BTO RESEARCH REPORT 761

Analysis of Wetland Bird Survey (WeBS) data for The Humber Estuary SSSI, SAC, SPA and Ramsar site: fourth appraisal – sector-level trends to winter 2021/22

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BTO Birds Science People

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Authors

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Report of work carried out by The British Trust for Ornithology
under contract to Natural England

December 2023

British Trust for Ornithology, The Nunnery, Thetford, Norfolk, IP24 2PU
Registered Charity No. 216652

British Trust for Ornithology

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Published in December 2023 by the British Trust for Ornithology
The Nunnery, Thetford, Norfolk, IP24 2PU, UK

ISBN 978-1-912642-57-1

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EXECUTIVE SUMMARY

1. The Humber Estuary is a site of national and international importance for its wader and wildfowl populations, supporting approximately 141,600 waterbirds on average during the winter and passage periods (winters 2017/18–2021/22, Austin *et al.* 2023). It has been designated as a Special Protection Area (the Humber Estuary SPA) for many waterbird species.

2. The Wetland Bird Survey (WeBS) is a long-running survey recording numbers of all waterbird species, monthly, on sites throughout the UK. This includes counts collected for some 42 count sectors which together cover the Humber Estuary. These data can be used to assess population trends in different parts of the Humber Estuary.

3. This study aimed to update the previous reports (Austin *et al.* 2008; Ross-Smith *et al.* 2013, Woodward *et al.* 2018) that assessed population trends of waterbird species in different parts of the Humber Estuary, in order to identify areas where species were declining contrary to, or in excess of, the trend for the Humber Estuary as a whole and, furthermore, to identify sectors that support an increasing proportion of species that are declining across the Humber Estuary as a whole.

4. Smoothed population trends were generated using data from the period 1995/96-2020/21 and assessed for the most recent winter period for each of the 41 waterbird species specified by Natural England. For 31 species there were sufficient data on at least some sectors to assess sector trends, relative importance in relation to the whole Humber Estuary population and whether the proportion of the entire Humber Estuary population supported by each sector had increased or decreased significantly.

5. In slight contrast to the increase seen in the previous report (Woodward *et al.* 2018) but in partial agreement with the two prior reports (Austin *et al.* 2008 and Ross-Smith *et al.* 2013), populations of most wader species have seen stabilisation in the short- or medium-term following long-term declines. In particular, the northern side of the estuary is seeing populations more in decline, whilst the southern shore (mid and outer particularly) has seen more increases. All sectors have seen some declines on them despite the relatively better performance in the southern sectors as a whole.

6. Population trends of other waterbird species were variable. Two of the goose species are stable following general increases whilst Dark-bellied Brent Goose is in short-term decline. Dabbling ducks also show mostly increasing or stable trends bar Mallard which has been declining on many sectors. Diving ducks have seen strong declines for Pochard and Scaup whilst others are more stable.

7. As described by the previous Humber reports, many of these population changes are in line with regional trends. However, numbers on the Humber Estuary have decreased in importance in terms of the proportion of the regional numbers– Golden Plover, Curlew, Knot, Sanderling, Turnstone and Redshank which may indicate that site-specific factors are affecting Humber populations. In contrast, the proportion of Grey Plover and Ringed Plover supported on the Humber has increased, suggesting that the conditions on the estuary are relatively favourable for these declining species, relative to other sites across the region.

1. INTRODUCTION

1.1 Background

The Humber Estuary is the largest British macro-tidal coastal plain estuary on the North Sea, and is one of the finest examples of an estuary of its type. The Humber Estuary is also a site of national and international importance for its wader and wildfowl populations, in addition to a range of other habitats and species. It is one of the top seven sites in the UK for its waterbird population, having supported an average of approximately 141,600 waterbirds during winter and passage periods over the five-years up to winter 2021/2022 (Austin *et al.* 2023). This total includes nationally important numbers of 22 species in winter and of nine species during passage. As a result, it enjoys the highest levels of legal protection currently possible in this country and is designated as a Site of Special Scientific Interest (SSSI), Special Protection Area (SPA), Special Area of Conservation (SAC), European Marine Site and Ramsar Site. The Humber Estuary SPA is thus designated for its internationally important populations of 25 species of wintering waterbird.

Under the Wildlife and Countryside Act 1981 (as substituted by CRoW 2000 and inserted by NERC 2006) Natural England (NE) must consider notices for operations on the Humber Estuary SSSI, such as wildfowling, and determine whether to consent or refuse these proposals, or to impose conditions on the way they are carried out. Under the auspices of the Conservation of Habitats and Species Regulations 2017, Natural England also undertakes and advises on Habitats Regulations Assessment (HRA) concerning the effects of plans and projects on the Humber Estuary as a European site (SPA, SAC and Ramsar Site). One of the major considerations in consenting activities and undertaking/advising on HRA is the likely impact of the proposed activity or development on SPA birds.

An analysis of Wetland Bird Survey (WeBS) data held by the British Trust for Ornithology (BTO) for each of the 41 different geographical count units (sectors) on the Humber Estuary was carried out by the BTO in 2008 to provide better understanding of fluctuations in bird numbers on the Humber Estuary and to assess the potential impact of activities and developments on SPA populations (Austin *et al.*, 2008). This report was updated in 2013 and 2018 to include analysis of more recent data on bird population fluctuations in different parts of the Humber Estuary and to identify recent changes in bird population numbers within each sector as compared to the Humber Estuary as a whole (Ross-Smith *et al.*, 2013, Woodward *et al.* 2018). All three reports have played an important part in the consenting of operations and HRA of plans and projects in Humber Estuary. This new update again incorporates the most recent data available (up to winter 2021/22) and includes analysis of additional species.

1.2 Objectives

The aim of this project is to update Woodward *et al.* (2018) by including the most recent WeBS data in the existing analysis and interpretation of bird population trends in the Humber Estuary. This will allow a reappraisal of our understanding of fluctuations in numbers of certain waterbird species to inform the consenting of operations and appropriate assessments of plans and projects on the Humber Estuary by:

- providing updated abundance trends from those available in the 2018 report for each of the WeBS sectors of the Humber Estuary for the 36 internationally important wintering waterbird species and comparing these trends to the Humber Estuary as a whole. The species to be re-analysed are:

Tundra Bean Goose	Dark-bellied Brent Goose	Greylag Goose
Pink-footed Goose	European White-fronted Goose	Shelduck
Shoveler	Gadwall	Wigeon
Mallard	Pintail	Teal
Pochard	Tufted Duck	Scaup
Goldeneye	Smew	Oystercatcher
Avocet	Lapwing	Golden Plover
Grey Plover	Ringed Plover	Whimbrel
Curlew	Bar-tailed Godwit	Black-tailed Godwit
Turnstone	Knot	Ruff
Sanderling	Dunlin	Green Sandpiper
Redshank	Greenshank	Little Egret

- undertaking analyses of the abundance trends for five further species and comparing these trends to the Humber Estuary as a whole, provided sufficient data are available to do so. The five additional species to be considered for analysis are:

Moorhen	Coot	Common Crane
Snipe	Great White Egret	

- identifying those WeBS sectors in which substantial numbers of species are declining contrary to, or more rapidly than on the Humber Estuary as a whole and assessing whether any changes have occurred since Woodward *et al.* (2018).

- identifying those sectors that support a substantial proportion of each species and assessing whether any changes have occurred since Woodward *et al.* (2018).

1.3 Species

The 41 species for which data were analysed for this report are listed in Table 1.1, along with their SPA status (Natural England 2007). Trends for one or more sectors could be produced for 31 of the 41 species but there were insufficient data to produce trends for the others (see further details under Methodology, Section 2.1 below).

Table 1.1 Species for which trends and analyses were considered, their designation and whether or not they occur in sufficient numbers and frequency for analysis of sector trends**.**

Species	**SPA feature[1]**	**Sector level analysis**
Tundra Bean Goose *Anser serrirostris*		x
Dark-bellied Brent Goose *Branta bernicla bernicla*	✓	✓
Greylag goose *Anser anser*		✓
Pink-footed Goose *Anser brachyrhynchus*		✓
European White-fronted Goose *Anser albifrons albifrons*		x
Shelduck *Tadorna tadorna*	✓*	✓
Shoveler *Spatula clypeata*		✓
Gadwall *Mareca strepera*		✓
Wigeon *Mareca penelope*	✓	✓
Mallard *Anas platyrhynchos*	✓	✓
Pintail *Anas acuta*		✓
Teal *Anas crecca*	✓	✓
Pochard *Aythya ferina*	✓	✓
Tufted Duck *Aythya fuligula*		✓
Scaup *Aythya marila*	✓	x
Goldeneye *Bucephala clangula*	✓	✓
Smew *Mergus albellus*		x
Moorhen *Gallinula chloropus*		✓
Coot *Fulica atra*		✓
Common Crane *Grus grus*		x

Species	SPA feature[1]	Sector level analysis
Oystercatcher *Haematopus ostralegus*	✓	✓
Avocet *Recurvirostra avosetta*	✓*	✓
Lapwing *Vanellus vanellus*	✓	✓
Golden Plover *Pluvialis apricaria*	✓*	✓
Grey Plover *Pluvialis squatarola*	✓	✓
Ringed Plover *Charadrius hiaticula*	✓	✓
Whimbrel *Numenius phaeopus*	✓	x
Curlew *Numenius arquata*	✓	✓
Bar-tailed Godwit *Limosa lapponica*	✓*	✓
Black-tailed Godwit *Limosa limosa*	✓*	✓
Turnstone *Arenaria interpres*	✓	✓
Knot *Calidris canutus*	✓*	✓
Ruff *Philomachus pugnax*	✓*	x
Sanderling *Calidris alba*	✓	✓
Dunlin *Calidris alpina*	✓*	✓
Snipe *Gallinago gallinago*		✓
Green Sandpiper *Tringa ochropus*		x
Redshank *Tringa totanus*	✓*	✓
Greenshank *Tringa nebularia*	✓	x
Great White Egret *Ardea alba*		x
Little Egret *Egretta garzetta*		✓

[1] Identifies species which qualify as an SPA feature in their own right, as they occurred in nationally or internationally important numbers at the time of the SPA citation (marked *), and those which are listed as being part of the waterbird assemblage feature on the SPA citation (Natural England 2007). ***Note however that, with the exception of Greylag Goose (a re-established species), the other species listed in the table also qualify as an SPA feature as part of the SPA Assemblage feature, even though they were not specifically mentioned on the citation***.

2. METHODOLOGY

2.1 Waterbird Data

WeBS is a long-running survey that monitors waterbird numbers on sites throughout the UK via monthly site visits, when numbers of all waterbird species are recorded (Austin *et al.* 2023). On large sites, such as the Humber Estuary, where it is not feasible, or indeed desirable, to make a single count for the entire site, synchronous counts of smaller count sectors are undertaken by teams of volunteer counters (Figure 2.1.i). These sector counts are routinely summed to give the overall site total, and during this process the completeness of the overall count assessed. This is required because all sectors are not necessarily counted on all occasions. This completeness assessment is species specific because the absence of data from a given sector would not be expected to affect the overall total equally for all species. Furthermore, completeness is assessed on a month by month, year by year basis using algorithms that allow for both seasonal and long-term trends in site usage. Thus a consolidated count for a site composed of multiple sectors is considered complete when those sectors counted on the month in question would be expected to hold at least 75% of the site total for the species in question for the season and year in question. Whilst the division of large sites into sectors has evolved principally in response to the practicality of undertaking counts, the divisions between sectors typically follow distinctive features of the environment. Thus an analysis of waterbird trends on the individual sectors can inform in a biologically meaningful manner.

Over time, and particularly on larger sites a complex hierarchy of site structure can develop as sectors are subdivided by WeBS counters, however, importantly, existing sector boundaries are retained and incorporated into the new divisions to ensure that counts from divided sectors can be combined and numbers compared over long time series. Thus the hierarchical structure of the Humber Estuary count sectors (Figure 2.1.ia & b) has evolved through time as existing sectors have been subdivided.

Forty constituent and extant WeBS sectors of the Humber Estuary were considered in this report (Figure 2.1.ii)[1].

[1] This report primarily considers these forty WeBS sectors for simplicity and parsimony. As shown in Figures 2.1.ia and b, the Humber Estuary is composed of more than forty sectors. However, many of these are either no longer counted, or are composite sectors (e.g. Theddlethorpe to Grainthorpe Marsh, or Goole to Faxfleet), such that any information on trends therein encompasses that of the WeBS sectors at a finer spatial resolution. Analysis and interpretation in this report is carried out at the finest spatial resolution possible, although references to trends across larger parts of the Humber are included in species accounts (Section 4).

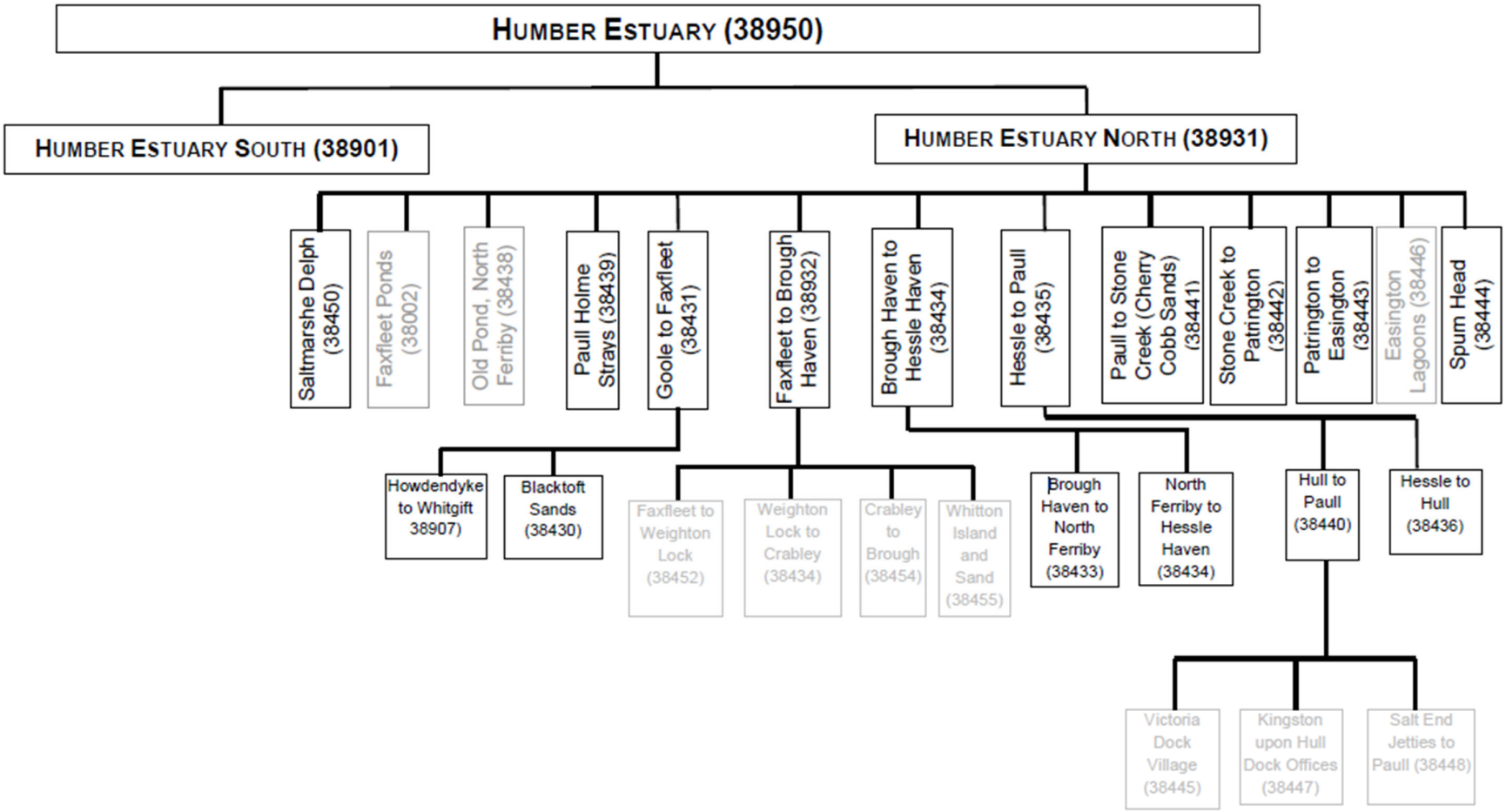

Figure 2.1.ia Structural hierarchy of WeBS count sectors on the north side of the Humber Estuary. Greyed out boxes identify sectors for which data for at least the most recent five winters are unavailable. Sectors at the finest spatial scale are primarily considered for interpretation in this report. Note that birds at Easington Lagoons (Beacon Ponds) are included within Spurn Head counts (38444). Easington Lagoons was added as a new sector in 2018/19 with the intention of counting Easington Lagoon and Spurn Head as two separate count sectors, but this change in recording has not yet occurred.

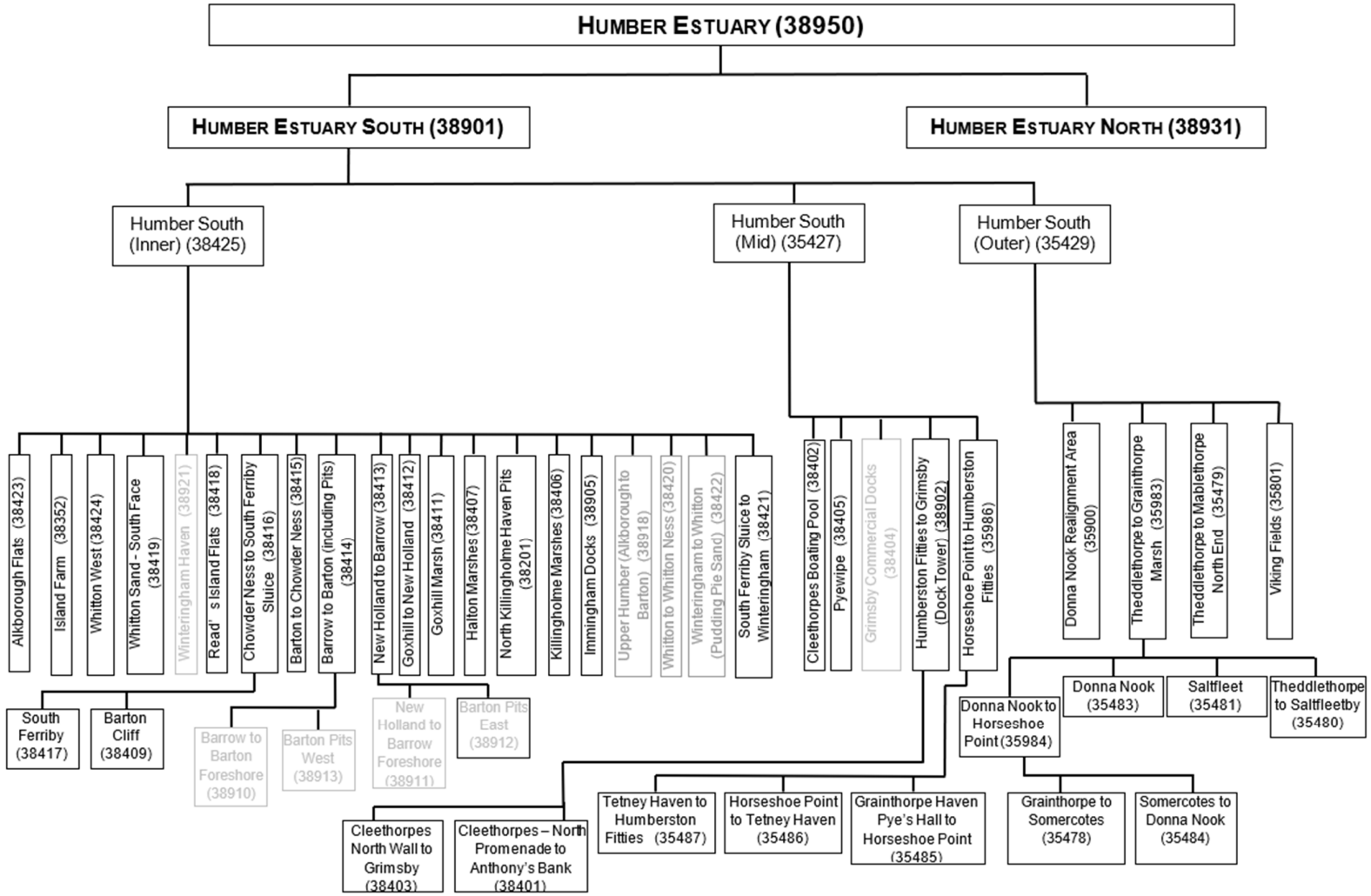

Figure 2.1.ib Structural hierarchy of WeBS count sectors on the south side of the Humber Estuary. Greyed out boxes identify sectors for which data for at least the most recent five winters are unavailable. Sectors at the finest spatial scale are primarily considered for interpretation in this report.

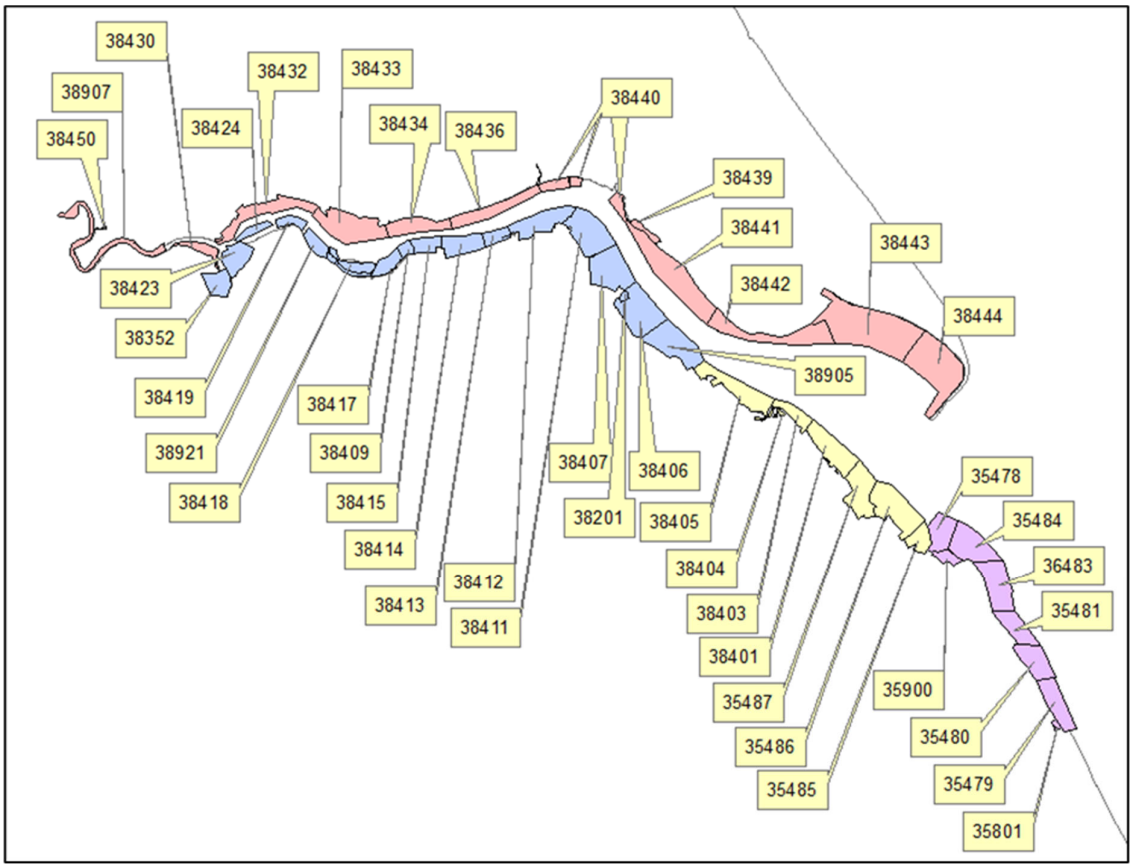

Figure 2.1.ii Locations of each count sector on the Humber Estuary. Four groupings of sectors are shown as follows: "Humber Estuary (North)" is shown in dark pink; "Humber South (Inner)" in light blue; "Humber South (Mid)" in pale yellow; and "Humber South (Outer)" in lilac. These WeBS sectors represent the scale at which data are analysed in this report. Note that some sectors (e.g. sector 38440) have recently been further subdivided for WeBS counts (see Figure 2.1.ia & b) but there are insufficient data to analyse these sectors at the finer scale.

2.1.1 Smoothed waterbird trends and percentage change

The methodology used to produce smoothed site, regional and national trends as reported by WeBS Alerts (Woodward *et al.* 2019) can be usefully extended to generate trends on smaller areas of interest such as single or appropriately grouped WeBS count sectors. It is, however, important to recognise that the numbers of birds underlying the observed trend on sectors are generally much lower than those underlying site trends reported by WeBS Alerts which, by definition, are at least equal to the national qualifying threshold. Consequently, individual trends should not be 'over-interpreted'. For example, a 50% decline from 30 birds to 15 birds would give much less cause for concern than a 50% decline from 1000 to 500 birds the latter being much more likely to reflect a real and substantial loss of birds from an area than the former. However, whilst acknowledging this, a consistent pattern of decline across multiple species, even when the numbers involved for some of them are comparatively low, is strongly indicative of adverse factors affecting the sector in question, and the particular suite of species showing a decline in numbers can guide us in where to look for problems (for example, does the suite of species represent those known to be particularly sensitive to disturbance or those with similar ecological requirements).

Thus, using the latest available validated WeBS data (those to winter 2021/22 inclusive), following Atkinson *et al.* (2000, 2006), smoothed trends were calculated using Generalized Additive Models (GAMs) for the relevant species. The smoothing is to ensure that year-specific factors, such as poor conditions on the breeding grounds or particularly harsh weather on the wintering grounds, that are not related to changes in the quality of the Humber Estuary itself, do not contribute overly to the trend. Percentage change has been calculated for short- (5 years) medium- (10 years) and long-term (25 years). The long-term period has been updated from 15 years in previous reports now that sufficient time series are available at the sector level. Consequently, it now matches the length of the long-term period used in the WeBS Alerts report (Woodward *et al*. 2019). To ensure statistical robustness, percentage change is calculated with reference to the penultimate winter in the time series available so as to avoid referring to the end points of the smoothed trend (which are less robust). By way of analogy with the WeBS Alerts system, declines of at least 25% but below 50% are flagged as medium-declines (or moderate declines), and declines of 50% or greater are flagged as high-declines (or sharp declines). We specifically do not use the terms medium- and high-Alerts because unlike the percentage change reported by WeBS Alerts, medium and high declines reported at the sector level do not constitute a formal WeBS Alert. The corresponding percentage change required to balance the numbers to their former level following a decline are likewise termed medium- or moderate (at least 33% but below 100%) and high- or sharp (100% or greater) increases.

Trends can only be produced for species where sufficient data exist across the years being considered, and cannot be produced for species which are recorded irregularly and/or in very low numbers on the Humber Estuary in winter (Tundra Bean Goose, European White-fronted Goose, Common Crane, Scaup, Smew, Great White Egret). In addition, trends are for the winter period only, and robust WeBS trends cannot be produced for species which are almost entirely recorded on passage (Ruff, Whimbrel, Green Sandpiper, Greenshank). Wintering trends rely on the assumption that the number of individuals present at a site usually remains relatively stable for several weeks at a time (or longer) and hence monthly WeBS counts are representative of the wintering population. This is not the case during passage months: numbers can fluctuate on a daily basis as birds arrive and depart, so counts may vary by chance from year to year according to whether or not the count date happens to coincide with a peak in passage. In addition, passage birds are present for a relatively short but unknown length of time, which may also vary from year to year. For both these reasons, numbers counted during passage months cannot be considered representative of the passage population in a particular year, and hence trends are not produced.

2.1.2 Placing the smoothed waterbird indices into context

Once the smoothed sector indices have been produced the observed trends are placed in context of the site trends. Following Banks and Austin (2004), the standard WeBS methodology as used to compare site trends with regional and national trends when reporting WeBS Alerts (Woodward *et al.* 2019) is extended here to compare counts sector trends with site trends. Where waterbird numbers of a given species on a given count sector follow those of the species across the site as a whole then the proportion of site numbers on the sector will remain constant. Any significant deviation from this gradient of zero would indicate that the waterbird populations on the relevant count sector are doing either better or less well than would be expected from the site trend. Consequently:

- where a decline on a sector reflects a decline across the site as a whole it is unlikely that the observed site trend is being driven by factors affecting that sector. If this is true of the majority of sectors, then this may indicate that the observed site decline in the species in question is due to factors external to the site and are thus not due to site management issues *per se*;

- where a decline on a sector is more pronounced than that across the site as a whole, this may suggest that factors affecting that sector could be contributing to the overall decline;
- where a decline on a sector is less pronounced than the decline across the site as a whole, this suggests that relatively favourable conditions on that sector are helping buffer site declines;

- where an increase on a sector is less pronounced than that across the site as a whole, this suggests that the sector is already at carrying capacity for the species in question or, if historically it supported greater numbers, that the quality of the sector to that species has diminished;

- where an increase on a sector is greater than that across the whole site, this suggests that trends on that sector are driving the increase across the site or that the sector in question is relatively attractive compared to the site as a whole when increased numbers arrive at the site due to external factors.

