

Habitat usage of wintering ducks at the Ouse Washes, England

GARETH THOMAS

Introduction

The Ouse Washes is the largest area of neutral grassland in the East Anglian fens. They are c. 32 km long by c. 1 km at their widest point and consist of 1,914 ha of fields which are separated by 140 km of functional ditches. The land is enclosed by two boundary banks and there is a difference in elevation of about 1.2 m from one side of the Washes to the other. 1,100 ha (58%) of the Washes are owned by voluntary conservation bodies of which 490 ha (26%) are designated as wildfowl refuges.

Vegetation and land-use

The main function of the Washes is to hold excess flood water from the River Ouse, usually between December–March. In summer, the land dries out sufficiently for about 2,000 beef cattle, 500 sheep and 200 horses to be grazed on it. About 160 ha are mown for hay and subsequently grazed. Reed canary grass *Phalaris arundinacea* predominates over about 54% of the area: reed grass *Glyceria maxima* over 32% and tufted hair grass *Deschampia caespitosa* 19%. *Phalaris* and *Glyceria* swards are shorter and more discontinuous on the grazed and mown fields which have an average of 10 species of flowering plants/0.25 sq m. In such areas flote grass *Glyceria fluitans*, marsh foxtail *Alopecurus geniculatus* and common spike rush *Eleocharis palustris* are locally dominant in the wet areas whilst creeping bent *Agrostis stolonifera* forms continuous carpets in the drier parts. The highest sites, flooded for only short periods each winter, contain locally dominant stands of red fescue *Festuca*

rubra and meadow foxtail *Alopecurus pratensis*. In ungrazed and lightly grazed fields only about five plant species/0.25 sq m are recorded. Most of these areas are covered by continuous swards of *Phalaris arundinacea* or *Glyceria maxima* growing to a height of 1–1.5 m.

Historical background to increased duck usage

The 3,400 sq km of fens were substantially drained by the mid-19th century and wildfowl numbers declined greatly. Some small relic fens and washlands remained undrained until 1940–1960 and held wintering ducks. Since then, the Ouse Washes is the only large area virtually guaranteed to hold shallow winter floods. Also shooting disturbance has lessened, and wildfowling now takes place in defined areas and mainly on Saturdays. The Wildfowl Trust total refuge (287 ha) became operational in 1968–1969 and that of Royal Society for the Protection of Birds (203 ha) in 1969–1970 which guaranteed feeding and loafing sites. Average annual usage in bird days (September to April inclusive) is shown for three periods in Table 1. Most of the increases in usage took place in the 1960s with the large increase in Wigeon *Anas penelope* coinciding with the establishment of refuges.

Usage related to winter flooding

Table 2 gives the bird days, for duck, Coot *Fulica atra* and Moorhen *Gallinula chloropus* spent at the Ouse Washes from

Table 1. Duck usage of the Ouse Washes (average of annual bird days) for three periods 1951–1974.

Species	Period A	Period B		Period C	
	1951–52—1959–60 Bird days	1960–61—1968–69 Bird days	B/A %	1969–70—1973–74 Bird days	C/A %
Pintail	131,350	183,380	140	184,000	140
Teal	111,020	254,100	229	319,440	288
Mallard	206,550	410,020	199	675,480	318
Gadwall		4,320		5,930	137
Wigeon	767,440	1,088,340	142	3,990,000	520
Shoveler	17,640	57,170	324	59,600	338
Pochard	27,020	129,900	481	105,400	390
Tufted Duck	6,110	30,830	505	24,600	403
Total ducks	1,267,130	2,158,060	170	5,346,450	422

Table 2. Bird days at the Ouse Washes.

