

# Results of the third Non-Estuarine Waterbird Survey, including population estimates for key waterbird species

Austin, G., Frost, T., Mellan, H. & Balmer, D.





**BTO Research Report No. 697**

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Population Estimates for  
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**Authors**

**Graham Austin, Teresa Frost, Heidi Mellan, Dawn Balmer**

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## EXECUTIVE SUMMARY

- During December, January and February of the winter of 2015/16 the BTO organised the third Non-estuarine Waterbird Survey (NEWS III), the fourth in a series of coordinated winter surveys of the non-estuarine coast of the UK, following the Winter Shorebird Count (WSC) in 1984/85 (Moser 1987), NEWS I in 1997/98 (Rehfisch *et al.* 2003) and NEWS II in 2006/07 (Austin *et al.* 2008).
- The basic field-work methodology has remained unchanged across all four surveys. The data recorded and the manner in which they have been collated has evolved to allow more robust estimates of waterbird numbers to be made. These changes have implications when it comes to making comparisons between the surveys. A brief overview of the four surveys is therefore provided.
- This document reports population estimates of key bird species on the non-estuarine coast of the UK and its constituent countries, Great Britain and crown dependencies during the winter of 2015/16. These new population estimates for waders, and where appropriate similar estimates for wildfowl, will feed directly into revised population estimates for wintering waterbirds that are in preparation.
- NEWS III achieved 53% coverage of the non-estuarine coast of the UK, an improvement on 44% for NEWS II.
- Counters were also asked to score the extent of deposits of beach-cast seaweed, enabling estimates of relative amounts of this resource to be produced. Areas with the highest amounts of beach-cast seaweed included Ards in Northern Ireland, Anglesey in Wales, and Shetland, Orkney and West Scotland.
- A total of 217 bird species/sub-species/races and 18 mammal species were recorded during the survey.
- A bootstrap approach was used to derive regional (county) estimates of the populations of 43 key coastal waterbird species to be found on the non-estuarine coast during the winter of 2015/16 and during the three previous surveys. These in turn were used to derive separate estimates for the UK and each of its four constituent countries, Great Britain and crown dependencies.
- Population estimates from NEWS III for the four non-estuarine specialists, Ringed Plover, Sanderling, Purple Sandpiper and Turnstone were 16,203, 12,903, 10,184 and 25,988 individuals respectively. Compared to NEWS II estimates, the population point estimates for Ringed Plover, Purple Sandpiper and Turnstone decreased, although only in the case of Turnstone did the 95% confidence intervals for the two surveys not overlap. The point estimate for Sanderling increased from NEWS II.
- Further analyses of these data are planned targeting publication in peer-reviewed journals of investigations of population change and the importance of beach-cast seaweed to wader species.



## 1. INTRODUCTION

During December 2015 and January and February 2016 the BTO ran the fourth in a series of intermittent surveys of the non-estuarine coast of the UK (NEWS III), following a tradition that began during the winter 1984/85 under the guise of the Winter Shorebird Count (WSC: Moser 1987) and continued during the winter of 1997/98 (NEWS I: Rehfisch *et al.* 2003) and 2006/07 (NEWS II: Austin *et al.* 2008). As with NEWS II, NEWS III was a joint survey of UK and the Republic of Ireland in conjunction with the Irish Wetland Bird Survey; only results for the UK are presented in this report.

Results from NEWS II for 2006/07 showed that some species, such as Sanderling *Calidris alba*, Purple Sandpiper *Calidris maritima*, Bar-tailed Godwit *Limosa lapponica* and Turnstone *Arenaria interpres*, had declined on the UK's non-estuarine coast since the first survey in 1984/85, contributing to overall UK population declines. It is vital that we monitor these and other species on this habitat as many occur in internationally important numbers and this habitat may support significant proportions of some species' populations. Despite associated Special Protection Area (SPA) and Site of Special Scientific Interest (SSSI) designation for several sites, the non-estuarine coast is inadequately monitored by the primary scheme for monitoring the UK's wintering waterbirds, the Wetland Bird Survey (WeBS).

A significant factor in the abundance of some wader species on the open coast is likely to be the amount of beach-cast seaweed deposited by winter storms on the strandline, which can support high numbers of macro-invertebrates as it starts to decompose. There is, however, uncertainty over the extent to which bird populations on the coast are actually reliant on beach-cast seaweed, particularly in the UK where very little research has been carried out. For the first time, during NEWS III, volunteers were also asked to score the extent of seaweed washed up on shore as they recorded the number of birds using coastal sites.

Furthermore, changes in distribution of waders within the UK have been found to be associated with changes in weather (Rehfisch *et al.* 2004, Austin & Rehfisch 2005), and declines recorded in the UK could be explained by increases in some northern European countries (Maclean *et al.* 2008). It has been demonstrated at the flyway scale that distributions of waders and other waterbirds are responding strongly to medium-term trends in climate (Maclean *et al.* 2008, Lehtikoinen *et al.* 2013). Information collected through NEWS III is therefore applicable to a host of research questions relating to waterbird use of the non-estuarine coast.

NEWS III had the following objectives:

- To contribute to revised non-estuarine waterbird population estimates for the UK and its constituent countries, Great Britain and crown dependencies, and associated 1% thresholds, which are available for future reporting for Article 12 of the EU Birds Directive.
- To contribute to revised all-Ireland non-estuarine waterbird population estimates, incorporating results for Northern Ireland with results from the Republic of Ireland.
- To contribute to the production of northwest Europe and East Atlantic Flyway population estimates.
- To contribute to improved data on seaduck numbers and distribution, as well as potentially other non-estuarine bird groups, mammals and habitat features.
- To provide data for incorporation into the Scottish wintering waterbird indicator and the Marine Strategic Framework Directive (MSFD) non-breeding waterbird indicator.

- To contribute to Common Standards Monitoring of SPAs and SSSIs in each of the four countries of the UK.
- To contribute to a revised assessment of the status of species on non-estuarine SPAs and SSSIs in each of the four countries of the UK and enable comparison with the non-estuarine coast in each region as a whole.
- To collect data on strandline deposits of beach-cast seaweed and their associated importance for birds (and other biodiversity). This will represent a baseline inventory of the resource, with potential application to a host of related research questions.
- To provide data for use in a range of research questions relating to waterbirds of the non-estuarine coast; including exploring patterns of distribution in response to climate change and other environmental change.

This document reports population estimates for waterbirds and seabirds on the non-estuarine coast of the UK during the winter of 2015/16. A revised methodology is used compared to reports on earlier surveys. This report contains results using the revised methodology for the earlier surveys for comparison with the most recent survey. It also summarises information on the amount of beach-cast seaweed recorded on NEWS survey visits, a likely key factor in determining the abundance of some wader species. The results update our current knowledge of numbers of waterbirds, in particular waders, on the UK's coast, and will feed in to updated winter waterbird population estimates.

## 2. METHODS

While the basic field-work methodology has remained unchanged across all four surveys, the data recorded and the manner in which they have been collated have evolved to allow more robust estimates of waterbird numbers to be made. However, these changes have implications when it comes to making comparisons between the four surveys. A brief overview of each survey is therefore pertinent.

### 2.1 Winter Shorebird Count (WSC)

The WSC ostensibly covered all open coast habitat where the intertidal habitat was considered suitable for waders. Organisationally, the UK coastline was divided into 41 'administrative regions' (essentially based on the accepted county boundaries at that time) and each region assigned to a regional organiser. These regions were further sub-divided into a variable number of 'administrative areas' (essentially dictated by the representation of the coastline that could be copied from 1:50,000 scale maps on to an A4 sheet of paper). Within each area, the coastline was further divided into Count Stretches, defined by the surveyors and generally demarcated by changes in habitat (e.g. boundaries between sand and rock) or physical features (e.g. creeks, road-heads). The Count Stretches within each area were numbered sequentially using a coding system based on these three levels of organisation (Region|Area|CountStretch). Extensive stretches of coastline dominated by high cliffs were excluded on practical grounds and because such coastlines were deemed to offer little or no suitable habitat for waders. This included extensive stretches of coastline in Shetland and Hoy, Orkney. The east coast of the Western Isles was also excluded as it was considered to offer little in the way of suitable habitat. Thus, approximately 95% of the total UK open coast was covered. In addition to the UK, coverage was obtained for Jersey in the Channel Islands.

The WSC targeted the intertidal habitat and counts were requested for all waders and Eider *Somateria mollissima*. Counts were often received for other species especially Grey Heron *Ardea cinerea* and sea-ducks but there is no obvious means of quantifying the level of coverage for these other species from the visit data. It is probable that some counts included birds immediately inland from the intertidal habitat but again there is no means by which this can be quantified from the data. Such counts would not affect estimates of numbers of all species equally and, for example, counts of larger more visible species such as Oystercatcher *Haematopus ostralegus* and Curlew *Numenius arquata* that make extensive use of habitats such as fields adjacent to the shore could be disproportionately affected.

Although included in the original estimates of wader numbers from the WSC, data from some of the count stretches covered by the WSC were subsequently excluded from comparative analyses (Rehfishch *et al.* 2003) because they are considered to be estuarine in nature (based on Buck 1993 to 1997 series) and are preferentially reported as part of the WeBS Core Count Scheme.

### 2.2 Non-estuarine Waterbird Survey 1997/98 (NEWS I)

The boundaries of the count stretches defined for the WSC were again used for NEWS 1997/98. However, an effort was made to reduce the length of some of the longer count stretches from the WSC by subdividing those in excess of an arbitrarily chosen 5-km with the aim of making count stretches more standardised with a target length of about 2-km and no more than 4-km. Although, this left many count stretches still in excess of the 2-km target it did address the worst cases (up to 80-km). Unfortunately, some counters chose to combine some adjacent count stretches thus, in part, countering this objective. NEWS again targeted complete coverage of the UK's non-estuarine coast. However, whilst as geographically extensive as the WSC, fewer count stretches were visited and

NEWS achieved 38% coverage of the UK non-estuarine coast with large extents of western Scotland unvisited. Additionally counts were received from Guernsey in the Channel Islands.

There was evidence that this reduced coverage introduced some bias into the data due to counters targeting count stretches with high numbers of waterbirds; in such regions the count stretches covered by NEWS held higher numbers of birds during the WSC than those not covered by NEWS. Consequently, subsequent analyses had to address the fact that, in some areas, those count stretches visited were unrepresentative of the non-estuarine coast overall for those areas (Rehfishch *et al.* 2003).

NEWS targeted all species of waterbird along the non-estuarine coast and also recorded separate counts for intertidal habitat, inland habitat (viewable from the high-tide mark) and sea (easily viewable from the high-tide mark with binoculars).

### **2.3 Non-estuarine Waterbird Survey 2006/07 (NEWS II)**

Assuming *a priori* that, like NEWS, NEWS II would not achieve complete coverage of the non-estuarine coast, and with the aim of avoiding the bias introduced by counters selecting stretches they expected to hold high waterbird numbers detected for NEWS, a random sampling element was introduced for NEWS II. Thus, count stretches within each organisational area were ordered randomly and organisers asked to assign counters to count stretches following that order, only omitting count stretches on the grounds of practical complications such as difficulty of access or remoteness from available counters but explicitly not on prior expectations of waterbird numbers. These randomly assigned count stretches were selected from those used for WSC or, where those had been sub-divided into smaller count units for NEWS 1997/98, then the latter. Organisers were asked to aim to arrange coverage of at least the first 10 randomly chosen count stretches in each administrative area or all stretches where there were fewer than 10, and repeat this for all administrative regions under their jurisdiction. This ensured a random survey design at the local level at the same time as avoiding large gaps in geographic coverage. Field methodology was described in Austin and Rehfishch (2007). The 44% coverage achieved for NEWS II was higher than that achieved for NEWS, but no coverage was obtained for Somerset, the Isles of Scilly, Coll and Tiree or the Channel Islands.

As part of the preparation for NEWS II, the electronic Count Stretch Inventory implemented for NEWS was updated on ArcGIS (ESRI) using the Watsonian Vice County boundary low-tide mark data obtained from the National Biodiversity Network. Previously, the boundaries had been digitised at a much poorer resolution and using the high tide mark (the non-estuarine waterbird surveys focus on low-tide counts). This enabled us to supply counters with forms customised to indicate count stretches against the 1:25,000 Ordnance Survey backdrop (1:50,000 OSNI for Northern Ireland) and comments and annotations received from counters enabled us to correct historic errors that originated from the WSC maps, recorded grid references and past survey count forms.

The NEWS II count methodology was substantially based on that used during the WSC and NEWS (Moser 1987, Rehfishch *et al.* 2003). However, comments and data received during NEWS made it apparent that not all habitats (intertidal, at sea, landward of intertidal zone) had received equal attention, although the scale of the issue was not quantifiable. Consequently for NEWS II, counters were asked to explicitly state whether or not they surveyed each of the three habitats. This additional information allowed for a more rigorous approach to be taken when estimating waterbird numbers across all three habitats but has also made apparent the dangers of using direct comparisons of waterbird numbers between the surveys as a means of quantifying change over time.

In collaboration with the Mammal Society, an insert recording form was included with the surveyors recording pack to allow recording mammals including sea-mammals at sea and species in general associated with the intertidal habitat.

#### **2.4 Non-estuarine Waterbird Survey 2015/16 (NEWS III)**

NEWS III used a similar random sampling design to NEWS II, targeting as priority but not restricting coverage to the same stretches that were covered by NEWS II in 2006/07 (Austin *et al.* 2008). Each NEWS sector was approximately 2 km in length. As in NEWS II in 2006/07, the aim was to achieve overall coverage equating to at least 50% of the non-estuarine coast in the UK and for organisers to assign priority stretches first, which were the same randomly selected count stretches designated in NEWS II, to avoid geographic gaps and bias from counter preferential selection of more productive areas of coast.

NEWS III aimed for full coverage of all non-estuarine SPAs and SSSIs that are designated for their waterbird features that are otherwise not counted through WeBS. To ensure sufficient geographic coverage for population estimates, we used professional fieldworkers in Scotland, encouraged expeditionary teams of volunteers and made use of RSPB staff on sabbatical leave (West Cornwall and Coll). The Royal Air Force Ornithological Society spent two weeks gap-filling in north-west Scotland in mid-February.

NEWS III was carried out in December 2015 and January 2016, with an extension made for fieldwork to continue to the end of February 2016 due to poor weather during the main count period. The strong winds and heavy rain, particularly in the west, meant that some volunteers found it difficult to fit in fieldwork in suitable conditions during December and January. Counters were able to submit multiple visits to sector.

NEWS III was run as an online survey, using additional functionality within the existing WeBS Online data submission system. Considerable database and development work was required to produce the online application, though this can readily be adapted for future NEWS surveys. Some results were also reported on paper forms, and these data subsequently input to the database. Data recording was expanded for NEWS III to collect additional information on habitat, specifically strandline deposits of beach-cast seaweed, and their use as a foraging resource. We also facilitated the collection of counts for mammals and raptors, included principally to enhance the experience for and meet the expectations of the surveyors who have in the past frequently recorded these groups on the paper forms on their own initiative.

## 2.5 Analysis

### 2.5.1 Waterbird population estimates

The analytical approach used to estimate the numbers of waterbirds on the non-estuarine coast during the winter of 2015/16 is essentially similar to that previously used for estimating numbers from data collected by NEWS (Rehfishch *et al.* 2003) and NEWS II (Austin *et al.* 2008). This uses a bootstrap approach to derive estimates at the regional level, summing across the relevant bootstrapped samples to derive country estimates. The difference to the method used previously is that the bootstrap approach is used to estimate populations for the whole of the region, whereas in the previous analysis the counted stretches were treated effectively as a census and only populations on the uncounted stretches were estimated using the bootstrap approach to add to the “census” value.

