Northern Ireland Seabird Report 2019

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Northern Ireland Seabird Report 2019

NI Seabird Steering Group

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This report is the published outcome of the work of the Northern Ireland Seabird Network – a network of volunteers, researchers and organisations – coordinated by the BTO Seabird Coordinator, and funded by NIEA.

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Northern Ireland Seabird Report 2019

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Editorial

Katherine Booth Jones

BTO NI Science Officer and Seabird Coordinator

RAZORBILL, BY SARAH KELMAN / BTO

This is the seventh edition of the Northern Ireland Seabird Report, covering 2019. This report is the published outcome of the work of the Northern Ireland Seabird Network of volunteers, overseen by the British Trust for Ornithology (BTO) on behalf of the Northern Ireland Environment Agency (NIEA).

At the core of the Seabird Network in Northern Ireland are our surveyors, some of whom work for Government bodies such as NIEA, and others on behalf of Non-Government Organisations (NGOs) such as Royal Society for the Protection of Birds (RSPB), Ulster Wildlife and the National Trust. All are important contributors through the provision of data for 2019 and previous years, and provide advice and guidance from their expert staff. I am grateful for their co-operation and assistance. Many other surveyors are volunteers who give their time freely to help. The amount and quality of work undertaken by volunteers in Northern Ireland is exemplary, and we are fortunate that many enthusiastic and talented people are part of the Northern Ireland Seabird Network. As always, it is important that volunteers who are interested in staying connected to the Northern Ireland Seabird Network for news and surveys make sure that they have provided their GDPR consent and contact details to the Seabird Coordinator, Katherine Booth Jones (Katherine.BoothJones@bto.org). I would like to thank everyone who has contributed to this report and to encourage more people to join the Seabird Network. I would also like to thank NIEA for their continued financial support for both the Seabird Coordinator role and for the production of this annual report.

This 2019 report on breeding seabirds in Northern Ireland follows the format of the preceding reports. However, you may notice that the bar-charts found in previous reports have been replaced with point- and line-graphs, representing the same data but in a format more in keeping with reporting elsewhere. I have kept the colony-level detail from previous years, even where data have changed little since our last report. It is important that this report represents a summary of current species knowledge, and that reference to other, earlier, reports is not necessary. In this we are taking a similar stance to the Joint Nature Conservation Committee (JNCC) and their online Seabird Monitoring Programme (SMP) report.

As in previous years, several articles have been submitted for inclusion in the Northern Ireland Seabird Report. These articles provide further detail on seabird-related topics, and highlight some of the exciting seabird research being undertaken in Northern Ireland and further afield. I am very grateful to the authors for giving their time to produce these articles.

One important change in this issue of the Seabird Report is that our former Editor, Shane Wolsey, has stepped down to enjoy his retirement after over a decade as the BTO Northern Ireland Officer. His knowledge of and enthusiasm for the seabirds of Northern Ireland will be sorely missed, and we all wish him a well-earned retirement.

Naturally, a summary such as this does not report all data, but all records collected are of real value in understanding our local seabirds. A report such as this is only as robust as the data that we can collect, so if you have additional seabird population data, either recent or historic, then please share it with the Northern Ireland Seabird Coordinator (myself) and JNCC, for the benefit of seabirds in Northern Ireland. The year 2020 is the final year of the current seabird census – Seabirds Count, so I encourage any readers with an interest in seabirds to volunteer their time to monitor seabirds over the coming season.

Seabird Monitoring Overview

SHAG, BY EDMUND FELLOWES / BTO

Seabird colony censuses in the UK and Ireland

There have been three national seabird censuses covering the UK and Ireland. The first, Operation Seafarer, was conducted in 1969 and 1970 by the then recently formed Seabird Group. More than 1,000 surveyors took part. The results were summarised in Cramp *et al.* (1974) *The Seabirds of Britain and Ireland*. Operation Seafarer was a major achievement and provided the first comprehensive and detailed account of the abundance and distribution of breeding seabirds in the UK and Ireland. However, Operation Seafarer also highlighted major problems in accurately counting some species, namely Storm Petrel *Hydrobates pelagicus*, Leach's Storm Petrel *Oceanodroma leucorhoa*, Manx Shearwater *Puffinus puffinus*, Razorbill *Alca torda*, Common Guillemot *Uria aalge*, Black Guillemot *Cepphus grylle* and Atlantic Puffin *Fratercula arctica*.

The second census, known as the Seabird Colony Register (SCR), was instigated by the then Nature Conservancy Council and the Seabird Group. Most fieldwork was carried out from 1985 to 1988. The results were published in Lloyd *et al.* (1991) *The Status of Seabirds in Britain and Ireland*. The SCR provided the first assessment of nationwide trends through comparison with results from Operation Seafarer. Recently developed survey techniques provided more reliable baseline estimates for Common Guillemot, Razorbill and Black Guillemot and served as the foundation for future monitoring of seabird populations. Crucially it also allowed the national importance of individual colonies to be compared, and for sites to be designated as Special Protection Areas (SPAs) under the EC 'Birds Directive'. A legacy of the Seabird Colony Register was the establishment of the Seabird Monitoring Programme (SMP, see below).

The third national census was Seabird 2000. It was co-ordinated by the Joint Nature Conservation Committee (JNCC) in partnership with other organisations: Scottish Natural Heritage (SNH), Countryside Council for Wales (CCW), Natural England (NE), NIEA, RSPB, The Seabird Group, Shetland Oil Terminal Environmental Advisory Group (SOTEAG), Birdwatch Ireland, and National Parks and Wildlife Service (Dept. of Environment, Heritage and Local Government, Republic of Ireland). Fieldwork was carried out from 1998 to 2002. Seabird 2000 provided population information on the 24 species of seabird which regularly breed in the UK and Ireland, estimating that over eight million seabirds breed in Britain and Ireland each year. Coverage was as comprehensive as possible and included, for the first time, counts of inland colonies. The updated population estimates allowed the identification of new, and the continued monitoring of existing SPAs, and provided updated national trends. Seabird 2000 used recently developed playback techniques for the first time, providing reliable baseline estimates for petrel and shearwater populations. The results were published in Mitchell *et al.* (2004) *Seabird Populations of Britain and Ireland*, and demonstrated that the seabird assemblage that breeds here is of extraordinary international importance.

The fourth national census, Seabirds Count (jncc.gov.uk/our-work/breeding-seabird-national-censuses), has been developed by the SMP Partnership and is coordinated by JNCC. Data collection for the current census is being undertaken between 2015 and 2020. In 2020, the Marine Protected Areas Management and Monitoring Programme (MarPAMM, mpa-management.eu) will be supporting the Seabird Count census in Northern Ireland and western Scotland. MarPAMM is a €6.4 million project is supported by the European Union's INTERREG VA Programme, managed by the Agri-Food and Biosciences Institute (AFBI). The project aims to develop tools to help manage marine and coastal environments by collecting data on the distribution, abundance and movement of marine species and habitats, and modelling connectivity between species,

habitats and the influence of climate change. In Northern Ireland, Rathlin Island and the steep cliffs of north Antrim will be surveyed using funds from MarPAMM, as these areas require intensive boat- and land-based survey techniques, which are very difficult to cover through volunteer effort. However, the continued support of the volunteer Northern Ireland Seabird Network who contribute to this report annually will be vital, especially to fill monitoring gaps.

The Seabird Monitoring Programme (SMP)

Since 1986, seabird populations in the UK and Ireland have been monitored through the SMP (jncc.gov.uk/our-work/seabird-monitoring-programme) coordinated on behalf of partnership organisations by JNCC. Annual data on breeding abundance and breeding success of seabirds are collected from a large network of sites, both regionally and nationally, to enable species' conservation status to be assessed. To examine trends at individual colonies, at country level and across the whole UK, it is essential that individual sites can be monitored consistently for many years.

Data on breeding abundance – the number of breeding pairs or individuals – provide a medium to long term measure of how populations are faring. Data on breeding success/productivity – the number of chicks fledged per breeding pair – are regarded as a short term or more immediate measure of changes in the wider environment (Parsons *et al.*, 2008).

Studies at the four SMP key sites (Isle of May, Canna, Fair Isle and Skomer) provide extra information on adult survival and, for a limited number of species, on diet and phenology, which are used to help to diagnose the changes in abundance. Additional data on survival rates at other sites are collected through the BTO's Retrapping for Adult Survival (RAS) scheme (Horswill *et al.*, 2016), although there are no current RAS sites in Northern Ireland.

The SMP generates annual indices of abundance and breeding success from these data, which are reported online (JNCC, 2016: https://jncc.gov.uk/our-work/seabird-population-trends-and-causes-of-change-1986-2015-report-category/). Where possible trends are given at the scale of the UK or country level, but where coverage is only possible at individual sites, the indices are shown at the site level. The SMP is a vital programme for monitoring seabird population trends between the full national censuses.

Why monitor seabirds?

The SMP enables its partners to monitor the health of the marine environment and inform seabird conservation issues. Monitoring seabirds is important for several reasons:

- seabirds are an important component of marine biodiversity in the UK;
- seabirds are top predators and a useful indicator of the state of marine ecosystems;
- human activities impact upon seabirds, both positively and negatively and these effects should be monitored;
- the UK is internationally important for seabirds;
- seabirds are protected by European law and the UK has obligations to monitor and protect populations; and
- monitoring provides data which underpin targeted conservation policy development and action.

The Northern Ireland Seabird Coordinator role

In 2013, NIEA initiated funding for a 'Northern Ireland Seabird Coordinator' post at the BTO. The main aim of the Seabird Coordinator is to facilitate an increase in annual seabird monitoring across Northern Ireland. Critical to this is the active support and engagement of volunteer seabird monitors (the Northern Ireland Seabird Network), who collect much of the seabird data in Northern Ireland. The Coordinator works closely with JNCC to ensure that all monitoring data collected by volunteers feeds into the SMP online database (jncc.defra.gov.uk/smp), which has included the creation of a definitive register of Northern Ireland sites (see below). The role also includes the compilation of an annual report on the state of seabird populations (this report), with input from the Northern Ireland Seabird Steering Group, consisting of independent experts, the Royal Society for the Protection of Birds (RSPB), the National Trust and the Northern Ireland Environment Agency (NIEA). The Seabird Steering Group also advises on the programme of activities for the Coordinator, the development of the Northern Ireland Strategy for Seabird Monitoring, and the evolution of the Northern Ireland Seabird Network. The initial five year plan has now been extended to 2023 and the Seabird Coordinator role is included in the duties of the BTO Science Officer for Northern Ireland.

The Northern Ireland Strategy for Seabird Monitoring

In 2013, a strategy for seabird monitoring in Northern Ireland was developed (Northern Ireland Seabird Data Collection Strategy 2014–19, unpublished report to NIEA). The strategy provides the context and sets minimum requirements for the annual monitoring of breeding seabirds in Northern Ireland to facilitate effective management of this natural resource. It focuses on the monitoring of populations and productivity in Northern Ireland while also facilitating further detailed studies of those populations. The main objectives are:

- to identify priorities for seabird monitoring in Northern Ireland;
- to identify priorities for seabird research in Northern Ireland;
- to gather data which will assist NIEA and conservation NGOs in managing protected seabird species and habitats;
- to increase the number of seabird breeding sites monitored annually; and
- to increase the number of people involved in seabird monitoring in Northern Ireland.
- This strategy is now due to be revised, looking forward to seabird monitoring between 2020 and 2025.

The Northern Ireland sites register

During 2013 a full register of all known, possible or potential seabird nesting sites, consistent with the SMP site register, was created by the Northern Ireland Seabird Coordinator. This means that every part of the Northern Ireland coastline now has a recording section for data entry in the SMP online database. All known inland sites are also listed. Sites are grouped by general area into 'Master Sites'. Master Sites usually can contain a number of different sub-sites, for example along stretch of coastline or in a large lough, or they might contain just one site, for example a small, isolated lough. Due to legacy issues from historical record keeping and the way data are held in the SMP online database, a separate site register is maintained for Black Guillemot.

Breeding Seabirds in Northern Ireland in 2019

Katherine Booth Jones

BTO NI Science Officer and Seabird Coordinator

GREAT BLACK-BACKED GULL, BY EDMUND FELLOWES / BTO

The following species accounts summarise the known status of each breeding seabird species in Northern Ireland (see Table 1). The accounts also provide a summary of population trends at the main breeding sites, where data exist. These data were collected by many volunteers and site wardens across Northern Ireland and a list of those contributors is given at the end of this report. Many other people have contributed records from the 1960s onwards, when concerted monitoring began for some species. Without that recording we would not be able to generate these population graphs and tables.

Table 1: Seabird species breeding in Northern Ireland

Species	NI Priority[1]	BoCCI Status[2]	UK BoCC[3]	IUCN Red List[4] (Europe)
Northern Fulmar	N	GREEN	AMBER	Endangered
Manx Shearwater	N	AMBER	AMBER	Least Concern
European Storm Petrel*	N	AMBER	AMBER	Least Concern
Great Cormorant	N	AMBER	GREEN	Least Concern
European Shag	N	AMBER	RED	Least Concern
Great Skua	N	AMBER	AMBER	Least Concern
Black-legged Kittiwake	N	AMBER	RED	Vulnerable
Black-headed Gull	Y	RED	AMBER	Least Concern
Mediterranean Gull	N	AMBER	AMBER	Least Concern
Common Gull	N	AMBER	AMBER	Least Concern
Lesser Black-backed Gull	N	AMBER	AMBER	Least Concern
Herring Gull	Y	RED	RED	Near Threatened
Great Black-backed Gull	N	AMBER	AMBER	Least Concern
Little Tern*	Y	AMBER	AMBER	Least Concern
Sandwich Tern	N	AMBER	AMBER	Least Concern
Common Tern	N	AMBER	AMBER	Least Concern
Roseate Tern	Y	AMBER	RED	Least Concern
Arctic Tern	N	AMBER	AMBER	Least Concern
Common Guillemot	N	AMBER	AMBER	Least Concern
Razorbill	N	AMBER	AMBER	Least Concern
Black Guillemot	N	AMBER	AMBER	Least Concern
Atlantic Puffin	N	AMBER	RED	Endangered

[1]Northern Ireland Priority species are those identified during the preparation of the Northern Ireland Biodiversity Strategy (2002) and subsequently, using criteria set out by stakeholders (http://www.habitas.org.uk/priority/); [2]Birds of Conservation Concern in Ireland (Colhoun & Cummins, 2013); [3]UK Birds of Conservation Concern 4 (Eaton *et al.,* 2015); [4]International Union for Conservation of Nature's Red List of Threatened Species (Birdlife International, 2018a) * Not currently breeding, historical records only

In Northern Ireland, the Birds of Conservation Concern Ireland (BoCCI) list is used for flagging species conservation issues (Colhoun & Cummins, 2013). Following the 2013 reassessment, Great Cormorant, European Shag and Atlantic Puffin moved from the 'Green' to 'Amber' list – a higher concern status – leaving only Northern Fulmar on the Green list (Colhoun & Cummins, 2013). It should be noted, however, that this latest assessment took place in the first year of the Northern Ireland Seabird Network, and was based on relatively low coverage of some species' populations (Colhoun & Cummins, 2013). The authors of the BoCCI recommended a six-year interval for revising the list, therefore new data collected by the network will undoubtedly be of use to the next assessment, which is due to be underway in 2020.

There are some notable differences between the All-Ireland BoCCI list and the UK Birds of Conservation Concern (Eaton *et al.,* 2015). In particular, European Shag, Black-legged Kittiwake and Roseate Tern are in the UK Red list, with the first two species being new additions in 2016. The European Shag is stable in Northern Ireland, while populations of Black-legged Kittiwakes have remained stable or declined at a lower rate than the rest of the UK (Leonard, 2016a). The Roseate Tern is not Red-listed in Ireland as it is in the UK, since it supports the largest European colony for the species at Rockabill in Dublin (Leonard & Wolsey, 2016), but it remains a precarious breeding species in Northern Ireland.

Seabird surveys of abundance and breeding success in the UK and Ireland are undertaken using standard survey guidelines for each species (Walsh *et al.*, 1995). Tables 2 and 3 briefly outline the survey units and methods used for estimating the numbers of each species under consideration in Northern Ireland.

Table 2: Units for surveys of seabird numbers/abundance.

Unit	Abbreviation	Description
Apparently Occupied Nest	AON	An active nest occupied by a bird, pair of birds, or with eggs or chicks present.
Apparently Occupied Territory	AOT	When nests cannot be discerned (e.g. for Great Skua), the presence of a nest may be inferred at the time of year when nests are likely to be complete or eggs are newly hatched by the presence of an incubating adult, or adult displaying territorial behaviour.
Apparently Occupied Site	AOS	An active site occupied by a bird, pair of birds, or with eggs or chicks present. Used for species without obvious nests such as Northern Fulmar.
Apparently Occupied Burrow	AOB	An apparently active and occupied burrow which may have a nest.
Individuals	Ind	Individual birds.

Species accounts are structured as follows:

Overview – conservation status, a brief description of the species characteristics, population size estimates from censuses and SMP trends for abundance and breeding success for the UK as a whole and for Northern Ireland (available up to 2015: JNCC, 2016).

Abundance in 2019 – a summary of the current year's breeding numbers (abundance) in Northern Ireland, with historical trends where data are available. In most cases, graphs show population trends, and, unless otherwise stated, gaps in graphs mean no count was carried out during that year. Where data are available for all years, a smoothed trend curve is fitted through the data points using a local polynomial regression fitting method ('loess') in the R package 'ggplot2', version 3.2.1 (R version 3.6.1). The curve is presented with a standard error 95% confidence interval at around the smoothed curve. For abundance data which represent the entire population of Northern Ireland (or near-to), for example, for Mediterranean Gulls and tern species, cumulative plots are given.

Breeding success in 2019 – a summary of current knowledge on breeding success in Northern Ireland. For species with sufficient data for visualisation (Northern Fulmar, European Shag, Black-legged Kittiwake and Common Tern), productivity is plotted per year across all sites where productivity was measured. In these plots, a trend curve is fitted through the data points using the methods described for breeding numbers above. However, it should be noted that these trends are based on small sample sizes and are not weighted for sample size per site, and are therefore best used as a quick visual representation only and should be interpreted with caution.

Table 3: For consistency and for convenience to volunteers in Northern Ireland we recommend following the methods and the timings outlined below for recording seabird abundance. The methods listed here are derived from Walsh *et al.* (1995) where more detailed descriptions and comparisons of all survey methods can also be found, in addition to methods for measuring breeding success.

Species	Unit	Notes
Northern Fulmar	AOS	Count between 09.00 and 17.30, and 15th May to 5th July. Apparently Occupied Sites are those ledges suitable for nesting with a bird present (Population–monitoring method 1, Walsh *et al.*, 1995).
Manx Shearwater	AOB	Late May to mid-June. Survey using tape playback between 09.00 and 17.00 (Population–monitoring method 2, Walsh *et al.*, 1995).
Great Cormorant	AON	Count period 15th May to 25th June (Population–monitoring method 1, Walsh *et al.*, 1995).
European Shag	AON	Count period 1st May to 25th June.
Great Skua	AOT	Count period late May to June.
Black-legged Kittiwake	AON	Count late May to mid-June. Only count completed nests with at least one adult attending.
All gull species	AON Ind	Count late May to mid-June. Counts of adults on nests, or transects to count nests. Alternatively, flush counts of individual adults (Population–monitoring method 1, 3, or 5, Walsh *et al.*, 1995).
All tern species	AON Ind	Count mid-June. Counts of adults on nests, or transects to count nests. Alternatively, flush counts of individual adults (Population–monitoring method 1, 2 or 3, Walsh *et al.*, 1995).
Common Guillemot	Ind	Count between 08.00 and 16.00, and from 1st – 21st June, with ~5 repeats if possible. Birds on tidal rocks or sea excluded.
Razorbill	Ind	Count between 08.00 and 16.00, and from 1st – 21st June, with ~5 repeats if possible. Birds on tidal rocks or sea excluded.
Black Guillemot	Ind	Count any birds seen within c. 300m of the shore and any on land, between 05.00 and 09.00, and from 26th March to 15th May.
Atlantic Puffin	Ind	Ideally, AOS/AOB should be counted, following methods described in Walsh et al., 1995. For small colonies, as may be present in Norther Ireland (outside of Rathlin Island), count individuals above ground, flying over the colony and birds within 200m of the shore in April (Census-method 3, Walsh *et al.*, 1995). Evening or early morning visits will produce highest counts.
European Storm Petrel	AOB	Storm Petrels do not currently breed in Northern Ireland, therefore no recommendations are specifically made here.

A table detailing specific counts of breeding numbers at defined SMP Master Sites in Northern Ireland between 2015 and 2019 can be found in Table 7 in the Appendix on page 80.

Northern Fulmar

Fulmarus glacialis

Conservation status: Green listed in the BOCCI (2014–2019), Amber listed in BOCC4 (2015), EC Birds Directive – migratory species.

PHILIP CROFT / BTO

Overview

Summary: Northern Fulmars (Fulmars) are tube-nosed seabirds around the size of a small gull that nest in loose cliff-based colonies. They can use relatively small cliff faces, sometimes several miles inland. They are non-migratory and can be seen all year round. The name Fulmar means 'foul gull' (Robinson, 2005).

UK population size, abundance and breeding success trends: Fulmars are very common in northern Britain. The UK population of Fulmar increased between the 1969–1970 and 1985-1988 censuses (from ~ 291,000 to 517,000 pairs), but remained stable between 1985–1988 and 1998–2002 when 501,609 pairs were recorded. The latest UK breeding population estimate is 350,000 (195,000–680,000) (Mitchell *et al.*, 2004; Woodward *et al.*, 2020). An increase in the use of commercial discards has been cited as one of the reasons for a massive increase in breeding range and population size across the North Atlantic in the 20th Century (Mitchell *et al.*, 2004). Annual SMP abundance indices suggests that Fulmars may now be in decline after reaching a population peak in 1996 (JNCC, 2016).

At the UK level, the annual productivity index has been steadily decreasing since 1986 (JNCC, 2016). Analysis of the SMP dataset by Cook and Robinson (2010) found that the mean breeding success of Fulmars was 0.39 chicks/AOS and had declined at a rate of 0.005 chicks per nest per year between 1986 and 2008. This equates to a decline in breeding success of 11%. Using available life history information (population size, clutch size, age at first breeding and survival rates of different age classes), Cook and Robinson (2010) predicted that the UK Fulmar population would decline by about 12% over 25 years.

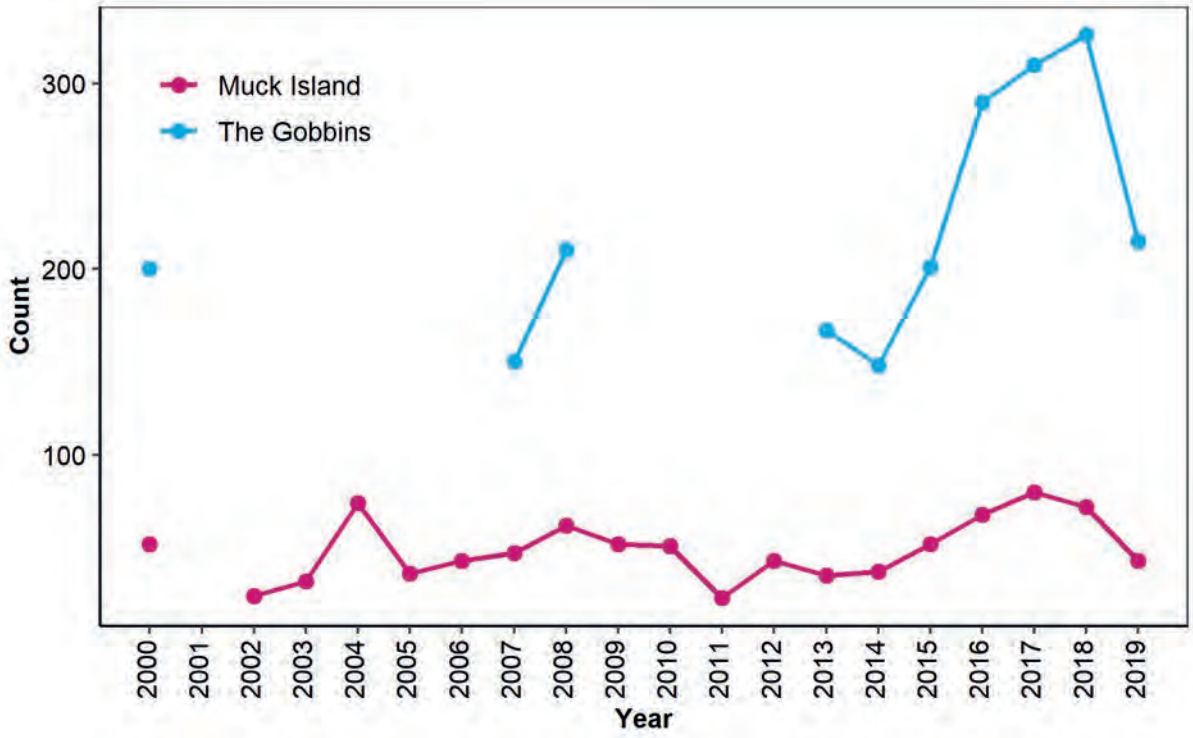
Northern Ireland population size, abundance and breeding success trends: In Northern Ireland, Fulmars are a widespread breeding species, with the most important site being at Rathlin Island. Other notable sites are Downhill, Binevenagh, The Gobbins and Muck Island. Small numbers are scattered around the coast where suitable cliff habitat occurs. Between 1985–1988 and 1998–2002 censuses Fulmar increased in Northern Ireland from 3,540 to 5,992 breeding pairs (Mitchell *et al.,* 2004). Since Seabird 2000, annual monitoring indicates that numbers in Northern Ireland have generally decreased, following the trend for the UK as a whole (JNCC, 2016). A full census, including Rathlin Island and the steep cliffs of the north coast of Co. Antrim, will be required to produce a more up to date Northern Irish population estimate.

The collection of productivity data in Northern Ireland has been limited; therefore no meaningful average productivity figure can be produced (JNCC, 2019).

Abundance in 2019

Numbers of Fulmar at The Gobbins were at their lowest since 2015 (Figure 1), declining by 34% between 2018 and 2019, despite record high totals in the previous three years (Table 7, Appendix). The pattern of decline was also reflected on nearby Muck Island in 2019. Although this population is smaller than that of The Gobbins, Fulmar numbers here have been relatively stable since the 1998-2002 census (Figure 1). A full count at Rathlin Island has not occurred since 2011, although it is planned that this will occur as part of the 'Seabirds Count' census in 2020. Around the coastline of Northern Ireland and away from these sites, more Fulmar were counted in 2019 than 2018, with increased counts around Downhill and the Giant's Causeway Coast (Table 7, Appendix).

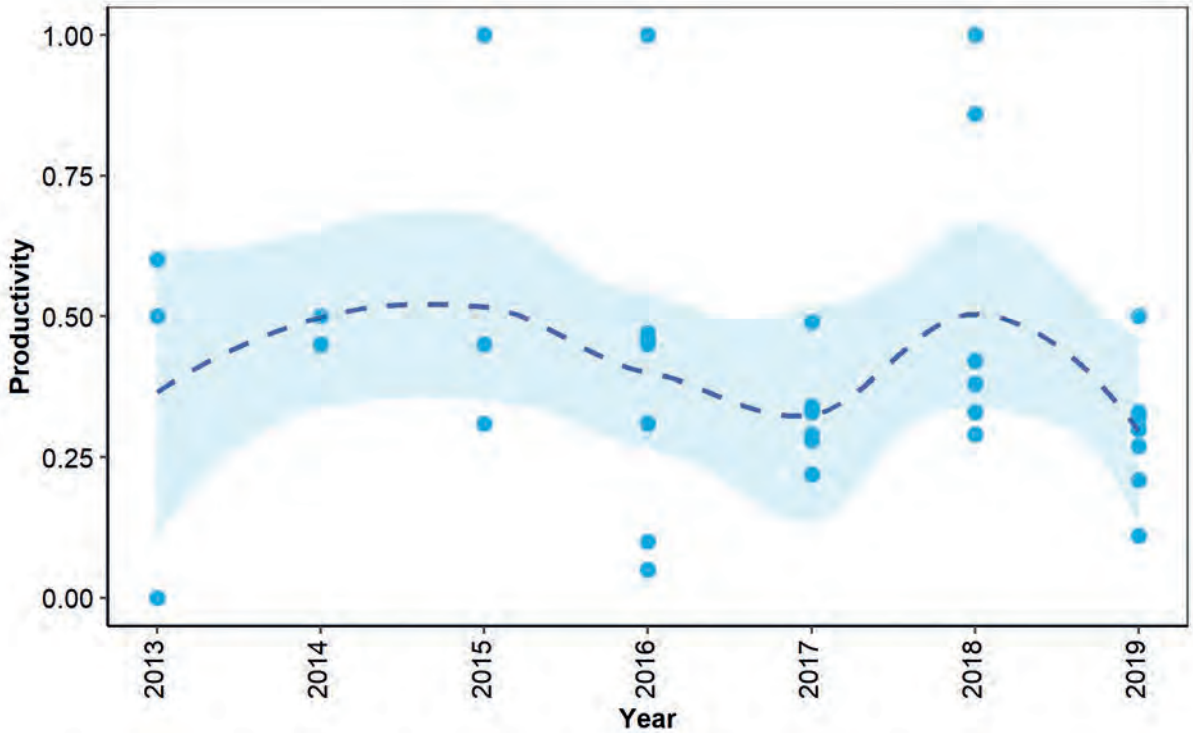
Figure 1: Fulmar counts (AOS) at Muck Island (red) and The Gobbins (blue), 2000–2019.



Breeding success in 2019

In 2019, Fulmar productivity was recorded on eight sites, and all but one of these had a lower productivity than in 2018. At West of Carrick-a-Rede, 30 AOS produced 15 chicks (0.5 chicks/AOS); this was the site with the greatest productivity in 2019. The site with the lowest productivity was also located on the north coast; a site at Hamilton's Seat produced only four chicks from 35 AOS (0.11 chicks/AOS). Over the past six years, Fulmar productivity has been highly variable between Northern Irish colonies and breeding seasons, and there does not appear to be a strong trend over time (Figure 2).

Figure 2: Productivity (chicks/AOS) for Fulmar in Northern Ireland between 2013 and 2019. The dashed line represents the Locally Weighted Least Squares Regression trend in productivity over time. The shaded region represents the 95% confidence interval around the trend. Sites measured for Fulmar productivity between 2013 and 2019 include: Ballygalley Head, Lighthouse Island, Maggy's Leap, Muck Island, Portmuck, The Gobbins, sections of the North Coast site, Park Head and Portnaboe.



Manx Shearwater

Puffinus puffinus

Conservation status: Amber listed in the BOCCI (2014–2019), Amber listed in BOCC4 (2015), EC Birds Directive – migratory species.

LIZ CUTTING / BTO

Overview

Summary: Manx Shearwaters are burrow-nesting, tube-nosed seabirds. They are highly pelagic, spending most of the year at sea and only coming ashore under the cover of darkness to avoid avian predators. They are also the longest-living seabird recorded in the UK, with one recorded as at least 55 years old (Robinson, 2005).

UK population size, abundance and breeding success trends: Most of the world's population of Manx Shearwaters breed in Britain and Ireland (Hamer & Hill, 1997; Mitchell *et al.*, 2004). At the time of the last census, an estimated 299,678 AOS were counted in the UK (JNCC, 2019), and the latest estimates haven't changed (Mitchell *et al.*, 2004; Woodward *et al.,* 2020). However, the secretive lifestyle of Manx Shearwaters (burrow-nesting) makes them a difficult species to survey, and the breeding population of Manx Shearwater was only comprehensively surveyed for the first time during Seabird 2000 (1998–2002, Mitchell *et al.*, 2004). Annual changes in breeding abundance are not reported by SMP, while changes in survey methods over time have meant that population trends from the censuses across the UK are not reliable. The largest colony in the world is on the island of Skomer in Wales. Formerly thought to hold around 100,000 AOBs at the turn of the century (Smith *et al.*, 2001), a survey in 2011 suggested that the population was approximately 316,000 AOBs (Perrins *et al.*, 2012).

Due to the difficulty in surveying Manx Shearwater burrows, few sites in the UK are monitored for productivity. Among these, average Manx Shearwater productivity is 0.66 chicks per pair and there is little year-to-year variation (JNCC, 2019).

Northern Ireland population size, abundance and breeding success trends: The only confirmed extant colony in Northern Ireland is on the Copeland Islands, where there are birds on Lighthouse Island and Big Copeland. The Copeland Islands were last surveyed in 2007 (Stewart & Leonard, 2007). At that time, there were approximately 3,444 AOB on Lighthouse Island and 1,406 AOB on Big Copeland. There was an apparent 5.3% increase on the previous survey in 2000, although the former survey result was within the confidence limits of the 2007 population estimate. The presence of European Rabbit (*Oryctolagus cuniculus*) on Mew for the last 15 years could facilitate the colonisation by breeding Manx Shearwater due to the creation of suitable nesting burrows (Rhodes, 2017). Surveys have not been carried out over the period 2008–2018 on the Copeland Islands due to the labour intensive and costly monitoring which would be required, and therefore the shearwater population is urgently due a resurvey.

Rathlin Island formerly held a colony of unknown size (Brooke, 1990) but the species has not been confirmed breeding for many years (Liam McFaul, RSPB, pers. comm.) and surveys for Seabird 2000 (1998–2002) did not detect any birds (Mitchell *et al.*, 2004). Deane (1954) estimated 150 AOBs on Rathlin Island but the Operation Seafarer (1969–1970) figure was 1,000–10,000 AOBs (Mitchell *et al.*, 2004). The inaccessibility of the cliffs and the cryptic nature of the species make these estimates unreliable. All that is certain is that a huge decline has occurred on the island, probably to extinction.

Breeding success was monitored on Lighthouse Island by Copeland Bird Observatory between 2007 and 2013, using study burrows. These consist of modified burrows which have a concrete slab placed over the nesting chamber to allow easy access. In the seven years of monitoring, breeding success on Copeland was usually a little higher than other sites in the UK (Table 4), although extremely wet weather in 2007 resulted in a success rate of just 0.38 chicks per pair.

Abundance in 2019

There is no annual surveying of Manx Shearwaters in Northern Ireland, but all three Copeland Islands are due a Manx Shearwater census in 2020.

