

Analysis of wintering waterbird population trends for the Lough Neagh and Lough Beg Special Protection Area (SPA)

El Haddad, H., Austin, G., Woodward, I. & Booth Jones, K.



BTO Research Report No. 760

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Authors

Hala El Haddad, Graham Austin, Ian Woodward & Katherine Booth Jones

Report of work carried out by the British Trust for Ornithology
on behalf of NIEA and the DAERA

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Hala El Haddad, Graham Austin, Ian Woodward & Katherine Booth Jones,

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EXECUTIVE SUMMARY

- The Lough Neagh and Lough Beg Special Protection Area is an important site for wintering waterfowl that is monitored yearly by BTO surveyors.
- Monthly visits are conducted during winter to count the number of species present. These counts are collated into abundance estimates which can be used to produce trends for the site.
- Because of the site's large size, it was divided into 11 sub-regions for which trends are produced and compared. 19 species were chosen to be analysed based on previous records on the site.
- Tables showing percentage of change over the short, medium, and long term, and five-year means of peaks per site and sub-region were produced for each species. Pie charts showing the amount of change per sub-region show the proportion of species which declined, increased and remained stable. Smoothed trends were created for each species to show changes in its population over the past 24 years on the local, regional and national level.
- The 19 species were divided into five groups to summarise their results. The groups are a) geese and swans, b) dabbling ducks, c) diving ducks, d) Coot, grebes and Cormorant, and e) waders.
- Greylag Goose and Whooper Swan populations had a high increase over the long term. The Mute Swan population remained stable over the long term but there were insufficient records for Bewick's Swan to produce trends. The most important sub-region for Whooper Swan and Greylag Goose was the extralimital swan fields, while the most important sub-region for Mute Swan was Lough Beg.
- Dabbling ducks had stable populations over the long term, with Shoveler, Gadwall and Wigeon having slight population increases over the medium term. Shoveler is the least abundant dabbling duck on the site and its population is concentrated in a few sub-regions. Mallard and Teal are more widespread on the loughs. The most important sub-region for all five species is Lough Beg.
- Diving duck populations decreased over the medium and long term. All species except Scaup had a high decline over the past 24 years, although Scaup did have a high decline over the medium term and a moderate decline over the long term. The Pochard and Tufted Duck site populations account for a high proportion of the Northern Irish Pochard and Tufted Duck populations. Southeast Lough Neagh is an important sub-region for Pochard, Tufted Duck, Goldeneye and Scaup, although it is less so for Goldeneye in the past five years. Southwest Lough Neagh is important for all the diving ducks except Scaup.
- Both grebe populations had a moderate increase over the short, medium, and long term. Cormorant had a stable population, and Coot had a moderate decrease over the long term. The most important sub-region for the grebes is Northwest Lough Neagh and the most important sub-region for Coot is Southeast Lough Neagh. The Cormorant population is more evenly spread over the site with Southwest Lough Neagh as its most important site.

- Lapwing, Curlew and Golden Plover populations had high declines over all terms across many sub-regions. On the whole site, Golden Plover populations were stable over all terms, while Curlew and Lapwing declined slightly over the long term. The most important sub-region for the waders is Lough Beg and the sub-region with the most decline in wader populations is Northern Lough Neagh.
- The reasons for the changes in population witnessed can be based on global, regional, or local factors. The smoothed trends produced allow estimations to be made regarding the scale of the factors affecting these species. Bewick's Swans are likely to be impacted by global factors which are affecting their migratory patterns, such as short-stopping. Diving ducks and Coots seem to be affected by local factors, such as food availability, water quality, and disturbance levels. Finally, waders are affected by regional factors, such as habitat fragmentation and increases in meso-predators.
- It is necessary to look into factors that could be affecting wintering dabbling ducks, Cormorant, grebes, and other geese and swans on the site to further understand the changes occurring in their populations.

1. INTRODUCTION

1.1 Background

Lough Neagh, Lough Beg and Portmore Lough are the three eutrophic waterbodies which make up the Lough Neagh and Lough Beg Special Protection Area (SPA). The three also make up the Lough Neagh and Lough Beg Ramsar Site, which incorporates a larger area of habitat, particularly to the south of Lough Neagh. Lough Neagh is the largest freshwater lake in both the island of Ireland and in the UK. Lough Neagh, Lough Beg and Portmore Lough have also been declared as Areas of Special Scientific Interest (ASSI). The three lakes are in the centre of Northern Ireland and are an important wintering ground for a variety of waterfowl and breeding birds. The smallest of the three, Portmore Lough, is in a nature reserve managed by the Royal Society for the Protection of Birds (RSPB). Lough Neagh in particular, is regularly used by communities in the local and wider area for a variety of recreational and industrial activities. Specifically, recreational activities include swimming, rafting, kayaking, wildfowling, and fishing. Industrial activities include sand and gravel extraction, providing water to NI Water, harvesting freshwater invertebrates, and industrial fishing.

According to the Department of Agriculture, Environment, and Rural Affairs' (DAERA) website, the SPA *"qualifies as a wetland of international importance by regularly supporting over 20,000 [individuals] of a variety of species of waterfowl in winter ... [and] an important assemblage of breeding birds ..."* (DAERA n.d.). The British Trust for Ornithology (BTO) monitors these species as part of the Wetland Bird Survey (WeBS) which is a monitoring scheme that surveys waterbirds across the UK (<https://bto.org/our-science/projects/wetland-bird-survey>). The Lough Neagh, Lough Beg and Portmore Lough network of designated sites, which are legally protected for their importance to wintering waterbirds, depends fundamentally on the data collected in WeBS surveys.

1.2 Aims

The aim of this project is to produce an analysis of WeBS data for the Lough Neagh and Lough Beg SPA. This will provide details of wintering waterfowl population changes around the loughs and assist in identifying potential research questions to be pursued. This report achieves these aims through:

- Documenting short- (five-year), medium- (10-year), and long- (25-year) term abundance trends for 19 species of wintering waterfowl around the SPA.
- Determining which sub-regions are most important for species populations.
- Showing when and where changes were most prominent and how long they had been occurring.

2. METHODS

The WeBS Core Count Scheme is a monitoring scheme that focuses on wintering waterfowl. It is a long-running survey and is UK-wide. The survey involves visiting waterbodies and recording the number of each species present and is conducted monthly (Austin *et al.* 2023). Because the Lough Neagh and Lough Beg SPA is very large, it is divided into smaller count sub-regions. The counts can be summed across multiple sub-regions to produce higher level monthly totals for sub-regions and for the whole site, which can be used to produce further trends and indicators. Due to gaps in coverage between sub-regions, the completeness of the sub-region and site totals is examined for each individual species. A count is considered complete when the sub-regions counted that month are expected to hold at least 75% of the sub-region or site total for that species in that year or season. Where a count is missing an imputed value is used; where a count has been flagged as incomplete it is assessed against the imputed value which is substituted if higher.

The SPA was divided into 11 sub-regions (Figure 2a) for which trends were produced. The sub-regions were chosen to facilitate trend production because there are over 100 count sub-regions in the SPA, which means numbers would have been too low to produce trends per sub-region.

The species chosen to be analysed (Table 2a) were decided upon based on species which historically wintered on Lough Neagh and Lough Beg and contributed to the SPA or ASSI classification. A total of 19 species were analysed.

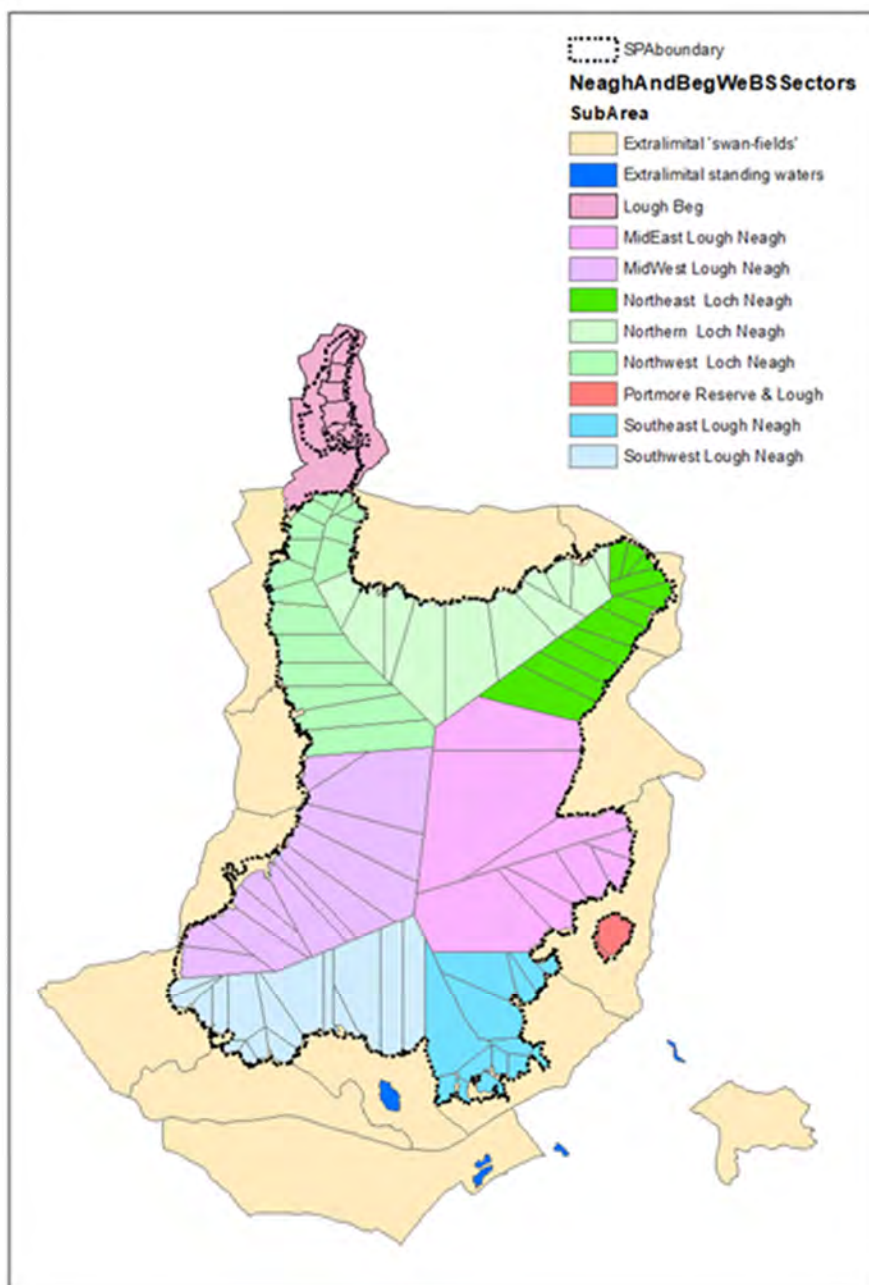


Figure 2a. Sub-regions of Lough Neagh and Lough Beg SPA.