The comparisons between sectors and site are derived from a logistic regression model with a binomial error term. The resulting plots depict the percentage contribution of the sector to the site as a whole and the associated confidence limits represent both variation in this proportion between months in a given year and the underlying sample size (for example, we would be more confident of our estimate that a sector contributed 10% of the site total if 100 birds out of 1000 on the site were counted there than we would be if this was 10 out of 100). This is based on the winter period as routinely used for all WeBS reporting (Nov-Mar for waders and Sep-Mar for other species). Only data from months where counts consolidated across the site as a whole had been assessed as complete were used - following standard WeBS protocol described above.

Having considered the trends on the sectors, each in the context of trends across the site as a whole, it is important to consider the site trends in the context of the region – here the area covered by the Environment Agency (EA)'s Anglian Region and Yorkshire and North East Region combined (following standard WeBS Alerts reporting), as this can modify our interpretation of the pattern of change across sectors. This is especially important where there has been an increase or decline regionally. Consequently:

- where there has been an apparent re-distribution of a species within the Humber Estuary (that is, declines on some sectors appear to be balanced by increases on other sectors), but the proportional contribution of the Humber Estuary to increasing regional numbers is declining, then this implies that those sectors on the Humber Estuary with static or declining numbers are actually of concern because we would expect them to be increasing in parallel with the other sectors. Thus, in such cases, the apparent redistribution within the Humber Estuary is misleading and the species in question may be facing problems on those sectors not supporting an increase in numbers;

- where a species is in regional decline, we would expect declines on at least some of the sectors of the Humber Estuary regardless of whether birds are being affected by adverse factors locally. Thus, we would expect those sectors of least suitable habitat to a given species to be the first to show a decline in numbers.

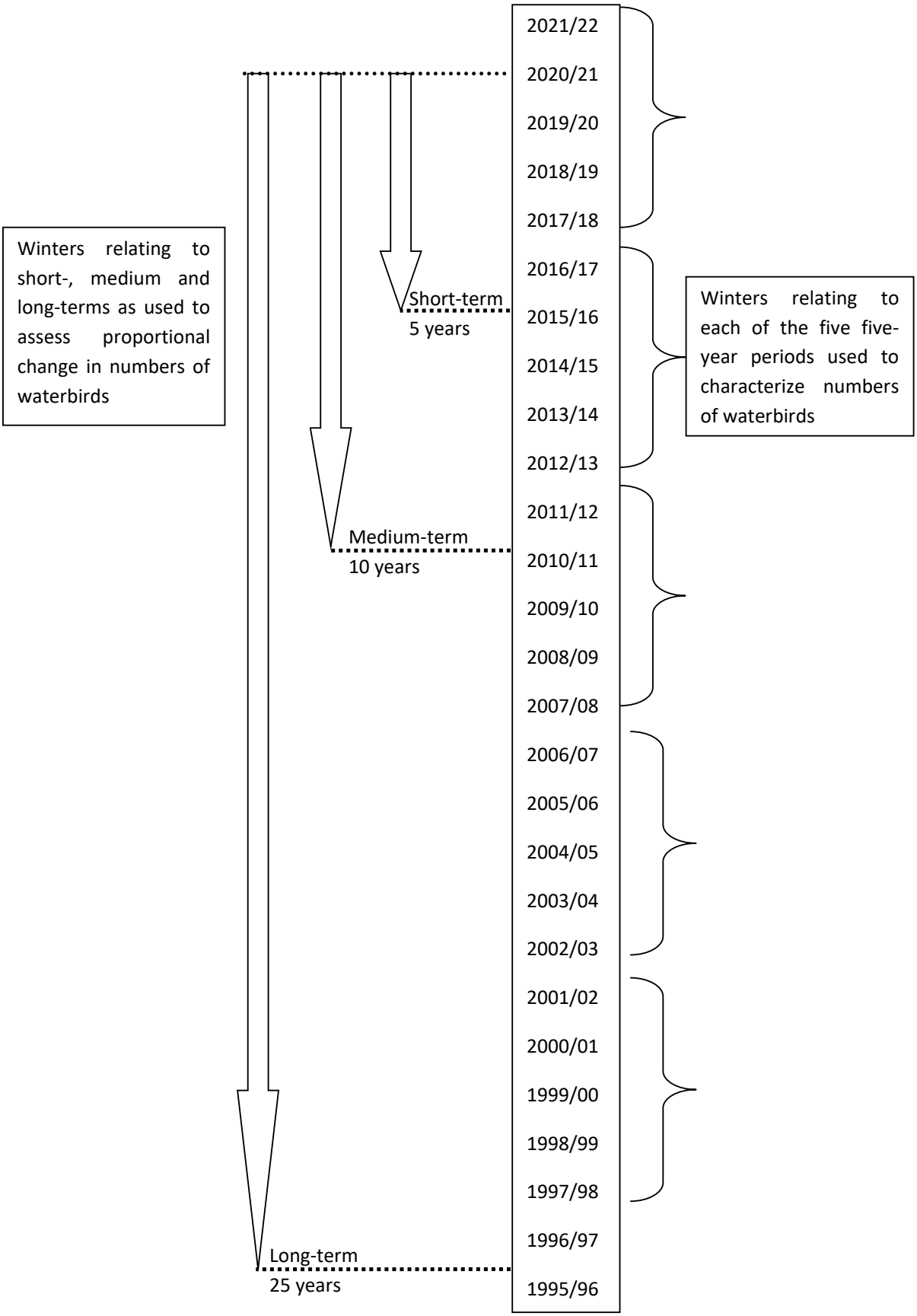

Figure 2.1.2.i Schematic of reference winters used for reported waterbird numbers and change.

2.1.3 Comparing figures and tables with previous reports

The tables and figures presented in the appendices of this report (provided as separate MS Excel Documents) contain all the information found in the previous analyses of WeBS count sector trends (Woodward *et al.* 2018, Austin *et al.*, 2008; Ross-Smith *et al.*, 2013).
We draw your attention to the following:

- in the trend plots for sectors and site we present both winter averages (as previously) in blue and winter peaks in green. The latter have been requested by NE for sector level analyses because they are referred to in NE documentation on guidelines for consideration of wildfowling consents. However, interpretations in this report are based primarily on the winter averages because unlike winter peaks they are robust against missing data or abnormal counts due to severe weather events, disturbance incidents or other unusual occurrences. Also if there were to be a trend in over-winter carrying capacity of a sector this will be reflected in the winter-averages (essentially an index of bird-days supported by a sector) but easily missed by the winter peak.

- in the table of change (Table 3.1.i & 3.1.ii) each of the long-, medium- and short-term changes are colour coded independently in this report, as in Woodward *et al.* (2018), Ross-Smith *et al.* (2013). In Austin *et al.* (2008), a single table cell was colour coded for the worst-case scenario across all three timeframes. For example, under the old system a sector for which there was a high decline in the long-term, a medium increase in the medium term and a high increase in the short-term would have been colour coded red despite a decline only being an issue over one of the three timeframes. Under the new scheme a triplet of adjoining table cells for the high-, medium- and short terms would be colour coded red, light-green, dark-green respectively thus reflecting the turnaround in the trend.

The tables in the current report can be compared directly with the corresponding tables from Austin *et al.* (2008) by taking the worst-case scenario from each triplet.

Furthermore, the BTO has prepared a guidance document 'Guidance to interpretation of Wetland Bird Survey within-site trends' (Austin & Ross-Smith 2013) to aid the interpretation of WeBS sector trend analyses. This document is also provided in the supplementary material accompanying this report. These guidelines give full details of analyses included in this report and the rationale behind them as an aid to the interpretations of numbers and trends on WeBS count sectors. In summary these include:

- proportional change in the numbers of each species assessed over the long-, medium- and short-terms (Overview: Tables 3.1.i & 3.1.ii, for underlying values see sheet 'Table Of Change' in 'Appendix A1 - Humber Estuary Sub-areas.xls').

- means of peak counts of each species for the most recent five-winter period or the most recent winter period available highlighting, for each species, sectors which support a high proportion of the birds using the SPA (Overview: Tables 3.1.iii & 3.1.iv, for important sectors; for underlying values together with equivalent values for the previous four five-winter periods and the Peak value in the most recent winter, see sheets 'MOPs' in 'Appendix A1 - Humber Estuary Sub-areas.xls).

- the proportion of species assessed as falling into each of the five categories from high decline through to high increase (mapped pie-charts: Figure 3.1.vi to 3.1.viii).

- for each species for each sector, graphs depicting both annual mean and annual peak numbers together with, where there is sufficient data, the smoothed trends through each. Accompanying each of these is a graph showing the proportional contribution of each sector to the overall numbers across the whole of the Humber (see 'Appendix A1 - Humber Estuary Sub-areas.xls' and for each sub-area and Appendices A2-A5 for the North, South Inner, South Mid and South Outer Sectors (placed in separate documents to make navigation easier due to the large number of Humber sectors).

- density plots for each species across all sectors which focus attention on the most important areas for each species (Appendix B).

3. RESULTS

3.1 Sector Trend Plots

The trends of each species on each WeBS sector are given in accompanying MS Excel™ Workbooks Appendices A1-A5, together with plots comparing the count sector trends with the site trends for the Humber Estuary. This series of plots puts each sector into the context of trends on the Humber Estuary as a whole. This information is summarised below (Tables 3.1.i and 3.1.ii)[2]. Colour coding is used to represent declines or increases; species are listed in taxonomic order and sectors have been listed to represent their geographical proximity to each other. Caution is advisable in interpreting individual cells in these tables at face value. For example, a 50% decline (shown in red) could represent a decline from 10,000 to 5,000 birds or could be a decline from 20 to 10. Consequently, it is important to be aware of the numbers of birds involved (obtainable from the plots or the mean of peak numbers in appendices A1-A5). However, consistency between adjacent cells would suggest that either a group of species or a group of adjacent sectors have similar trends even when numbers of individuals involved are relatively low. Where this is the case, this may suggest that the trends represent real ecological changes. Note that trends have not been calculated for ten species due to the very low numbers or intermittent occurrence during the winter on the Humber Estuary (Tundra Bean Goose, European White-fronted Goose, Common Crane, Scaup, Smew, Great White Egret, Ruff, Whimbrel, Green Sandpiper, Greenshank). Graphs showing peak and mean counts based on the raw count data are presented for these species but should consequently be interpreted with caution

This information is further summarised in map format, which better facilitates a geographic interpretation of the trends for all species as a whole (Figures 3.1.v to 3.1.viii) (see also Appendices A1-A5).

The importance of individual sectors for given species can be determined by considering the five-year mean of peak counts and peak counts from the most recent winter (Tables 3.1.iii and 3.1.iv) and underlying values are available in the supporting material (Appendix A1 - Humber Estuary Sub-areas.xlsx); the importance of individual sectors to particular species clearly influences the level of concern regarding the characteristics of the trends.

[2] As explained on page 4, information in these tables does not include composite sectors (with the exception of Humber Estuary (North), Humber South (Inner), Humber South (Mid) and Humber South (Outer) or obsolete sectors. This is for simplicity of interpretation and parsimony.

Table 3.1.i Overview of population trends of wildfowl and Little Egret within the Humber Estuary over the long- (1995/96–2020/21) the medium- (2010/11–2020/21) and the short- (2015/16–2020/21) terms**.** Cells are coloured to indicate trend status as follows: Red – a decline in numbers of at least 50%; Orange – a decline in numbers of at least 25% but less than 50%; White – a decline in numbers of less than 25% or an increase of less than 33%; Pale Green & black arrow – an increase in numbers of at least 33% but less than 100%; Dark Green & white arrows – an increase in numbers of at least 100%.

Table 3.1.ii Overview of population trends of waders within the Humber Estuary over the long- (1995/96–2020/21) the medium- (2010/11–2020/21) and the short- (2015/16–2020/21) terms**.** Cells are coloured to indicate trend status as follows: Red – a decline in numbers of at least 50%; Orange – a decline in numbers of at least 25% but less than 50%; White – a decline in numbers of less than 25% or an increase of less than 33%; Pale Green & black arrow – an increase in numbers of at least 33% but less than 100%; Dark Green & white arrows – an increase in numbers of at least 100%.

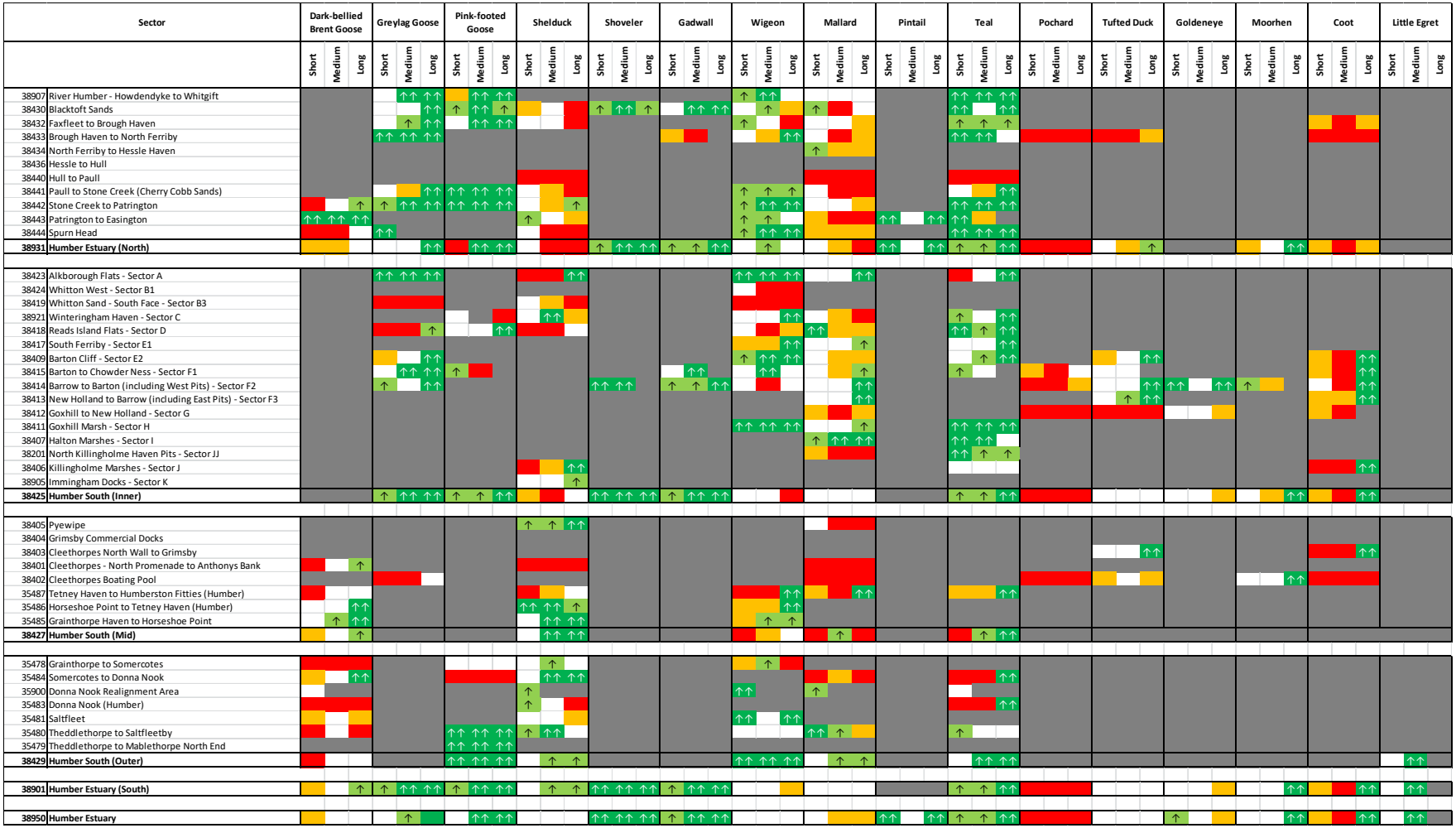

Table 3.1.iii The most important sectors for wildfowl species, moorhen, coot, great white egret and little egret in the Humber Estuary shown by colour: **Dark Blue –** sectors with a mean peak count over the last five winters (2015/06–2020/21) that is at least 20% of the total mean peak counts for the Humber Estuary over the same period; **Light Blue –** sectors with a mean peak count over the last five winters that is between 10% and 20% of the total mean of peak count for the Humber Estuary over the same period. **Dark Green –** sectors with a mean peak count over the last five winters that is less than 10% of that for the Humber Estuary, but the peak in the last winter has exceeded 20% of the five-year mean peak for the SPA. **Pale Green –** sectors for which the mean peak count over the last five winters was less than 10% of that for the SPA, but the peak in the last winter exceeded 10% of the five-year mean peak for the SPA.

Sector	Sector Name	Dark-bellied Brent Goose	Pink-footed Goose	Greylag Goose	European White-fronted Goose	Shelduck	Shoveler	Gadwall	Wigeon	Mallard	Pintail	Teal	Pochard	Tufted Duck	Scaup	Goldeneye	Smew	Moorhen	Coot	Great White Egret	Little Egret
38907	River Humber - Howdendyke to Whitgift																				
38450	Saltmarshe Delph																				
38430	Blacktoft Sands																				
38002	Faxfleet Ponds																				
38432	Faxfleet to Brough Haven																				
38433	Brough Haven to North Ferriby																				
38434	North Ferriby to Hessle Haven																				
38436	Hessle to Hull																				
38440	Hull to Paull																				
38441	Paull to Stone Creek (Cherry Cobb Sands)																				
38439	Paull Holme Strays																				
38442	Stone Creek to Patrington																				
38443	Patrington to Easington																				
38444	Spurn Head																				
38931	**Humber Estuary (North)**																				
38423	Alkborough Flats - Sector A																				
38352	Island Farm																				
38424	Whitton West - Sector B1																				
38419	Whitton Sand - South Face - Sector B3																				
38421	South Ferriby Sluice to Winteringham																				
38921	Winteringham Haven - Sector C																				
38418	Reads Island Flats - Sector D																				
38417	South Ferriby - Sector E1																				
38409	Barton Cliff - Sector E2																				
38415	Barton to Chowder Ness - Sector F1																				
38414	Barrow to Barton (including Pits) - Sector F2																				
38413	New Holland to Barrow - Sector F3																				
38412	Goxhill to New Holland - Sector G																				
38411	Goxhill Marsh - Sector H																				
38407	Halton Marshes - Sector I																				
38201	North Killingholme Haven Pits - Sector JJ																				
38406	Killingholme Marshes - Sector J																				
38905	Immingham Docks - Sector K																				
38425	**Humber South (Inner)**																				
38405	Pyewipe																				
38403	Cleethorpes North Wall to Grimsby																				
38401	Cleethorpes - North Promenade to Anthonys Bank																				
38402	Cleethorpes Boating Pool																				
35487	Tetney Haven to Humberston Fitties (Humber)																				
35486	Horseshoe Point to Tetney Haven (Humber)																				
35485	Grainthorpe Haven to Horseshoe Point																				
38427	**Humber South (Mid)**																				
35478	Grainthorpe to Somercotes																				
35484	Somercotes to Donna Nook																				
35900	Donna Nook Realignment Area																				
35483	Donna Nook (Humber)																				
35481	Saltfleet																				
35480	Theddlethorpe to Saltfleetby																				
35479	Theddlethorpe to Mablethorpe North End																				
35801	Viking Fields																				
38429	**Humber South (Outer)**																				
38901	**Humber Estuary (South)**																				
38950	**Humber Estuary**																				

Table 3.1.iv The most important sectors for wader species in the Humber Estuary shown by colour: **Dark Blue –** sectors with a mean peak count over the last five winters (2015/06–2020/21) that is at least 20% of the total mean peak counts for the Humber Estuary over the same period; **Light Blue –** sectors with a mean peak count over the last five winters that is between 10% and 20% of the total mean of peak count for the Humber Estuary over the same period. **Dark Green –** sectors with a mean peak count over the last five winters that is less than 10% of that for the Humber Estuary, but the peak in the last winter has exceeded 20% of the five-year mean peak for the SPA. **Pale Green –** sectors for which the mean peak count over the last five winters was less than 10% of that for the SPA, but the peak in the last winter exceeded 10% of the five-year mean peak for the SPA.

Sector	Sector Name	Oystercatcher	Avocet	Lapwing	Golden Plover	Grey Plover	Ringed Plover	Whimbrel	Curlew	Bar-tailed Godwit	Black-tailed Godwit	Turnstone	Knot	Ruff	Sanderling	Dunlin	Snipe	Green Sandpiper	Redshank	Greenshank
38907	River Humber - Howdendyke to Whitgift																			
38450	Saltmarshe Delph																			
38430	Blacktoft Sands																			
38002	Faxfleet Ponds																			
38432	Faxfleet to Brough Haven																			
38433	Brough Haven to North Ferriby																			
38434	North Ferriby to Hessle Haven																			
38436	Hessle to Hull																			
38440	Hull to Paull																			
38441	Paull to Stone Creek (Cherry Cobb Sands)																			
38439	Paull Holme Strays																			
38442	Stone Creek to Patrington																			
38443	Patrington to Easington																			
38444	Spurn Head																			
38931	**Humber Estuary (North)**																			
38423	Alkborough Flats - Sector A																			
38352	Island Farm																			
38424	Whitton West - Sector B1																			
38419	Whitton Sand - South Face - Sector B3																			
38421	South Ferriby Sluice to Winteringham																			
38921	Winteringham Haven - Sector C																			
38418	Reads Island Flats - Sector D																			
38417	South Ferriby - Sector E1																			
38409	Barton Cliff - Sector E2																			
38415	Barton to Chowder Ness - Sector F1																			
38414	Barrow to Barton (including Pits) - Sector F2																			
38413	New Holland to Barrow - Sector F3																			
38412	Goxhill to New Holland - Sector G																			
38411	Goxhill Marsh - Sector H																			
38407	Halton Marshes - Sector I																			
38201	North Killingholme Haven Pits - Sector JJ																			
38406	Killingholme Marshes - Sector J																			
38905	Immingham Docks - Sector K																			
38425	**Humber South (Inner)**																			
38405	Pyewipe																			
38403	Cleethorpes North Wall to Grimsby																			
38401	Cleethorpes - North Promenade to Anthonys Bank																			
38402	Cleethorpes Boating Pool																			
35487	Tetney Haven to Humberston Fitties (Humber)																			
35486	Horseshoe Point to Tetney Haven (Humber)																			
35485	Grainthorpe Haven to Horseshoe Point																			
38427	**Humber South (Mid)**																			
35478	Grainthorpe to Somercotes																			
35484	Somercotes to Donna Nook																			
35900	Donna Nook Realignment Area																			
35483	Donna Nook (Humber)																			
35481	Saltfleet																			
35480	Theddlethorpe to Saltfleetby																			
35479	Theddlethorpe to Mablethorpe North End																			
35801	Viking Fields																			
38429	**Humber South (Outer)**																			
38901	**Humber Estuary (South)**																			
38950	**Humber Estuary**																			

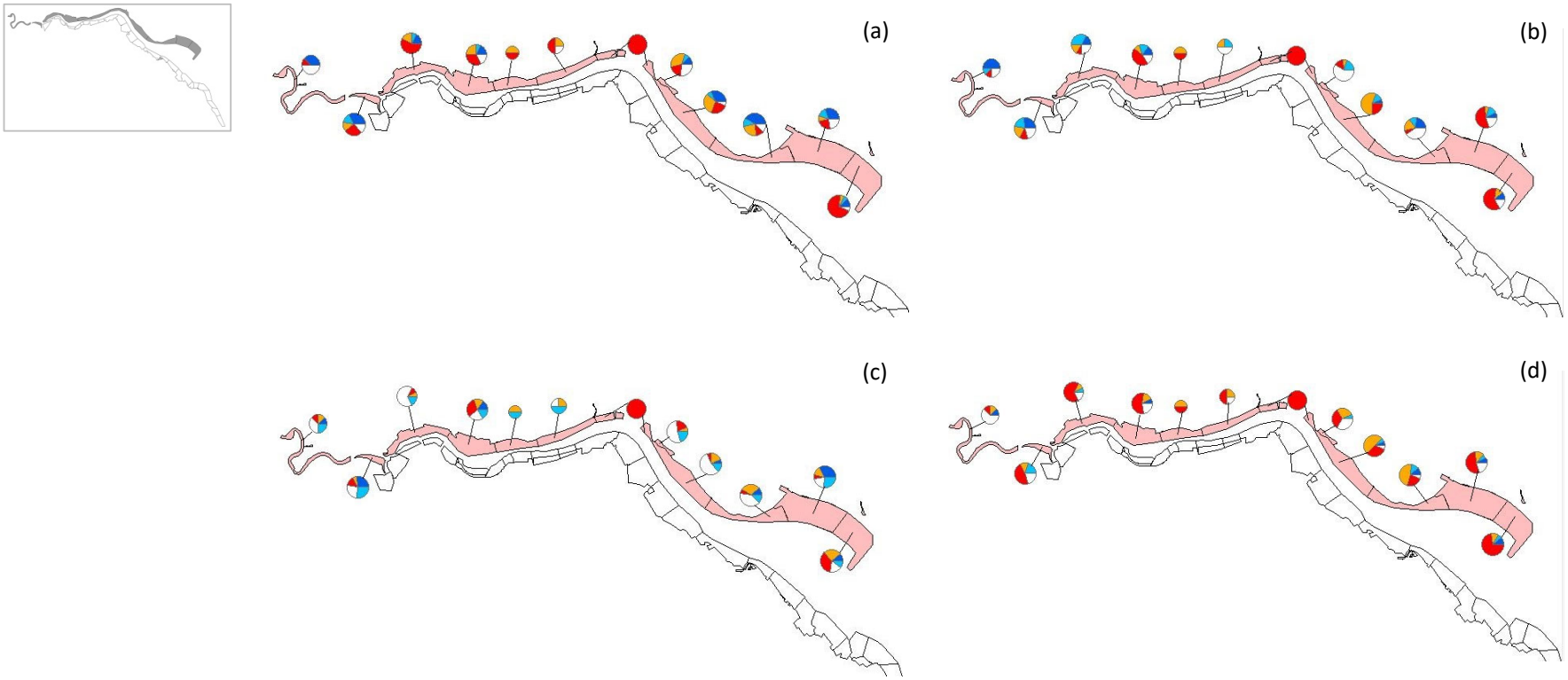

Figure 3.1.v **Population trends of waterbirds within the Humber Estuary (North) over (a) the long-term (1995/96–2020/21); (b) the medium-term (2010/11–2020/21); (c) the short-term (2015/16–2020/21) and (d) the "worst case" scenario (poorest trend from any of the three periods).** The area of each pie chart relates to the number of species for which trends could be determined on the WeBS count sector in question and within each pie chart the proportions of those species that have undergone a substantial decline (red), a moderate decline (orange), "no" change (white), moderate increase (pale blue) and sharp increase (dark blue).

