# *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 2007/08 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 2007/08 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 = 2007/08 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 2007/08 are discussed. WeBS Low Tide Counts were carried out on 18 different sites, with estuary accounts encompassing 9 of these. Other counts, usually on limited numbers of sectors or only in one month, were made in the winter of 2007/08 on Adur Estuary, Burry Inlet, Carmarthen Bay, Duddon Estuary, 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 *Wildfowl & Wader Counts*. 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 2007/08, focusing on species held in important numbers at the site in question.

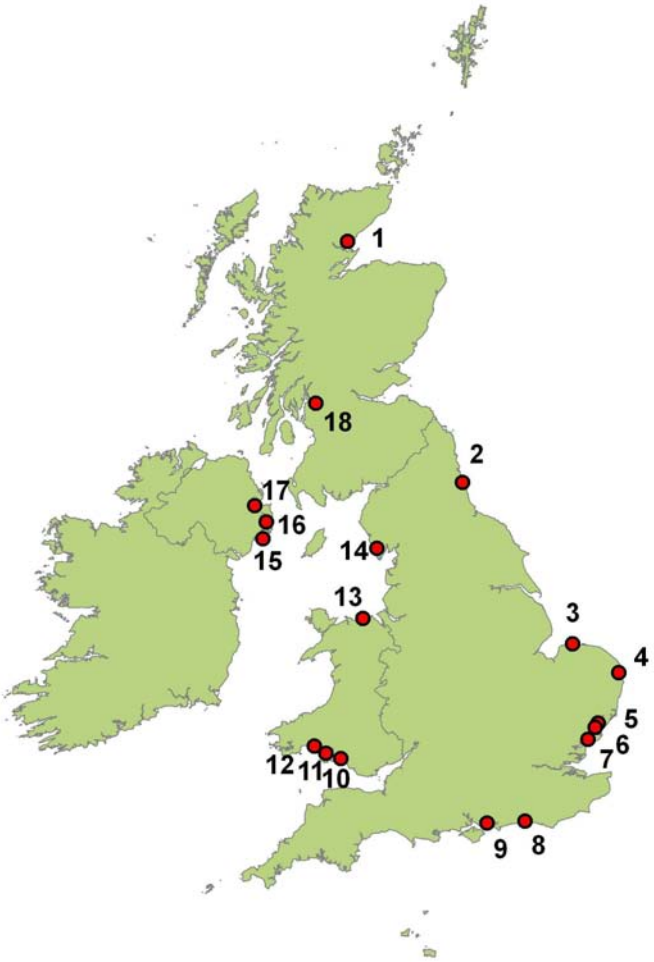
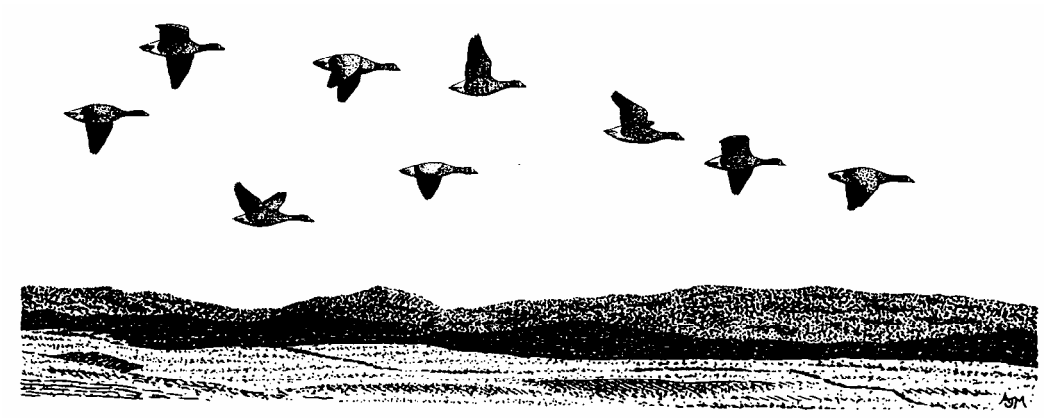



*Figure 58.* Map showing estuaries covered at low tide in the winter of 2007/08. 1: Loch Fleet; 2: Tyne Estuary; 3: North Norfolk Coast; 4: Breydon Water; 5: Orwell Estuary; 6: Stour Estuary; 7: Colne Estuary; 8: Adur Estuary; 9: Langstone Harbour; 10: Swansea Bay; 11: Burry Inlet; 12: Carmarthen Bay; 13: Clwyd Estuary; 14: Duddon Estuary; 15: Killough Harbour; 16: Strangford Lough; 17: Belfast Lough; 18: Inner Firth of Clyde.

*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** |
|---|---|---|
| Adur Estuary (8) | None | None |
| Belfast Lough (17) | BW | SU, SP, E., GN, RM, RH, BV, GG, OC, RP, PS, RK, TT |
| Breydon Water (4) | BS, PG, WN, T., SV, AV, GP, BW, RK | BS, EW, PT, RU |
| Burry Inlet (11) | PT, OC, BW | DB, SV, DN, CU, GK |
| Carmarthen Bay (12) | CX, SS | OC, GP, BW, GK |
| Clwyd Estuary (13) | None | None |
| Colne Estuary (7) | DB | SU, AV, BW, GK |
| Duddon Estuary (14) | None | RP, SS, DN, CU |
| Firth of Clyde (18) | E. | GN, RM, SZ, CA, SA, OC, CU, GK, RK |
| Killough Harbour (15) | QN | None |
| Langstone Harbour (9) | None | TT |
| Loch Fleet (1) | JI | None |
| North Norfolk Coast (3) | PF, EW, DB, WN, PT, CX, KN, BA | SU, T., SV, RM, RX, CA, OC, BW, AV, RP, GP, GV, SS, RU, CU, GK, RK, TT |
| Orwell Estuary (5) | None | DB, GA, PT, AV, KN, BW, RK |
| Stour Estuary (6) | BW, GV | DB, SU, PT, AV, 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 |
| Swansea Bay (10) | None | OC |
| Tyne Estuary (2) | None | None |



