



Irish Wetland Bird Survey: Results of Waterbird Monitoring in Ireland in 2012/13



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Summary

- The Irish Wetland Bird Survey (I-WeBS) was initiated in the Republic of Ireland in the winter of 1994/ 95. It is the primary tool for monitoring the status of non-breeding wintering waterbirds and the ongoing importance of the wetlands upon which they rely.
- This report aims to summarise the results of the survey in 2012/13 and provides an update on the status of wintering waterbirds and their key sites.
- I-WeBS uses the look-see method where counters record the number of individuals of each waterbird species on frequent visits to their pre-defined wetland sites. Wildfowl, waders and wildfowl allies are counted at each wetland visited. Counts of gulls and terns are optional. It is requested that counts be undertaken once per month between September and March inclusive, and on or near pre-determined dates.
- In 2012/13, 259 sites comprising 743 subsites were covered, and this included the majority of the important sites. Some 65% of sites were covered in at least three months, and greatest coverage during the season was in January when 81% of sites were surveyed.
- A total of 101 waterbird species was recorded, including 68 which are regularly occurring wintering species, and the remainder which are scarce and/ or passage migrants. The maximum number recorded was in January, dominated by waders (52%), followed by ducks (22%) and swans & geese (11%). Light-bellied Brent Goose *Branta brenicla hrota*, Wigeon *Anas penelope*, Coot *Fulica atra*, Golden Plover *Pluvialis apricaria* and Black-headed Gull *Croicocephalus ridibundus* were the most numerous of the swans & geese, ducks, wildfowl allies, waders and gulls respectively.
- Totals of 41 internationally important and 72 nationally important sites were identified, with Dundalk Bay, Wexford Harbour & Slobbs, Lough Swilly and Dublin Bay once again among the top five most important sites. A total of seven sites moved from internationally to nationally important while a further five sites that were of international importance during the last publication are no longer of significant importance.
- The trends of 43 species were measured and showed that 12 species increased on average over the period between 1994/95 and 2012/13, while 10 species declined. Greatest increases were in Little Egret *Egretta garzetta*, (feral) Canada Goose *Branta Canadensis*, Barnacle Goose *Branta leucopsis*, Sanderling *Calidris alba* and Light-bellied Brent Goose while greatest declines were in Bewick's Swan *Cygnus columbianus bewickii*, Scaup *Anas marila*, Pochard *Aythya farina* and Lapwing *Vanellus vanellus*.
- An assessment of shorter-term trends for the period 2008/09 to 2012/13 showed greatest increases in Canada Goose, Barnacle Goose, Light-bellied Brent Goose, Sanderling and Bar-tailed Godwit *Limosa limosa*. Conversely, the greatest short-term declines have been shown in Bewick's Swan, Shoveler *Anas clypeata*, Pochard and Scaup.

Introduction

Ireland is situated on some of the major flyways for arctic-nesting species and 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).

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. On the basis of the data collated through this survey, as well as previous wetland bird surveys, including the Winter Wetland Survey (1984/85-1986/87) and the Wetlands Enquiry (1971/72-1973/74), in excess of 90 wetlands in Ireland have been designated as Special Protection Areas (SPAs) under the EU Birds Directive (2009/147/EC) for wintering waterbirds.

This report presents summarised results of data collated in 2012/13, and on the population status of wintering waterbird and their key wetland sites in the Republic of Ireland.

Tacumshin Lake, Co. Wexford, Photo by Alyn Walsh



Methods

Field methods

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 each waterbird species on frequent visits to their pre-defined wetland sites. Waterbirds are counted at each wetland visited. Counts are requested once per month between September and March inclusive, and on or near pre-determined dates. It is recommended that counts of coastal sites be carried out at or near high tide, and therefore dates selected for survey are on mid-month weekends with high tides as close to midday as possible. Given differences in tidal cycle regimes around Ireland, counts for south and west coast sites are scheduled one week later than those of east coast and midland sites.

Large sites usually require a team of counters to ensure that counts are conducted over a relatively short period (within three hours), thus minimising duplicate counting of birds, particularly for those species that move extensively. Participants are encouraged to try to coordinate counts of adjacent sites between which movements are likely to occur.

Analyses

Waterbird totals are compiled, and annual peaks evaluated. The mean of peaks over the most recent five-season period available is used to examine site importance. In order to generate species trends, the counts are modeled using a multiplicative log-linear index model with site, year and month factors (Underhill and Prys-Jones 1994). Full details on the methods and analyses used have been described in detail in Crowe and Boland (2004) with the following exception. In addition to the standard mean annual

Grey Heron. Photo by Peter Walsh



change overall, a short-term trend which reflects the pattern of change between 2005/06 and 2010/11 is given.

Additional data sources used in this paper included data from the January 2010 International Swan Census (Boland *et al.* 2010), the Baseline Waterbird Survey 2009 – 2012 (Cummins and Crowe 2010, 2011, 2012) and data provided by the UK Wetland Bird Survey.

Results

Coverage

In total, 259 sites comprising 743 subsites were covered in 2012/13 (Fig. 1), with greatest coverage (seven or more counts) mostly at coastal sites, and fewer counts of two or less at inland wetlands. The sites covered were predominantly lakes or estuaries (Fig. 2), with rivers & canals, non-estuarine coast and turloughs each comprising more than 5% of the total sites covered.

Most of the counts were carried out in all months between September and March, and a small number of counts (29 counts at 14 sites in total) in other months. Greatest coverage (81% of sites) was in January (Table 1), while coverage in other months was lower, and ranged between 36% and 67% of sites covered.

Table 1. Number of sites and subsites covered each month and overall in 2012/13

	Sites	Subsites
Sep	94	236
Oct	145	366
Nov	157	414
Dec	147	353
Jan	211	576
Feb	173	416
Mar	126	279
Covered overall	259	743

Some 50 sites (19% of total) were covered once only, while 65% of sites were covered in at least three months and 20% were covered in all seven months.

Data were received at the time of writing for almost all key sites covered in 2012/13, i.e. sites that are of international or national importance. Exceptions included Bannow Bay, Baldoyle Bay, Tramore Back Strand, Cashen River & Estuary, Lough Ree, Waterford Harbour, Skerries Islands, Lough Carra, Smerwick Harbour, Fortwilliam Turlough, Bracklagh Lough and Dublin Zoo Ponds.

Three aerial censuses were undertaken, with thorough censuses on 11th December 2012 and 2nd February 2013, of the Shannon and Fergus Estuary, Lough Derg, the Little Brosna Callows, Shannon Callows and the Suck Callows. A further count on 17th November 2012 was curtailed due to poor weather conditions.

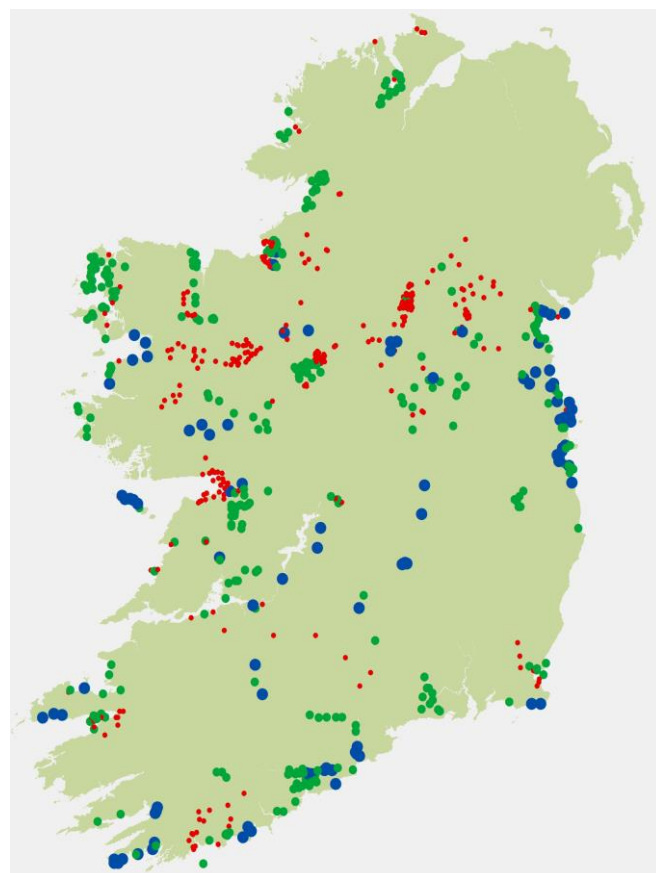


Figure 1. Subsites covered during 2012/13, illustrating the frequency of coverage: red = covered on at most two occasions during the season, green = 3-6 occasions, blue = 7 or more occasions.

