

Irish Wetland Bird Survey: results of waterbird monitoring in Ireland in 2009/10

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In 2009/10, 253 sites comprising 733 subsites were covered as part of the Irish Wetland Bird Survey, and this included the majority of the important sites. A total of 104 waterbird species was recorded, with numbers of most species peaking in January. Wigeon *Anas penelope*, Teal *Anas crecca* and Light-bellied Brent Goose *Branta bernicla hrota* among the wildfowl, Golden Plover *Pluvialis apricaria*, Lapwing *Vanellus vanellus* and Dunlin *Calidris alpina* among the waders, and Black-headed Gull *Chroicocephalus ridibundus* among the gulls, were the most numerous species recorded. A total of 48 internationally important and 86 nationally important sites were identified, with Dundalk Bay, Wexford Harbour and Slob, Lough Foyle, Dublin Bay and Lough Swilly being the top five most important sites. The trends of 39 species were measured and showed that 18 increased on average over the period between 1994/95 and 2009/10, while eight declined. Greatest increases were in Barnacle Goose *Branta leucopsis*, Canada Goose *Branta canadensis*, Light-bellied Brent Goose, Sanderling *Calidris alba* and Black-tailed Godwit *Limosa limosa*, while greatest declines were in Bewick's Swan *Cygnus columbianus bewickii* and Scaup *Anas marila*. A cold weather period extending from mid-December 2009 into January 2010 may have been responsible for lower numbers of several species in January 2010.



Introduction

Situated along some of the major flyways for arctic-nesting species, Ireland is of significant importance for wintering waterbirds. Extensive areas of wetland and a relatively mild climate attract more than one million waterbirds each winter. Most species which occur in Ireland migrate from the north and northwest (principally Canada, Greenland and Iceland), or

from the northeast (northern Europe, Scandinavia, Russia and Siberia), moving south to winter predominantly in west and northwest Europe and west Africa (Wetlands International 2006, Wernham *et al.* 2002).

Plate 80. Greenshank (John Fox).

As a member of the European Union, and as a signatory to a number of international conservation conventions, Ireland is required to identify and designate important wetlands for waterbirds. As a part of this process, Ireland is obliged to carry out regular monitoring of these sites.

The Irish Wetland Bird Survey (I-WeBS) was initiated in the Republic of Ireland in 1994/95. This survey is ongoing, and aims to continue to monitor wintering waterbird populations and the wetlands upon which they rely. Data collected during this and previous surveys (including the Winter Wetland Survey (1984/85-1986/87) and the Wetlands Enquiry (1971/72-1973/74)) have provided the basis for designating over 80 wetlands as Special Protection Areas (SPAs) in Ireland under the EU Birds Directive (209/147/EC) for their wintering waterbirds. This paper presents summarised results of data collected in 2009/10 on the status of wintering waterbird populations and their key wetland sites in the Republic of Ireland.

Methods

Full details of the methods used have been described in Crowe and Boland (2004). Additional data sources used included that from the January 2010 International Swan Census (Boland *et al.* 2010a), the Baseline Waterbird Survey 2009-2012 (Cummins and Crowe 2010) for selected sites where coverage was otherwise poor, and data provided by the UK Wetland Bird Survey. The scientific names of all species mentioned are listed in Table 1 and Appendix 1.

Results

Coverage

In total, 253 sites comprising 733 subsites were covered in 2009/10 (Figure 1), and included 51% lakes, turloughs and reservoirs, 28% coastal sites (estuarine/open coast) and 15% rivers, with the remaining sites including gravel pits (2) marsh/bogland (5) and grassland (1). Counts were carried out in all months between September and March. Greatest coverage (85% of sites) was achieved in January (Table 1), while coverage in other months was lower, with between 40% and 59% of sites covered. Some 65 sites (26% of total) were covered once only, while 62% of sites were covered in at least three months and 21% were covered in all seven months. Eight sites were covered in additional months outside the core period.

Data were received at the time of writing for almost all key sites covered in 2009/10. Exceptions included Seagrange Park, Portmarnock Marsh, Brandon Bay, Skerries Islands, Ringabella Creek, Lough Gur, Delvin River – Hampton Cove, Lough Carra and the Stick Estuary. Others, such as the grasslands at Kells

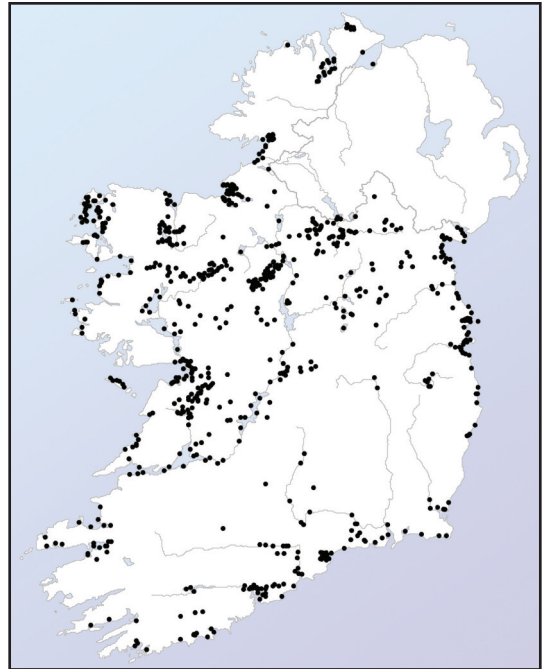


Figure 1. Site and subsite coverage in 2009/10.

(Co. Meath, regularly used by Whooper Swans) and sites such as Kildare Curragh and Inishtrahull Island (Co. Donegal) are only occasionally covered during I-WeBS.

Two aerial censuses were undertaken, on 10 December 2009 and 22 January 2010, of the Shannon and Fergus Estuary, Lough Derg, the Little Brosna Callows, Shannon Callows and the Suck Callows.