*White-fronted Geese (Andy McKay)*

*Table 10.* Peak and mean counts and mean density (birds per ha) of 18 waterbird species across 18 estuaries covered by the 2007/08 WeBS Low Tide Counts. Stour and Orwell estuaries displayed separately. "+" indicates non-zero densities of <0.01 birds per ha.

| Species | Adur Estuary | | | Belfast Lough | | | Breydon Water | | |
|---|---|---|---|---|---|---|---|---|---|
| | ***Peak No.*** | *Mean No.* | *Mean Dns.* | ***Peak No.*** | *Mean No.* | *Mean Dns.* | ***Peak No.*** | *Mean No.* | *Mean Dns.* |
| Brent Goose | 1 | 0 | + | 92 | 67 | 0.03 | 0 | 0 | 0 |
| Shelduck | 0 | 0 | 0 | 322 | 224 | 0.11 | 98 | 53 | 0.11 |
| Wigeon | 0 | 0 | 0 | 248 | 202 | 0.09 | 9750 | 6211 | 12.94 |
| Teal | 23 | 19 | 0.21 | 713 | 560 | 0.26 | 965 | 431 | 0.9 |
| Mallard | 11 | 5 | 0.06 | 496 | 363 | 0.17 | 167 | 94 | 0.2 |
| Pintail | 0 | 0 | 0 | 0 | 0 | 0 | 67 | 40 | 0.08 |
| Oystercatcher | 7 | 3 | 0.11 | 3416 | 3102 | 6.94 | 15 | 5 | 0.01 |
| Ringed Plover | 38 | 21 | 0.73 | 174 | 142 | 0.32 | 24 | 12 | 0.03 |
| Golden Plover | 0 | 0 | 0 | 0 | 0 | 0 | 14000 | 6344 | 15.78 |
| Grey Plover | 15 | 7 | 0.24 | 0 | 0 | 0 | 82 | 29 | 0.07 |
| Lapwing | 481 | 270 | 3.6 | 1018 | 750 | 1.65 | 17335 | 7381 | 18.36 |
| Knot | 0 | 0 | 0 | 24 | 9 | 0.02 | 195 | 148 | 0.37 |
| Dunlin | 222 | 100 | 3.46 | 420 | 265 | 0.59 | 6650 | 4597 | 11.64 |
| Black-tailed Godwit | 0 | 0 | 0 | 276 | 210 | 0.46 | 2042 | 857 | 2.13 |
| Bar-tailed Godwit | 0 | 0 | 0 | 45 | 29 | 0.07 | 3 | 1 | + |
| Curlew | 1 | 0 | + | 471 | 402 | 0.88 | 602 | 279 | 0.69 |
| Redshank | 21 | 17 | 0.23 | 828 | 783 | 1.72 | 1222 | 1171 | 2.91 |
| Turnstone | 64 | 28 | 0.95 | 264 | 218 | 0.49 | 2 | 1 | + |

| Species | Burry Inlet | | | Carmarthen Bay | | | Clwyd Estuary | | |
|---|---|---|---|---|---|---|---|---|---|
| | ***Peak No.*** | *Mean No.* | *Mean Dns.* | ***Peak No.*** | *Mean No.* | *Mean Dns.* | ***Peak No.*** | *Mean No.* | *Mean Dns.* |
| Brent Goose | 570 | 373 | 0.05 | 1 | 0 | + | 0 | 0 | 0 |
| Shelduck | 608 | 343 | 0.05 | 184 | 122 | 0.02 | 64 | 47 | 0.14 |
| Wigeon | 847 | 333 | 0.05 | 330 | 203 | 0.04 | 284 | 164 | 0.48 |
| Teal | 25 | 18 | + | 166 | 153 | 0.03 | 10 | 4 | 0.01 |
| Mallard | 59 | 31 | + | 215 | 108 | 0.02 | 68 | 41 | 0.12 |
| Pintail | 1531 | 865 | 0.12 | 261 | 165 | 0.03 | 0 | 0 | 0 |
| Oystercatcher | 12861 | 10527 | 2.63 | 10911 | 8732 | 2.59 | 280 | 227 | 1.21 |
| Ringed Plover | 18 | 10 | + | 52 | 35 | 0.01 | 0 | 0 | 0 |
| Golden Plover | 750 | 417 | 0.07 | 2033 | 567 | 0.14 | 4 | 1 | 0.01 |
| Grey Plover | 240 | 171 | 0.04 | 64 | 31 | 0.01 | 0 | 0 | 0 |
| Lapwing | 872 | 434 | 0.07 | 973 | 611 | 0.15 | 880 | 599 | 3.2 |
| Knot | 850 | 431 | 0.11 | 6486 | 3538 | 1.05 | 0 | 0 | 0 |
| Dunlin | 3339 | 2285 | 0.57 | 1302 | 925 | 0.27 | 99 | 95 | 0.51 |
| Black-tailed Godwit | 50 | 16 | + | 68 | 31 | 0.01 | 0 | 0 | 0 |
| Bar-tailed Godwit | 0 | 0 | 0 | 30 | 9 | + | 0 | 0 | 0 |
| Curlew | 823 | 771 | 0.13 | 544 | 438 | 0.11 | 166 | 128 | 0.69 |
| Redshank | 303 | 215 | 0.04 | 640 | 489 | 0.12 | 216 | 184 | 0.98 |
| Turnstone | 35 | 19 | + | 74 | 44 | 0.01 | 78 | 46 | 0.24 |