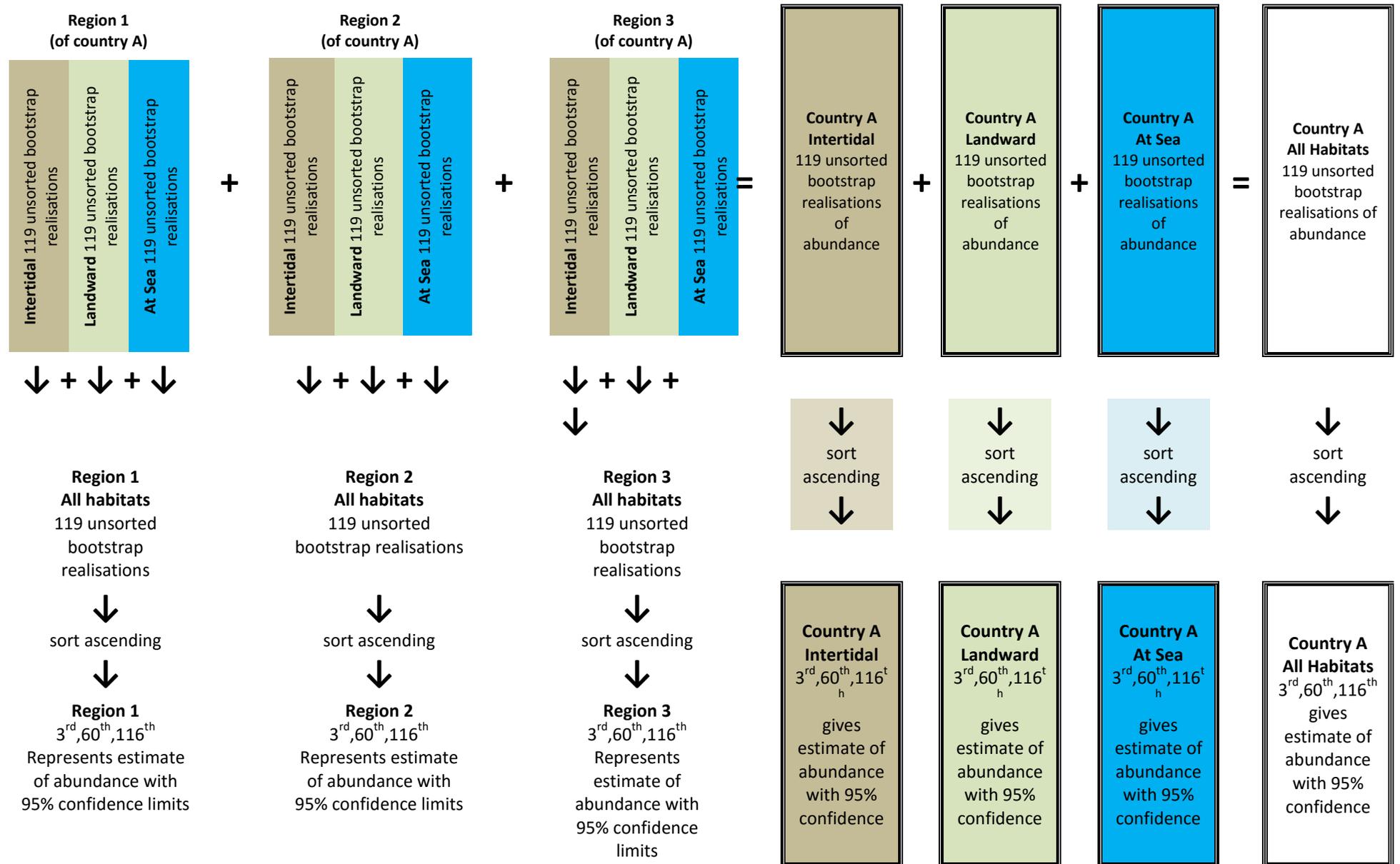
Thus, for each species, for each region and for each habitat (inland, intertidal, sea) 119 bootstrap realisations of the total number of birds counted within that region were obtained from a sample with replacement of stretches drawn from the region in question until that sample equated to the length of non-estuarine coast within that region. In order to produce the best possible estimates of numbers, 119 all-habitat region estimates were obtained by summing the unordered estimates from each of the three habitats. This approach allows for differential proportional coverage at the county level across the three habitats. Where multiple visits to a count stretch had been made, the count made closest to the 17<sup>th</sup> January 2016, International Waterbird Count day, was used.

Equivalent bootstrap repetitions for the constituent countries of the UK, GB and UK estimates were derived by summing across unsorted realisations for the relevant constituent regions. The latter approach was used so that, for example, estimates of numbers on stretches in southern England would not be influenced by counts in northern Scotland and *vice versa* when estimating the numbers across the whole of the UK as would be the case had the sample had itself been drawn from the whole of the UK.

For each geographical extent, the point (median), lower and upper 95% confidence limit estimates for the number of birds were obtained by taking the 60<sup>th</sup>, 3<sup>rd</sup> and 116<sup>th</sup> ascendant ordered bootstrap values respectively (see Figure 2.5.i).

Reporting of waterbird abundance estimate for NEWS and NEWS II retained the original county and Scottish regions that were used for WSC. However, changes in administrative boundaries and the abandonment of the former Scottish regions mean that those boundaries are no longer in general usage. Accordingly regions to be used for reporting NEWS III have been reappraised to take into account current county boundaries and geographic coverage. However, consideration had to be given to the extent of non-estuarine coast and samples obtained, which meant not all current administrative boundaries could be adhered to, particularly in South Wales and Scotland, and it has been necessary to create ‘NEWS geographic reporting regions’ that encompass several counties or island groups. For the purpose of online reporting and to facilitate comparisons between surveys, previous surveys have been reanalysed to reflect the revised NEWS geographic reporting regions.

**Figure 2.5.i** Diagrammatic representation of bootstrap realisations based on a country (A) comprising three regions 1, 2 and 3.



## 2.5.2 Strandline deposits

Appendix 4 contains the description and guidance given to surveyors on how to assess strandline deposits of beach-cast seaweed. Counters were asked what extent of the count stretch (sector) was covered by heavy, medium and light deposits. Considering these dimensions, a score was calculated to summarise the relative amount of beach-cast seaweed available on the sector. Scores were first generated separately for the amounts of heavy, medium and light deposits and these then summed to provide an overall score for the sector (Table 2.5.i). For example, if 80% of the sector was covered with medium deposits of beach-cast seaweed and 20% by light deposits, the overall score would be 317.5 (300+17.5).

**Table 2.5.i** Scoring matrix for strandline deposits of beach-cast seaweed. The total score for a sector is the sum of the scores for heavy, medium and light deposit taken from this table.

Extent of sector	Strandline deposit description	heavy	medium	light
	SCORES	9	4	1
High (>50%)	<b>75</b>	675	300	75
Medium-high (26-50%)	<b>37.5</b>	337.5	150	37.5
Medium-low (11-25%)	<b>17.5</b>	157.5	70	17.5
Low (1-10% of sector)	<b>5</b>	45	20	5
None (<1%)	<b>0</b>	0	0	0

## 2.6 Comparison with Population Estimates Methodology for the Non-estuarine Coast from NEWS II

Given the considerations described above, care must be taken when comparing data between surveys presented in the results below. Ultimately, estimates of population change will be made following a paired count stretch approach as used by Rehfishch *et al.* (2003). This is a more powerful approach than that of direct comparison of estimates of total numbers between surveys, the latter being vulnerable to differences in geographical coverage between surveys or unknown biases in count-stretch selection.

As described in Section 2.5.1, we have undertaken a revision of the allocation of count sectors to use more refined regions, especially in Scotland, Wales and Northern Ireland, and so had a more refined stratification available for analysis and so would expect improved abundance estimates for those region over what would have been reported previously. We also have a greater understanding of the synchrony/asynchrony of survey visits within regions, facilitated by online data capture, than previously. Accordingly, we have adjusted precise details of the analysis so we no longer treat the counted part of the coast within each region as a census to which an extrapolated estimate for the remainder is added, but rather treat the counts as sample repetitions to be extrapolated to the entire coast within that region. Furthermore, the exercise of loading data from past surveys into the on-line database resulted in some 'lost data' being retrieved and there have been minor modifications in the assignment of stretches that are intermediary between estuarine and non-estuarine coast to include those not included in the WeBS Core Count scheme with a view to improving overall national population estimates. Accordingly, it has been desirable to re-analyse data from those previous surveys using the same analysis protocol as for the latest survey and so increase comparability.

### 3. RESULTS

#### 3.1 Coverage

Coverage for the UK was significantly improved on NEWS II, with 53% of the non-estuarine coast covered by length (53% by number of stretches and 79% of priority stretches, compared with 44% of all stretches and 61% of priority stretches for NEWS II). Coverage of 80% or higher was achieved in Somerset, the Isles of Scilly and Coll, none of which had been surveyed during NEWS II. There was also some coverage of Alderney, Guernsey and Herm in the Channel Islands, but there was no coverage on Jersey or Sark. Tiree was not surveyed during the 2015/16 survey period, but an equivalent 2013 survey of NEWS stretches was incorporated into the NEWS III dataset (Mitchell *et al.* 2013). See Figure 3.1.i for an overview and Appendix 1 for detailed coverage figures by country and NEWS region.

#### 3.2 Population Estimates

The most numerous wader species recorded on the non-estuarine coast of the UK during NEWS III was Oystercatcher (total count 44,116; point estimate for the non-estuarine coast 69,905). Oystercatcher is followed by Curlew (24,735; 44,344), Turnstone (14,215; 25,988), Dunlin *Calidris alpina* (13,336; 19,415), Redshank *Tringa totanus* (11,267; 18,513), Golden Plover *Pluvialis apricaria* (10,978; 18,513), Lapwing *Vanellus vanellus* (10,613; 17,490), Ringed Plover *Charadrius hiaticula* (8,240; 16,203), Sanderling (8,903; 12,903), Purple Sandpiper (5,603; 10,184), Bar-tailed Godwit (3,325; 6,217), Knot *Calidris canutus* (2,332; 2,683) and Grey Plover *Pluvialis squatarola* (855; 1,012). Population estimates including 95% confidence intervals for these are given in Table 3.2.i for all coastal habitats combined (i.e. intertidal, seaward and landward) for the non-estuarine coast for the UK, its constituent countries, Great Britain and crown dependencies. A total of 1,807 Snipe *Gallinago gallinago* was recorded and an estimate of 4,848 is provided using the same methodology, but the species is considered to be underestimated due to low detection rates.

Other waterbird and seabird species were also counted during NEWS III and estimates are presented in Table 3.2.i for those with a headcount of 900 or more and excluding Velvet Scoter *Melanitta fusca* (numbers for this species were concentrated too much for the analysis to be meaningful). The two most numerous bird species recorded were gulls: Herring Gull *Larus argentatus*, (total count 107,900; point estimate for the non-estuarine coast 159,782) and Black-headed Gull *Larus ridibundus* (50,572; 64,198). Other non-wader waterbirds and seabirds using the non-estuarine coast in large numbers in mid-winter include Common Gull *Larus canus* (31,871; 54,239), Wigeon *Anas penelope* (22,619; 44,600), Guillemot *Uria aalge* (15,576; 42,481), Shag *Phalacrocorax aristotelis* (13,608; 34,217) and Eider (11,736; 23,946).

#### 3.3 Population Estimates for NEWS II and Earlier Surveys

Table 3.3.i contains revised bootstrap-derived UK non-estuarine coast estimates for key waders from NEWS II using the revised methodology and geographic regions described in Section 2.5.1, compared with those published in Austin *et al.* (2008) and NEWS III. The revised analysis increases the 2006/07 estimates for NEWS II for Oystercatcher, Grey Plover, Lapwing, Dunlin, Bar-tailed Godwit, Curlew and Redshank, with other wader species having estimates that, although changed, have 95% confidence limits overlapping those previously published.

Figures 3.3.i and 3.3.ii plot the all-habitat and intertidal-only key wader estimates using the analysis methodology described in Section 2.5.1 for the wader species from all four surveys. It should be noted that these differ from previously published estimates, and do not, for example, make adjustments for the tendency in NEWS I for better coverage of count stretches with higher numbers of birds (see Section 2.2). Particularly for species that use non-intertidal habitats (Golden Plover, Lapwing and Curlew) the estimate in Figure 3.3.i for the 1984 Winter Shorebird Count is depressed, presumably due to relatively low inclusion of landward habitats, with the intertidal estimates being perhaps more comparable (Figure 3.3.ii).

Population estimates using the revised analysis methodology suggest that several wader species were present on the non-estuarine coast in smaller numbers in 2015/16 compared with 2006/07: Lapwing(-57%), Curlew (-31%), Redshank (-37%) and Turnstone (-32%) estimates were all lower for NEWS III than NEWS II with non-overlapping 95% confidence intervals (Table 3.3.i, Figure 3.3.i). The estimate for Sanderling increased (+79%). Of the remaining key wader species where the 95% confidence intervals for NEWS II and NEWS III overlapped, Bar-tailed Godwit (+53%), Dunlin (+13%) and Knot (+5%) increased and Golden Plover (-49%), Oystercatcher (-23%), Grey Plover (-21%), Ringed Plover (-13%) and Purple Sandpiper (-12%) decreased.

### 3.4 Distributions

Figure 3.4.i indicates the centroids of species' distributions recorded during NEWS III; whilst not adjusted for coverage, or including WeBS data, this allows for some comparison of distribution between species. The centroids were calculated by the weighted mean location, weighted by the abundance recorded on the count stretch (maximum count in cases where multiple visits were made).

Shelduck, Knot, Sanderling and Dunlin are well distributed along the UK coastline, without a strong bias in any direction. Relatively few species have a southern bias; however, of the gulls only Common Gull has a northerly bias, the others occurring in greater numbers in southern Britain. Other species with a more south-easterly distribution include Cormorant *Phalacrocorax carbo*, Red-throated Diver *Gavia stellata*, Great Crested Grebe *Podiceps cristatus* and Dark-bellied Brent Goose *Branta bernicla bernicla*. Of the waders, Snipe, Bar-tailed Godwit and Purple Sandpiper have the most northerly non-estuarine coast distributions and Grey Plover the most southerly; Ringed Plover the most westerly and Grey Plover the most easterly distribution.

UK maps of counts for individual species are given in Appendix 3. Many species, particularly waders, occur relatively equally on both the east and west coasts, such as Curlew, Redshank, Ringed Plover and Turnstone. Mallard *Anas platyrhynchos*, Teal *Anas crecca* and Goldeneye *Bucephala clangula* similarly show little tendency to favour one coast above the other. Bar-tailed Godwit favours Orkney and the Outer Hebrides; Purple Sandpiper also occurs in greatest numbers there, but also occurs frequently along the east coast of Scotland and north-eastern England, resulting in a mean location that is further east than that of Bar-tailed Godwit. The mean location for Fulmar *Fulmarus glacialis* and Gannet *Morus bassanus* was in the far north-east, but inspection of their maps shows clusters of records in other areas such as Cornwall.

Exploratory methods can be used to identify areas with high density or diversity of species. Figure 3.4.ii identifies areas where many waders are present using spatial kernel density smoothing on the combined abundance of the 13 key wader species on each NEWS count stretch. It also identifies coastal stretches with seven or more of those species present. Although limited, as not adjusted for coverage, it highlights the potential importance of areas such as the north Kent coast, north-east England, Orkney, north Wales coast and Outer Ards in Northern Ireland.

### 3.5 NEWS Report Online: Regional Distribution and Estimates

Detailed maps showing the recorded count and coverage for each species are published on the NEWS tab of the Wetland Bird Survey Report Online at <https://www.bto.org/webs-reporting-news>. The count symbol displayed is based on the maximum count in the case of multiple visits (unlike in the calculation of estimates, where the count made closest to the 17<sup>th</sup> January 2016, International Waterbird Count day, was used for each count stretch). The region maps indicate coverage per species, including partial habitat coverage where, for example, the intertidal habitat was covered but seaward and landward habitats were not for each sector, interpreted to how this affects the coverage for individual species. The region table gives the head count and regional estimate for each species present. In addition to data from the latest

survey, data on counts and coverage are also available from WSC, NEWS I and NEWS II to facilitate comparisons between surveys.

### **3.6 Designated Sites**

Some non-estuarine coastal SPAs and SSSIs have non-estuarine waders (Turnstone, Purple Sandpiper, Sanderling, Ringed Plover, Curlew, Bar-tailed Godwit) or Eider as notified interest features. Appendix 2a tabulates counts made during NEWS III at these key designated sites and also gives 2015-16 WeBS counts where these were made. To aid in interpretation, Appendix 2b gives the equivalent counts for WSC, NEWS I and NEWS II and information on coverage of the designated site in each survey (no extrapolation is made to account for incomplete coverage) and Appendix 2c shows the geographic location of the count stretches surveyed during NEWS III compared to the designated site boundary. It should be noted that double counting was possible during NEWS III as, in contrast to WeBS, it was not feasible to locally synchronise counting.

### **3.7 Strandline Deposits**

Figure 3.7.i illustrates estimates of the relative amounts of strandline deposits of beach-cast seaweed. Areas which were reported as having large amounts of strandline deposits included the east of Northern Ireland around the Ards peninsular, Anglesey in Wales, and the Solent, the Yorkshire coast around Flamborough Head, and the north Northumberland coast in England. In Scotland, coastlines reported as having high strandline deposits densities included those of Fife, Orkney, Shetland and much of west Scotland.