Breeding success in 2019

No breeding success data were available for 2019. In 2018, a sample of study burrows on Lighthouse Island was monitored by the Oxford Navigation Group with the support of the Copeland Bird Observatory. Of these 39 contained eggs during the incubation period and were shallow enough to follow to the chick rearing phase. In August, 30 of these study burrows contained chicks. If it is assumed that chick presence in August is a good (if slightly inflated) indicator of the number of fledged young, the productivity of the sample of occupied nests in 2018 was 0.77 chicks per pair. Methods may not have been consistent with previous years, therefore this estimated productivity has not been included in Table 4 for comparison.

Table 4: Manx Shearwater productivity at Copeland Bird Observatory.

Year	Nests sampled	Chicks hatched per pair	Chicks fledged per pair
2007	71	Not recorded	0.38
2008	67	0.70	0.67
2009	76	0.83	0.82
2010	65	0.88	0.88
2011	60	0.86	0.86
2012	50	0.78	0.76
2013	54	0.82	0.80

SARAH KELMAN / BTO

European Storm Petrel

Hydrobates pelagicus

Conservation status: Amber listed in the BOCCI (2014–2019), Amber listed in BOCC4 (2015), EC Birds Directive – listed in Annex 1 and as a migratory species.

JOE PENDER

Overview

Summary: European Storm Petrels are sparrow-sized tube-nosed seabirds. They are highly pelagic, only returning to land to breed. They eat mostly plankton and small fish on the surface of the sea without alighting, almost appearing to walk on water, pattering across the water's surface (Robinson, 2005).

UK population size, abundance and breeding success trends: The UK breeding population of European Storm Petrel was only comprehensively surveyed for the first time during Seabird 2000 (1998–2002) using the standard playback method (Mitchell *et al.*, 2004; Ratcliffe *et al.*, 1998), when 25,700 pairs were counted. The most recent estimation of the population size has not changed (Mitchell *et al.*, 2004; Woodward *et al.*, 2020). Due to the intensive and costly monitoring which would be required, there is little information available from which to derive UK or country level population trends since Seabird 2000 (JNCC, 2016). While new monitoring techniques, such as passive infra-red and endoscopes, are being tested for their usefulness in monitoring storm petrels, these methods are still costly in terms of fieldwork effort and equipment (Perkins *et al.*, 2018). For similar reasons, there is a lack of annual data collected on productivity.

Northern Ireland population size, abundance and breeding success trends: The species has no known breeding sites in Northern Ireland. Ussher and Warren (1900) reported that in relation to breeding in Ireland "two small islands off the north coast of Antrim" were reported to have populations of storm petrels. The only small islands which they could realistically have been referring to are Sheep Island, Antrim and one of The Skerries. Deane (1954) reported up to a dozen pairs on Sheep Island, but the species is considered unlikely to be still there. It may be present on Rathlin Island but no surveys have been conducted recently. The nearest colony is on Sanda Island, Scotland which is just 37 km to the east. The Skerries, off Portrush, are another potential breeding site. A survey of these locations is long overdue.

Great Cormorant

Phalacrocorax carbo

Conservation status: Amber listed in the BOCCI 2014–2019, Green listed in the BOCC4 (2015), EC Birds Directive – migratory species

EDMUND FELLOWES / BTO

Overview

Summary: The Great Cormorant (Cormorant) is a widespread breeding species, often found in dense colonies. Historically, Cormorants have been regarded as primarily coastal birds in Britain and Ireland, but during the last 40 years there has been a gradual shift in the species' breeding and wintering distributions to inland sites, to the extent that almost every lowland lake and river has a few individuals (Newson *et al.*, 2007).

UK population size, abundance and breeding success trends: Due to the sometimes transient nature of their colonies, Cormorants can be difficult to census. However, the UK population estimate from the Seabird 2000 (1998–2002) census was 8,900 AON, an increase of 10% since the previous census (JNCC, 2019). The UK breeding abundance index for Cormorants 1986–2015 indicates that the population increased between 1986 and 1995, but since 2005 has declined (JNCC, 2016). The latest UK winter population estimate is 64,500 (Frost *et al.*, 2019; Woodward *et al.*, 2020).

The UK productivity has remained fairly between 1991 and 2015, with nests fledging 1.84 chicks on average (JNCC, 2016).

Northern Ireland population size, abundance and breeding success trends: The increase seen between the 1985–1988 and 1998–2002 censuses was in contrast to the trend in Northern Ireland, where Cormorant numbers dropped from 736 AON to 663 AON during the same period. Cormorants have historically principally bred at two sites – Sheep Island (north coast, Co. Antrim) and Bird Island (Strangford Lough). In 2010, the Sheep Island colony split with some birds moving to The Skerries. Smaller numbers are found at The Gobbins and Burial Island on the Outer Ards Peninsula, although the latter site is not monitored annually. The latest Northern Ireland winter population estimate is approximately 2,500 (Frost *et al.*, 2019; Woodward *et al.*, 2020).

The collection of productivity data in Northern Ireland has been limited; therefore no meaningful average productivity figure can be produced (JNCC, 2019).

Abundance in 2019

Long-term annual data dating back to 1986 are available for Bird Island, Strangford Lough, where numbers increased erratically until 2005, to a peak of 490 AON (Figure 3). Since then numbers have fallen, but appear to be increasing again in recent years. Numbers of Cormorants on Sheep Island seem to be declining, although no count was carried out this year (Figure 4). The colony at the Skerries has not been surveyed for as long, and counts have varied substantially between years. It seems probable that the original population of Sheep Island is now spread between the two sites (Figure 4), while exchange with the colony at Inishowen (Co. Donegal) is also thought possible but has not been validated (e.g. by movements of colour ringed birds). Periodic counts of the numbers at The Gobbins cliffs dating back to 1969 (Figure 5) have shown fluctuating numbers in recent years, dropping to as low as two AON in 2007, returning to 33 AON in 2008. No Cormorants were found at The Gobbins in 2019 (Table 7, Appendix).

Figure 3: Cormorant count (AON) at Bird Island, Strangford Lough, 1986–2019. The dashed line represents the Locally Weighted Least Squares Regression trend in Cormorant numbers over time. The shaded region represents the 95% confidence interval around the trend.

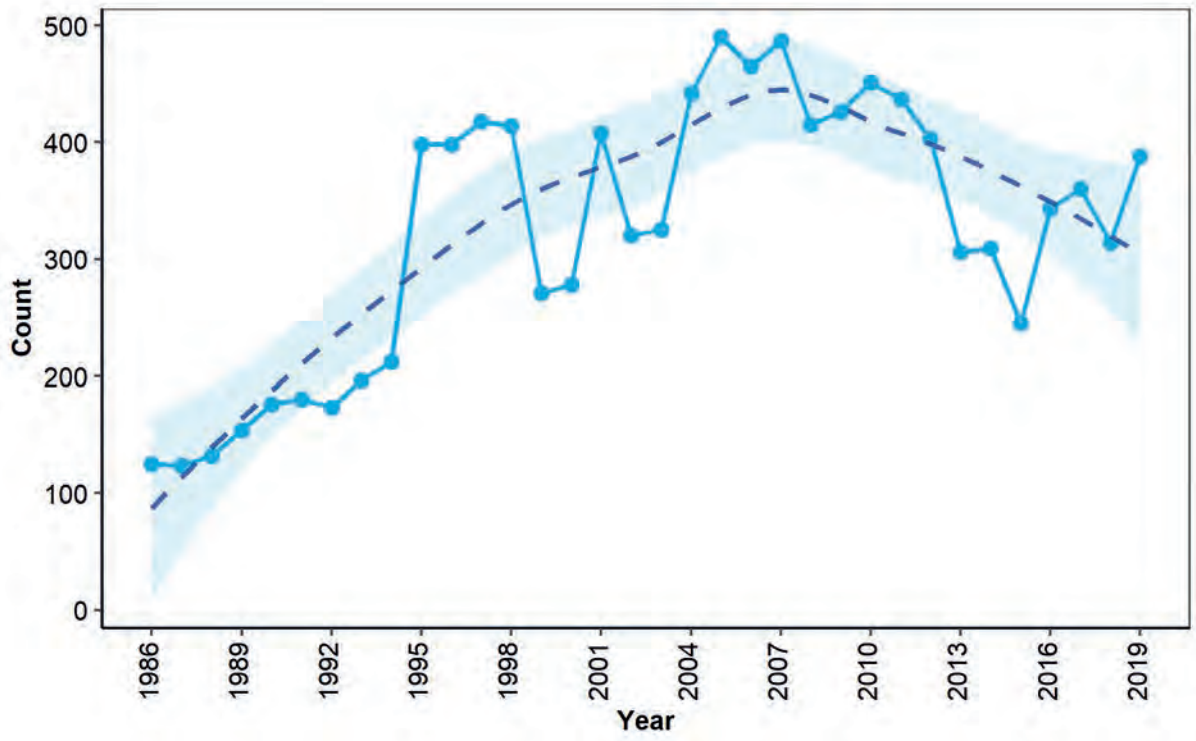


Figure 4: Cormorant counts (AON) at The Skerries and Sheep Island, 1985–2019. The Skerries were not surveyed before 2010 as it was believed that no Cormorants were present. The Skerries were not surveyed in 2016, and Sheep Island was not surveyed in 2019. The dashed line represents the Locally Weighted Least Squares Regression trend in Cormorant numbers over time at Sheep Island (no trend for The Skerries, due to missing data). The shaded region represents the 95% confidence interval around the trend.

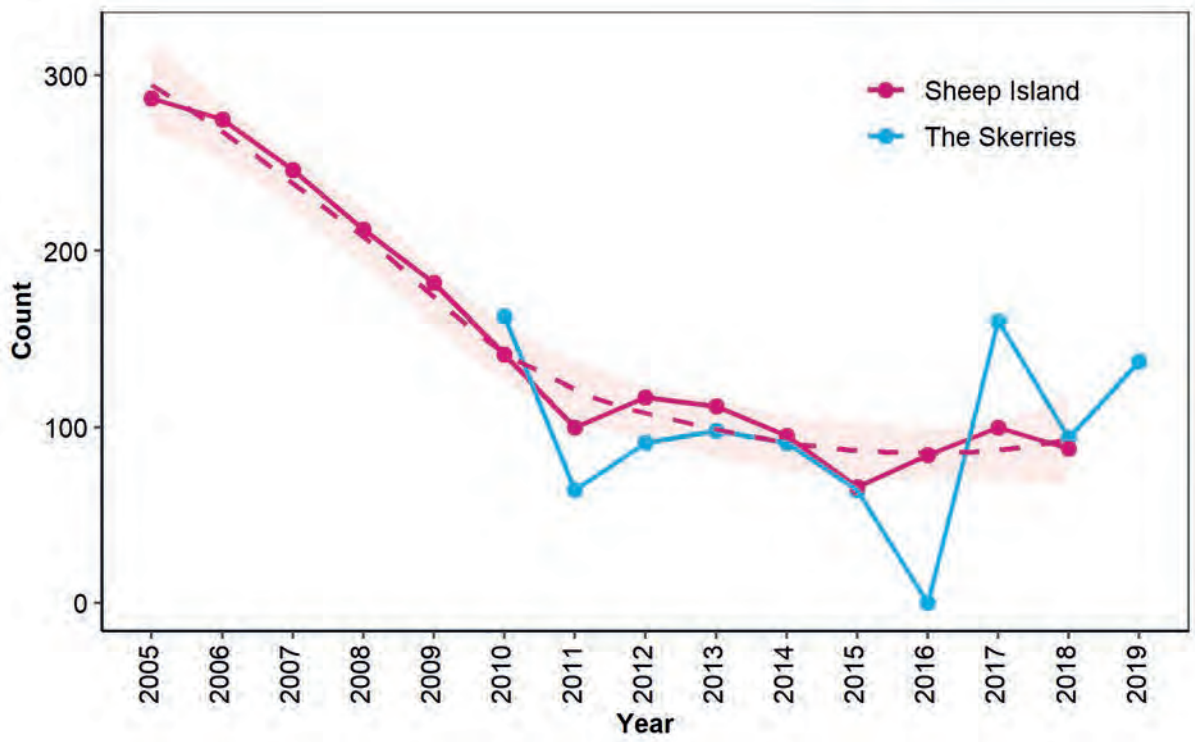
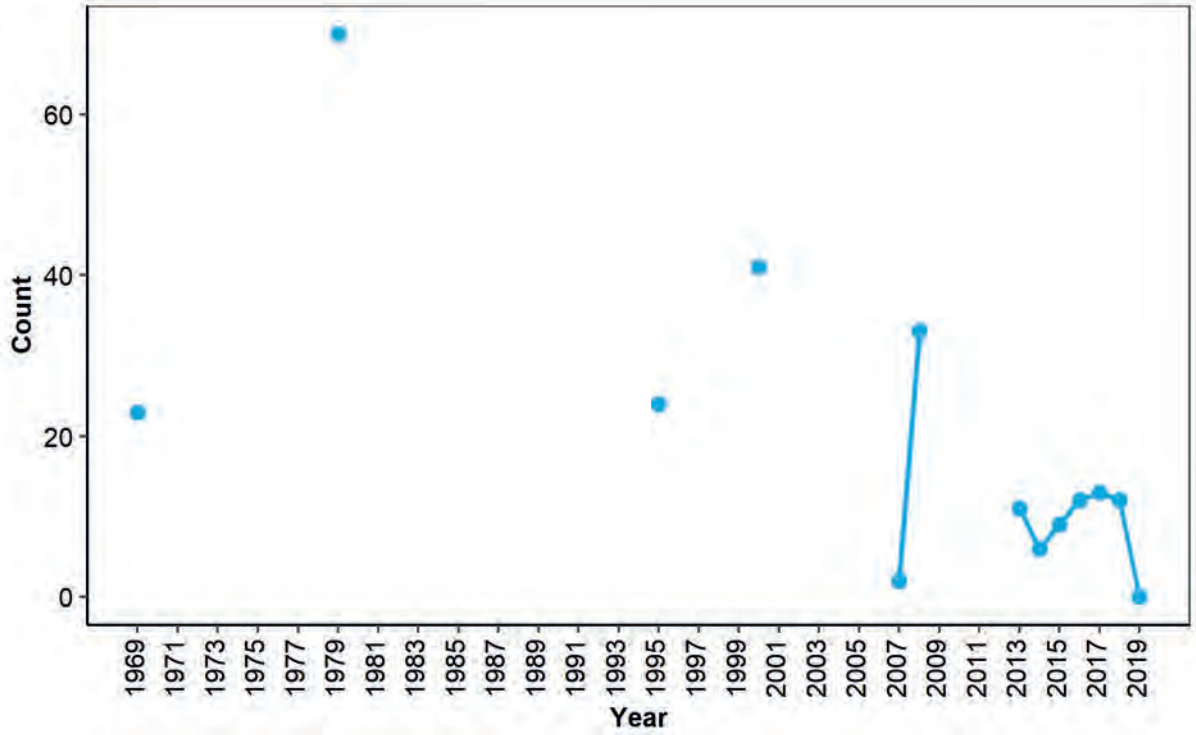


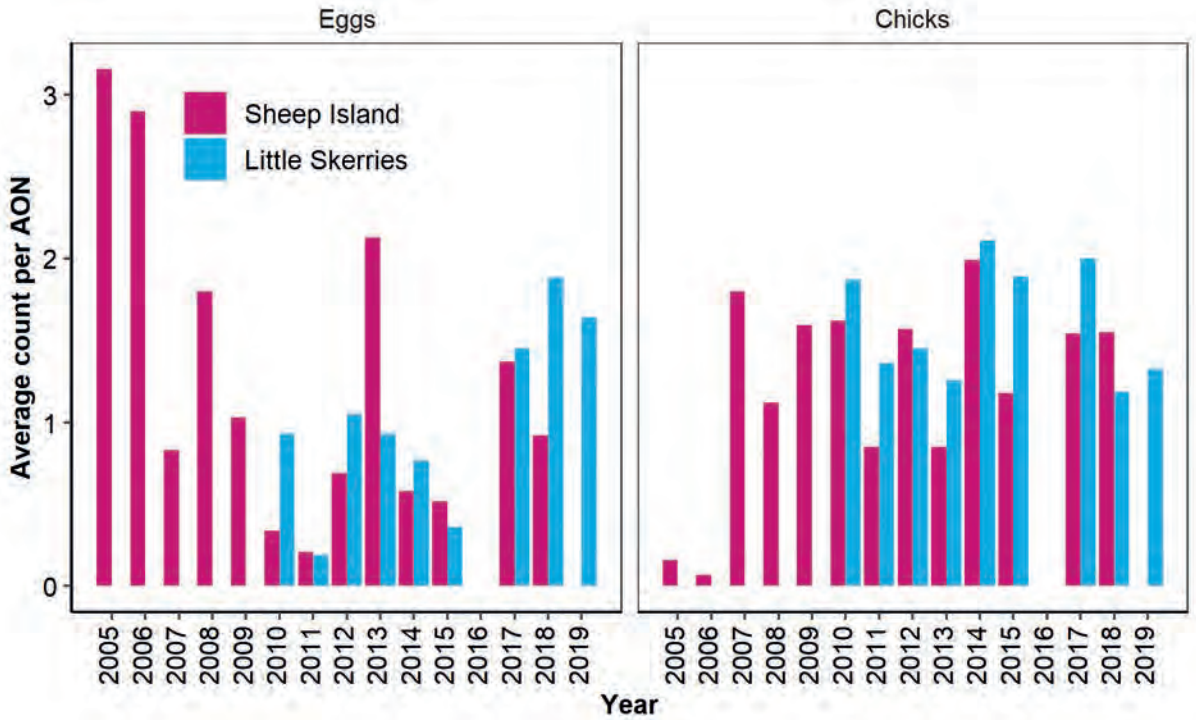
Figure 5: Cormorant numbers (AON) at The Gobbins, 1969–2019.



Breeding success in 2019

Due to their breeding asynchrony, many visits are required to colonies through the season to assess the productivity of Cormorants. However, the NIEA make single-visit surveys to Sheep Island and the Skerries annually to count numbers of eggs and chicks in the Cormorant colonies (Figure 6). Little Skerries supported 1.64 eggs per AON and 1.33 chicks per AON. Sheep Island was not counted in 2019. The Gobbins held 11 nests, which produced 11 chicks.

Figure 6. The average number of Cormorant eggs (left) and chicks (right) per AON observed by NIEA on breeding season visits to Sheep Island (red) and Little Skerries (blue).



European Shag

Phalacrocorax aristotelis

Conservation status: Amber listed in the BOCCI (2014–2019), Red listed in the BOCC4 (2015), EC Birds Directive – migratory species.

ALLAN DREWITT / BTO

Overview

Summary: Slightly smaller than the Cormorant, the European Shag (Shag) is endemic to the northeast Atlantic and the Mediterranean. It is a marine inshore species that is almost never observed out of sight of land (Mitchell *et al.*, 2004). The species nests on offshore islands or on cliffs, and colonies range in size from a few to several thousand pairs.

UK population size, abundance and breeding success trends: Over a third of the world population breeds in the UK and Ireland (JNCC, 2016). The UK population size was estimated to be 26,565 AON at the last census in 1998-2002 (Mitchell *et al.*, 2004). The UK breeding abundance index shows a 45% decline between 1986 and 2015, though this decline has been predominantly in Scotland with populations in England and Wales showing little change (JNCC, 2016). Latest estimates put the UK population at 17,500 (13,500–20,500) (Mitchell *et al.*, 2004; Woodward *et al.*, 2020). Declines may be related to a reduction in the availability of Shag's preferred prey species, the sandeel (*Ammodytes marinus*, Heubeck *et al.*, 2015; Howells *et al.*, 2017). Annual return rates of adults are usually in the order of 80-90% (JNCC, 2016) but Shags are vulnerable to one-off events such as extreme winter storms and the return rate may drop to below 15% because of their impact (Frederiksen *et al.*, 2008; Heubeck *et al.*, 2015). The latest UK winter population estimate is 110,000 (Frost *et al.*, 2019; Musgrove *et al.*, 2011; Woodward *et al.*, 2020).

The shortage of sandeels is thought to have contributed to low productivity in some years, but on average between 1986 and 2008 Shag productivity at sample sites was estimated to be 1.21 chicks per pair (Cook & Robinson, 2010; JNCC, 2019).

Northern Ireland population size, abundance and breeding success trends: In Northern Ireland, the Shag is a widespread breeding species, with the largest colonies being at The Maidens (offshore from Larne) and Rathlin Island, with other breeding pairs scattered widely around the coast in smaller groups. The Seabird 2000 (1998–2002) census estimated that there were 301 AON in Northern Ireland, and that this was an decrease of 32% since the previous census (JNCC, 2019).

The collection of productivity data in Northern Ireland has been limited; therefore no meaningful average productivity figure can be produced (JNCC, 2019).

Abundance in 2019

Numbers at Muck Island, while small, have increased since 2014, from 16 AON to 38 AON (Figure 7). Although numbers at the neighbouring site at The Gobbins were at their highest recorded in 2018 (Figure 7), they have only increased by 11% since Seabird 2000 (1998–2002). In 2018, the population on Rathlin Island was half that in 1985 (Figure 8) but appears to have been gradually increasing since 2015. Shag records for Rathlin are not available for 2019. Shags stopped breeding in Strangford Lough in 2007 (Figure 10). The species has been recorded in small numbers at several new locations since 2013.

Figure 7: European Shag counts (AON) at Muck Island (red) and The Gobbins (blue), 2000–2019. The dashed line represents the Locally Weighted Least Squares Regression trend in Cormorant numbers over time at Muck Island (no trend for The Gobbins, due to missing data). The shaded region represents the 95% confidence interval around the trend.

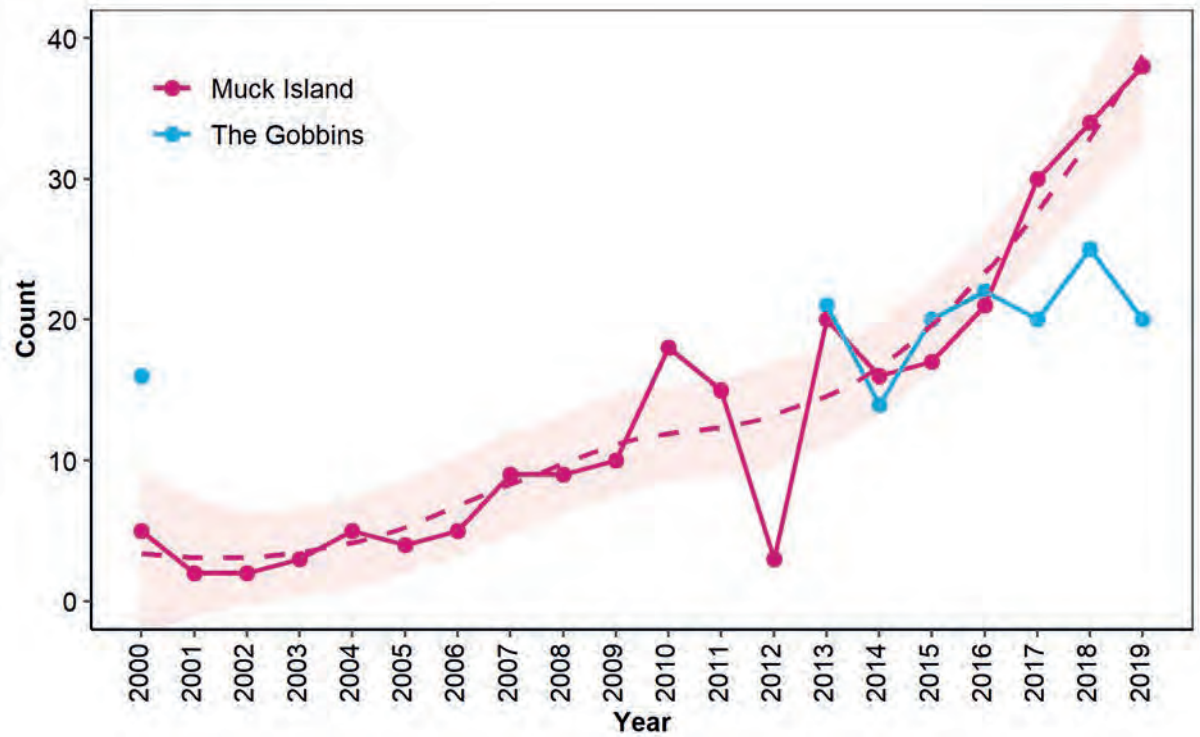
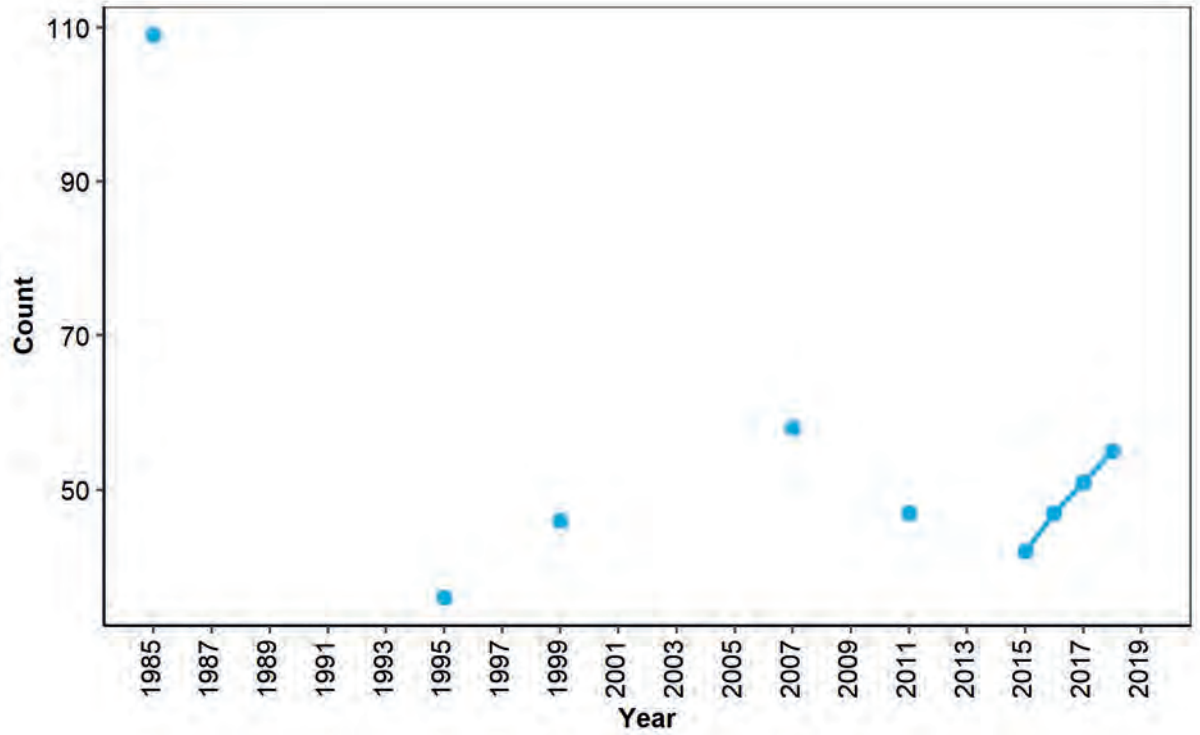


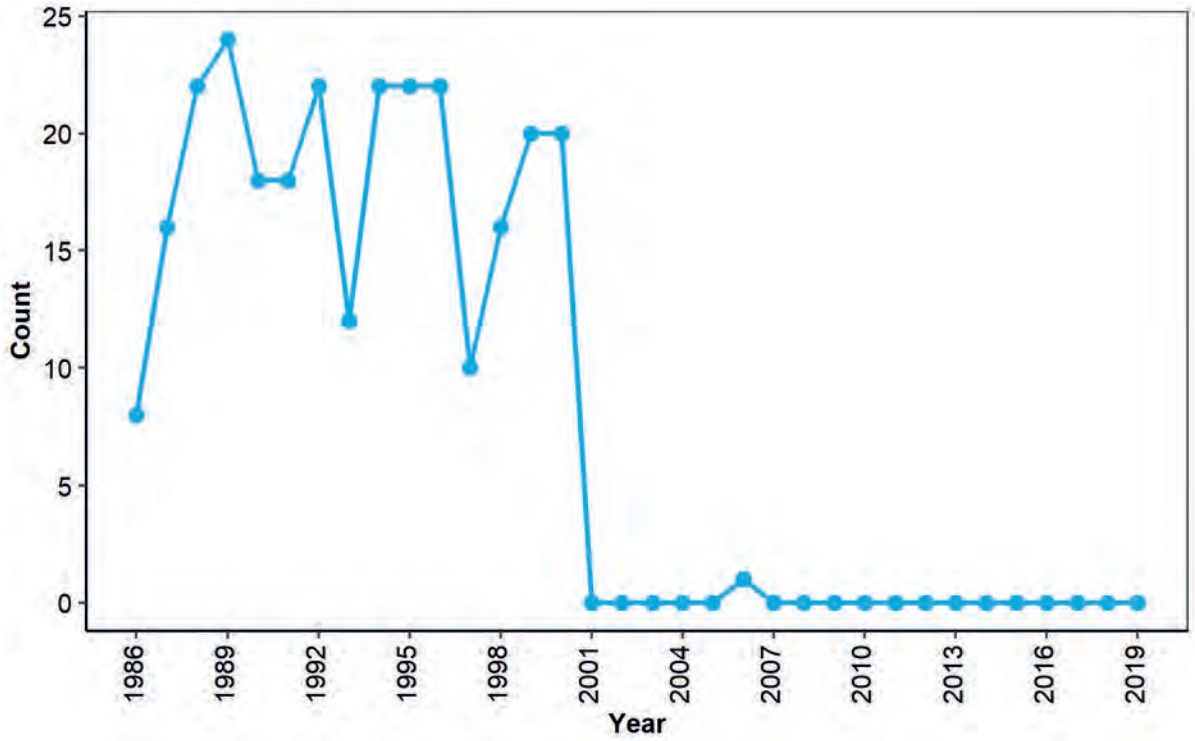
Figure 8: European Shag counts (AON) at Rathlin Island, 1985–2018. No data were available for 2019.



Breeding success in 2019

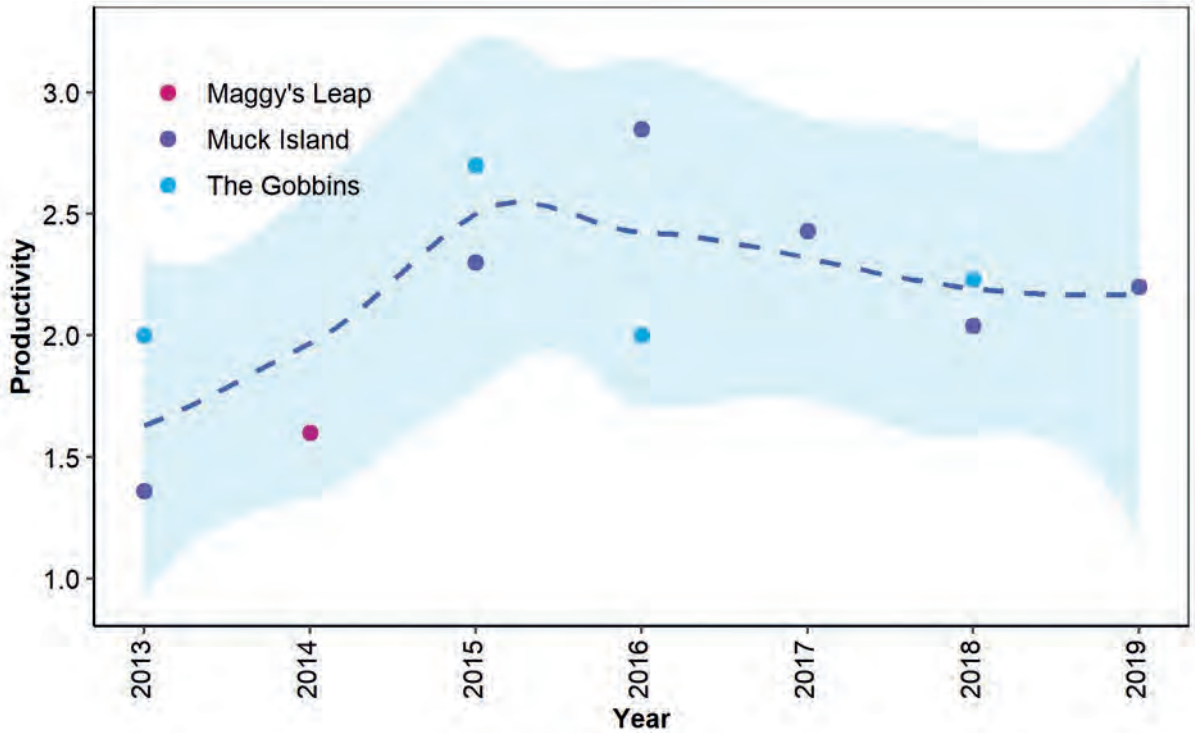
In 2019, the Muck Island colony produced 44 chicks from 20 nests, a slightly higher figure than in the previous two years (Figure 10). Productivity data were not recorded at The Gobbins in 2019. Figure 10 shows the yearly productivity data for Shag at Muck Island, The Gobbins and one recording from Maggy's Leap, and shows that there is considerable variation between year and between sites. Although the trend in productivity appears to be increasing, because very few sites are monitored for Shag productivity and records are not available for all years, the trend line has a large 95% confidence interval (blue shading) and is a rough guide only.

Figure 9: European Shag numbers (AON) at Strangford Lough, 1986–2019. Although surveys have taken place in all years, no Shags have been counted since 2006.



Productivity at these sites is above the current UK average of approximately 1.5 chicks/AON (JNCC, 2016). Longer term, in the UK from 1986–2015 productivity has varied between 1.00 and 1.60 chicks/AON. Population Viability Analysis calculations by Cook and Robinson (2010) suggests that if all demographic parameters remain the same (survival, clutch size, etc.) the UK population will decline by 9% over the next 25 years.

Figure 10: Productivity (Chicks/AON) for European Shags 2013–2019 at Muck Island (dark blue), The Gobbins (pale blue) and Maggy's Leap (red). The dashed line represents the Locally Weighted Least Squares Regression trend in productivity over time. The shaded region represents the 95% confidence interval around the trend.