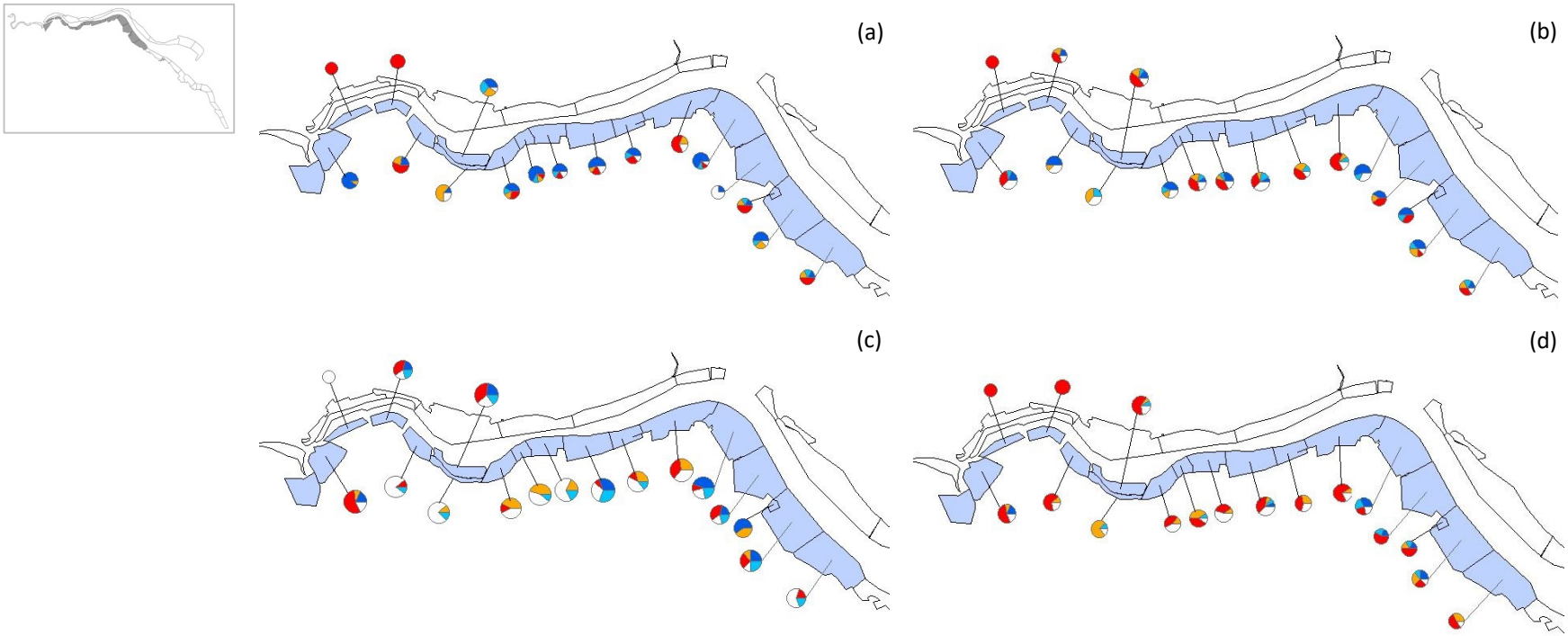

Figure 3.1.vi **Population trends of waterbirds within the Humber South (Inner) over (a) the long-term (1995/96–2020/21); (b) the medium-term (2010/11–2020/21); (c) the short-term (2015/16–2020/21) and (d) the "worst case" scenario (poorest trend from any of the three periods).** The area of each pie chart relates to the number of species for which trends could be determined on the WeBS count sector in question and within each pie chart the proportions of those species that have undergone a substantial decline (red), a moderate decline (orange), "no" change (white), moderate increase (pale blue) and sharp increase (dark blue).

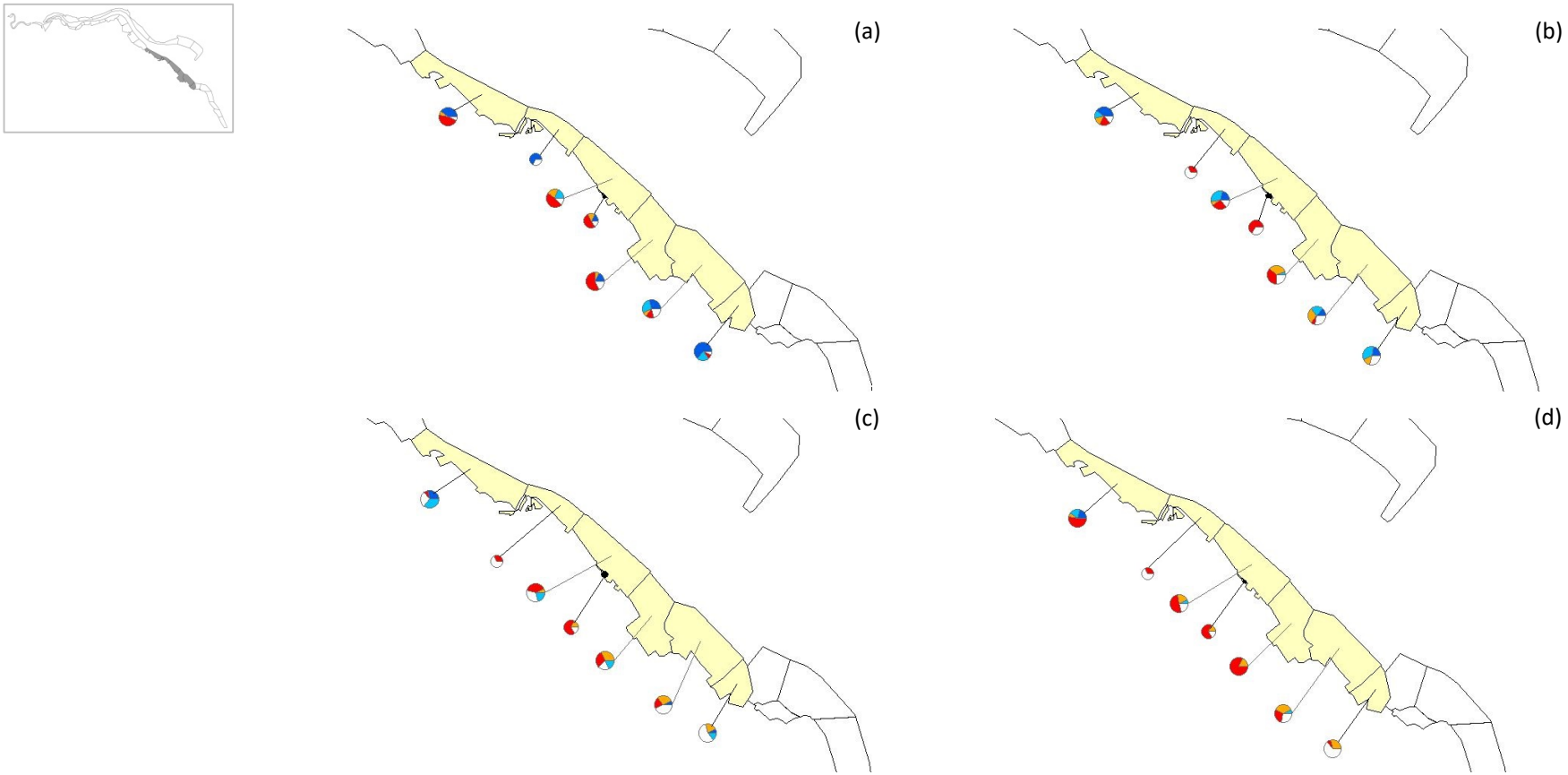

Figure 3.1.vii **Population trends of waterbirds within the Humber South (Mid) over (a) the long-term (1995/96–2020/21); (b) the medium-term (2010/11–2020/21); (c) the short-term (2015/16–2020/21) and (d) the "worst case" scenario (poorest trend from any of the three periods).** The area of each pie chart relates to the number of species for which trends could be determined on the WeBS count sector in question and within each pie chart the proportions of those species that have undergone a substantial decline (red), a moderate decline (orange), "no" change (white), moderate increase (pale blue) and sharp increase (dark blue).

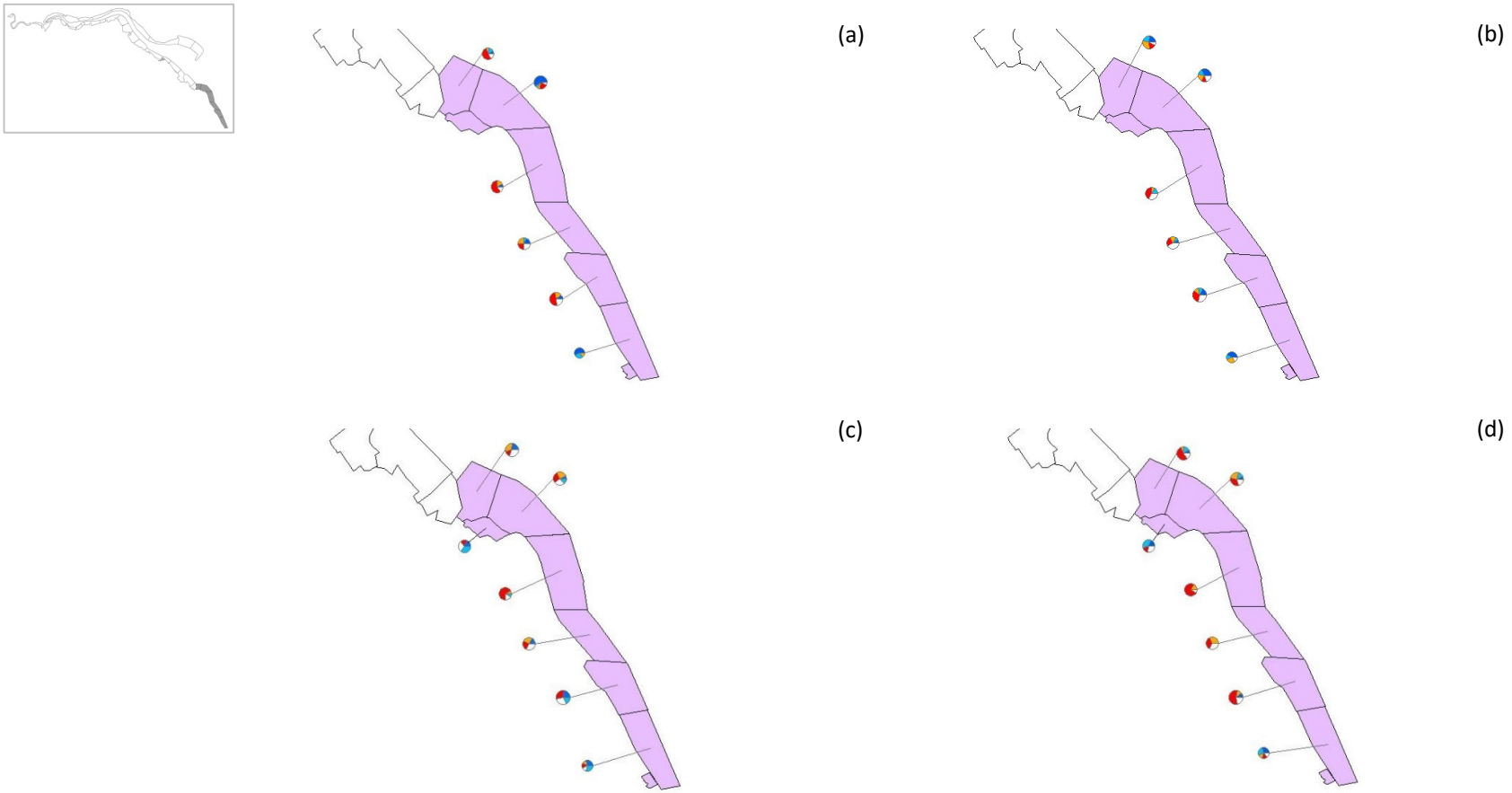

Figure 3.1.viii Population trends of waterbirds within the Humber South (Outer) over (a) the long-term (1995/96–2020/21); (b) the medium-term (2010/11–2020/21); (c) the short-term (2015/16–2020/21) and (d) the "worst case" scenario (poorest trend from any of the three periods). The area of each pie chart relates to the number of species for which trends could be determined on the WeBS count sector in question and within each pie chart the proportions of those species that have undergone a substantial decline (red), a moderate decline (orange), "no" change (white), moderate increase (pale blue) and sharp increase (dark blue).

4. DISCUSSION AND CONCLUSIONS

4.1 Species Trends

4.1.1 Tundra Bean Goose *Anser serrirostris*

This species is only occasionally observed within the Humber Estuary; hence robust sector level trends cannot be produced. Observations usually involve flocks present on the Humber for a short period only, and peak WeBS counts were of 81 in December 2011 and 30 in January 2015. There have been no further records of the species during WeBS counts since one bird in February 2016. Mean counts within the region increased from around 40 in the early 2000s to around 160 in 2011/12, though they have dropped back to around 70 in 2015/16. Since the last report for the Humber in 2018 (Woodward *et al.* 2018) no additional records have been made on any of the sectors in the estuary. As this is a scarce wintering species in the UK, sectors on the Humber would become important for this species should they overwinter on a more regular basis in the future (as they did in 2011/12 when a flock was present for three consecutive months). Tundra Bean Goose was not appraised by any of the three previous reports - Austin *et al.* (2008), Ross-Smith *et al.* (2013) and Woodward *et al.* (2018).

4.1.2 Brent Goose (Dark-bellied) *Branta bernicla bernicla*

The number of overwintering Dark-bellied Brent Geese on the Humber has declined in recent years after a period of stability followed by a short increase (seen in Ross-Smith *et al.* 2013 and Woodward *et al.* 2018). These trends loosely follow the wider regional trend which has also seen an increase in the same period to a peak in the mid-2010s, with the Humber peaking in 2015/16 and the region in 2014/15. The decline following these peaks to the recent winter of 2021/22 has resulted in similar population levels to the early 2000s though it should be noted that the estuary consistently holds the same proportion of the region's Brent Geese averaging around 5%. As with Woodward *et al.* (2018) there are generally similar numbers of the species on both the north and south sides of the Humber Estuary though slightly more are on the south side, particularly in the South (Mid) (38427) and South (Outer) (38429) section of WeBS sectors. The northern sectors (Humber Estuary North 38931) have a slightly slower decline compared to the South (Outer) (38429) section which has strongly followed the overall declining trend for the estuary in recent years. South (Mid) (38427) has seen an overall long-term increase in its numbers of Brent Geese since the mid-1990s though there have been declines around peaks in the mid- and short-term, but its importance to the population of Humber Estuary Brent Geese is also increasing with now more than 40% of the estuary's birds based in this area's sectors. No one sector is driving this or increasing strongly but the overall stability or gentle increase of the four sectors with trends have cumulatively added together. Humber Estuary South (Outer) (38429) is more variable with a recent decline in the short-term reducing the importance of this area slightly to a little below 40%. Saltfleet (35481) and Somercoates to Donna Nook (35484) continue to be important to the Brent Goose population on the Humber, though they are now closer to an average of 15% of the Humber population than over 20% as reported in Woodward *et al.* (2018). These decreases may be due, at least in part, to the fact that some birds have begun using the Donna Nook Realignment Area (35900) sector: this supported 12% of the estuary population in 2021/22.

The outer three northern sectors from Stone Creek to Patrington (38442), through Patrington to Easington (38443) to Spurn Head (38444) are the only sites in this area able to have trends produced with Patrington to Easington (38443) which supported around 20% of the estuary's Brent Geese in 2021/22, showing a strong increase in numbers in the most recent four years contrary to the declines on the other two sectors.

4.1.3 British/Irish Greylag Goose *Anser anser*

As seen in the previous report (Woodward *et al.* 2018), the Greylag Goose has continued its overall upward trend across the Humber over the period covered by this report (1995/96 to 2021/22) matching the wider regional and UK trends. There have been some slight variations in the persistency of this trend that is not seen in the regional trend, with a slight downturn in the mid-2010s (lowest point in 2016/17). Greater numbers of the species can be found on the northern side of the estuary (Humber Estuary North 38931), which currently supports around 70% of the estuary's individuals, but both sides are experiencing the same general increasing trend in numbers. Most of this increase in the north is driven by the inland sectors, with Faxfleet to Brough Haven (38432) supporting around 40% of the estuary's Greylags, with River Humber – Howdendyke to Whitgift (38907) supporting between 10% and 20% in recent years though the proportion is increasing and the peak count in 2021/22 was around 35% of the SPA peak . On the Humber Estuary South (38901) only the South (Inner) (38425) sectors have enough numbers to produce a trend, supporting between 30% and 40% of the Greylags. This shows a general increase in numbers though no one sector drives the trend and many show a slight decline in the short term and historic declines in the long-term – particularly Whitton Sand - South Face (38419) which supported between 10% and 20% of the birds on the Humber in the late 1990s but now is close to 2%. Both the South (Mid) (38427) and South (Outer) (38429) don't have enough numbers to produce trends though they do see a few individuals each year (mean counts have not exceed six birds across either area). Greylag Goose was not considered in the species accounts in either Austin *et al.* (2008) or Ross-Smith *et al.* (2013) but it was included for the first time in Woodward *et al.* 2018.

4.1.4 Pink-footed Goose *Anser brachyrhynchus*

As described in previous reports (Ross-Smith *et al.* 2013, Woodward *et al.* 2018), Pink-footed Geese on the Humber have had a principally slow increase in numbers over the 25 years of this report, with the bulk arriving in the last decade. Within the latest eight years represented in this report, there has been an increase in numbers of Pink-footed geese on the Humber Estuary, with average numbers rising substantially and a peak count of 42,409 in October 2021. Whilst this peak will almost certainly include passage birds, counts of 10,928 in December 2021 and 6,556 in January 2022 suggest that large numbers are now wintering in the area. There is no regional trend available for comparison, as this species feeds away from estuarine sites and hence is under-recorded by daytime WeBS counts, and accordingly WeBS does not routinely index them using WeBS data. They are instead monitored by roost counts organised outside of WeBS. The UK trend also had a similar substantial increase over the period covered by this report (Austin *et al*. 2023) and hence the increases on the Humber reflect this wider increase. The South (38901) area of the Humber have hosted the bulk of the Pink-footed Goose population in most years, although there have been significant numbers using the northern side of the estuary in some years, most notably between 2013/14 and 2017/18. As for the other migrant goose species, most birds are found on the South (Outer) (38429) sectors of the Humber Estuary rather than the upper reaches. The Theddlethorpe to Saltfleetby (35480) sector has principally driven this areas trend, supporting around 20% of the SPA total in the latest couple of years reported. The most important sector on Humber Estuary North (38931) is Faxfleet to Brough Haven (38432) sector which supports around 40% of the population on the estuary. On Humber Estuary South (Inner) (38425), Pink-footed Geese are mostly restricted to Read's Island Flats (38418) which supports around 40% of the estuary peak. Insufficient numbers are recorded to enable trends to be produced for South (Mid) (38427) or any of its sectors.

4.1.5 European White-fronted Goose *Anser albifrons albifrons*

This species is only occasionally observed within the Humber Estuary, hence robust sector level trends cannot be produced. Observations usually involve flocks which are often present on the Humber for a short period only, with peak counts of more than ten birds being observed on WeBS counts in seven of the winters covered by this report (1995/96, 2003/04, 2010/11, 2011/12, 2016/17, 2017/18, 2020/21). The maximum count was in 2011/12 with 125 birds and only the outermost norther sector – Spurn Head (38444) tends to see any numbers passing through on a regular basis even if not enough for a trend. Mean counts within the region are usually between 200 and 600, but higher numbers are recorded across the region in some winters, including three of the winters when WeBS recorded larger flocks on the Humber Estuary (1995/96; 2011/12; 2016/17). Hence the Humber Estuary is of relatively low importance for this species. European White-fronted Goose was not included in any of the three previous reports - Austin *et al.* (2008), Ross-Smith *et al.* (2013) and Woodward *et al.* (2018).

4.1.6 Shelduck *Tadorna tadorna*

The number of Shelduck on the Humber have continued to remain consistent with the previous three reports (Austin *et al.* 2008, Ross-Smith *et al.* 2013 and Woodward *et al.* 2018) being relatively stable over the past 25 years. There is a slight decline in the overall regional trend for Shelduck, but this is not reflected in the Humber trend through there have been some variations within the overall stable trajectory for the population. Looking within this estuary-wide trend, the northern sectors have experienced declines since peaking around 2006/07 and 2007/08 whilst numbers on the southern sectors have remained relatively stable following an increase between 2021/13 and 2016/17. The largest percentage of the population was in the northern sectors until the late 2000s but the southern sectors now support over 60% of the wintering Shelduck on the SPA (particularly in the South (Mid) (38427) sectors). This shift was noted in all three reports that preceded this one and this has continued. The decline in the Humber Estuary North (38931) began principally in 2008/09 following a short increase in the early to mid-2000s and most of the seven northern sectors with trends have also seen declines in the short term. Whilst the Humber Estuary South (38901) as a whole has had a slight increase, Humber Estuary South (Inner) (38425) has declined in the short-term following a peak around 2009/10. The most important sector on the South (Inner) is Read's Island Flats (38418) which supports more than 20% of the SPA total on average; however, peak counts on this sector have decreased to around 5–15% of the SPA total in the three most recent winters. Humber Estuary South (Mid) (38427) has seen a sharp jump in the proportion of the estuary's Shelduck, having increased from around 5% in 2012/13 to 30–40% from 2013/14 and around 45–50% from 2020/21. This increase is driven by increased on Pyewipe (38405) which now supports around 35% of the estuary's birds and Grainthorpe Have and Horseshoe Point (35485) which supports more than 10%. The South (Outer) (38429) was relatively stable in its trend with some fluctuations. Somercoates to Donna Nook is the most important sector in this area supporting more than 10% on the estuary total on average.

4.1.7 Shoveler *Spatula clypeata*

In previous reports, the Shoveler populations on the Humber have been stable with mean numbers being below 100 birds in most years (Austin *et al.* 2008, Ross-Smith *et al.* 2013) but in the past ten years there has been a sharp increase with the mean abundance increasing to just over 200 by the winter of 2021/22. There was a small dip in the later 2000s as noted by Woodward *et al.* (2018) but this did not continue and the population continued to rise again to the current numbers with a peak count of 463 in March 2022. The wider regional trend is also on a positive and shows steady increases, without the small drop seen on the Humber; hence, the Shoveler population on the

estuary is generally following the same trend as for the east of England. Shoveler on the Humber make up around 5% of the regional population and this proportion has increased slightly over the period covered by this report. The north and southern sectors have similar percentages of the SPA population, with the South (Inner) (38425) sectors supporting the majority of the population on the south. Only one northern sector, Blacktoft Sands (38430) holds enough Shoveler to produce a trend and thus drives the main trend for Humber Estuary North (38931). Blacktoft Sands's importance has declined over the long-term, going from supporting more than 50% of the Humber's Shoveler in the late 1990s down to around 30% in recent years. This may indicate that the site is at or close to its carrying capacity. The Humber Estuary South (Inner) (38425) has only one sector with enough Shoveler historically to produce a trend – Barrow to Barton (38414) and this drives the increasing trend in this area though the sector only holds between 10% and 20% of the population and both Alkborough Flats (38423) and Killingholme Marshes (38406) have become important sectors supporting more than 20% of the estuary population over the most recent five year period. Humber South (Mid) (38427) doesn't have any notable numbers of Shoveler to produce a trend, and neither does South (Outer) (38429) though in the latter area numbers at Theddlethorpe to Saltfleetby (35480) have been steadily increasing and now supports more than 20% of the estuary population.

4.1.8 Gadwall *Mareca strepera*

Gadwall have been on a steady increase over the past 25 years, more so than the general positive trend for the region which has stabilised slightly lower than the peak in 2009–2012. The numbers on the Humber Estuary are low compared to the east of England region as whole, with less than 250 birds seen on average fewer than 3% of the Gadwall in the region). The majority of Gadwall are found on the Humber Estuary North (38931) and Humber South (Inner) (38425) areas with the majority of Gadwall found within on the latter of these areas. The trend for the Humber Estuary North (38931) follows the main estuary trend in increasing over the long, mid and short-terms and supports between 20–40% of the Gadwall population of the estuary. There are only two northern sectors with consistently high enough populations for trends to be produced, Blacktoft Sands (38430) which drives the northern trend, and Brough Haven to North Ferriby (38433) where numbers peaked between 2005/06 and 2015/16 but have since declined. Two of the Humber Estuary South (Inner) (38425) sectors have trends – Barton to Chowder Ness (38415) and Barrow to Barton (including West Pits) (38414), and both support more than 20% of Gadwall based on mean peak counts for the most recent five years, as does Alkborough Flats (38423). Humber South (Outer) (38429) and South (Mid) (38427) don't support enough of the species to produce any trends, though a few individuals are seen on a few sectors and there was a peak count of 76 individuals at Pyewipe in 2021/22.

4.1.9 Wigeon *Mareca Penelope*

As generally seen by previous reports (Austin *et al.* 2008, Ross-Smith *et al.* 2013 and Woodward *et al.* 2018), Wigeon numbers have been relatively stable in the long term with a small increase seen in the latest winter reported (2021/22) though numbers were previously higher in the mid-1990s. This trend is in line with that of the region which is very stable with little variation over the past 25 years though the proportion of Wigeon held compared to the East of England region is low at 3% and total numbers on the estuary are well below the threshold to identify nationally important sites (4,500 individuals) indicating the low importance of the Humber for this species. North and south regions of the estuary show similar proportions of the population though in the south the majority can be found on the South (Inner) (38425) sectors. South (Outer) (38429) has no one sector leading its trend, though Donna Nook Realignment Area (35900) has seen a sharp increase in the number of Wigeon since its creation. Within the sectors comprising Humber Estuary North (38931), Faxfleet to Brough Haven (38432) has historically held the largest proportion of Wigeon, but this has since

declined substantially, whilst this has occurred, numbers have increased at Stone Creek to Patrington (38442) and Paull to Stone Creek (Cherry Cobb Sands) (38441) both of which now support more than 20% of the SPA peak total, although in the case of Stone Creek to Patrington this is driven by an usually high count in 2021/22 and hence it is unclear whether this increase will be sustained. Humber South (Inner) (38425) sectors show a variety of trends but the principal area with a significant proportion of Wigeon on the Humber is Alkborough Flats (38423) which supports more than 20% of the estuary's Wigeon, based on recent peak counts. Island Farm (38352) and Reads Island Flats (38418) are of lesser importance but support between 10% and 20% of the SPA total.

4.1.10 Mallard *Anas platyrhynchos*

As described in Woodward *et al.* (2018), there is a continuing long-term decline in Mallard populations on the Humber which was first reported in Austin *et al.* (2008). Numbers have been stable in the short-term, however, though future years of data will reveal whether this indicates a genuine upturn rather than a slight variation in the general trend. In the context of the wider region, the Humber follows the overall long-term decline and short-term increase of the past four years (to 2021/22) supporting around 5% of the region's Mallards (consistent since the early 1990s as seen in previous reports, Woodward *et al.* 2018). This pattern suggests that the trends on the Humber are driven by broadscale changes to Mallard populations rather than habitat conditions on the Humber. Historically, the northern sectors hold the majority of the Mallard numbers on the Humber, though in the short term this has switched to just over half of the population now being on the south of the estuary, particularly driven by the outer sectors which have had a sharp increase in numbers based there. The declining trend for Humber Estuary North (38931) is seen across almost all sectors though some are more pronounced in their declines than others most sectors have been stable or have even increased slightly in the short-term. The South (Inner) (38425) sectors combined have been relatively stable in their numbers over the short-term support around 40% of the estuary's Mallards but the individual sectors show highly variable trends. This is mainly due to relatively low numbers on all sectors with Mallard being widely spread across the area rather than concentrated in a few sectors. Five sectors support between 10% and 20% of the estuary total based on peak counts and it is possible that some movement between sectors may occur across the winter. In contrast to the increase seen in Woodward *et al. (*2018), Humber Estuary South (Mid) (38427) has seen declines on all sectors for which trends could be produced but South (Outer) (38429) has seen an increase on Donna Nook Realignment Area (35900) since its creation and this sector now supports more than 10% of the Humber's Mallard.

4.1.11 Pintail *Anas acuta*

As reported in the three previous reports (Austin *et al.* 2008, Ross-Smith *et al.* 2013 and Woodward *et al.* 2018), only low numbers of Pintail occur on the Humber with mean WeBS counts of less than 100 in most years, although there has been a recent peak count of 242 in January 2022. There were sharp increases in Pintail running from the late 1990s through to peaks in the 2000s reaching over 200 on a couple of occasions but numbers declined down to the previous levels below 100 individuals from the winter of 2012/13 through until 2019/20. The wider regional trend for Pintail over the 25 years of this report shows an increase to over 4,500 individuals in the early 2000s before a steep decline as seen on the Humber followed by a period of stability which continues through to 2021/22. The Humber has roughly followed this trend despite its low numbers of Pintail suggesting the Humber trends are driven by the changes in the wider population. As seen in Woodward et al. (2018), the Humber Estuary North (38931) trend is driven almost entirely by Patrington to Easington (38443) sector which supports around 80% of the estuary's birds. Trends could not be produced for the other northern sectors and all the southern sectors, although numbers at Alkborough Flats

(38423) in Humber South (Inner) have increased in recent years and it is the only other sector apart from Patrington to Easington that now supports more than 10% of the SPA population.

