Winter distribution and habitat requirements of Wigeon in Britain

MYRFYN OWEN AND GWYN WILLIAMS

Introduction

Wigeon *Anas penelope* are traditionally coastal birds and are still largely found in brackish habitats in winter. At the turn of the century they were considered by most writers to feed almost exclusively on mudflats chiefly on *Zostera* (e.g. Millais 1902), while Berry (1939) concluded that although Wigeon were found inland it was in relatively small numbers. Glegg (1943) reviewed the literature on the food of Wigeon up to 1942 and found ample reports of the birds feeding on a wide variety of foods other than *Zostera*, albeit less frequently. He reported a decline of the species in the 1930's but concluded that this was not caused by the decrease in *Zostera* and that Wigeon were adaptable enough to survive the decline of their main food plant. Although Glegg probably overestimated the normal variety of Wigeon foods (see Olney 1965, Owen 1973), his predictions as to the future of the species have proved correct.

Although Wigeon numbers in Britain have not changed markedly in recent years, there has been some redistribution, chiefly involving increases in numbers inland and the colonization of new inland sites. With this redistribution has come some change in feeding habitats, to managed grasslands and in some areas to arable farmland.

Ecological studies of Wigeon are being carried out at several sites in Britain, covering a range of habitats from traditional mudflat feeding areas to exclusively inland habitats. In an attempt to assess the factors affecting winter distribution in Britain and the use of various habitat types by Wigeon, a questionnaire survey was carried out in 1974, based on the results of the National Wildfowl Counts. These have been carried out monthly between September and March by hundreds of expert amateurs since 1947 (see e.g. Atkinson-Willes 1970).

Materials and methods

A site qualified for inclusion in the survey if it had more than 200 Wigeon counted on it in at least two of the preceding 15 years. Thus sites which during this period had ceased to hold Wigeon, as well as new sites, could be included.

Two hundred and forty-two sites so qualified in England, Scotland and Wales but there was insufficient count data from 23 of these or from Ireland. The full analysis therefore covers 219 sites in Britain.

A questionnaire was sent to each counter who now covered a qualifying site, and, if a return was not received, to those covering nearby sites or to people who wrote in response to an appeal sent to all wildfowl counters in December 1974.

The information requested on the printed forms came under the following headings:

1. Site description
   (*a*) type of roost: lake; artificial water; sea; mudflats or estuary; inland floods or land.
   (*b*) size: less than 100 acres; 100–250 acres; 250–500 acres; 500–1000 acres; over 1,000 acres.
2. Feeding area description
   Mudflats; saltmarsh or salting pasture; inland flooded pasture; unflooded pasture; arable crops.
3. Feeding habits
   (*a*) distance flown to feed: feeding area on site; less than 2 miles; 2–5 miles; 5–10 miles; 10–20 miles; not known.
   (*b*) feeding time: by day; by night; both.
4. History and prospects
   Counters were asked to detail any changes in disturbance and other factors which had taken place in the last 5, 10, and 20 years, over the roost and/or feeding area; any future proposals or known threats.

It was suggested counters included information on the influence of nearby sites, time of year or weather on Wigeon numbers or habits.

Information on Wigeon numbers up to and including the 1973–1974 season was extracted from the files of the National Wildfowl Counts, which are housed at the Wildfowl Trust, or from counts made for the British Trust for Ornithology/Royal Society for the Protection of Birds/Wildfowl Trust Birds of Estuaries Enquiry (e.g. Prater 1975). Two basic figures were used—the maximum count in each season and the number of 'Wigeon days' spent at the site during the period September to March. The Wigeon days total was arrived at by multiplying the average of two successive counts by the number of days between them, e.g. 200 birds