Great Skua

Stercorarius skua

Conservation status: Amber listed in the BOCCI (2014–2019), Amber listed in the BOCC4 (2015), EC Birds Directive – migratory species

ALLAN DREWITT / BTO

Overview

Summary: Great Skuas are Herring Gull-sized, heavy-set seabirds. Also colloquially known as 'Bonxies', a name that may derive from the old Norse for 'dumpy' (Robinson, 2005). Great Skuas are known for their aggressive behaviour towards human intruders on their territories (Mitchell *et al.*, 2004).

UK population size, abundance and breeding success trends: During the Seabird 2000 (1998–2002) census, the UK held 60% (9,634 AOT) of the Great Skua world population (Mitchell *et al.*, 2004); consequently, the UK has an international responsibility to monitor and protect Great Skuas. Orkney and Shetland are the core breeding area but the species has now spread through the Western Isles (JNCC, 2016). The UK population is increasing, by 148% between the 1969–1970 and 1985–1988 censuses and by 26% by Seabird 2000 (JNCC, 2019). Therefore the recent breeding attempts on Rathlin are not surprising. Annual sampling of breeding abundance is insufficient to generate reliable population trends for the UK, country level or at individual sites.

Productivity has varied between 1.1 and 0.2 chicks per pair since 1986 (JNCC, 2019).

Northern Ireland population size, abundance and breeding success trends: The first occurrence of Great Skuas breeding in Northern Ireland occurred in 2010. In the Republic of Ireland, the first breeding occurred in the late 1990s in Co. Mayo (Mitchell *et al.*, 2004) and there are now approximately 15 AOTs, although no complete survey has been undertaken (Steve Newton, pers. comm.).

The Northern Irish pair of Great Skua has an average productivity of 0.8 chicks fledged per pair per year (JNCC, 2019).

Abundance in 2019

A single pair once again bred on Rathlin Island (Table 7, Appendix) the eight consecutive year since the first breeding attempt.

Breeding success in 2019

Although the pair did not breed successfully in 2017 or 2018, in 2019 the pair fledged one chick (Liam McFaul, RSPB, pers. comm.).

Black-legged Kittiwake

Rissa tridactyla

Conservation status: Amber listed in the BOCCI (2014–2019), Red listed in the BOCC4 (2015), EC Birds Directive – migratory species.

PHILIP CROFT / BTO

Overview

Summary: The Black-legged Kittiwake (Kittiwake) is the most numerous gull species in the world and, perhaps surprisingly, also the most numerous breeding gull in the UK (Woodward *et al.*, 2020). Of the UK's breeding gulls, it is the most oceanic in its habits and most adapted to nesting on vertical rocky sea-cliffs.

UK population size, abundance and breeding success trends: The Kittiwake is currently suffering a well-publicised and catastrophic decline (Birdlife International, 2018b), largely due to climate change (Frederiksen *et al.*, 2007), but also over-fishing of sandeels, its main prey resource (Frederiksen *et al.*, 2004; Nikolaeva *et al.*, 2006), oil spills (del Hoyo *et al.*, 1996; Nikolaeva *et al.*, 2006) and pollution (Nikolaeva *et al.*, 2006). In the Seabird 2000 (1998–2002) census, the UK population was estimated to be 378,847 AON, a decline of 25% since the previous census. The UK breeding abundance index showed a decline of 60% between 1986 and 2015 (JNCC, 2016). During this period the adult return rate at the Isle of May, although fluctuating annually, has declined overall so the survival of adults may be a key issue for Kittiwake conservation (JNCC, 2016). The latest estimate of Kittiwake population size in the UK is 205,000 (175,000–255,000) (Mitchell *et al.*, 2004; Woodward *et al.*, 2020).

Kittiwake productivity in the UK has increased since a low point in 2007, although productivity is still rarely over 0.60 chicks fledged per AON for many colonies (JNCC, 2016; Miles, 2013).

Northern Ireland population size, abundance and breeding success trends: Relative to the overall UK and Ireland trend since 1986, and its historical status, the Northern Ireland population is still reasonably stable. The largest colony by far in Northern Ireland is on Rathlin Island, the second largest colony at The Gobbins being only approximately 10% the size of the Rathlin Island colony. Other small colonies are dotted around the coast at Muck Island, Maggie's Leap, Castlerock, Carrick-a-rede, Dunluce and The Skerries. Colonies at Gun's Island and Strangford Lough have become extinct in the last fifteen years. The last census estimated that Northern Ireland held 13,060 AON, but numbers may have increased since the last census (JNCC, 2019).

Research suggests that 0.80 chicks per pair are needed to maintain steady breeding populations of Kittiwakes (Coulson, 2017), a productivity value exceeded on average (0.93 chicks per pair, 95% CI 0.81–1.05) by Northern Irish Kittiwake colonies since 2014.

Abundance in 2019

All around the coast of Northern Ireland, Kittiwakes appear to have had a good year in 2019, with increases at all sites with comparable coverage between 2018 and 2019 (Table 7, Appendix). There are good historical datasets for The Gobbins and Muck Island (Figure 11), and Donard Cove (Figure 12). In 2019, The Gobbins held 1,145 AON, the highest count since 2007 and an increase of 68% over 2018 (Table 7, Appendix). Numbers on Muck Island were also up 65% on 2018's count, with 519 AON (Table 7, Appendix). Recorded numbers at the Portrush cliffs increased slightly to 332 AON (Table 7, Appendix). At Strangford Lough, a peak of 466 AON was reached in 1996 before Kittiwake disappeared as a breeding species at the site. At Rathlin Island, Kittiwake numbers grew from 6,822 AON in 1985 to 9,917 AON in 1999, but at time of the latest survey in 2011 had dropped back to 7,922 AON, a decrease of 20% (Allen *et al.*, 2011).

Overall, populations at individual colonies are fluctuating, presumably in response to local feeding conditions. There is no clear pattern with some colonies on both the north coast and Co. Down coast fairing badly (e.g. no Kittiwakes recorded in recent times at Castlerock and Strangford Lough, a drop in numbers at Donard Cove (Figure 12)), but other colonies remaining largely static or growing (e.g. Newcastle to Maggy's Leap, The Gobbins, Muck Island and on the North Antrim Coast; Table 7, Appendix).

Figure 11: Black-legged Kittiwake counts (AON) at Muck Island (red) and The Gobbins (blue), 2000–2019. The dashed line represents the Locally Weighted Least Squares Regression trend in Kittiwake numbers over time at Muck Island (no trend for The Gobbins, due to missing data). The shaded region represents the 95% confidence interval around the trend.

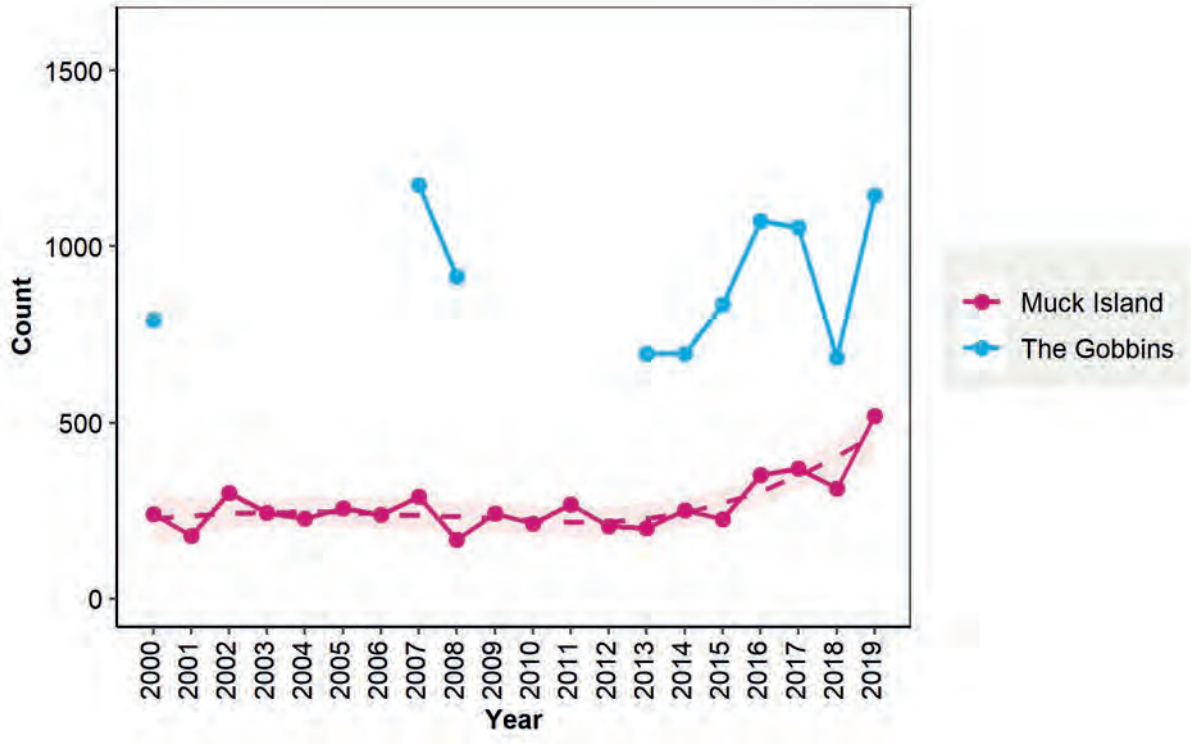
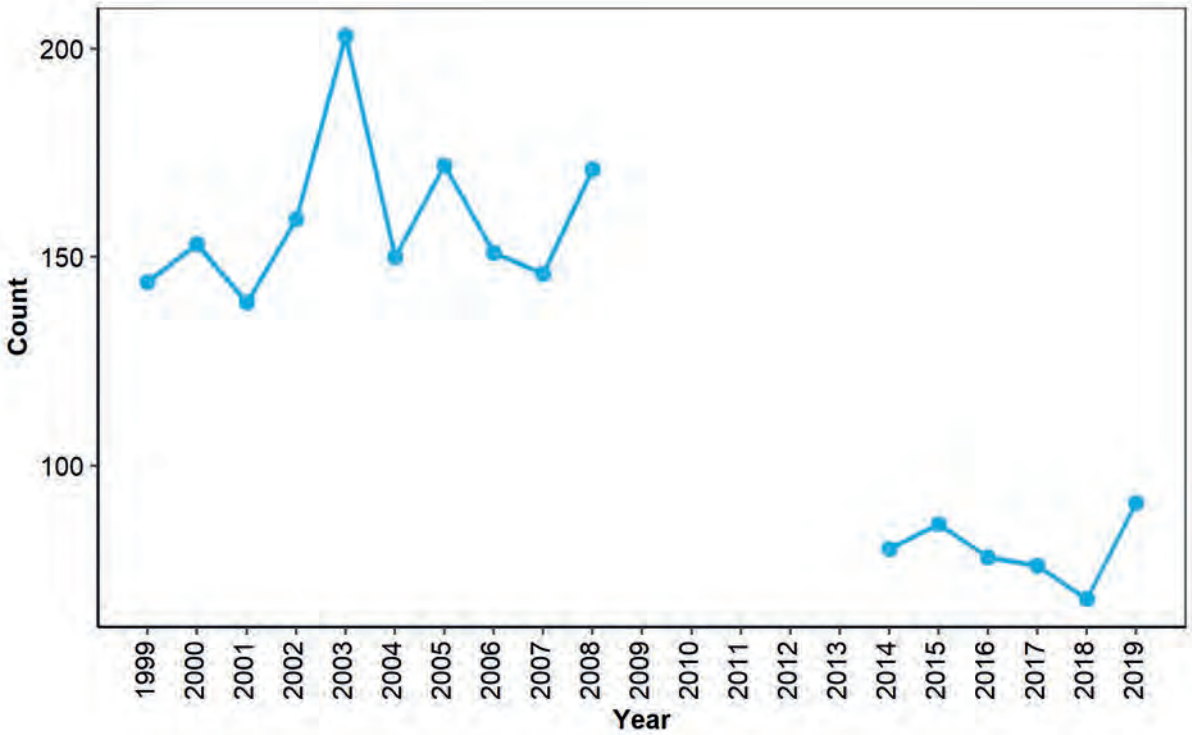


Figure 12: Black-legged Kittiwake counts (AON) at Donard Cove, 1999–2019. No surveys were undertaken between 2009 and 2013.

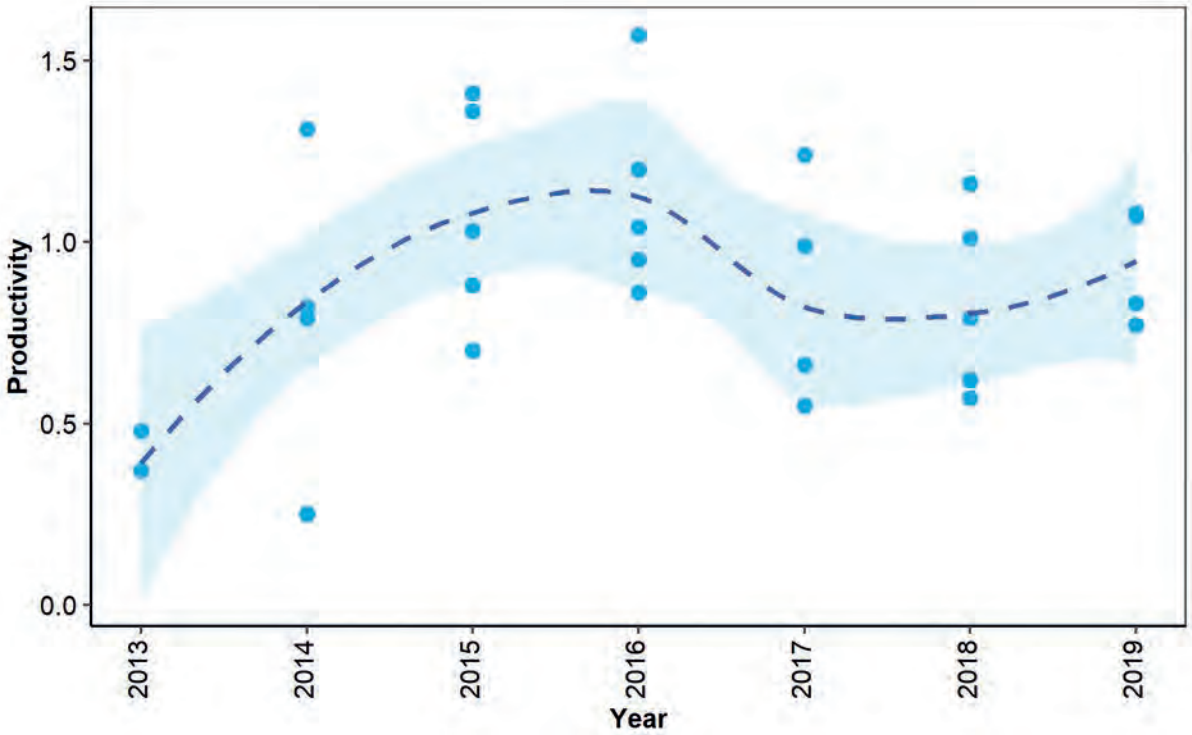


Breeding success in 2019

At all four sites monitored in 2019, productivity was higher in 2019 than in 2018 (Figure 13). Sites on the north coast had, on average, a higher Kittiwake breeding success than other monitored sites, although 128 AON in Portrush produced 137 chicks (1.07 chicks/AON) this year, only slightly over the 1.01 chicks/AON recorded in 2018.

At The Gobbins, a study of 490 AON produced 406 chicks (0.83 chicks/AON), an improvement over 2018 when the productivity was 0.57 chicks/AON, the lowest since 2014. On Muck Island 343 AON produced 263 chicks (0.77 chicks/AON). The productivity plot in Donard Cove, Maggy's Leap had its best year (1.08 chicks/AON) in the six years it has been monitored.

Figure 13: Kittiwake productivity (chicks/AON) 2013–2019 across five sites in Northern Ireland (Donard Cove, Muck Island, Portrush, Rathlin Island and The Gobbins). The dashed line represents the Locally Weighted Least Squares Regression trend in productivity over time. The shaded region represents the 95% confidence interval around the trend.



Black-headed Gull

Chroicocephalus ridibundus

Conservation status: Red listed in the BOCCI (2014–2019), Amber listed in the BOCC4 (2015), EC Birds Directive – migratory species, Northern Ireland Priority species (Northern Ireland Biodiversity Strategy 2002).

EDMUND FELLOWES / BTO

Overview

Summary: Black-headed Gulls are small gulls found throughout the UK, both around the coasts and inland. They are particularly abundant in the winter when the UK breeding population is joined by migrants from continental Europe (Wernham *et al.*, 2002). Black-headed Gulls are not uncommon in winter in gardens, although similarly to other gull species, their urbanisation appears to be a recent phenomenon (Robinson, 2005).

UK population size, abundance and breeding success trends: The Black-headed Gull is a common breeding species in the UK, with 5.6% of the world population recorded during Seabird 2000 (1998–2002), numbering at around 140,000 pairs (Mitchell *et al.*, 2004). It is unclear how the population may compare to previous decades because previous UK and Ireland surveys were incomplete, with many inland colonies remaining uncounted. Therefore, although Seabird 2000 showed an apparent increase, this was due to more comprehensive surveying that may have masked an actual population decline (JNCC, 2016). Data submitted to the SMP show an increase in the UK breeding abundance index during the late 1980s, but a decline thereafter until 2003. The trend has been upward since then, although with a slight decline in 2015. The UK is estimated to host nearly 2,200,000 individuals in the winter (Burton *et al.*, 2013; Woodward *et al.*, 2020).

In the UK productivity fluctuates from 0-1.20 chicks per AON (JNCC, 2016).

Northern Ireland population size, abundance and breeding success trends: In Northern Ireland, the Black-headed Gull is a widespread breeding species, occurring in a relatively few large colonies, with major concentrations at Strangford Lough, Belfast Lough, Larne Lough, Copeland Islands, Lough Neagh and Lower Lough Erne. In the Seabird 2000 (1998–2002) census, 4,037 AON were counted in Northern Ireland, a decline of 12% since the previous census. The winter population of Northern Ireland is estimated to be 44,000 individuals (Burton *et al.*, 2013; Woodward *et al.*, 2020). The collection of productivity data in Northern Ireland has been limited; therefore no meaningful average productivity figure can be produced (JNCC, 2019). There is a pattern of 'boom or bust' frequently seen in local colonies with extreme weather, predation and food shortages likely to be the main reasons for breeding failure (Kerry Leonard, pers. obs.). The potential impact of predators, such as American Mink (*Mustela vison*) (Craik, 1997) or Eurasian Otters (*Lutra lutra*), on inland colonies in Northern Ireland is largely unstudied. Collecting productivity data is a high priority.

Abundance in 2019

The numbers at Larne Lough grew from just 109 AON in 1987 to a high of 3,102 AON in 2016 (Figure 14; Table 7 Appendix). This was the first time in several years that a completely accurate nest counting census was carried out. While the completeness of the 2016 count is likely to have been responsible for some of the increase in recorded numbers, Black-headed Gull populations can fluctuate between years, something which has been previously seen at Larne Lough. In 2019, numbers had fallen from the 2016 high to 2,618 AON (Figure 14). The Strangford Lough population remains at historically low levels, at 1,305 AON in 2019 (Figure 15). Belfast Lough held 560 AON in 2019, continuing their decline from the 2017 high of 717 AON (Table 7, Appendix). At Portmore Lough 143 AON were recorded, similar to numbers in 2018. There are also breeding populations in Co. Fermanagh; Moorlough Lake supported 95 AOTs in 2018 but was not counted in 2019, while Lower Lough Erne had 1,718 AON in 2019, an increase of 41% over 2018 (Table 7, Appendix).

Figure 14: Black-headed Gull counts (AON) at Larne Lough, 1987–2019.

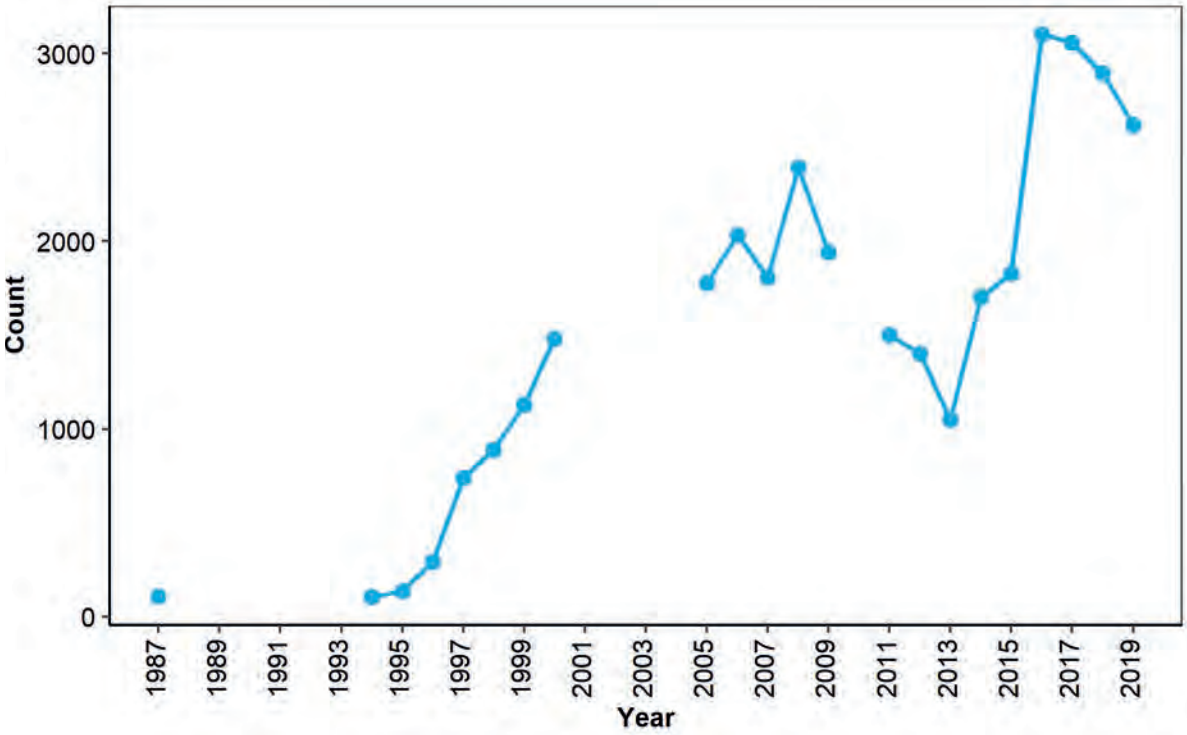
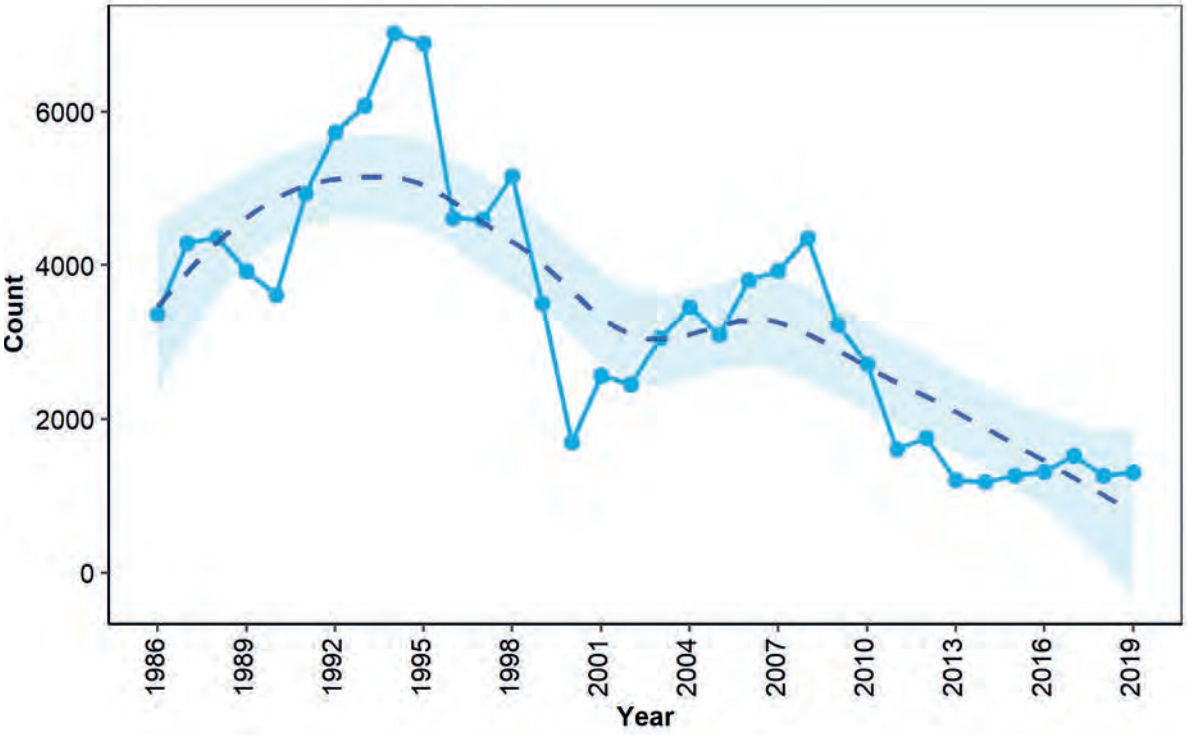


Figure 15: Black-headed Gull counts (AON) at Strangford Lough, 1986–2019. The dashed line represents the Locally Weighted Least Squares Regression trend in Black-headed Gull numbers over time at Strangford Lough. The shaded region represents the 95% confidence interval around the trend.



On Lough Neagh a count of the main breeding islands gave an estimate of 11,595 individuals in 2016, but numbers have fallen in recent years with approximately 8,120 individuals counted in 2017 and 8,906 in 2018 (Table 7, Appendix; Bob Davidson and Stephen Foster, pers. obs.). A survey of Black-headed Gulls was not carried out at Lough Neagh in 2019. Lough Neagh supported 30,000 breeding pairs of Black-headed Gulls on 12 islands in the 1980s; subsequently the gulls have abandoned breeding on Shallow Flat and Coney Island Flat, and have decreased in number on Padian Island, Owen Roe and Scaddy Island (Allen & Mellon, 2018).

Breeding success in 2019

At Portmore Lough, 143 AON produced 155 chicks (1.08 chicks/AON) in 2019, a similar level of productivity to that seen in 2018. Breeding success was approximately1.50 chicks/AON at Blue Circle Island and Swan Island in Larne Lough in 2019. Despite being on the 2013 BoCCI red list, very little productivity data have ever been collected for Black-headed Gulls in Northern Ireland.

EDMUND FELLOWES / BTO

Mediterranean Gull

Larus melanocephalus

Conservation status: Amber listed in the BOCCI (2014-2019), Amber listed in the BOCC4 (2015), EC Birds Directive – Annex 1 and migratory species.

ALLAN DREWITT / BTO

Overview

Summary: Slightly larger and more 'black-headed' than the Black-headed Gull, the Mediterranean Gull is the most recent addition to the breeding seabird fauna of the UK and Ireland. The colonisation of the UK was a result of the expansion in population size and range from the species' core population around the Black Sea and into other European countries in the 1950s and 1960s (JNCC, 2016).

UK population size, abundance and breeding success trends: From just one pair in the 1985–1988 census there were over 100 AON during Seabird 2000 (1998–2002) and there are now approximately 1,200 AON across the UK (Holling *et al.*, 2017; Woodward *et al.*, 2020). Most large colonies are located in south and south-east England, although the distribution is expanding northward with smaller colonies becoming established elsewhere. In the winter, numbers of Mediterranean Gulls increase to 4,000 individuals (British Trust for Ornithology, 2019; Woodward *et al.*, 2020).

Few productivity data are collected for Mediterranean Gulls, but the species is thought to experience high breeding success, which contributes to its increasing population size (JNCC, 2019).

Northern Ireland population size, abundance and breeding success trends: After first breeding in 1995, initially between one and three AON were recorded annually in Northern Ireland, across three different sites. Numbers have gradually increased, however, particularly since Mediterranean Gulls started breeding at Belfast Lough RSPB reserve in 2016.

The collection of productivity data in Northern Ireland has been limited; therefore no meaningful average productivity figure can be produced (JNCC, 2019).

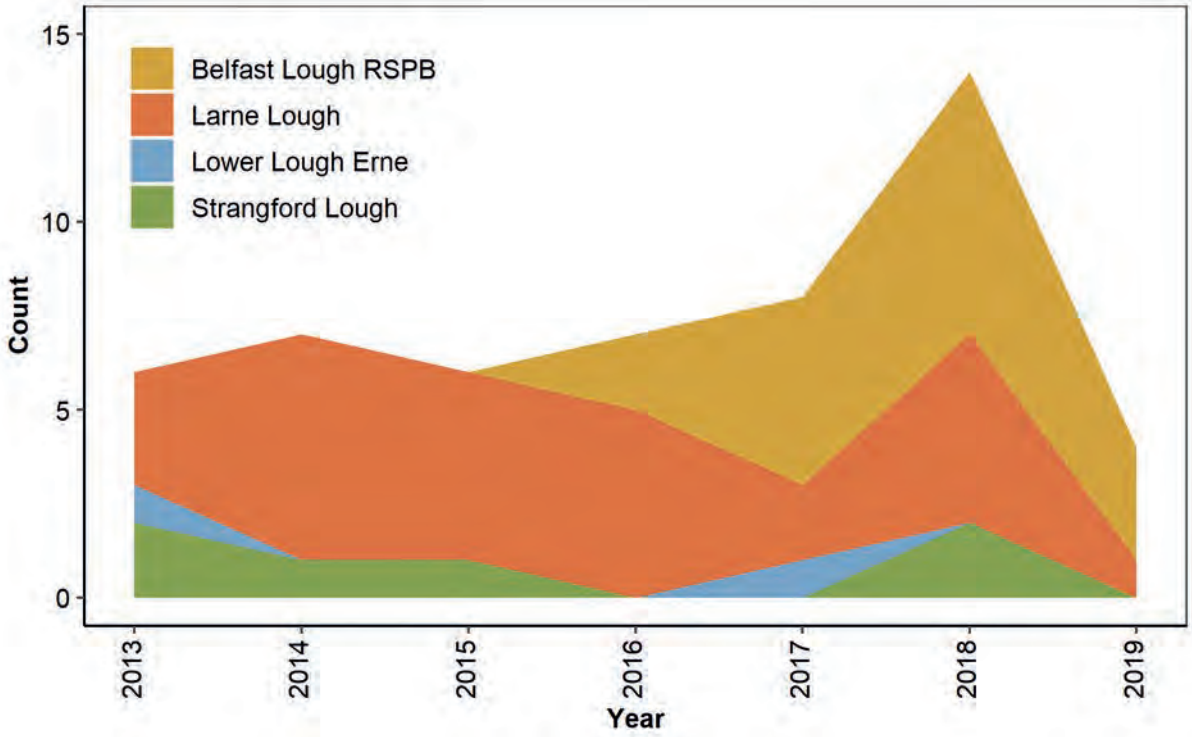
Abundance in 2019

Unlike 2018, when the greatest number of Mediterranean Gulls on record bred in Northern Ireland (14 AON), only four Mediterranean Gull pairs were recorded as nesting in 2019 (Table 7, Appendix). Of these four, three pairs bred at Belfast Lough RSPB and one in Larne Lough (Figure 16). Mediterranean Gulls were absent this year from Strangford Lough and Lower Lough Erne.

Breeding success in 2019

No productivity was measured for Mediterranean Gulls in 2019, due to their reduced numbers around the country and high vegetation levels in the area of the nests in Belfast Lough (Chris Sturgeon, RSPB, pers. comm.). The productivity of Mediterranean Gulls was estimated to be 1.75 chicks/AON at Larne Lough and 2.17 chicks/AON in Belfast Lough in 2018.

Figure 16: Cumulative Mediterranean Gull count (AON) in Northern Ireland, 2013-2019. The area filled represents the number of Mediterranean Gull pairs per year, and the colour represents the number in each site.



Common Gull

Larus canus

Conservation status: Amber listed in the BOCCI (2014-2019), Amber listed in the BOCC4 (2015), EC Birds Directive – migratory species.

ALLAN DREWITT / BTO

Overview

Summary: A dainty gull, resembling a small Herring Gull, the Common Gull nests colonially around coasts and inland sites. In North America the species is often referred to as the Mew Gull. The Common Gull is the classic gull of sports fields, and can often be seen paddling its feet to encourage worms to surface in grassy areas (Robinson, 2005).

UK population size, abundance and breeding success trends: Scotland held 98% of breeding Common Gulls in the UK during Seabird 2000 (1998–2002) (Mitchell *et al.*, 2004), so the rest of the UK is relatively insignificant for this species. Over half (57%) of the breeding Common Gulls in Seabird 2000 bred inland (Mitchell *et al.*, 2004). In the Seabird 2000 census, there were an estimated 48,714 AON in the UK but because inland colonies were not counted in previous censuses, a comprehensive estimate of Common Gull population change is not available. The winter population of Common Gull in the UK is estimated to be 710,000 (680,000–730,000) (Musgrove *et al.*, 2011, 2013; Woodward *et al.*, 2020).

In Scotland 0.10-0.70 chicks per nest has been recorded (JNCC, 2016). American Mink predation has a large impact at some colonies (Craik, 1997).

Northern Ireland population size, abundance and breeding success trends: Historically the Common Gull was a scarce breeding species in Northern Ireland, belying its name. However, coastal-nesting Common Gulls had increased in their population size from 192 to 383 AON between the 1985–1988 and 1998–2002 censuses. Now Common Gulls breed in small numbers around the coast but by far the largest concentrations are on the Copeland Islands and at Strangford Lough. The Northern Ireland trend contrasts with the trend in the overall UK breeding abundance index, which indicates a modest increase between 1986 and 1998, but a subsequent decline (JNCC, 2016). Approximately 10,000 Common Gulls visit Northern Ireland in the winter (Musgrove *et al.*, 2011, 2013; Woodward *et al.*, 2020).

The collection of productivity data in Northern Ireland has been limited; therefore no meaningful average productivity figure can be produced (JNCC, 2019).

Abundance in 2019

The species has spread around the coast since Seabird 2000 (1998-2002) with small numbers appearing at several locations, although unfortunately not formally monitored (Kerry Leonard, pers. obs.). For example, one such new colony was discovered in late July 2013 at Torr Head, Co. Antrim. On the Copeland Islands, although numbers have dropped, birds have spread out from a few large sub-colonies to form new satellite sub-colonies around the shore of all three islands. The Copeland Islands have not been completely surveyed since 2012 when there were 452 AON, down from a peak of 830 AON in 2009. In 2018, 15 AON were recorded on Lighthouse Island, but Big Copeland and Mew Island were not counted.

