

# Waterbird monitoring in Ireland 2000/01: results of the seventh year of the Irish Wetland Bird Survey (I-WeBS)

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This paper summarises the results of the seventh year of the Irish Wetland Bird Survey, placing the results in the context of previous years, especially those since 1996/97. Counts of over 350 sites were carried out in 2000/01, with most major wetlands being covered at least once. Monthly coverage was similar to that attained in previous years though access to rural areas due to Foot and Mouth Disease restrictions affected spring counts. Counts were below the

long-term average for most species. Peaks of Little Egret, Greylag Goose, Shoveler and Ringed Plover were, however, the highest recorded yet during I-WeBS counts. Peak counts of Shoveler at two sites were the highest yet recorded. A peak count of Coot at Lough Corrib exceeded the international threshold level for the third time, making this site easily the most important in Britain and Ireland. Provisional trends suggest increases in the latter two species together with Oystercatcher, Bar-tailed Godwit and Curlew. In contrast, most duck species, Grey Plover, Dunlin and Black-tailed Godwit appear to have declined and populations of largely sedentary species such as Great Crested Grebe, Mute Swan and Mallard appeared to be stable. 8 sites hold more than 20,000 waterbirds on average; a further 15 sites hold numbers exceeding 10,000 waterbirds. The Shannon & Fergus Estuary retains its position as the most important wetland holding around 60,000 waterbirds on average and 28 species in nationally or internationally important numbers. Only Wexford Harbour & Slobbs exceed this, holding fewer waterbirds in total but 29 species of national or international importance. The importance of continued long-term monitoring for assessment of site importance for individual species, periodic revisions of population estimates and analysis of national trends in populations is discussed.

## Introduction

The Irish Wetland Bird Survey is Ireland's national winter waterbird monitoring project. Since 1994/95 winter waterbird counts have been undertaken at a variety of wetland sites throughout the Republic of Ireland in parallel with the projects' equivalent scheme in Great Britain and Northern Ireland (WeBS).

Following from two highly successful schemes in the 1970s (Wetland's Enquiry; Hutchinson 1979) and 1980s (Winter Wetland's Survey; Sheppard 1993), the I-WeBS scheme was conceived in the mid-1990s. In contrast with

these previous projects, I-WeBS was initiated with long-term monitoring as a core objective.

The project aims to monitor the numbers and distribution of wintering waterbirds in the Republic of Ireland, enabling, in the long-term, the description of changes in population size and distribution, and the assessment of the importance of individual wetland sites. In addition, a programme of special surveys and research serve to

enhance our understanding of waterbird ecology nationally and internationally. Annual results from the scheme have been published since 1994/95 (Delany 1996; 1997; Colhoun 1999; 2000; 2001a; 2001b). This paper summarises the results of the seventh season of the I-WeBS project, placing it in context of previous seasons. A more detailed account of the first seven years of the project is currently in preparation.

## Methods

### Field methods and scheme organisation

I-WeBS uses the well-established technique of counting the numbers of waterbirds at wetland sites by the 'look-see' method (Bibby et al 1992). This involves counters recording the number of individuals of a number of waterbird species on frequent visits to pre-defined discrete wetland sites. The species considered are those that are described as waterbirds by Wetland's International which in Ireland comprise divers, grebes, Cormorant, herons and egrets, swans, geese, ducks, rails, waders, gulls, terns and Kingfisher. Counts of gulls and terns are optional. Though imperfect for certain groups of species, such as grassland-feeding waders, this method is the best available for general waterbird counting. Counts are requested to be carried out once per month for the period September - March and the organisation and administration of the scheme is carried out by a project officer with help on a local basis from local/regional organisers. The counts themselves are undertaken on the whole by skilled amateur ornithologists and professional staff of Dúchas The Heritage Service. Manpower demands are so high and the widespread nature and scale of sites so great that few sites can be counted in every month. In these circumstances, counters are encouraged to undertake counts in January (coincident with the International Waterbird Census and as many months as possible on either side. The dates chosen for counting are pre-determined so as to minimise duplication in counting across the entire country, and are selected in order to optimise tidal conditions for counters covering coastal sites. Where possible, dates occur on mid-month weekends with high tides around midday enabling counting to occur in the hours immediately preceding and following high tides. There is flexibility to account for local conditions such as counter availability and weather conditions.

### Interpretation of results

Waterbird counts using the methods described are long established and internationally recognised as the best means by which objective and scientifically sound data on

waterbird numbers using a given site can be collected. While universally sound, the method is inherently weak for certain species or groups of species due primarily to behaviour and ecology. Amongst these are inland feeding waders (e.g. Curlew, Golden Plover and Lapwing) which occur well beyond discrete wetland sites, species which occur on the open sea (e.g. divers and seaduck), counts of which are constrained by sea and viewing conditions, and skulking species such as Snipe (Colhoun 2001a).

