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

Tables 9 and 10 present three statistics for 18 of the more numerous waterbird species present on 21 estuaries covered during the 2008/09 winter: the peak number of a species over the whole site counted in any one month (with checks for count synchronicity made from assessing proximity of count dates and consultation with Local Organisers); 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 2008/09 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 = 2008/09 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 = not covered in one survey winter. 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 2008/09 are discussed. WeBS Low Tide Counts were carried out on 23 different sites, with estuary accounts encompassing 9 of these. To allow space in this report for these sites which have not been counted for many years, dot density distribution maps for Belfast Lough, Breydon Water, Strangford Lough and the Stour/Orwell Estuaries where repeat counts are made each year are available on our website at ***www.bto.org/webs/websdownloads/lowtidemaps*** or from the WeBS office. Other counts, usually on limited numbers of sectors or only in one month, were made in the winter of 2008/09 on Adur Estuary, Burry Inlet, Carmarthen Bay, Dyfi Estuary, Killough Harbour, Langstone Harbour, Loch Fleet and Thames. 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 56 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 2008/09, focusing on species held in important numbers at the site in question.

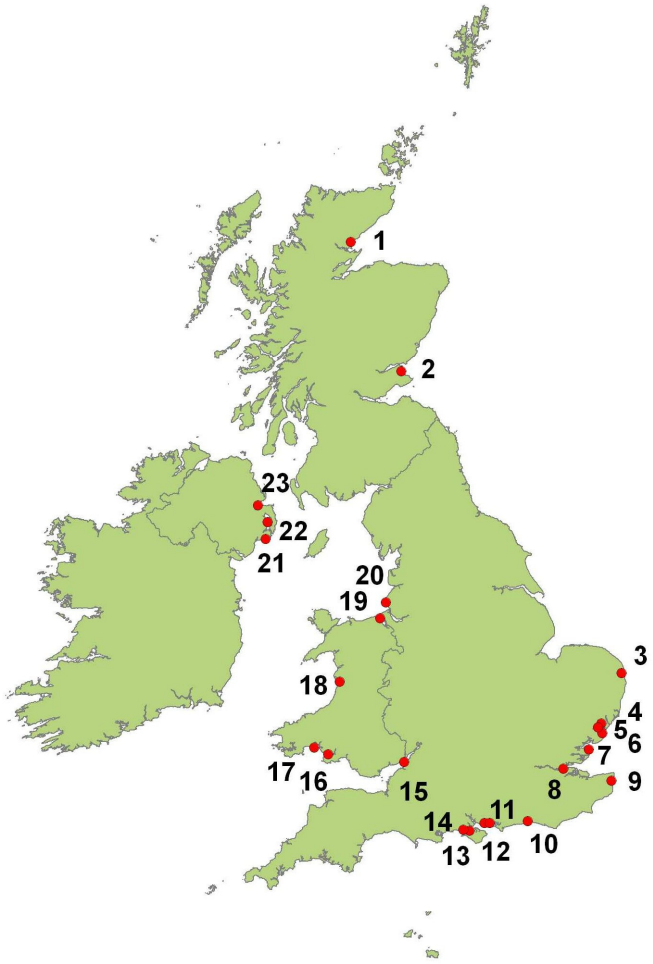


Figure 56. Map showing estuaries covered at low tide in the winter of 2008/09.
1: Loch Fleet; 2: Eden Estuary; 3: Breydon Water; 4: Orwell Estuary; 5: Stour Estuary; 6: Dengie Flats; 7: Hamford Water; 8: Thames Estuary; 9: Pegwell Bay; 10: Adur Estuary; 11: Langstone Harbour; 12: Portsmouth Harbour; 13: Newtown Harbour; 14: Northwest Solent; 15: Severn Estuary; 16: Burry Inlet; 17: Carmarthen Bay; 18: Dyfi Estuary; 19: Dee Estuary; 20: Alt Estuary; 21 Killough Harbour; 22: Strangford Lough; 23: Belfast Lough.

Table 9. Sites with Estuary Accounts and important bird numbers held. Numbers in parentheses refer to the location in figure 56. For species codes see table 8.

	International Importance	**National Importance**
Adur Estuary (10)	None	None
Alt Estuary (20)	KN, SS, BA	CX, RP, GV, DN, LB
Belfast Lough (23)	BW	SU, SV, SP, E., GN, RM, RH, BV, GG, OC, RP, PS, RK, TT
Breydon Water (3)	BS, PG, WN, T., SV, AV, GP, L., BW, RK, CN	BS, EW, PT, RU
Burry Inlet (16)	PT, OC, KN, BW	DB, SV, DN, CU, GK
Carmarthen Bay (17)	CX, SS	OC, GP, BW, GK
Dee Estuary (19)	SU, PT, OC, KN, DN, BW, RK	WN, T., CX, GG, CA, RP, GV, L., SS, RU, BA, CU, GB
Dengie Flats (6)	DB, GV, KN, BA	RP, GP, DN
Dyfi Estuary (18)	None	None
Eden Estuary (2)	PG	QS, BW
Hamford Water (7)	DB, GV	SU, T., LG, AV, GP, KN, RU, BW, BA, RK
Killough Harbour (21)	QN	None
Langstone Harbour (11)	DB, DN, BW	RM, GV, TT
Loch Fleet (1)	JI	None
Newtown Harbour (13)	None	DB, BW
Northwest Solent (14)	DB	PT, BW
Orwell Estuary (4)	BW	DB, GA, PT, AV, KN, BW, RK
Pegwell Bay (9)	None	RH, GP, L., GB
Portsmouth Harbour (12)	DB, BW	LG, DN
Severn Estuary (15)	MS, BS, EW, SU, PT, SV, RP KN, DN, LB, HG	WN, GA, T., PO, LG, AV, GP, L., SS, RU, BW, CU, RK
Stour Estuary (5)	MS, BW,	DB, SU, PT, AV, GV, DN, RU, RK, TT
Strangford Lough (22)	MS, WS, QN, SU, GP, KN, BW, BA, RK	T., WN, MA, PT, SV, E., GN, RM, BV, GG, CO, RP, GV, L., DN, CU, GK
Thames Estuary (8)	DB, SV, AV, RP, GV, KN, DN BA, RK, BH	SU, WN, GA, T., LG, CA, GP, BW, L., SS, RU, CU, TT, LB, HG, GB

Table 10. Peak and mean counts and mean density (birds per ha) of 18 waterbird species across 18 estuaries covered by the 2008/09 WeBS Low Tide Counts. Stour and Orwell estuaries displayed separately. "+" indicates non-zero densities of <0.01 birds per ha.

Species	Adur Estuary			Alt Estuary			Belfast Lough		
	Peak No.	*Mean No.*	*Mean Dns.*	***Peak No.***	*Mean No.*	*Mean Dns.*	***Peak No.***	*Mean No.*	*Mean Dns.*
Brent Goose	0	0	0	0	0	0	165	115	0.06
Shelduck	0	0	0	250	216	0.08	604	342	0.17
Wigeon	0	0	0	3	1	+	188	169	0.08
Teal	42	25	0.28	115	72	0.03	400	371	0.18
Mallard	14	5	0.06	263	184	0.07	313	255	0.13
Pintail	0	0	0	0	0	0	0	0	0
Oystercatcher	3	2	0.08	540	491	0.3	2599	2369	5.63
Ringed Plover	42	26	0.91	45	20	0.01	147	112	0.27
Golden Plover	0	0	0	500	162	0.1	0	0	0
Grey Plover	13	6	0.19	212	151	0.09	1	0	+
Lapwing	191	119	1.59	306	172	0.11	667	542	1.26
Knot	0	0	0	335	213	0.13	7	2	0.01
Dunlin	257	99	3.41	2711	1705	1.04	559	368	0.87
Black-tailed Godwit	0	0	0	36	17	0.01	690	349	0.81
Bar-tailed Godwit	0	0	0	2651	1309	0.8	28	18	0.04
Curlew	2	1	0.01	876	516	0.31	554	404	0.94
Redshank	50	31	0.41	683	488	0.3	1122	1026	2.39
Turnstone	26	7	0.22	63	54	0.03	300	268	0.64

Species	Breydon Water			Burry Inlet			Carmarthen Bay		
	Peak No.	*Mean No.*	*Mean Dns.*	***Peak No.***	*Mean No.*	*Mean Dns.*	***Peak No.***	*Mean No.*	*Mean Dns.*
Brent Goose	1	1	+	288	182	0.03	0	0	0
Shelduck	15	9	0.02	604	396	0.06	165	115	0.03
Wigeon	14398	10700	22.29	249	193	0.03	1032	593	0.14
Teal	1044	340	0.71	18	10	+	195	100	0.02
Mallard	148	97	0.2	31	15	+	218	82	0.02
Pintail	50	21	0.04	517	407	0.06	276	213	0.05
Oystercatcher	2	1	+	10005	7640	1.91	8135	6954	2.68
Ringed Plover	15	6	0.02	14	5	+	73	66	0.03
Golden Plover	3500	2493	6.2	251	63	0.01	3000	750	0.23
Grey Plover	25	13	0.03	97	30	0.01	40	21	0.01
Lapwing	5186	3329	8.28	1062	417	0.07	804	347	0.11
Knot	215	263	0.67	423	304	0.08	1650	1371	0.53
Dunlin	4785	2792	7.07	3900	2611	0.65	3793	1917	0.74
Black-tailed Godwit	2712	1551	3.86	220	142	0.02	85	43	0.01
Bar-tailed Godwit	0	0	0	82	35	0.01	95	30	0.01
Curlew	607	372	0.92	578	489	0.08	473	266	0.08
Redshank	1903	1132	2.82	363	262	0.04	649	370	0.12
Turnstone	0	0	0	2	1	+	101	61	0.02

Species	Dee Estuary			Dengie Flats			Dyfi Estuary		
	Peak No.	*Mean No.*	*Mean Dns.*	***Peak No.***	*Mean No.*	*Mean Dns.*	***Peak No.***	*Mean No.*	*Mean Dns.*
Brent Goose	141	132	0.01	881	1230	0.33	1	0	+
Shelduck	2640	1827	0.1	205	191	0.05	79	47	0.05
Wigeon	1627	1263	0.07	281	192	0.05	234	180	0.19
Teal	3129	2468	0.13	32	24	0.01	7	3	+
Mallard	1108	994	0.05	58	38	0.01	42	32	0.03
Pintail	2541	1869	0.1	2	1	+	41	28	0.03
Oystercatcher	32820	29478	2.68	4489	3943	1.72	136	111	0.2
Ringed Plover	165	87	0.01	13	22	0.01	27	11	0.02
Golden Plover	225	183	0.01	8820	4505	1.67	86	22	0.03
Grey Plover	2033	1505	0.14	1480	1982	0.86	2	1	+
Lapwing	3768	2698	0.2	589	385	0.14	63	45	0.06
Knot	20850	15624	1.42	9075	8125	3.54	0	0	0
Dunlin	16855	15107	1.38	5991	7259	3.16	121	65	0.12
Black-tailed Godwit	2872	2582	0.19	0	0	0	0	0	0
Bar-tailed Godwit	4213	3311	0.3	1930	1871	0.81	0	0	0
Curlew	3021	2872	0.21	349	510	0.19	83	77	0.1
Redshank	9576	5533	0.4	395	512	0.19	31	21	0.03
Turnstone	345	259	0.02	160	174	0.08	3	1	+

Table 10 continued. Peak and mean counts and mean density (birds per ha) of 18 waterbird species across 18 estuaries covered by the 2008/09 WeBS Low Tide Counts. Stour and Orwell estuaries displayed separately. "+" indicates non-zero densities of <0.01 birds per ha.