Numbers of Common Gulls increased steadily in Strangford Lough in the 1990s, but since have been less stable, with a huge increase in the 2000s followed by a decline in the early 2010s (Figure 17). In 2019, numbers of Common Gull were the highest since 2012 (346 AON). The smaller population at Larne Lough population increased to 37 AON in 2018, but fell to only 9 AON in 2019 (Figure 18). There are a few Common Gulls

at Carlingford Lough, and these increased to nine AON in 2019 (Table 7, Appendix). Up to nine AON of Common Gulls have been recorded annually in the Outer Ards since 1986 (Figure 19). It was not possible to count one important colony of Common Gulls at Lower Lough Erne in 2019, so although the count of 337 AON is the highest on record (Table 7, Appendix), this is probably an underestimate (Brad Robson, RSPB, pers. comm.).

Figure 17: Common Gull counts (AON) at Strangford Lough, 1985–2019.

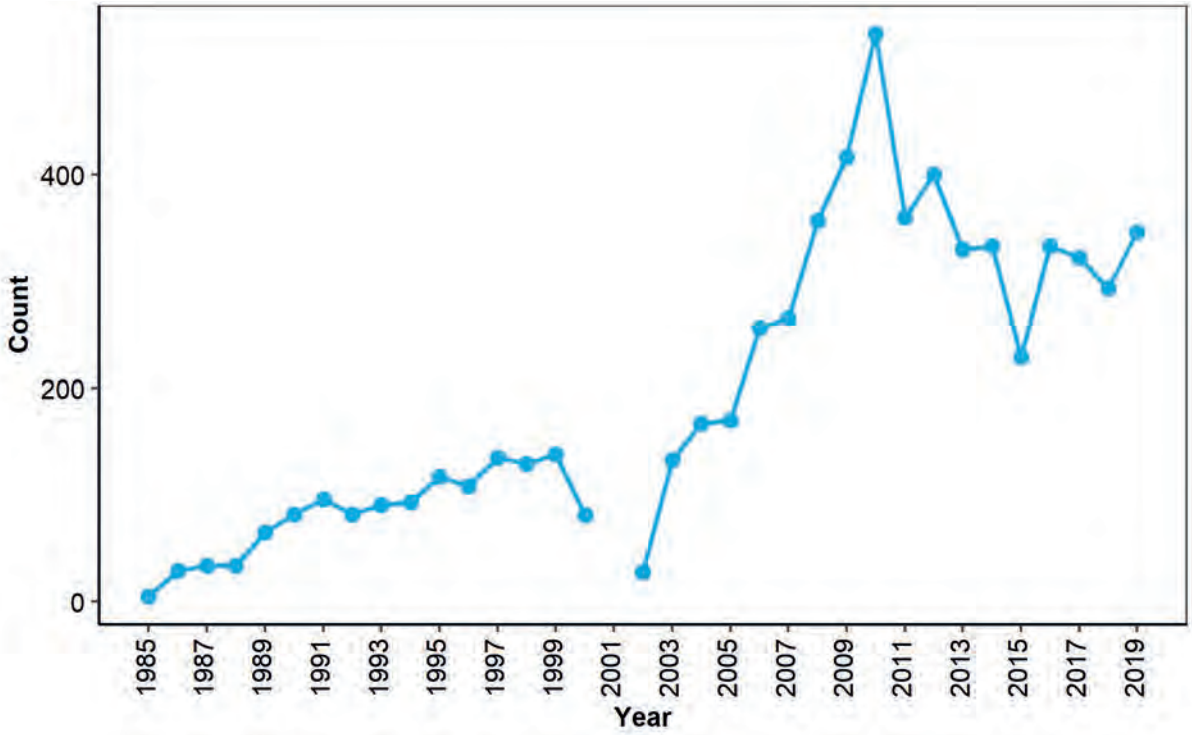


Figure 18: Common Gull counts (AON) at Larne Lough, 1995–2019.

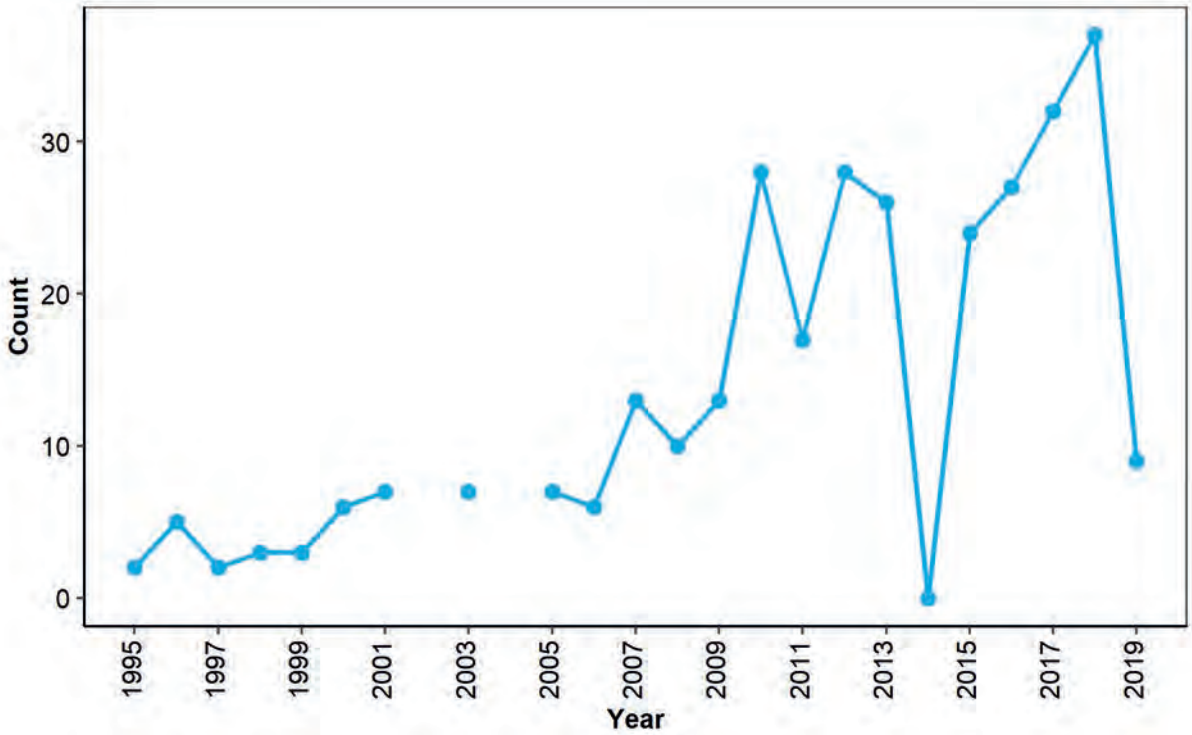
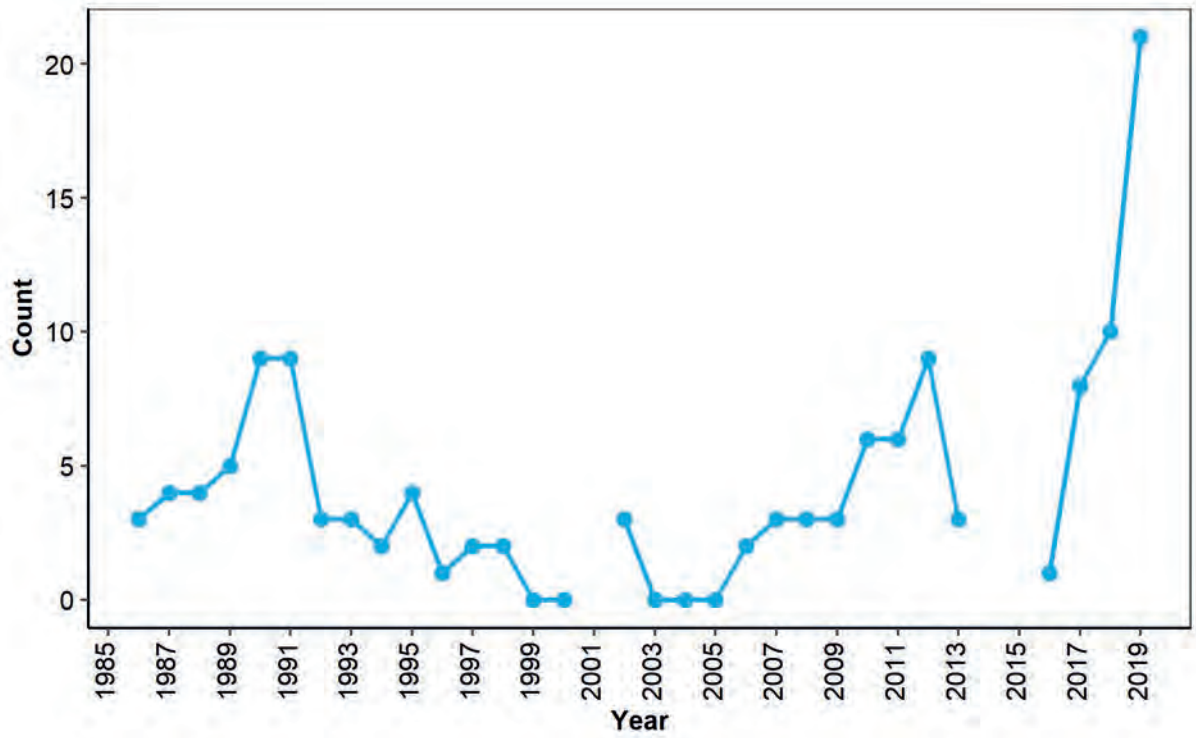


Figure 19: Common Gull counts (AON) in the Outer Ards, 1986–2019.



Breeding success in 2019

Productivity at Green Island, Carlingford Lough was estimated to be 0.87 chicks/AON, but these were the only productivity data collected for Common Gull in Northern Ireland in 2019.

Lesser Black-backed Gull

Larus fuscus

Conservation status: Amber listed in the BOCCI (2014-2019), Amber listed in the BOCC4 (2015), EC Birds Directive –migratory species.

ALLAN DREWITT / BTO

Overview

Summary: Lesser Black-backed Gulls nest colonially and often with other gull species, particularly Herring Gulls (Mitchell et al., 2004). However, unlike Herring Gulls, many Lesser Black-backed Gulls from the UK migrate to the Iberian Peninsula or North Africa during the non-breeding period (Mitchell *et al.*, 2004; Rock, 2002).

UK population size, abundance and breeding success trends: The species breeds across north and west Europe and increased in numbers generally throughout its range during much of the 20th Century. During Seabird 2000 (1998–2002) the UK held 38% of the estimated world population, at 111,960 AON, an increase of 40% over the previous census period (JNCC, 2019). However, with the species' spread to inland urban sites, it is likely that some colonies remained uncounted. Although many of the UK's breeding Lesser Black-backed Gulls migrate during the winter, the winter population is estimated to be 130,000 (120,000–130,000) (Musgrove *et al.*, 2011, 2013; Woodward *et al.*, 2020), boosted by an influx of birds from Iceland and Scandinavia.

In the UK as a whole, productivity measured at natural-nesting (i.e. non-urban) colonies is generally low, below 0.60 chicks/AOT (JNCC, 2016). The factors causing low productivity in Lesser Black-backed Gulls are not fully understood, but include predation at some colonies.

Northern Ireland population size, abundance and breeding success trends: The Lesser Black-backed Gull is a widespread breeding species in Northern Ireland, mainly in a few large colonies at Strangford Lough, Copeland Islands, Lower Lough Erne and Lough Neagh. There are smaller numbers at Rathlin Island, The Skerries and Muck Island. Across Northern Ireland as a whole, numbers of coastal-nesting Lesser Black-backed Gulls doubled between the 1969–1970 and 1985–1988 censuses, and increased further to 131% by 1998–2002, when 1,033 AON were counted. Inland colonies were only censused for the first time in Seabird 2000 (940 AON), so trends are unavailable for these sites (JNCC, 2019). As many as 10,000 Lesser Black-backed Gulls may visit Northern Ireland in the winter (Musgrove *et al.*, 2011, 2013; Woodward *et al.*, 2020).

The collection of productivity data in Northern Ireland has been limited; therefore no meaningful average productivity figure can be produced (JNCC, 2019).

Abundance in 2019

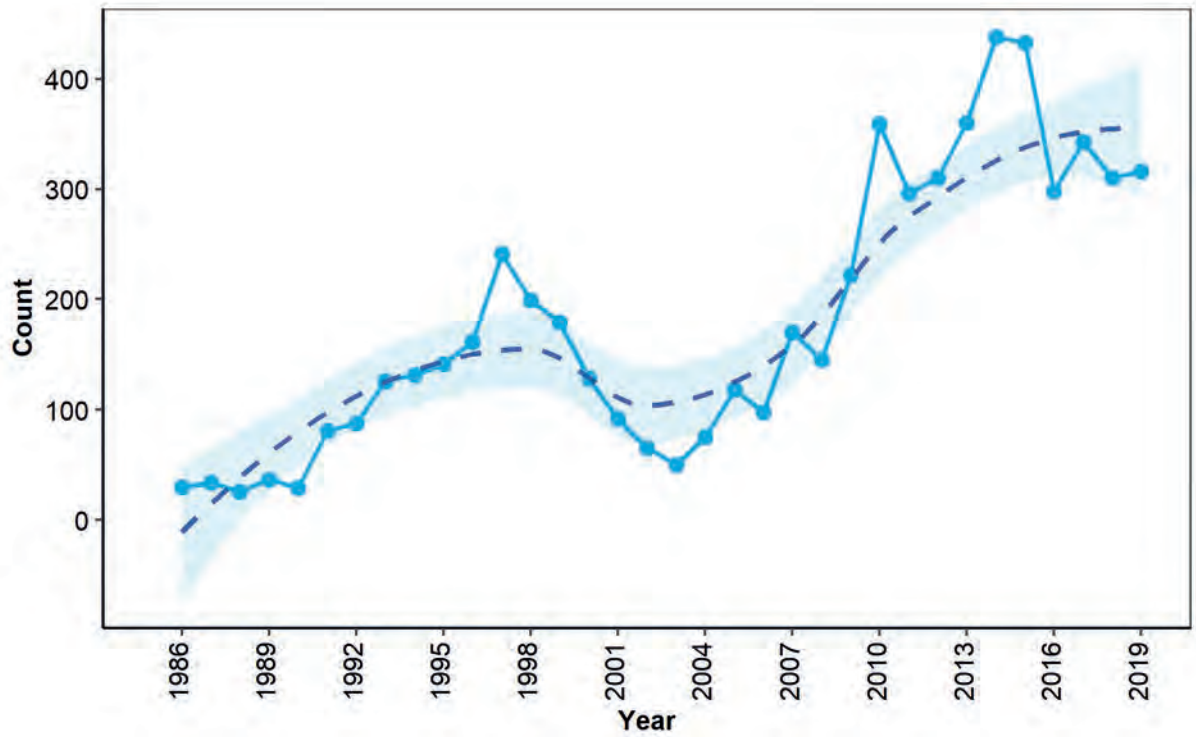
Numbers at Lower Lough Erne remained high in 2019 at 1,584 AON, only a 2% decline on the previous year (Table 7, Appendix). Although not counted in 2019, 2,496 and 2,052 individuals were also recorded at colonies on Lough Neagh in 2017 and 2018, respectively (Table 7, Appendix). The largest increases in numbers have been recorded on Tolan's Flat, Phil Roe's Flat and Padian Island (Allen & Mellon, 2018). Numbers at Strangford Lough were also stable between 2018 and 2019 (Figure 20).

The Copeland Bird Observatory repeated their large-gull survey in 2019. A greater coverage by surveyors of the vegetated upper slopes of the colony led to an increased count of 547 AON over the count of 365 in 2018. It is likely that the 2019 count, which represents greater survey effort, is a more accurate estimate of the Lesser Black-backed Gull AON on Lighthouse Island, but the difference in counts between 2018 and 2019 demonstrates the importance of standardising effort across years to understand true population change.

The 1998–2002 census recorded a total 63 Lesser Black-backed Gull nests on rooftops in Belfast city centre

and Belfast harbour. In 2018 and 2019, NIEA-funded vantage-point surveys provided updated figures based on observations carried out from two of the tallest buildings in the city (unpublished data, Booth Jones *et al.*, 2019). In 2019, at least 221 AON were observed from the vantage points, over double the previous year's count (Table 7, Appendix). It is unlikely that this represents an increase in actual numbers of gulls between the years, but a consequence of longer observation times and clearer conditions. Due to the complexity of the roof-scape and the limited number of vantages, observed Lesser Black-backed Gull AON are likely to be a distinct underestimate of the total number present in central Belfast. Urban nesting appears to be an increasing phenomenon in Northern Ireland, and records of roof-nesters from volunteers would be welcome.

Figure 20: Lesser Black-backed Gull counts (AON) in Strangford Lough, 1986–2019. The dashed line represents the Locally Weighted Least Squares Regression trend in Lesser Black-backed Gull numbers over time. The shaded region represents the 95% confidence interval around the trend.



Breeding success in 2019

No colonies were monitored for breeding success in 2019. A very small sample of three nests followed as part of the NIEA-funded urban gull tracking work in Belfast city centre produced five large chicks, although these could not be followed to fledging age (1.67 chicks/AON).

Herring Gull

Larus argentatus

Conservation status: Red listed in the BOCCI (2014–2019); Red listed in the BOCC4 (2015), EC Birds Directive – migratory species, Northern Ireland Priority species (Northern Ireland Biodiversity Strategy 2002).

EDMUND FELLOWES / BTO

Overview

Summary: The Herring Gull is lightly larger than the Lesser Black-backed Gull. It was historically widespread in Britain and Ireland and is largely resident (Mitchell et al., 2004). It nests in a range of habitats, from rocky coastlines to rooftops, but rarely inland. Although quite common on roofs now, this behaviour was first observed in the 1920s in the south west of England (Robinson, 2005).

UK population size, abundance and breeding success trends: Herring Gulls suffered a catastrophic decline in the late 1980s, largely due to botulism (Mitchell *et al.* 2004). Between the 1969–1970 and 1985–1988 censuses, Herring Gulls declined by 43% and declined a further 13% by 1998–2002, to 130,230 AON (JNCC, 2019). However, with the species' spread to inland urban sites, it is likely that some colonies remained uncounted. If existing UK demographic parameters (survival, clutch size, etc.) remain the same then a 60% decrease in national population is predicted over the next 25 years (Cook & Robinson, 2010). During the winter, visitors from Scandinavia swell the Herring Gull population to around 740,000 (710,000–780,000) (Musgrove et al., 2011, 2013; Woodward et al., 2020).

Analysis of the SMP dataset found that between 1986 and 2015, the mean productivity of Herring Gulls was 0.75 chicks/AON, and declined at a rate of 0.016 chicks per nest per year (Cook & Robinson, 2010; JNCC, 2016).

Northern Ireland population size, abundance and breeding success trends: The population in Northern Ireland declined by 96% between the 1985–1988 and 1998–2002 censuses to just 709 AON (Cramp *et al.*, 1974; JNCC, 2019; Mitchell *et al.*, 2004). Concentrations of Herring Gulls occur at the Copeland Islands and Strangford Lough. Smaller colonies are on Rathlin Island, Burial Island, Muck Island and The Skerries. The population of Rathlin Island declined from 4,037 AOTs in 1985 to just 19 AOTs in 1999 (Mitchell et al., 2004). A similar decline occurred on the Copeland Islands, from approximately 7,000 AOTs in 1985 to 225 AOTs in 2004. The figures for Strangford Lough mirror this trend, with a massive and rapid decline in the mid-1980s, numbers reaching a low point just after the turn of the century. Since 2007, numbers of AOTs at Copeland and Strangford have shown sustained growth. Like the Lesser Black-backed Gull, the Herring Gull is increasingly being recorded as a roof-nesting bird throughout the UK (Mitchell *et al.*, 2004), and it is hoped that Herring Gulls in urban areas will be counted in the future. Any volunteer records would be welcome.

The collection of productivity data in Northern Ireland has been limited; therefore no meaningful average productivity figure can be produced (JNCC, 2019).

Abundance in 2019

The colony on Strangford Lough remained stable, with 1,273 AON recorded in 2019 (Figure 21; Table 7, Appendix). The major colony spanning the three Copeland Islands has not been surveyed since 2012. However, in 2018 and 2019 volunteers from Copeland Bird Observatory conducted a full survey of Lighthouse Island, with 483 AON being counted in both years. The population estimate is a 110% increase on the 2012 count (206 AON).

Small numbers have bred at Lower Lough Erne since records began in 2000, but dropped slightly to three AON in 2019 (Figure 22).

As with Lesser Black-backed Gulls, Herring Gulls are often found roof-nesting in coastal towns and cities. An NIEA-funded vantage-point survey from two of the tallest buildings in Belfast in 2018 and 2019 (unpublished data, Booth Jones *et al.*, 2019) found that the very small population of eight AON recorded in the 1998-2002 census had increased to at least 16 AON in 2018 and 39 in 2019. It is unlikely that there was an increase in actual numbers of gulls between 2018 and 2019, rather that higher numbers were observed in 2019 as a consequence of longer observation times and clearer conditions. Due to the complexity of the roof-scape and the limited number of vantages, observed Herring Gull AON are likely to be a underestimate of the total number present in central Belfast.

Breeding success in 2019

No colonies were monitored for breeding success in 2019. A very small sample of three nests followed as part of a gull tracking study for NIEA raised eight large chicks (2.67 chicks/AON), but these were not followed to fledging.

Figure 21: Herring Gull numbers (AON) at Strangford Lough, 1986–2019. The dashed line represents the Locally Weighted Least Squares Regression trend in Herring Gull numbers over time. The shaded region represents the 95% confidence interval around the trend.

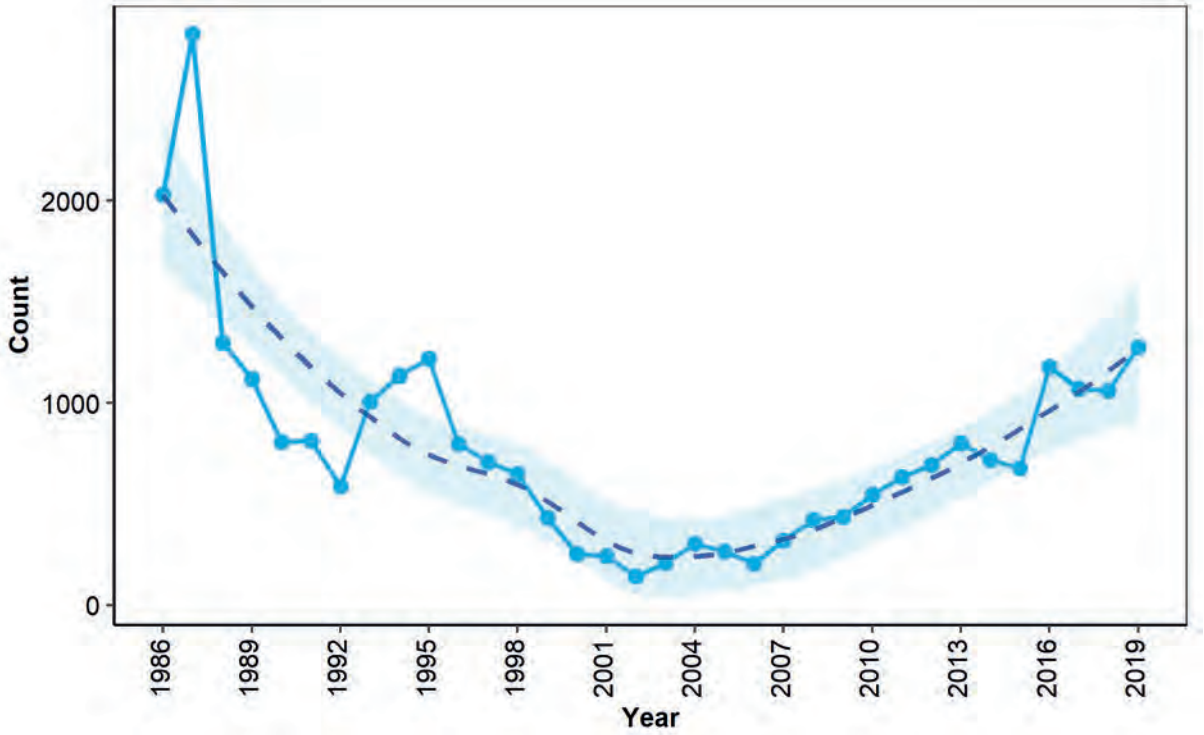
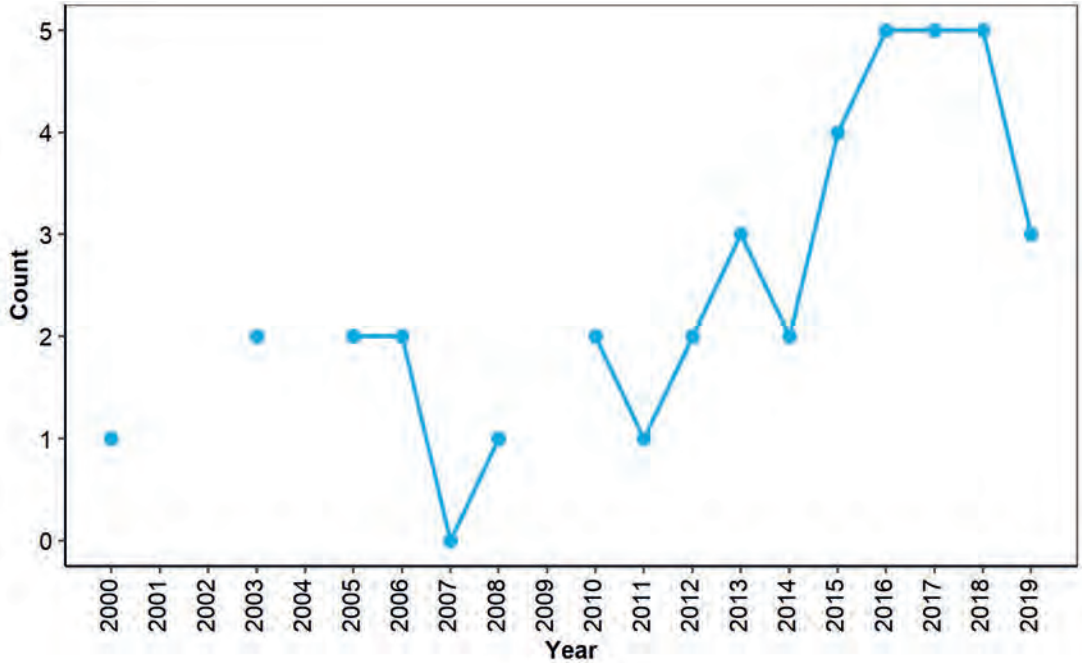


Figure 22: Herring Gull counts (AON) at Lower Lough Erne, 2000-2019.



Great Black-backed Gull

Larus marinus

Conservation status: Amber listed in the BOCCI (2014–2019), Amber listed in the BOCC4 (2015), EC Birds Directive – migratory species.

EDMUND FELLOWES / BTO

Overview

Summary: The Great Black-backed Gull is the largest of the gulls, with an average wing length of 473.9 ± 20.3 mm and average weight of 1.56 ± 0.21 kg (Robinson, 2005). They have an extensive breeding range across the north Atlantic. Great Black-backed Gulls are mostly found in open shore habitats during the breeding season (Robinson, 2005).

UK population size, abundance and breeding success trends: Historically, Britain and Ireland have hosted most of the world population of Great Black-backed Gulls after Iceland and Norway. Great Black-backed Gulls in Britain and Ireland breed mainly in the Outer and Inner Hebrides and the Northern Isles of Scotland. The 20th century saw widespread expansion of the breeding range and numbers on both sides of the Atlantic, remarkable given that a period of decline rendered the species virtually extinct as a breeder in the UK towards the end of the previous century (Mitchell *et al.*, 2004). The UK population has changed little across the census periods and at Seabird 2000 (1998–2002) it was estimated to be 16,735 AON (JNCC, 2019), while recent estimates are similar to this at 15,000 (7,200–19,000) pairs (Mitchell *et al.*, 2004; Woodward *et al.*, 2020). During the winter, numbers of Great Black-backed Gulls increase to 77,000 (72,000–82,000) (Musgrove *et al.*, 2011, 2013; Woodward *et al.*, 2020).

There is no clear trend in the productivity of Great Black-backed Gulls, which has varied between 1.70 and 0.70 chicks per pair since 1986, but monitoring across the UK has shown that productivity has generally increased since the early 2000s (JNCC, 2016, 2019).

Northern Ireland population size, abundance and breeding success trends: The population of Great Black-backed Gull in Northern Ireland declined by 74% from 240 AON to 71 AON between the 1969–1970 and 1998–2002 censuses (JNCC, 2019). The most important site in Northern Ireland is on Great Minnis's Island, Strangford Lough. The second most important colony is probably now at Burial Island, Outer Ards peninsula. Although this colony has not been completely surveyed since 1998 (when no birds were present), a population has again established itself on the island (Kerry Leonard, pers. obs.). Approximately 1,000 Great Black-backed Gulls visit Northern Ireland during the winter (Musgrove *et al.*, 2011, 2013; Woodward *et al.*, 2020).

The collection of productivity data in Northern Ireland has been limited; therefore no meaningful average productivity figure can be produced (JNCC, 2019).

Abundance in 2019

There were 107 AON in Strangford Lough (Figure 23) in 2019, the majority of these (87 AON) found at Great Minnis's Island. Burial Island in the Outer Ards held 42 AON in 2019. Outside Strangford Lough and Outer Ards the only Great Black-backed Gulls to be recorded were one pair in Donard Cove and three in Lower Lough Erne (Table 7, Appendix). Numbers of Great Black-backed Gull AON have not been counted on the Copeland Islands since 2012.

Figure 23: Great Black-backed Gull counts (AON) at Strangford Lough, 1986–2019. The dashed line represents the Locally Weighted Least Squares Regression trend in Great Black-backed Gull numbers over time. The shaded region represents the 95% confidence interval around the trend.

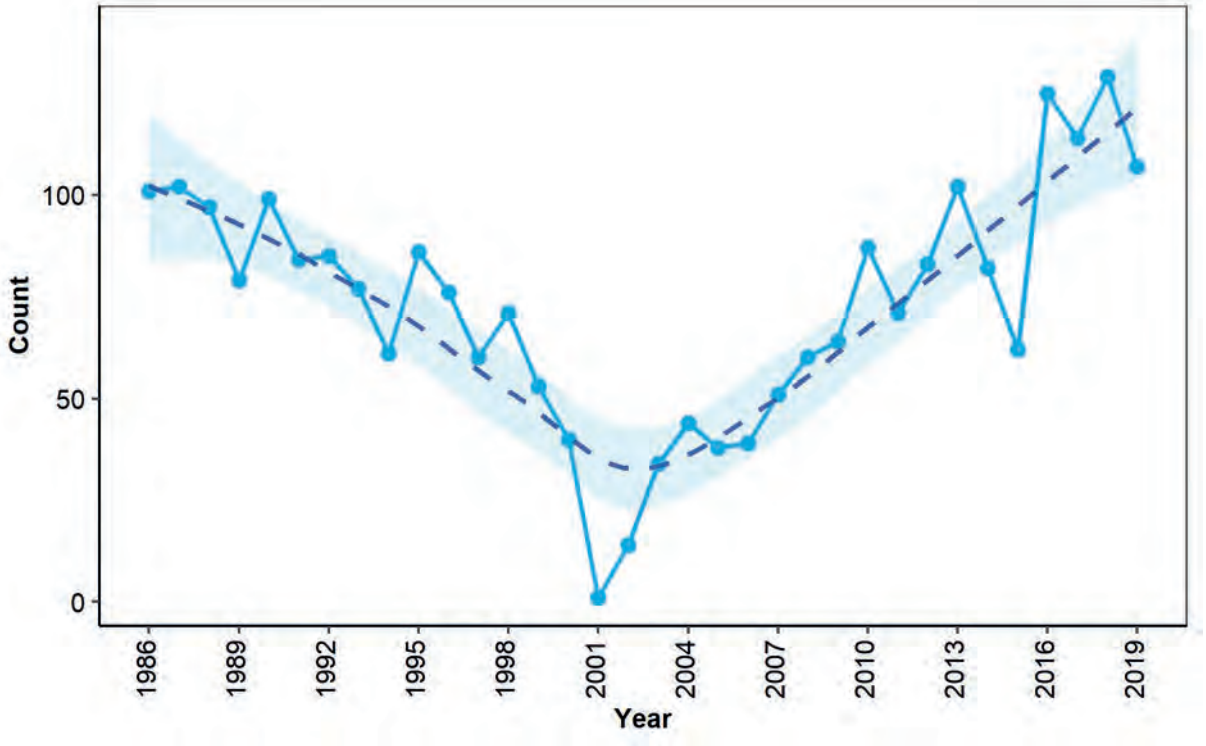
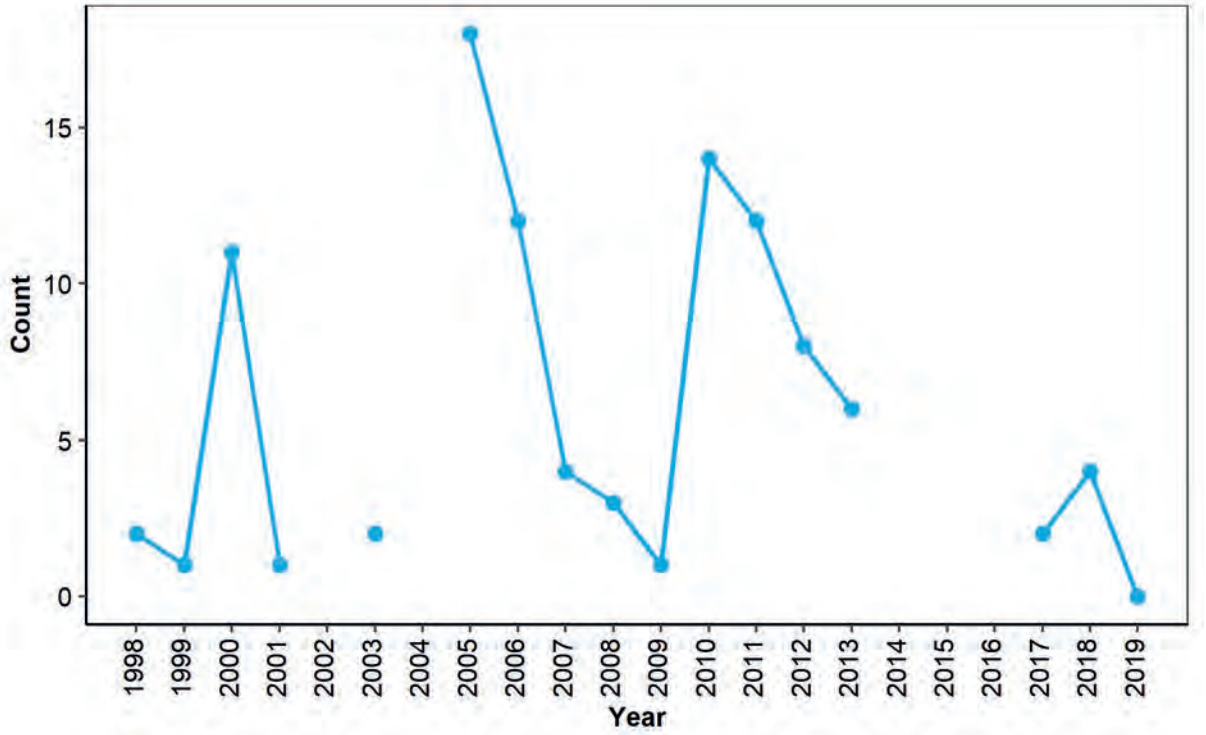


Figure 24: Great Black-backed Gull numbers (AON) at Carlingford Lough, 1985–2019.