Table 2a. Species assessed in this report.

| Species | Code | Assessed in this report | SPA feature | Lough Neagh ASSI feature | Lough Beg ASSI feature |
|--------------------------|------|-------------------------|-------------|--------------------------|------------------------|
| Bewick's Swan | BS | Y | Y | Y | Y |
| Whooper Swan | WS | Y | Y | Y | Y |
| Pochard | PO | Y | Y | Y | Y |
| Tufted Duck | TU | Y | Y | Y | Y |
| Scaup | SP | Y | Y | Y | Y |
| Goldeneye | GN | Y | Y | Y | Y |
| Great Crested Grebe | GG | Y | Y | Y | Y |
| Golden Plover | GP | Y | Y | Y | Y |
| Icelandic* Greylag Goose | JI* | Y | | N* | N* |
| Mute Swan | MS | Y | | Y | Y |
| Shelduck | SU | N | | Y | |
| Gadwall | GA | Y | | Y | Y |
| Wigeon | WN | Y | | Y | Y |
| Mallard | MA | Y | | Y | Y |
| Pintail | PT | N | | | |
| Teal | T. | Y | | Y | Y |
| Red-breasted Merganser | RM | N | | | |
| Little Grebe | LG | Y | | Y | Y |
| Cormorant | CA | Y | | Y | Y |
| Coot | CO | Y | | Y | Y |
| Lapwing | L. | Y | | Y | Y |
| Grey Heron | H. | N | | | |
| Curlew | CU | Y | | | |
| Black-tailed Godwit | BW | N | | | |
| Dunlin | DN | N | | | |
| Redshank | RK | N | | | |

*Icelandic Greylag was not assessed for WeBS Alerts as unable to distinguish Iceland [JI] and British/Irish [JA] populations. However, analysis at species level [GJ] most likely feasible.

An adapted methodology was used to produce smoothed site trends based on the methodology for WeBS Alerts (Woodward *et al.* 2019). The smoothed trends produced can give an indication of where and when changes begin affecting different species populations. Trends were produced using Generalised Additive Models (GAMs) on counts from 1994/95 to 2019/20. Trends are smoothed so that changes caused by factors that occurred in one year are not over-emphasised. Short- (five-year), medium- (10-year), and long- (24-year) term percentage changes were also produced. A high decline is classified as a decline of at least 50% over the term. A medium decline is a decline of at least 25% but less than 50%. “No” change or remaining stable is defined as a decline of less than 25% to an increase of less than 33% over the term. Medium increase is an increase of at least 33% but less than 100%. Finally, a high increase is an increase of at least 100%. Note that an increase of 33% is needed to reverse a decline of 25% and an increase of 100% is needed to reverse a decline of 50%. If the start year had no records or there were insufficient data across the period of interest, the percentage changes could not be produced. The trends produced show the wintering waterfowl numbers and changes.

Means of peaks tables are also produced, which help in determining relative importance of sub-regions. Sub-regions with high importance are defined as sub-regions for which the most recent five-year mean peak equals at least 20% of that for the SPA. Sub-regions with moderate importance are defined as sub-regions for which the most recent five-year mean peak equals at least 10% but less than 20% of that for the SPA. Areas for which the most recent five-year peak was less than 10% but the peak in the last winter exceeded 20% of the SPA could be of high importance but must be analysed with caution. Similarly, areas for which the most recent five-year mean peak was less than 10%, but where the peak in the last winter exceeded 10% of the SPA, could be of moderate importance.

Additionally, for any sub-region to be defined as of moderate or high importance to a species, its most recent five-year mean peak must be greater than 10.

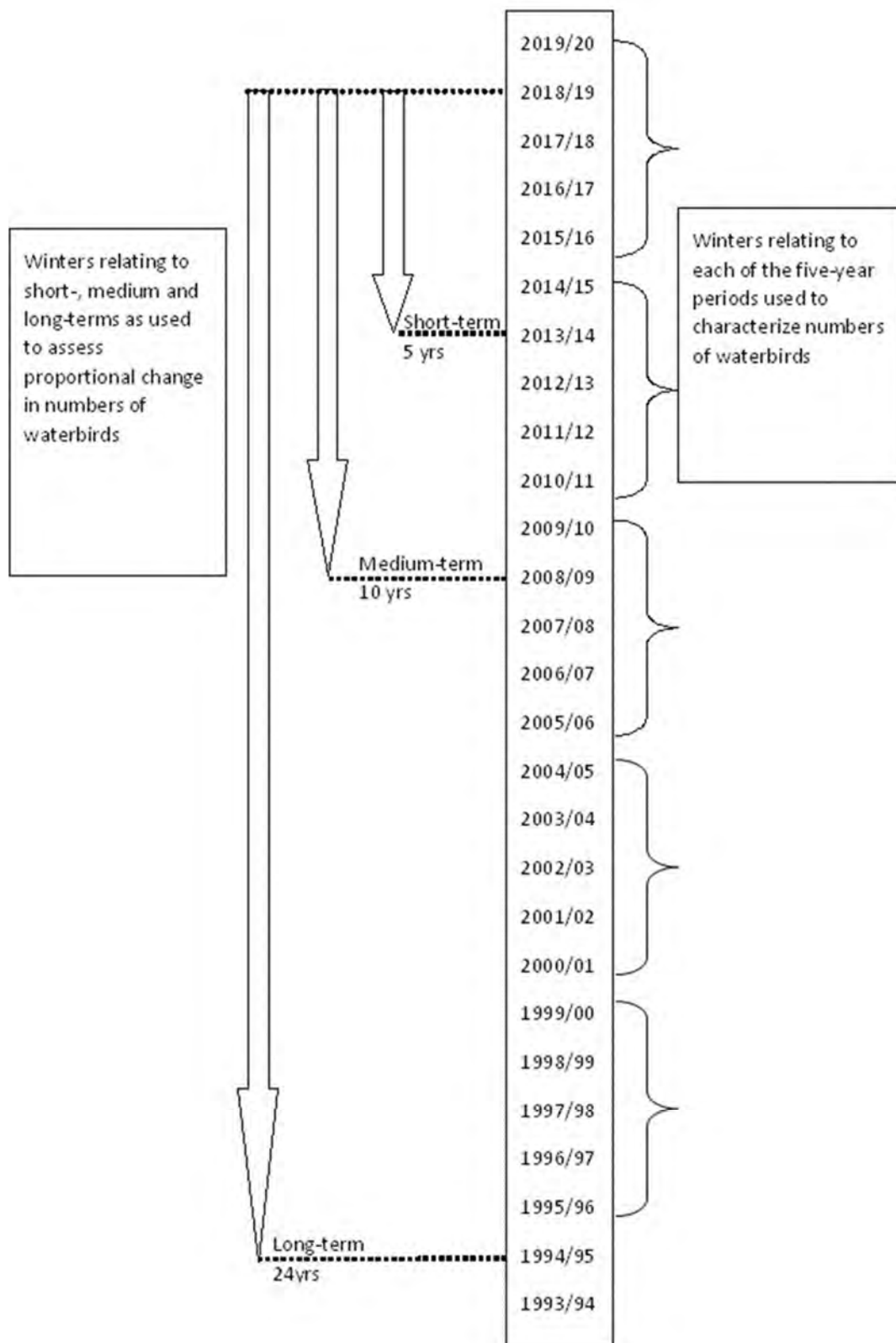


Figure 2b. Schematic of reference winters used for reported waterbird numbers and change.

There are multiple conclusions to be drawn from comparing each species' smoothed sub-region trends with one another, with its SPA trends, and with its Northern Ireland trends. The methodology for these comparisons is adapted from Banks & Austin (2004) and is based on the methodology used in WeBS Alerts (Woodward *et al.* 2019). In summary, the reason for changes in species populations per sub-region can be assessed based on these comparisons (Austin & Ross-Smith, 2014). The comparisons allow us to narrow down the possible factors driving population changes and assess whether changes are most likely to be caused by local factors or by factors affecting populations on a wider scale, although further research is needed to understand direct contributors. Comparisons are calculated by using a logistic regression model with a binomial error term. Smoothed trend plots and the report by (Austin & Ross-Smith 2014) will be provided as supplementary material to this report to explain the details of these comparisons.

3. RESULTS

The analysis produced the following outputs for each sub-region and each of the 19 species:

- Percentage of change for each sub-region over the short (five-year), medium (10-year), and long (25-year) terms.
- Five-year mean peaks over each consecutive five-year period.
- Smoothed trend plots and mean peak plots.
- Plots showing sub-region population as a proportion of the SPA population.

The analysis also produced smoothed trend plots for the SPA, regional Northern Ireland plots, and the SPA population as a proportion of the Northern Ireland population. Finally, pie charts displaying the proportion of species assessed that increased, decreased, or remained stable per sub-region were also produced (Figure 3a, 3b, and 3c).