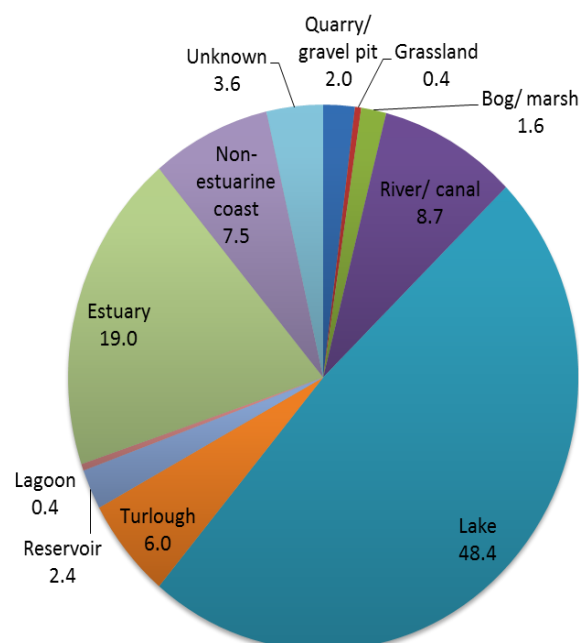


Figure 2. Primary habitats of sites covered in 2012/13.

Total waterbird numbers

Overall, 101 species were recorded in 2012/13, including 14 swan & goose species, 26 duck, 21 wildfowl allies, 27 waders, 12 gulls and five tern species. The scientific names of all species are given in these tables or are otherwise mentioned in the text.

Overall, some 68 regularly occurring species were recorded (Table 2), a further 29 species which are scarce (Table 3), and another four species that are from introduced or released origins Canada Goose *Branta canadensis*, Mandarin Aix *galericulata*, feral/ hybrid goose, feral/ hybrid Mallard.

The maximum number of waterbirds was recorded in January (Fig. 3), and was dominated by waders (52%), followed by ducks (22%) and swans & geese (11%). Light-bellied Brent Goose, Wigeon, Coot, Golden Plover and Black-headed Gull were the most numerous of the swans & geese, ducks, wildfowl allies, waders and gulls respectively (Table 2).

Sites of International & National Importance

Totals of 41 internationally important and 72 nationally important sites were identified (Table 4 & 5). Of the internationally important sites, seven supported in excess of 20,000 waterbirds (excluding gulls and terns)¹ and they were Dundalk Bay, Wexford Harbour & Slob, Lough Swilly, Dublin Bay, Cork Harbour, Lough Corrib and the Little Brosna Callows. Of these sites, annual peaks were lowest in 2012/13 at all sites other than Dublin Bay and Cork Harbour (Table 4).

The list of sites supporting at least 20,000 waterbirds excludes Lough Foyle and Rogerstown Estuary that were listed during the last published report (Crowe *et al.* 2012). Lough Foyle is monitored by UK WeBS and continues to support numbers in excess of this threshold (Austin *et al.* (2014) reported a mean of 30,575 for the period).

Numbers at Rogerstown have fluctuated considerably over the past five years, with total numbers at their lowest in 2010/11 (Table 4). The total in 2012/13 once again exceeded 20,000 waterbirds, largely driven mostly by the apparent recovery in plover numbers which had declined considerably in both of the two prior seasons. However, it is worth noting that numbers recorded

¹ Gulls and terns are excluded because counts of birds from both of these groups are optional and are not routinely undertaken at all sites.

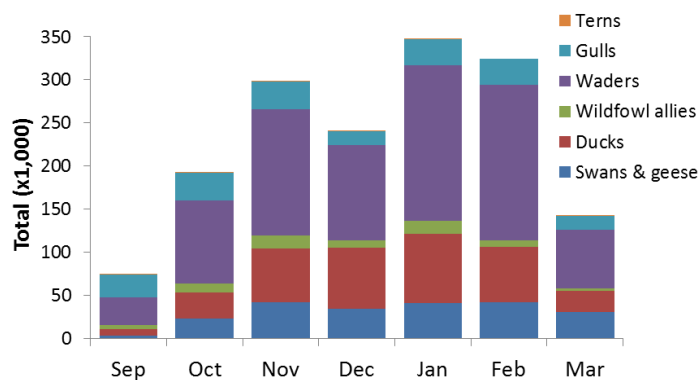


Figure 3. Total number of waterbirds recorded between September 2012 and March 2013.

of most other waders were at least 10% lower in 2012/13 than their respective 5-year means, especially Curlew, Greenshank and Redshank. Furthermore, the 2012/13 annual peak of Light-bellied Brent Goose (1,395) dropped to half that recorded in the previous season, and to 30% of the mean of annual peaks for the period.

Among the remaining internationally important sites, there was a substantial (95%) increase in total numbers at the Shannon Callows when compared with the respective previously published mean (Crowe *et al.* 2012), and there have also been notable increases at Blacksod & Tullaghan Bays, Boyne Estuary, Killala Bay, Lady's Island Lake and the Shannon & Fergus Estuary. Killala Bay and Hick's Tower (Robswall) moved from national to international importance when compared with the last publication (Crowe *et al.* 2012).

In contrast, the greatest declines in overall waterbird numbers at international sites, as reflected by declines in excess of 20% in the mean of peaks since the last publication, has been at Ballymacoda, Broadmeadow (Malahide) Estuary, Corofin Wetlands, Lough Derravaragh, Lough Iron and the Cull & Killag (Ballyteige) relative to previous years.

A total of five sites moved from internationally important to nationally important for migratory birds, and they were

- Rahasane Turlough (previously of international importance for Black-tailed Godwit),
- Blackwater Estuary (Black-tailed Godwit and Lesser Black-backed Gull),
- Trawbreaga Bay (Barnacle Goose),
- Dundalk Bay Outer (Light-bellied Brent Goose), and
- Blackwater Callows (Black-tailed Godwit).

Seagrange Park has formerly been identified as internationally important for Light-bellied Brent Goose and Black-tailed Godwit. This grassland site, which is inextricably linked and supports birds from nearby wetland sites, especially North Bull Island and Baldoyle Bay, was not monitored in any season during the current period.

Of the nationally important sites (Table 5), there have been increases, in excess of 20% when compared with the respective means presented in Crowe *et al.* (2012), at Lough Gara and the River Shannon (Lower). In contrast, there have been substantial declines, in excess of 20% when compared with the respective means presented in Crowe *et al.* (2012), at 11 sites, most notably Wexford Bay, Kilcolman Marsh, Annaghmore Lakes and Lough Arrow.

A total of eight sites were identified as nationally important for this period that were not listed during the former period (Crowe *et al.* 2012), and they were Bracklagh Lough, Carrowmore Beach, Delvin River - Hampton Cove, Fortwilliam Turlough, Inishmore, Aran Islands, Kilkeran Lake, Lough Conn and the River Deel (Table 5). In contrast, there were 13 sites identified as nationally important during the former period that were not listed as nationally important here.

Little Brosna Callows, January 2011



Table 2. Total numbers counted of regularly occurring waterbirds between September 2012 and March 2013.

