

ORIELTON DUCK DECOY THE STORY OF ITS DECLINE

TIM STOTT* and CARL MITCHELL†

*FSC at Orielton Field Centre, Pembroke, Dyfed SA71 5EZ

†The Wildfowl and Wetlands Trust, Slimbridge, Gloucestershire GL2 7BT

ABSTRACT

The duck decoy was constructed in 1868 on “Decoy Lake”, a 6 hectare artificial pond on the western periphery of Orielton Estate, some 5 km south of Pembroke in south-west Dyfed. Records, commencing 1877, were kept in the *Orielton Decoy Book*. Average wintering numbers on the lake were in the region of 10,000–12,000 duck, of which some 90% were wigeon, *Anas penelope*. The decoy fell into disuse during the First World War, but was refurbished for ringing purposes in 1934. Nearly 11,000 duck were ringed between 1934 and 1950, providing some of the earliest records of movements and migrations of wintering wildfowl. A flock of 3000 wigeon was seen in 1938 but, since the Second World War, wigeon have declined further and were last recorded in 1978. Since 1960, wigeon stocks in Britain have remained stable and possible reasons for the Orielton decline are discussed.

INTRODUCTION

THE ORIELTON DUCK decoy was located on what is now locally called “Decoy Lake”, a 6 hectare pond artificially created in 1820 by the damming of a fold between two hillsides. Decoy Lake lies on the western periphery of Orielton Estate, some 5 km south of Pembroke in south-west Dyfed (Fig. 1). The northern side is wooded and the southern, farmland. The pond is fed, on the east side, by Orielton Stream. Most of the decoy pipes were concealed in the swampy coppice where the stream enters.

“Decoy” comes from two Dutch words “*eende*” (duck) and “*kooi*” (cage) and they were originally constructed to capture wild duck for the market. The decoy is built around a secluded pond, situated close to existing feeding grounds. Waterfowl become used to using it as a safe roost, made more attractive by baiting the margins with grain. The principle is simple, involving the luring of ducks into the end of a long and narrowing semi-circular netted “pipe” which ends in a cage (Fig. 2). Ducks are enticed to the entrance of the pipe, either by baiting or by the use of a dog. The dog is used in place of a “natural” predator, such as a fox, *Vulpes vulpes*, which the dog is often chosen to resemble. When a land predator threatens duck on a pond, they all face it and follow its movements at a safe distance, in a type of mobbing behaviour (Cook and Pilcher, 1982). A decoy dog is trained to run in and out of screens along the side of the decoy pipe. With encouragement from the decoyman, it makes regular appearances in front of the duck, luring them further and further into the narrowing pipe. The duck are finally collected in a cage at the end of the pipe and are removed, formerly for the table but more commonly, in recent years, for the purpose of ringing and release.

*Present address: Barnard Castle School, Barnard Castle, Co. Durham DL14 8UN.

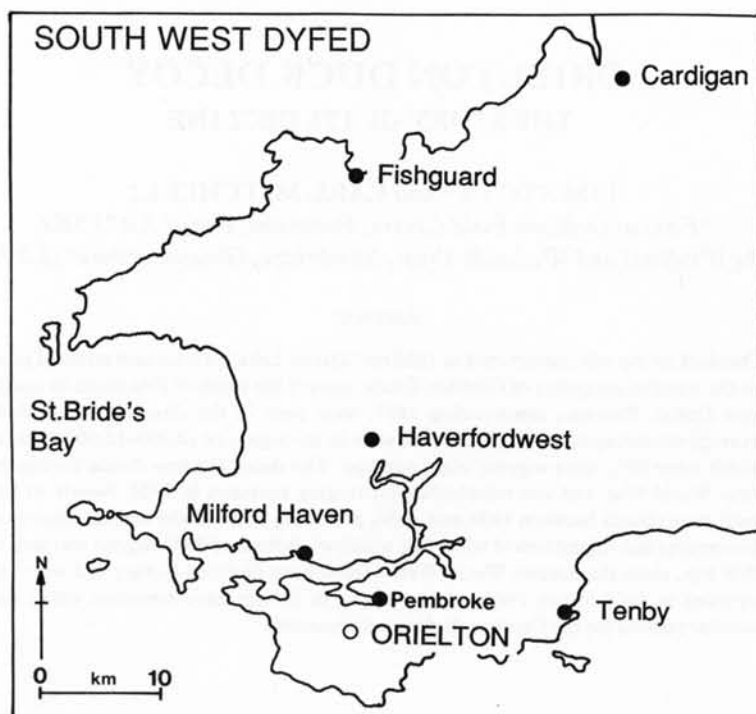


FIG. 1.
A map to show the location of Orielton.

