Wigeon *Anas penelope* movements and turnover: a report on the first two seasons of a Wildfowl and Wetlands Trust Project

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The Wigeon *Anas penelope* is a grazing duck which used to winter almost entirely on estuaries in Britain, feeding on *Zostera* and algae on mudflats and grazing saltmarsh grasses (Atkinson-Willes 1963). The species has, in recent decades, changed its distribution both by moving increasingly inland to feed (Owen & Williams 1976) and by shifting from unprotected areas to reserves (Owen & Salmon 1985). The number of Wigeon wintering in Britain has not shown a substantial trend in either direction since 1960, though a number of cold winters in the last decade has resulted in temporary influxes (Owen *et al.* 1986 and Fig. 1) and the total for northwest Europe has also been relatively stable since 1967 (Monval & Pirot 1989). Britain, at peak, holds more than a quarter of the northwest European stock, estimated at about 750,000 (Monval & Pirot 1989). Changes in the fortunes of the species in Britain, therefore, may have an important effect on the total population.

Owen & Mitchell (1988) detailed the breeding range and migratory flyways of Wigeon wintering in Britain and Ireland based on ringing recoveries. The breeding range includes Iceland, Fennoscandia through northern USSR to about 90°E, with a marked concentration between 50°E and 70°E. Most recoveries of Wigeon ringed in Iceland were from northern Scottish and some Irish counties, whilst most British recoveries from ringing in northwest Europe and western USSR were in southern and eastern counties and some southern Irish counties. A 'roundabout' migration pattern was suggested for continental/USSR breeders - the spring route being further south than the return autumnal passage.

Recoveries within a winter of Wigeon ringed in Britain, received prior to January 1986, show a marked westwards and northwestward movement, particularly to Ireland, from the principal ringing stations in Norfolk, Suffolk and Essex.

Peak counts of wintering Wigeon occurred in autumn in northern British counties and in late winter in eastern British counties. The Wigeon of southern England in autumn include those *en route* to Ireland. Many die during the shooting season and are supplemented by arrivals of ducks wintering in northwest continental Europe, particularly at times of cold weather. The northerly group, consisting predominantly of Icelandic stock, pass through Scotland in the autumn to winter further south and southwest, but are not substantially replaced.

The Wigeon is an important quarry of wildfowlers. It is the third most important wildfowl species in the bag of British shooters; in the early eighties the total shot was around 120,000 annually (Harradine 1985). Distribution changes, especially when they involve movements from shooting areas to reserves, greatly affect hunting opportunities.

In recent years there have been considerable local shifts in the numbers of Wigeon within Britain, particularly involving major sites in the north of England. The peak counts of Wigeon in four of these sites for the 1980s are given in Figure 2.

Clearly substantial changes have occurred, but those on adjacent sites seem not to have been well correlated. The most striking changes, and those that have caused most interest among wildfowlers and conservationists, are the decline in peak numbers at Lindisfarne and the increase on the Ribble Estuary. The variations at the two sites are, however, not closely related and a much more detailed examination is required before any conclusions can be reached as to whether or not the changes in the east and west are linked.

The effective conservation and management of Wigeon in Britain and Ireland depends on a knowlege not only of numbers and distribution at a particular time but also of their movements and turnover within a winter, and of the rela-

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tionship between populations in different places. With the aim of furthering our understanding of any factors influencing the numbers and distribution of Wigeon, objectives were set for the present study:

1) Increased ringing of Wigeon at a number of localities in Britain and Ireland, particularly where ringing had previously been absent (e.g. northern Scotland), involving a colour-ringing and dye-marking scheme that allowed an examination of winter movements of individuals.
2) A detailed look at the numbers and sex ratio of Wigeon at all major sites over a complete winter.

Methods

Cannon-nets were used to catch grazing and loafing Wigeon. Previous catches of Wigeon have primarily involved large, open walk-in duck traps. Once caught, detailed biometric measurements were taken - these data will be used for a long-term project looking at body condition and survival - a metal British Trust for Ornithology (BTO) ring was fitted to one leg, and up to two coloured plastic rings, some of which were numbered, put on one or both legs. A bright yellow dye was applied to either the belly feathers or forewing (of adult males) based on a regional regime. Once the dye had dried, all birds were released, usually in small parties.