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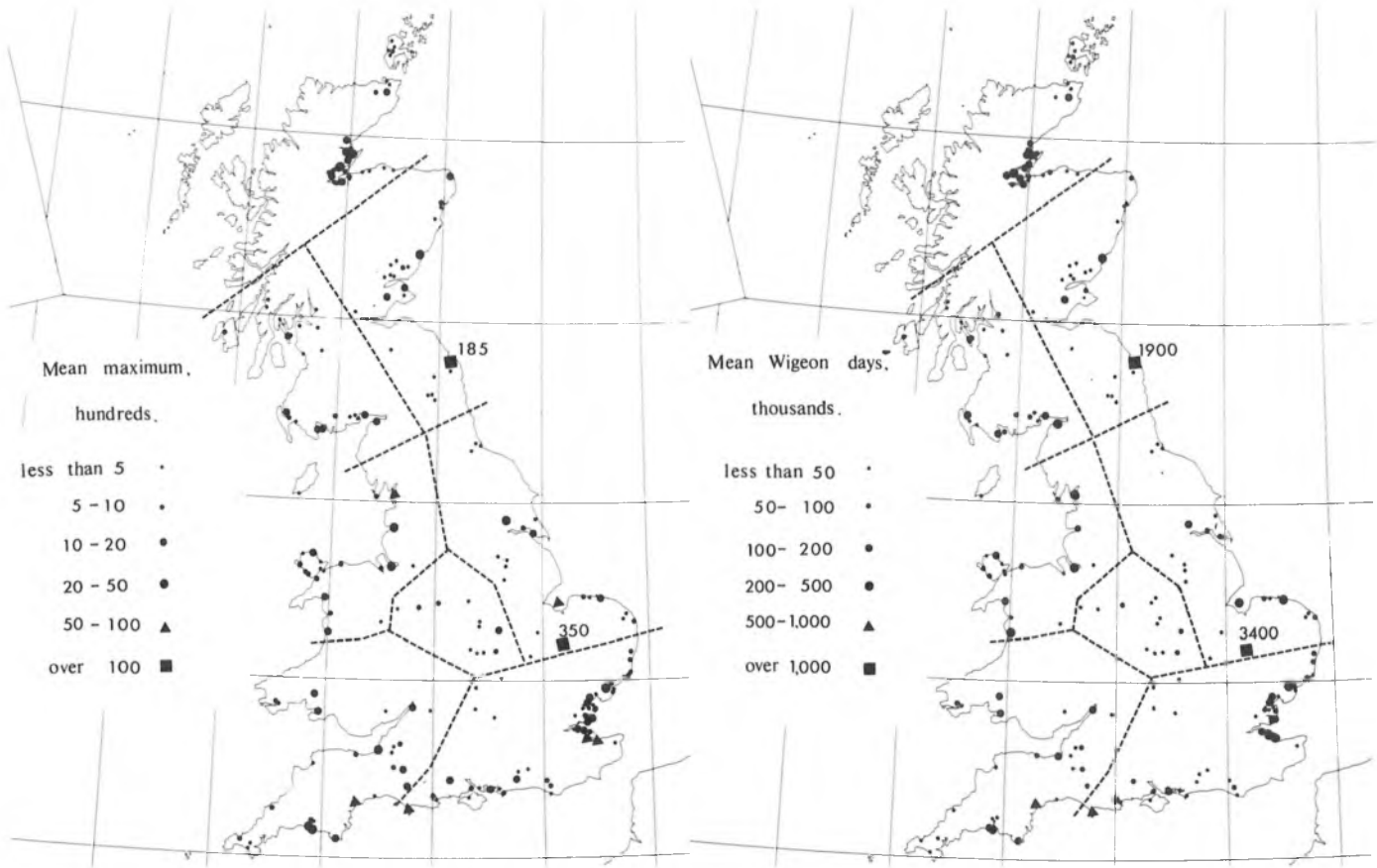

Figure 1. The distribution of Wigeon in Britain as illustrated by the mean maxima (a) **and Wigeon days** (b). For explanation of Wigeon days see text. The country is divided by dotted lines into 8 regions (see text and Table 1).

on the first count and 800 a month later gives 1000/2 × 30 days = 15,000 Wigeon days. This is only a rough approximation of usage but provides a better indication of the true value of a site than does the annual maximum count. The sites were categorized on the basis of the means of maximum counts and of Wigeon days over the last three, four or five seasons (as available).

Results

Wigeon numbers and distribution

The sites are depicted by the means of maximum counts and of Wigeon days in Figure 1 (a) and 1 (b) respectively. These confirm that Wigeon are a widespread, mainly coastal, species, with large concentrations in a few sites. The count coverage of north-west Scotland was not good and Wigeon are probably present in several sites there.