All tables and plots are provided in the accompanying file – Loughs Neagh and Beg WeBS trends.xlsx

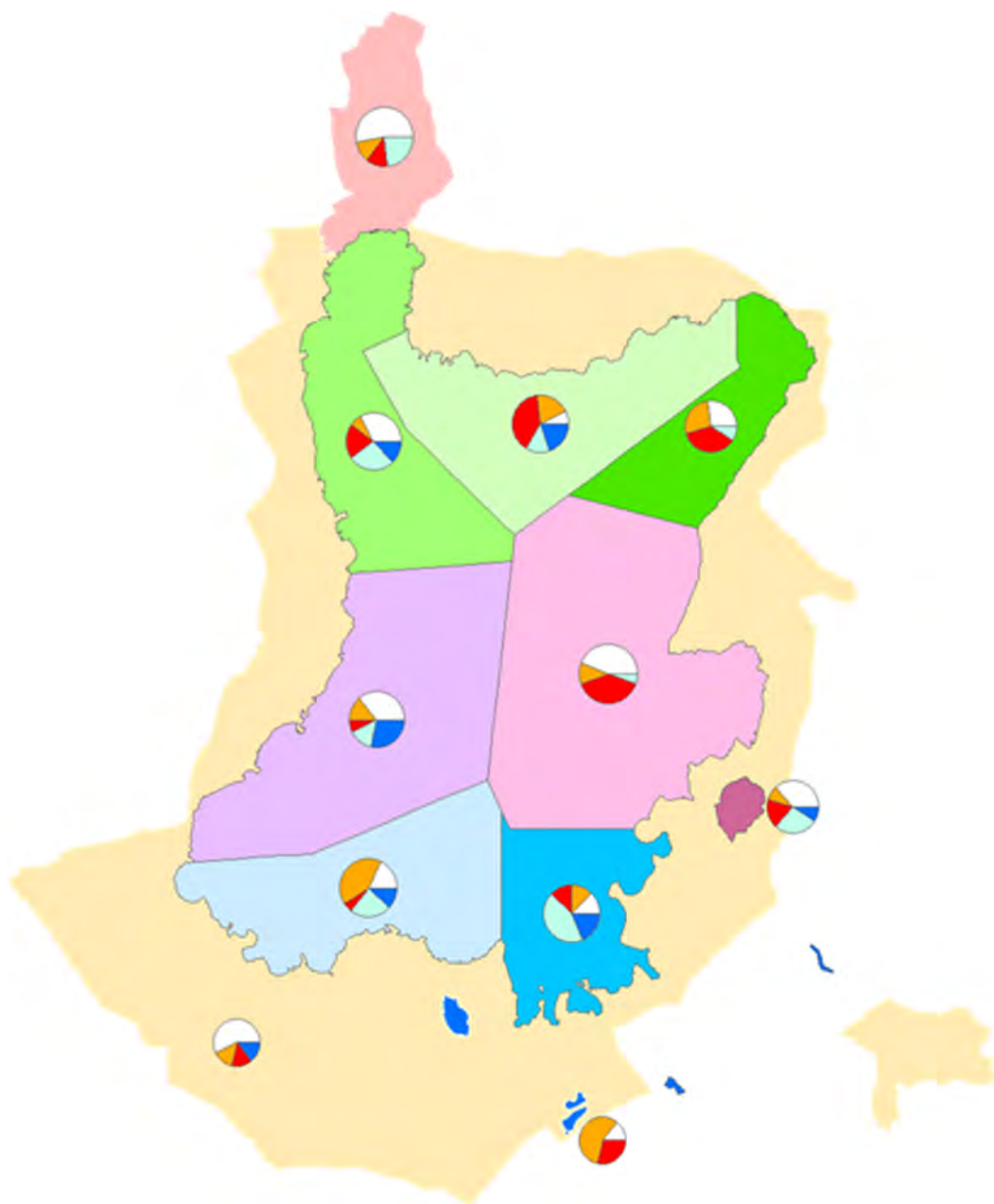


Figure 3a. Proportion of species assessed for the short (five-year) term that are classified as stable (white), moderate decline (orange), high decline (red), moderate increase (pale blue), high increase (dark blue). Area of pie chart is proportional to the number of species for which smoothed trends could be fitted and slices of pie charts are proportional to number of species in each classification.

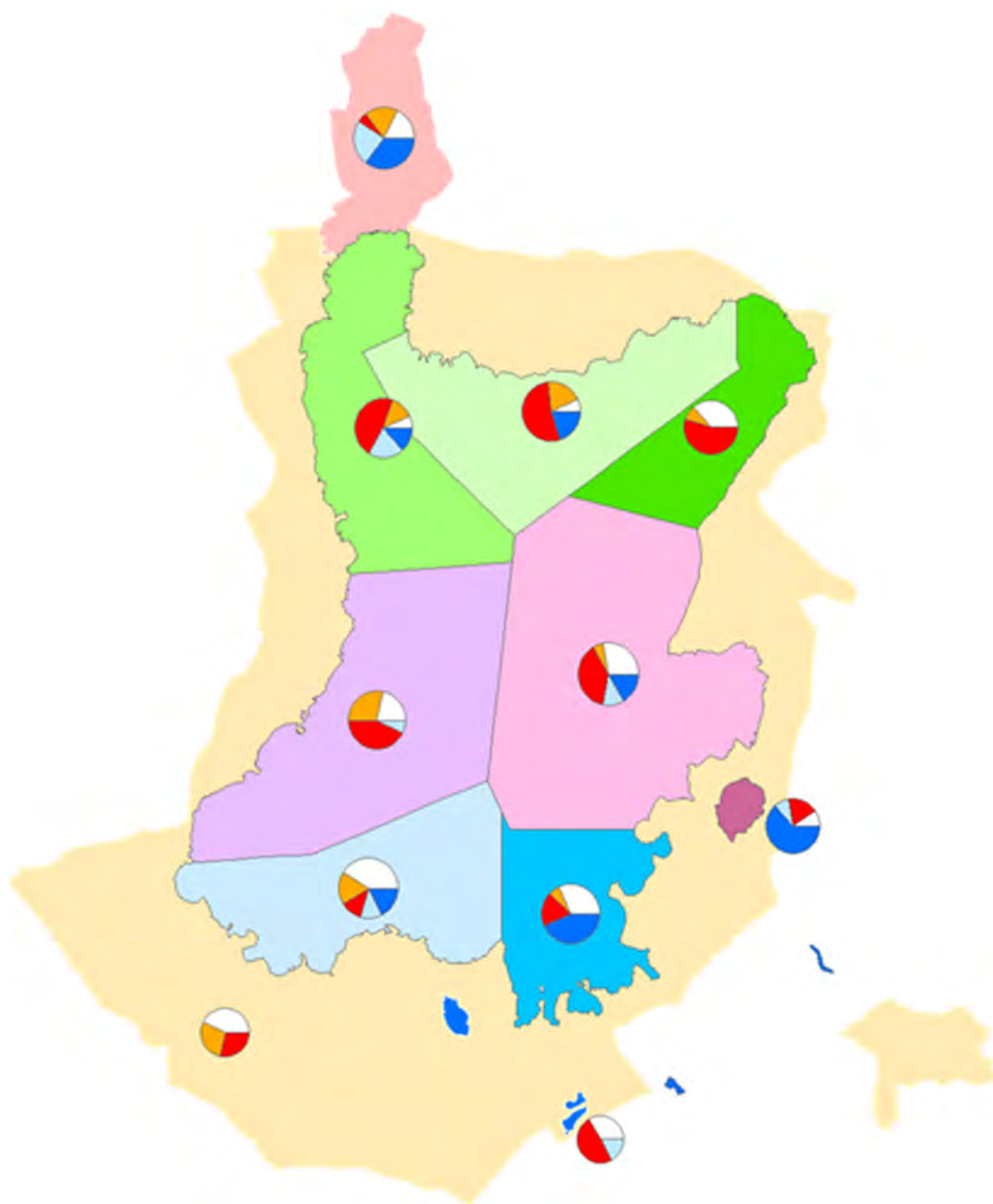


Figure 3b. Proportion of species assessed for the medium (10-year) term that are classified as stable (white), moderate decline (orange), high decline (red), moderate increase (pale blue), high increase (dark blue). Area of pie chart is proportional to the number of species for which smoothed trends could be fitted and slices of pie charts are proportional to number of species in each classification.

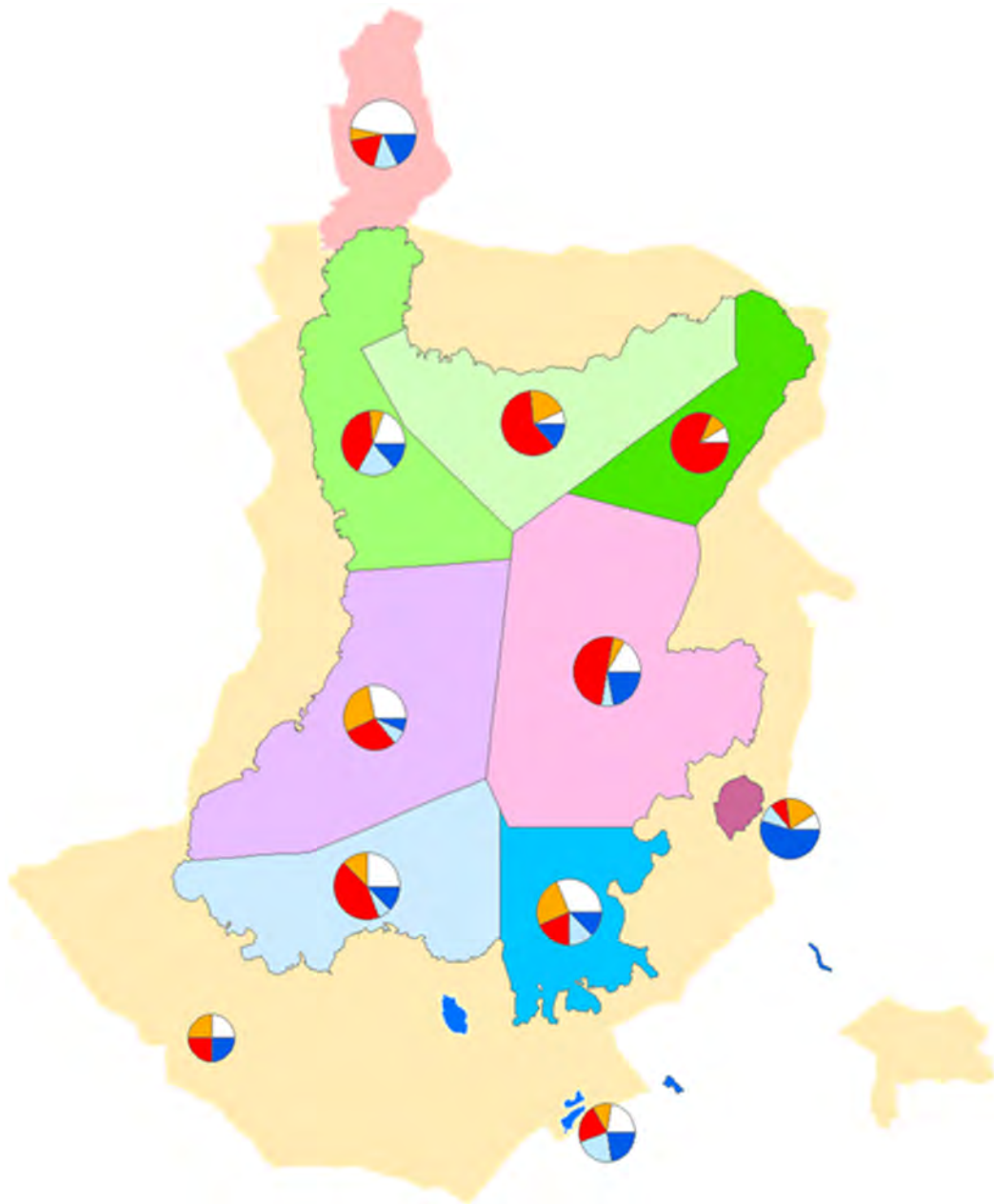


Figure 3c. Proportion of species assessed for the long (25-year) term that are classified as stable (white), moderate decline (orange), high decline (red), moderate increase (pale blue), high increase (dark blue). Area of pie chart is proportional to the number of species for which smoothed trends could be fitted and slices of pie charts are proportional to number of species in each classification.