| Species | Colne Estuary | | | Duddon Estuary | | | Inner Firth of Clyde | | |
|---|---|---|---|---|---|---|---|---|---|
| | ***Peak No.*** | *Mean No.* | *Mean Dns.* | ***Peak No.*** | *Mean No.* | *Mean Dns.* | ***Peak No.*** | *Mean No.* | *Mean Dns.* |
| Brent Goose | 2464 | 1336 | 0.44 | 0 | 0 | 0 | 0 | 0 | 0 |
| Shelduck | 1600 | 1210 | 1.61 | 213 | 213 | 0.14 | 262 | 162 | 0.05 |
| Wigeon | 1927 | 1184 | 0.39 | 389 | 389 | 0.25 | 771 | 682 | 0.19 |
| Teal | 1052 | 772 | 0.26 | 1 | 1 | + | 995 | 515 | 0.14 |
| Mallard | 188 | 148 | 0.05 | 18 | 18 | 0.01 | 483 | 316 | 0.09 |
| Pintail | 42 | 27 | 0.01 | 0 | 0 | 0 | 10 | 6 | + |
| Oystercatcher | 713 | 619 | 0.5 | 1679 | 1679 | 1.4 | 2861 | 2468 | 1.29 |
| Ringed Plover | 177 | 126 | 0.1 | 49 | 49 | 0.04 | 31 | 18 | 0.01 |
| Golden Plover | 2828 | 1287 | 0.64 | 0 | 0 | 0 | 3 | 1 | + |
| Grey Plover | 575 | 475 | 0.38 | 19 | 19 | 0.02 | 2 | 1 | + |
| Lapwing | 3329 | 1745 | 0.87 | 295 | 295 | 0.25 | 2301 | 1660 | 0.84 |
| Knot | 3051 | 2005 | 1.62 | 210 | 210 | 0.17 | 13 | 3 | + |
| Dunlin | 6716 | 5736 | 4.63 | 351 | 351 | 0.29 | 1027 | 473 | 0.25 |
| Black-tailed Godwit | 617 | 488 | 0.24 | 0 | 0 | 0 | 19 | 7 | + |
| Bar-tailed Godwit | 220 | 185 | 0.15 | 0 | 0 | 0 | 32 | 18 | 0.01 |
| Curlew | 525 | 469 | 0.23 | 218 | 218 | 0.18 | 1440 | 1169 | 0.59 |
| Redshank | 1442 | 1272 | 0.63 | 162 | 162 | 0.13 | 1864 | 1480 | 0.75 |
| Turnstone | 304 | 219 | 0.18 | 36 | 36 | 0.03 | 0 | 0 | 0 |

| | Killough Harbour | | | Langstone Harbour | | | Loch Fleet | | |
|---|---|---|---|---|---|---|---|---|---|
| | ***Peak*** | *Mean* | *Mean* | ***Peak*** | *Mean* | *Mean* | ***Peak*** | *Mean* | *Mean* |
| **Species** | ***No.*** | *No.* | *Dns.* | ***No.*** | *No.* | *Dns.* | ***No.*** | *No.* | *Dns.* |
| Brent Goose | 225 | 129 | 1.79 | 1602 | 1368 | 2.9 | 0 | 0 | 0 |
| Shelduck | 4 | 2 | 0.02 | 400 | 178 | 0.38 | 74 | 61 | 0.08 |
| Wigeon | 47 | 21 | 0.29 | 360 | 214 | 0.45 | 789 | 596 | 0.76 |
| Teal | 93 | 24 | 0.34 | 34 | 22 | 0.05 | 173 | 104 | 0.13 |
| Mallard | 0 | 0 | 0 | 39 | 14 | 0.03 | 80 | 57 | 0.07 |
| Pintail | 0 | 0 | 0 | 32 | 11 | 0.02 | 0 | 0 | 0 |
| Oystercatcher | 67 | 45 | 0.69 | 539 | 425 | 1.05 | 535 | 428 | 0.75 |
| Ringed Plover | 16 | 9 | 0.14 | 139 | 69 | 0.17 | 0 | 0 | 0 |
| Golden Plover | 2500 | 808 | 12.42 | 0 | 0 | 0 | 0 | 0 | 0 |
| Grey Plover | 0 | 0 | 0 | 213 | 208 | 0.51 | 0 | 0 | 0 |
| Lapwing | 452 | 182 | 2.8 | 30 | 18 | 0.05 | 73 | 27 | 0.05 |
| Knot | 68 | 42 | 0.64 | 193 | 99 | 0.24 | 40 | 35 | 0.06 |
| Dunlin | 315 | 251 | 3.85 | 5403 | 3869 | 9.58 | 70 | 36 | 0.06 |
| Black-tailed Godwit | 0 | 0 | 0 | 37 | 34 | 0.09 | 0 | 0 | 0 |
| Bar-tailed Godwit | 0 | 0 | 0 | 29 | 28 | 0.07 | 97 | 65 | 0.11 |
| Curlew | 38 | 29 | 0.45 | 287 | 221 | 0.55 | 147 | 169 | 0.29 |
| Redshank | 76 | 65 | 0.99 | 225 | 196 | 0.49 | 113 | 100 | 0.17 |
| Turnstone | 0 | 0 | 0 | 60 | 44 | 0.11 | 12 | 5 | 0.01 |