The two maps in Figure 1 are strikingly similar, so that maximum counts do in fact give a reasonable impression of the use of Britain by Wigeon. The average length of stay of winter immigrants to Britain is more than 100 days, and the Wigeon days totals are about a hundred times the maxima. There are some differences between the two maps however. For example the importance of individual sites in the estuarine complexes of Moray Basin and Essex/North Kent are less when considered on a Wigeon days basis. This is because birds move around within the complex, and maxima are therefore recorded at different sites in different months. The use made of different sites also varies. For example the Swale estuary in North Kent has a mean maximum of 5,450 birds and supports 300,000 Wigeon days, while the Exe estuary, Devon, with a mean maximum of 5,400 has more than double the usage—650,000 Wigeon days.

Wigeon wintering in Britain originate from Iceland, Scandinavia and the USSR. Icelandic birds largely arrive in Scotland and Ireland, while continental birds migrate through the Baltic and arrive in south-east England from Denmark or the Netherlands (Donker 1959). The populations mingle during the winter and many English sites probably hold both Icelandic and continental birds.

Figure 2 shows the timing of the maximum counts in different areas. The month in which the maximum was recorded most often was noted for each site. Where the predominant month was uncertain the site was omitted. Wigeon movements obviously depend on local conditions of food and weather, but a clear pattern is evident in Figure 2 with birds moving southwards from Scotland after the October peak there. The vast majority of sites in the south of England have peaks in December and January. The south of England receives birds from the north and the east, and some southern sites are rather variable in the timing of their maximum

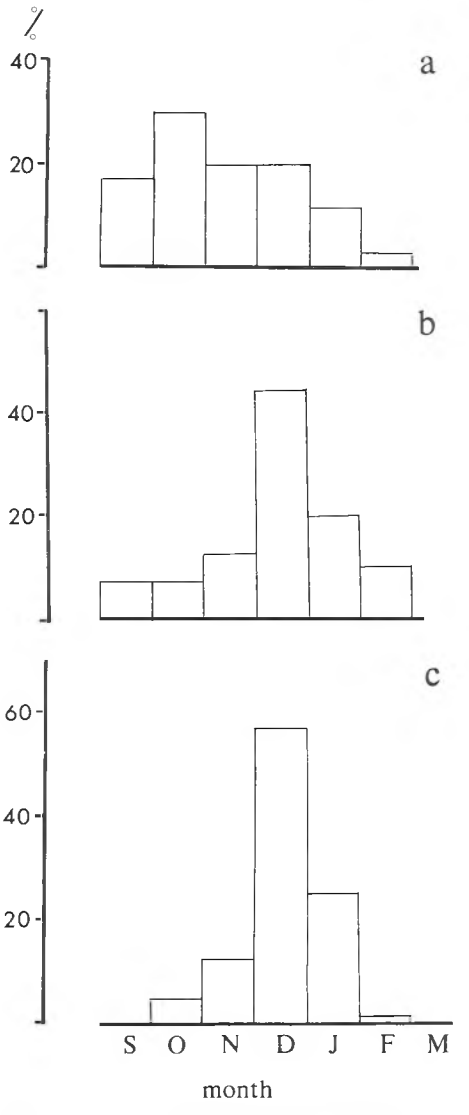

Figure 2. The percentage of sites with maxima in different months in three different areas of Britain: (a) Scotland and northern England (the 3 northern sectors in Figure 1); (b) Midlands (the 3 central sectors); and (c) South.

counts. Some estuaries in Essex often have early peak counts, probably of continental immigrants which later disperse westwards. There is also a clear tendency during the last five winters for maxima to be recorded later in the season, especially in northern areas. These winters have been exceptionally mild.

Since our survey includes only sites which occasionally hold more than 200 Wigeon, it does not cover all the birds wintering in Britain. However, a comparison of the total on the 1,500 sites in which wildfowl counts are made annually indicates that our sites hold more than 90% of counted Wigeon. The wildfowl counts themselves include the vast majority of British Wigeon haunts. Some (of the less important) sites had to be excluded from our survey because of lack of data, so it is probable that the survey includes more than three-quarters of the Wigeon wintering in Britain.