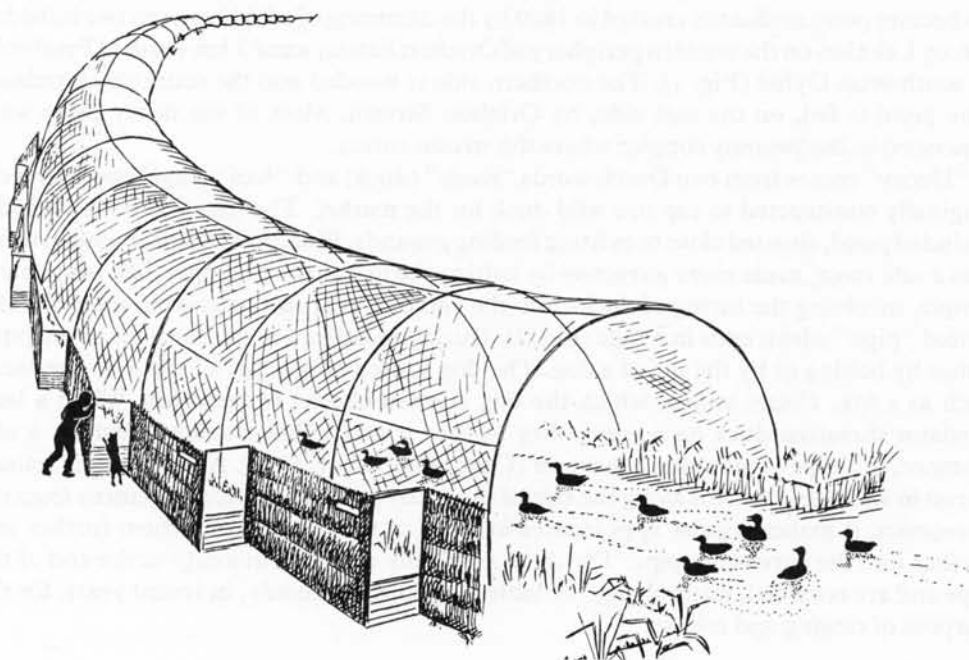


FIG. 2.
Diagrammatic drawing of a decoy pipe in use.

Table 1. Records of duck taken on the Decoy Lake, 1877–1912, from the Orielton Decoy Book

Winter	First birds taken	Last birds taken	Mallard	Wigeon	Teal	Pintail	Shoveler	Various	Totals
1877–78	28/11/77	15/2/78	5	504	341	0	0	3	853
1878–79	22/8/78	11/2/79	183	452	871	6	4	15	1531
1879–80	17/9/79	14/2/80	244	604	485	6	6	23	1368
1880–81	30/9/80	26/2/81	100	275	317	2	1	16	711
1881–82	28/9/81	23/2/82	70	535	190	1	1	5	802
1882–83	16/9/82	10/2/83	85	643	264	1	1	3	973
1883–84	25/8/83	23/2/84	150	562	363	3	1	1	1080
1884–85	1/11/84	22/2/85	360	575	144	9	2	1	1091
1885–86	5/9/85	1/3/86	129	287	133	4	0	9	562
1889–90			148	1061	757	4	1	3	1974
1890–91			405	1395	682	31	7	1	2521
1908–09	25/9/09	26/2/09	60	467	384	7	0	18	936
1909–10	13/9/09	10/2/10	67	243	296	0	0	17	623
1910–11	12/9/10	13/2/11	25	211	54	0	7	4	301
1911–12	24/10/11	22/1/12	13	83	171	0	0	1	268
Totals			2044	7897	5452	74	31	120	15,618