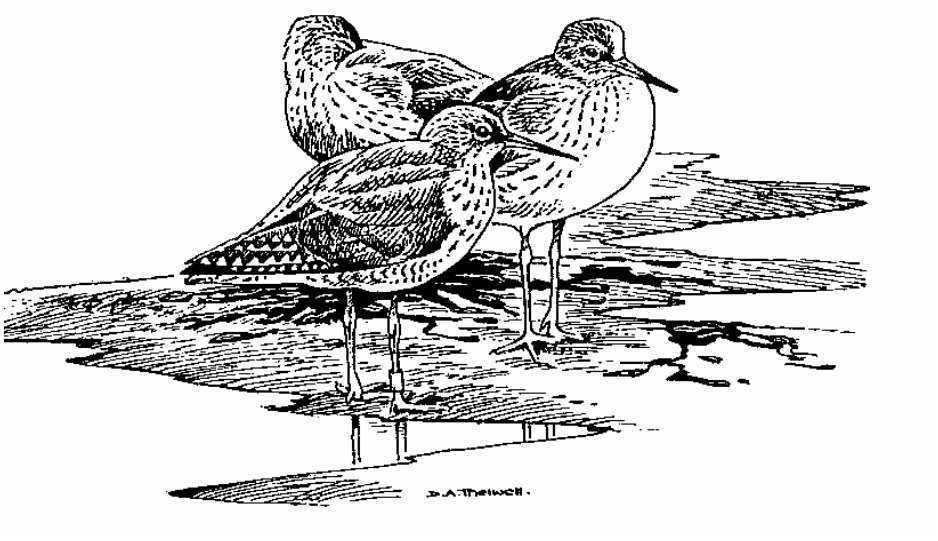
	Eden Estuary			Hamford Water			Langstone Harbour		
	Peak	*Mean*	*Mean*	***Peak***	*Mean*	*Mean*	***Peak***	*Mean*	*Mean*
Species	***No.***	*No.*	*Dns.*	***No.***	*No.*	*Dns.*	***No.***	*No.*	*Dns.*
Brent Goose	29	26	0.02	5698	3161	2.26	1563	1399	2.97
Shelduck	183	141	0.1	1243	1022	0.73	187	131	0.28
Wigeon	108	53	0.04	2491	1678	1.2	969	591	1.25
Teal	91	61	0.04	10684	4471	3.2	94	60	0.13
Mallard	112	72	0.05	117	87	0.06	42	25	0.05
Pintail	1	0	+	56	28	0.02	24	12	0.03
Oystercatcher	2505	2007	2.14	899	646	0.96	364	297	0.74
Ringed Plover	21	6	0.01	237	168	0.25	54	40	0.1
Golden Plover	50	14	0.01	7234	5513	6.98	0	0	0
Grey Plover	344	218	0.23	1786	1004	1.49	170	128	0.32
Lapwing	433	197	0.21	3523	2114	2.68	156	73	0.18
Knot	530	278	0.3	4263	1957	2.91	101	56	0.14
Dunlin	2371	1654	1.76	3731	3103	4.61	4163	3169	7.84
Black-tailed Godwit	162	122	0.13	521	339	0.43	68	46	0.11
Bar-tailed Godwit	264	176	0.19	619	453	0.67	13	8	0.02
Curlew	640	386	0.4	256	203	0.26	186	155	0.38
Redshank	1401	720	0.75	1036	922	1.17	189	160	0.4
Turnstone	6	2	+	274	185	0.28	66	33	0.08

	Loch Fleet			Newtown Harbour			Northwest Solent		
	Peak	*Mean*	*Mean*	***Peak***	*Mean*	*Mean*	***Peak***	*Mean*	*Mean*
Species	***No.***	*No.*	*Dns.*	***No.***	*No.*	*Dns.*	***No.***	*No.*	*Dns.*
Brent Goose	0	0	0	1158	938	2.13	1716	1437	2.14
Shelduck	28	22	0.03	225	186	0.42	186	107	0.16
Wigeon	839	764	0.98	1241	1068	2.42	330	157	0.23
Teal	222	127	0.16	1207	983	2.23	116	39	0.06
Mallard	142	129	0.17	77	36	0.08	20	10	0.02
Pintail	0	0	0	173	94	0.21	4	1	+
Oystercatcher	785	580	1.02	104	83	0.37	150	86	0.2
Ringed Plover	14	4	0.01	54	29	0.13	28	19	0.04
Golden Plover	0	0	0	2	1	+	415	119	0.28
Grey Plover	0	0	0	161	97	0.43	98	84	0.2
Lapwing	16	8	0.01	349	151	0.58	50	13	0.03
Knot	303	103	0.18	1052	713	3.16	6	2	+
Dunlin	143	48	0.08	2474	2094	9.27	5850	3559	8.35
Black-tailed Godwit	0	0	0	140	37	0.14	433	225	0.53
Bar-tailed Godwit	25	7	0.01	6	2	0.01	8	4	0.01
Curlew	287	220	0.38	175	107	0.41	120	79	0.19
Redshank	234	154	0.27	88	63	0.24	156	98	0.23
Turnstone	2	1	+	36	32	0.14	121	70	0.16

	Orwell Estuary			Pegwell Bay			Portsmouth Harbour		
	Peak	*Mean*	*Mean*	***Peak***	*Mean*	*Mean*	***Peak***	*Mean*	*Mean*
Species	***No.***	*No.*	*Dns.*	***No.***	*No.*	*Dns.*	***No.***	*No.*	*Dns.*
Brent Goose	1130	682	0.39	42	18	0.01	2538	2042	1.29
Shelduck	807	555	0.32	96	76	0.06	138	87	0.06
Wigeon	1370	1200	0.69	410	373	0.27	500	423	0.27
Teal	940	598	0.34	761	337	0.24	148	99	0.06
Mallard	363	335	0.19	391	262	0.19	82	44	0.03
Pintail	125	88	0.05	26	9	0.01	0	0	0
Oystercatcher	1464	1120	1.71	620	462	0.78	574	494	0.51
Ringed Plover	176	135	0.21	175	124	0.21	62	31	0.03
Golden Plover	609	197	0.16	3500	2974	3.68	0	0	0
Grey Plover	358	225	0.34	210	96	0.16	52	32	0.03
Lapwing	747	380	0.31	8260	6730	8.33	113	86	0.09
Knot	3357	1931	2.94	260	173	0.29	4	1	+
Dunlin	2260	2001	3.05	1153	770	1.3	6143	5466	5.67
Black-tailed Godwit	813	454	0.37	0	0	0	666	477	0.49
Bar-tailed Godwit	3	2	+	273	182	0.31	57	15	0.02
Curlew	526	457	0.37	496	343	0.42	369	275	0.28
Redshank	1392	1309	1.07	190	106	0.13	624	472	0.49
Turnstone	156	114	0.17	130	81	0.14	142	79	0.08

Table 10 continued. Peak and mean counts and mean density (birds per ha) of 18 waterbird species across 18 estuaries covered by the 2008/09 WeBS Low Tide Counts. Stour and Orwell estuaries displayed separately. "+" indicates non-zero densities of <0.01 birds per ha.

	Severn Estuary			Stour Estuary			Strangford Lough		
	Peak	*Mean*	*Mean*	***Peak***	*Mean*	*Mean*	***Peak***	*Mean*	*Mean*
Species	***No.***	*No.*	*Dns.*	***No.***	*No.*	*Dns.*	***No.***	*No.*	*Dns.*
Brent Goose	27	20	+	1631	1354	0.55	3191	2643	0.3
Shelduck	2450	2160	0.06	3499	2282	0.93	5583	3304	0.37
Wigeon	8672	6231	0.18	4702	3907	1.6	917	625	0.07
Teal	4401	3150	0.09	1109	799	0.33	1012	805	0.09
Mallard	2321	2137	0.06	203	171	0.07	405	378	0.04
Pintail	655	441	0.01	486	293	0.12	414	332	0.04
Oystercatcher	1046	958	0.05	1133	1041	0.67	9231	6573	1.72
Ringed Plover	127	100	0.01	218	191	0.12	277	183	0.05
Golden Plover	1440	1020	0.05	2174	1276	0.78	11328	6817	1.78
Grey Plover	343	198	0.01	2208	1593	1.02	71	39	0.01
Lapwing	9081	7337	0.34	1543	531	0.33	5198	3482	0.91
Knot	4066	2553	0.13	7704	4607	2.95	6376	3357	0.88
Dunlin	27136	25614	1.32	18338	13099	8.4	4455	2701	0.71
Black-tailed Godwit	646	456	0.02	932	613	0.38	327	122	0.03
Bar-tailed Godwit	87	31	+	115	87	0.06	969	542	0.14
Curlew	2612	2291	0.11	1231	946	0.58	1381	1266	0.33
Redshank	2936	2641	0.12	2176	1721	1.06	2782	2120	0.55
Turnstone	629	467	0.02	496	487	0.31	199	162	0.04



Redshanks (D. Thelwell)

ALT ESTUARY

Site description

The River Alt emerges as a creek on the shoreline of Liverpool Bay, between the Ribble and the Mersey Estuaries. The majority of the site is sandy in character, although somewhat muddier at the river mouth where there are also some artificial rocky areas. A large area of saltmarsh used to be present at the mouth of the Alt but has mostly been lost to land claim, principally in the early 19th century. The whole site is backed by one of the most important dune systems in the country, though much of the southern part has been lost to housing and docklands (Sefton Council 2009). The whole of the Alt is both a Ramsar Site and SPA, most of it in combination with the Ribble Estuary to the north but Seaforth in combination with parts of the Dee. Potential threats include dock expansions and recreational disturbance.

General bird distribution 2008/09

Area covered 1,639 ha; Mean total birds 7,620; Mean bird density 4.6 birds/ha.

The 2008/09 Low Tide Counts were the first at this important site since 1998/99, being carried out in order to inform future coastal management by Sefton Council. The beach at Crosby was the main area for wading birds, most notably Sanderling, which peaked at 1,278 birds in January; this is by far the highest count of this species on any of the low tide counts carried out this winter. Dunlin, with a peak of 2,711 birds, was the most numerous species recorded, followed by Bar-tailed Godwit. Curlews were most numerous around the Hightown area, and numbers peaked at 876 in February. Wildfowl numbers were relatively low, largely due to the lack of creeks and saltmarsh that species such as Teal and Wigeon tend to favour. Mallard, concentrated around the Hightown Dunes, were the most numerous wildfowl species, whilst the 1,500 Pink-footed Geese recorded were probably the remains of the overnight roost of c.5000 off Formby Point (White *pers. comm.*).

