Northern Ireland Seabird Report 2018

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Northern Ireland Seabird Report 2018

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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Editorial

This is the sixth edition of the Northern Ireland Seabird Report, covering 2018. 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). Organisations such as the National Trust, Ulster Wildlife and the Royal Society for the Protection of Birds (RSPB) are important contributors through the provision of data for 2018 and previous years, and provide advice and guidance from their expert staff.

As always, 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 RSPB, Ulster Wildlife and the National Trust. We are 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. Due to the introduction of General Data Protection Regulation (GDPR) in 2018, there have been changes in the law which affect how we can contact people and store personal details such as email addresses. Seabird Network members were required to provide their explicit consent for us to retain their name and email address, which has led to our member list reducing from 76 to 49 people in 2018. It is important therefore that volunteers who are interested in staying connected to the Northern Ireland Seabird Network for news and surveys make sure that the Seabird Coordinator, Katherine Booth Jones (katherine.boothjones@bto.org) has their details.

This 2018 report on breeding seabirds in Northern Ireland follows the format of the preceding reports. We have kept the 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 Report. These articles provide further detail on seabird monitoring in Northern Ireland, and highlight some of the exciting seabird research being undertaken. We are very grateful to the authors for giving their time to produce these articles.

We would like to thank everyone who has contributed to this report and to encourage more people to join the Seabird Network. We 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.

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, as we are aware, so if you have additional seabird population data, either recent or historic, then please share it with us and JNCC, for the benefit of seabirds in Northern Ireland.

Shane Wolsey
BTO NI Officer

Katherine Booth Jones
BTO NI Seabird Officer and Seabird Coordinator

February 2019

Seabird Monitoring Overview

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 seabirds in the UK and Ireland. However, Operation Seafarer also highlighted major problems in accurately counting some species, namely European Storm Petrels *Hydrobates pelagicus*, Leach's Storm Petrels *Oceanodroma leucorhoa*, Manx Shearwaters *Puffinus puffinus*, Razorbills *Alca torda*, Common Guillemots *Uria aalge*, Black Guillemots *Cepphus grylle* and Atlantic Puffins *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 coordinated 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 (http://jncc.defra.gov.uk/page-7413) (JNCC 2017), has been developed by the SMP Partnership and is coordinated by JNCC. Data collection for the current census is being undertaken between 2015 and 2019, although this may be extended into 2020 to maximise the coverage of the census. The continued support of the seabird surveying network in Northern Ireland who have contributed to this report will be vital, especially to fill monitoring gaps.

The National Seabird Monitoring Programme

Since 1986, seabird populations in the UK and Ireland have been monitored through the Seabird Monitoring Programme (http://jncc.defra.gov.uk/page-1550) coordinated on behalf of partnership organisations by JNCC. Sample 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 short term or more immediate measure of population status.

Studies at four key sites (Isle of May, Canna, Fair Isle and Skomer) provide information on adult survival, diet, phenology used to help to diagnose the changes in abundance. Additional information on survival rates at other sites is 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 expressed as a percentage of the population recorded at sites in 1986 when standardised monitoring began (JNCC 2016). 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. The Coordinator works closely with JNCC to ensure that all monitoring data collected feeds into the 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), and coordinates monitoring in Northern Ireland. At the outset, a Seabird Steering Group was formed to advise on the development of the Northern Ireland Strategy for Seabird Monitoring and to advise on the evolution of a Northern Ireland wide group of volunteers and the programme of activities that the Seabird Coordinator is undertaking. A network of seabird surveyors and researchers in Northern Ireland has been created through the work of the Coordinator (the Northern Ireland Seabird Network). The five year plan extended to 2018 and in the future the Seabird Coordinator role is included in the duties of the new BTO Science Officer for Northern Ireland.

The Northern Ireland Strategy for Seabird Monitoring

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.

The strategy 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.

The Northern Ireland Site Register

During 2013 a full register of all known, possible or potential seabird nesting sites, which is consistent with the SMP site register, was created. 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 sites, for example along a 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 JNCC database, a separate site register is maintained for Black Guillemot.

Breeding Seabirds in Northern Ireland in 2018

Katherine Booth Jones
BTO NI Science Officer and Seabird Coordinator

The following species accounts summarise the known status of each breeding seabird species in Northern Ireland (see Table 1). Those accounts also provide a summary of population trends at the main breeding sites, where data exists. 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]
Northern Fulmar	N	GREEN	AMBER
Manx Shearwater	N	AMBER	AMBER
European Storm-petrel*	N	AMBER	AMBER
Great Cormorant	N	AMBER	GREEN
European Shag	N	AMBER	RED
Great Skua	N	AMBER	AMBER
Black-legged Kittiwake	N	AMBER	RED
Black-headed Gull	Y	RED	AMBER
Mediterranean Gull	N	AMBER	AMBER
Common Gull	N	AMBER	AMBER
Lesser Black-backed Gull	N	AMBER	AMBER
Herring Gull	Y	RED	RED
Great Black-backed Gull	N	AMBER	AMBER
Little Tern*	Y	AMBER	AMBER
Sandwich Tern	N	AMBER	AMBER
Common Tern	N	AMBER	AMBER
Roseate Tern	Y	AMBER	RED
Arctic Tern	N	AMBER	AMBER
Common Guillemot	N	AMBER	AMBER
Razorbill	N	AMBER	AMBER
Black Guillemot	N	AMBER	AMBER
Atlantic Puffin	N	AMBER	RED

[1] NI Priority species are those identified during the preparation of the NI Biodiversity Strategy (2002) and, subsequently, using criteria set out by stakeholders (http://www.habitas.org.uk/priority/).
[2] Birds of Conservation Concern in Ireland 3 (Colhoun & Cummins 2013).
[3] UK Birds of Conservation Concern 4 (Eaton *et al.* 2015).
* 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 NI Seabird Network, and was based on relatively low coverage of some species' populations (Colhoun & Cummins 2013). The authors of the BoCCI recommend a six-year interval for revising the list, therefore new data collected by the network will undoubtedly be of use to the next assessment.

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, which supports the largest European colony for the species at Rockabill in Dublin (Leonard & Wolsey 2016), but remains a critically endangered breeding species in Northern Ireland.

Seabird surveys of abundance (breeding numbers) and breeding success in the UK and Ireland are undertaken using standard survey guidelines for each species (Walsh *et al.* 1995) and entered into a central database (http://jncc.defra.gov.uk/smp/). Tables 2 and 3 briefly outline the survey units and methods used for estimating the numbers of each species under consideration in Northern Ireland. For further information please refer to Walsh *et al.* (1995).

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.

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-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. 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 Northern 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 Petrels	AOB	Storm Petrels do not currently breed in Northern Ireland, therefore no recommendations are specifically made here.

Species accounts are structured as follows:

Overview – a description of their basic ecology, points of interest and a brief summary of the main breeding sites for the species in Northern Ireland.

Breeding numbers – a summary of current knowledge on breeding numbers (abundance) in Northern Ireland, with historical trends where data are available, and comparison with UK populations and trends, which are available up to 2015 (JNCC 2016). Graphs show population trends, and, unless otherwise stated, gaps in graphs mean no count was carried out during that year.

Breeding success – a summary of current knowledge on breeding success in Northern Ireland, and comparison with UK populations as reported by the JNCC (which, as above are available up to 2015: JNCC 2016). For species with sufficient data for visualisation (Fulmar, Shag and Kittiwake), 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 a local polynomial regression fitting method ('loess') in the R package 'ggplot2', version 2.2.1 (R version 3.4.1). The curve is presented with a standard error confidence interval around the smoothed curve. However, this method of presenting a general trend is based on small sample sizes and is not weighted for samples size per site, and is therefore best used as a quick visual representation only and should be interpreted with caution.

A table detailing specific counts of breeding numbers at defined Seabird Monitoring Programme Master Sites in Northern Ireland between 2015 and 2018 can be found in Table 10 in the Appendix on page 69.

Northern Fulmar *Fulmarus glacialis*

EC Birds Directive – migratory species
Green listed in the Birds of Conservation Concern in Ireland 3 (2014–2019)

Overview

Northern Fulmars (Fulmars) are one of the commonest seabirds in Britain and adult birds are present in UK waters all year round. Their food comes from a wide variety of sources including zooplankton, fish and fishing discards. 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). Fulmars nest in loose colonies and can utilise relatively small cliff faces, sometimes several miles inland. During the incubation stage of their breeding cycle, Fulmars can range an incredible 2,890 km from the colony in search of food (Edwards *et al.* 2016).

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.

Breeding numbers

Long-term data are available for The Gobbins (Figure 1), Rathlin Island (Figure 2) and Muck Island (Figure 3), although not on an annual basis. The Gobbins held 326 AOSs in 2018, the highest ever total recorded for the third year in a row. Numbers on Muck Island were down slightly on 2017, with 72 AOSs. Away from these sites, there were fewer AOSs in 2018 than in 2017 (Table 10). 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.

The UK population increased by approximately 77%, and the Northern Ireland population by 58% between the 1969–1970 and 1985–1988 censuses. Across the UK the Fulmar population then decreased by 3% between 1985–1988 and 1998–2002, while the population in Northern Ireland increased by another 69% (JNCC 2016). Since that date numbers in Northern Ireland have generally decreased, and a similar trend has also been seen in the breeding abundance index across the UK (JNCC 2016).

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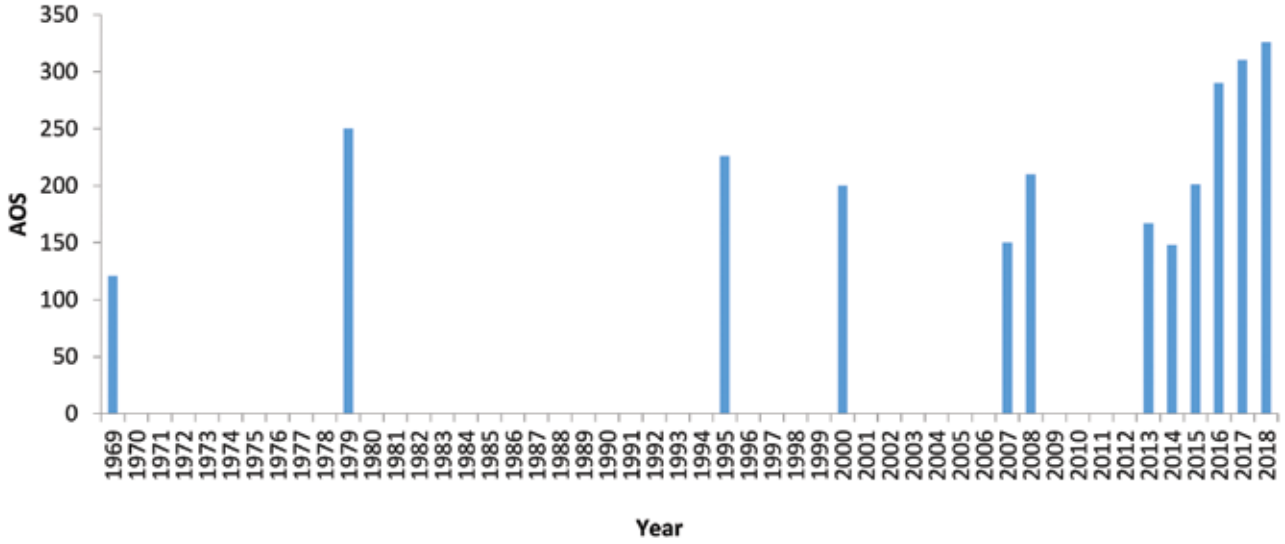

Figure 1 Northern Fulmar numbers (AOSs) at The Gobbins, 1969–2018.

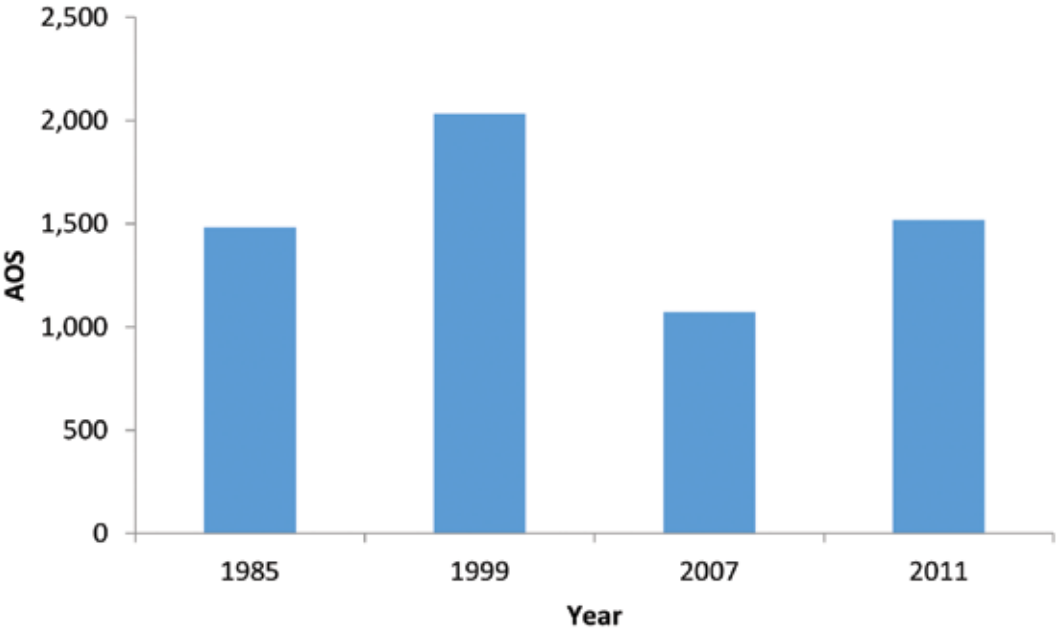

Figure 2 Northern Fulmar numbers (AOSs) on Rathlin Island, 1985–2011.

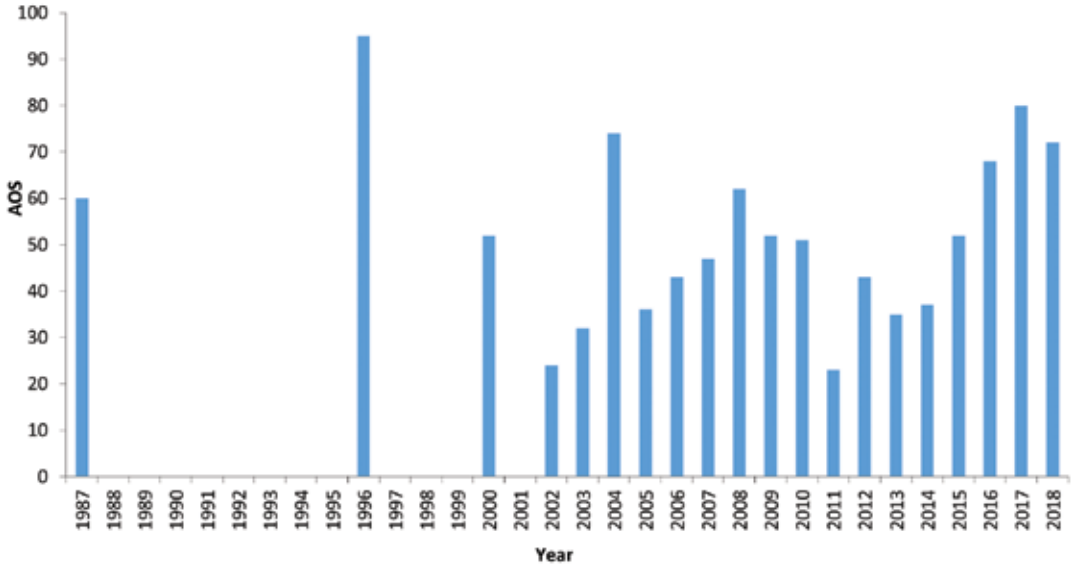

Figure 3 Northern Fulmar numbers (AOSs) at Muck Island, 1987–2018.

Breeding success

In Antrim, breeding success data were collected for The Gobbins (0.38 chicks/AOS, lower than the 0.45 chicks/AOS recorded between 2014 and 2016), Portmuck (1.00 chicks/AOS, higher than in 2017). In 2016, very few chicks fledged from Muck Island, even when birds on the nearby cliffs 400m away on the mainland Gobbins site were productive, with predation by Brown Rats (*Rattus norvegicus*) on Muck Island being a possible cause of the difference. Ulster Wildlife have since performed an eradication project on the island, declaring it rat-free in 2018 (see page 48 for an account of the eradication project), which may have led to the increase from 0.34 chicks per AOS in 2017 to 0.42 chicks per AOS this year. Since invasive mammalian predators are one of the top threats to seabird populations (Croxall *et al.* 2012), the eradication of rats on Muck may result in higher breeding productivity for the seabirds nesting there in the future. This year's average breeding success across all sites was higher (0.50 chicks/AOS) than the recent UK average (JNCC 2016).

Breeding success data were also collected for sites on the north coast, where productivity was on average 0.45 chicks/AOS, and at Portmuck, which had the highest recorded productivity in 2018 of 1 chick/AOS (Figure 4). Over the past five years, Fulmar productivity has been highly variable between sites and breeding seasons, although this year has seen a slight increase overall (Figure 4).

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 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.

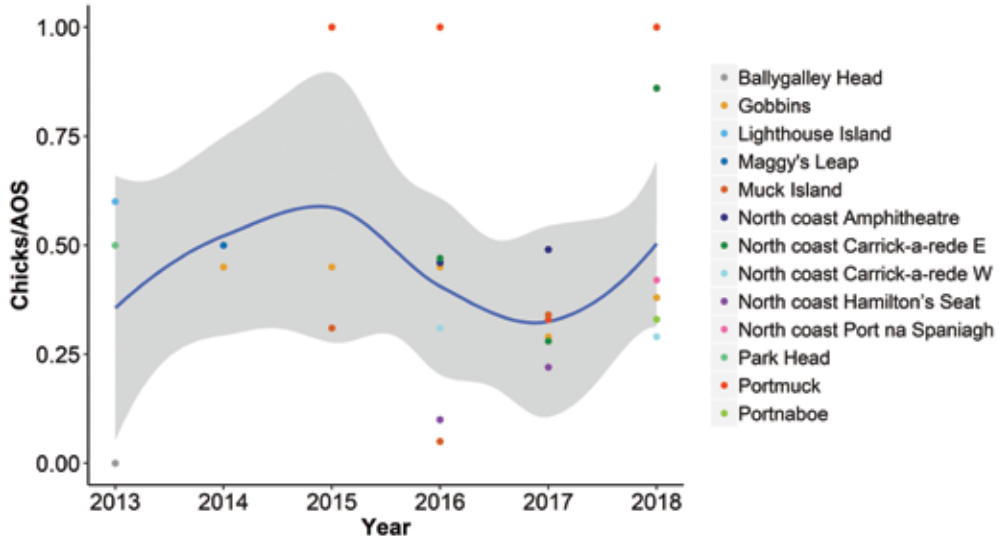

Figure 4 Productivity (chicks/AOS) for Fulmar between 2013 and 2018. The curve (blue line) represents the trend in Fulmar productivity between years, across different sites (not weighted for sample size). The standard error of the curve is shown in grey.

Manx Shearwater *Puffinus puffinus*

EC Birds Directive – migratory species
Amber listed in the Birds of Conservation Concern in Ireland 3 (2014–2019)

Overview

Most of the world's population of Manx Shearwaters breed in Britain and Ireland (Hamer & Hill 1997; Mitchell *et al.* 2004). They are highly pelagic and spend most of the year at sea. Manx Shearwaters tracked with geolocators during the non-breeding season have been recorded as travelling as much as 1,193km in a day, at an average speed of 55km/h (Guilford *et al.* 2009). They nest in burrows, only coming ashore under the cover of darkness to avoid avian predators. Manx Shearwaters became extinct from the eponymous colony on the Calf of Man during the 18th Century, probably due to Brown Rat predation (Mitchell *et al.* 2004). Although tiny numbers had recolonised the Calf, a rat eradication programme in 2012 has resulted in an increasing population (Kate Hawkins *pers. comm.*).

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). The breeding population of Manx Shearwater was only comprehensively surveyed for the first time during Seabird 2000 (Mitchell *et al.* 2004).

The only confirmed extant colony in Northern Ireland is on the Copeland Islands, where there are birds on Lighthouse Island and Big Copeland. 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 did not detect any birds (Mitchell *et al.* 2004). Deane (1954) estimated 150 AOBs on Rathlin Island but the Operation Seafarer 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.

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Breeding numbers

The Copeland Islands were last surveyed in 2007 (Stewart & Leonard 2007). At that time, there were approximately 4,850 AOBs – 3,444 AOBs on Lighthouse Island and 1,406 AOBs on Big Copeland. This was approximately a 5.3% increase on the previous survey in 2000. However, the previous (2000) survey result was within the confidence limits of the 2007 population estimate and it is likely there was little change between 2000 and 2007. It is estimated that the colony is now 8–10 times larger than it was in the 1950s. A recent MSc dissertation tested burrow occupancy at a subsample of 177 burrows using a dual-sex call playback methodology. A total of 90 response calls were recorded in this subsample, equating to a burrow occupancy of around 50% (Rhodes 2017). The study did not predict the size of the Manx Shearwater population of Lighthouse Island based on the data collected.

The presence of European Rabbits (*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. For similar reasons, there is little information available from which to derive UK or country level population trends since Seabird 2000 (JNCC 2016).

Breeding success

Breeding success was monitored on Lighthouse Island by Copeland Bird Observatory between 2007 and 2013, using study burrows. These consist of natural burrows which are excavated outside the breeding season and 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 (Table 4), although extremely wet weather in 2007 resulted in a success rate of just 0.38 chicks per pair. 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 the 117 burrows monitored, 40 contained eggs during the incubation period. Many study burrows were collapsed (26), empty (24) or too deep to investigate (11). In August, 31 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 0.78 chicks per pair. Methods may not have been consistent with previous years monitoring, therefore this estimated productivity has not been included in Table 4 for comparison. Breeding success data for Manx Shearwaters are only collected at five other sites across the whole of the UK and consequently there are no UK or country level productivity indices (JNCC 2016). On Rum, in Scotland, the average has been approximately 0.69 chicks/pair (JNCC 2016). On Skomer, in Wales, average breeding success from 1995–2015 was 0.62 chicks/pair. Breeding success on Bardsey has been slightly higher with an average of 0.73 chicks/pair from 2004–2012, and in 2014 and 2015 0.70 and 0.66 chicks/pair, respectively (JNCC 2016).

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

European Storm Petrel *Hydrobates pelagicus*

EC Birds Directive – listed in Annex 1 and as a migratory species
Amber listed in the Birds of Conservation Concern Ireland 3 (2014–2019)

Overview

European Storm Petrels are highly pelagic, only returning to land to breed. The UK breeding population of European Storm Petrel was only comprehensively surveyed for the first time during Seabird 2000 using the standard playback method (Mitchell *et al.*, 2004; Ratcliffe *et al.* 1998). 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.* 2017). For similar reasons, there is a lack of annual data collected on productivity.

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 37km to the east. The Skerries, off Portrush, are another potential breeding site. A survey of these locations is long overdue.

JAMES O'NEILL

Great Cormorant *Phalacrocorax carbo*

EC Birds Directive – migratory species
Amber listed in the Birds of Conservation Concern in Ireland 3 (2014–2019)

Overview

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 of wintering quarters inland, to the extent that almost every lowland lake and river has some. In England increasing numbers of Cormorants breed inland, in trees (Newson *et al.* 2013; Newson *et al.* 2007), but this is a trend that has not yet been seen in Northern Ireland.

In Northern Ireland, Cormorants have, historically, principally bred at two sites – Sheep Island (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.

HUGH THURGATE

Breeding numbers

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 AONs (Figure 5). Since then numbers have fallen back to 314 AONs in 2018. Numbers were down slightly on the high numbers recorded in 2018 at the Skerries (94 AONs) and Sheep Island (88 AONs) (Figure 6). The colony at Sheep Island has fluctuated in numbers annually but has shown an overall decrease in size since 1985 (380 AONs). The colony at the Skerries has increased as that at Sheep Island has decreased, so much so that these colonies are now very similar in size. It seems probable that the original population is now spread between the two sites (Figure 6), 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). The combined population at the Skerries and Sheep Island in 2018 has declined to 60% of the 2010 population. Periodic counts of the numbers at The Gobbins cliffs dating back to 1969 (Figure 7) have shown fluctuating numbers in recent years, dropping as low as two AONs in 2007, returning to 33 AONs in 2008. A total of 12 AONs were recorded in 2018, a similar total to that in 2017 (13 AON, Table 10).

The UK breeding abundance index for Cormorants 1986–2015 indicates that the population increased between 1986 and 1995, but since 2005 has declined back to former levels (JNCC 2016).

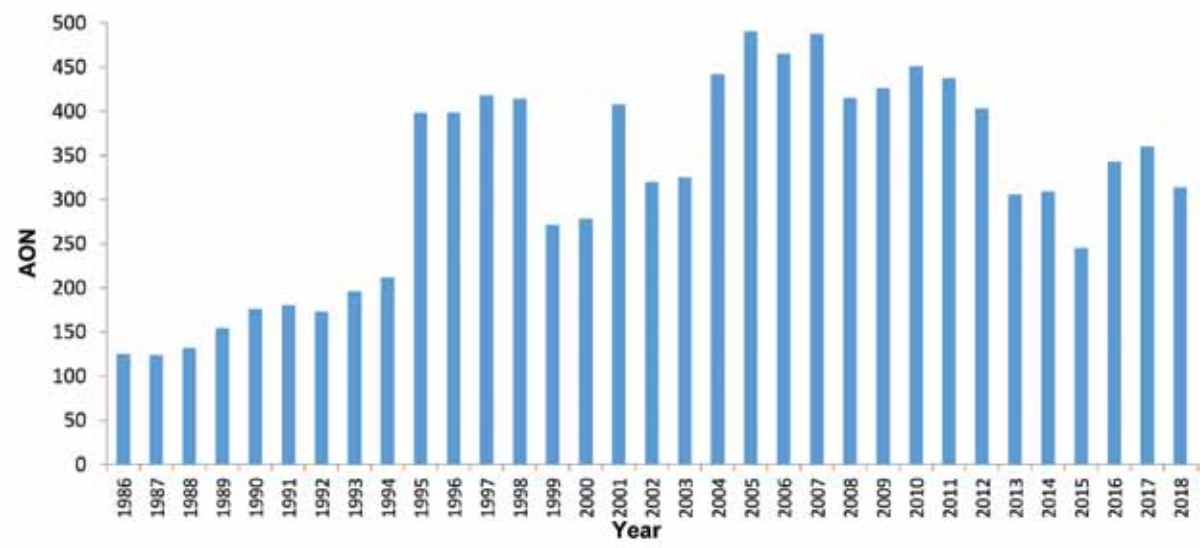

Figure 5 Cormorant numbers (AONs) at Bird Island, Strangford Lough, 1986–2018.

