WeBS Low Tide Counts

AIMS

Estuarine sites in the UK provide the most important habitat for non-breeding waterbirds, acting as wintering grounds for many migrants but also as stopover feeding locations for other waterbirds passing along the East Atlantic Flyway. Core Counts on estuaries tend to quantify birds present at high tide roosts. Although important, knowledge of roost sites provides only part of the picture, and does not elucidate the use that waterbirds make of a site for feeding.

The WeBS Low Tide Counts scheme has flourished since its inception in the winter of 1992/93, with most of the major estuaries covered. The scheme aims principally to monitor, assess and regularly update information on the relative importance of inter-tidal feeding areas of UK estuaries for wintering waterbirds and thus to complement the information gathered by WeBS Core Counts.

The data gathered contribute greatly to the conservation of waterbirds by providing supporting information for the establishment and management of UK Ramsar sites and Special Protection Areas (SPAs), other site designations and whole estuary conservation plans. In addition, WeBS Low Tide Counts enhance our knowledge of the low water distribution of waterbirds and provide data that highlight regional variations in habitat use, whilst also informing protection of the important foraging areas identified. WeBS Low Tide Counts provide valuable information needed to gauge the potential effects on waterbirds of a variety of human activities which affect the extent or value of inter-tidal habitats, such as proposals for dock developments, recreational activities, tidal power barrages, marinas and housing schemes. Designing mitigation or compensation for such activities can be assisted using data collected under the scheme. Furthermore, the effects on bird distributions of climate change and sea level rise can be assessed.

METHODS

The scheme provides information on the numbers of waterbirds feeding on subdivisions of the inter-tidal habitat within estuaries. Given the extra work that Low Tide Counts entail, often by the same counters that carry out the Core Counts, WeBS aims to cover most individual estuaries about once every six years, although on some sites more frequent counts are made. Co-ordinated counts of waterbirds are made by volunteers each month between November and February on pre-established subdivisions of the inter-tidal habitat in the period two hours either side of low tide.

DATA PRESENTATION

Tabulated Statistics

Table 10. presents three statistics for 18 of the more numerous waterbird species present on 18 estuaries covered during the 2006/07 winter: the peak number of a species over the whole site counted in any one month; an estimate of the mean number present over the winter for the whole site (obtained by summing the mean counts of each species for each count section) and the mean density over the site (in birds per hectare), which is the mean number divided by the total area surveyed (in hectares). The area value used for these calculations is the sum of the inter-tidal and non-tidal components of each count section but omits the sub-tidal areas (*i.e.* those parts of the count section which are under water on a mean low tide).

Dot Density Maps

WeBS Low Tide Count data are presented as dot density maps, with subdivision of count sections into basic habitat elements. The reason for such a subdivision is to ensure species are plotted on appropriate habitat areas and to improve the accuracy of density estimates. Each section for which a count has been made is divided into a maximum of three different habitat components:

Inter-tidal: Areas that lie between mean high water and mean low water.

Sub-tidal: Areas that lie below mean low water. In more 'open-coast'-type situations, a sub-tidal zone reaching 500 m out from the inter-tidal sections has been created arbitrarily, to indicate the approximate extent of visibility offshore from land-based counts.

Non-tidal: Areas that lie above mean high water (usually saltmarsh although some grazing marshes are also covered).

The mean count for the sector is then divided amongst a varying number of the different components, dependent on the usual habitat preferences of the species involved. For example, Dunlin dots are plotted exclusively on inter-tidal sections whereas Wigeon dots are spread across inter-tidal, sub-tidal and non-tidal areas (in proportion to the relative areas of these three components).

Currently, throughout all WeBS Low Tide Count analyses, mean low tide and mean high tide are taken from the most recent Ordnance Survey 1:25000 maps (in Scotland, the lines on the OS maps are mean low water springs and mean high water springs instead). It is recognised, unfortunately, that these maps represent the current real shape of the mudflats, water channels and saltmarshes to varying degrees of accuracy. However, in the interests of uniformity across the UK, the Ordnance Survey outlines are adhered to throughout the analyses.

The maps display the average number of birds in each count section as dots spread randomly across habitat components of count sections, thus providing an indication of both numbers and density. **It is important to note that individual dots do not represent the precise position of individual birds; dots have been assigned to habitat components proportionally and are then randomly placed within those areas. No information about the distribution of birds at a finer scale than the count sector level should be inferred from the dot density maps.** For all maps in the present report, one dot is equivalent to one bird, except where stated. The size of individual dots has no relevance other than for clarity.

As most estuaries have now been covered more than once at low tide, density maps show the relative distributions of species in the winter of 2006/07 compared to an earlier winter of survey. It is hoped that comparative dot density distributions will lead to an easier and fuller appreciation of low tide estuarine waterbird distribution, and changes therein. The following colour conventions apply to density maps: red dots = 2006/07 winter; blue dots = earlier winter; pale blue = water; yellow = inter-tidal habitat (*e.g.* mudflat, sandflat); pale green = non-tidal habitat (*e.g.* saltmarsh, reedbed); grey or brown = not covered in one survey winter; dark blue = sector never covered. More detailed information concerning analysis and presentation of WeBS Low Tide Counts can be obtained from Neil Calbrade, the National Organiser (WeBS Low Tide Counts), or from the publication *Estuarine Waterbirds at Low Tide* (Musgrove *et al.* 2003).

ESTUARY ACCOUNTS

The main estuaries counted at low tide in the winter of 2006/07 are discussed. WeBS Low Tide Counts were carried out on 18 different sites, with estuary accounts encompassing 11 of these. Other counts, usually on limited numbers of sectors, were made in the winter of 2006/07 on Adur Estuary, Burry Inlet, Carmarthen Bay, Killough Harbour, Langstone Harbour, Swansea Bay and Tyne. These sites are not included in the estuary accounts, but data can be obtained from the WeBS Low Tide Count National Organiser upon request.

For the main site accounts, data were collected during the period November to February. Assessment of national and international importance is based on five year peak mean counts from the main species accounts in this volume of *Waterbirds in the UK*. Figure 58. shows the location of the sites discussed, and a site description is presented for each estuary. Distribution maps are presented for selected species, which are those of national or international importance, or are known to be undergoing site-level changes, where possible. General bird distribution is

described for the winter of 2006/07, focusing on species held in important numbers at the site in question.

Table 9. Sites with Estuary Accounts and important bird numbers held. Numbers in parentheses refer to the location in figure 58. For species codes see table 8.

	International Importance	**National Importance**
Belfast Lough (17)	BW	SU, SP, E., GN, RM, RH, BV, GG, OC, RP, PS, RK, TT
Breydon Water (5)	PG, WN, T., SV, GP, BW, RK	BS, EW, PT, AV, RU
Deben Estuary (6)	None	DB, SU, LG, AV, GV, BW, GK, RK
Exe Estuary (10)	BW	DB, RM, AV, GK
Firth of Tay (2)	BA	E., CA, SS, RK
Inland Sea (14)	None	None
Orwell Estuary (7)	None	DB, GA, PT, AV, KN, BW, RK
Stour Estuary (7)	BW	DB, SU, PT, AV, GV, DN, RU, RK, TT
Strangford Lough (16)	MS, WS, QN, SU, GP, KN, BA, RK	T., WN, MA, PT, SV, E., GN, RM, BV, GG, CO, RP, GV, L., DN, BW, CU, GK
Tees Estuary (4)	None	SV, LG, CA, SS, RU, GK, RK
Ythan Estuary (1)	PG	E., RU, GK, RK

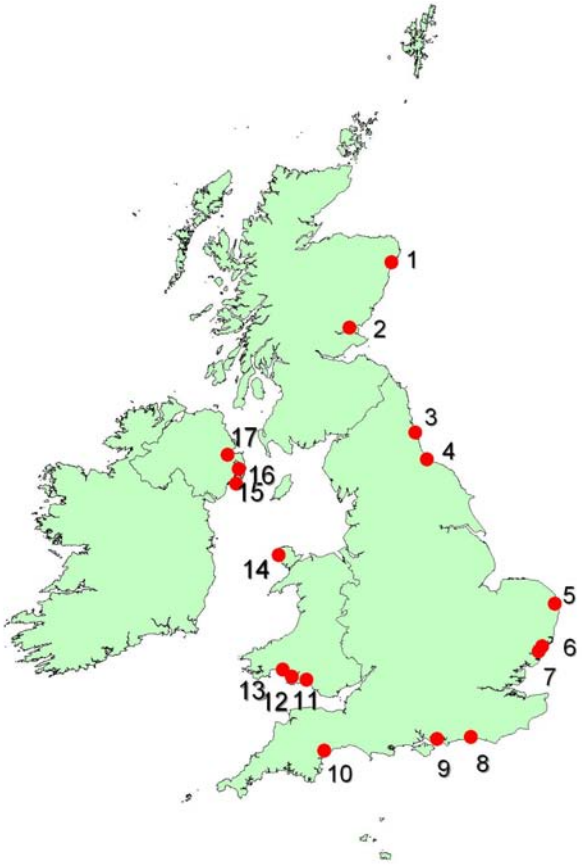


Figure 58. Map showing estuaries covered at low tide in the winter of 2006/07. 1: Ythan Estuary; 2: Firth of Tay; 3: Tyne Estuary; 4: Tees Estuary; 5: Breydon Water; 6: Deben Estuary; 7: Stour & Orwell Estuaries; 8: Adur Estuary; 9: Langstone Harbour; 10: Exe Estuary; 11: Swansea Bay; 12: Burry Inlet; 13: Carmarthen Bay; 14: Inland Sea; 15: Killough Harbour; 16: Strangford Lough; 17: Belfast Lough.

Table 10. Peak and mean counts and mean density (birds per ha) of 18 waterbird species across 18 estuaries covered by the 2006/07 WeBS Low Tide Counts. Stour and Orwell estuaries displayed separately. "+" indicates non-zero densities of <0.01 birds per ha.