Comparative bird distribution

In both winters, Shelduck have shown aggregated distributions, with birds being concentrated almost exclusively at just one location, off Hightown. Between 1998/99 and 2008/09, Shelduck numbers counted on the Alt estuary have increased, from a mean site count of 119 in 1998/99 to a recent mean site count of 216 birds. This is also reflected in the mean site density, up to 0.08 birds per hectare from 0.05 birds per hectare. However, the Ribble/Alt SPA has shown a decline in the numbers of Shelduck in line with the region, following a peak in the early 1990s, with the site being issued with a Medium Alert (see *http:/www.bto.org/webs/alerts*) over the ten-year period. Seaforth Docks, which had a concentration of up to 56 birds in 2008/09, was omitted from the 1998/99 counts.

Bar-tailed Godwit numbers have also steadily declined on the Ribble/Alt SPA with a Medium Alert over five-, ten-, and 25-year periods. However, numbers counted on Low Tide Counts have shown an increase in the last ten years. However, in previous years, many birds roosting on the Alt use the North Wirral shore to feed at low tide. This apparent increase would suggest that many birds now remain on the Alt throughout the Low Tide period too. In 1998/99, the mean site count was 1,021 (with a peak count of 1,657) whilst in 2008/09 the mean site count had risen to 1,309 (with a peak of 2,651). Moreover, there was a major shift in distribution between 1988/99 and 2008/09: the main area of concentration in 2008/09 was near Crosby where there was a mean count of 793 birds and a mean density of 11 birds per hectare. A few birds were scattered further north, particularly off Hightown, whilst in 1998/99 the majority were present between Hightown and Formby Point with relatively few at Crosby.

The Alt Estuary counts were made by BCM Environmental Services Ltd on behalf of Sefton Council. These data are generously made available by Sefton Council to The Wetland Bird Survey.

FIGURE 57 Low Tide distribution of Shelduck and Bar-tailed Godwit (below: 1 dot = 2 birds) for the winters of 1998/99 (blue) and 2008/09 (red) on the Alt Estuary. Yellow = intertidal; pale green = non-tidal; blue = subtidal.

DEE ESTUARY

Site description

The Dee is a large estuary situated between the Wirral and the north Wales coast and is characterized by extensive sand flats, mudflats and saltmarsh. The main channel of the Dee runs close to the Welsh shore for much of its length where the mudflats are less wide. On either side of the estuary mouth there are long expanses of sandy beaches and sand dunes. A line of cliffs stretches between Hoylake and Heswall along the eastern side of the Dee. At the northern end, close to the eastern shore at Hilbre, there are a series of small rocky islands. The Dee is heavily industrialised, particularly along the Welsh Shore. There are steel and paper mills at Shotton, a gas-fired power station at Connah's Quay and a gas terminal at Point of Ayr, docks at Mostyn and several chemical works concentrated along the Welsh shoreline. Recreational disturbance is potentially widespread, especially from sailing, windsurfing, jet skiing and kite surfing, but is controlled by wardening by local authority rangers. Around the estuary mouth, the sands are used for dog walking and horse riding. There are two wardening schemes to reduce disturbance to wader roosts operated by RSPB and local rangers services. Other leisure activities and commercial fishing prevail. Evidence suggests that there is considerable interchange of waterbirds between here and the Mersey, Ribble and Alt Estuaries.

General bird distribution 2008/09

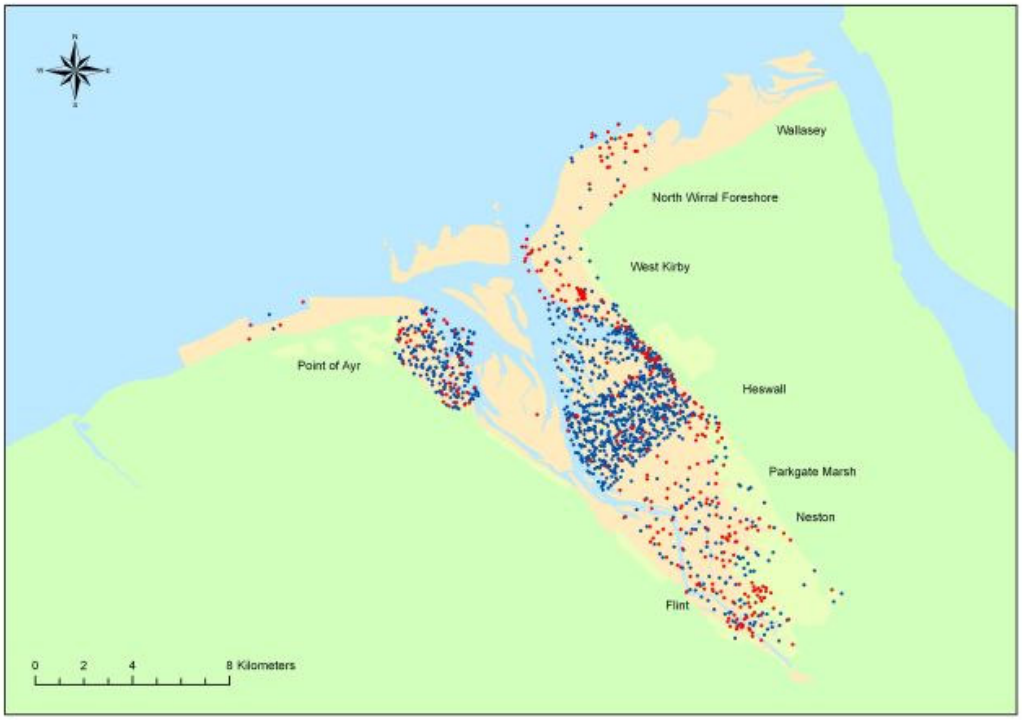
Area covered 13,793 ha; Mean total birds 91,697; Mean bird density 6.6 birds per ha.

The Dee Estuary supports a diverse range of species in nationally and internationally important numbers, and the 51 species recorded during the Low Tide Counts in 2008/09 was the second highest of all the sites counted. Oystercatchers were present in the largest numbers, with a peak of 32,820 birds followed by Knot (20,850) and Dunlin (16,885); all three species were present throughout the main body of the estuary and along the North Wirral Foreshore. Wildfowl such as Wigeon, Teal and Mallard were largely found at the upper reaches of the estuary between Parkgate Marsh and Flint, whilst the main concentration of Pintails (for which the Dee Estuary is the most important site in the UK) was off the Wirral Country Park near Thurstaston: in earlier years the favoured area was the main river channel between Oakenholt and Bagillt. An example of the increase of Little Egrets in UK is shown by a peak of 18 in 2001/02 rising to 57 in 2008/09.

Comparative bird distribution

Shelduck are present in internationally important numbers on the Dee Estuary, being only second in numbers to the neighbouring Mersey Estuary. Numbers on the Dee have steadily increased in the long-term with peak high water counts in autumn reflecting movement of moulting birds from the Mersey to the Dee but numbers in the winter period have fallen. Low Tide Counts have fallen dramatically, with a mean of 5,460 in 2001/02 to a mean of 1,827 in 2008/09. Much the same areas were favoured in both winters, with the bulk of the birds between Heswall and West Kirby where the mean count fell from 2,666 (1.77 birds per hectare) to 171 (0.11 birds per hectare). A smaller concentration was also present at the Point of Ayr where again the mean count fell from 928 (0.96 birds per hectare) in 2001/02 to 236 (0.24 birds per hectare) in 2008/09.

Knot, which are also present in internationally important numbers here, have undergone a big decline. As a result, the site has been issued with a High Alert (see *http://www.bto.org/webs/alerts*) over the twenty-five-year period although numbers more recently have remained stable. There has also been a decline in numbers on the Low Tide Counts too, falling from a mean count of 19,850 in 2001/02 to 15,624 in 2008/09. The distribution of birds has also changed between the two counts; in 2001/02 the vast majority of the birds were present along the North Wirral Foreshore, whilst in 2008/09 many more were within the estuary's main body.



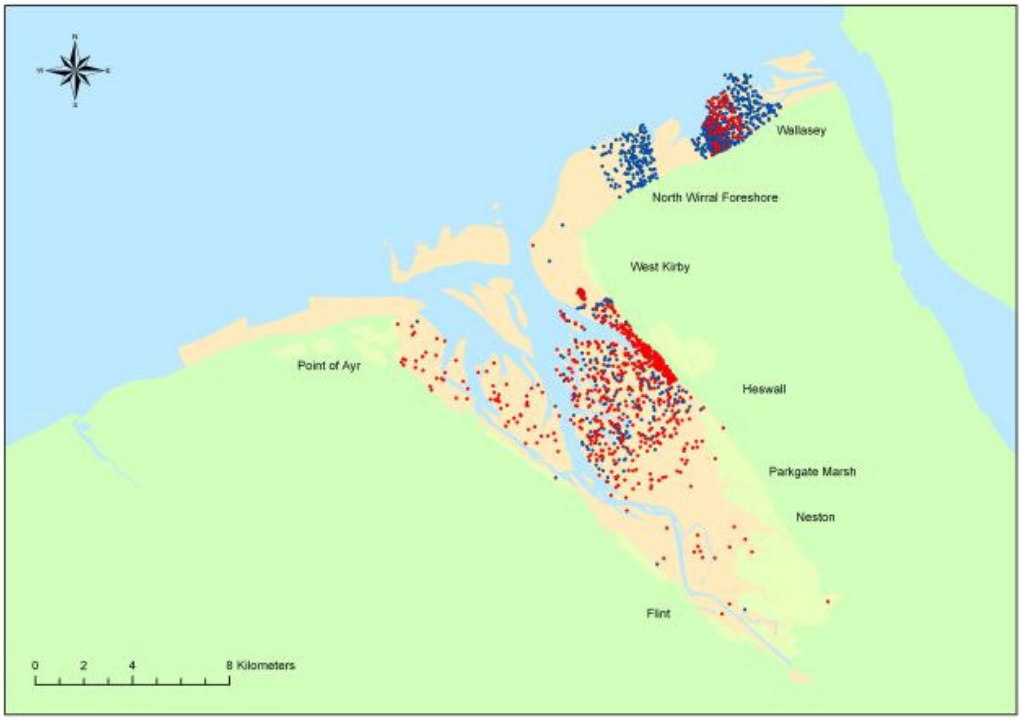


FIGURE 58 Low Tide distribution of Shelduck (above: 1 dot = 5 birds) and Knot (below: 1 dot = 20 birds) for the winters of 2001/02 (blue) and 2008/09 (red) on the Dee Estuary. Yellow = intertidal; pale green = non-tidal; blue = subtidal.