Total numbers are derived from summed 'core counts' across all sites counted in each month on dates as near as possible to the priority dates given. These figures thus exclude other counts (duplicates) taken at a number of sites in the same month. For the assessment of the importance of individual sites, the peak count from each site in each year is used, irrespective of whether a core or duplicate count. A calculation of population trends could theoretically be made by comparing total numbers across sites in each year. However, application of such a technique is confounded by the fact that not all sites are counted in each month and/or year. As a consequence, the most simple method employed here also considers totals across sites counted in January of each year alone. This is susceptible to considerable distortion of any absolute trends which exist due to a number of factors, not least of which are geographical and habitat biases in coverage for sites counted in January of each year, and the consequent limited numbers of sites which can be used in such an analysis. As a consequence, the trends shown for selected species must be interpreted with caution and must be treated as provisional. The method used expresses the sum of counts for individual species as a ratio of an arbitrary standard (as per Ogilvie 1967). The first year of I-WeBS (1994) was chosen for this purpose and the index set at 100.

## Results

### Weather

The weather was generally unsettled during the early part of the season with rainfall above normal between September and December. It was the wettest autumn on record in places. Despite this, sunshine levels were above average between September and March in most parts of the country. Mean temperatures were close to normal between September and December. However, temperatures in January were below normal throughout the country, while December and February had spells of both mild and very cold weather. Overall the winter of 2000/01 was the coldest in five seasons. March was also cooler than normal, with more frequent frosts. Rainfall totals for December to March inclusive were below normal for most of the country.

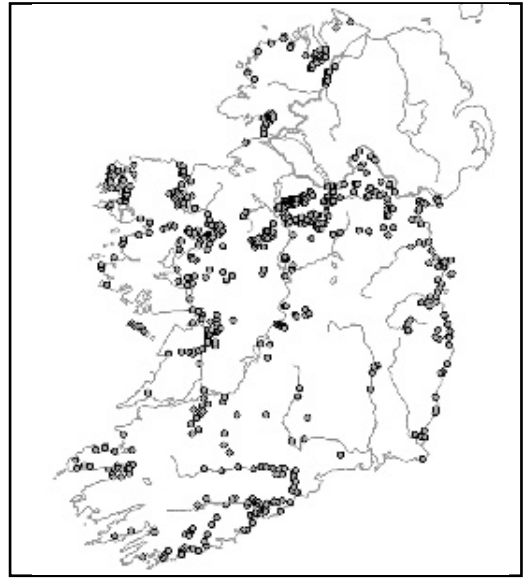
## Coverage

Some 270 sites (comprising 655 count units) were covered in 2000/01. These were widely distributed around the country and included major coastal and inland sites (Figure 1). Priority dates chosen for the 2000/01 season were 16/17 September, 14/15 October, 11/12 November, 9/10 December, 13/14 January, 10/11 February and 10/11 March. The dates of counts on the south and west coasts were one week later in each case. As is usually the case, coverage was greatest in January, when 87% of sites were covered. The effects of Foot and Mouth disease and associated restrictions on access to rural areas resulted in a pronounced decline in coverage in March, when only 17% of sites were covered. In all other months, around 60% of sites were covered on average. The frequency with which sites were covered was variable. 28% of sites were counted in one month only, 26% in six months and only 5% in all seven (Sep-Mar inclusive). A number of significant sites were either not covered or data not submitted in time for incorporation into this paper. These included Loughs Mask, Conn and Cullin (Mayo), the River Slaney, Tacumshin Lake, Bannow Bay (Wexford), Dungarvan Harbour (Waterford) and the Westmeath Lakes. No aerial survey of the Rivers Shannon, Suck or Little Brosna and their callows, or of the Shannon & Fergus Estuary, Lough Ree or Lough Derg was undertaken. However, some of these sites were surveyed from the ground.

## Total numbers

Total numbers of most species were below average, in part reflecting poor March coverage and the absence of counts from a number of key sites as described above. The peak count was made in January when over 400,000 waterfowl were counted at over 230 sites (Table 1). Waders alone accounted for over 55% of this total. In turn, counts of Golden Plover and Lapwing alone accounted for a significant proportion (45%) of the peak wader count (Table 1).

Peak counts were below average for the vast majority of species. Numbers of all diver species and Cormorant were below their long-term means. The continuing increase and expansion of Little Egret was evident in the highest peak yet recorded. Swans and geese were generally recorded in lower than normal numbers. Both Mute and Bewick's Swan numbers fell below average, as did numbers of Greenland White-fronted Goose, and Barnacle Goose. The highest recorded total of Greylag Geese was made in January and numbers of Canada Goose, Light-bellied Brent Goose and Whooper Swan were above average.



**Figure 1.** Map showing locations of sites covered by IWeBS in 2000/01.

## Trends

Increases were evident in eight species, decreases in 13 and a stable trend in eight (Table 2). Notable amongst the increases are those for Gadwall and Shoveler, Oystercatcher, Ringed Plover, Bar-tailed Godwit and Curlew. A decreasing trend was evident for most other duck species, in addition to Grey Plover, Dunlin and Black-tailed Godwit. In contrast, Great Crested Grebe, Cormorant, Little Egret, Mute Swan, Mallard and Redshank, all showed relatively stable numbers, as did both Light-bellied Brent Goose and Greylag Goose.