	Adur Estuary			Belfast Lough			Breydon Water		
	Peak	*Mean*	*Mean*	*Peak*	*Mean*	*Mean*	*Peak*	*Mean*	*Mean*
Species	*No.*	*No.*	*Dns.*	*No.*	*No.*	*Dns.*	*No.*	*No.*	*Dns.*
Brent Goose	1	0	+	59	28	0.06	1	1	+
Shelduck	0	0	0	313	210	0.46	116	86	0.21
Wigeon	6	3	0.04	196	159	0.35	14830	8623	21.45
Teal	53	29	0.39	428	341	0.75	162	101	0.25
Mallard	31	12	0.16	244	217	0.48	163	108	0.27
Pintail	0	0	0	0	0	0	269	123	0.31
Oystercatcher	7	5	0.07	4002	3538	7.76	128	44	0.11
Ringed Plover	125	106	1.41	141	92	0.2	4	1	+
Golden Plover	0	0	0	20	7	0.02	24930	12599	31.34
Grey Plover	22	18	0.24	0	0	0	21	7	0.02
Lapwing	1291	967	12.89	1303	1049	2.3	14110	9613	23.91
Knot	1	0	+	43	14	0.03	440	139	0.35
Dunlin	480	340	4.53	357	314	0.69	5755	3284	8.17
Black-tailed Godwit	0	0	0	478	327	0.72	1421	1268	3.15
Bar-tailed Godwit	0	0	0	82	54	0.12	0	0	0
Curlew	2	0	+	779	503	1.1	584	312	0.78
Redshank	42	34	0.45	1397	1166	2.56	1083	934	2.32
Turnstone	39	20	0.27	405	322	0.71	0	0	0

	Burry Inlet			Carmarthen Bay			Deben Estuary		
	Peak	*Mean*	*Mean*	*Peak*	*Mean*	*Mean*	*Peak*	*Mean*	*Mean*
Species	*No.*	*No.*	*Dns.*	*No.*	*No.*	*Dns.*	*No.*	*No.*	*Dns.*
Brent Goose	816	593	0.1	0	0	0	2073	891	1.37
Shelduck	472	444	0.08	177	133	0.03	616	471	0.72
Wigeon	886	823	0.15	500	405	0.1	1524	895	1.38
Teal	81	35	0.01	264	209	0.05	253	159	0.24
Mallard	18	11	+	244	157	0.04	178	121	0.19
Pintail	578	269	0.05	69	39	0.01	296	169	0.26
Oystercatcher	14339	10969	1.94	10154	10110	2.51	319	213	0.33
Ringed Plover	42	42	0.01	109	74	0.02	33	21	0.03
Golden Plover	200	200	0.04	3000	1284	0.32	918	464	0.71
Grey Plover	353	188	0.03	33	17	+	223	167	0.26
Lapwing	200	217	0.04	3314	2051	0.51	2315	1339	2.06
Knot	1580	1035	0.18	1722	1199	0.3	204	99	0.15
Dunlin	6218	5330	0.94	2968	2251	0.56	3500	2554	3.93
Black-tailed Godwit	300	95	0.02	101	53	0.01	177	157	0.24
Bar-tailed Godwit	37	16	+	70	25	0.01	6	3	+
Curlew	1041	720	0.13	348	260	0.06	451	361	0.56
Redshank	324	204	0.04	362	354	0.09	1431	1321	2.03
Turnstone	26	17	+	0	0	0	61	57	0.09

	Exe Estuary			Firth of Tay			Inland Sea		
	Peak	*Mean*	*Mean*	*Peak*	*Mean*	*Mean*	*Peak*	*Mean*	*Mean*
Species	*No.*	*No.*	*Dns.*	*No.*	*No.*	*Dns.*	*No.*	*No.*	*Dns.*
Brent Goose	1215	1218	0.84	0	0	0	79	64	0.16
Shelduck	179	106	0.07	131	79	0.01	80	68	0.18
Wigeon	2109	1815	1.26	170	121	0.02	848	526	1.36
Teal	754	535	0.37	323	122	0.02	59	19	0.05
Mallard	367	323	0.22	482	375	0.07	39	23	0.06
Pintail	69	62	0.04	0	0	0	50	36	0.09
Oystercatcher	1602	1439	1	1616	1547	0.28	231	199	0.51
Ringed Plover	75	40	0.03	48	34	0.01	129	89	0.23
Golden Plover	125	117	0.08	44	11	+	631	341	0.88
Grey Plover	180	177	0.12	180	127	0.02	86	67	0.17
Lapwing	631	500	0.35	217	87	0.02	933	684	1.76
Knot	38	23	0.02	42	22	+	203	96	0.25
Dunlin	3091	2613	1.81	981	668	0.12	1144	912	2.35
Black-tailed Godwit	813	805	0.56	0	0	0	6	3	0.01
Bar-tailed Godwit	114	67	0.05	1002	763	0.14	67	25	0.06
Curlew	702	683	0.47	504	428	0.08	544	369	0.95
Redshank	309	260	0.18	784	448	0.08	304	220	0.57
Turnstone	73	71	0.05	47	32	0.01	56	35	0.09

	Killough Harbour			Langstone Harbour			Orwell Estuary		
	Peak	*Mean*	*Mean*	*Peak*	*Mean*	*Mean*	*Peak*	*Mean*	*Mean*
Species	*No.*	*No.*	*Dns.*	*No.*	*No.*	*Dns.*	*No.*	*No.*	*Dns.*
Brent Goose	213	114	1.75	696	501	1.24	1500	868	0.71
Shelduck	2	1	0.02	183	131	0.32	727	564	0.46
Wigeon	127	81	1.25	142	103	0.25	1633	1351	1.1
Teal	11	7	0.11	35	10	0.02	1223	850	0.69
Mallard	0	0	0	8	6	0.01	461	393	0.32
Pintail	0	0	0	10	5	0.01	753	323	0.26
Oystercatcher	62	49	0.75	642	538	1.33	1861	1559	1.27
Ringed Plover	36	19	0.29	84	31	0.08	153	88	0.07
Golden Plover	1100	715	11	2	1	+	400	100	0.08
Grey Plover	0	0	0	291	227	0.56	234	170	0.14
Lapwing	486	255	3.92	164	99	0.25	2727	1631	1.33
Knot	42	15	0.23	121	46	0.11	1398	716	0.58
Dunlin	386	175	2.69	4682	3818	9.45	2962	2784	2.27
Black-tailed Godwit	0	0	0	44	34	0.08	390	235	0.19
Bar-tailed Godwit	0	0	0	38	19	0.05	2	1	+
Curlew	68	62	0.95	276	253	0.63	825	745	0.61
Redshank	92	72	1.11	193	177	0.44	2075	1650	1.34
Turnstone	0	0	0	61	56	0.14	257	191	0.16

	Stour Estuary			Strangford Lough			Swansea Bay		
	Peak	*Mean*	*Mean*	*Peak*	*Mean*	*Mean*	*Peak*	*Mean*	*Mean*
Species	*No.*	*No.*	*Dns.*	*No.*	*No.*	*Dns.*	*No.*	*No.*	*Dns.*
Brent Goose	2049	1128	0.69	7179	3711	0.98	0	0	0
Shelduck	2312	1581	0.97	3413	2537	0.67	0	0	0
Wigeon	3471	3192	1.96	851	636	0.17	0	0	0
Teal	920	494	0.3	712	450	0.12	0	0	0
Mallard	274	212	0.13	496	357	0.09	8	2	+
Pintail	424	238	0.15	388	316	0.08	0	0	0
Oystercatcher	1333	1056	0.65	6421	5788	1.52	3878	1743	3.85
Ringed Plover	250	183	0.11	278	145	0.04	13	3	0.01
Golden Plover	5870	2541	1.56	8513	3618	0.95	0	0	0
Grey Plover	1699	1439	0.88	55	33	0.01	10	4	0.01
Lapwing	3225	2182	1.34	5154	3003	0.79	0	0	0
Knot	17796	10979	6.75	5380	3878	1.02	0	0	0
Dunlin	15663	13308	8.18	3151	2506	0.66	236	94	0.21
Black-tailed Godwit	764	485	0.3	535	361	0.09	0	0	0
Bar-tailed Godwit	182	109	0.07	419	296	0.08	3	1	+
Curlew	941	864	0.53	1918	1405	0.37	21	13	0.03
Redshank	1361	1255	0.77	2482	2081	0.55	75	41	0.09
Turnstone	490	377	0.23	185	189	0.05	57	47	0.1

	Tees Estuary			Tyne Estuary			Ythan Estuary		
	Peak	*Mean*	*Mean*	*Peak*	*Mean*	*Mean*	*Peak*	*Mean*	*Mean*
Species	*No.*	*No.*	*Dns.*	*No.*	*No.*	*Dns.*	*No.*	*No.*	*Dns.*
Brent Goose	0	0	0	0	0	0	0	0	0
Shelduck	504	471	1.18	0	0	0	229	90	0.45
Wigeon	212	150	0.38	0	0	0	1085	437	2.16
Teal	51	39	0.1	283	122	4.52	66	30	0.15
Mallard	0	0	0	4	2	0.07	218	76	0.38
Pintail	0	0	0	0	0	0	2	1	+
Oystercatcher	314	258	0.65	0	0	0	722	430	2.13
Ringed Plover	43	24	0.06	0	0	0	19	10	0.05
Golden Plover	6	2	0.01	2950	1592	58.96	3236	1272	6.3
Grey Plover	115	106	0.27	0	0	0	12	7	0.03
Lapwing	0	0	0	1025	608	22.52	4923	1723	8.53
Knot	143	58	0.15	0	0	0	220	141	0.7
Dunlin	174	139	0.35	171	66	2.44	608	276	1.37
Black-tailed Godwit	24	17	0.04	0	0	0	0	0	0
Bar-tailed Godwit	31	30	0.08	0	0	0	80	44	0.22
Curlew	328	267	0.67	4	3	0.11	1383	527	2.61
Redshank	556	462	1.16	258	174	6.44	1067	545	2.7
Turnstone	12	6	0.02	0	0	0	106	34	0.17

BELFAST LOUGH

Site description

Belfast Lough is a large sea lough in the northeast of Ireland, with the city of Belfast at its head. The area surveyed comprised the coast from Carrickfergus on the north shore around to the eastern end of Bangor on the south shore. Much of the site is afforded SPA and Ramsar status, with a further proposed SPA over open water. The outer parts of the Lough's shore are generally rocky with some sandy bays, although more extensive areas of intertidal mud are found toward Belfast. Industrial land claim has reduced the area of the mudflats over the last 150 years, and Belfast has become the main port in Northern Ireland for heavy cargo. More recently, all of the area, including the important Belfast Harbour Pools, has been given a degree of protection. Extensive areas of the lough support commercial shellfisheries. There are problems of refuse disposal, pollution and general disturbance, but notably bait diggers on the north shore can pose potentially high levels of disturbance.

General bird distribution 2006/07

Area covered 456 ha; Mean total birds 11,020; Mean bird density 24.2 birds per ha.

Counts were received from three months of the winter, but with 44 species recorded, this was the second highest diversity of the sites counted in 2006/07. Eider, Scaup and Great Crested Grebes are species that occur in nationally important numbers, all of which were again largely distributed along the west side of the lough south of Carrickfergus. The Belfast Harbour Pools once again supported high densities of birds, in particular wildfowl such as Wigeon and Teal. Redshank, Oystercatcher and also Scaup favoured the southwest corner of the lough, whilst Curlew favoured the more open stretches between Macedon Point and Carrickfergus. Amongst the more regular birds recorded were vagrant Ring-billed and Glaucous Gulls.