Species		Sep	Oct	Nov	Dec	Jan	Feb	Mar
Mute Swan	<i>Cygnus olor</i>	1,164	1,887	2,796	3,082	2,999	2,619	970
Bewick's Swan	<i>Cygnus columbianus</i>				3	24		3
Whooper Swan	<i>Cygnus cygnus</i>	11	1,629	2,837	2,524	3,686	2,735	1,623
Pink-footed Goose	<i>Anser brachyrhynchus</i>	1	1	6	1	24	2	34
Greenland White-fronted Goose	<i>Anser albifrons flavirostris</i>		266	9,260	8,664	9,650	9,184	7,941
Greylag Goose	<i>Anser anser</i>	171	455	3,468	802	2,410	1,677	652
Barnacle Goose	<i>Branta leucopsis</i>		2,030	2,787	323	422	1,416	2,039
Light-bellied Brent Goose	<i>Branta bernicla hrota</i>	1,613	16,408	20,057	18,054	21,175	24,281	17,330
Shelduck	<i>Tadorna tadorna</i>	114	594	2,812	2,816	5,106	4,473	2,153
Wigeon	<i>Anas penelope</i>	2,012	12,934	24,511	33,149	25,309	24,044	5,293
Gadwall	<i>Anas strepera</i>	137	251	359	281	498	332	165
Teal	<i>Anas crecca</i>	1,182	4,563	10,810	16,144	20,324	15,427	8,420
Mallard	<i>Anas platyrhynchos</i>	3,230	5,560	7,538	6,907	8,662	4,610	1,973
Pintail	<i>Anas acuta</i>	9	138	397	800	744	746	183
Shoveler	<i>Anas clypeata</i>	78	594	792	1,058	1,295	1,331	510
Pochard	<i>Aythya ferina</i>	30	71	2,020	1,540	2,033	1,090	146
Tufted Duck	<i>Aythya fuligula</i>	315	2,679	8,050	4,845	8,576	5,637	1,708
Scaup	<i>Aythya marila</i>	1	154	128	53	147	47	13
Long-tailed Duck	<i>Clangula hyemalis</i>		35	58	17	28	21	16
Eider	<i>Somateria mollissima</i>		120	152	2	6	3	2
Common Scoter	<i>Melanitta nigra</i>	57	1,780	3,943	2,937	5,282	5,129	2,680
Goldeneye	<i>Bucephala clangula</i>		32	501	533	880	751	232
Red-breasted Merganser	<i>Mergus serrator</i>	232	815	761	443	873	634	461
Goosander	<i>Mergus merganser</i>		10	2	3	10	3	19
Red-throated Diver	<i>Gavia stellata</i>	5	54	55	28	71	99	53
Black-throated Diver	<i>Gavia arctica</i>		2			2	4	5
Great Northern Diver	<i>Gavia immer</i>	1	98	300	258	429	539	454
Little Grebe	<i>Tachybaptus ruficollis</i>	403	607	534	592	744	370	185
Great Crested Grebe	<i>Podiceps cristatus</i>	183	279	791	299	597	614	266
Slavonian Grebe	<i>Podiceps auritus</i>		5	31	3	23	67	28
Cormorant	<i>Phalacrocorax carbo</i>	1,166	2,260	2,012	1,141	2,613	1,217	623
Shag	<i>Phalacrocorax aristotelis</i>	308	756	551	309	484	503	318
Little Egret	<i>Egretta garzetta</i>	392	350	290	146	205	181	159
Grey Heron	<i>Ardea cinerea</i>	398	399	393	246	476	263	207
Water Rail	<i>Rallus aquaticus</i>	4	5	8	4	3	2	1
Moorhen	<i>Gallinula chloropus</i>	289	345	257	201	289	243	181
Coot	<i>Fulica atra</i>	1,673	4,848	9,703	5,374	9,111	3,057	584
Oystercatcher	<i>Haematopus ostralegus</i>	10,178	20,974	21,429	17,323	22,168	19,018	9,778
Ringed Plover	<i>Charadrius hiaticula</i>	1,951	3,543	3,094	2,792	2,992	2,118	986
Golden Plover	<i>Pluvialis apricaria</i>	862	15,063	39,186	18,063	38,589	39,306	6,408
Grey Plover	<i>Pluvialis squatarola</i>	115	1,899	1,003	947	1,060	1,460	943
Lapwing	<i>Vanellus vanellus</i>	776	5,821	22,242	17,219	32,672	35,642	1,990
Knot	<i>Calidris canutus</i>	496	4,752	8,351	9,622	7,623	8,106	6,998
Sanderling	<i>Calidris alba</i>	908	3,164	2,543	1,717	4,864	3,245	1,597
Purple Sandpiper	<i>Calidris maritima</i>		11	13	144	62	81	123
Dunlin	<i>Calidris alpina</i>	2,038	6,531	13,154	14,104	22,333	25,189	8,692
Ruff	<i>Philomachus pugnax</i>	7	2	7	1	8	1	
Jack Snipe	<i>Lymnocyptes minimus</i>			1	4	4	1	1
Snipe	<i>Gallinago gallinago</i>	50	90	308	213	335	276	91
Woodcock	<i>Scolopax rusticola</i>			4	1	110	1	1
Black-tailed Godwit	<i>Limosa limosa</i>	4,110	9,519	8,002	6,992	9,054	10,488	8,206
Bar-tailed Godwit	<i>Limosa lapponica</i>	777	3,842	6,326	5,170	12,915	10,662	9,174
Whimbrel	<i>Numenius phaeopus</i>	12	32	2		3	3	1
Curlew	<i>Numenius arquata</i>	4,614	7,906	8,892	6,921	12,097	11,975	4,198
Common Sandpiper	<i>Actitis hypoleucos</i>	3			17	1	22	
Spotted Redshank	<i>Tringa erythropus</i>	3	2	8	2		8	
Greenshank	<i>Tringa nebularia</i>	415	457	460	284	454	421	220
Redshank	<i>Tringa totanus</i>	4,228	10,953	9,478	6,484	11,148	10,429	7,058
Turnstone	<i>Arenaria interpres</i>	861	2,052	1,857	2,234	2,607	1,705	1,585
Mediterranean Gull	<i>Larus melanocephalus</i>	75	21	40	5	7	40	30
Black-headed Gull	<i>Chroicocephalus ridibundus</i>	9,286	15,399	17,294	9,532	17,242	16,510	9,505
Ring-billed Gull	<i>Larus delawarensis</i>			1	2	5	7	8
Common Gull	<i>Larus canus</i>	2,718	6,732	5,891	3,283	7,842	6,807	2,290
Lesser Black-backed Gull	<i>Larus fuscus</i>	10,221	5,098	4,850	392	978	2,472	1,680
Herring Gull	<i>Larus argentatus</i>	2,228	3,604	2,567	2,337	2,844	3,659	2,093
Great Black-backed Gull	<i>Larus marinus</i>	1,325	1,590	1,171	902	867	1,337	678
Sandwich Tern	<i>Sterna sandvicensis</i>	809	30		2	2		28
Kingfisher	<i>Alcedo atthis</i>	7	5	6	10	11	20	4

Table 3. Other scarce species recorded in 2012/ 13, indicating the peak count in brackets.

Snow Goose <i>Anser caerulescens</i> (1)	Spoonbill <i>Platalea leucorodia</i> (2)
Dark-Bellied Brent Goose <i>Branta bernicla bernicla</i> (2)	American Coot <i>Fulica americana</i> (1)
Black Brant <i>Branta bernicla nigricans</i> (1)	Crane <i>Grus grus</i> (5)
Ruddy Shelduck <i>Tadorna ferruginea</i> (2)	Little Stint <i>Calidris minuta</i> (1)
Muscovy Duck <i>Cairina moschata</i> (1)	Pectoral Sandpiper <i>Calidris melanotos</i> (2)
American Wigeon <i>Anas americana</i> (58)	Curlew Sandpiper <i>Calidris ferruginea</i> (9)
Green-winged Teal <i>Anas carolinensis</i> (3)	Green Sandpiper <i>Tringa ochropus</i> (2)
Ring-necked Duck <i>Aythya collaris</i> (2)	Little Gull <i>Larus minutus</i> (4)
Surf Scoter <i>Melanitta perspicillata</i> (1)	Yellow-legged Gull <i>Larus arg. cachinnans michahellis</i> (1)
Velvet Scoter <i>Melanitta fusca</i> (1)	Iceland Gull <i>Larus glaucoides</i> (4)
Smew <i>Mergellus albellus</i> (3)	Glaucous Gull <i>Larus hyperboreus</i> (5)
Red-necked Grebe <i>Podiceps grisegena</i> (1)	Roseate Tern <i>Sterna dougallii</i> (6)
Black-necked Grebe <i>Podiceps nigricollis</i> (2)	Common Tern <i>Sterna hirundo</i> (3)
Bittern <i>Botaurus stellaris</i> (1)	Little Tern <i>Sterna albifrons</i> (6)
Glossy Ibis <i>Plegadis falcinellus</i> (1)	

Redshank. Photo by Michael Finn.



Table 4. Internationally important sites based on counts between 2008/09 and 2012/13, indicating the species that occur in internationally important numbers (upper case) and nationally important numbers (lower case). Species codes, together with 1% thresholds for national and international importance, are defined in the Appendix. An asterisk indicates poor quality count, and was not included in the calculation of the mean.