Total waterbird numbers

Some 104 species were recorded overall (excluding feral hybrid geese and ducks) (Table 1). Wigeon, Teal, Light-bellied Brent Goose and Whooper Swan were the most numerous wildfowl, and Golden Plover, Lapwing, Dunlin and Oystercatcher were the most numerous wader species recorded. Black-headed Gull, Common Gull and Lesser Black-backed Gull were the most numerous of the gulls.

Largest numbers of waterbirds were recorded in December, totalling over 350,000, and comprising 33% wildfowl (including their allies), 57% waders and 11% gulls (Table 1). Numbers of almost all waterbird groups peaked in January, with the exception of the waders, where the peak was in December. This was due principally to the unusually low numbers of Golden Plover, and to a lesser extent Lapwing, recorded during the severe weather counts in January. Tern numbers peaked in September.

Monthly peaks were widely variable between species in 2009/10, and while most species showed peaks in January (35% of those regularly occurring), there were many

exceptions, with 17% of species showing peaks each in October and November.

Table 1. Total numbers of waterbirds counted during I-WeBS in the Republic of Ireland in 2009/10. Note that less commonly recorded species are listed separately at the bottom of this table and are included in the subtotals given for each of the species groups.

	Sep	Oct	Nov	Dec	Jan	Feb	Mar
Sites covered	103	128	125	150	216	124	122
Subsites covered	201	333	308	375	618	273	267
Mute Swan <i>Cygnus olor</i>	1,407	2,251	2,323	2,302	3,619	1,568	1,304
Bewick's Swan <i>Cygnus columbianus</i>			5	5	100	36	
Whooper Swan <i>Cygnus cygnus</i>	34	3,723	3,817	4,737	11,144	2,913	2,358
Greenland White-fronted Goose <i>Anser albifrons flavirostris</i>		327	8,117	8,532	8,675	8,872	264
Greylag Goose <i>Anser anser</i>	352	1,464	2,966	875	3,091	1,274	540
Canada Goose <i>Branta canadensis</i>	14	194	32		57	15	4
Barnacle Goose <i>Branta leucopsis</i>			3,458	2,062	1,388	968	1,290
Light-bellied Brent Goose <i>Branta bernicla hrota</i>	3,306	11,857	21,813	15,887	17,279	14,067	10,720
Shelduck <i>Tadorna tadorna</i>	481	1,681	4,280	3,959	5,760	4,369	2,362
Wigeon <i>Anas penelope</i>	4,537	12,283	22,397	23,091	38,674	16,588	7,257
Gadwall <i>Anas strepera</i>	219	281	170	343	534	298	309
Teal <i>Anas crecca</i>	4,450	8,364	12,585	15,656	19,020	12,714	7,540
Mallard <i>Anas platyrhynchos</i>	6,386	8,952	7,680	8,061	9,221	4,940	2,685
Pintail <i>Anas acuta</i>	31	242	598	511	625	708	461
Shoveler <i>Anas clypeata</i>	459	1,312	1,287	1,766	2,139	1,220	533
Pochard <i>Aythya ferina</i>	39	58	3,340	1,554	3,040	2,090	993
Tufted Duck <i>Aythya fuligula</i>	319	2,067	17,980	5,910	8,211	3,980	2,096
Scaup <i>Aythya marila</i>	7	169	336	181	283	210	30
Eider <i>Somateria mollissima</i>	3	452	8	4		7	24
Long-tailed Duck <i>Clangula hyemalis</i>		2	9	22	25	12	5
Common Scoter <i>Melanitta nigra</i>	90	9,082	3,036	4,724	4,096	1,015	465
Goldeneye <i>Bucephala clangula</i>		50	359	782	1,183	557	211
Red-breasted Merganser <i>Mergus serrator</i>	48	614	557	520	1,072	664	545
Red-throated Diver <i>Gavia stellata</i>	13	198	135	94	133	127	90
Black-throated Diver <i>Gavia arctica</i>		2	2	3	20		16
Great Northern Diver <i>Gavia immer</i>	25	154	288	337	601	249	195
Cormorant <i>Phalacrocorax carbo</i>	1,382	1,958	1,261	1,356	1,426	860	838
Shag <i>Phalacrocorax aristotelis</i>	109	299	404	207	546	232	61
Little Egret <i>Egretta garzetta</i>	704	439	220	191	149	157	171
Grey Heron <i>Ardea cinerea</i>	482	568	388	447	490	267	238
Little Grebe <i>Tachybaptus ruficollis</i>	632	819	651	765	819	306	317
Great Crested Grebe <i>Podiceps cristatus</i>	190	624	476	692	1,130	627	373
Slavonian Grebe <i>Podiceps auritus</i>		74	13	7	37	36	3
Water Rail <i>Rallus aquaticus</i>	12	23	25	14	13	14	20
Moorhen <i>Gallinula chloropus</i>	262	384	312	1,807	328	238	306
Coot <i>Fulica atra</i>	1,971	3,963	17,188	10,424	9,197	2,802	931
Total wildfowl and their allies	27,993	75,084	138,613	117,887	154,298	85,114	45,651
Oystercatcher <i>Haematopus ostralegus</i>	28,383	31,451	29,227	29,684	23,881	21,022	14,733
Ringed Plover <i>Charadrius hiaticula</i>	1,824	3,644	3,846	2,884	3,249	2,307	660
Golden Plover <i>Pluvialis apricaria</i>	4,429	30,084	35,425	54,952	14,089	9,922	12,395