4. DISCUSSION

4.1 Geese and swans

Table 4.1a Short-, medium-, and long-term percentage change for geese and swans on the SPA and across the 11 sub-regions. Dark blue represents high increase, pale blue represents moderate increase, white represents no increase (stable), orange being available to produce trends. Values underpinning these tables are available in the "TableOfChange" sheet in the accompanying support material (Appendix - Lough Neagh WeBS trends.xlsx).

| Site Code | Site Name | Greylag Goose | | | Mute Swan | | | Bewick's Swan | | | Whooper Swan | | |
|------------|------------------------------|---------------|--------|------|-----------|--------|------|---------------|--------|------|--------------|--------|------|
| | | Short | Medium | Long | Short | Medium | Long | Short | Medium | Long | Short | Medium | Long |
| UK9020091 | Loughs Neagh and Beg SPA | - | ↓ | ↑↑ | - | ↑ | - | - | - | - | - | - | ↑↑ |
| Q2015 | Lough Beg | ↓↓ | ↓ | ↑↑ | ↑ | ↑↑ | ↑ | - | - | - | ↑ | ↑↑ | ↓ |
| NIEA23MELN | Mid East Lough Neagh | - | ↑↑ | ↑↑ | - | ↑ | ↓↓ | - | - | - | ↓ | ↑↑ | ↑↑ |
| NIEA23MWLN | Mid West Lough Neagh | - | - | - | ↑ | - | ↓ | - | - | - | ↓↓ | ↓↓ | ↑↑ |
| NIEA23NELN | Northeast Lough Neagh | - | - | - | - | - | ↓↓ | - | - | - | - | - | - |
| NIEA23NLN | Northern Lough Neagh | - | - | - | ↑ | ↑↑ | - | - | - | - | - | - | - |
| NIEA23NWLN | Northwest Lough Neagh | - | - | - | ↑ | ↑ | - | - | - | - | - | ↓ | ↑ |
| NIEA23PORT | Portmore Reserve and Lough | ↑ | ↓↓ | ↓↓ | ↑↑ | ↑↑ | ↑↑ | - | - | - | - | - | - |
| NIEA23SELN | Southeast Lough Neagh | - | - | - | ↑ | ↑↑ | - | - | - | - | - | - | - |
| NIEA23SWLN | Southwest Lough Neagh | ↑↑ | - | - | ↑ | ↑↑ | - | - | - | - | - | - | - |
| NIEA23XLSF | Extralimital swan fields | - | ↓ | ↑↑ | ↓ | - | ↑ | - | - | - | - | - | ↑↑ |
| NIEA23XLSW | Extralimital standing waters | ↓↓ | ↑ | - | ↓ | ↓↓ | ↑ | - | - | - | - | - | - |

Table 4.1b. Five-year mean of peaks tables for geese and swans on the SPA and across the 11 sub-regions. Dark blue represents a sub-region of high importance, pale blue represents moderate importance, white represents no significance, and grey represents insufficient records being available to produce trends. Values underpinning these tables are available in the "MOPs" sheet in the accompanying supporting material (Appendix - Lough Neagh WeBS trends.xlsx).

| Code | Site | Greylag Goose | Mute Swan | Bewick's Swan | Whooper Swan |
|------------|------------------------------|---------------|-----------|---------------|--------------|
| Q2015 | Lough Beg | | | | |
| NIEA23MELN | Mid East Lough Neagh | | | | |
| NIEA23MWLN | Mid West Lough Neagh | | | | |
| NIEA23NELN | Northeast Lough Neagh | | | | |
| NIEA23NLN | Northern Lough Neagh | | | | |
| NIEA23NWLN | Northwest Lough Neagh | | | | |
| NIEA23PORT | Portmore Reserve and Lough | | | | |
| NIEA23SELN | Southeast Lough Neagh | | | | |
| NIEA23SWLN | Southwest Lough Neagh | | | | |
| NIEA23XLSF | Extralimital swan fields | | | | |
| NIEA23XLSW | Extralimital standing waters | | | | |

4.1.1 Greylag Goose *Anser anser*

The population of Greylag Goose increased in the early 2000s before decreasing slightly. Consequently, there has been a high increase over the long term despite a moderate decline over the medium term. They occurred in insufficient numbers over five sub-regions of the lough and in too few numbers to create a long-term comparison in two more sub-regions. Southwest Lough Neagh and the extralimital swan fields were found to have high importance for the population, with Lough Beg and Southwest Lough Neagh having the largest increase in Greylag Goose numbers over the long term.

4.1.2 Mute Swan *Cygnus olor*

The Mute Swan population on the SPA has been stable over the short and long terms with a slight increase in the medium term. Mideast and Northeast Lough Neagh both had high declines in Mute Swan over the long term. Because the SPA plot is similar to the Mute Swan plot for Northern Ireland, and the SPA vs NI plot is stable at around 70-80%, we can assume that broadscale factors are the main contributors to Mute Swan population changes. The mean of peaks (MOPs) tables shows that the species is widely distributed throughout the loughs, with seven of the 11 sub-regions supporting an average of between 10 and 20% of the SPA total population over the last five years. Lough Beg was the most important sub-region for Mute Swan, supporting more than 20% of the SPA population.

4.1.3 Bewick's Swan *Cygnus columbianus bewickii*

There have been no records for Bewick's Swan on the SPA since January 2007, when one was recorded.

4.1.4 Whooper Swan *Cygnus cygnus*

There are insufficient data to produce trends for Whooper Swan in five of the 11 sub-regions. The overall SPA population was stable over the short and medium term but had a high increase over the long term. The most significant increase was in the extralimital swan fields where there has been an increase of more than 1000% over the long-term. This sub-region was the most important for the Whooper Swan and supports between 60% and 80% of the SPA population with Lough Beg as a moderately important sub-region that supports between 10% and 20% of the local population.

4.2 Dabbling ducks

Table 4.2a. Short-, medium-, and long-term percentage change for dabbling ducks on the SPA and across the 11 sub-regions. Dark blue represents high increase, pale blue represents moderate increase, white represents no increase (stable), orange represents moderate decline, and red represents high decline. Grey represents insufficient records being available to produce trends. Values underpinning these tables are available in the "TableOfChange" sheet in the accompanying support material (Appendix - Lough Neagh WeBS trends.xlsx).

| Site Code | Site Name | Shoveler | | | Gadwall | | | Wigeon | | | Mallard | | | Teal | | |
|-------------|------------------------------|----------|--------|------|---------|--------|------|--------|--------|------|---------|--------|------|-------|--------|------|
| | | Short | Medium | Long | Short | Medium | Long | Short | Medium | Long | Short | Medium | Long | Short | Medium | Long |
| UK9020091 | Loughs Neagh and Beg SPA | = | ↑ | = | = | ↑ | = | = | ↑ | = | = | = | = | = | = | = |
| 02015 | Lough Beg | ↑ | ↑ | = | = | = | = | = | ↑ | = | = | = | ↑ | = | = | = |
| NIEA23MELN | MidEast Lough Neagh | = | = | = | = | = | = | = | = | = | = | = | = | ↓ | ↑ | ↑ |
| NIEA23MVALN | MidWest Lough Neagh | = | = | = | = | = | = | = | = | = | ↑ | ↑ | = | ↑ | ↓ | = |
| NIEA23NELN | Northeast Lough Neagh | = | = | = | = | = | = | = | = | = | = | = | = | ↓ | ↓ | ↓ |
| NIEA23NLN | Northern Lough Neagh | = | = | = | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | = | = | = | ↓ | ↓ | ↓ |
| NIEA23NWLN | Northwest Lough Neagh | = | = | = | = | = | = | = | = | = | ↑ | ↑ | ↑ | ↓ | ↓ | ↓ |
| NIEA23PORT | Portmore Reserve and Lough | = | = | = | = | = | = | = | ↑ | ↑ | ↑ | ↑ | ↑ | ↑ | ↑ | ↑ |
| NIEA23SELN | Southeast Lough Neagh | = | = | = | ↑ | ↑ | ↓ | ↑ | ↑ | ↑ | = | ↑ | ↑ | = | = | ↓ |
| NIEA23SWLN | Southwest Lough Neagh | = | = | = | = | = | = | = | ↑ | ↑ | = | ↑ | ↓ | ↑ | = | = |
| NIEA23XLSF | Extralimital swan fields | = | = | = | = | = | = | ↑ | ↑ | ↓ | ↑ | ↑ | = | = | = | = |
| NIEA23XLSW | Extralimital standing waters | = | = | = | = | = | = | = | = | = | ↓ | = | = | = | = | ↓ |