Questionnaire returns

The response to the questionnaire was excellent, 210 returns (87%) being received. The sites for which data were not received were mostly of minor importance, and all major haunts were included. Most counters filled in details of the roost and the feeding area and gave some historical information, dealing mainly with changes in shooting pressure or other disturbance. While the following analysis cannot be regarded as a complete dossier on Wigeon sites, it gives an indication of the conditions encountered by most of the birds wintering in Britain. Seventeen sites incompletely covered by counts had questionnaires returned. These are included in questionnaire analyses where appropriate.

1. *Site description*

The proportion of sites and of Wigeon usage in coastal and inland areas is shown in Table 1. Britain was divided into eight regions, mainly along natural barriers to the movement of birds, such as mountain ridges or tracts of unsuitable habitat, and the regional boundaries are shown in Figure 1. Although more than half the sites occur inland, four-fifths of Wigeon days are spent on the coast. This may reflect a preference for coastal feeding areas or roosts or, perhaps more likely, a shortage of suitable areas inland. The birds do quickly establish themselves on inland sites where conditions are suitable, as at the Ouse Washes in East Anglia, which now support 48% of the inland Wigeon days.

Forty-nine out of 110 inland sites (45%) are artificial in origin and 70% of inland Wigeon days are spent on these man-made habitats. This includes the East Anglian washes which were created some three centuries ago. (The Ouse Washes account for 69% of Wigeon days spent on artificial habitats.) Large reservoirs such as Abberton (Essex), Alaw (Gwynedd), and Eyebrook (Leicestershire), have also become important Wigeon sites. Together they support a total of 404,000 Wigeon days annually and each has a regular peak of more than 1,000 birds. Gravel pits do not have such extensive grassy margins as reservoirs and even large complexes hold rather few Wigeon. The most important are the Blashford Gravel Pits (Hampshire) which support 69,000 Wigeon days, although many of the birds may only be roosting there.

Large sites afford greater security from disturbance as well as more extensive feeding areas. The usage of sites in different size

Table 1. The number of sites in coastal and inland areas of each of eight regions (see Figure 1 for boundaries), **and their use by Wigeon.** Wigeon days in thousands.

	Coastal		Inland		Total		
	Sites	Wigeon days	Sites	Wigeon days	Sites	Wigeon days	%
Highlands and Islands	15	2,086	24	689	39	2,775	7·5
S.E. Scotland	9	2,525	20	389	29	2,914	7·9
S.W. Scotland	9	780	12	629	21	1,409	3·8
E. Midlands	6	972	14	3,773	20	4,745	12·8
W. Midlands	16	1,796	4	192	20	1,988	5·4
Central Midlands	0	0	11	384	11	384	1·0
South East	34	19,363	17	565	51	19,928	53·9
South West	16	2,355	12	459	28	2,814	7·6
Total	105	29,877	114	7,080	219	36,957	
%	48	80·8	52	19·2			

categories is shown in Table 2. Although 71% of Wigeon stay on the largest sites, small areas do hold substantial numbers. Many of the smaller sites are used exclusively as roosts for birds feeding on nearby pastures. In general, though, Wigeon gather on large sites, four of which support 17% of the total Wigeon days and 17 as much as 28%. Coastal sites tend to be large (71% were more than 500 acres (200 ha) in area) whereas inland ones are predominantly small (only 39% larger than 500 acres).

2. *The feeding area*

Wigeon are predominantly vegetarians, specializing on the leaves of aquatic plants and grasses. The amount of time spent on each of five different habitat types is shown in Table 3. In most areas more than one habitat was used and many counters gave an estimate of the proportion of time spent on each. If no estimate was given the Wigeon days were divided equally between the habitats listed. Most of the larger sites were well documented, so it is thought that Table 3 gives a reasonable assessment of habitat use.

Although 80% of Wigeon roost on the coast, only 54% of feeding takes place in brackish habitats. Increasing use is made of pastures behind the sea wall and of wet inland fields, as at Bridgwater Bay, Somerset (Owen 1973). Mudflats are still very important for Wigeon but many observers commented that the main food there had changed from eelgrass *Zostera* to the alga *Enteromorpha*. The use of arable land by Wigeon is a recent development, most of the feeding being on sprouting winter wheat in February and March. They also regularly accompany Mallard *Anas platyrhynchos* into corn stubbles, and occasionally harvested potato fields, where they feed on the waste tubers.