Grey Plover <i>Pluvialis squatarola</i>	412	329	889	1,188	1,802	653	859
Lapwing <i>Vanellus vanellus</i>	2,877	14,092	28,185	38,325	28,255	14,107	867
Knot <i>Calidris canutus</i>	3,249	4,340	7,347	12,729	21,830	9,382	16,541
Sanderling <i>Calidris alba</i>	2,243	2,686	1,650	2,198	1,856	2,108	1,065
Purple Sandpiper <i>Calidris maritima</i>	1	5	15	37	10	154	
Dunlin <i>Calidris alpina</i>	2,809	5,455	11,620	21,168	30,567	26,578	8,719
Ruff <i>Philomachus pugnax</i>	3	26	32	2	5	1	5
Jack Snipe <i>Lymnocyptes minimus</i>			8	3	2	1	4
Snipe <i>Gallinago gallinago</i>	102	255	720	483	549	303	136
Woodcock <i>Scolopax rusticola</i>			5		1		
Black-tailed Godwit <i>Limosa limosa</i>	8,096	12,974	14,174	5,876	9,195	7,141	7,012
Bar-tailed Godwit <i>Limosa lapponica</i>	3,767	7,828	5,729	9,691	7,508	8,108	6,494
Whimbrel <i>Numenius phaeopus</i>	36	3		1	10	2	6
Curlew <i>Numenius arquata</i>	8,744	10,399	12,254	11,451	12,525	10,439	4,488
Greenshank <i>Tringa nebularia</i>	391	507	419	349	413	283	241
Redshank <i>Tringa totanus</i>	10,630	16,989	13,326	10,759	9,875	9,480	7,579
Turnstone <i>Arenaria interpres</i>	897	1,779	1,783	1,545	2,597	1,647	1,806
Total waders	78,931	142,863	166,652	203,308	168,248	123,499	83,769
Black-headed Gull <i>Chroicocephalus ridibundus</i>	16,048	20,447	16,387	19,248	16,978	14,891	8,617
Mediterranean Gull <i>Larus melanocephalus</i>	12	42	36	20	15	32	11
Common Gull <i>Larus canus</i>	5,590	6,761	9,131	9,636	8,599	5,909	2,913
Lesser Black-backed Gull <i>Larus fuscus</i>	2,167	1,106	7,375	5,073	2,447	562	343
Herring Gull <i>Larus argentatus</i>	2,665	2,279	4,401	3,034	4,271	1,789	1,803
Great Black-backed Gull <i>Larus marinus</i>	934	1,040	1,173	1,262	1,395	505	631
Total gull	27,418	31,682	38,514	38,274	33,713	23,690	14,321
Sandwich Tern <i>Sterna sandvicensis</i>	670	3	1		7		2
Common Tern <i>Sterna hirundo</i>	135						
Roseate Tern <i>Sterna dougallii</i>	12						
Arctic Tern <i>Sterna paradisaea</i>	28		1				
Total tern	845	3	2	0	8	0	2
Kingfisher <i>Alcedo atthis</i>	9	12	6	4	8	3	1
Total waterbirds	135,196	249,644	343,788	359,623	356,275	232,306	143,744

Less commonly recorded species, together with peak count (in parentheses) and number of months recorded: Black Swan *Cygnus atratus* (5) 2, Pink-footed Goose *Anser brachyrhynchus* (18) 4, Bar-headed Goose *Anser indicus* (1) 7, Snow Goose *Anser caerulescens* (1) 1, Dark-Bellied Brent Goose *Branta bernicla bernicla* (2) 3, Black Brant *Branta bernicla nigricans* (1) 2, Ruddy Shelduck *Tadorna ferruginea* (1) 3, American Wigeon *Anas americana* (2) 5, Green-winged Teal *Anas carolinensis* (3) 5, Baikal Teal *Anas formosa* (1) 1, American Black Duck *Anas rubripes* (1) 1, Garganey *Anas querquedula* (1) 2, Ring-necked Duck *Aythya collaris* (2) 4, Smew *Mergellus albellus* (3) 3, Goosander *Mergus merganser* (1) 2, Ruddy Duck *Oxyura jamaicensis* (1) 1, Pacific Diver *Gavia pacifica* (1) 2, Cattle Egret *Bubulcus ibis* (1) 1, Great White Egret *Ardea alba* (1) 3, Glossy Ibis *Plegadis falcinellus* (1) 1, Spoonbill *Platalea leucorodia* (5) 6, Black-necked Grebe *Podiceps nigricollis* (1) 1, American Golden Plover *Pluvialis dominica* (1) 1, Curlew Sandpiper *Calidris ferruginea* (19) 3, Buff-breasted Sandpiper *Tryngites subruficollis* (6) 1, Common Sandpiper *Actitis hypoleucos* (9) 5, Green Sandpiper *Tringa ochropus* (5) 6, Spotted Redshank *Tringa erythropus* (6) 5, Little Gull *Hydrocoloeus minutus* (4) 2, Ring-billed Gull *Larus delawarensis* (4) 5, Yellow-legged Gull *Larus michahellis* (2) 4, American Herring Gull *Larus smithsonianus* (1) 1, Iceland Gull *Larus glaucooides* (3) 4, Glaucous Gull *Larus hyperboreus* (3) 2, Forster's Tern *Sterna forsteri* (1) 1.

Important sites

Totals of 48 internationally important and 86 nationally important sites were identified (Table 2). Of the internationally important sites, ten supported in excess of 20,000 waterbirds (excluding gulls and terns). Dundalk Bay, Wexford

Harbour and Slobs, Lough Foyle, Dublin Bay and Lough Swilly were among the most important sites overall. Among the top sites, waterbird totals were relatively consistent at most sites, with totals in 2009/10 the highest in the five-year period at Dundalk Bay and Lough Corrib and lowest at Lough Foyle and Rogerstown Estuary.

Table 2. Total numbers of waterbirds at principal wetlands counted by I-WeBS between 2005/06 and 2009/10. Totals are derived from summed annual maxima of each species (excluding gulls and terns) across all months September to March inclusive in each year. Species codes are given below, with those shown in lower and upper case indicating occurrence in nationally and internationally important numbers respectively. Asterisks illustrate incomplete counts, which were excluded from calculations of the means.