### **3.8 Data Collection and Collation**

Participants were encouraged to give feedback on their experience of taking part for consideration in future surveys. Feedback received included the following:

#### Strandline and habitat recording

- There was some confusion over the difference between live seaweed cover and strandline seaweed deposits. Consider using live and dead seaweed to help distinguish.
- Confusion over recording where no deposits present; request for “0-1%” rather than “<1%”.
- Request for woodland to be added as a landward habitat.
- Request for more guidance on profiles, especially regarding cliffs.

#### Instructions and guidance

- Consider having two sets of instructions; one short (one page A4) and one more comprehensive.
- Consider having a more extensive FAQ and more photos to illustrate habitats.
- Clarify where e.g. Fulmar on cliffs should be recorded (i.e. in the intertidal zone).
- Request for more extensive guidance to Regional Organisers, including making it clear what their responsibilities are (i.e. checking data) and what to do if not happy with the count that has been submitted and they want to organise a recount.

#### Online Data Entry

- There is more correspondence received when surveys are online, as it is easier for volunteers to make contact the organiser and ask questions; need to ensure this is properly resourced.
- Request for an option to say ‘no birds’ and skip to the submit button after entering the habitat data.
- Consider using a more map-based procedure to select a count stretch (there are potential cost implications if, for example, OS maps are used).

- Consider ways of ordering the count stretches so they are easier to find for data entry purposes for those surveying multiple count stretches and implement a way to view which sectors have been input.

**Figure 3.1.i** Coverage obtained for NEWS III. Coastal stretches in blue were covered; those in white were not covered.



**Table 3.2.i** The population estimates of the key species of waterbird and seabird on the non-estuarine coast of the UK and its constituent countries, Great Britain and crown dependencies during winter 2015/16. Each population estimate is presented as the median bootstrapped value and its 95% confidence limits. Similar estimates for NEWS regions are given on the NEWS report online. Country coverage statistics are given in Appendix 2. Estimates for species that occur out to sea are for individuals visible from the coast only and strongly influenced by weather conditions. Snipe numbers are likely to underestimated due to low detection rates. Species in **bold** were the key waders reported in previous NEWS.

Species	Northern Ireland	England	Scotland	Wales	Isle of Man	Channel Islands	Great Britain	United Kingdom
Greylag Goose <i>Anser anser</i>	36 (2 - 126)	7 (0 - 35)	13,991 (10,083 - 17,725)	50 (0 - 250)	0 (0 - 0)	8 (0 - 48)	14,021 (10,097 - 17,875)	14,078 (10,110 - 17,900)
Brent Goose (Dark-bellied) <i>Branta bernicla bernicla</i>	0 (0 - 0)	1,967 (990 - 3,820)	0 (0 - 0)	43 (0 - 133)	0 (0 - 0)	136 (20 - 358)	2,011 (1,119 - 3,842)	2,011 (1,119 - 3,842)
Brent Goose (Light-bellied) <i>Branta bernicla hrota</i>	1,066 (471 - 2,317)	16 (0 - 80)	143 (2 - 372)	265 (73 - 548)	0 (0 - 0)	0 (0 - 0)	456 (171 - 764)	1,534 (820 - 2,920)
Shelduck <i>Tadorna tadorna</i>	56 (23 - 98)	413 (61 - 1,194)	1,400 (970 - 2,009)	157 (56 - 337)	193 (70 - 411)	149 (8 - 662)	1,995 (1,272 - 2,846)	2,042 (1,338 - 2,916)
Wigeon <i>Anas penelope</i>	14 (0 - 59)	1,842 (440 - 4,006)	41,643 (34,102 - 49,854)	1,060 (601 - 1,763)	896 (80 - 3,288)	0 (0 - 0)	44,589 (36,705 - 53,200)	44,600 (36,714 - 53,228)
Teal <i>Anas crecca</i>	1,121 (462 - 2,223)	380 (141 - 663)	8,545 (6,576 - 11,415)	128 (22 - 326)	99 (0 - 495)	10 (0 - 130)	9,170 (7,019 - 11,959)	10,329 (7,990 - 13,177)
Mallard <i>Anas platyrhynchos</i>	470 (238 - 732)	932 (523 - 1,489)	13,427 (11,139 - 15,284)	216 (144 - 299)	302 (107 - 749)	107 (12 - 250)	14,663 (12,328 - 16,369)	15,098 (12,762 - 16,809)
Eider <i>Somateria mollissima</i>	446 (261 - 704)	667 (535 - 854)	22,762 (16,528 - 35,805)	19 (2 - 47)	151 (49 - 260)	0 (0 - 0)	23,496 (17,196 - 36,547)	23,946 (17,604 - 37,183)
Long-tailed Duck <i>Clangula hyemalis</i>	1 (0 - 3)	24 (0 - 74)	4,820 (3,333 - 7,066)	0 (0 - 0)	0 (0 - 0)	0 (0 - 0)	4,832 (3,333 - 7,085)	4,834 (3,334 - 7,085)
Common Scoter <i>Melanitta nigra</i>	1 (0 - 8)	678 (395 - 1,039)	2,415 (923 - 4,756)	7,204 (1,876 - 19,670)	0 (0 - 0)	0 (0 - 0)	10,541 (4,499 - 22,107)	10,543 (4,500 - 22,111)
Goldeneye <i>Bucephala clangula</i>	11 (0 - 46)	76 (25 - 142)	2,038 (1,268 - 3,179)	11 (4 - 20)	0 (0 - 0)	0 (0 - 0)	2,129 (1,335 - 3,297)	2,136 (1,336 - 3,309)
Red-breasted Merganser <i>Mergus serrator</i>	54 (17 - 90)	203 (127 - 322)	7,000 (6,085 - 7,837)	177 (96 - 267)	0 (0 - 0)	0 (0 - 0)	7,389 (6,478 - 8,276)	7,424 (6,553 - 8,323)
Red-throated Diver <i>Gavia stellata</i>	63 (35 - 123)	1,696 (495 - 4,915)	789 (608 - 952)	176 (109 - 304)	9 (0 - 60)	0 (0 - 0)	2,698 (1,447 - 5,827)	2,765 (1,504 - 5,908)
Great Northern Diver <i>Gavia immer</i>	75 (41 - 108)	217 (141 - 354)	4,065 (3,388 - 4,805)	54 (30 - 89)	0 (0 - 0)	11 (0 - 28)	4,326 (3,671 - 5,128)	4,398 (3,728 - 5,234)

Table 3.2.i continued

Species	Northern Ireland	England	Scotland	Wales	Isle of Man	Channel Islands	Great Britain	United Kingdom
Great Crested Grebe <i>Podiceps cristatus</i>	1 (0 - 4)	5,498 (639 - 12,489)	16 (3 - 31)	198 (136 - 296)	0 (0 - 0)	14 (0 - 29)	5,751 (898 - 12,696)	5,751 (900 - 12,697)
Fulmar <i>Fulmarus glacialis</i>	848 (238 - 2,021)	4,224 (2,721 - 5,254)	60,550 (42,103 - 85,374)	660 (430 - 932)	52 (0 - 146)	32 (0 - 118)	65,182 (47,396 - 90,038)	66,309 (48,202 - 90,750)
Gannet <i>Morus bassanus</i>	16 (6 - 26)	965 (309 - 2,785)	8,997 (350 - 43,333)	1 (0 - 4)	4 (0 - 21)	14 (0 - 98)	9,983 (1,189 - 44,681)	9,994 (1,200 - 44,698)
Cormorant <i>Phalacrocorax carbo</i>	889 (462 - 1,452)	6,079 (3,725 - 10,433)	7,735 (6,045 - 11,195)	750 (574 - 887)	89 (19 - 167)	104 (46 - 239)	14,960 (10,693 - 20,588)	15,792 (11,863 - 21,288)
Shag <i>Phalacrocorax aristotelis</i>	531 (403 - 696)	3,215 (2,091 - 5,100)	30,043 (24,657 - 38,197)	336 (263 - 413)	122 (36 - 269)	357 (194 - 600)	33,823 (27,896 - 41,791)	34,217 (28,348 - 42,394)
Grey Heron <i>Ardea cinerea</i>	139 (101 - 180)	229 (181 - 275)	4,860 (4,405 - 5,442)	126 (85 - 158)	39 (9 - 97)	76 (22 - 134)	5,218 (4,733 - 5,778)	5,365 (4,834 - 5,932)
Oystercatcher <i>Haematopus ostralegus</i>	3,603 (2,807 - 4,501)	11,639 (9,982 - 13,434)	43,576 (38,468 - 48,924)	10,957 (7,903 - 15,173)	1,300 (269 - 4,081)	2,613 (1,198 - 4,183)	66,439 (60,427 - 72,054)	69,905 (64,204 - 75,545)
Ringed Plover <i>Charadrius hiaticula</i>	539 (290 - 768)	1,362 (846 - 2,128)	13,537 (10,872 - 16,109)	672 (409 - 929)	90 (1 - 288)	126 (0 - 420)	15,647 (12,797 - 18,166)	16,203 (13,245 - 18,541)
Golden Plover <i>Pluvialis apricaria</i>	2,446 (339 - 6,352)	1,529 (346 - 3,402)	12,339 (6,904 - 24,782)	876 (103 - 2,689)	0 (0 - 0)	0 (0 - 0)	15,259 (9,095 - 27,879)	18,513 (11,238 - 30,825)
Grey Plover <i>Pluvialis squatarola</i>	28 (11 - 50)	512 (284 - 886)	293 (170 - 498)	175 (44 - 353)	6 (0 - 45)	80 (0 - 1,098)	987 (644 - 1,458)	1,012 (675 - 1,481)
Lapwing <i>Vanellus vanellus</i>	2,572 (1,093 - 4,066)	1,896 (478 - 5,297)	11,222 (7,862 - 14,365)	1,648 (573 - 2,975)	0 (0 - 0)	14 (0 - 294)	14,779 (11,925 - 19,968)	17,490 (14,148 - 22,178)
Knot <i>Calidris canutus</i>	3 (0 - 9)	7 (2 - 15)	1,565 (508 - 2,893)	1,078 (324 - 2,560)	0 (0 - 0)	0 (0 - 0)	2,674 (1,212 - 4,478)	2,683 (1,213 - 4,484)
Sanderling <i>Calidris alba</i>	460 (30 - 1,635)	3,446 (2,454 - 4,632)	8,266 (5,153 - 11,999)	619 (180 - 1,053)	111 (0 - 629)	14 (0 - 119)	12,410 (9,489 - 16,708)	12,903 (10,248 - 17,268)
Purple Sandpiper <i>Calidris maritima</i>	156 (58 - 279)	613 (284 - 989)	9,407 (7,086 - 13,084)	43 (21 - 69)	6 (0 - 32)	0 (0 - 0)	10,028 (7,661 - 13,815)	10,184 (7,780 - 13,945)
Dunlin <i>Calidris alpina</i>	1,395 (537 - 2,673)	3,457 (1,618 - 7,336)	12,306 (6,290 - 20,927)	1,951 (613 - 3,644)	40 (0 - 320)	52 (0 - 676)	18,048 (10,057 - 25,727)	19,415 (12,737 - 26,634)
Snipe <i>Gallinago gallinago</i>	72 (20 - 125)	32 (1 - 136)	4,718 (3,972 - 5,620)	28 (6 - 70)	3 (0 - 23)	0 (0 - 0)	4,796 (4,039 - 5,674)	4,848 (4,097 - 5,769)
Bar-tailed Godwit <i>Limosa lapponica</i>	26 (6 - 89)	118 (22 - 351)	5,984 (4,241 - 9,329)	11 (2 - 29)	0 (0 - 0)	2 (0 - 19)	6,192 (4,305 - 9,490)	6,217 (4,314 - 9,501)

Table 3.2.i continued

Species	Northern Ireland	England	Scotland	Wales	Isle of Man	Channel Islands	Great Britain	United Kingdom
<b>Curlew</b> <i>Numenius arquata</i>	1,839 (1,317 - 2,412)	3,009 (1,904 - 5,424)	36,578 (31,104 - 42,698)	2,769 (2,122 - 3,659)	1,000 (0 - 3,804)	599 (151 - 1,282)	42,498 (36,476 - 48,961)	44,344 (38,324 - 50,613)
<b>Redshank</b> <i>Tringa totanus</i>	1,392 (1,101 - 1,772)	2,171 (1,687 - 2,691)	13,694 (12,351 - 14,912)	1,185 (715 - 1,787)	99 (8 - 285)	58 (0 - 191)	17,029 (15,688 - 18,301)	18,513 (17,122 - 19,758)
<b>Turnstone</b> <i>Arenaria interpres</i>	1,518 (1,202 - 1,766)	3,513 (2,693 - 4,136)	20,031 (17,544 - 23,242)	1,054 (743 - 1,380)	106 (2 - 472)	138 (29 - 252)	24,553 (22,078 - 27,843)	25,988 (23,552 - 29,324)
Kittiwake <i>Rissa tridactyla</i>	304 (27 - 1,244)	1,697 (458 - 4,726)	676 (386 - 1,055)	982 (111 - 2,836)	8 (0 - 68)	0 (0 - 0)	3,609 (1,681 - 6,504)	4,029 (2,141 - 7,447)
Black-headed Gull <i>Larus ridibundus</i>	4,284 (2,874 - 6,117)	35,260 (28,110 - 44,711)	10,561 (7,928 - 14,511)	14,094 (8,097 - 25,549)	357 (77 - 906)	1,235 (597 - 2,474)	59,918 (49,050 - 74,177)	64,198 (53,243 - 80,086)
Common Gull <i>Larus canus</i>	2,032 (1,046 - 4,201)	7,540 (4,894 - 10,846)	42,236 (34,248 - 51,485)	1,876 (1,145 - 2,530)	23 (0 - 115)	0 (0 - 0)	51,892 (43,681 - 60,061)	54,239 (45,544 - 61,989)
Lesser Black-backed Gull <i>Larus fuscus</i>	27 (2 - 71)	1,322 (896 - 1,732)	392 (232 - 533)	711 (462 - 942)	2 (0 - 14)	86 (6 - 255)	2,437 (1,906 - 2,908)	2,470 (1,944 - 2,928)
Herring Gull <i>Larus argentatus</i>	5,141 (3,625 - 7,919)	59,330 (48,744 - 69,073)	67,813 (61,332 - 75,802)	26,607 (22,436 - 31,564)	3,255 (1,772 - 5,980)	6,633 (3,663 - 10,599)	154,218 (138,144 - 168,407)	159,782 (144,377 - 172,784)
Great Black-backed Gull <i>Larus marinus</i>	621 (327 - 1,169)	6,977 (5,585 - 8,845)	11,694 (10,414 - 13,348)	922 (745 - 1,124)	64 (7 - 144)	1,000 (504 - 2,250)	19,640 (17,823 - 21,769)	20,333 (18,335 - 22,552)
Guillemot <i>Uria aalge</i>	114 (40 - 271)	2,146 (1,105 - 3,841)	35,931 (3,079 - 100,440)	4,472 (83 - 12,194)	0 (0 - 0)	0 (0 - 0)	42,331 (8,077 - 111,615)	42,481 (8,241 - 111,665)
Razorbill <i>Alca torda</i>	273 (135 - 493)	562 (290 - 1,138)	1,328 (664 - 2,374)	148 (35 - 331)	0 (0 - 0)	19 (0 - 56)	2,109 (1,323 - 3,332)	2,396 (1,597 - 3,632)
Black Guillemot <i>Cephus grylle</i>	81 (49 - 131)	6 (0 - 19)	3,452 (2,750 - 3,981)	12 (0 - 25)	0 (0 - 0)	0 (0 - 0)	3,479 (2,751 - 4,015)	3,551 (2,830 - 4,082)

**Table 3.3.i** Population estimates of the key species of wader on the non-estuarine coast of the UK during winter 2006/07 using the revised methodology, 2006/07 estimates using the previous methodology (Austin *et al.* 2008) and 2015/16 estimates using the revised methodology. Each population estimate is supplied as the median bootstrapped value and its 95% confidence limits.