| | North Norfolk Coast | | | Orwell Estuary | | | Stour Estuary | | |
|---|---|---|---|---|---|---|---|---|---|
| | ***Peak*** | *Mean* | *Mean* | ***Peak*** | *Mean* | *Mean* | ***Peak*** | *Mean* | *Mean* |
| **Species** | ***No.*** | *No.* | *Dns.* | ***No.*** | *No.* | *Dns.* | ***No.*** | *No.* | *Dns.* |
| Brent Goose | 7828 | 4721 | 0.53 | 1601 | 1059 | 0.61 | 1686 | 1526 | 0.63 |
| Shelduck | 1222 | 1048 | 0.12 | 618 | 552 | 0.32 | 2130 | 1838 | 0.75 |
| Wigeon | 7740 | 3570 | 0.4 | 1615 | 1432 | 0.82 | 3729 | 3506 | 1.44 |
| Teal | 3278 | 2840 | 0.32 | 714 | 560 | 0.32 | 1474 | 906 | 0.37 |
| Mallard | 675 | 540 | 0.06 | 461 | 380 | 0.22 | 194 | 142 | 0.06 |
| Pintail | 697 | 433 | 0.05 | 192 | 151 | 0.09 | 234 | 191 | 0.08 |
| Oystercatcher | 3699 | 3421 | 0.98 | 1653 | 1444 | 2.2 | 1098 | 1065 | 0.68 |
| Ringed Plover | 355 | 312 | 0.09 | 86 | 54 | 0.08 | 167 | 161 | 0.1 |
| Golden Plover | 2919 | 1439 | 0.23 | 150 | 85 | 0.07 | 2608 | 1671 | 1.03 |
| Grey Plover | 1339 | 1265 | 0.36 | 309 | 184 | 0.28 | 2329 | 1792 | 1.15 |
| Lapwing | 3277 | 1647 | 0.26 | 1810 | 750 | 0.61 | 4203 | 2069 | 1.27 |
| Knot | 9597 | 5538 | 1.59 | 3552 | 1982 | 3.02 | 5734 | 4109 | 2.63 |
| Dunlin | 5731 | 4617 | 1.33 | 3140 | 2558 | 3.9 | 14091 | 11988 | 7.68 |
| Black-tailed Godwit | 145 | 49 | 0.01 | 845 | 614 | 0.5 | 902 | 646 | 0.4 |
| Bar-tailed Godwit | 1463 | 1143 | 0.33 | 9 | 5 | 0.01 | 215 | 122 | 0.08 |
| Curlew | 2538 | 1745 | 0.28 | 753 | 624 | 0.51 | 866 | 741 | 0.46 |
| Redshank | 2899 | 2602 | 0.41 | 1375 | 1238 | 1.01 | 1811 | 1630 | 1 |
| Turnstone | 588 | 528 | 0.15 | 150 | 125 | 0.19 | 434 | 381 | 0.24 |

| | Strangford Lough | | | Swansea Bay | | | Tyne Estuary | | |
|---|---|---|---|---|---|---|---|---|---|
| | ***Peak*** | *Mean* | *Mean* | ***Peak*** | *Mean* | *Mean* | ***Peak*** | *Mean* | *Mean* |
| **Species** | ***No.*** | *No.* | *Dns.* | ***No.*** | *No.* | *Dns.* | ***No.*** | *No.* | *Dns.* |
| Brent Goose | 4903 | 2681 | 0.32 | 0 | 0 | 0 | 0 | 0 | 0 |
| Shelduck | 6084 | 3762 | 0.45 | 0 | 0 | 0 | 17 | 9 | 0.05 |
| Wigeon | 627 | 404 | 0.05 | 0 | 0 | 0 | 0 | 0 | 0 |
| Teal | 905 | 724 | 0.09 | 0 | 0 | 0 | 23 | 10 | 0.06 |
| Mallard | 454 | 327 | 0.04 | 0 | 0 | 0 | 14 | 10 | 0.06 |
| Pintail | 591 | 381 | 0.05 | 0 | 0 | 0 | 0 | 0 | 0 |
| Oystercatcher | 6864 | 5377 | 1.52 | 646 | 646 | 1.57 | 115 | 63 | 1.8 |
| Ringed Plover | 227 | 134 | 0.04 | 37 | 37 | 0.09 | 10 | 7 | 0.2 |
| Golden Plover | 8817 | 5668 | 1.6 | 0 | 0 | 0 | 0 | 0 | 0 |
| Grey Plover | 47 | 34 | 0.01 | 3 | 3 | 0.01 | 0 | 0 | 0 |
| Lapwing | 3906 | 2619 | 0.74 | 0 | 0 | 0 | 66 | 19 | 0.55 |
| Knot | 7360 | 3687 | 1.04 | 0 | 0 | 0 | 0 | 0 | 0 |
| Dunlin | 4115 | 2378 | 0.67 | 283 | 283 | 0.69 | 66 | 28 | 0.8 |
| Black-tailed Godwit | 311 | 209 | 0.06 | 0 | 0 | 0 | 0 | 0 | 0 |
| Bar-tailed Godwit | 1069 | 705 | 0.2 | 0 | 0 | 0 | 0 | 0 | 0 |
| Curlew | 1221 | 1078 | 0.3 | 8 | 8 | 0.02 | 8 | 7 | 0.2 |
| Redshank | 2413 | 2099 | 0.59 | 7 | 7 | 0.02 | 334 | 203 | 5.8 |
| Turnstone | 202 | 158 | 0.04 | 0 | 0 | 0 | 37 | 24 | 0.69 |

## 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 2007/08*

*Area covered 456 ha; Mean total birds 10,818; Mean bird density 23.7 birds per ha.*

