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THE STATUS OF IRELAND'S BREEDING SEABIRDS: BIRDS DIRECTIVE ARTICLE 12 REPORTING 2013 – 2018

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An Roinn Cultúir, Oidhreachta agus Gaeltachta
Department of Culture, Heritage and the Gaeltacht

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Front cover, small photographs from top row:

Coastal heath, Howth Head, Co. Dublin, Maurice Eakin; **Red Squirrel** *Sciurus vulgaris*, Eddie Dunne, NPWS Image Library; **Marsh Fritillary** *Euphydryas aurinia*, Brian Nelson; **Puffin** *Fratercula arctica*, Mike Brown, NPWS Image Library; **Long Range and Upper Lake**, Killarney National Park, NPWS Image Library; **Limestone pavement**, Bricklieve Mountains, Co. Sligo, Andy Bleasdale; **Meadow Saffron** *Colchicum autumnale*, Lorcan Scott; **Barn Owl** *Tyto alba*, Mike Brown, NPWS Image Library; **A deep water fly trap anemone** *Phelliactis* sp., Yvonne Leahy; **Violet Crystalwort** *Riccia huebeneriana*, Robert Thompson

Main photograph:

Fulmar *Fulmarus glacialis*, David Tierney.

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1 Contents

Executive Summary

Every summer approximately one half to three-quarters of a million seabirds congregate in colonies across Ireland to start their breeding season. Their preferred breeding habitats are principally found on mainland cliffs and on offshore marine islands. These breeding sites are often in close proximity to the rich foraging habitat of continental shelf waters. Ireland is particularly important for its breeding populations of Manx Shearwater, Storm Petrel and Roseate Tern.

This Irish Wildlife Manual describes our contemporary knowledge of the twenty-four species of seabirds that regularly breed in Ireland. Data collected under the National Seabird Monitoring Programme over the period 2013 – 2018 inclusive allowed for the production of robust contemporary population estimates for the majority of species. The fieldwork to collect such data was accomplished largely by National Parks and Wildlife Service staff and by way of procured contracts to BirdWatch Ireland. This database was further enhanced by the gracious contributions of skilled volunteers. In 2017 the co-ordination and compilation of the data was undertaken by Alan Lauder Consulting under contract to NPWS.

Our national species population estimates were compared to those derived from previous surveys over the short- and long-term (usually circa 16 and 32 year periods). Over the short-term it was estimated that 85% of those 20 species assessed were considered to be increasing with only two species (i.e. 10%) showing stable trends and one species (Kittiwake) showing a negative trend since the turn of the century. When this analysis was repeated over the long-term on 19 species approximately 68% were estimated to have increased, 21% decreased and 11% showing more stable trends.

With regard to the largely positive trends over the short- and long-term, it is difficult to rule out with precision how much the estimated greater contemporary survey effort, compared to previous surveys, has influenced these assessments but certainly some species have shown spectacular long-term increases (e.g. Roseate Tern, 579%; Common Tern, 201%; Lesser Black-backed Gull, 145%; Gannet, 94%; and Fulmar, 68%). Additionally, two seabird species have successfully colonised Ireland since approximately the turn of the century (i.e. Mediterranean Gull and Great Skua).

Of the four species that were deemed to have decreased over the long-term (Black-headed Gull, 11%; Common Gull, 25%; Herring Gull, up to 33%; and Kittiwake, 35%) only Kittiwake, our most abundant breeding gull species, is also declining over the short-term and thus is of particular cause for concern.

Active and targeted conservation work occurs at several tern colonies in Ireland especially along the east and southeast coasts. The analysis set out here shows that effectively managed projects can deliver conservation dividends with strong positive population growth recorded for several tern species at sites including Lady's Island Lake SPA and Rockabill SPA. These protected site population increases have occurred in concert with decreases in these populations' breeding ranges at the national level. Thus highlighting the necessity of such interventions.

The species assessments set out here in this IWM directly inform Ireland's reporting on the implementation of EU Birds Directive under Article 12 for the period 2013 – 2018 inclusive. Part of this reporting process requires the identification of pressures and threats acting or are likely to act on Ireland's breeding seabirds in the coming years. On a per species basis the most frequently identified threats included: offshore wind energy developments; the potential impacts of climate changes on our seabirds foraging habitats; the fishing industry via overfishing or by way of incidental seabird bycatch; mammalian predation; recreational disturbance; and the blight of plastic waste in our oceans whose detrimental impacts on marine life we are now only beginning to quantify in earnest.

Further work is required on deriving contemporary population estimates of our burrow nesting seabirds including Puffin, Manx Shearwater and Storm Petrel but historical accounts and the preliminary work thus far has highlighted the acute negative impact that some invasive mammals can

have on these breeding species. Eradication projects in tandem with the advancement of biosecurity measures on our most sensitive sites need to be progressed in the near term.

The power and efficacy of conservation management can be increased through collaboration. The data collected here through the National Seabird Monitoring Programme is to be combined with the data of our partners and colleagues in the Seabird Monitoring Programme of Britain and Ireland in order to produce an update of the status of Ireland and Britain's seabird species under the Seabirds Count Project.

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One of our more experienced NPWS seabird surveyors and dear colleague, Frank McMahon, died during the tenure of this survey programme – we dedicate this report to his memory.

1 Introduction

With a coastline of over 7,500 km and a marine territory covering approximately 880,000 km^2, Ireland supports hundreds of thousands of seabirds throughout the year (Rogan *et al*., 2018; Jessopp *et al*., 2018). Twenty-four seabird species regularly breed here, with globally important populations of Manx Shearwater, Storm Petrel and Roseate Tern (Mitchell *et al*., 2004). Ireland supports upwards of 45,000 breeding pairs of Gannet, almost 10% of the biogeographic population worldwide (Mitchell *et al*., 2004).

Seabirds breed on many of Ireland's most iconic cliffs forming spectacular high-rise colonies (e.g. Gannet, Fulmar, Kittiwake, Guillemot, Razorbill) whilst others site their nests underground in excavated burrows (e.g. Puffin, Manx Shearwater) or in manmade and/or natural rocky cracks and crevices (Black Guillemot, Storm Petrel, Leach's Petrel).

Five species of terns breed here in the summer with relatively large and widespread populations of Common and Arctic Terns followed by more restricted breeding colonies of Sandwich, Roseate Tern and Little Tern. These seabirds site their nests on offshore islands, shingle beaches, man-made structures and on the islands of our inland lakes. Ireland also supports six species of breeding gulls (Black-headed Gull, Mediterranean Gull, Common Gull, Lesser Black-backed Gull, Herring Gull and Great Black-backed Gull) some of which also breed inland and increasingly in our urban centres. Cormorant and Shag also breed successfully along our coasts with some Cormorants choosing to site their colonies on trees close to some of our inland wetlands. Relatively recent colonists, and more of a rarity, are the Great Skua, which breed on remote islands off the west coast, and the Mediterranean Gull, whose core breeding distribution is centred on Lady's Island Lake, Co. Wexford.

Figure 1 Little Skellig's Gannet colony, Co. Kerry. Photograph David Tierney

Under the European Birds Directive (Directive 2009/147/EC), Ireland is obliged to take the requisite measures to maintain its population of breeding seabird species and indeed to maintain the populations of all species of naturally occurring birds in the wild. Furthermore under article four of this directive Member States shall classify the most suitable territories in both number and in size as Special Protection Areas (SPAs). The majority of the most important colonies for most breeding seabird species' in Ireland are included in the SPA network. An important facet of conservation management is the establishment of a fit for purpose monitoring regime that enables the prioritisation and targeting of finite resources for such conservation management to be both effective and efficient.

Reporting on the status of Ireland's seabirds, based on such monitoring data, is also an obligation of the Birds Directive, under Article 12, which has developed over the years to the current, and relatively new format. This reporting procedure requires Ireland to submit, in a structured format common to all Member States, contemporary population estimates for each species, both within and outwith the SPA network, along with population and range trend information over both the short- (circa 12 year) term and the long-term (circa early 1980s onwards) periods. Additionally, this Article 12 report seeks to compile associated information on relevant pressures and threats and required species conservation measures.

The survey results set out in this report are largely based on data collected during the period 2013 – 2018 which overlaps with the Seabirds Count census survey window. This Seabirds Count census, is a follow up from Seabird 2000, which was the last major census of seabirds across Ireland and Britain, and has been developed by the Seabird Monitoring Programme partnership and is co-ordinated by the Joint Nature Conservation Committee in the UK (for more information please see http://jncc.defra.gov.uk/page-7413). The data contained in this report will be a significant contribution to the overall seabird data of the Seabirds Count census.

This Irish Wildlife Manual describes the programme of seabird survey work, led by and coordinated by the National Parks & Wildlife Service (of The Department of Culture, Heritage and the Gaeltacht) and assisted by Alan Lauder Consulting and BirdWatch Ireland.

Figure 2 Wardened Roseate Tern colony at Lady's Island Lake, Co Wexford. Photograph David Tierney

2 Ireland's National Seabird Monitoring Programme 2013 – 2018

2.1 Introduction

The last round of Article 12 reporting (covering the period 2008 – 2012) was significantly constrained by the lack of available comprehensive and contemporary data for many of our breeding seabird species. Effective survey and monitoring is an important foundation for the on-going and future seabird conservation management actions. In order to address these data gaps in a strategic and cost-effective manner it was necessary to establish a National Seabird Monitoring Programme.

The current programme of seabird monitoring follows three previous national surveys, namely: Operation Seafarer, 1969-1970 (Cramp *et al*., 1974); Seabird Colony Register (SCR), 1985-1988 (Lloyd *et al*., 1991); and Seabird 2000 (Mitchell *et al*., 2004). These multi-species surveys were informed by or were supplemented by other national seabird surveys including the All-Ireland Tern Surveys of 1984 and 1995 (Whilde, 1985 and Hannon *et al*., 1997) and targeted surveys of Gannet colonies across Ireland and the UK (Wanless *et al*., 2005).