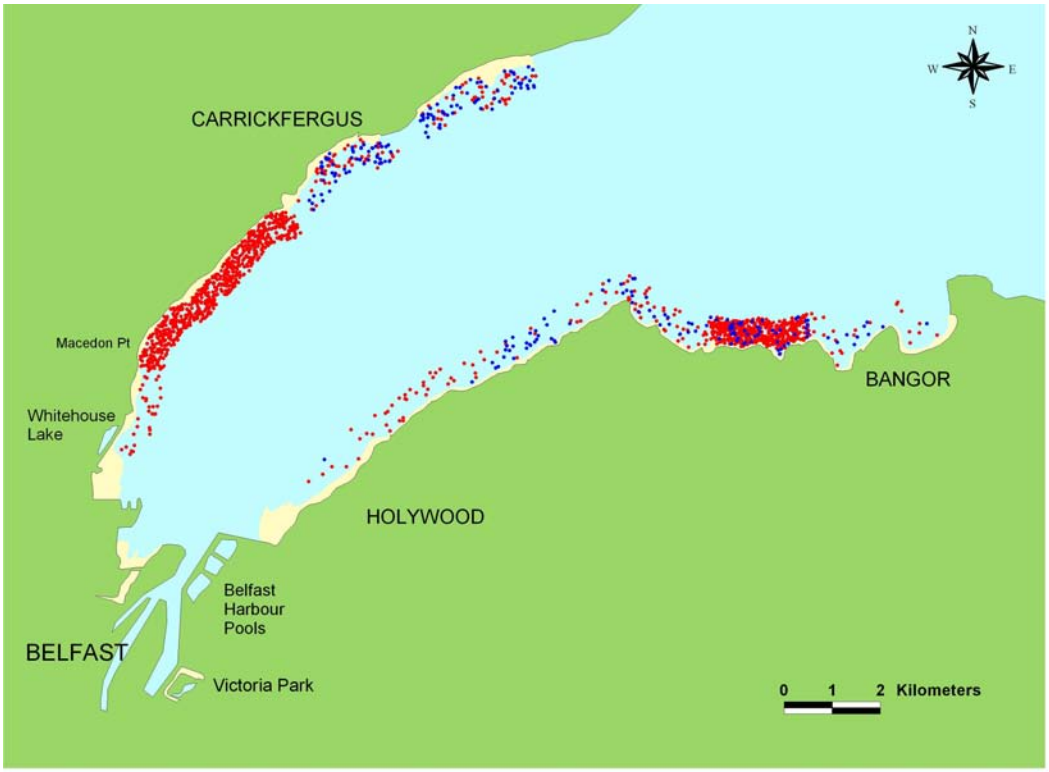
Comparative bird distribution

As reported in *WITUK 2005/06* (Musgrove *et al*. 2007), Eider numbers in Northern Ireland have increased steadily over the past twenty years, and Belfast Lough remains the key site for this species in the province. Figure 59. demonstrates the distribution of Eider in 2006/07 and ten years previously in 1996/97.

Across the lough, the mean density of the species has increased from 0.13 birds per ha to 0.56 birds per ha in 2006/07, reflecting the increase in the mean site count from 223 in 1996/97 to 941 (with peak counts of 352 and 1068 respectively).

Unlike Scaup which favour the southwest corner of the lough, the Eiders show two main areas of concentration, on the west side of the lough between Macedon Point and Carrickfergus, and also just to the west of Bangor. In the sector west of Bangor, the mean density has increased from 0.43 birds per ha in 1996/07 to 1.54 birds per ha in 2006/07.

In contrast, Knot is a species that has shown a decline over the same period, the site being issued with a High Alert over the ten-year period (Maclean & Austin 2008). Between 1996/97 and 2006/07, the mean density across the whole site dropped from 0.43 birds per ha to 0.03 birds per ha with the mean count dropping from 193 to just 14 birds. The distribution of the birds has contracted so much that they were only recorded in one area just south of Whitehouse Lake in 2006/07 whereas previously they were found near Holywood and west of Belfast Harbour. Even in this one sector, the mean count had decreased from 30 in 1996/97 to 14 in 2006/07. Within Northern Ireland, this species has traditionally been highly concentrated at Strangford Lough and, with the decline at Belfast Lough, this level of concentration has become even greater.



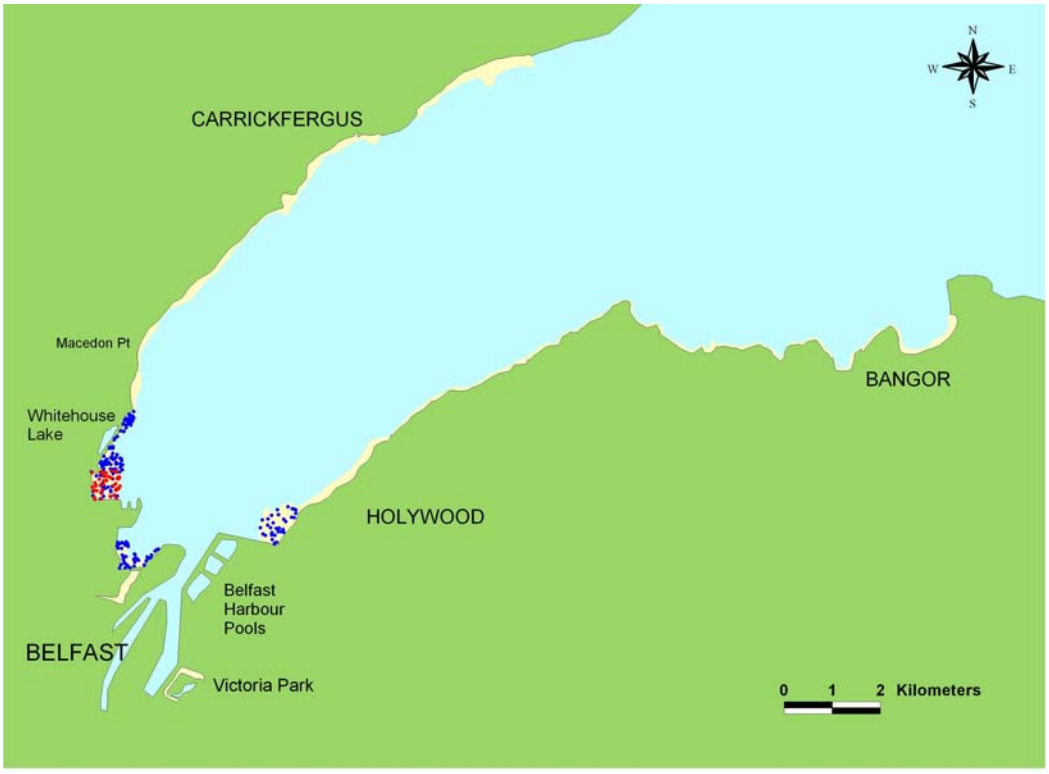


Figure 59. Low Tide distribution of Eider (above) and Knot (below) for the winters of 1996/97 (blue) and 2006/07 (red). Yellow = intertidal; pale green = non-tidal; blue = subtidal. 1 dot = 1 bird

BREYDON WATER

Site description

Breydon Water is a bar-built estuary separated from the North Sea by the spit of land on which Great Yarmouth sits. The estuary forms the lower reaches of the Yare and Waveney rivers, which drain much of central East Anglia. The rivers are tidal for many miles inland but only the estuary area from the confluence of the rivers is considered here. At high tide, Breydon Water forms a large lake but as the tide recedes, the only water that remains forms a narrow channel, well marked by buoys for the numerous leisure cruisers. There are small areas of saltmarsh, principally at the eastern end. To the north of the estuary stretches the huge expanse of the Halvergate Levels, Breydon Marshes and Berney Marshes. These form an extensive area of grazing marsh that has been subject to varying degrees of drainage in recent years. The main high tide roosts occur at the RSPB reserve at Berney Marshes (only accessible by boat, train or a very long walk) and in the eastern saltmarsh. The site is designated as a SPA and is judged in favourable condition. The main conservation issues in the area involve boating, shooting and grazing marsh management. The river channel leading out through Great Yarmouth to the sea is highly industrialized.

General bird distribution 2006/07

Area covered 402 ha; Mean total birds 37,601; Mean bird density 93.5 birds per ha.

Breydon Water once again supported the highest overall mean density of all sites included in the 2006/07 Low Tide Counts, with 93.5 birds per ha. Only the Stour Estuary, which has four times the area of Breydon, produced a higher mean total of birds, which shows the importance of this site. The number of species present was slightly lower than in 2005/06 with 23 recorded. Golden Plover were again present in the highest mean numbers (12,599 birds) and densities (31 birds per ha on average across the winter), and were distributed densely from Breydon Junction to Acle Marshes. Again, the relatively small area for feeding supported high densities of Lapwing (23.91 birds per ha) and Wigeon (17.96 birds per ha).

Comparative bird distribution

Since 1998/99, WeBS has received regular counts of Breydon Water at low tide. The winters of 2006/07 and 1999/00 are compared for the distributions of two species, both apparently increasing at low water, Avocet and Pintail.

In common with many sites, Breydon Water has held increasing numbers of Avocets during the winter months. The mean site density has increased from 0.16 to 0.22 birds per ha between the two winters, with the mean winter count now nearly numbering 200 birds. The reasons for this change are not clear, although are probably due in part to increasingly mild winters in East Anglia; many of the birds wintering here are derived from continental breeders. Figure 60. shows how the distribution has changed between years, with birds formerly favouring the area by the Pump House north towards Breydon Junction. In 2006/07 however, the bulk of the birds congregated near Berney Marshes with very few found further northeast.

Numbers of wintering Pintail have also steadily increased, with a mean count of 122 in 2006/07 compared to 79 in 1999/00. This has also seen the mean site density increase from 0.17 birds per ha to 0.25 birds per ha between the years. In both winters, Pintail favoured the north side of Breydon Water although in 1999/00, they were found between Acle Marshes and Breydon Junction, whilst by 2006/07 had extended its range more towards Berney Marshes.