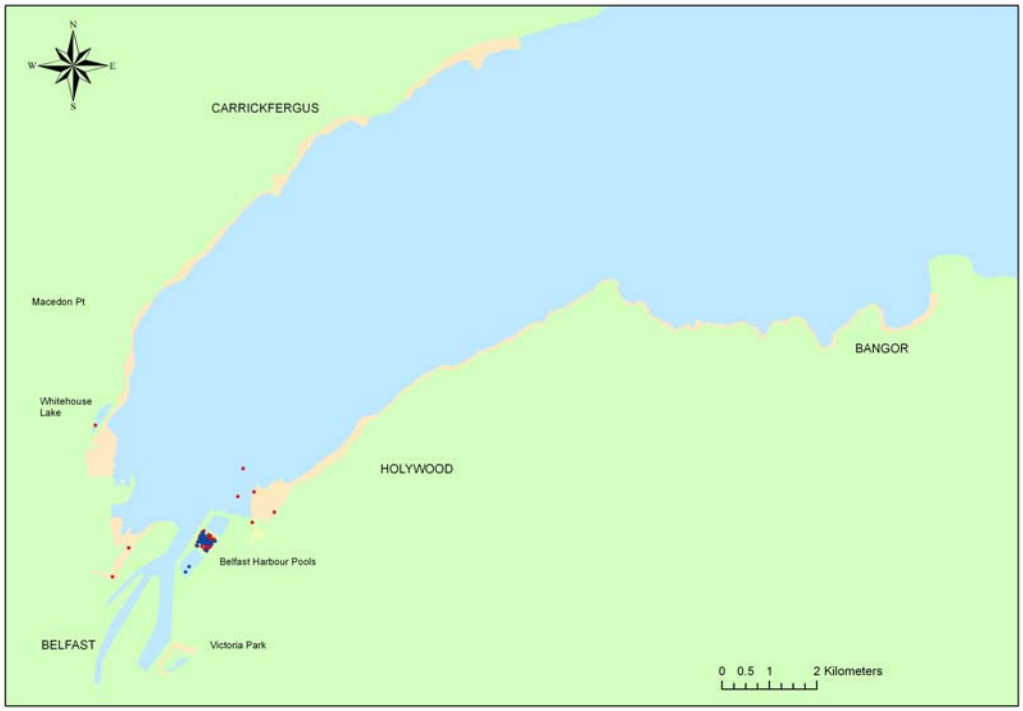
The Belfast Lough area supports significant populations of a range of birds, some of which have shown an increase in recent years. Between the winters of 1997/98 and 2007/08, low tide counts (of the same area) of Shelduck increased from 164 to 224; Wigeon almost doubled from 107 to 202; Teal up from 285 to 560; Mallard from 272 to 363; Ringed Plover from 46 to 142; and Black-tailed Godwit from 162 to 210.

However, several key species present in large numbers have declined drastically over the same time period. They include: Oystercatcher down from 6,014 to 3,102; Lapwing down from 1,167 to 750; Knot down from 216 to just 9 birds; Dunlin down from 1,469 to 265; Curlew halved from 861 to 402 and Redshank from 2,083 to just 783; all serious declines. In the cases of Knot and Dunlin at least, it is possible that the reductions may be a response to climate change in that they are choosing to winter on British east coast estuaries rather than venturing further west to Irish estuaries. Amongst the more regular birds recorded was a vagrant Ring-billed Gull.

### *Comparative bird distribution*

In both winters, Teal have shown aggregated distributions, which in 1997/98 involved birds being concentrated almost exclusively at just one location, Belfast Harbour pools. However in 2007/08 they were more widespread, using four locations: Belfast Harbour Pools, Whitehouse Lake, Holywood and Belfast Docks area, along with a small cluster at Victoria Park. Hence, it appears that the increase in numbers of this species may have required it to distribute more widely around the site, although other factors (such as changes disturbance) could also be at play. Numbers counted on core counts here have also increased in recent years, with the Belfast Harbour Pools being the favoured location.

In contrast, Bar-tailed Godwit has undergone a big decline over the same period, although numbers have fluctuated, with the site being issued with a High Alert (see http://www.bto.org/webs/alerts/) over the ten-year period (Maclean & Austin 2008). In a similar fashion to Teal, Bar-tailed Godwit displayed a similar distribution between the two winter periods, although slightly less aggregated. In 1997/98, godwits were mostly clustered around Whitehouse Lake and the south end of Holywood with few birds elsewhere. However in 2007/08 the mean count had decreased from 56 to 29 birds. Although numbers had declined, they were more dispersed, perhaps giving a false impression of an increase on the map (Figure 59), and birds were now to be found feeding all along the western shore from Belfast to Carrickfergus.



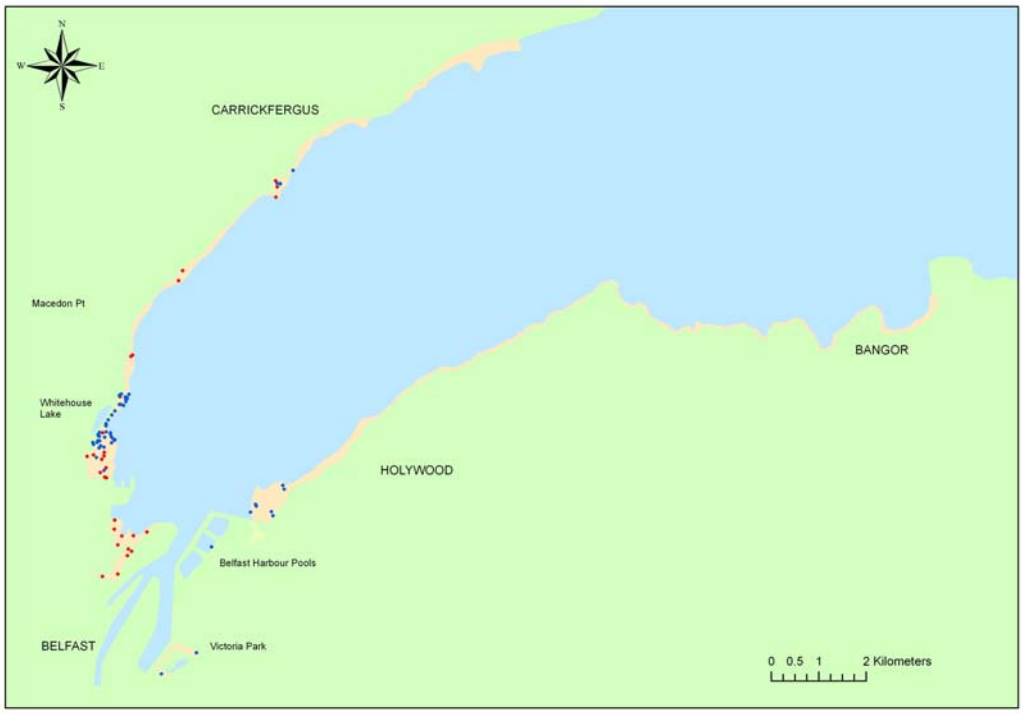




*Figure 59.* Low Tide distribution of Teal (above: 1 dot = 10 birds) and Bar-tailed Godwit (below) for the winters of 1997/98 (blue) and 2007/08 (red) at Belfast Lough. Yellow = intertidal; pale green = non-tidal; blue = subtidal.