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

Site	2005/06	2006/07	2007/08	2008/09	2009/10	Mean	Important species
Internationally important sites regularly supporting more than 20,000 waterbirds							
Dundalk Bay	55,986	59,650	59,085	59,782	62,518	59,404	gj, PB, su, wn, t., ma, pt, cx, rm, rh, gg, ca, h., OC, rp, GP, gv, l., KN, dn, BW, BA, cu, gk, rk, tt
Wexford Harbour & Slobs	42,208		39,508*	53,125	30,847*	47,667	ms, bs, WS, NW, PB, su, wn, ga, t., ma, pt, sp, rm, gg, ca, GP, gv, l., BW, ba, cu
Lough Foyle **	39,780	36,228	34,837	39,208	29,938	35,998	WS, gj, PB, su, wn, t., ma, pt, e., rm, rh, lg, gg, h., oc, gp, l., kn, ss, dn, BA, cu, gk, rk
Dublin Bay	27,536	31,575	31,427	33,933	33,634	31,621	PB, su, wn, t., pt, sv, rm, gg, ca, h., oc, rp, gv, KN, ss, dn, BW, BA, cu, gk, rk, tt
Lough Swilly	31,469	31,867	28,552	28,790	30,147	30,165	ms, WS, NW, GJ, PB, su, wn, t., ma, sv, tu, sp, gn, rm, lg, gg, h., co, oc, rp, gp, l., kn, dn, bw, ba, cu, gk, rk
Little Brosna Callows	35,821	17,942	36,803	32,390	279*	27,946	ms, NW, wn, t., pt, SV, gp, l., BW
Lough Corrib	25,962	31,279	16,650	27,423	33,575	26,978	ms, ga, sv, PO, tu, lg, co, gp
Cork Harbour	26,923	21,730*	25,624	19,167*	19,097*	26,274	su, wn, t., ma, sv, rm, lg, gg, ca, h., oc, gp, l., dn, BW, ba, cu, gk, rk, tt
Rogerstown Estuary	32,339	20,039	19,060	26,177	16,878	22,899	gj, PB, su, t., sv, oc, rp, gp, gv, l., kn, dn, BW, cu, gk, rk, tt
Tralee Bay, Lough Gill & Akeragh Lough	29,701	29,142	16,586	10,837	17,015	20,656	ms, PB, wn, sv, sp, oc, rp, gp, l., ss, BW, ba, cu, gk, rk, tt

Other internationally important sites

Dungarvan Harbour ****	19,134	13,740	19,563	18,265	23,354	18,811	PB, su, oc, gp, gv, kn, dn, BW, ba, gk, rk, tt
Inner Galway Bay	27,180	14,386	14,246	20,049	12,859	17,744	Ms, PB, wn, t., sv, rm, rh, ND, lg, ca, h., oc, rp, gp, gv, l., dn, bw, ba, cu, gk, rk, tt
Ballymacoda	19,127	17,037	16,982	490*	2,276*	17,715	t., gp, gv, ss, dn, BW, ba
Bannow Bay ****	15,273	16,761	17,035	14,542	22,355	17,193	PB, su, gp, gv, l., kn, cu, BW, ba, rk
The Cull & Killag (Ballyteige)	20,424	10,438	23,871	12,661	5,593	14,597	PB, gp, l., bw
Rahasane Turlough	12,592*	11,882	18,650	17,874	8,932	14,335	wn, t., pt, sv, gp, l., BW
Shannon & Fergus Estuary ***	25,986	6,990	11,069	14,698	7,860	13,321	WS, su, wn, t., ca, gp, l., dn, cu, rk
Broadmeadow (Malahide) Estuary	15,870	14,504	14,394	10,619	8,315	12,740	ms, PB, su, pt, cx, gn, rm, gg, h., oc, gp, gv, kn, bw, ba, gk, rk, tt
Boyne Estuary		3,278	16,324	14,786	11,188	11,394	PB, oc, gp, kn, ss, bw, rk
Carlingford Lough **	10,458	9,942	10,477	10,585	4,256	9,144	PB, su, t., sp, rm, gg, ca, h., oc, rp, dn, gk, rk, tt
Nanny Estuary & shore	7,688	4,294	4,591*	10,552	9,165	7,925	PB, cx, oc, rp, kn, ss
Castlemaine Harbour & Rossbehy	4,960*	3,583*	8,112	7,604	5,845*	7,858	PB, pt, cx, oc, kn, ss, dn, ba, cu, rk
Blacksod & Tullaghan Bays	4,806	5,467	3,143*	8,686	10,020	7,245	by, PB, cx, rm, ND, rp, kn, ss, ba, gk, tt
Courtmacsherry Bay, Broadstrand Bay & Dunworley	9,359	6,329	7,362	5,654	5,089	6,759	wn, dn, BW, gk
Tramore Back Strand	10,520	7,412	5,054	7,619	1,640	6,449	PB, gp, gv, bw
Blackwater Estuary		7,762	5,733	7,324	4,638	6,364	BW, cu, gk, rk, LB
Donegal Bay	8,439	5,729	5,901	4,706	7,029	6,361	ms, PB, cx, rm, rh, ND, lg, h., oc, ss, gk
North Wicklow Coastal Marshes	4,762*	4,978*	4,907	7,272	6,778	6,319	gj, PB, wn, t., sv, rh, lg, l., bw
Clonakilty Bay	94*		2,687	6,832	9,170	6,230	gp, kn, BW, gk
River Suck ***	5,749	3,862	6,926	2,886	11,020	6,089	ms, WS, wn
Sligo Harbour	5,486	4,050	7,470	6,008	5,315	5,666	PB, oc, kn, dn, ba
Baldoyle Bay	4,196	5,927	5,544	5,766	5,884	5,463	PB, su, pt, oc, gv, bw, rk
Drumcliff Bay Estuary	4,414	3,148	6,034	4,691	7,975	5,252	BY, kn, ss, ba
Lady's Island Lake	4,208	4,062	3,154	5,062	8,287	4,955	ws, PB, wn, ga, sv, bw
Ballysadare Bay	5,205	2,933	5,769	3,608	5,521	4,607	PB, rm, ss, dn, ba, gk, rk
Killala Bay	9,372	4,611	2,095	4,276	1,535	4,378	PB, ba
Clew Bay	4,337	3,341	3,969	4,708	4,024	4,076	by, PB, rm, h., rp, ss, gk, rk
Trawbreaga Bay ****			3,564	3,382	4,155	3,700	BY, PB, gk
Termoncarragh & Annagh Marsh	3,766	3,411	2,774	2,848	4,801	3,520	BY, rp, ss
Lough Rea	2,830	2,970	2,828	3,217	3,765	3,122	SV, co
Inishkea Islands	3,105					3,105	BY
Lough Iron	2,924	3,975	4,255	1,855	2,143	3,030	ws, NW, sv
Hicks Tower, Robswall	2,804	1,898	2,744	3,051	3,226	2,745	PB, oc, rp, gv, ba
Dundalk Bay Outer (North: Ballagan Point - Giles Quay)	2,035	1,453*	1,508*	1,929	1,811	1,925	PB, ca, tt
Seagrange Park	922	1,400				1,161	PB, BW
Portmarnock Marsh	517	935	1,089			847	PB
Lambay Island	747		1,045	27	980	700	PB
Kells (Meath)		240				240	WS