4.1.12 Teal *Anas crecca*

Teal on the Humber have been on a steady increase in the long-term following the wider region trend though the estuary has a stronger short-term increase in numbers. The previous reports (Ross-Smith *et al.* 2013 and Woodward *et al.* 2018) also identified this increase as starting in the late 1990s but the levelling off that they reported has not continued and there have been further recent increases. A sudden jump in numbers occurred in 2021/22 with numbers peaking in October 2021 (at 9,994 individuals) which is not reflected in the regional trend. Future counts will reveal whether this represents an unusual influx or is an indicator of ongoing increases. Both sides of the Humber reflect the estuary wide patterns in the trends and peaks, though the South (Mid (38427) sectors had seen a short-term decline that isn't seen in other areas. On Humber Estuary North (38931), Blacktoft Sands (38430) has the highest percentage of the estuary's Teal for that side, though it doesn't follow the more recent stronger increase in the short-term that is seen across the estuary as a whole, perhaps suggesting it is already at carrying capacity. However, the outer three northern sectors (Stone Creek to Patrington, Patrington to Easington and Spurn Head – 38442, 38443, 38444) have recorded substantial increases in recent years after years at low or non-existent numbers of Teal, with counts in 2021/22 being particularly notable and higher than those at Blacktoft Sands. The South (Inner) (38425) sectors have been steadily rising in numbers though the trend is reasonably stable (if fluctuating) around 40%, driven mainly by Read's Island Flats (38418) with around 20–30% of Teal. In the last report (Woodward *et al.* 2018), Alkborough Flats (38423) were seen to support the highest proportion of Teal across the estuary, but this declined strongly following a peak in 2013/14 and now is again of low importance for the species. Humber South (Outer) (38429) has seen an increase in numbers like the estuary as a whole, but the importance of the area hasn't changed from around 15% of the SPA total. No one sector here is identified as holding high importance for the estuary though the Donna Nook Realignment Area (35900) supports the most Teal for the area (around 7% of the SPA total).

4.1.13 Pochard *Aythya farina*

In the previous reports there has been a sharp decline in Pochard numbers on the Humber Estuary from the mid- to late-1990s that stabilised (Ross-Smith *et al.* 2013) before declining again from 2007/08 (Woodward *et al.* 2018). This decline has continued to the point that there are regularly less than 60 Pochard seen on the Humber during the winter WeBS counts – in the short-term (5 winters) a peak of 59 is the most that has been reached. This is a dramatic decline from the highs of over 2,000 in 1993/94 and 1996/97. The Humber is a relatively unimportant site for Pochard at a regional scale, and the regional trend has shown a low rate of decline from the mid-1990s to a stabilised point in the late 2000s that has continued with only a slight upturn in last five years (short-term trend). The fact that the site trend follows the regional trend suggests that the declines on the site may be due to broadscale population changes; the decline on the site is slightly greater than the regional decline but this could mean that other regional sites are preferred and does not necessarily imply that conditions on the site have deteriorated for Pochard.

Only a few sectors have sufficient data to allow for trends to be produced, these trends all follow the main Humber Estuary trend and show substantial declines, with the three sectors in Humber Estuary South (Inner) now supporting the majority of the Humber's wintering Pochard population. Barrow to Barton (including West Pits) (38414) which supports over 50% of the population and Barton to Chowder Ness (38415) and Goxhill to New Holland (38412) over 20%. On the northern side, the

trend is principally determined by Brough Haven to North Ferriby (38433) where numbers have declined to such an extent that the species is now effectively absent from the sector.

Although just outside the SPA boundary, Cleethorpes Boating Lake (38402) also now supports important numbers of Pochard relative to the SPA total and it is possible that some or all of the birds using this sector also use sectors within the SPA. As for the SPA, the trend on the boating lake is in decline across all three timeframes considered.

4.1.14 Tufted Duck *Aythya fuligula*

The number of Tufted Duck on the Humber Estuary has been relatively stable over the past 10 years following fluctuations in the long-term trends. From the previous reports, Tufted Duck numbers increased in the late-1990s before dropping in the late 2000s to the current stable point from the winter of 2010/11 (Ross-Smith *et al.* 2013). These stable short and mid-term trends are reflected in the stable regional trend which the Humber follows. Low numbers are present on the northern sectors with the majority being on the southern side and both areas' trends (plus Humber Estuary South (Inner) (38425), the only southern area with trends available) follow the general pattern of being broadly stable with a peak within the 2000s. Humber Estuary South (Inner) (38425) supports over 80% of the Tufted Duck population on the estuary as a whole, reach 90% in some recent years whist Humber Estuary (North) (38931) hosts less than 100 birds even with peaks but it still followed the overall trends. The most important sector on the Humber Estuary South (Inner) (38425) is Barrow to Barton (including West Pits) supporting around 60% of the population based on the recent peak counts, Barton to Chowder Ness (38415), New Holland to Barrow (38413) and Halton Marshes (38407) all supported between 10% and 20% of the SPA peak total during the most recent five years. However, numbers at Goxhill to New Holland (38412) have declined dramatically. To the north, Brough Haven to North Ferriby (38443) is the only sector with enough birds to produce a trend and therefore drives the main trend for the whole northern side: as for Pochard, numbers have declined substantially on this sector. As highlighted in Woodward *et al.* (2018) the proportion of Tufted Duck on the Humber compared to the region are very low showing its low importance (<2%) on a regional scale for the 25 years of this report.

4.1.15 Scaup *Aythya marila*

The Humber is not an important wintering area for this species, and numbers wintering on the Humber Estuary over the last 25 years have been too low to enable any robust trends to be produced, usually averaging fewer than three birds across the Humber Estuary each winter although occasionally larger flocks are recorded by WeBS (e.g. 43 in January 2017). Numbers were higher historically and the long-term change shows a decline of 99%. Scaup is also relatively scarce at a regional scale, with mean counts of fewer than 30 birds recorded in the majority of the years covered by this report. The regional trend is reflected in the trend reported for the Humber as a whole with the Humber representing less than 10% of birds in the region in most winters. Sector level trends could not be produced for Scaup in any of the three previous reports - Austin *et al.* (2008), Ross-Smith *et al.* (2013) and Woodward *et al.* (2018).

4.1.16 Goldeneye *Bucephala clangula*

Though the regional trend for Goldeneye is showing a slow but steady decline in the numbers over the past 25 years, the trend on the Humber Estuary as a whole is more variable with a moderate decline over the long-term but a moderate decrease in the short-term. As pointed out in the previous three reports (Austin *et al.* 2008, Ross-Smith *et al.* 2013 and Woodward *et al.* 2018) there are only low numbers on the Humber, with mean counts usually less than 200; however, there are

large fluctuations with the highest peak during the period covered by this report being 681 in January 2016). The majority of the Goldeneye population is on the South side of the Humber sectors in the South (Inner) (38425) area which is the only larger area with sufficient data to enable a trend to be produced for it. Within this area, the sector with the greatest proportion of Goldeneye is Goxhill to New Holland (38412) In the previous report (Woodward *et al.* 2018) this was reported to be poorly covered by WeBS with fewer visits than ideal in the most recent years but increased coverage has confirmed the importance of this sector which has seen a mild decline over the long term but has stabilised in the short-term and supports up to 90% of the SPA total based on peak counts during the last five winters.. The adjacent Goxmill Marsh sector (38411) is also important for the species supporting more than 20% of the Humber's birds, and nearby Barrow to Barton (including West Pits) supporting 10–20% On the northern side of the estuary,Brough Haven to North Ferriby (38433) is also identified as an important sector based on recent peak counts, although there are some gaps in coverage for this sector. As mentioned in Woodward *et al.* (2018), fluctuating numbers of Goldeneye are seen on the Humber and the overall percentage of the region has fluctuated slightly but has been relatively constant at around 5–8% over the 25 years of this report.

4.1.17 Smew *Mergus albellus*

Numbers of Smew wintering on the Humber have been too low to enable any sector level or overall estuary trends to be produced, the maximum mean winter count having been one in all 25 years covered by this report, with a peak count of seven in December 1998. Smew were seen more regularly on the Humber in the earlier years covered, with at least one or two seen each winter until 2012/13 but no birds have been seen subsequently. Smew is a relatively scarce wintering species in the UK, and numbers in the region have fluctuated over the period covered by this report, at between 10 and 49 birds, with lower numbers recorded in recent years, in line with the trend for the UK as a whole. Sector level trends could not be produced for Smew in any of Austin *et al.* (2008), Ross-Smith *et al.* (2013) or Woodward *et al.* (2018).

4.1.18 Moorhen *Gallinula chloropus*

Though presenting in only relatively low numbers, Moorhen is currently following a stable trend on the Humber in the medium term (since 2010/11). Prior to this there was a sharp increase in numbers from the late 1990s to a peak in 2003/04 which then declined at a similarly fast rate down to the current stable level (2021/22). It should be noted that this species can more be difficult to count robustly than many of the other WeBS species covered by this report as it is less likely to be observed in more open habitats. However, the regional trend is broadly similar to the site trend although there has been a slightly downward trend since the early 2010s. The UK trend follows a similar pattern (Austin *et al*. 2023). More birds can be seen on the southern side of the estuary, particularly in the South (Inner) (38425) area (which is the only southern area able to have a trend produced), but both sides followed the wider Humber trend with a long-term peak followed by a more stable period. The Northern side of the estuary's trend (Humber Estuary North (38931)) is similar to that of the whole estuary, showing a strong long-term increase leading up to the early 2000s before declining and rising in the mid-2000s before declining again in the short term. No single northern sector had enough numbers for a trend to be produced. The Humber Estuary South (Inner) (38425) trend follows the overall trend for the estuary as a whole but is driven by a single sector, Barrow to Barton (including West Pits (38414) which is the only sector with high importance for Moorhen (mean peak counts of more than 20% of the SPA total based on the last five winters).. This species was not included in any of the previous reports (Austin *et al.* 2008; Ross-Smith *et al.* 2013; Woodward *et al.*2018). Although just outside the SPA boundary, Cleethorpes Boating Lake (38402) also supports important numbers of Moorhen relative to the SPA total.

4.1.19 Coot *Fulica atra*

The regional trend for Coot has been on a steady decline over the medium term since 2010/11 following a period of relative stability from the late 1990s. The Humber specific trend for Coot has however had a high increase in the early 2000s followed by a decline at the same time as the national decline. The birds on the Humber make up a very small proportion of the regional population (less than 1%). The southern side of the Humber has the largest numbers of Coot (the South (Inner) (38425) region which is the only area with sufficient numbers for a trend to be produced). Humber Estuary South (Inner) (38425) contains on average 90% of Coot on the estuary and has six sectors populated enough to produce trends. Of these six, Barrow to Barton (including West Pits) (38414) is the most important with peak counts in the most recent five years representing over 60% of the SPA total. New Holland to Barrow (38413) and Barton to Chowder Ness (38413) also both support around 20% of the SPA population. The northern side of the Humber (Humber Estuary North 38931) did have a peak count of Coot of 417 in 2006/07 following an increase from the late 1990s, but numbers sharply declined the following year and have been in gentle decline subsequently with a mean peak count of only 39 for the whole north of the estuary for the most recent five years. The northern trend is driven by populations using two sectors upriver – Faxfleet to Brough Haven (38432) and Brough Haven to North Ferriby (38433) of which the latter has held the majority of the population historically. The majority of the remaining Coot in the north are at Blacktoft Sands (38430). The South (Mid) (38427) and South (Outer) (38429) both have too low numbers of Coot to produce trends for any sectors

This species was not included in any of the previous reports (Austin *et al.* 2008; Ross-Smith *et al.* 2013; Woodward *et al.* 2018).

4.1.20 Common Crane *Grus grus*

This species is only rarely seen on the Humber and during winter the normal numbers are low with only 1–2 birds recorded every few years on WeBS counts. Records occurred in: 1999/00, 2001/02, 2004/05, 2009/10 and 2020/21 (all singles apart from two in 2009/10). In 2021/22 there was an unusual influx with 20 birds seen on the Humber in April, most likely on migration. In all, there are not enough numbers of Cranes using the Humber Estuary over the past 25 years to enable any robust trends to be produced. This species was not included in any of the previous reports (Austin *et al.* 2008; Ross-Smith *et al.* 2013; Woodward *et al.* 2018). However, this species has increased substantially in the UK since 2001/11 (Austin *et al.* 2023) and it seems likely that numbers using the estuary will increase further in the coming years.

4.1.21 Oystercatcher *Haematopus ostralegus*

As seen in previous reports (Ross-Smith *et al.* 2013), Oystercatcher number have fluctuated on the Humber over the long term 25-year trend with a decline from the late 1990s to mid-2000s, increasing again around 2007/08 to 2019/20 before falling sharply. The regional trend has been relatively stable with slight fluctuations over the same period. The majority of Oystercatchers can be found on the southern sections of the Humber Estuary, after a change in the mid-2000s from a more equal distribution previously, driven by a locally increasing trend for the south areas in contrast to long-term declines in the north. The South (Inner) (38425) section has too few birds to enable trends to be produced but the South (Mid) (38427) area has shown a trend similar to that of the estuary overall and supports the majority of the Oystercatchers in the south, with the South (Outer) (38429) also supporting around 20–30% of the SPA total after quite a lot of fluctuation in the long term. As mentioned in previous reports, the 25-year period just misses showing the sharp decline of the early 1990s when it held 10-15% of the region's birds (Ross-Smith *et al.* 2013, Woodward *et al*. 2018); the

site now supports around 5–10% of the region's Oystercatcher. The South (Mid) (38427) trend has been relatively stable since the beginning of the 2010s as mentioned, and the two most important sectors for the species fall in this area and both support mean peak counts of more than 20% of the SPA total: Horseshoe Point to Tetney Haven (35846) and Grainthorpe Haven to Horseshoe Point (35485), with Cleethorpes North Promenade to Anthony's Bank supporting 5–10%. The proportion of Oystercatchers on Humber Estuary South (Outer) (38429) sectors are still quite low compared to the South (Mid) area, although Somercoates to Donna Nook is of moderate importance with recent mean peak counts reaching 5–10% of the SPA total. The northern side of the estuary (Humber Estuary North (38931)) has shown declines over the long term by 75%, with almost all Oystercatcher found on the outermost sectors from Paull through to Spurn Head (covering 38441, 38442, 38443, 38444). Spurn Head (38444) holds the largest numbers on the northern side and drives the trend for Humber Estuary North (38931) and remains a moderately important sector despite a decline in the short-term. The decline on Paull to Stone Creek (38441) seen by Ross-Smith *et al*. (2013) and Woodward *et al*. (2018) has continued to the point that no Oystercatchers are now seen in this sector. Patrington to Easington (38443) has seen a moderate increase in the short-term though the numbers around the trend are very variable.

4.1.22 Avocet *Recurvirostra avosetta*

Following the general increase in Avocet numbers on the Humber Estuary over the long term noted in the previous report (Woodward *et al.* 2018) there has been a high decline in the short-term although the population is still many times higher than in the 1990s and is similar to the numbers seen between the mid-2000s and 2013/14. The SPA trend is now no-longer in line with the regional trend which has continued its steep increase. The proportion of Avocets on the Humber Estuary as a percentage of the region has remained under 10% with some slight fluctuations. The highest number of individuals are predominantly found in the southern areas of the estuary with those on South (Inner) (38425) being most prominent and this is the only area with a trend as the other areas – North (38931) and South (Mid) (38427) and South (Outer) (38429) – have insufficient data for trend production. The Humber Estuary South (Inner) (38425) holds the vast majority of Avocets on the Humber in most winters and hence the trend follows that seen for the estuary as a whole. Most of the Avocet are found on one sector Read's Island Flats (38418) which remains the most important sector for the species although it has seen a decline in importance over the most recent five years, with peak counts of moderate importance occurring on three other sectors: South Ferriby (38417), North Killingholme Haven Pits (38201) and Killingholme Marshes (38406). Avocets are infrequent elsewhere on the estuary or only occur in very low numbers, e.g. at Blacktoft Sands (38430), and there are no other important sectors away from Humber Estuary South (Inner) area. It is unclear why Avocet numbers have declined in the short-term on the Humber given the ongoing increases in the region; the trends could possibly indicate that conditions on Read's Island Flats are becoming less favourable for the species.

4.1.23 Lapwing *Vanellus vanellus*

Over the short term on the Humber Estuary, Lapwing have remained roughly stable with small variation seen in numbers. This follows a moderate increase over the medium term, although there has been a moderate decline in the long-term due to decreases which occurred from mid-2000s to early 2010s. Prior to this, previous reports highlighted the declines in Lapwing numbers on the Humber from higher numbers in the mid-1990s (Austin *et al.* 2008, Ross-Smith *et al.* 2013, Woodward *et al*. 2018). In the wider region declines have been reported over the same period and numbers are currently relatively stable matching the trend seen on the Humber, and the proportion of the region's Lapwing using the SPA hasn't changed much hovering around 10% but with some fluctuations over time. The northern side of the estuary has a small proportion of Lapwing numbers compared to the south but both areas follow the same estuary-wide trend pattern of declines from

2006/07 through to relative stability in the most recent five years. Higher numbers can be found on the South (Inner) (38425) area though there are enough numbers of Lapwing on the South (Mid) (28427) and South (Outer) (38429) to produce trends though these show lower numbers and less variation than the other areas. Humber South (Inner) (38425) currently supports around 60% of the Lapwing population on the Humber following a slow increase in importance with all sectors holding proportions of the estuary's Lapwing, with Read's Island Flats (38418) being of high importance for Lapwing based on peak counts during the last five winters, with Alkborough Flats and Island Farm both being of moderate importance, i.e. supporting 10–20% of the SPA peak totals. Humber South (Mid) (38427) and South (Outer) (38429) don't have many Lapwing in comparison to the estuary as a whole, both less than 20%, and there has been little change in their trends over the past 25 years, although in the Outer area Donna Nook Realignment Area has become a moderately important sector for the species. Looking at sector level trends for Lapwing within Humber Estuary North (38931), all bar one sector has enough numbers for trends to be produced, with four sectors recently supporting a moderately important proportion of the SPA total. Most show stable or increasing trends in the short- to medium-term but long-term declines, with peaks that match the main northern trend's peak in the early to mid-2000s.

4.1.24 Golden Plover *Pluvialis apricaria*

Following earlier reports for the Humber Estuary which seesawed between increasing trends (Austin *et al.* 2008, Woodward *et al.* 2018) and decreasing trends (Ross-Smith *et al.* 2013) the Golden Plover population has continued to fluctuate. The 25-year trend shows an increase in numbers between 1996/97 and 2005/06 before strongly declining to a low in 2011/12. This then increased again to a lower point than before in 2016/17 before declining again to a new low over the 25 years in 2021/22. This is broadly similar to the regional trend although the recent regional trend has been relatively stable and the proportion of the regional population has consequently decreased from around 30% in the 1990s to around 15% to 20%. Until 2011/12 the majority of Golden Plover were on the northern sides of the Humber but this has switched and birds are now more evenly distributed between the two sides. The increases on the southern side have occurred on Humber South (Inner) (38425) area rather than the South (Mid) (38427) and South (Outer) (38429) areas. Humber Estuary South (Inner) (38425) has several sectors with numbers high enough for trends but, as for Lapwing, the principal area is Read's Island Flats (38418) which in recent winters has supported around 40% of the SPA total, and Alkborough Flats and Island Farm which have both held moderately important numbers . The South (Mid) (38427) has seen declines across all sectors bar one, Grainthorpe Haven to Horseshoe Point (35485) which increased in the early 2000s and though soon declined from a peak in 2006/07, it remained higher than before though the overall importance of the sector for Golden Plover remains comparatively low (i.e. <10% of the SPA total). Humber South (Outer) (38429) has less than 9% of the estuary's Golden Plover and Grainthorpe to Somercoates (35478) is the only sector that shows no declines. The northern trend, which peaked at mean counts of over 22,000 in 2006/07 after a rise from the last 1990s, has declined to a low of less than 1,900 with most sector trends following the general decline for this side of the estuary. Paull to Stone Creek (Cherry Cobb Sands) (38441) holds the largest percentage for the northern side and is identified as a sector of high importance (i.e. supporting peak numbers > 20% of the SPA peak in recent winters). Faxfleet to Brough Haven (38432) is of moderate importance.

4.1.25 Grey Plover *Pluvialis squatarola*

As noted in Woodward *et al.* (2018), there has been a slight increase in numbers of Grey Plover on the Humber Estuary compared to that seen in the earlier reports (Austin *et al.* 2008, Ross-Smith *et al.* 2013). The numbers at the end of the 1990s were relatively stable and then started to increase around 2004/05 to a roughly stable level in 2011/12. Numbers have since fluctuated from winter to

winter peaking in 2016/17 but have remained relatively stable. The regional trend for Grey Plover across the combined Anglian and North-east WeBS regions is in decline, and the importance of the Humber Estuary relative to these regions has gently increased over the 25 years of this report as mentioned previously (Ross-Smith *et al.* 2013, Woodward *et al.* 2018) suggesting that conditions across the estuary as a whole remain favourable for this species. The majority of Grey Plover can be found now on the northern sides of the Humber Estuary, but the relative importance of the north and south of the estuary has fluctuated as well widely over the past 25 years with neither side having the majority of Grey Plover for long bar a period in the mid-2000s to early-2010's in the north which matches a higher trend over the same period for this area. The majority of Grey Plover in Humber Estuary South (38425) are found on the South (Mid) (38427) sectors with fewer birds found on the South (Outer) (38429) areas and the species more or less absent from the South (inner) area (38425). The sharp increase for South (Mid) mentioned in Woodward *et al.* (2018) had been reversed with a steep decline over the short-term. Two South (Mid) sectors are of importance to the wider estuary population of Grey Plovers with Horseshoe Point to Tetney Haven (35486) supporting around 35% of the SPA total based on recent peak counts despite the short-term sharp decline on the sector, and Cleethorpes North Promenade to Anthony's Bank supporting 10–20%. The outermost four sectors on the Northern side from Paull to Stone Creek (38441) through Stone Creek to Patrington (38442), Patrington to Easington (38443) to Spurn Head (38444) have enough numbers to produce trends. With the exception of Spurn Head, they are all of high importance for the species, supporting more than 20% of the total Grey Plover on the Humber Estuary based on the peak counts from the five most recent winters.

4.1.26 Ringed Plover *Charadrius hiaticula*

Following the steep decline from 2000/01 to 2008/09 in Ringed Plover reported by Austin *et al.* (2008) and Ross-Smith *et al.* (2013), numbers wintering on the Humber Estuary have stabilised following a moderate increase over the medium-term. This slight recovery, as first mentioned in Woodward *et al.* (2018), is in contrast to the wider steady decline seen in the East of England trends which has halved since the start of the long-term trend (1996/97). The number of Ringed Plovers in the Humber Estuary as a proportion of the region is relatively unchanged over the long term. However, this proportion declined during the late 1990s and early 2000s when the site decline was more severe than the regional decline and has subsequently recovered as the recent stability on the estuary now contrasts positively with ongoing regional declines. This suggests that conditions are now relatively favourable for Ringed Plover wintering on the estuary, at least in the sectors where they still remain. The southern side of the estuary currently supports the majority of the species since 2010/11 mainly in South (Outer) (38429) and South (Mid) (38427)) and this area follows the wider estuary trend of increasing slightly over recent years. The Northern side's trend is much flatter with a slightly decline over the long term. Humber Estuary South (Outer) (38429) has only sector with enough numbers for a trend – Theddlethorpe to Saltfleetby (35480). This sector is of high importance supporting 20% of the Humber's Ringed Plover population even though it is low in actual numbers, with a mean peak count of 35 birds over the most recent five winters. Saltfleet (35481) and Theddlethorpe to Mablethorpe North End (35479) both support 10–20% of the SPA total based on recent counts. Humber Estuary South (Mid) (38427) did have 40–50% of the Ringed Plover on the estuary in the 2010s but this has now declined over the last five years to around 30%. Two sectors support important numbers of Ringed Plover with Cleethorpes – North Promenade to Anthony's Bank (38401) being of high importance even though it has seen declines in the long term with the proportion of the SPA total using this sector dropping from around 30-40% in the early 2000s to around 20–25% in recent winters. All sectors with trends have seen a decline on this area. Sectors on the Humber Estuary North (38931) show generally low numbers of Ringed Plover, although there was a count of 90 birds at Patrington to Easington (38443) in February 2022. Hull to Paull (38440) and Spurn Head (38444) have held higher numbers of this species historically but no longer do so.

4.1.27 Whimbrel *Numenius phaeopus*

Whimbrel are primarily a passage species on the Humber Estuary, only a very small number being present on the Humber Estuary and within the wider region during the winter; hence sector level trends cannot be produced. In recent years, peak passage counts during WeBS have typically been recorded in July or August during the 'autumn' passage, with three figure total counts occurring in eight years since 2000 and including two counts greater than 150 (275 in July 2000 and 250 in July 2015). This species was not included in either Austin *et al.* (2008), Ross-Smith *et al.* (2013) or Woodward *et al.* (2018). Sector level trends could not be produced for Scaup in any of the three previous reports - Austin *et al.* (2008), Ross-Smith *et al.* (2013) and Woodward *et al.* (2018).

4.1.28 Curlew *Numenius arquata*

Curlew have seen a steady decrease in numbers on the Humber Estuary since a peak around 2006/07, prior to this there were two periods of increase in the long-term trend – between 1996/97 and 2000/01 and 2003/04 and 2006/07. Austin *et al.* (2008) first reported this decline starting and though Woodward *et al*. (2018) were optimistic of a stabilisation, the shallow decline has continued through the medium- and short-term. The wider regional trend is in decline as well since 2000/01but on a slightly less severe trend than the one seen on the Humber Estuary, at least during the early years of the decline. Over the mid and long term, the Humber Estuary holds around 10% of the Curlew population in the region, having declined very slightly from the early 2000s. The northern side of the estuary has seen similar trends and now holds less than 50% of the Humber Estuary's Curlew population. The southern side has been more variable in its trend and numbers here have remained relatively stable, consequently it now holds more than 50% of the population as the numbers on the northern side decline more strongly. A lot of Curlew now are based on Humber South (Outer) (38429) areas which have seen a gentle long-term increase in numbers, South (Mid) (38427) has been more variable and South (Inner) (38425) has declined gently though both have not particularly changed their proportions of Curlew held. The increase in importance of Humber Estuary South (Outer) (38429) for Curlew is driven by several sectors that have seen upturns in numbers present, particularly Theddlethorpe to Mablethorpe North End (35479) which has recorded substantial increases over the long-term and is of moderate importance having supported 10–20% of the estuary's Curlew across the five most recent winters. Humber Estuary South (Mid) (38427) was highly important before 1997/98 but has shown long-term declines and has seen many sectors on a downward trend, though Horseshoe Point to Tetney Haven (35486) has increased though numbers here are relatively low still. Pyewipe (38405) is the only sector in Humber South (Mid) supporting moderately important numbers of Curlew.

South (Inner) (38425) holds around 20% of the Curlew on the estuary and this proportion hasn't changed substantially since the late 1990s, though the total numbers have declined at the same time as the whole estuary trend, and Goxhill Marsh (38411) has been the most important sector in this area with up to 13% of the Humber Estuary's Curlew in the past five years. On the northern side, Patrington to Easington (38443) holds the largest numbers of Curlew and is of high importance to the SPA based on recent counts. Paull to Stone Creek (Cherry Cobb Sands) (38441) follows closely behind and rates as being of moderate importance to the SPA supporting around 15% of the Curlew on the estuary.

4.1.29 Bar-tailed Godwit *Limosa lapponica*

During the end of the 1990s, there was a sharp increase in Bar-tailed Godwit on the Humber Estuary that Austin *et al.* (2008) described followed by a steep decline from 2001/02 (Ross-Smith *at al.* 2013). There was a slight recovering and increase between 2006/07 and 2011/12 which then led to a

decline seen by Woodward *et al.* (2018) but in the short-term there has been another increase which hasn't showed any signs of plateauing yet (from 2017/18 to 2021/22). The wider region has also experienced similar fluctuations, though the peak seen in the late 2000s lasted longer and a decline from 2017/18 contrasts with the recent increases seen on the SPA. The importance within the region of the site for Bar-tailed Godwit has similarly fluctuated though generally a little less than 10% of the region's birds seen on the Humber Estuary each winter. These fluctuations at both the regional and site levels make the trends, and consequently the importance of the recent upturn on the Humber, difficult to interpret

The northern side of the estuary has shown a similar decline to the whole site but, unlike the south, does not show a short-term increase; consequently the north has lost its majority in the numbers of Bar-tailed Godwit to the southern areas with the highest numbers now found in the South (Mid). South (Mid) (38427) (>60%) bringing it back towards its previous importance in the late 1990s.This has been driven by a sharp short term increase at Pyewipe (38405) where the species was more or less absent prior to 2019/20, alongside a recovery in numbers at Cleethorpes – North Promenade to Anthony's Bank (38401), with both sites being identified at of high importance to the estuary, i.e. supporting mean peak counts of more than 20% of the SPA peak total during the most recent five winters. As pointed out in Woodward *et al.* (2018), Horseshoe Point to Tetney Haven (35486) had previously held a more important role on the estuary for Bar-tailed Godwit following a sudden increase but there has not been a recovery following the steep decline on this sector. South (Outer) (38429) retains a small proportion of birds on the estuary as a whole and numbers here have been relatively stable. Only the outermost four sectors in the north – between Paull and Spurn Head (sectors 38441, 38442, 38443, 38444) have sufficient data for trends to be produced and generally show a decline over the medium- and short-term although both Paull to Stone Creek (Cherry Cobb Sands) (38441) and Patrington to Easington (38443) continue to support sufficient numbers of Bar-tailed Godwit to be of moderate importance to the estuary as a whole, i.e. mean peak counts representing 10–20% of the SPA total over recent winters.