Breeding success in 2019

No nests of Great Black-backed Gull are monitored in Northern Ireland currently.

Little Tern

Sternula albifrons

Conservation status: Amber listed in the BOCCI (2014–2019), Amber listed in the BOCC4 (2015), EC Birds Directive – listed in Annex 1 and as a migratory species, Northern Ireland Priority species (Northern Ireland Biodiversity Strategy 2002).

PHILIP CROFT / BTO

Overview

Little Terns are the smallest species of tern breeding in the UK, nesting exclusively on the coast usually on beaches where their eggs are so well camouflaged they are almost invisible (Robinson, 2005).

UK population size, abundance and breeding success trends: Numbers of Little Tern in the UK declined (-23%) between the 1985–1988 census and the most recent census (1998–2002). Although the population of 1,927 AON was higher during Seabird 2000 than during the original census of 1969–1970 (JNCC, 2019), recent estimates suggest the population size has reduced to 1,450 pairs (Holling & the Rare Breeding Birds Panel, 2017; Woodward *et al.*, 2020).

The breeding success of Little Terns has generally been low during the recording period and varies steeply from year to year. The average breeding success was 0.51 chicks per pair between 1986 and 2008 (Cook & Robinson, 2010; JNCC, 2019).

Northern Ireland population size, abundance and breeding success trends: On the island of Ireland the main breeding concentrations are on the south and east coast. In Northern Ireland it has always been a rare breeding species and has not been reported as definitely nesting since 1996.

Abundance in 2019

No breeding attempts were reported in 2019.

Sandwich Tern

Thalasseus sandvicensis

Conservation status: Amber listed in the BOCCI (2014–2019), Amber listed in the BOCC4 (2015), EC Birds Directive – Annex 1 and migratory species.

ALLAN DREWITT / BTO

Overview

The Sandwich Tern is the largest species of tern breeding in Northern Ireland. It is known for its extremely erratic population trends and distribution, caused by mass movements of individuals between colonies. Sandwich Terns almost always nest in shared colonies with Black-headed Gulls, potentially benefitting from the gulls' aggressive nest defence in response to predators.

UK population size, abundance and breeding success trends: The UK holds approximately 9% of the world population of Sandwich Terns (JNCC, 2016). Census data indicate that the UK population increased by 33% between the 1969–1970 and 1985–1988 censuses, but that numbers then declined by 15% by 1998–2002 (JNCC, 2019). At the last census, the UK population was estimated to be 12,490 AON (JNCC, 2019) and most recent estimates are similar at 14,000 (13,000–15,000) pairs (Mitchell *et al.*, 2004; Woodward *et al.*, 2020). The UK breeding abundance index indicates that numbers are now similar to those in 1986 but that numbers can fluctuate greatly from year to year (JNCC, 2016).

UK productivity decreased from a peak of over 0.80 chicks/AON in 2000 to 0.40 chicks/AON in 2015, and averaged 0.66 chicks per nest per year between 1986 and 2008 (Cook & Robinson, 2010; JNCC, 2019).

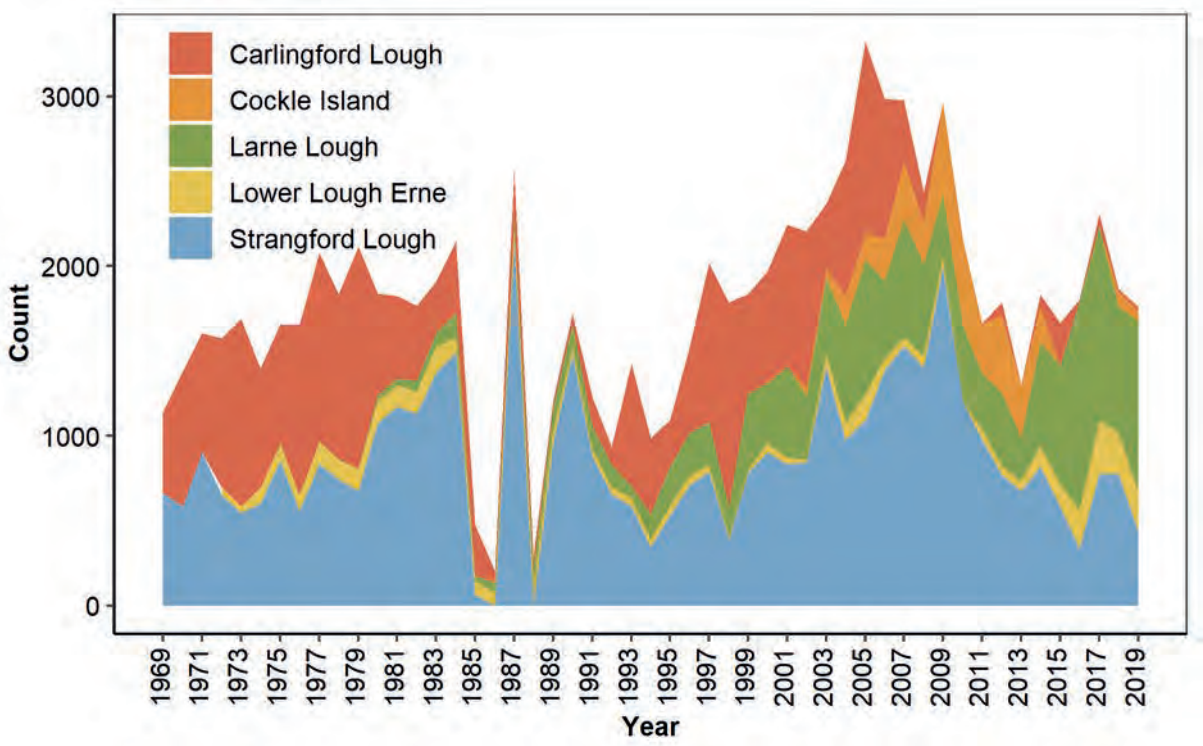
Northern Ireland population size, abundance and breeding success trends: During Seabird 2000 (1998–2002), the population size of Sandwich Tern in Northern Ireland was 1,954 AON, an 11% decline since the previous census. The most recent estimate puts the Northern Ireland population at around 1,500 pairs (Mitchell *et al.*, 2004; Woodward *et al.*, 2020). In Northern Ireland most Sandwich Terns breed in a few large colonies at Strangford Lough, Larne Lough, Lower Lough Erne and Cockle Island, Groomsport. Sandwich Tern has the most complete and consistent monitoring record over the longest period and of any seabird species in Northern Ireland.

The collection of productivity data in Northern Ireland has been limited, but between 1990 and 2015 the mean breeding success was 0.34 chicks per pair per year (JNCC, 2019).

Abundance in 2019

Presenting the total populations for the main coastal colonies together (Figure 25) is advantageous as terns may move colony from year to year and it allows an overall appraisal of the Northern Ireland population. Numbers of Sandwich Terns dropped in 2019 in Strangford Lough, on Cockle Island and in Lower Lough Erne, but increased very slightly in Carlingford Lough and by nearly 300 pairs in Larne Lough (Figure 26; Table 7, Appendix). The count of Sandwich Terns at Strangford Lough is the longest running popultion count of seabirds in Northern Ireland, and celebrated its 50th year in 2018 (Hugh Thurgate, pers. comm.). The total for the five colonies counted was 1,759 in 2019, a 5% decline on 2018.

Figure 25: Cumulative Sandwich Tern counts (AON) at Carlingford Lough, Cockle Island, Larne Lough, Lower Lough Erne and Strangford Lough, 1969–2019. The area filled represents the number of Black-headed Gull pairs per year, and the colour represents the number in each site.



Breeding success in 2019

Breeding success has been monitored intermittently at Lower Lough Erne since 1990. The success rate has rarely been greater than 0.50 chicks per nest and usually much lower (Brad Robson, RSPB, pers. comm.). It is not possible to assess detailed productivity information for Sandwich Tern in Lower Lough Erne in 2019, but it was observed that torrential rain and flooding had a negative impact on the colony in June (Brad Robson, RSPB, pers. comm.). Despite improving breeding success at Carlingford Lough from 2011–2015 due to an intensified programme of monitoring and conservation, productivity has been low in recent years, caused by the suspected predation of eggs and young by Otter (Matthew Tickner, RSPB, pers. comm). However in 2019 24 nests produced 20 chicks, which is the highest breeding success recorded at the site (Table 5). A large number of nests (988 AON) on Blue Circle Island in Larne Lough produced at least 400 chicks (0.4 chicks/AON), but this is probably an underestimate, as many chicks were hiding in the vegetation on the island (Matthew Tickner, RSPB, pers. comm.). On the neighbouring Swan Island (Larne Lough), 22 nests failed to produce any chicks again this year. A National Trust study of breeding terns in Strangford Lough found that productivity was on average 0.64 chicks/AON across all islands monitored, but similarly to 2018 the most successful breeding location was Swan Island in Strangford harbour (0.8 chicks/AON, Wolsey, 2019).

Table 5: Productivity (chicks/AON) of breeding Sandwich Terns at Carlingford Lough since 2014.

Year	Productivity
2014	0.66
2015	0.56
2016	0.00
2017	0.00
2018	0.15
2019	0.83

Common Tern

Sterna hirundo

Conservation status: Amber listed in the BOCCI (2014–2019), Amber listed in the BOCC4 (2015), EC Birds Directive – listed in Annex 1 and as a migratory species.

MOSS TAYLOR / BTO

Overview

Despite their name, Common Terns are not the most abundant UK tern species but are probably the most familiar because their breeding range extends around much of the coastline, and inland to lakes and loughs across most of the UK (Mitchell *et al.*, 2004; Robinson, 2005).

UK population size, abundance and breeding success trends: Although the UK population rose slightly between the 1969–1970 and 1985–1988 censuses, numbers fell to 11,838 AON by Seabird 2000 (1998–2002), a similar number as recorded in the first census (JNCC, 2019) and more up-to-date estimates (Mitchell *et al.*, 2004; Woodward *et al.*, 2020). Recent updates to the UK breeding abundance index suggest that following Seabird 2000 there was a decline, followed by an upward trend from 2015.

Productivity fluctuates between years as it is heavily influenced by weather conditions, predations and foraging success. Between 1986 and 2015, UK breeding success varied between approximately 0.35 and 0.75 chicks per pair per year (JNCC, 2019).

Northern Ireland population size, abundance and breeding success trends: Common Terns are the most widespread breeding tern species in Northern Ireland with coastal and inland populations. Significant numbers breed at several sites on Lough Neagh but these are poorly monitored. The main coastal sites are Strangford Lough, Larne Lough, Belfast Lough and Carlingford Lough. The Northern Ireland population of Common Terns increased by 55% from 1,096 to 1,704 AON between the 1985-1988 and 1998-2002 censuses, (JNCC, 2019).

Productivity data for Common Terns in Northern Ireland show they had an average fledging rate of 0.57 chicks per nest between 1999 and 2015 (JNCC, 2019).

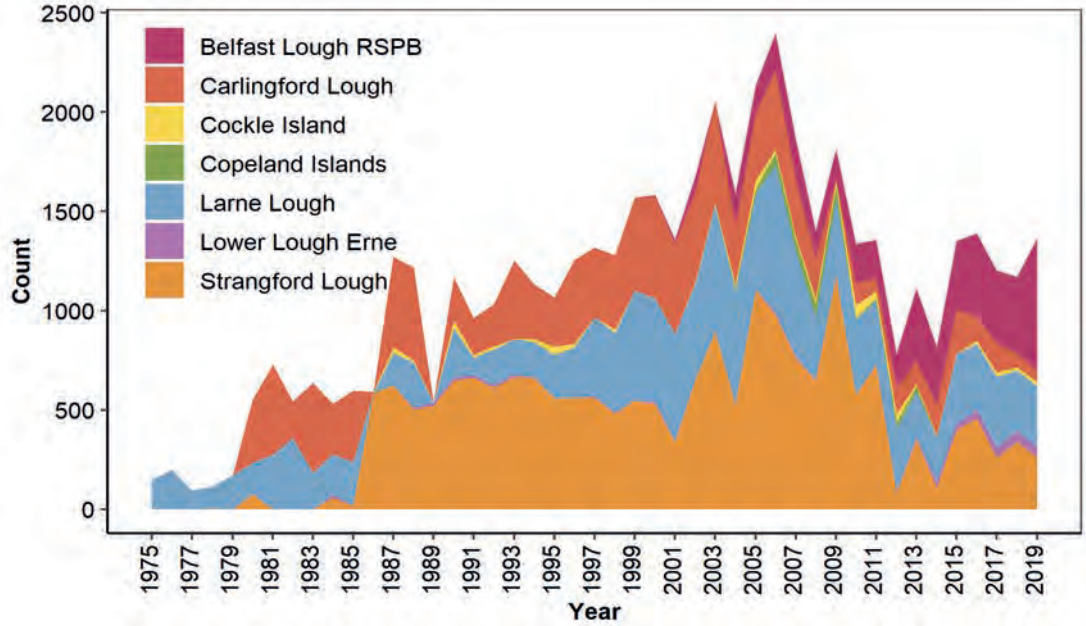
Abundance in 2019

Historical data for the main Northern Ireland colonies are incomplete. The cumulative total for the main eastern colonies is shown in Figure 26. In the late 1980s, there was a sudden increase to over 1,000 AON and, by the early 21st Century, there were over 2,000 AON. Since this peak the population has again declined and numbers are now similar to the late 1980s.

The cumulative population for the six main east coast colonies in 2019 was the highest since 2016, at 1,314 AON. Numbers of Common Terns breeding at Larne Lough, Cockle Island (Outer Ards), Strangford Lough and Carlingford Lough were largely similar to 2018, and the increase observed is largely due to a 75% increase at Belfast Lough RSPB (Table 7, Appendix).

Numbers were stable inland; 54 AON were recorded at Lower Lough Erne and 128 at Portmore Lough in 2019 (Table 7, Appendix). No counts were made of other locations in Lough Neagh in 2019, but the majority of individuals were found on the Torpedo Platform and Croaghan Island in 2018. An estimated 17 AON were observed on the tern raft in the Lagan in 2019, although the visibility of nests was poor (Katherine Booth Jones, pers. obs.).

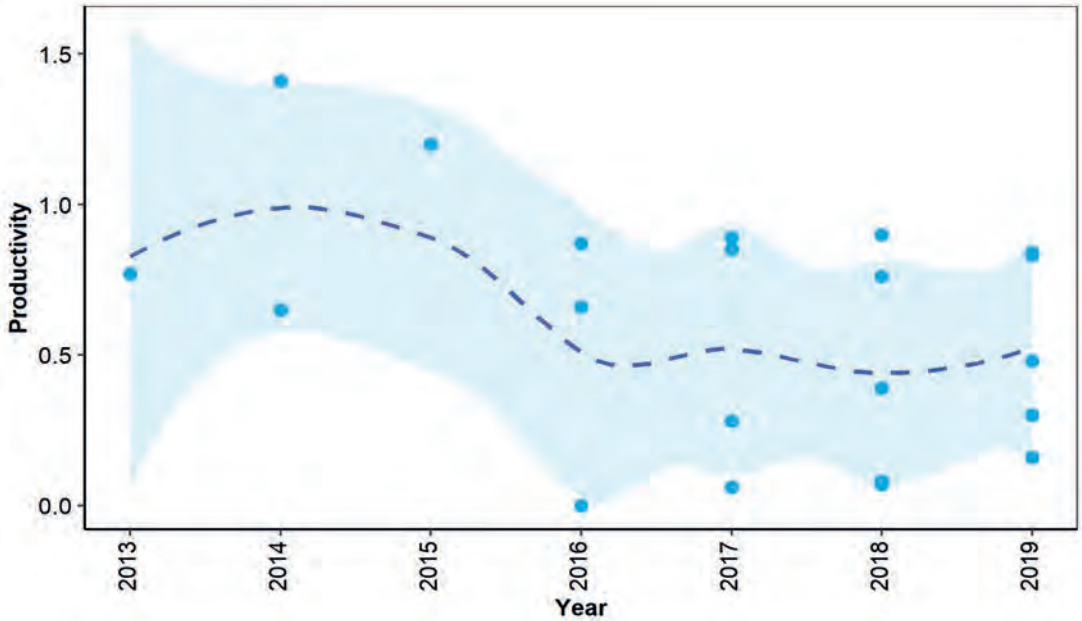
Figure 26: Cumulative Common Tern numbers (AON) at Belfast Lough RSPB, Carlingford Lough, Cockle Island, Copeland Islands (not counted since 2013), Larne Lough, Lower Lough Erne and Strangford Lough, 1975–2019. The area filled represents the number of Black-headed Gull pairs per year, and the colour represents the number in each site.



Breeding success in 2019

Figure 27 shows the breeding productivity of Common Terns in Northern Ireland across different sites from 2013 to 2019. In 2019, the average across all monitored sites was 0.65 chicks/AON. Portmore Lough has recorded Common Tern productivity for the longest period, and in 2019 productivity remained fairly consistent with recent years, at 0.83 chicks/AON fledged. Productivity improved at Green Island, Carlingford Lough, with 27 chicks estimated to have fledged from 56 AON (0.48 chicks/AON). Blue Circle and Swan Islands, Larne Lough, both suffered from low productivity (0.18 and 0.15 chicks/AON, respectively). Productivity of the Strangford Lough population was very low in 2018 (0.08 chicks/AON), due to both the effects of Storm Hector and significant predation by large gulls (Herring and Great Black-backed) and Otter. However, in 2019, productivity had increased to 0.86 chicks/AON, a sustainable figure (Wolsey, 2019). Productivity of 0.30 chicks/AON was estimated at Belfast Lough RSPB, although high vegetation levels may have hidden chicks from view (Chris Sturgeon RSPB, pers. comm).

Figure 27: Common Tern productivity (chicks/AON) 2013–2019 across five sites in Northern Ireland (Belfast Harbour RSPB, Carlingford Lough, Lagan Tern Raft, Larne Lough, Portmore Lough RSPB and Strangford Lough). The dashed line represents the Locally Weighted Least Squares Regression trend in productivity over time. The shaded region represents the 95% confidence interval around the trend.



Roseate Tern

Sterna dougallii

Conservation status: Amber listed in the BOCCI (2014–2019), Red listed in the BOCC4 (2015), EC Birds Directive – listed in Annex 1 and as a migratory species, Northern Ireland Priority species (Northern Ireland Biodiversity Strategy 2002).

TOM CADWALLENDER / BTO

Overview

Roseate Terns are whiter than the Common Tern and sometimes have a pinkish tinge, likely obtained from the carotenoid Astraxanthin found in their diet (Hays *et al.*, 2006). Roseate Terns were nearly hunted to extinction for the millenary trade in the 19th Century, and although they did recover in numbers during the 20th Century, they are now the most range-restricted tern species in the UK (JNCC, 2019).

UK population size, abundance and breeding success trends: In Scotland, the main colony at the Firth of Forth appears to have been extirpated, partly due to a growth in the local Herring Gull population (JNCC, 2016). The only colony in England, on Coquet Island, has increased slowly this century but has currently levelled out at approximately 100 AON annually (Holling & the Rare Breeding Birds Panel, 2017; JNCC, 2019; Woodward *et al.*, 2020). It may have benefitted from emigration from other sites. Declines in Roseate Terns in Wales may have been due to emigration to more suitable breeding sites in the Republic of Ireland (JNCC, 2019). In the Seabird 2000 (1998–2002) census only 56 AON were recorded, a decline of 83% from the previous census. However, the population is now showing some early signs of recovery and in 2015 there were 113 AON (JNCC, 2019). The stronghold for the species within Britain and Ireland is now in south east Ireland at Rockabill Island and Lady's Island Lake.

The breeding success of Roseate Terns in UK colonies has been moderate to high, probably due to increased conservation efforts. Since 2000, productivity has varied between approximately 0.55 and 1.00 chicks per pair per year (JNCC, 2019).

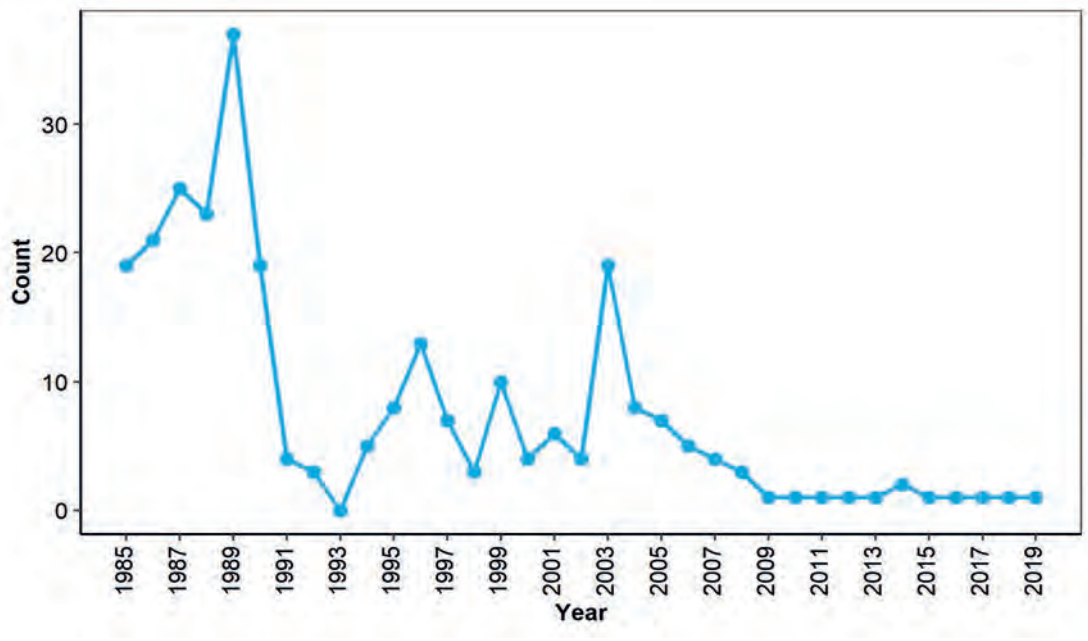
Northern Ireland population size, abundance and breeding success trends: Historically Mew Island in the Copeland Group was one of the major sites for Roseate Tern in Ireland (Thompson, 1851). However, the species ceased to breed in Northern Ireland around 1880 before apparently re-colonising in the first quarter of the 20th century (Deane, 1954) and good numbers were again breeding on Mew by 1941 (Williamson et al., 1941) before rapidly decreasing to extinction on the island in the 1950s. Carlingford Lough formerly held a population of up to 40 AON in 1987. Numbers of Roseate Terns were also highest in the late 1980s in Larne Lough, but have clung on as a breeding species there since, albeit in very small numbers. Between the 1985-1988 and the 1998-2002 censuses, the number of Roseate Terns in Northern Ireland declined by 94% to four AON.

Although only a single pair of Roseate Terns currently nests in Northern Ireland, over time there has been no significant variation in productivity in Northern Ireland, averaging 0.56 chicks fledged per pair per year between 1991 and 2015 (JNCC, 2019).

Abundance in 2019

In 2019, there was again a single pair at Larne Lough (Figure 28).

Figure 28: Roseate Tern population counts (AON) at Larne Lough, 1985–2019.



Breeding success in 2019

The pair at Larne Lough fledged at least one chick in 2019 (Matthew Tickner, RSPB, pers. comm).

Arctic Tern

Sterna paradisaea

Conservation status: Amber listed in the BOCCI (2014–2019), Amber listed in the BOCC4 (2015), EC Birds Directive – listed in Annex 1 and as a migratory species.

GRAHAM CATLEY / BTO

Overview

Similar in appearance to the Common Tern, but with a longer tail and without any black on the beak, the Arctic Tern is the commonest tern species in the UK. However, due to its more northerly distribution, it is less familiar to many than the Common Tern (JNCC, 2019).

UK population size, abundance and breeding success trends: The UK population has fluctuated greatly since the 1960s. There was an apparent large increase between the 1969–1970 and 1985–1988 censuses, though there is uncertainty as to the true magnitude of this change due to questions of compatibility of methods between censuses. At the last census, the population was estimated to be 53,380 AON, a decrease of 31% since 1985-1988 (JNCC, 2019; Mitchell *et al.*, 2004; Woodward *et al.*, 2020). The UK abundance index indicates an 18% increase from 1986 to 2015 (JNCC, 2019).

Arctic Terns suffer the lowest breeding success of any seabird species in the UK, remaining below 0.30 chicks per pair in most years (JNCC, 2019).

Northern Ireland population size, abundance and breeding success trends: In Northern Ireland the species is concentrated into just a few colonies including the Copeland Islands, Strangford Lough, Belfast Harbour, Bird Island, Green Island and Cockle Island. The population grew in the intervals between the previous censuses, rising by 257% between 1969–1970 and 1985–1988, and again by 78% to 767 AON by Seabird 2000 (1998-2002, JNCC, 2019).

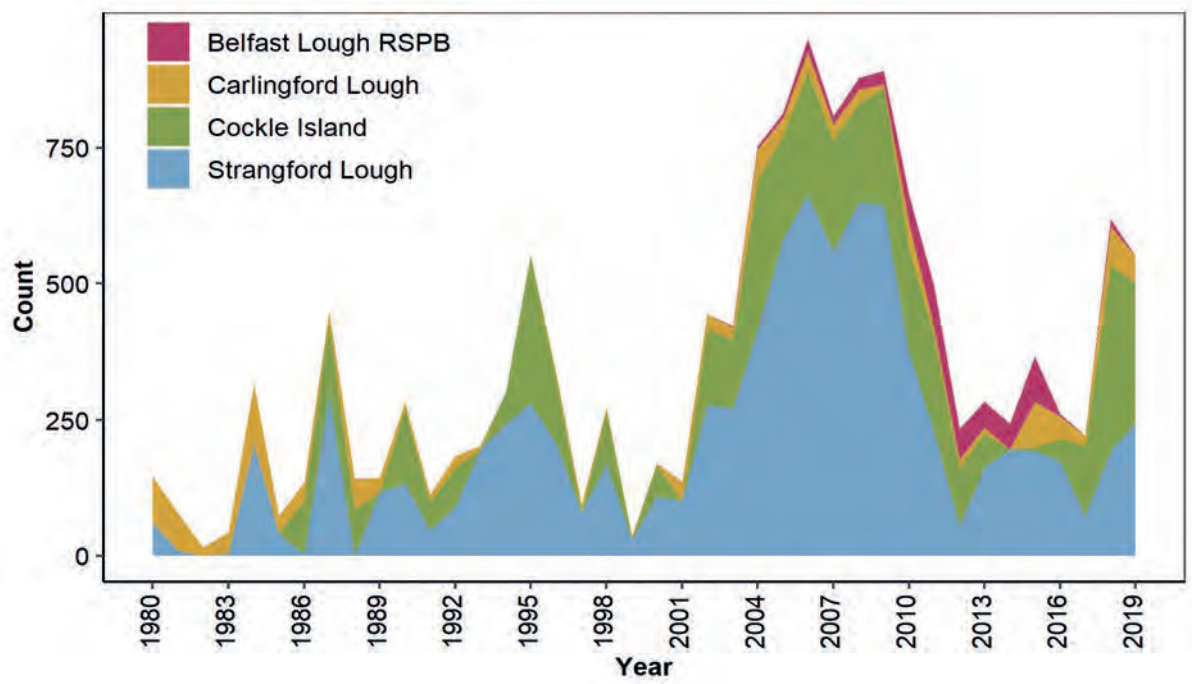
Between 1991 and 2015, the Arctic Tern productivity in Northern Ireland was similarly low to that elsewhere in the UK, fledging approximately 0.35 chicks per pair on average, and there was no statistically significant trend during this time (JNCC, 2019).

Abundance in 2019

Colonies of Arctic Terns around Northern Ireland are highly variable in their size year-to-year (Figure 29). Numbers present at Strangford Lough have plummeted in the past decade, falling from a high of 663 AON in 2006 to 73 AON in 2017 (Figure 29), but increased in 2018 and 2019 (Table 7, Appendix). Although numbers of Arctic Terns were between 48 and 83 AON in Belfast Lough RSPB between 2010 and 2015, Arctic Terns have been much scarcer since, with only a since breeding pair in 2019 (Table 7, Appendix). The Cockle Island population boomed in 2018, but reduced by 25% to 255 AON in 2019 (Table 7, Appendix). The colony at Green Island, Carlingford Lough fell from 70 AON in 2018 to 50 AON in 2019.

In the last 25 years, the Copeland Islands and Strangford Lough have held the majority of breeding Arctic Terns in Northern Ireland. The population at the Copeland Islands fluctuated between 600 and 1,250 AON between 2000 and 2013, but no full survey has taken place on all three islands in the past five years. An estimated 75 Arctic Tern AON were present on Big Copeland in 2019, producing around 40 chicks (David Galbraith, Copeland Bird Observatory, pers. comm.), however although an estimated 150 individuals were present on Lighthouse Island in 2019, these experienced a complete breeding failure potentially due to high levels of predation from Jackdaws (*Corvus monedula*) (Chris Acheson and David Galbraith, Copeland Bird Observatory, pers. comm.).

Figure 29: Cumulative Arctic Tern counts (AON) at Belfast Lough RSPB, Carlingford Lough, Cockle Island and Strangford Lough 1980-2019. The area filled represents the number of Black-headed Gull pairs per year, and the colour represents the number in each site.



Breeding success in 2019

From the 50 AON at Green Island, Carlingford Lough, it is estimated that 24 chicks were produced in 2019 (0.48 chicks/AON, Matthew Tickner, RSPB, pers. comm.) an improvement over the 0.04 recorded in 2018. Likewise, breeding success was higher in 2019 than in 2018 in Strangford Lough, where a total of 252 AON across multiple islands produced 190 chicks (0.75 chicks/AON, Wolsey, 2019). This is in stark contrast to 2018 when Arctic Terns had an extremely low productivity of 0.01 chicks/AON due to the effects of Storm Hector and significant predation by large gulls and Otters.

Common Guillemot

Uria aalge

Conservation status: Amber listed in BOCCI (2014–2019), Amber listed in the BOCC4 (2015), EC Birds Directive – migratory species.

PHILIP CROFT / BTO

Overview

The Common Guillemot (Guillemot or Common Murre) is one of the most abundant seabirds in the northern hemisphere (Mitchell *et al.*, 2004). Guillemots are extremely gregarious and colonies can contain many tens of thousands of individuals, and these very large populations occur both in the Atlantic and Pacific Oceans (Mitchell *et al.*, 2004).

UK population size, abundance and breeding success trends: The UK and Ireland censuses in 2000 showed a large population increase compared to the previous survey, although some of this may have been due to better coverage and survey methods (JNCC, 2016). Between the 1969–1970 and 1998–2002 censuses, the numbers of individuals recorded rose from 611,281 to 1,416,334. Low breeding success may predict a decline in numbers in the future (JNCC, 2019) and most recent estimates put the population size at approximately 950,000 individuals (Mitchell *et al.*, 2004; Woodward *et al.*, 2020). The breeding abundance index shows that, across the UK, Guillemots have increased by approximately 50% since 1986 (JNCC, 2016).

The average breeding success of Guillemots in the UK between 1986 and 2008 was 0.66 chicks per pair, and declined by 0.02 chicks per pair per year over this period (Cook & Robinson, 2010; JNCC, 2019).

Northern Ireland population size, abundance and breeding success trends: In Northern Ireland the main colony is on Rathlin Island with smaller satellites at The Gobbins, Muck Island and at scattered cliff faces between Ballycastle and Portrush. Between the 1969–1970 and 1985–1988 censuses, the numbers of Guillemot appeared to remain stable, but had more than doubled to 98,546 individuals by Seabird 2000 (JNCC, 2019). Following a 50% decrease between 1999 and 2007, numbers of Guillemots rose by 60% to 130,445 individuals in 2011, when the last full survey was undertaken of Rathlin (Allen et al., 2011). This probably makes Rathlin the largest colony in the UK and Ireland. Recent estimates of Common Guillemots population size in Northern Ireland are slightly lower, at 65,000 individuals (Mitchell *et al.*, 2004; Woodward *et al.*, 2020).

The collection of productivity data in Northern Ireland has been limited; therefore no meaningful average productivity figure can be produced (JNCC, 2019).

Abundance in 2019

In 2019, 2,782 individuals were recorded at The Gobbins and 2,617 individuals at Muck Island (Figure 30; Table 7, Appendix), continuing a generally positive trend since 2007. On Rathlin Island, the RSPB carry out annual comparative counts of study plots to monitor population levels (Figure 31). While no data are available for 2019, in 2018 3,454 Guillemots were counted in the study plots, representing a stable count since 2015.

Figure 30: Guillemot counts (individuals) at Muck Island and The Gobbins, 2000–2019.