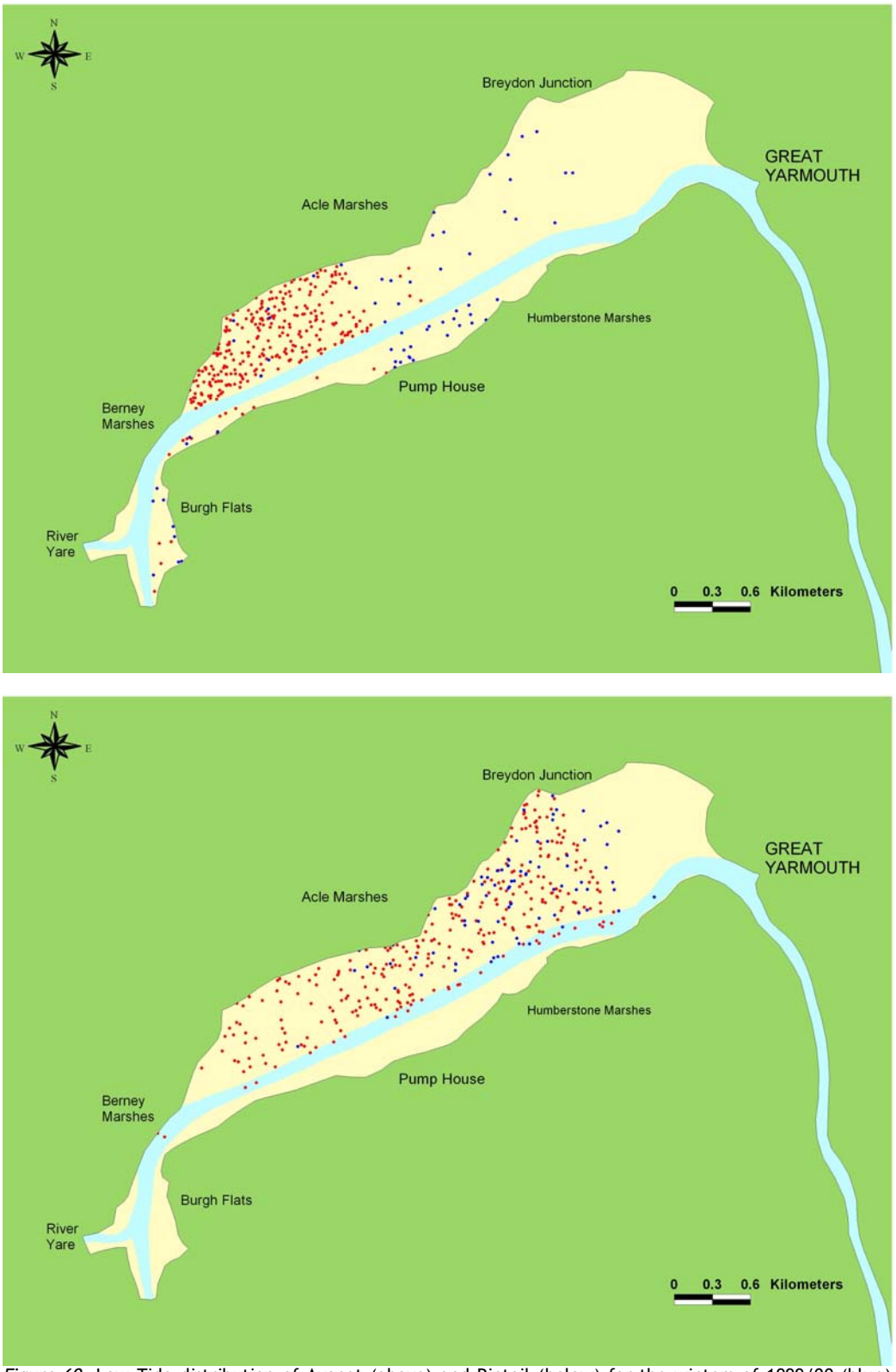


Figure 60. Low Tide distribution of Avocet (above) and Pintail (below) for the winters of 1999/00 (blue) and 2006/07 (red). Yellow = intertidal; pale green = non-tidal; blue = subtidal.

DEBEN ESTUARY

Site description

The Deben is a long, narrow estuary on the Suffolk coast, with its head at Woodbridge and its mouth just to the northeast of Felixstowe. There are relatively wide mudflats on the inner part of the estuary but these are narrower towards the mouth. Most of the surrounding land is agricultural in nature, with much of the outer estuary flanked by low-lying grazing marshes. There is also a fringe of saltmarsh around much of the estuary. Martlesham Creek, on the west bank at the northern end of the site is the largest of a number of small side creeks. Recreational activities such as sailing and watersports are perhaps the most obvious sources of disturbance to waterbirds on the site.

General bird distribution 2006/07

Area covered 650 ha; Mean total birds 10,030; Mean bird density 15.4 birds per ha.

Despite its relatively small area, the Deben Estuary supports a good variety of birds, with 40 different waterbird species recorded, many in large numbers. Dunlin were present in the highest mean numbers (2,552 birds) and densities (5.33 birds per ha on average across the winter), and were distributed densely along the full length of the site. Redshank (mean count 1,225), Dark-bellied Brent Geese (mean count 890) and Wigeon (mean count 863) were also present in large numbers. Many species were distributed widely along the narrow estuary, though some species had favoured areas. Pintail, for example, were found exclusively just north of Stonner Point, whilst Golden Plover favoured the area opposite Kirton Marshes. Among the more unusual species recorded were Great Northern Diver and Shag.

Comparative bird distribution

The distributions of two species - Dark-bellied Brent Goose and Black-tailed Godwit, are considered here. The winters of 2006/07 and 1998/99 are compared.

Nationally, Dark-bellied Brent Geese numbers have fallen and then risen again over the period under consideration. The mean site density of Dark-bellied Brent Geese on the Deben Estuary has increased from 0.39 to 1.00 birds per ha between the two winters. This is also reflected in the peak count, which has risen from 648 to over 2,000 birds. Figure 61. shows Dark-bellied Brent Geese had three distinct favoured areas in both 1998/99 and 2006/07, north of Stonner Point, around Falkenham Marshes and the main concentration by Kirton Marshes and Kirton Creek. Brent Geese can sometimes be under-recorded on WeBS Low Tide Counts as they often favour fields that lie outside the recording area and as such can be missed. However, as the Peak Core Count in 2006/07 was 1,759 birds, this appears not to have been the case here.

Black-tailed Godwit numbers are increasing annually across the UK. The mean count on the Deben Estuary has more than doubled between 1998/99 and 2006/07, increasing from 68 to 155 birds, with peak counts of 104 and 177 respectively. Unlike the Brent Geese that favour the wider stretches of the estuary, figure 61. shows that Black-tailed Godwits favour the narrower creeks around Martlesham Creek and northwards towards Woodbridge.

Figure 61. Low Tide distribution of Dark-bellied Brent Geese (above) and Black-tailed Godwit (below) for the winters of 1998/99 (blue) and 2006/07 (red). Yellow = intertidal; pale green = non-tidal; blue = subtidal.

EXE ESTUARY

Site description

The Exe Estuary is located on the south coast of England in Devon. Comprising open water, foreshore, low-lying land and saltmarshes, the estuary extends 10km south from Exeter to the open sea at the SSSI at Dawlish Warren. The site is designated as an SPA due to the internationally important numbers of wintering and passage waterbirds it supports. The mud and sand flats hold mussel and eelgrass beds, which provide rich feeding grounds for many species. Potential threats posed to this site include sea-level changes that may lead to flooding, erosion and coastal defence improvements, disturbance from leisure activities and developments, the extension of workshops and cesspit construction, wildfowling and inappropriate land management (BirdLife International 2003). Other potential threats include habitat loss due to dredging, over-fishing and aquaculture projects, changes in water quality resultant from improvements to waste water discharges and recreational disturbance.

General bird distribution 2006/07

Area covered 1,443 ha; Mean total birds 11,804; Mean bird density 8.2 birds per ha.

Counts were received from two months of the winter (November and January) although a relatively high total of 41 species was still recorded. Dunlin were present in the highest mean numbers (3,091 birds) and densities (2.54 birds per ha on average across the winter), favouring the northern end of the estuary north of Powerham Sand and also at Lympstone and south of Starcross. Oystercatcher, Wigeon and Dark-bellied Brent Geese also averaged over 1,000 birds across the winter. Two Slavonian Grebes were present in January.

Comparative bird distribution

One of the species for which the site is designated as an SPA is the Avocet. At the time of designation in the mid 1990s the site supported about 28% of the British wintering population, but the proportion is now closer to 10%. This apparent decline in importance, however, is deceptive, as numbers have risen slightly on the Exe, but more steeply elsewhere in the UK (trends for species both on such designated sites, and for the country as a whole, are examined on a regular basis as part of the WeBS Alerts system – see http://www.bto.org/webs/alerts/).

Figure 62. illustrates the distribution of Avocets on the Exe in 2006/07 (red dots) compared with that recorded in 1993/94 (blue dots) when the last WeBS Low Tide Counts were carried out here. It appears that the distribution of Avocets between the two seasons has changed. The mudflats closest to Topsham were a favoured area in both years, and in 1993/94 they supported by far the highest proportion of the birds, with smaller numbers elsewhere along the eastern side of the estuary. However, in 2006/07 the western shore, particularly at Powderham Sand and just north of here also held good numbers of Avocets. Although this may just be due to more birds being on the site, this shift in the distribution was also evident in the densities of birds. In 1993/94, the mean count in the key sector at Topsham was 75 (2.98 birds/ha), whereas in 2006/07 the mean density had declined by 10% to 2.66 birds/ha. However, as Low Tide Counts just record a 'snapshot' of distribution, this apparent shift may be a within winter difference rather than a definite change of general distribution.

The Little Egret is now a familiar sight on many estuaries, with those in southern Britain especially well colonised. The scale of the increase is reflected well in Figure 62., which shows the distribution of the species on the Exe Estuary in the winters of 1993/94 and 2006/07. The influx of Little Egrets in the UK began in 1989 and the species has increased rapidly ever since. In 1993/94, only a handful of Little Egrets were present on the Exe Estuary, with a peak of just 7 birds recorded. By 2006/07, however, the peak count had risen to 55 birds, with a wide scattering of birds, many between Exmouth and Lympstone and also at Topsham.

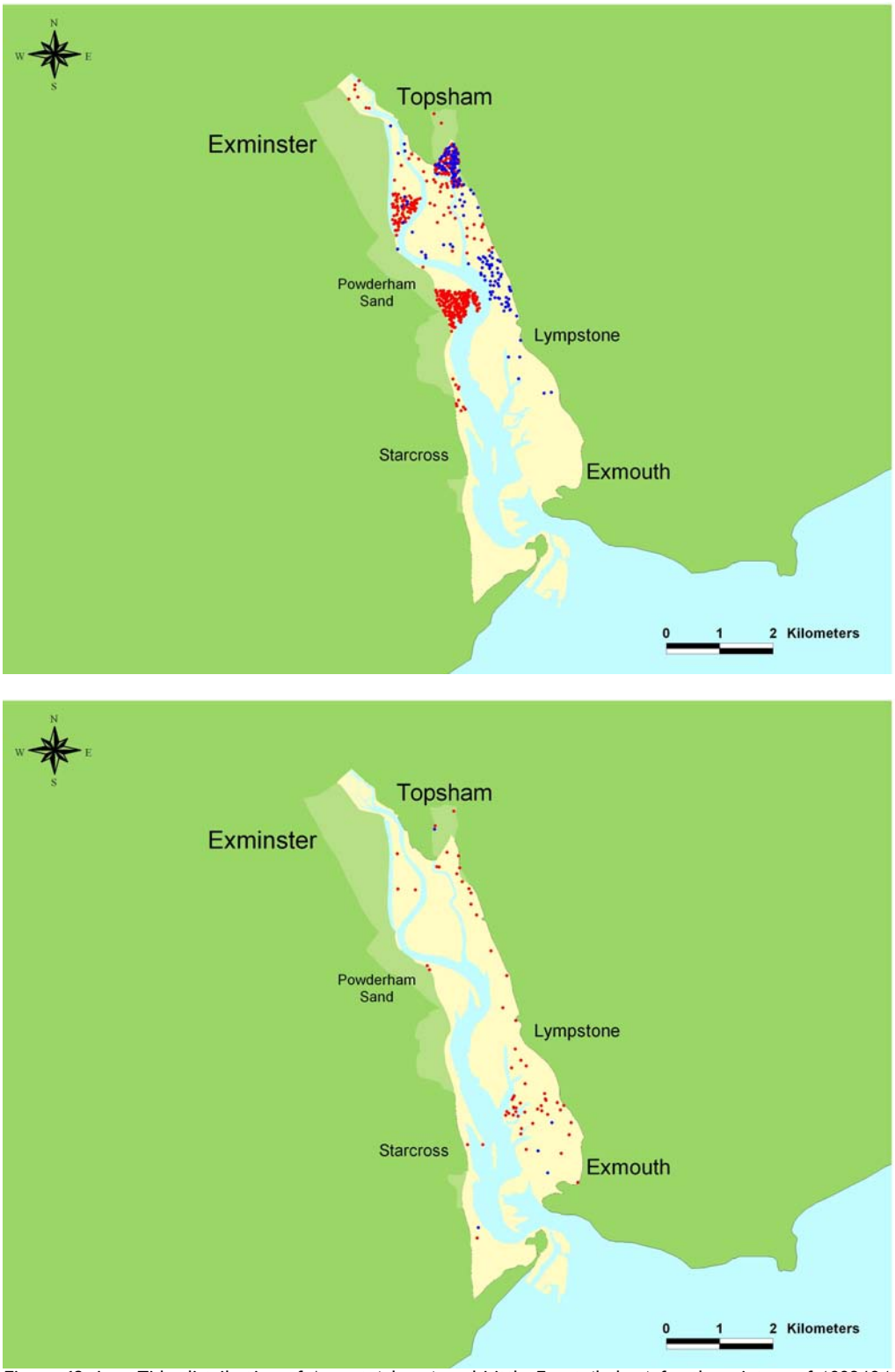


Figure 62. Low Tide distribution of Avocet (above) and Little Egret (below) for the winters of 1993/94 (blue) and 2006/07 (red). Yellow = intertidal; pale green = non-tidal; blue = subtidal.