HISTORY

The decoy was constructed in 1868, although the first records date from 1877 (Owen *et al.*, 1986). Records were kept in the *Orielton Decoy Book*, which contains details of duck caught and disposed of. At this time, the average daily winter number of duck on the lake was 10,000–12,000, of which some 90% were wigeon, *Anas penelope* (Mackworth Praed, 1988). Table 1 summarises these early records. It is clear that quite large numbers of mallard, *Anas platyrhynchos*, wigeon and teal, *A. crecca*, were taken. Trapping supplied the House table, local butchers, friends of the estate and the decoyman himself.

Destinations of birds caught at Orielton (quoted from the decoy book) include: Edinburgh; Mr Jones, West Farm; Jim Reynolds; Smith & Son, Tenby; The House; "sent to friends"; and "given out to farmers". Numbers trapped peaked at over two and a half thousand in the winter of 1890–91, declining thereafter until the onset of the First World War, when trapping was discontinued. At this time, the decoy was being operated by Herbert Williams, of the same family that ran Borough Fen Decoy in Cambridgeshire. The last record entered in the decoy book is for the winter of 1911–1912.

The decoy pipes were left unattended during the First World War. They became overgrown with young trees and silted up. Decoy Lake was used as a shooting ground until 1934 when two members of the Wildfowl Inquiry Committee, Colonel C. W. Mackworth Praed and Captain H. A. Gilbert, reconditioned the decoy. By 1934, the big flocks of wigeon no longer visited Orielton, and even in the local estuaries the number did not exceed 3000. Teal, on the other hand, remained and, in 1935, 2300 birds were counted on the lake. Wigeon returned slowly after the 1934 renovation work on the decoy and for a short time, in 1938, some 3000 were present.

Whatever the causes, the composition of the duck community at the decoy in 1938 was very different from what it had been before the First World War. Catches of pintail, *Anas acuta*, and shoveler, *A. clypeata*, averaged only 5 and 2, respectively, between 1877 and 1912 whereas, in 1938, 50 pairs of pintail and 100 pairs of shoveler were common.

Table 2. *The numbers of duck ringed on the Orielton Decoy in the 1930s—see Mackworth Praed (1938) for details*

Season	1934–35	1935–36	1936–37	1937–38	1938–39
Number of duck caught	326	1259	1176	1432	1577

Table 3. *Destinations of the 108 overseas recoveries (mostly teal with a few wigeon) of Orielton-ringed duck—see Mackworth Praed (1938) for details. Not included are the 56 individuals recovered in Ireland*

Country of recovery	Teal	Wigeon	Pintail	Shoveler	Tufted duck	Totals
Scandinavia	31	—	—	—	—	31
The Netherlands	22	1	1	3	—	27
Germany	15	1	—	1	—	17
Russia	7	4	1	—	1	13
France and Belgium	11	—	—	—	—	11
Latvia	2	1	—	—	—	3
Italy	2	—	—	—	—	2
Iceland	—	—	1	—	—	1
Poland	1	—	—	—	—	1
Rumania	1	—	—	—	—	1
Portugal	—	1	—	—	—	1
Totals	92	8	3	4	1	108

Numbers of some other species appear to have declined during the same period. There were no more than 30 pochard, *Aythya ferina*, on the lake in 1938 compared with observations of “dozens if not hundreds” before 1914. However, the only really significant decline was in the number of wigeon.

Ringed of duck caught in the Orielton Decoy was carried out on behalf of the Wildfowl Inquiry Committee between 1934 (when the decoy was reconditioned) and 1939, when the onset of the Second World War interrupted the work (Table 2).

Over the five-year period (1934–1939), there were 506 recoveries (excluding recaptures in the decoy, which totalled between 800 and 1000 each season), of which 171 were from overseas. Fifty-six of these were from Ireland but, of the remainder, 108 were from further afield (Table 3).