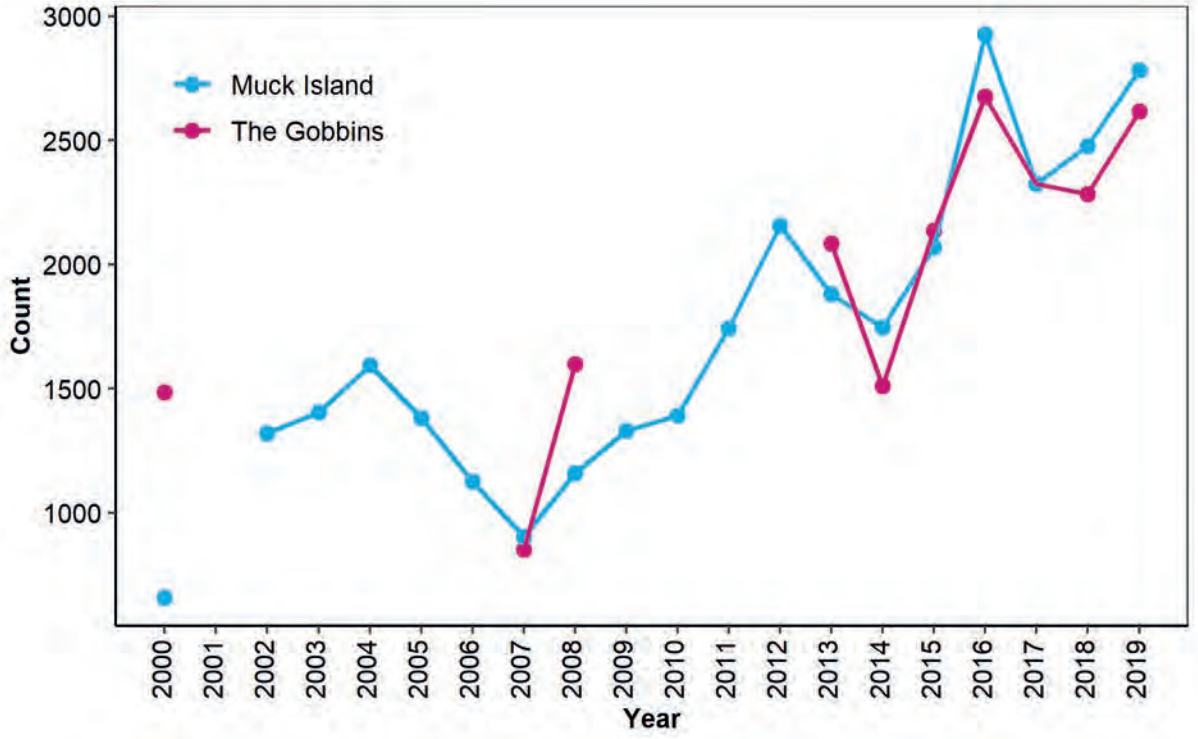
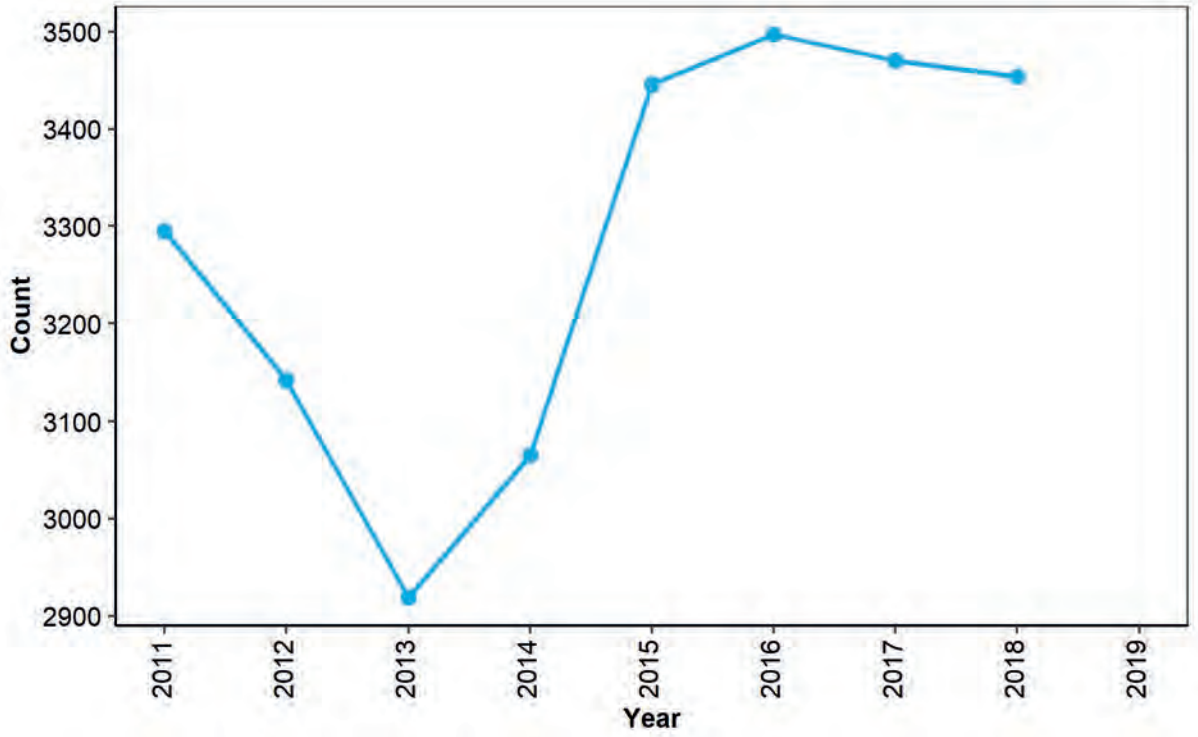


Figure 31: Guillemot study plot counts (individuals) at Rathlin Island, 2011–2018. No data were available for 2019.



Breeding success in 2019

No Guillemot productivity data were collected in 2019. Hooded Crows (*Corvus cornix*), Carrion Crows (*Corvus corone*) and Herring Gulls are responsible for the predation of many Guillemot eggs at The Gobbins (Kerry Leonard, pers. comm.).

Razorbill

Alca torda

Conservation status: Amber listed in the BOCCI (2014–2019), Amber listed in the BOCC4 (2015), EC Birds Directive – migratory species.

SARAH KELMAN / BTO

Overview

The Razorbill is an auk of the North Atlantic and Arctic Ocean, breeding on both sides of the Atlantic. Razorbills nest on ledges with Common Guillemots and Kittiwakes, but also frequently in clefts, holes and under boulders. Their eggs are individually marked for easy recognition on busy ledges (Robinson, 2005).

UK population size, abundance and breeding success trends: Razorbill populations showed successive increases between the national censuses, though the population of 132,734 individuals recorded at the time of the first census in 1969–70 (JNCC, 2019) may have been underestimated, because the small ledges they nest on can often be hidden from view, making them difficult to count (Mitchell *et al.*, 2004). By the 1998–2002 census, the estimated population size was 187,052 individuals, a 21% increase on the previous 1985–1988 census. The latest estimates put the population size at approximately 165,000 (100,000–250,000) individuals (Mitchell *et al.*, 2004; Woodward *et al.*, 2020). The UK breeding abundance index has fluctuated over the last 25 years but is still well above 1980s levels (JNCC, 2016).

Although productivity has increased slightly since 2008, the average breeding success of Razorbills in the UK between 1986 and 2008 was 0.55 chicks per pair, and declined by 0.01 chicks per pair per year over this period (Cook & Robinson, 2010; JNCC, 2019).

Northern Ireland population size, abundance and breeding success trends: In Northern Ireland the main colony is on Rathlin Island with smaller satellites at The Gobbins, Muck Island and at scattered cliff faces between Ballycastle and Portrush. Between the 1969–1970 and 1985–1988 censuses, the numbers of Guillemot increased by 58%, and had more than doubled to 24,084 individuals by Seabird 2000 (JNCC, 2019).
The collection of productivity data in Northern Ireland has been limited; therefore no meaningful average productivity figure can be produced (JNCC, 2019).

Abundance in 2019

The last full survey of Rathlin, in 2011, recorded 22,975 individuals. This was double the figure recorded in 2007, but only 10% above the 1999 total. Rathlin was the largest colony in the UK and Ireland at the time of Seabird 2000 (Mitchell *et al.*, 2004).

Numbers of Razorbills were at the highest level ever recorded on Muck Island this year, at 1,118 individuals compared to 2018's 736 individuals, an increase of 52% (Figure 32). However, numbers at The Gobbins decreased by 23% between 2018 and 2019, to 679 individuals (Figure 32). No data are available for the Rathlin Island study plots in 2019, but in 2018, 548 individuals were recorded, which was the lowest count since the establishment of the plots (Figure 33). However, it should be noted that numbers of Razorbills in attendance at the colony can be subject to large fluctuations, as in some years, many birds may not breed.

Figure 32: Razorbill counts (individuals) at Muck Island (blue) and The Gobbins (red) 1987–2019.

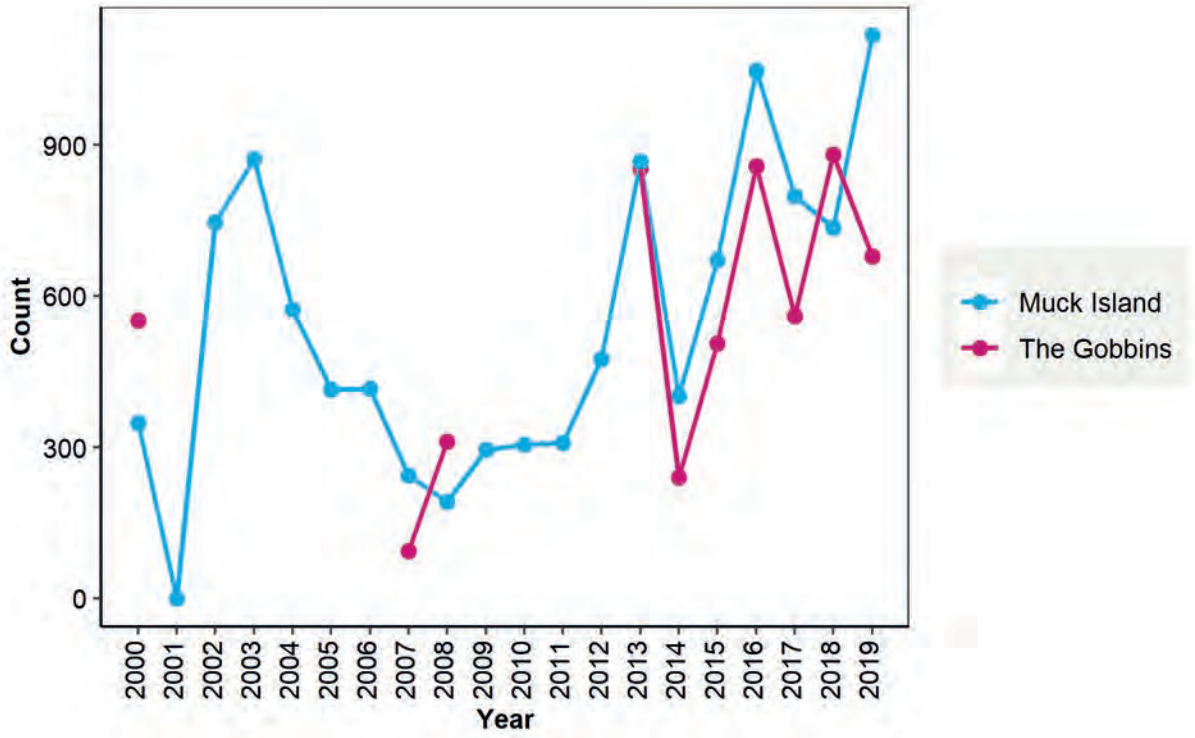
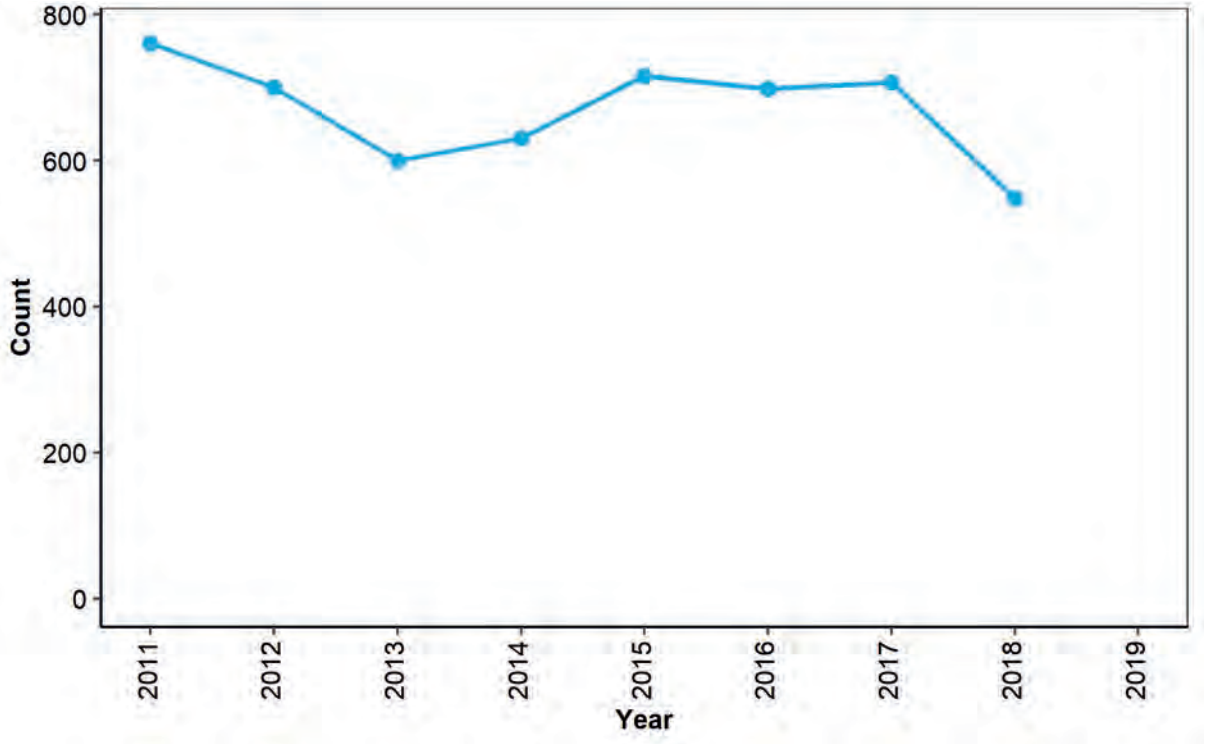


Figure 33: Razorbill study plot counts (individuals) at Rathlin Island, 2011–2018. No data were available for 2019.



Breeding success in 2019

Razorbill productivity is not currently recorded at any sites in Northern Ireland.

Black Guillemot

Cepphus grylle

Conservation status: Amber listed in the BOCCI (2014–2019), Amber listed in the BOCC4 (2015).

HUGH INSLEY / BTO

Overview

The striking Black Guillemot (or Tystie) is a circumpolar auk which in the UK has historically been a predominantly Scottish species. They can be found around rocky shores and nest in natural or artificial crevices, making the recording of breeding pairs difficult. When Black Guillemots carry fish in their bills the way the fish point suggest that some individuals are right-handed, whilst some are left-handed (Robinson, 2005).

UK population size, abundance and breeding success trends: There was insufficient coverage in the 1969–1970 census to create a robust population estimate for Black Guillemot. Numbers appeared to remain stable between the 1985-1988 census (37,745 individuals) and Seabird 2000 (38,714 individuals) (JNCC, 2019), however recent estimates put the population at around 19,500 individuals (Mitchell *et al.*, 2004; Woodward *et al.*, 2020).

There was no statistically significant trend in Black Guillemot productivity at study sites (in Orkney and Co. Down), which was on average 1.01 chicks per pair between 1986 and 2014 (JNCC, 2019).

Northern Ireland population size, abundance and breeding success trends: Between the censuses in 1969–1970 and 1985–1988 Black Guillemot expanded their range in the Irish Sea, adopting the use of artificial structures such as harbour walls and jetties as nest sites. This is likely to have contributed to the 120% increase in Black Guillemots between the 1985–1988 and 1998–2002 censuses, to 1,174 individuals (JNCC, 2019).

The breeding success of Black Guillemots in Northern Ireland is mostly monitored through a study colony in Bangor, Co. Down. On average between 1986 and 2015 productivity was 0.98 chicks per nest (JNCC, 2019).

Abundance in 2019

Counts of Black Guillemots from around the coast of Northern Ireland in 2018 are recorded in Table 6. Although the population remains stable there has been a change in distribution within counties Down and Antrim since Seabird 2000 (1998–2002). Some areas have seen increases (for example, the Copelands and Inner Belfast Lough), while others have seen decreases (for example outer Belfast Lough). The Rathlin Island population has also decreased since 2000 (Figure 34).

Figure 34: Black Guillemot counts (individuals) at Rathlin Island, 1999–2018. No data available for 2019.

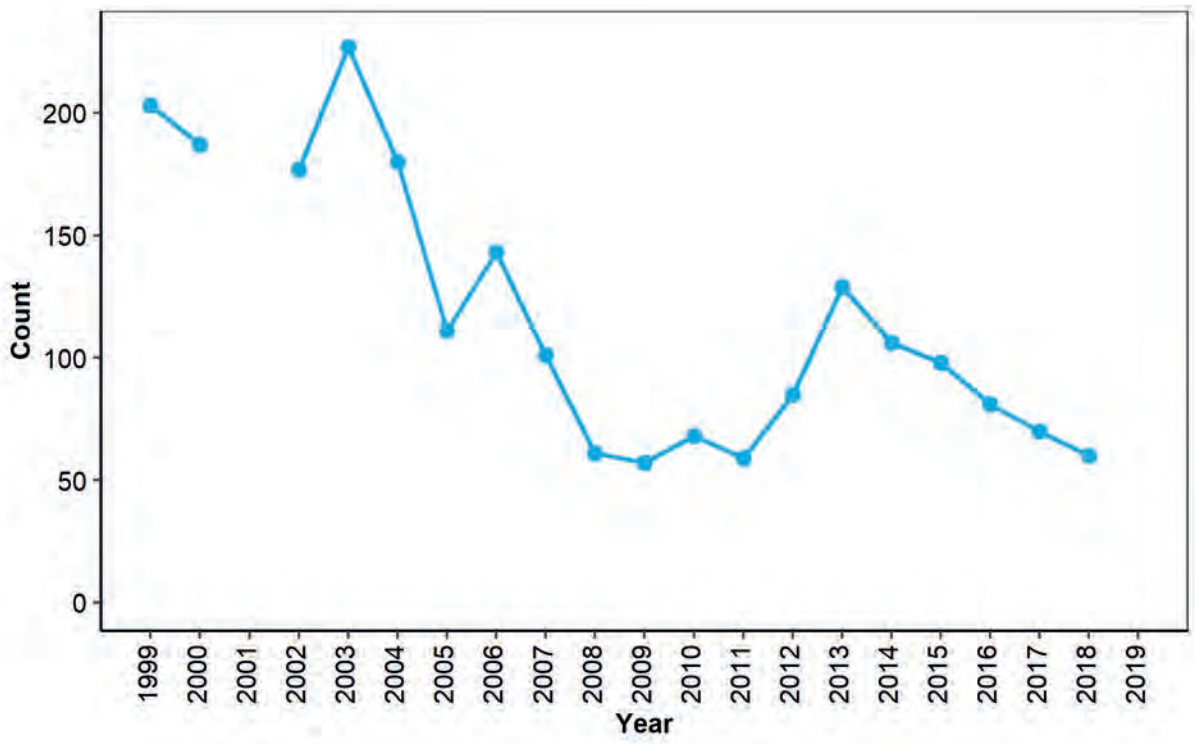


Table 6: Black Guillemot numbers (individuals) at sites in Northern Ireland in 2019.

Parent site	Site	Count
Magilligan to Castlerock	Castlerock	16
The Barmouth (River Bann) to Portrush Bay	The Barmouth to Portrush Bay	26
Portrush Harbour	Portrush Harbour 1	25
Larne to Torr Head	Cushendall	5
	Garron Coast	4
	Ballygalley	0
Larne Lough and Island Magee	The Maidens	11
Whitehead Town	Whitehead Town 1	0
Carrickfergus to White Head	Eden to White Head	93
Grey Point to Bangor	Grey Point to Bangor 1	1
Bangor	Bangor Marina	57
Copeland Islands	Old Lighthouse Island	60
Donaghadee	Donaghadee 1	9
Millisle	Millisle 1	0
Ballywalter	Ballywalter 1	8
Ballyhalbert	Ballyhalbert 1	1
Bloody Bridge to Newcastle	Bloody Bridge to Newcastle 1	26
Mourne Coast	Mourne Coast 1	11
Annalong Harbour	Annalong Harbour 1	58
Carlingford Lough	Rostrevor	13
	Warrenpoint	29

Breeding success in 2019

No productivity data were collected for Black Guillemot in 2019. In 2018 the Black Guillemot colony in Bangor Harbour had an overall productivity of 1.08 chicks per nest (Shane Wolsey, pers. comm.).

Puffin

Fratercula arctica

Conservation status: Amber listed in BOCCI (2014–2019), Red listed in the BOCC4 (2015), EC Birds Directive – migratory species.

PHILIP CROFT / BTO

Overview

The Atlantic Puffin (Puffin) is the most instantly recognisable of all North Atlantic seabirds. They are a secretive bird on land, nesting in burrows, and until recently relatively little was known about their pelagic lifestyle. Their colourful beaks have been recorded carrying up to 83 small fish in one go (Robinson, 2005).

UK population size, abundance and breeding success trends: Around 10% of the world population of Puffins breeds in the UK and Ireland, where it is the second most abundant breeding seabird (Mitchell *et al.*, 2004). The UK population of Puffin increased by 13% between the 1969–1970 and, 1985–1988 censuses, and by a further 19% to 580,714 AOB by Seabird 2000 (JNCC, 2019). However, due to their burrow-nesting habits and often remote breeding sites, Puffins are a difficult species to monitor. Therefore data collection is biased towards smaller colonies and counts of individuals, rather than AOB. Counts of individuals can vary quite markedly between years compared to counts of apparently occupied burrows and this makes it impossible to generate a reliable breeding abundance index for the UK population (JNCC, 2016).

The breeding success of Puffins has been variable throughout the recording period, but since the late 1990s has been generally lower than breeding success in the late 1980s and early 1990s (JNCC, 2019). More recently in 2015, average breeding success was 0.55 chicks per pair (JNCC, 2019).

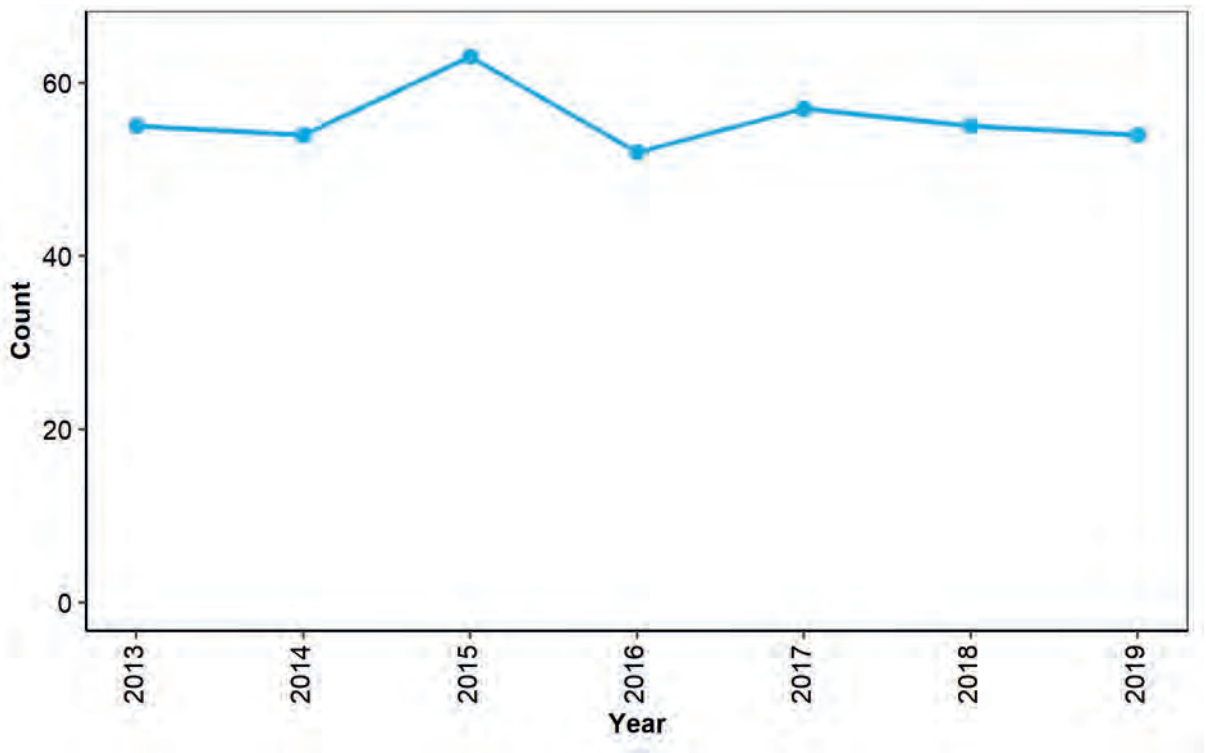
Northern Ireland population size, abundance and breeding success trends: Although there was an apparent increase of 86% in Puffin AOB between the 1969–1970 and 1985–1988 censuses, Puffins had declined by 40% to 1,610 AOB by Seabird 2000 (JNCC, 2019). The main colony is on Rathlin, which holds approximately 98% of the Northern Irish population; small numbers also breed at The Gobbins. Some are occasionally seen at Muck Island although breeding has not been confirmed. A conservation project on the Copeland Islands, using decoys and sound lures to attract birds, has resulted in a new colony with breeding confirmed in 2015 (Wolsey & Smyth, 2017). This was a tremendous achievement and hopefully the start of a viable colony, proof that the use of sound lures and decoys can work for this species without the need for translocations.

The collection of productivity data in Northern Ireland has been limited; therefore no meaningful average productivity figure can be produced (JNCC, 2019).

Abundance in 2019

In 2019, a peak count of 54 individuals was recorded at The Gobbins, in the same range as counts during 2013–2018 (Figure 35). A peak count of 106 individual Puffins was observed from Lighthouse Island in the Copeland Islands across the breeding season (Copeland Bird Observatory, pers. comm.), a similar figure to the previous year (Table 7, Appendix). In 2018, the colony area, established using decoys and a sound system playing colony calls (Wolsey & Smyth, 2017), was examined in mid-May and 11 burrows were identified that had possible evidence of use, although only three of these were directly observed being visited by Puffins (Katherine Booth Jones, pers. obs.).

Figure 35: Puffin counts (individuals) at The Gobbins, 2013–2019.



Breeding success in 2019

No productivity data were collected in 2019. In 2016, two chicks fledged from the new colony on Lighthouse Island. Despite yearly use of the colony by Puffins, there have been no confirmed fledglings since, due to the difficulty of recording breeding success on the island.

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Tern foraging over wake structures in the Narrows tidal channel, Strangford Lough

Lilian Lieber

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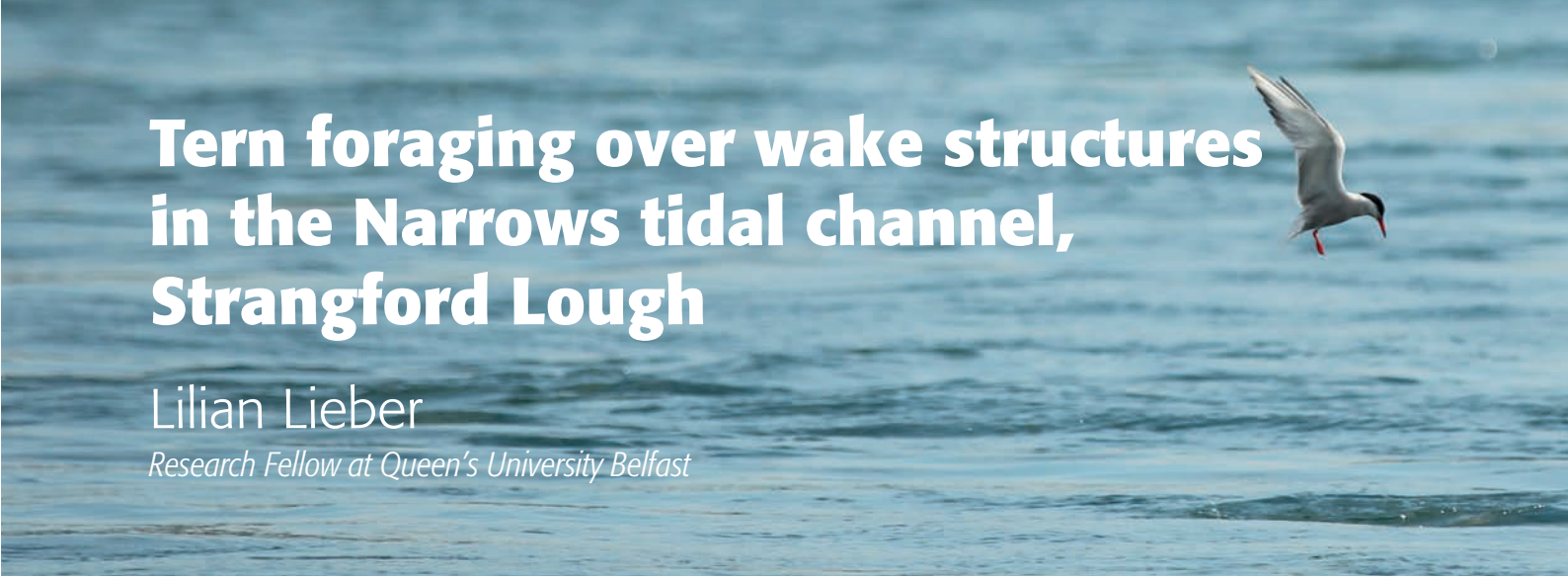


COMMON TERN HOVERING OVER A SMALL SCALE EDDY, LILIAN LIEBER

Marine urbanisation – the introduction of man-made structures into our seas – is increasing and common, even in more remote areas (Dafforn *et al.*, 2015). Strangford Lough is no exception as here you'll find maricultural infrastructure for shellfish (e.g. mussel and oyster farms), seaweed cultivation as well as tidal energy devices. Most of these structures have not been developed to a great extent and mostly present opportunities for small-scale commercialisation, research or prototype testing. However, even single structures can cause change in the marine environment and new synergies between marina fauna and man-made structures are likely. For instance, microscopic animals may settle on structures, while fish seek structures as a refuge or artificial reef habitats and even seals have been shown to start foraging around offshore windfarms (Russel *et al.* 2014).

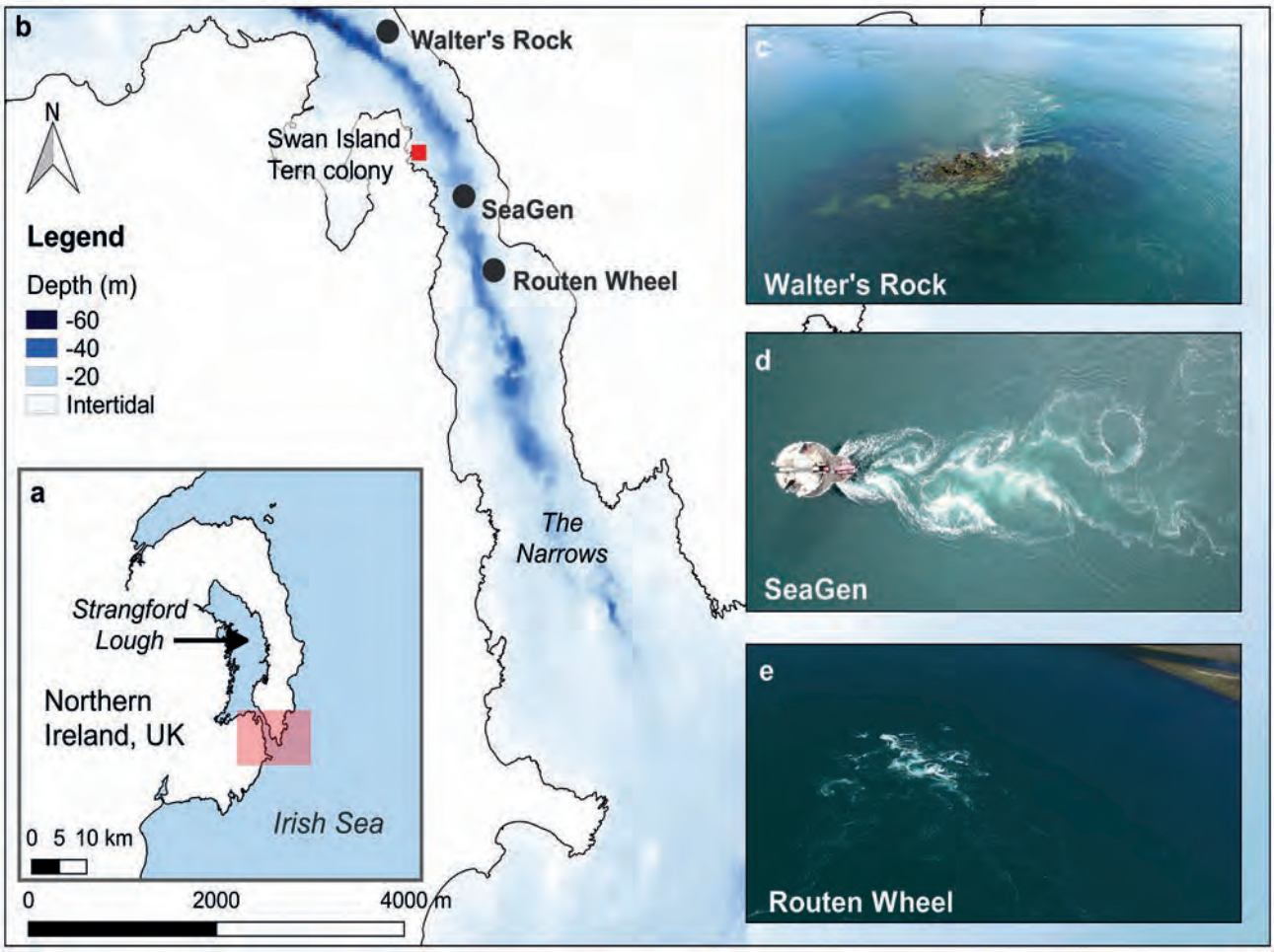
How about seabirds? Seabirds are excellent indicators of both natural and man-made change in the marine environment, because their behaviour can be more readily monitored. The Narrows tidal channel, which connects Strangford Lough with the Irish Sea, provides a highly dynamic and complex environment for foraging seabirds – characterised by headlands, islands and submerged rocks. Where strong tides over four meters per second rush past, it can generate turbulent swirls or eddies, including wakes left behind topographic features. Terns, being shallow plunge-diving seabirds, rely on such physical processes in tidally energetic environments to make prey available near the sea surface (Urmy *et al.* 2018). Turbulent flows can break up shoals of small fish or even displace individual fish, making small prey items more vulnerable to surface foragers (Laio 2007). Notably, the predictability of areas of extreme turbulence or shallow upwellings in tidal streams may be more important than overall prey density.