FIRTH OF TAY

Site description

The Firth of Tay is a large estuary located on the east coast of central Scotland, stretching for some 35km from near Newburgh to the estuary mouth. For much of its length, the most extensive intertidal flats are on the north side, west of Dundee, fringed by a dense *Phragmites* reed bed along the upper part of the shore. However, most waders favour the intertidal areas nearer the estuary mouth, where there are stony scars and mussel beds.

General bird distribution 2006/07

Area covered 5,446 ha; Mean total birds 7,710; Mean bird density 1.4 birds per ha.

The Tay was the largest site counted at low tide in 2006/07. Despite this, the mean total of birds was relatively low with less than 8,000 birds of 38 species counted. This resulted in the lowest density of any site counted at just 1.4 birds per hectare. The most numerous species by far was Eider, with a peak count of over 4,500 birds. These were largely congregated around Abertay Sands at the mouth of the estuary. Oystercatchers were the only other species with a four figure mean count, with an average of 1,548 counted, whilst good numbers of Dunlin, Bar-tailed Godwits, Curlew and Redshank were also recorded. Other sea ducks, which are often overlooked on low tide counts, were well represented with small numbers of Long-tailed Ducks, Common Scoter, Goldeneye and Red-breasted Merganser seen.

Comparative bird distribution

This site was issued with a high alert for one species, Red-breasted Merganser (Maclean & Austin 2008). The distribution of this species and Bar-tailed Godwit are considered here. The winters of 2006/07 and 1996/97 are compared.

Red-breasted Mergansers are found throughout the site. The counting of these, along with other species of sea duck, is very much determined by the weather on the day of the count, and numbers fluctuate significantly during Core Counts. The number of Red-breasted Mergansers recorded on the low tide counts has halved in the two seasons under consideration. In 1996/97, the mean count was 99 birds, whereas in 2006/07 this had fallen to 45 birds. Numbers are greatest towards the mouth of the estuary although small numbers of birds frequent the narrower stretches as far as Newburgh. Although widely, though thinly distributed, concentrations of birds were obvious near Broughty Ferry and around Abertay Sands in 2006/07. In 1996/97 however, the north side of the firth such as Barry Sands was favoured.

During WeBS Core Counts, Bar-tailed Godwit numbers have fluctuated at this site over the last twenty years, with numbers peaking in 1996/97. The mean low tide site count then was 1,708 birds but numbers have decreased since then with a mean low tide count of 763 in 2006/07. In both winters, the distribution was very similar, with My Lord's Bank, the north shore between Broughty Ferry and Barry Sands, and Tayport and Tentsmuir Point on the south side being the favoured areas.

However, in 2006/07 Barry Sands was the most favoured area with fewer birds in particular around My Lord's Bank than in the winter of 1996/97, possibly due to increasing aircraft activity at the adjacent Dundee airport.

Both species are also believed to use uncounted areas outwith the firth, partly accounting for the apparent declines.

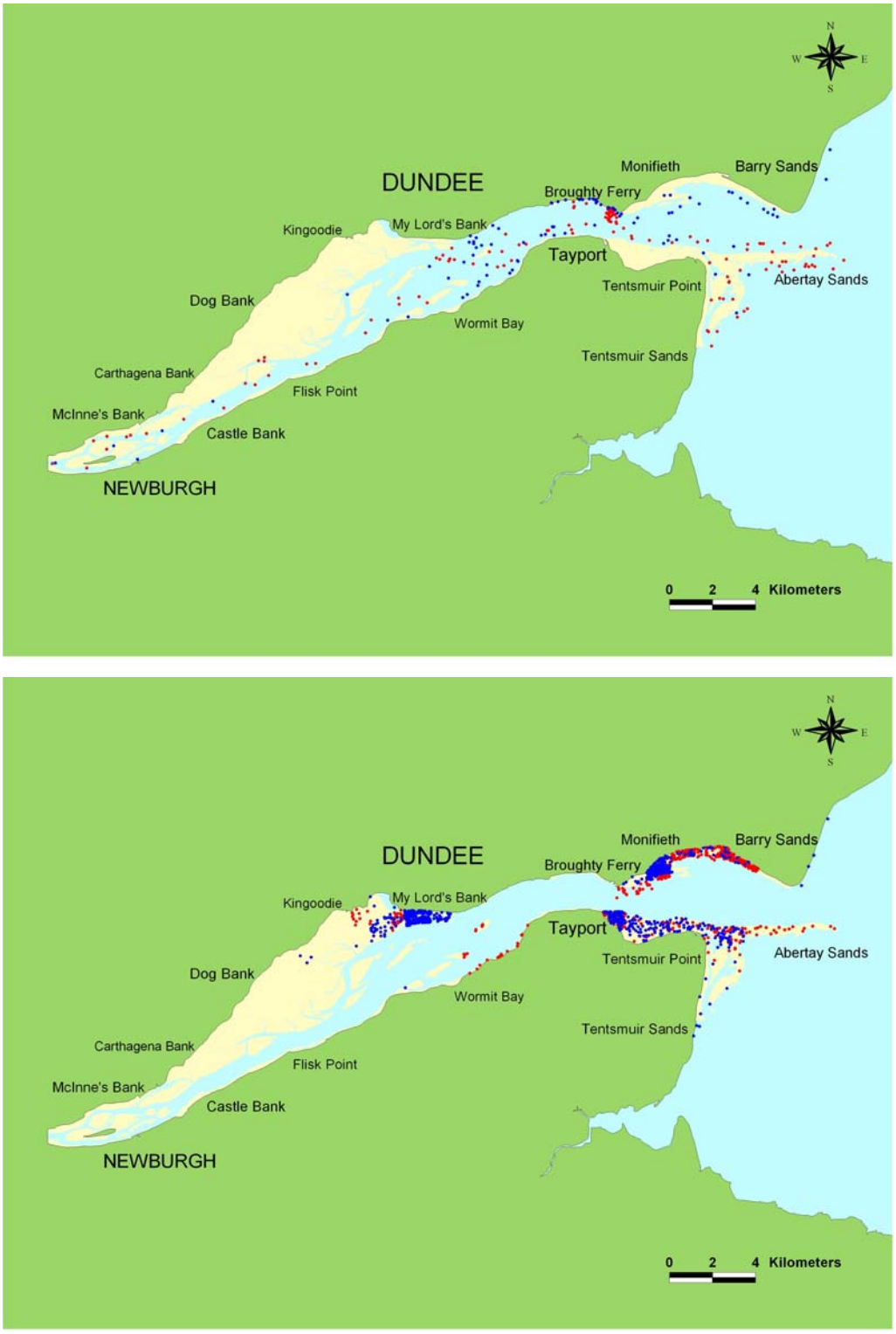


Figure 63. Low Tide distribution of Red-breasted Merganser (above) and Bar-tailed Godwit (below: 1 dot = 2 birds) for the winters of 1996/97 (blue) and 2006/07 (red). Yellow = intertidal; pale green = non-tidal; blue = subtidal.

INLAND SEA / ALAW ESTUARY

Site description

The Inland Sea (Alaw Estuary) lies between Anglesey and Holy Island on the northwest Wales coast. Two road bridges border the site, Four Mile Bridge to the south and Stanley Embankment to the north. To the north of the Stanley Embankment is the small estuary of the Afon Alaw, which empties into Holyhead Bay past the sands of Traeth y Gribin. On the west side of the estuary lie the sheltered flats of Beddmanarch Bay. For the low tide counts, the whole intertidal area from Porth Dryw on the east shore and Gorsedd-y-penrhyn on the west shore south to Four Mile Bridge was counted.

General bird distribution 2006/07

Area covered 388 ha; Mean total birds 4,029; Mean bird density10.4 birds per ha.

Thirty-eight species of waterbird were recorded at low tide despite the site being one of the smallest areas covered. Dunlin were present in the largest numbers, with a mean count of over 900 birds through the winter. The intertidal area near Four-mile Bridge saw the highest densities of Dunlin with a mean density of nearly 10 birds per hectare recorded. This was also the favoured area for Redshank with a mean count of 105 birds recorded. Wigeon however were found largely between Beddmanarch Bay and Four Mile Bridge, with only a few birds further north. Amongst the more numerous species was a vagrant Long-billed Dowitcher and up to 2 each of Great Northern Diver and Slavonian Grebes.

Comparative bird distribution

The Inland Sea was previously counted under the WeBS Low Tide Count Scheme in 1995/96. Here, the distributions of two species, Light-bellied Brent Goose and Knot are compared between the winters of 2006/07 and 1995/96.

The mean count of Light-bellied Brent Geese (of the East Canadian High Arctic population, which winters mostly in Ireland) has doubled from 32 to 64 birds between the two winters. This slight increase comes as the national trend remains at about the same level. The change in distribution is quite striking, with a northwards shift (Figure 64.). In 1995/96, Brent Geese were found almost exclusively south of Beddmanarch Bay whereas in 2006/07 all the birds were recorded north of Beddmanarch Bay up to Porth Penrhyn-mawr.

Unlike many estuaries, Knot are not found in large numbers on the Inland Sea. However, between 1995/96 and 2006/07, the number of Knot has increased. In 1995/96, Knot were only recorded in one month, with a mean count of just 11 birds (0.13 birds per hectare) over the winter, all on Traeth y Gribin. By 2006/07, the mean count on this same section had risen to 71 birds (0.90 birds per hectare) with birds recorded in all four months. In 2006/07, Knot were also recorded in Beddmanarch Bay, the south end of Traeth y Gribin and also by Four Mile Bridge.