DENGIE FLATS

Site description

Dengie Flats lie between the Blackwater and Crouch-Roach Estuaries. The flats are comprised of an extensive area of tidal mudflat with saltmarsh towards the eastern end of the Dengie Peninsula. Evidence suggests that there is considerable interchange of waterbirds between these adjacent estuaries. The mudflats support extensive growth of *Entermorpha* alga along with populations of molluscs, marine worms and crustaceans. Unusually, for an open-coast situation, the mudflats grade into saltmarsh and the transition zone is characterised by mud-mounds with shell-lined gullies between them. The saltmarsh vegetation is relatively intact, despite being exposed to wave action, and a series of drainage channels bisect this habitat. Opposite Bradwell, at the northern end of the site, there is a small sand and shingle spit, the front of which has been severely eroded. Agricultural operations have claimed most of the historic grazing marshes, which are now located behind the sea wall. Although a relatively remote site, there is some recreational activity; for example, water sports, beach recreation, bait digging and wildfowling. Bradwell Nuclear Power Station, at the extreme northwest corner, represents the only major industrial development adjacent to the site (Musgrove et al 2003).

General bird distribution 2008/09

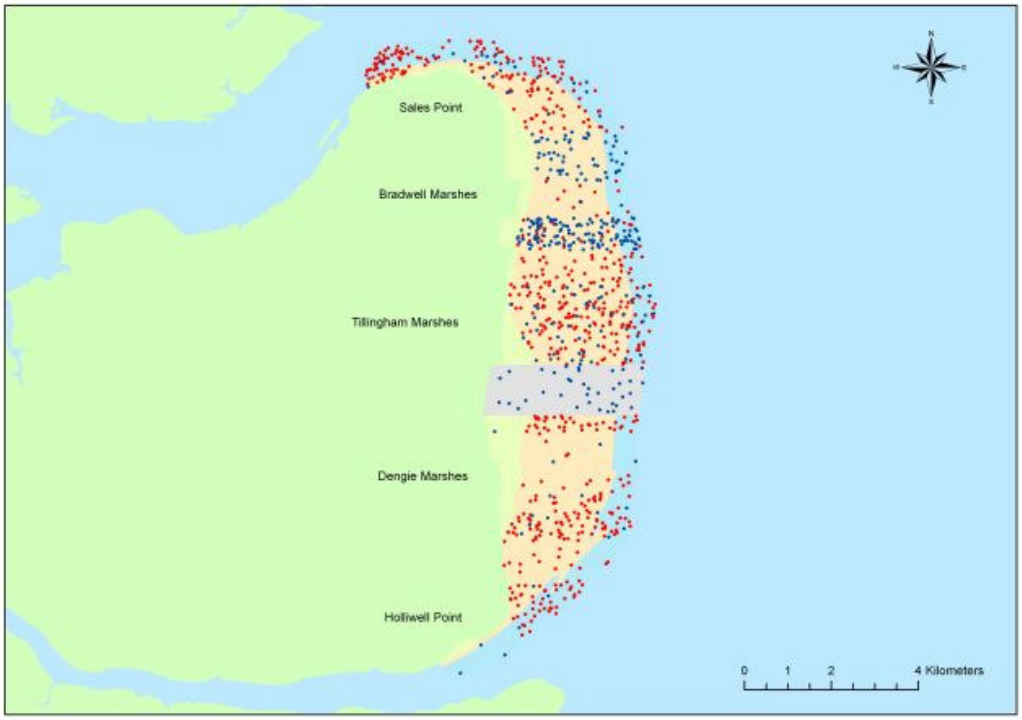
Area covered 2,696 ha; Mean total birds 31,021; Mean bird density 11.5 birds/ha.

With 22 species recorded, Dengie Flats, despite its size, produced one of the lowest varieties of waterbirds, although the number of many of species was high. Knot was the most numerous species recorded, with a peak of 9,075; although widespread along the length of the flats, the highest concentration was at the south end near Dengie Marshes. Dunlin too were found in their highest numbers at the south end whereas Bar-tailed Godwits favoured the area by Bradwell Marshes in the north. Oystercatcher and Curlew were more widespread throughout the flats with fewer concentrations of birds. The few Ringed Plover that were seen were at both the extreme north and south ends of the flats. Wildfowl such as Shelduck, Wigeon, Teal and Mallard were all found in greatest numbers around the area by Bradwell Marshes.

Comparative bird distribution

Between the two most recent winters that Low Tide Counts have been carried out on the Dengie Flats, the number of Dark-bellied Brent Geese has increased. Whilst numbers counted on Core Counts have only seen a slight increase (rising from 1,798 in 2001/02 to 2,364 in 2008/09), those counted on Low Tide Counts have doubled with a mean count in 2008/09 of 1,230 compared with 609 in 2001/02. This increase may have been brought about by improved feeding conditions at low tide following the sinking of barges offshore which have altered the floral composition of the mudflats (A. Harbott *pers comm.*). Birds in 2008/09 were widely spread out with small concentrations west of Sales Point and between Tillingham and Bradwell Marshes. In 2001/02, the majority of birds were found around Bradwell Marshes, with small numbers elsewhere.

After The Wash, Dengie Flats is the most important site for Grey Plover in the UK and numbers counted on core counts have doubled over the last few years. Numbers counted on Low Tide Counts have also seen an increase, going up from a mean site count of 1,048 in 2001/02 (mean site density of 0.42 birds per hectare) to a mean of 1,982 (0.86 birds per hectare) in 2008/09. Birds were generally quite widespread along the flats in both winters, with the highest density being between Dengie Marshes and Holliwell Point of 3.08 birds per hectare in 2008/09 (compared with 1.5 birds per hectare in 2001/02). However, in the 2008/09 counts, the area of the flats between Bradwell Marshes and Tillingham Marshes supported many more birds than on the 2001/02 counts.



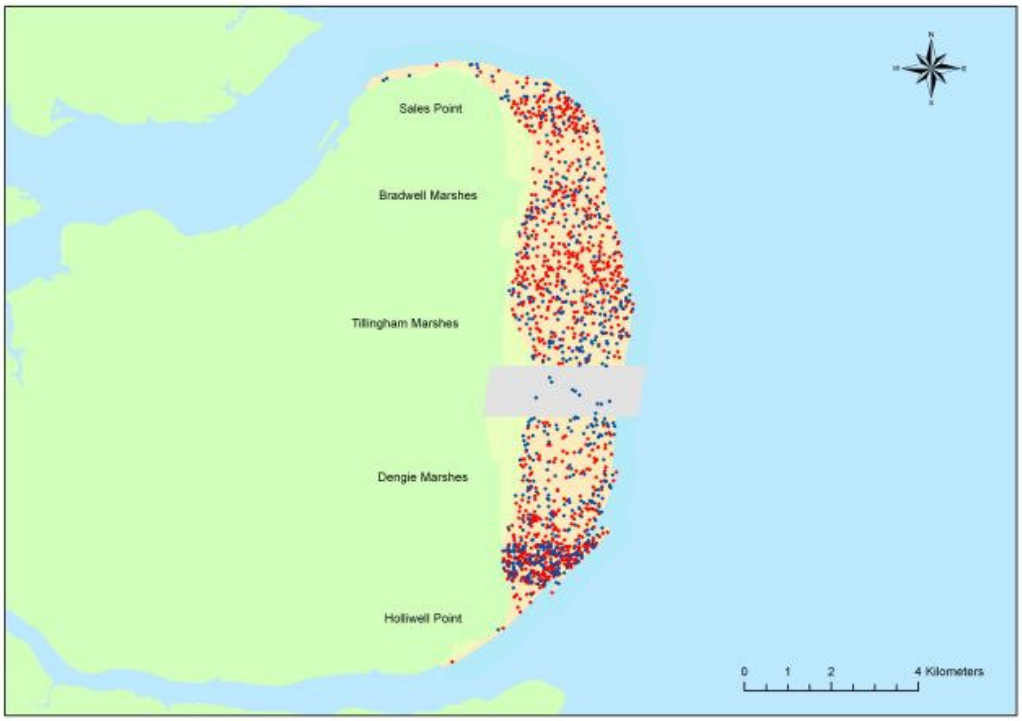


FIGURE 59 Low Tide distribution of Dark-bellied Brent Goose (above: 1 dot = 2 birds) and Grey Plover (below: 1 dot=2 birds) for the winters of 2001/02 (blue) and 2008/09 (red). Yellow = intertidal; pale green = non-tidal; blue = subtidal. Grey area not counted in later winter.

Site description

The Eden is a relatively small estuary positioned between the Firth of Tay to the north and the Forth of Forth to the south. Evidence suggests that there is considerable interchange of waterbirds between here and the Firth of Tay, and the two estuaries are considered together as one functional unit in the SPA and SAC designations. The River Eden enters the estuary in the southwest corner and at low tide a narrow subtidal channel meanders across extensive intertidal flats. The estuary is predominantly muddy, although towards the mouth, the substrate becomes increasingly sandy. Areas of mussel beds and eelgrass occur in the western zones. Saltmarsh vegetation is present along the shores, with the greatest development at the southwestern end, off Edenside. In some areas, *Spartina* is invading the saltmarsh. The estuary mouth is flanked by sand dunes on both the northern and southern sides, with a spit on the southern shore extending into the estuary, representing a mobile and dynamic sediment system. The outer southern section of the estuary abuts an area of rocky shore at St Andrews. Regular over-flying of the estuary from RAF Leuchars occurs; this airbase limits access along the northern shore. Recreational disturbance is monitored and managed by a permit system and associated byelaws. Recreational impacts include wind and sail watersports, fishing, horse riding and wildfowling. Bait digging is prohibited on the main intertidal mudflats.

General bird distribution 2008/09

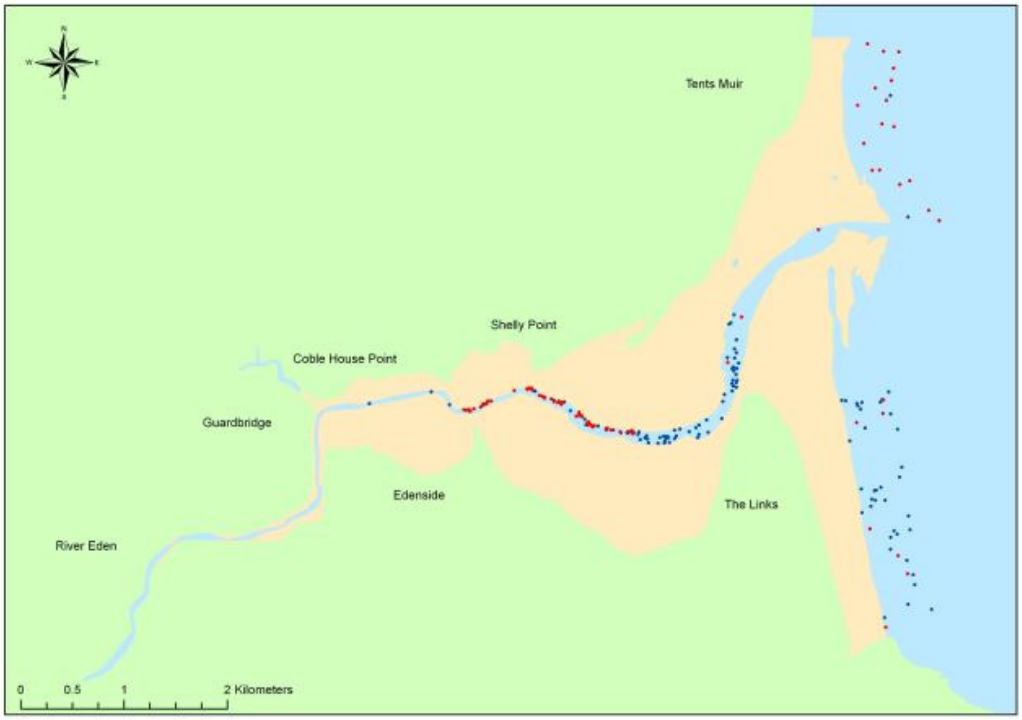
Area covered 960 ha; Mean total birds 6,542; Mean bird density 6.8 birds/ha.