When SeaGen, the UK's first grid-connected tidal turbine energy structure was installed in 2008, it led to the emergence of a distinct eddy-dominated wake spanning tens to hundreds of meters behind the tower, depending on tidal state. SeaGen's surface-piercing monopile foundation was placed in the strongest flows in the mid-channel of the Narrows, therefore changing local flows to a much larger extent than structures elsewhere.

Study sites

To understand how terns (Sandwich – *Thalasseus sandvicensis*, Common – *Sterna hirundo* and Arctic Terns – *S. paradisaea*) foraging in the Narrows associate with both natural and man-made wake structures, we set up a study in the summer of 2018. At the time of our study, SeaGen was being decommissioned and its turbine blades had been removed. But the remaining structure still generated a large turbulent downstream wake, known as a von Kármán vortex street (Kármán 1937). Using a vantage point survey design, we focused our observations around SeaGen's wake as well as two nearby natural dynamic sites as a comparison: 1) an island wake off Walter's Rock and 2) the whirlpool structures known as the Routen Wheel, with the latter characterised by powerful eddies (vortices) and localised upwellings (boils). While the three wake features differ in appearance, they all predictably create local zones of extreme turbulent flow structures and terns have been observed foraging around all three features prior to the study.

Map adapted from Lieber *et al.* 2019 showing the three wake sites in the Narrows tidal channel.



Methods

We stratified the surveys by time of day and tidal state, keeping the effort per site relatively equal. Counts of hovering or diving terns deemed foraging were completed every second or third minute for 15 minutes with a five-minute rest period. This gave us high-resolution count data of foraging terns over each of the three localised wake features (area of ~0.05 km²) between 18th July 2018 and 12th August 2018. Sandwich Terns were reliably identified, while Common and Artic Terns were jointly classified as 'small terns'.

As the spatial extent of SeaGen's wake was larger than for the other sites, observations were spatially divided into North (area of flood tide wake) and South (area of ebb tide wake) of the foundation. This also helped to assess whether terns were solely attracted to the environmental cue of turbulence ('ecological trap') or if aggregations were coupled to the ebb-flood tidal cycle. Foragers use environmental cues to select habitats that maximize their fitness; ecological traps can be the result of rapid human-induced environmental change, when animals mistakenly prefer novel habitats with familiar cues where their fitness is lower than in other available habitats (Hale & Swearer 2016). It should be noted that SeaGen's wake did not differ in appearance between the ebb and flood tide.

Tern foraging dynamics

We found that, on average, there were three times more terns foraging over SeaGen's wake than over the nearby natural wake sites (Lieber *et al.*, 2019). Tern foraging aggregations over SeaGen's wake frequently exceeded 50 birds, however this was only evident during the flood tidal cycle. Strong tidal coupling was evident across all features, with the highest probability of encountering terns at SeaGen (North) and Walter's Rock during peak flood tides, and Routen Wheel during peak ebb tides. The Routen Wheel promotes a more intense turbulence field during the ebb tide due to the geographical alignment of the channel (NW-SE).

Overall, our results suggest that all three features acted as a predictable prey conveyor belt for foraging terns, with SeaGen's flood wake promoting the largest feeding flocks. To investigate the SeaGen wake dynamics further, we mapped out the turbulent flows across the water column using an acoustic Doppler current profiler

(an oceanographic instrument used to measure water current speed and direction using sound waves) and used drone surveys to track individual tern flight trajectories from above. The acoustic visualisations from the current profiler revealed that SeaGen's eddy-dominated wake mixed material across the entire water column, which could provide a mechanism to lift potential small prey items, such as juvenile fish, towards the surface. While the wake was extremely turbulent, it slowed down the high currents and created patches of smooth eruptions (boils) at the sea surface. Finally, using the drone recordings, we could track the highly localised foraging movements of terns limited directly over the turbulent wake.

Top: Seabird foraging over SeaGen's flood wake, Lilian Lieber. Bottom: Tracked terns over SeaGen's wake, Alex Nimmo-Smith.

Summary

On-going investigations are underway to characterize the exact physical flow structures seabirds associate with to elucidate the mechanisms underlying foraging site selection. In addition to the wake sites, we have collected data on shallow upwelling sites across the Narrows that terns associate with and are currently compiling the data to allow comparisons to be made in the future. It should be noted that these observations only reflect a short monitoring period and it will therefore be important to undertake future observation counts across these sites to gain a better understanding of tern foraging behaviour in the Narrows.

In summary, we have shown that local tidal forcing around a monopile tidal energy structure led to a predictable foraging site for terns. Our research highlights that man-made structures can alter seabird distribution dynamics at a multitude of scales. Such insight allows a better understanding of the drivers of seabird habitat use. It also informs the placing of man-made structures in such a way that it reduces potential negative impacts. In an era of intense marine urbanisation, this research helps us to understand seabird responses to environmental change and highlights the importance of changes in localised physical forcing. The remaining SeaGen tower was removed on 25th July 2019. While most of the man-made structures in Strangford Lough are aimed to decarbonize our energy demands and support the blue economy, any environmental interactions between marine fauna and man-made structures need to be monitored and considered to allow dynamic natural systems to thrive while promoting ecosystem services.

For more information, the video summary of this study (youtube.com/watch?v=bhjcmdVRU0M) and the full publication (nature.com/articles/s42003-019-0364-z) are available online.

Acknowledgments

I'd like to thank my two external collaborators who helped design this study's methodology, dedicated many hours in the field collecting data and jointly helped analyse the results of the surveys: Dr Alex Nimmo-Smith, who is a physical oceanographer and CAA-approved drone pilot at the University of Plymouth, and Dr James Waggitt, who dedicated his PhD researching seabirds in tidally energetic environments and who is now based at Bangor University, Wales. I'd also like to thank the National Trust, specifically Hugh Thurgate, for providing valuable insight into tern numbers and behaviour in Strangford Lough. I'd also like to thank Louise Kregting at Queen's Belfast and my funding body, the Bryden Centre for advanced marine and bio-energy research. The Bryden Centre project is supported by the European Union's INTERREG VA Programme, managed by the Special EU Programmes Body (SEUPB).

Disclaimer: The views and opinions expressed in this report do not necessarily reflect those of the European Commission or the Special EU Programmes Body (SEUPB).

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Irish Sea Tern Network Meeting

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EDMUND FELLOWES / BTO

The first-ever meeting of the Irish Sea Tern Network took place in Bangor, Wales on 17th and 18th October, supported by the Roseate Tern LIFE Project. This was a truly powerful networking event with almost fifty representatives of statutory agencies, Non-Governmental Organisations (NGOs), voluntary groups and individual experts attending from England, North Wales, the Isle of Man, Northern Ireland and the Republic of Ireland. Practically every tern colony around the Irish Sea was represented.

We convened in the spirit of collaboration based on the growing evidence that the same birds use different sites within and between years all around the Irish Sea. We know from GPS tagging that Arctic Terns (*Sterna paradisaea*) from the Skerries venture out to shores of Ireland, that Sandwich Terns (*Thalasseus sandvicensis*) can switch breeding colonies within a single season and that colour-ringed Little Terns (*Sternula albifrons*) breed in different colonies from year to year. Moreover, a prospect of the roseate tern expansion within the Irish Sea has become increasingly likely with birds breeding on the Skerries and Larne Lough (Northern Ireland) and more potential sites in the scope. It was therefore prudent to meet fellow site managers and experts to exchange experience in tackling similar issues such as predation control, habitat management, research and monitoring. There are several further conservation imperatives for which tightening the collaboration could benefit tern populations within the Irish Sea. These are:

- Standardising methods for data gathering and sharing.
- Coordinating research and monitoring projects.
- Coordinating policy statements, lobbying and casework responses.
- Developing regional projects and obtaining funding.

It was difficult to discuss all aspects of colony management in detail during just one and a half days. We aimed to provide a solid background to the most important issues, stimulate discussions and exchange of knowledge between site managers during and after the meeting.

Graham White and Gavin Thomas from the ecology team of the Royal Society for the Protection of Birds (RSPB) kicked off the meeting with the mammalian predation session, where they gave an overview of the latest developments in terrestrial predator control and fencing solutions used by the Society. RSPB's Karen Varnham and Tessa Coledale talked about practical aspects of biosecurity monitoring on islands and presented aspirations of the Biosecurity for LIFE Project.

Jen Smart from the RSPB started the avian predation session with a presentation on diversional feeding of Kestrels (Falco tinnunculus) and preliminary results of a trial on using agri-lasers (lasers used to startle birds) in deter avian predators. Steve Newton (BirdWatch Ireland) and Ian Sims (RSPB) presented case studies on gull management from Rockabill (Republic of Ireland), the Skerries and Ynys Feurig (Wales), followed by Chris Redfern from the Natura History Society of Northumbria, who conveyed results of the PhD study conducted by Ibrahim Alfarwi on gull predation at Coquet Island (north-east England).

Martin Perrow (ECON Ecological Consultants) started a highly anticipated session on research and monitoring, showing the results of Sandwich, Arctic and Roseate Terns (*Sterna dougallii*) visual tracking around breeding colonies. We had also two excellent presentations on colour ringing. Henry Cook (North Wales Wildlife Trust)

showed post-breeding dispersal of Sandwich Tern chicks around the Irish Sea and David Norman (Merseyside Ringing Group) presented patterns of between colony movements of Little Terns. Chris Redfern presented the results of geolocator tracking studies on Arctic and Roseate Terns.

The second day started with Leigh Lock presenting results of the RSPB's Sustainable Shore study and opportunities for habitat creation through managed realignment and beneficial use of dredging. Daniel Piec provided more specific examples of habitat work undertaken as part of the Roseate Tern LIFE project, followed by a Hodbarrow (England) case study presented by Dave Blackledge (RSPB). The session finished with two presentations on artificial structures for Common Terns from Shotton (Wales) and Preston Docks (England) presented by Peter Coffey (Merseyside Ringing Group) and Paul Ellis (Fylde Bird Club) respectively.

In the final session, Neil McCulloch (Northern Ireland Environment Agency, NIEA), Steven Newton (BirdWatch Ireland), Matthew Murphy (Natural Resources Wales, NRW), Bart Donato (Natural England, NE) and David Wright (Department of Environment, Food and Agriculture, DEFA, Isle of Man Government) presented overviews of tern colonies from their respective countries. These talks provided a good introduction to the final, open-floor discussion session.

Although there was no appetite for formalising the network into a partnership, we identified a few areas of collaboration such as testing simple management interventions on multiple sites (for example effectiveness of canes against gull predation), continuing colour-ringing and colour-ring reading and looking into potential impacts of offshore wind developments on forage fish. This last topic raised a lot of interest in the light of the apparent acceleration of the offshore wind developments, especially in the Republic of Ireland, and because so far, practitioners have mostly been interested in collision rates.

A more interactive data sharing was also discussed, possibly in the form of an online Google spreadsheet, but it would require coordination, at least in the first year for the solution to catch. There were also more theoretical discussions on the impact of managing colonies on capabilities of terns to colonise other sites.

In summary, the meeting was seen as a great value and several discussions have started between individual participants after the meeting. Notwithstanding the value of a Facebook Group Irish Sea Tern Colony Network, face to face meeting of fellow site managers and experts provided an opportunity to discuss issues in detail and facilitate further collaboration. It was agreed that the next meeting will be in two years, most likely in Dublin.

Information on how to access presentations and other materials is here: roseatetern.org/irish-sea-network.html

Biosecurity for LIFE Project

Tessa Coledale
Biosecurity Officer for Wales and Northern Ireland

SHEEP ISLAND, WITH RATHLIN ISLAND ON THE HORIZON, OFF THE COAST OF CO. ANTRIM. TESSA COLEDALE.

The Biosecurity for LIFE project is a partnership between the Royal Society for the Protection of Birds (RSPB), National Trust for Scotland and National Trust working to implement effective and improved biosecurity on all 42 of the UK offshore island Special Protection Areas (SPAs) designated for breeding seabirds. The project is funded by EU Life with support from statutory agencies and will run from 2018 – 2022. Its main aim is to reduce the chance of invasive non-native mammalian predators such as rat, mice, mink, feral cat, stoat, and hedgehog reaching UK seabird islands where they aren't already present.

Almost eight million seabirds of 25 species breed in the UK and Republic of Ireland and 13 of these species breed in internationally important numbers including 90% of the world's Manx Shearwaters (*Puffinus puffinus*), 68% of the world's Northern Gannets (*Morus bassanus*), and 60% of the world's Great Skuas (*Stercorarius skua)*. Seabirds are one of the most threatened bird groups in Europe and globally. One of the key threats to UK seabirds is the presence of invasive non-native mammalian predators which can decimate breeding colonies by eating eggs, chicks and adult birds. New incursions are reported every year from islands around the UK and climate change among other factors is expected to make these a more common occurrence.

There are five sites in Northern Ireland that the RSPB are engaging with. These include Sheep Island, Rathlin, the Copeland Islands and the islands in Larne and Carlingford Loughs. They are all very different with Sheep Island having very steep sides and being Northern Ireland's largest breeding Great Cormorant (*Phalacrocorax carbo*) colony. Green Island (Carlingford Lough), Swan Island (Larne Lough) and Blue Circle Island (Larne Lough) are small, noisy, low-lying islands full of breeding terns including Northern Ireland's only known breeding pair of Roseate Terns (*Sterna dougallii*). The Copeland Island group was also designated for supporting nationally important populations of tern, Arctic (*Sterna paradisaea*) in this instance. It also holds internationally important populations of Manx Shearwater, a species particularly susceptible to invasive non-native mammalian predators due to its burrow-dwelling nature on land.

Northern Ireland's largest seabird colony can be found on the 100m high cliffs around Rathlin which qualify as a SPA by supporting internationally important breeding numbers of Razorbill (*Alca torda)*, Common Guillemot (*Uria aalge*) and Kittiwake (*Rissa tridactyla*). Rathlin is inhabited and attracts over 50,000 visitors to its shores every year, much of this through wildlife tourism. Rats and ferrets are already present on the island which means we will be working on preventing new invasive non-native mammalian predators arriving but also minimising the number of already established invasive non-native species such as rats continuing to come across from the mainland. Not only does this work benefit seabirds but other species and habitats too, as well as having socio-economic benefits through impacts on tourism, agriculture and housing.

Eradications are costly and logistically challenging so it is much easier to keep an island free of invasive predators in the first place. Even if an eradication is carried out, biosecurity measures are vital for preventing a reinvasion of the site. The three key elements of biosecurity are:

- **PREVENTION** by establishing barriers on incursion pathways to prevent invasive species reaching an island.
- **EARLY DETECTION** of invasive species.
- **RAPID RESPONSE** to an incursion if it occurs, thereby preventing an invasion.

We're hoping to improve biosecurity measures on all 42 sites by working on the following:

1. Working with site managers, communities and key stakeholders to write and implement biosecurity plans. Each plan will provide island summaries along with details of invasive non-native mammalian predators that are at risk of invading the island. The plans will describe key pathways that invasive predators may take on to the islands and what can be done to prevent this. The plans will give details of how routine monitoring will be carried out and by who and give a thorough plan for how to respond in the event of an incursion.
2. The project has financial support to enable islands to then implement the biosecurity surveillance mentioned in their biosecurity plan, whether that be through training or paying for boat trips or equipment such as camera traps or wax block detection devices.
3. Training a biosecurity dog to be able to detect signs of rats. Their acute sense of smell means they can do this far more effectively and quickly than we are able to.
4. Developing a network of eight regional Rapid Incursion Response Hubs to hold all the kit required for detecting invasive non-native mammalian predators on seabird SPA islands and responding if an incursion occurs. To man these hubs, we'll be looking to set up and train large volunteer teams similar to the idea used by the mountain rescue or RNLI. This will hopefully mean that there will always be enough people available to set up a response to a possible incursion within 48 hours.
5. Training marine industries and businesses to implement biosecurity measures.
6. Spreading general awareness of the threat of invasive non-native mammalian predators and the need for good biosecurity through events, presentations, posters, leaflets and signage boards at key harbours.
7. Working with UK statutory agencies to write a seabird island biosecurity strategy for mammalian predators so that this project is just the beginning of biosecurity being fully implemented in the UK.
8. Establishing a European Eradication, Biosecurity and Incursion Response Advisory Group so that people working in the sector can knowledge share.

A biosecurity surveillance station (inset) and a wax block that has been chewed by a rat (main). Images by Tom Churchyard.

How you can help

One thing that everybody can do straight away is check your boat, car and baggage next time you're travelling to an island to stop stowaways joining you for the journey. Also don't forget to remove the temptation by keeping any food in animal-proof containers to avoid attracting any unwelcome guests.

Travelling by vehicle

Vehicles are at higher risk of harbouring stowaways when they have been sitting stationary in an area that has potential invasive mammals, in particular rodents.

- Check for nesting material as part of your regular vehicle checks. Rodents are known to use cavities within the chassis and engine space to nest and sleep.
- If you are going direct to an island lift the bonnet and visually check for signs of stowaways (the act of lifting the bonnet is usually enough to startle them).
- Think about cargo you are transporting! The risk of cargo holding rodents (which in turn can attract stoats) depends on where it has come from – hay/straw bales are high risk so check for holes. Other high-risk material includes building materials that have been kept in bundles throughout transportation, animal feed and farm equipment. Where possible transport cargo well wrapped and packed and store cargo off the ground in a secure building before transportation.

Travelling on foot

Small mammals can climb into personal baggage and are more likely to do so if there is food inside. This is not as uncommon as people imagine.

- Where possible pack your bag on the day of travel to an island and do not leave your baggage in high risk areas, such as quaysides, unattended before travel.
- Always check through baggage before travel and store all food in rodent proof containers to reduce the attraction.
- Large food orders in boxes should be checked for any damage to outer packaging such as entrance holes or gnaw marks. If damage is found open the package and check for stowaways, do not transport damaged food packs. Repack damaged food packs into a new box or container before travel.

On the boat

Harbours and ports are high risk for the presence of invasive mammals, especially rodents. Rodents are inquisitive, agile and good swimmers. It is easy for them to gain access to any boat.

- Keep a tidy boat and store food in rodent proof containers to reduce the attraction to stowaways.
- Consider regular checks for rodents using chew cards.
- Keep snap traps on board to deal with any stowaways. Do not set sail for an island if you suspect stowaways may be on board.
- If you find a stowaway on board whilst at sea, do not throw it overboard as it could swim to a near-by island, and do not land on a predator-free island.

If you're interested in committing to volunteer for one of our Rapid Incursion Response Hubs or know of an event where it would be useful to promote the project, please do get in touch.

Island biosecurity is still a relatively new concept for the UK but with your help we hope to change this so that the UK ends up more like New Zealand where everybody knows what biosecurity means and the quick and simple steps they can take to keep our island wildlife safe.

For more information visit our website biosecurityforlife.org.uk or follow us on Twitter @biosecurityLIFE

Seawatching at Ramore Head

Neal Warnock
Larne, County Antrim

A TYPICAL VIEW FROM THE SEAWATCHING SHELTER ON A GOOD DAY. NEAL WARNOCK

Regarded by many as the premier seawatching site on the north coast of Ireland, Ramore Head sits at the heart of the popular seaside town of Portrush in County Antrim. It has received sporadic coverage since it came to prominence in the 1970s. I have sea-watched regularly there since 2008 and this is my personal take on what it has to offer.

Facilities

I doubt there can be many better equipped seawatching locations in Ireland; I've certainly not been to one. A large (free) car park lies right beside the small headland, which has toilets, chip vans and ice cream vans all at close proximity to the seawatching point. There are several pathways around the headland.

Watch points

Most birders tend to seawatch from a concrete seating area close to the tip, but this offers little protection from the elements, is right on the main path (increasing the likelihood of being asked what you are taking photos of all day!) and is too far out into the bay to pick up the full range of species for my liking. My seawatching point of choice is from the shelter on the east side of the headland, which sits back overlooking a small inlet and is slightly lower down. In a north westerly, it is sheltered from the wind and you can keep yourself and your gear relatively dry during rain. This location allows you to pick up those close passing skuas and petrels more easily and I also find it easier to pick up high flying species such as divers and skeins of geese from here. There is also a wooden bench to sit on. As with most seawatching points, it does have its downsides – a reduced window of opportunity to view seabirds for one. It is also possible to seawatch from the car park, but many birds will be missed in wave troughs.

Time of year

If conditions are suitable (see below), it is worth a look at any time of year though the main period is from mid-July until late October. In late summer large numbers of Manx Shearwaters (*Puffinus puffinus*) and occasional European Storm Petrels (*Hydrobates pelagicus*) and small numbers of skuas can be expected. From early autumn, numbers of skuas begin to increase as does your chance of seeing scarcer species such as Leach's Storm Petrel (*Oceanodroma leucorhoa*), Grey Phalarope (*Phalaropus fulicarius*) or Sabine's Gull (*Xema sabini*). As autumn progresses, thousands of auks can appear, juvenile skuas begin to arrive in numbers and this is also the best time of year to see returning wintering waders and wildfowl such as Barnacle Geese (*Branta leucopsis*) and Whooper Swans (*Cygnus cygnus*). Seawatching in the winter months could produce sightings of Little Auk (*Alle alle*) but it can get rather cold at Ramore Head during a northerly in December!

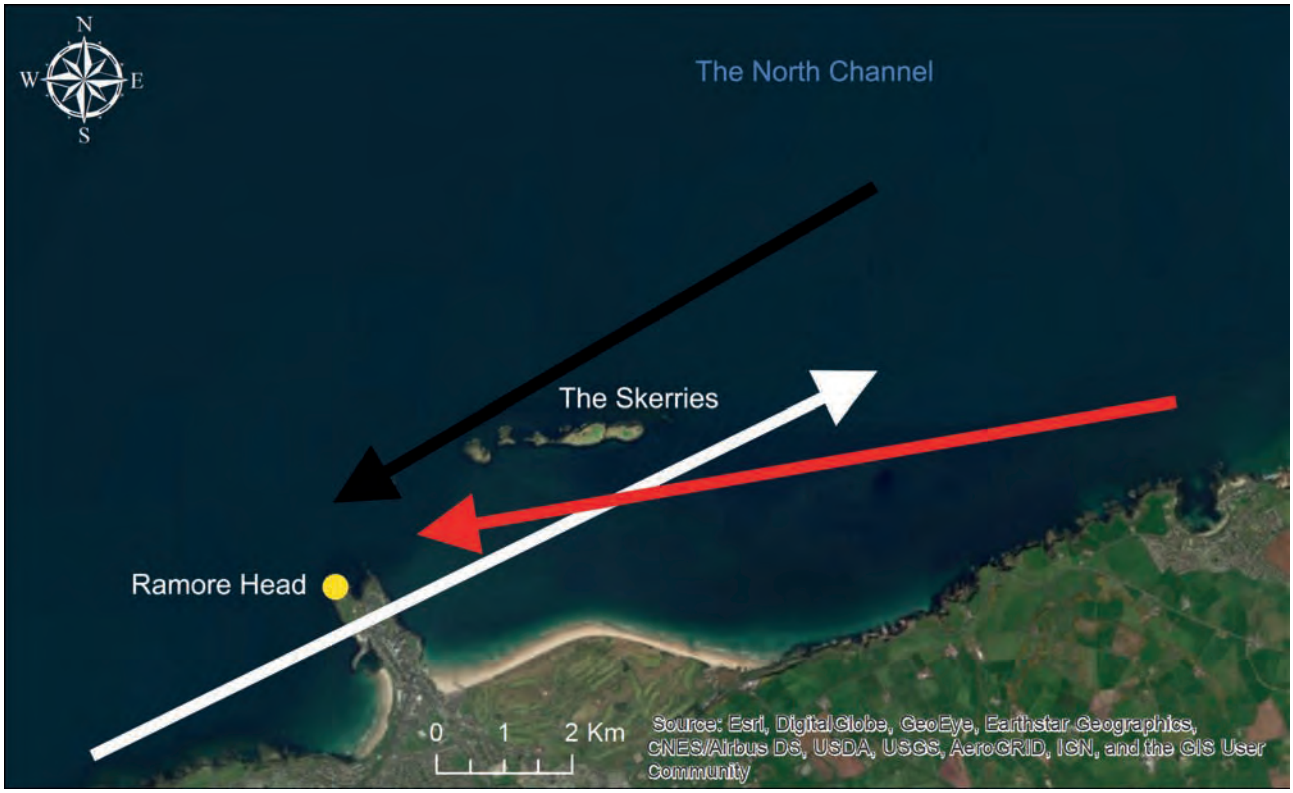
Weather conditions

I tend to have a different outlook on this than most. A north westerly is important but birders should not dismiss the site in non "classic" conditions. What is far more important is where the weather system originates, how far it has travelled and the severity of conditions as it passes through the north Atlantic. The idea being that seabirds

are forced along the west coast of Scotland, and navigate back out towards the Atlantic via the north coast of Ireland. I have found any wind direction between W and NNW can be good. I would suggest forgetting about trying to seawatch at Ramore in a northerly – there is no shelter anywhere, the swell is often far too big to see any birds and you are likely to catch pneumonia no matter how many layers you put on.

However, for me the optimal wind direction at Ramore is west-north-west. In a full on north-westerly, passage can split into several streams either side of The Skerries making it difficult to keep tabs on what's going on and in a westerly, many birds are too far away to be safely identified (doesn't stop me trying though!). In a NNW wind direction, you begin to be buffeted around in the seawatch shelter and the sea state becomes "messy". With a WNW, the majority of birds pass in a single stream just beyond The Skerries. Figure 1 demonstrates the typical range and direction of travel of various species on a good seawatching day.

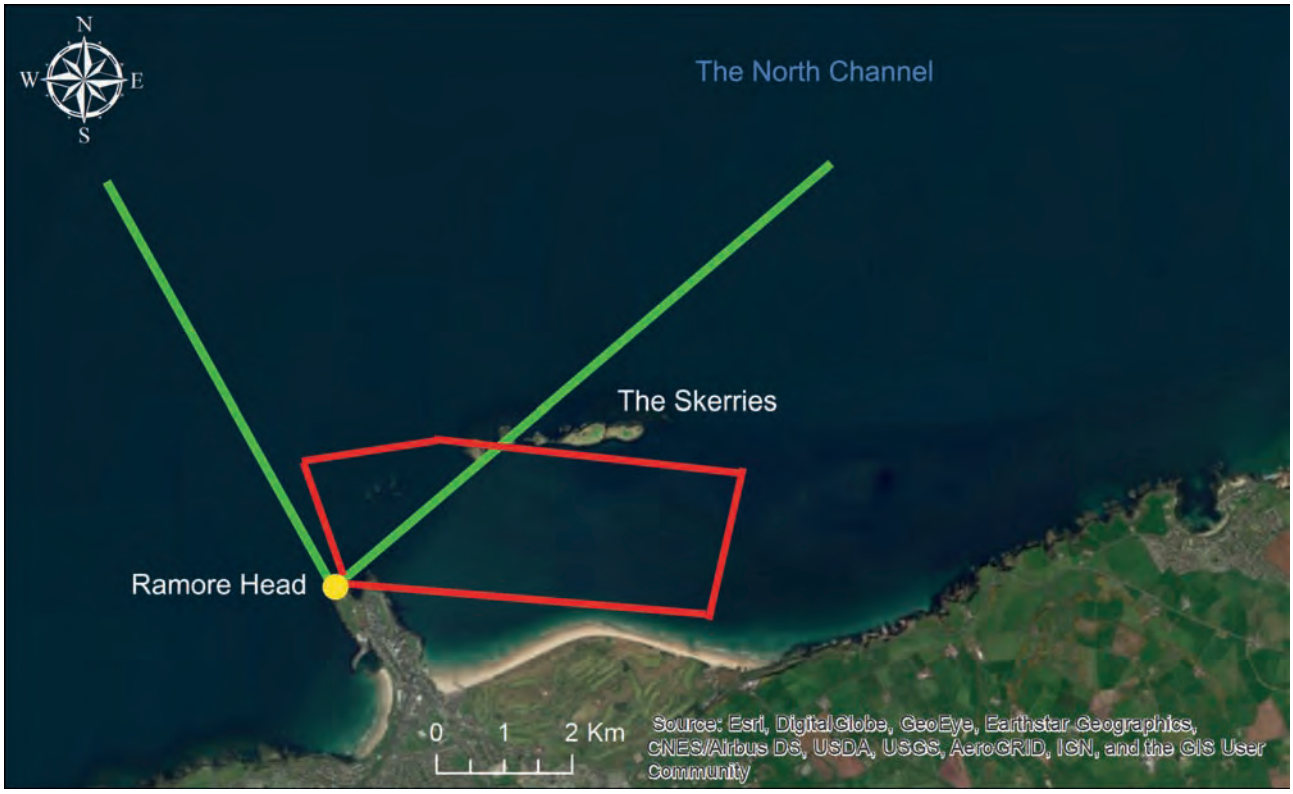
Figure 1: Typical flight lines of migrating seabirds at Ramore Head. Black arrow = main stream, shearwaters and skuas. White arrow = direction that geese and swans often appear from. Red arrow = close stream, storm-petrels, skuas, Grey Phalarope, Sabine's Gull.



Tactics

An early start is a must. Birds will be on the move at first light and the best birds often pass very early in the day, especially skuas. The hours between 10am and 2pm are often the quietest, with things picking up again in the afternoon. As most birds are passing from east to west, I tend to scan just beyond The Skerries through the scope and every now and then scan for anything moving closer in through binoculars (Figure 2). Always check overhead too, as flocks of geese often fly straight over your head. It is not uncommon for skuas to fly straight over the car park. The small bay just below the seawatch shelter is also worth checking for Grey Phalaropes. The main tactic I would suggest is putting in as much time as possible.

Figure 2: Guidance on where to look for passing seabirds. Red box: scan in this area with binoculars. Green section: scan this area with scope.



Birds

The main attraction has got to be the regular appearance of large numbers of Leach's Petrels following autumn gales (up to 500 in a day have been recorded). Many of these birds pass remarkably close in and some great photos have been taken from the rocks at Ramore. I have seen Leach's at Kilcummin Head in County Mayo and the Bridges of Ross in County Clare but the best views I have ever had are from Ramore. The same could be said for small skuas and Sabine's Gulls, which are often so close that bins are no longer required. It also gets large counts of skuas (e.g. 158 Great Skuas (*Stercorarius skua*) on 13th September 2012), which sometimes pass by in flocks. The other thing that sets it apart from other watch points is the mass arrival and range of returning wildfowl; for example, over 1000 Barnacle Geese have been recorded in a day. Every now and again something unusual is seen and the list of rare species recorded at this site rivals any in Ireland, with Fea's-type Petrel (*Pterodroma feae*), Little Shearwater (*Puffinus assimilis*), Wilson's Storm Petrel (*Oceanites oceanicus*) and Black-browed Albatross (*Thalassarche melanophris*) all seen here in the past.

The headland is also home to one of the largest wintering flocks of Purple Sandpipers (*Calidris maritima*) in Northern Ireland, with counts of up to 100 birds in some years. It is also one of the best Northern Irish sites for Twite (*Linaria flavirostris*), Snow (*Plectrophenax nivalis*) and Lapland Bunting (*Calcarius lapponicus*), and the nearby parks and gardens have thrown up the occasional passerine rarity in the past such as Yellow-browed Warbler (*Phylloscopus inornatus*) and Red-breasted Flycatcher (*Ficedula parva*). If seawatching is poor there are also some fantastic gull watching spots nearby such as Corbally Reservoir. The Bann Estuary is not that far away either, which is always worth checking in autumn for waders.

Strangford Lough tern productivity 2019

Shane Wolsey
Shane Wolsey Consulting Ltd.

OTTER, BY LIZ CUTTING / BTO

2019 is the second consecutive year that the National Trust engaged Shane Wolsey to undertake a season of intensive monitoring of the breeding terns at key colonies in Strangford Lough, specifically to assess the productivity of the three species of breeding tern (Sandwich *Thalasseus sandvicensis*, Common *Sterna hirundo* and Arctic Terns *S. paradisaea*) and to identify and quantify the impact of predation. This work is critically important if there is to be a better understanding of some of the causes behind the fall in numbers of nesting terns on Strangford Lough during the past decade.

Methodology

Island visits

During the 2019 breeding season 13 visits were made by a team of three observers was made by boat to the most important tern breeding islands, these being North Boretree Rock, Gabbock Island, Swan Island, Dunnyneill Island, Black Rock and Dunsy Rock (not all islands were visited every time).

Breeding numbers

Detailed counts of adults and nests (AONs - Apparently Occupied Nest) were conducted when possible using the following methods:

Species	Method	Notes
Sandwich Tern *Thalasseus sandvicensis*	On each island when it was thought the maximum number of nests had been laid, each nest was marked (identified) with a piece of pasta from a pre-counted bag of pasta. Number of pieces of pasta used equal number of nests. This standard method was not needed in 2019 except on Swan – and was conducted by the NT Ranger team.	This method only counts the nests on the particular day of the survey. Nests that are built and laid at a later date need to be accounted for separately. Tally mark nest counts were also used where smaller numbers of additional nests required counting.
Common Tern *Sterna hirundo*	Tally mark nest count, which included counting the number of eggs in each nest.	Method is suitable for smaller numbers of nests and can be repeated through season. Also see notes for Arctic Tern below.
Arctic Tern *Sterna paradisaea*	Tally mark nest count, which included counting the number of eggs in each nest.	Nests of Common Tern and Arctic Tern can be difficult to separate visually. Nest material and clutch size may be helpful (a full clutch of Common Tern normally has 3 eggs while Arctic Tern normally has just 2 eggs). Although far from ideal, it was necessary to count the nests of these two species, and then divide their number in the same proportion as the adults present.