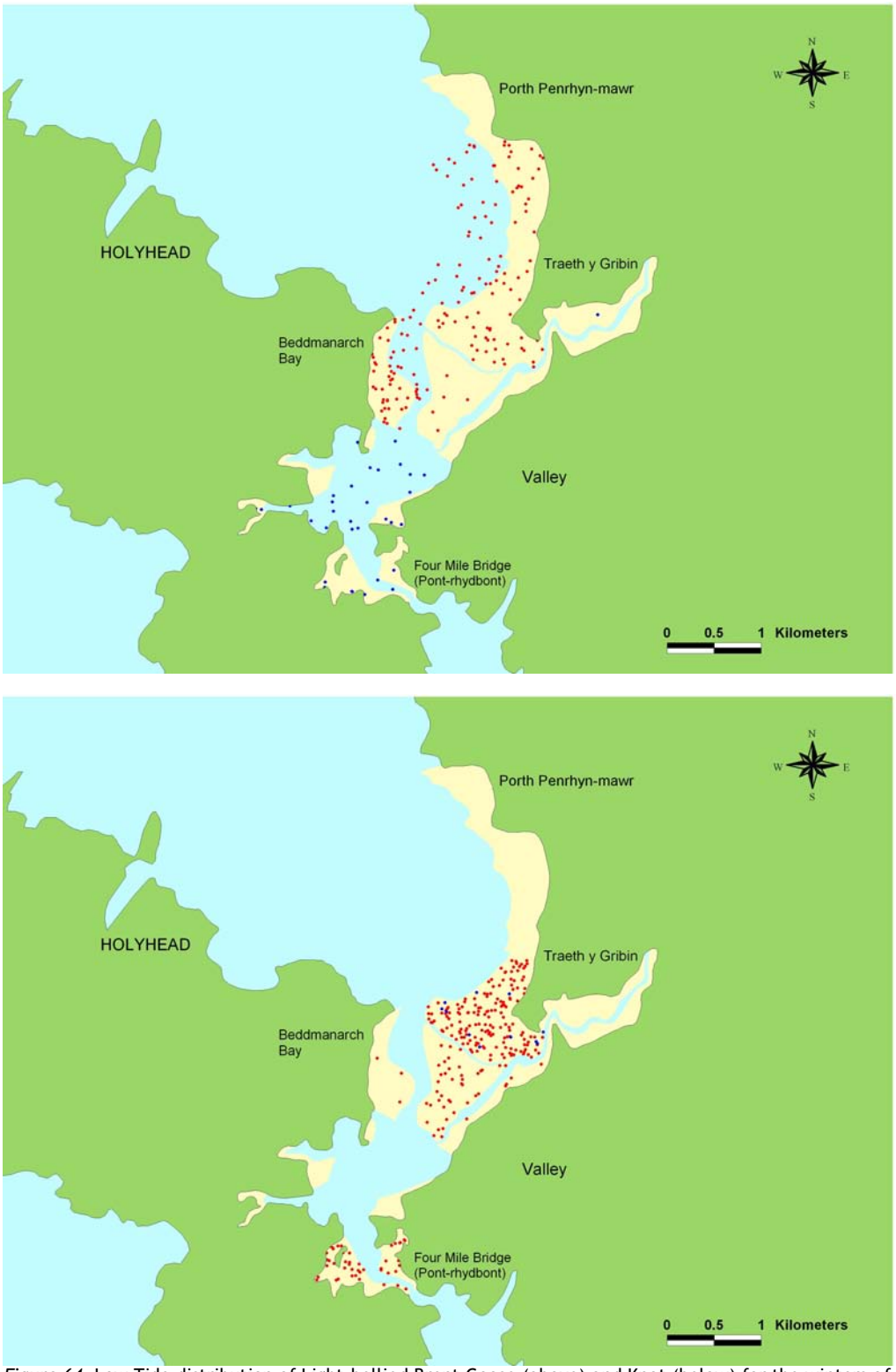


Figure 64. Low Tide distribution of Light-bellied Brent Goose (above) and Knot (below) for the winters of 1995/96 (blue) and 2006/07 (red). Yellow = intertidal; pale green = non-tidal; blue = subtidal.

STOUR & ORWELL ESTUARIES

Site description

The Stour is a long and straight estuary, which forms the eastern end of the border between Suffolk and Essex. The estuary's mouth converges with that of the Orwell, which extends from Ipswich to Felixstowe, as the two rivers enter the North Sea. The outer Stour is sandy and substrates become progressively muddier further upstream. There are seven shallow bays along the estuary and sharply rising land or cliffs, covered with ancient coastal woodland and agricultural land, leaving little room for saltmarsh development, border much of its length. Much of the intertidal substrate of the Orwell is fairly muddy. In mitigation for the latest port development, both the north and south shores of the lower reaches of the estuary have had soft silts placed behind stiff clay bunds within the intertidal areas, changing the substrate again. Long stretches of farmland and wet meadow are situated along the mid-estuary, the latter providing roost sites for waterbirds. Nature conservation in the area includes the Stour & Orwell Estuaries Ramsar site and SPA, with management by RSPB, Woodland Trust, Essex Wildlife Trust and Suffolk Wildlife Trust. Some sailing and shooting occurs, though the major concern remains continued expansion of dock operations and subsequent land claim of important feeding areas. The estuaries are here considered together as one functional unit to reflect the extent of the SPA designation.

General bird distribution 2006/07

Areas covered 1,627/1,227 ha; Mean total birds 42,423/16,313; Mean bird density 26.1/13.3 birds per ha.

As in the winter of 2005/06, many areas of the Orwell held significant numbers of birds, including Jill's Hole, Trimley Marshes, Mulberry Middle, Loompit Lake and near Nacton. Favoured areas on the Stour were Holbrook Bay, Erwarton Bay, Copperas Bay, Bathside Bay, Jacques Bay, Stutton Mill, Seafield Bay and near Mistley. Single figure counts of Spotted Redshank were present on both estuaries, while other more unusual species recorded included Red-throated Diver, Slavonian Grebe, Black Brant and Scaup.

Comparative bird distribution

Black-tailed Godwits occur here in internationally important numbers, although they are a species that is undergoing a decline on this site with a Medium Alert being triggered (Maclean & Austin 2008). Comparisons with the winter of 1996/97 are displayed. In both winters, Black-tailed Godwits favoured the western end of the Stour Estuary around Jacques and Holbrook Bays west to Seafield Bay. However, in 2006/07, the largest concentration was in Seafield Bay and near Mistley with much fewer than in 1996/97 in Jacques Bay, Stutton Mill and the west side of Holbrook Bay. The mean count for the winter has decreased from 1,739 birds in 1996/97 to 484 by 2006/06. However, there has been a slight increase in the mean counts on the Orwell from 173 birds in 1996/97 to 234 in 2006/07, with the area near the Orwell Bridge to Mulberry hard and south of Redgate Hard seeing increased numbers. Pintail have undergone a similar pattern of decline, with numbers decreasing from a mean of 512 on the Stour in 1996/97 to 235 in 2006/07 although mean numbers increased from 167 to 323 in the same period on the Orwell. The main area of increase on the Orwell is Trimley Marshes where the density has increased from 0.16 to 3.49 birds per hectare. The main concentration on the Stour is near Mistley (5.98 birds per hectare in the main area in 2006/07) though in 1996/97 birds were much more widespread around the inner reaches of the estuary around Seafield Bay and Stutton Mill.

The Stour & Orwell Estuaries are counted by Suffolk Wildlife Trust under contract to Harwich Haven Authority. These data are generously made available to The Wetland Bird Survey.

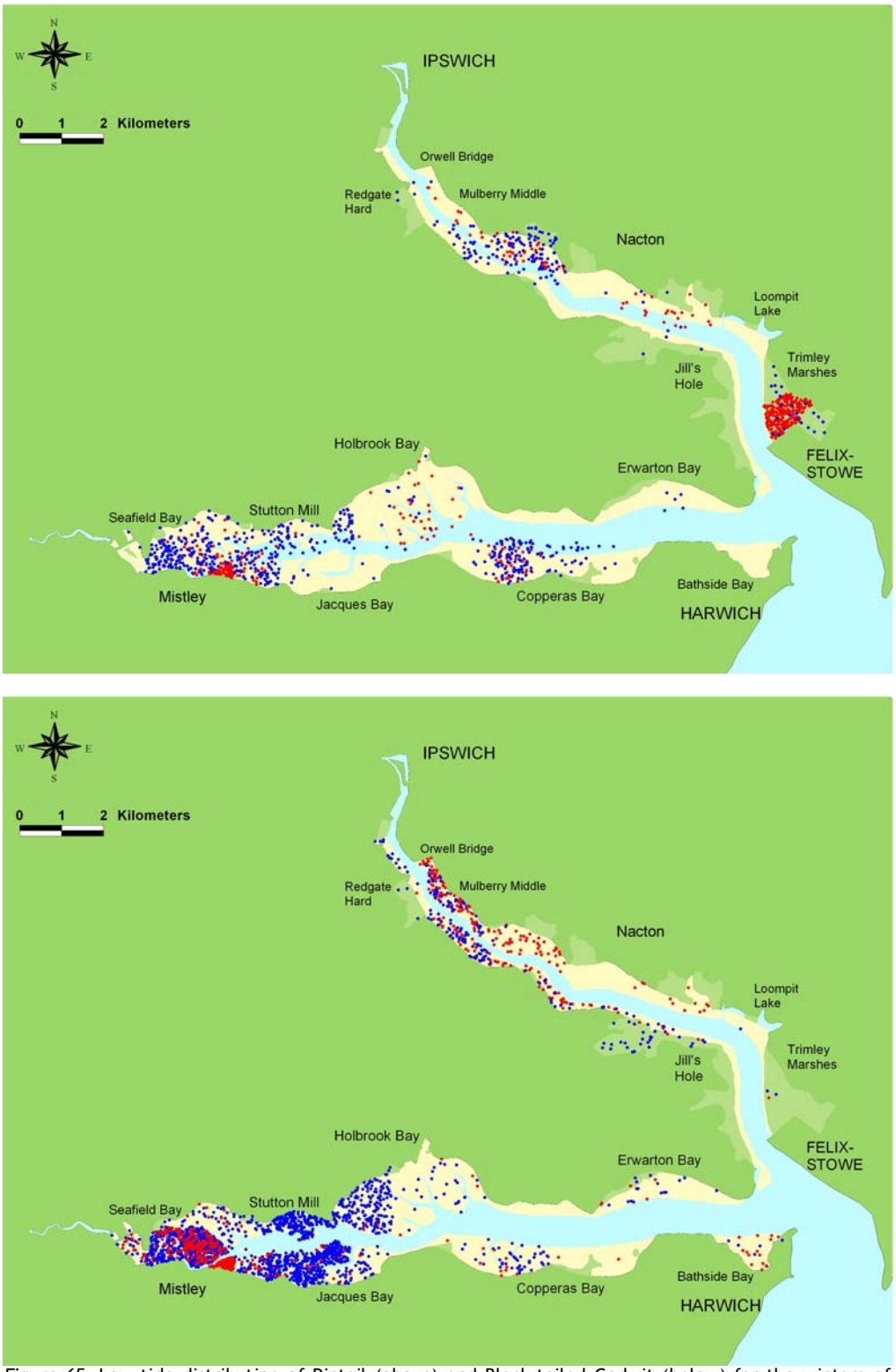


Figure 65. Low tide distribution of Pintail (above) and Black-tailed Godwit (below) for the winters of 1996/97 (blue dots) and 2006/07 (red). Yellow = intertidal; pale blue = subtidal; pale green = intertidal.