3. *Feeding habits*

Two-thirds of the sites included the roost and all the feeding area. Only 16% were exclusively used as roosts. There were no records of Wigeon flying more than 10 miles (16 km) between roost and feeding area and only five sites where flighting more than 5 miles (8 km) was regular. Wigeon feed both by day and night. On mudflats their feeding is controlled by the tide. Elsewhere they feed by day in undisturbed areas but where the feeding grounds are subject to daytime disturbance the birds spend the day on the roost.

4. *History and prospects*

Given suitable roosts and feeding areas, disturbance is the main factor controlling the use of a site by Wigeon. Table 4 gives a summary of the replies to the historical section. Information beyond five years ago was lacking. The number of sites where conditions have deteriorated or are under threat may seem alarming, but the proportion of birds involved is small. Six important sites are fully protected as National Nature Reserves, although only one was created specifically to safeguard the wintering wildfowl. These supported 7% of the Wigeon days. Twenty-four sites (including the N.N.R.s) which enjoyed some

Table 2. The number and proportion of Wigeon days spent on sites of different size. Wigeon days in thousands.

Area	Sites	Wigeon days	%	Days/ site	Mean max./ site
Less than 100 acres	40	993	4·9	25	375
100–250 acres	20	993	4·9	50	448
250–500 acres	33	2,301	11·4	70	952
500–1,000 acres	28	1,450	7·2	52	652
More than 1,000 acres	72	14,402	71·5	200	2,272

Table 3. The various habitats used for feeding, and the proportion of feeding time spent by Wigeon on each. Wigeon days in thousands.

Feeding area	No. of sites	Total Wigeon days	%
Mudflats	82	6,765	34·4
Saltmarsh, salting pasture	76	3,930	20·0
Inland flooded pasture	57	4,848	24·6
Unflooded pasture	77	3,286	16·7
Arable	20	849	4·3

degree of protection held nearly a fifth of the Wigeon in Britain. Nevertheless it is apparent that many more Wigeon sites are deteriorating than are created or improving and this trend is likely to continue.

Table 5 lists the influences which counters think have deleterious effects on Wigeon in their sites. All, apart from encroachment by cordgrass *Spartina*, are caused by man, and most by his recreational activities. Notable among industrial threats is the oil development in north-east Scotland and this already affects six sites in the Moray Basin.

The Ouse Washes, East Anglia, is now Britain's most outstanding Wigeon site, holding no fewer than 42,000 birds in February 1975. The increase in numbers and usage there in recent years is shown in Figure 3 and is largely due to protection of nearly half the area by three conservation organizations, the Wildfowl Trust, the Royal Society for the Protection of Birds and the Cambridgeshire and Isle of Ely Naturalists' Trust, and to improvements in the management of the grasslands for wildfowl. Most of the land was acquired between 1967 and 1970. The number of Wigeon days spent on the Washes increased from about 1 million in 1962–1968 to 4·5 million in 1973–1974.

Alaw Reservoir in Anglesey (Gwynedd) provides a good example of the colonization of a newly created roost. The reservoir was completed in 1965–1966 in an area which previously held few Wigeon. Parts of the reservoir were established as bird sanctuaries and there is no sailing or boating. Six hundred