Despite its relatively small size, 41 species of waterbird were recorded on the Eden Estuary. Oystercatcher, with a peak count of 2,505 birds, was the most numerous species recorded, closely followed by Dunlin with a peak count of 2,371. Redshank was the only other species with a four-figure peak count, of 1,401 birds. The majority of the wader species favoured the area between Shelly Point and The Links with Bar-tailed Godwit and Curlew favouring the north side of the river and Knot and Grey Plover favouring the south. Dunlin and Redshank however were found in the greatest densities between Edenside and Coble House Point. Wildfowl were thinly represented with relatively few Wigeon, Teal and Mallard present. Seaduck however were often present offshore in high numbers, including infrequently recorded species on Low Tide Counts such as Long-tailed Duck, and both Common and Velvet Scoter.

Comparative bird distribution

WeBS Core counts of Eider on the Eden Estuary have remained constant, though numbers counted on the Low Tide Counts during the last two sets of counts have fallen slightly. In 2001/02 the mean count was 108 birds but in 2008/09, this mean count had fallen to 84 birds. The distribution of birds within the site has changed little with most birds along the river channel and others on the sea. In 2008/09 birds tended to favour the sea to the north of the estuary mouth off Tents Muir, whereas in 2001/02 birds were found to the south off The Links (though sea conditions at the time of the count may affect this). It is possible that local movements between this site and the nearby larger Tay Estuary may contribute to this apparent decline.

Black-tailed Godwit numbers counted at low tide have also declined over the same period. In 2008/09 the mean site count was 122 (0.13 birds per hectare) compared with a mean site count of 183 (0.19 birds per hectare) in 2001/02. Again, local movements, particularly to the Forth where the core peak was at its highest ever level, may contribute to this apparent decline. Black-tailed Godwits favour the muddy, innermost parts of the estuary, unlike Bar-tailed Godwits that favours the sandier mouth and beach. The highest concentration of Black-tailed Godwits in 2008/09 was along the River Eden channel, with fewer around the Edenside area. This contrasted with the 2001/02 distributions when the Edenside area to Shelly Point was favoured.



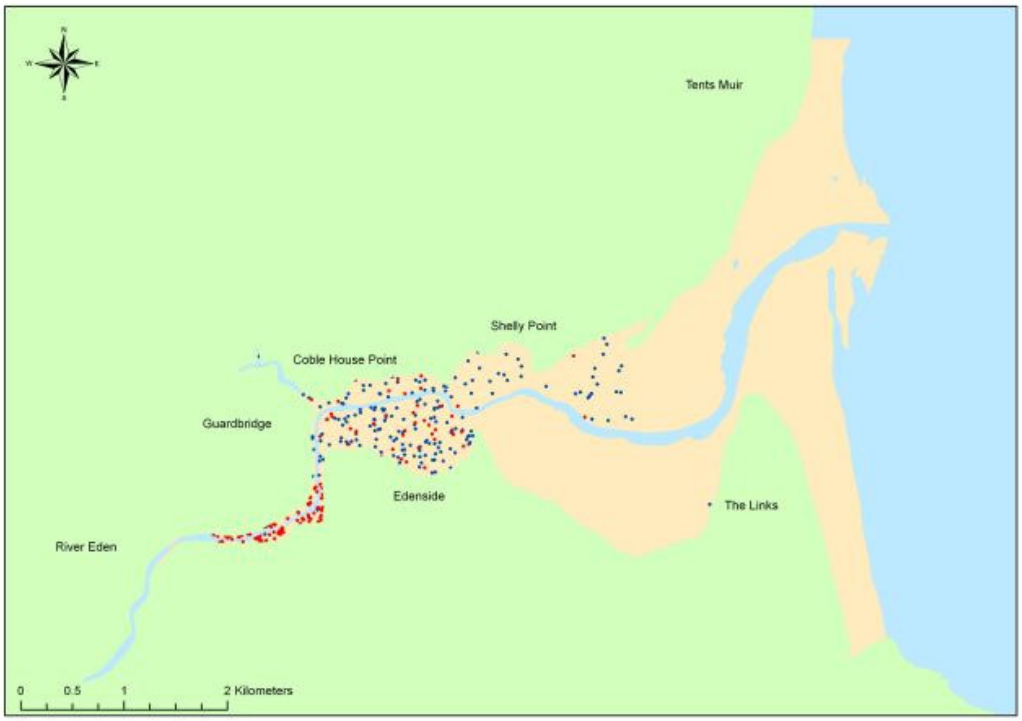


FIGURE 60 Low Tide distribution of Eider (above) and Black-tailed Godwit (below) for the winters of 2001/02 (blue) and 2008/09 (red) on the Eden Estuary. Yellow = intertidal; pale green = non-tidal; blue = subtidal.

HAMFORD WATER

Site description

Hamford Water is a large, shallow, estuarine basin hosting a diverse mixture of habitats. On either side of the mouth there are shingle spits topped by sand dunes and shell banks. The combined actions of wind and waves are slowly pushing them inland over the saltmarsh. The rest of the area is a matrix of dissected saltmarshes, islands, channels and mudflats backed by a range of brackish, fresh and reed-fringed marshes. Many of the islands are former saltmarshes, now embanked and converted to wet grassland. However, some have reverted to saltmarsh after seawalls were breached at the end of the 19th century, now leaving just Horsey Island as freshmarsh. *Heteromorphy* algae and eelgrass grow on the soft intertidal sediments. Industrial activity and urban sprawl are virtually absent with the exception of an explosive works along the north shore. There are high levels of aquatic recreational activities along the main channels, with marinas and moorings along the Walton Channel. Military aircraft training is a major source of disturbance to the waterfowl and three local wildfowling clubs shoot over some of the saltings and flats. As sea levels continue to rise, erosion of the shingle spits on the estuary mouth is an ongoing concern. A more immediate problem is accretion of sediment in the creeks, possibly due to movement of sediment caused by dredging in the nearby Stour/Orwell Estuaries (J.Novorol *pers comm.*)

General bird distribution 2008/09

Area covered 790 ha; Mean total birds 27,830; Mean bird density 35.2 birds/ha.

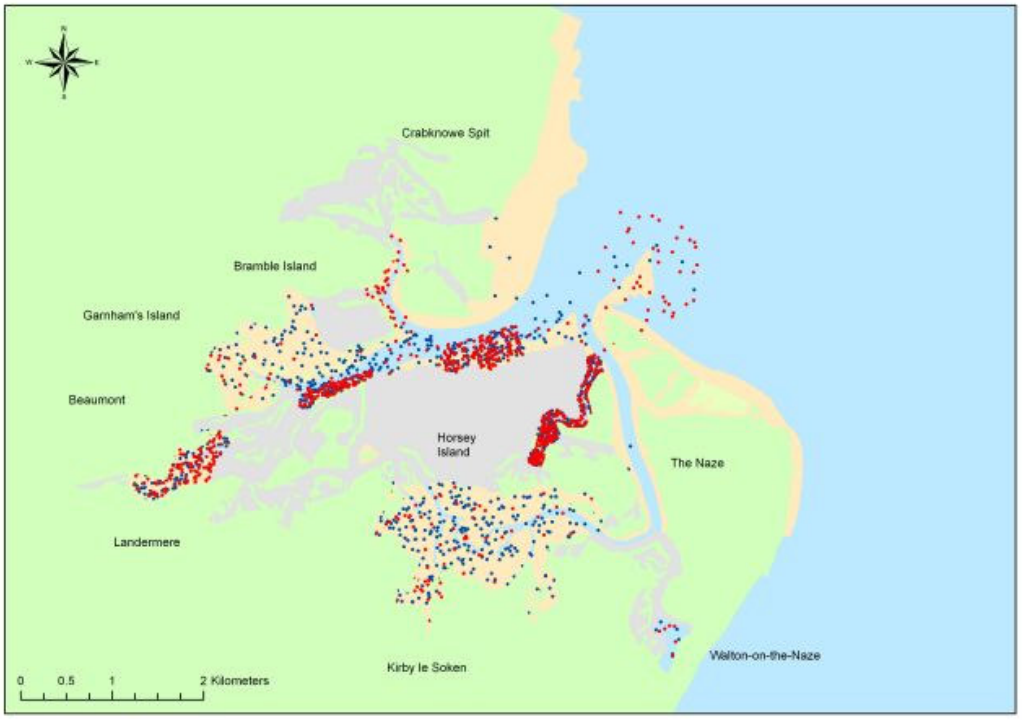
Hamford Water is a large site and due to the creeks and vegetation much of the site is inaccessible from land, thus low tide counts do not cover the whole site.

The cold weather in January brought in increased numbers of some wildfowl, predominantly Teal (J.Novorol pers comm.); the count of 10,684 was nearly double that of the Core counts. These birds were found largely on the north side of Horsey Island and the east side of Bramble Island. Redshank and Curlew were widely distributed throughout the site, but Avocets and Knot were found in their highest numbers around the south side of Horsey Island whereas Black-tailed Godwit favoured the north side. Typical tideline waders such as Bar-tailed Godwit, Ringed Plover, Sanderling and Turnstone favoured the area along the extensive mud near Crabknowe Spit.

Comparative bird distribution

Wigeon numbers at Hamford Water have shown a steady increase over the past twenty-five years. However, more recently numbers have declined and a Medium-Alert (see *http://www.bto.org/webs/alerts/*) has been triggered for this species for the last ten-year period. Numbers counted on Low Tide Counts in 2008/09 compared with the last set of Low Tide Counts here in 2001/02 has also shown a decline, with a peak of 2,491 in 2008 compared with a peak of 2,826 in 2001/02. The distribution in both winters was similar, with obvious concentrations of birds along the east and north sides of Horsey Island and at Landermere.