It is interesting to compare the trapping records for the period 1877–1912 with the ringing records for 1934–1939. The average number decoyed per season was remarkably similar, although figures fluctuated between 268 in 1911–1912 to 2521 in 1890–1991.

Whether or not the decoy records are indicative of the actual numbers of these birds visiting Decoy Lake, or whether they reflect the ease with which different species may be caught in this way, is difficult to say. The latter may partially account for different proportions of the catch at any one time, but are unlikely to explain differences between the two periods (since the design of the decoy was not altered). The most obvious change, between the two periods, namely in the relative proportions of teal and wigeon certainly cannot be explained in this way.

Table 4. *Comparison of the percentage composition of the trapping records for Orielson Duck Decoy between 1877–1912 (Table 1) and 1934–1939*

Species	1877–1912 period (15 years decoying)	1934–1939 period (5 years decoying)
Teal	35.0	78.5
Wigeon	50.5	8.0
Mallard	13.0	5.5
Shoveler	0.2	4.0
Pintail	0.5	2.5
others	0.8	1.5
	100.0	100.5
Total birds decoyed	15,618	5770
average per season	1041	1154

The decoy was kept going until 1941, part of the catch being sold to meet expenses. During 1942, the decoyman, Mr Greenslade, met with a serious accident and all activities had to cease. The pipes remained in good condition until a freak snowstorm on 27 January 1945, broke them all down. The decoy was visited in July of that year by Captain Gilbert and Miss Barclay-Smith who investigated the possibility of re-starting the decoy for ringing purposes. They suggested repairs to be carried out. Mr Greenslade, who had by now recovered from his accident, was re-engaged as the decoyman. The position was said to be "much more favourable than in 1934. There were 50 mallard and 3 teal present on 16 July 1945, which was an excellent lead in."

Although the decoy must have suffered disturbance from the troops stationed at Orielson during the war, it had not been shot over. Miss Barclay-Smith took the following actions:

- (i) She interviewed the Officer in Command of Orielson Camp to secure his co-operation in stopping further disturbance of the decoy. As a result, the decoy was put "out of bounds" to all troops.
- (ii) She interviewed Mr John Bennion, the new tenant of Orielson Farm, whose land borders the decoy lake. It was agreed that his employees would keep disturbance on the adjoining fields to a minimum.
- (iii) She interviewed Mr Arthur Gaddum, whose land also adjoined the decoy, and secured his full co-operation.

Mr Greenslade started the restoration work in July 1945, and restored two of the pipes to full working order. The action was fully endorsed by the Wildfowl Enquiry Committee; catching and ringing began in September. By the end of the year, 900 birds had been ringed. Most were teal, but the catch also included wigeon, shoveler, mallard, pochard and pintail. Restoration and maintenance costs (mainly Greenslade's wages, 70 shillings (£3.50) a week in line with the minimum agricultural wage) were of great concern to the Committee. Fortunately, grants of £100 were given by the Royal Society to Colonel Mackworth Praed for scientific investigations into wildfowl migration routes, and by the Royal Society for the Protection of Birds towards general expenses. Mr E. O. Elsdon, of the West Wales Field Society, assisted with the recording of birds ringed and, on 1 April 1950, management of the Orielson decoy was transferred from the Wildfowl Inquiry Committee to the West Wales Field Society.

Elsdon (1950) reported that duck were fewer than ever on Decoy Lake in the winter of 1949–50, although in the surrounding districts they were plentiful. He considered the increased, and more mechanised, agricultural activity (as compared to 1870 when the pond was visited by much larger numbers of duck) to be the most obvious cause. Noise was less likely to cause disturbance than movement across the fields and along the nearby main road. He suggested the need for artificial screening, until the young trees (planted in 1949) provided sufficient natural cover. Some of the older trees, planted around the pond, were dying and in need of replacement. One of the two operational pipes had been completely rebuilt by Mr Dalgety in 1949, but had not had a chance to prove itself owing to the lack of duck.