## Principal sites

The total counts for the most important waterbird sites in the Republic of Ireland are listed in Table 3. The mean of annual maxima since 1996/97 exceeds the 20,000 level (a qualifying Ramsar criterion) at 12 sites. All but three are coastal sites and eight of the top 10 are estuarine. 2000/01 peaks were on the whole lower than previous peaks, reflecting lower than average numbers of waterbirds generally throughout the season at these sites. The long-term average of peak counts at a further 15 sites exceed 10,000 waterbirds. Between them, these 27 sites held over half of the 65 internationally important concentrations. In total 15 species occur in internationally important concentrations and a further 28 in nationally important numbers only (Table 4). The top sites in

**Table 1.** Total numbers of waterbirds counted by I-WeBS in the Republic of Ireland, 2000/01.

Species Name	Sep	Oct	Nov	Dec	Jan	Feb	Mar
<i>No. sites visited</i>	128	150	182	175	234	177	45
<i>No. count units visited</i>	312	357	416	392	649	390	62
Red-throated Diver <i>Gavia stellata</i>	14	111	96	76	136	62	3
Black-throated Diver <i>Gavia arctica</i>	0	0	52	3	31	0	0
Great Northern Diver <i>Gavia immer</i>	8	37	167	189	318	149	3
Pied-billed Grebe <i>Podilymbus podiceps</i>	0	1	0	0	0	0	0
Little Grebe <i>Tachybaptus ruficollis</i>	519	390	295	312	475	265	51
Great Crested Grebe <i>Podiceps cristatus</i>	320	564	541	709	1,157	803	26
Slavonian Grebe <i>Podiceps auritus</i>	4	0	2	4	10	30	0
Black-necked Grebe <i>Podiceps nigricollis</i>	1	2	1	1	2	0	0
Cormorant <i>Phalacrocorax carbo</i>	2,608	2,023	2,153	1,721	2,657	1,745	213
Little Egret <i>Egretta garzetta</i>	208	62	49	32	38	38	15
Grey Heron <i>Ardea cinerea</i>	560	559	458	396	675	304	82
Mute Swan <i>Cygnus olor</i>	1,731	2,270	2,297	2,035	3,518	2,002	382
Bewick's Swan <i>Cygnus columbianus</i>	0	2	100	171	180	18	0
Whooper Swan <i>Cygnus cygnus</i>	27	2,609	2,614	1,906	5,069	1,845	239
Pink-footed Goose <i>Anser brachyrhynchus</i>	0	12	6	9	29	20	0
Greenland White-fronted Goose <i>Anser a. flavirostris</i>	0	4,275	8,422	7,951	9,576	1,548	3
Greylag Goose <i>Anser anser</i>	407	1,828	1,315	1,708	5,848	2,789	299
Canada Goose <i>Branta canadensis</i>	187	68	91	4	220	40	1
Barnacle Goose <i>Branta leucopsis</i>	0	21	352	259	524	478	0
Dark-bellied Brent Goose <i>Branta b. bernicla</i>	0	0	0	0	1	2	0
Light-bellied Brent Goose <i>Branta b. hrota</i>	64	1,947	5,328	10,612	12,888	10,943	766
feral/hybrid goose <i>Anser sp.</i>	1	181	59	37	98	84	21
Shelduck <i>Tadorna tadorna</i>	147	338	1,570	3,351	5,408	5,007	340
Wigeon <i>Anas penelope</i>	3,434	12,833	29,986	24,294	42,898	22,198	839
American Wigeon <i>Anas americana</i>	0	0	0	1	1	2	0
Gadwall <i>Anas strepera</i>	49	138	165	237	244	246	17
Teal <i>Anas crecca</i>	3,539	7,949	12,128	12,481	24,922	15,516	1,403
Green-winged Teal <i>Anas c. carolinensis</i>	0	0	0	1	0	1	1
Mallard <i>Anas platyrhynchos</i>	10,563	9,611	11,791	8,934	15,829	5,963	593
Pintail <i>Anas acuta</i>	14	77	147	354	668	381	0
Garganey <i>Anas querquedula</i>	0	0	0	0	1	0	0
Shoveler <i>Anas clypeata</i>	137	638	903	751	2,512	1,650	95
Pochard <i>Aythya ferina</i>	42	10,698	16,289	815	9,163	1,259	59
Ring-necked Duck <i>Aythya collaris</i>	0	1	0	1	3	0	0
Tufted Duck <i>Aythya fuligula</i>	645	3,336	4,577	2,276	6,540	2,788	174
Scaup <i>Aythya marila</i>	7	10	191	311	319	128	0
Eider <i>Somateria mollissima</i>	3	1	2	7	1	6	0
Long-tailed Duck <i>Clangula hyemalis</i>	0	0	47	6	34	0	0
Common Scoter <i>Melanitta nigra</i>	2,038	3,423	4,387	6,457	7,198	693	463
Surf Scoter <i>Melanitta perspicillata</i>	0	0	0	0	2	0	0
Velvet Scoter <i>Melanitta fusca</i>	0	0	0	14	2	1	0
Goldeneye <i>Bucephala clangula</i>	8	34	485	495	1,353	1,026	9
Smew <i>Mergus albellus</i>	0	1	1	1	1	0	0
Red-breasted Merganser <i>Mergus serrator</i>	310	380	603	515	852	606	20
Goosander <i>Mergus merganser</i>	0	0	0	02	0	0	0
Ruddy Duck <i>Oxyura jamaicensis</i>	0	3	1	1	0	0	0
Water Rail <i>Rallus aquaticus</i>	8	13	19	9	19	9	2
Moorhen <i>Gallinula chloropus</i>	410	300	250	260	339	298	85
Coot <i>Fulica atra</i>	1,646	4,871	8,899	1,249	18,250	1,163	136
<b>Total wildfowl</b>	<b>28,891</b>	<b>70,996</b>	<b>116,332</b>	<b>90,528</b>	<b>179,298</b>	<b>81,764</b>	<b>6,243</b>