Site	2008/09	2009/10	2010/11	2011/12	2012/13	Mean	Species occurring in significant numbers
<u>Sites supporting more than 20,000 waterbirds</u>							
Dundalk Bay	59,782	62,518	50,527	50,642	46,921	54,078	gj, PB, su, wn, t., ma, pt, cx, rm, rh, gg, ca, et, h., OC, rp, gp, gv, l., KN, dn, BW, BA, cu, gk, rk, tt
Wexford Harbour & Slobs	53,113	30,738*	24,449*	47,245	27,112*	50,179	ws, NW, PB, su, wn, ma, pt, rm, ca, gp, gv, l., BW, ba
Lough Swilly	28,781	30,147	30,351	33,677	28,175	30,226	MS, WS, NW, GJ, PB, su, wn, t., ma, sv, tu, gn, rm, lg, gg, h., co, oc, rp, gp, l., kn, dn, BW, ba, cu, gk, rk, tt
Dublin Bay	33,933	33,624	27,924	26,796	27,443	29,944	PB, su, wn, t., pt, sv, rm, gg, et, h., oc, rp, gv, kn, ss, dn, BW, BA, cu, gk, rk, tt
Cork Harbour	19,380*	18,972*	24,516*	26,323	28,611	27,467	su, t., rm, lg, gg, ca, et, gp, dn, BW, cu, gk, rk
Lough Corrib	27,333	33,571	38,147	11,012*	8,101	26,788	MS, ga, PO, tu, lg, co
Little Brosna Callows	32,390			20,962	12,011	21,788	MS, ws, NW, wn, ga, t., pt, SV, gp, gv, l., BW
<u>Other internationally important sites</u>							
Tralee Bay, Lough Gill & Akeragh Lough	10,597	17,015	18,547	21,029	23,898	18,217	MS, ws, PB, t., ma, sv, sp, oc, rp, gp, gv, l., ss, dn, BW, ba, cu, rk, tt
Rogerstown Estuary	26,177	16,878	8,667	16,784	21,749	18,051	gj, PB, su, t., sv, rm, et, oc, rp, gp, gv, l., kn, ss, dn, BW, cu, gk, rk, tt
Tacumshin Lake	12,553	23,569	10,282	19,499	11,827	15,546	MS, ws, su, wn, ga, t., pt, sv, lg, co, gp, l., dn, bw
Dungarvan Harbour	17,545	23,354		8,880	11,966	15,436	PB, su, rm, gg, et, oc, gp, gv, l., kn, dn, BW, ba, cu, gk, rk, tt
Bannow Bay	14,542	22,355		9,204		15,367	PB, su, rm, et, oc, gp, gv, l., dn, BW, ba, cu, gk, rk
Inner Galway Bay	19,479	12,859	12,009	18,710	11,663	14,944	MS, PB, wn, t., sv, rm, rh, ND, lg, gg, ca, et, h., oc, rp, gv, l., dn, bw, ba, cu, gk, rk, tt
Boyne Estuary	14,786	11,188	8,928	23,045	15,159	14,621	PB, su, t., oc, gp, gv, l., kn, ss, dn, bw, rk
Ballymacoda		2,276*	3,268*	17,675	8,987	13,331	rp, gp, gv, ss, bw, ba
Shannon & Fergus Estuary	14,698	7,860	10,560	12,172	12,759	11,610	WS, su, wn, t., ca, gp, gv, l., dn, bw, cu
Castlemaine Harbour & Rossbehy	7,505	6,747*	12,084	11,648	10,735	10,493	PB, su, wn, ma, pt, cx, et, gv, ss, dn, ba, cu, rk
Shannon Callows	5,382	6,284	8,355	20,652	7,591	9,653	MS, WS, wn, t., gp, l.
Blacksod & Tullaghan Bays	8,680	8,377	5,439*	9,739	10,633	9,357	by, PB, cx, rm, rh, ND, rp, gv, ss, dn, ba, cu, gk, tt
Inishcarra Reservoirs	11,761	10,868	2,519	3,275	13,942	8,473	MS, wn, t., ma, sv, tu, gp, gv, l.
Broadmeadow (Malahide) Estuary	10,201	7,296	10,745	3,466	9,488	8,239	MS, PB, su, ga, pt, gn, rm, gg, h., oc, gv, kn, dn, bw, ba, gk, rk, tt
River Suck	2,886	11,020	6,439	6,026	7,118	6,698	MS, ws, wn, l.
North Wicklow Coastal Marshes	7,080	6,778	6,536	5,275	1,155*	6,417	gj, PB, wn, t., sv, rh, lg, et, l.
Donegal Bay	4,706	7,012	7,110	5,607	6,647	6,216	MS, ws, PB, cx, rm, ND, lg, h., oc, ss, ps, cu, gk, tt
Clonakilty Bay	4,958	9,170	6,045	6,220	4,064	6,091	rp, kn, dn, BW, cu, gk
Lady's Island Lake	5,062	7,952	4,667	4,324	8,443	6,090	MS, gj, wn, ga, sv, et, co, bw, tt
Drumcliff Bay Estuary	4,613	7,974	6,276	6,614	4,260	5,947	BY, rm, oc, gv, kn, ss, ba
The Cull & Killag (Ballyteige)	12,661	5,464	2,732	3,939	4,391	5,837	PB, gp, gv, l., ba
Baldoyle Bay	5,766	5,884				5,825	PB, su, gg, et, oc, rp, gv, bw, gk, rk, tt
Courtmacsherry Bay, Broadstrand Bay & Dunworley	5,654	5,089	6,320	6,025	5,520	5,722	su, wn, t., nd, et, rp, dn, BW, cu, gk
Lough Derg (Shannon)	5,689	5,247	6,614	3,724	4,429	5,141	MS, t., tu, gn, co
Sligo Harbour	5,334	5,315	3,611	3,741	6,673	4,935	PB, su, cx, rm, oc, rp, kn, dn, ba, cu, rk
Tramore Back Strand	6,169	1,306*	5,025	3,120		4,771	PB, ga, gv
Killala Bay	4,276	1,535	4,855	4,634	4,220	3,904	PB, gv, kn, ba
Lough Rea	3,215	3,765	3,256	3,125	3,456	3,363	SV, co
Lough Derravaragh	3,691	3,082	3,653	1,916	3,284	3,125	MS, po, tu, lg, co
Hick's Tower & Robswall	3,051	3,226	3,001	2,977		3,064	PB, oc, gv, ba
Lough Ennell	2,913	2,524	2,553	3,891	1,964	2,769	MS, po, tu, lg, co
Lough Iron	1,699	1,925	1,762	3,428	1,690	2,101	ws, NW, ga, sv
Lough Oughter Complex	2,087	176*	1,156*	1,870	2,081	2,013	MS
Corofin Wetlands		2,462	1,525	201	312	1,125	MS, ga, lg

Table 5. Nationally important sites based on counts between 2008/09 and 2012/13, indicating the species that occur in nationally important numbers. Species codes are defined in the Appendix. An asterisk indicates poor quality count, and was not included in the calculation of the mean.