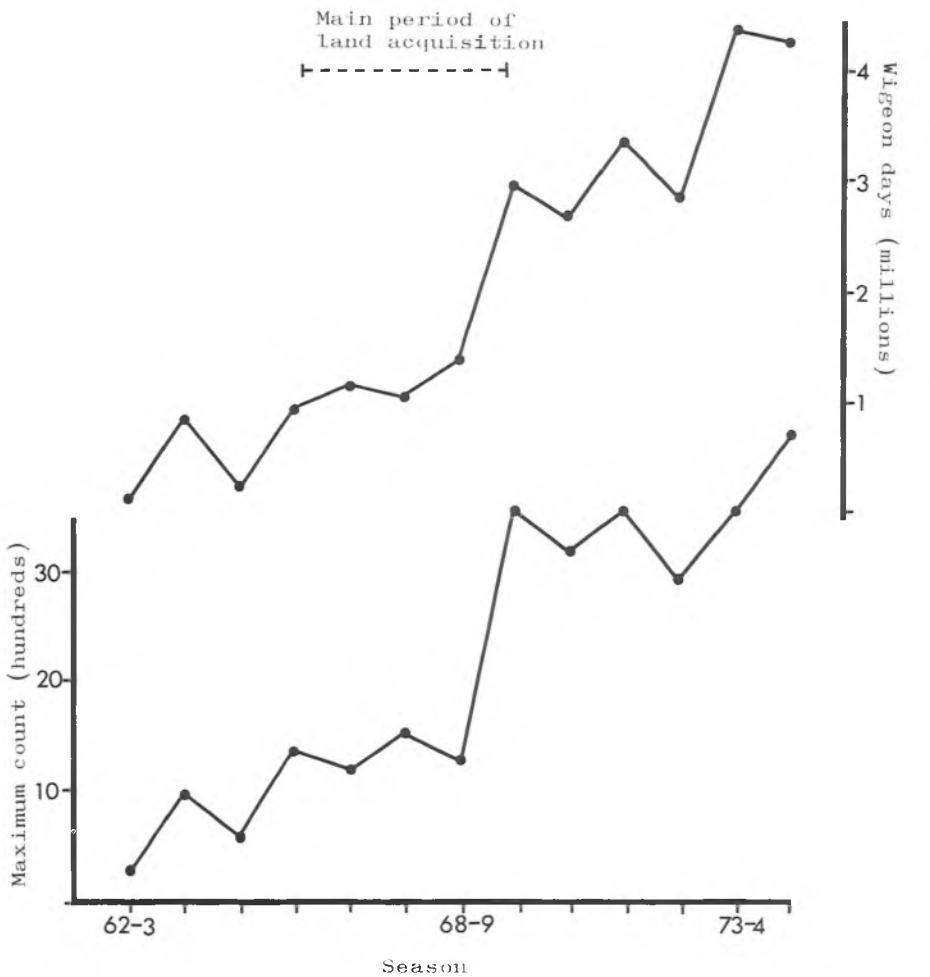

Figure 3. Changes in Wigeon maxima and usage of the Ouse Washes, East Anglia, before and after the acquisition and protection of large parts of the area by conservation organizations.

Table 4. The number of Wigeon sites where conditions of disturbance and other factors had changed in the last five years, and those where changes were envisaged in the future. The data cannot be summed because some sites where conditions were different on feeding areas and roost are included twice.

	Roost	Feeding area	Both	Total
Last 5 years				
Deteriorated	11	29	48	88
Improved	2	9	3	14
No change	34	6	90	130
Future				
Threats	12	20	52	84
Benefits	8	7	13	28
No change	7	1	86	94

Table 5. Factors which counters listed as being important threats to Wigeon on their sites. The table gives no indication of the relative importance of threats, only their incidence.

Recreation	Sites	Commercial/Development	Sites
Shooting	37	Industrial development	31
Boating, sailing	28	Drainage	20
Fishing	18	Reclamation	12
Bird watching	9	Military activities	4
Power boating/water skiing	6	Bird scaring	2
Pleasure flying	2		
Other recreational activities	13		

Other: *Spartina* encroachment on to mudflats—4.