In addition to the coordinated surveys of breeding seabirds listed above, some of the largest cliff-nesting seabird colonies are censused on a more regular basis e.g. Great Skellig, Co. Kerry. Many of our important tern colonies are monitored on an annual basis as part of the on-going conservation work at these colonies (e.g. Johnson *et al*., 2018 and Acampora *et al*., 2018).

Operation Seafarer did highlight problems in count accuracy for some species including burrow-nesters (Storm Petrel, Puffin and Manx Shearwater), cliff-nesters (Razorbill and Guillemot) and Black Guillemot. Seabird 2000 carried out the first comprehensive pre-breeding survey of Black Guillemots in Ireland. Population estimates for Razorbill, Guillemot and Black Guillemot are presented as individuals (as per Walsh *et al*., 1995) which includes birds with eggs or chicks, their mates and non-breeders.

The National Seabird Monitoring Programme (NSMP) was established in 2013 and firstly acquired aerial photographs of Ireland's main gannetries by NPWS and Aer Corps staff. These photographs were analysed by BirdWatch Ireland (BWI) under contract to NPWS, to produce updated population estimates (see Newton *et al*., 2015a). This phased and targeted approach of the NSMP progressed relying heavily on the NPWS staff to undertake the required survey work and drafting in extra resources by way of a BWI contract in 2015 to survey all the main cliff nesting seabird colonies that were identified during previous surveys (Newton 2015b). For each subsequent year similar approaches, where resources allowed, continued up to and beyond 2018 with targeted work at inland/freshwater sites, marine islands and further species-specific surveys e.g. Black Guillemot. Throughout this five year period, BWI volunteers contributed valuable survey data to this programme. In addition to the collection of seabird data using standard techniques, the NSMP is also associated with the promotion of refining existing methods through research (see Arneill, 2018, Cartuyvels, 2017, O'Connor *et al*., 2017) and collaborating with other seabird survey initiatives including the ObSERVE Programme (see Jessopp *et al*., 2018).

In late 2017, Alan Lauder Consulting (ALC) completed a review of survey progress and identified gaps to be covered to ensure survey completion. In 2018, ALC took on the role of providing through the season support to NPWS field staff engaged in seabird surveys and to direct survey effort of NPWS staff and volunteer surveyors at relevant seabird areas (both coastal and inland) not covered in the previous four year period. ALC also provided support (e.g. survey field maps and forms) to a BWI field team assisting NPWS in completion of seabird surveys in counties Donegal and Sligo.

ALC was also tasked with maintaining and expanding the national breeding seabird database in a way that is compatible with Seabirds Count in order that all data is easily retrievable for subsequent analysis. ALC were also required to analyse all available and relevant data to produce conservation assessments for each of Ireland's breeding seabird species. The assessments, published here in this Irish Wildlife

Manual, underpin the Article 12 reporting work and represents a large section of the relevant data and analysis that is to be shared with colleagues in the UK as part of the Seabirds Count initiative.

2.2 2013 – 2018 Survey Coverage

The aim was to ensure comprehensive coverage of all known historical breeding sites (including revisiting the Seabird 2000 and All-Ireland Tern Survey sites) and where possible to include any other suitable coastal cliffs, islands, lakes etc. (for more dispersed breeding seabird species) which had not been previously surveyed. The selection of these areas was based in part on anecdotal evidence of possible breeding as well as other resources including the Bird Atlas 2007-11 (Balmer *et al*., 2013) to identify any additional breeding locations for survey.

Overall, satisfactory coverage was achieved for most species groups identified below, to enable robust population estimates to be calculated. Some known breeding sites were not covered due to other limiting factors including bad weather or seas impairing planned surveys (e.g. big swells), restricted access (difficult terrain, difficult to land boats etc), and resource limitations (e.g. available expertise; available boats).

All colonies with significant populations of cliff-nesting seabirds that were surveyed for Seabird 2000, were re-surveyed. These included the large colonies at Lambay Island (Co. Dublin), the Cliffs of Moher (Co. Clare), Horn Head (Co. Donegal), and Great Saltee (Co. Wexford). In addition, suitable stretches of coastline along seaboard counties and marine islands were surveyed using a combination of land-based vantage points and boat-based surveys to achieve as comprehensive coverage as possible of breeding cliff-nesting species including Kittiwake, Guillemot, Razorbill and Fulmar.

A census of Gannets was carried out based primarily on data collected in 2014 and supplemented with 2013 data. This work is part of the regular census of all gannetries in Ireland and Britain which takes place every ten years or so (see Newton *et al*., 2015a). A total of seven colonies were censused including a new colony at Ireland's Eye (Co. Dublin).

Given that Cormorants may not breed at the same site year on year, the relevant guidance recommends counting all colonies in a single year (Mitchell *et al*., 2004). While this was not quite achieved during the current survey, efforts were made to ensure regional coverage of the species within the same season if possible. For example, the marine islands survey in 2016, covered many of the known offshore breeding sites in Connemara (Co. Galway). Coverage of all the known important colonies were not achieved during the 2013 – 2018 window and a 2010 count for one site was used in the analysis. A trial drone survey was successfully completed on one Cormorant colony off the Co. Galway coast (see O'Connor *et al*., 2017).

The largest tern colonies along the east coast (Rockabill, Dublin Port, Kilcoole, Wexford Harbour, Lady's Island) are monitored on an annual basis and any counts presented for these sites are based on an average over multiple years within the overall reporting period. Breeding terns are considered to have low site fidelity and therefore efforts were made to ensure regional coverage of most suitable coastal islands in 2016 which was achieved in counties Clare, Dublin, Donegal, with coverage completed in some counties (e.g. Cork, Galway, Mayo, Kerry) over a more protracted three-year period (2016 – 2018) - this was due to increased logistical demands in counting some of the offshore islands to achieve full coverage of local areas. Inland breeding tern colonies were also surveyed using knowledge of previous surveys and local NPWS officers.

In addition, tetrad records for terns, Cormorants and gulls from the Bird Atlas 2007–11 (Balmer *et al*., 2013) were reviewed with any probable or confirmed records used to identify potential inland breeding sites requiring survey. These were then followed up by local NPWS staff or volunteers as appropriate.

In a very limited number of cases, data from previous surveys were brought forward to account for sites that were not surveyed during the 2013 – 2018 period (e.g. Cormorant). Survey work for burrow nesting

seabirds (i.e. Manx Shearwater, Storm Petrel, Leach's Petrel, Puffin and Black Guillemot), although underway, were not yet complete at time of writing. These species require specialist survey methods and are more logistically difficult to attain robust population estimates, therefore the conservation assessments presented here are of an interim nature.

Based on anecdotal evidence and some limited surveys it is apparent that there are significant numbers of the larger gull species (e.g. Herring Gull, Lesser Black-backed Gull) breeding in urban and potentially peri-urban areas. Again, typical survey techniques for coastal or island sites, are not well suited to deriving robust population estimates for these urban breeding gull populations. Relevant available data for north Dublin (i.e. ROD 2018) were incorporated into the conservation assessments here.

2.3 Census Methods

The majority of surveys conducted as part of the national seabird monitoring programme followed guidance on sampling and census methods for seabirds as well as species-specific methodology detailed in the Seabird Monitoring Handbook for Britain and Ireland (Walsh *et al*., 1995). This facilitated the assessment of population sizes and to estimate the changes in numbers since the last national census carried out in Seabird 2000 (Mitchell *et al*., 2004). A summary of the methods employed and recommended timings of surveys are set out here in Table 1. These census instructions are based on the monitoring handbook (i.e. Walsh *et al*. 1995) and inform the methods for the Seabirds Count census work across Ireland, Northern Ireland and Britain.

Table 1 Recommended survey periods and count units

Species	Time of year	Time of day*	Count Unit#
Fulmar	Late May – early July (ideally June)	09:00 – 17:30	**AOS**
Manx Shearwater	Late May – early June	Day light	**AOS**
Storm Petrel	Early July	Day light	**AOS**
Leach's Storm Petrel	Late June	Day light	**AOS**
Gannet	June – July	Day light	**AOS**
Cormorant	*Coastal colonies:* early May – late June *Inland colonies:* mid April – mid May (dates relate to peak nesting periods, repeated counts if possible)	Day light	**AON**
Shag	Normally late May – mid-June (peak nesting period, repeated counts if possible)	Day light	**AON** (plus separate counts of **Trace Nests** and **Individuals** if possible.) **Individuals** if birds are nesting out of sight in caves or boulder fields.
Great Skua	Late May – mid-July (preferably June)	Day light	**AOT**
Gulls (*Larus* spp.)	Late May – early June	Day light or 08:00 – 18:00 for vantage point counts and flush counts	**AOT, AON** or **Individuals** (flush counts)
Kittiwake	Late May – mid-June (early July if late breeding season; repeated counts if possible)	Day light	**AON** (plus separate count of **Trace Nests** and **Individuals** if possible)
Terns	Two counts of nests desirable; one before June high tide and one before July high tide. If counting individuals repeated counts from early – mid June	08:00-16:00 or preferably 10:00-14:00 if flush counts are used	**AON** or **Individuals** (flush counts)
Guillemot & Razorbill	1 – 21 June (early July if late breeding season)	08:00 – 16:00	**Individuals** present in the colony
Black Guillemot	Late March – early May	first light – 09:00	**Individuals** on sea and/or land
Puffin	Late April – mid-May optimal (late April – early August is acceptable)	Day light	**AOB** or **Individuals** on land & adjacent sea where colony inaccessible

* = British Summer Time (BST) or Coordinated Universal Time (UTC) + 1 hour. # = AON = Apparently Occupied Nest; AOT = Apparently Occupied Territory; AOS = Apparently Occupied Site (includes burrows), AOB = Apparently Occupied Burrow

2.4 Site and subsite boundaries

Previous national surveys have defined sites and subsites using Ordnance Survey six-figure grid references. With advances in Geographical Information Systems (GIS), grid references are no longer considered the best method of recording spatially defined survey data. For the most recent survey, a spatial database was created using polygons to define sites and subsites surveyed which allows for more accurate and efficient colony monitoring resulting in more robust estimates of species distributions and population trends. The design of the most recent survey was based on replicating the Seabird 2000 subsites and where possible these boundaries were retained. However, there were some cases where this was not possible due to changes in survey methods i.e. from land-based vantage points to boat-based survey where delineation of Seabird 2000 subsites were more difficult for surveyors to adhere to. In addition, in cases where Seabird 2000 site boundaries extended beyond the SPA boundary, Seabird 2000 site boundaries were redefined to allow counts within and out-with the SPA boundary to be more accurately determined, a requirement under Article 12 reporting. Further work is required to complete the process of accurately defining subsites at some locations (e.g. Loop Head) where poor count conditions impaired accurate delineation of subsite boundaries at the time of survey.