A request for sightings of dyed and colour-ringed Wigeon was sent to reserve wardens, wildfowl counters, wildfowlers through the 'Shooting Times' and casual birdwatchers through popular natural history magazines.

Forms requesting age counts of Wigeon on National Wildfowl Count days (one in every winter month, September-March) were sent in autumn 1988 to the 40 sites with highest Wigeon numbers.

Results

A total of 969 Wigeon was caught in eight counties (average catch = 45) across Britain during the two winters 1987-88 and 1988-89 (Fig. 3), increasing the ringed sample in Great Britain and Ireland by 10.2%.

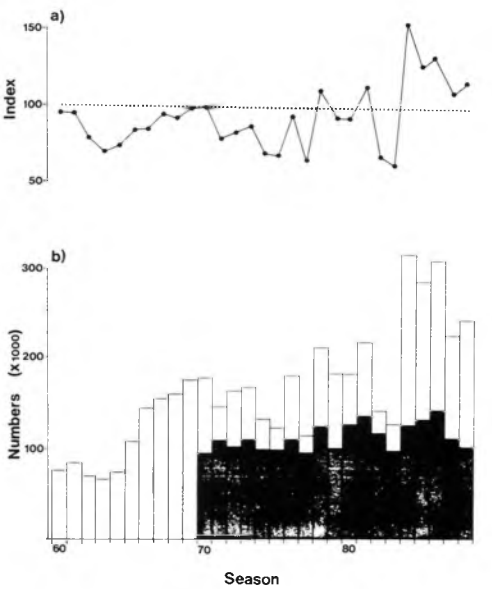

Figure 1. (a) January trend and (b) total January count for Wigeon in Britain 1960-61 to 1988-89. The method used to compute the yearly indices has been described by Owen et al. (1986); 68 sites (Shaded Columns) have been counted each year since 1970.

To date, 21 recoveries of marked Wigeon have been reported, representing 2.2% of the marked total, a figure lower than was expected. Owen *et al.* (1986) calculated a Wigeon recovery rate of 17.2% based on all ringing recoveries received to date and Boyd (1962) reported a survival rate of 53% per annum. Ringing during the first two winters took place between 11 November 1987 and 26 March 1989 and recov-

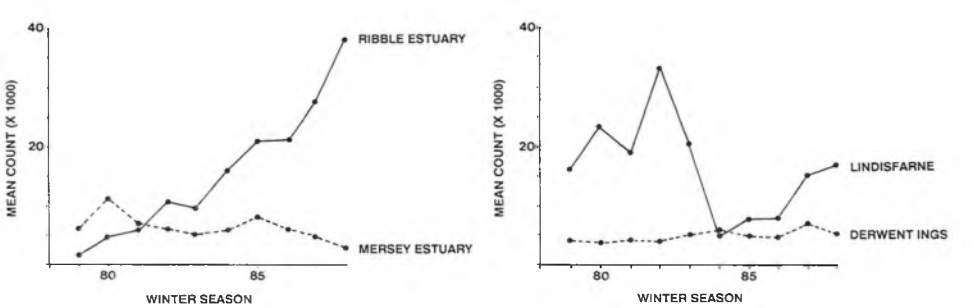

Figure 2. The peak count of Wigeon in each season from two western and two eastern sites in the north of England, 1979-80 to 1988-89.

eries have been received to 31 October 1989. During the 18-month period, the expected recovery rate would be 5.3% (51 recoveries) if those ringed in the current study were to follow an average pattern. The mild winters in 1987-88 and 1988-89 may have had a significant effect on distribution of Wigeon and their consequent exposure to hunting pressures but it is also likely that early estimates of mortality were too high. Seventeen recoveries were of shot birds, the others include one taken by a mink *Mustela vison*, one unknown cause, one road casualty and the remains of one Wigeon were found in the nest of a Gyrfalcon *Falco rusticolus* in Iceland. The sites of recovery are shown in Figure 3. Three recoveries were within-winter movements (all ringed near Inverness) and a further four were local (<20 km) within a winter. Four were shot in the same locality during the following winter, indicating a degree of site-faithfulness to winter quarters in successive years. The remainder were of movements away from the ringing site in following years.