4.1.30 Black-tailed Godwit *Limosa limosa*

The fluctuations around a relatively stable trend prior to 2012/13 of Black-tailed Godwit on the Humber Estuary were described in all three previous reports (Austin *et al.* 2008, Ross-Smith *et al.* 2013 or Woodward *et al.* 2018). This has continued subsequently although there has been a sharp increase in the most recent winter (2021/22) with a peak count of 5,541 in November 2021 being the highest ever WeBS count during the winter period. The regional trend for the East of England has been increasing steadily over the 25-year long-term trend of this report, at the same time the proportion of the Black-tailed Godwits in the region on the Humber has fluctuated slightly, remained around or just below 10% in most winters not showing any decrease in importance of the estuary within the region despite the relatively stable site trend until recently. The relatively stable site trend may mean that the SPA is at or close to its carrying capacity for wintering birds, It should be noted that larger numbers of Black-tailed Godwit are recorded on passage between August and October, and hence not included in the wintering trends shown, with the peak WeBS count for the site being 7,114 birds counted in September 2019. It is possible that the high November 2021 count may have involved late passage birds.

The southern areas of the estuary have become the main area for Black-tailed Godwits in the medium term, as they were in the late 1990s; prior to this there was a more even north/south split between the mid-2000s to 2010/12. Few Black-tailed Godwit are found on the South (Outer) (38429) area, but the other two southern areas have a variable trend over the past 25 years – Humber South (Mid) (38427) has supported the highest numbers except for a period from 2004/05 to 2012/13 when almost no Black-tailed Godwit used this area. The most recent upturn in numbers for the area

is driven by a recent sharp increase at Pyewipe (38405) which is the only sector of high importance to the estuary in Humber South (Mid) and has supported around 80% of the population across the Humber Estuary in recent winters. There has been a relatively stable trend on the South (Inner) (38425) though numbers have fluctuated; within this area, Killingholme Marshes (38406) is of high importance to the SPA, supporting around 27% of the estuary's birds based on recent peak counts. The trend for the northern side of the estuary, increasing steeply in the early 2000s, then saw a gradual if fluctuating decline, but numbers are low compared to the south (mean counts of less than 100 birds in recent winters having peak at 269 birds in 2005/06). Short- or medium-term declines have occurred on all northern sectors for which trends can be produced and no sectors currently support important numbers, although Spurn Head (38444), Paull to Stone Creek (Cherry Cobb Sands) (38441) and Hull to Paull (38440) have been important for the species historically particularly in the mid to late 2000s when large percentages of the Humber's numbers were found there.

4.1.31 Turnstone *Arenaria interpres*

Over the past 25 years on the Humber Estuary, Turnstone numbers have been in decline although numbers have been stable over the medium-term with mean winter counts fluctuating between around 50 and 200. The highest point of the trend occurred in 1999/2000 (mean of 562 birds) before a steep decline to around 200 birds in 2005/06. The regional trend for East of England is quite different being more stable apart from a slight decline between 2008/09 and 2009/10. The proportion of Turnstone wintering on the Humber has been variable over the past 25 years, declining slightly as a result of the differing site and regional trends from around 10% in the late 2000s to around 5%. The northern side of the Humber has a downward but fluctuating trend, with cyclical peaks occurring approximately every five years until recently. The trend on the southern side is closer to that of the wider estuary trend with larger fluctuations and this side of the estuary supports the vast majority of the population, with this proportion having increased to over 80% in the short-term.

There are very few birds on the Southern (Outer) (38429) area and there was a steep decline on the South (Mid) (38427) area from 2002/03 – 2005/06 to very low numbers although there has been a partial recovery over the medium-term. There is one sector with peak counts of moderate importance to the SPA: Cleethorpes – North Promenade to Anthony's Bank (38401) where a substantial increase occurred in 2021/22. South (Inner) (38425) shows wide fluctuations in Turnstone numbers and the proportion of the SPA total has consequently also fluctuated. The recent trend is driven by mostly by the Goxhill to New Holland sector (38412), which currently supports around 80% of the SPA total based on the peak counts from the most recent five winters. Two adjacent sectors – New Holland to Barrow (38413) and Goxhill Marsh (38412) – have held important numbers historically but counts have been much lower in recent years. There are only two northern sectors with sufficient data to produce trends - Spurn Head (38444) which has been on a continuous decline from a trending high of 40 birds in 1996/97 down to around and less than 8, and Hessle to Hull (38436), where the majority of Turnstone using the north of the estuary have historically been found. This sector was formerly of high importance for Turnstone with numbers peaking in the early 2000s declining to less than 20 in 2021/22. The declines on this sector are likely to have had a major influence on the trend for the Humber SPA and hence understanding the drivers of this decline is key to understanding why the SPA trend differs from the regional trend. It should be noted that the adjacent sector Hull to Paull (38440) has also recorded important numbers of Turnstone in the past: this sector has recently been split into three lower level sectors with Victoria Dock Village (38445) no longer being covered. It will be important to that Victoria Dock Village is covered for WeBS in the future in order to be confident that the number of Turnstone using the north side of the estuary is not undercounted.

4.1.32 Knot *Calidris canutus*

Previous reports have found that number of Knot on the Humber Estuary have remained relatively stable (Austin *et al.* 2008, Ross-Smith *et al.* 2013) but the early indications of a downturn noted by Woodward *et al.* (2018) have continued and the long-term trend now shows a moderate decline. There was a slight increase in the trend prior to 2001/02 but since then the trend has been consistently but shallowly downwards. It should also be noted that the raw numbers have fluctuated widely across the 25 winters of this report, in particular the peak counts – in 2001/02 this reached almost 50,000 but in 2021/22 this is now closer to 17,000. The regional trend fluctuates as well but, following an increase in the early 2000s, it has remained relatively steady around 120,000–140,000 birds. As a consequence of the differing site and regional trends, the proportion of Knot on the Humber Estuary from the region has also declined, from closer to 15% in the late 1990s/early 2000sto below 10% in recent years. This decline could indicate that conditions on the SPA have worsened for this species relative to other estuaries within the region.

The distribution of Knot on the estuary has changed with each report, Austin *et al.* (2008) and Ross-Smith *et al.* (2013) mentioned redistribution from south to the north side of the Humber Estuary, but Woodward *et al.* (2018) saw some movements back to the south. In recent winters, the south again holds the majority of the Knot on the estuary though there is some fluctuation with the north showing a very small increase over the last three winters but still supporting below 40% of the estuary total. The trend on the southern side of the estuary is much more variable compared to the overall estuary trend whilst the northern trend is more closely linked to those seen on the wider estuary, but it declines more strongly since 2006/07 as more Knot have been using the southern sectors. The vast majority of Knot on the south of the estuary are using the South (Mid) (38427) area with smaller numbers on the South (Outer) area (38429.Both have highly fluctuating trends with some similar declines and peaks. Three southern sectors support numbers of importance to the estuary based on the most recent winters, all in the South (Mid) area: Cleethorpes – North Promenade to Anthony's Bank (38401) and Grainthorpe Haven to Horseshoe Point (35485) both support more than 20% of the SPA total and Horseshoe Point to Tetney Haven (35486) supports 10–20%. Numbers have increased in the medium-term at the first two sites but have shown high declines at the third .The outermost sectors of the northern side of the estuary are the most important northern sectors for Knot and all show declines over one or more terms. Following these declines, Patrington to Easington (38443) is now the only northern sector supporting more than 10% of the estuary's Knots and is highlighted as being of moderate importance in this report.

4.1.33 Ruff *Calidris pugnax*

Ruff are infrequently recorded during WeBS visits on the Humber Estuary over the winter, numbers being insufficient to enable trends to be generated for any sectors. Blacktoft Sands (38430) on the north of the estuary continues to get occasional records in winter, including a peak count of 40 in February 2020, but there were have been no recent records at Alkborough Flats (38423) the other sector mentioned by Woodward *et al.* (2018). However, there was also a record of 29 birds at Island Farm (38352) in November 2021 and there have been counts of four and eight birds at Goxhill Marsh (38411) in two recent winters. The Humber therefore supports a small proportion of the Ruff wintering in the region which usually numbers between 200 and 300 individuals. Peak counts for this species occur during autumn passage, usually in August or September. Total counts of over 100 occurred relatively often in the 1980s and 1990s, but the latest three figure count was in October 2017. During the most recent ten autumns the peak counts have been between 60 and 80 birds in most years, but sometimes lower. This species was not included in either Austin *et al.* (2008) or Ross-Smith *et al.* (2013).

4.1.34 Sanderling *Calidris alba*

As described in Woodward *et al.* (2018), Sanderling numbers declined on the Humber in the early 2000s followed by a steady increase starting in 2004/05. This continued to around 2013/14 since when numbers have fluctuated widely between winters making the underlying trend difficult to interpret. This regional trend has been more stable in contrast to the Humber Estuary, but show a sharp upturn in numbers in the last two winters which is reflected in a slight upturn in the SPA trend. Since around 2004/05, the population of Sanderling on the Humber has been between 5 and 10% of those found in the region in most years, with some fluctuations. The proportion was higher prior to this date, being above 10% and occasionally closer to 20%, which may indicate that local factors contributed to the declines of this species across the estuary in the early 2000s.

The northern side of the estuary has been on a declining trend over the long-, medium- and short terms – the numbers of birds have always been low compared to the southern side, and now the north now supports less than 5% of the SPA total. The vast majority of Sanderling are found on Humber Estuary's southern sectors and hence the Humber (South) trend matches that of the estuary as a whole. The South (Inner) (38425) areas have no Sanderling but South (Mid) (38427) and South (Outer) (38429) share the numbers across them and show broadly similar trends. The Cleethorpes – North Promenade to Anthony's Bank sector (38401) has regained its importance in Sanderling numbers on the Humber in the past few winters, Donna Nook (35483) and Theddlethorpe to Mablethorpe North End (35479) are also both designated as being of high importance to the estuary for this species, based on recent peak counts, with three other sectors across the South (Mid) and South (Outer) areas being of moderate importance. On the northern sides, only Spurn Head (38444) has sufficient data to produce trends, which follows the same trend as the North as a whole, a decline in the long, medium and short terms, and now holds less than 3% of the Sanderling on the estuary. As mentioned in previous reports (Woodward *et al.* 2018), Sanderling feed along tide lines and are known to be susceptible to disturbance; hence feeding flocks may use several different sectors across the same winter. This species was not included in either Austin *et al.* (2008) or Ross-Smith *et al.* (2013).

4.1.35 Dunlin *Calidris alpine*

The decline in the late 1990s (from 1998/99) mentioned in the previous reports (Austin *et al.* 2008, Ross-Smith *et al.* 2013) stabilised in the early 2010s (as reported in Woodward *et al.* 2018) and this has continued with a slight upturn in the last year reported (2021/22). The variation is quite low around this stable trend, and it matches that seen in the wider East of England region which had a decline in the long term that stabilised in the medium term (from around 2006/07) with a slight upturn in the most recent year (2021/22). There is on average 10% of the region's Dunlin present on the Humber Estuary. The northern side of the estuary has followed a similar trend to the estuary as a whole, albeit with a slightly more serious decline whilst the southern side has had a positive increase since 2006/07 regaining numbers lost in in the late 1990s and early 2000s. The distribution of birds has also shifted from north to south since 2006/07) and the south now supports around 70% of the Dunlin using the SPA whilst the north has around 30%. The South (Inner) (38425) trend has remained relatively more stable than the other areas being lowest in 2012/13 before rising whilst numbers on the South (Mid) (38427) and South (Outer) (38429) started rising around 2008/09. The highest numbers are on the South (Mid) where Pyewipe (38405) and Cleethorpes – North Promenade to Anthony's Bank (38401) have both recorded medium-term increases and both support numbers of high importance on the estuary, i.e. peak counts averaging more than 20% of the SPA total over recent winters. The Southern (Inner) (38425) trends are driven mainly by Read's Island Flats (38418) which supports between 10–20% of the SPA total and hence is of moderate importance. Looking at the sectors individually, on the North side, the most important sectors for Dunlin are Patrington to

Easington (38443) and Paull to Stone Creek (Cherry Cobb Sands) (38441). Although both show similar decline trends to the North as a whole, they continue to support enough birds to be of moderate importance in relation to the SPA total. However, following more severe declines Spurn Head (38444) now supports fewer than 5% of the estuary's Dunlin.

4.1.36 Snipe *Tringa ochropus*

Snipe was not included in previous reports - Austin *et al.* (2008), Ross-Smith *et al.* (2013) or Woodward *et al.* (2018). Snipe are recorded in low numbers during WeBS counts on the Humber Estuary and their trend has been relatively positive and shows a moderate increase over the long term, with a gentle increase up to a peak in 2007/08 before fluctuating. The regional trend has been in decline since its peak in 2002/03 although counts have been highly variable from winter to winter and the last three years have seen a slight upturn. In recent years, the Humber Estuary holds around 5–10% of the East of England regional population; this has increased since the early 2000s as a result of the differing site and regional trends.

The southern areas support the majority of the Snipe on the estuary (around 60% although the proportion fluctuates widely) and both sides follow the broadly stable but fluctuating wider estuary trend described above. The northern sector trend is mostly driven by Blacktoft Sands (38430) which supports numbers of high importance relative to the SPA total. Only the South (Outer) (38429) sectors as a whole have large enough regular populations to be able to create an area trend and this again broadly follows the wider estuary trend. On the South (Outer) area, low but variable numbers of Snipe have been recorded across several sectors, with Somercoates to Donna Nook (35484) and Saltfleet (35481) identified as being of moderately important sectors based on the last five winters and Theddlethorpe to Saltfleetby (35480) as possibly of moderate importance, i.e. based on the most recent winter only.. On South (Mid) (38427) sectors Cleethorpes – North Promenade to Anthony's Bank (38401) is of moderate importance and Cleethorpes – North Promenade to Anthony's Bank possibly of moderate importance. and on the South (Inner) area (38425), North Killingholme Pits (38201) is of high importance and Goxhill Marsh (38411) of moderate importance.
It should be noted that as a cryptic species, Snipe are difficult to count and hence the WeBS counts may reflect only a small (and unknown) proportion of the birds using the SPA, and the fluctuations from winter to winter may reflect changes in detectability as well as changes in abundance, e.g. Snipe can sometimes become easier to see and count in more severe weather. Whilst the higher level trends such as those for the estuary as a whole are more likely to reflect genuine trends as they are based on counts from multiple counters and sectors, counts on individual sectors may be substantial undercounts and some sectors with low or zero counts may support important numbers of Snipe in areas of suitable habitat which are not accessible to the WeBS counter.

4.1.37 Green Sandpiper *Tringa ochropus*

This species is recorded within the Humber Estuary primarily during the autumn passage, and only a few individuals remain on the Humber Estuary during the winter; hence sector level trends cannot be generated for any sector. Passage counts peak in July or August, usually at between ten and 20 birds. Green Sandpiper was not included in either Austin *et al.* (2008) or Ross-Smith *et al.* (2013).

4.1.38 Redshank *Tringa tetanus*

The decline in Redshank on the Humber Estuary started in the late 1990s (around 1998/99) and continued until around 2010/11, since when numbers have been relatively stable numbers in the medium term with some recent fluctuations. The trend broadly follows that of the wider region which has been in decline since the early 2000s with little variation though the decline on the

Humber Estuary through the 2000s was steeper. Consequently, the proportion of Redshank in the Humber compared to the wider region has declined from close to 20% in the late 1990s, to around 10%.

The trends for two sides of the estuary have similarly declined though the decline on the northern has been more severe than on the south and also more prolonged with the trend not stabilising until the short-term period. The northern side (Humber Estuary (North) (38931)) also had previously held the majority of Redshank on the estuary in the early to mid-2000s but now around 60% of birds are supported by the three areas that male up Humber South (Inner, Mid and Outer). In recent years, Redshank have relatively evenly dispersed across the southern side of the estuary with slightly fewer birds on the South (Inner) sectors. The South (Outer) (38429) area's trend has been relatively stable, although the trends on the individual sectors have been variable and some individuals from other sectors may have moved to the Donna Nook Realignment Area (35900) since its creation as it is now the most important sector in the area based on peak counts during the last five winters, and is classified as being of moderate importance to the estuary, as is Saltfleet (35481). Numbers have fluctuated on the South (Mid)(38427) area and trends have also varied across sectors here, with Pyewipe (38405) supporting more than 10% of the SPA total in recent winters and hence being defined as a moderately important sector: had a large downturn throughout the 2000s which has increased up again slightly in the short-term. The South (Inner) (38425) area held onto its numbers for longer, despite being at a lower level, with the decline not occurring until around 2010/11. Sector level trends are again variable and Redshank are widely dispersed with no sectors supporting more than 10% of the estuary total. Looking at the sector level, the northern sectors are all in general decline though several have stabilised in the short or medium terms and four of the outermost sectors are all defined as sectors of moderate importance to the SPA based on recent peak counts.

4.1.39 Greenshank *Tringa nebularia*

Greenshank are primarily seen on the Humber Estuary during autumn passage and only a few individuals stay on the estuary and in the wider region during winter. As first mentioned in Woodward *et al.* (2018) the mean winter count has not exceeded four birds in the 25 years covered by this report and the peak count (November 2011) was of eight birds. As a result it is not possible to generate trends for this species within the Humber. The wider regional trend has a maximum of 24 birds and has seen a generally increase during the 1990s and early 2000s from around 10 through to around 20 birds but a decline in recent years to a mean of around 14. During autumn passage (July to September), much higher counts may be obtained in some years, the highest during the period covered by this report being 106 in August 2010, although in most years the peak has been between 30 and 60. Greenshank was not included in either Austin *et al.* (2008) or Ross-Smith *et al.* (2013).

4.1.40 Great White Egret *Ardea alba*

Occurrences of Great White Egret on the Humber Estuary are sporadic and in low numbers (less than five). For the majority of the 25 years covered in this report, only one bird was seen at a time several years apart but since 1017/18 they have become a regular occurrence on the estuary on WeBS counts though mainly in the summer month and in low numbers with a maximum of five individuals seen in July 2021. These sightings have mainly come from the southern side of the estuary with the South (Outer) (38429) having records in the past whilst now they are seen occasionally on all three southern areas (Inner, Mid and Outer). Great White Egret was not included in any of the previous reports (Austin *et al.* 2008, Ross-Smith *et al.* 2013 and Woodward *et al.* 2018).

4.1.41 Little Egret *Egretta garzetta*

Little Egret numbers have been increasing on the Humber over the past 18 years since 2004/05, albeit with some plateaus in numbers during the early 2010s and over the short-term following a slight decline between 2016/17and 2018/19. Woodward *et al.* (2018) highlighted that the species distribution range has been moving northwards steadily after starting to colonise the UK in the 1990s. The regional trend reflects this strongly with two clear increases starting in 1998/99 and then again after a couple of years in a plateau at 2012/13. The short-term regional trend has been a slight decline from 2017/18 for a few years with numbers possibly stabilising. The WeBS trends for the SPA and the region are in line with trends shown by the Breeding Bird Survey (Heywood *et al.* 2023) and the BTO Heronries Census (https://www.bto.org/our-science/projects/heronries-census), and the dips may reflect the effects of severe weather. The proportion of Little Egrets on the Humber is also increasing following the northwards expansion of the species with the site continuing to support close to 8% of the birds in the region as detailed by Woodward *et al.* (2018). Peaks for this species have reached over 300 in September 2016 and 241 in October 2021. The species is mainly present on the South (Outer) (38429) and South (Mid) areas of the estuary, the first of which supports around 40-50% of the SPA total. Five sectors on Humber South (Outer) and four sectors on Humber South (Mid) have had peak counts over the last five winters or the most recent winter exceeding 10% of the SPA peak total and are hence classified as moderately important sectors, includingTetney Haven to Humberstone Fitties (35487) and Grainthorpe Haven to Horseshoe Pont (35485), Grainthorpe to Somercoates (35478) and Theddlethorpe to Saltfleetby (35480) which have all seen peaks of over 40 birds in recent years, and the Donna Nook Realignment Area (354830) which has seen peaks of 67 in September 2014 and 55 in September 2017. Compared to the previous report (Woodward *et al.* 2018), several more sectors on the northern side are now seeing birds recorded although not yet in sufficient numbers for any sectors to be noted as being of importance for the species on an estuary scale. This species was not included in either Austin *et al.* (2008) or Ross-Smith *et al.* (2013).

4.2 Broad Patterns

4.2.1 Waders and Shelduck

Following the format of previous reports (Austin *et al.* 2008, Ross-Smith *et al.* 2013 and Woodward *et al.* 2018), Shelduck and waders are discussed together because all these species feed on mudflat invertebrates and are therefore likely to respond in similar ways to changes in the environment. Of the 15 wader species (out of 20) able to be considered, 12 have declined at the scale of the Humber Estuary in at least one time period in the 25 winters covered by this report – an increase of three from Woodward *et al.* (2018). This time Golden Plover has declined in numbers over all timeframes and alongside Oystercatcher, Avocet and Snipe were the only four species for which a decline was apparent in the short-term. Curlew and Bar-tailed Godwit have seen medium-term declines only but long-term declines are seen in Lapwing, Ringed-Plover, Turnstone, Dunlin and Redshank. Six species have seen increases in at least one timeframe, including Black-tailed Godwit which was the only one to see increases across all three timeframes. Sanderling saw a medium-term increase followed by stability as has Ringed-Plover and Lapwing (though note their long-term declines mentioned before). Avocet has had a long-term increase but its short-term decline requires a closer look for this species' trends. Stability has been seen across the three timeframes for Grey Plover and across two timeframes for Turnstone, Knot, Dunlin and Redshank (short and medium). Short-term stability is seen for Curlew and Bar-tailed Godwit but again, note their medium-term declines mentioned above. Shelduck have been stable across all three timeframes.

Continuing the pattern seen in the last report (Woodward *et al.* 2018), the current data shows that recent declines have been substantially more severe on the northern shore (Humber Estuary North 38931). Of the 15 species we are comparing, 13 have declines in any of the three timeframes, with seven being across all three and four species recording declines in two periods. Only two waders – Grey Plover and Black-tailed Godwit recorded any increases in the northern sectors for any of the three time periods assessed (with the latter being only in the long-term) though three others saw stability in the short-term (Lapwing, Curlew and Redshank). For Shelduck, the northern sectors have shown declines in the medium and long-term before stabilising for the short-term.

On the southern shores (Humber Estuary South 38901), eight species have seen increases or stability across the sectors as a whole (Lapwing, Curlew, Bar-tailed Godwit, Black-tailed Godwit, Knot, Sanderling, Dunlin and Snipe) with only Black- and Bar-tailed Godwits showing any increases in the short-term. Declines were reported for seven species with four species showing declines in just one timeframe (Oystercatcher, Ringed Plover, Turnstone and Redshank) whilst three species had two timeframes declining (Avocet, Golden Plover and Grey Plover). Short-term declines have occurred for four species (Oystercatcher, Avocet, Golden Plover and Snipe). Shelduck were stable in the short term and increasing in the medium and long term on the southern sectors.

Only 10 species of the 15 species occur on the South (Inner) (38425) area in sufficient numbers for trends to be assessed. Three species, Dunlin, Black-tailed Godwit and Bar-tailed Godwit, saw increases in the short-term whilst Avocets have steeply declined in the same timeframe and Lapwing, Ringed-Plover, Curlew, Turnstone and Redshank have been stable. South (Mid) (38427) has 10 species with at least one timeframe declining out of 13 with trends. Again, Black and Bar-tailed Godwit have shown only increases or stability in their trends in this area, though 11 species have at least one increase with Dunlin, Sanderling, Knot, Black-tailed Godwit having a medium-term increase followed by short-term stability. High short-term declines are seen for Lapwing, Golden Plover, Grey Plover and moderate declines for the short-term in Oystercatcher, Ringed Plover, Curlew and Redshank. For South (Outer) 12 species have trends, of which Golden Plover shows decline in all three timeframes out of five species with declines in any timeframe (Oystercatcher, Lapwing, Golden Plover, Grey Plover, Snipe and Redshank). Nine species have increases across one or more of the three timeframes: Knot and Ringed Plover have increased in all three and four species have increases in the medium-term followed by stability (Lapwing, Grey Plover, Sanderling and Dunlin). Again, for Shelduck whilst Humber South (Inner) (38425) was stable in the long term but declining in the medium and short-terms. The other southern areas (Mid 38527 and Outer 38529) are stable in the short-term following increases in the other two timeframes.

These results show that increases in the south are driven by improvements in the Humber South (Mid) and (Outer) areas, as first reported by Woodward *et al.* (2018) in contrast to the patterns seen in the previous reports (Austin *et al.* 2008, Ross-Smith *et al.* 2013).

4.2.2 Dabbling ducks

Dabbling ducks, of which six species can be assessed, have mostly been stable or increasing on the SPA. Shoveler, Gadwall and Teal have increases in all three timeframes, Pintail has an increase in the short-term following medium-term stability with a long-term increase and Wigeon have stabilised with little change across all three timeframes. Mallard however, have seen declines in the long- and medium-terms.

Trends for Humber South (38901) and North (38931) broadly follow the overall trends though not all species are present on all sectors. Teal are doing well across the suite of northern sectors they occupy, with only Hull to Paull (38440) showing declines. This sector also shows severe declines for

Mallard but Mallard are doing poorly across the north. Brough Haven to North Ferriby (38433) shows declines in one or more periods for all species bar Teal for which trends can be produced (Gadwall, Wigeon and Mallard). Apart from Mallard, all five species of dabbling ducks are doing well on most of the other sectors– either increasing or stabilising and very much follow the overall estuary trends.

The trends for Humber South (Inner) (38425) broadly match the overall estuary trend for most dabbling ducks, though Wigeon have severely declined in the long-term and show variable results between sectors, whilst trends for Mallard are also variable with increases on some sectors in contrast to the wider declines shown by this species. Trends for the Humber South (Mid) area (38427) show severe declines in the short-term for all three species for which trends can be produced – Wigeon, Mallard and Teal (though the latter species shows long and medium increases). These declines occur on all sectors for which results are available. In contrast, Humber South (Outer) (38529) shows increases or stability in the short term and increase in the medium and long-term across the area as a whole for the three duck species for which trends can be produced – Wigeon, Mallard and Teal – although sector results are more variable.

4.2.3 Other wildfowl

There are not many diving ducks recorded on the Humber Estuary and so as with previous reports, trends for these species should be interpreted with caution. For the four diving duck species with overall estuary trends, two species are declining severely – Pochard (severe declines in all three timeframes) and Scaup (severe declines in the long and short-terms, stable in medium-term, but no longer occurring regularly and hence effectively more or less extinct on the SPA). Tufted Duck is stable on the whole across the estuary (<25% declines) whilst the Goldeneye trend is mixed with short-term increases, medium term stability and long-term medium declines. The declines in Pochard reflect the long-sustained declines in this species wintering in the UK. Only one site on the northern side of estuary hosts sufficient numbers of diving ducks for trends to have been produced. This is Brough Haven to North Ferriby (38433) which has recorded declines for both Pochard and Tufted Duck. Humber South (Inner) (38425) has seen Pochard declining on all three sites for which trends were produced but had long-term increases of Tufted Duck on three sites though high declines for Tufted Duck occurred across all three timeframes at Goxhill to New Holland (38412). Goldeneye have increased in the short-term on Barrow to Barton (including West Pits) (38414) in contrary to the other diving duck species, which are in decline (Pochard) or stable (Tufted Duck) in the short-term on this sector.

Of the three geese species for which trends can be produced across the Humber Dark-bellied Brent Geese shows a decline in the short-term following two timeframes of stability and Greylag Goose and Pink-footed Goose are both stable in the short-term following increases in the medium- and long-term trends. This is in slight contrast again to previous reports all-over increases (Woodward *et al.* 2018 and Austin *et al.* 2008). The northern sectors are generally positive or stable across many timeframes (particularly medium and long-term) for Greylag and Pink-footed Geese. Dark-bellied Brent Geese are declining in the short- and medium terms on the north of the estuary though they are present on different sites in general to the other two goose species mentioned. Humber South (Inner) (38425) is positive with increases across all three timeframes for Greylag and Pink-footed Geese, though a few sectors are showing severe declines for Greylag in the short- and medium-terms which historically had been important – Whitton Sand -South Face (38419) and Reads Island Flats (38418). South (Mid) (38427) and South (Outer) (38429) are important for Dark-bellied Brent Geese which have declined in the short-term across both areas though long-term trends showed increases for South (Mid). Numbers of Pink-footed Geese have increased on the Outer (38429) area

but only on two sectors Theddlethorpe to Saltfleetby (35480) and Theddlethorpe to Mablethorpe North End (35479).