ENGLISH NAME	2006/07 (Austin 2008)	2006/07	2015/16
Oystercatcher	71,104 (68,354 - 74,180)	90,740 (74,751 - 106,510)	69,905 (64,204 - 75,545)
Ringed Plover	15,774 (14,740 - 16,920)	18,575 (14,225 - 27,397)	16,203 (13,245 - 18,541)
Golden Plover	24,355 (22,248 - 29,770)	36,447 (23,057 - 55,367)	18,513 (11,238 - 30,825)
Grey Plover	818 (762 - 889)	1,284 (922 - 1,654)	1,012 (675 - 1,481)
Lapwing	9,890 <sup>1</sup> (8,906 - 11,190)	40,237 (28,054 - 52,352)	17,490 (14,148 - 22,178)
Knot	2,176 (1,846 - 2,692)	2,547 (989 - 4,839)	2,683 (1,213 - 4,484)
Sanderling	6,467 (5,722 - 7,489)	7,205 (5,185 - 9,911)	12,903 (10,248 - 17,268)
Purple Sandpiper	11,329 (10,499 - 12,485)	11,527 (8,794 - 15,022)	10,184 (7,780 - 13,945)
Dunlin	10,012 (8,901 - 11,487)	17,043 (12,715 - 25,715)	19,415 (12,737 - 26,634)
Bar-tailed Godwit	1,596 (1,417 - 1,824)	4,066 (2,161 - 7,435)	6,217 (4,314 - 9,501)
Curlew	46,243 (44,063 - 48,949)	64,681 (53,951 - 78,256)	44,344 (38,324 - 50,613)
Redshank	24,263 (23,403 - 25,376)	29,184 (25,446 - 33,206)	18,513 (17,122 - 19,758)
Turnstone	33,922 (32,488 - 35,244)	38,078 (33,048 - 42,452)	25,988 (23,552 - 29,324)

<sup>1</sup> This estimate was identical to the intertidal estimate and likely an error, see discussion in 4.1.

**Figure 3.3.i** All habitat population point estimates and 95% confidence intervals for key species of wader using the revised methodology for data from all four surveys. Values for previous surveys are not equivalent to those previously published and coverage biases and uncertainty in the first two surveys may adversely influence those estimates (especially WSC estimates of species that favour inland habitats).

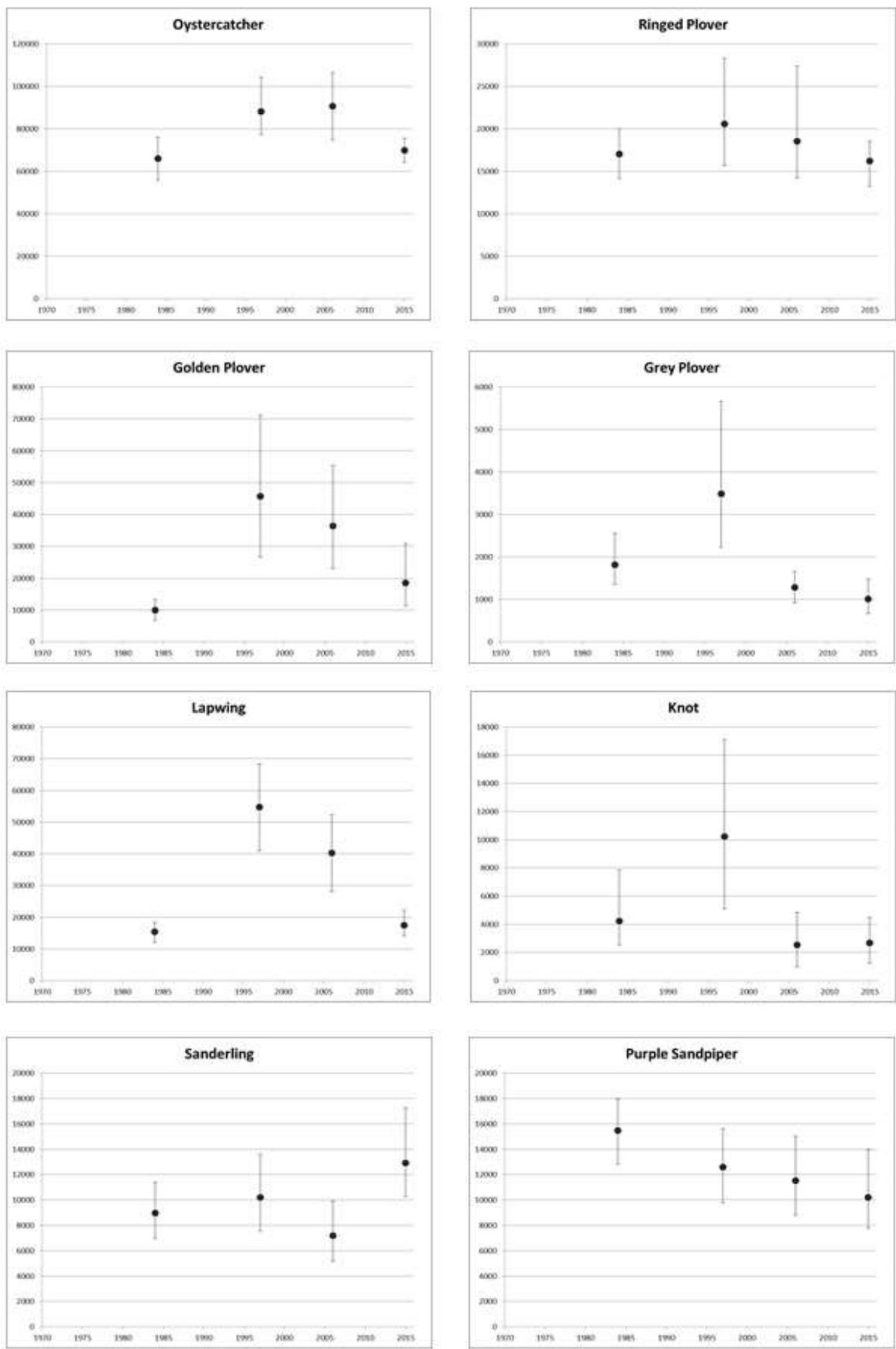
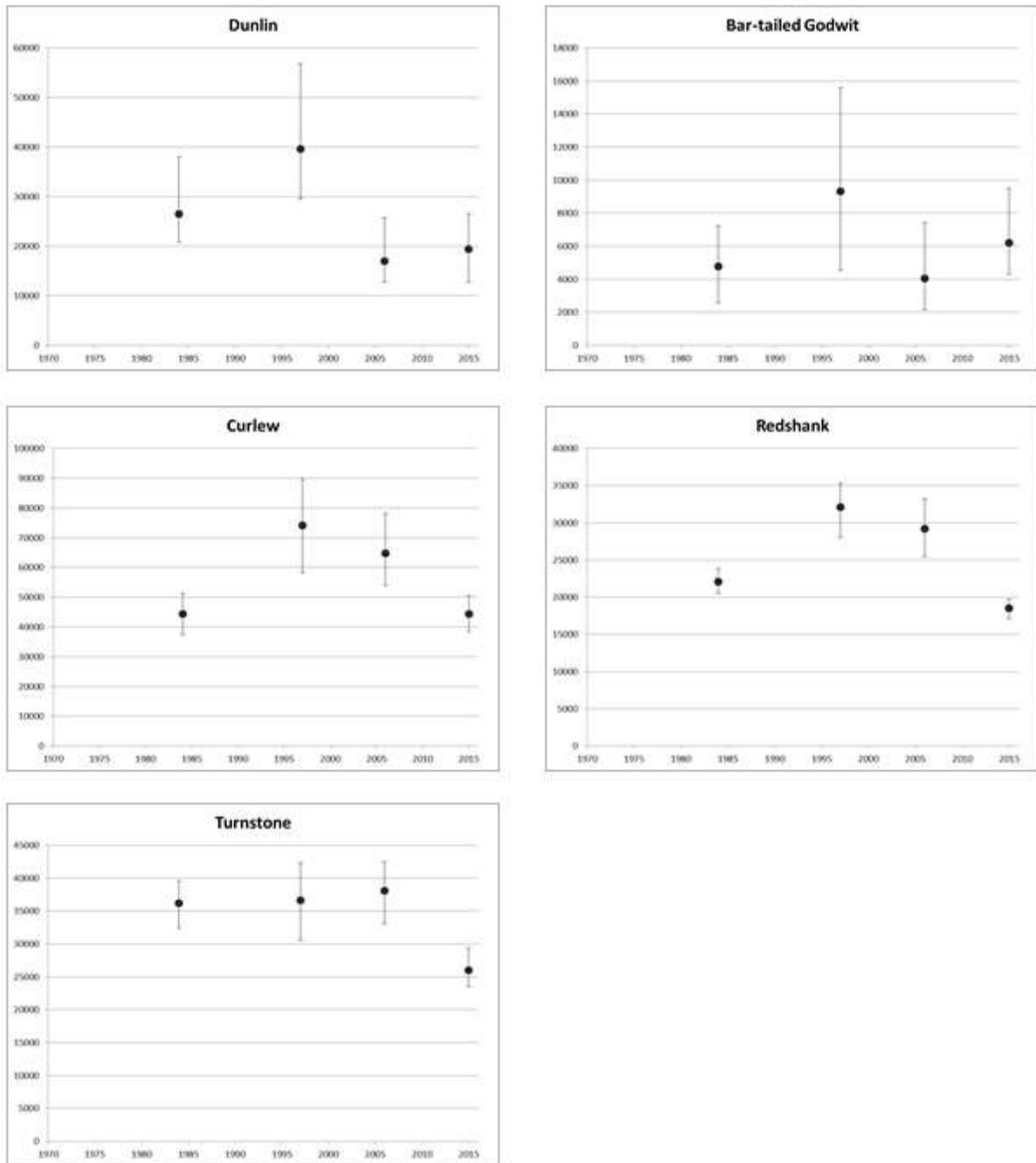


Figure 3.3.i continued



**Figure 3.3.ii** Intertidal-only habitat population point estimates and 95% confidence intervals for key species of wader using the revised methodology for data from all four surveys

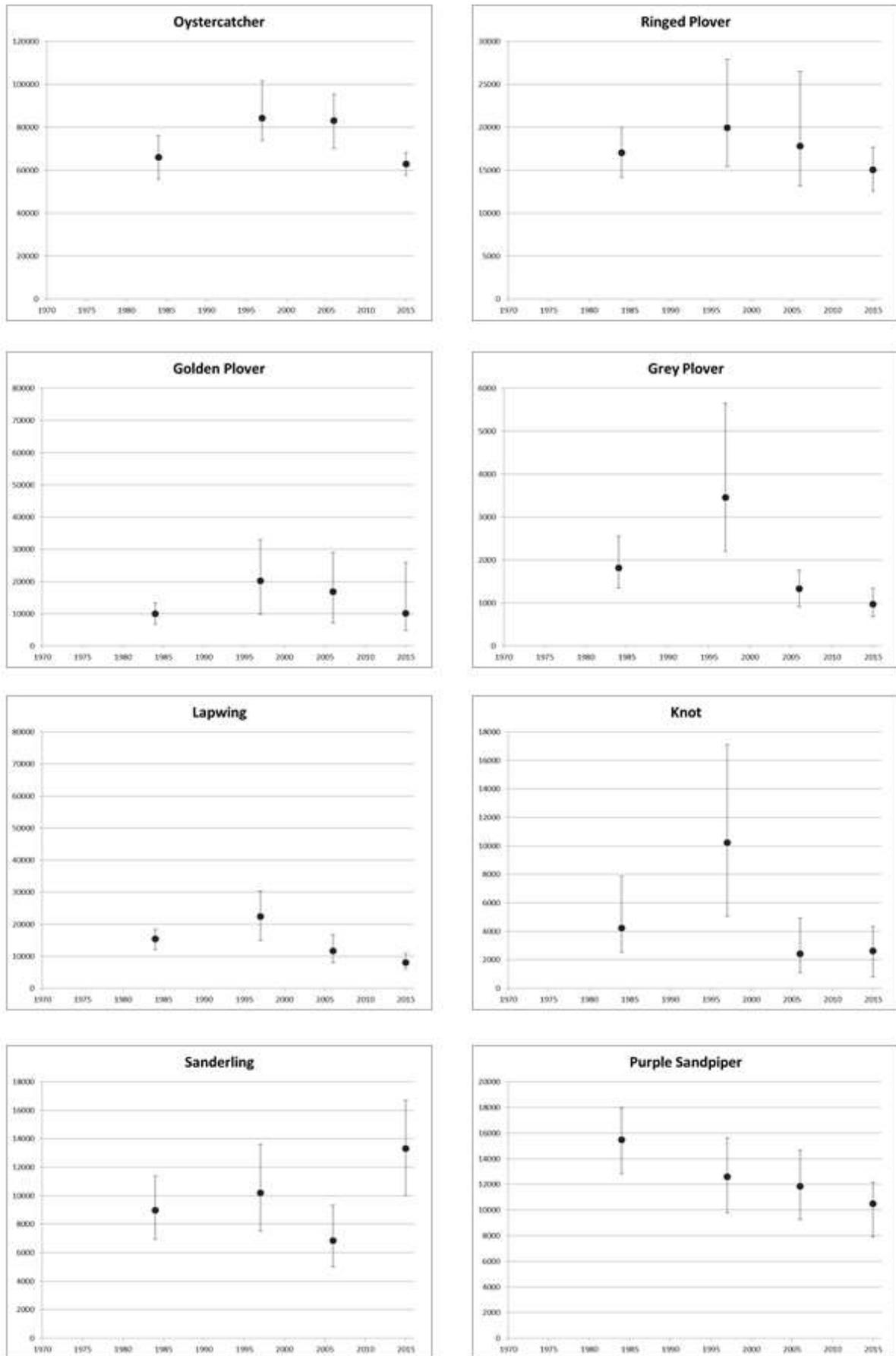
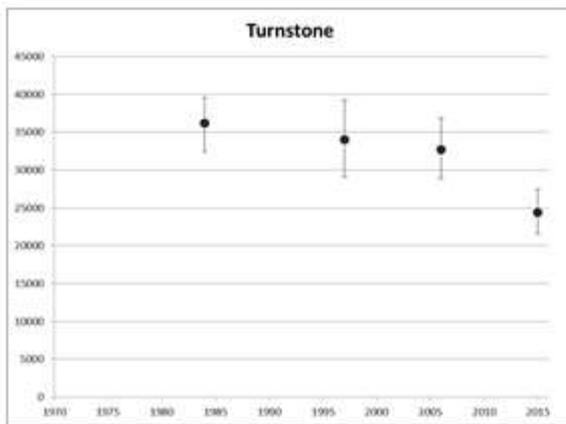
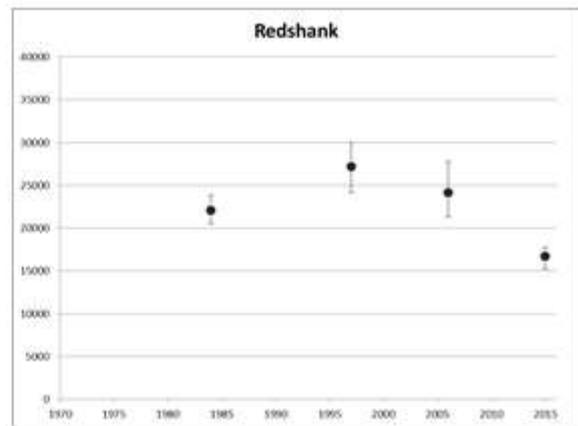
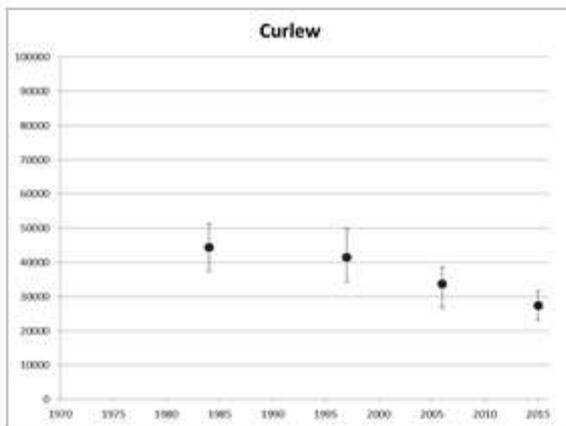
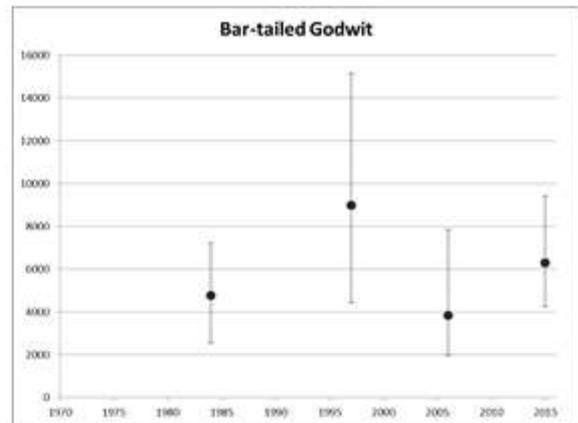
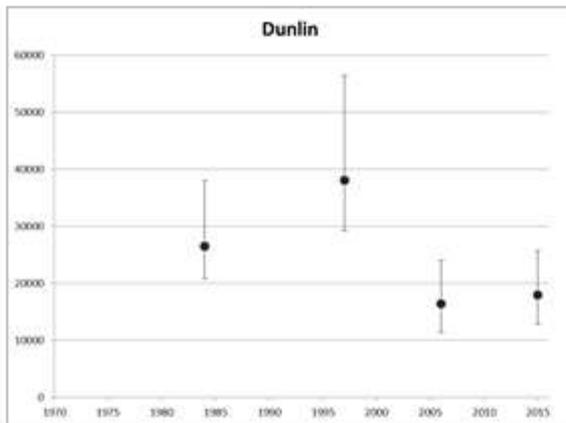
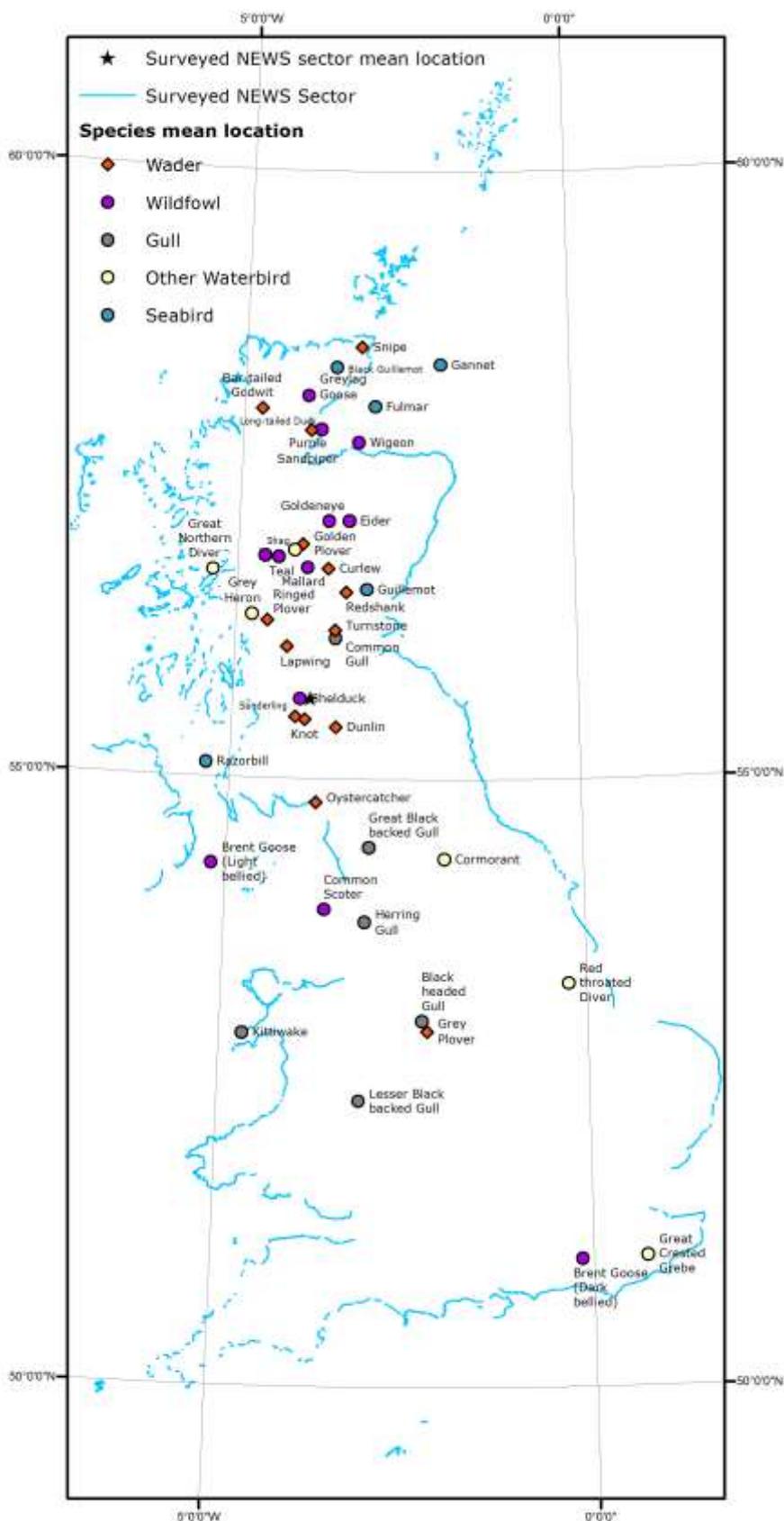