Table 1. (Continued).

Species Name	Sep	Oct	Nov	Dec	Jan	Feb	Mar
Oystercatcher <i>Haematopus ostralegus</i>	23,252	20,347	22,771	18,359	20,038	18,093	968
Ringed Plover <i>Charadrius hiaticula</i>	2,122	3,434	4,111	2,578	2,991	1,906	195
American Golden Plover <i>Pluvialis dominica</i>	1	0	0	0	0	0	0
Golden Plover <i>Pluvialis apricaria</i>	3,096	38,269	63,424	37,337	48,360	57,319	4,166
Grey Plover <i>Pluvialis squatarola</i>	859	1,470	1,151	2,137	1,785	1,295	217
Lapwing <i>Vanellus vanellus</i>	3,893	13,232	42,554	48,651	54,435	33,143	132
Knot <i>Calidris canutus</i>	2,986	2,811	5,998	9,599	11,340	12,015	248
Sanderling <i>Calidris alba</i>	728	1,086	1,250	1,291	1,099	605	155
Little Stint <i>Calidris minuta</i>	4	0	0	0	0	0	0
White-rumped Sandpiper <i>Calidris fuscicollis</i>	0	1	0	0	0	0	0
Baird's Sandpiper <i>Calidris bairdii</i>	1	0	0	0	0	0	0
Curlew Sandpiper <i>Calidris ferruginea</i>	29	0	0	0	0	0	0
Purple Sandpiper <i>Calidris maritima</i>	33	17	32	60	34	40	10
Dunlin <i>Calidris alpina</i>	5,083	15,388	19,040	35,729	41,387	28,663	1,297
Buff-breasted Sandpiper <i>Tryngites subruficollis</i>	1	0	0	0	0	0	0
Ruff <i>Philomachus pugnax</i>	60	14	3	1	4	5	0
Jack Snipe <i>Lymnocyptes minimus</i>	1	2	13	23	22	19	17
Snipe <i>Gallinago gallinago</i>	92	282	550	681	772	512	179
Woodcock <i>Scolopax rusticola</i>	0	0	0	2	3	0	0
Black-tailed Godwit <i>Limosa limosa</i>	5,412	3,799	8,523	6,846	9,935	5,691	237
Bar-tailed Godwit <i>Limosa lapponica</i>	3,285	3,133	6,126	6,245	6,174	5,776	347
Whimbrel <i>Numenius phaeopus</i>	23	3	0	0	2	8	1
Curlew <i>Numenius arquata</i>	13,133	12,561	15,384	17,315	17,337	18,375	626
Spotted Redshank <i>Tringa erythropus</i>	2	27	4	1	105	0	0
Redshank <i>Tringa totanus</i>	10,641	11,644	8,968	7,343	9,459	9,585	565
Greenshank <i>Tringa nebularia</i>	382	367	341	256	279	274	33
Green Sandpiper <i>Tringa ochropus</i>	9	7	5	1	7	1	0
Wood Sandpiper <i>Tringa glareola</i>	1	0	0	0	0	0	0
Common Sandpiper <i>Actitis hypoleucos</i>	9	15	6	11	8	3	0
Turnstone <i>Arenaria interpres</i>	858	1,144	1,927	1,349	1,579	1,356	225
Grey Phalarope <i>Phalaropus fulicarius</i>	0	0	0	1	0	0	0
<b>Total waders</b>	<b>75,996</b>	<b>129,053</b>	<b>202,181</b>	<b>195,816</b>	<b>227,155</b>	<b>194,684</b>	<b>9,618</b>
<b>Total waterfowl</b>	<b>105,655</b>	<b>200,670</b>	<b>319,020</b>	<b>286,772</b>	<b>407,166</b>	<b>276,790</b>	<b>15,958</b>
Mediterranean Gull <i>Larus melanocephalus</i>	7	1	1	1	2	4	1
Little Gull <i>Larus minutus</i>	0	0	0	0	1	0	0
Black-headed Gull <i>Larus ridibundus</i>	18,697	17,767	20,794	21,068	19,856	15,133	668
Ring-billed Gull <i>Larus delawarensis</i>	0	1	1	3	0	3	1
Common Gull <i>Larus canus</i>	4,069	4,634	4,859	6,483	7,264	3,509	226
Lesser Black-backed Gull <i>Larus fuscus</i>	10,443	5,387	3,552	1,665	2,051	1,212	369
Herring Gull <i>Larus argentatus</i>	1,718	2,003	1,883	1,999	2,163	1,022	154
Iceland Gull <i>Larus glaucoides</i>	0	0	0	1	0	1	0
Glaucous Gull <i>Larus hyperboreus</i>	1	0	0	0	5	1	0
Great Black-backed Gull <i>Larus marinus</i>	1,647	1,302	1,497	1,882	1,717	522	182
Kittiwake <i>Rissa tridactyla</i>	6	0	0	787	227	32	2
<b>Total Gulls</b>	<b>36,588</b>	<b>31,095</b>	<b>32,587</b>	<b>33,889</b>	<b>33,286</b>	<b>21,439</b>	<b>1,603</b>
Sandwich Tern <i>Sterna sandvicensis</i>	574	0	0	0	0	0	3
Common Tern <i>Sterna hirundo</i>	7	1	0	0	0	0	0
Arctic Tern <i>Sterna paradisaea</i>	1	0	0	0	0	0	0
Black Tern <i>Chlidonias niger</i>	2	2	0	0	0	0	0
<b>Total Terns</b>	<b>584</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>3</b>
Kingfisher <i>Alcedo atthis</i>	12	11	10	7	11	6	0