	1970-71 Winter floods	1972-73 No winter floods		1973-74 Winter floods	
	Bird days	Bird days	$\frac{1972-73}{1970-71} \%$		$\frac{1973-74}{1970-71} \%$
Pintail	216,320	59,020	27	261,720	121
Teal	483,300	189,970	39	351,690	73
Mallard	1,119,100	294,640	26	585,040	52
Gadwall	8,640	2,630	30	6,750	78
Wigeon	4,098,900	3,124,520	76	4,813,800	117
Shoveler	82,200	29,070	35	72,450	88
Pochard	183,410	6,500	4	24,300	13
Tufted Duck	26,410	17,550	67	26,080	99
Moorhen	73,510	45,470	62	53,090	72
Coot	327,120	80,280	25	142,930	44

September to April inclusive in the winter of 1970-1971 (typical flooding) and of 1972-1973 (no flooding). However about 65 ha of shallow pools were artificially maintained in the dry winter. The 6.62 million duck days spent under flooded conditions were reduced by almost a half to 3.85 million days during the dry winter. There were no prolonged cold spells in either season. Tufted Duck *Aythya fuligula* and Wigeon populations dropped the least, by 33% and 24% respectively. Tufted Ducks were able to find alternative feeding in rivers, ditches, permanent pools and local gravel pits, while Wigeon graze on dry land. Parties of birds commuted regularly to the permanent pools to drink. The populations of the other dabbling ducks fell from 61% for Teal *Anas crecca* to 74% for Mallard *Anas platyrhynchos*. Water is a necessary feeding medium for these birds, filtering out fruits, seeds and invertebrates. Although Gadwall *Anas strepera*, like Wigeon, eat mostly leaves and stems, these are mostly of aquatic plants. The Coot and Pochard *Aythya ferina* populations fell most markedly by 75% and 96%. Some of the displaced Coot probably used local gravel pits and reservoirs whilst the Pochard did not stay in the region at all. The third column of Table 2 shows the bird days in the winter 1973-1974, following the drought. Tufted Duck and Wigeon usage recovered and the latter increased. Dabbling ducks largely returned to their former levels. Somewhat surprisingly the number of Mallard days was only a half of those of the typically flooded winter.

Coot usage recovered to 44% and Pochard only to 13% of the normal level. These species may have lost some of their site tenacity to the

wintering area; their populations had not fully recovered by two years later.

Autumn flooding

The populations of ducks are at their lowest from September to November when the Washes are usually dry. In 1968 however a flood in July persisted throughout this period. Some species were recorded in exceptional numbers: 5,000 Teal in September (normally 500) and 1,000 Pochard in November (10). The autumn passage population of Shoveler *Anas clypeata* built up and 2,000 were present from August to October (50).

Usage related to disturbance

Table 3 shows the pattern of duck usage during the five months of the open and three months of the close season for a typical winter. The top group of species use the

Table 3. Bird days at the Ouse Washes 1970-71.

	Sept-Jan (5 months)	Feb-Apr (3 months)
Teal	301,000	182,000
Mallard	751,000	368,000
Gadwall	5,940	2,700
Wigeon	2,136,000	1,963,000
Moorhen	45,000	29,000
Pintail	124,000	92,300
Shoveler	22,000	60,000
Pochard	16,000	167,000
Tufted	6,400	19,600
Coot	113,000	214,000

Table 4. Percentages of bird days and bird days per ha in refuges and non-refuges on the Ouse Washes 1970-1971.

		Refuges 490 ha		Non-refuges 1424 ha	
Before 31st Jan		% Bird days	bird days ha	% Bird days	Bird days ha
Mallard	751.000	87	1,333	13	67
Wigeon	2,136.000	83	3,618	17	250
Pochard	16,000	21	7	79	9
Moorhen	45,000	47	43	53	16
After 31st Jan					
Mallard	368.000	32	240	68	173
Wigeon	1,963.000	40	1,602	60	812
Pochard	167,000	0	0	100	115
Moorhen	29,000	51	30	49	10

Washes extensively in both periods. The bottom group of species use the Washes more in the close season but this is related more to the presence of flood water. Suitable flooding for Pintail *Anas acuta*, Pochard and Coot usually occurs from January onwards. Passage populations of Shoveler and Tufted Duck also build up in late winter, and some of these remain to breed.