## 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 (Broads Authority 2007). 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 2007/08*

*Area covered 402 ha; Mean total birds 28,043; Mean bird density 69.8 birds per ha.*

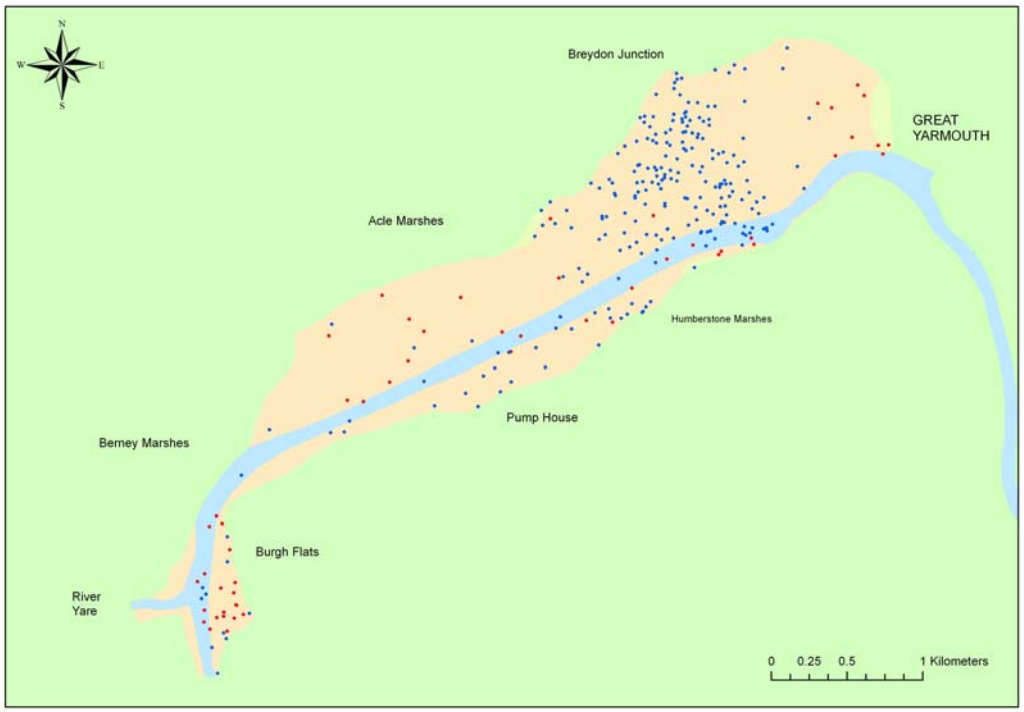
Breydon Water once again supported the highest overall mean density of all sites included in the 2007/08 Low Tide Counts. However, the mean density of 69.8 birds per ha was much lower than for 2006/07 when the mean site density was 93.5 birds per ha, largely due to a reduction in Golden Plover and Wigeon numbers. Lapwing were present in the highest numbers (peak count of 17,335 birds) and densities (18 birds per ha on average across the winter) whilst Golden Plover numbers peaked at 14,000 birds. Again, the relatively small area for feeding supported high densities of many species including Golden Plover (15.78 birds per ha), Wigeon (12.94 birds per ha), Redshank (2.91 birds per ha) and Black-tailed Godwit (2.13 birds per ha).

### *Comparative bird distribution*

Since 1998/99, WeBS has received regular counts of Breydon Water at low tide. The winters of 2007/08 and 1998/99 are compared for the distributions of two species, Shelduck and Dunlin.

Shelduck have been in long-term decline for many years, possibly due to the accretion of mud on the northeast section of the estuary (Rowe pers. comm.) Between the two winters, the mean count has declined from 234 to 53 birds. In 1998/99 there was a broad scatter of birds but with the bulk of records concentrated on the flats between Breydon Junction and Stone Corner, and a smaller congregation at Burgh Flats. By 2007/08 there was still a cluster of birds at Burgh Flats, although the mass of birds on the main Breydon Junction section had disappeared.

Conversely, Dunlin has undergone an increase with the mean count going up from 3,779 to 4,597 birds. Figure 60 shows the distribution of Dunlin between the two winters, with the bulk of the wintering population located in the eastern-most half of the estuary between Breydon Junction and Great Yarmouth. The increase in Dunlin over this 10-year period is believed to be related to climate change with birds now preferring to spend the winter on the now-milder east coast, rather than heading to the west coast (e.g. the Severn). Numbers of Dunlin have been declining on the west coast, switching to the east coast where winters are less severe than in former years. This may be the factor that is driving the observed increases in Golden Plover, Lapwing and Black-tailed Godwit too.