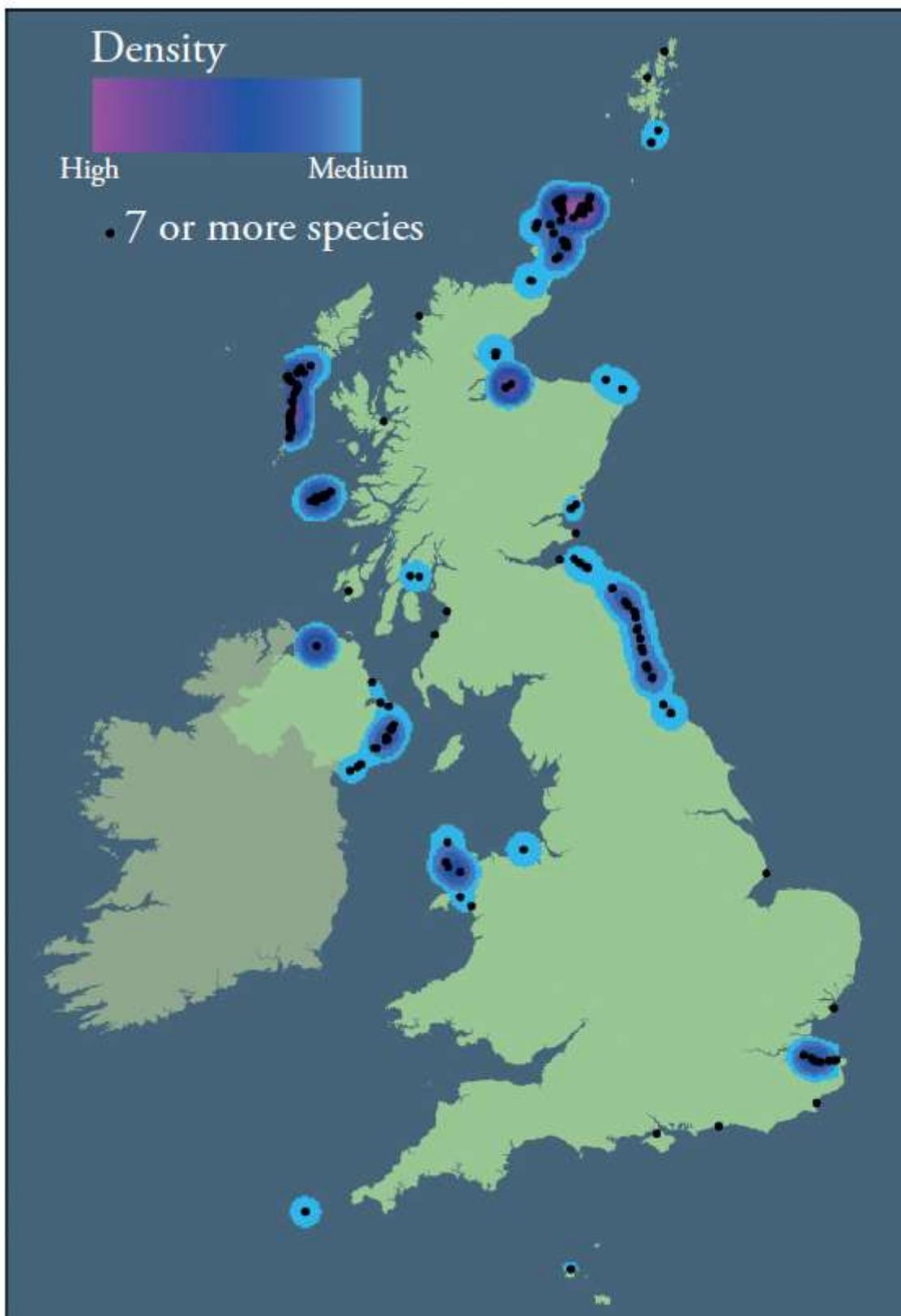
Figure 3.3.ii continued



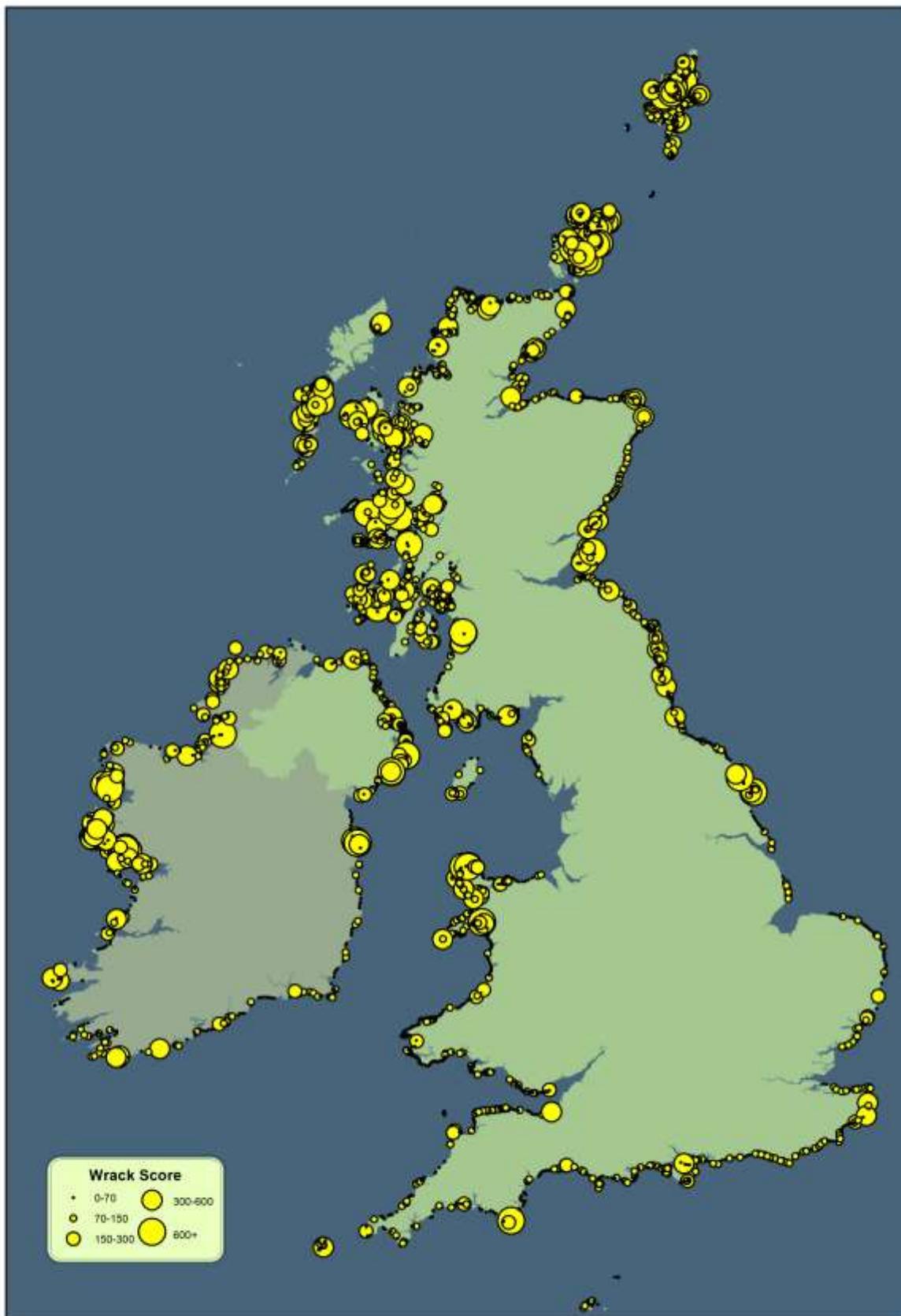
**Figure 3.4.i** Species location centroids for NEWS III surveys. Where multiple counts were carried out at an individual count stretch, the maximum count for each species was used.



**Figure 3.4.ii** Non-estuarine coast with high density and diversity of key species of wader (i.e. Oystercatcher, Ringed Plover, Golden Plover, Grey Plover, Lapwing, Knot, Sanderling, Purple Sandpiper, Dunlin, Bar-tailed Godwit, Curlew, Redshank, and Turnstone).



**Figure 3.7.i** Inventory of strandline deposits of beach-cast seaweed for the UK and Republic of Ireland. Strandline deposits score calculated by the extent of heavy, medium and light deposits present (Table 2.5.i). Kernel density map of scores shown as inset.



## **4. DISCUSSION**

### **4.1 Population Estimates**

The purpose of this report was to estimate the number of waders present on the non-estuarine coast of the UK during the winter of 2015/16, revising the previous estimates in Austin and Rehfisch (2007), and for the first time in reporting a non-estuarine coast survey to include estimates of other waterbirds and seabirds present.

Estimates were produced using data for the earlier surveys as well as the most recent survey and those for NEWS II are included here. The revised methodology, following a better understanding of the degree of asynchrony of counts, which treats counts as a sample within geographical regions, rather than a census to be extrapolated, led to changes in some cases for the 2006/07 wader estimates (Table 3.3.i). In all species, the revision increased the population estimate. For some species, the change was more notable in the confidence interval rather than the point estimate; for example, the Purple Sandpiper point estimate only increased slightly from 11,329 to 11,527 but the 95% confidence interval was three times wider, changing from (10,499-12,485) to (8,794 – 15,022). This is to be expected, as the confidence intervals previously assumed the counts that were made were a census, with no uncertainty, rather than an estimate, with associated uncertainty. There were also large changes in the estimates for other species, either in absolute or percentage terms compared to the published estimate for NEWS II; for example, the estimate for Oystercatcher increased from 71,104 to 90,740 and the estimate for Bar-tailed Godwit from 1,596 to 4,066.

The biggest apparent adjustment to the previously published estimates is for Lapwing, for which the 2006/07 point estimate increased from 9,890 to 40,237, with the 95% interval changing from (8,906 - 11,190) to (28,054 - 52,352). However, this is because of an error in Austin and Rehfisch (2007) where the reported all-habitat estimate given for Lapwing was actually that for the intertidal habitat only. Comparing the intertidal-only estimates (Figure 3.3.ii), the estimate using the revised methodology is 11,461 with a 95% confidence interval of (7,828 – 16,401), which intersects that of Austin and Rehfisch (2007). This issue only affected Lapwing.

All calculated regional estimates are included on NEWS Report Online, including those for species such as Velvet Scoter for which national estimates are not included in Table 3.2.i due to their restricted distributions or recorded count not meeting the threshold.

The non-estuarine coast estimates from this report will input into the next UK wintering waterbird population estimates assessment.

### **4.2 Species Distribution along the Non-estuarine Coast**

The Online NEWS Report allows detailed inspection of NEWS counts on interactive maps at a regional level. Particularly useful is sector coverage information when interpreting data at a site level (since missing landward or seaward counts on a sector are negligible for some species but not for others). Local research and site casework using the Online NEWS report or raw count data is encouraged, particularly as, with the benefit of local knowledge, stronger assumptions can often be made for particular areas when analysing the data from NEWS.

Figure 3.4.i illustrated the mean location (weighted by count) for each species for which estimates were produced, with species maps in Appendix 3. The mean location for all species was slightly to the south-east of the mean location of a counted NEWS sector, being strongly influenced by the distribution of the most numerous species, Herring Gull, Black-headed Gull and Oystercatcher; whereas most species have their individual mean location north of the mean location of a counted NEWS sector.

The relative importance of the Scottish non-estuarine coast is demonstrated by 31 of the 43 species in Figure 3.4.i having their mean weighted location within Scotland. The distribution information from NEWS III will be valuable for future research into how the distributions of non-estuarine waterbirds change over time, for example in response to climate change.

Areas such as Orkney, the outer Forth Estuary, Anglesey, the Uists and the Outer Ards have both high amounts of strandline deposits recorded (Figure 3.6.i) and high wader density and diversity (Figure 3.4.ii). Relationships between coastal bird communities and strandline deposits will be explored in planned further work to investigate the extent to which the amount of seaweed deposited can predict the overall abundance and distribution of coastal wintering waterbird populations. Such information will provide an insight into those areas likely to be most impacted by any large-scale human-induced changes in the availability of seaweed and the likely risks posed to key waterbird populations.