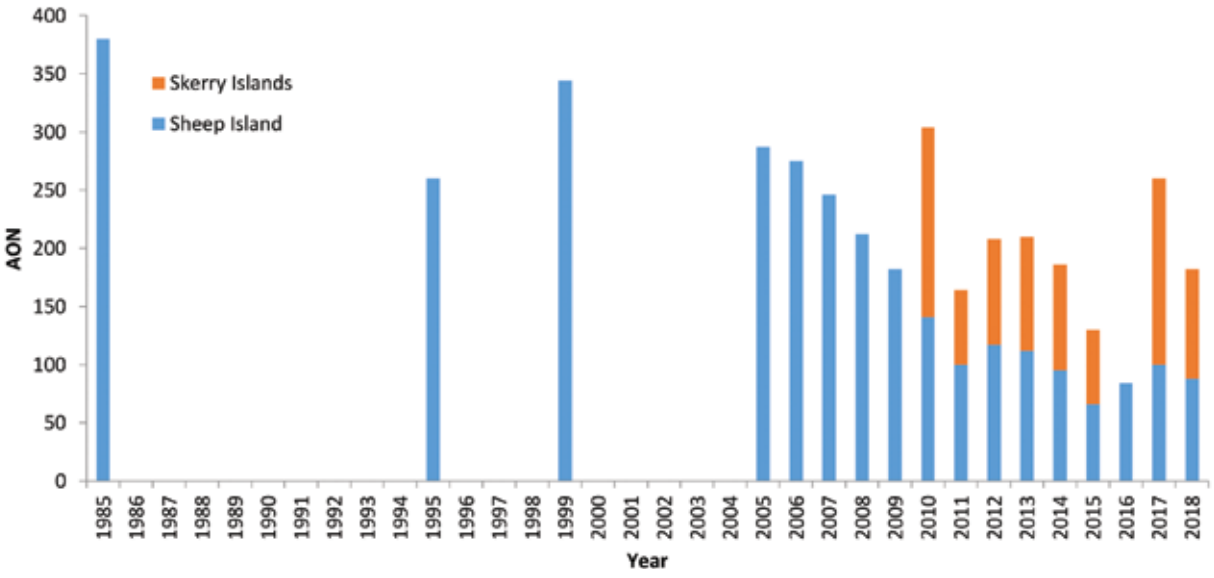

Figure 6 Cumulative Cormorant numbers (AONs) at the Skerry Islands and Sheep Island, 1985–2018. The Skerry Islands were not surveyed before 2010 as it was believed that no Cormorants were present. The Skerry Islands were also not surveyed in 2016.

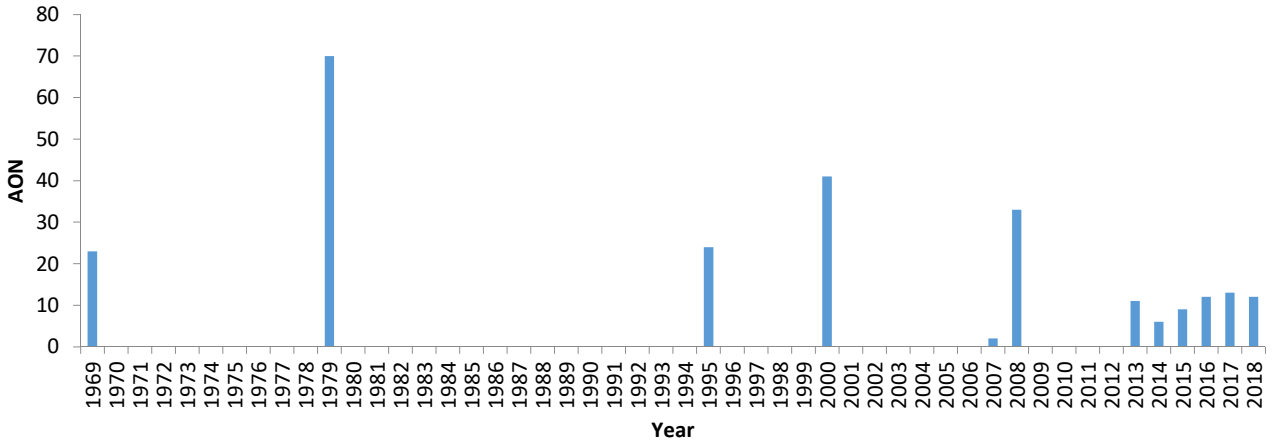

Figure 7 Cormorant numbers (AONs) at The Gobbins, 1969–2018.

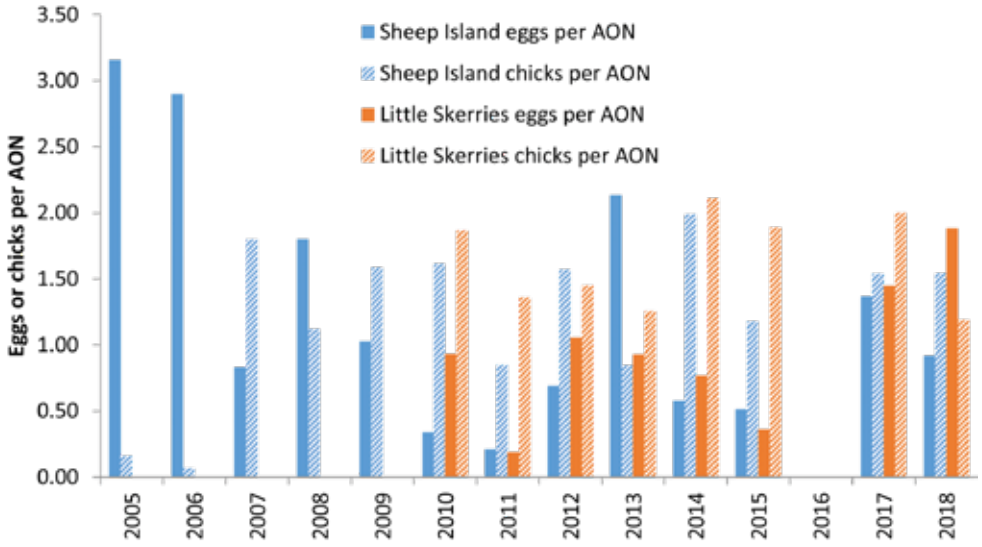

Figure 8 The average number of eggs (solid fill) or chicks (hatched fill) per AON counted during a single visit survey to Sheep Island (blue) and Little Skerries (orange). No records were made in 2016.

Breeding success

No true breeding success data were collected for Cormorants in 2018, which, due to their breeding asynchrony require multiple visits to the colony throughout the season. 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 8). On the 6th June 2018, Sheep Island supported 0.92 eggs and 1.55 chicks per AON and the Little Skerries supported 1.88 eggs per AON and 1.19 chicks per AON. The UK productivity has remained fairly between 1991 and 2015, with nests fledging 1.84 chicks on average (JNCC 2016).

European Shag *Phalacrocorax aristotelis*

EC Birds Directive – migratory species
Amber listed in the Birds of Conservation Concern in Ireland 3 (2014–2019)

Overview

The European Shag (Shag) is endemic to the north-east 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. Unlike many seabirds, Shags do not make long trips to forage at sea but instead use social information with others from their colony to find local, shared foraging grounds (Evans *et al.* 2016). Over a third of the world population breeds in the UK and Ireland (JNCC 2016). 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.


JAMES O'NEILL

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). Declines may be related to a reduction in the availability of Shag's preferred prey species, the sandeel (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).

Breeding numbers

Numbers at Muck Island and the neighbouring site at The Gobbins (Figure 9) have increased over the long-term, and numbers in 2018 were the highest recorded. The population on Rathlin Island is currently half that in 1985 (Figure 10) but appears to have been gradually increasing since 2015. Shags stopped breeding in Strangford Lough in 2007 (Figure 11). The species has been recorded in small numbers at several new locations since 2013.

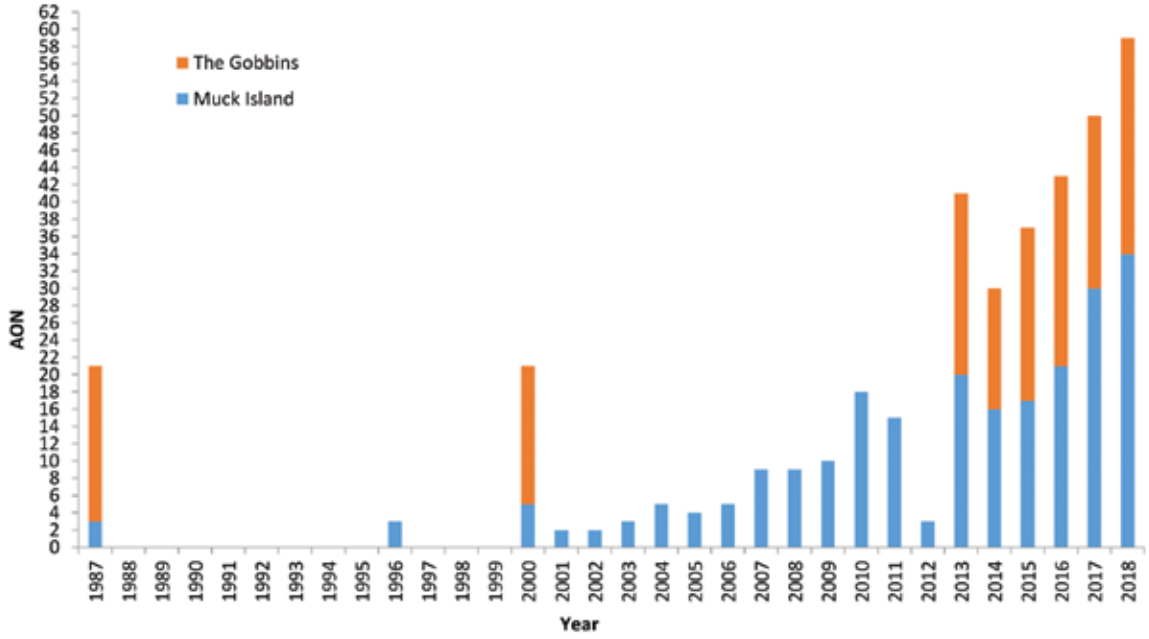

Figure 9 Cumulative European Shag numbers (AONs) at Muck Island and The Gobbins, 1987–2017.

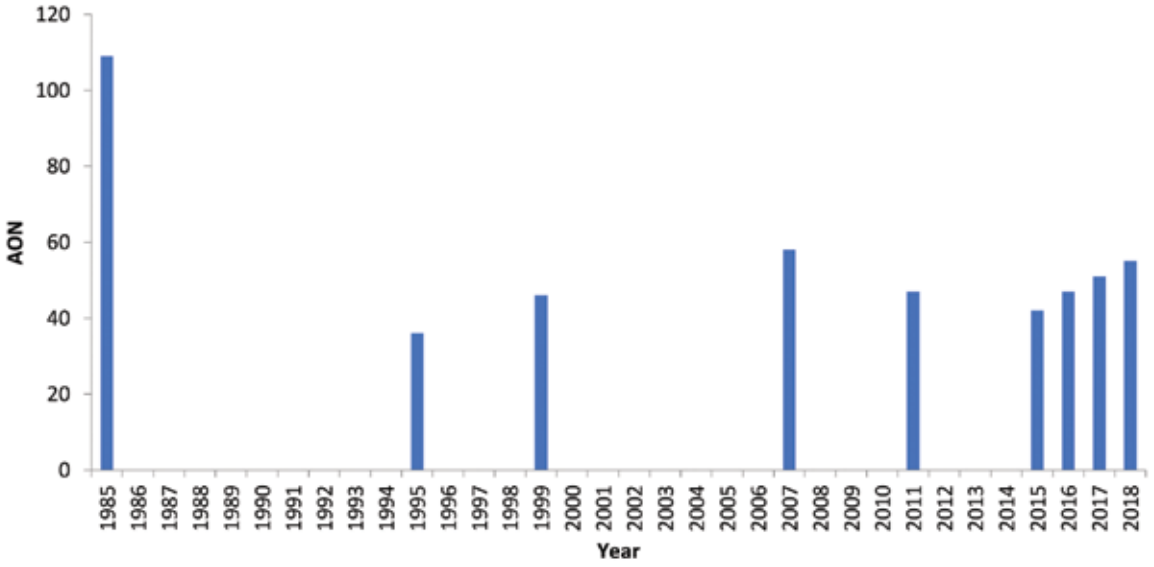

Figure 10 European Shag numbers (AONs) at Rathlin Island, 1985–2018.

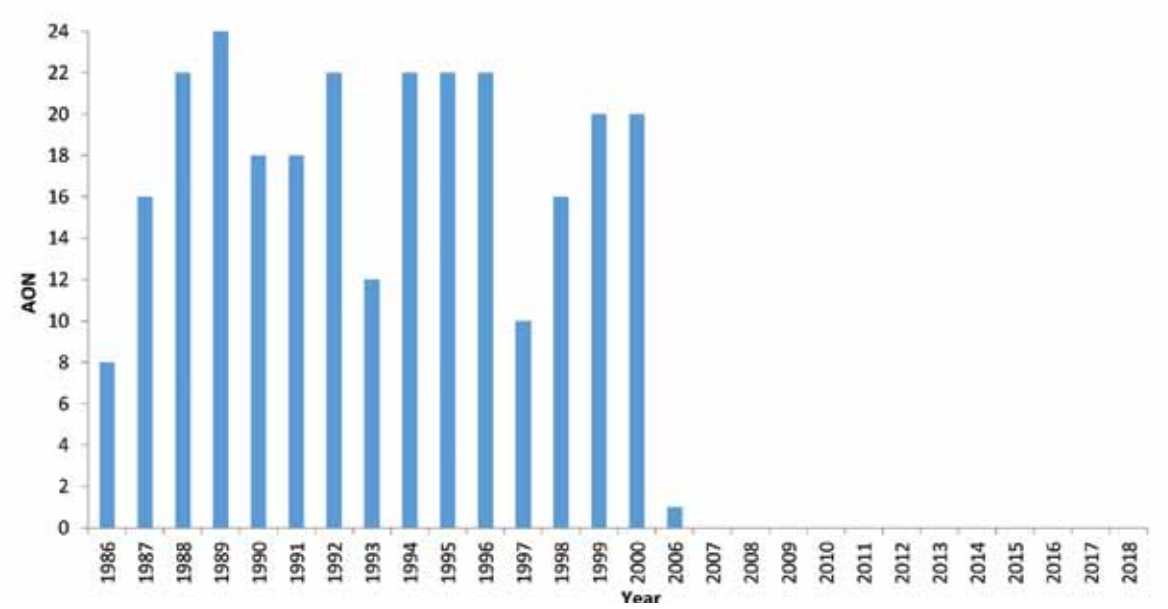

Figure 11 European Shag numbers (AONs) at Strangford Lough, 1986–2018. Although surveys have taken place in all years, no Shags have been counted since 2007.

Breeding success

In 2018, the Muck Island colony produced 2.04 chicks/AON, fewer than in 2017 and 2016. In contrast, breeding success at The Gobbins was 2.23 chicks/AON, compared to the 2.00 chicks/AON produced in 2016 (not recorded in 2017). Figure 12 shows the trend in Shag productivity between 2013 and 2018, and it appears to be fairly stable. However, as very few sites are monitored for Shag productivity, and records are not available for all years, the trend line has a large confidence interval (grey shading) and is a rough guide only. 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.

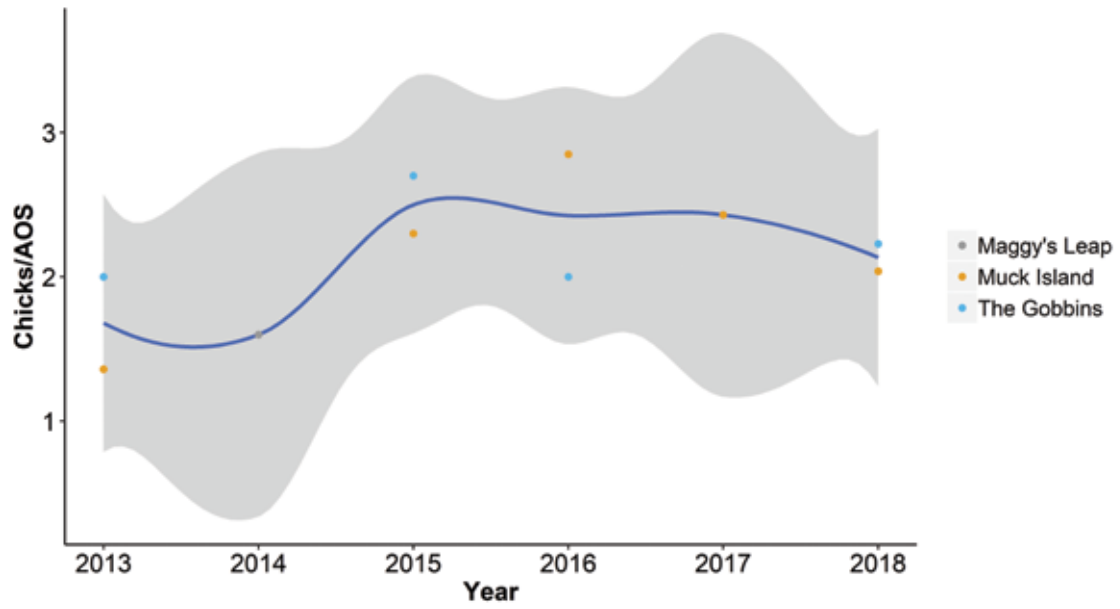

Figure 12 Productivity (Chicks/AON) for European Shags between 2013 and 2018. The curve (blue line) represents the trend in Shag productivity between years, across different sites (not weighted for sample size). The standard error of the curve is shown in grey.

Great Skua *Stercorarius skua*

EC Birds Directive – migratory species
Amber listed in the Birds of Conservation Concern in Ireland 3 (2014–2019)

Overview

Also colloquially known as 'Bonxies', Great Skuas are known for their aggressive behaviour towards human intruders on their territories (Mitchell *et al.* 2004). Individuals in a population have foraging specialisations, for example foraging on fish, exploiting fisheries discards, directly predating smaller seabirds or stealing food from other seabirds (Votier *et al.* 2004). The first occurrence of Great Skuas breeding in Northern Ireland occurred in 2010. During the Seabird 2000 surveys, the UK held 60% of the Great Skua world population (Mitchell *et al.* 2004), and due to this 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). On Orkney the population increased 23% from 2000 to 2010 (Meek *et al.* 2011) and on Fair Isle the number of AOTs from 1986–2008 increased from 84 to 294 (JNCC 2016).

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 UK population is healthy and the recent breeding attempts on Rathlin could be considered overdue. Great Skuas have been shown to be serious predators of Leach's Petrels on St. Kilda. This is a potential cause for concern in relation to Storm Petrel populations on islands off the west coast of Ireland (Phillips *et al.* 1999; Votier *et al.* 2006).

LINDA THOMPSON

Breeding numbers

Breeding attempts have been made by a single pair of birds on Rathlin since 2010. In 2016, the pair fledged two chicks successfully, but was unsuccessful in 2017 (Table 10). In 2018, a pair nested again, producing one chick that was seen for around 10 days before disappearing, and it is thought that it was either predated or trampled by cattle (Liam McFaul, RSPB *pers. comm.*). Annual sampling of breeding abundance is insufficient to generate reliable population trends for the UK, country level or at individual sites.

Black-legged Kittiwake *Rissa tridactyla*

EC Birds Directive – migratory species
Amber listed in the Birds of Conservation Concern in Ireland 3 (2014–2019)

Overview

The Black-legged Kittiwake (Kittiwake) is the most numerous gull species in the world. It is the most oceanic in its habits and most adapted to nesting on vertical rocky sea-cliffs. However, the Kittiwake is currently suffering a well-publicised and catastrophic decline (Birdlife International 2018), 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 Britain and Ireland, the largest and most numerous colonies are found along the North Sea coasts of Britain, around Orkney and Shetland, and off north-west Scotland (Mitchell *et al.* 2004).

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, Maggy'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.

STEPHEN MAXWELL

Breeding numbers

At Rathlin Island, Kittiwake numbers grew from 6,822 AONs in 1985 to 9,917 AONs in 1999, but at time of the latest survey in 2011 had dropped back to 7,922 AONs, a decrease of 20% (Allen *et al.* 2011). There are good historical datasets for The Gobbins (Figure 13), Maggy's Leap (Figure 14) and Muck Island (Figure 15). In 2018, The Gobbins held 683 AONs, only 64% of the 2017 total and the lowest count since 2000. Numbers on Muck Island were also down, with 314 AONs compared to 2017's 369 AONs. Recorded number at the Portrush cliffs increased slightly to 293 AONs (Table 10), although one less site was surveyed there. At Strangford Lough, a peak of 466 AONs was reached in 1996 before Kittiwake disappeared as a breeding species at the site.

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. Castlerock and Strangford), but other colonies remaining largely static or growing (e.g. The Gobbins, Muck Island and Portrush, Table 10).

The UK population showed a 20% increase between Operation Seafarer and the Seabird Colony Register. By the time of Seabird 2000 the UK population had declined by 40%, and this decline has continued. The breeding abundance index for the UK 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). Relative to the overall UK and Ireland trend since 1986, and its historical status, the Northern Ireland population is still reasonably healthy.

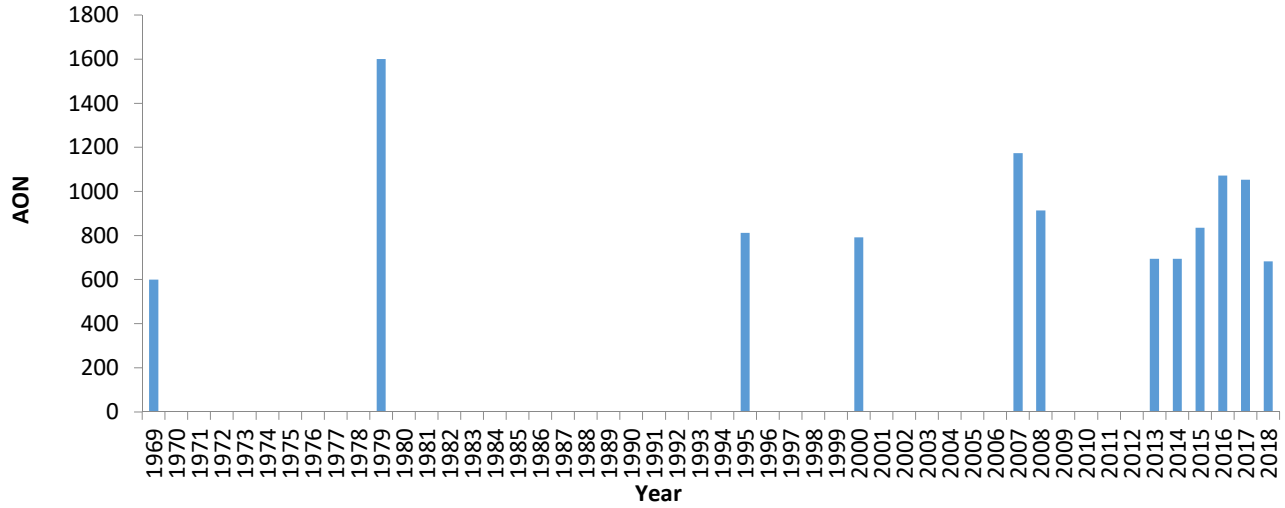

Figure 13 Black-legged Kittiwake numbers (AONs) at The Gobbins, 1969–2018.

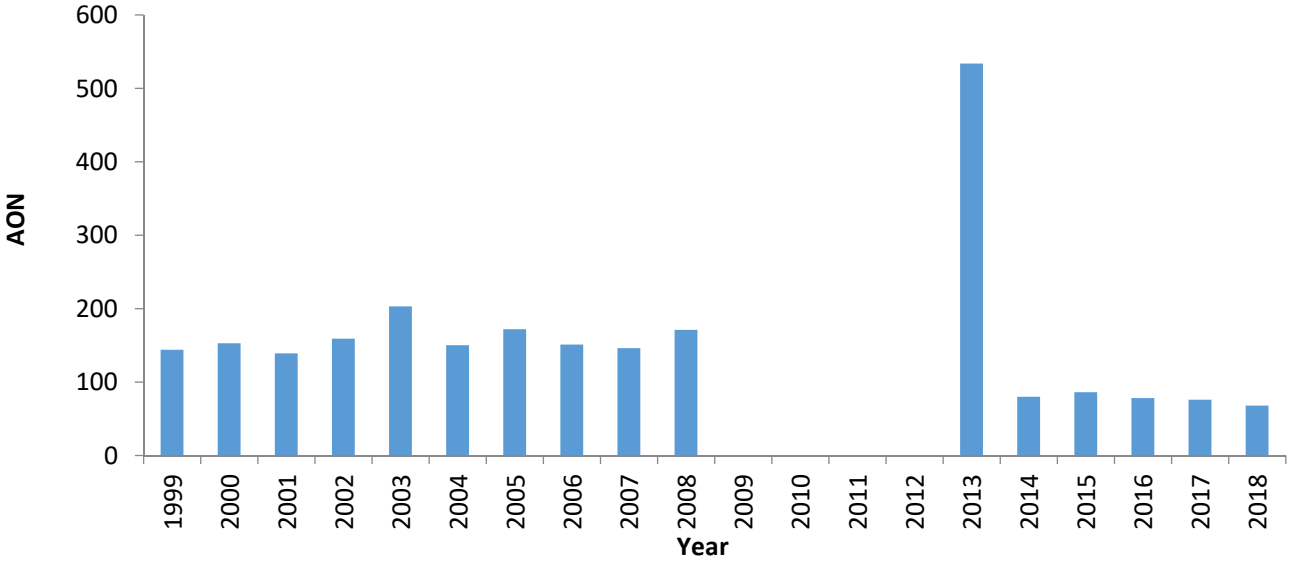

Figure 14 Black-legged Kittiwake numbers (AONs) at Maggy's Leap, 1999–2018. No surveys were undertaken between 2009 and 2012.