Nationally important sites supporting more than 1,000 birds

Tacumshin Lake	13,686	18,693	23,826	12,665	23,688	18,512	ms, ws, su, wn, ga, t., pt, sv, lg, gp, l., bw
Southern Roscommon Lakes	4,789*	10,933	15,083	11,047	9,987	11,763	nw, wn, t., pt, sv, gp, l.
Inishcarra Reservoirs	9,337	13,688	10,405	11,761	10,868	11,212	ms, wn, t., ma, sv, tu, gp, l.
Lough Ree	6,771	13,270	15,379		36*	11,807	ms, ws, wn, sv, tu, lg, co, gp, l.
Cahore Marshes	11,170	8,533*	6,159*	7,372*		11,170	nw, sv, bw
Ballycotton Shanagarry		7,006	8,391	9,031	3,541*	8,143	t., gp, gv, ss, bw
Lough Owel	10,055	6,264	3,856	6,154	6,851	6,636	sv, po, tu, lg, gg, co
Kiltullagh Lough			8,542	5,834	4,752	6,376	sv, gp
Shannon Callows ***	15,278	1,220	3,511	5,382	6,284	6,335	ms, ws, wn, l.
Glenamaddy Turlough			8,914	5,931	2,060	5,635	gp
Dunany Point - Clogher Head	7,039	3,362	4,820	4,632	2,819	4,534	cx, rm, oc, kn, ss
Lough Derravaragh	4,611	5,295	4,703	3,700	3,274	4,317	ms, po, tu, lg, co
Lough Derg (Shannon) ***	4,924	1,970	3,664	5,689	5,247	4,299	ms, t., tu, gn, co
Wexford Bay	2,318	3,888	2,457		8,417	4,270	cx, rh
Kildare Curragh	5,100		3,000			4,050	gp
Lough Sheelin	2,665	3,448	3,794	4,494	2,385	3,357	po, tu, gn, lg, gg, co
Kilcolman Marsh	1,693*	4,537	3,658	2,264	2,156	3,154	wn, t., sv
Boora Lakes - Back Lakes Finnermores				5,422	867	3,145	gp
Rosscarbery	2,903	4,990			1,338	3,077	gp
Lough Cullin	5,781	3,056	2,676	1,286	1,659	2,892	tu
Waterford Harbour	5,246	2,135		2,268	903	2,638	oc, bw
Corofin Wetlands	2,809	295*	604*		2,462	2,636	ms, ga, pt, sv, lg
South Mayo Coast	2,834	2,393	2,804	2,253	2,413	2,539	rp, ss
Ballyallia Lake	3,017	2,189	2,753	2,259	2,209	2,485	sv, lg
Lough Oughter Complex	2,806	2,810	2,208	2,087	359*	2,478	ms, ws, tu, gn, gg
North Central Galway Lakes	2,288	3,158	2,403	1,773	2,727	2,470	ws, sv
Lough Kinale & Derragh Lough	2,438				810*	2,438	po, tu, lg, co
Castleplunket Turloughs	1,300*	4,537	1,384	2,589	940	2,363	pt, sv
Lough Ennell	974		2,104	2,913	2,524	2,129	ms, po, tu, lg, co
Rostaff Lake	1,225	2,113	1,692	3,357	1,007	1,879	sv
Coole Lough - Newtown Turlough	2,494	865*	1,145	494*	1,468*	1,820	sv
Brandon Bay - Inner Brandon Bay	541	2,975				1,758	cx, rp, ss, gk
Skerries Islands	1,980	1,251	1,353*	1,554		1,595	ca, tt
River Erne & lakes north of Belturbet	1,863	1,107*	1,313	746*	189*	1,588	tu, co
Mid-Clare Coast (Mal Bay - Doonbeg Bay)	1,971	1,425			1,228	1,541	ss, ps, tt
Skerries Coast	1,376	868*	2,070	1,106	1,028*	1,517	gj, rp, tt
Annaghmore Lakes	702	3,578	842	863	861	1,369	sv
River Slaney			2,084		589	1,337	t.
Broadhaven & Sruwadacon Bays	1,205	273*	962*	787*	1,466	1,336	rm, rp, ss, gk
River Shannon (Lower) ***	1,672	709	371	1,901	1,673	1,265	tu, gn
River Suir Lower	2,505	1,293	420	1,047	1,007	1,254	gj
Lough Gara	856	395	1,037	1,605	1,952	1,169	ws
Glen Lough	1,716	1,269	1,802	436	621	1,169	sv
Ringabella Creek	954	1,498	1,195	1,022		1,167	bw
Lough Gur	1,072	1,779	973	800		1,156	sv