Mammal data collected as part of the survey will be made available for use under an Open Government Licence via the National Biodiversity Network (NBN) Atlas (<http://nbnatlas.org>).

### 4.3 Indications of Change for Key Wader Species

The latest WeBS ten-year trends for the UK for the key wader species all show declines, apart from Bar-tailed Godwit and Sanderling (Frost *et al.* 2017). Over a similar time period, the NEWS III estimate also increased for these two species compared with NEWS II: in the case of Sanderling (+79%) there was no overlap in the confidence intervals, suggesting a real increase in overwintering numbers in 2015/16 compared with 2006/07; but for Bar-tailed Godwit (+53%) the 95% confidence intervals from the two surveys did overlap. Population estimates for Dunlin (+14%), Knot (+5%), Purple Sandpiper (-12%), Ringed Plover (-13%), Grey Plover (-21%) and Oystercatcher (-23%) also all had confidence intervals that overlapped with those in NEWS II, indicating further paired-sample analysis is needed to properly understand whether and where change has occurred.

For five species, non-overlapping 95% confidence intervals suggest genuine declines since 2006/07, and comparison with WeBS trends suggest a possibility that the magnitude of the declines over this period may possibly be greater than on WeBS sites. These species were Lapwing (change from NEWS II to NEWS III estimate -57%), Golden Plover (-49%), Redshank (-37%), Turnstone (-32%) and Curlew (-31%).

Compared to all three previous surveys, for the key wader species on the intertidal habitat (Figure 3.3.ii) the 95% confidence intervals for NEWS III overlapped with at least one previous survey for all the species except Turnstone, with the NEWS III intertidal point estimate being 24,381, lower than WSC (36,201), NEWS I (33,994) and NEWS II (32,680). The change between the intertidal-only estimate for WSC in 1984/85 and NEWS III in 2015/16 is -33% and from NEWS II in 2006/07 it is -25%. In comparison, the WeBS 25-year trend for Turnstone is -47% and 10-year trend -24% (Frost *et al.* 2017).

Overlapping population estimate confidence intervals do not necessarily mean we will be unable to show there has been change in non-estuarine coast populations using more robust paired-sample comparisons. Although Figures 3.3.i and 3.3.ii may give some indication of directions of population change, it should also be remembered that the uncertainty in habitat coverage in the Winter Shorebird Count, and the bias towards coastlines with more birds present in the first Non-estuarine Waterbird Survey, means caution should be used in interpreting results from the earlier surveys. It is therefore envisaged that further analyses will be undertaken to estimate more rigorously how numbers may have changed between years.

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**Appendix 1** Regional coverage for NEWS III. Values given indicate the total length of non-estuarine coast, total and percentage length of non-estuarine coast covered, number and percentage of all count stretches visited, and number and percentage of priority count stretches visited. These are maximum values based on coverage of the intertidal habitat only, coverage of inland and sea habitats generally being less than this. Data were derived from the NEWS count stretch definitions GIS coverage, which is based on the low-tide Watsonian County Boundary data obtained from the NBN

Region	Total length (km)	Length covered (km)	Percent length coverage	Count stretches covered	Priority stretches covered
Causeway Coast and Glens	137	106	77	79% 52/66	83% 48/58
Mid and East Antrim	68	61	89	86% 37/43	90% 18/20
Newry Mourne and Down	72	61	85	84% 62/74	100% 20/20
Ards and North Down	102	99	97	97% 62/64	93% 28/30
<b>Northern Ireland</b>	<b>378</b>	<b>326</b>	<b>86</b>	<b>86%</b> <b>213/247</b>	<b>89%</b> <b>114/128</b>
Lothian and Borders	144	127	88	93% 51/55	92% 36/39
Fife	87	87	100	100% 43/43	100% 11/11
Angus	88	88	100	100% 35/35	100% 20/20
Aberdeenshire	422	420	100	99% 134/135	100% 48/48
Moray and East Ross	208	196	94	95% 61/64	98% 39/40
Shetland	2162	418	19	24% 364/1536	59% 195/332
Orkney	1210	706	58	65% 319/494	85% 47/55
Sutherland and Caithness	1107	759	69	72% 246/340	84% 127/151
West Ross	773	296	38	39% 111/285	66% 85/128
Inner Hebrides - north	1053	297	28	30% 99/325	50% 81/162
Outer Hebrides	943	429	45	50% 121/244	84% 70/83
Lochaber	786	158	20	24% 73/303	82% 69/84
Argyll and Bute	1469	335	23	27% 201/743	69% 129/186
Inner Hebrides - mid	885	655	74	77% 359/464	81% 57/70
Inner Hebrides - south	645	247	38	42% 92/221	88% 44/50
North Ayrshire and Arran	253	113	45	52% 55/105	65% 35/54
South Ayrshire	138	70	51	63% 30/48	69% 25/36
Dumfries and Galloway	341	296	87	90% 107/119	96% 48/50
<b>Scotland</b>	<b>12714</b>	<b>5699</b>	<b>45</b>	<b>45%</b> <b>2501/5559</b>	<b>73%</b> <b>1166/1599</b>
Conwy, Denbeigh and Flint	91	91	100	100% 29/29	100% 24/24
Anglesey	228	228	100	100% 109/109	100% 40/40
Gwynedd	245	224	92	91% 107/117	100% 72/72
Ceredigion	103	72	70	73% 38/52	85% 17/20
Pembroke and Carmarthen	374	327	88	90% 119/132	100% 30/30
Glamorgan	144	141	98	98% 94/96	100% 30/30
<b>Wales</b>	<b>1185</b>	<b>1084</b>	<b>91</b>	<b>93%</b> <b>496/535</b>	<b>99%</b> <b>213/216</b>
Somerset	55	49	88	85% 22/26	80% 16/20
Devon	404	231	57	53% 122/231	92% 60/65
Cornwall	556	198	36	38% 93/242	82% 41/50

<b>Region</b>	<b>Total length (km)</b>	<b>Length covered (km)</b>	<b>Percent length coverage</b>	<b>Count stretches covered</b>	<b>Priority stretches covered</b>
Isles of Scilly	128	105	82	76% 35/46	76% 35/46
Dorset	182	154	84	83% 63/76	90% 27/30
Hampshire	46	46	100	100% 19/19	100% 14/14
Isle of Wight	133	85	64	71% 56/79	78% 47/60
West Sussex	73	73	100	100% 16/16	100% 10/10
East Sussex	105	105	100	100% 29/29	100% 10/10
Kent	162	156	97	96% 53/55	94% 34/36
Essex	26	26	100	100% 10/10	100% 10/10
Suffolk	82	64	77	83% 29/35	90% 18/20
Norfolk	86	86	100	100% 36/36	100% 30/30
Lincolnshire	30	30	100	100% 8/8	100% 8/8
East Yorkshire	90	79	87	87% 26/30	96% 25/26
North Yorkshire	115	68	59	60% 27/45	80% 24/30
Tees Valley	67	67	100	100% 22/22	100% 18/18
Durham	22	22	100	100% 12/12	100% 10/10
Tyne and Wear	51	41	80	85% 28/33	95% 19/20
Northumberland	199	195	98	99% 74/75	97% 38/39
Cumbria	90	88	98	95% 37/39	90% 18/20
<b>England</b>	<b>2705</b>	<b>1968</b>	<b>73</b>	<b>70%</b> <b>817/1164</b>	<b>90%</b> <b>512/572</b>
<b>Isle of Man</b>	<b>183</b>	<b>43</b>	<b>24</b>	<b>25%</b> <b>16/63</b>	<b>55%</b> <b>11/20</b>
<b>Channel Islands</b>	<b>211</b>	<b>62</b>	<b>29</b>	<b>25%</b> <b>16/63</b>	<b>56%</b> <b>14/25</b>
<b>Great Britain</b>	<b>16604</b>	<b>8751</b>	<b>53</b>	<b>53%</b> <b>3814/7258</b>	<b>79%</b> <b>1891/2387</b>
<b>United Kingdom</b>	<b>17377</b>	<b>9183</b>	<b>53</b>	<b>53%</b> <b>4059/7631</b>	<b>79%</b> <b>2030/2560</b>

**Appendix 2a** NEWS III counts for key designated sites. The head count is the sum of maximum sector counts for key species of interest during NEWS III of stretches intersecting key Special Protection Areas and Sites of Special Scientific Interest. The number of individuals of the interest feature cited in each site notification is given where appropriate, or N where a number is not given but the species was noted as being a qualifying feature or present in nationally important numbers. Grey shading and bold text indicates that the species is an interest feature at the site. Note that many of the designated sites include areas of non-open coast that were not included in the NEWS survey, and detailed analysis at the site level should combine NEWS data with other data sources. The maximum winter 2015/16 WeBS count for the best match to the SPA or SSSI boundary is given where this is available (otherwise “n/c”); this may or may not overlap with areas counted for NEWS III depending on the site. The regional estimate for the appropriate NEWS region is also given, with the 95% confidence intervals given in parentheses. Other regional estimates can be found in the NEWS report online at [www.bto.org/webs-reporting](http://www.bto.org/webs-reporting) in the NEWS tab.

	Turnstone	Purple Sandpiper	Sanderling	Ringed Plover	Curlew	Bar-tailed Godwit	Eider
East Sanday Coast SPA interest feature	<b>1400</b>	<b>840</b>				<b>N</b>	
NEWS head count	<b>660</b>	<b>912</b>	552	190	447	<b>583</b>	70
WeBS winter max (2015/16)	<b>n/c</b>	<b>n/c</b>	n/c	n/c	n/c	<b>n/c</b>	n/c
Orkney regional estimate	4,475 (3,534 - 5,471)	4,167 (2,552 - 6,037)	1,510 (633 - 3,121)	2,064 (1,448 - 2,577)	13,834 (10,363 - 18,246)	2,641 (1,371 - 4,862)	1,181 (821 - 1,685)
Firth of Forth SPA interest feature	<b>860</b>			<b>328</b>	<b>1928</b>	<b>1974</b>	<b>9400</b>
NEWS head count	<b>118</b>	65	1	<b>10</b>	<b>140</b>	<b>9</b>	<b>1649</b>
WeBS winter max (2015/16)	<b>498 (NOV)</b>	72 (NOV)	317 (MAR)	<b>338 (DEC)</b>	<b>3574 (FEB)</b>	<b>1011 (JAN)</b>	<b>5590 (JAN)</b>
Lothian and Borders regional estimate (NB also partly in Fife)	165 (73 - 289)	33 (4 - 87)	0 (0 - 0)	43 (7 - 110)	351 (174 - 557)	6 (0 - 30)	1,869 (499 - 4,322)
Lindisfarne SPA interest feature			<b>218</b>	<b>163</b>		<b>2946</b>	<b>1568</b>
NEWS head count	6	0	<b>0</b>	<b>0</b>	513	<b>100</b>	<b>43</b>

	Turnstone	Purple Sandpiper	Sanderling	Ringed Plover	Curlew	Bar-tailed Godwit	Eider
WeBS winter max (2015/16)	(132) (MAR)	0	[165] (FEB)	96 (NOV)	1547 (DEC)	[1159] (FEB)	532 (DEC)
Northumberland regional estimate	646 (391 - 886)	384 (107 - 800)	666 (364 - 1,075)	135 (39 - 309)	767 (178 - 3,083)	115 (15 - 343)	560 (422 - 721)
North Uist Machair and Islands SPA interest feature	<b>670</b>	<b>N</b>		<b>590</b>			
NEWS head count	<b>277</b>	<b>147</b>	411	<b>454</b>	144	198	43
WeBS winter max (2015/16)	<b>130 (MAR)</b>	<b>38 (JAN)</b>	190 (JAN)	<b>144 (FEB)</b>	55 (JAN)	70 (JAN)	0
Outer Hebrides regional estimate	3,380 (2,050 - 5,103)	2,976 (1,342 - 5,675)	4,834 (2,514 - 8,095)	3,270 (1,954 - 4,938)	1,933 (1,391 - 2,746)	2,593 (1,276 - 5,791)	762 (302 - 1,548)
Northumbria Coast SPA interest feature	<b>1739</b>						
NEWS head count	<b>517</b>	293	770	244	280	40	433
WeBS winter max (2015/16)	<b>870 (NOV)</b>	390 (JAN)	538 (JAN)	142 (NOV)	(894) (MAR)	85 (JAN)	436 (NOV)
Northumberland regional estimate (NB also partly in Tyne & Wear and Durham)	646 (391 - 886)	384 (107 - 800)	666 (364 - 1,075)	135 (39 - 309)	767 (178 - 3,083)	115 (15 - 343)	560 (422 - 721)
Outer Ards SPA interest feature	<b>1210</b>			<b>516</b>			
NEWS head count	<b>475</b>	56	0	<b>131</b>	697	2	195
WeBS winter max (2015/16)	<b>619 (JAN)</b>	32 (NOV)	1 (JAN)	<b>226 (NOV)</b>	650 (JAN)	5 (NOV)	663 (NOV)
Ards and North Down Estimate	592 (365 - 788)	58 (20 - 94)	0 (0 - 0)	154 (41 - 290)	1,018 (590 - 1,450)	2 (0 - 5)	255 (93 - 507)

	Turnstone	Purple Sandpiper	Sanderling	Ringed Plover	Curlew	Bar-tailed Godwit	Eider
Sléibhteán agus Cladach Thiriodh (Tiree Wetlands and Coast) SPA interest feature	<b>873</b>			<b>653</b>			
NEWS head count	<b>645</b>	214	653	<b>648</b>	540	77	340
WeBS winter max (2015/16)	<b>25 (DEC)</b>	0	0	<b>28 (DEC)</b>	75 (DEC)	15 (NOV)	0
Inner Hebrides - mid regional estimate	1,175 <b>(769 - 1,824)</b>	301 (103 - 549)	795 (148 - 1,587)	1,245 <b>(770 - 1,969)</b>	1,451 (985 - 1,904)	91 (44 - 218)	435 (171 - 884)
Solent and Southampton Water SPA interest feature				<b>552</b>			
NEWS head count	55	15	258	<b>38</b>	78	0	0
WeBS winter max (2015/16)	456 (JAN)	(1) (NOV)	30 (JAN)	<b>358 (DEC)</b>	980 (JAN)	15 (JAN)	38 (MAR)
Isle of Wight regional estimate (partly in Hampshire)	103 (27 - 224)	30 (0 - 75)	278 (0 - 992)	39 <b>(5 - 117)</b>	106 (51 - 215)	0 (0 - 0)	0 (0 - 0)
South Uist Machair and Lochs SPA interest feature			<b>700</b>	<b>490</b>			
NEWS head count	321	192	<b>452</b>	<b>278</b>	81	102	32
WeBS winter max (2015/16)	15 (NOV)	36 (NOV)	<b>0</b>	<b>3 (DEC)</b>	92 (FEB)	(24) (FEB)	0
Outer Hebrides regional estimate	3,380 <b>(2,050 - 5,103)</b>	2,976 <b>(1,342 - 5,675)</b>	4,834 <b>(2,514 - 8,095)</b>	3,270 <b>(1,954 - 4,938)</b>	1,933 (1,391 - 2,746)	2,593 (1,276 - 5,791)	762 (302 - 1,548)
Thanet Coast and Sandwich Bay SPA interest feature	<b>940</b>						
NEWS head count	<b>233</b>	6	63	87	105	0	2

	Turnstone	Purple Sandpiper	Sanderling	Ringed Plover	Curlew	Bar-tailed Godwit	Eider
WeBS winter max (2015/16)	<b>67 (DEC)</b>	1 (MAR)	188 (JAN)	57 (NOV)	370 (DEC)	270 (JAN)	4 (MAR)
Kent regional estimate	467 (254 - 731)	8 (1 - 21)	193 (58 - 404)	166 (57 - 342)	154 (80 - 259)	0 (0 - 0)	3 (0 - 6)
Isle of May SSSI interest feature	<b>N</b>	<b>N</b>					
NEWS head count	<b>50</b>	<b>35</b>	0	0	45	0	20
WeBS winter max (2015/16)	<b>n/a</b>	<b>n/a</b>					
Fife Estimate	148 (62 - 268)	83 (27 - 158)	1 (0 - 3)	68 (23 - 127)	333 (206 - 507)	2 (0 - 5)	455 (333 - 561)
Rosehearty to Fraserburgh Coast SSSI interest feature	<b>500</b>	<b>250</b>			<b>N</b>		<b>N</b>
NEWS head count	<b>68</b>	<b>43</b>	0	26	<b>394</b>	5	<b>164</b>
WeBS winter max (2015/16)	<b>75 (NOV)</b>	<b>16 (MAR)</b>	0	23 (NOV)	<b>121 (JAN)</b>	3 (JAN)	<b>45 (DEC)</b>
Aberdeenshire Estimate	411 (275 - 551)	176 (84 - 408)	213 (70 - 440)	79 (11 - 146)	<b>2,048</b> (1,078 - 2,951)	19 (2 - 40)	<b>1,373</b> (839 - 2,074)
Whiting Ness- Ethie Haven SSSI interest feature	<b>N</b>	<b>N</b>					
NEWS head count	<b>8</b>	<b>0</b>	23	0	23	0	9
WeBS winter max (2015/16)	<b>n/c</b>	<b>n/c</b>					
Angus Estimate	150 (32 - 290)	30 (2 - 61)	50 (3 - 106)	45 (9 - 99)	85 (53 - 120)	4 (0 - 12)	460 (67 - 1,189)

**Appendix 2b** Winter Shorebird Count (WSC) and Non-estuarine Waterbird Survey (NEWS) I, II and III counts for key designated sites. The head count is the sum of maximum sector counts for key species of interest during each survey of stretches intersecting key Special Protection Areas and Sites of Special Scientific Interest. Bold text indicates that the species is an interest feature at the site. Coverage is shown for each survey as the number of stretches covered of all or some of the relevant habitats (landward, intertidal and seaward) compared with the total number of stretches intersecting with the designated site, with colour indicating the habitat-species groups. No extrapolation is undertaken to account for incomplete coverage.