Table 4.2b. Five-year mean of peaks tables for dabbling ducks on the SPA and across the 11 sub-regions. Dark blue represents a sub-region of high importance, pale blue represents moderate importance, white represents no significance, dark green represents the sub-region may be of high importance based on the peak from the most recent winter, and pale green represents the sub-region may be of moderate importance based on the peak from the most recent winter. Grey represents insufficient records being available to produce trends. Values underpinning these tables are available in the "MOPs" sheet in the accompanying support material (Appendix - Lough Neagh WeBS trends.xlsx).

| Code | Site | Shoveler | Gadwall | Wigeon | Mallard | Teal |
|------------|------------------------------|----------|---------|--------|---------|------|
| Q013 | Lough Beg | | | | | |
| NIEAZ3MELN | Mideast Lough Neagh | | | | | |
| NIEAZ3MWLN | MidWest Lough Neagh | | | | | |
| NIEAZ3NELN | Northeast Lough Neagh | | | | | |
| NIEAZ3NELN | Northern Lough Neagh | | | | | |
| NIEAZ3NWLN | Northwest Lough Neagh | | | | | |
| NIEAZ3PORT | Portmore Reservoir and Lough | | | | | |
| NIEAZ3SELN | Southeast Lough Neagh | | | | | |
| NIEAZ3SWLN | Southwest Lough Neagh | | | | | |
| NIEAZ3DUSP | Extralimital swan fields | | | | | |
| NIEAZ3SLW | Extralimital standing waters | | | | | |

4.2.1 Shoveler *Spatula clypeata*

There are insufficient data to produce trends for Shoveler in 10 of the 11 sub-regions. Lough Beg is the only sub-region for which trends were produced. The population of Shoveler has fluctuated making the trend difficult to interpret, but Shoveler was stable over both the short and long term and shows a moderate increase over the medium term. The SPA vs NI plot shows that the percentage of the total Northern Ireland population which is on the SPA has increased from 25% to around 40%. This suggests that conditions on the site are relatively favourable for Shoveler compared to elsewhere in the country. The most important sub-regions for Shoveler on the SPA were Lough Beg, Portmore Lough, and the extralimital standing waters, with the most recent Portmore Lough and extralimital standing water five-year averages being almost equal to the threshold for national importance for Shoveler (20) and Lough Beg having more than double that number.

4.2.2 Gadwall *Mareca strepera*

Similar to Shoveler, there are insufficient data to produce trends for Gadwall populations in eight of the 11 sub-regions of the SPA. The SPA population has remained relatively stable over the long term, although a temporary decrease which occurred in the mid-2000s has led to a moderate increase being shown in the medium term trend. The Mideast Lough Neagh population was stable over the short, medium, and long term and the proportion of the SPA population using this sub-region has increased suggesting it has become more important for the species. The Northern Lough Neagh population has shown a very slight decrease over the long term; however, the percentage change is very small meaning the population is still relatively stable. Finally, the population in Southeast Lough Neagh decreased in the late 1990s and early 2000s and hence shows a moderate decrease over the long term, but has partially recovered with increases over the short and medium terms. Lough Beg, Mideast Lough Neagh, Portmore Lough, and Southeast Lough Neagh all support more than 20% of the SPA Gadwall population, with the extralimital standing waters having supported more than 20% of the population in the last winter but less than 10% over the past five years.

4.2.3 Wigeon *Mareca penelope*

The SPA population of Wigeon decreased between 2004/05 and 2010/11 but has since recovered. The proportion of the Northern Ireland population on the SPA has increased, indicating that the SPA is becoming more important relative to other Northern Ireland sites and hence that conditions for the species are likely to be favourable. Again, there were insufficient data to produce trends for Wigeon in four of the 11 sub-regions. Lough Beg and Southwest Lough Neagh are the most important sub-regions for Wigeon, with the most recent five-year averages reaching 2,108 in Lough Beg (around 70% of the SPA population) and 630 in Southwest Lough Neagh. There has been an increase in records of the Wigeon in the extralimital swan fields. Specifically, the sub-region supported more than 20% of the SPA population in the last winter, but the most recent five-year average was less than 10% of the SPA population. Wigeon decreased over the short, medium, and long term in Northern Lough Neagh while increasing from zero to 200 individuals over the long term in the Portmore Lough Reserve.

4.2.4 Mallard *Anas platyrhynchos*

Mallard had a stable population on the SPA over the short, medium, and long term. The extralimital swan fields have unsuitable habitat for Mallard which explains why there were insufficient data to produce trends in that sub-region. The biggest long-term decrease in Mallard numbers (in percentage terms) was in Northeast Lough Neagh and the biggest long-term increase was in Lough Beg. Similar to the Mute Swan, the SPA plot shows a similar pattern to the Northern Ireland plot, and the SPA vs. NI plot is stable around 60%. This pattern suggests that the SPA population is more likely to be affected by broadscale factors which affect the whole country rather than factors that are local to the loughs. Five of the 11 sub-regions support between 10% and 20% of the Mallard population, and Lough Beg is the most important sub-region for the species with a five-year average of 1,865 Mallard between 2015/16 and 2019/20. The proportion of the SPA population has declined on Northern and Northeast Lough Neagh but has increased on Northwest Lough Neagh, suggesting that the relative suitability of these sub-regions may have changed over the long term.

4.2.5 Teal *Anas crecca*

Teal has shown a very shallow population decrease of -18% over the long term although this is below the threshold to be classed as a moderate decline and the trends over the short, medium, and long term are classed as stable. However, this trend contrasts with increases across Northern Ireland as a whole and hence the proportion of the Northern Ireland population supported by the SPA has declined from around 30% to under 20%. This suggests either that local factors are negatively affecting the SPA population, or that the population is close to carrying capacity. There were insufficient data to produce trends for Teal in the extralimital swan fields over all three terms and insufficient data to produce medium trends in the extralimital standing waters. Teal had high declines over the long term in the extralimital standing waters, Northeast Lough Neagh, Northern Lough Neagh and Northwest Lough Neagh, and the declines in these sub-regions may be largely responsible for the contrast between the SPA and Northern Ireland trends for Teal. The sub-region with the highest percentage increase for Teal is Portmore Lough, with an increase of more than 700%. The most important sub-region for Teal is Lough Beg, supporting around 50% to 60% of the SPA population, with Mideast Lough Neagh, Portmore Lough, and Southwest Lough Neagh supporting between 10% and 20% of the SPA population.

4.3 Diving ducks

Table 4.3a. Short-, medium-, and long-term percentage change for diving ducks on the SPA and across the 11 sub-regions. Dark blue represents high increase, pale blue represents moderate increase, white represents no increase (stable), orange represents moderate decline, and red represents high decline. Grey represents insufficient records being available to produce trends. Values underpinning these tables are available in the "TableOfChange" sheet in the accompanying support material (Appendix - Lough Neagh WeBS trends.xlsx).

| Site Code | Site Name | Pochard | | | Tufted Duck | | | Scaup | | | Goldeneye | | |
|------------|------------------------------|---------|--------|------|-------------|--------|------|-------|--------|------|-----------|--------|------|
| | | Short | Medium | Long | Short | Medium | Long | Short | Medium | Long | Short | Medium | Long |
| UK9020091 | Loughs Neagh and Beg SPA | - | ↓ | ↓ | - | - | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ |
| 02015 | Lough Beg | ↓ | ↓ | ↓ | ↓ | ↑ | ↓ | - | - | - | - | ↓ | ↓ |
| NIEA23MELN | Mid East Lough Neagh | ↓ | ↓ | ↓ | - | - | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ |
| NIEA23MWLN | Mid West Lough Neagh | - | - | ↓ | ↓ | ↓ | ↓ | ↑ | ↓ | ↓ | ↓ | ↓ | ↓ |
| NIEA23NELN | Northeast Lough Neagh | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | - | - | - | ↓ | ↓ | ↓ |
| NIEA23NLN | Northern Lough Neagh | ↑ | ↓ | ↓ | ↓ | ↓ | ↓ | - | - | - | ↓ | ↓ | ↓ |
| NIEA23NWLN | Northwest Lough Neagh | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | - | ↓ | ↓ |
| NIEA23PORT | Portmore Reserve and Lough | - | ↑ | - | - | ↑ | ↑ | ↑ | ↓ | ↓ | - | - | - |
| NIEA23SELN | Southeast Lough Neagh | ↑ | ↑ | ↓ | ↑ | ↑ | ↓ | ↑ | ↓ | ↓ | ↓ | ↓ | ↓ |
| NIEA23SWLN | Southwest Lough Neagh | ↓ | ↓ | ↓ | ↓ | - | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ |
| NIEA23XLSF | Extralimital swan fields | - | - | - | - | - | - | - | - | - | - | - | - |
| NIEA23XLSW | Extralimital standing waters | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | - | - | - | - | - | - |

Table 4.3b. Five-year mean of peaks tables for diving ducks on the SPA and across the 11 sub-regions. Dark blue represents a sub-region of high importance, pale blue represents moderate importance, white represents no significance, and grey represents insufficient records being available to produce trends. Values underpinning these tables are available in the "MOPs" sheet in the accompanying support material (Appendix - Lough Neagh WeBS trends.xlsx).

| Code | Site | Pochard | Tufted Duck | Scaup | Goldeneye |
|------------|------------------------------|---------|-------------|-------|-----------|
| 02015 | Lough Beg | | | | |
| NIEA23MELN | Mid East Lough Neagh | | | | |
| NIEA23MWLN | Mid West Lough Neagh | | | | |
| NIEA23NELN | Northeast Lough Neagh | | | | |
| NIEA23NLN | Northern Lough Neagh | | | | |
| NIEA23NWLN | Northwest Lough Neagh | | | | |
| NIEA23PORT | Portmore Reserve and Lough | | | | |
| NIEA23SELN | Southeast Lough Neagh | | | | |
| NIEA23SWLN | Southwest Lough Neagh | | | | |
| NIEA23XLSF | Extralimital swan fields | | | | |
| NIEA23XLSW | Extralimital standing waters | | | | |

4.3.1 Pochard *Aythya ferina*

Pochard's SPA population declined sharply between 1999/00 and 2002/03 and has subsequently continued to decline, albeit more slowly. The Pochard had a high decline over the long term in nine of the 11 sub-regions it was found in. Around 100% of the Northern Ireland population of Pochard are on the Lough Neagh and Lough Beg SPA, hence as almost all the country's population winters on the SPA it is not possible to use the Northern Ireland trend to draw conclusions about possible drivers of the decline. However, declines in Britain and Ireland have been attributed to changes in the wintering distribution of Pochard, most likely driven by climate change and also by declines in the European population. The most important sub-regions for Pochard are Midwest Lough Neagh, Southeast Lough Neagh, and Southwest Lough Neagh, with all of their respective most recent five-year peaks exceeding 1,500 individuals. The sub-regions supporting more than 20% of the population each respectively had stable, high increase, and medium decline over the short and medium term, i.e. Southeast Lough

Neagh was more important over the medium term whereas Southwest Lough Neagh has become less important. Overall, the SPA population decreased from around 10,000 individuals in 1995 to 3,000 individuals in 2020. The Lough Neagh and Lough Beg site retains its international importance for Pochard and still supports the largest number of Pochard in the UK (Austin *et al.* 2023).