Lough Carra	1,124	1,207	1,147	1,123		1,150	ga, sv, gn, lg
Delvin River - Hampton Cove	2,476		472	500		1,149	cx, kn
Greaghans	942	1,274	1,210	1,290	954	1,134	ws, sv
Inishtrahull Island		1,112				1,112	by, e.
Smerwick Harbour	1,247	1,061	1,043	1,053	1,023	1,085	rp
North East Galway Lakes	827	1,117	1,085	1,077	1,227	1,067	ws, sv
Stick Estuary (Oysterhaven)	1,339	1,063	973	851		1,057	bw
Doolough Headford (Turloughcor)	537	978	1,319	1,567	857	1,052	ga, sv
Poulaphouca Reservoir	1,421	649	1,024	1,270	669	1,007	gj

Other nationally important sites: Lough Arrow 998 (tu, lg), Mullet West 971 (by, ln, ss), Dunfanaghy New Lake 955 (by), Eslin River 853 (ms), Charleville Lagoons 752 (sv), Dublin Zoo Ponds 749 (sv, h.), Termon Turloughs 690 (sv), Omey Strand 654 (rp, ss), Lough Boderg 623 (po), Lough Eorna 605 (sv,), Ballyconneely Bay 576 (rp), Mannin Bay 557 (rp, ss), Lough Aderry 550 (ga, bw), Clonea Strand 548 (rh), Pat Reddan's Lake 545 (ga, sv), Kilglass Lough 520 (lg), Marfield Lake 511 (ga, lg), Bantry Bay 507 (lg), An Trá Beg 506 (gk), Inishmore, Aran Islands 502 (ss), East Ballinamore Lakes 484 (ws), Feacle Turlough 442 (ws), Inishbofin 403 (ss), Bray Harbour 364 (ms), Cor-dara Turlough 349 (sv), Skerries, Baldongan 305 (gj), River Moy 191 (ws), Mountseskin/Gortlum 132 (gj), Ballincrick grasslands 115 (gj), Varry Reservoir 111 (lg), Ballyhonock Lough 84 (ga).

* Poor quality count

** Based on data obtained from UK Wetland Bird Survey (WeBS)

*** Aerial census

**** Data from the Baseline Waterbird Data project 2009-2012 (Cummins and Crowe 2010)

Internationally and nationally important flocks were recorded for 19 and 42 species respectively in at least one of the five seasons between 2005/06 and 2009/10, including 17 and 40 species respectively for the 2009/10 season itself (Table 3). Numbers of internationally and nationally important concentrations were reasonably consistent over the five-season period for most species. The most notable exceptions included an increase in the number of internationally important concentrations of Whooper Swan, Barnacle Goose and Black-tailed Godwit and a decline in Shoveler and Golden Plover. There was an increase in the number of nationally important concentrations relative to other recent seasons of Teal, Pochard, Oystercatcher, Sanderling and Greenshank, and a decline in several species, most notably Greylag Goose, Shelduck, Tufted Duck, Goldeneye, Golden Plover, Lapwing, Curlew and Turnstone.

Waterbird trends

The trends of 39 species were measured for the period 1994/95 to 2009/10 (Figure 2). Increases of 2% or more per year on average were recorded in 18 species, with greatest increases seen in Canada Goose, Barnacle Goose, Light-bellied Brent Goose, Tufted Duck, Little Egret, Sanderling and Black-tailed Godwit. Declines of 2% or more per year were recorded in eight species, including Bewick's Swan, Greylag Goose, Scaup, Goldeneye, Grey Plover, Lapwing, Dunlin and Curlew.

The trends of the remaining 14 species were broadly stable. The trends of most species (24 in total) remained stable or increased between 2008/09 and 2009/10.

Discussion

I-WeBS coverage during the winter of 2009/10 was good and benefited from additional efforts undertaken for the International Swan Census in January 2010, along with additional waterbird surveys undertaken as part of the Baseline Waterbird Survey (Cummins and Crowe 2010). The winter of 2009/10 was documented as having the most extreme cold spell in Ireland since 1963 (Met Éireann 2010a). Weather patterns were relatively normal up until the second half of December, when exceptionally severe frosts and heavy snowfall dominated. December was reported as the coldest in 28 years (Met Éireann 2009). This cold spell persisted into the first half of January.

This cold spell, which also persisted throughout much of Europe, would have affected waterbird distribution patterns and occurrence in Ireland. During cold spells in Europe, many migratory bird species are known to move west from Europe into Britain, and then on to Ireland, which typically experiences milder winter conditions (Wernham *et al.* 2002).

However, in 2009/10, Ireland also suffered these extreme conditions, and many of the inland wetlands were frozen over throughout much of December and January, and some into

Table 3. Internationally and nationally important concentrations of waterbirds recorded in the Republic of Ireland each season between 2005/06 and 2009/10. The threshold values used are based on Crowe *et al.* (2008) (national) and Wetlands International (2006) and are presented in Appendix 1.

Species	Code	Internationally important concentrations					Nationally important concentrations				
		2005	2006	2007	2008	2009	2005	2006	2007	2008	2009
Mute Swan ¹	MS					14	14	20	15	15	
Bewick's Swan	BS					2		1	2	2	
Whooper Swan	WS	8	7	8	8	15	9	8	8	13	12
Greenland White-fronted Goose	NW	2	1	3	3	4	5	2	4	3	1
Greylag Goose	GJ	2	2	1	1	1	8	8	10	8	6
Barnacle Goose	BY	3	2	3	2	6	4	6	2	5	
Light-bellied Brent Goose	PB	24	23	29	29	29					
Shelduck	SU						15	13	12	16	11
Wigeon	WN						22	23	23	16	19
Gadwall	GA						9	12	12	13	12
Teal	T.						20	18	20	18	21
Mallard	MA						7	6	9	6	6
Pintail	PT				1		14	11	11	10	12
Shoveler	SV		3	2	3	1	32	27	30	30	30
Pochard	PO	1	1	1			6	4	8	4	7
Tufted Duck	TU					1	15	13	11	11	9
Scaup	SP						4	3	3	5	3
Eider	E.						1	2	1	1	1
Long-tailed Duck	LN							1	1	1	
Common Scoter	CX						7	9	6	5	7
Goldeneye	GN						8	6	7	6	4
Red-breasted Merganser	RM						17	11	18	17	16
Red-throated Diver	RH						5	4	3	8	8
Great Northern Diver	ND	4	2	4	3	4					
Cormorant	CA						13	10	9	7	6
Grey Heron	H.						9	11	13	13	12
Little Grebe	LG						18	16	23	18	20
Great Crested Grebe	GG						12	11	10	9	7
Slavonian Grebe	SZ					1					
Coot	CO						9	9	8	10	11
Oystercatcher	OC		1	1	1	1	16	13	17	15	20
Ringed Plover	RP		1		2	1	20	16	19	15	18
Golden Plover	GP	4	2	5	2	1	20	26	22	21	13
Grey Plover	GV						14	10	12	15	12
Lapwing	L.						19	15	20	15	11
Knot	KN	2	1	2	3	1	17	9	14	11	14
Sanderling	SS						15	19	15	22	23
Purple Sandpiper	PS						1	1	2		2
Dunlin	DN						14	12	16	17	15
Black-tailed Godwit	BW	11	11	12	11	19	13	14	11	14	6
Bar-tailed Godwit	BA	2	3	4	3	3	15	16	11	14	15
Curlew	CU						17	15	16	10	14
Greenshank	GK						17	19	17	19	20
Redshank	RK	1				1	17	17	21	20	17
Turnstone	TT						15	14	12	15	11
Lesser Black-backed Gull	LB		1	1	2	1					