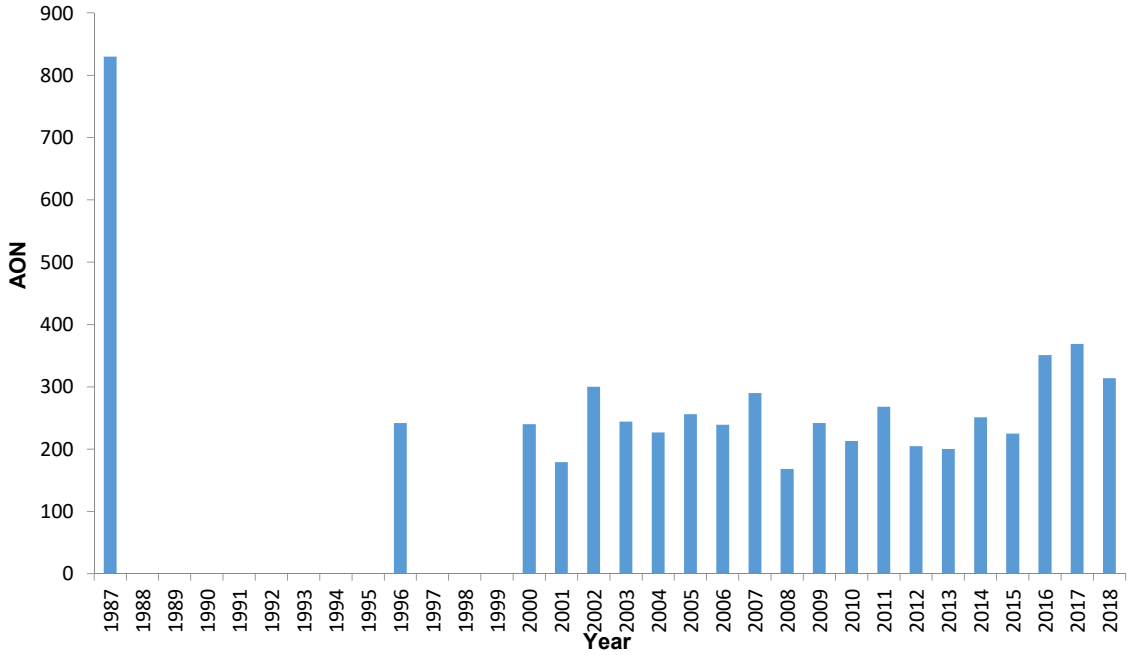

Figure 15 Black-legged Kittiwake numbers (AONs) at Muck Island, 1987–2018. No surveys were undertaken from 1988 to 1995, and 1997 to 1999.

Breeding success

The trend in Kittiwake productivity can be seen in Figure 16. At The Gobbins, nine plots were investigated for Kittiwake productivity, which ranged from 0.42 to 0.87 chicks/AON. Overall the productivity was 0.57 chicks/AON, the lowest since 2014. Four plots were studied at Muck Island, recording productivity ranging from 0.40 to 1.01, averaging 0.62 chicks/AON, the lowest since 2013.

Counter to the poor breeding season at The Gobbins and Muck Island, breeding success at Maggy's Leap (0.79 chicks/AON) was higher than in 2017. In previous years some nests were abandoned, possibly due to gull or Peregrine (*Falco peregrinus*) predation (Andy Carden *pers. comm*). Productivity was higher on the north coast, where Rathlin Island produced 1.28 chicks/AON and Portrush produced 1.01 chicks/AON.

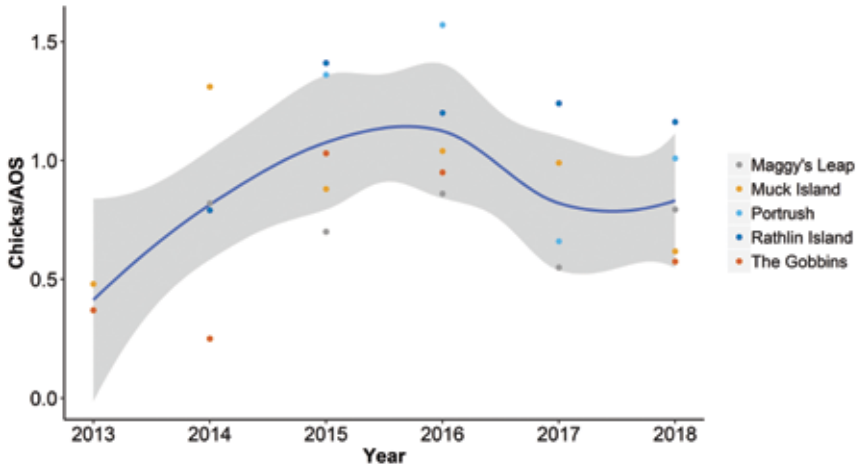

Figure 16 Kittiwake productivity (chicks/AON) from 2013 to 2018 across five sites in Northern Ireland. The curve (blue line) represents the trend in Kittiwake productivity between years, across different sites (not weighted for sample size). The standard error of the curve is shown in grey.

Black-headed Gull *Chroicocephalus ridibundus*

EC Birds Directive – migratory species
Red listed in the Birds of Conservation Concern in Ireland 3 (2014–2019)
Northern Ireland Priority species (Northern Ireland Biodiversity Strategy 2002)

Overview

The Black-headed Gull is a common breeding species in the UK, with 5.6% of the world population recorded during Seabird 2000, 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). Like other gull species, Black-headed Gulls have likely benefited from anthropogenic sources of food, such as fisheries discards and domestic waste (Mitchell *et al.* 2004). Black-headed Gulls are particularly abundant in the winter when the UK breeding population is joined by migrants from continental Europe (Wernham 2002). The UK is estimated to host nearly ~2,200,000 individuals in the winter, of which ~44,000 are found in Northern Ireland (Burton *et al.* 2013).

In Northern Ireland, the Black-headed Gull is a widespread breeding species in relatively few large colonies, with major concentrations at Strangford Lough, Belfast Lough, Larne Lough, Copeland Islands, Lough Neagh and Lower Lough Erne.

Breeding numbers

The numbers at Larne Lough grew from just 109 AONs in 1987 to a high of 3,102 AONs in 2016 (Table 10). 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. This year, in 2018, numbers dropped a little to 2,895 AONs. The Strangford Lough population remains at historically low levels, at 1,267 AONs (Figure 17). Belfast Lough held 607 AONs in 2018, 100 fewer than in 2017. However, at Portmore Lough 146 AONs were recorded, up on 115 AONs in 2017. There are also breeding populations in Co. Fermanagh; Moorlough Lake supported 95 AOTs while Lower Lough Erne had 1,218 AONs in 2018 (Table 10).


NEAL WARNOCK

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 10, Bob Davidson and Stephen Foster *pers. obs.*). 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).

Data submitted to the SMP show an increase in the UK 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.

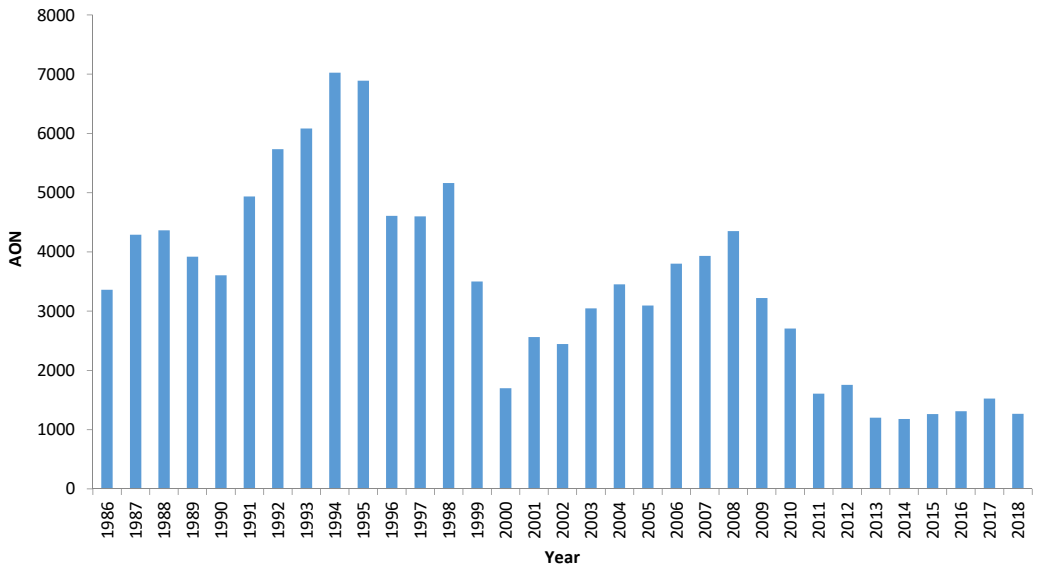

Figure 17 Black-headed Gull numbers (AONs) at Strangford Lough, 1986–2018.

Breeding success

At Portmore Lough, 124 AONs produced 159 chicks (1.28 chicks/AON) in 2018. Although there were more AONs in 2018 than in 2017 (105 AONs), the productivity was almost identical. Breeding success was approximately 1.50 chicks/AON at Blue Circle Island and Swan Island in Larne Lough in 2018. Despite being on the 2013 BoCCI red list, very little productivity data have ever been collected for Black-headed Gulls in Northern Ireland.

In the UK productivity fluctuates from 0-1.20 chicks per AON (JNCC, 2016). This pattern of 'boom or bust' is seen frequently in local colonies (Kerry Leonard *pers. obs.*), with extreme weather, predation and food shortages appearing to be the

main reasons for breeding failure. The potential impact of predators such as American Mink (*Mustela vison*) (Craik 1997) or Eurasian Otters (*Lutra lutra*) on inland colonies in Northern Ireland are largely unstudied. Collecting productivity data is a high priority.

Mediterranean Gull *Larus melanocephalus*

EC Birds Directive – Annex 1 and migratory species
Amber listed in the Birds of Conservation Concern in Ireland 3 (2014–2019)

Overview

The Mediterranean Gull is the most recent addition to the breeding seabird fauna of the UK and Ireland. From just one pair in the 1985–1988 census there were over 100 AONs during Seabird 2000 and there are now approximately 800 AONs across the UK (JNCC 2016). Most large colonies are located in south and south-east England, although the distribution is expanding northward with smaller colonies becoming established elsewhere. 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). Breeding was first proven in Northern Ireland in 1995.

JONATHAN CLARK

Breeding numbers

After first breeding in 1995, initially between one and three AONs 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. This year (2018) a record of 14 AONs were recorded in Northern Ireland (Figure 18). Five AONs were counted at Larne Lough in 2018, an increase on 2017. Mediterranean Gulls also returned to Strangford Lough (2 AONs) after a two-year absence. By far the biggest increase has been at Belfast Lough RSPB, which went from zero AONs in 2015, to seven AONs in 2018. Only one individual male was spotted at Lower Lough Erne this year (Brad Robson, RSPB *pers. comm.*). Two individuals were observed in Lough Neagh this year at the Torpedo Platform, but breeding was not confirmed (Bob Davidson and Stephen Foster *pers. comm.*).

Breeding success

The Mediterranean Gulls at Larne Lough had an estimated productivity of 1.75 chicks/AON in 2018. Six of the seven nests were monitored at Belfast Lough RSPB in 2018, producing a total of 13 chicks (2.17 chicks/AON).

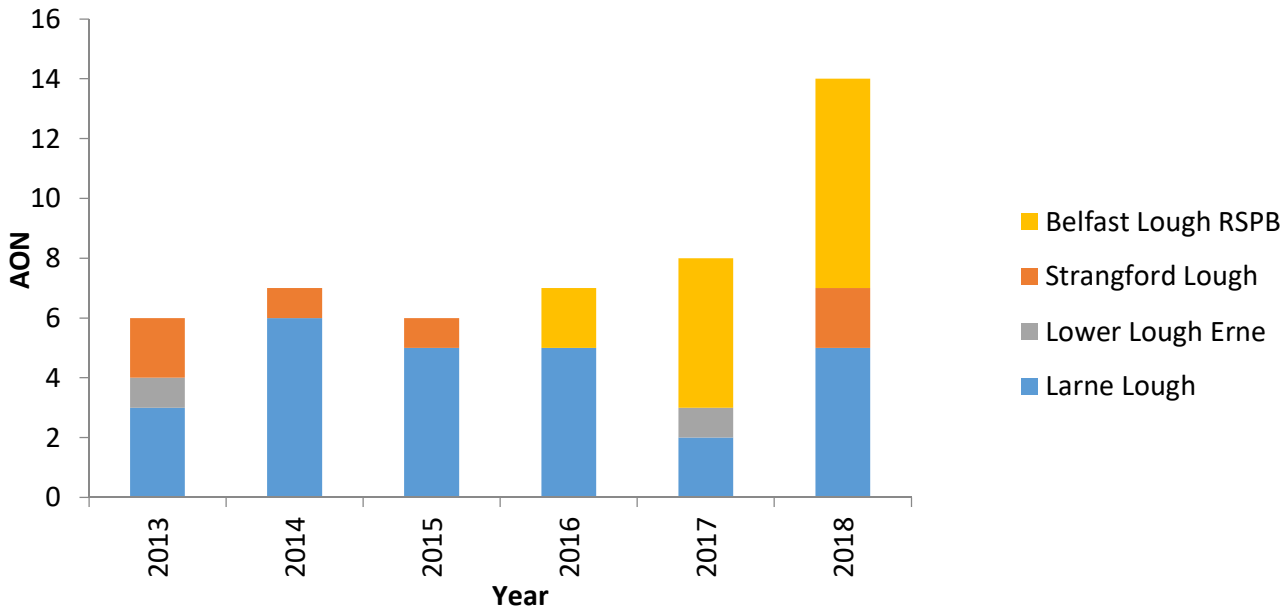

Figure 18 Cumulative Mediterranean Gull numbers (AONs) in Northern Ireland, 2013–2018.

Common Gull *Larus canus*

EC Birds Directive –migratory species
Amber listed in the Birds of Conservation Concern in Ireland 3 (2014–2019)

Overview

Scotland held 98% of breeding Common Gulls in the UK during Seabird 2000 (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). Historically the Common Gull was a scarce breeding species in Northern Ireland, which belied its name, but from the mid-1990s a steady increase occurred, which then accelerated after 2000. 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.

JON LEES

Breeding numbers

The Copeland Islands have not been completely surveyed since 2012 when there were 452 AONs, down from a peak of 830 AONs in 2009. On Strangford Lough there were 293 AONs in 2018, fewer than previous years (Figure 19). The smaller population at Larne Lough increased to 37 AONs in 2018, the highest number on record (Figure 20). There are fewer still Common Gulls at Carlingford Lough compared with Larne Lough, however there were six AONs recorded in 2018, as in

2017. Up to nine AONs of Common Gulls have been recorded annually in the Outer Ards since 1986 (Figure 21). Numbers at the inland colony in Lower Lough Erne also declined from 189 AONs in 2016 to 143 in both 2017 and 2018 (Table 10).

The species has spread around the coast since Seabird 2000 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. In 2018, 15 AONs were recorded on Lighthouse Island, but Big Copeland and Mew Island were not counted.

The Northern Ireland trend contrasts with the overall UK and Ireland picture where a modest increase appeared to have occurred between 1986 and 1998, but with a subsequent decline in the breeding abundance index (JNCC 2016).

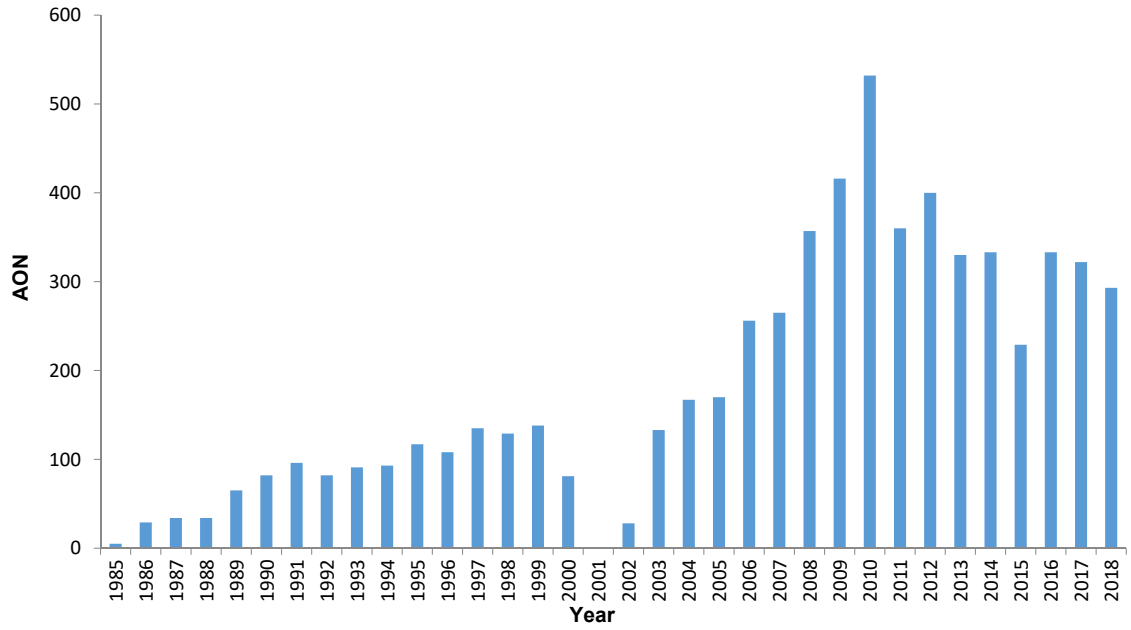

Figure 19 Common Gull numbers (AONs) at Strangford Lough, 1985–2018.

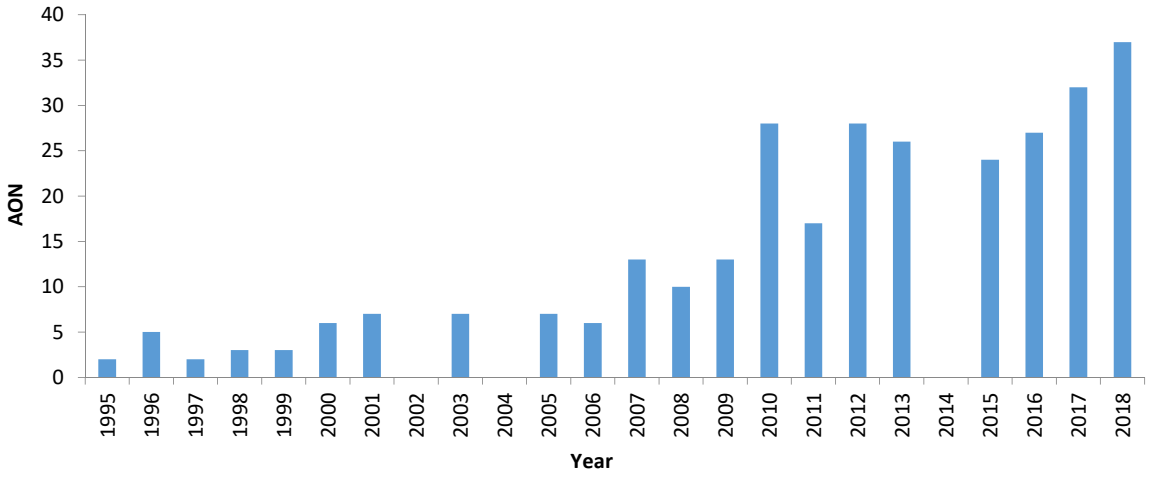

Figure 20 Common Gull numbers (AONs) at Larne Lough, 1995–2018.

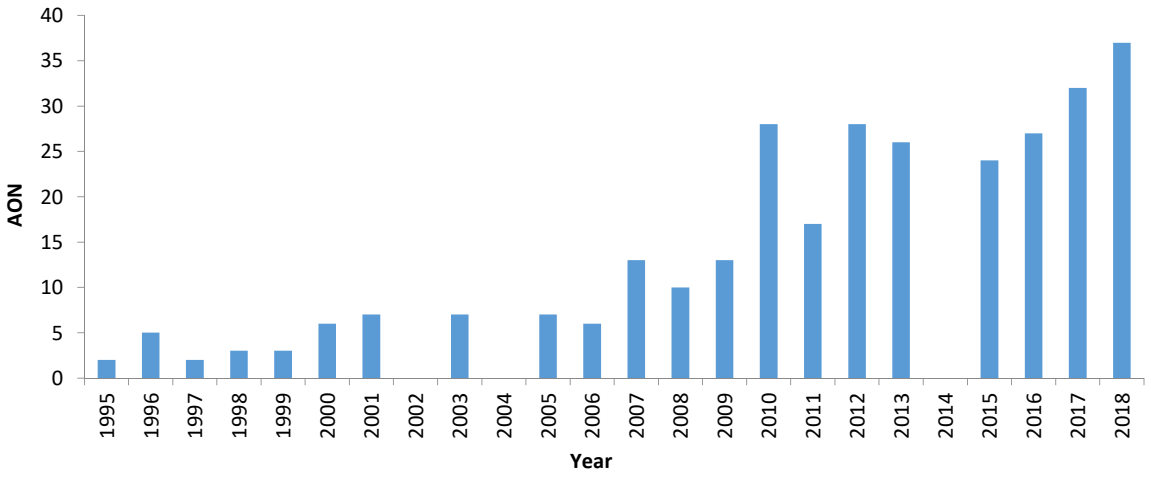

Figure 21 Common Gull numbers (AONs) in the Outer Ards, 1986–2018.

Breeding success

Productivity at Green Island, Carlingford Lough was estimated to be 0.67 chicks/AON, but this was the only productivity data collected for Common Gull in Northern Ireland in 2018. 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).

Lesser Black-backed Gull *Larus fuscus*

EC Birds Directive –migratory species
Amber listed in the Birds of Conservation Concern in Ireland 3 (2014–2019)

Overview

The species breeds across north and west Europe and increased in numbers generally throughout its range during much of the 20th Century. However, Lesser Black-backed Gulls are assigned an Amber threat level in Ireland due to a moderate decline in breeding range in the past 25 years and a localised distribution (Colhoun & Cummins 2013). Lesser Black-backed Gulls nest colonially 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 Iberia or North Africa during the non-breeding period (Mitchell *et al.* 2004; Rock, 2002). Colonies can occur in a diverse range of habitats, from offshore islands, cliffs, moorland and in recent decades, on the roofs of buildings (Mitchell *et al.* 2004). During Seabird 2000 the UK held 38% of the estimated world population.

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. Roof nesting is widespread in Belfast and there is also a colony in Antrim town; however, urban nesting gulls are currently not routinely counted in Northern Ireland. It is hoped that urban nesting Lesser Black-backed Gulls will be counted in the future and records of roof nesters from volunteers would be welcome.

KEVIN KIRKHAM

Breeding numbers

Numbers at Lower Lough Erne were reportedly the same in 2018 as in 2017, at 1,316 AOTs (Table 10). Totals of 2,496 and 2,052 individuals were also recorded at colonies on Lough Neagh in 2017 and 2018, respectively (Table 10). The largest increases in numbers have been recorded on Tolan's Flat, Phil Roe's Flat and Padian Island (Allen & Mellon 2018). Strangford Lough held 310 AONs, slightly fewer than recorded in 2017 (343 AONs, Figure 22).

The first AON count since 2012 (555 AONs) was carried out on Lighthouse Island in the Copeland Islands group by the Copeland Bird Observatory volunteers. This survey recorded an estimated 365 Lesser Black-backed Gull AONs in a mixed species colony with Common and Herring Gulls; a decrease of 34.2% since 2012.

The Seabird 2000 census recorded at total 63 Lesser Black-backed Gull nests on rooftops in Belfast city centre and Belfast harbour. In 2018 an NIEA-funded vantage-point survey was carried out in Belfast from two of the tallest buildings and found at least 101 AONs in the city centre and harbour. Due to the complexity of the roof-scape and the limited number of vantages, this is likely to be a distinct underestimate. Urban nesting appears to be an increasing phenomenon in Northern Ireland. An additional 12 AONs were reported in the wider Belfast area by members of the public via an online survey (https://www.surveymonkey.co.uk/r/BTO_Urban_Gulls_Belfast). Although it was not possible to record pairs, 77 adults were in attendance at a colony on a disused warehouse in Carrickfergus (Dave Allen *pers. comm.*), along with a colony of an estimated 600 pairs of mixed gulls on a supermarket roof near Antrim, thought to consist mainly of Lesser Black-backed Gulls (Mark Smyth *pers. comm.*).

The breeding abundance index for the UK population indicates an increase up to 2000, but a subsequent decline back to 1986 levels (JNCC, 2016). This is in marked contrast to the Northern Irish population which has continued to increase since 2000.

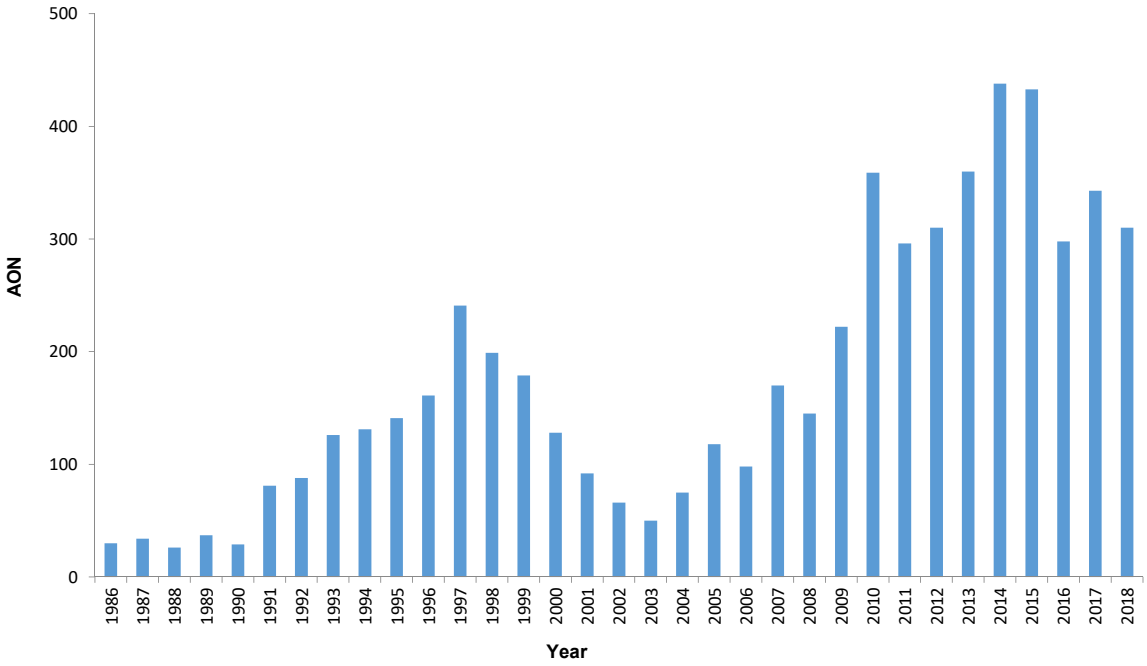

Figure 22 Lesser Black-backed Gull numbers (AONs) in Strangford Lough, 1986–2018.