Site	2008/09	2009/10	2010/11	2011/12	2012/13	Mean	Species occurring in significant numbers
Rahasane Turlough	17,704	8,928	9,169	14,150	5,798	11,150	wn, t., pt, sv, et, gp, l., bw
Nanny Estuary & shore	10,552	9,165	4,031	3,881*	3,407*	7,916	cx, kn, ss
Cashen River & Estuary	2,029*			6,542		6,542	l.
Kiltullagh Lough	5,834	4,749	9,072		3,964	5,905	gp, l.
Southern Roscommon Lakes	11,047	9,963	2,315		2	5,832	wn, t., sv, gp, l.
Blackwater Estuary	7,324	4,638	3,802*	5,248	4,973	5,546	et, bw, cu, gk, rk
Ballycotton Shanagarry	9,000	3,541	1,912*	3,654	5,263	5,365	t., gp, gv, ss
Lough Owel	6,126	6,676	5,711	3,572	4,469	5,311	sv, po, tu, gg, co
Lough Ree			4,663			4,663	wn, tu, co, l.
Clew Bay	4,708	4,024	4,636	4,295	5,027	4,538	rm, nd, lg, ca, h., rp, ss, cu, gk, rk, tt
Ballysadare Bay	3,608	3,770	4,171	4,694	3,575	3,964	rm, ss, dn, ba, cu, gk
Dunany Point - Clogher Head	4,632	2,819	4,901	4,053	2,994	3,880	cx, rm, kn, ss
Rosscarbery		1,338	4,851	4,712	3,196	3,524	gp
Brandon Bay - Inner Brandon Bay				4,129	2,542	3,336	cx, rp, ss
Trawbreaga Bay	3,382	4,155	2,007	1,421*	1,316*	3,181	by, gk
River Deel	1,208*				3,092	3,092	l.
Glenamaddy Turlough	5,881	2,060	4,014		195	3,038	sv, gp
Wexford Bay		8,417	460	1,176	997	2,763	cx
Termoncarragh & Annagh Marsh	2,848	2,663	2,452	2,112	2,691	2,553	BY, rp, ss
Lough Sheelin	4,494	2,385	2,368	1,551	1,326	2,425	po, tu, lg, gg, co
South Mayo Coast	2,248	2,395	2,990	2,035	1,593	2,252	rp, ss
North Central Galway Lakes	1,773	2,727*	1,795	2,332	2,977	2,219	sv
River Slaney		589*				2,216	t.
Delvin River - Hampton Cove					2,084	2,084	cx, ps, bw, tt
Ballyallia Lake	2,256	2,209	1,835	1,978	2,013	2,058	ga, t., pt, sv, lg, co
Lough Gara	1,605	1,952	2,600	1,901*	1,831	1,997	ws, tu
Dundalk Bay Outer	1,929	1,811	550*	1,475	2,671	1,972	ca
Blackwater Callows		3,771		1,394	670	1,945	ws, t., bw
Lough Cullin	1,286	1,659	1,342	2,666	1,846	1,760	tu
Kilglassan Turlough/ Greaghans	2,583	1,800	2,095	1,465	814	1,751	ws
Rostaff Lake	3,333	1,007	1,987	1,667	706	1,740	ga, sv
Cabragh Wetlands	2,553	1,245	1,277	2,296	1,325	1,739	t.
L. Coy - Blackrock - Bullaunagh - Ballylee	624	1,894	1,414	1,795	2,123	1,570	ws
River Shannon (Lower) Aerial	1,901	1,673	1,451	854	1,851	1,546	po, tu, co
Lough Conn	1,014	1,717	1,624	2,313	762	1,486	gv
Waterford Harbour	2,268	903		1,280		1,484	bw
Skerries Coast	1,106	1,028*	1,075	1,777	1,931	1,472	rp, tt
Kilcolman Marsh	2,250	2,156	702	1,183	921	1,442	t., sv
Castleplunket Turloughs	2,589	1,124	1,074	385	1,471	1,329	sv
Poulaphouca Reservoir	991	659		2,126	1,333	1,277	gj, t., ma
Castlemaine Outer: Inch offshore			1,577	1,807	330	1,238	cx, rh, ss
Mid-Clare Coast (Mal Bay - Doonbeg Bay)		1,199	1,073	922	1,753	1,237	ss, ps, tt
North East Galway Lakes	1,077	1,227	773	1,678	1,372	1,225	ws, sv
Broadhaven & Sruwadaccon Bays	787*	1,404	866	1,370	981	1,155	rm, nd
Doolough Headford (Turloughcor)	1,505	855	743	979	1,693	1,155	ga, sv
Skerries Islands	1,143					1,143	ca, tt
Lough Carra	1,110	850	1,122	1,141		1,056	ga, gn, lg
Smerwick Harbour	1,053	1,023				1,038	rp
South East Clare Lakes	639*	591*	1,382	726	984	1,031	ga, lg
Stick Estuary (Oysterhaven)	851	806	885	1,033	1,524	1,020	bw

Other nationally important sites (mean and species): Fortwilliam Turlough (985) ga, River Suir Lower (952) gj, Mullet West (881) by, Inishmore, Aran Islands (762) ss, Lough Foyle (727) gk, Annaghmore Lakes (706) sv, Termon Turloughs (639) sv, lg, Charleville Lagoons (636) sv, Omey Strand (583) rp, ss, Lough Eorna (569) sv, lg, Ballyconneely Bay (545) rp, Bracklagh Lough (527) po, Dublin Zoo Ponds (517) h., An Trá Beg (495) gk, Marfield Lake (478) ga, lg, Lough Arrow (469) lg, Mannin Bay (459) nd, rp, Lough Aderry (453) ga, Pat Reddan's Lake (451) ga, sv, Skerries, Baldongan (395) gj, Lough Gloire (221) lg, Carrowmore Beach (188) ss, Kilkieran Lake (162) lg.

Waterbird trends

The trends of 43 species were measured for the period 1994/95 to 2012/13 (Table 6). Overall mean annual increases of 2% or more per year on average were recorded in 12 species, with greatest increases seen in Little Egret, Canada Goose, Barnacle Goose, Sanderling and Light-bellied Brent Goose. Declines of 2% or more per year were recorded in 10 species, and were greatest in Bewick's Swan, Scaup, Pochard and Lapwing. The trends of the remaining 21 species were broadly

stable. A selection of these increasing and declining trends is presented in Figures 4 and 5.

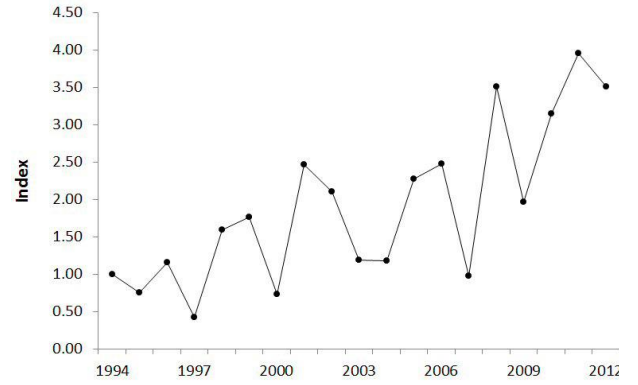
The assessment of shorter term trends for the period 2008/09 to 2012/13 showed that greatest recent increases have been shown in Canada Goose, Barnacle Goose, Light-bellied Brent Goose, Sanderling and Bar-tailed Godwit. Conversely, the greatest short-term declines have been shown in Bewick's Swan, Shoveler, Pochard and Scaup.

Table 6. Waterbird trends, indicating the mean annual change for the entire period (1994/95 – 2012/13), as well as for a recent short-term period (2008/09 – 2012/13).

Species		Long-term change 1994/95 - 2012/13 (%)	Short-term change 2008/09 - 2012/13 (%)
Mute Swan	<i>Cygnus olor</i>	0.64	-6.01
Bewick's Swan	<i>Cygnus columbianus</i>	-17.17	-22.13
Whooper Swan	<i>Cygnus cygnus</i>	1.78	-0.43
Greenland White-fronted Goose	<i>Anser albifrons flavirostris</i>	-0.77	2.18
Greylag Goose	<i>Anser anser</i>	-3.78	-2.91
Canada Goose	<i>Branta canadensis</i>	8.30	7.29
Barnacle Goose	<i>Branta leucopsis</i>	8.12	9.67
Light-bellied Brent Goose	<i>Branta bernicla hrota</i>	5.82	7.83
Shelduck	<i>Tadorna tadorna</i>	-1.24	-5.38
Wigeon	<i>Anas penelope</i>	-1.73	-8.06
Gadwall	<i>Anas strepera</i>	4.00	1.07
Teal	<i>Anas crecca</i>	0.36	-2.42
Mallard	<i>Anas platyrhynchos</i>	-0.99	-4.06
Pintail	<i>Anas acuta</i>	-0.01	-3.73
Shoveler	<i>Anas clypeata</i>	0.69	-15.98
Pochard	<i>Aythya ferina</i>	-5.79	-14.85
Tufted Duck	<i>Aythya fuligula</i>	1.75	-6.64
Scaup	<i>Aythya marila</i>	-11.82	-23.60
Goldeneye	<i>Bucephala clangula</i>	-2.70	0.10
Red-breasted Merganser	<i>Mergus serrator</i>	-0.63	2.18
Red-throated Diver	<i>Gavia stellata</i>	-0.28	-6.17
Little Grebe	<i>Tachybaptus ruficollis</i>	2.29	-11.50
Great Crested Grebe	<i>Podiceps cristatus</i>	0.49	4.45
Cormorant	<i>Phalacrocorax carbo</i>	0.81	0.11
Little Egret	<i>Egretta garzetta</i>	34.60	-11.36
Grey Heron	<i>Ardea cinerea</i>	1.05	-9.42
Moorhen	<i>Gallinula chloropus</i>	2.82	-8.83
Coot	<i>Fulica atra</i>	1.45	-7.39
Oystercatcher	<i>Haematopus ostralegus</i>	2.13	-4.16
Ringed Plover	<i>Charadrius hiaticula</i>	1.26	-2.09
Golden Plover	<i>Pluvialis apricaria</i>	-3.05	-2.21
Grey Plover	<i>Pluvialis squatarola</i>	-2.77	4.14
Lapwing	<i>Vanellus vanellus</i>	-5.00	-5.58
Knot	<i>Calidris canutus</i>	0.93	-10.95
Sanderling	<i>Calidris alba</i>	6.19	10.78
Purple Sandpiper	<i>Calidris maritima</i>	1.95	-1.02
Dunlin	<i>Calidris alpina</i>	-4.62	-4.17
Black-tailed Godwit	<i>Limosa limosa</i>	4.40	-0.30
Bar-tailed Godwit	<i>Limosa lapponica</i>	1.20	8.00
Curlew	<i>Numenius arquata</i>	-3.04	-0.12
Greenshank	<i>Tringa nebularia</i>	3.36	0.13
Redshank	<i>Tringa totanus</i>	1.44	-2.64
Turnstone	<i>Arenaria interpres</i>	2.71	1.26