There have been 15 live sightings of marked Wigeon away from the original ringing place, mainly by birdwatchers and all within the winter of ringing (Fig. 4). Four birds with dyed forewings were seen in Denmark at two nature reserves and another in northern Holland, all in early spring and presumably on migration to breeding grounds. There have been many observations of marked birds at the ringing site later in the same winter and during the following winter. Again, this indicates that some birds are faithful to certain quarters for at least part of the winter. Most of the within-winter movements are reports of dye-marked birds. Wigeon have quite small tarsi and seeing coloured rings, in long grass for example, can be difficult and is impossible in flight. Sightings are, however, particularly rewarding since they shed light onto the movements of individuals without the need for recapture. The dye will only last until the bird undertakes a complete body feather moult during the summer after capture.

Monthly age counts forms were returned from 11 of the 40 sites but did not provide enough data for analysis of age structure of flocks throughout the winter months.

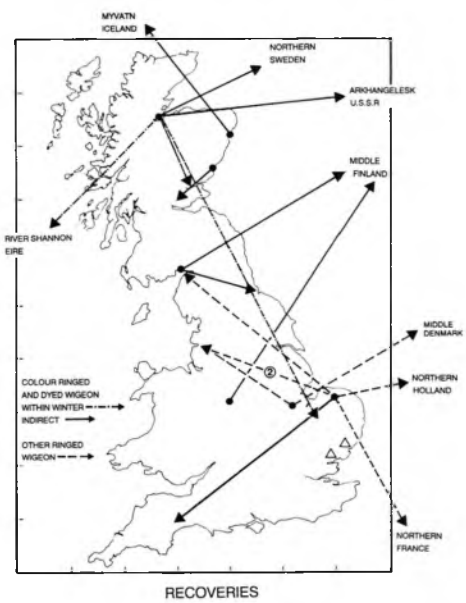

Figure 3. Ringing location of colour-ringed and dyed Wigeon in winters 1987-88 and 1988-89 and recoveries of marked birds. (● new ringing sites, Δ traditional Wigeon catching sites; Nacton, Suffolk and Abberton, Essex). All recoveries are of shot birds, eight of which were local (<20 km) and are not shown. Eleven other recoveries have been notified of birds that have been ringed after September 1987 (but had not been colour-ringed or dyed). Four were local movements, the others are shown using broken lines.

Discussion

Both winters of the study have been comparatively mild compared to the harsh conditions of the winters of the mid-1980s and it is expected that movements of dyed birds would not reflect the extreme movements associated with cold weather.

Patterns of movement of our wintering Wigeon are beginning to emerge from areas previously under-ringed. Certainly some of the Wigeon caught near Inverness, Highland Region, in autumn, move south and west later in the same winter, thus re-enforcing the trend suggested earlier. The idea that the Wigeon wintering in Scotland are of primarily Icelandic stock, however, is not supported by recoveries and sightings, since eight of 20 sightings and recoveries are from continental Europe. It may be that Scotland is a mixing ground for both populations much in the same way that Ireland is. Of interest too are the 'within refuge' movements shown in Figure 4 (e.g. Loch Leven NNR, Tayside to Martin Mere WWT Centre, Lancashire) which demonstrate the importance of protected areas to Wigeon. It is surprising that there is little evidence of movement to Ireland; this may occur more readily at times of extreme cold.