Despite these problems, Lockley (1951) reported that some 150 duck were ringed, before the untimely death of Mr Elsdon on 17 December 1950. Volunteers, including the previous decoyman, Mr Greenslade, and Mr Ronald Lockley (founder of Skokholm Bird Observatory, who bought the Orielson estate in 1954) kept ringing going, and brought the total up to 418 by the end of the season—366 teal, 45 mallard, 4 tufted duck, *Aythya fuligula*, 2 wigeon and 1 gadwall, *Anas strepera*. Even so, the future of the decoy was uncertain. Funding of the order of £500 per annum was needed to keep it going as a ringing station. Ringing continued, on a reduced scale, for several more seasons, although catches were small. The decoy was left almost abandoned because of lack of local interest, and of a supervisor. Eventually, in August 1955, the traps were repaired and the one pipe that had survived the years of neglect and occasional snowfalls was made into an automatic trap. Netting was secured over the pipe entrance and a small funnel trap at water level was constructed (Lockley, 1957). This “pipe trap”, together with four small lakeside traps, caught over 1000 waterfowl during the 1955–1956 season, including 434 newly-ringed teal. Numbers of duck visiting the lake, however, began to fall and little ringing was achieved in subsequent winters. A notable event in 1958 was the use of the last of the historic set of Orielson rings, although rings marked “British Museum, London” had also been used since 1939.

Mackworth Praed (1939) presented a full list of foreign recoveries, and distribution maps, based on birds marked before that date with Orielson rings. In all, a further 5166 birds were caught and newly ringed after 1945. One hundred and seventy-five foreign recoveries of teal, marked with British Museum rings (details now held by the British Trust for Ornithology) are shown in Fig. 5.

The decoy, damaged by storms and disturbed by local farming, finally ceased operations after the 1959–1960 season (Kear, 1990). The lake had been sold to David Mason of West Orielson Farm in 1955 and Ronald Lockley sold Orielson to the Field Studies Council in 1963. The decoy pipes once more fell into disrepair at this time and, although the West Wales Naturalists’ Trust rented the lake as a reserve for wildlife, no attempt was made to renovate them (Dr R. G. Crump, *personal communication*).

Ringling at Orielson Decoy Lake provided some of the earliest insights into the movements and migrations of wildfowl. The pioneering achievements of C. W. Mackworth Praed, H. A. Gilbert, Mr Greenslade, Ronald Lockley and a number of volunteers are considerable. Further use of duck decoys as ringing stations began in the late 1940s at Berkeley New Decoy, Gloucestershire, and at Borough Fen Decoy, Cambridgeshire. Under the direction of their Founder, Peter Scott (who had visited Orielson Decoy in 1955), the Wildfowl Trust co-ordinated the ringing effort at these and several other decoys. In 1967, over 8000 birds were newly-ringed at six decoys—surely the heyday of duck ringing at decoys in Britain. Over the last 20 years, the duck trapping effort has



FIG. 3. Mr Greenslade and approximately 800 duck in flight over Decoy Lake (January 1948). Picture courtesy of *The Times*.

shifted from decoys to large cage traps, probably as a result of the increasing number of water bodies in lowland England and the lessening disturbance in many places as a result of conservation activities (Owen *et al.*, 1986—and see also Discussion). Decoys are also expensive to maintain and run, especially in labour costs—part of the reason why Orielson Decoy was no longer operated. Today, there are only five decoys in use as ringing stations and, in 1989, fewer than 2000 birds were caught and ringed in them (Mitchell, 1990), Borough Fen Decoy, Berkeley New Decoy, Abbotsbury Decoy (Dorset), Boarstall Decoy (Buckinghamshire), and Hale Decoy (Merseyside) still catch small numbers of duck but their upkeep and maintenance today is largely based on their historical value (Kear, 1990).

Regular counts of wildfowl using Orielson Decoy, since the Second World War, reflect the gradual decline in the number of duck using the lake. Orielson was first included in the National Wildfowl Count scheme, organised by the Wildfowl Trust, in 1948. Counts, usually conducted on one Sunday close to the middle of each winter month, have been conducted since then but totals are tiny when compared with the estimates of 10,000 to 12,000 birds on the lake during the 1877–1912 period (Table 5).