¹ The Mute Swan population is resident, thus there is no conservation requirement to define 1% thresholds for site assessment for this species.

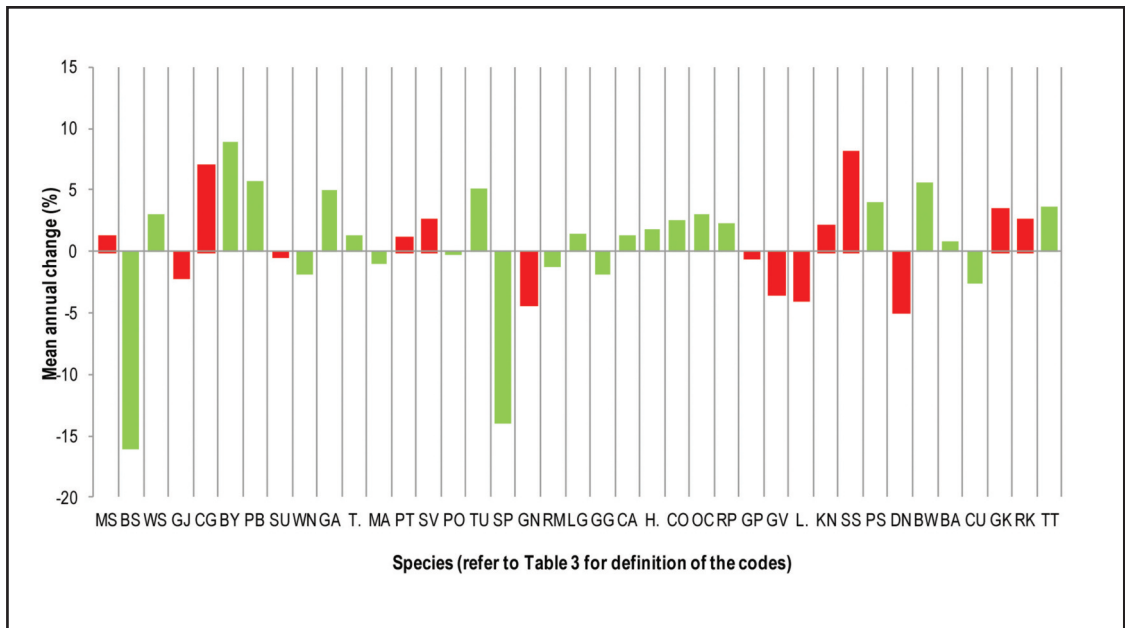


Figure 2. Trends in waterbird numbers between 1994/95 and 2009/10. For each species, the mean annual change per year is presented. The pattern of change between 2008/09 and 2009/10 is illustrated by the colour of the bars, with green showing stability or an increase, and red showing a decline. The trend for Little Egret exceeds the scale and is not shown; its mean annual change was calculated at +48% per year.

February. It is likely that many species would have responded by moving to larger waterbodies, or waterways which are less prone to the frozen conditions, or to coastal sites where frosts are less severe and food is more accessible. Some species such as Wigeon, Teal, Golden Plover and Lapwing are known to move south to France and Iberia under extreme conditions (Wernham *et al.* 2002). It is likely that there was increased mortality caused by additional excessive movements required to escape from frozen conditions, combined with limited accessibility to food. However, some waterbirds presumably benefited from a temporary suspension of hunting that was enacted by the Department of the Environment, Heritage and Local Government on 6 January 2010.

These cold conditions might help explain some of the patterns of occurrence shown in 2009/10. In particular, the decline in numbers of Golden Plover and Lapwing in January relative to the previous month, the increase in number of key wetland sites of international and national importance, and the increase in numbers at some of these sites, especially at Dundalk Bay, Lough Corrib and Dungarvan Harbour. Waterbird totals at the River Suck were inflated in 2009/10 by the presence of large numbers of Golden Plover and Lapwing in particular. These high counts were recorded during December, and prior to the extreme cold weather spell. The

counts of Golden Plover and Lapwing at this site declined from 3,550 and 3,442 respectively in December to 310 and 280 in January.

In contrast, total waterbird counts were lower at some sites in 2009/10, possibly also because of unusual movements of birds caused by the cold weather. At Rogerstown Estuary, numbers of Golden Plover, Lapwing, Curlew and Black-tailed Godwit recorded in 2009/10 were especially low. At Carlingford Lough, numbers of most wader species were low in 2009/10, most notably Oystercatcher, Ringed Plover, Lapwing and Curlew. Numbers of Light-bellied Brent Goose, Shelduck and Mallard were also appreciably lower. Lower bird numbers at Lough Foyle in 2009/10 were due to lower counts of Greylag Goose, Shelduck, Wigeon, Golden Plover, Knot, Dunlin, Bar-tailed Godwit and Curlew. However, Lough Foyle supported higher, internationally important numbers of Slavonian Grebe in 2009/10.