4.3.2 Tufted Duck *Aythya fuligula*

Like Pochard, the Tufted Duck SPA population decreased sharply in the early 2000s (between 2000/01 and 2002/03). It has since remained relatively stable. The most important sub-regions for the Tufted Duck on the SPA were Southeast Lough Neagh and Southwest Lough Neagh, each carrying a maximum of around 3,500 Tufted Duck (on average) between 2015/16 and 2019/20 (around 40% of the SPA population). Midwest Lough Neagh supported between 10% and 20% of the SPA population. Tufted Duck, like the other diving ducks around the lough, makes up around 100% of the Northern Ireland population and hence the Northern Ireland trend cannot be used to draw conclusions about the drivers of change. The Tufted Duck population increased by 700% over the medium term on the Portmore Reserve and around 130% over the long term. The Tufted Duck decreased in nine of the 11 sub-regions of the SPA, with the decreases ranging between 35% and 96%. As for Pochard, these declines have affected most of Lough Neagh with the population now concentrated in the two southern sub-regions. The Lough Neagh and Lough Beg site currently supports the second largest number of Tufted Duck in the UK (Austin *et al.* 2023).

4.3.3 Scaup *Aythya marila*

Numbers of Scaup on the SPA have fluctuated, peaking between 2005/06 and 2008/09, but have declined subsequently to such an extent that the long-term trend shows a moderate decline. There are insufficient data to produce trends for Scaup in six of the 11 sub-regions of the SPA. Scaup increased over the long term in Midwest Lough Neagh and Southwest Lough Neagh, with an increase of 300% at the latter sub-region. The most important sub-regions for Scaup are Northwest and Southeast Lough Neagh, with around 80% of the SPA population supported by the first of these two sub-regions. There were very few Scaup records in seven of the sub-regions. The SPA plot has a similar pattern to the NI plot and the SPA vs. NI plot showed that the percentage of the Northern Ireland population that is on the lough increased from around 80% to 90% during the 1990s and 2000s, to around 95% from 2012/13 onwards. This suggests that conditions on the SPA remain more favourable than other sites in the country. The Lough Neagh and Lough Beg site supports the largest number of Scaup in the UK (Austin *et al.* 2023).

4.3.4 Goldeneye *Bucephala clangula*

There were insufficient data to produce trends for Goldeneye in three of the 11 sub-regions of the SPA. Apart from a brief period in the late 1990s, Goldeneye have been declining throughout the period covered and consequently had a high decline in the SPA and all eight sub-regions for which trends could be produced over the medium and long term. The most important sub-regions for Goldeneye are Southwest Lough Neagh, Northwest Lough Neagh, and Mideast Lough Neagh all of which supported more than 20% of the SPA population on average between 2015/16 and 2019/20. Southeast Lough Neagh supported between 10% and 20% of the SPA population. Although Pochard and Tufted Duck are doing well in Portmore Reserve, there have been no records of Scaup and Goldeneye in the past five years. The number of Goldeneye on the SPA decreased from around 4,400 in 1995 to around 800 in 2020. Around 80% to 90% of the Northern Ireland population of Goldeneye are on the Lough Neagh and Lough Beg SPA, hence it is not possible to use the Northern Ireland trend to draw conclusions about possible drivers of the decline. However, changes in wintering distribution of Goldeneye have been demonstrated, most likely driven by climate change, with more European

birds now wintering further north-east closer to their breeding areas (Lehikoinen *et al.* 2013). The declines on the SPA may have been driven by these changes.

4.4 Grebes, Coot and Cormorant

Table 4.4a Short-, medium-, and long-term percentage change for grebes, Coot and Cormorant on the SPA and across the 11 sub-regions. Dark blue represents high increase, pale blue represents moderate increase, white represents no increase (stable), orange represents moderate decline, and red represents high decline. Grey represents insufficient records being available to produce trends. Values underpinning these tables are available in the "TableOfChange" sheet in the accompanying support material (Appendix - Lough Neagh WeBS trends.xlsx).

| Site Code | Site Name | Coot | | | Little Grebe | | | Great Crested Grebe | | | Cormorant | | |
|------------|------------------------------|-------|--------|------|--------------|--------|------|---------------------|--------|------|-----------|--------|------|
| | | Short | Medium | Long | Short | Medium | Long | Short | Medium | Long | Short | Medium | Long |
| UK9020091 | Loughs Neagh and Beg SPA | ↑ | ↑↑ | ↓ | ↑ | ↑ | ↑ | ↑ | ↑ | ↑ | - | ↓ | - |
| 02015 | Lough Beg | ↓ | ↑↑ | - | - | ↑↑ | ↑↑ | - | ↓ | - | - | - | - |
| NIEA23MELN | Mid East Lough Neagh | ↓↓ | ↓↓ | ↓ | ↑ | ↑↑ | ↑↑ | - | - | ↓ | - | ↓ | - |
| NIEA23MWLN | Mid West Lough Neagh | ↑↑ | ↑ | - | - | ↓↓ | ↓↓ | - | ↓↓ | ↓ | - | ↓ | - |
| NIEA23NELN | Northeast Lough Neagh | ↓ | ↓↓ | ↓↓ | - | - | - | ↓ | ↓ | ↓↓ | ↑ | - | - |
| NIEA23NLN | Northern Lough Neagh | ↓↓ | ↓↓ | ↓↓ | ↑↑ | ↑↑ | ↑↑ | ↑↑ | ↑↑ | ↑↑ | ↓ | ↓↓ | ↓ |
| NIEA23NWLN | Northwest Lough Neagh | ↑ | ↑↑ | ↑ | ↑↑ | ↑ | ↑↑ | ↑↑ | ↑↑ | ↑↑ | - | ↓ | - |
| NIEA23PORT | Portmore Reserve and Lough | ↓ | ↑↑ | ↓ | - | - | - | ↑ | - | ↑↑ | - | - | - |
| NIEA23SELN | Southeast Lough Neagh | ↑ | ↑ | ↑ | ↑ | ↑ | - | ↑ | - | - | ↓ | - | - |
| NIEA23SWLN | Southwest Lough Neagh | ↑ | - | ↓↓ | ↑ | ↑↑ | - | ↑↑ | ↑↑ | ↑ | ↑ | - | ↑↑ |
| NIEA23XLSF | Extralimital swan fields | - | - | - | - | - | - | - | - | - | - | - | - |
| NIEA23XLSW | Extralimital standing waters | ↓ | - | - | - | - | - | - | - | - | - | - | - |

Table 4.4b. Five-year mean of peaks tables for grebes, Coot and Cormorant on the SPA and across the 11 sub-regions. Dark blue represents a sub-region of high importance, pale blue represents moderate importance, white represents no significance, and grey represents insufficient records being available to produce trends. Values underpinning these tables are available in the "MOPs" sheet in the accompanying support material (Appendix - Lough Neagh WeBS trends.xlsx).

| Code | Site | Coot | Little Grebe | Great Crested Grebe | Cormorant |
|------------|------------------------------|------|--------------|---------------------|-----------|
| 02015 | Lough Beg | | | | |
| NIEA23MELN | Mid East Lough Neagh | | | | |
| NIEA23MWLN | Mid West Lough Neagh | | | | |
| NIEA23NELN | Northeast Lough Neagh | | | | |
| NIEA23NLN | Northern Lough Neagh | | | | |
| NIEA23NWLN | Northwest Lough Neagh | | | | |
| NIEA23PORT | Portmore Reserve and Lough | | | | |
| NIEA23SELN | Southeast Lough Neagh | | | | |
| NIEA23SWLN | Southwest Lough Neagh | | | | |
| NIEA23XLSF | Extralimital swan fields | | | | |
| NIEA23XLSW | Extralimital standing waters | | | | |

4.4.1 Little Grebe *Tachybaptus ruficollis*

Little Grebe numbers declined slightly between 1994/95 and around 2011/12, but as a result of subsequent increases the short-, medium- and long-term trends for the SPA all show moderate increases. There were insufficient data to produce trends for Little Grebe in four of the 11 sub-regions. The population in Midwest Lough Neagh contrasts with the other sub-regions for which trends could be produced and shows a high decline over the medium and long term. Little Grebe increased over the long term in four sub-regions and in Southeast and Southwest Lough Neagh it has increased over the medium term, reversing earlier declines in these sub-regions during the 1990s and early 2000s. The most important sub-region for Little Grebe is Northwest Lough Neagh supporting 20% to 30% of the SPA population and five other sub-regions supported between 10% and 20% of the population. The SPA population of Little Grebe increased from 280 in 1995 to 440 in 2020 and the proportion of the Northern Ireland population supported by the SPA has increased suggesting that conditions on the site are favourable relative to other sites in the country.

4.4.2 Great Crested Grebe *Podiceps cristatus*

The SPA population of wintering Great Crested Grebes has fluctuated over the period covered, and shows a moderate increase over the short, medium, and long term. There were insufficient data to produce trends in the extralimital swan fields and the extralimital standing waters. There are contrasting trends across different sub-regions suggesting that the relative suitability of different areas of the SPA for this species may have changed over time. The population of Great Crested Grebes decreased across different terms in four sub-regions of the SPA and increased heavily in four other sectors across different terms. The most important sub-regions for the Great Crested Grebe were Northwest and Southwest Lough Neagh, both supporting more than 20% of the SPA population. Mideast Lough Neagh, Northern Lough Neagh, and Southeast Lough Neagh all supported between 10% and 20% of the SPA population. The percentage of the Northern Ireland Great Crested Grebe population that is on the Lough Neagh and Lough Beg SPA increased from around 30% in 1995 to around 90% in 2020. This change could be explained by the Northern Ireland population on WeBS sites decreasing from around 1,700 in 1995 to 1,000 in 2020 while the SPA population increased from 500 to 800 in the same period. This suggests that habitat conditions on the SPA are favourable for this species, at least on the sub-regions where it is increasing, in comparison to other WeBS sites in Northern Ireland. The Lough Neagh and Lough Beg site currently supports the second largest number of Great Crested Grebes in the UK (Austin *et al.* 2023). Lough Neagh alone with 1,041 pairs recorded in 2012 (Allen & Mellon 2012), supports a large proportion of the all-Ireland population of breeding Great Crested Grebes.