Numbers of Oystercatchers counted on the Low Tide Counts have also decreased between the two sets of counts. The mean count in 2001/02 was 1551 birds (2.3 birds per hectare), though by 2008/09 this mean site count had fallen to 646 (0.96 birds per hectare). However, numbers counted on core counts within the last five years have remained stable. This can largely be accounted for as birds that roost within the shelter of Hamford Water move out at low tide to favoured feeding areas such as mussel banks in the Stour and Orwell estuaries (J. Novorol pers comm.). The main concentration of birds was along the main intertidal area by Crabknowe Spit, which has seen the largest decline in numbers, falling from a mean of 912 (7.66 birds per hectare) in 2001/02 to just 178 (1.5 birds per hectare) in 2008/09. Smaller concentrations of birds were also seen in both winters around the south side of Horsey Island and to the west of Bramble Island.



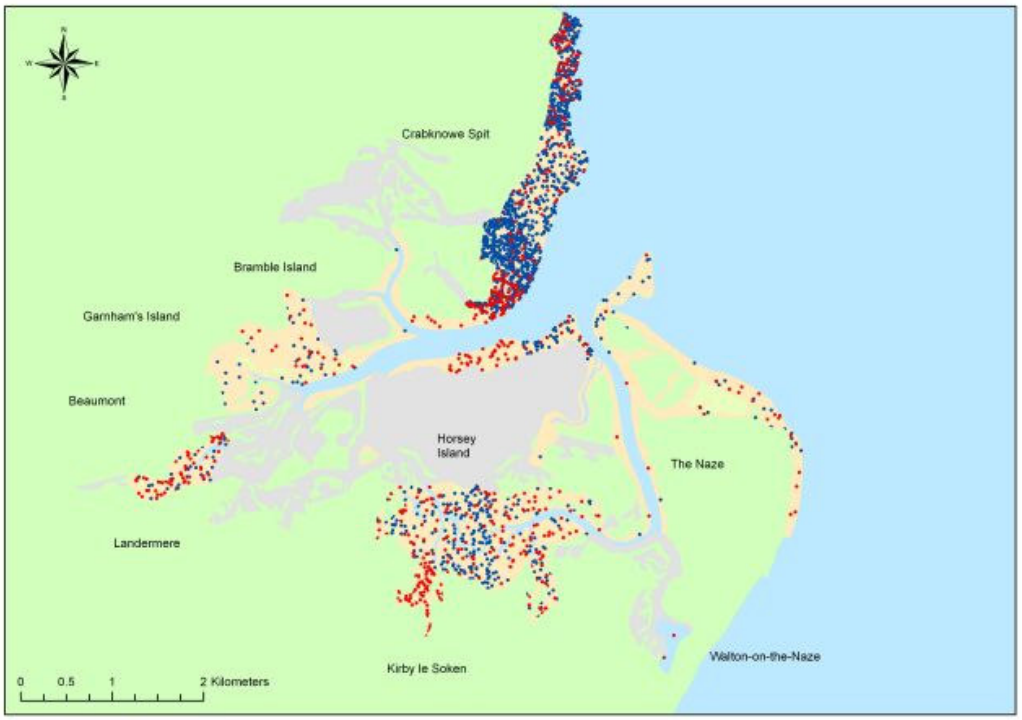


FIGURE 61 Low Tide distribution of Wigeon (above: 1 dot = 2 birds) and Oystercatcher (below) for the winters of 2001/02 (blue) and 2008/09 (red) on Hamford Water. Yellow = intertidal; pale green = non-tidal; blue = subtidal. Grey area not counted in either winter.

NEWTOWN HARBOUR

Site description

Newtown Harbour is situated on the northwest coast of the Isle of Wight, between Yarmouth and Cowes. Although it is the largest estuary on the island, the only freshwater input comes from a number of small streams. The mouth is relatively narrow and bounded on either side by shingle spits. Within the estuary, the intertidal flats comprise of combinations of mud, sand and shingle. Almost half of the saltmarsh habitat on the Isle of Wight occurs within the estuary, the majority of which occur along the banks of the creeks, many known locally as "Lakes", well inland from the mouth. In recent years however, new saltmarsh has developed in the central parts of the estuary behind the breached seawall. The area is popular with tourists, particularly in the summer months. The only light industry on the estuary is a boat repair yard at Shalfleet. Some bait digging takes place in the area. The estuary is a SSSI and forms part of the Solent & Southampton Water SPA and Ramsar Site.

General bird distribution 2008/09

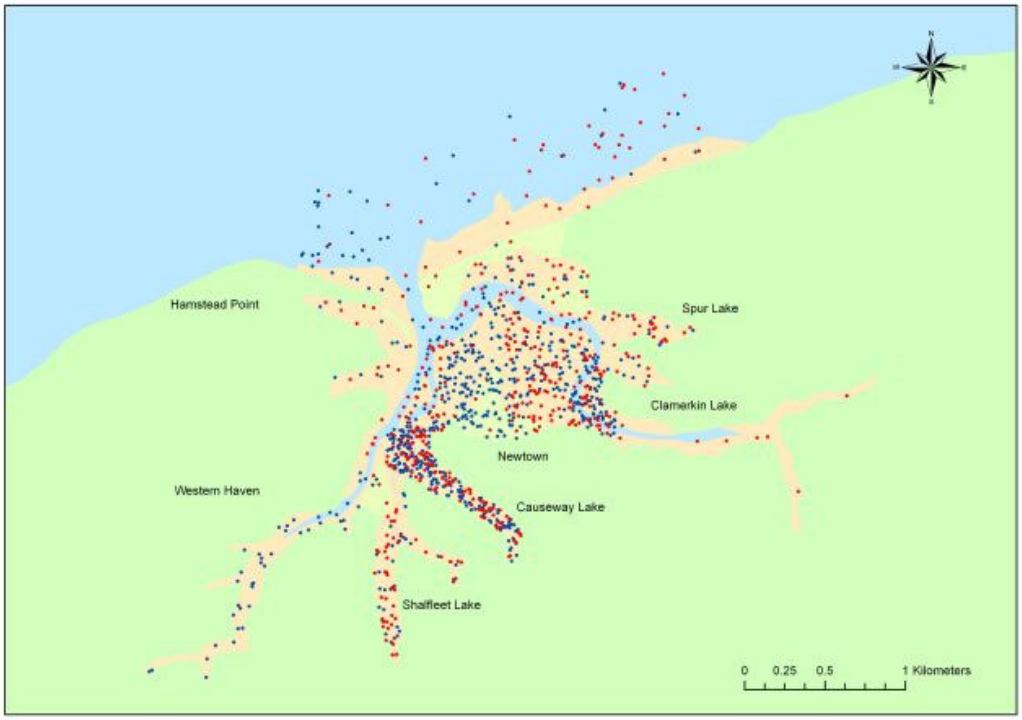
Area covered 262 ha; Mean total birds 6,877; Mean bird density 26.2 birds/ha.

At just 262 hectares, Newtown Harbour represents the second smallest site counted at low tide. Despite its size, 33 species were recorded which was more than at several larger sites. Dunlin were the most numerous species, peaking at 2,474 birds with Knot being the second most numerous wader, both species favouring the large expanse of intertidal habitat of Newtown National Nature Reserve. Wildfowl were well represented with three species (Teal, Wigeon and Dark-bellied Brent Goose) being recorded in four figure numbers. Pintail favoured Causeway Lake whilst Teal favoured Clamerkin and Spur Lakes.

Comparative bird distribution

Dark-bellied Brent Geese occur in nationally important numbers in Newtown Harbour, with numbers counted on Low Tide Counts similar to those counted on Core Counts. Between the two winter periods when Low Tide Counts have been carried out on this site, the number of Dark-bellied Brent Geese counted has declined. The mean site count between the years has fallen from 1,327 (3.01 birds per hectare) in 1999/00 to 938 (2.13 birds per hectare) in 2008/09; numbers counted on Core Counts have fluctuated over the same period. The distribution in both years was very similar, with Causeway Lake supporting the highest density of birds where the mean density fell from 385 birds (21.4 birds per hectare) in 1999/00 to 225 birds (12.47 birds per hectare) in 2008/09. Newtown Nature Reserve and both Clamerkin and Spur Lakes also held good numbers of birds in both winters.

The number of Black-tailed Godwits recorded on Low Tide Counts has also seen a decline between the two years. This species is also found in nationally important numbers though numbers counted on Core Counts in recent years has also fallen. The area around Causeway Lake was favoured in both years, though in 1999/00 birds were also found on the west side of the Harbour up towards Hamstead Point. In 2008/09, a mean of just 37 birds (0.14 birds per hectare) was counted on the Low Tide Counts compared with a mean of 113 (0.43 birds per hectare) in 1999/00.



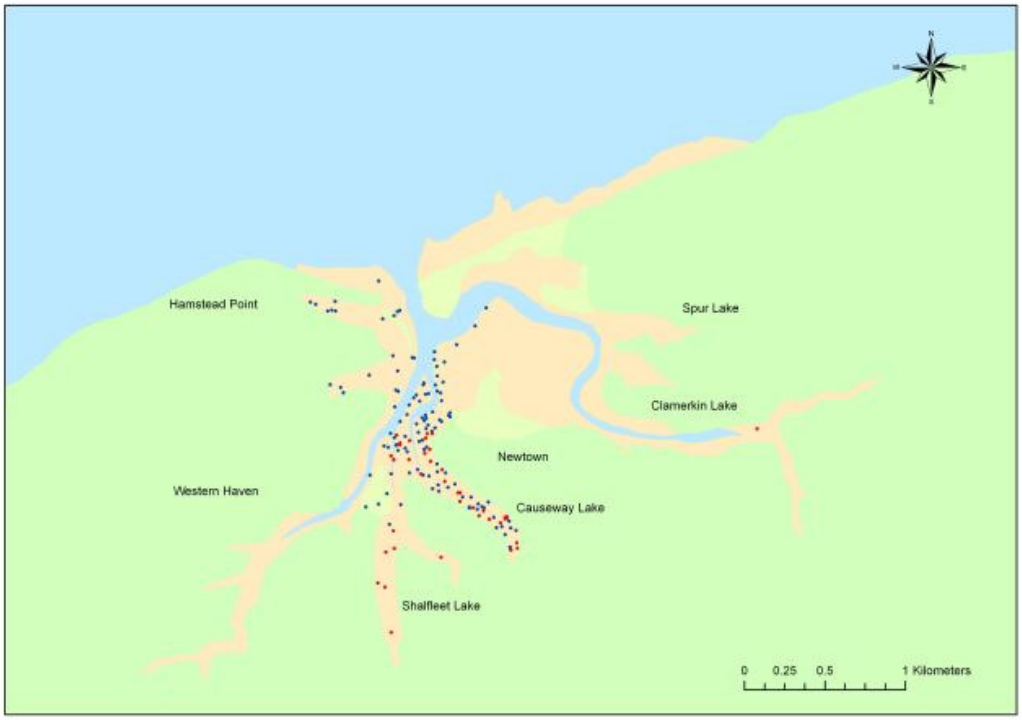


FIGURE 62 Low Tide distribution of Dark-bellied Brent Goose (above: 1 dot = 2 birds) and Black-tailed Godwit (below) for the winters of 1999/00 (blue) and 2008/09 (red) at Newtown Harbour. Yellow = intertidal; pale green = non-tidal; blue = subtidal.