A separate spatial database was produced for the survey of Black Guillemot from 2017 onwards due to the very different survey methods that are used to derive population estimates for this species compared to the more typical breeding seabird species.

2.5 Count quality and data processing

All surveyors involved in the surveys of cliff-nesting seabirds, gulls, Cormorants and terns were provided with count instructions summarised from the Seabird Monitoring Handbook (Walsh *et al*., 1995) which formed the basis of the core guidance given to all participants. For each species, the recommended counting techniques were chosen, the timing of survey (day and month) and the count unit were provided. Many of the surveyors attended specific seabird survey workshops in advance of the survey season in order to promote a consistency of approach.

Depending on whether the observer had a reasonable view or not of the nest site e.g. for some gull species it can prove difficult to ascertain incubating adults, then the observer may have used Apparently Occupied Nests (AON) or Apparently Occupied Territories (AOT). For the purposes of generating national estimates, any counts at sites which have included counts of AOT or AOS have been added to the core count unit of AON to ensure all potential breeding locations or breeding pairs are included.

Observers were also asked to note count accuracy on their forms. Overall, most counts were deemed accurate (79%), with the remainder either estimated (12.7%) e.g. flush counts at breeding tern colonies or no quality measure was given (8.2%). In such cases, it was assumed there was no issue with count quality and that the observer had overlooked recording the information on count forms.

Counts which largely fell within the recommended time of year were included in generating population estimates. Counts carried out outside the recommended period of survey were not included unless they proved to be the only counts for a site, in which case best expert opinion was used to determine whether the records should inform the final distribution map. For the 2016 marine islands survey, some data cleaning of counts submitted was carried out based on expert judgement to ensure only counts of good quality were included (Newton *et al*., 2016).

Boats were frequently used as a suitable platform for survey. The positives of boat surveying are that it allows observers to access hard to reach stretches of coastline and islands and to cover long stretches of coast more efficiently. The disadvantage of using boats is that it can be more difficult to count from boat-based vantage points, including determining subsite boundaries, in poor sea state conditions.

Generating overall national population estimates for a species requires a single count or estimate for that species at each site surveyed. However, the methodology for counting some species requires more than one visit to a colony e.g. breeding terns. In such instances, only one count is used in the final analysis to generate the overall population estimates. This figure was either the reported total in final written reports or the adjusted figures provided by expert judgement. For sites which are counted annually, there are also several counts per site in the database. This allowed, in some instances, the calculation of more robust site population estimates based on multi-year averages. Other instances of duplicate counts include counts which were deemed less suitable due to poorer weather conditions than others. Exclusion of 'earlier' counts at sites which were subsequently re-surveyed in better conditions were justified where the observer indicated the quality of the count had been compromised on the previous occasion. In such instances, the second count was used and not the average value.

The current national survey draws on data collected during the period 2013 – 2018, which coincides with the current Article 12 Birds Directive reporting period. However emphasis on particular species groups did vary over this period e.g. a complete survey of the Gannet was based just on two years i.e. 2013 and 2014. Therefore the precise time period on which the national species' population estimates were based can vary from species to species.

Observers were asked to submit data on count forms provided by coordinators and/or electronic submission of data on excel worksheets. Excluding records for Black Guillemot and burrow-nesting species, over 3,000 individual site records were submitted. This dataset required the querying of several anomalies with observers, adjusting any information as required in the database in order to ensure a consistent approach is taken to generate population estimates for each species. The importance of capturing the survey information spatially cannot be overstated including the collection of null records.

While defining boundaries (i.e. digitising each site and subsite surveyed) in GIS proved to be a labour intensive process, it will ensure clarity on the extent of coverage for species and more readily support the comparability of the results from this survey with future ones. This approach also led to increased precision and accuracy in the estimation of each breeding seabird's distribution. The replacement of grid references (point data) with more accurate polygons (covering a larger spatial footprint) for defining subsite boundaries is likely to result in an increase of the range change from previous reporting. Range is defined as the total number of 10 km grid squares that intersect with each subsite where a positive breeding event was recorded. In a minority of cases, and exclusively for species whose breeding ranges are highly restricted, this value was adjusted downwards by excluding those 10 km grid squares that only partially intersected with a subsite and where that subsite had already intersected with and was included within an adjoining 10 km grid square.

3 Species accounts

This section of species accounts presents detailed population and breeding distribution data for the majority of Ireland's breeding seabird species. The specific format of these accounts was defined to be compatible with the prescribed format of aforementioned Article 12 report. The current Article 12 report, covering the period 2013 – 2018 was transmitted to the European Commission in July of 2019.

This is a relatively new report format developed jointly by Member States, the Commission and contracted experts. This revised format, first used to report the period 2008–2012, included information on the size and trend of individual bird species' populations and distributions, sections for reporting on the main pressures and threats affecting species for which SPAs have been classified, as well as an estimation of the total national population covered by the SPA network. Since 2012 the format has been further revised within the Expert Group on Reporting under the Nature Directives, for the current reporting period (DG Environment, 2017).

Note that the population estimates of each species, and their associated population trends, are dependent upon the data to hand during the analyses and write up stage of this report. The data collected thus far as part of the NSMP will be supplemented further with data from 2019 and 2020 resulting in the possibility of the contemporary population estimates for Ireland changing with the finalisation of the Seabirds Count initiative.

The recommended period to describe a short-term population trend is a rolling 12-year time window. No comprehensive seabird breeding population estimates for Ireland exists for the year 2006. The default approach adopted here is to compare the contemporary population sizes estimated by way of the Seabird 2000 data which equates to a 12 to 20 year window period i.e. 1998 – 2002 to 2014 – 2018 with a 16-year period between survey window endpoints.

The recommended period to describe the long-term population trend is approximately 1980 to the current reporting window – this is to coincide with the establishment of the Birds Directive. For the purposes of this seabird report, the relatively robust national population estimates based on the survey work of the Seabird Colony Register Survey, which was undertaken during the period 1985 – 1987 is the default source to estimate a long-term trend for Ireland's seabird populations. This equates to a 32-year period between survey window endpoints.

Although not necessary from a European reporting perspective, the historical change in national population estimates from the Operation Seafarer surveys undertaken during 1968 – 1970 and the current surveys are often set out in graphical form for each species. However such comparison must be viewed with caution due to the potential disparity in particular species survey effort and changes in survey methods.

As previously mentioned and for Article 12 reporting purposes, the spatial extent of the distribution of each breeding seabird species is described as the number of 10 km X 10 km (i.e. 100 km^2) grid squares. The long-term change in distribution is calculated by way of a comparison with the relevant breeding species' distributions set out in The New Atlas of Breeding Birds in Britain and Ireland: 1988-1991 (see Gibbons *et al.*, 1993) which was informed by the SCR survey. As part of the last Article 12 reporting work, the NPWS GIS Unit interrogated the Seabird 2000 dataset to estimate the number of occupied 10 km X 10 km grid squares for each breeding seabird species – a comparison of this dataset with the contemporary data was the basis for the short-term breeding distribution trend.

3.1 Fulmar	*Fulmarus glacialis*	Fulmaire
Breeding population	**Population estimate (2015 – 2018):**	32,899 pairs
	Short-term trend (1998/2002 - 2015/2018):	0%
	Long-term trend (1985/87 - 2015/2018):	+ 68%
	Proportion within the SPA Network	69%
Breeding distribution	**Current (2015 – 2018):**	140 10 km grid squares
	Short-term trend (1998/2002 - 2015/2018):	+ 14%
	Long-term trend (1988/91 – 2015/2018):	+ 4%

Data confidence: Over 70% of counts were conducted in June, which is the noted ideal month for surveying this species and greater than the 64% figure for Seabird 2000. Approximately 66% of the total contemporary population estimate is derived from single visit surveys undertaken in 2015. Our confidence in both the contemporary national population estimate and the breeding range is at least a **medium**. The confidence in our short-term estimates of change is **medium** based on greater coverage in this round compared to Seabird 2000. The estimated long-term population change is also qualified as **medium**, as coverage was not as comprehensive in the SCR even though some corrections for surveyed colonies were made (Lloyd *et al*. 1991).