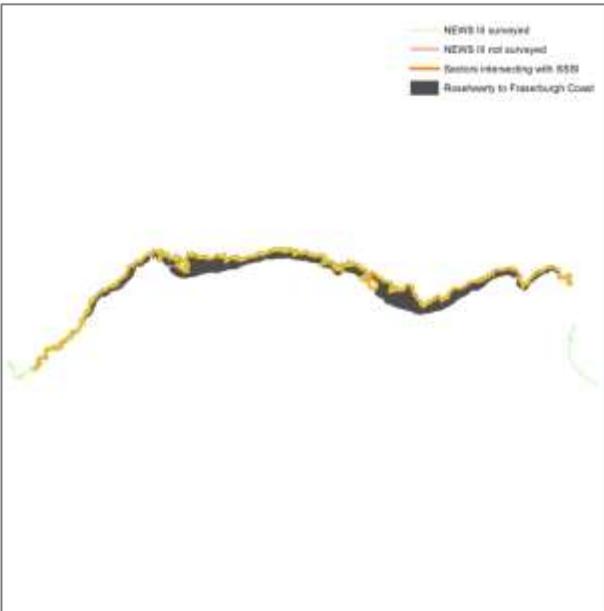
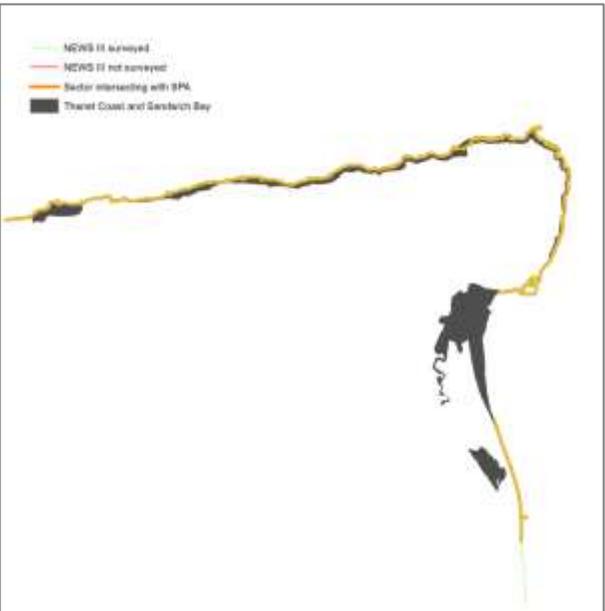
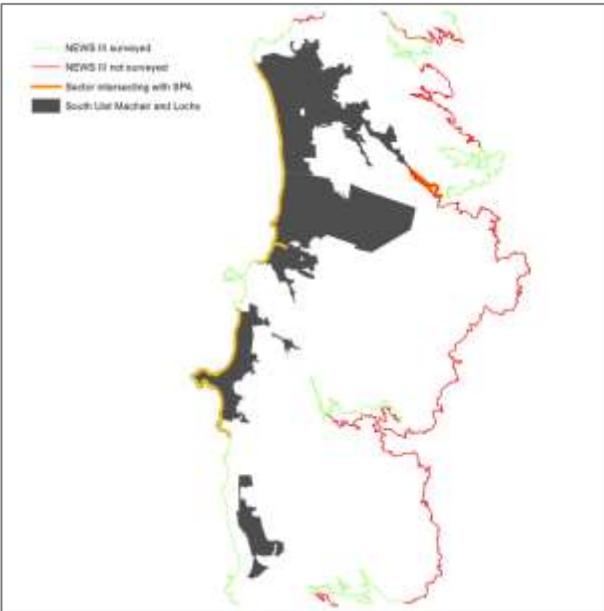
	Winter Shorebird Count/Non-Estuarine Waterbird Survey head count							Relevant habitats covered (# stretches)						
	Turnstone (TT)	Purple Sandpiper (PS)	Sanderling (SS)	Ringed Plover (RP)	Curlew (CU)	Bar-tailed Godwit (BA)	Eider (E_)	TT/PS/SS	RP/CU/BA		E_		Total	
								All	All	Some	All	Some		
<b>East Sanday Coast</b>													<b>East Sanday Coast</b>	
1984	<b>907</b>	<b>870</b>	434	231	375	<b>750</b>	85	27	27		22		<b>31</b>	
1997	<b>1028</b>	<b>358</b>	320	330	362	<b>1014</b>	47	23	14	9	2	4	<b>31</b>	
2006	<b>849</b>	<b>451</b>	367	85	374	<b>449</b>	3	26	5	21	4	7	<b>31</b>	
2015	<b>660</b>	<b>912</b>	552	190	447	<b>583</b>	70	31	31		31		<b>31</b>	
<b>Firth of Forth</b>													<b>Firth of Forth</b>	
1984	<b>930</b>	408	0	<b>136</b>	<b>212</b>	<b>74</b>	<b>839</b>	25	25		25		<b>29</b>	
1997	<b>275</b>	31	5	<b>93</b>	<b>280</b>	<b>17</b>	<b>791</b>	28	28		28		<b>29</b>	
2006	<b>280</b>	66	10	<b>38</b>	<b>129</b>	<b>24</b>	<b>15</b>	26	15	11	14	11	<b>29</b>	
2015	<b>118</b>	65	1	<b>10</b>	<b>140</b>	<b>9</b>	<b>1649</b>	27	22	5	23	4	<b>29</b>	
<b>Lindisfarne</b>													<b>Lindisfarne</b>	
1984	21	32	<b>53</b>	<b>2</b>	1	<b>5</b>	<b>177</b>	4	4		4		<b>6</b>	
1997	2	5	<b>40</b>	<b>3</b>	396	<b>9</b>	<b>102</b>	4	4		4		<b>6</b>	
2006	7	2	<b>2</b>	<b>59</b>	137	<b>2</b>	<b>2</b>	4	4		4		<b>6</b>	
2015	6	0	<b>0</b>	<b>0</b>	513	<b>100</b>	<b>43</b>	6	6		6		<b>6</b>	
<b>North Uist Machair and Islands</b>													<b>North Uist Machair and Islands</b>	
1984	<b>394</b>	<b>303</b>	228	<b>863</b>	396	710	25	20	20		20		<b>23</b>	
1997	<b>117</b>	<b>13</b>	217	<b>304</b>	117	509	55	21	21		18	1	<b>23</b>	
2006	<b>409</b>	<b>81</b>	382	<b>628</b>	179	363	150	18	16	2	16	2	<b>23</b>	
2015	<b>277</b>	<b>147</b>	411	<b>454</b>	144	198	43	19	15	4	15	4	<b>23</b>	

	Winter Shorebird Count/Non-Estuarine Waterbird Survey head count							Relevant habitats covered (# stretches)					
	Turnstone (TT)	Purple Sandpiper (PS)	Sanderling (SS)	Ringed Plover (RP)	Curlew (CU)	Bar- tailed Godwit (BA)	Eider (E_)	TT/PS/SS	RP/CU/BA		E_		Total
									All	Some	All	Some	
<b>Northumbria Coast</b>							<b>Northumbria Coast</b>						
1984	1281	520	243	355	58	57	1717	81	81		81		88
1997	832	258	261	325	508	140	1248	88	88		88		88
2006	358	114	296	221	290	32	191	61	32	29	32	24	88
2015	517	293	770	244	280	40	433	85	74	11	74	9	88
<b>Outer Ards</b>							<b>Outer Ards</b>						
1984	1242	139	0	644	1460	115	377	50	50		50		50
1997	29	4	45	178	284	30	0	26	25	1	25	1	50
2006	684	30	5	102	703	33	32	45	27	18	19	23	50
2015	474	53	0	131	846	2	195	48	46	2	39	2	50
<b>Sléibhtean agus Cladach Thiriodh (Tiree Wetlands and Coast)</b>							<b>Tiree Wetlands and Coast</b>						
1984	810	81	360	875	431	45	49	24	24		24		30
1997	871	254	364	476	846	23	463	29	29		29		30
2015	645	214	653	648	540	77	340	30	30		30		30
<b>Solent and Southampton Water</b>							<b>Solent and Southampton Water</b>						
1984	167	17	235	303	43	109	0	33	33		33		35
1997	97	2	8	161	120	3	16	23	23		23		35
2006	41	2	26	30	99	3	80	26	10	16	11	15	35
2015	55	15	258	38	78	0	0	29	20	9	21	8	35
<b>South Uist Machair and Lochs</b>							<b>South Uist Machair and Lochs</b>						
1984	260	109	550	1119	35	74	73	8	8		8		11
1997	298	312	434	851	116	15	199	10	10		10		11
2006	203	355	55	407	76	1	48	8	3	5	2	5	11
2015	321	192	452	278	81	102	32	10	4	6	4	6	11

	Winter Shorebird Count/Non-Estuarine Waterbird Survey head count							Relevant habitats covered (# stretches)					
	Turnstone (TT)	Purple Sandpiper (PS)	Sanderling (SS)	Ringed Plover (RP)	Curlew (CU)	Bar-tailed Godwit (BA)	Eider (E_)	TT/PS/SS	RP/CU/BA		E_		Total
	All	All	Some	All	Some	Total							
<b>Thanet Coast and Sandwich Bay</b>							<b>Thanet Coast and Sandwich Bay</b>						
1984	313	41	565	55	30	23	17	8	8		8		18
1997	481	9	316	145	60	3	15	14	14		14		18
2006	230	14	312	105	35	0	0	12	3	9	3	5	18
2015	233	6	63	87	105	0	2	18	10	8	10	8	18
<b>Rosehearty to Fraserburgh Coast SSSI</b>							<b>Rosehearty to Fraserburgh Coast</b>						
1984	686	354	0	64	56	4	453	12	12		12		12
1997	189	34	0	0	50	0	65	8	8		8		12
2006	149	17	0	22	118	0	169	11	10	1	10	1	12
2015	68	43	0	26	394	5	164	12	12		11	1	12
<b>Whiting Ness - Ethie Haven SSSI</b>							<b>Whiting Ness- Ethie Haven</b>						
1984	37	72	0	24	28	0	107	9	9		9		11
1997	28	3	0	0	55	1	273	9	9		9		11
2006	6	2	0	0	176	0	70	10	10		10		11
2015	8	0	0	23	23	0	9	11	11		11		11
<b>Isle of May SSSI</b>							<b>Isle of May</b>						
1984	93	60	0	0	46	0	317	1	1		1		1
1997	-	-	-	-	-	-	-	0	0		0		1
2006	-	-	-	-	-	-	-	0	0		0		1
2015	50	35	0	0	45	0	20	1	1		1		1

**Appendix 2c** NEWS III stretches intersecting (orange) with designated site boundaries (grey) and coverage during NEWS III (green).



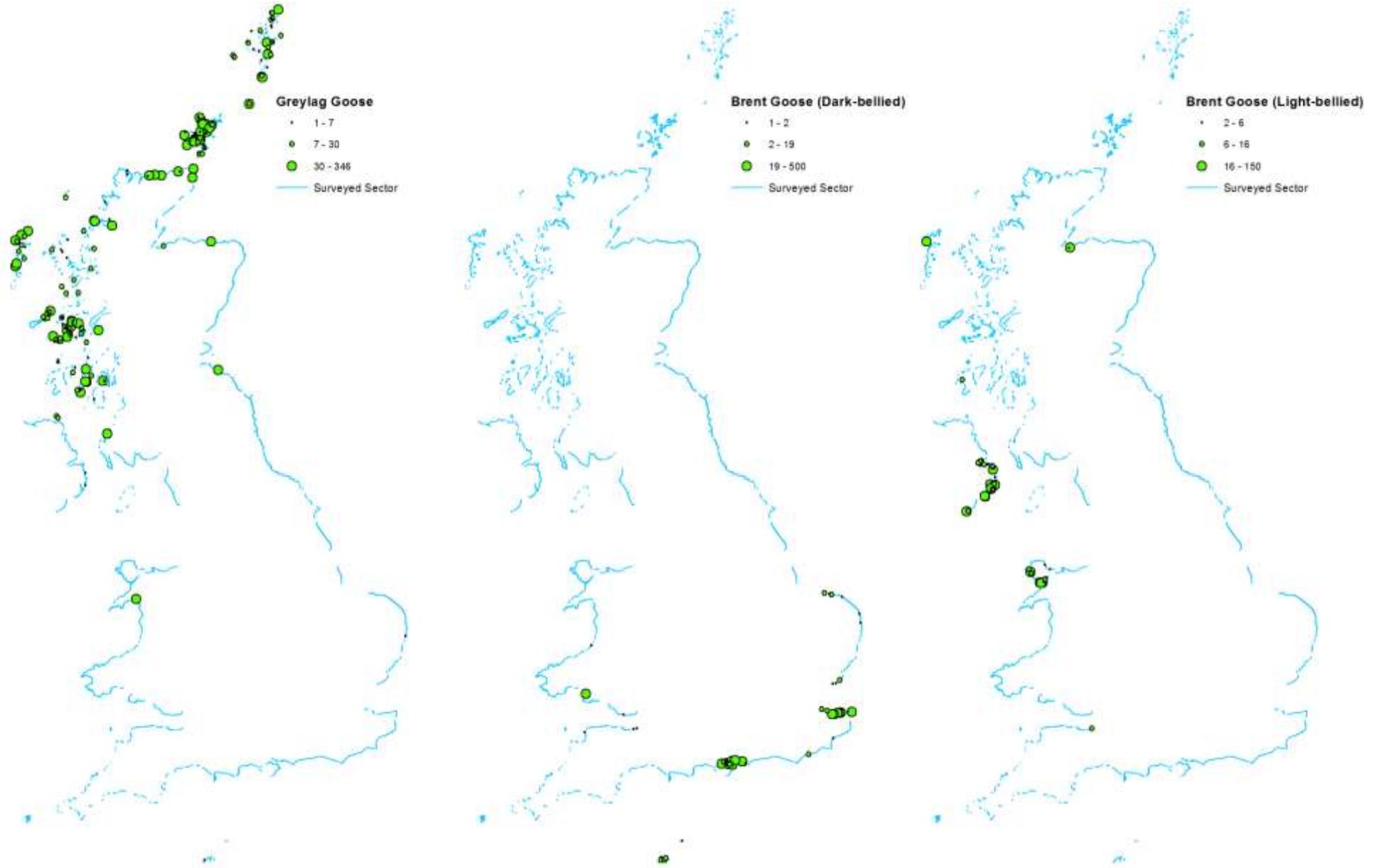


NEWS R surveyed  
NEWS R not surveyed  
Sectors intersecting with SSS  
Whiting Pass- Ethio Haven



**Appendix 3**

NEWS III raw count distribution maps. Detail and coverage can be seen on the interactive regional maps at <http://www.bto.org/webs-reporting-news>.