An interesting pattern of site-faithfulness is also apparent from winter recoveries and sightings. A breakdown of the national recov-

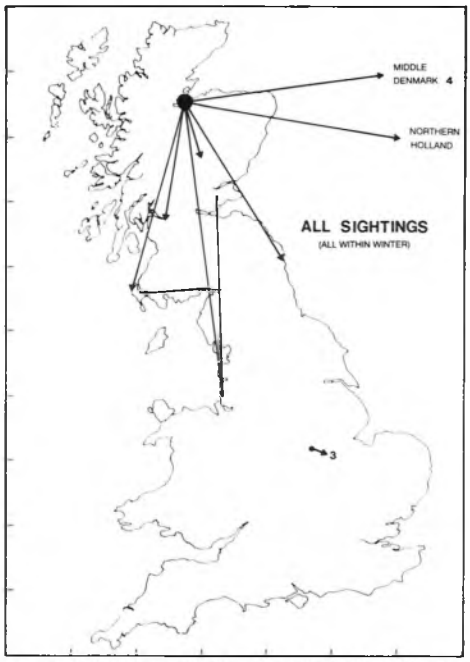

Figure 4. Sightings of colour-ringed and dyed Wigeon (all within winter).

ery sample showed that 47% of juveniles and 58% of adults (sample size 176) were recovered less than 50 km from the original ringing site in subsequent winters (November to January). Colour-ringed birds from this study have been seen at all original ringing sites in subsequent winters. Of 43 Wigeon ringed and dyed at Caerlaverock, Dumfries and Galloway, in February 1988, eight were recaptured at the same site in November 1989 still bearing their colour rings. This leads to two suggestions. First, Wigeon have been shown to be highly mobile within a winter, often travelling considerable distances within Britain and Ireland, but they also show a degree of winter site-faithfulness. It is possible that Wigeon have an ultimate winter destination but flocks move between several refuges along the way. The capture sites of this study probably reflect 'staging' areas, for example the environs of Inverness, and 'destination' areas, for example Caerlaverock. A refuge may be important for Wigeon simply because many pass through the refuge, staying for a short period that is governed by local weather, feeding conditions and disturbance. In mild winters, the Wigeon may not need to reach a final destination, particularly if staging feeding areas are ice-free. Quite often the turnover of birds at a refuge includes new arrivals, some from continental Europe, particularly in midwinter. The second suggestion, now the subject of a new study, is that if Wigeon do exhibit a degree of site-faithfulness, their chances of finding their mate of the previous breeding season is higher than if they moved randomly around the country. That a migratory dabbling duck can show a long-term pair bond has never been documented and has been thought unlikely (but see the following report on Mallard). By colour-marking individuals it is hoped to establish whether such pair reformation can occur and is common.

The questions that prompted this study remain unanswered; we have not yet established a clear link between the major sites where shifts in numbers have occurred in recent winters. One reason for this is that the recovery/sighting rate of marked birds has been very low, particularly from Ireland. The fact that both Icelandic and continental Wigeon pass through northern Britain *en route* to Ireland may mean that it is the Irish wintering birds that are short-stopping, particularly in the Ribble Estuary. Within Britain, there have been changes in the balance of protection of sites, and birds have moved increasingly onto reserves at the expense of unprotected areas (Owen & Salmon 1985). This may have caused a shift from Lindisfarne to the Ribble Estuary. Another intriguing aspect of the early results is the very low recovery rate, which suggests much higher survival than the estimate of Boyd (1962). Whether this is because of a shift to wintering on refuges remains a matter of speculation, as does the failure of the British population as a whole to increase despite an improvement in survival.

Further work is planned for the next two winters. Catching of Wigeon is already underway in Scotland and England (winter 1989-90) and it is hoped to encourage ringing in Ireland and Iceland too. Hopefully we will experience a 'normal' winter with associated cold snaps providing an opportunity to monitor movements. This may also increase the currently low rate of recovery. A more comprehensive attempt at gathering weekly age and sex ratio counts from principal Wigeon sites will be attempted in the winter of 1990-91.

The project so far has provided previously unknown information, added to our understanding of the pattern of winter movements, and perhaps will shed light onto the pairing and mixing of Wigeon populations in their winter quarters.

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