Site description

Pegwell Bay is a small estuary at the mouth of the River Stour in east Kent. For much of its length, the Stour is narrow, although it broadens widely at the mouth. The inner estuary substrates are composed of fine, muddy particles and the sediments become increasingly sandier as the estuary broadens into Sandwich Bay. There are narrow rocky outcrops in the northeastern section, between Pegwell and West Cliff areas of Ramsgate. Saltmarsh has developed around both banks of the River Stour. Along the western side, most saltmarsh has been lost to land claim. Saltmarsh habitat along the eastern bank is more extensive. The shoreline to the south of the Stour is backed by a long stretch of bare shingle, behind which there are extensive dunes and sandy grassland. The dune system is growing rapidly northwards and diverting the channel of the Stour. There is relatively little industrial activity, with a power station and industrial wharf at Richborough, a chemical works further upriver at Great Stonar and a harbour at Ramsgate. Leisure activities such as sailing, windsurfing and waterskiing are abundant and there is also a marina. Beach recreation is also widespread and wildfowling takes place on the grazing marshes.

General bird distribution 2008/09

Area covered 808 ha; Mean total birds 13,411; Mean bird density 16.6 birds/ha.

The Pegwell Bay area supports significant populations of a range of birds, some of which have shown an increase in recent years. Lapwing and Golden Plover were found in the largest numbers, predominantly in the north at Pegwell Bay and on the River Stour Estuary saltmarshes. Of the traditional wading species, Dunlin were the most numerous, with birds being found exclusively in Pegwell Bay on either side of the river mouth. Other waders such as Bar-tailed Godwit, Grey Plover, Curlew and Knot were also found in greatest numbers here. Wigeon were the most widespread of the wildfowl species, with a few birds being found as far south as Sandwich Flats. Pintail and Shoveler were largely confined to the saltmarsh areas along the length of the River Stour, whereas both Mallard and Teal were found both here and in Pegwell Bay itself. Shelduck favoured the expanse of Pegwell Bay with few birds further south. Relatively few Dark-bellied Brent Geese were present, and as with many wildfowl, were found around the mouth of the River Stour. Offshore, single Scaup and small numbers of Red-throated Diver, Common Scoter and Eider were also present.

Comparative bird distribution

In both winters, Teal have shown aggregated distributions, with birds being concentrated in the north end of the Bay in Pegwell Bay itself and the adjacent River Stour Estuary saltmarshes. However in 2008/09 they were much more numerous, in line with those counted on Core Counts, especially in Pegwell Bay. In 2002/03, the mean site count was 94 (0.08 birds per hectare), yet in 2008/09, this figure had increased to 337 (0.24 birds per hectare), though as with other sites, the harsh winter may have resulted in influxes of birds.

In contrast, Sanderlings have undergone a decline over the same period. Pegwell Bay is used as a migration route for many birds, including Sanderling and also occasionally as a refuge when higher pressure on the Thanet coast forces birds into Pegwell and Sandwich Bays and so numbers fluctuate depending on the level of disturbance (P. Findley *pers comm*.) In 2002/03 there was a mean site count of 188 (0.32 birds per hectare), though this number had fallen to 67 (0.11 birds per hectare) in 2008/09. However, unlike Teal, Sanderling distribution at this site is much more widespread along the length of Pegwell Bay south to Sandwich Bay, though in 2008/09 birds were much more localised, with the majority of birds were found around the mouth of the River Stour.

FIGURE 63 Low Tide distribution of Teal (above) and Sanderling (below) for the winters of 2002/03 (blue) and 2008/09 (red) at Pegwell Bay. Yellow = intertidal; pale green = non-tidal; blue = subtidal.

PORTSMOUTH HARBOUR

Site description

This large harbour in the Solent lies between Portsmouth to the east and Gosport and Fareham to the west. The main freshwater inflow is Wallington River to the northwest. This meets the saltwater at Fareham Lake, which restricts the freshwater input to the Harbour. The connection to the Solent is only 200 metres wide at the narrowest point. Saltmarsh is a relatively limited habitat around the shores of the estuary. However, eelgrass and algal growth on the mudflats is more extensive. The shores of the harbour are heavily industrialised, including port and housing developments, along with major naval docks and installations. Future developments and dock expansion are potential threats as the pressure to reduce MOD activity/spending is one of the main future threats as this could lead to the release of land adjacent to the Harbour for development (D.Bill *pers comm*.)

General bird distribution 2008/09

Area covered 968 ha; Mean total birds 10,376; Mean bird density 10.7 birds/ha.

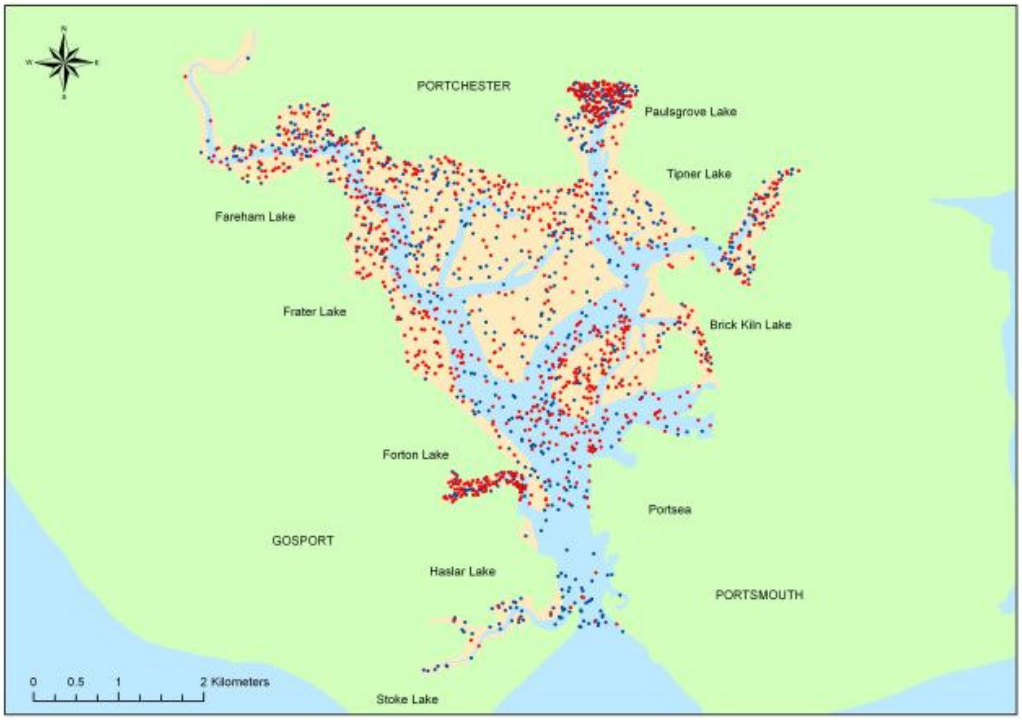
Portsmouth Harbour supports high numbers of many species of waterbird, with 36 species recorded on the Low Tide Counts. Wildfowl were well represented, with up to 77 Red-breasted Mergansers, 34 Goldeneye and a Scaup amongst the more regular species. Both Red-breasted Merganser and Goldeneye numbers have declined nationally over the last ten years and sheltered harbours and bays are often favoured along the south coast. Both these species favoured Fareham and Paulsgrave Lakes. Indeed, many of the wildfowl species recorded favoured the creeks, or 'Lakes', with Wigeon found in Fareham Lake and along the Bedenham Shore at Frater Lake only and both Mallard and Teal concentrated both here and in Tipner Lake as well. A Black Brant, an uncommon visitor to Britain from America in with the Brent Geese was probably a returning bird. Wading birds were much more widespread, with Oystercatcher and Curlew widely distributed across the site. Dunlin were the most numerous species present, peaking at 6,143 birds, with these birds favouring the northwest corner of the harbour around Fareham Lake and also Forton Lake. Due to the lack of exposed tide line, there were very few Knot, Bar-tailed Godwits, Grey Plover and Sanderling that are more numerous on the larger open estuaries. Up to 49 Little Egrets were recorded, again emphasising their abundance along the south coast in particular.

Comparative bird distribution

Dark-bellied Brent Geese are present in Portsmouth Harbour in internationally important numbers. In the last twenty-five years, numbers here have increased threefold though in more recent years, numbers have stabilised (see *http://www.bto.org/webs/alerts/*).

Low Tide Counts at Portsmouth Harbour reflect the continuing increase, with the mean site count in 2002/03 being 1,549 (0.99 birds per hectare) rising to 2,042 (1.29 birds per hectare) in 2008/09. Although widely distributed across the harbour, the two main areas of concentration were in Forton Lake and Paulsgrove Lake. Fewer birds were found at the harbour mouth in 2008/09 than previously.

Redshank numbers in Portsmouth Harbour have also steadily increased in the last five years. As with Brent Geese, this trend was also reflected in the Low Tide Counts, where the 2008/09 mean site total was 472 (0.49 birds per hectare) compared with 359 (0.37 birds per hectare) in 2002/03. Typically for this species, the 'Lakes' were favoured areas rather than the more open expanses, in particular in Fareham Lake where there was a mean count of 109 birds (2.65 birds per hectare) in 2008/09 compared with 62 (1.5 birds per hectare) in 2002/03. Smaller concentrations were also found in Tipner Lake and Paulsgrove Lake.



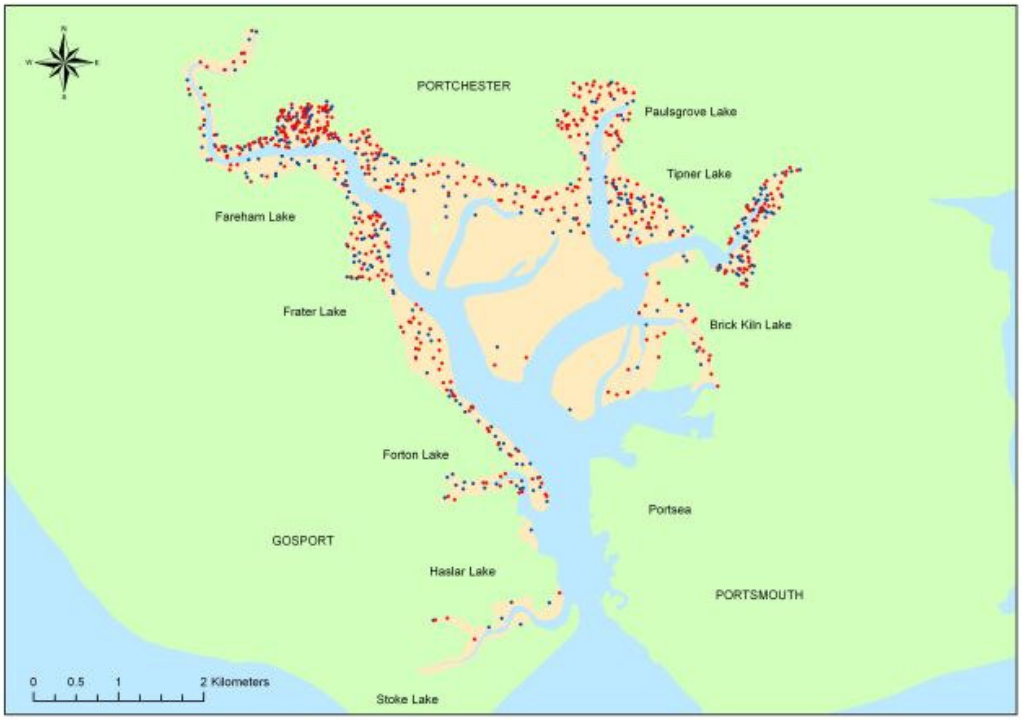


FIGURE 64 Low Tide distribution of Dark-bellied Brent Goose (above: 1 dot = 2 birds) and Redshank (below) for the winters of 2002/03 (blue) and 2008/09 (red) at Portsmouth Harbour. Yellow = intertidal; pale green = non-tidal; blue = subtidal.