4.4.3 Coot *Fulica atra*

There were insufficient data to produce trends for Coot in the extralimital swan fields. The SPA population decreased sharply between 1999/00 and 2008/09 but has subsequently made a partial recovery; consequently, the trends show a moderate increase over the short term and a high increase over the medium term but a moderate decrease over the long term. The Coot population had a high decrease over the long term in Northern Lough Neagh, Northeast Lough Neagh, Mideast Lough Neagh, and Southwest Lough Neagh with the decrease ranging between 75% and 97% per sub-region. On the other hand, the Coot population shows a high increase over the long term in Southeast Lough Neagh and a moderate increase in Northwest Lough Neagh, suggesting that the relative habitat suitability of different areas of the SPA has changed over the period covered. The most important sub-regions for Coot are Lough Beg and Southeast Lough Neagh. However, numbers on Lough Beg have been falling recently in contrast to Southeast Lough Neagh which has held upwards of 50% of the site total between the winter of 2014/15 and 2019/20. The percentage of Northern Ireland's Coot population

on the SPA decreased from 90% to 80% between 1995 and 2020, then increased from around 80% in 2010 to around 100% in 2020. As most of the Northern Ireland population winters on the SPA, the Northern Ireland trend matches the SPA trend and it is not possible to compare the trends in order to assess whether broadscale factors or local factors are driving the changes observed. However, it is worth noting that the decline in the Coot population in the early 2000s mirrors the changes in the diving duck populations. It is therefore possible that the local factors affecting diving duck populations might have also impacted Coot populations.

4.4.4 Cormorant *Phalacrocorax carbo*

There were insufficient data to produce trends for Cormorant in three of the 11 sub-regions of the SPA. The Lough Neagh and Lough Beg SPA Cormorant population increased during the late 1990s but decreased between 2005/06 and 2013/14. Consequently, the trend was stable over the short and long term but shows a moderate decrease over the medium term. Southwest Lough Neagh is the only sub-region that showed a high increase in the number of Cormorants on the SPA over any term. The increase was by 119% over the long term. In most other sub-regions, the trend mirrors that of the SPA as a whole, with initial increases followed by decreases, meaning that the largest declines in most sub-regions occur in the medium-term trend. Northeast, Southeast, and Southwest Lough Neagh all support more than 20% of the SPA Cormorant population and Mideast, Northern, and Northwest Lough Neagh support between 10% and 20% of the SPA population. Cormorants are widespread across the loughs, with their population remaining stable below 600 over the 25-year period, despite increasing to around 1,000 in 1999 and 2005. The trend broadly matches the Northern Ireland trend suggesting broadscale factors have most likely driven the changes observed.

4.5 Waders

Table 4.5a. Short-, medium-, and long-term percentage of change for waders on the SPA and across the 11 sub-regions. Dark blue represents high increase, pale blue represents moderate increase, white represents no increase (stable), orange represents moderate decline, and red represents high decline. Grey represents insufficient records being available to produce trends. Values underpinning these tables are available in the "TableOfChange" sheet in the accompanying support material (Appendix - Lough Neagh WeBS trends.xlsx).

| Site Code | Site Name | Lapwing | | | Golden Plover | | | Curlew | | |
|------------|------------------------------|---------|--------|------|---------------|--------|------|--------|--------|------|
| | | Short | Medium | Long | Short | Medium | Long | Short | Medium | Long |
| UK9020091 | Loughs Neagh and Beg SPA | = | ↓ | ↓ | = | = | = | = | = | ↓ |
| 02015 | Lough Beg | = | ↑ | = | ↑ | ↑ | ↑↑ | = | ↑↑ | = |
| NIEA23MELN | MidEast Lough Neagh | ↓↓ | ↓↓ | ↓↓ | ↓↓ | ↓↓ | ↓↓ | ↓↓ | ↓↓ | ↓↓ |
| NIEA23MWLN | MidWest Lough Neagh | ↑ | ↓ | ↓ | = | ↓↓ | ↓ | - | - | - |
| NIEA23NELN | Northeast Lough Neagh | = | ↓↓ | ↓ | ↓↓ | ↓↓ | ↓↓ | - | - | - |
| NIEA23NLN | Northern Lough Neagh | ↓↓ | ↓↓ | ↓↓ | ↓↓ | ↓↓ | ↓↓ | ↑ | ↓ | ↓↓ |
| NIEA23NWLN | Northwest Lough Neagh | = | ↓↓ | ↓↓ | ↑ | ↓↓ | ↓↓ | ↑ | = | = |
| NIEA23PORT | Portmore Reserve and Lough | ↓↓ | ↑ | ↓ | ↓↓ | ↓↓ | ↑↑ | - | - | - |
| NIEA23SELN | Southeast Lough Neagh | ↓ | ↓ | ↓ | ↓↓ | ↓↓ | = | ↑ | = | ↑ |
| NIEA23SWLN | Southwest Lough Neagh | ↓ | ↓ | ↓↓ | ↓ | ↓ | ↓↓ | ↓ | = | ↓↓ |
| NIEA23XLSF | Extralimital swan fields | ↓ | ↓↓ | ↓↓ | = | = | = | ↓↓ | ↓↓ | ↓ |
| NIEA23XLSW | Extralimital standing waters | - | - | - | - | - | - | - | - | - |

Table 4.5b. Five-year mean of peaks tables for waders on the SPA and across the 11 sub-regions. Dark blue represents a sub-region of high importance, pale blue represents moderate importance, white represents no significance, and grey represents insufficient records being available to produce trends. Values underpinning these tables are available in the "MOPs" sheet in the accompanying support material (Appendix - Lough Neagh WeBS trends.xlsx).

| Code | Site | Lapwing | Golden Plover | Curlew |
|------------|------------------------------|---------|---------------|--------|
| 02015 | Lough Beg | | | |
| NIEA23MELN | MidEast Lough Neagh | | | |
| NIEA23MWLN | MidWest Lough Neagh | | | |
| NIEA23NELN | Northeast Lough Neagh | | | |
| NIEA23NLN | Northern Lough Neagh | | | |
| NIEA23NWLN | Northwest Lough Neagh | | | |
| NIEA23PORT | Portmore Reserve and Lough | | | |
| NIEA23SELN | Southeast Lough Neagh | | | |
| NIEA23SWLN | Southwest Lough Neagh | | | |
| NIEA23XLSF | Extralimital swan fields | | | |
| NIEA23XLSW | Extralimital standing waters | | | |

4.5.1 Lapwing *Vanellus vanellus*

The Lapwing population has fluctuated over the period covered but shows a slight decline and, consequently, the trend was stable over the short term but decreased moderately over the medium and long term. There was a slight increase in Lapwing over the medium term in Lough Beg and Portmore Lough, and a slight increase over the short term in Midwest Lough Neagh, but these all reflect short-term fluctuations. The Lapwing population decreased over the long term in all sub-regions of the SPA except Lough Beg (where numbers were stable over the long-term) and this sub-region has become increasingly important in the last decade, holding in excess of 50% of the SPA population and to some extent offsetting declines elsewhere on the site. Other important sub-regions for the Lapwing are Southeast and Southwest Lough Neagh supporting between 10% and 20% of the total SPA population. The percentage of the Northern Ireland population on the SPA increased from around 25% to 40%. This increase could be attributed to the decline in the Northern Irish Lapwing population, from 14,000 in 1995 to 6,000 in 2020, while the decline of the SPA population has been much shallower. This suggests that the decline on the SPA is most likely driven by broadscale population changes and that habitat conditions on the SPA remain favourable overall, and in particular at Lough Beg. Finally, there were insufficient data to produce trends for Lapwing in the extralimital standing waters.

4.5.2 Golden Plover *Pluvialis apricaria*

The SPA population of Golden Plover has fluctuated over the period covered although the trend was stable over the short, medium, and long term. The sub-regions show similar fluctuations and hence the results are difficult to interpret, but the population increased over all periods in Lough Beg, over the short term in Northwest Lough Neagh, and over the long term in Portmore Lough. Similar to Lapwing, there were insufficient data to produce trends for the extralimital standing waters, and their population in the extralimital swan fields was stable across all three terms. The Golden Plover population decreased in all six other sub-regions across different terms. The decreases ranged between 30% and 46% for slight declines and between 57% and 100% for high declines. The most important sub-regions for Golden Plover are Lough Beg and the extralimital swan fields, with Lough Beg containing more than 2,800 individuals on average and the swan fields containing more than 750 over the past five years. Lough Beg has become increasingly important over the past decade and most recently has supported upwards of 60% of the site totals, possibly offsetting declines elsewhere across the SPA. Southwest Lough Neagh supports between 10% and 20% of the population, with numbers

also reaching around 700 individuals in the past five years. The percentage of the Golden Plover on the SPA increased from less than 40% to around 60% which means the SPA might become more important for the Northern Ireland population with time. As for Lapwing, this also suggests that habitat conditions are favourable for this species, at least at Lough Beg.