DISCUSSION

The Decline of Wigeon

Wigeon is an abundant species, with the winter population in north-west Europe, considered stable between 1967 and 1986, at about 750,000 birds (Monval and Pirot, 1989).



FIG. 4. Mr Greenslade (right) and an unknown visitor releasing three Wigeon captured in the decoy (January 1948). Picture courtesy of *The Times*.

Winter visitors to Britain and Ireland originate from Iceland, Fenno-Scandia through northern Russia to about 90°E (Owen and Mitchell, 1988). Wigeon are highly mobile within their wintering quarters, particularly in times of cold weather (Ridgill and Fox, 1990). In less severe winters, the birds have been shown to show a high degree of site faithfulness; marked wigeon returning to the same winter quarters over several seasons (Mitchell and Owen, 1990). In recent decades, the species has clearly changed its distribution both by moving inland to feed (Owen and Williams, 1976) and by shifting from unprotected areas to reserves (Owen and Salmon, 1985).

The winter habitat of wigeon is primarily lowland and largely maritime, especially along shallow, fairly sheltered, coasts with extensive tracts of tidal mud, sand or salt marsh (Cramp and Simmons, 1977). Freshwater and brackish lagoons or tracts of flooded grassland are also attractive and may be used in preference to coastal waters. They freely use suitable man-made lakes but space and visibility are essential.

From the 17th century, decoys offered daytime protection from shooting—a form of early “refuge”. The relatively small numbers of duck caught were quickly replaced by others seeking the sanctuary of a disturbance-free lake. During the last 100 years, numbers of duck using the remaining decoys have fallen, with only mallard and teal now evident in any number. The decline in numbers is especially evident at Orielton. Wigeon flocks, estimated at between 9000 and 11,000, were seen on Decoy Lake in the period 1877–1912.