The four additional species that aren't geese or ducks show mixed trends across the estuary. Little Egret increased substantially in the medium-term but has now stabilised in the most recent short-term trends. Moorhen also shows recent stable trends (over the medium-term) though the long-term trend was increasing strongly. Coot has suffered severe declines medium-term and moderate declines in the short-term, though these declines have not reversed earlier increases and the long-term trend shows a high increase. Few sector level trends are available for these species and those that are available (for Coot and Moorhen) broadly match the overall trends for the estuary.

4.2.4 Summary

Overall, trends in numbers of waders and ducks varied between species, whereas since the last report the three geese species for which trends could be analysed are no longer increasing. The new additional species including two egrets, Coot and Moorhen are again mixed and variable in their trends across the estuary.

Of the 31 species for which trends could be assessed for the Humber Estuary, there were declines in numbers detected in at least one time period for 18, increases for 16 and stable trends across all three timeframes for four species. The majority of species show stable trends in the short term whilst there are stronger trends (both increasing and decreasing) in the medium- and long-term timeframes. Four species saw increases across all three timeframes – Black-tailed Godwit, Teal, Gadwall and Shoveler whilst Pochard was the only species declining across all three periods. Short-term increases have been additionally seen for Goldeneye and Pintail. Five waders and one duck species whilst stable in the short-term had previously declined in numbers and have not recovered to previous levels. The more positive results seen in Woodward *et al.* (2018) have not continued for all species though the overall outlook remains better than seen by Ross-Smith *et al.* (2013) and Austin *et al.* (2008).

Continuing what was seen in a previous report (Woodward *et al.* 2018), declines in bird numbers have been seen for many of the sectors on the northern side of the Humber, where 21 out of 28 species have seen declines in one or more timeframe, with many waders (12 out of 15) showing severe declines across multiple periods. Increases have been reported for 11 species, though only one wader and three ducks have seen short-term increasing trends. The Humber South (Inner) (38425) sectors show more positive trends with increases seen for the two goose species, three dabbling ducks and three waders for which trends could be produced for this area; the other species in this area are more variable and their overall trends highly sector dependent. Declines were seen for 12 species (of 23) though only five were in the short-term. Humber South (Mid) (38427) has trends for 18 species, with short-term increases seen on any timeframe for 15 of these though only two are in the short-term. Short-term declines have occurred for 11 species though which is less favourable and again trends are variable across sectors. The South (Outer) (38429) area has only three of 19 species showing short-term declines and four showing short-term increases with many species (12) stable (no change) in their trends. These increases and periods of stability continue the positive trend seen on the southern sectors by Woodward *et al.* (2018).

A little more than half of the trends for the Humber Estuary during the 25 winters to 2021/22 are in line with the regional trends (though many of the rest are only different in the short-term), suggesting that the factors affecting many of the waterbirds numbers on this estuary are likely to be those that act at the broad-scale across the wider region or the UK as a whole (such as climate change and general population shifts). There are a few cases where numbers on the Humber Estuary

have decreased in importance in terms of the proportion of the regional numbers– Golden Plover, Curlew, Knot, Sanderling, Turnstone and Redshank. There is the potential that specific site pressures may still be driving or exacerbating some of these declines, and hence further investigation into the causes would be prudent, which if identified could potentially be address through management actions. The declines in wader numbers across northern side of the estuary, and in particular the outermost sectors, suggests that any local pressures may be in this area, Sanderling is an exception as the vast majority of birds occur on the south of the estuary, but note that for this species any site-specific pressures affected the population in the early 2000s and the recent data suggest they are no longer affecting the species. To show some positives, there have been slight increase in proportion of regional numbers of Grey Plover and Ringed Plover supported on the Humber, suggesting that the conditions on the estuary are relatively favourable for these declining species, relative to other sites across the region. This report also includes results for the Donna Nook Realignment Area (35900; created in 2013) for the first time, with important numbers of some species, e.g. Redshank, being shown to use this sector. High counts for some species have also been recorded at Island Farm (38352; created in 2020) although it is still too early for any trends to be produced for this sector.

Acknowledgements

The data analysed in this report come from the Wetland Bird Survey (WeBS) Core Count Scheme. WeBS is a partnership scheme jointly funded by the British Trust for Ornithology (BTO), Royal Society for the Protection of Birds (RSPB) and the Joint Nature Conservation Committee (JNCC), with fieldwork conducted by volunteers and previous support from Wildfowl & Wetlands Trust. This report would not have been possible without the dedication all the volunteer observers who have undertaken WeBS counts on the Humber Estuary.

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Appendix A Population trends of each species for each sector of the Humber Estuary**.**

This appendix can now be found as a series of five Excel files for each of reading. Within each file there is a tab for Navigation, Table of Change, Mean of Peaks (MOPs) and for each of the 39 species with enough numbers for at least one trend to be produced. For each species in each area/sector, the y-axes of the left-hand graphs show the number of individuals counted, while the y-axes of the right-hand graphs are percentages (i.e. the percentage of the Humber population found in that sector per year).

Appendix Title	**Description**
Appendix A1 – Humber Estuary Sub-areas.xlsx	Population trends of each species at the Humber Estuary as a whole, North, South (Inner), South (Mid) and South (Outer) areas
Appendix A2 – Humber Estuary North sectors.xlsx	Population trends of each species in Humber Estuary North at a sector level
Appendix A3 – Humber Estuary South Inner sectors.xlsx	Population trends of each species in Humber Estuary South (Inner) at a sector level
Appendix A4 – Humber Estuary South Mid sectors.xlsx	Population trends of each species in Humber Estuary South (Mid) at a sector level
Appendix A5 – Humber Estuary South Outer sectors.xlsx	Population trends of each species in Humber Estuary South (Outer) at a sector level

Appendix B Maps of species density across Humber WeBS sectors.

The darker the shading the higher the density of birds, and numbers are the five-year mean of peaks for 2017/18 – 2021/22.

Please note that for Tundra Bean Goose (XR), Smew (SY), Common Crane (AN), Green Sandpiper (GE) and Great White Egret (HW) no maps were produced due to insufficient observations (5-year mean of peaks is equal to zero on all sectors).