Breeding success

A sample of four nests was monitored as part of NIEA-funded urban gull tracking work in Belfast city centre and successfully raised six chicks to fledging age (1.5 chicks/AON). One monitored nest at Belfast Lough RSPB produced one chick. 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 Blacked-backed Gulls are not fully understood, but include predation at some colonies

Herring Gull *Larus argentatus*

EC Birds Directive – migratory species
Red listed in the Birds of Conservation Concern in Ireland 3 (2014–2019)
Northern Ireland Priority species (Northern Ireland Biodiversity Strategy 2002)

Overview

The Herring Gull was historically widespread in Britain and Ireland and is largely resident (Mitchell *et al.* 2004). However, Herring Gulls suffered a well-publicised catastrophic decline in the late 1980s, largely because of botulism (Mitchell *et al.* 2004), and the population in Northern Ireland declined by 96% between Operation Seafarer and Seabird 2000 (Stanley Cramp *et al.* 1974; Mitchell *et al.* 2004). Concentrations of Herring Gulls occur at the Copeland Islands and Strangford Lough. These two populations have recently been shown to exploit marine, intertidal and terrestrial food resources in different proportions, which may differentially affect their breeding successes at the two locations (O'Hanlon *et al.* 2017). 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.

Breeding numbers

The colony on Strangford Lough remained stable, with 1,061 AONs recorded in 2018 (Figure 23). The major colony spanning the three Copeland Islands has not been surveyed since 2012. However, in 2018 volunteers from Copeland Bird Observatory conducted a full AON survey of Lighthouse Island, finding an estimated 483 Herring Gull AONs in a mixed species colony with Common and Lesser Black-backed Gulls; a 17.5% increase on the last count of AONs (411 AONs, 2012).

Small numbers have bred at Lower Lough Erne since records began in 2000, and this population has remained stable at five AONs since 2016 (Figure 24).

As with Lesser Black-backed Gulls, Herring Gulls are often found roof-nesting in coastal towns and cities. An NIEA-funded vantage-point survey of Belfast city centre and harbour from two of the tallest buildings found that the very small population recorded in the Seabird 2000 census (8 AONs) had doubled to at least 16 AONs. Because of the limited number of vantages and complexity of the roof-scape of central Belfast, this is likely to be an underestimate of true numbers. Additionally, Herring Gulls may be nesting in higher numbers in the docks area of the city (Katherine Booth Jones *pers. obs.*), which wasn't surveyed in 2018. One Herring Gull AON was reported in the wider Belfast area by a member of the public via an online survey (https://www.surveymonkey.co.uk/r/BTO_Urban_Gulls_Belfast). There were 16 adults present at a mixed gull colony on a disused warehouse in Carrickfergus (Dave Allen, pers. comm.), but it was not possible to get records of AONs. The ~600 pair mixed gull colony on a supermarket roof near Antrim also contained Herring Gulls, but a count of AONs was not possible in 2018 (Mark Smyth, pers. comm.).


KEVIN KIRKHAM

Across the UK the breeding abundance of Herring Gull has declined by around 40% between 1999 and 2014 (JNCC 2016). In contrast, in Northern Ireland populations have been modestly increasing. 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).

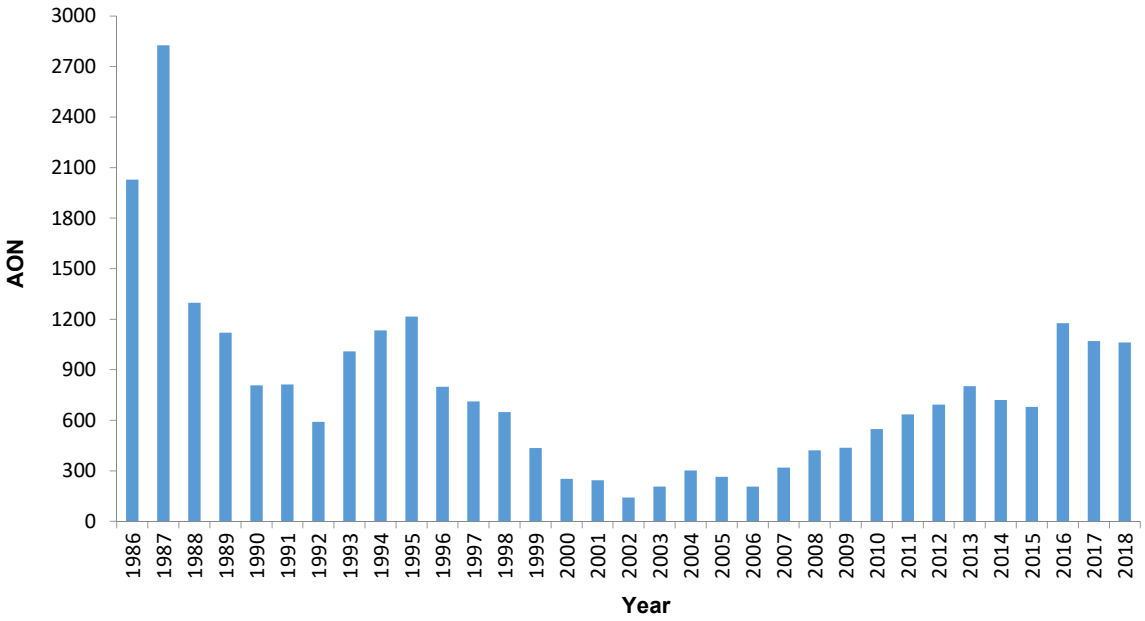

Figure 23 Herring Gull numbers (AONs) in Strangford Lough, 1986–2018.

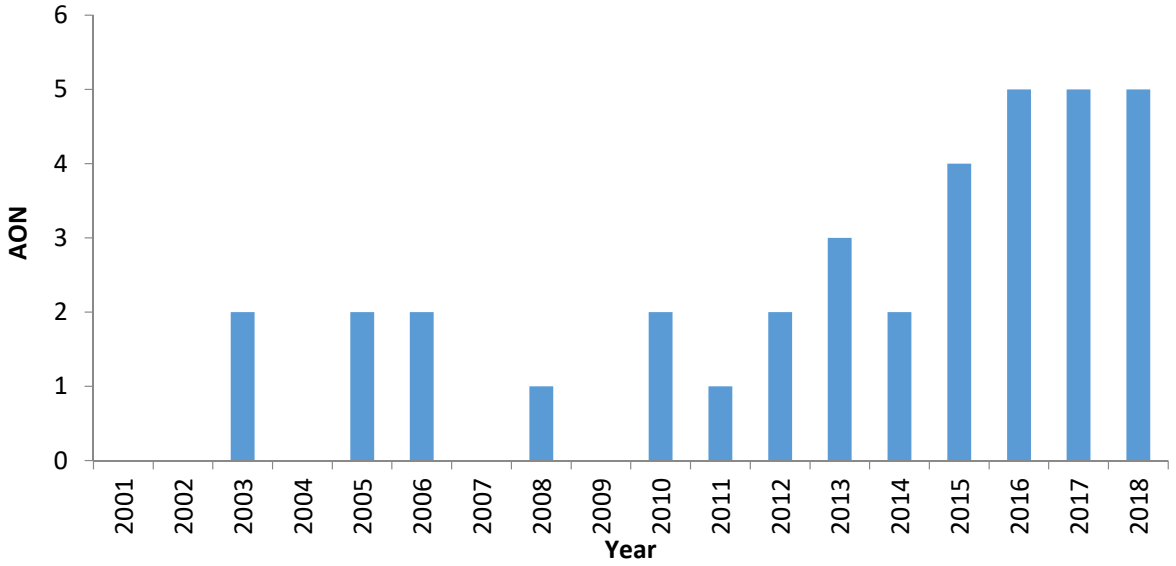

Figure 24 Herring Gull numbers (AONs) at Lower Lough Erne, 2000–2018.

Breeding success

No productivity data was collected for Herring Gull in Northern Ireland in 2018. 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).

Great Black-backed Gull *Larus marinus*

EC Birds Directive – migratory species
Amber listed in the Birds of Conservation Concern in Ireland 3 (2014–2019)

Overview

The Great Black-backed Gull has an extensive breeding range across the north Atlantic. Historically, Britain and Ireland have hosted most of the world population 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 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.*).

KEVIN KIRKHAM

Breeding numbers

There were 129 AONs at Strangford Lough (Figure 25) in 2018, which is the highest number recorded at the site. Burial Island in the Outer Ards held 40 AONs in 2018. Eight individual Great Black-backed Gulls were seen on a survey visit to the Maidens in 2018. Two AONs were counted this year at Lough Neagh, Muck Island and The Gobbins, but none were counted at Maggy's Leap (Table 10). Four AONs were counted at Green Island in Carlingford Lough (Figure 26) this year. Four AONs were also found at Lower Lough Erne in 2018, as in 2016 and 2017 (Table 10). Numbers of Great Black-backed Gull AONs have not been counted on the Copeland Islands since 2012.

Since 1986, the UK breeding abundance index has fluctuated, increasing from the 1980s into the 1990s but then decreasing steadily so that in 2012 the index was at its lowest point since 1986 (JNCC 2016). However, the population has recovered a little and is presently back to 1986 levels (JNCC 2016).

Breeding success

No nests of Great Black-backed Gull are monitored in Northern Ireland currently. Monitoring across the UK has shown that productivity has increased since the early 2000s (JNCC 2016).

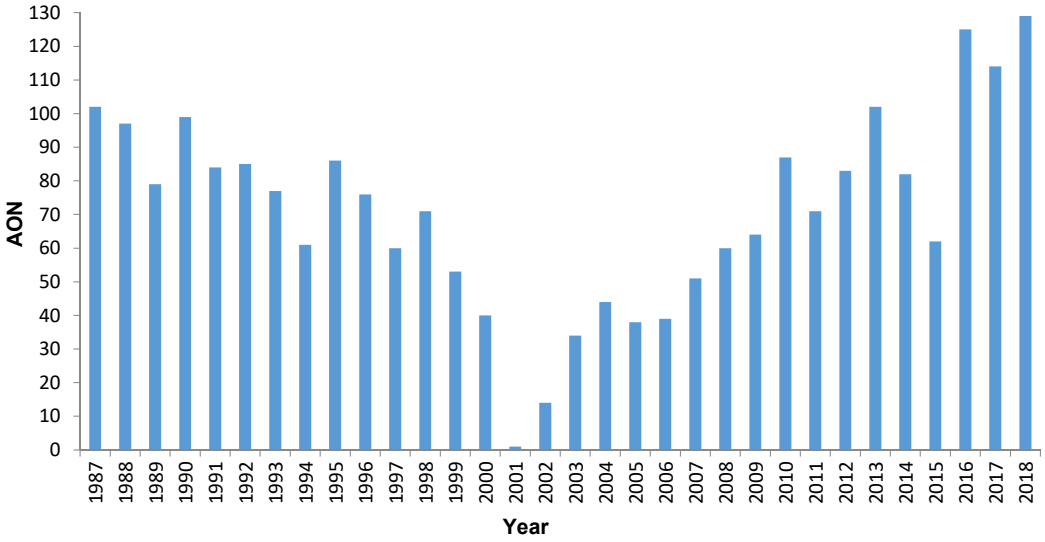

Figure 25 Great Black-backed Gull numbers (AONs) at Strangford Lough, 1986–2018.

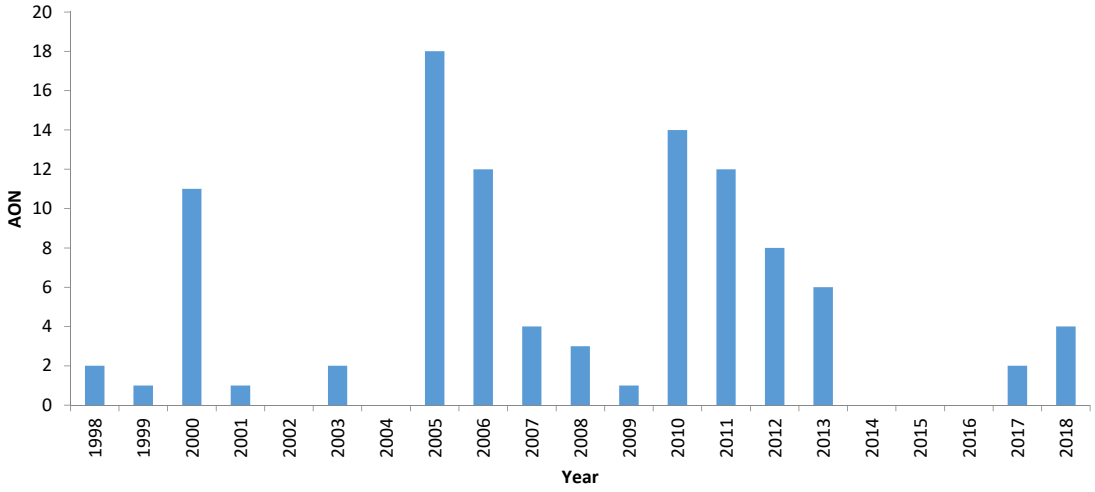

Figure 26 Great Black-backed Gull numbers (AONs) at Carlingford Lough, 1985–2018. Surveys were not carried out in all years.

Little Tern *Sternula albifrons*

EC Birds Directive – listed in Annex 1 and as a migratory species
Amber listed in the Birds of Conservation Concern in Ireland 3 (2014–2019)
Northern Ireland Priority species (Northern Ireland Biodiversity Strategy 2002)

Overview

This is the smallest species of tern breeding in the UK, nesting exclusively on the coast usually on beaches. They do not forage far from their breeding site (Mitchell *et al.* 2004). 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.

Breeding numbers

No breeding attempts were reported in 2018.

Sandwich Tern *Thalasseus sandvicensis*

EC Birds Directive – Annex 1 and migratory species
Amber listed in the Birds of Conservation Concern in Ireland 3 (2014–2019)

Overview

Sandwich Terns exhibit the most erratic population trends and distribution of any seabird breeding in the UK. The population fluctuates dramatically between years due to large variations in the proportion of mature birds attempting to breed and distribution varies owing to mass movements between colonies. The species is distributed widely around the coast (Mitchell *et al.* 2004). During the breeding season, Sandwich Terns make foraging trips an average distance of 27km from the colony, and vary in their habitat use between years (Fijn *et al.* 2017). Sandwich Terns almost always nest in shared colonies with Black-headed Gulls, potentially benefiting from the gulls' aggressive nest defence in response to predators.

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 1969–1970 and 1985–1988, but that numbers then declined by 15% in the period between 1985–1988 and 1998–2002.

In Northern Ireland most Sandwich Terns (and other tern species) breed in a few large colonies. For Sandwich Tern, these colonies are at Strangford Lough, Larne Lough, Lower Lough Erne and Cockle Island, Groomsport.

NEAL WARNOCK

Breeding numbers

Presenting the total populations for the main coastal colonies together (Figure 27) is advantageous as terns may move colony from year to year and it allows an overall appraisal of the Northern Ireland population. At Carlingford Lough numbers reached a peak in 1979, when 1,302 AONs were recorded. However there have been few nests in recent years. In 2017 there were 71 AONs, but this year this dropped further to 13. No Sandwich Terns bred at Cockle Island between 2015 and 2017, but this year there were 92 AONs. Numbers at Larne Lough fell for a second year in a row, from 1,141 AONs in 2017 to 732 AONs in 2018. In contrast, the Strangford Lough population remained stable at 776 AONs in 2018. The count of Sandwich Terns at Strangford Lough is the longest running population count of seabirds in Northern Ireland, celebrating its 50th year in 2018 (Hugh Thurgate *pers.comm.*). The total for these four colonies was 1,613 AONs in 2018, slightly down on 2017. Inland at Lower Lough Erne, numbers were reportedly the same as in 2017 at 316 AONs, maintaining the highest count since records began (Figure 28).

Sandwich Tern has the most complete and consistent monitoring record over the longest period of any seabird species in Northern Ireland. The UK abundance index indicates that numbers are now similar to those in 1986 but that numbers can fluctuate greatly from year to year (JNCC 2016).

Breeding success

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.*). No specific data are available for 2018. Despite improving breeding success at Carlingford Lough from 2011–2015 due to an intensified programme of monitoring and conservation, only two chicks fledged from 13 AONs in 2018 (Table 5). There was also very low breeding success for Arctic and Common Terns at the same site. Suspected predation of eggs and young by Eurasian Otter (*Lutra lutra*)

is the possible cause of breeding failure for terns at Carlingford (Matthew Tickner, RSPB *pers. comm.*). Sandwich Tern nests that were protected from ground predators by an enclosure experienced a relatively good productivity on Blue Circle Island, Larne Lough, at 0.78 chicks/AON (Matthew Tickner, RSPB *pers. comm.*). However, the colony on the neighbouring Swan Island produced no chicks this year. The productivity of the whole population of Sandwich Terns in Strangford Lough was 0.20 (on 776 AON). This figure masks the fact that the only island in Strangford to produce any Sandwich Tern young was Swan Island in Strangford harbour, where a productivity of 0.91 was attained. UK productivity has decreased from a peak of over 0.80 chicks/AON in 2000 to 0.40 chicks/AON in 2015.

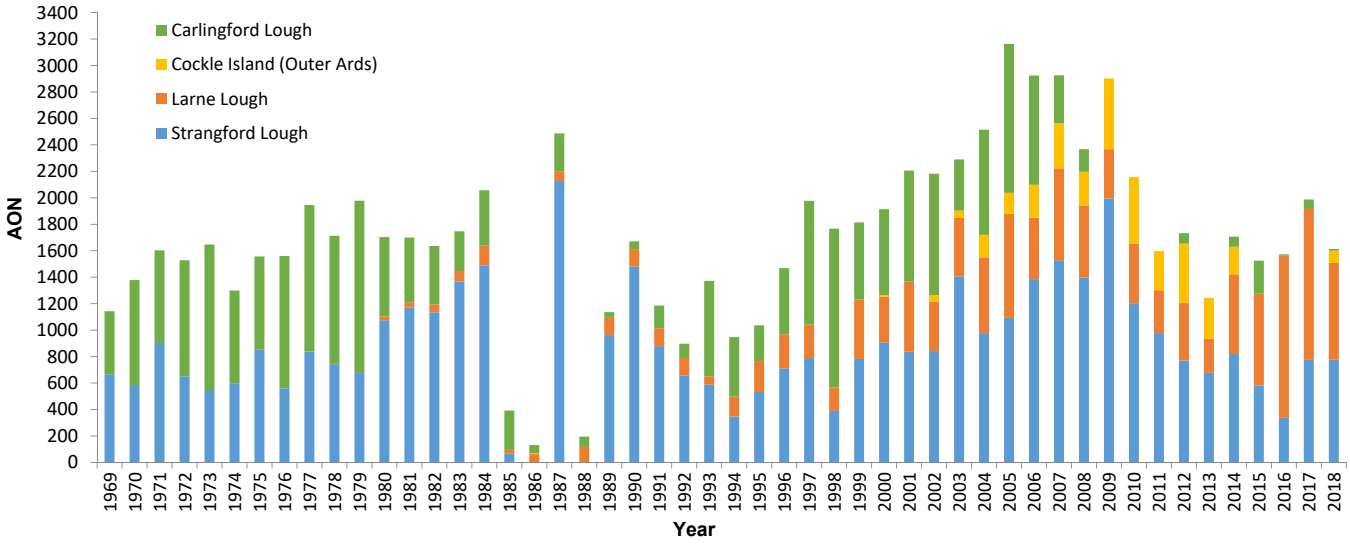

Figure 27 Cumulative Sandwich Tern numbers (AONs) at Cockle Island, Larne Lough, Carlingford Lough and Strangford Lough, 1969–2018.

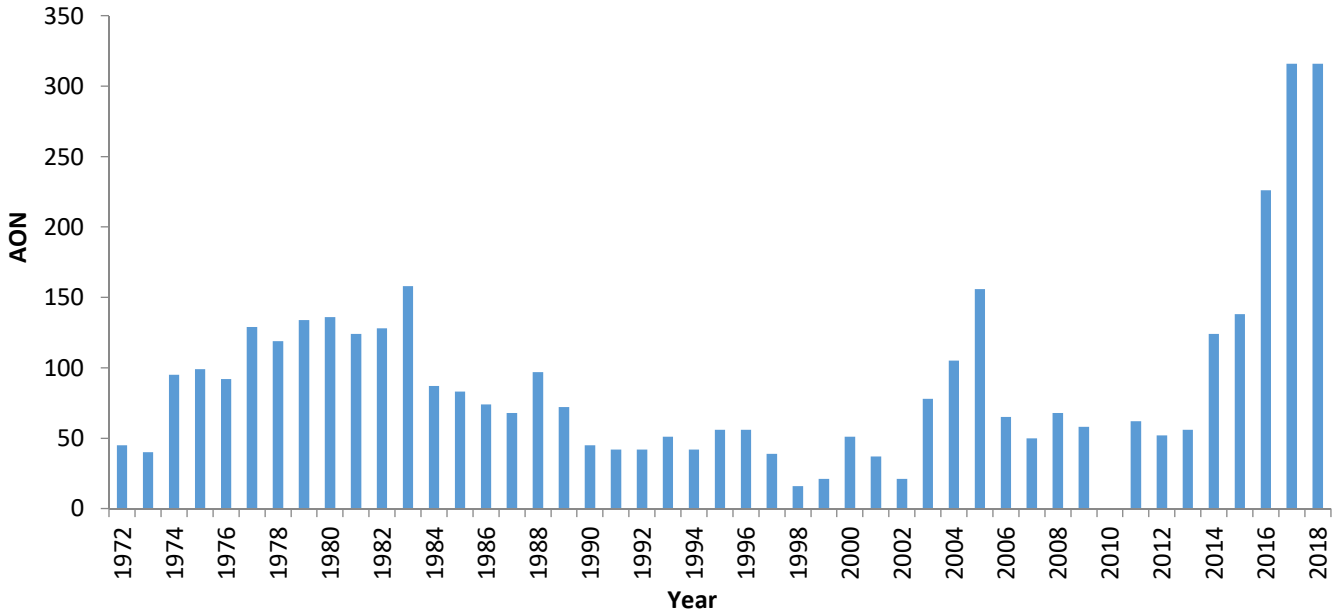

Figure 28 Sandwich Tern numbers (AONs) at Lower Lough Erne, 1972–2018.

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

Year	Productivity
2014	0.66
2015	0.56
2016	0
2017	0
2018	0.15

Common Tern *Sterna hirundo*

EC Birds Directive – listed in Annex 1 and as a migratory species
Amber listed in the Birds of Conservation Concern in Ireland 3 (2014–2019)

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 country (Mitchell *et al.* 2004). 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.

Interestingly, a recent study (Mostello *et al.* 2016) found that Common Terns and Arctic Terns (*Sterna paradisaea*) are able to successfully hybridise. A mixed-species pair was observed in a colony in Massachusetts, USA. Over their eight year pair-bond they raised nine chicks, one of which was observed successfully backcrossing with a Common Tern (Mostello *et al.* 2016).

JON LEES

Breeding numbers

Historical data for the main Northern Ireland colonies are incomplete. The cumulative total for the main eastern colonies is shown in Figure 29. In the late 1980s, there was a sudden increase to over 1,000 AONs and, by the early 21st Century, there were over 2,000 AONs. Since this peak the population has again declined and numbers are now similar to the late 1980s. The population for the six main east coast colonies was slightly lower than in 2017, down from 1,154 to 1,119 AONs in total.

Total numbers fell very slightly across a range of sites around the coast of Northern Ireland (Figure 29), a result of increases at Strangford Lough and Belfast Harbour RSPB combined with decreases at Larne Lough, Cockle Island and Carlingford Lough. Inland, 51 AONs were located at Gravel Ridge Island, Lower Lough Erne in 2018 (Figure 30). Other population increases were recorded at Portmore Lough (135 AONs, increasing from 102 in 2017, Table 10) and at various locations in Lough Neagh, from 331 individuals in 2017 to 369 individuals in 2018, with the majority of individuals found on the Torpedo Platform and Croaghan Island (Table 10). Common Terns were not counted on the Lagan tern raft this year.

Across the UK breeding numbers remained steady from 1986–2006 but since then there has been a decline, with the abundance index in 2015 19% below that of 1986 (JNCC 2016). Although the reasons for this are unproven there has been a decrease in breeding success in the last 15 years (JNCC 2016).

Breeding success

Table 6 shows the breeding productivity of Common Terns in Northern Ireland across different sites from 2013 to 2018. Portmore Lough has recorded Common Tern productivity for the longest period, and in 2018 productivity remained fairly constant, at 0.90 chicks/AON fledged. Productivity remained extremely low at Green Island, Carlingford Lough, with only five chicks estimated to have fledged from 70 AONs. Blue Circle Island, Larne Lough, which was not affected by Storm Hector on 14/06, had Common Tern productivity of 0.80, whereas nearby Swan Island had an initial productivity of 0.71 chicks/AON which dropped to 0.34 chicks/AON due to the significant impact of Storm Hector washing out large numbers of nests. Productivity of the Strangford population of Common Terns was very low at 0.08 chicks/AON based on 340 AONs, due to both the effects of Storm Hector and significant predation by large gulls (Herring and Great Black-backed) and Otter. Productivity data for Common Terns in Northern Ireland show they had an average fledging rate of 0.32 chicks/AON between 1999 and 2011 (JNCC 2016), while this year the average across all monitored sites was 0.40 chicks/AON.

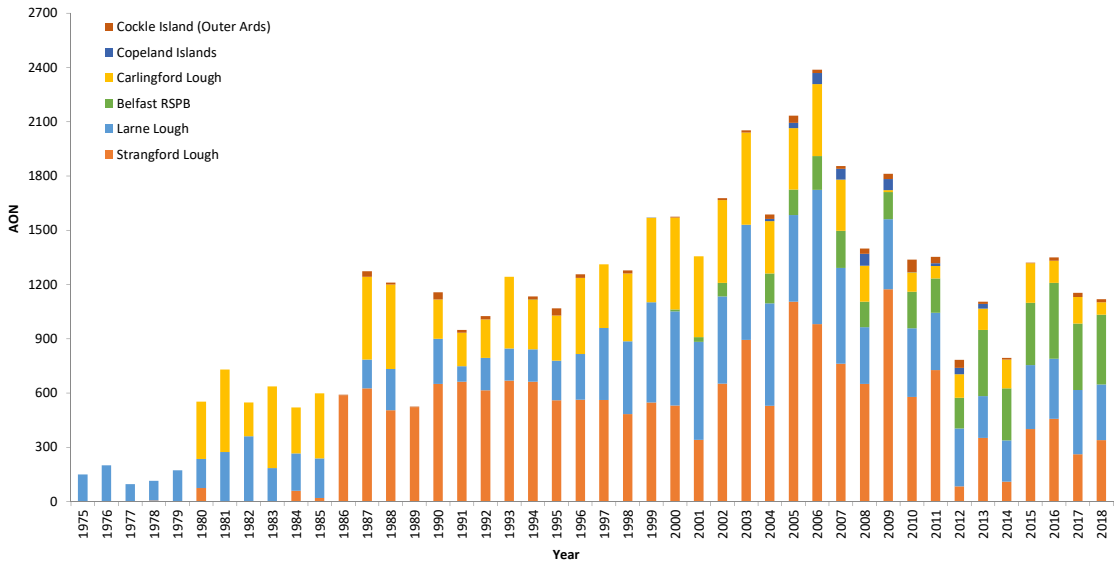

Figure 29 Cumulative Common Tern numbers (AONs) at Cockle Island, Copeland Islands (not counted since 2013), Carlingford Lough, Belfast Lough RSPB, Larne Lough and Strangford Lough, 1975–2018.