**Table 2.** Provisional population trends of selected waterbird species derived from 119 sites counted in January of each year 1995 - 2001 inclusive. See text for details and limitations of the method used.

Species name	1995	1996	1997	1998	1999	2000	2001
Little Grebe	100	48	76	67	78	108	103
Great Crested Grebe	100	70	56	87	56	57	81
Cormorant	100	72	116	99	69	117	83
Little Egret	100	600	900	800	700	600	600
Grey Heron	100	138	206	138	131	263	131
Mute Swan	100	60	87	113	141	57	61
Whooper Swan	100	228	395	298	174	240	60
Greylag Goose	100	80	269	171	74	114	174
Light-bellied Brent Goose	100	110	84	151	46	108	120
Shelduck	100	133	142	130	149	148	88
Wigeon	100	131	121	120	114	64	91
Gadwall	100	60	163	120	193	123	143
Teal	100	157	111	113	92	84	110
Mallard	100	101	120	104	138	108	103
Pintail	100	375	108	192	100	83	0
Shoveler	100	118	56	146	126	153	124
Pochard	100	172	329	90	64	61	35
Tufted Duck	100	68	103	50	54	71	59
Red-breasted Merganser	100	132	332	153	111	42	158
Coot	100	65	81	72	63	107	48
Oystercatcher	100	84	59	110	117	83	114
Ringed Plover	100	128	210	95	70	130	193
Grey Plover	100	141	139	146	26	52	33
Dunlin	100	93	74	111	57	97	78
Black-tailed Godwit	100	48	21	8	152	11	52
Bar-tailed Godwit	100	98	189	98	130	241	175
Curlew	100	135	78	172	171	138	109
Redshank	100	179	120	150	151	133	127
Greenshank	100	88	73	119	81	104	42
Turnstone	100	116	84	48	49	67	40

**Table 3.** Total numbers of waterbirds at principal wetlands counted by I-WeBS, 1996/97 - 2000/01; totals are derived from summed annual maxima of each species across all months Sep - Mar inclusive in each year. Only sites holding 10,000 or more waterbirds and those holding internationally important concentrations of one or more species are shown. Species codes are given below, with those shown in lower- and upper-case indicating occurrence in nationally and internationally important numbers respectively.

BA: Bar-tailed Godwit	GP: Golden Plover	PS: Purple Sandpiper
BS: Bewick's Swan	GV: Grey Plover	PT: Pintail
BW: Black-tailed Godwit	H.: Grey Heron	RK: Redshank
BY: Barnacle Goose	KN: Knot	RM: Red-breasted Merganser
CA: Cormorant	L.: Lapwing	RP: Ringed Plover
CO: Coot	LG: Little Grebe	SP: Scaup
CU: Curlew	LN: Long-tailed Duck	SS: Sanderling
CX: Common Scoter	MA: Mallard	SU: Shelduck
DN: Dunlin	MS: Mute Swan	SV: Shoveler
GA: Gadwall	ND: Great Northern Diver	T.: Teal
GG: Great Crested Grebe	NW: Greenland White-fronted Goose	TT: Turnstone
GJ: Greylag Goose	OC: Oystercatcher	TU: Tufted Duck
GK: Greenshank	PB: Light-bellied Brent Goose	WN: Wigeon
GN: Goldeneye	PO: Pochard	WS: Whooper Swan

Table 3. (Continued)