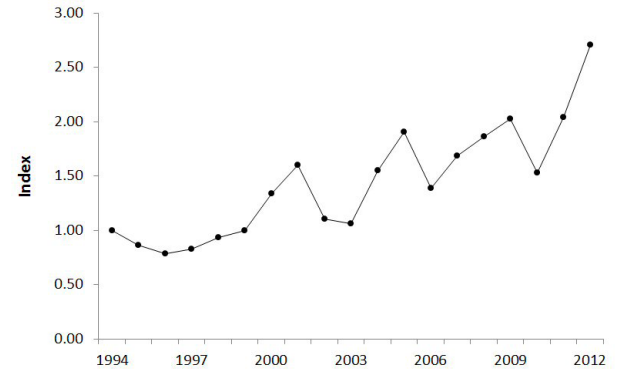
Canada Goose

On balance this species has increase throughout I-WeBS, although fluctuations reflect the relatively small sample of sites that are monitored.



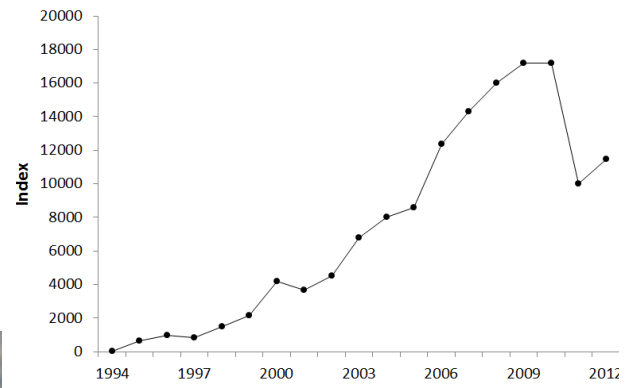
Light-bellied Brent Goose

This species has increased throughout I-WeBS, with numbers in 2011/12 and 2012/13 indicating a more rapid rate of increase (photo by Ronnie Martin).



Little Egret

Little Egret has increased at a phenomenal rate since I-WeBS began, with numbers showing a substantial drop in 2011/12, possibly from the cold winter, but with some recovery in evidence in 2012/13 (photo by John Fox).



Sanderling

Numbers have increased throughout I-WeBS, and have been especially notable in recent years (photo by John Fox).

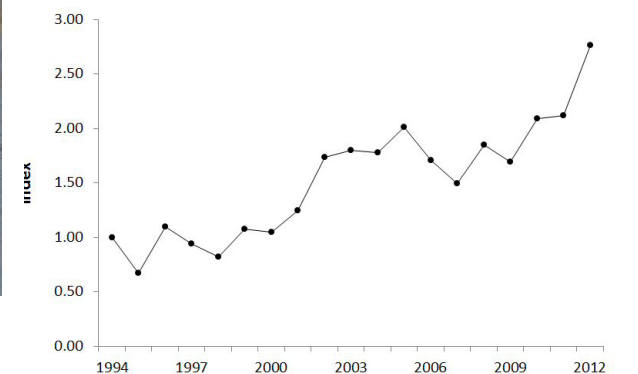
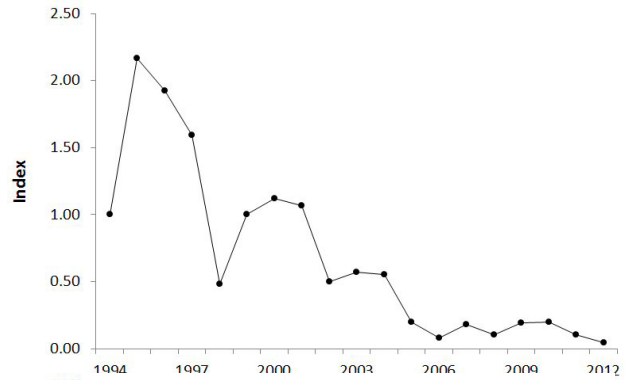
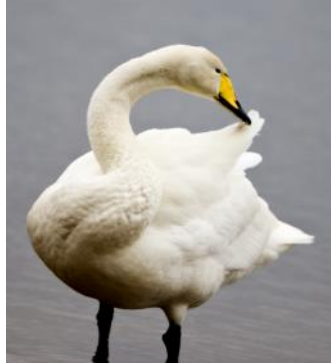


Figure 4. Species showing increasing trends between 1994/ 95 and 2012/13.

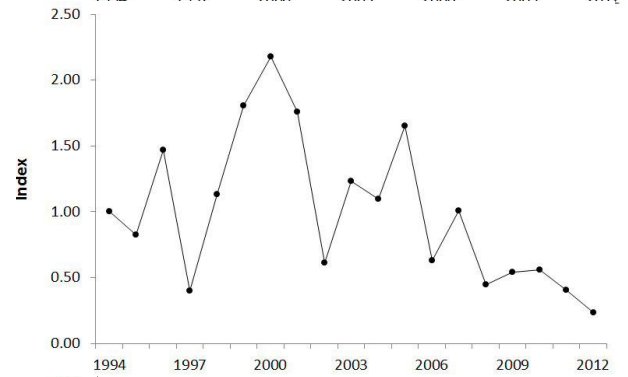
Bewick's Swan

This species has declined since the 1980s. The last swan census (2010) has shown that less than 100 birds now winter in Ireland (photo by Ken Kinsella).



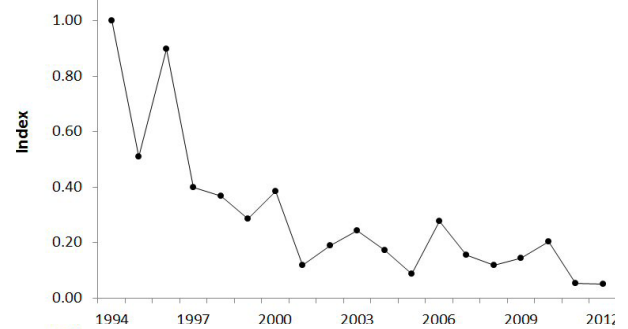
Pochard

Numbers have declined throughout I-WeBS in the Republic of Ireland. There has been substantial variability in annual totals, which probably reflects difficulties in counting them at key sites such as Lough Corrib (photo by John Fox).



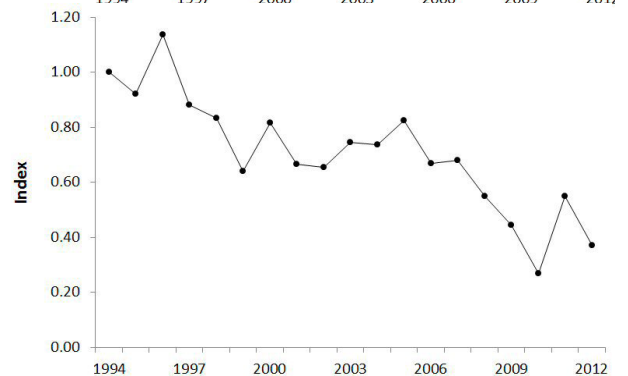
Scaup

Numbers continue to decline throughout I-WeBS (photo by Stephen McAvoy).



Lapwing

Lapwing numbers have declined throughout I-WeBS (photo by Clive Timmons).



Dunlin

There has been an ongoing decline in Dunlin numbers since the mid-1990s (photo by Liam Ryan).