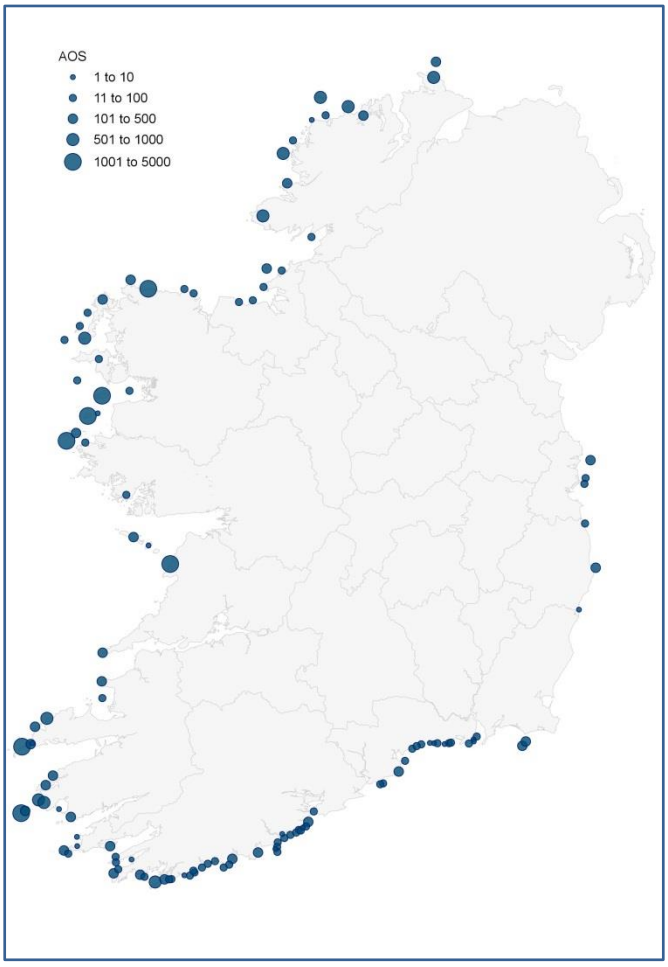

Figure 3 Breeding Fulmar abundance and distribution for the period 2015 – 2018.

The Fulmar (also referred to as Northern Fulmar) is a common sight around Ireland's northwest, west and south coasts where they often nest near the top of grassy cliffs along wide ledges (Mitchell *et al*., 2004) and feed on a variety of marine prey including fish offal and discards from commercial fisheries (Phillips *et al*., 1999). The colonisation of Ireland and Britain by the Fulmar over the last two centuries has been largely attributed to their close association with fisheries, but contemporary dietary studies indicate they also feed on a wide variety of prey including sandeels, squid, amphipods and copepods (Philips *et al*., 1999). Historically, their breeding distribution was largely restricted to the arctic regions but since the 1700s, their range has expanded southwards from Iceland via the Faroes, the Shetlands, the Orkneys down the British and Irish coasts (Snow & Perrins, 1998).

During the breeding season, nesting Fulmar are widely dispersed along our coasts as illustrated by the most recent seabird national census (2015 – 2018) which recorded this large petrel breeding at over 120 sites across Ireland (Figure 3). Our contemporary national population is very similar with the corresponding estimate from Seabird 2000, and a sizable increase from the previous survey during the 1980s (Figure 4).

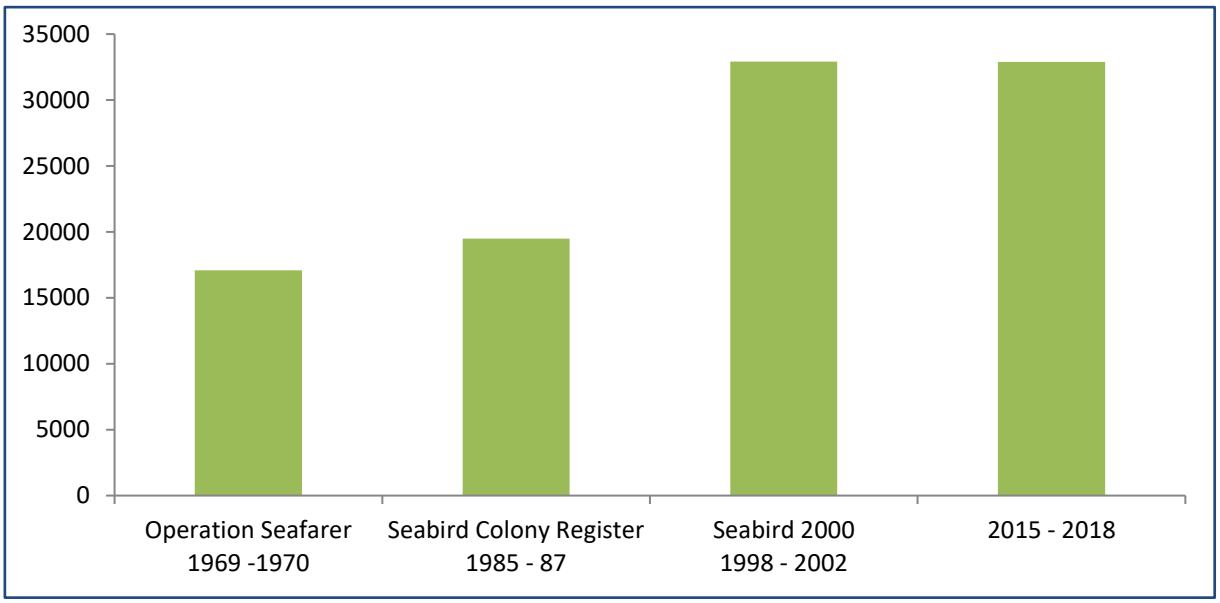

Figure 4 Breeding population estimates of Fulmar (AOS) from Operation Seafarer (1969 – 1970) to the current survey (2013 – 2014).

However the overall stability masks marked changes in the breeding Fulmar population estimates at site level - Table 2 present surveys estimates from a selection of the large colonies that were identified in Seabird 2000. It is interesting to note that the Cliffs of Moher and Clare Island, two of the most important colonies as identified by Seabird 2000, have both undergone marked but contrasting changes in their site estimates (+36% and -31% respectively).

The contrasting fortunes of some of the large traditional Fulmar colonies across Ireland indicate that the relationship between factors influencing the recorded colony abundances in Ireland may be a complex one. Recent studies in Britain have specified that adult survival may be a factor driving declines at some colonies (Cordes *et al*., 2015). Although further analysis is needed but cognisant of the calculated short-term increase in the breeding distributions between this survey and Seabird 2000 it may well that increase survey effort may be masking a short-term decline in the actual breeding population.

Table 2 Population trends of breeding Fulmar (AOS) at a selection of Irish colonies since Seabird 2000.

Site	Seabird 2000 1998/2002	2015 - 2018	% change since Seabird 2000
Inishshark Island	603	1160	+ 92%
Puffin Island	447	670	+ 50%
Cliffs of Moher	3566	4842	+ 36%
Cape Clear Island	466	527	+13%
Inishturk Island	2897	2881	- 1%
Great Skellig	761	725	- 5%
Duvillaun Islands	638	547	- 14%
Little Saltee	205	167	- 19%
Inishvikillane	672	517	- 23%
Clare Island	4029	2789	- 31%
Lambay	585	375	- 36%
Great Saltee	315	190	- 40%
Aran Island - Aranmore	1535	768	- 50%

Figure 5 Fulmar. Photograph Tim Melling

3.2 Gannet	*Morus bassanus*	Gainéad
Breeding population	**Population estimate (2013 – 2014):**	47,946 pairs
	Short-term trend (2004 – 2014):	+ 33%
	Long-term trend (1984/85 – 2013/14):	+ 94%
	Proportion within the SPA Network	100%
Breeding distribution	**Current (2013 – 2014):**	Six 10 km grid squares
	Short-term trend (2004 – 2014):	+ 20%
	Long-term trend (1984/85 – 2013/14):	+ 50%

Data confidence: Our contemporary population estimate and distribution for this species is **high** due to the conspicuous nature of gannetries and that the survey data came from a single species national survey conducted during 2013 – 2014 of the seven known colonies. Both the short- and long-term comparisons are against high quality counts and therefore our confidence in these estimates are also **high**. Again due to the limited number of colonies in Ireland, our confidence in the estimated change in distribution is also **high**.

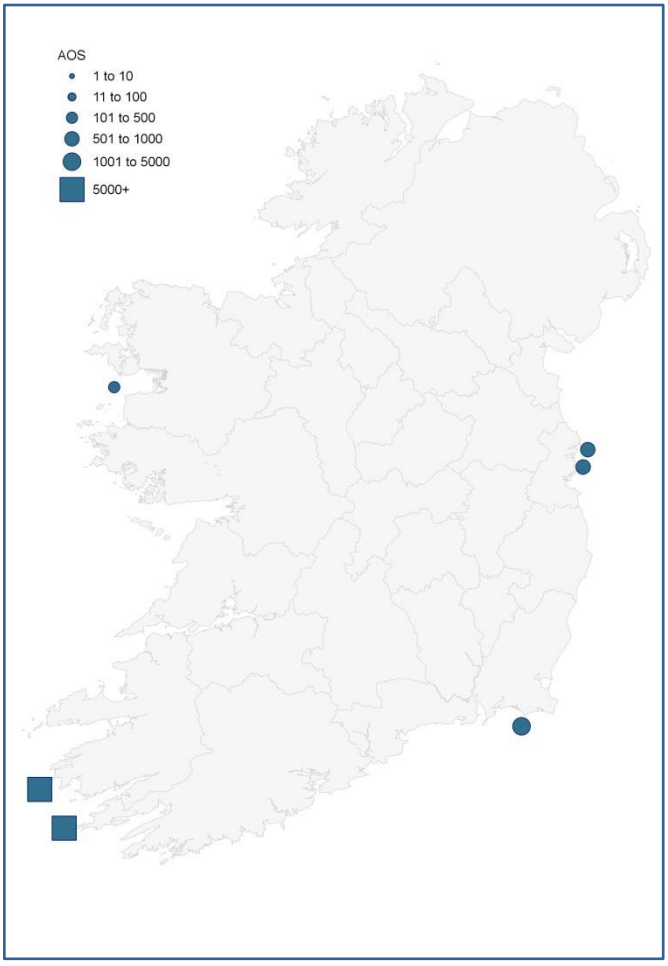

Figure 6 Breeding Gannet abundance and distribution for the period 2013 – 2014

The Gannet (also referred to as Northern Gannet) is the largest seabird of the north Atlantic with breeding birds occurring mainly in the temperate waters of the north Atlantic up to the arctic fringe. Adults are large white long-bodied, long-winged seabirds with a spear-shaped bill and yellow buff tinge on the rear part of the head and contrasting black ends to wings (Snow & Perrins, 1998). They are site faithful with most colonies occupied for decades or longer (Mitchell *et al*., 2004). Gannets breed on isolated sea stacks, small uninhabited islands and on occasion, inaccessible cliffs on large islands (often inhabited) with nests usually on ledges of cliffs above the splash zone and sometimes on flat tops or on shallow soil (Snow & Perrins, 1998). Gannets spend most of their lives in the open sea and feed from the surface on small shoaling fish i.e. sandeels and on Mackerel (*Scomber scombrus*), Herring (*Clupea harengus*) and other mid-sized pelagic fish and on discards from fishing vessels (Votier *et al*., 2004).