Table 4 shows the percentage of bird days and bird days/ha on refuges and non-refuges for four species. The period up to 31st January includes the shooting season, that after 1st February has no disturbance from shooting. The results for Mallard and Wigeon are typical for dabbling ducks, with only 13% and 17% respectively of the bird days spent in the non-refuge areas up to 31st January. After 31st January about two-thirds of the Mallard and Wigeon days are spent on land that was formerly shot over. The duck days per ha spent in the refuges before 31st January are 19.6 times that of the non-refuges for Mallard and 14.5 times for Wigeon. After 31st January the proportions are reduced to 1.4 times and twice respectively. The Moorhen distribution is similar in both periods with about 3 times as many Moorhen days per ha being spent in the refuges as the non-refuges. This pattern may be related to the territoriality of the Moorhen and the absence of flocking unless the weather is cold and flooding extensive. The small number of Pochard were equally distributed in the two areas before 31st January, mainly using the boundary rivers which are unshot. After 31st January the influx of Pochard utilized the non-refuge areas. The counts from which all these figures were calculated were taken fortnightly on a weekday to avoid the concentration of wildfowl into the refuges at weekends. This means

that calculated usage of the refuges is less than the real figure.

In December and January wildfowling is most intensive and the two refuges sometimes hold virtually all the wildfowl, about 50,000. The R.S.P.B. refuge is about 3 km long but four of the 17 fields in the area are privately owned and used by wildfowlers. The fields are equidistant from one another and when they are shot simultaneously all the wildfowl in the refuge are dispersed. This has involved c. 20,000 Wigeon and up to 10,000 other species on several occasions in December and January. There is a certain amount of feeding before dawn in non-refuge areas but the birds flight back onto the refuges shortly after dawn during the shooting season.

Habitat used by feeding ducks related to depth of flooding

Feeding dabbling ducks follow the water line, reflecting the availability of food and the limitations imposed by their feeding methods. Table 5 contrasts the commonest feeding methods used by species under conditions of shallow and deep flooding. The observations were made over one square kilometre using the facilities at the Wildfowl Trust Observatory. Under shallow flooding almost half of the area was flooded with equal amounts over and under 40 cm. Under deep flooding about three-quarters of the area was flooded with about half under at least 40 cm of water.

With Gadwall, Pintail and Mallard there is an intensification of feeding with head and neck under water or upending as the depth of flooding increases, while Tufted Duck and Pochard dive more often. Under shallow flooding Pochard resort to the wider variety of feeding postures characteristic of the

Table 5. Feeding methods of ducks on the Ouse Washes.

	Little flooding		High flooding	
Pintail	Head and neck under/upend	77%	Head and neck under/upend	94%
Teal	Beak and head under	77%	Head and neck under	63%
Mallard	Head and neck under/upend	81%	Head and neck under/upend	94%
Gadwall	Head and neck under/upend	69%	Head and neck under/upend	90%
Wigeon	Walk and pluck grass	81%	Walk and pluck grass	50%
Shoveler	Beak under	60%	Head and neck under/upend	70%
Tufted	Dive	89%	Dive	98%
Pochard	Dive	55%	Dive	98%
Coot	Swim and Pluck	54%	Head and neck under/upend	70%

dabbling ducks as they feed on the same seeds. A high proportion of the Tufted Duck dive in the flooded ditches, probably feeding on aquatic molluscs. With shallow flooding Coot commonly feed by plucking emergents whilst swimming but under deep floods they concentrate on pulling submergents to the surface, after putting head and neck under water or upending. In shallow floods Teal and Shoveler mostly fed with beaks and heads under and beak under respectively and switch to head and neck under and upending under deep flooding. Wigeon plucked grass whilst walking mostly on dry land but under deep floods half the feeding postures include beak under, head under, neck under and more rarely upending and commensalizing with Bewick's Swans. The dabbling ducks are able to exploit submerged foods down to about 40 cm for Mallard and Pintail, 30 cm for Wigeon, 34 cm for Shoveler and 24 cm for Teal. On extremely deep floods some species have to leave the Washes almost completely. Wigeon and Coot merely walk out on to the boundary banks and graze. Those banks grazed and mowed in previous summers are favoured because the grass leaves are of a more manageable size and belong to more palatable grasses.

Structure of vegetation and topography of fields

When under deep floods mown and heavily grazed fields do not have so many feeding duck as do the lightly grazed or fallow fields. In the former non-floating seeds and leaves are too far submerged and floating seeds are quickly moved away by wind and currents. They form narrow drift lines at the edge of the floods which are underused by dabbling duck. The latter fields contain vegetation which emerges from the water and arrests floating seeds over a wider area. They are held by debris, surface tension and the submerged leaves and stems. Invertebrates also collect with particularly high densities of Collembola,

Gastropoda and Coleoptera, especially Staphylinids. Drowned earthworms are trapped amongst the submerged leaves at densities of up to 300 per sq m, in the top 25 cm. It is thus desirable to have lightly grazed fields at regular intervals to ensure that foods are more readily available under high floods. The slightly elevated banks of the ditches extending for up to about 10 m into the fields. Under deep flooding these provide shallower feeding sites. They are also used as loafing sites. Many fields have natural humps and depressions which when flooded also increase the opportunities for feeding ducks.