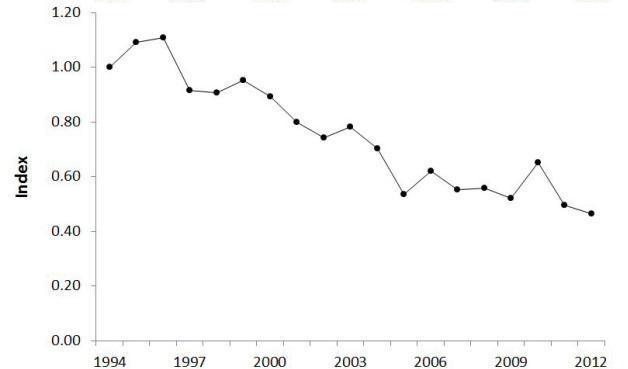


Figure 5. Species showing declining trends between 1994/ 95 and 2012/13.

Discussion

The extent of I-WeBS coverage during the winter of 2012/13 was good, with the majority of key sites covered in three or more months. Coverage levels continue to be comparable with other recent winters. The weather during this season was relatively mild (Met Éireann 2013a), with an especially cold period that commenced late in the spring (Met Éireann 2013b), from mid-March that lasted into early April.

Thus, there were no exceptional patterns of waterbird movement evident in 2012/13, with highest numbers of most regularly occurring (44 out of 68) species recorded during the mid-winter period (between December and February). A number of species showed earlier peaks in October or November, and were largely reflected waders on passage (such as Ringed Plover and Greenshank), or species congregating at larger wetland sites that are monitored prior to dispersal (e.g. Greylag Goose and Barnacle Goose). During the last publication (Crowe *et al.* 2012) we reported a drop in numbers of the two grassland feeding plovers Golden Plover and Lapwing. The 2012/13 season saw numbers return to former peaks (I-WeBS data unpublished), despite a small drop in numbers of both species in December (2012).

The list of internationally and nationally important sites was lower compared with other recent

winters (Crowe *et al.* 2012). The changes in flyway thresholds were reported during the last publication, meaning that there was a genuine decline in bird numbers at several key sites that have been continuously highlighted for their importance for birds throughout I-WeBS, especially Rahasane Turlough, Blackwater Estuary and the Blackwater Callows. Trawbreaga Bay was reported for its apparent decline in Barnacle Goose. However, just one count was received, from November, which may not have been entirely representative. Furthermore, there is evidence that shows that Barnacle Goose numbers continue to thrive at the site (Crowe *et al.* in prep.).

The declines in several species have continued and are worrisome, especially those showing marked short-term declines (i.e. during the five winters leading up to 2012/13 inclusive) in Bewick's Swan, Shoveler, Pochard and Scaup. The increase in Knot reported previously (Crowe *et al.* 2012) has taken a downturn, with a short-term decline reported here, driven by substantial declines in 2011/12 and again in 2012/13. The declines in Lapwing and Dunlin are also of considerable concern given that these patterns of decline have continued throughout I-WeBS. They are consistent with the trends in the respective flyways of these species indicating that the factors driving this change are operating at a wider scale.

Acknowledgements

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Comerford, J. Concannon, F. Connolly, C. Conroy, D. Coombes, A. Copland, J. Copner, W. Cormacan, M. Cotter, D. Cotton, J. Coveney, K. Craig, N. Cribbon, J. Cromie, J. Cronin, J. Crosher, F. Cross, O. Crowe, C. Crowley, P. Crushell, T. Cuffe, C. Cullen, D. Cullen, S. Cummins, C. Cunningham, E. Dale, D. Daly, G. Daly, M. Davis, E. De Milo, A. Delaney, B. Denny, P. Denny, L. Desierdo, D. Dillon, D. Dodrill, C. Doherty, A. Donaghy, E. Doran, P. Dower, F. Doyle, K. Doyle, L. Doyle, T. Doyle, B. Duffy, M.A. Duggan, J. Dunleavy, S. Egan, J. English, M. Enright, D. Fabby, L. Fasola, D. Farrar, S. Farrell, L. Feeney, S. Feeney, R. Fennelly, M. Finnegan, P. Finnegan, T. Finnen, K. Finney, A. Fitzpatrick, D. Fitzpatrick, A. Fleming, U. Fleming, L. Floyd, C. Flynn, O. Foley, B. Forristal, D. Foulkes, J. Fox, E. Foyle, G. Franck, K. Freeman, J. Freestone, P. Fuentes, H. Galvin, P. Gaughran, T. Gittings, E. Glanville, T. & J. Gordon, T. Gordon, B. Gormley, M. Gunn, M. & S. Guthrie, M. Hackett, S. Haloran, P. Hamill, J. Hamilton, L. Hankey, T. Hannigan, G. Hannon, G. Hardwicke, P. Harford, N. Harmey, N. Hatch, J. Hayes, C. Heardman, S. Heery, B. Hegarty, J. Higgins, P. Higgins, C. Hill, I. Hill, M. Hogan, S. Hogan, C. Holt, J. Hopkins, J. Hughes, G. Hunt, J. Hunt, T. Hunter, C. Hurley, J. Hurley, C. & L. Huxley, S. Ingham, C. Ingram, P. Jago, B. Johnston, E. Johnston, S. Jones, L. Kane, T. Kealy, M. Keane, E. Keegan, P. Keirns, J. Keleman, K. Kelleher, A. G. Kelly (Cavan), C. Kelly, D. Kelly, Jayne Kelly, Joe Kelly, K. Kelly, T. Kelly, T. Kenneally, D. Kennedy, M. Kenny, N. Keogh, M. Kerrane, W. Kiefel, J. Kilroy, C. King, F. King, A. Lauder, M. Lavery, O. Lavery, J. Law, R. Leak, S. Ledwith, P. Leigh Doyle, L. Lenehan, L.J. Lewis, D. Litster, L. Long, J. Lovatt, J. Lusby, Aine Lynch, Annette Lynch, J. Lynch, P. Lynch, P. Lynders, D. Lyons, D. Lysaght, K. Mackie, B. Madden, E. Magee, C. Malone, D. Marshall, A. Martin, B. Martin, J. Matthews, M. Maunsell, L. McAlavey, G. McCaffrey, S. McCanny, P. McCarron, G. McCormack, M. McCormack, P. McCrossan, N. McCulloch, L. McDaid, L. McDaniel, D. McDonagh, D. McDonald, R. McDonald, M. McDonnell, P. McDonnell, G. McElwaine, F. McGabhann, G. McGann, D. McGrath, E. McGreal, S. McKeever, Eileen McKenna, Elizabeth McKenna, M. McKenna, Danny McLaughlin, Dermot McLaughlin, M. McLaughlin, R. McLaughlin, D. McLoughlin, F. McManus, J. McNally, S. McNamara, B. McPolin, J. Meade, S. Meany, A. Mee, T. Mee, B. Meehan, O. Merne, The Warden, J. Milroy, N. & K. Mitchell, J. Mohan, S. Moles, M. Moloney, J. Monaghan, P. Moore, V. Moore, P. Moran, N. Morgan, M. Morris, F. Murphy, G. Murphy, Jacinta Murphy, John Murphy, E. Murray, Seamus Murray, Sinead Murray, Tom Murray, Tony Murray, G. Murtagh, T. Murtagh, T. Nagle, D. Nesbitt, S. Newton, T. Ni Fhloinn, J. Noonan, L. Nuttall, I. O'Brien, J. O'Brien, L. O'Brien, M. O'Connell, P. O'Connell, P. O'Connell, J. O'Connor, A. O'Dónaill, G. O'Donnell, P. O'Donnell, B. O'Donoghue, P. O'Donoghue, T. O'Donoghue, F. O'Duffy, J. O'Halloran, S. O'Hehir, D. O'Higgins, D. O'Keefe, K. O'Leary, P. O'Leary, B. O'Loughlin, D. O'Loughlin, B. O'Mahony, D. O'Mahony, N. O'Malley, K. O'Rourke, B. O'Shea, M. O'Sullivan (Cork), M. O'Sullivan (Kerry), O. O'Sullivan, G. & F. Owens, G. Pearson, C. Peppiatt, A. Phillip, P. Phillips, S. Pierce, C. Pollock & C. Barton, B. Power, G. Power, J. Power, F. Prendergast, N. Raftery, V. Raine, P. Reaney, S. Redican, D. Rees, Margaret Reilly, Michael Reilly, A. Robb, B. Robson, M. Roche, P. Roche, T. Roderick, J. Roe, G. Rogan, B. Ryan, L. Ryan, Martin Ryan, Michael Ryan, P. Ryan, G. Scott, J. Shannon, N. Sharkey, R. Sheppard, P. Sheridan, A. Sherington, C. Shoebridge, M. Shorten, D. Skehan, J. Small, P. Smiddy, M. Souter, A. Speer, T. Spillane, R. Stephens, W. Stringer, D. Suddaby, E. Sweeney, K. Tapp, T. Tarpey, P. Taylor, T. Tedstone, R. Teesdale, M. ten Cate, R. Thompson, M. Tickner, D. Tierney, N. Tierney, V. Toal, J. Toland, P. Troake, C. Tweney, H. van Pesch, B. Vennemann, A. Walsh, P. Walsh, P. Watson, Richard Watson, Ross Watson, A. Webb, F. Wheeldon, R. Wheeldon, P. White, G. Williams, C. Wilson, G. Wilson, J. Wilson, M. Wilson, P. Wolstenholme, W. Woodrow, K. & L. Woods, P. Woodworth, J. Wray.