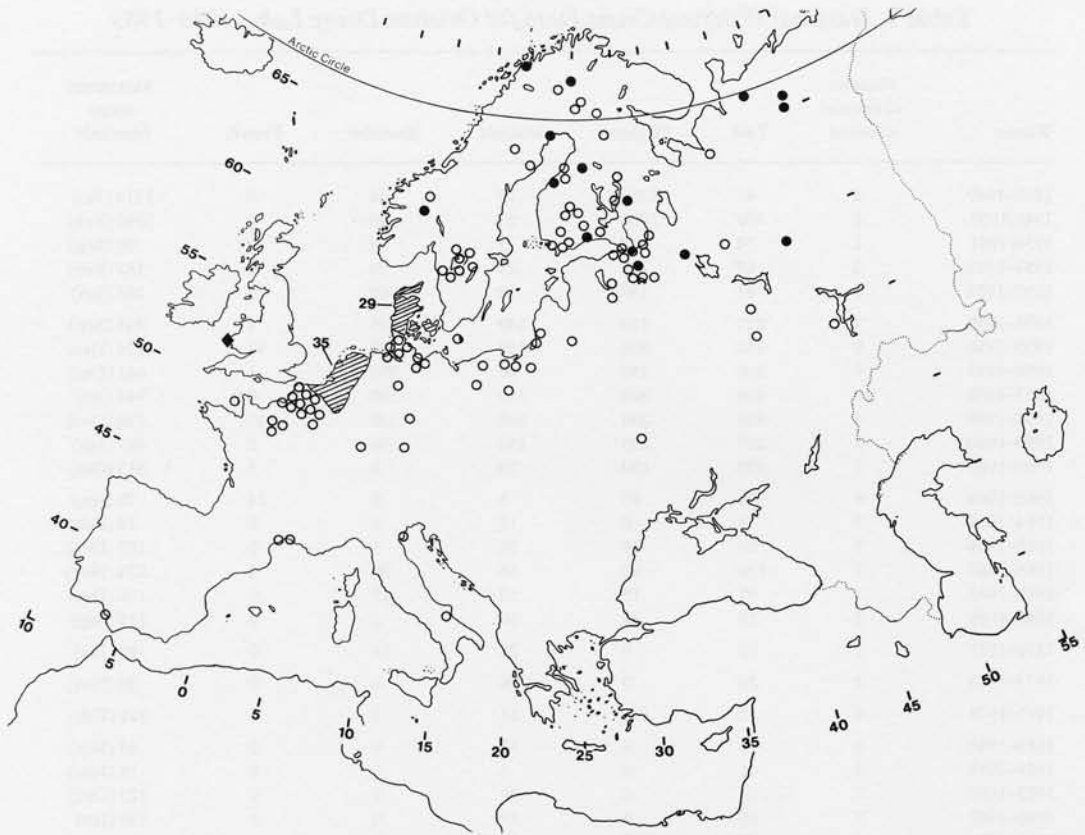


FIG. 5. Approximate recovery positions of 175 teal ringed at Orielton Decoy after 1939 and found abroad (see Mackworth Praed [1939] for pre-1939 recoveries). ●, recovered in May, June or July (breeding areas), ○, recovered in other months. ◆, location of Orielton Decoy. A few recovery positions have been slightly adjusted for clarity. Further, 29 recoveries were reported from Denmark and 35 reported from The Netherlands and Belgium (none were recovered between May and July). Data courtesy of the British Trust for Ornithology.

The very few seen in 1934 rose to 3000 in 1938 but the recovery was short-lived and postwar wigeon counts never exceeded 1200 (Table 5). The species was last seen on Decoy Lake in 1978, when 8 were present on 4 January, and 16 on 30 September. None was seen there in January 1985, despite the cold winter which had brought 5000 wigeon to Pembrokeshire, many of which were observed away from the estuary. Even more (over 15,000) were in Pembrokeshire during the 1987 cold weather, but it seems that none came to Orielton (David Little, *personal communication*).

Wigeon used to be very largely restricted to the coast (Owen *et al.*, 1986), so much so that there was widespread concern over its future in the 1930s when stocks of eel grass, particularly of *Zostera marina*, declined drastically following a wasting disease. But the extent of the species' dependence on *Zostera* had been overestimated. Nationally, the decline in numbers was not maintained and the bird continued to thrive and move into new habitats.

A series of other contributory factors may have advanced the decline at Orielton. Changes in the chemistry of the lake water will have affected the quality of the macrophyte vegetation as a food resource (David Little, *personal communication*). Intensification of farming in the area during the 1939–45 war, and then the boom in early potatoes from the

Table 5. *National Wildfowl Count Data for Orielton Decoy Lake, 1948–1989*

Winter	Number of months counted	Teal	Wigeon	Mallard	Shoveler	Pintail	Maximum count (month)*
1948–1949	6	41	1200	15	34	0	1214 (Jan)
1949/1950	6	300	1000	23	20	0	1040 (Feb)
1950/1951	1	74	0	5	0	0	80 (Sep)
1951–1952	4	65	150	23	30	0	187 (Feb)
1952–1953	1	37	150	14	65	0	288 (Jan)
1954–1955	7	275	115	140	25	4	445 (Sep)
1955–1956	9	750	350	130	250	11	1124 (Dec)
1956–1957	9	200	150	60	300	1	641 (Dec)
1957–1958	10	400	300	110	100	0	744 (Jan)
1958–1959	4	350	200	105	300	30	738 (Dec)
1959–1960	7	275	235	150	30	2	497 (Jan)
1960–1961	7	250	150	70	4	1	313 (Oct)
1963–1964	5	44	65	6	0	14	75 (Jan)
1964–1965	7	4	0	12	0	0	16 (Feb)
1965–1966	7	50	36	32	5	0	103 (Dec)
1966–1967	7	120	90	56	30	0	224 (Nov)
1967–1968	7	95	15	53	75	0	176 (Dec)
1968–1969	3	10	40	60	2	0	116 (Sep)
1970–1971	2	82	0	28	54	0	185 (Jan)
1972–1973	2	22	0	26	0	0	50 (Nov)
1975–1976	4	8	190	51	2	1	221 (Feb)
1983–1984	6	15	0	43	0	0	43 (Sep)
1984–1985	4	11	0	7	0	0	18 (Nov)
1985–1986	7	14	0	28	2	0	127 (Dec)
1986–1987	7	65	0	29	0	0	126 (Jan)
1987–1988	6	55	0	35	0	0	92
1988–1989	6	27	0	55	0	0	58