Productivity

Productivity of Common Tern and Arctic Tern was assessed using an enclosure method as described in Method 1 of in Walsh et al 1995 on Gabbock Island and Dunnyneill Island. Productivity for these two species plus Sandwich Terns was assessed using a similar method on North Boretree Rock and Black Rock but in this instance using the whole of each island as the 'enclosure'.

In the enclosures on Gabbock and Dunnyneill every nest was individually marked (numbered). Within the enclosures the progress of each nest was followed, recording information on a Numbered Nest Record form and all chicks that reached three days old were ringed, and the subsequent progress of each chick towards fledging followed, recording the information on a Ringed Chick Record form. It is recognised that this system of assessing productivity has weaknesses, in part due to the enclosures only being monitored on a seven- to nine-day cycle. No young were actually seen to leave the enclosure – if they are not found dead within the enclosure (or elsewhere) then they simply stop being recorded as being present – and as such they could have been predated or could have fledged. In the absence of significant known predation this could be considered to reflect successful fledging, or in the presence of significant known predation, the absence of finding a chick could indicate that it had been predated and removed.

Predation monitoring

Monitoring for predation, or the presence of potential predators, was conducted on every island on every visit, and to assist with this trail cameras were deployed on all islands for the duration of the season. For details of predation monitoring methodology see Wolsey and Thurgate 2019. Note that as a result of findings during the 2018 season's monitoring, the first visiting 2019 involved the deployment of electric fencing on Gabbock, Dunnyneill, Black Rock and Dunsy Rock in an effort to deter otters from predating eggs, young and adult terns. Consent was obtained from the Department for Agriculture, Environment and Rural Affairs (DAERA) to install the electric fencing.

Results

By incorporating data gathered by this monitoring with additional data gathered by the NT Ranger Team, it has been possible to establish the minimum of the number of pairs of each species to breed within the lough, along with the productivity of each species. This is shown in Table 1.

Table 1: Number and productivity of breeding terns on Strangford. AON = Apparently Occupied Nests, or pairs.

	2018		2019	
Species	**AON**	**Productivity**	**AON**	**Productivity**
Sandwich Tern	776	0.20	455 -44% ↓	0.64 ↑↑
Common Tern	340	0.08	275 -19% ↓	0.86 ↑↑
Arctic Tern	193	0.01	252 +31% ↑	0.75 ↑↑

Table 1 shows that the number of Sandwich and Common Terns, particularly Sandwich, breeding within Strangford has declined between 2018 and 2019. The cause of this decline is not known but is likely to be related to the extensive predation in 2018 (and prior to that) that led to zero productivity on all islands except Swan Island. In contrast to a lough-wide decrease of 44%, Swan Island saw a 61% increase in the number of breeding Sandwich Terns in 2019.

Table 1 also shows the significant improvement there has been year on year in the productivity of all three species of tern. It is believed that this follows the deployment of the electric fencing, which, while not eliminating predation by Eurasian Otter (*Lutra lutra*), greatly reduced it. All islands suffered some otter predation, along with predation by a range of other species (gulls, Peregrine *Falco peregrinus*, other birds of prey), but no island saw the systematic predation leading to colony desertion that was evident in 2018.

As in 2018, the most significant predator after otter has been the Great Black-backed Gull (*Larus marinus*). Individual Great Black-backs have become 'specialists' in the predation of tern eggs and young, showing no fear of entering a tern colony, and great skill at predating eggs and young. It is thought that although the population

of Great Black-backs in Strangford is quite high, the number involved in tern predation is very small – but they have a significant impact.

Predation monitoring during the 2019 season involved reviewing 71,837 20-second-long video clips recorded during the 2019 season. These have helped to identify without any doubt some of the predatory activity within the tern colonies. What has been interesting is what they have not recorded – there was no evidence of predation by other mammalian predators (e.g. rats, American Mink *Neovison vison*, Pine Martin *Martes martes*, Red Fox *Vulpes vulpes*) on any island (although rats were found to be present on Dunsy Rock at the beginning of the season).

Otter on Gabbock on morning of 29/07/2019.

Discussion

In considering the productivity of the breeding terns on Strangford Lough the 2019 season proved to be very different from the 2018 season. The two factors that are thought to have particularly contributed to this difference are:

1. the birds in 2019 did not have to contend with a weather event that caused significant loss of nests and young, as they did in 2018 (Storm Hector on 14/06/2018); and
2. the deployment of electric fencing before the start of the 2019 season to deter Otters from predating adults, eggs and young is thought to have worked to some extent.

Despite there being no weather events that could be described as 'extreme' having a major negative impact on tern productivity, there was, nevertheless, plenty of rain during the 2019 season and on many occasions, this was heavy rain. There were many young terns that became soaked and died as a result, thus reducing tern productivity, but not catastrophically so.

During 2019 Otters remain significant predators of breeding terns, but their overall impact has been greatly reduced compared to 2018. Even though evidence of predation by otters was found on North Boretree Rock, Gabbock Island, Swan Island, Dunnyneill Island, Black Rock and Dunsy Rock – i.e. on all islands monitored – it is believed that the deployment of electric fencing on four of the islands has had a role in deterring otters from predating terns.

The impact of electric fencing is hard to quantify and appears to have been different on different islands – presumably where different Otters are involved. On Gabbock Island the electric fence seems to have been reasonably effective in the early part of the season, but from mid-season onwards it seems to have had little effect. The Otter predating on the island seems to have learnt to avoid the fence or to simply ignore the electric pulse – and consequently it predated young terns (and some gulls) with impunity.

On Dunsy Rock predation of adults and young terns by Otter seems to have been kept to a minimum through most of the season – it is hard to tell whether eggs were taken by otter early in the season – even though otter was present (recorded on video). Only at the very end of the season was there some quite limited predation. It is likely that the electric fence helped to deter the otter from roaming the island.

On Black Rock an Otter-predated European Shag (*Phalacrocorax aristotelis*) was found before the start of the breeding season, and before the electric fence was erected, indicating that Otter was present. However, throughout the rest of the season there was no sign of predation by Otter.

On Dunnyneill Island, despite there being the biggest population of breeding terns other than on Swan Island, there was no Otter predation through the breeding season until one event at the very end of the season when six birds (young gulls and terns) were found predated in very close proximity to each other at the western end of the colony. This was at a time when nearly all the young had fledged and therefore relatively safe.

It seems likely that the electric fences on Dunnyneill, Black Rock and Dunsy Rock were quite effective and greatly reduced the impact of predation by Otter. The fence on Gabbock was much less effective. Given that the fences were all of the same type it seems likely that the cause of the lesser effectiveness of the Gabbock fence was the boldness of the Otter involved.

Otter predation on Swan Island was considerable during 2019 having been absent in 2018. Its impact will not only have been on the individual birds that were predated (adults and young) but also on the remaining breeding birds through the disturbance it caused. However in 2019, whilst the impact has been significant, particularly on Common and Arctic Terns, it has not been overwhelming for Sandwich Terns.

Perhaps the most important predator of terns during 2019 were black-backed gulls, thought to be nearly all Great Black-backed Gulls. These were a constant predatory presence on North Boretree Rock, Gabbock Island, Dunsy Rock and Dunnyneill Island (where they were joined by Herring Gulls *L. argentatus*). They were present but seemed less effective on Black Rock, and they were not significant at all on Swan Island. It is believed that some of the Great Black-backed Gulls are 'specialist' tern predators. A video clip of a great black-back predating a Common Tern nest of Dunsy Rock shows the bird skilfully picking up and swallowing, without breaking, each of three eggs within as many seconds, and rapidly retreating. It was evident that that particular bird knew exactly what it was doing and how to do it most efficiently. It should be noted that the large population of Great Black-back Gulls resident in Strangford is not all focused on predation of tern nests, but it undoubtedly contains individuals who do focus on this source of prey.

Unlike in 2018, 2019 provided evidence of predation by other avian predators, including Peregrine and Buzzard (*Buteo buteo*). A number of video clips of Peregrine on the ground eating prey (terns and Black-headed Gull *Chroicocephalus ridibundus*) on Dunsy Rock were recorded, including one clip of the Peregrine being on the ground at night (or at least in the dark of very-early morning). A Peregrine and Buzzard were on the ground at the same time on Green Island Rock on 29/07 when there were the remains of five predated young Black-headed Gulls.

There were the remains of two young Black-headed Gulls on Dunsy Rock that are believed to be prey of a bird of prey, but not a Peregrine (the plucked primary and secondary feathers were snipped at the base, whereas those from a Peregrine predated bird are simply plucked and not snipped). There were also three young Sandwich Terns predated on Swan Island that looked as though they may have been predated by a bird of prey, but which one is not known.

It is almost certain that some predation was carried out by other avian predators – Common Gulls (*L. canus*), Black-headed Gulls, corvids – but no evidence of this was recorded and it is not thought to have been significant.

This second year of detailed monitoring of predation and tern productivity has shown that each year can be very different. This year (2019) has proved to be a much more successful year for the terns on Strangford Lough than 2018, although there were significantly fewer Sandwich Terns present. This success is thought to be the result of the absence of any severe weather event in 2019, and to the partial success of deterring predation by Otters through the deployment of electric fencing. The results of 2019 monitoring indicated that it will be important to continue detailed monitoring in future years, to continue to undertake otter deterrent actions including deployment of electric fencing and sonic deterrents but with continuous effort to innovate and refine deterrent actions.

Acknowledgments

Thanks to the National Trust for commissioning and funding this work, and particularly Andrew Upton and Hugh Thurgate (and the rest of Ranger Team) for enabling this work. Thanks also to Ron Price and Ashley Buchanan for their unstinting support in the field throughout the season.

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2019 Seabird Nesting Report for Strangford Lough and the Outer Ards

Hugh Thurgate
National Trust

SARAH KELMAN / BTO

Fieldworkers: Hugh Thurgate (17), Tomasz Ciesielski (2), Jasper Gallagher (1), Geoff Geddis (2), Will Hawkins (8), Jim McNair (13) Ruth Pinkerton (1), Sam Tanner (1)

Monitoring visits were undertaken on: May 9th, May 13th, May 15th, May 20th ,May 21st , May 22nd , May 23rd , May 28th , May 30th, June 6th, June 7th , June 10th , June 11th, June 14th , June 18th, June 19th, June 21st .

Species accounts

Cormorant *Phalacrocorax carbo*
Strangford Lough: 388 AON (Apparently Occupied Nests), Outer Ards 77 AON.
In 2019 the 'sub-colony' along the western fringe of Bird Island had moved northwards, with some birds nesting right up at the north western corner, almost at the tip of the island. The total nest count this year was the highest since 2012 which together with that of Burial Island (77 AON) means that the east coast of County Down remains the stronghold of this species in Northern Ireland.

Sandwich Tern *Thalasseus sandvicensis*
Strangford Lough: 434 AON, Outer Ards 61 AON
A count of six adults at the marina in Portaferry on March 8th was thought to represent a significant proportion of the overwintering population on Strangford Lough and the Upper Ards peninsula. Aerial Sandwich Tern were heard vocalising after 11pm on both April 7th and 8th in Killyleagh, courtship was underway for the first of the spring arrivals. The first hatched Sandwich Tern clutches were found on Swan Island on May 22nd of the three there was one hatched out of a clutch of two, one from a clutch of one and two from a clutch of two. All chicks were deemed to be in the first days of life. Given chicks can hatch two to three days apart, the eldest of these chicks may have hatched on May 19th and with the egg being laid sometime between April 25th and April 29th. Swan Island again had the biggest colony on the Lough, 269 AON, an increase of 61% on 2018 representing 62% of the total 2019 population. The colony dominated the top of the island nesting in numbers and at such a density that the later arriving common and Arctic Terns were restricted to the periphery of the island, the distribution they used to occupy before the shell bed was created on the top of the island in 2004. Productivity of Sandwich Tern was reasonably good for Swan Island, though a little bit down on 2018, as a result of some late season Eurasian Otter (*Lutra lutra*) predation. However productivity on the three other islands was good contrasting with 2018 which saw zero productivity away from Swan Island. For Strangford Lough as a whole a figure of 0.64 young fledging per pair was calculated contrasting with 0.2 for 2018. Despite a season of good overall productivity the total number of breeding pairs this year was disappointing and of concern with approximately half of the core Strangford population 'missing', bringing the breeding population below international significance at 0.59% of the biogeographic population but maintaining UK significance at 3.5% of the population and approximately 10% of the Irish population (Seabird 2000). Cockle Island had just 61 pairs nesting this year, down a third on 2018. This colony is now extremely susceptible to wash outs and will disappear in the next decade if the predicted rising sea levels occur.

Common Tern *Sterna hirundo*
Strangford Lough: 262 AON, Outer Ards: 21 AON
After last year's very poor annual productivity, 0.08 fledged young per pair, which was thought to have been typical of the recent fortunes of this species on the Lough, 2019 saw productivity figures of 0.86 a significant improvement and one which if maintained would see a population increase. Two hundred and sixty-two breeding pairs whilst disappointingly low still represents a nationally significant population at 2.2% of the UK population but is not of international significance at just 0.1% of the biogeographic population. The 2019 breeding population compares favourably with the eight year mean of 283 AON but well down on the eight year period before that, where the mean stood at 810 AON. Dunnyneill held almost exactly half of the Lough's population with nesting occurring, if all 'Commic' counts included some Common Tern, on 16 islands in total.

Arctic Tern *Sterna paradisaea*
Strangford Lough: 245 AON, Outer Ards: 255 AON
Similarly to Common Terns, Arctic Terns had a notably good year for productivity, with 0.75 young per pair contrasting with 0.01 in 2018. An annual figure of 0.7 young fledged per pair would result in a stable population. In terms of the number of breeding pairs, 2019 was the best year since 2010 with numbers akin to the those of the early noughties and not the atypically high numbers of the second half of the first decade of the new millennium. However, numbers remain below (0.45%) the nationally qualifying level which would be of concern regarding the SPA targets. Cockle Island alone held more Arctic Tern pairs (255) than the whole of the Strangford Lough islands put together.

Herring Gull *Larus argentatus*
Strangford Lough: 1,273 AON, Outer Ards: 199 AON
In light of the Herring Gull's red data listing the more than three-fold increase on Strangford Lough since 2007 would appear to be highly significant. An overall Lough count of 1,273 AON in 2019 was the highest count this millennium and almost exactly double that recorded in 2015.

Lesser Black-backed Gull *Larus fuscus*
316 AON
By contrast to its close cousin the Herring Gull, Lesser Black-back Gull numbers have remained relatively stable over the last decade. Their main colony exists in the large Herring Gull colony on Green Island, Killyleagh, but Ogilby Island which has only recently been colonised is fast approaching as a contender as the Lough's biggest colony with 66 AON recorded in 2019.

Greater Black-backed Gull *Larus marinus*
Strangford Lough: 129 AON, Outer Ards: 42 AON
Although breeding numbers were slightly down on 2018, this was the fourth consecutive year of over a hundred pairs Lough wide and 107 AON represents 4.6% of the Seabird 2000 population estimate of 2,312 for the island of Ireland.

Black-headed Gull *Chroicocephalus ridibundus*
588 AON Outer Ards: 239 AON
Numbers of breeding Black-headed Gull on the Lough are a pale shadow of their former selves but have actually remained very stable since 2011 if the population at Castle Espie is included in the totals. By far and away the largest colony in recent years is on Swan Island and its continued success here could be vitally important if Strangford Lough is to hold onto its declining Sandwich Tern population, as this species often nests in close association with Black-headed Gulls. It is no coincidence that the largest Sandwich Tern colony in 2019 also occurred on Swan Island.

Common Gull *Larus canus*
346 AON, Outer Ards: 5 AON
Apparently poor productivity in this species over recent years hasn't yet had an impact on the breeding adult population, in fact 346 breeding pairs in 2019 represented the best count since 2012.

Mediterranean Gull *Larus melanocephalus*
0 AON

In 2018 both pairs of Mediterranean Gulls appeared to successfully fledge young and so it was hoped that they would return in 2018 and this would mark the establishment of this species on the Lough. However in 2019 there was no sign of this species anywhere on the Lough and there was an absence of the usual early spring records of birds flying overhead in the Quoile estuary and in the vicinity of Killyleagh. This species remains tantalisingly unpredictable on Strangford Lough despite the burgeoning population at Lady's Island Lake and what looks like an establishing population in Belfast Lough.

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Marine Protected Area Management and Monitoring Programme (MarPAMM) in the Republic of Ireland

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KITTIWAKE COLONY, NEWCASTLE, CO. DOWN. KENDREW COLHOUN

The Marine Protected Area Management and Monitoring Programme (MarPAMM) is a €6.4 million EU funded cross-border environment project, designed to develop new tools for monitoring and to trial new approaches to managing a number of protected coastal & marine environments in Ireland, Northern Ireland and Western Scotland. The projects trans-boundary nature adds considerable strength in many ways, not least makes a great deal of sense due to the fact that many marine species and habitats do not abide by administrative borders. From 2018 to 2022 more than 45 staff from seven partner organisations with diverse expertise and experience in marine conservation, marine research, habitat mapping, modelling, stakeholder engagement, project management and communication are collaborating to support effective management of protected marine species and habitats in the project area. The partnership brings together statutory organisations (Agri-Food and Biosciences Institute, Marine Scotland, and Scottish Natural Heritage) with academic institutions (University College Cork, Ulster University, Scottish Association for Marine Science) and a Non-Governmental Organisation with proven expertise in a relevant field (BirdWatch Ireland). Stakeholders with detailed local area knowledge are, however, at the heart of MarPAMM. The parallel INTERREG Compass and Swell projects also add considerable opportunities for cross-project working, data sharing and collaboration.

Seven work packages deliver MarPAMM's full range of outputs, with BirdWatch Ireland (BWI) contributing to two: (1) Seabird Monitoring and Modelling and (2) MPA Management Plans. The Seabird Monitoring and Modelling work package for the Republic of Ireland is being undertaken by BWI staff along the coasts of Co. Sligo, Co. Donegal and Co. Louth. In 2018, the project's primary focus was to census a range of species in these areas. Population counts of cliff nesting seabirds, such as Black-legged Kittiwake (*Rissa tridactyla*), Northern Fulmar (*Fulmarus glacialis*), Razorbill (*Alca torda*), Black (*Cepphus grylle*) and Common Guillemot (*Uria aalge*), Shag (*Phalacrocorax aristotelis*), Cormorants (*Phalacrocorax carbo*) and all gull species were conducted via land- and boat-based surveys. Burrow nesting seabird surveys of European Storm Petrel (*Hydrobates pelagicus*) were performed on offshore islands, as they will only breed at rodent-free areas to avoid egg/chick predation, which are usually uninhabited islands. These population estimates will feed directly into MarPAMM's Management Plans work package but also will contribute to the ongoing work of Seabirds Count.

The 2019 field season concentrated on two main objectives; monitoring productivity and tracking seabird movements at selected sites. Breeding success of Kittiwake was recorded at several Sligo and Donegal colonies, building on existing productivity monitoring data.

We fitted a range of GPS tags and geolocators to several seabird species to help us understand, through their movements, how they use their environment, important foraging sites in the breeding season and their winter distribution. To date, there has been very little tracking of seabirds in Irish colonies within this sea area (limited to several species tracked from Rathlin, Black Guillemots from Bangor and Copeland, and Manx Shearwaters from Copeland). Foraging data is of significant use when assessing the relative importance of sea areas of interest. It underpins the ability for ecological niche modelling for the range of species which utilise the area for foraging during the breeding season, and in particular, marine management planning.

We fitted small (4g) remote-download GPS tags to breeding Kittiwakes at a colony on the east coast, tracking the movements of provisioning birds for around one week (getting locations at 20-minute intervals). These and other birds in the Newcastle/Bloody Bridge colony were fitted with engraved colour-rings as part of a new BTO CES

programme. Also, to investigate winter movements, a sample of 20 Kittiwakes from both here and Rockabill were fitted with SEATRACK-funded geolocators.

The foraging behaviour of large gulls (Herring *Larus argentatus*, Lesser Black-backed *L. fuscus* and Great Black-backed *L. marinus*) has not been intensively studied in this sea area but complementary on-going studies (Clyde Mursheil and the BTO in Belfast) may provide useful information on the importance of the marine environment for our work. The large wintering populations of gulls associated with various fishing ports including Killybegs in Donegal Bay have in part prompted us to try and gain a better understanding of the year-round usage of Donegal Bay by breeding gulls. Consequently, we identified two suitable colonies on islands off Donegal/Sligo (Inishmurray and Inishtrahull). To date, a total of 18 gulls (Herring Gull n=9; Lesser Black-backed Gull n=9) were fitted with solar charging GSM/GPS (15g or 20g Ornitela Ornitrack) tags using a weak-link backpack Teflon harnesses. In addition to attaching tracking devices, engraved colour-rings were fitted to adult and young large gulls of all 3 species in order to build up a picture of the wider dispersal of these species – supplementing the information arising from the necessary restricted sample of GPS tagged individuals. Re-sighting of these colour-ringed gulls can be submitted to BWI MarPAMM via kcolhoun@birdwatchireland.ie.

During the MarPAMM project, we will be undertaking aerial surveys of marine waters (Donegal Bay and Carlingford Lough) and winter bird surveys of Divers, Grebe and sea duck along coastal sites of Donegal and Louth. These are on-going at present. Plans for 2020 will include much more and more diverse tracking work across a range of species in colonies in the west and east further informing seabird modelling work.

Fulmar fitted with a tarsal-mounted Global Location Sensing (GLS) tag, or 'geolocator'. Kendrew Colhoun.

Appendix: Species Counts

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Table 7: Cumulative counts (N) of all species of seabird (excluding Black Guillemot) within Seabird Monitoring Programme (SMP) 'Master Sites' in Northern Ireland between 2015 and 2019. The number of sub-sites surveyed in a Master Site, an indication of relative survey effort between years, is included in brackets next to the count unless the sub-sites were not specified (NR = not recorded). Hyphens (-) denote that no data were collected. Seabirds are counted using recommended census units from Table 3, unless specified with the record.

		2015	2016	2017	2018	2019
Species (count units)	**Master Site**	**N (sites)**	**N (sites)**	**N (sites)**	**N (sites)**	**N (sites)**
Fulmar (AOS)	Downhill	135 (6)	78 (4)	81 (4)	88 (6)	95 (5)
	North Antrim Coast	16 (10)	37 (10)	38 (10)	16 (9)	21 (4)
	Rathlin Island	-	-	28 (3)	25 (3)	10 (NR)
	Giants Causeway Coast	-	-	-	55 (5)	134 (2)
	Causeway Coast	-	-	-	84 (1)	100 (3)
	East Antrim Coast	31 (21)	45 (16)	60 (11)	34 (12)	40 (14)
	Larne Lough to Portmuck	2 (2)	2 (1)	6 (1)	2 (1)	3 (1)
	Muck Island	52 (1)	68 (1)	80 (1)	72 (1)	43 (1)
	The Gobbins	201 (5)	290 (NR)	310 (NR)	326 (5)	215 (5)
	Islandmagee South	0 (1)	-	-	-	-
	Blackhead	3 (1)	3 (1)	29 (1)	30 (1)	31 (1)
	Whitehead	3 (1)	3 (1)	5 (1)	7 (1)	5 (1)
	Copeland Islands	-	-	-	6 (1)	8 (1)
	Maggy's Leap to Newcastle	12 (1)	-	-	-	-
	Maggy's Leap	-	-	1 (1)	-	2 (1)
Cormorant (AON)	The Skerries	64 (1)	-	60 (1)	94 (1)	137 (1)
	Sheep Island	66 (1)	84 (1)	100 (1)	88 (1)	-
	The Gobbins	0 (5)	12 (NR)	13 (NR)	12 (5)	0 (5)
	Outer Ards	-	-	-	53 (7)	77 (7)
	Strangford Lough	245 (NR)	343 (NR)	360 (NR)	314 (NR)	388 (25)
Shag (AON)	Downhill	3 (2)	0 (4)	-	0 (6)	38 (1)
	North Antrim coast	2 (1)	1 (10)	1 (10)	2 (9)	0 (7)
	The Skerries	64 (1)	-	-	-	-
	Sheep Island	66 (1)	-	-	-	-
	Rathlin Island	42 (NR)	47 (NR)	51 (NR)	55 (NR)	-
	The Maidens	-	-	-	20	-

	Muck Island	17 (1)	21 (1)	30 (1)	34 (1)	38 (1)
	The Gobbins	20 (5)	22 (NR)	20 (NR)	25 (5)	20 (5)
	Maggy's Leap to Newcastle	4 (1)	3 (1)	-	-	0 (1)
	Donard Cove	3 (1)	3 (1)	5 (1)	-	9 (1)
Great Skua (AOT)	Rathlin Island		1 (NR)	1 (NR)	1 (NR)	1 (NR)
Kittiwake (AON)	Downhill	92 (2)	-	-	0 (6)	0 (5)
	North Antrim coast	207 (10)	279 (10)	236 (10)	293 (9)	332 (6)
	Rathlin Island	-	-	340	313 (3)	56 (NR)
	Muck Island	225 (1)	351 (1)	369 (1)	314 (1)	519 (1)
	The Gobbins	835 (5)	1,072 (NR)	1,053 (NR)	683 (5)	1145 (5)
	Maggy's Leap to Newcastle	483 (1)	-	-	513 (1)	671 (1)
	Donard Cove (formerly Maggy's Leap)	86 (1)	78 (1)	76 (1)	68 (1)	91 (1)
Mediterranean Gull (AON)	Larne Lough	5 (2)	5 (2)	2 (2)	5 (2)	0 (2)
	Belfast Harbour	-	2 (1)	5 (1)	7 (1)	3 (1)
	Strangford Lough	1 (NR)	0 (NR)	0 (NR)	2 (NR)	0 (25)
	Lower Lough Erne	1 (NR)	1 Ind (NR)	1 (NR)	1 Ind (NR)	1 Ind (NR)
	Lough Neagh and Lough Beg (Antrim)	-	1 Ind (9)	-	2 Ind (8)	-
Black-headed Gull (AON)	Larne Lough	1,825 (2)	3,102 (2)	3,060 (2)	2,895 (2)	2,618 (2)
	Belfast Harbour	~450 (1)	386 (1)	717 (1)	607 (1)	560 (1)
	Outer Ards	135 (NR)	67 (NR)	93 (7)	189 (7)	239 (7)
	Strangford Lough	1,265 (NR)	1,312 (NR)	1,524 (NR)	1,267 (NR)	1,305 (25)
	Carlingford Lough	1 (1)	-	-	-	-
	Lower Lough Erne	1,026 (NR)	1,238 (NR)	1,216 (NR)	1,218 (NR)	1,718 (NR)
	Moorlough Lake	0 (1)	66 Ind (1)	-	93 (1)	-
	Lough Vearty	5 (1)	-	0 (1)	-	-
	Lough Neagh and Lough Beg (Londonderry)	-	250 Ind (2)	-	40 (3)	-
	Lough Neagh and Lough Beg (Antrim)	95 (1)	4,565 Ind 95 AON (9)	115 (1)	4,368 Ind 191 AON (8)	-
	Lough Neagh and Lough Beg (Tyrone)	-	6,750 Ind (4)	-	4,250 Ind (3)	-
	Lough Neagh and Lough Beg (Armagh)	-	30 Ind (6)	-	118 Ind (5)	-
	Antrim Town	-	15 (1)	-	-	-
Common Gull (AON)	Rathlin Island	76 (NR)	84 (NR)	70 (NR)	62 (NR)	21 (NR)
	East Antrim Coast	-	-	22 Ind (1)	-	-
	Larne Lough	24 (NR)	27 (NR)	32 (NR)	37 (NR)	9 (1)
	Muck Island	20 (1)	-	51 Ind (1)	-	0 (1)
	Outer Ards	-	1 (NR)	9 (7)	10 (7)	21 (7)
	Copeland Islands	-	-	-	15 (1)	30 Ind (1)
	Strangford Lough	229 (NR)	333 (NR)	322 (NR)	293 (NR)	346 (25)
	Carlingford Lough	1 (1)	3 (1)	6 (1)	6 (1)	9 (1)
	Lower Lough Erne	163 (NR)	189 (NR)	143 (NR)	262 (NR)	337 (NR)
	Moorlough Lake	0	-	-	-	-
	Lough Vearty	16 (1)	3 (1)	8 Ind (1)	-	-
	Lough Galboly	0	-	22 Ind (1)	-	13 Ind (1)
	Lough Neagh and Lough Beg (Armagh)	-	15 (6)	-	0 (8)	-

Lesser Black-backed Gull (AON)	Belfast Harbour	-	-	1 (1)	1 (1)	-
	Belfast (city centre)	-	-	-	101 (1)	221 (1)
	Copeland Islands	-	-	-	365	547 (1)
	Strangford Lough	433 (NR)	298 (NR)	343 (NR)	310 (NR)	316 (25)
	Lower Lough Erne	1,211 (NR)	1,185 (NR)	1,316 (NR)	1,622 (NR)	1,584 (NR)
	Lough Neagh and Lough Beg (Londonderry)	-	0 (2)	-	230 Ind 20 AON (3)	-
	Lough Neagh and Lough Beg (Antrim)	-	980 Ind (9)	-	830 Ind (8)	-
	Lough Neagh and Lough Beg (Tyrone)	-	353 Ind (4)	-	360 Ind (3)	-
	Lough Neagh and Lough Beg (Armagh)	-	390 Ind (6)	-	612 Ind 3 AON (5)	-
	Antrim Town	-	600 (1)	-	-	-
Herring Gull (AON)	The Gobbins	2 (5)	2 (NR)	1 (NR)	-	0 (5)
	Belfast (city centre)	-	-	-	16 (1)	39 (1)
	Outer Ards	-	-	-	187 (3)	199 (7)
	Copeland Islands	-	-	-	483 (1)	483 (1)
	Strangford Lough	679 (NR)	1,177 (NR)	1,070 (NR)	1,061 (NR)	1,273 (51)
	Maggy's Leap to Newcastle	4 (1)	-	-	-	0 (1)
	Donard Cove	-	-	-	-	1 (1)
	Carlingford Lough	-	0 (1)	-	-	1 (1)
	Lower Lough Erne	4 (NR)	5 (NR)	5 (NR)	5 (NR)	3 (NR)
	Antrim Town	-	15 (1)	-	-	-
Great Black-backed Gull (AON)	The Maidens	-	-	-	8 Ind (1)	-
	Muck Island	1 (1)	-	2 (1)	2 (1)	0 (1)
	The Gobbins	2 (5)	1 (NR)	2 (NR)	2 (5)	0 (5)
	Outer Ards	-	-	-	40 (3)	42 (7)
	Strangford Lough	62 (NR)	125 (NR)	114 (NR)	129 (NR)	107 (25)
	Maggy's Leap to Newcastle	3 (1)	-	-	-	-
	Donard Cove	-	-	2 (1)	-	1 (1)
	Carlingford Lough	2 (1)	2 (1)	2 (1)	4 (1)	0 (1)
	Lower Lough Erne	2 (NR)	4 (NR)	4 (NR)	2 (NR)	3 (NR)
	Lough Neagh/Lough Beg (Armagh)	-	1 (6)	1 (1)	1 (5)	-
Sandwich Tern (AON)	Larne Lough	694 (2)	1,229 (2)	1,141 2)	732 (2)	1,010 (2)
	Outer Ards	0 (1)	0 (1)	-	92 (3)	61 (7)
	Strangford Lough	581 (NR)	337 (NR)	775 (NR)	776 (NR)	434 (25)
	Carlingford Lough	250 (1)	7 (1)	71 (1)	13 (1)	24 (1)
	Lower Lough Erne	138 (NR)	226 (NR)	316 (NR)	250 (NR)	230 (NR)
Common Tern (AON)	Larne Lough	353 (2)	333 (2)	355 2)	307 (2)	303 (2)
	Belfast Harbour	344 (1)	418 (1)	367 (1)	385 (1)	672 (1)
	Belfast Channels	7 (1)	12 (1)	13 (1)	-	17 (1)
	Outer Ards	3 (NR)	18 (NR)	23 (7)	17 (7)	21 (7)
	Strangford Lough	401 (NR)	457 (NR)	262 (NR)	340 (NR)	262 (25)
	Carlingford Lough	220 (1)	123 (1)	147 (1)	70 (1)	56 (1)
	Lower Lough Erne	30 (NR)	41 (NR)	51 (NR)	52 (NR)	54 (NR)
	Moorlough Lake	0 (1)	4 (1)	-	2 (1)	-
	Lough Neagh and Lough Beg (Antrim)	84 (1)	240 Ind 75 AON (9)	271 Ind 102 AON (4)	246 Ind 135 AON (8)	-
	Lough Neagh and Lough Beg (Armagh)	-	3 Ind (6)	60 Ind (1)	123 Ind (5)	-
Roseate Tern (AON)	Larne Lough	1 (2)	1 (2)	1 (2)	1 (2)	1 (2)

Arctic Tern (AON)	Larne Lough	1 (2)	0 (2)	0 (2)	0 (2)	0 (2)
	Belfast Harbour	83 (1)	4 (1)	0 (1)	15 (1)	15 (1)
	Outer Ards	105 (NR)	43 (NR)	269 (7)	343 (7)	255 (7)
	Copeland Islands	-	-	-	46 (1)	75 AON, 150 Ind (2)
	Strangford Lough	194 (NR)	173 (NR)	73 (NR)	193 (NR)	245 (25)
	Carlingford Lough	85 (1)	41 (1)	20 (1)	70 (1)	50 (1)
Common Guillemot (Ind)	Rathlin Island	-	-	3,470 (3)	3,454 (3)	-
	Muck Island	2,070 (1)	2,926 (1)	2,554 (1)	2,478 (1)	2,782 (1)
	The Gobbins	2137 (5)	2,675 (5)	2,326 (5)	2,284 (5)	2,617 (5)
Razorbill (Ind)	Rathlin Island	716 (NR)	698 (NR)	707 (3)	683 (3)	-
	Muck Island	671 (1)	1,048 (1)	799 (1)	736 (1)	1,118 (1)
	The Gobbins	506 (5)	858 (5)	560 (5)	882 (5)	679 (5)
Puffin (Ind)	Rathlin Island	3 (NR)	5 (NR)	6 (3)	3 (3)	-
	The Gobbins	63 (5)	52 (5)	57 (5)	55 (5)	54 (5)
	Copeland Islands	-	-	-	100 Ind, est 11 AOBs	106 (1)

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