Site	96-97	97-98	98-99	99-00	00-01	Mean	Species
Shannon & Fergus Estuary	63,307	65,097	62,230	46,097	-	59,183l	g,gg,ca,ms,ws,gj,PB,su,wn,ga,t.,ma,pt,sv,sp,co,rp,gp,gv,l.,kn,dn,BW,ba,cu,RK,gk,tt
Dundalk Bay	62,048	50,145	46,682	66,903	42,215	53,599	gg,ca,gj,PB,su,t.,ma,pt,rm,OC,rp,gp,gv,l.,KN,dn,BW,BA,cu,RK
Wexford Harbour & Slobs	57,689	47,817	41,583	(32,792)	(24,515)	49,030	lg,gg,ca,ms,BS,NW,PB,su,wn,t.,ma,pt,sp,gn,rm,co,oc,rp,gp,gv,l.,kn,ss,dn,BW,BA,cu,rk,gk
Lough Corrib	23,467	36,747	46,233	34,590	35,158	35,239	ms,nw,ga,sv,PO,tu,co,gp,l.
Cork Harbour	50,259	31,305	32,718	-	28,686	34,661	lg,gg,ca,su,wn,t.,ma,pt,sv,rm,oc,gp,gv,l.,dn,BW,ba,cu,RK,gk,tt
Little Brosna Callows	(2)	24,334	33,681	44,705	27,380	32,525	ws,NW,wn,t.,pt,sv,gp,l.,BW
Dublin Bay	36,191	40,295	30,860	23,049	26,247	31,328	gg,PB,su,t.,pt,sv,rm,oc,rp,gp,gv,kn,ss,dn,bw,BA,cu,RK,gk,tt
Tralee Bay, Lough Gill & Akeragh Lough	22,207	21,779	42,409	31,169	25,646	28,642	ms,ws,PB,su,wn,ga,t.,ma,pt,sv,sp,oc,rp,gp,gv,l.,ss,dn,bw,ba,cu,rk,gk,tt
Lough Swilly	25,968	26,170	25,995	28,513	27,819	26,893	lg,gg,ca,ms,WS,NW,GJ,su,wn,ma,sv,tu,sp,gn,rm,co,oc,kn,dn,cu,RK,gk
Ballymacoda	27,117	23,714	26,688	26,682	26,710	26,182	t.,rp,gp,gv,l.,kn,ss,dn,BW,ba,cu,rk,tt
Shannon Callows	11,535	4,960	27,581	40,172	-	21,062	ms,WS,wn,gp,l.,bw
Tacumshin Lake	17,724	17,245	35,998	12,683	-	20,913	lg,ms,BS,WS,wn,ga,t.,pt,sv,tu,co,gp,gv,l.,bw
<b>&gt;10,000 waterbirds</b>							
Dungarvan Harbour	23,912	21,181	17,476	15,349	-	19,480	gg,PB,su,rm,oc,gp,gv,l.,kn,dn,BW,ba,rk,tt
Lough Ree	(4,134)	24,884	16,520	9,674	22,020	18,275	ms,wn,t.,ma,pt,sv,tu,gn,co,gp,l.
Boyne Estuary	11,911	21,331	24,218	12,224	18,053	17,547	su,oc,gp,gv,l.,kn,ss,bw,rk,tt
The Cull & Killag	21,085	15,869	17,290	15,137	-	17,345	PB,su,rp,gp,gv,l.,bw,ba
Castlemaine Harbour & Rossbehy	28,465	19,184	17,556	8,710	11,060	16,995	ca,PB,su,pt,sp,cx,oc,rp,ss,ba,rk,gk,tt
Inner Galway Bay	16,058	17,418	10,869	19,923	15,364	15,926	ND,lg,ca,h.,ms,PB,wn,t.,sv,rm,rp,gp,l.,dn,ba,rk,tt
Rahasane Turlough	21,170	20,894	5,317	15,792	14,126	15,460	ws,nw,wn,gp,bw
Rogerstown Estuary	14,083	15,302	11,019	11,906	23,861	15,234	gj,PB,su,sv,oc,rp,gv,kn,ss,dn,bw,rk,gk,tt
Bannow Bay	14,738	8,684	18,729	13,086	-	13,809	PB,su,pt,oc,gp,gv,l.,kn,dn,bw,ba,rk
Courtmacsherry Bay, Broadstrand Bay & Dunworley	15,182	11,703	16,069	14,459	10,135	13,510	su,rm,gp,gv,bw,cu,gk