Figure B.DB Dark-bellied Brent Goose

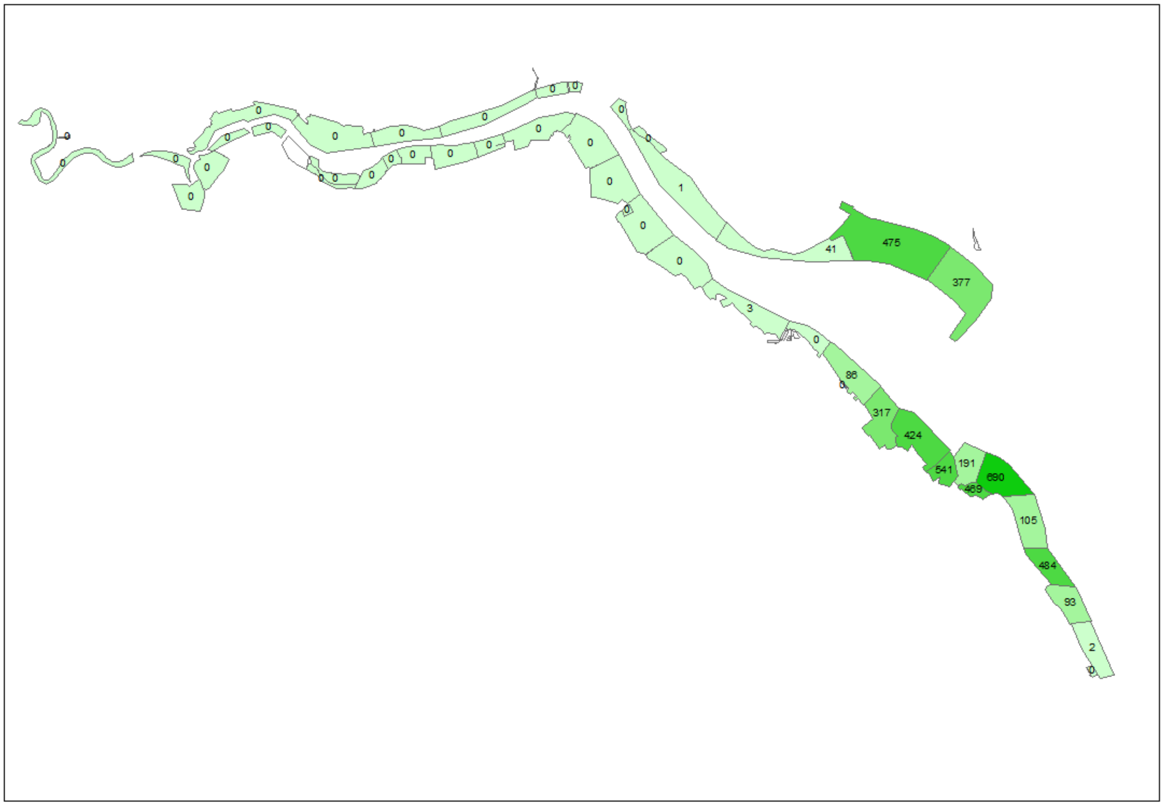


Figure B.JA British/Irish Greylag Goose

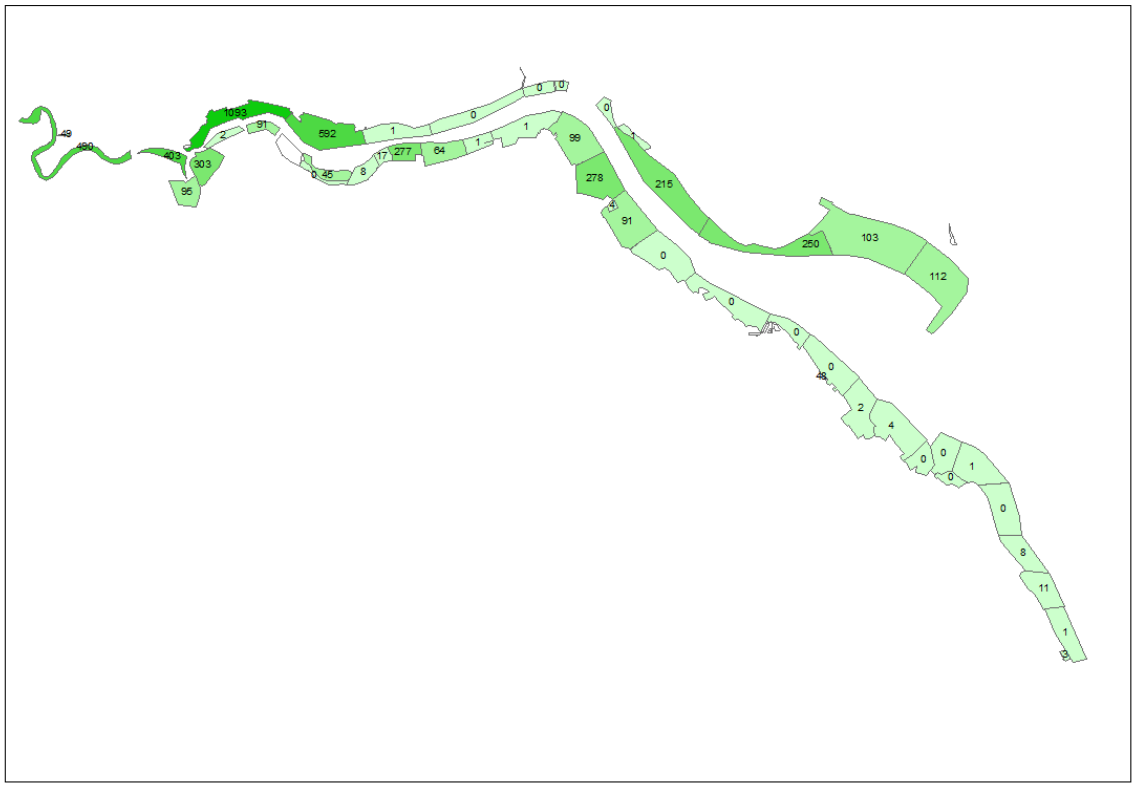


Figure B.PG Pink-footed Goose

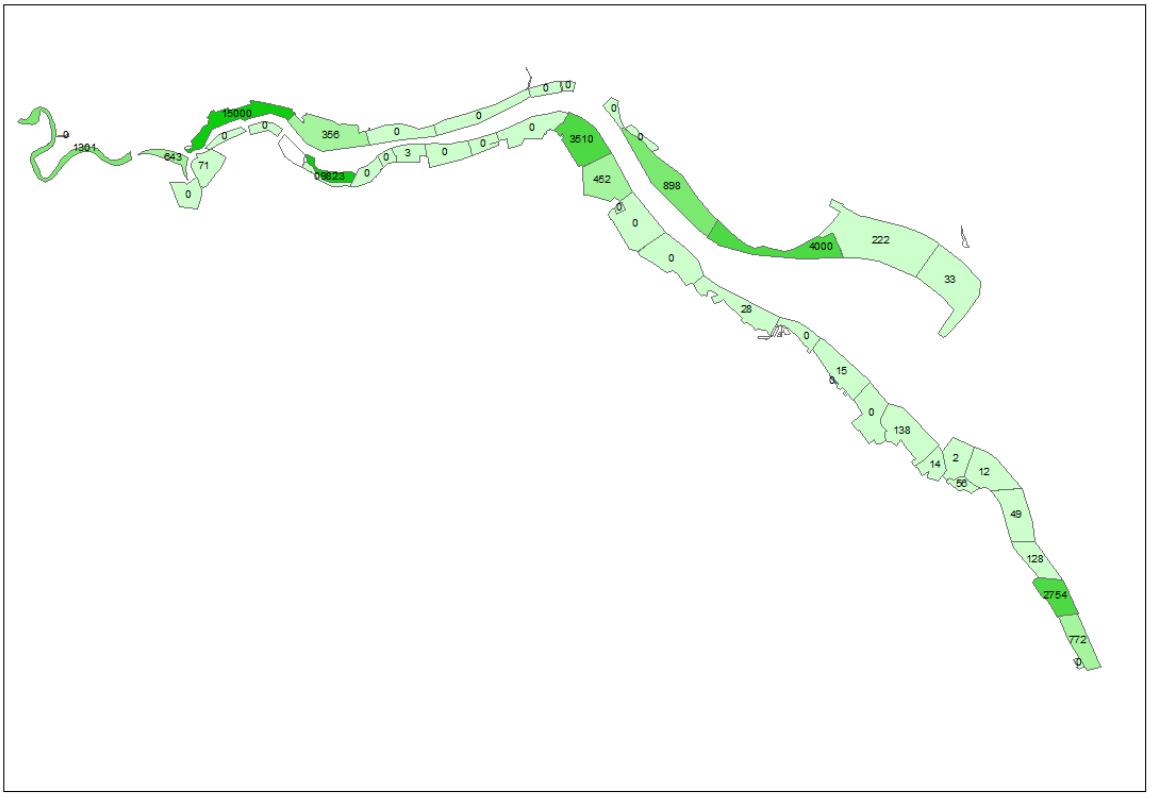


Figure B.EW European White-fronted Goose

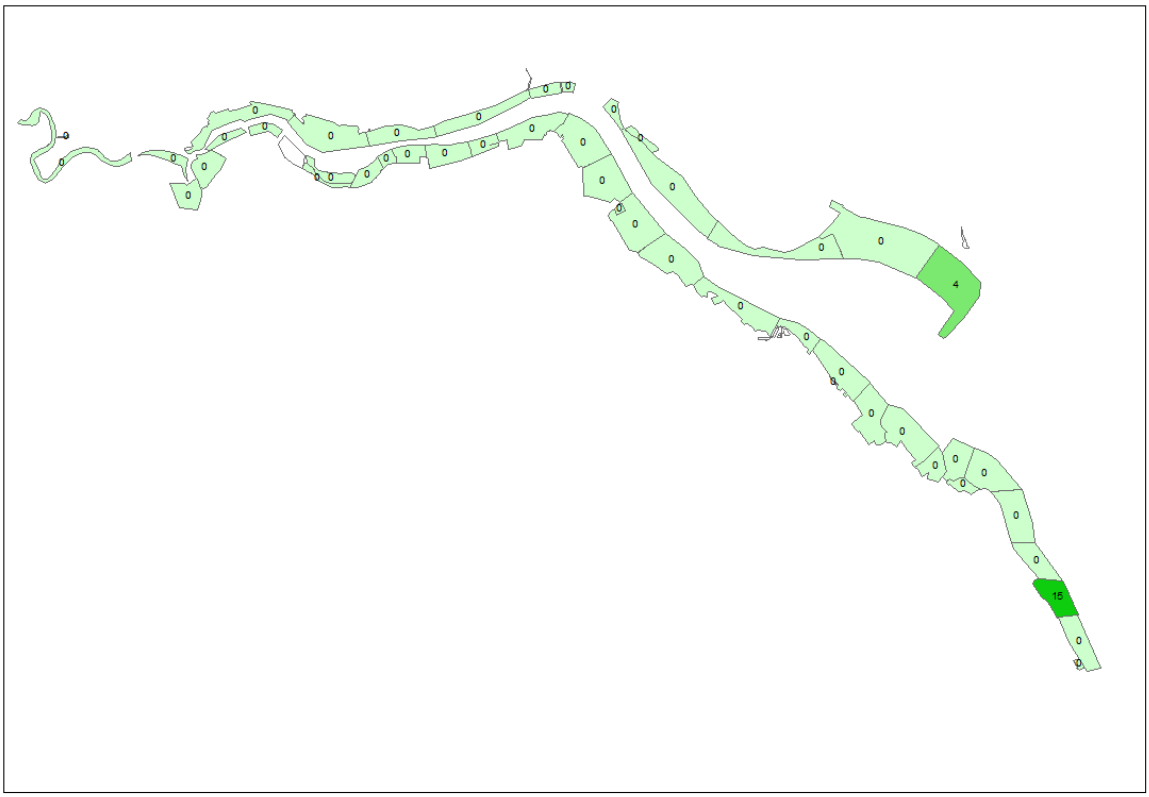


Figure B.SU Shelduck

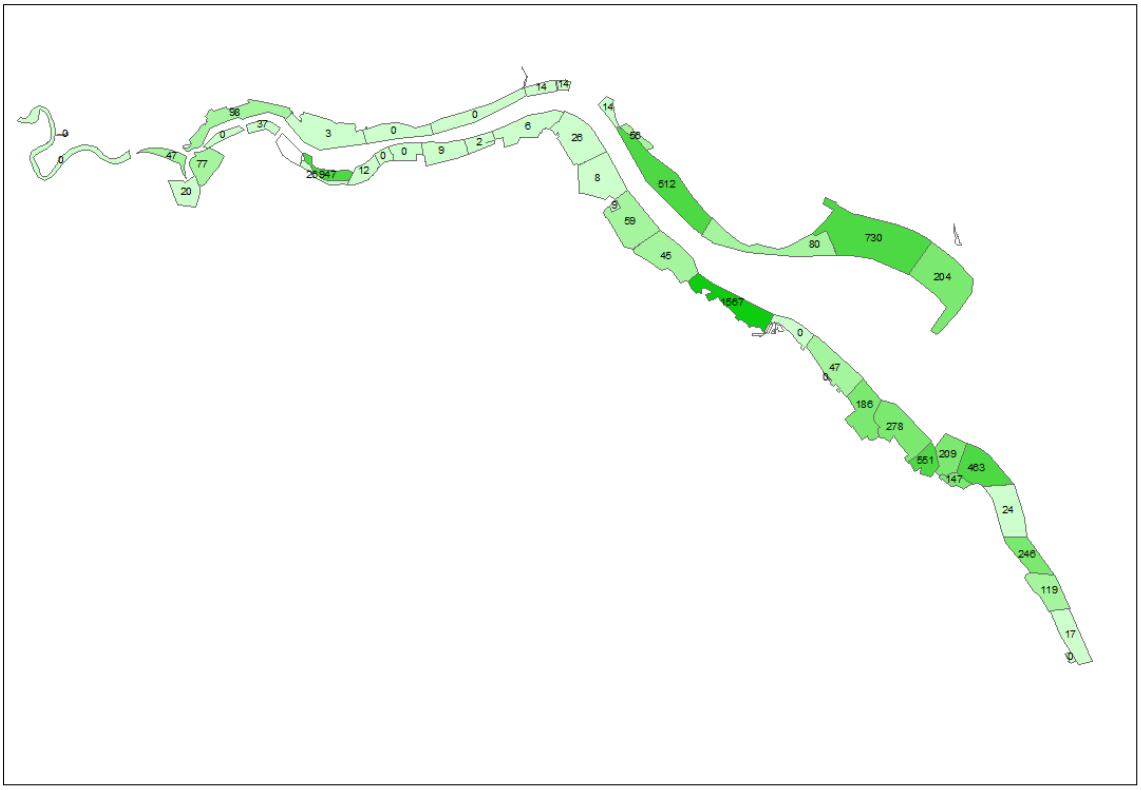


Figure B.SV Shoveler

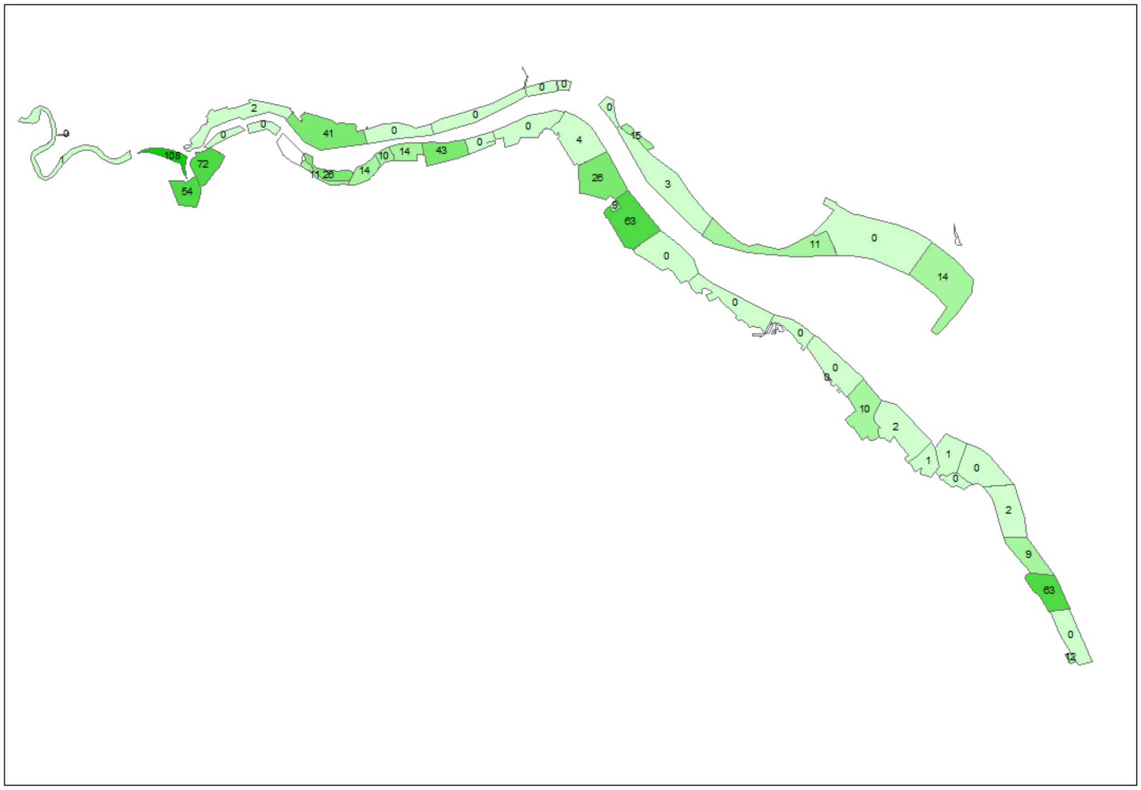


Figure B.GA Gadwall

Figure B.WN Wigeon

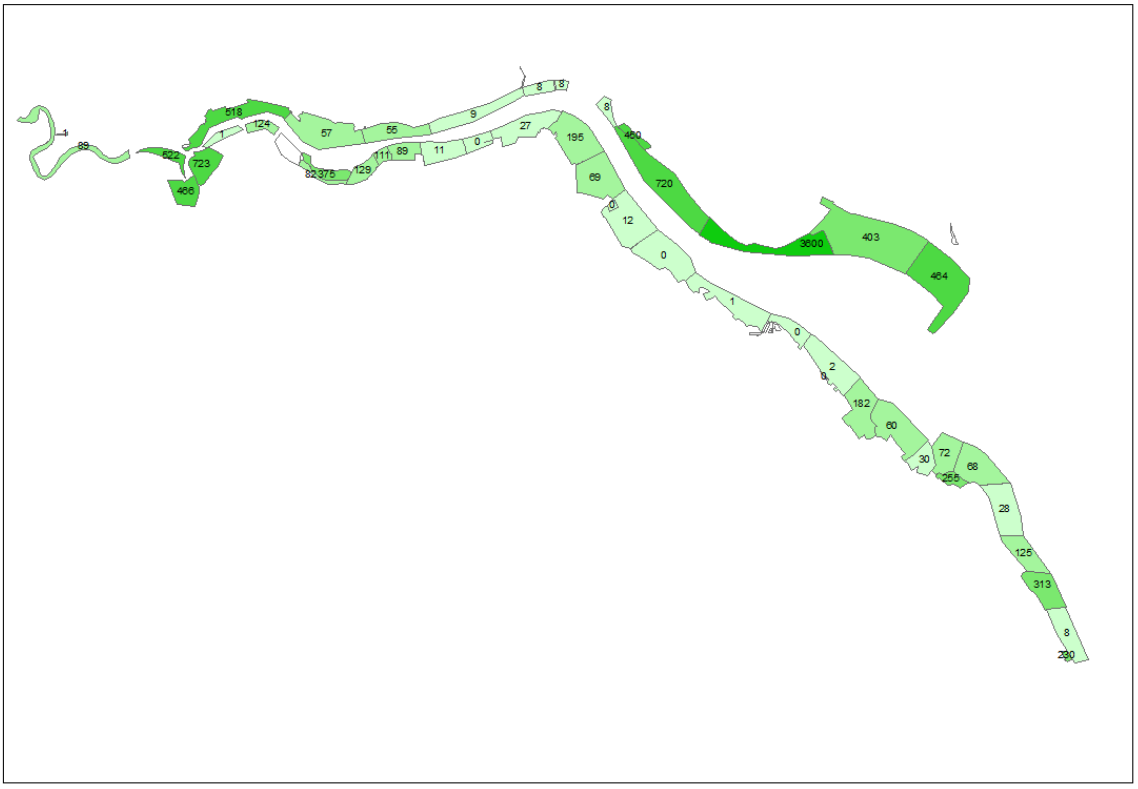


Figure B.MA Mallard

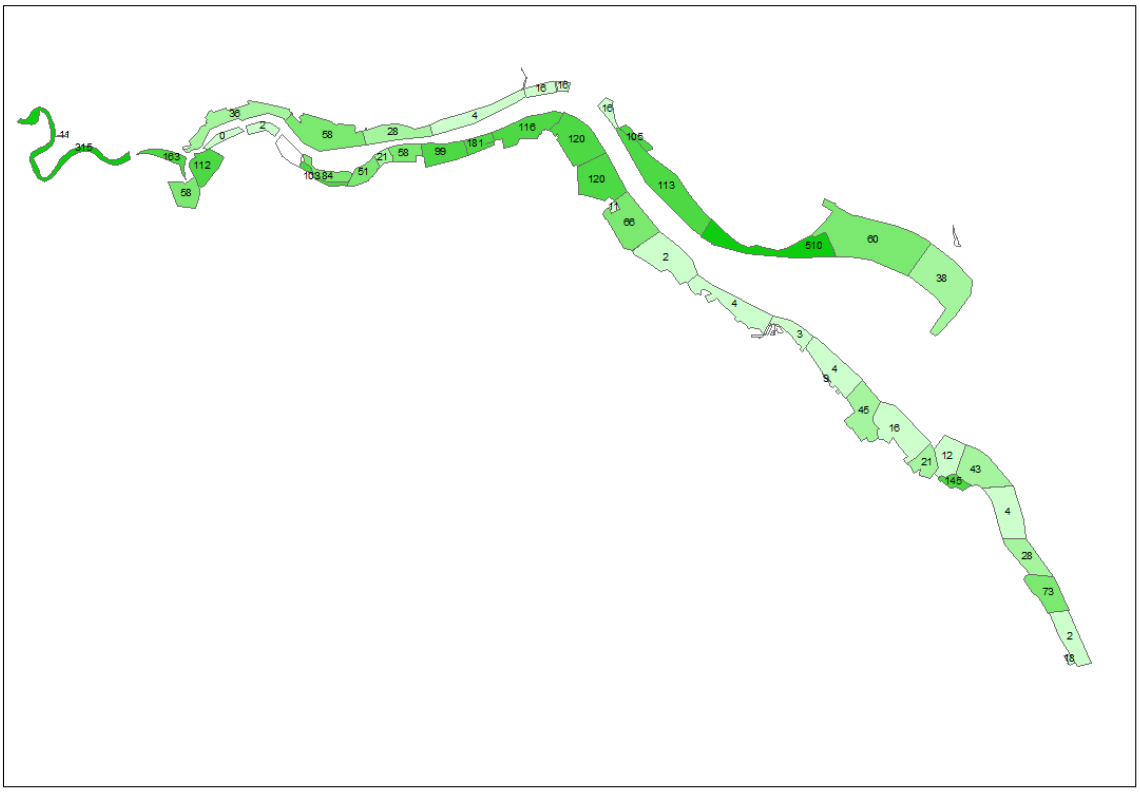


Figure B.PT Pintail

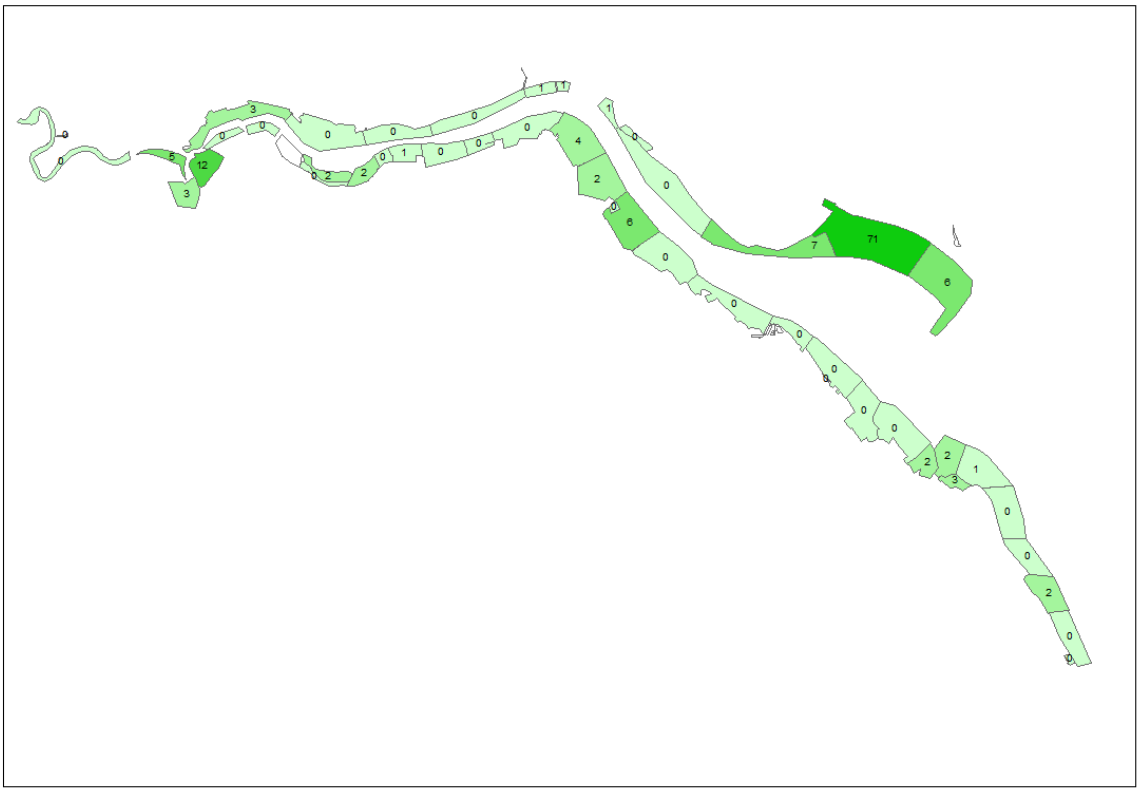


Figure B.T Teal

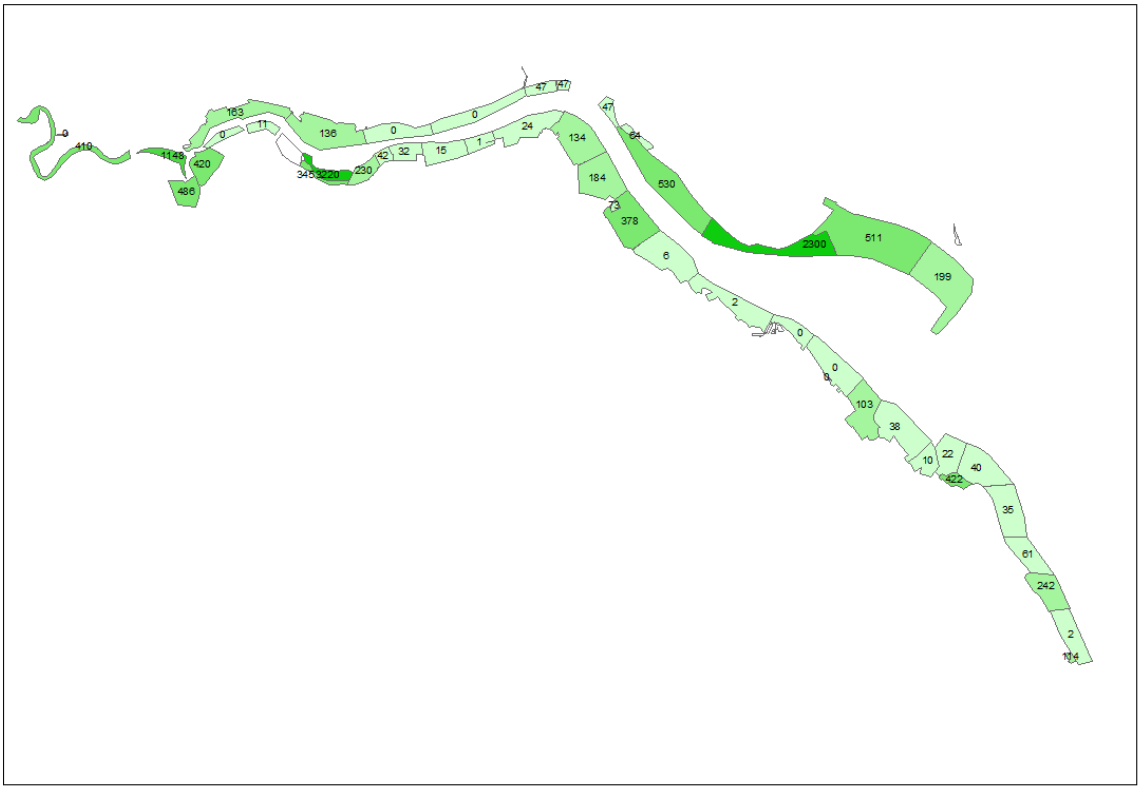


Figure B.PO Pochard

Figure B.TU Tufted Duck

Figure B.SP Scaup

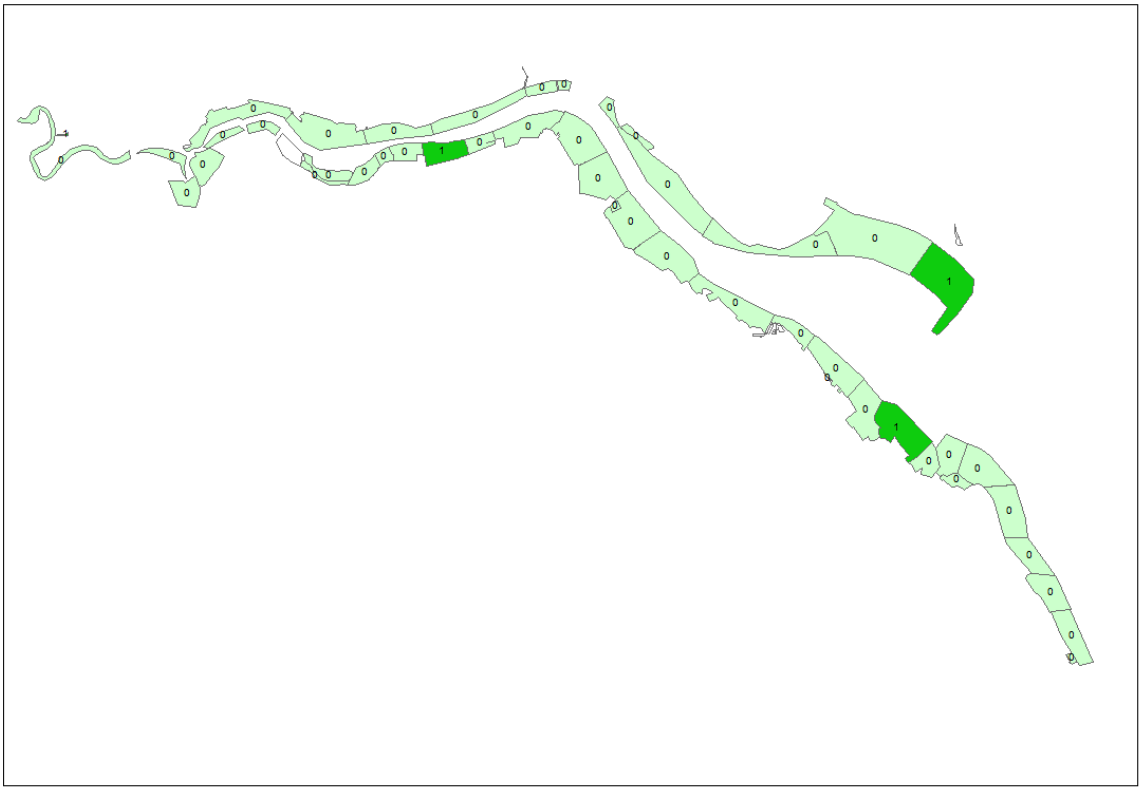


Figure B.GN Goldeneye

Figure B.MH Moorhen

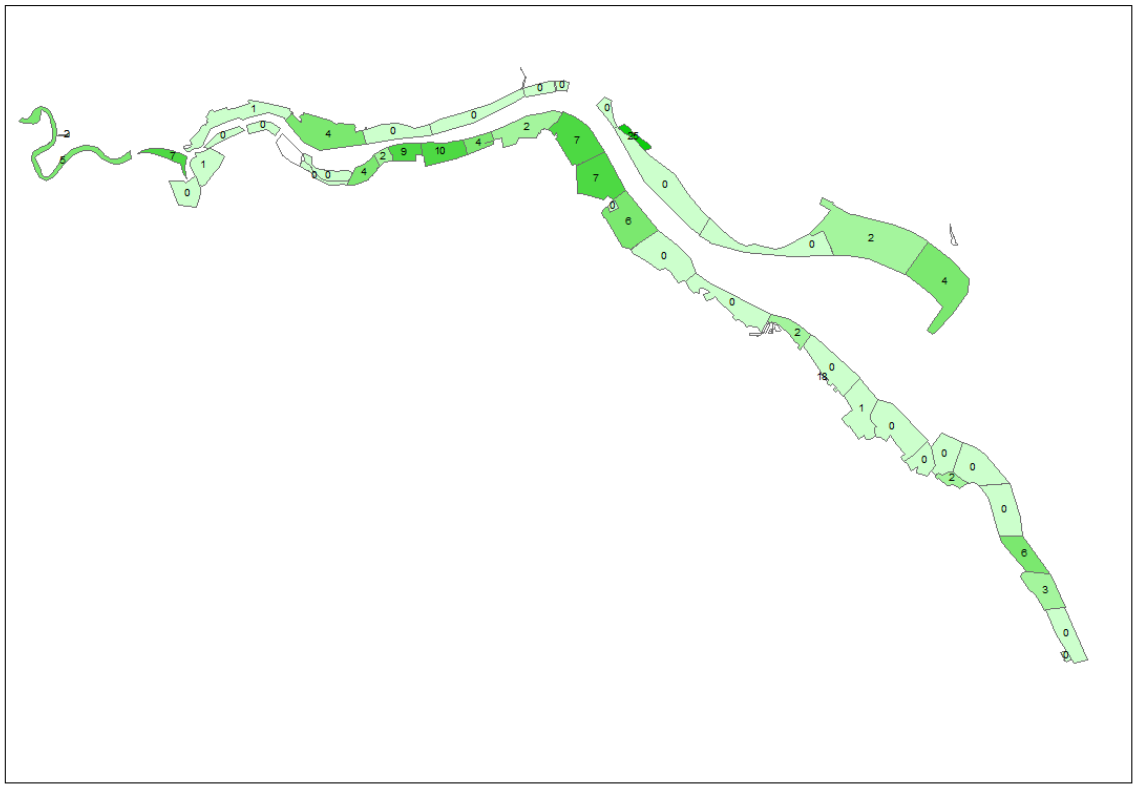


Figure B.CO Coot

Figure B.OC Oystercatcher

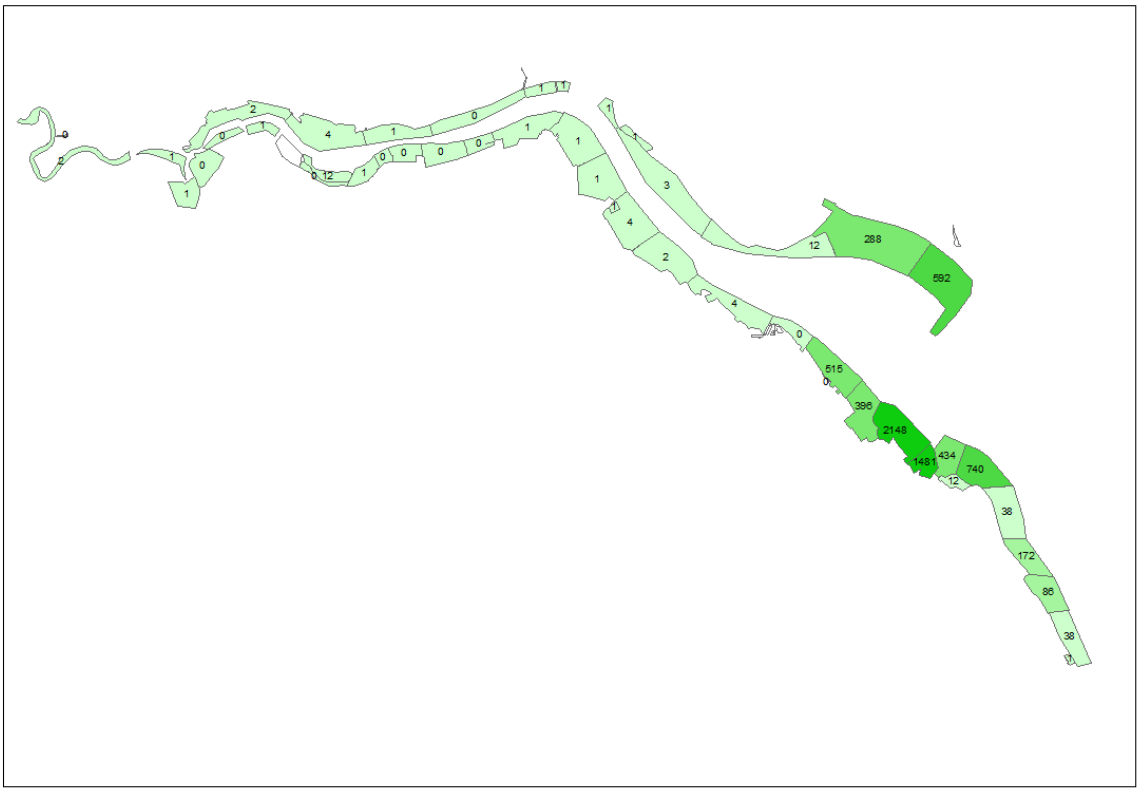


Figure B.AV Avocet

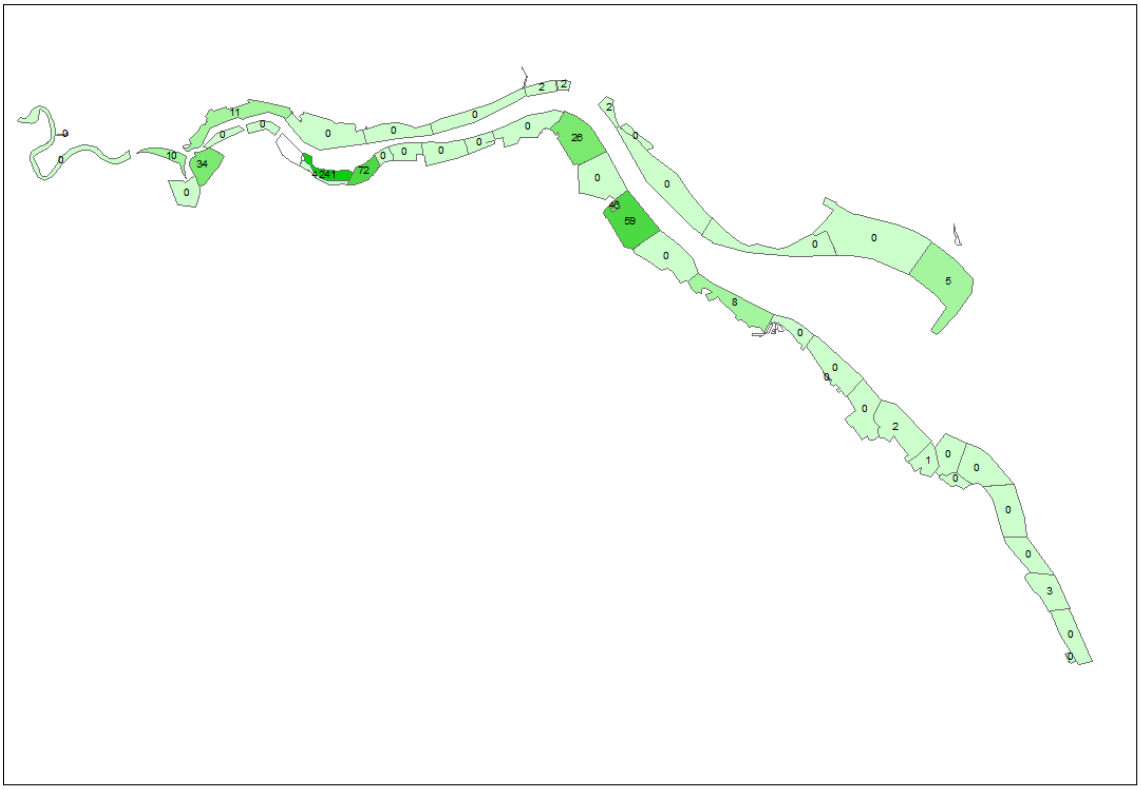


Figure B.L Lapwing

Figure B.GP Golden Plover

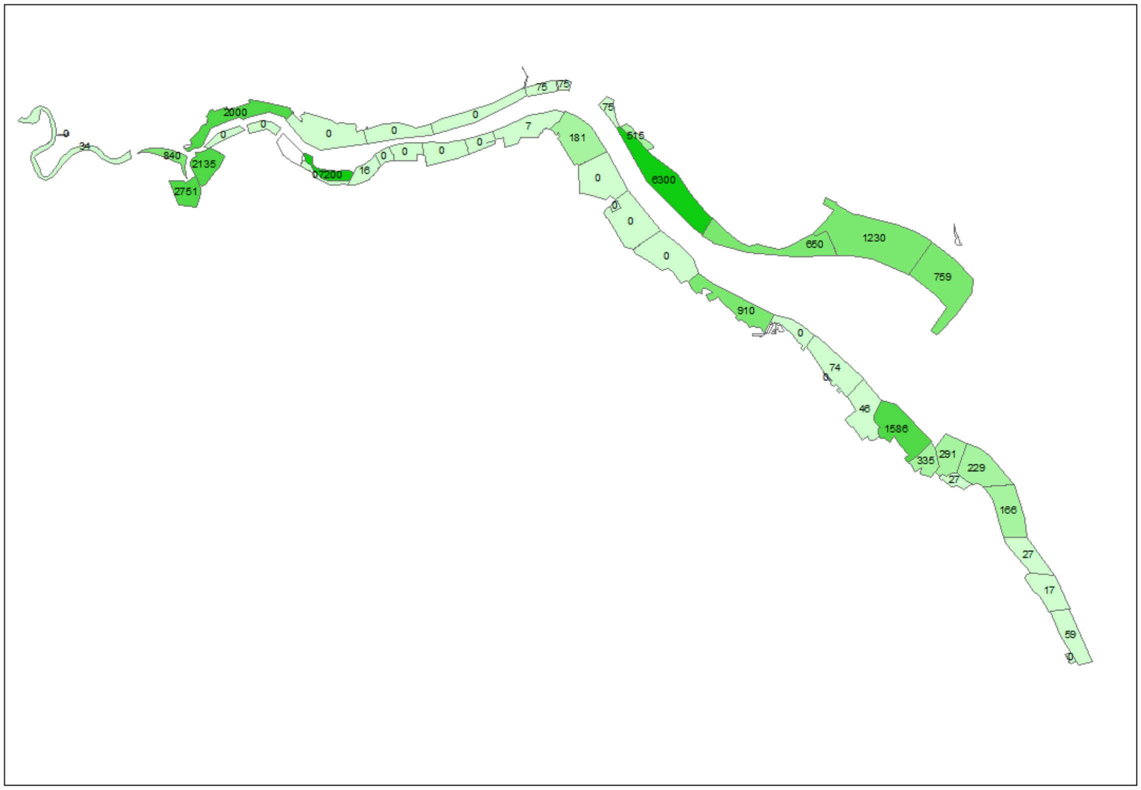


Figure B.GV Grey Plover

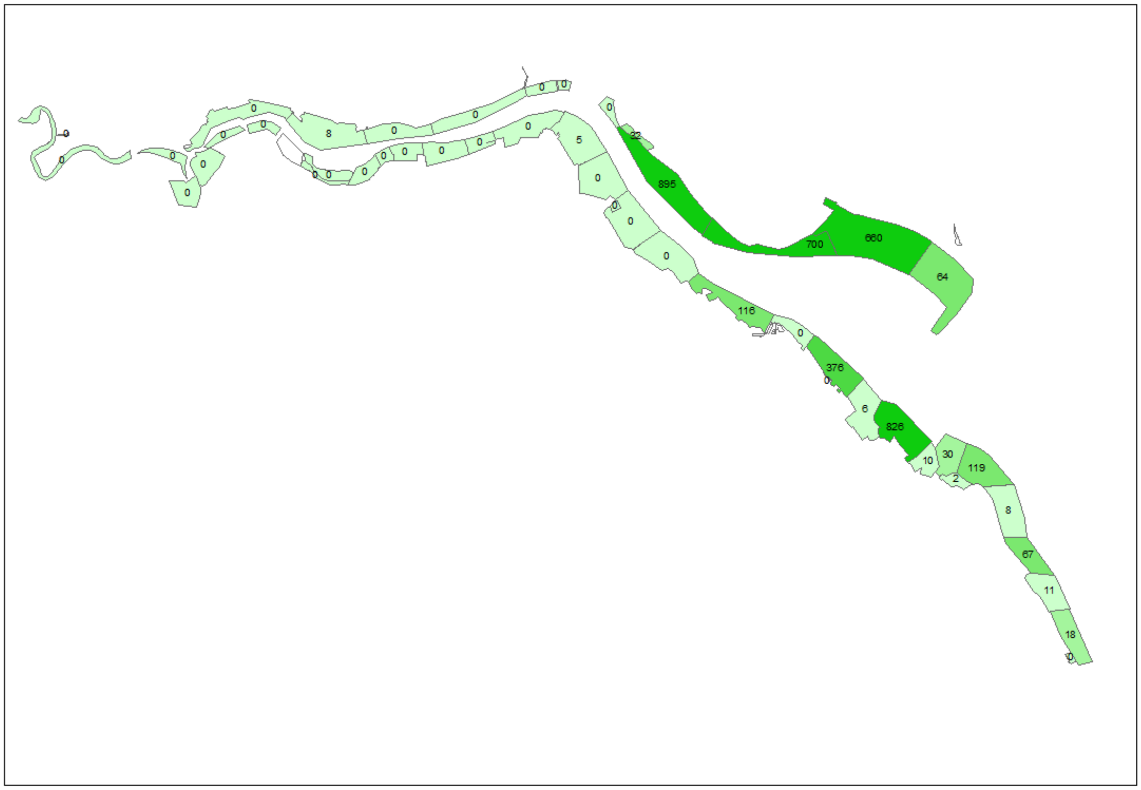


Figure B.RP Ringed Plover

Figure B.WM Whimbrel

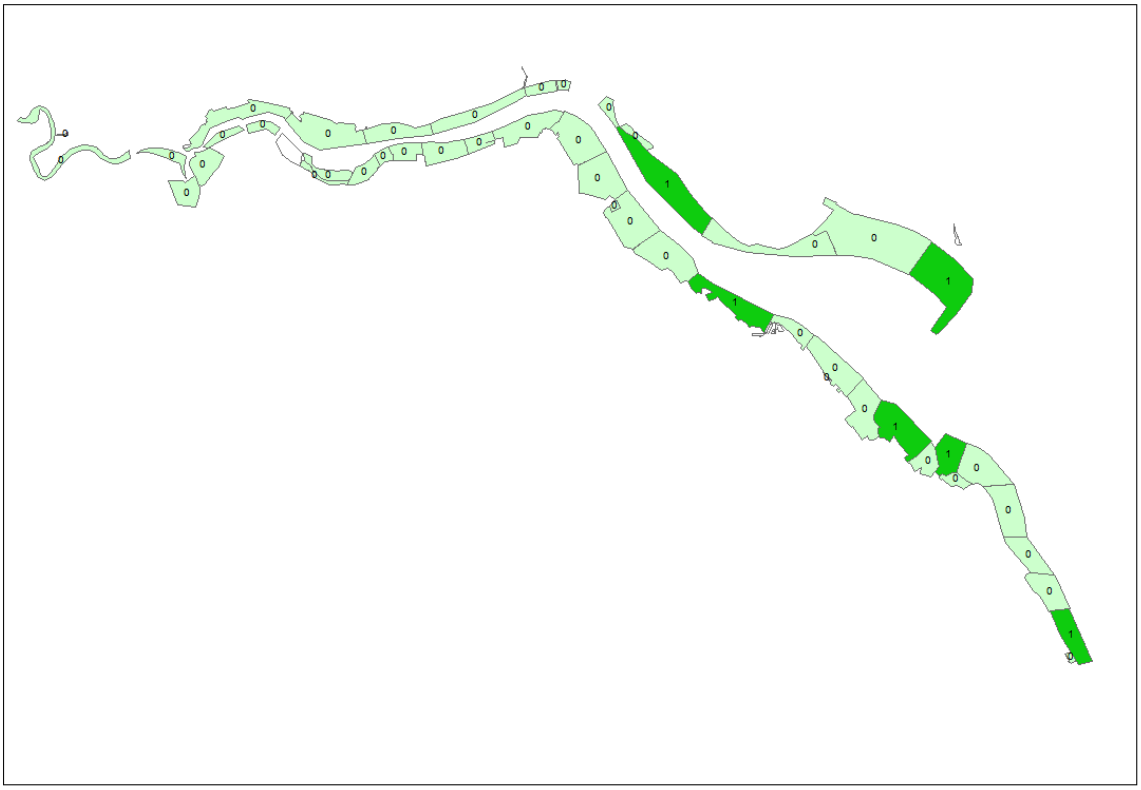


Figure B.CU Curlew

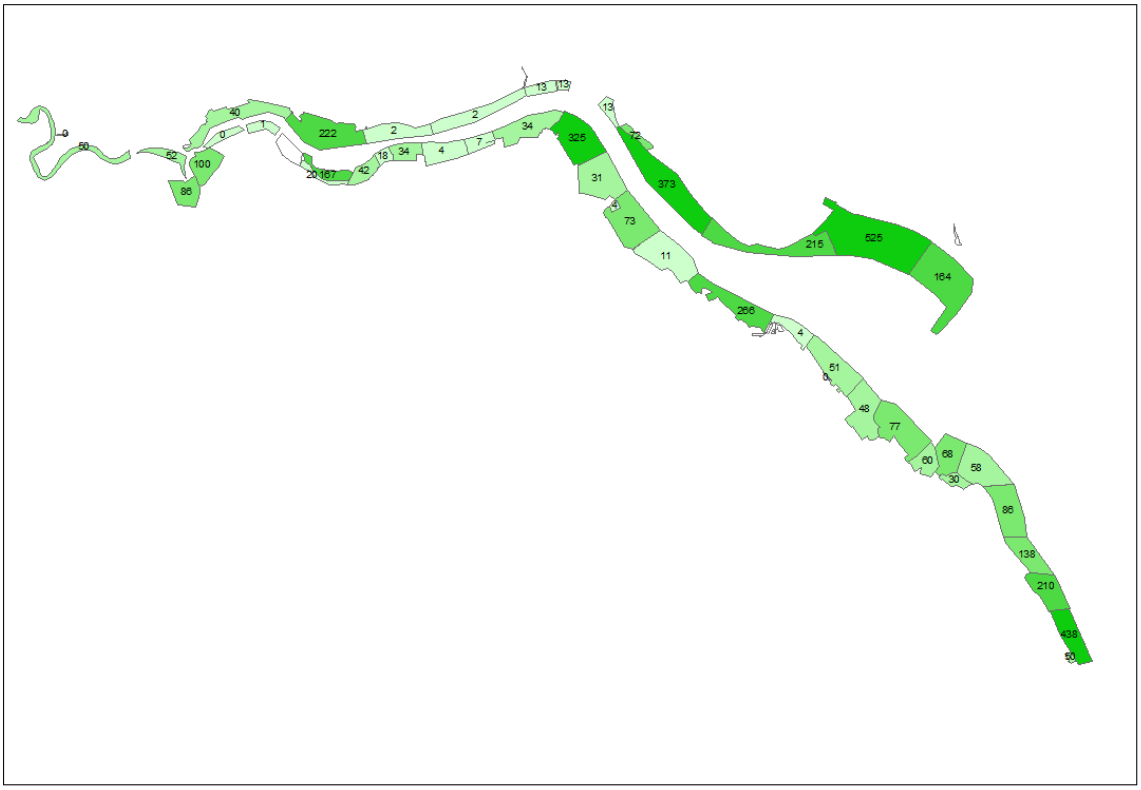


Figure B.BA Bar-tailed Godwit

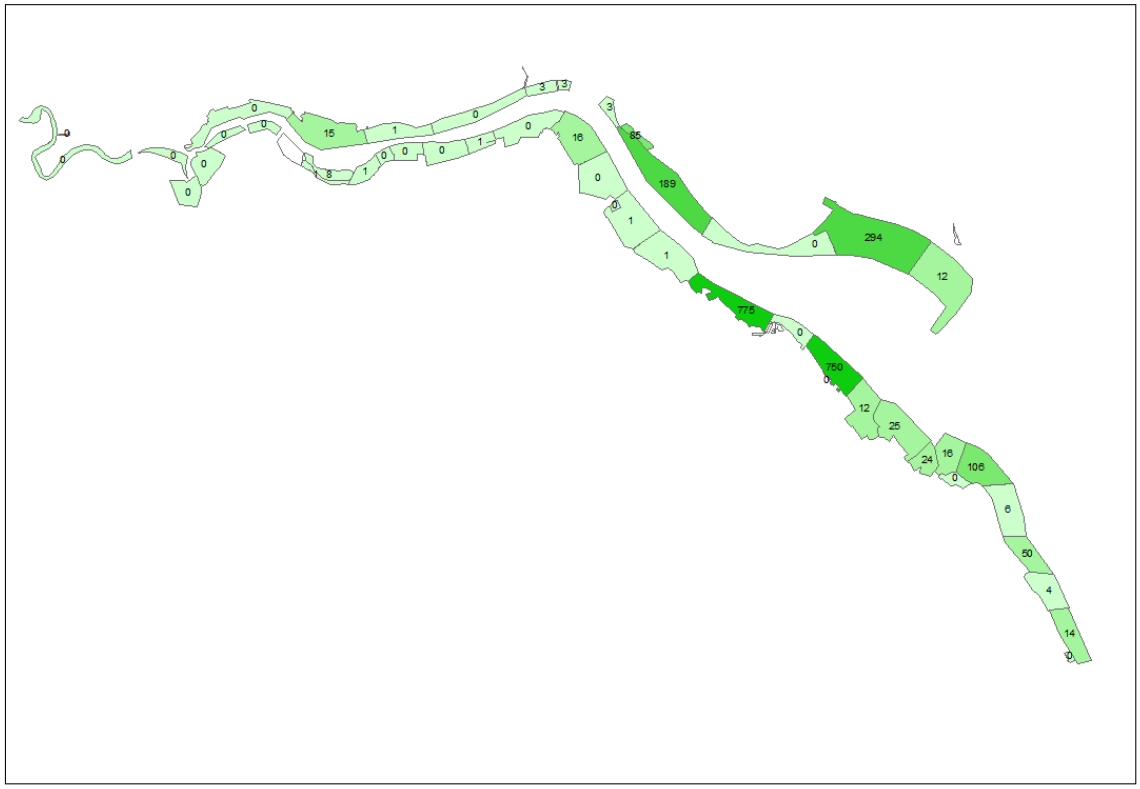


Figure B.BW Black-tailed Godwit

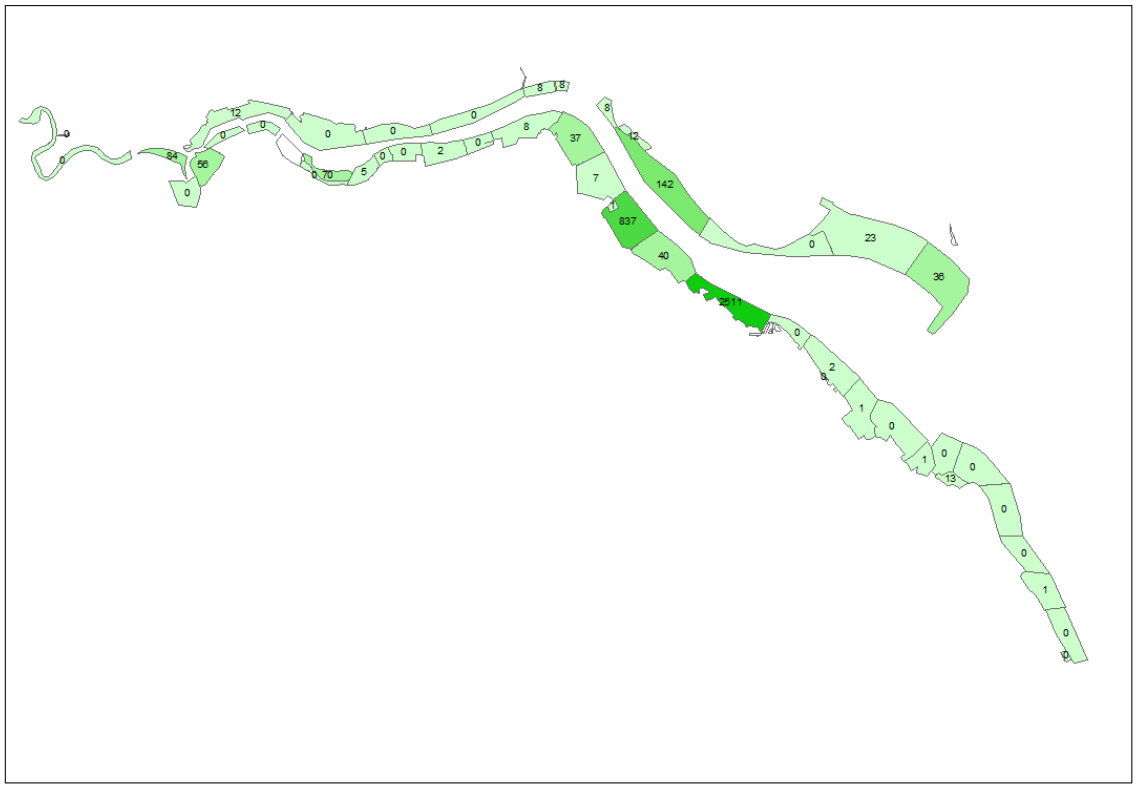