Usage of the surrounding arable fens

The agricultural land of the Isle of Ely covers 87,400 ha and 50% is under cereals, chiefly winter wheat and spring barley and most of the remainder under potatoes and sugar beet. Cereal stubbles are available from August to October before being ploughed. More than half of the Mallard and small numbers of other dabbling duck from the Washes feed in the fields. From November onwards waste potato tubers are exposed in the ploughed fields and Mallard and Pintail consume them. They commonly use fields within 2 km of the Washes but are recorded up to 5 km away. Sometimes as much as a half of the Wigeon eat the leaves of germinating winter wheat from late December until March. The proportion of these species using the arable fens increases when the Ouse Washes are very heavily flooded.

The morning flighting pattern in winter involves flying out before dawn, returning a few hours later. The birds return close together, which suggests disturbance by farm workers starting their day. They leave again for the fens 2-3 hours before dusk, returning just after. In periods of frost and during very high flooding flocks are to be seen in the fens at all times of day. The Washes then serve mainly as a roost. This was not a feature prior to

1950. Wigeon were first noticed feeding on germinating winter cereals in the 1963 winter and Pintail on cereals and potatoes in the mid-1960s. This coincides with an increased usage of the Ouse Washes by these species as well as the prolonged freeze-ups in those winters.

During the period of study, continuous freeze-ups were uncommon and usually lasted for less than one week. When they occurred the populations of ducks, except Mallard, Pintail and Wigeon left the Ouse

Washes, presumably for coastal or brackish areas. Although populations of these three species became depressed the majority of birds turned to feeding on waste potatoes and winter wheat leaves.

Summary

The paper describes some of the broad features governing habitat usage of wintering ducks at the Ouse Washes, England. They include flooding, disturbance, refuges, climate and availability of food.

G. J. Thomas, Royal Society for the Protection of Birds, The Lodge, Sandy, Beds.

Responses of wintering Brent Geese to human disturbance

N. W. OWENS

Summary

An assessment is given of the effects of human disturbance on the distribution and behaviour of Dark-bellied Brent Geese *Branta bernicla bernicla* wintering in Essex. Disturbed areas and places with poor visibility were avoided in early winter, but were used later when other areas became depleted of

food. Geese became partially habituated to the proximity of people and to some loud noises, but not to small low-flying aircraft. Disturbance could be greatly reduced by restricting access to the sea wall in certain areas around high tide, and by controlling low-flying aircraft.

N. W. Owens, Colney Research Station, I.T.E., Norwich. Present address: 7 Bramston Close, Oundle, Peterborough.

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The Amey Roadstone—Game Conservancy Wildfowl Project

M. STREET

The object is to discover ways of increasing the breeding success of wildfowl on wetlands created by the gravel industry. Mallard *Anas platyrhynchos* and Tufted Duck *Aythya fuligula* are the important species studied. The main study area is a 300 ha quarry at Great Linford, Bucks, with a 14 ha breeding reserve.

The principal investigation is into the factors affecting juvenile mortality; their food supplies are the subject of intensive study. Correlations are being sought between duckling feeding patterns, survival, and the numbers of hatching insects.

The food of adults has been studied over three shooting seasons. Mallard were dependent to a great extent on cereal grains, Tufted

Duck mainly on aquatic invertebrates, especially molluscs. The study has been extended to investigate the foods of breeding Mallard. Invertebrates, particularly earthworms and Tipulidae larvae, appear to be important foods for both sexes in spring and summer. The birds show a rapid increase in body weight and body fat in autumn and a decline in condition in spring.

The use of different plants for nest sites, escape and feeding cover is being monitored. The success of nests is being related to cover type and position. Artificial nest structures are being tested to determine their effectiveness and acceptability in different position.

M. Street, Great Linford Works, Newport Pagnell, Bucks.