The Irish breeding population has been censused on five occasions since the late 1960s (Newton *et al*., 2015a) along with the population in Britain and, where possible, across the north Atlantic. The most recent census of breeding Gannets in Ireland largely took place in during the breeding seasons of 2013 and 2014 (Figure 6). Gannets have been breeding on Great Saltee (Co. Wexford), Bull Rock (Co. Cork) and Little Skellig (Co. Kerry) since at least the 1970s. The most recent colonisation is Lambay Island where breeding occurred in 2007 (Table 3). The results of the census of Irish gannetries were largely derived from aerial photographs taken in 2013 and 2014 and supplemented by additional land-based vantage point counts at the smaller colonies i.e. Clare Island, Ireland's Eye and Lambay Island (Newton *et al*., 2015a). The count unit for aerial surveys is the Apparently Occupied Site (AOS) as usually it is not possible to see whether one or two birds are present on the site (Mitchell *et al*., 2004). For the three largest colonies (Little Skellig, Bull Rock and Great Saltee), estimates were derived by taking the mean (or average) of three independent observer counts of the aerial imagery following guidance by (Harris & Lloyd, 1977).

Table 3 Census totals (AOS) of Gannets at Irish colonies for the period 1969-70 to 2013-14 (adapted from Newton *et al*., 2015a).

Site	1969 - 1970	1984 - 1985	1995	2004	2013 - 2014	% Change since 2004
Clare Island	0	2	3	3	267	+ 8800%
Little Skellig	c. 22,000	22,500	26,436	29,600	35,294	+ 19%
Bull Rock	c. 1,500	1,511	1,815	3,694	6,388	+ 73%
Great Saltee	155	710	1,250	2,446	4,722	+ 93%
Ireland's Eye			45	285	547	+ 92%
Lambay					728	-
National Total	23,655	24,723	29,549	36,111	47,946	+ 33%

The Irish population has increased by an estimated 33% over the 10-year period from 36,111 AOS in 2004 to 47,946 AOS in 2014 (Table 2). Across the traditional colonies, populations increased across the board with the highest increase (since the 2004 survey) recorded at Great Saltee (93%), followed by Ireland's Eye (92%), the Bull Rock (73%) and Little Skellig (19%). In 2015, the gannetry on Lambay Island was re-surveyed using land-based vantage point method and was found to have increased from 728 AOS in 2013 to 926 AOS in 2015, an increase of 27% in just two years. In historical terms, the population has increased by 121% since Operation Seafarer (Figure 7).

The introduction of the landing obligation (LO) under the new CFP reform came into force on 1 January 2019. This means that fishing vessels are required to retain and land all quota species, albeit non-quota species can still be discarded. The feeding behaviour of the Gannet has included feeding on discarded fish from vessels off our coast (Votier *et al*., 2004). With the implementation of LO there may be future repercussions in terms of food availability for our breeding Gannet population, which can benefit from

the practice through scavenging (Votier *et al*., 2010). However, ongoing declines in global catches of fish will most likely have longer-term impacts on this long-lived seabird (Votier *et al*. 2013; Mackey *et al*., 2004; MacDonald *et al*., 2015). Furthermore, entanglement with marine debris and fishing gears can cause of mortality of individuals (Rodriguez *et al*., 2013). While Gannets can feed by plunge diving, the risk of collision with wave or tidal turbines was assessed as being low, although the collision risk score for this species is higher for offshore wind turbines given the flight heights and trajectory of commuting Gannets (Ramiro & Cummins, 2016).

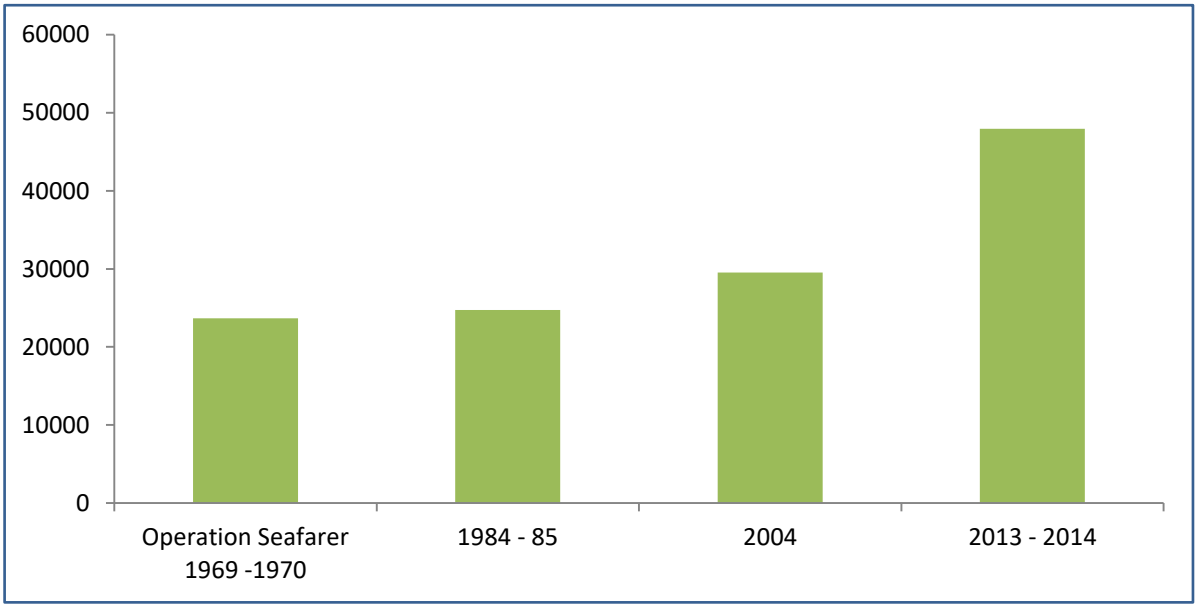

Figure 7 Breeding population estimates of Gannet (AOS) from Operation Seafarer (1969 – 1970) to the current survey (2013 – 2014).

Figure 8 Gannet with nesting material. Photograph Alyn Walsh.

3.3 Cormorant	*Phalacrocorax carbo carbo*	Broigheall
Breeding population	**Population estimate (2015 – 2018):**	4,688 pairs
	Short-term trend (1998/2002 - 2015/2018):	+ 15%
	Long-term trend (1985/87 - 2015/2018):	+ 18%
	Proportion within the SPA Network	72%
Breeding distribution	**Current (2015 – 2018):**	82 10 km grid squares
	Short-term trend (1998/2002 - 2015/2018):	+ 75%
	Long-term trend (1988/91 – 2015/2018):	- 5%

Data confidence: Cormorants can show a low degree of site faithfulness between years which may impact on the national population estimate derived from survey data over several years. Our population estimate and distribution for this species, is informed primarily on data collected in 2015 – 2018. However 2010 survey data for two known sites have been used in this analysis on the assumption that populations have not changed significantly in the interim. Therefore we have **medium** confidence in the recorded national population estimate. The confidence in our long-term estimate of breeding distribution change is **medium** but possibly less so for the short-term based on the fact that more sites were surveyed, particularly inland ones this round compared to Seabird 2000.

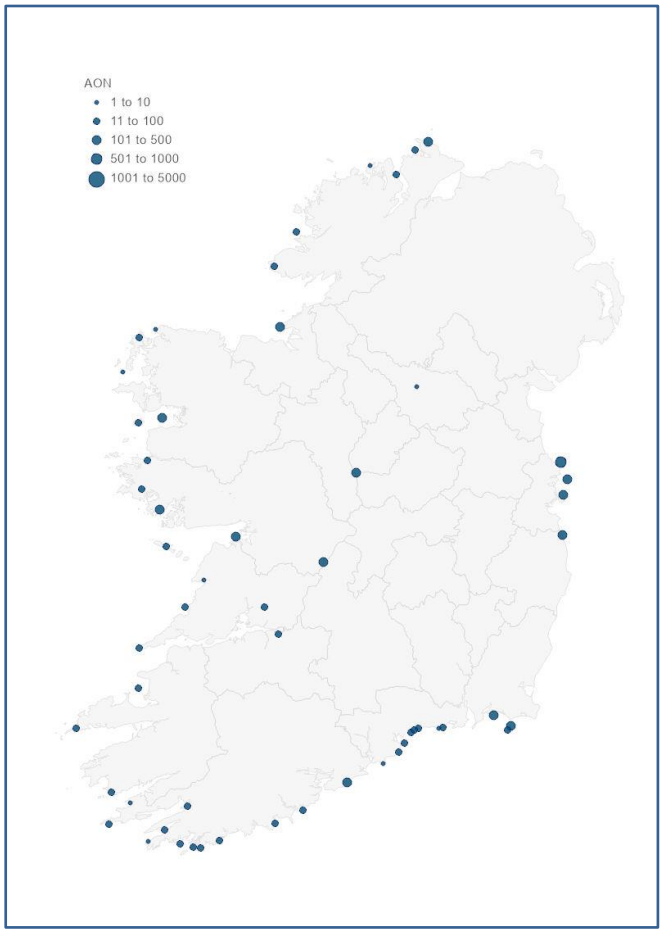

Figure 9 Breeding Cormorant abundance and distribution for the period 2015 – 2018.