**Table 3.** (Continued)

Site	96-97	97-98	98-99	99-00	00-01	Mean	Species
Southern Roscommon Lakes	13,517	(220)	5,839	20,438	14,196	13,498	t.,pt,sv,gp,l.
Blackwater Estuary	15,064	13,650	16,157	8,804	12,781	13,291	gp,l.,dn,bw,rk,gk
Broadmeadow (Malahide) Estuary	8,759	10,835	14,126	9,394	11,452	10,913	gg,PB,su,pt,gn,rm,oc,gv, kn,dn,bw,ba,gk,tt
Killala Bay	10,133	7,323	11,861	15,223	8,858	10,680	rp,gp,gv,kn,ss,dn,ba,rk,gk
Tramore Back Strand & Bay	13,019	9,352	8,693	11,246	-	10,578	PB,gp,gv,l.,dn,bw,ba
<b>&lt;10,000 waterbirds</b>							
Carlingford Lough	7,460	8,729	9,172	9,955	(3,565)	9,285	gg,ca,PB,sp,ln
The Mullet, Broadhaven & Blacksod Bays	13,107	(3,594)	5,207	8,644	9,225	9,046	ND,BY,cx,rm,RP,gv,kn,ss, ps,dn,ba,tt
North Central Galway Lakes	4,634	13,256	6,488	3,494	11,523	7,879	WS,wn,gp
Clonakilty Bay	8,569	6,513	8,294	(28)	7,201	7,644	su,rp,gv,BW,gk
Baldoyle Bay	5,923	7,374	6,592	9,303	5,749	6,988	gg,PB,rp,gp,gv,bw,ba
North Wicklow Coastal Marshes	10,176	7,045	5,726	-	5,633	6,737	lg,gj,PB,wn,t.
Lough Iron	7,435	7,118	6,602	4,948	-	6,526	WS,NW,wn,t.,sv
Sligo Harbour	6,938	(258)	6,360	3,804	-	5,701	PB,oc,rk,gk
Cashen River Estuary	-	-	3,677	6,385	-	5,031	WS,gp
Ballyallia Lake	4,763	4,958	7,288	46	5,539	4,519	wn,ga,t.,ma,SV,co,bw
Blackwater Callows	5,594	3,895	2,952	2,910	3,709	3,812	WS,wn,t.,bw
River Foyle	4,505	2,130	3,789	4,498	3,160	3,616	ca,WS,gj,t.
Lough Oughter Complex	4,030	3,410	3,838	3,627	2,726	3,526	gg,ms,WS,wn,gn
Donegal Bay	4,521	1,098	4,747	4,042	3,161	3,514	ND,ms,ws,PB,cx,ss
Drumcliff Bay Estuary	-	1,537	3,191	4,553	-	3,094	BY,ln,rp,ss,ba
River Suck	1,244	1,815	2,948	3,854	4,777	2,928	WS,NW
Stabannan\Braganstown	2,432	1,333	2,444	3,397	4,190	2,759	GJ
L. Coy - Blackrock - Bullaunagh - Ballylee	2,068	(947)	4,378	1,115	3,110	2,668	WS
Coole Lough - Newtown Turlough	4,645	(754)	2,454	791	2,776	2,667	WS
Skerries Islands	2,690	2,455	3,087	2,965	2,102	2,660	ca,PB,ps,tt
Trawbrega Bay	2,597	2,309	2,620	2,691	-	2,554	PB,BY
Lough Gara	2,597	-	-	-	1,201	1,899	WS,NW
Seagrang Park	1,290	1,006	867	1,668	1,590	1,284	PB,bw
Ballyvaughan Bay	1,238	1,273	-	(375)	-	1,256	ND
Glen Lough	267	464	637	1,538	-	727	WS
Gweebarra Bay	710	-	-	-	-	710	BY,ln
Birmore Island	-	-	-	456	-	456	BY
River Blackwater	-	182	-	-	-	182	WS
Oilean MacDara	-	536	-	-	-	536	BY

**Table 4.** Number of concentrations of waterbirds counted in each year, 1996/97 - 2000/01 which attained threshold levels for international and interim all-Ireland importance levels. The most recent threshold values (Colhoun *et al* in prep.) are used.

	No. of internationally important concentrations					Additional concentrations of all-Ireland importance				
	96-97	97-98	98-99	99-00	00-01	96-97	97-98	98-99	99-00	00-01
Great Northern Diver	2	3	3	4	2	?	?	?	?	?
Little Grebe	?	?	?	?	?	17	12	16	15	8
Great Crested Grebe	0	0	0	0	0	14	9	13	13	9
Cormorant	0	0	0	0	0	18	13	15	16	11
Grey Heron	0	0	0	0	0	0	0	0	0	2
Mute Swan	0	0	0	0	0	20	14	19	23	13
Bewick's Swan	2	2	0	2	0	5	0	1	7	1
Whooper Swan	14	7	11	11	8	12	4	14	17	5
Greenland White-fronted Goose	3	7	7	5	3	2	2	2	4	8
Greylag Goose	2	1	4	4	2	10	10	9	9	10
Barnacle Goose	3	2	5	4	2	4	3	4	4	0
Light-bellied Brent Goose	19	19	22	26	22	0	0	0	0	0
Shelduck	0	0	0	0	0	18	16	19	19	11
Wigeon	0	0	0	0	0	25	20	21	23	12
Gadwall	0	0	1	0	0	11	9	6	10	5
Teal	0	0	0	0	0	23	25	26	26	21
Mallard	0	0	0	0	0	12	7	10	13	8
Pintail	0	0	0	0	0	19	15	17	11	6
Shoveler	1	0	0	0	2	24	23	23	17	14
Pochard	2	1	1	1	1	8	6	9	4	0
Tufted Duck	0	1	0	0	0	16	8	9	14	4
Scaup	0	0	0	0	0	7	4	6	7	5
Eider	0	0	0	0	0	0	1	1	0	0
Long-tailed Duck	0	0	0	0	0	3	0	2	1	2
Common Scoter	0	0	0	0	0	9	7	9	9	6
Goldeneye	0	0	0	0	0	9	8	7	8	4
Red-breasted Merganser	0	0	0	0	0	23	17	18	19	10
Coot	0	0	1	0	1	12	11	8	9	3
Oystercatcher	1	0	0	1	0	14	18	17	17	12
Ringed Plover	2	1	2	0	3	21	22	23	27	16
Golden Plover	0	0	0	0	0	30	32	36	36	24
Grey Plover	1	1	0	0	0	21	21	20	21	12
Lapwing	0	0	0	1	0	28	25	23	20	15
Knot	2	2	2	2	2	12	8	10	11	8
Sanderling	0	0	0	0	0	17	15	17	19	14
Purple Sandpiper	0	0	0	0	0	2	4	5	6	2
Dunlin	0	1	0	1	0	21	16	21	18	16
Black-tailed Godwit	7	8	14	8	11	23	21	18	16	10
Bar-tailed Godwit	5	3	4	4	2	14	14	14	14	13
Curlew	0	1	0	0	0	11	9	13	12	10
Redshank	3	4	5	3	4	14	16	14	16	17
Greenshank	0	0	0	0	0	14	14	15	12	10
Turnstone	0	0	0	0	0	12	13	17	15	8
<b>Total</b>	<b>69</b>	<b>64</b>	<b>82</b>	<b>77</b>	<b>65</b>	<b>575</b>	<b>492</b>	<b>547</b>	<b>558</b>	<b>365</b>