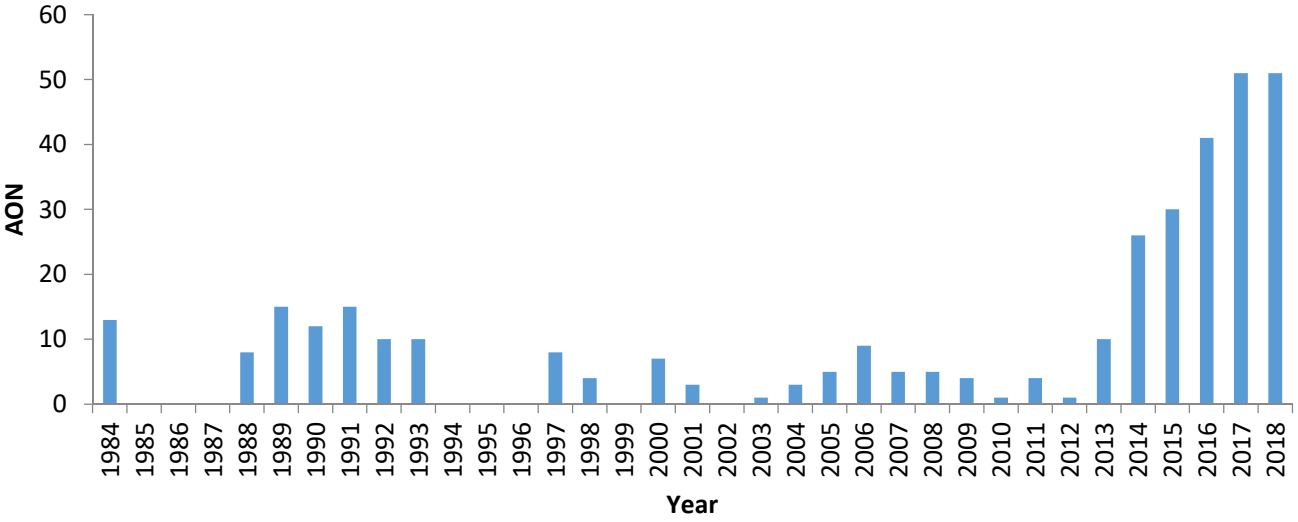

Figure 30 Common Tern numbers (AONs) at Lower Lough Erne, 1984–2018.

Table 6 Productivity (chicks/AON) of breeding Common Terns across five sites from 2013 to 2018. Gaps in the data indicate that no records were made at the location in that year.

Year	Belfast Harbour RSPB	Portmore Lough RSPB	Lagan Tern Raft	Carlingford Lough	Larne Lough	Strangford Lough
2013	0.77					
2014	0.65	1.41				
2015		1.20				
2016		0.87	0.66	0.00		
2017		0.89	0.85	0.06	0.28	
2018	0.39	0.90		0.07	0.56	0.08

Roseate Tern *Sterna dougallii*

EC Birds Directive – listed in Annex 1 and as a migratory species
Amber listed in the Birds of Conservation Concern in Ireland 3 (2014–2019)
Northern Ireland Priority species (Northern Ireland Biodiversity Strategy 2002)

Overview

European populations of the Roseate Tern declined during the 20th Century, a decline which was mirrored by population declines in North America (del Hoyo *et al.* 1996). Numbers stabilised in the late 20th Century and while some European populations have continued to decline, other colonies have increased, with focused conservation measures helping this recovery (Newton & Crowe 2000).

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 AONs annually. It may have benefited from emigration from other sites. The stronghold for the species within Britain and Ireland is now in south-east Ireland at Rockabill Island and Lady's Island Lake.

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 in the 1950s.

NEAL WARNOCK

Breeding numbers

The species has suffered a near terminal decline as a breeding species in Northern Ireland since the late 1980s (Leonard 2016b). Carlingford Lough formerly held a population of up to 40 AONs in 1987. However, none breed there anymore. 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 (Figure 31). In 2018, there was again a single pair at Larne Lough.

Breeding success

The pair at Larne Lough hatched two chicks again this year (Matthew Tickner, RSPB *pers. comm.*) and it is thought that these fledged (Shane Wolsey *pers.comm.*)

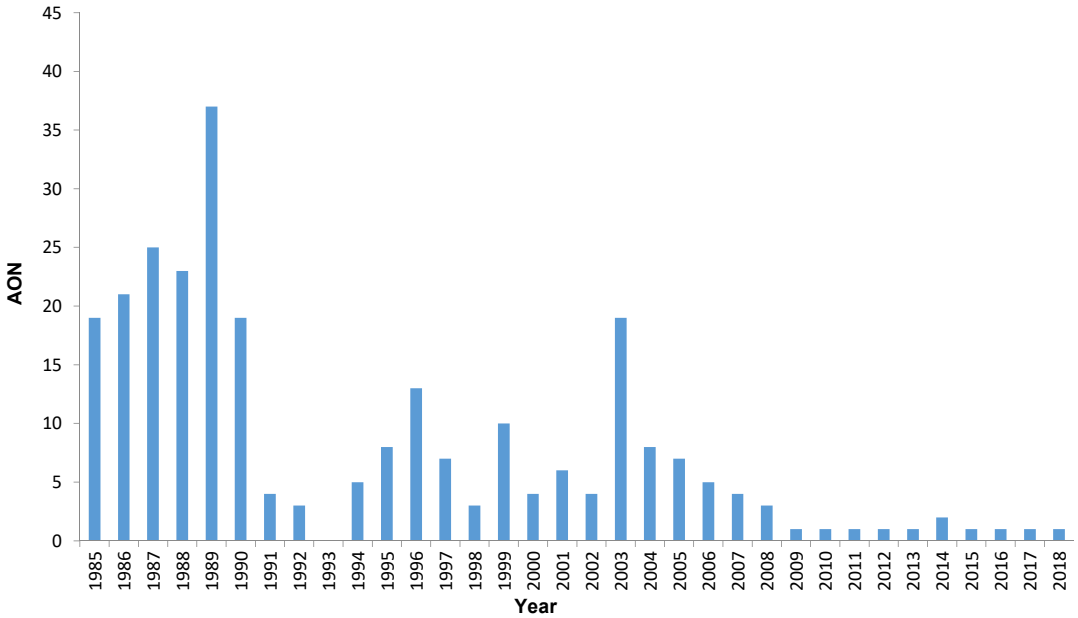

Figure 31 Roseate Tern population numbers (AONs) at Larne Lough, 1985–2018.

Arctic Tern *Sterna paradisaea*

EC Birds Directive – listed in Annex 1 and as a migratory species
Amber listed in the Birds of Conservation Concern in Ireland 3 (2014–2019)

Overview

Arctic Terns are the commonest tern breeding in the UK. The UK population has fluctuated greatly since the 1960s. There was an apparent large increase between 1969 and 1986, though there is uncertainty as to the true magnitude of this change due to questions of compatibility of methods between censuses. Most of the UK population (73%) nests in the Northern Isles (Mitchell *et al.* 2004). 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.

Breeding numbers


GEOFF CAMPBELL

Numbers present at Strangford Lough have plummeted in the past decade, falling from a high of 663 AONs in 2006 to 73 AONs in 2017 (Figure 32), but increased in 2018 to 193 AONs. Arctic Terns did not breed in Belfast Lough RSPB in 2017, but this year there were 15 AONs (Figure 32). The Cockle Island population has boomed from 129 AONs in 2017 to 341 AONs in 2018, an increase of 164%. The colony at Green Island, Carlingford Lough was the largest since 2015, with 70 AONs.

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 AONs between 2000 and 2013, but no full survey has taken place on all three islands in the past five years. However, the Arctic Tern population was counted on Lighthouse Island in 2018, and 150 AONs were recorded from a vantage point. This is an estimate, since from a distance it was difficult to discern whether the terns were on nests or resting (Chris Acheson, Copeland Bird Observatory *pers. comm.*).

The UK breeding abundance index for Arctic Tern showed an apparent rapid increase, followed by decrease, during 1986 to 1990. From 1990 the index has fluctuated, mainly above 1986 levels (JNCC 2016). The 2015 index was 18% above the 1986 level (JNCC 2016).

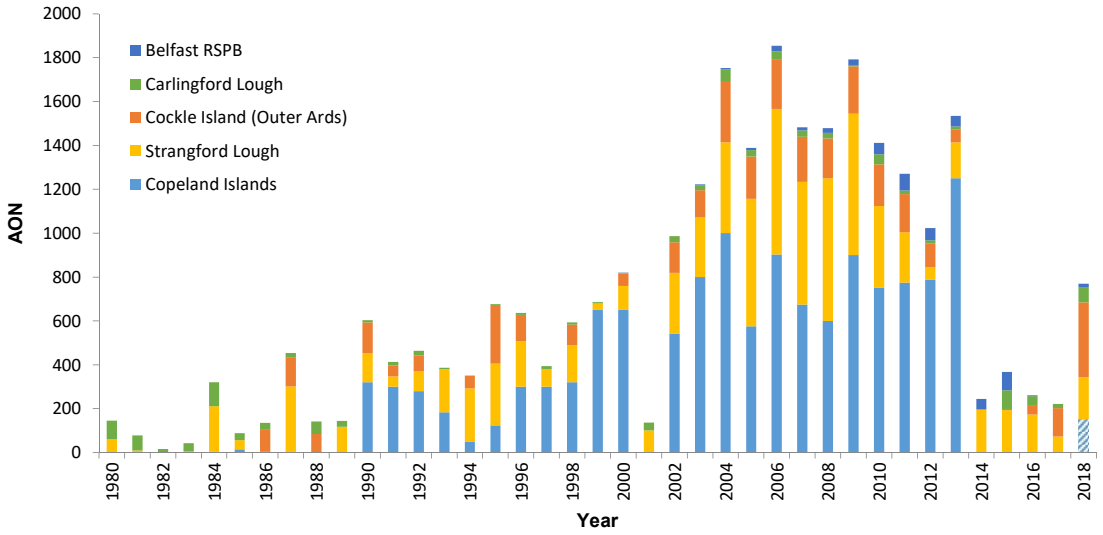

Figure 32 Cumulative Arctic Tern numbers (AONs) at Belfast Lough RSPB, Carlingford Lough, Copeland Islands (not fully counted since 2013), Strangford Lough, and Cockle Island (Outer Ards), 1980–2018. The cross-hatched pale blue bar represents the incomplete Copeland Island count in 2018, encompassing Lighthouse Island only.

Breeding success

From the 70 AONs at Green Island, Carlingford Lough, it is estimated that three chicks were produced (0.04 chicks/AON, Matthew Tickner, RSPB *pers. comm.*). The Strangford Lough population of 193 AON 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*

EC Birds Directive – migratory species
Amber listed in Birds of Conservation Concern in Ireland 3 (2014–2019)

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). Guillemots are proficient divers, and can dive deeper (~30–70m) than other auks they often share colonies with, like Puffins and Razorbills (Shoji *et al.* 2015; Thaxter *et al.* 2010). This is likely due to the fact that they carry only a single prey item back to the colony when provisioning chicks and therefore must spend more time searching for larger prey for trips to be energetically worthwhile (Thaxter *et al.* 2010).

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). 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.

GEOFF CAMPBELL

Breeding numbers

The last full survey of Rathlin, in 2011, recorded 130,445 individuals (Allen *et al.* 2011). After a 50% decrease between 1999 and 2007 this was a 60% increase which probably makes Rathlin the largest colony in the UK and Ireland. In 2018, 2,284 individuals were recorded at The Gobbins (Figure 33) and 2,478 individuals at Muck Island (Figure 34).

The breeding abundance index shows that, across the UK, Guillemots have increased by approximately 50% since 1986 (JNCC 2016). However, the increase at Rathlin Island contrasts with Handa, the largest colony during Seabird 2000, where the population has decreased by 42% since 2000 (JNCC 2016). Studies on the Isle of May have shown that Guillemot adults have a 90% annual return rate (JNCC 2016), but this was much lower in 2007–2008, which may give clues to the reasons for the low count on Rathlin Island in 2007. On Rathlin Island, the RSPB carry out annual comparative counts of study plots to monitor population levels (Figure 35). In 2018, 3,454 Guillemots were counted in the study plots, representing a stable count since 2015.

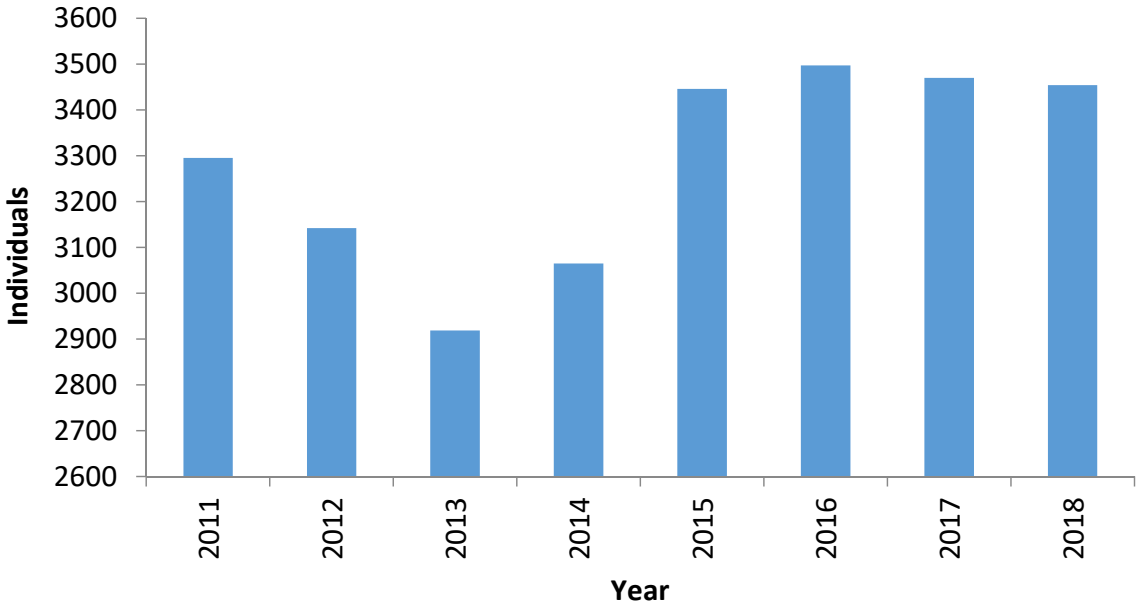

Figure 33 Common Guillemot numbers (individuals) at The Gobbins, 1969–2018.

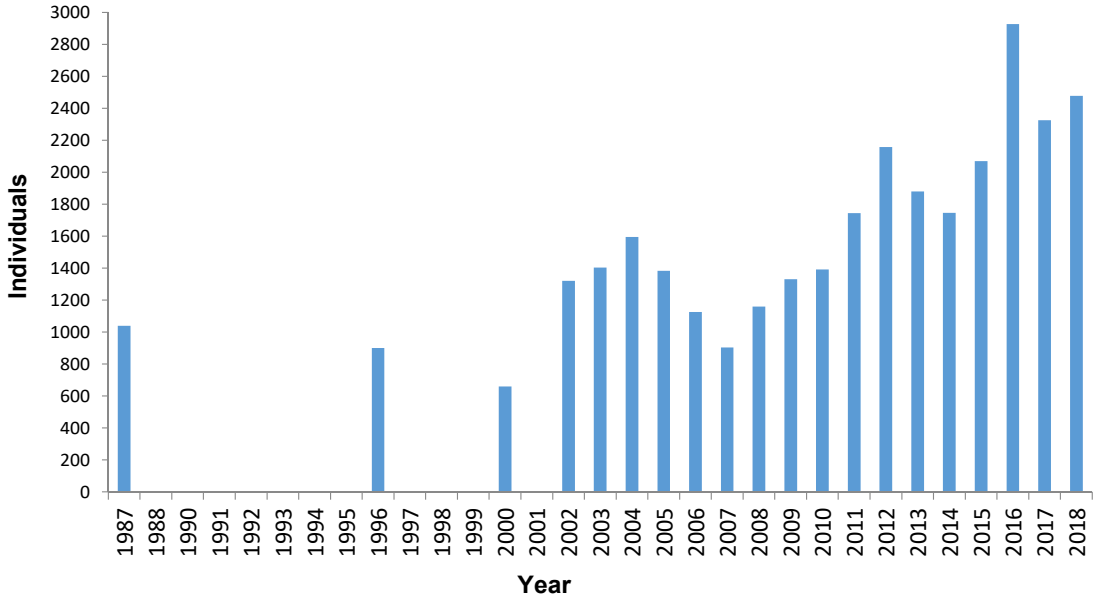

Figure 34 Common Guillemot numbers (individuals) at Muck Island, 1987–2018.

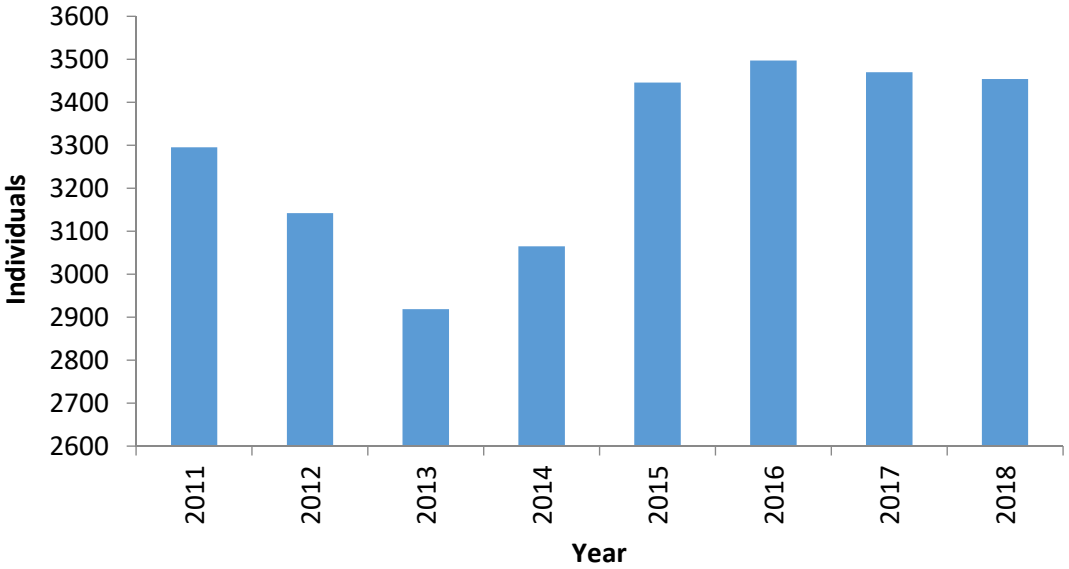

Figure 35 Common Guillemot study plot counts (individuals) at Rathlin Island, 2011–2018.

Breeding success

No Guillemot productivity data were collected in 2018. Hooded Crows, Carrion Crows and Herring Gulls are responsible for the predation of many Guillemot eggs at The Gobbins (Kerry Leonard *pers. comm.*).

Between 2002 and 2007 just 0.30 chicks/pair were fledged at sites monitored in the UK. Levels of productivity have recovered since 2007 to 0.50-0.60 chicks/pair, but are still below that of the 1980s (JNCC 2016).

Razorbill *Alca torda*

EC Birds Directive – migratory species
Amber listed in the Birds of Conservation Concern in Ireland 3 (2014–2019)

Overview

The Razorbill is an auk of the North Atlantic and Arctic Ocean. They breed on both sides of the Atlantic. Razorbills nest on ledges with Common Guillemots and Kittiwakes, but also frequently in clefts, holes and under boulders. Unlike the Guillemot, Razorbills are able to carry several prey items in their bills back to the colony when chick provisioning, and therefore can afford to make shorter and shallower dives for smaller prey (Thaxter *et al.* 2010), thus avoiding competition for food with Guillemots.

Razorbill populations showed successive increases during the UK and Ireland censuses, though the population at the time of Operation Seafarer may have been underestimated, because the small ledges they nest on can often be hidden from view, making them difficult to census (Mitchell *et al.* 2004).

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.

STEPHEN MAXWELL

Breeding numbers

The UK breeding abundance index has fluctuated over the last 25 years but is still well above 1980s levels (JNCC 2016). 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 down very slightly at Muck Island this year, at 736 individuals compared to 2017's 799 individuals (Figure 36). However, numbers at The Gobbins increased by 57.5% between 2017 and 2018, to 882 individuals (Figure 37). Only 548 individuals were recorded in the study plots on Rathlin Island this year, which is the lowest count since the establishment of the plots (Figure 38). However, it should be noted that numbers of Razorbills in attendance at the colony can be subject to large fluctuations, particularly where many birds may not breed each year. For example, comparing 2016 counts to those in 2014 shows how perilous it could be to count nesting Razorbills at a site one year in ten or twenty, to discern national trends.

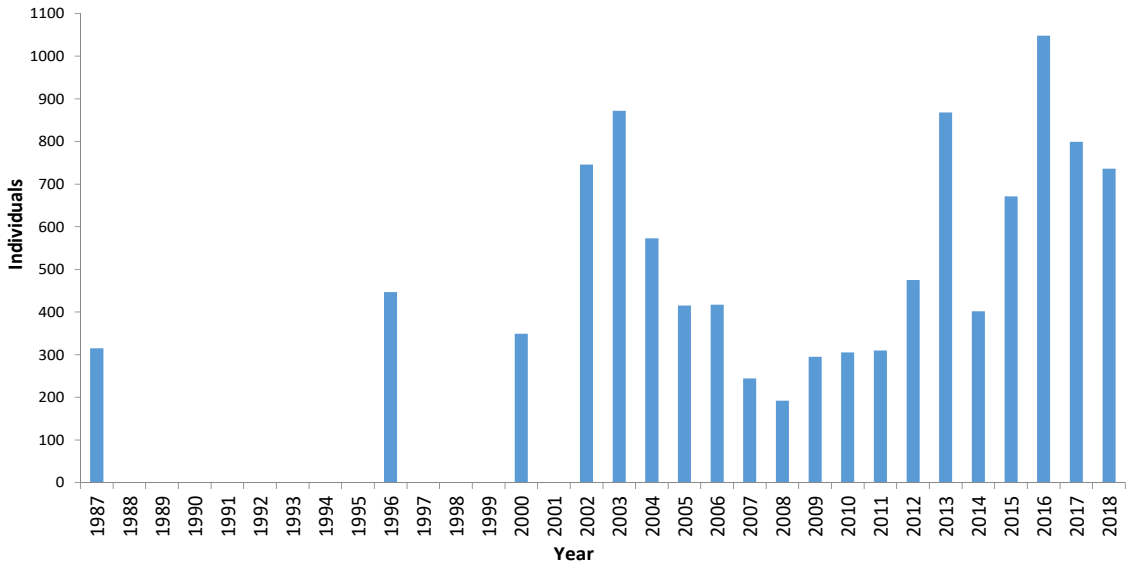

Figure 36 Razorbill numbers (individuals) at Muck Island, 1987–2018.

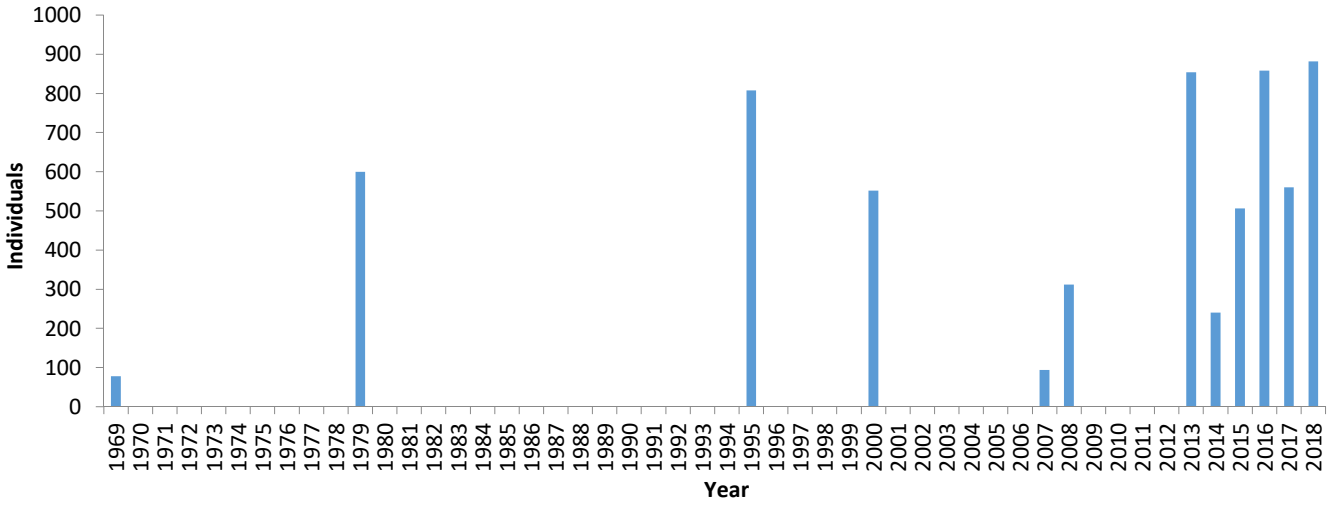

Figure 37 Razorbill numbers (individuals) at The Gobbins, 1969–2018.