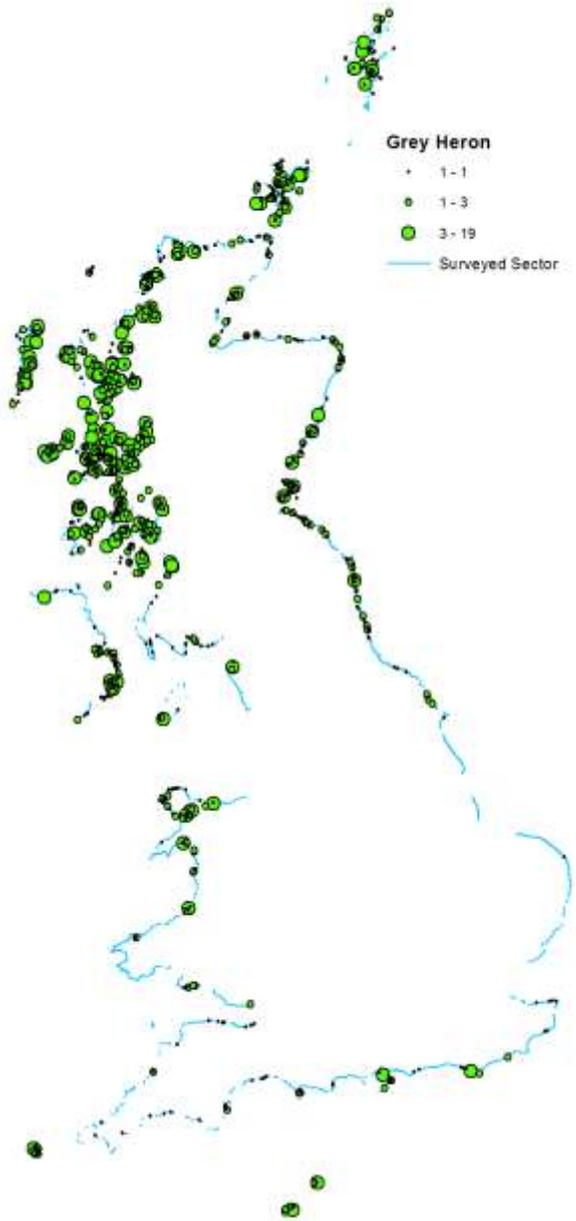


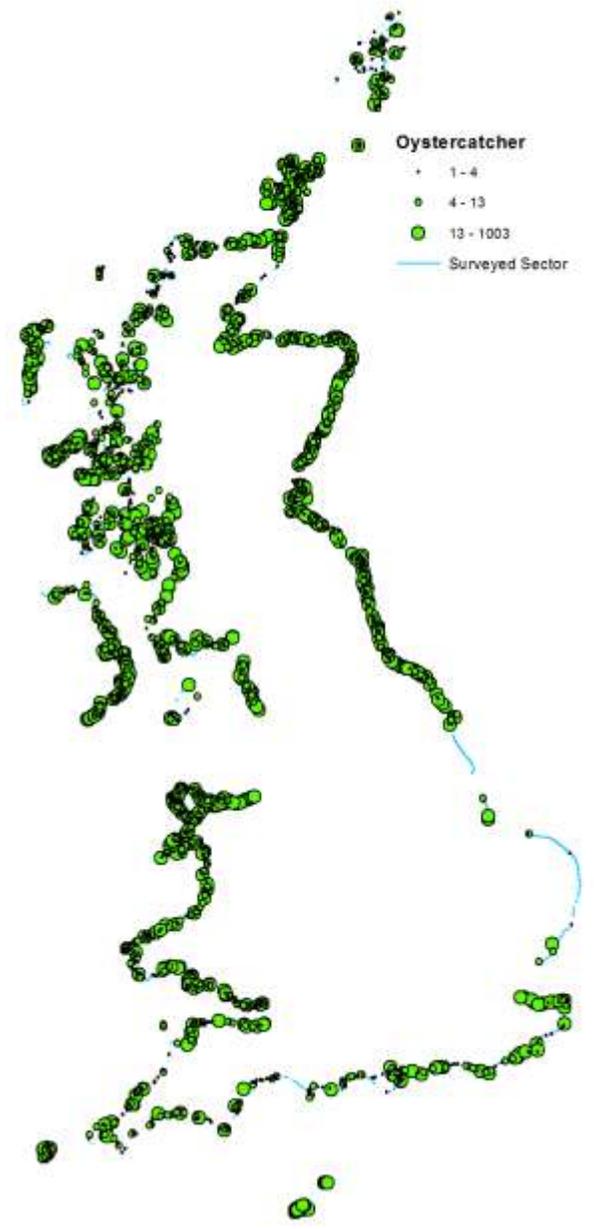






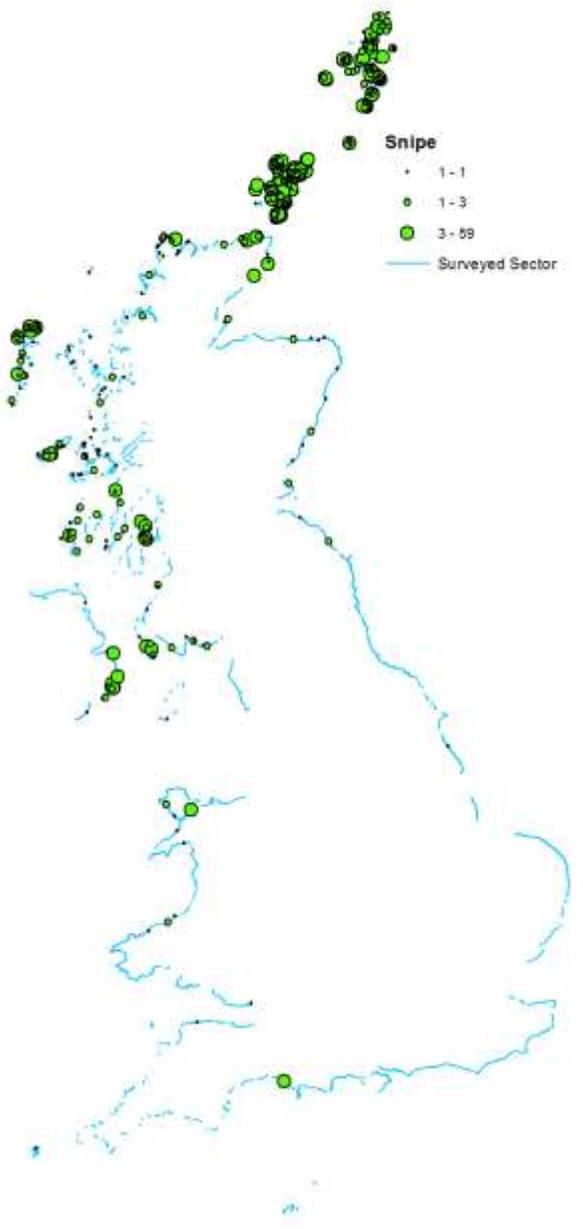
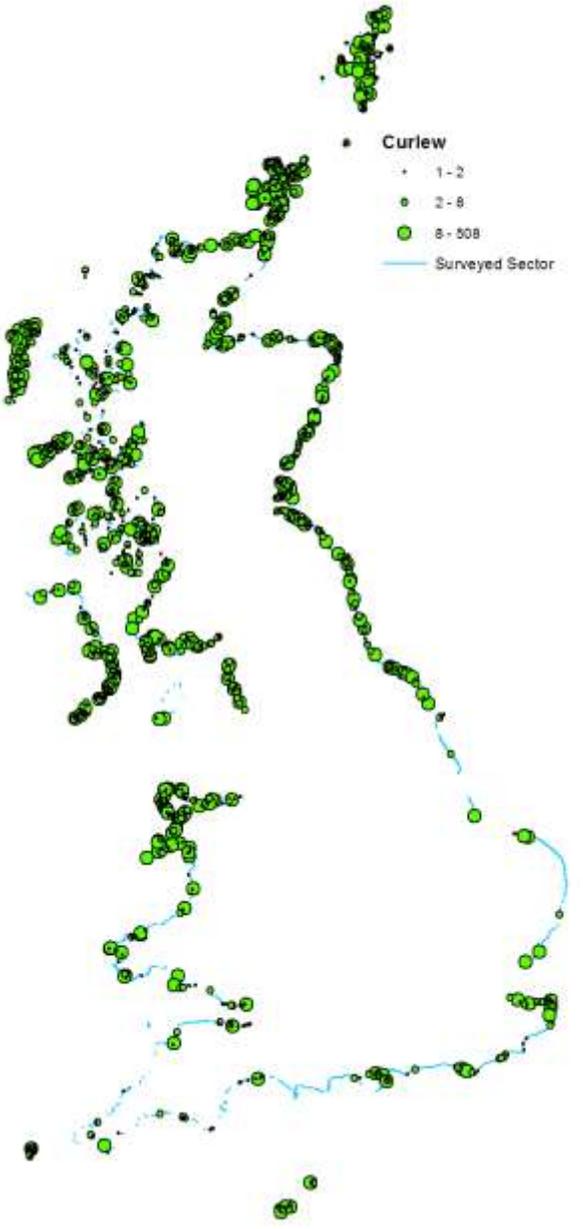






















**Appendix 4** Instructions for counters taking part in NEWS III, including guidance on recording strandline deposits.

## NEWS Non-Estuarine Waterbird Survey INSTRUCTIONS



Please use the information on this sheet in conjunction with the instructions on the NEWS III recording form.

### When should the counts be made?

A single count of waterbirds (i.e. waders, wildfowl, divers, grebes, cormorants, shags, herons and egrets) on non-estuarine coasts should be made on any date between 1<sup>st</sup> December 2015 and 31<sup>st</sup> January 2016. However, ideally the counts should be made as close to mid-January as possible to coincide with the International Waterbird Count (17<sup>th</sup> January). Counts should be made at any time within a 6 hour period commencing 3 hours before the advertised time of low water and finishing 3 hours after low water. Ideally, adjoining sectors should be counted on the same day. If this is not possible, then counts on different dates are acceptable.

### Supplementary counts

While only a single count during the low tide period is required for the primary objectives of the survey, we would very much welcome supplementary counts on other dates and at other stages of the tide cycle.

### Where to count

Waterbirds should be recorded separately from the three habitats:

- The intertidal shore between the high and low water marks (*essential*).
- The sea adjacent to the coast, as far as you can see (unless particularly difficult).
- The inland areas visible within 100m of the high water mark (unless particularly difficult).

Additionally we are asking you to record details of the strandline (wrack) on the high water mark and the birds using the strandline (wrack) (unless particularly difficult)

### What to count

Recording waders on the intertidal habitat is the priority for this survey. Please ensure that you cover the entire intertidal habitat (including the strandline) and count all wader species within this area.

However, whenever possible, in addition to waders we would also encourage counters to record any other species of birds, including wildfowl, seabirds, raptors and non-waterbirds, and also mammals using each of the habitats within the sectors.

- We do realise that for some areas of coastline the sheer number and diversity of birds present; the weather conditions and the local geography will make the accurate recording of every species impracticable. However, in these circumstances an approximate count would be better than no count.
- There are spaces on the recording form to write in any additional species.
- Please tick the "present" box if a species was present, which you were unable to count. If you are using paper forms, please write "NC" (No Count) in the appropriate space. Please indicate which habitats were surveyed at the top of each species section. *This is very important* because it is the only way we will be able to distinguish Nil Returns (no birds present) from Not Surveyed (birds possibly present but not counted).

### Recording the strandline

In addition to recording habitat details, NEWS presents an opportunity to collect broad-scale data on the volume and use of strandline (wrack) deposits from across Britain and Ireland. Please make a quick assessment of the alongshore extent of each of the height/width classes – see images overleaf for additional guidance. Please also tick the "Any using strandline" box to indicate which species are using the wrack.

### Sectors of coastline to be counted

The sectors to be counted will be supplied to the Regional Organiser and made available online as a prioritised list based on those covered in past surveys. It is therefore very important to stick to the coastal sector indicated on the map (i.e. please do not 'lump' sectors together). The sectors will be colour coded according to their level of importance for coverage, with the 'priority' sectors for coverage shown in red, and non-priority sectors shown in amber, and will include sectors known to have held both large and small numbers of waterbirds during the previous survey. Therefore, we would like Regional Organisers to ensure that at the very least, the 'key' sectors are covered, and to contact the BTO as soon as possible if this proves to be difficult or impossible. Counters are encouraged to request at least one 'priority' sector to count as Regional Organisers will be allocating these first.



NEWS is funded by Natural England, Natural Resources Wales, Scottish Natural Heritage and the WeBS Partnership, supported by I-WeBS



The start and end points are for guidance only. The grid references for the start and end points are plotted at the precise location indicated by counters for the original Winter Shorebird Count in 1985 or as modified for NEWS in 1997/98 and NEWS II in 2006/07. The associated grid references are given to six figures (i.e. nearest 100 metres). The original count stretches were designated by field-workers who took part in the 1985 Winter Shorebird Count. They were asked to base the limits of their count sectors on identifiable features such as changes in substrate (e.g. where rock meets sand), rock outcrops, road-heads etc on features such as a marina or a bay. Especially in the cases of shorter count-stretches, the grid references indicated may seem to be incorrectly positioned because of the precision of the grid references being used. *If there is a clear feature within about 100 metres of the indicated point it is likely that this is the true limit of the count-stretch and so should be used accordingly.*

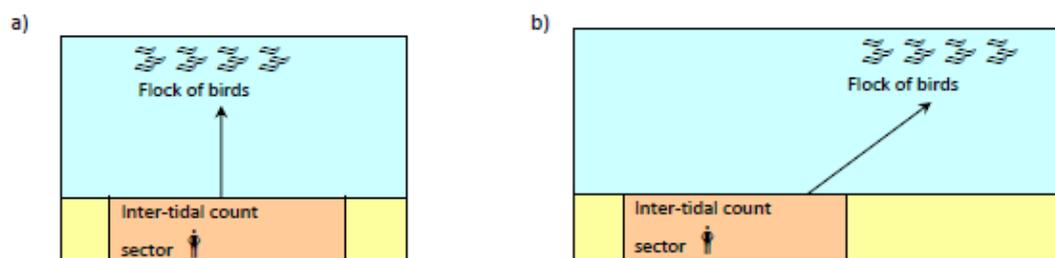
#### Making the counts

**Intertidal:** Wherever possible, where there is a wide shore, please try to walk well down the intertidal area as many birds tend to feed at the water's edge, and might be difficult to count from higher up. Ideally, the counts should be carried out in good weather conditions, commencing on a falling tide. Please ensure that you have read the 'General Health and Safety' form before commencing with any counts ([www.bto.org/health-safety](http://www.bto.org/health-safety)). Always be aware of the possibility of the tide cutting you off from the landward side. Take special care if traversing slippery rocks.

To avoid missing or counting birds twice, only count those birds that you walk past. Any birds disturbed from the beach ahead of the counter that subsequently fly past (and therefore behind the observer), or inland/out to sea, or beyond the end of the sector should be recorded. Any birds that fly past you from behind, and subsequently land in the sector ahead of the observer should be ignored as they will probably already have been recorded. The exception to this would be if the species involved had not been previously recorded, thus ruling out the possibility of double recording. Any birds observed merely flying along/over the sector without actually landing in it should not be recorded.

*To prevent flushing the birds in front of you out of the count sector, try to walk around flocks of birds.* This is likely to be a major problem, as birds will tend to move ahead of the counter and often build up at a break in the substrate type e.g. at the point where rocks becomes sand. If there is a large concentration of several species, it is likely to be difficult to get an accurate count once they are airborne. Try and see if there is an apparent movement of birds ahead of you and try to minimise this by walking higher up the beach if you think that it will lessen the disturbance.

**Offshore:** Only those birds actually offshore from a sector should be included within the counts of that sector (see example a below). Please do not include birds when they are not directly opposite the count sector (see example b below). You may record birds as far offshore as you feel confident in being able to identify them.



Offshore birds flying past should not be recorded unless they were originally on the sea within the sector, or they land offshore from the sector being counted.

**Inland:** Please only record birds that are within 100 m of the high-water mark.

Birds flying inland of the high-water mark should not be counted, unless they have taken off from the sector currently being counted or have landed in it.

If it is not possible to see inland from the beach because of cliffs, then no counts can be made, so please mark the inland habitat as not surveyed.

**\*\*Seabirds (eg Fulmar, Shag, Kittiwake etc) using a cliff face or breeding ledges should be recorded as Intertidal rather than being on the land\*\***

**General:** It will probably be easiest to count birds on the sea and inland at regular intervals along the count sector.

Any flocks of birds in the intertidal area, inland or offshore that overlap two sectors need to be counted carefully. Only record that portion of the flock that occurs within the relevant sector.

Finally, thank you for volunteering for NEWS, we hope you enjoyed taking part in this survey!

## Recording the strandline