STRANGFORD LOUGH

Site description

Strangford Lough is a large shallow sea lough on the east coast of Northern Ireland, protected as a SPA, a Marine Nature Reserve, and a Ramsar Site. The site includes the Narrows, a deep rocky channel to the Irish Sea. The main body of the lough is sheltered to the east by the Ards Peninsula. Downpatrick and Newtownards are the largest human habitations nearby. Within the lough there are numerous rocky outcrops and small islands. The north of the lough in particular holds extensive intertidal mud and sand flats and there are countless other bays and inlets, and large expanses of open water, providing a wide diversity of habitat. Since 2001, mobile gear fishing has been banned in Strangford Lough to allow populations of the Horse Mussel *Modiolus modiolus* to recover. Static fishing and catching of crustaceans still occurs. There is some recreational activity within the lough, including sailing. Despite the enormity of Strangford Lough, dedicated counters are able to count along the majority of its shoreline, and do so at low tide annually – an impressive achievement.

General bird distribution 2006/07

Area covered 3,807 ha; Mean total birds 32,550; Mean bird density 8.6 birds per ha.

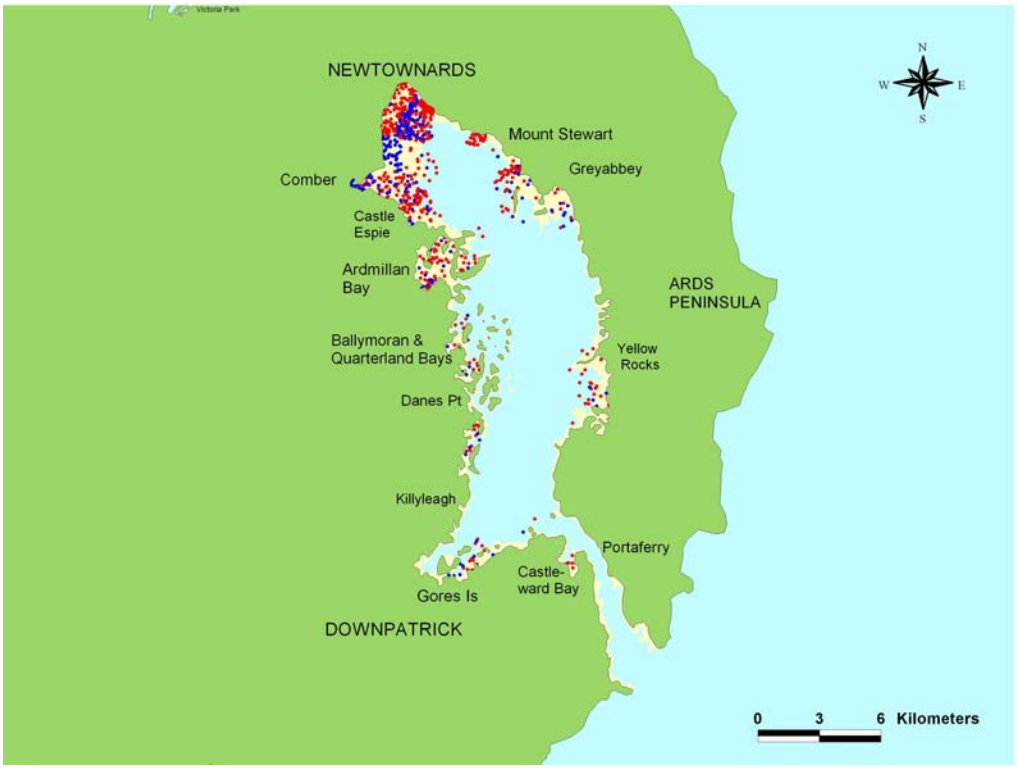
Once again, Strangford Lough produced the widest diversity of species recorded on the low tide counts with 49 different types of waders and wildfowl. Oystercatchers were present in the highest numbers, with a mean of over 5,700 birds recorded whilst other waders including Lapwing, Golden Plover, Knot, Dunlin, Curlew and Redshank were also found in large numbers. Light-bellied Brent Geese, (of the East Canadian High Arctic population) occur in internationally important numbers at Strangford Lough and are widespread. In the autumn and early part of the winter they are concentrated in the north end of the Lough but start to disperse and move either out of the Lough altogether or further south in the Lough as the winter progresses. Large numbers of Brent only use Strangford as a stop over for a few days before dispersing to other parts of Ireland. Other species however are very restricted in their range. For example, Gadwall were concentrated in Castleward Bay and Bar-tailed Godwits were found at Castle Espie and on the north east shoreline. An average of 33 Greenshank on the site was the highest recorded, with most sites counted at low tide recording single figures.

Comparative bird distribution

Figure 66. shows the distribution of two species that are undergoing different patterns of change. Distribution data from Low Tide Counts undertaken in 1996/97 are displayed for comparison with bird distribution ten years later in 2006/07, for Dunlin and Shelduck.

Shelduck are present at Strangford Lough in internationally important numbers. In keeping with the Northern Ireland trend, Shelduck numbers have been steadily increasing over the past ten years. This shows in a comparison of the mean winter count for the two winters; in 2006/07 the figure was 2,531, compared to 2,231 in 1996/07. Although widespread around the lough, Shelduck numbers were greatest at the northern end between Newtownards and Castle Espie.

In contrast, Dunlin numbers peaked in 1996/97 (Maclean & Austin 2008) but since then have seen a steep decline sufficient to trigger a High Alert. The mean low tide count for the winter of 2006/07 was 2,501 birds (0.66 birds per ha), compared with 10,296 (2.55 birds per ha) in 1996/97, reflecting a sharp decline in Dunlin at the site. As with Shelduck, the main concentrations of Dunlin are in the northern bays, especially around Comber, Newtownards and Greyabbey, though previously favoured areas such as Castle Espie in particular appear to be used by fewer birds than ten years previously.



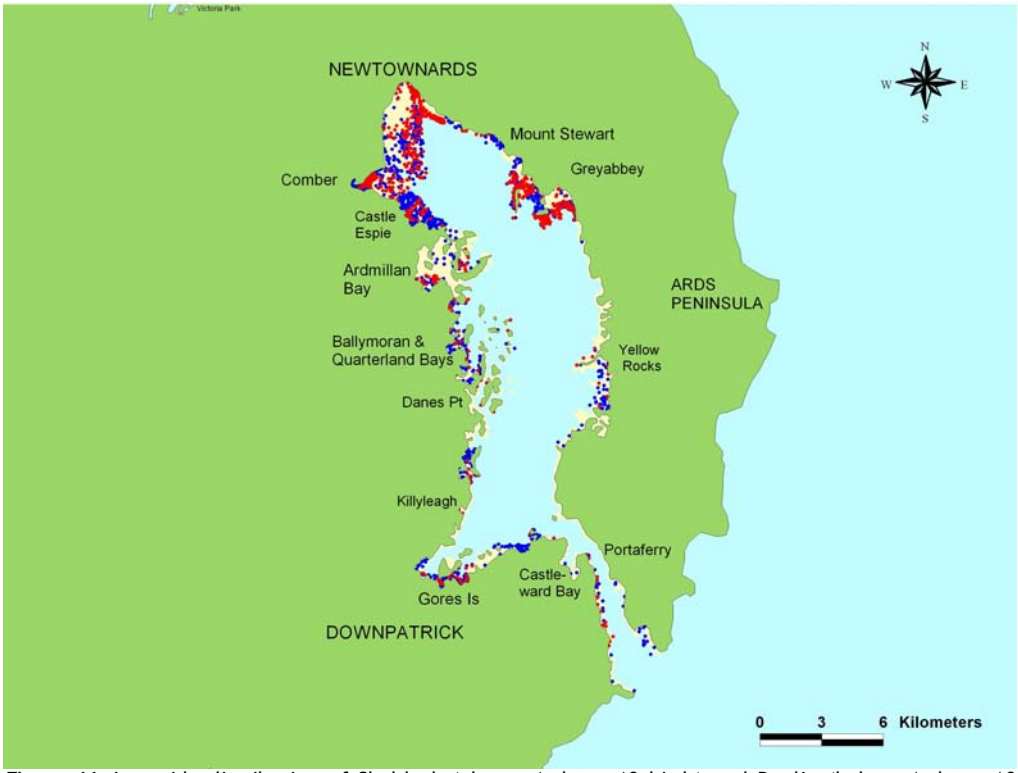


Figure 66. Low tide distribution of Shelduck (above: 1 dot = 10 birds) and Dunlin (below: 1 dot = 10 birds) for the winters of 1996/97 (blue dots) and 2006/07 (red). Yellow = intertidal; pale blue = subtidal; pale green = nontidal.

TEES ESTUARY

Site description

The Tees is, with the exception of Lindisfarne, the only sizeable estuarine site on the east coast between the Humber and the Forth. The surveyed area includes Seal Sands, Greatham Creek, Bran Sands and North and South Gares along with the sandy beaches between Hartlepool and Redcar. The estuary has been considerably modified by human activities, initially for agriculture, but more recently for industrial and port-related developments. The area is now highly industrialised, dominated by petrochemical plants, which pose a potential threat to the site's habitats and wildfowl. Changes in the sediment and possibly eutrophication are thought to be more serious long-term threats (Buck 1997).

General bird distribution 2006/07

Area covered 400ha; Mean total birds 2,028; Mean bird density 5.1 birds per ha.

The Tees has only been counted once before at Low Tide, in 1996/97 when the whole site was covered. Coatham Sands and the area between North Gare and Hartlepool were not counted in 2006/07. This site was issued with alerts for four species of the five evaluated (Maclean & Austin 2006) – Shelduck., Lapwing, Knot and Sanderling.

Shelduck and Redshank were present in the highest numbers whilst Curlew, Oystercatcher, Dunlin and Wigeon were also recorded in three figure mean counts. Seal Sands supported the highest densities of birds of many species. Other favoured areas included North Gare Sands and Bran Sands.

Comparative bird distribution

Despite fluctuations, there has been a general trend of decreasing Shelduck numbers on the Teesmouth and Cleveland Coast SPA (Maclean & Austin 2008). The mean count of Shelduck has decreased from 627 birds in 1996/97 to 471 in 2006/07. Although not directly comparable due to the difference in areas covered between the two winters, the main area of concentration in both winters was on Seal Sands, so it is likely that this reflects a real decline. The mean count on Seal Sands has decreased from 565 birds (2.12 birds per hectare) in 1996/97 to 469 (1.87 birds per hectare) in 2006/07.

Curlew numbers, however, would appear to have increased on the Tees. Despite a smaller area being counted in 2006/07 than in 1996/97, the mean count has increased from 228 birds to 266 birds between the two years. Although most numerous on Seal Sands, the highest proportional increase occurred at Greatham Creek. Here the mean count has risen from 7 birds (0.13 birds per hectare) in 1996/97 to 33 birds (0.57 birds per hectare) in 2006/07. Smaller numbers of birds were also present near Port Clarence, Bran Sands and North Gare Sands.