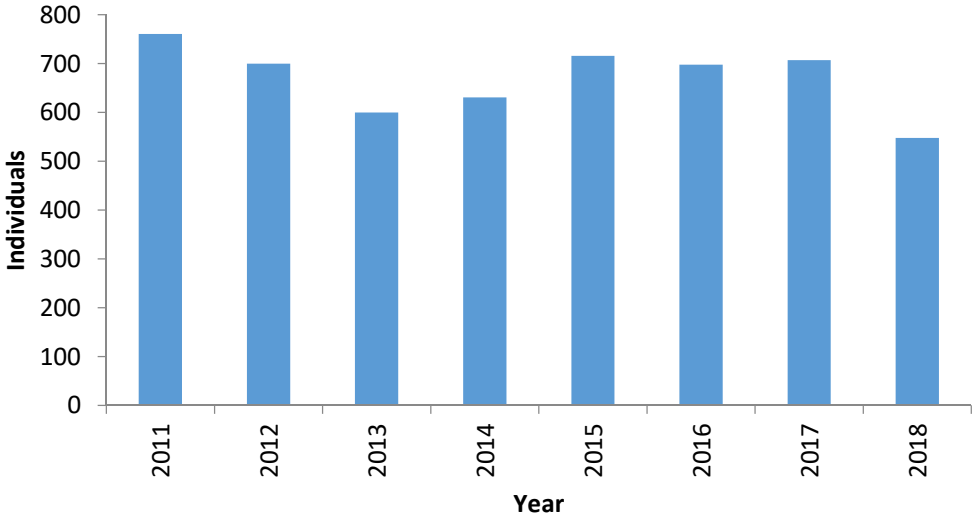

Figure 38 Razorbill study plot numbers (individuals) at Rathlin Island, 2011–2018.

Breeding success

Across the UK annual productivity has declined slowly over the last 25 years and is now approximately 0.50 chicks/ pair (JNCC 2016). Razorbill productivity is not currently recorded at any sites in Northern Ireland.

Black Guillemot *Cepphus grylle*

Amber listed in the Birds of Conservation Concern in Ireland 3 (2014–2019)

Overview

The Black Guillemot (or Tystie) is a circumpolar species which in the UK has historically been a predominantly Scottish species. Between censuses in 1969–1970 and 1985–1988 there was a range expansion and the species increased dramatically around the coast of Northern Ireland (JNCC 2016). This increase has continued through Seabird 2000 to this day. Black Guillemots nest in crevices (natural or man-made) and can be difficult to survey. It is essential the recommended methodology is followed.

Black Guillemots, like other seabirds, show a high degree of philopatry once they start to breed (Brooke 1990), but juveniles will disperse readily to other colonies (Frederiksen & Petersen 2000). Increased juvenile dispersal away from poorer sites, coupled with poorer adult survival, but better survival for Co. Down birds, could be responsible for the observed changes in distribution. However, we simply do not know for sure. Black Guillemots in Northern Ireland feed almost exclusively on Butterfish *Pholis gunnellus* (Cramp & Simmons 1983; Gaston & Jones 1998) and the distribution and abundance of this fish species must be a key factor influencing Black Guillemot populations and distribution.

Research carried out on the population nesting in Bangor Harbour revealed that, as for some other UK seabird species (e.g. Kittiwake, Common Guillemot, European Shag (Frederiksen *et al.* 2004) onset of breeding for Black Guillemots is influenced by environmental conditions in that breeding year (Greenwood 2007). First egg dates for Black Guillemots in Bangor Harbour were correlated with sea surface temperature in the Firth of Clyde (Greenwood 2007). These and other published results from Julian Greenwood's work on Black Guillemots in Bangor Harbour highlight the scientific value of relatively local studies performed by volunteers.

JON LEES

Breeding numbers

Counts of Black Guillemots from around the coast of Northern Ireland in 2018 are recorded in Table 7.

Although the population remains stable there has been a change in distribution within counties Down and Antrim since Seabird 2000. 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 39).

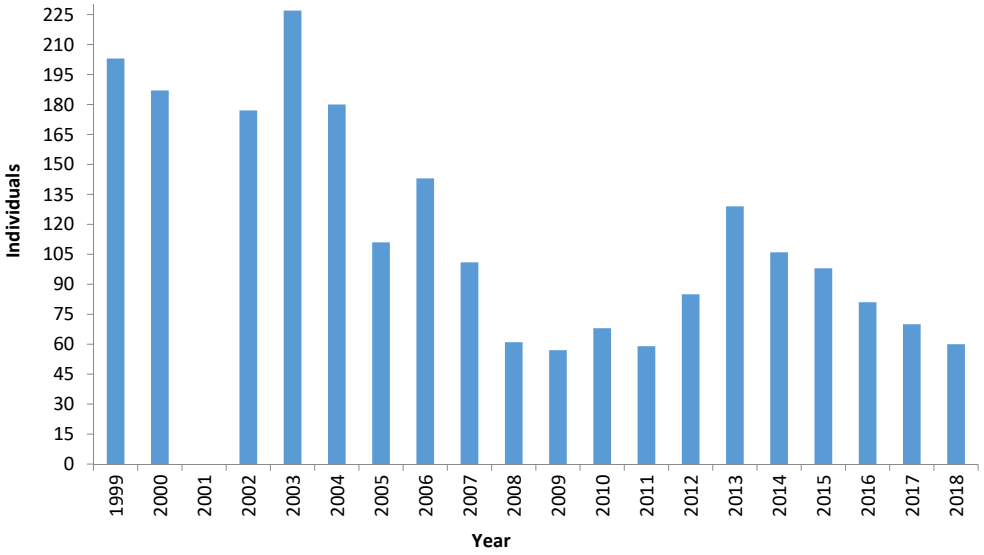

Figure 39 Black Guillemot numbers (individuals) at Rathlin Island, 1999–2018.

Table 7 Black Guillemot numbers (individuals) at sites in Northern Ireland in 2018.

Parent Site	Site	Count
The Barmouth (River Bann) to Portrush Bay	The Barmouth to Portrush Bay	22
Portrush Harbour	Portrush Harbour 1	14
Rathlin Island	Rathlin Island 1	60
Larne to Torr Head	Cushendall	9
	Garron Coast	6
	Glenarm Harbour	69
	Ballygalley	0
Larne Lough and Island Magee	Larne Lough	94
	The Maidens	35

Table 7(Contd)

Parent Site	Site	Count
	Barr's Head to Black Head	32
Barr's Head fo Black Head	Barr's Head to Castle Robin	4
	Castle Robin to Portmuck	22
	Gobbins	6
	South Islandmagee - Tysties	0
Muck Island	Muck 1	14
Whitehead Town	Whitehead Town 1	1
Carrickfergus to White Head	Eden to White Head	140
Belfast to Grey Point	Belfast to Grey Point 1	7
Bangor	Bangor Marina	76
Bangor to Groomsport	Bangor to Groomsport1	10
Copeland Islands	Our Lighthouse Island	100
Strangford Lough	Strangford Mainland - Kircubbin to Greyabbey	0
	Strangford Mainland - Greyabbey	0
	Strangford Mainland - Greayabbey to Newtownwards	0
South Down	Minerstown to Ballykinler	0
Bloody Bridge to Newcastle	Bloody Bridge to Newcastle 1	9
Mourne Coast	Mourne Coast 1	25
	Annalong HarbourAnnalong Harbour 1	34
Kileel Harbour	Harbour	6
Carlingford Lough	Rostrevor	16
	Warrenpoint	21

Breeding success

In Bangor harbour, 26 Black Guillemot nest sites were monitored, and these had an overall productivity of 1.08 chicks per nest (Shane Wolsey *pers. comm.*).

Atlantic Puffin *Fratercula arctica*

EC Birds Directive – migratory species
Amber listed in Birds of Conservation Concern in Ireland 3 (2014–2019)

Overview

The Atlantic 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. This is changing with the use of new technology to discover wintering areas and migratory routes (Guilford *et al.* 2011; Harris *et al.* 2010) and foraging behaviours (Shoji *et al.* 2015). The latest research suggests that breeding pairs follow similar migratory routes post breeding season (although the mechanism for this is still unknown) and that this subsequently allows pairs to breed earlier and more successfully the following spring (Fayet *et al.* 2017).

Around 10% of the world population breeds in the UK and Ireland, where it is the second most abundant breeding seabird (Mitchell *et al.* 2004). In Northern Ireland the main colony is on Rathlin, with small numbers 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.

Breeding numbers

In 2017, a peak count of 57 was recorded at The Gobbins, in the same range as counts during 2013–2016 (Figure 40). Birds were present around Lighthouse Island, the Copeland Islands, with approximately 82 individuals present in late May. One Puffin was seen on Lighthouse Island on the 21st May excavating and carrying nest material, however, the number of AOBs is unknown, as Puffin breeding is not monitored on the Copeland Islands at present (Copeland Bird Observatory *pers. comm.*).

The logistical difficulties in monitoring Atlantic Puffin colonies means that few data are collected annually and that a bias toward smaller colonies exists; these are usually counts of individual adult birds in attendance at breeding sites. 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).

CHRISTINE CASSIDY

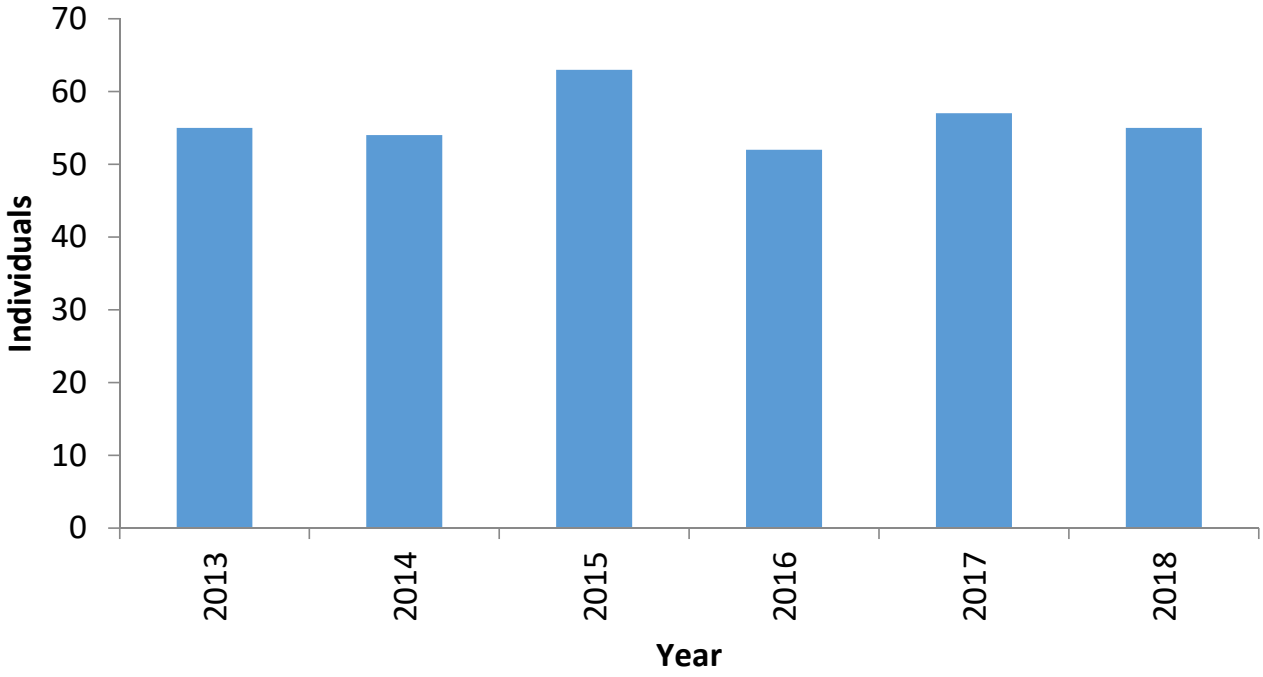

Figure 40 Puffin numbers (individuals) at The Gobbins, 2013–2018.

Breeding success

In 2016, two chicks fledged from the new colony on Lighthouse Island. However, there are no records from 2018. Monitoring elsewhere in the UK has shown that productivity is highly variable; in 2015, across the UK, productivity averaged 0.55 chicks per pair (JNCC 2016).

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Seabird Recovery Project - Isle of Muck

John McLaughlin, Ulster Wildlife

The Isle of Muck is one of the largest breeding seabird colonies in Northern Ireland. It is managed by Ulster Wildlife and is part of Portmuck ASSI (Area of Special Scientific Interest). The island is 600m long with sea cliffs rising to 30m above sea level. A tombolo (a natural causeway) connects the island to the shore at low tide and is the only geological feature of its kind on the open coast in Northern Ireland. The island hosts a number of breeding seabirds including Guillemots, Razorbills, Fulmars, Kittiwakes and Shags and the surrounding waters are notable for the presence of harbour porpoise and seals.

Historically, large numbers of Herring Gull bred on the Isle of Muck and suppressed much of the vegetation on the island plateau. The Herring Gull population has declined dramatically since the early 1990's and the island plateau became dominated by rank grassland vegetation, scrub and bracken.

Brown Rats

Visits to the Isle of Muck revealed the presence of a large Brown Rat (*Rattus norvegicus*) population. The short distance from the mainland and periodic exposure of the tombolo may have facilitated rat colonisation on the island. Reduced numbers of breeding gulls and the predominance of grasses provide cover for nesting rats and many rat 'tunnels' and rat droppings were found throughout the island. Rats are voracious predators and they can easily take the eggs and chicks of defenceless seabirds. Fulmars are particularly vulnerable to predation as they nest along easily accessible sections of the cliff ledges. Brown Rats are a non-native invasive species and they have a detrimental impact on breeding seabirds as well as limiting the range of species that could colonise the island, including burrow-nesting seabirds like Manx Shearwater and Atlantic Puffin.

JOHN MCLAUGHLIN

Baiting on Muck Island

Rat Eradication

Funding from the Biffa Award enabled Ulster Wildlife to launch the Seabird Recovery Project in winter 2017. The aims of the project were to eradicate the Brown Rat population and improve the habitat for breeding seabirds. A programme of rat eradication began in December 2017 with a series of 44 bait stations set out across the island. The stations were baited with rodenticide two to three times a week for six weeks.

Intensive monitoring took place alongside the baiting programme. Some of the tools used to monitor for rat presence include wildlife surveillance cameras, flavoured wax blocks, which indicate any gnawing behaviour (teeth marks) and tracking tunnels with ink-based tracking cards, which reveal the footprints of any rats passing through. After six weeks, the rats ceased to take the bait and all monitoring tools became inactive suggesting that the rat population had been eradicated successfully.

JOHN MCLAUGHLIN

Chewed wax blocks

Seabird Monitoring

During the summer months, seabird monitoring was carried by Ulster Wildlife staff. This involved population counts for Black Guillemots, Kittiwake productivity and whole colony counts. Anecdotal reports from local fishermen and birdwatchers in the Portmuck area suggested that greater numbers of seabirds and Eider Ducks had been observed during the summer compared with previous years.

Habitat Management

In summer 2018, a substantial area of bracken was removed on the southern end of the island plateau, extending the habitat for breeding seabirds, although some bracken has been retained to provide cover for nesting Eider Ducks. Scrub control also commenced to remove areas of encroaching elder from the western slopes of the island. To reduce the dense grassland vegetation a number of Portland and Shetland sheep were introduced to graze the island from September to February. Reducing the grassland vegetation cover will improve the habitat for breeding seabirds and increase the prospects for species such as Manx Shearwater and Puffin to establish in the absence of Brown Rats.

Going Forward

Atlantic Puffins breed nearby at The Gobbins and Ulster Wildlife aim to set up decoys on the island with a Puffin call system to attract the iconic birds to breed on the Isle of Muck. Research has also gone into developing rat resistant nest boxes for Black Guillemots, which will be constructed and set up before the breeding season next spring.

Ulster Wildlife staff will continue monitoring the island on a monthly basis in order to detect any rat re-incursion and a biosecurity plan is in place to eradicate any colonists quickly before a population might establish.

Gull tracking in Belfast takes flight: reviewing data from the first breeding season

Katherine Booth Jones, Chris Thaxter, Gary Clewley, Shane Wolsey, Phil Atkinson & Niall Burton

British Trust for Ornithology

Introduction

Despite apparent increases in urban colonies, both Herring and Lesser Black-backed Gulls are listed in the Birds of Conservation Concern in Ireland 2014–2019 (Colhoun & Cummins 2013). Lesser Black-backed Gulls are assigned an Amber threat level, due to a moderate decline in breeding range in the past 25 years and a localised distribution in Ireland, while Herring Gulls are Red-listed in Ireland due to a population decline of 90% in the past 25 years, coupled with a reduction in breeding range of at least 70% (Colhoun & Cummins 2013).

Little is known about the habitat-use of urban gulls, as most GPS tracking to date has concentrated on rural and coastal nesting gulls, although see Rock *et al.,* (2016). The BTO also has PhDs currently underway drawing from tracking of urban nesting gulls in north-west England and the Firth of Forth. Tracking studies have the potential to answer key questions on how urban gulls differ from their declining rural and coastal counterparts in their use of space and food resources, particularly since urban populations are visibly on the rise.

Beyond the conservation motivation for studying urban gulls, their movement into urban environments has sparked human-wildlife conflict issues. Reports of problems with gulls are on the rise from residents, tourism and businesses in towns and cities across the UK, coinciding with the numbers of urban nesting gulls increasing in recent years (Calladine *et al.* 2006; JNCC 2016; Raven & Coulson 1997; Rock 2005). Problems include the spreading of litter, noise, fouling with droppings and the potential for disease transmission through contamination with droppings (Calladine *et al.* 2006; Fogarty *et al.* 2003; Hatch 1996), including antibiotic resistant strains of bacteria (Dolejská *et al.* 2009; Fogarty *et al.* 2003).

In Northern Ireland, urban gull populations are completely unstudied. The last seabird census, Seabird 2000, estimated that there were only 63 and eight roof-top Apparently Occupied Nests (AONs) of Lesser Black-backed Gulls and Herring Gulls respectively (JNCC 2017). There are existing tracking data from Herring Gulls breeding in a nearby coastal colony (Atkinson *et al.* 2015), but there are no data yet on the areas of key use for urban nesting gulls.

This project aims to track Lesser Black-backed Gulls and Herring Gulls nesting in Belfast city centre using Movetech GPS tags to identify areas of key use for urban nesting gulls. Analysis of the space-use of urban nesting gulls is not only of ecological interest due to the increasing urbanisation of wild animals and conservation status of large gulls, but will also benefit agencies wishing to reduce human-gull conflict, including possible risks to human health in Belfast and other urban centres.

Methods

Buildings in central Belfast were investigated for accessibility and roof-nesting gull presence in late March and April 2018. Gulls were caught at nests using a walk-in chicken-wire cage, placed over the nest. Ideally, nests are best targeted at late-egg stage in mid-late May, when gulls are incubating eggs. Four Lesser Black-backed Gull nests on two buildings (the Cecil Ward Building and Goodwood House) were located and gull catching occurred on the 25th May 2018, during the late egg stage for two of the nests, and partially through hatching for the other two.

The project aims to fit a total of 12 Movetech (http://movetech-telemetry.com/) Global Positioning System – Global System for Mobile Communication (GPS-GSM) devices to six Lesser Black-backed Gulls and six Herring Gulls using a weak-link body harness. Harnesses are handmade from Teflon and fitted to the body size of the gull. Arms of the harness pass above and below the wings of the gull and are joined at the front by a cotton weak-link, which allows the harness to drop off once the cotton has worn through.

From the four nests, six Lesser Black-backed Gulls were captured. Morphometric measurements and an assessment of moult were conducted as standard to the ringing process, allowing age, body condition and sex to be estimated. Guidelines from Harris and Jones (1969) were used to sex individuals at a 95% confidence level. Four of the Lesser Black-backed Gulls captured on the sample of four nests were likely to be males, and two females.

All six gulls were fitted with BTO metal rings and a plastic colour ring, to aid field identification of individuals. The four largest gulls, all predicted to be males, were fitted with Movetech GPS tags to minimise the proportional weight a gull carries for welfare reasons. In this case, all tags were under 3% of the gulls' total body weight, complying with licencing regulations.

GPS trackers were set to record a position once per hour except during hours of darkness, when a single GPS fix was taken to save power. The data were downloaded via the GSM mobile network and stored on the Movebank online data repository (www.movebank.org).

Following Thaxter *et al.* (2018) and Soanes *et al.* (2013) a 'Time-In-Area' (TIA) approach was used to identify areas of key use by tagged gulls. TIA analyses calculate the time spent by each individual gull in a grid of cells across the region surrounding the colony.

In this case, a 500m^2 was selected as an appropriate resolution for the analysis. Although the TIA approach aims to limit the problems of subjectivity that are inherent in other methods of estimating space-use for organisms in tracking studies, cell-size does influence the output and must be subjectively chosen. The R package 'trip' (Sumner, 2016) was used to manipulate the spatial data from the GPS tags to produce areas with 100%, 95%, 75% and 50% Utilisation Density (UD) contours, representing the total area used (100%), down to core foraging area (50%). Analyses were carried out in the R programming environment (R version 3.5.1, R Core Team 2018).

Results

All colour-ringed gulls were re-sighted at their nest sites at least twice during the breeding season (Table 8). This included paired individuals B11:W and B15:W, who's nest of a single chick failed around 2nd July. Both parents were present at the nest three weeks later on the 20th July.

Table 8 Re-sighting (R) dates of colour-ringed individuals. All re-sightings were made at the nest site of the individual, with exception of: * resighting at individual's core foraging location on McClure Street, Belfast and † re-sighting at individual's core foraging location on Laurelbank, Belfast.

Individual	14/06/2018	22/06/2018	06/07/2018	20/07/2018	24/07/2018
Yellow B13:W			R	R	R
Yellow B14:W	R	R	R	R	R†
Yellow B12:W	R	R	R	R*	
Yellow B11:W	R			R	
Yellow B15:W		R		R	
Yellow B10:W	R	R	R	R	

Breeding season location fixes were collected between the 25th May 2018 and the beginning of the post-breeding migration. The earliest leaving date recorded for an individual in 2018 was 12th August (Yellow B14:W), one individual left on the 22nd August (Yellow B10:W) and two individuals left on 3rd September (Yellow B11:W, Yellow B12:W).

The maximum trip distance recorded was 47km from the nest sites in Belfast, which occurred during late June. This was exceptional though, and the average maximum distance from the nest was 5km, varying from 3km to 8km between individuals. Foraging trips lasted an average of six hours. The maximum trip duration of 19 hours away from the nest occurred after the fledging period of the gull chicks, in mid-August.

All four tracked gulls showed preferences for different foraging areas around Belfast (Figure 41), despite nesting closely together in the city centre. Although the gulls visited areas in the surrounding agricultural land around Belfast and Belfast Lough, the majority of locations were concentrated in urban areas.

Discussion

Analysis of the location data from sample of gulls tracked in 2018 demonstrated that there was not one single location or resource that gulls were attracted to during the breeding season. Individuals were remarkably consistent in the areas they visited throughout the breeding season, but these areas were different between individuals. The gulls appeared to travel directly to these sites in many cases, suggesting that they were targeting spatio-temporally predictable food resources.

Between-individual differences in breeding seabird foraging distribution can be attributed to a range of biological factors, for example sex (Ceia *et al.* 2012; Pinet *et al.* 2012; Quillfeldt *et al.* 2014; Thiers *et al.* 2014; Weimerskirch *et al.* 2014), breeding stage (Cleeland *et al.* 2014; Pinet *et al.* 2012; Weimerskirch *et al.* 1993) and age (Péron & Grémillet 2013; Thiers *et al.* 2014; Weimerskirch *et al.* 2014). Cases of between-individual differences combined with within-individual consistency are less well documented however, and specialisation in foraging site has been referred to as Individual Foraging Site Fidelity (IFSF) (Wakefield *et al.* 2015). Individual differences in foraging strategy have been reported in gannets (Patrick *et al.* 2014; Votier *et al.* 2010), gulls (Ceia *et al.* 2014; Navarro *et al.* 2017) and guillemots (Woo *et al.* 2008, specialisation in foraging behaviour rather than site). Possible causes for IFSF are plentiful and varied, but may in part be due to differences in personality (Patrick & Weimerskirch 2014) or as a mechanism to reduce intra-specific competition (Navarro *et al.* 2017).

The implications of between-individual differences in IFSF when it comes to urban gulls may be important when it comes to minimising human-gull conflicts in towns and cities. For example, gulls causing a public nuisance at a particular site may not be local to the site; therefore mitigation measures applied to local populations will not have the desired effect. However, there may be an advantage to managing particular individuals or targeted resources that will remove issues over nuisance behaviour at a particular site.

The individual differences observed in the foraging sites of breeding Lesser Black-backed Gulls tracked so far in Belfast demonstrate the importance of obtaining a representative sample size for a population (Soanes *et al.* 2013), although sample sizes are generally restricted by the cost of tagging devices and effort involved in tagging individuals. In 2019, a further two GPS tags are scheduled

to be fitted to Lesser Black-backed Gulls, and six to Herring Gulls. Future data collection will help to characterise areas of potential human-gull conflict in Belfast, and provide a comparison of how Lesser Black-backed Gulls and Herring Gulls use urban areas during the breeding season.