The Cormorant (also referred to as Great Cormorant) has a worldwide distribution with the Atlantic subspecies '*carbo*' occurring in Ireland and elsewhere in northwest Europe (Cramp & Simmons, 1977). Cormorants breed on stacks, rocky islets, cliffs or rocky promontories with colonies obvious by the extent of white-wash caused by guano (Mitchell *et al*., 2014). Primarily a ground nesting coastal breeding bird but new colonies have established on trees associated with inland wetlands (Figure 9). The greater availability of prey at inland waterbodies through fish stocking has likely contributed to the increase inland populations (MacDonald, 1987; Kirby *et al*., 1996) in combination with likely over-harvesting of fish in coastal waters (Cowx, 2013). These piscivorous birds often come into conflict with anglers, particularly given their increased usage of inland waterways for both feeding and breeding (Mitchell *et al*., 2004). The sub-species *P. c. sinensis* has been expanding its range in mainland Europe and in southeastern parts of Britain, but has not yet been recorded as a breeding bird in Ireland (Tierney *et al*., 2011).

Less than 10% of the estimated national breeding population (2015 – 2018) occur at inland sites. The last national census of Cormorant colonies in Ireland was approximately 20 years ago and covered the majority of the main colonies (Mitchell *et al*., 2014), but coverage for the most recent survey has been more extensive at 65 sites surveyed compared to 41 sites for the previous survey with significantly more focus on inland sites compared to Seabird 2000. This disparity in survey effort of smaller colonies between surveys is likely to partly explain the recorded increase in breeding distribution and therefore this change should be treated with caution and should be viewed as a maximum estimate. The current estimate is based on a comprehensive survey of known breeding sites, including offshore islands and inland freshwater lakes, and is therefore the best estimate to date in terms of coverage of the species range in Ireland.

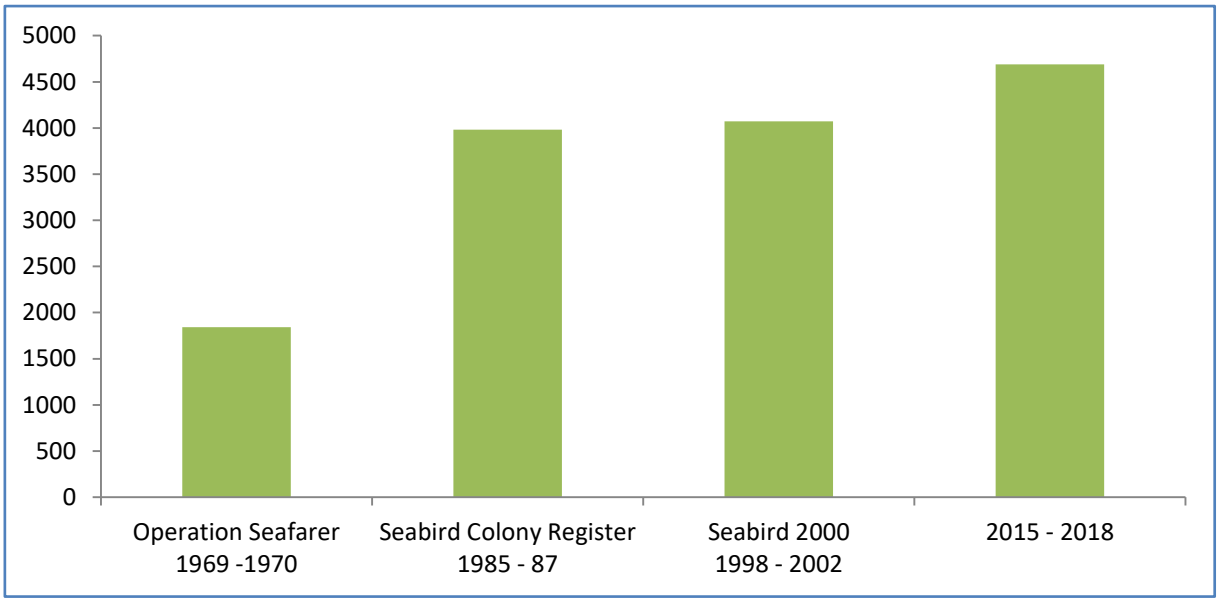

Figure 10 National population estimates for Cormorant (AON) from Operation Seafarer to the current survey.

Figure 10 illustrates the moderate increase in the contemporary population estimates from previous survey based estimates. This estimated population trend is likely driven by a number of factors. Declines at Lambay Island have coincided with increases at Ireland's Eye, St. Patrick's Island and a new colony at Bray Head established in 2009 (Tierney *et al*., 2011). The Cormorant colony at Lough Cutra, which previously held 150 pairs in Seabird 2000, is now considered to be abandoned with no breeding birds recorded in 2017 despite an extensive survey. For Deer Island, the population estimate (212 AON) derived from a survey of the island completed using a drone in 2017 (O'Connor *et al*., 2017). This estimate was considered to be more accurate of the true population than a coincident boat based count.

Table 4 Census totals (AON) of Cormorant at a selection of Irish colonies for the period 1985 – 1988 to 2015 – 2018.

Site	SCR (1985 - 1988)	Seabird 2000 (1998 - 2002)	2015 -18	% Change (1998-2018)
Ballycotton Island		46	75	+ 63%
Capel Island		52	82	+ 58%
Ireland's Eye	19	306	424	+ 39%
Lough Derg (several colonies)	417	207	272	+ 31%
Inishowen Peninusla		225	289	+ 28%
Ardboline & Horse Island		156	191	+ 22%
Deer Island		200	212	+ 6%
Keeragh Islands	239	200	199	- 1%
St. Patrick's Island	0	558	544[∞]	- 3%
Little Saltee	234	273	208	- 24%
Duvillaun Islands	154	20	10	- 50%
Sovereign Islands		156	76	- 51%
Lough Scannive	218	160	71	- 56%
Lambay Island	1027	675	299	- 56%
Lough Cutra	166	150	0	- 100%

[∞] Count recorded in 2010

On the south coast, increases have been noted at Ballycotton and Capel Islands and at Ireland's Eye on the east coast which contrasts the fortunes of other southern (e.g. Sovereign Islands) and eastern colonies (Lambay Island, **Table 4**). Explaining the local variation in colony fortunes is likely a combination of a number of factors. Timing of breeding in Cormorants can differ between individuals in the same colony and indeed some colonies can appear and disappear as the colony shifts location between years and therefore combining counts of nearby sites across different years can increase risk of uncertainty in trend detection (Mitchell *et al*., 204). Ideally multiple visits are made to a colony, but this is not always possible. Timing of the site surveys is also key due to the relatively prolonged breeding activity between individuals (Mitchell *et al*., 2004; Newson *et al*., 2005). In the UK, first-year survival and breeding success is higher for inland breeding Cormorants (Newson *et al*., 2005) which is linked to earlier and greater food availability at inland sites.

Figure 11 Cormorant chicks on the nest. Photograph Clare Heardman

3.4 Shag	*Phalacrocorax aristotelis aristotelis*	Seaga
Breeding population	**Population estimate (2015 – 2018):**	4,980 pairs
	Short-term trend (1998/2002 - 2015/2018):	+ 45%
	Long-term trend (1985/87 - 2015/2018):	+ 7%
	Proportion within the SPA Network	74%
Breeding distribution	**Current (2015 – 2018):**	121 10 km grid squares
	Short-term trend (1998/2002 - 2015/2018):	+ 46%
	Long-term trend (1988/91 – 2015/2018):	+ 12%

Data confidence: This species' prolonged and highly variable breeding season can impact on the accuracy of the estimates of the true population size. Only a small proportion of our sites were counted more than once during the 2015 – 2018 period and therefore our confidence in the current national estimate is at best a **medium**. Although the timing of our counts are on a par with those of Seabird 2000 (i.e. 81% of counts were conducted between 15 May and 25 June which is the preferred survey period after Walsh *et al.*, 1995, compared to 83%). We also have up to a **medium** level confidence in our estimates of change notwithstanding the increased level of survey effort over the period 2015 – 2018 compared to Seabird 2000.