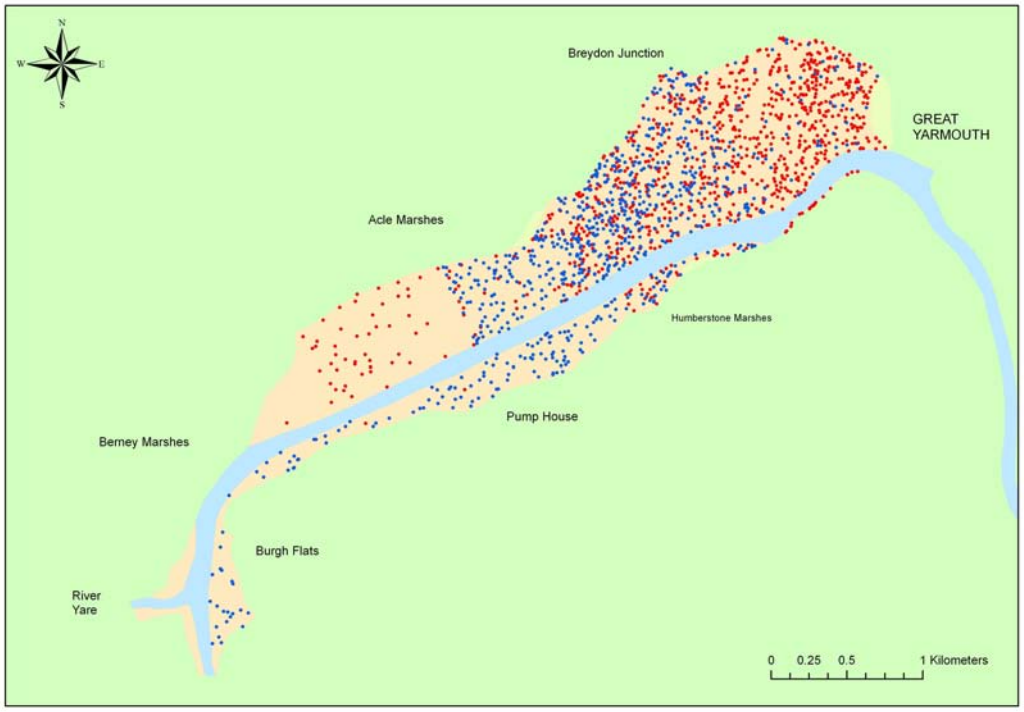




*Figure 60.* Low Tide distribution of Shelduck (above) and Dunlin (below: 1 dot = 5 birds) for the winters of 1998/1999 (blue) and 2007/08 (red) at Breydon Water. Yellow = intertidal; pale green = non-tidal; blue = subtidal.

## CLWYD ESTUARY

### *Site description*

The Clwyd is a small estuary that lies on the north Wales coast between Kinmel Bay and Rhyl. The river channel is narrow and entirely canalised, with a restricted mouth opening onto a wide sandy beach at Rhyl. The inner estuary is mostly muddy with a limited saltmarsh fringe. The adjacent marine lake at Rhyl is also a suitable feeding ground when partially drained in the winter. Most disturbance at the site comes from human recreational activities, most intensively during the summer months, but industrial activities are limited. The estuary does not have any statutory designation, not overlapping with any SPAs or SSSIs.

### *General bird distribution 2007/08*

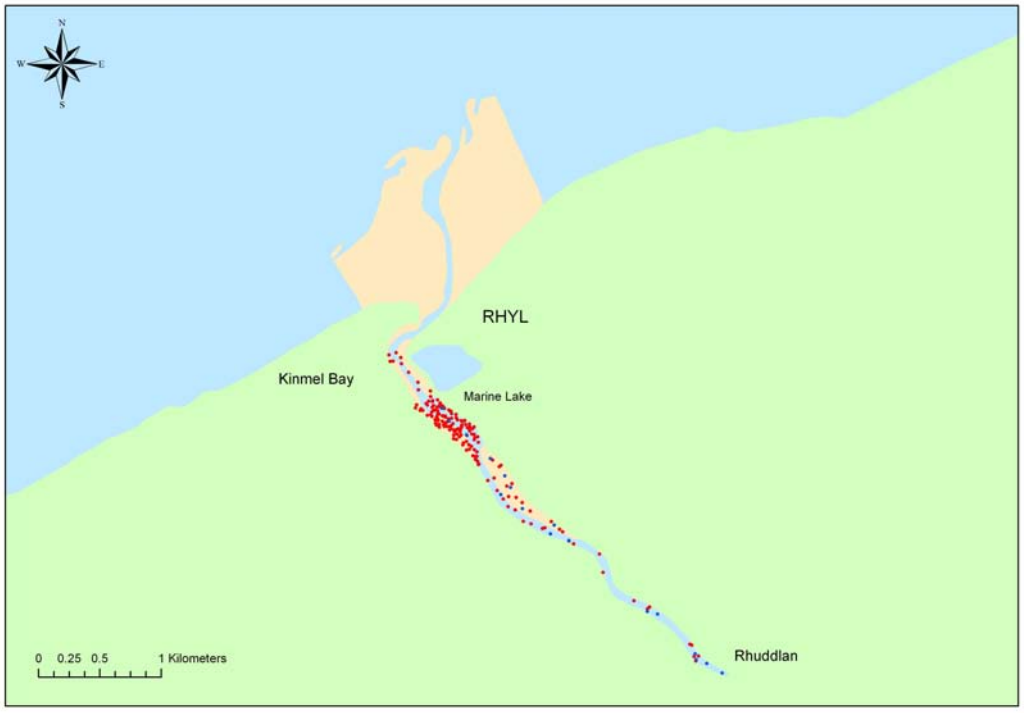
*Area covered 187 ha; Mean total birds 1,661; Mean bird density 8.9 birds per ha.*

Counts were received from three months of the winter, and unsurprisingly, this small estuary produced the lowest diversity of waterbirds of the sites covered in 2007/08, with just 20 species recorded. This total included Common Scoter, a seldom-recorded species on low tide counts, with a count of 75 birds offshore in December representing a very small proportion of the total numbers further offshore in Liverpool Bay. Little Egrets were absent when this site was last covered in 1992/93 at low tide when they were still a rare bird in much of the UK but three were present in January, typically along the narrow central creek. Lapwings were present in good numbers with a peak of over 800 birds, largely around the marine lake and adjacent creek. Curlew favoured the intertidal areas along the channel rather than the more exposed areas along the beach, possibly due to increased disturbance here or increased food availability in the muddier sediments.

### *Comparative bird distribution*

Wigeon are present on the Clwyd estuary along the riverine channel solely south of Rhyl, and not on the sands or coastal area along the Rhyl seafront. The mean counts of Wigeon increased on the Clwyd estuary from 16 to 164 between the winters 1992/93 and 2007/08, an increase by a factor of ten in this period. Although this is a big increase, these are low numbers on a national scale. The main concentration of Wigeon was just south of the Marine Lake with a mean density of 11.5 birds per hectare recorded on the narrow intertidal area. Unlike Wigeon, Oystercatchers frequented all the intertidal zones, both within the Clwyd river channel and the coastal flats north of Rhyl. Mean counts increased from 62 to 227 birds between the winters 1992/93 and 2007/08, a more than three-fold increase in this period. This was reflected in the density of birds on the site, which increased from 0.33 birds per hectare in 1992/93 to 1.21 birds per hectare in 2007/08. However, the intertidal area north of Rhyl counted is just a small area compared with the extensive mudflats that extend both east and west from the site, which must be borne in mind with this species.