Figure B.TT Turnstone

Figure B.KN Knot

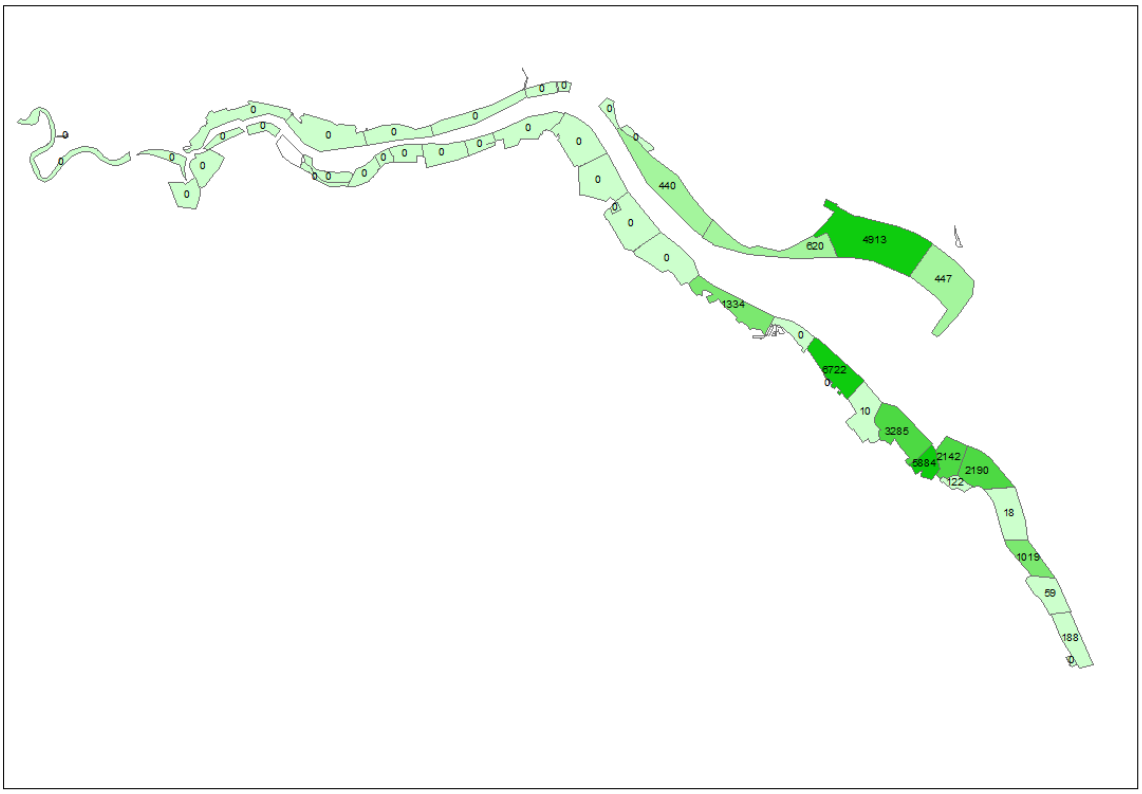


Figure B.RU Ruff

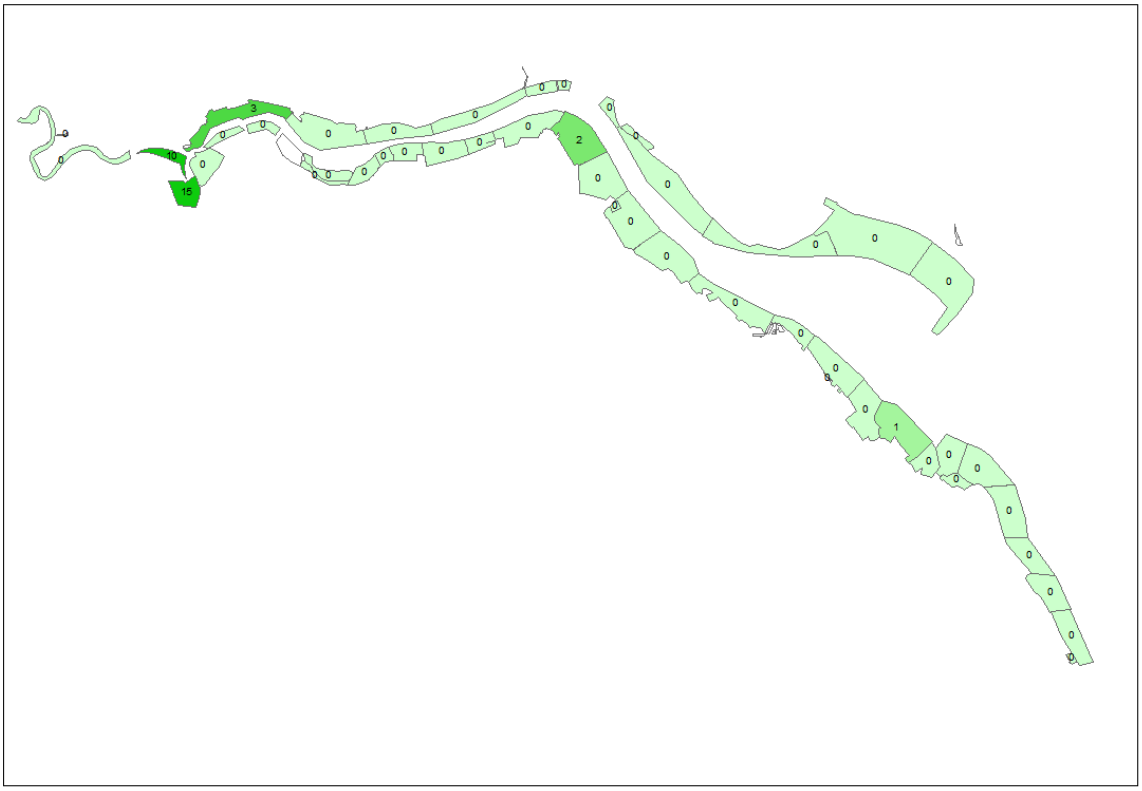


Figure B.SS Sanderling

Figure B.DN Dunlin

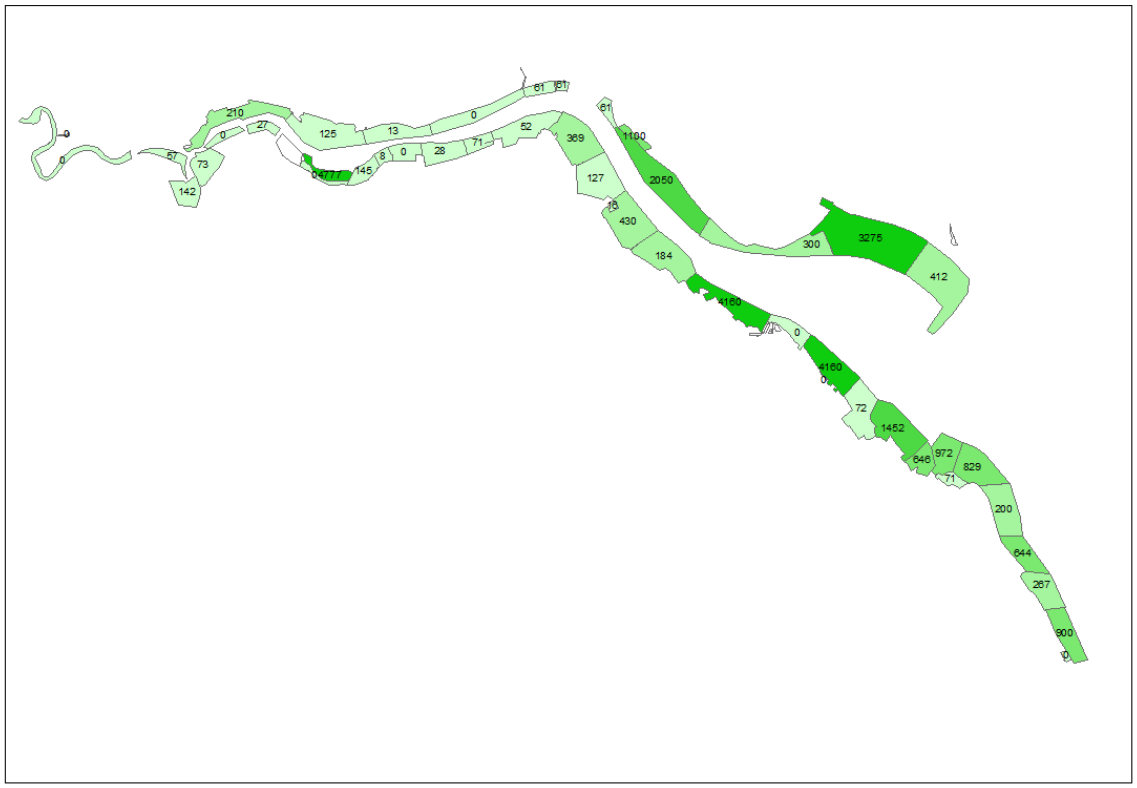


Figure B.SN Snipe

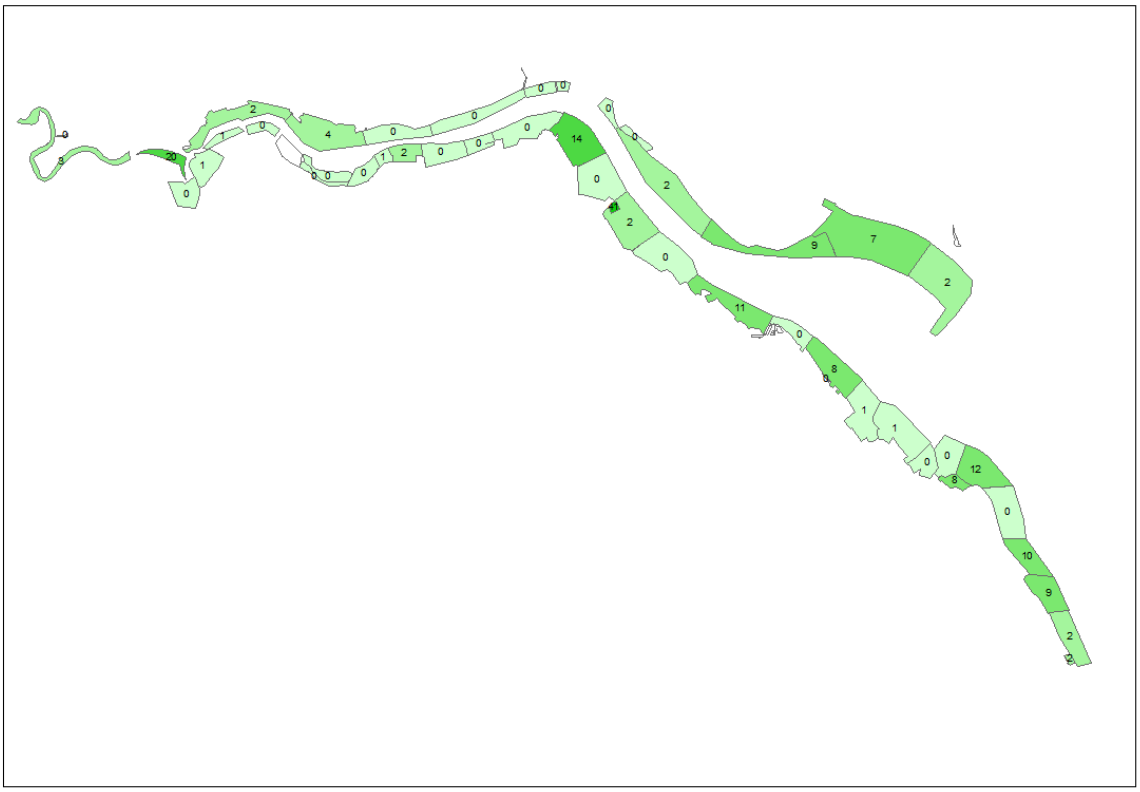


Figure B.RK Redshank

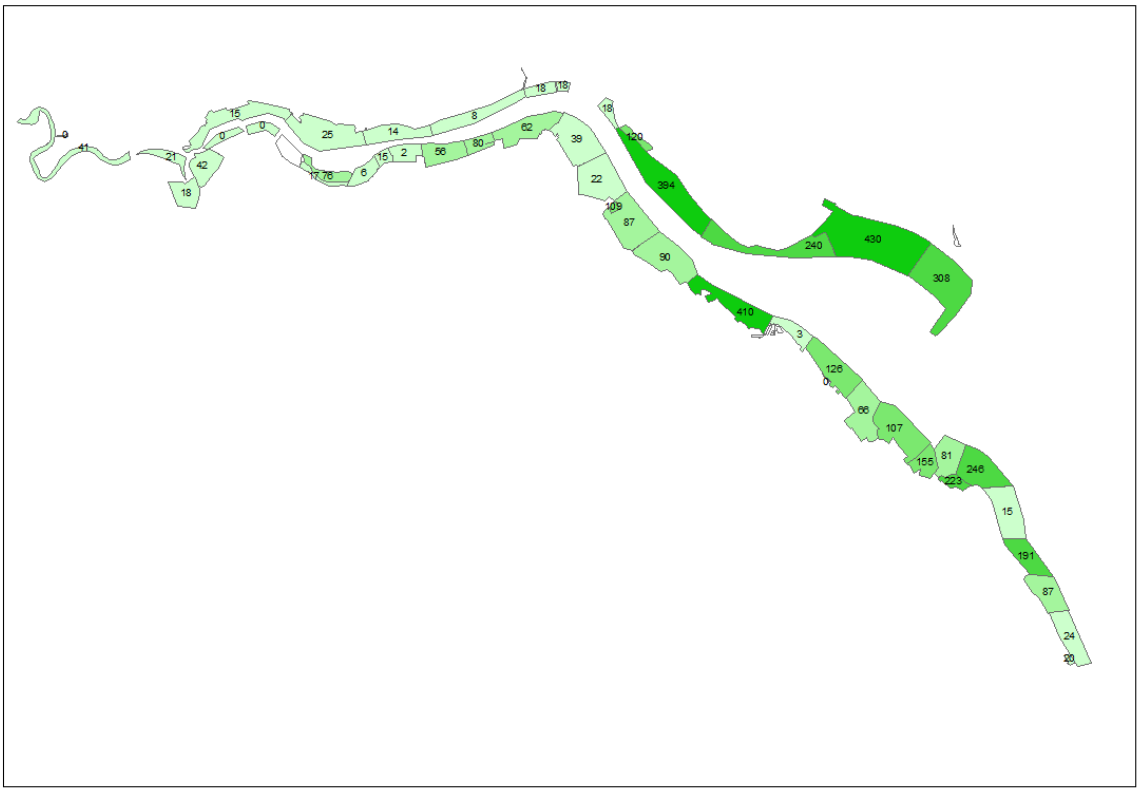


Figure B.GK Greenshank

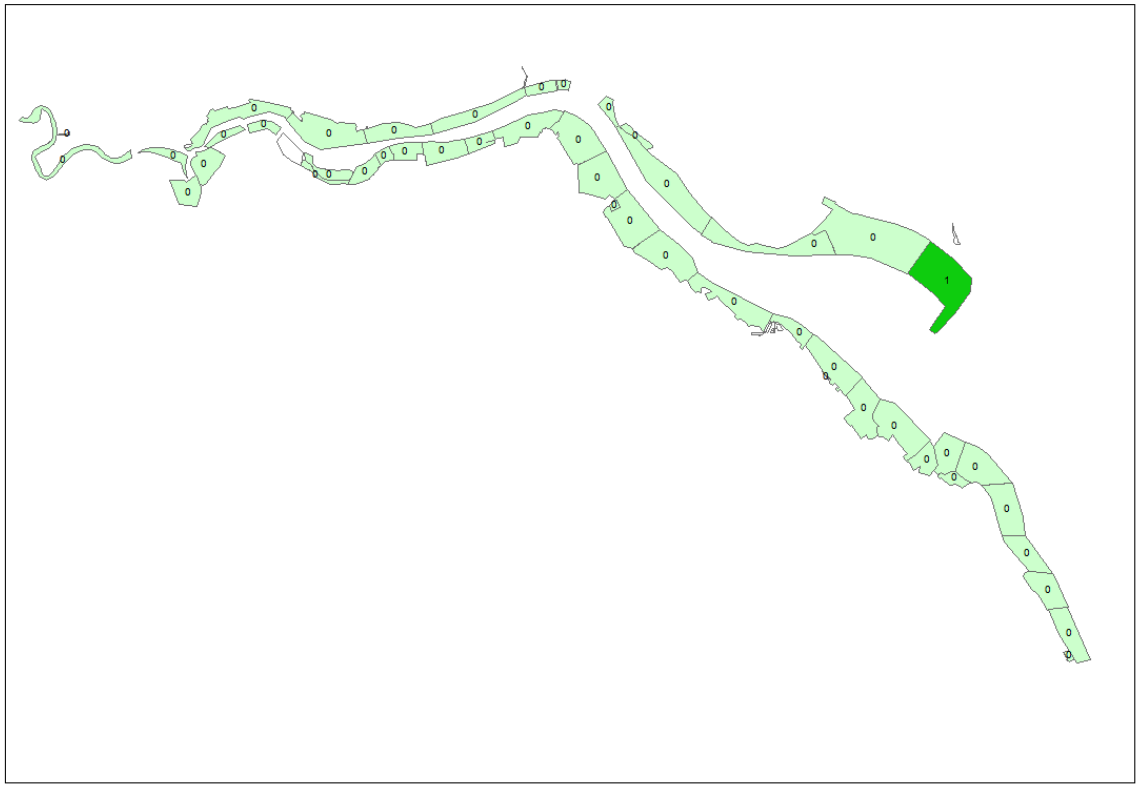
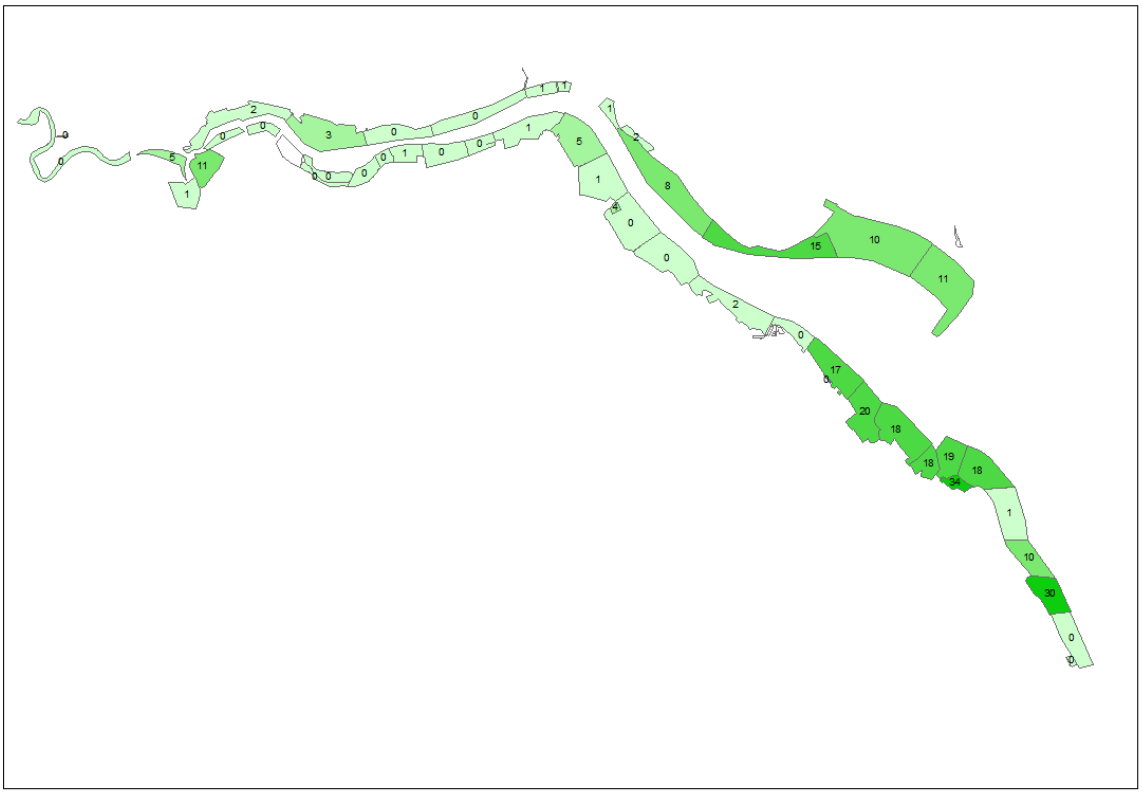


Figure B.ET Little Egret



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Analysis of Wetland Bird Survey (WeBS) data for The Humber Estuary SSSI, SAC, SPA and Ramsar site: fourth appraisal – sector-level trends to winter 2021/22

This study updates previous reports that assessed population trends of waterbird species in different parts of the Humber Estuary, in order to identify areas where species were declining contrary to, or in excess of, the trend for the Humber Estuary as a whole. The report also identifies sectors that support an increasing proportion of species that are declining across the Humber Estuary as a whole.

CITATION e.g. Bowgen, K.M., Austin, G.E., Wetherhill, A. & Woodward, I.D. 2023. Analysis of Wetland Bird Survey (WeBS) data for The Humber Estuary SSSI, SAC, SPA and Ramsar site: fourth appraisal – sector-level trends to winter 2021/22. BTO Research Report **761**, British Trust for Ornithology, Thetford, UK.

ISBN 978-1-912642-57-1

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