*Maximum monthly count of all duck on a single visit during that winter, with the month of that visit. Grebes (e.g. *Podiceps* spp.), grey heron (*Ardea cinerea*), swans (*Cygnus* spp.), geese (*Branta* spp.), coot (*Fulica atra*) and moorhen (*Gallinula chloropus*) are excluded. Other species of duck recorded in small numbers include gadwall, tufted duck, pochard, goldeneye (*Bucephala clangula*), scaup (*Aythya marila*), and red-breasted merganser (*Mergus serrator*).

1950s must have provided considerable disturbance. Runoff from the fields would affect lake water chemistry, and the move away from permanent pasture affected local food supplies for the duck. Increased human disturbance, inevitable once keeping stopped, and a discontinuation of baiting the lake margins reduced its attractiveness to all species. It has also been suggested (Matthews, 1969), that one of the reasons why decoys do not “work” as well now is that the change from killing to ringing allowed wariness of the pipes to be transmitted by the released birds.

Today, wigeon increasingly use coastal refuge sites, mostly reserves, where they can feed, loaf, preen and sleep in one place (Owen and Williams, 1976). The increased provision of safe refuges may well be another cause of the decline in numbers at Orielton and other decoys.

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REFERENCES

- COOK, T. and PILCHER, R. E. M. (1982). *The History of Borough Fen Decoy*. Providence, Ely.
- CRAMP, STANLEY and SIMMONS, K. E. L. (1977). *Handbook of the Birds of Europe, the Middle East and North Africa. The Birds of the Western Palearctic*. Vol. 1. Ostrich to Ducks. Oxford University Press. 722 pages.
- ELSDON, E. O. (1950). Orielton Decoy—brief report on the decayed state of the decoy. *Annual Report of the West Wales Field Society*, 12, 12–14.
- KEAR, J. (1990). *Man and Wildfowl*. T. & A. D. Poyser.
- LOCKLEY, R. M. (1951). Orielton Decoy—Report on the 1950–51 winter at the decoy with numbers of duck ringed. *Annual Report of the West Wales Field Society*, 13, 12.
- LOCKLEY, R. M. (1977). *Orielton—the human and natural history of a Welsh manor*. Andre Deutsch.
- MACKWORTH PRAED, C. W. (1939). Orielton Decoy Ringing Station, Pembrokeshire. *Report of the Wildfowl Inquiry Committee*, 1938–39.
- MATTHEWS, G. V. T. (1969). Nacton Decoy and its catches. *Wildfowl*, 20, 131–137.
- MITCHELL, CARL (1990). Progress on bird ringing by the Wildfowl and Wetlands Trust during 1989. *Wildfowl*, 14, 142–144.
- MONVAL, J.-Y. and PIROT, J.-Y. (eds) (1989). Results on the International Waterfowl Census 1967–1986. *IWRB Special Publication No. 8*. Slimbridge. 145 pp.
- ORIELTON DECOY BOOK (1877–1912). *Details of duck caught and disposed of: summary of seasons 1877–1912*. Pembrokeshire Archives D/LLO/238.
- OWEN, MYRFYN, ATKINSON-WILLES, G. L. and SALMON, D. G. (1986). *Wildfowl in Great Britain*. Second edition. Cambridge University Press. 613 pages.
- OWEN, M. and MITCHELL, C. (1988). Movements and migrations of wigeon, *Anas penelope*, wintering in Britain and Ireland. *Bird Study*, 35, 47–59.
- OWEN, M. and SALMON, D. G. (1985). *Wildfowl distribution in relation to reserves and shooting*. Unpublished report to NCC, Wildfowl Trust.
- OWEN, M. and WILLIAMS, G. M. (1976). Winter distribution and habitat requirements of wigeon in Britain. *Wildfowl*, 27, 83–90.
- RIDGILL, S. C. and FOX, A. D. (1990). Cold weather movements of waterfowl in Western Europe. *IWRB Special Publication No. 13*. Slimbridge UK 87 pp.