References

- Austin, G.E., Calbrade, N.A., Mellan, H.J., Musgrove, A.J., Hearn, R.D., Stroud, D.A., Wotton, S.R. & Holt, C.A. 2014. *Waterbirds in the UK 2012/13: The Wetland Bird Survey*. BTO, RSPB and JNCC, in association with WWT. British Trust for Ornithology, Thetford.
- Bibby, C.J., Burgess, N.D. & Hill, D.A. 1992. *Bird Census Techniques*. Academic Press, London.
- Boland, H. & Crowe, O. 2012. *Irish wetland bird survey: waterbird status and distribution 2001/02 – 2008/09*. BirdWatch Ireland, Kilcoole, Co. Wicklow.
- Boland, H., McElwaine, J.G., Henderson, G., Hall, C., Walsh, A. & Crowe O. 2010. Whooper *Cygnus cygnus* and Bewick's *C. columbianus bewickii* Swans in Ireland: results of the international census, January 2010. *Irish Birds* 9: 1-10.
- Crowe O, Boland H. 2004. Irish Wetland Bird Survey: Results of waterbird monitoring in Ireland in 2001/02. *Irish Birds* 7: 313-326.
- Crowe, O., Holt, C. 2013. Estimates of waterbird numbers wintering in Ireland, 2006/07 – 2010/11. *Irish Birds* 9, 545-552.
- Crowe, O., Boland, H. & Walsh, A. 2012. Irish Wetland Bird Survey: Results of waterbird monitoring in Ireland in 2010/11. *Irish Birds* 9: 397-410.
- Cummins, S. & Crowe, O. 2010. *Collection of baseline waterbird data for Irish coastal Special Protection Areas 2: Trawbreaga Bay, Lough Swilly, Donegal Bay, Blacksod & Broadhaven, Inner Galway Bay and Wexford Harbour & Slobs*. BirdWatch Ireland Report for NPWS, April 2010.
- Cummins, S. & Crowe, O. 2011. *Collection of baseline waterbird data for Irish coastal Special Protection Areas 2010/11*. BirdWatch Ireland Report for NPWS, June 2011.
- Cummins, S. & Crowe, O. 2012. *Collection of baseline waterbird data for Irish coastal Special Protection Areas 2011/12*. BirdWatch Ireland Report for NPWS, June 2012.
- Met Éireann. 2013a. Winter 2013. Available for download at <http://www.met.ie/climate/MonthlyWeather/clim-2013-win.pdf>.
- Met Éireann. 2013b. Spring 2013. Available for download at <http://www.met.ie/climate/MonthlyWeather/clim-2013-spr.pdf>.
- Underhill, L.G. & Prys-Jones, R.P. 1994. Index numbers for waterbird populations I. Review and methodology. *Journal of Applied Ecology* 31: 463-480.
- Wernham, C.V., Toms, M.P., Marchant, J.H., Clark, J.A., Siriwardena, G.M., Baillie, S.R. (eds.). 2002. *The Migration Atlas: movements of the birds of Britain and Ireland*. T. & A.D. Poyser, London.
- Wetlands International. 2006. *Waterfowl population estimates - Fourth Edition*. Wetlands International, Wageningen, The Netherlands.
- Wetlands International. 2012. *Waterbird Population Estimates, Fifth Edition. Summary Report Wetlands International, Wageningen The Netherlands* (with estimates available at <http://wpe.wetlands.org/>).

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>		90
Bewick's Swan	<i>Cygnus columbianus</i>	20	220
Whooper Swan	<i>Cygnus cygnus</i>	150	270
Pink-footed Goose	<i>Anser brachyrhynchus</i>		3500
Greenland White-fronted Goose	<i>Anser albifrons flavirostris</i>	110	240
Greylag Goose	<i>Anser anser</i>	50	980
Barnacle Goose	<i>Branta leucopsis</i>	150	710
Light-bellied Brent Goose	<i>Branta bernicla hrota</i>		400
Shelduck	<i>Tadorna tadorna</i>	120	3000
Wigeon	<i>Anas penelope</i>	630	15000
Gadwall	<i>Anas strepera</i>	20	600
Teal	<i>Anas crecca</i>	340	5000
Mallard	<i>Anas platyrhynchos</i>	290	20000
Pintail	<i>Anas acuta</i>	20	600
Shoveler	<i>Anas clypeata</i>	30	400
Pochard	<i>Aythya ferina</i>	160	3000
Tufted Duck	<i>Aythya fuligula</i>	310	12000
Scaup	<i>Aythya marila</i>	65	3100
Long-tailed Duck	<i>Clangula hyemalis</i>		17250
Eider	<i>Somateria mollissima</i>	35	14840
Common Scoter	<i>Melanitta nigra</i>	140	5500
Goldeneye	<i>Bucephala clangula</i>	60	11500
Smew	<i>Mergellus albellus</i>		400
Red-breasted Merganser	<i>Mergus serrator</i>	20	1700
Red-throated Diver	<i>Gavia stellata</i>	20	3000
Black-throated Diver	<i>Gavia arctica</i>		3750
Great Northern Diver	<i>Gavia immer</i>	20	50
Little Grebe	<i>Tachybaptus ruficollis</i>	20	4000
Great Crested Grebe	<i>Podiceps cristatus</i>	40	3500
Slavonian Grebe	<i>Podiceps auritus</i>		55
Cormorant	<i>Phalacrocorax carbo</i>	120	1200
Shag	<i>Phalacrocorax aristotelis</i>		2000
Little Egret	<i>Egretta garzetta</i>	20	1300
Grey Heron	<i>Ardea cinerea</i>	25	2700
Moorhen	<i>Gallinula chloropus</i>		20000
Coot	<i>Fulica atra</i>	220	17500
Oystercatcher	<i>Haematopus ostralegus</i>	690	8200
Ringed Plover	<i>Charadrius hiaticula</i>	100	730
Golden Plover	<i>Pluvialis apricaria</i>	1200	9300
Grey Plover	<i>Pluvialis squatarola</i>	30	2500
Lapwing	<i>Vanellus vanellus</i>	1100	20000
Knot	<i>Calidris canutus</i>	280	4500
Sanderling	<i>Calidris alba</i>	60	1200
Little Stint	<i>Calidris minuta</i>		3000
Curlew Sandpiper	<i>Calidris ferruginea</i>		10000
Purple Sandpiper	<i>Calidris maritima</i>	20	710
Dunlin	<i>Calidris alpina</i>	570	13300
Ruff	<i>Philomachus pugnax</i>		12200
Jack Snipe	<i>Lymnocyptes minimus</i>		20000
Snipe	<i>Gallinago gallinago</i>		20000
Black-tailed Godwit	<i>Limosa limosa</i>	190	610
Bar-tailed Godwit	<i>Limosa lapponica</i>	150	1200
Whimbrel	<i>Numenius phaeopus</i>		6700
Curlew	<i>Numenius arquata</i>	350	8400
Green Sandpiper	<i>Tringa ochropus</i>		15500
Spotted Redshank	<i>Tringa erythropus</i>		900
Greenshank	<i>Tringa nebularia</i>	20	2300
Redshank	<i>Tringa totanus</i>	300	3900
Turnstone	<i>Arenaria interpres</i>	95	1400
Mediterranean Gull	<i>Larus melanocephalus</i>		770
Black-headed Gull	<i>Chroicocephalus ridibundus</i>		20000
Common Gull	<i>Larus canus</i>		16400
Lesser Black-backed Gull	<i>Larus fuscus</i>		5500
Herring Gull	<i>Larus argentatus</i>		10200
Great Black-backed Gull	<i>Larus marinus</i>		4200

¹ Crowe and Holt. 2013

² Wetlands International 2012