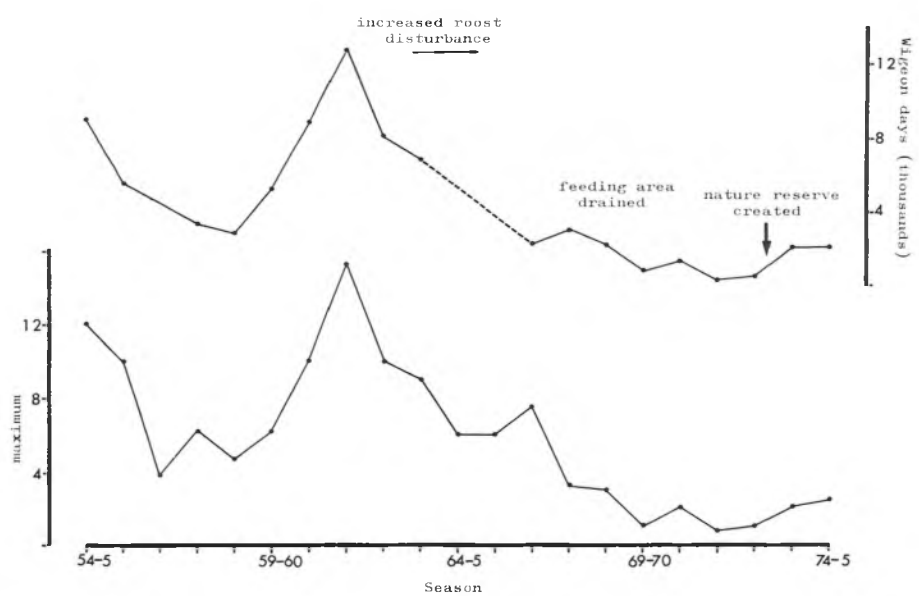

Figure 4. Changes in Wigeon use of Titchfield Haven, Hampshire and an indication of some of the factors responsible, 1954–1975.

Wigeon were present in January 1967 and the maximum increased to 1,650 in January 1973. The use of the site increased from 53,000 Wigeon days in 1966–1967 to 182,000 in 1973–1974 and the reservoir is now one of the eight best sites for Wigeon inland in Britain.

Increased roost disturbance and drainage of feeding areas have been responsible for the loss of a large amount of Wigeon habitat especially where floodwater was used as a roost. A well documented case is Titchfield Haven (Hampshire) for which data are presented in Figure 4. Increases in recreational use of the Solent in the early 1960s resulted in the abandonment of an estuarine roost, while the cutting of a new river channel in 1967 allowed the feeding area to be drained. Consequent disturbance and concurrent increase in recreational activities, particularly bird watching, in the area, accelerated the decline in Wigeon use. In 1972 the site was purchased by the Hampshire County Council, and was declared a Local Nature Reserve in 1973. The control of disturbance since has resulted in a partial recovery in Wigeon numbers. Proposed changes in management, including flooding of parts of the feeding area, will probably result in further improvements.

Discussion

Wigeon have a predominantly coastal distribution but this is probably due to a shortage of suitable areas inland rather than preference for estuarine habitats or foods. The British Wigeon population is at present in a healthy state but much of this is accounted for by an increase in a few sites such as the Ouse Washes, which holds 30,000 more Wigeon at peak than it did ten years ago. In most sites prospects are rather unfavourable, and oil development in the Moray Firth area poses a particular threat. The species has few competitors for food on inland wetlands and a continued increase on freshwater feeding grounds and colonization of new roosts should compensate losses of estuarine habitat to some extent.

Acknowledgements

This work would not have been possible without the co-operation of the Wildfowl counters, who not only provided the basic count data but also completed the questionnaires, sometimes in great detail. Mr B. S. Duffin is especially thanked for documenting the changes at Titchfield Haven. We also thank Mr G. L. Atkinson-Willes for making the wildfowl count data available, for advice on the questionnaire and for constructive criticism of a draft. Messrs. D. G. Salmon and M. Nugent helped in the analysis and in the preparation of the manuscript.

Summary

A questionnaire survey was carried out on sites which twice held 200 or more Wigeon *Anas penelope* in the last 15 years, and the numbers and distribution of the Wigeon in Britain were analysed.

Winter maximum counts and 'Wigeon days' are used to assess the importance of sites. Wigeon are predominantly coastal and concentrate on rather few, large sites. There is a north-south and east-west dispersal within Britain during winter.

Although 80% of Wigeon roost on the coast, only 54% of their feeding is done there. A third of the feeding time is on mudflats but inland pastures are now the most important Wigeon habitats. Wigeon feed both by day and night and generally feed close to the roosting site. Very seldom do they fly more than 5 miles (8 km) to feed.

Prospects for the future of many sites are bleak, threats coming from recreational use of waters and from industrial development on estuaries. The adaptability of Wigeon should enable the species to maintain its numbers by moving into newly created habitats and adopting new feeding grounds. Examples are given of the effects of changes in disturbance and habitat factors on Wigeon use of certain sites.

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Dr M. Owen and **G. M. Williams,** Wildfowl Trust, Slimbridge, Gloucester, GL2 7BT.