducks). Once, Peter Scott sought, and gained, the support of volunteers to help catch Pink-footed Geese in northern Britain in the 1950s; today, WWT is still actively encouraging the efforts of volunteers and collaborators. There is still much to learn, and WWT is determined to contribute to the full.

References

Boyd, H. 1956. Summer recoveries of Wigeon, Pintail, Shoveler and Tufted Duck ringed in Britain. *Wildfowl Trust Ann. Rep.* 8;47-51.

Boyd, H. 1957. Mortality and kill amongst British-ringed Teal *Anas crecca. Ibis* 99:157-177.

Clark, J.A., Adams, S.Y., Peach, W.J. & Simons, J.R. 1996. Report on bird ringing in Britain and Ireland for 1994. *Ringing & Migration* 17:36-79.

Cramp, S. & Simmons, K.E.L. 1977. *Birds of the Western Palaearctic Vol. 1*, Oxford, the University Press.

Fox, A.D. & Mitchell, C. 1988. Migration and seasonal distribution of Gadwall from Britain and Ireland: a preliminary assessment. *Wildfowl* 39;145-152.

Kear, J. 1990. *Man and wildfowl*, T. & A.D.Poyser, London.

Matthews, J.V.T. 1969. Nacton Decoy and its catches. *Wildfowl* 20:131-137.

Mitchell, C., Owen, M. & Etheridge, B. 1995. *Within-winter movements, winter site fidelity and age ratios of Wigeon in Britain and Ireland.* Report to JNCC. WWT, Slimbridge. 60 pp.

Ogilvie, M.A. 1972. Large numbered leg bands for individual identification of swans. *J.Wild.Mngt.* 36:1261-1265.

Owen, M. 1980. *Wild Geese of the World.* Batsford, London.

Owen, M. & Cook, W.A. 1977. Variations in body weight, wing length and condition of Mallard *Anas platyrhynchos* and their relationship to environmental change. *J.Zool.Lond.* 183:377-395.

Owen, M. & Mitchell, C. 1988. Movements and migrations of Wigeon *Anas penelope* wintering in Britain and Ireland. *Bird Study* 35:47-59.

Owen, M., Atkinson-Willes, G.L, & Salmon, D.G. 1986. *Wildfowl in Great Britain*, 2nd edition, Cambridge.

Ridgill, S. & Fox, A.D. 1990. Cold weather movements of waterfowl in Western Europe. *IWRB Spec. Publ.* 13, Slimbridge, UK. 87 pp.

Scott, P. 1949. The decoy. *Severn Wildfowl Trust Ann. Rep.* 1:57-61.

Carl Mitchell, The Wildfowl & Wetlands Trust, Slimbridge, Glos, GL2 7BT, UK. **Malcolm Ogilvie,** Glencairn, Bruichladdich, Isle of Islay, Argyll, PA49 7UN, UK.