4.5.3 Curlew *Numenius arquata*

There were insufficient data to produce trends for Curlew in four of the 11 sub-regions of the SPA. The overall SPA population declined until around 2009/10, and has subsequently fluctuated. Consequently, the trend was stable over the short and medium term but decreased moderately over the long term. The Curlew population decreased in Mideast, Northern, Southeast, and Southwest Lough Neagh across different terms. However, numbers increased in Lough Beg, which has risen in importance to now support about 50% of the overall SPA population in recent years, and also in Northwest, and Southeast Lough Neagh. Numbers in Northern Lough Neagh have also increased moderately over the short term, although this has not reversed earlier high declines in this sub-region. The highest increase was in Lough Beg. The most important sub-regions for the SPA population are Lough Beg, Southeast Lough Neagh and Southwest Lough Neagh, all supporting more than 20% of the SPA population. Northwest Lough Neagh and the extralimital swan fields support between 10% and 20% of the Curlew population on the SPA. There were no records of Curlews at Northeast Lough Neagh, Portmore Lough, and the extralimital standing waters over the last five years. The SPA population makes up around 10% of the Northern Ireland Curlew population and the Northern Ireland trend matches that of the SPA, suggesting that the changes on the SPA may be driven by broadscale population changes rather than local factors. The total SPA population decreased from around 300 in 1995 to around 250 in 2020. Lough Beg supports the highest number of Curlews on the SPA, with the number of individuals reaching more than double the numbers supported in other sub-regions.

5. CONCLUSION

5.1 Geese and swans

Goose and swan numbers are relatively stable in the SPA, except for Bewick's Swan for which no records were collected since January 2007. Bewick's Swan is on both the UK (Stanbury *et al.* 2021) and Irish (Gilbert *et al.* 2021) Birds of Conservation Concern Red Lists and declines have been reported all over the four countries. It is likely these declines are due to the Bewick's Swan stopping earlier on their migratory path to Northern Ireland (Beekman *et al.* 2019; Nuijten *et al.* 2020). This phenomenon is known as short-stopping (Pavón-Jordán *et al.* 2019). The extralimital swan fields were the most important sub-regions for Greylag Goose and Whooper Swan, which are both on both Amber Lists. Lough Neagh and Lough Beg supports internationally important numbers of Whooper Swan. Meanwhile Mute Swan is on the Irish Amber List but the UK Green List, and its most important sub-region is Lough Beg.

5.2 Dabbling ducks

There are five dabbling ducks among the 19 species covered: Shoveler, Gadwall, Wigeon, Mallard and Teal. Their populations are mostly stable, with slight increases for some over the medium term. The most important sub-region for all five species is Lough Beg. The sub-region with the largest increase in dabbling ducks is Portmore Lough and the sub-region with the largest decrease is Northern Lough Neagh. Unlike other dabbling ducks, Wigeon forage on grass, hence the increase seen in the extralimital swan fields. All five of these species are on the Amber List of the UK Birds of Conservation Concern. Shoveler is on the Irish Red List while the other four dabbling ducks are on the Irish Amber List. All dabbling duck species also seem to have experienced a decline in 2010. It is also worth noting that species for which it was possible to produce trends, these species exhibited declines in Northern and Northeast Lough Neagh. These declines suggest potential issues with habitat for dabbling ducks in these sectors.

5.3 Diving ducks

All four diving ducks populations are facing a decline across the overall SPA. Since declines are consistent across the whole lough, the observed changes are most likely due to broadscale factors. However, it is worth noting that Pochard, Tufted Duck and Goldeneye experienced declines in their total lough populations in the winter of 2000/01. This simultaneous decline suggests a local event might have occurred during that time and caused these declines. Goldeneye and Tufted Duck had their highest decline at Northern Lough Neagh while Scaup and Pochard declined most at Mideast Lough Neagh and Northeast Lough Neagh respectively. Southeast and Southwest Lough Neagh are the most important sub-regions for diving ducks. Southwest Lough Neagh is becoming more important for three of the four diving ducks which suggests that local factors in the sub-region might be causing these changes. Three of the four diving duck species are on the UK and Irish Birds of Conservation Concern Red List. Tufted Duck is on the UK Green List but on the Irish Red List. Declines in the Lough Neagh and Lough Beg SPA diving duck populations have been observed since the 90s, and have been attributed to multiple reasons. Some studies suggest Tufted Duck populations might have declined due to increased competition from Roach *Rutilus rutilus* over chironomid larvae (Winfield & Winfield 1994). Evans & Day (2001) suggest that more research must be put into disturbance levels on the lough. Bunting *et al.* (2007) discuss the change in Lough Neagh's water quality due to agricultural runoff. Finally, Lehtikoinen *et al.* (2013) and Maclean *et al.* (2006) discuss the possibility of climate change and migratory changes being the main contributors to the local population changes of all four species.

5.4 Coot, grebes, and Cormorant

Coot, Little Grebe, Great Crested Grebe and Cormorant numbers demonstrate favourable populations, with their population trends ranging from stable to high increases. Northern Lough Neagh had the highest increase for the grebes and the highest decrease for Cormorant. Southeast and Southwest Lough Neagh had the highest increase for Coot and Cormorant respectively. Southeast Lough Neagh is one of the most important sub-regions for Coot and Cormorant and Northwest Lough Neagh is one of the most important sub-regions for grebes. All these species are on the green list. One study assessed the changes in Coot and diving duck distribution on the SPA to determine whether they were affected by local, regional or global factors. Because Coots have a very different feeding behaviour to diving ducks, and both species are decreasing on the lough, Tománková *et al.* (2012) suggest that the changes are due to local factors such as food availability, disturbance levels, or ecological changes to the loughs.

5.5 Waders

Northern Ireland supports a number of important wintering and breeding wader populations. Of the three wader species discussed in this report, two are on the UK Birds of Conservation Concern Red List: Lapwing and Curlew. All three species are on the Irish Red List. Both species show slight declines in the long term. Northern Lough Neagh is an area of highest decline for Lapwing and Golden Plover. Lough Beg is an important sub-region for waders, as it was for dabbling ducks, and has become increasingly so over the past decade. Although no studies have discussed changes in wintering wader populations and their attributed declines, breeding wader populations have declined greatly in Northern Ireland. The factors causing the decline in the breeding wader populations can be attributed to habitat loss and fragmentation, increase in meso-predators, and possibly climate change (Booth Jones *et al.* 2022). Possible countermeasures to these problems would be: restorative habitat management projects, predator mitigation measures, and head-starting initiatives (Colhoun *et al.* 2015, Colwell *et al.* 2020). Existing initiatives and projects have already shown success in recent years (Hunt *et al.* 2023).

5.6 Site overview

Regarding the locality of factors affecting waterfowl populations on the Lough Neagh complex, it is worth looking into the trends observed over the different sub-regions. Lough Beg has become increasingly important for multiple species, including all geese and swans, dabbling ducks, and waders on the lough, as well as Coot, Little Grebe, and Cormorant. On the other hand, diving ducks are declining in Lough Beg. The Northern and Western sub-regions of the site also seem to be experiencing declines across a range of species. Little Grebe and Great Crested Grebe both showed signs of increasing in Northern and Northeast Lough Neagh, while declining in the Northwest sub-region. Similarly, Coot populations increased in the Northeast sub-region but declined in the Northwest and Northern sub-regions. The Mute Swan population remained mostly stable across the three northern sub-regions, and the remaining species all experienced declines across all three periods assessed.

Wintering waterbird populations in the Midwest and Mideast Lough Neagh sub-regions show interesting trends. Geese species, swan species, Shoveler and Gadwall are all present in very small numbers in those sub-regions. Pochard, Goldeneye and Tufted Duck populations increased in Mideast Lough Neagh in 2000/01, with Goldeneye and Tufted Duck also increasing in that time in Midwest Lough Neagh. Coot, Golden Plover, Cormorant and the grebe species also increased in middle sub-regions around that time, while Curlew and Lapwing decreased. Other notable changes across the periods assessed include: a decrease in Scaup and Goldeneye around 2009/10; and an increase in the wader populations in 2005/06 and then a decrease starting 2011/12.

Portmore Lough supported at least 10% of the Mute Swan, Shoveler, Gadwall and Teal populations of the overall Lough Neagh complex. The extralimital swan fields supported at least 10% of the Greylag Goose, Mute Swan, Whooper Swan, Golden Plover and Curlew populations. There was also more than 20% of the site's Wigeon population in the swan fields over the winter of 2019/20, despite there being less than 10% in the five years before. Finally, the extralimital standing waters supported at least 20% of the Lough Neagh Shoveler population and Gadwall population, despite there being less than 10% of the site's Gadwall individuals in the five years before.

Southwest and Southeast Lough Neagh are also doing well for many species. Southwest Lough Neagh supports at least 10% of 14 different species' populations on the Lough and Southeast supports at least 10% of 12 different species. Those 14 and 12 species include two of the wader species, both grebes, Mute Swan, Cormorant, and three of the four diving ducks. Greylag Goose and Whooper Swan population trends are similar in both sub-regions, suggesting a connection in their feeding patterns or habitat requirements. The Shoveler population is especially low in numbers in both sub-regions. Multiple species showed an increase in 2000/01, including Teal, Wigeon and Coot. Despite the decrease in diving duck populations across the SPA as a whole in the winter of 2000/01, all four diving ducks except Goldeneye showed increases in their populations at the Southeast and Southwest sub-regions. The Goldeneye population increased in 2000/01 in the Southwest sub-region but not the Southeast and increased in both sub-regions in the winter of 2011/12. Wigeon and Coot also increased between 2015/16 and 2016/17. Both grebes increased over the long term in the southern sub-regions, and the Cormorant population increased in the Southeast while simultaneously decreasing in the Southwest in the winters 1998/99, 2005/06 and 2012/13. Finally, all wader species increased slightly in 1996/97, 2006/07 and 2013/14.

In conclusion, further research is needed to look into specific factors affecting wintering species which have changed dramatically yet are under-reported. It is possible that increases in some species could be related to decreases in others due to better water quality, increased food availability, or competitive behaviours. These relationships could be investigated further. Similarly, further research could be conducted into the periodicity of the population changes; for example, the simultaneous decrease of diving duck populations around 2000 could be significant.

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Images: Gadwall in flight, by Chris knights; Little Grebe, by Graham Catley

Analysis of wintering waterbird population trends for the Lough Neagh and Lough Beg Special Protection Area (SPA)

The aim of this project is to produce an analysis of WeBS data for the Lough Neagh and Lough Beg SPA. This will provide details of wintering waterfowl population changes around the loughs and assist in identifying potential research questions to be pursued. This report achieves these aims through: documenting short-, medium- and long- term abundance trends for 19 species of wintering waterfowl around the SPA, identifying which sub-regions are most important for species populations, and showing when and where changes were most prominent and how long they had been occurring.

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