*Wigeons (Dawn Balmer)*



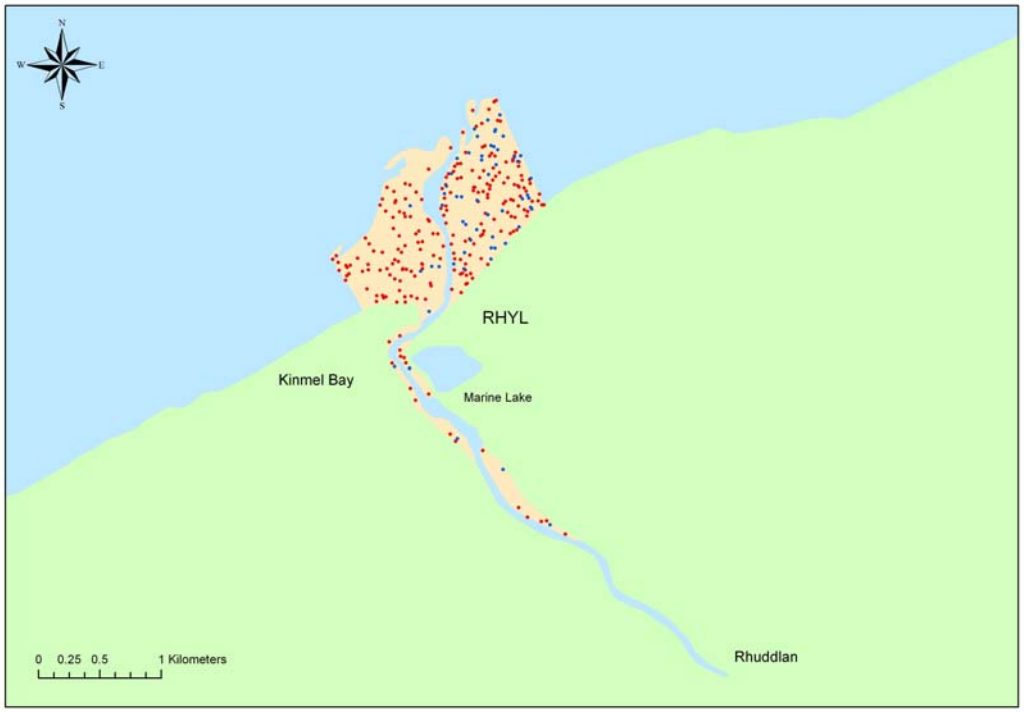




*Figure 61.* Low Tide distribution of Wigeon (above) and Oystercatcher (below) for the winters of 1992/93 (blue) and 2006/07 (red). Yellow = intertidal; pale green = non-tidal; blue = subtidal.

## COLNE ESTUARY

### *Site description*

The Colne Estuary is located on the coast of Essex in eastern England. It is a comparatively short and branching estuary, with five tidal arms that flow into the main channel of the River Colne. The estuary has a narrow intertidal zone predominantly composed of flats of fine silt with mud-flat communities typical of southeastern English estuaries. There is a wide variety of coastal habitats which include mud-flat, saltmarsh, grazing marsh, sand and shingle spits, disused gravel pits and reedbeds which provide feeding and roosting opportunities for the large numbers of waterbirds that use the site. The Colne Estuary is an integral component of the phased Mid-Essex Coast SPA (Stroud *et al*. 2001).

Potential threats to this SPA and surrounding areas are posed by disturbance caused by air activities such as paragliding, the development of a wharf, sea defences, homes and shops, car parks, marinas, holiday parks and an airport, and saltmarsh loss caused by sea-level rise (BirdLife International 2003). Specific potential threats to this site include erosion of saltmarsh, sediment-flats and eel-grass, changes in water quality, deliberate goose scaring on adjacent farmland and recreational disturbance.

### *General bird distribution 2007/08*

*Area covered 2,010 ha; Mean total birds 25,510; Mean bird density 12.7 birds per ha.*

The Colne Estuary has only previously been covered once for Low Tide Counts in 1994/95 when only the areas north of Mersea Island and Brightlingsea were counted. In 2007/08, Colne Point and the southeast side of Mersea Island were covered in addition. Counts were received from three months of the winter, with 45 species recorded, including both Slavonian and Red-necked Grebes. Dunlin were present in the largest numbers with a mean site count of over 7,000 birds whilst Dark-bellied Brent Goose, Shelduck, Wigeon, Golden Plover, Lapwing, Knot and Redshank also had four figure mean site counts. Great Crested Grebe numbers peaked at 411 in January, although counts of this species are dependent on weather condition and sea state, as most occur in offshore waters in this area.

### *Bird distribution*

As only a small proportion of the total site was covered in 1994/95, Figure 62 just displays distributions from 2007/08.

Wigeon tend to favour the creeks off the main channel, and in some areas favoured the saltmarshes where they may be undercounted amongst the channels. The highest numbers were found along the Pyefleet Channel on the north side of Mersea Island where the peak count was 838 birds. The small area of non-tidal grassland on the east side of Mersea Island attracted the highest densities of the species with a mean of 22.87 birds per hectare recorded.

Since 1994/95, Avocet numbers on the Colne Estuary have increased dramatically (Maclean and Austin 2008). Although not directly comparable due to the different areas being covered the peak count in 1994/95 was 264 whilst in 2007/08, the peak count was 586. The main concentration of Avocets was of over 340 birds, mostly roosting, at the north end of the main channel where the mean density of birds was 5.21 birds per hectare. Another roost of up to 94 birds was present in the Brightlingsea Creek and birds were also present along the South Geedon Creek. Whilst many wading birds feed most actively at low tide, many Avocets feed on the edge of the rising tide of prey such as shrimps and so can often be found roosting over the low tide period.