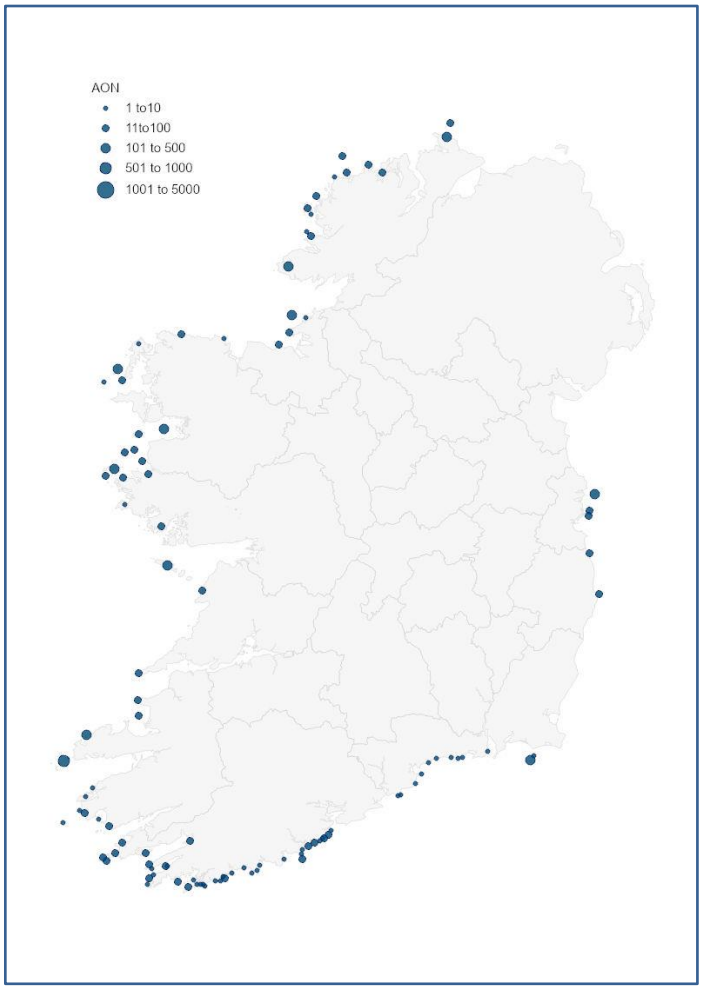

Figure 12 Breeding Shag abundance and distribution for the period 2015 – 2018

The Shag (also referred to as European Shag), is an inshore species that feeds on a wide range of small fish, dispersing widely in their first and second years of life from natal colonies that are usually sited on cliffs or offshore islands (Mitchell *et al*., 2004). Compared to Cormorants, Shags are more strictly birds of coastal areas with inland records very scarce at any season (Hutchinson, 1989) and inland breeding not recorded.

The calculated short-term population increase (Figure 13) and its concomitant increase in the recorded breeding distribution is more pronounced than its longer term trend estimates indicating that: the population decreased in the 1990s and subsequently recovered; that the Seabird 2000 estimate was somewhat of an underestimate; or some combination of both. The estimated short-term increase in breeding range is quite high and should be treated with caution and as a maximum estimate. The Operation Seafarer estimate for this dispersed breeding species was considered by Hutchinson (1989) to be an underestimate of the true value of the early 1970s.

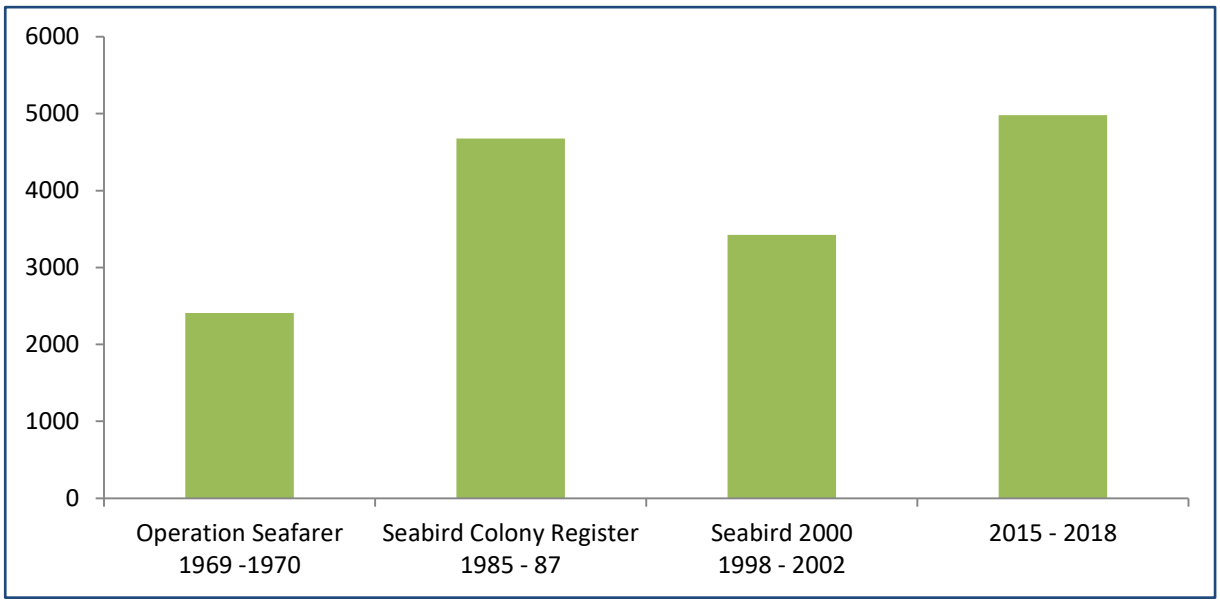

Figure 13 National population estimates for Shag (AON) from Operation Seafarer to the current survey.

Looking at the population estimates of individual Shag colonies over time, quite a varied picture is formed with both pronounced increases and decreases recorded (**Table 5**).

Table 5 Census totals (AON) of Shag at a selection of Irish colonies for the period since Seabird 2000

Site	Seabird 2000	2007	2015 - 2018	Change (from Seabird 2000)
Inishmurray	104	-	389	+ 274%
Howth	12	55	41	+ 241%
Ireland's Eye	32	64	81	+ 153%
Old Head of Kinsale	30	25	46	+ 53%
Clare Island	86	-	78	- 9%
Lambay	1122	1670	469	- 58%
Great Saltee	268	-	112	- 58%

The large decline at Lambay was offset to some degree by increases at other nearby east coast sites (e.g. Howth Head, Ireland's Eye) and significant increases elsewhere (e.g. Inishmurray) indicating that the recorded increase in our national population estimate does reflect, in part at least, an increase in the actual national population.

Figure 14 Shags nesting on an abandoned jetty near Whiddy Island, Co Cork. Photograph Clare Heardman

Figure 15 Nesting Shag. Photograph Tim Melling

3.5 Great Skua	*Catharacta skua*	Meirleach mór
Breeding population	**Population estimate (2015 – 2018):**	13 – 15 pairs
	Short-term trend (1998/2002 - 2015/2018):	+ 1200 – 1400%
	Long-term trend (1985/87 - 2015/2018):	N/A
	Proportion within the SPA Network	38%
Breeding distribution	**Current (2015 – 2018):**	11 10 km grid squares
	Short-term trend (1998/2002 - 2015/2018):	+ 1000%
	Long-term trend (1988/91 – 2015/2018):	N/A

Data confidence: This species is a relatively recent addition to the suite of breeding seabirds in Ireland. All known territory holding pairs of this rare breeding seabird were surveyed during the 2015 – 2018 period. Some of these territories were visited annually. Therefore coverage is considered comprehensive and confidence in the population estimate is at least **medium**. The confidence in our short-term estimates of change is **high** as there was just one breeding territory identified as part of Seabird 2000.

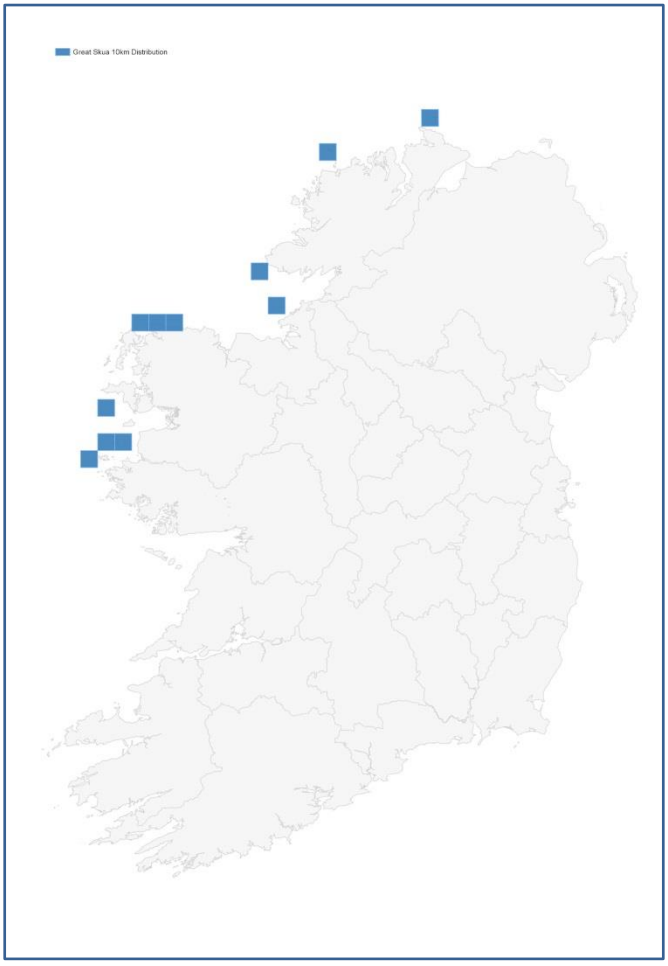

Figure 16 Great Skua Breeding Distribution 2015 - 2018

The Great Skua is a gull-like seabird which occupies coastal and marine habitats and is traditionally confined to breeding in more northerly latitudes (i.e. Iceland, the Faroes and Shetland and the Orkneys (Scotland) although recent decades has seen its range expand further south in mainland Britain (Snow & Perrins, 1988). In Ireland the strong population growth rate seems steady since colonisation with just one breeding pair at the end of the 20th century (Mitchell *et al.*, 2004) to at least 11 pairs in 2017 (Newton, 2017).

The Great Skua has been the subject of human persecution in the past (Snow & Perrins, 1998). This species has been described as a dietary generalist exploiting a wide range of prey from fish to kleptoparasitising and/or directly preying on seabirds as well as foraging on discards from fishing vessels. Recent research indicates a high degree of feeding plasticity exists in individuals regardless of sex, reproductive status or phase of breeding (Furness, 1987; Philips *et al*., 1997; Jakubas *et al*., 2018).