descending order of overall waterbird totals are the Shannon & Fergus Estuary (28 species: 3 internationally important 25 nationally important), Dundalk Bay (20: 6/14), Wexford Harbour & Slobs (29: 5/24).

## Future developments

The I-WeBS scheme, presently in its ninth season, is firmly established as the primary monitoring tool for waterbirds and wetland sites in the Republic of Ireland. This is complemented by close collaboration with the WeBS scheme in the UK which improves our understanding of waterbird ecology on a Britain/ all-Ireland basis. The importance of this scheme is demonstrated by the increasing demands made by government, non-government bodies, academic institutions and individuals for the high quality and integrity of the data collected and managed by the scheme. No other project of its kind manages, and regularly reports on, results in such a comprehensive manner. The ever-expanding database of information increases in value as each new season's data is added. This is because at least several seasons' data are required for generating estimates of population sizes. In order to keep such estimates 'current', revisions of estimates must be based on contemporary data. Similarly, for determination of trends at national levels, a continuous flow of high-quality data is needed each year. Only through such continuous effort can changes at the level of individual sites be described which can, in turn, influence and direct conservation action to manage sites for species conservation.

Revised all-Ireland population estimates are approaching completion (Colhoun et al in prep) and population trends are being analysed using Underhill indices (Underhill and Prys-Jones 1994) which can take account of gaps in coverage. The latter will be updated annually and population estimates at six to nine year intervals. Such analyses will benefit from improved coverage of some of the most important sites particularly in the mid-winter months (November - February), when the majority of wintering waterbird species present in this country have reached peak numbers. Additional counts outwith this period should prioritise months with site-specific phenological peaks for the most important species, such as autumn peaks of passage waders or resident breeding species at key sites.

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## References

- Bibby CJ, Burgess ND, Hill DA. 1992. *Bird Census Techniques*. Academic Press, London.
- Colhoun K. 1999. *Irish Wetland Bird Survey, 1996-97. Results from the third winter of the Irish Wetland Bird Survey*. BirdWatch Ireland, Dublin.
- Colhoun K. 2000. *Irish Wetland Bird Survey, 1997-98. Results from the fourth winter of the Irish Wetland Bird Survey*. BirdWatch Ireland, Dublin.
- Colhoun K. 2001a. *Irish Wetland Bird Survey, 1998-99. Results from the fifth winter of the Irish Wetland Bird Survey*. BirdWatch Ireland, Dublin.
- Colhoun K. 2001b. Irish Wetland Bird Survey, 1999-00: summary of the sixth I-WeBS season. *I-WeBS News* 6: 2-14.
- Colhoun K, Kershaw M, Cranswick PA & Rehfish MM, in prep. *A revision of population estimates for waterbirds wintering in Ireland: 1994/95 - 1998/99*.
- Delany S. 1996. *Irish Wetland Bird Survey, 1994/95. Results from the first winter of the Irish Wetland Bird Survey*. BirdWatch Ireland, Dublin.
- Delany S. 1997. *Irish Wetland Bird Survey, 1995/96. Results from the second winter of the Irish Wetland Bird Survey*. BirdWatch Ireland, Dublin.
- Hutchinson CD. 1979. *Ireland's Wetlands and their Birds*. IWC, Dublin.
- Ogilvie MA. 1967. Population changes and mortality of the Mute Swan in Britain. *Wildfowl* 18: 64-73.
- Sheppard R. 1993. *Ireland's Wetland Wealth: the birdlife of the estuaries, lakes, coasts, rivers, bogs and turloughs of Ireland*. IWC, Dublin.
- Underhill LG, Prys-Jones RP. 1994. Index numbers for waterbird populations I. Review and methodology. *Journal of Applied Ecology*.