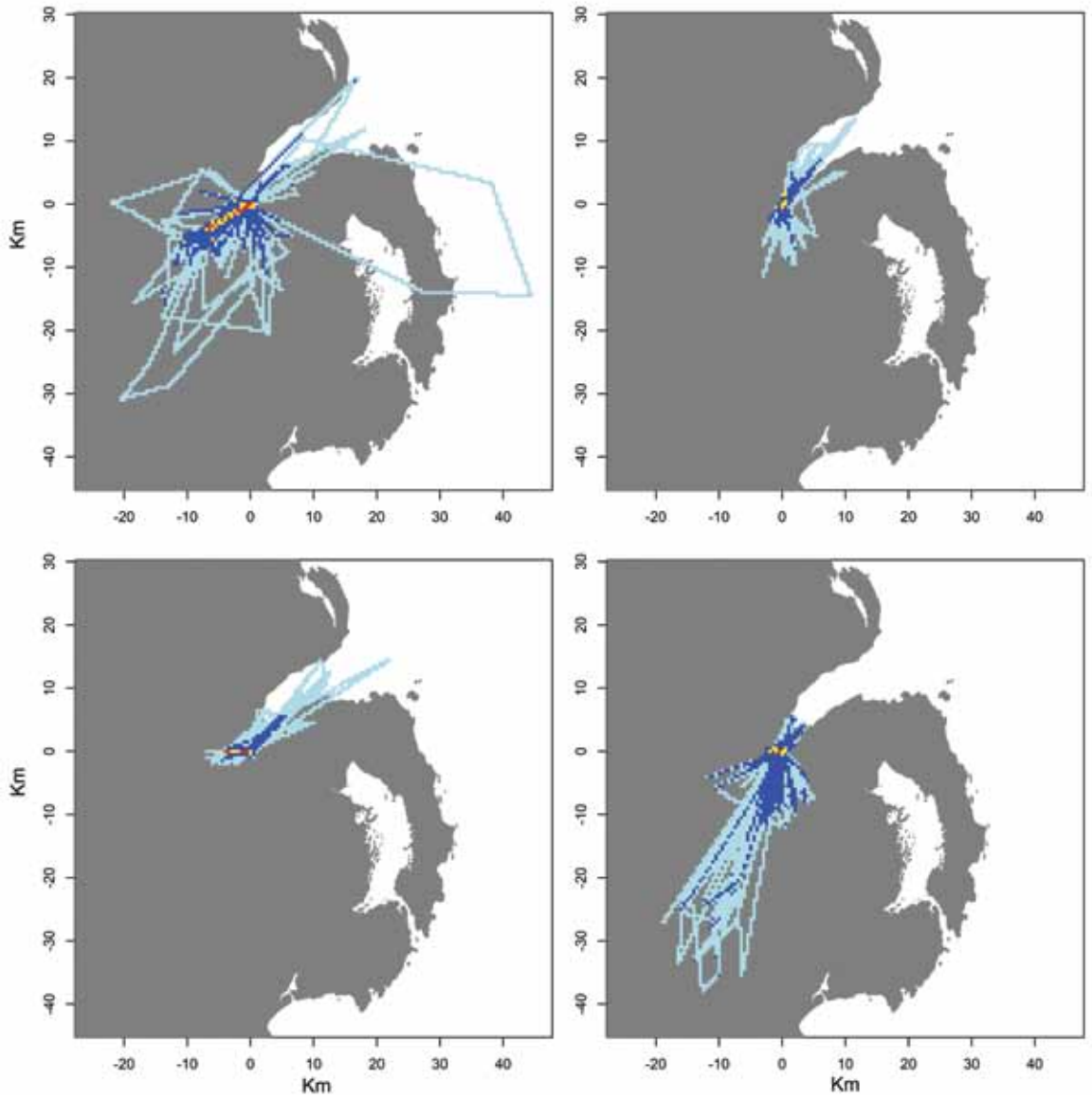

Figure 41 Time In Area (TIA) Utilisation Distributions (UD) for four GPS-tracked roof-nesting Lesser Blacked-backed Gulls breeding on rooftops in central Belfast. The grid is 500m square, and cell colour represents the proportion of the total tracked time spent in each cell: light blue = 100% UD, dark blue = 95% UD, yellow = 75% UD, red = 50% UD.

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2018 Seabird Nesting Report for Stangford Lough and the Outer Ards

Hugh Thurgate

Fieldworkers: Hugh Thurgate, Robert Drummond, Will Hawkins, Tomasz Ciesielski, Ed McGuiggan, Rachel Bolt, Gemma Sandford, James McNair, Judith Caldwell.

Species accounts

Sandwich Tern – 776 Apparently Occupied Nests (AON)

In addition to a predation study undertaken by Shane Wolsey (SW) for the National Trust, a comprehensive assessment of Sandwich Tern clutch size was undertaken by National Trust rangers at the different colonies to assess fecundity. This had never been undertaken before on Strangford Lough.

JAMES MCNAIR

Terns above Cockle Island

In 2018 the first Sandwich Tern clutches were found on Black Rock (Ringdufferin) (nine) and Gabbock Island (two) on 30th April. All were of single eggs, putting a probable first laying date at 29th or 30th April (Sandwich Tern incubation takes between 20 and 24 days and eggs are laid at two day intervals). On Swan Island 167 clutches were counted on 22nd May, giving a first laying date from between 29th April and 2nd May. Of these, 96 had one egg and 71 had two eggs. The proportion with two eggs was therefore 42.5%. Assuming laying was complete by this stage this would give a mean clutch size of 1.43 eggs per pair. The Sandwich Tern nests on Dunnyneill were counted just a day later. There were 284 clutches found, and of these 204 had single eggs, 79 had two and one had three, giving a mean clutch size of 1.29. Therefore the proportion of nests with two eggs was 27.8%. The colony on North Boretree Rock was counted on 4th June. Of the 32 nests, 24 had one egg and eight had two, with the 25% of nests containing two eggs. The mean clutch size was 1.25 eggs per pair. There were 233 nests counted on Gabbock on 5th June; 68 of these were doubles and 165 were singles, giving a mean clutch size of 1.29. The proportion with two eggs was 29.2%. A visit by SW to Black Rock (Ringdufferin) on 7th June revealed that there were 60 Sandwich Tern nests on the island. This figure was taken as the 'original complete' colony size for the island. However, mean clutch size was assessed at the peak nest count of 458 AONs, resulting from a very significant influx of birds after predation events on other islands. The mean clutch size came to 1.21 eggs per pair, and the percentage of nests with two eggs was 20.1%.

Table 9 Sandwich Tern populations around Strangford Lough and Outer Ards (AON).

Island	Sample size	Mean Clutch Size	% of clutches with 2 eggs	Productivity per pair
Swan	167	1.43	42.5	0.91 (n=139)
Dunnyneill	284	1.29	27.8	0
Gabbock	233	1.29	29.2	0
North Boretree Rock	32	1.25	25	0
Black Rock	458	1.21	20.1	0
Strangford Lough - whole	776	1.32	31.7	0.16
Cockle	85	1.55	55.3	N/R
Breeding success 1986-2008 (National SMP dataset)				0.66
Required productivity for maintaining a stable population				1.1

The first Sandwich Tern chicks on Cockle Island were located on 7th June; the eldest thought to be a maximum of three or four days. This would put the earliest laying date at 10th May (assuming a maximum incubation of 24 days), with the majority being laid around May 12th–13th. A count of 85 clutches was made on the first visit to the island on 22nd May, with 38 clutches of one egg and 47 of two eggs found, making an average clutch size per pair of 1.55. Assuming laying was complete. 55.3% of nests had two eggs.

Common Tern – 340 AON


JAMES MACNAIR
Arctic Tern nest

The first Common or Arctic Tern clutch was located on Cockle Island in Groomsport Harbour on 22nd May. It was incomplete, consisting of just one egg, putting the first laying at or around this date. At Cockle Island and throughout Strangford Lough, Common Tern nest losses were high as a result of the extra-ordinarily high tide in the wake of Storm Hector on 14th June. Sixty percent of nests were washed out on Gabbock Island where there had already been some losses due to predation by Eurasian Otter (*Lutra lutra*). Herring Gull had also impacted on the terns on Gabbock from fairly early on in the nesting season but dramatically so from 7th June. In the end every single tern egg on this island, including Arctic and Sandwich Tern were predated. On Swan Island 73% of the Common and Arctic Tern nests were washed out on 14th June but unlike the other main colonies on the Lough this island was not subject to any significant predation. Many of the small terns were thought to re-lay on Black Rock but some seemed to make a second nesting attempt on Swan Island, as Common Terns were still seen feeding four unfledged young on 16th August, with 16 fledged young in the vicinity. SW calculated productivity as 0.41 for Common Tern on Swan Island based on the maximum number of nests counted after Storm Hector, 69 in all. Productivity on all other islands was zero, a cataclysmic failure resulting from losses to wash outs and predation. Overall then Common Tern had a very poor breeding season with just one island producing fledged young. Overall productivity for the whole of the Lough was calculated to be just 0.14 young fledged per pair.

Arctic Tern – 193 AON

The vast majority of Arctic Tern were subject to exactly the same series of events as the Common Terns. The only sites that Arctic Tern used but Common Tern didn't were the South Sheelah's (2 AON) and Chanderies (13 AON). The one successful island for fledging was again Swan Island but they were thought not to be as productive as the Common Terns with just 0.08 productivity for Swan island and only 0.01 for the Lough as a whole.

Cormorant – 314 AON

At least seven of the 341 nests were constructed up on the grass at the extreme north western corner of the island away from the main concentration of nests at or near to the MHWM on the eastern (116), south eastern (97) and south western (94) edges of the island. At the time of the count on 12th June none of these nests had eggs laid in them. This congregation of nests was likely to have represented nesting attempts from younger sub dominant pairs and may not have resulted in eggs being laid or young reared although the impression of some the nests on an autumn visit to the island was that some of them were more than half-hearted structures and may have had clutches laid in them. The close proximity of the Herring Gull colony to each of the Cormorant 'sub-colonies' remains an issue during the nest count as all the Cormorant head for the water but some gulls remain and start to predate Cormorant eggs and small chicks. However closer observation made in recent years suggests that whilst this does occur the gulls initial interest is in devouring regurgitated gut contents from adults and chicks. In recent years monitoring visits to Bird Island have been limited to one and some of the monitoring team positioned at sub colonies to act as 'scarecrows' to reduce the impact of gull predation. This is the second consecutive year that there has been evidence of rats on the island having never been encountered from 2002–2016.

Black-headed Gull – 612 AON (total with Castle Espie - 1,299 AON)

A total count of 1,299 AON represents 9.29% of the all-Ireland population including the inland colonies and so would be classed as nationally significant. In the 2017 NT Nesting Report a reference was made to the Black-headed Gull colony establishing at Castle Espie in 2012 after significant landscaping and water level control measures were carried out as part of a major 're-vamp' of the site. However it has since been learned that Black-headed Gulls actually started nesting in 2009 with a significant increase in 2011 before the heritage lottery project works had been completed. Numbers increased to a maximum of 852 pairs in 2017 with a slight drop off this year. A great deal of work has been undertaken by WWT to try and reduce the number of Black-headed Gulls choosing to nest in the waterfowl collection area. Initially this was by various bird-scaring techniques and then more latterly by removing desirable nesting habitat. This work has had mixed results. One hundred and fifty-eight pairs of Black-headed Gull out of a total of 687 pairs, still chose to nest in the collections area in

2018. In 2018 it would appear that the drop of 165 pairs breeding at Castle Espie was accounted for within the increase of 193 pairs on the Lough proper. The population is now roughly split 50/50 between the Lough itself and Castle Espie and has been pretty stable since 2012. For the first time since monitoring began Black-headed Gull were found nesting on an old pontoon that sits in a small sheltered bay at the south-western edge of Island Taggart.

Common Gull – 302 AON

In 2018 the first eggs were found hatching on 22nd May which would put a first laying date at 26th April assuming a maximum incubation of 27 days. The biggest colony now occurs on Trasnagh scattered along the collapsed stone wall that runs along the south-eastern edge of the island.

Mediterranean Gull – 2 AON

A solitary adult was noted on Swan Island on 26th April and then on 8th May. A paired bird was observed incubating a clutch of three eggs on a nest just below the dense block of Alexanders on the north-western end of the island. A second pair was also observed a few metres away, an adult and a 2nd summer bird. This latter pair were not seen again during the monitoring season. A bird was still incubating on 22nd May and by 25th June had produced one chick close to fledging which was ringed. This was thought to be the second successful fledging on Swan Island from three attempts in recent years, two chicks having fledged in 2014. A Mediterranean Gull nest was found on Green Island (Killyleagh) on 30th April, the eighth time this species has nested on this island since 2002. Two chicks close to fledging were ringed on 12th June.

JAMES MACNAIR

Mediterranean Gull chicks on Green Island

Herring Gull – 1,062 AON

In light of the Herring Gull's conservation status the more than three-fold increase on Strangford Lough since 2007 would be seen as highly significant. Overall numbers have remained steady over the last three years at a little over 1,000 pairs. In 2018 there was a significant drop at one of the two main colonies, that on Green Island (Killyleagh), which halved to 130 pairs from 262. However numbers increased at the other main colony on Round Island from 269 to 331. The count on Green Island did take place early in the nesting season on 30th April and although nests structures without eggs were included in the count some pairs may not have started to nest build. The figure for Lesser Black-backed gulls also dropped from 59 to 42 pairs probably also reflecting the early count date. The decision to visit early was to try and ensure that an accurate count of Greylag Geese and Mallard was made but ideally a second visit, which would have been normal practice, would have been undertaken in the second or third week of May. Herring Gull bred for the first time off Island Taggart, a solitary pair nested along with 11 pairs of Black-headed Gull on an old pontoon.

Lesser Black-backed Gull – 314 AON

Lesser Black-backed Gull numbers nearly doubled on Ogilby Island, which would be a cause for concern in as far as this is likely to deter nesting terns or, if it doesn't deter them, would likely have a detrimental impact on them through disturbance and probable predation should terns settle to breed. Ogilby was one of the most consistently used islands by nesting terns throughout the 70's, 80's, 90's and 00's. It may not be a coincidence that 28 out of 29 Common/Arctic Tern nests located on a visit to the island on 21st June, were devoid of eggs. If any Common or Arctic Tern nests had been present on 13th or 14th June it is probable they would have been washed out but if re-laying had taken place one might have expected more nests with at least the start of a clutch by 21st June. It seems likely that predation was the probable culprit rather than a wash-out as the nest scrapes would have been compromised as well as the eggs if the latter had occurred.

Greater Black-backed Gull – 129 AON

Whilst the breeding population of Strangford Lough is not nationally important from a United Kingdom perspective, with the current population forming just 0.77% of the UK total, it is however highly significant within Northern Ireland where it compromises roughly three-quarters of the whole population. It is also nationally important within the island of Ireland, comprising 5.6% of the Seabird 2000 population estimate of 2,312. Whilst Great Black-backed Gull clutch-removal and nest raking has been adopted practice in recent years on the Lough at a few sites, it is only undertaken where there is usually only one or two pairs of Great Black-backed Gull nesting on a tern island. No removal was carried out in 2018. This was because Great Black-backed Gulls only nested on two tern islands, South Sheelah's Island and Dunsy Rock. As South Sheelah's has virtually disappeared due to coastal erosion it is no longer seen as a viable island for nesting tern and was not predicted to attract many terns in 2018. For this reason the solitary Great Black-backed Gull nest found on the 8th May was left untouched. As it turned out 15 pairs of Sandwich Tern were found to be nesting on the island on 28th June and were thought to be re-lays from Gabbock. Sixteen pairs of Arctic Tern and 12 pairs of Common Tern were also found on that date but there was no sign of the Great Black-backed Gull nest or chicks if any had hatched. A single Great Black-backed Gull nest was found

on Dunsy Rock on 4th June and it would have normal practice to remove it. However, the clutch had already hatched by the time of the visit and three chicks were in the nest and so were left alone. In 2018 Great Black-backed Gull were identified as a significant crepuscular and night time predator of tern eggs and chicks on Black Rock. It was thought to involve just one individual but from a future management point of view worrying, as the bird did not appear to have bred on the island itself and so could have been visiting the island from anywhere on the Lough. Also the fact it was visiting at night time meant it went under the 'radar' of the terns and so was not subjected to an aerial assault as would have happened in the day time.

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Predation of breeding terns on Strangford Lough 2018

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Introduction

In the Spring of 2018, The National Trust engaged Shane Wolsey (in his capacity as Senior Consultant, Shane Wolsey Consulting Ltd) 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, Common and Arctic Terns) and to identify and quantify the impact of predation. This work was felt to be critically important if a better understanding was to be had of some of the causes behind the fall in numbers of nesting terns on Strangford Lough. The results of this study would hopefully lead to targeted and meaningful recommendations on how these tern populations can be protected and enhanced in the future. This article focuses on predation.

Methodology

During the 2018 breeding season 11 visits were made to the most important tern islands in Strangford Lough, these being Gabbock Island, Swan Island, Dunnyneill Island, Black Rock and Dunsy Rock (not all islands were visited every time). Detailed counts of adults and nests (AONs – Apparently Occupied Nests) were conducted on most visits. Productivity enclosures were established on Swan Island, Black Rock and Gabbock – the results of which will be reported in detail elsewhere. 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. The presence and activity of predators was looked for by the following methods:

- **Search for remains of prey, including eggs, chicks and adults.** This was undertaken on every island during every visit, with photographs taken of most prey items. The nature of the prey remains gives an indication of the nature of the predator – an important method of predator monitoring, particularly when combined with the results from the use of trail cameras.
- **Search for field signs of predators, including tracks, spraints, pellets, etc.** This was undertaken on every island during every visit. In practice the nature of the ground (dense vegetation and rocky/stony foreshore) meant that pug marks were not found anywhere. However, the vegetation cover did allow for the creation of obvious trails (routes). Spraints and pellets were much in evidence on both the vegetated and stony portions of islands.
- **Deployment of trail cameras.** One trail camera was deployed per island. These proved to be extremely useful, with 31,139 video clips being recorded. Trail cameras were not without limitations however; these are detailed in the inset box '*Trail camera limitations*'. Cameras were set up to record 20 second video clips with a 10 second gap before the next video clip. This has proved to be a very suitable timing sequence – with most colony dreds being about 15 seconds long, and significant disturbance by a predator being longer than 10 seconds.

Trail camera limitations

Cameras were deployed within tern colonies and were therefore constantly being triggered. There can be more than one video clip per minute, resulting in very high numbers of clips to be reviewed – many thousands (31,139 clips were recorded on Strangford Lough islands in 2018). This rate of triggering also means that batteries will only last 2–3 days, after which no recording takes place. Recording at night drains batteries quicker than during the day (the cameras used did not have the facility to record just one or the other), thus when the batteries are nearly finished, and the camera switches to night mode, then it simply shuts down and stops recording.

Using trail cameras also only gives a very limited view of the colony. The field-of-view from a camera is 42°, leaving 318° not in view, so if anything is happening within the 318° it will not be captured on video.

Note that the trail cameras used, despite being market leading Bushnell Trophy Cam HD models, were rather temperamental. Two older cameras only worked intermittently and were taken out of service early on. Two of the five new cameras specifically bought for this work also stopped working during the progress of the season. On each camera failure, data was not gathered.

Results

Summarised results are presented below on an island-by-island basis.

Swan Island

Predation on Swan Island appears to have been limited to avian predation. A Common Gull was seen to take either a Black-headed Gull or a Common Gull egg (Figure 42). Video surveillance did not show any other predation by any other predator, although, particularly later in the season (when the Sandwich Terns had finished) the Common and Arctic Terns, and remaining Black-headed Gulls, were seen and heard to mob potential predators on a number of occasions, but none of these possible predators (thought to be avian) were caught on camera.

Interestingly, Eurasian Otters *Lutra lutra* are known to be present locally – spraint was found on harbour steps only 150m from Swan Island – but there was no evidence (prey items, spraint or video evidence), of presence on the island.

Gabbock Island

The presence of otter on Gabbock was suspected from the second monitoring visit on 18/05 when an adult Herring Gull was found predated, and confirmed on 31/05 when three adult Sandwich Terns were found predated, all in circumstances that pointed towards otter – all had been almost wholly eaten with just the wings, feet and tail left. The bones of these had all been snipped off the birds, and all three remains had been brought to the same location to be consumed – see Figure 43 below. On the same date there were some predated eggs that appeared to be avian predated.

Figure 42 Common Gull eating an egg on Swan Island on 31/05

SHANE WOLSEY

Figure 43 Remains of two adult Sandwich Tern on Gabbock, almost certainly predated by otter. The remains of a third adult Sandwich Tern were 5m away.

The presence and predatory inclination of otter was soon confirmed by video evidence, with otter being captured on video on 16 occasions (Figures 44 and 45). It is assumed that just one individual otter was involved, although this is not certain. A review of the thousands of video clips showed that the incubating adult Sandwich Terns perceived the threat of danger to come from the landward side of their nesting location – from the tussock grass – rather than from the seaward side. The otter was using the runnels between the tussocks to move about the island, and to approach the nesting terns.

Otter was not the only predator of these terns. Herring Gull also played a major role in predating eggs from a fairly early stage in the nesting cycle. An adult Herring Gull (it is thought that just one bird was involved) systematically predated the tern eggs, one at a time, advancing through the colony despite the adult terns trying to defend their nests (Figure 46). The gull took every egg as it worked its way along the colony, until it eventually took all eggs.

Figure 44 Otter eating Sandwich Tern eggs at 23.24 on 24/05/2018 on Gabbock.

Figure 45 Otter eating a Sandwich Tern chick on Gabbock Island – at 05.37 on 17/06/18. This is one of 14 video clips recorded over 4 days showing otter on Gabbock Island.

It is believed that as the terns became increasingly agitated as a result of the activities of the otter, they also became more susceptible to the predatory activities of the Herring Gull. It also seems likely that the unusually bold actions of this gull could be a learned activity, with this gull becoming a specialist tern nest predator. Note that on Gabbock the Herring Gull only predated during the day, when terns did mob the gull. The otter only predated at night, when terns did not mob it, until the last couple of days by which time most of the terns had deserted.

Figure 46 Herring Gull stealing one of the few remaining Sandwich Tern eggs on Gabbock.

Figure 47 Otter moving through Sandwich Tern colony on Dunnyneill at 23.05 on 08/06.

Dunnyneill Island

During the first two week period between the three initial monitoring visits there was little evidence of predation – a dead Black-headed Gull with a puncture wound to the back of the head, but not eaten, plus a few avian predated eggs. Video evidence revealed that the Sandwich Terns were remarkably settled throughout the day and night during this two week period.

However, one week later, on 16/06 the situation was dramatically different. Not only had Storm Hector destroyed 69% of the Common and Arctic Tern nests, but there was a cache of eight dead, predated adult Sandwich Terns and one young Black-headed Gull, all killed by otter. This animal was caught on video during the night of 08/06 (Figure 47), though on this occasion not actually eating anything.

The otter was also caught on video four more times, all on 25/06, when it was predating a Common Tern chick, a Sandwich Tern chick, and a large chick thought to be a gull chick.

After the appearance of the otter, from 08/06 onwards, the Sandwich Terns became exceedingly agitated, particularly through the night, lifting from their nests increasingly often, and for increasingly longer periods of time. By 23/06 nearly all nests of terns had been predated, with no evidence of young birds to suggest that the eggs had hatched and the chicks left the nest, and by 03/07 all nests were gone, and the adults had deserted the island altogether. It would appear that, as on Gabbock, the otter was using the cover of the island vegetation to approach nesting terns, and as a safe place to consume prey.

On Dunnyneill, unlike on other islands in Strangford during 2018, it did not appear that gull predation of eggs or young chicks played a major part in the failure of the colony, although it is known that some gulls certainly predated some eggs – a Common Gull was caught on video on 25/05 stealing a Black-headed Gull egg – and on 23/06 Herring Gulls were seen to take a large Black-headed Gull chick, and something else.

It is believed that no tern of any species fledged from Dunnyneill, and thus the productivity for all three species was zero.

Black Rock

At the very beginning of July there were over 420 AON of terns, 300 of which were Sandwich Tern. However, on the afternoon and evening of 03/07 the terns became exceptionally agitated, at times exploding off nests at minute intervals. This agitation continued into dusk, and then from 21:44 the Sandwich Terns stayed away from their nests until after dawn. At 22:16 a Great Black-backed Gull *Larus marinus* arrived and could be seen predating egg after egg (Figure 48). This predation continued through the dark hours of the night for this and two more nights.

When the Great Black-backed Gull returned during daylight hours on 04/07 it was agressively mobbed by terns, but still managed to predate chicks (both Common Tern and Sandwich Tern). By dawn on 05/07 all the Sandwich Terns had deserted and did not return.

Figure 48 Great black-backed gull on Black Rock, on the evening of 03/07 just as it started to predate Sandwich Tern eggs. Over three nights it predated every egg in the colony.

It is thought that just one Great Black-backed Gull was involved in this predation – only one was ever seen – but it is also thought that some other factor was involved in making the terns extremely agitated. It is believed that the intense agitation of the terns on the afternoon of 03/07 and during the day of 04/07 was not caused by the Great Black-backed Gull. The terns, during daylight hours were not frightened by the Great Black-backed Gull and were, on many occasions, capable of chasing the gull away with intense mobbing. It seems probable that the agitation was caused by something other than the Great Black-backed Gull, that resulted in the terns exploding off their nests in fright – this more urgent than normally seen when the birds undertake their regular dreds. The object of their concern was to the right of the camera area but was not recorded on video.

The end result, whatever the mix of causal factors, was a complete failure of breeding on Black Rock. It is thought that not a single young tern fledged.

Dunsy Rock

This island only gained a significant number of breeding terns late in the season, once they had left other sites within Strangford Lough. By 03/07 there were over 150 AON of Common and Arctic Terns (no Sandwich). There was also extensive evidence of the presence of otter – spraints and runnels through the tussock, and smaller holes in the tussock that were too small for otter and American Mink *Neovison vison*, and too big to be Brown Rat *Rattus norvegicus*. Two adult Common Tern and one adult Arctic Tern were found predated. One of these looked typical of an otter, but another was not typical of otter (unless it is an animal operating differently) but was very similar indeed to a kill found on Black Rock the same day. The third (the Arctic Tern) was in between.

Within 10 days – by 13/07 – over 95% of the tern nests had been predated. The cameras deployed during that week did not capture any predation before their batteries failed. During the subsequent period, with a camera overlooking just two nests, a pair of Great Black-backed Gulls were caught predating the eggs and young (Figure 49).

Figure 49 Great Black-backed Gull (one of a pair) predating Common Tern eggs on Dunsy Rock on 20/07.

On Dunsy Rock it is certain that Great Black-backed Gulls were important agents on the complete failure of the colony, and they may have been the only agents. However, it is also known that otters were present, and indeed there may have been other agents. No evidence of the presence of mink or Brown Rats was found.

Tern productivity on Dunsy Rock was zero.

Summary

The main predators of tern eggs, chicks and adults were otter and large gulls. Otters had major negative impacts on Gabbock and Dunnyneill Islands, and were known to be present and may have had a role to play on Black Rock and Dunsy Rock. Herring Gull, benefiting from otter disturbance, had a major negative impact on Gabbock, while Great Black-backed Gull had major negative impacts on Black Rock and Dunsy Rock, where otter may also have been causing disturbance. There was some insignificant predation by other avian predators. It was notable that despite extensive searching, no evidence of predation by other mammalian predators (e.g. rats, mink) was found on any island.

In reading this account of predation on breeding terns on Strangford Lough in 2018 it should be kept in mind that these results relate to only one year's monitoring. It is certain that all the factors that influence breeding tern productivity will not have been recognised during this one year of monitoring, and, indeed, factors that impact tern breeding productivity, change, from island to island, and from year to year. It will therefore be important to undertake further monitoring to properly understand what is impacting the success of terns breeding on the lough.

Acknowledgments

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Storm Petrel ringing in Mayo

Declan Clarke

In 1986 I was invited by Neville McKee and the Copeland Islanders to go on a ringing trip with them to Inishglora Island off the Mullet Peninsula in Co. Mayo. Inisglora is an uninhabited island that is believed to have 10,000 pairs of Storm Petrels breeding on it. Due to its remoteness, we had to camp on Inishglora.