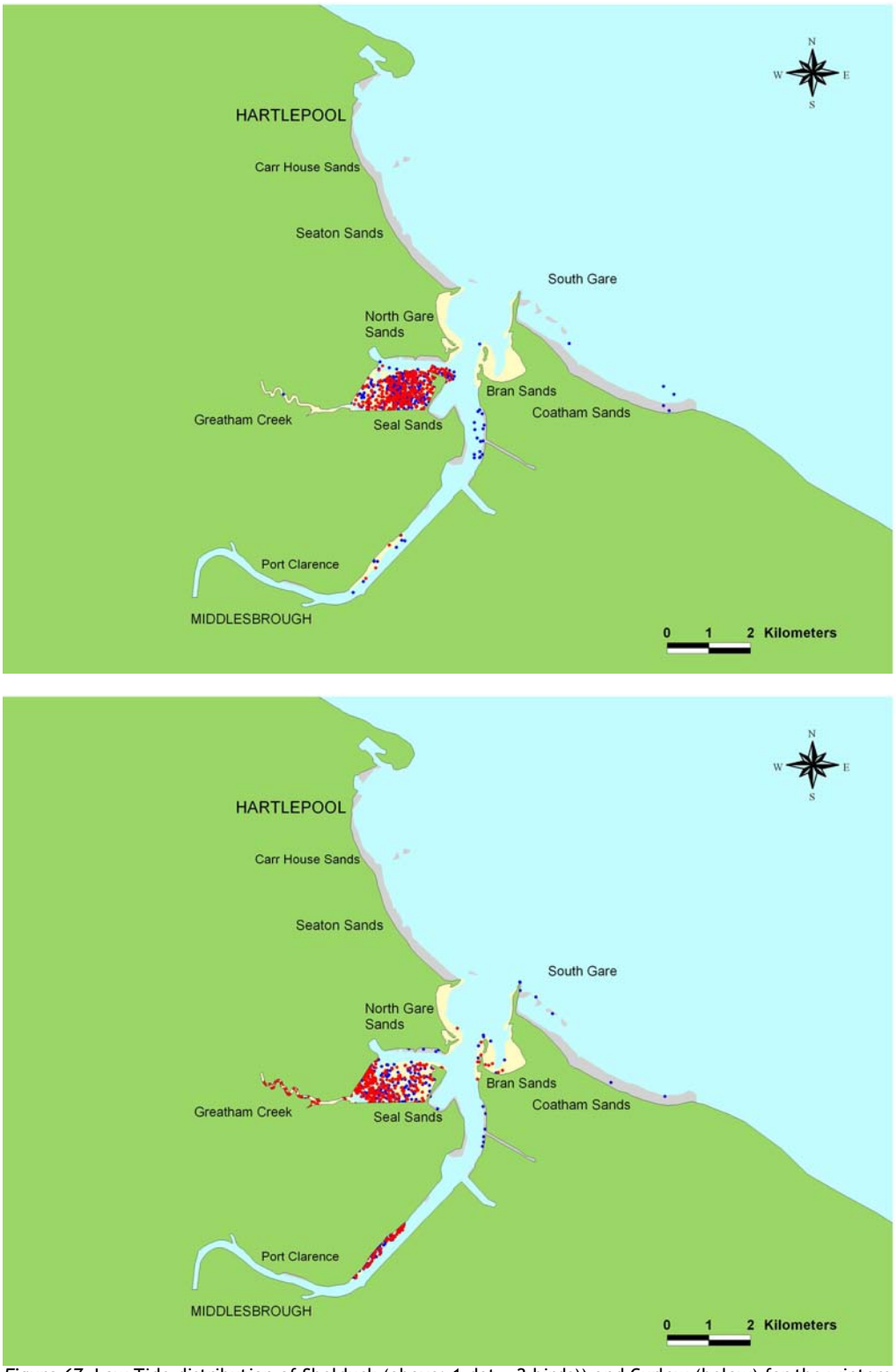


Figure 67. Low Tide distribution of Shelduck (above; 1 dot = 2 birds)) and Curlew (below) for the winters of 1996/97 (blue) and 2006/07 (red). Yellow = intertidal; pale green = non-tidal; blue = subtidal. Grey areas not counted in 2006/07.

YTHAN ESTUARY

Site description

The Ythan is a relatively small estuary in northeast Scotland, about ten miles north of Aberdeen. Despite its small size, it is the largest estuary between the Montrose Basin and the Moray Firth and as such is important in a local context. The estuary has a narrow shape and is shielded from the sea by the important dune system known as the Sands of Forvie. The inner estuary is muddy and the outer stretches more sandy, but there is relatively little in the way of saltmarsh. The main human influences on the estuary are recreation, including wildfowling. The principal issue of conservation concern in recent years has been the level of nitrogen leaching into the Ythan from surrounding farmland, leading to algal growth covering the sediments; the catchment is designated as a Nitrate Vulnerable Zone.

General bird distribution 2006/07

Area covered 202 ha; Mean total birds 4,739; Mean bird density 23.5 birds per ha.

Probably best known for its large Eider population, the Ythan Estuary supported 27 species of waterbird during the low tide counts. The most numerous bird was Lapwing with a mean count of over 1,000 birds (5.23 birds per hectare). Golden Plover were abundant also with a mean count of just short of 1,000 birds (4.91 birds per hectare). Of the more coastal waders, Curlew were the most abundant, with a mean of 445 birds, followed by Redshank (395 birds), Oystercatcher (351 birds) and Dunlin (214 birds). Oystercatchers and Turnstone were found to be most numerous at the mouth of the estuary south of Inches Point whereas species such as Dunlin, Curlew and Redshank preferred in the inner reaches of the estuary north of Waterside Bridge.

Comparative bird distribution

The distributions of two species issued with medium alerts (Maclean & Austin 2008), Eider and Redshank, are considered here. The winters of 1997/98 and 2006/07 are compared.

Although long-term numbers of Eider at the Ythan have risen, since the peak in the mid 1990s, numbers have dropped somewhat. The peak low tide count in 1997/98 was 1,448 birds whereas in 2006/07, this peak didn't reach four figures, standing at 908 birds. The decline in the mean count between the two years was not so extreme, falling from 788 to 706 birds, with the overall density falling from 15.76 to 13.84 birds per hectare. However, the 1997/98 counts were only carried out in three months. The distribution of birds between the two winters has changed. In 1997/98, the majority of the birds were between Inches Point and the estuary mouth, whereas in 2006/07, the area north of Inches Point up to Waterside Bridge was favoured. Small numbers of birds were also found north of here towards the Snub.

Redshank numbers have fallen since the turn of the century, enough to trigger a medium alert, although in reality the picture has been one of fluctuations, especially in the 1990s. The mean count has actually risen from 367 (1.81 birds per hectare) to 395 birds (1.96 birds per hectare) between 1997/98 and 2006/07. Figure 68. shows that despite this rise, the relative distribution appears to have remained rather consistent between the two seasons.

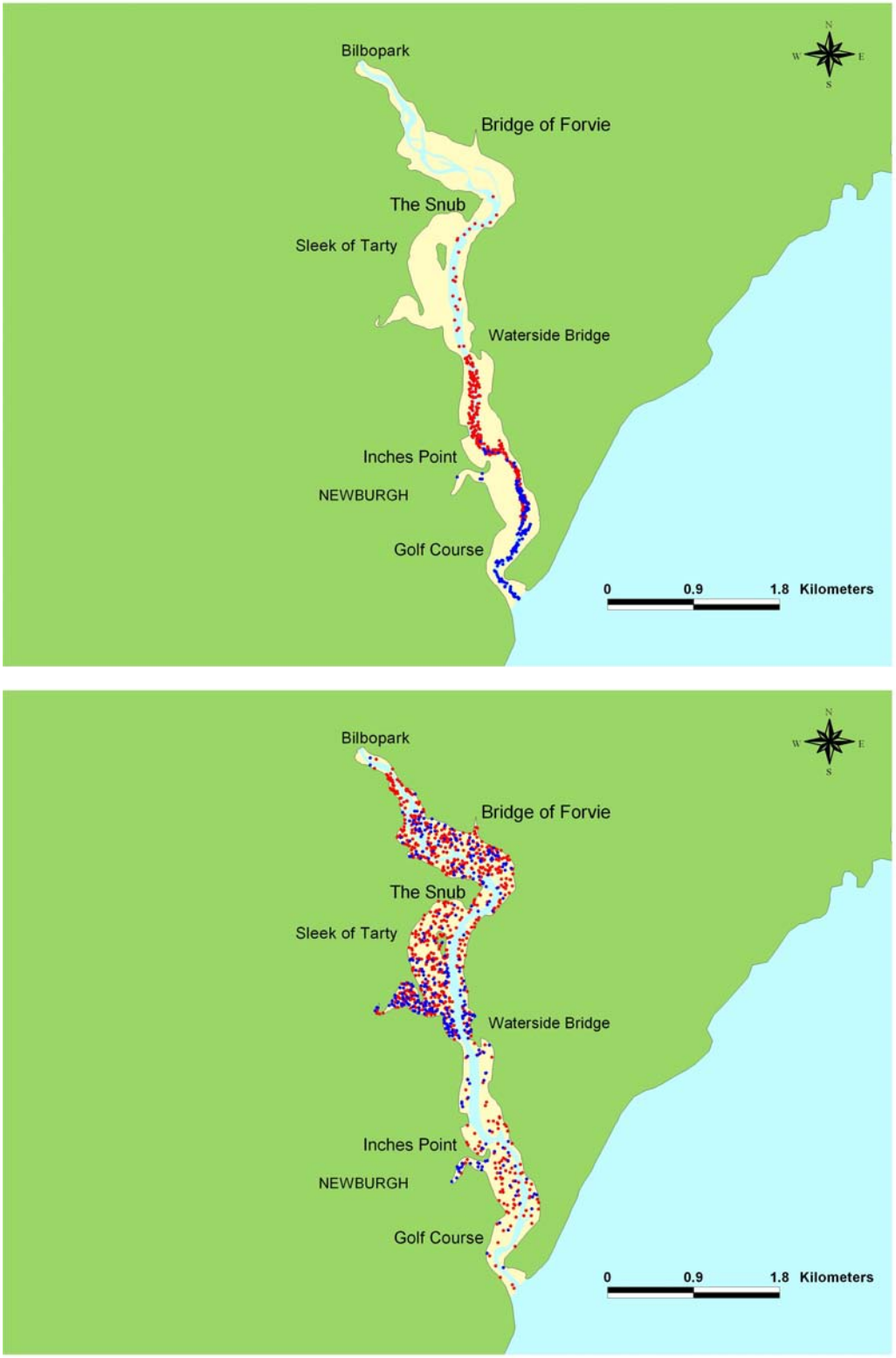


Figure 68. Low Tide distribution of Eider (above: 1 dot = 5 birds) and Redshank (below) for the winters of 1997/98 (blue) and 2006/07 (red). Yellow = intertidal; pale green = non-tidal; blue = subtidal.

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Sanderling (Al Downie)