Site description

The River Severn is the longest in Britain and drains a large area of Wales and the Midlands. The huge tidal range (the second largest in the world after the Bay of Fundy in Eastern Canada) means that much of the intertidal sediment is mobile. The whole of the estuary is both a Ramsar Site and SPA due to its internationally important assemblages of waterbirds. The estuarine mudflats in Cardiff Bay at the mouth of the estuary were lost when the construction of the Cardiff Bay Barrage was completed in the 1999. In partial mitigation for the loss of intertidal habitat, a series of freshwater lagoons were created at the Newport Wetland Reserve. Steart Flats and Berrow Flats comprise extensive mudflats within Bridgewater Bay. Industrial development is widespread, particularly around Avonmouth, where there are major port facilities and chemical works. There are also port facilities at Barry, Cardiff and Newport. The estuary has previously suffered from pollution with the discharge of heavy metals a particular problem. The upper reaches of the estuary are more rural in character. As in 2002/03, islands and sandbars in the middle of the estuary were counted at low tide by boat.

General bird distribution 2008/09

Area covered 21,824ha; Mean total birds 81,653; Mean bird density 3.7 birds/ha.

The Severn Estuary produced the greatest diversity of species on the 2008/09 Low Tide Counts with 64 species recorded. Mallard, Curlew and Dunlin were the most widespread species, being found in good numbers throughout the estuary, with Dunlin being by far the most numerous species present with a peak count of 27,136 birds. Grey Plover and Knot favoured the areas around Burnham-on-Sea and Peterstone on the Welsh shore near Newport whilst Oystercatchers were found from Severn Beach at Bristol southwards to Burnham-on-Sea. Wildfowl were generally more restricted in their favoured areas, with Pintail and Shoveler favouring the Slimbridge, Newport and Burnham-on-Sea areas whilst Teal also favoured the Severn Beach and Weston-Super-Mare areas.

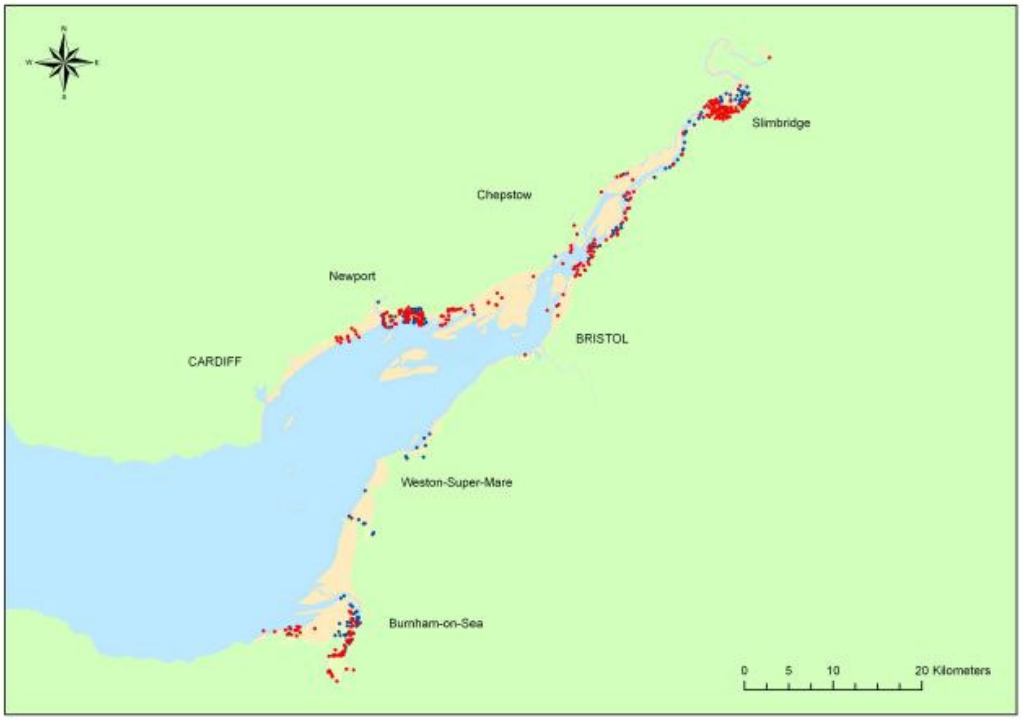
Comparative bird distribution

On the Severn Estuary, Wigeon are primarily present from September through to March, with a peak WeBS Core Count during the winter of 2008/09 of 7,589 birds. Numbers of Wigeon on the Severn Estuary have fluctuated since the mid-1970s though since the early-1990s have steadily risen (see *http://www.bto.org/webs/alerts/*).

Low Tide Counts on the Severn Estuary during 2008/09 recorded a winter mean of 6,231 (0.18 birds per hectare), which is a significant increase since 2002/03 when the mean site total was 3,283 (0.11 birds per hectare). Wigeon are most abundant at the smaller sub-estuaries near Burnham-on-Sea and north of Bristol where eel-grass on tidal flats or adjacent grassland provided extensive feeding opportunities. This species also occurs in large numbers at the Newport Wetlands Reserve and the New Grounds at WWT Slimbridge and the adjacent mudflats.

Numbers of Redshank counted on Core Counts on the Severn Estuary in 2008/09 were at their highest ever level. This peak of 2,970 matched the Low Tide peak of 2,936 well. This Low Tide peak count is also higher than the 2002/03 peak of 2,439 birds. Redshanks are widespread on the Severn Estuary in winter but favour river mouths and other sites where there are freshwater inputs into the estuary. High concentrations of Redshank are found at the mouth of the River Parrett at Burnham-on-Sea, near the mouth of the River Axe at Weston-Super-Mare, and near the mouth of the Rhymney near Cardiff and north along the shore adjacent to the Newport Wetlands Reserve.

Counts of the Severn Estuary were aided by funding from the Department of the Energy and Climate Change, which enabled gaps in coverage to be filled. The data from the surveys have been used to inform the Severn Tidal Power Strategic Environmental Assessment.



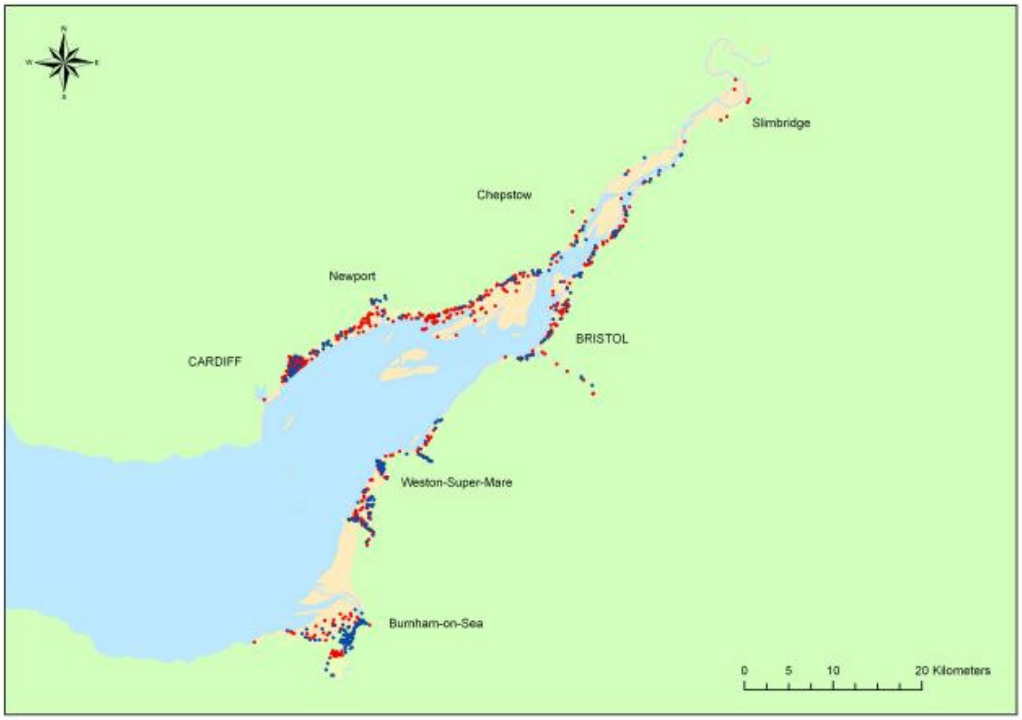


FIGURE 65 Low Tide distribution of Wigeon (above: 1 dot = 20 birds) and Redshank (below: 1 dot = 5 birds) for the winters of 2002/03 (blue) and 2008/09 (red) on the Severn Estuary. Yellow = intertidal; pale green = non-tidal; blue = subtidal.

ACKNOWLEDGEMENTS

We are very grateful to the following people and organisations that contributed to the Low Tide Count scheme in the winter of 2008/09. Apologies to anyone omitted accidentally from the list.

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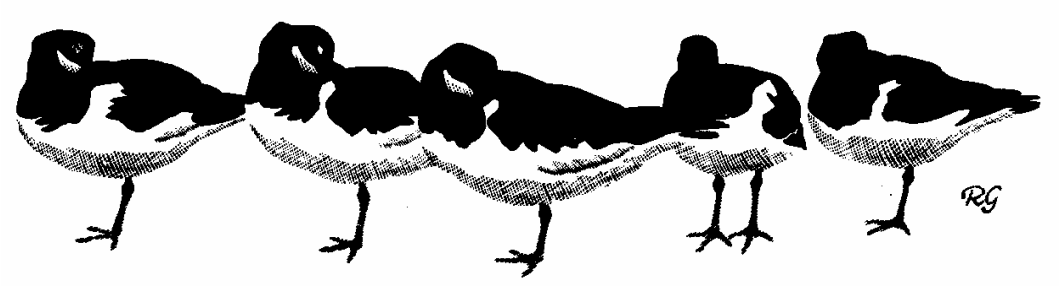

Oystercatchers (Robert Gillmor)