KATHERINE BOOTH JONES

Setting the mist nets at Annagh Head in 2018

The first four nights we were there we ringed an incredible 4,400 European Storm Petrels (*Hydrobates pelagicus*, often referred to affectionately as 'Stormies') and nine Leach's Petrels (*Oceanodroma leucorhoa*). As the weather forecast was turning bad we had to escape on the fifth day, tired but very satisfied.

This trip got me thinking about mainland, bed and breakfast-based petrel ringing on the west coast, but for 14 years I did nothing about it. However, in 1998/1999 I read in a BTO magazine about some ringers from the UK who were trying to organise a Storm Petrel ringing trip to Portacloy, Co. Mayo to ring Stormies and Leach's Petrels. But the cost was going to be a steep £350 each, which included their travelling etc. from the UK. This revitalised my thoughts for petrel ringing on the west coast.

So, at the end of July 2000, Chris Honan, Seamus Magouran and myself went on a mission to source potential ringing sites on the Mullet Peninsula. Our first ringing site was Portacloy on the north Mayo coast. The site was on a dramatic round-topped cliff peninsula, jutting out into the Atlantic. There was a drop of approximately 600 feet (183m) into the Atlantic Ocean either site of our mist net and tape-lure site. A beautiful site but extremely dangerous. If you missed your footing and went into the Atlantic Ocean you would never ring another bird or see your family and friends again. We ringed one Leach's Petrel and six European Storm Petrels that night, but for health and safety reasons and common sense we never returned to ring at Portacloy.

The next day we sourced out new, safer ringing sites overlooking The Stags of Broadhaven, where there is a colony of Leach's Petrels, believed to be approximately 300 pairs. This was a welcome upgrade as we were staying in comfortable bed and breakfasts where, if the wild Atlantic weather was against us, we could retreat to the warm and dry. An added bonus of not stranding ourselves on an island was that we could easily come home if poor conditions persisted.

From 2001 onwards and over the following years, we had three tape-lures and put up six 60ft nets on a bog near Kid Island and at Annagh Head, Co. Mayo, primarily for Stormies. We normally each year ring between five and 11 Leach's Petrels also.

Over the years we have had four Portuguese controls in Co. Mayo. These were originally ringed as part of a collaborative project between Cardiff University (Drs Rob Thomas and Renata Medeiros) and A Rocha Portugal to study the effects of climate change on the body condition of these tiny migrants. Techniques identical to those used in Ireland are used to catch Stormies as they migrate past the Algarve on their way north from the South Atlantic to their breeding grounds on islands around the British and Irish coasts. We have also had three controls of Stormies we have ringed at Sheepland, Ardglass, Co. Down on the east coast and were controlled by our efforts on the west coast of Ireland.

TERRY GOLDSMITH

A European Storm Petrel is released after ringing

Our Stormie season started stormily on Friday 27th July, when our arrival to Annagh Head was met with lashing rain. Unable to set the nets in such conditions, an obligatory trip to a cosy restaurant was in order to await an improvement in the weather. One team managed to open the nets at around 2am on the 28th, and caught good numbers before dawn.

The evening of the 28th was an improvement, and the nets and tape-lures were set at dusk. The night was soon busy with Storm Petrels. A night's 'Storm-Petrelling' involves coordination between a series of rotating teams. One team watches nets and extracts birds, placing petrels caught into specially adapted boxes for transport, another team rings birds, one individual records ring numbers and a team of helpers ferry boxes of petrels to the ringing team and return empty boxes to the nets. Team

members rotate throughout the night so that everyone gets a chance at each job and a change of scene. The night flies by and soon dawn arrives and petrel numbers fall. This year 470 European Storm Petrels and five Leach's Petrels were ringed. In years with more favourable weather, up to 1,800 petrels can be caught in a weekend!

Roll on the summer of 2019 when we can return to the west coast and check out the Storm Petrels which, for anyone who rings them, are probably one of the most beautiful birds you could see or touch.

Blue Circle Island restoration on Larne Lough

Gregory Woulahan, Matthew Tickner, Stephen Hare and Daniel Piec

Larne Lough on Northern Ireland's east coast provides an important refuge for breeding seabirds owing to a small number of significant factors. The sheltered sea lough provides conditions that are relatively free from the worst of the coastal weather; offshore locations for ground-nesting birds mean that the effects of disturbance and predation are less than at other more vulnerable sites; and finally, proximity to productive feeding areas allows breeding adults the best chance to raise chicks to fledging. The site is designated as a Special Protection Area, Area of Special Scientific Interest and a Ramsar site.

Swan Island in Larne Lough is a small, low-lying natural island that used to be the sole component of the RSPB Reserve here. However, its tiny (0.14 ha) size and low-lying nature limited the capacity and success of the colony through competition for space and vulnerability to tidal excesses.

In the late 1970's Dinah Browne (RSPB's erstwhile Regional Director) had the vision to bolster the potential breeding habitat for seabirds on Larne Lough by creating a new island. This new structure would allow for disposal of dredged material arising from the deepening of an access channel to Magheramorne on the shore of Larne Lough, where Blue Circle Industries PLC operated a quarry. An enterprising manager got behind the vision and started work to make Dinah's vision a reality.

The first attempt to create the island in the early 1980's was not a success due to settling of the original structure. However, in February 1989 Blue Circle Industries PLC restarted work to complete the island. These works involved rebuilding the basalt doughnut, relining the interior with geotextile sheeting, filling the interior with clay and quarry rubble and finally flattening and resurfacing the top layer. In the autumn of 1989 these works were finished but after a year of settling the north-west corner was identified as needing further attention. This area and the gradually lowering local perimeter of the island remained the primary areas of concern ever since and at high tides water passed through the north-west corner and overtopped the perimeter here, eroding the interior of the island.

Despite these issues, birds colonised the island in 1993, when a handful of Black-headed Gull pairs were joined by such species as Red-breasted Merganser (*Mergus serrator*) and Meadow Pipit (*Anthus pratensis*). When RSPB took on the lease of the site in 1994, a range of seabird species started to make this their home, including Ireland's first recorded breeding Mediterranean Gulls in 1995. From the arrival of breeding seabirds at Blue Circle Island in 1993, reserve totals have increased dramatically. The three-year mean of all breeding tern and gull pairs in the 1990–92 period was 435; it is now 4,455 (2016–18), having seen more than a ten-fold increase in numbers. Currently, twelve seabird species regularly nest here, including Black Guillemots and important populations of Sandwich (732 pairs in 2018) and Common Tern (307 pairs), Black-headed Gull (2,895 pairs) and Mediterranean Gull (five pairs). Blue Circle Island is also a regular breeding site for a single pair of Roseate Terns. The species was never abundant at Larne Lough, with a peak count of 19 pairs in 1990.

DANIEL PIEC

Blue Circle Island in August 2018 (left) and in November 2018 (right), after restoration works

The restoration of Blue Circle Island came to the fore once again as part of the Roseate Tern LIFE Project (roseatetern.org). This five-year project (2015–20) aims to improve nesting conditions at active Roseate Tern colonies, but also at sites within the former range. The RSPB identified Blue Circle Island as a priority site for restoration in preparation for a potential expansion of Roseate Terns from the core strongholds. There are several reasons why this island looks particularly promising for the establishment of a Roseate Tern colony. Apart from the previously mentioned good food resources and regular breeding attempts, Rockabill (the largest colony in Europe with 1,642 pairs in 2018) is only a 'stone's throw' away from Larne Lough in tern travel terms. There is also a stable colony of Common Terns, which Roseates depend on, as well as a large assemblage of Sandwich Terns and Black-headed Gulls, which help provide protection against predators. With the continued management from the RSPB, the restoration of the island was the main issue left to sort out.

Almost 50 years after its inception, following 18 months of preparations and two weeks of earthworks (sic!), the restoration was completed in the autumn of 2018. RSPB have been managing the site since 1994 under a management agreement with Blue Circle Industries PLC and more recently with Tarmac Cement & Lime Ltd who will transfer the ownership of the island to RSPB. The funding of over £400,000 to deliver 4,200m^3 of rock armour and 1,350 tonnes of gravel came from the LIFE Project and Tarmac (the current owners).

Given considerable predation pressure from otters and avian predators, this colony depends now on vigilant management, but also on successes of other colonies in the region. Terns can switch sites within a single breeding season, if for example flooding or predation pressure devastate a colony. The collapse of the Sandwich Tern colony at Cemlyn Bay on Anglesey due to otter predation in 2017 and a sudden subsequent influx of birds at Hodbarrow, a little further north in the Irish Sea, was a prime example. The Cemlyn Bay colony failed, but overall what we should be concerned about is the number of chicks produced within the metapopulation. Hodbarrow was ready to receive these birds and we need more sites like that. To this end, an establishment of a network of site managers would be very beneficial to exchange data, good practice and practical experience. This idea is not new, but recently the National Trust, RSPB and BTO Northern Ireland renewed discussions on making it reality with the first meeting planned for 2019.

Monitoring nest incorporation of debris by seabirds

Nina O'Hanlon

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Plastic pollution is an increasing, and global, environmental issue which poses a major threat to marine biodiversity (UNEP 2016). The production of plastic continues to rise with 4.8 – 12.7 million metric tonnes estimated to enter the oceans each year (Jambeck *et. al.* 2015). It is therefore not surprising that seabirds come into contact with it. Over 56% of world seabird species are known to have been affected by marine debris, most of it plastic (Gall and Thompson 2015). Seabirds can ingest debris or become entangled in it, which may have negative consequences on their survival. Several seabird species are known to incorporate debris into their nests, particularly those that build substantial surface nests such as gannets (Votier *et al.* 2011). However, to date the majority of evidence concerning nest incorporation of debris by seabirds is anecdotal, with little understanding of how this issue varies over time and space, or among species. In a recent report assessing the impact of marine plastic on seabirds in the north-eastern Atlantic, we found quantitative, published data on nest incorporation of plastic for just two species – Northern Gannets on Grassholm and Black-legged Kittiwakes in Denmark (O'Hanlon *et al.* 2017). Therefore there is a need to obtain further quantitative data on the extent of this issue.

NINA O'HANLON

It is not just plastic that seabirds can incorporate into their nests – this European Shag nest on Foula also contained wood, metal and fabric

During the 2018 breeding season, we carried out fieldwork across north Scotland to collect data on debris incorporated into Northern Gannet nests. Nest incorporation of debris, predominantly plastic, was recorded in all eight colonies visited. The majority of items were netting and rope, however packaging straps, plastic bags and balloons were also noted. The data collected during this fieldwork is being collated with that collected from other seabird researchers and ringers across the UK as well as Seabirds Count volunteers. To take advantage of nationwide visits to UK seabird colonies in 2018, as part of the Seabirds Count national breeding seabird census (2015–2019), we asked volunteers to record the proportion of seabird nests that contained plastic, and where possible take photographs so that we can use these images to identify the amount of different types of plastic found in the nests of seabird species. So far we have received data (including valuable zero counts) from a range of species including Northern Gannet, European Shag, Great Cormorant, Common Eider, Black-legged Kittiwake and the large gulls (Figure 50).

Can you help?

With Seabirds Count continuing in 2019, any data that can help fill the gaps in our map, especially in Northern Ireland, would be much appreciated. So far we have data from Herring and Lesser Black-backed Gull nests in Belfast City Centre and Lighthouse Island, Copeland, and we know that debris occurs in the nests of European Shags on the Maidens. So there is plenty of scope to help improve our understanding of this issue in Northern Ireland. When visiting seabird colonies this summer we are asking people to record the number of active nests that contain debris and the number of all active nests checked, as well as any incidences of entangled chicks or adults. If you have a little more time, information on the type (threadlike, sheet, hard fragments, foam or other) of any incorporated debris would also be valuable to determine the potential source of incorporated debris. Furthermore, any photographs of nests containing debris would be much appreciated so that we can estimate the amount of debris incorporated into individual nests, as would any photographs of entangled individuals.

If you would like to take part please get in touch (nina.ohanlon@uhi.ac.uk) to obtain a monitoring form, or if you would like any further information. This data will help us determine where marine debris is having the greatest impact on our seabirds, and which species are most affected.

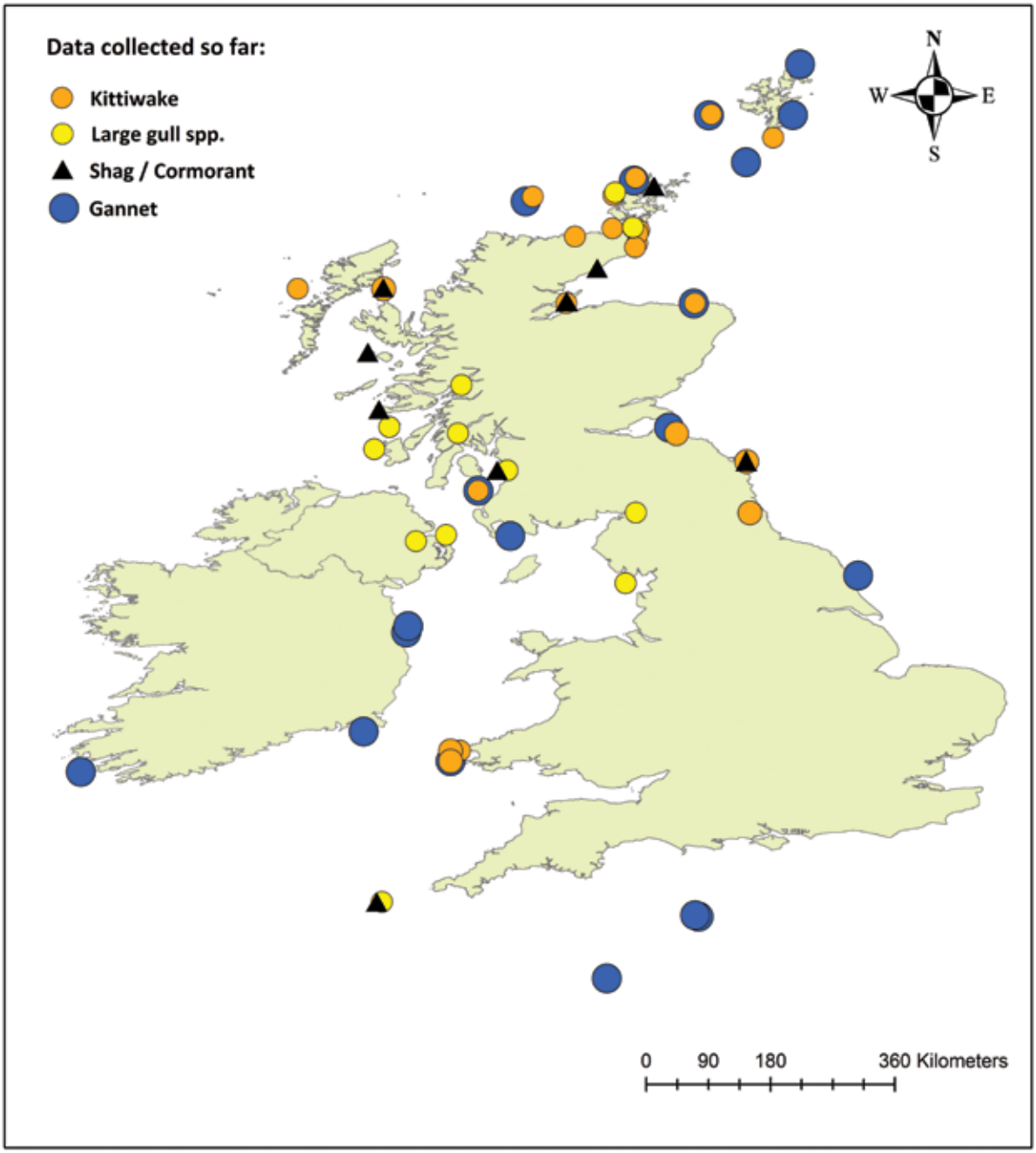

Figure 50 Locations of seabird colonies where data on nest incorporation of debris was recorded during 2018 (including zero counts).

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Appendix: Species counts

Table 10 Cumulative counts (N) of all species of seabird (excluding Black Guillemot) within Master Sites in Northern Ireland between 2015 and 2018. NS = the number of sub-sites surveyed in a Master Site (an indication of relative survey effort between years). NR = Not Recorded, sub-sites not specified. Hyphens (-) denote that no data were collected. Seabirds are counted using recommended census units from Table 3. Seabirds are counted using recommended census units from Table 3, unless specified with the record.

	Master Site	2015		2016		2017		2018	
		NS	N	NS	N	NS	N	NS	N
Fulmar (AOS)	Lough Foyle	-	-	-	-	-	-	3	0
	Downhill	6	135	4	78	4	81	6	88
	North Antrim Coast	10	16	10	37	10	38	9	16
	Rathlin Island	-	-	-	-	3	28	3	25
	Giants Causeway Coast	-	-	-	-	-	-	5	55
	Causeway Coast	-	-	-	-	-	-	1	84
	East Antrim Coast	21	31	16	45	11	60	12	34
	Larne Lough to Portmuch	2	2	1	2	1	6	1	2
	Muck Island	1	52	1	68	1	80	1	72
	The Gobbins	5	201	NR	290	NR	310	5	326
	Islandmagee South	1	0	-	-	-	-	-	-
	Blackhead	1	3	1	3	1	29	1	30
	Whitehead	1	3	1	3	1	5	1	7
	Copeland Islands	-	-	-	-	-	-	1	6
	Maggy's Leap to Newcastle	1	12	-	-	-	-	-	-
	Maggy's Leap	-	--	-	-	1	1	-	-
Cormorant (AON)	Skerry Islands	-	-	-	-	NR	60	1	94
	Sheep Island	-	-	1	84	1	100	1	88
	The Gobbins	5	0	NR	12	NR	13	5	12
	Outer Ards	-	-	-	-	-	-	3	53
	Strangford Lough	NR	245	NR	343	NR	360	NR	314
Shag (AON)	Downhill	2	3	4	0	-	-	6	0
	North Antrim coast	1	2	10	1	10	1	9	2
	Skerry Islands	1	64	-	-	-	-	-	-
	Sheep Island	1	66	-	-	-	-	-	-
	Rathlin Island	NR	42	NR	47	NR	51	NR	55
	The Maidens	-	-	-	-	-	-	1	20
	Muck Island	1	17	1	21	1	30	1	34
	The Gobbins	5	20	NR	22	NR	20	5	25
	Maggy's Leap to Newcastle	1	4	1	3	-	-	-	-
	Maggy's Leap	1	3	1	3	1	5	-	-
Great Skua (AOT)	Rathlin Island	1	1	NR	1	NR	1	NR	1
Kittiwake (AON)	Downhill	2	92	-	-	-	-	0	0
	North Antrim Coast	10	207	10	279	10	236	9	293
	Rathlin Island	-	-	-	-	3	340	3	313
	Muck Island	1	225	1	351	1	369	1	314
	The Gobbins	5	835	NR	1072	NR	1053	2	683
	Maggy's Leap to Newcastle	1	483	-	-	-	-	1	513
	Maggy's Leap	1	86	1	78	1	76	1	68
Mediterranean Gull (AON)	Larne Lough	NR	5	NR	5	NR	2	NR	5
	Belfast Harbour	-	-	1	2	1	5	1	7
	Strangford Lough	NR	1	NR	0	NR	0	NR	2
	Lower Lough Erne	NR	1	NR	1 Ind	NR	1	NR	1 Ind
	Lough Neagh and Lough Beg (Antrim)	-	-	1	1 Ind	-	-	9	2 Ind

Table 9 (contd)	Master Site	2015		2016		2017		2018	
		NS	N	NS	N	NS	N	NS	N
Black-headed Gull (AON)	Larne Lough	NR	1825	NR	3102	NR	3060	NR	2895
	Belfast Harbour	1	~450	1	386	1	717	1	607
	Outer Ards	1	135	1	67	2	93	3	189
	Strangford Lough	NR	1265	NR	1312	NR	1524	NR	1267
	Carlingford Lough	1	1	-	-	-	-	-	-
	Lower Lough Erne	NR	1026	NR	1238	NR	1216	NR	1218
	Moorlough Lake	1	0	1	66 Ind	-	-	1	93
	Lough Vearty	1	5	-	-	1	0	-	-
	Lough Galboly	-	-	1	-	-	-	-	-
	Lough Neagh and Lough Beg (L/derry)	-	-	2	250 Ind	-	-	3	40
	Lough Neagh and Lough Beg (Antrim)	1	95	9	4565 Ind 95 AONs	1	115	9	4368 Ind 191 AONs
	Lough Neagh and Lough Beg (Tyrone)	-	-	4	6750 Ind	-	-	4	4250 Ind
	Lough Neagh and Lough Beg (Armagh)	-	-	6	30 Ind	-	-	5	118 Ind
	Antrim Town	-	-	1	15	-	-	-	-
Common Gull (AON)	Rathlin Island	NR	76	NR	84	NR	70	NR	62
	East Antrim Coast	-	-	-	-	1	22 Ind	-	-
	Larne Lough	NR	24	NR	27	NR	32	NR	37
	Muck Island	1	20	-	-	1	51 Ind	-	-
	Outer Ards	-	-	1	1	2	8	3	10
	Copeland Islands	-	-	-	-	-	-	1	15
	Strangford Lough	NR	229	NR	333	NR	322	NR	293
	Carlingford Lough	1	1	1	3	1	6	1	6
	Lower Lough Erne	NR	163	NR	189	NR	143	NR	143
	Moorlough Lake	1	0	-	-	-	-	-	-
	Lough Vearty	1	16	1	3	1	8 Ind	-	-
	Lough Galboly	1	0	-	-	1	22 Ind	-	-
	Lough Neagh and Lough Beg (Armagh)	-	-	1	15	-	-	-	-
Lesser Black-backed Gull (AON)	Belfast Harbour	-	-	-	-	1	1	1	1
	Belfast (City Centre)	-	-	-	-	-	-	1	101
	Copeland Islands	-	-	-	-	-	-	1	365
	Strangford Lough	NR	433	NR	298	NR	343	NR	310
	Lower Lough Erne	NR	1211	NR	1185	NR	1316	NR	1316 230 Ind
	Lough Neagh and Lough Beg (L/derry)	-	-	2	0	-	-	3	20 AONs
	Lough Neagh and Lough Beg (Antrim)	-	-	9	980 Ind	-	-	9	830 Ind
	Lough Neagh and Lough Beg (Tyrone)	-	-	4	353 Ind	-	-	4	360 Ind
	Lough Neagh and Lough Beg (Armagh)	-	-	6	390 Ind	-	-	5	612 Ind 3 AONs
	Antrim Town	-	-	1	600	-	-	-	-
Herring Gull (AON)	The Gobbins	5	2	NR	2	1	1	-	-
	Belfast (City Centre)	-	-	-	-	-	-	1	16
	Outer Ards	-	-	-	-	-	-	3	187
	Copeland Islands	-	-	-	-	-	-	1	483
	Strangford Lough	NR	679	NR	1177	NR	1070	NR	1061
	Maggy's Leap to Newcastle	1	4	-	-	-	-	-	-
	Carlingford Lough	-	-	1	0	-	-	-	-
	Lower Lough Erne	NR	4	NR	5	NR	5	NR	5
	Antrim Town	-	-	1	15	-	-	-	-
Great Black-backed Gull (AON)	The Maidens	-	-	-	-	-	-	1	8 Ind
	Muck Island	1	1	-	-	1	2	1	2
	The Gobbins	5	2	NR	1	NR	2	5	2

Table 9 (contd)	Master Site	2015		2016		2017		2018	
		NS	N	NS	N	NS	N	NS	N
	Outer Ards	-	-	-	-	-	-	3	40
	Strangford Lough	NR	62	NR	125	NR	114	NR	129
	Maggy's Leap to Newcastle	1	3	-	-	-	-	-	-
	Maggy's Leap	-	-	-	-	1	2	-	-
	Carlingford Lough	1	2	1	2	1	2	1	4
	Lower Lough Erne	NR	2	NR	4	NR	4	NR	4
	Lough Neagh and Lough Beg (Armagh)	-	-	1	1	1	1	5	1
Sandwich Tern (AON)	Larne Lough	NR	694	NR	1229	NR	1141	NR	732
	Outer Ards	1	0	1	0	-	-	3	92
	Strangford Lough	NR	581	NR	337	NR	775	NR	776
	Carlingford Lough	1	250	1	7	1	71	1	13
	Lower Lough Erne	NR	138	NR	226	NR	316	NR	316
Common Tern (AON)	Larne Lough	NR	353	NR	333	NR	355	NR	307
	Belfast Harbour	1	344	1	418	1	367	1	385
	Belfast Channels	1	7	1	12	1	13	-	-
	Outer Ards	1	3	1	18	2	23	3	17
	Strangford Lough	NR	401	NR	457	NR	262	NR	340
	Carlingford Lough	1	220	1	123	1	147	1	70
	Lower Lough Erne	NR	30	NR	41	NR	51	NR	51
	Moorlough Lake	1	0	1	4	-	-	1	2
	Lough Vearty	-	-	-	-	1	0	-	-
	Lough Galboly	1	0	-	-	-	-	-	-
	Lough Neagh and Lough Beg (L/derry)	-	-	2	0	-	-		
	Lough Neagh and Lough Beg (Antrim)	1	84	9	240 Ind 75 AONs	4	271 Ind 102 AONs	9	246 Ind 135 AONs
	Lough Neagh and Lough Beg (Tyrone)	-	-	4	0	-	-	-	-
	Lough Neagh and Lough Beg (Armagh)	-	-	6	3 Ind	1	60 Ind	5	123 Ind
	Antrim Town	-	-	1	0	-	-	-	-
Roseate Tern (AON)	Larne Lough	NR	1	NR	1	NR	1	NR	1
Arctic Tern (AON)	Larne Lough	NR	1	-	-	-	-	-	-
	Belfast Harbour	1	83	1	4	-	-	1	15
	Outer Ards	2	105	1	43	2	269	3	343
	Copeland Islands	-	-	-	-	-	-	1	46
	Strangford Lough	NR	194	NR	173	NR	73	NR	193
	Carlingford Lough	1	85	1	41	1	20	1	70
Common Guillemot (Ind)	Rathlin Island	-	-	-	-	3	3470	3	3454
	Muck Island	1	2070	1	2926	1	2554	1	2478
	The Gobbins	5	2137	NR	2675	NR	2326	1	2284
Razorbill (Ind)	Rathlin Island	NR	716	NR	698	3	707	3	683
	Muck Island	1	671	1	1048	1	799	1	736
	The Gobbins	5	506	NR	858	NR	560	5	882
Puffin (Ind)	Rathlin Island	NR	3	NR	5	3	6	3	3
	The Gobbins	5	63	NR	52	NR	57	5	55
	Copeland Islands	-	-	-	-	-	-	1	100 Ind 11 AOBs

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