Despite the conditions in 2009/10, numbers of most species were higher at national level than in 2008/09, and the overall mean annual change for most remains favourable, but with declines prevalent within the wader group. Most of the trends are consistent with those previously published (Crowe *et al.* 2008), such as the substantial declines in Bewick's Swan, Scaup and Dunlin, and increases in Barnacle Goose, Light-

bellied Brent Goose and Sanderling. Others show that the status of species like Pintail, Shoveler, Tufted Duck and Turnstone has improved relative to the earlier period. In contrast, Greylag Goose is showing a decline which contrasts with the increase reported previously.

It is important that weather patterns are considered when monitoring the distribution of wintering waterbirds in Ireland. While the ranked importance of sites in 2009/10 did not change greatly relative to other recent winters (Boland *et al.* 2009, 2010b), there were substantial changes in numbers of some species using these sites. Some key inland sites, such as Lough Oughter and the Southern Roscommon Wetlands consist mostly of small lakes or turloughs, which are more susceptible to freezing over. These sites will therefore be expected to support lower numbers of birds during colder winters such as those experienced of late. The following winter of 2010/11 proved to be even colder, with the lowest temperatures ever recorded in Ireland in December 2010 (Met Éireann 2010b), perhaps indicating that colder winters may continue for some years to come.

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Appendix

Scientific names of all species mentioned in the text, together with national (all-Ireland) and international thresholds.

Species		1% National ¹	1% International ²
Mute Swan	<i>Cygnus olor</i>	110	110
Bewick's Swan	<i>Cygnus columbianus</i>	20	200
Whooper Swan	<i>Cygnus cygnus</i>	130	210
Pink-footed Goose	<i>Anser brachyrhynchus</i>		2,250
Greenland White-fronted Goose	<i>Anser albifrons flavirostris</i>	110	270
Greylag Goose	<i>Anser anser</i>	50	870
Barnacle Goose	<i>Branta leucopsis</i>	90	560
Light-bellied Brent Goose	<i>Branta bernicla hrota</i>	260 ³	260

Shelduck	<i>Tadorna tadorna</i>	150	3,000
Wigeon	<i>Anas penelope</i>	820	15,000
Gadwall	<i>Anas strepera</i>	20	600
Teal	<i>Anas crecca</i>	450	5,000
Mallard	<i>Anas platyrhynchos</i>	380	20,000
Pintail	<i>Anas acuta</i>	20	600
Garganey	<i>Anas querquedula</i>		20,000
Shoveler	<i>Anas clypeata</i>	25	400
Pochard	<i>Aythya ferina</i>	380	3,500
Tufted Duck	<i>Aythya fuligula</i>	370	12,000
Scaup	<i>Aythya marila</i>	45	3,100
Eider	<i>Somateria mollissima</i>	30	12,830
Long-tailed Duck	<i>Clangula hyemalis</i>		20,000
Common Scoter	<i>Melanitta nigra</i>	230	16,000
Goldeneye	<i>Bucephala clangula</i>	95	11,500
Red-breasted Merganser	<i>Mergus serrator</i>	35	1,700
Red-throated Diver	<i>Gavia stellata</i>	20	3,000
Black-throated Diver	<i>Gavia arctica</i>		3,750
Great Northern Diver	<i>Gavia immer</i>		50
Cormorant	<i>Phalacrocorax carbo</i>	140	1,200
Little Egret	<i>Egretta garzetta</i>		1,300
Grey Heron	<i>Ardea cinerea</i>	30	2,700
Little Grebe	<i>Tachybaptus ruficollis</i>	25	4,000
Great Crested Grebe	<i>Podiceps cristatus</i>	55	3,600
Slavonian Grebe	<i>Podiceps auritus</i>		55
Moorhen	<i>Gallinula chloropus</i>		
Coot	<i>Fulica atra</i>	330	17,500
Oystercatcher	<i>Haematopus ostralegus</i>	680	10,200
Ringed Plover	<i>Charadrius hiaticula</i>	150	730
Golden Plover	<i>Pluvialis apricaria</i>	1,700	9,300
Grey Plover	<i>Pluvialis squatarola</i>	65	2,500
Lapwing	<i>Vanellus vanellus</i>	2,100	20,000
Knot	<i>Calidris canutus</i>	190	4,500
Sanderling	<i>Calidris alba</i>	65	1,200
Purple Sandpiper	<i>Calidris maritima</i>	35	750
Dunlin	<i>Calidris alpina</i>	880	13,300
Ruff	<i>Philomachus pugnax</i>		12,500
Jack Snipe	<i>Lymnocyptes minimus</i>		
Snipe	<i>Gallinago gallinago</i>		20,000
Black-tailed Godwit	<i>Limosa limosa</i>	140	470
Bar-tailed Godwit	<i>Limosa lapponica</i>	160	1,200
Whimbrel	<i>Numenius phaeopus</i>		2,000
Curlew	<i>Numenius arquata</i>	550	8,500
Spotted Redshank	<i>Tringa erythropus</i>		900
Greenshank	<i>Tringa nebularia</i>	20	2,300
Redshank	<i>Tringa totanus</i>	310	3,900
Turnstone	<i>Arenaria interpres</i>	120	1,500
Black-headed Gull	<i>Chroicocephalus ridibundus</i>		20,000
Mediterranean Gull	<i>Larus melanocephalus</i>		
Common Gull	<i>Larus canus</i>		16,000
Lesser Black-backed Gull	<i>Larus fuscus</i>		4,500
Herring Gull	<i>Larus argentatus</i>		13,000
Great Black-backed Gull	<i>Larus marinus</i>		4,800

¹ Crowe *et al.* 2008² Wetlands International 2006³ Almost 100% if this flyway population winters in Ireland. Thus, the Wetlands International (2006) estimate of 260 birds was adopted for this paper