The current survey work records Great Skuas breeding on islands across four counties (Figure 16, Table 6), with confirmed breeding at 13 sites and individuals recorded at a further two occupied territories. Additional information was collated from a further nine sites but were deemed as being unlikely to hold territorial birds. The count unit for Great Skuas is the Apparently Occupied Territory (AOT) (Mitchell *et al*., 2004). The Irish population of Great Skua is currently and conservatively estimated to be 13 – 15 breeding pairs, an increase of 1200 to 1400% since Seabird 2000.

Table 6 Great Skuas breeding across Ireland during the period 2015 – 2018

County	Confirmed breeding	Possible/probable breeding
Donegal	3	2
Sligo	1	
Mayo	8	
Galway	1	
Total	13	2

Studies at colonies in Scotland have shown that sandeels (*Ammodytes* sp.) can play a crucial role in the life history of Great Skuas (i.e. breeding success, adult survival) with populations adversely affected by reduced sandeel abundance (Hamer *et al*., 1991). In recent years, the diet of Great Skua populations feeding in the North Sea has changed to discarded white-fish, despite declines in discarding, with changes in their avian prey diet composition too, from Kittiwake to auks and Fulmar (Church *et al*., 2018). Great Skuas are known to kill other seabirds (Newson *et al*., 2008) with a seasonal increase in the numbers of birds consumed likely in response to the fledging of auks and increases in the numbers of non-breeding Storm-petrels and Manx Shearwaters (Bearhop *et al*., 2001).

As a seabird which can prey on other seabirds for food, the Great Skua is at risk of plastic pollution which is transferred to Great Skuas mainly through Fulmars (Hamer *et al*., 2016) which appear to have higher loads of plastic particles than other sympatric species. The introduction of the Landing Obligation (LO) for all EU fishing fleets, is to eliminate the discarding of quota fish species in 2019, albeit non-quota species can still be discarded. The LO may affect those Great Skuas that do breed along our west and northwest coasts although more likely their dietary flexibility and the availability of alternative prey to discards (Church *et al*., 2018) will determine their continued success and range expansion. In light of these regulatory changes in commercial fishing, it is possible the Irish Great Skua population may target other seabirds as prey which could have impacts on other seabird populations (Votier *et al*., 2004, Calderwood & Reid, 2019).

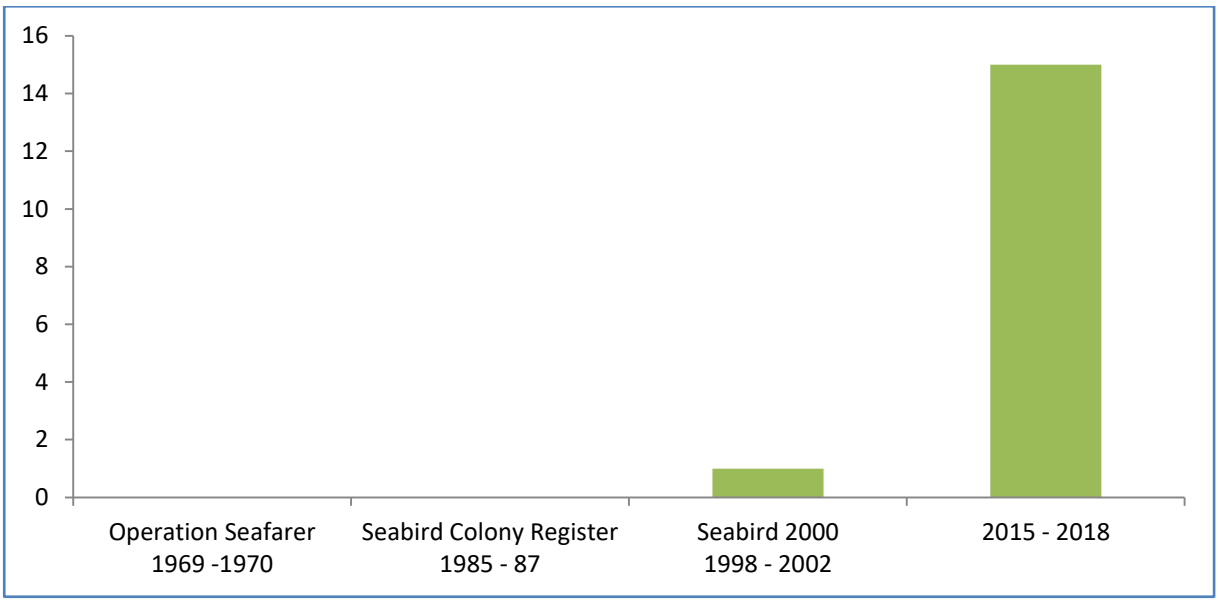

Figure 17 National breeding population estimates for Great Skua (AOT) from Operation Seafarer to the current survey

Figure 18 Great Skua. Photograph Alan Lauder

3.6 Mediterranean Gull	*Larus melanocephalus*	Sléibhín Meánmhuirí
Breeding population	**Population estimate (2015 – 2018):**	54 pairs
	Short-term trend (1998/2002 - 2015/2018):	+ 1700%
	Long-term trend (1985/87 - 2015/2018):	N/A
	Proportion within the SPA Network	98%
Breeding distribution	**Current (2015 – 2018):**	Four 10 km grid squares
	Short-term trend (1998/2002 - 2015/2018):	+ 300%
	Long-term trend (1988/91 – 2015/2018):	N/A

Data confidence: This rare breeding seabird species is another relatively recent addition to Ireland and they breed at just a few locations. In terms of abundance Ireland's most important colony is regularly monitored and therefore our estimate and abundance trend is **high.** It is possible that single or small colonies have gone undetected and therefore our confidence in the distribution and associated trends is considered to be of a **medium** level.

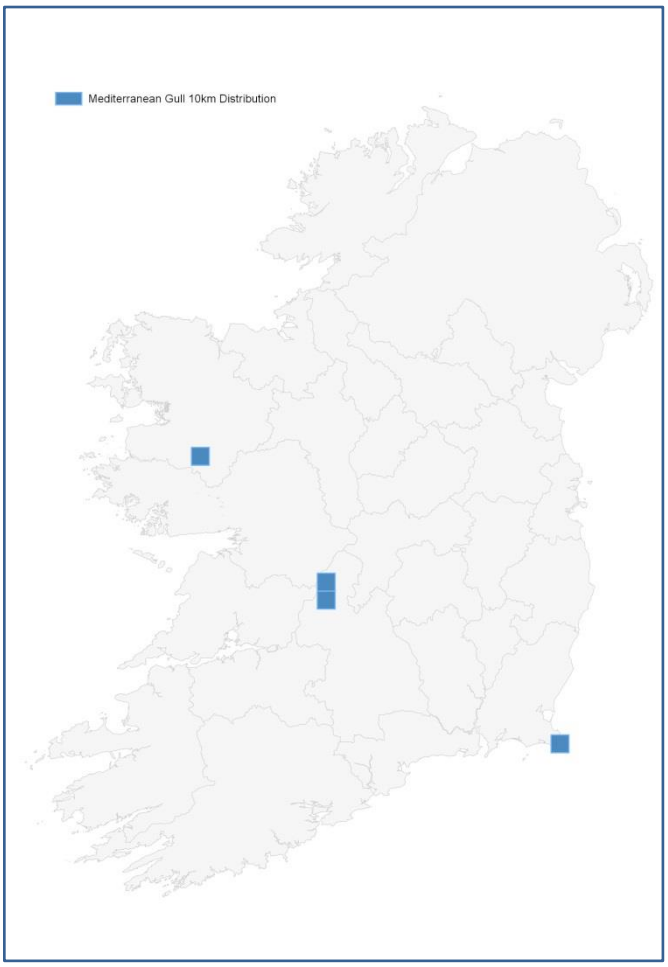

Figure 19 Mediterranean Gull Breeding Distribution 2015 - 2018

The Mediterranean Gull is a relative newcomer to the breeding seabird family in Ireland, and is probably most familiar as a passage migrant and winter visitor but yet, numbers of pairs breeding in Ireland have increased following similar expansion in southern England in the latter part of the 20th century. The total number of the breeding Mediterranean Gull population across Britain and Ireland was estimated to be 113 pairs during the Seabird 2000 census with just three breeding pairs recorded in Co. Wexford (Mitchell *et al*., 2004).

This most recent programme of seabird monitoring in Ireland (2014/2018) has recorded Mediterranean Gull breeding at a total of four sites around our coast (**Figure 19**), with records of individuals seen on suitable breeding habitat at a further three sites. Methods used included land-based counts and foot counts of occupied nests. The count unit for the Mediterranean Gull is the Apparently Occupied Nest (AON) (as per Mitchell *et al.*, 2004). For each county, AON tallies are presented (see Table 7). All AON records were collected during the ideal monitoring period (15 May – 30 June) as per Walsh *et al*. (1995).

Table 7 Mediterranean Gull breeding across Ireland during the period 2015 – 2018

County	Confirmed breeding	Possible/probable breeding
Mayo	1	
Galway		1
Tipperary	2	
Kerry		1
Wexford	51Ψ	1
National Total	54	

Ψ Average count (2015-2018)

This species often locates its nests within larger colonies of other breeding seabirds. While totals presented are for the number of nests found, there were sites where adult birds were recorded at suitable sites during the breeding season but no proof of breeding was obtained – these are also listed in Table **7**.

Figure 20 Inish Island at Lady's Island Lake – home to Ireland's largest Mediterranean Gull colony. Photograph Alyn Walsh

The current estimate of 54 pairs shows a substantial increase in this rare breeding bird (Figure 21) since Seabird 2000 when just three pairs were recorded (Mitchell *et al.*, 2004). Almost 95% of the total number of pairs breed at Lady's Island, Co Wexford. This is also an important tern and Black-headed Gull colony which is wardened and all breeding seabird species are regularly monitored there (see Daly *et al.*, 2018).

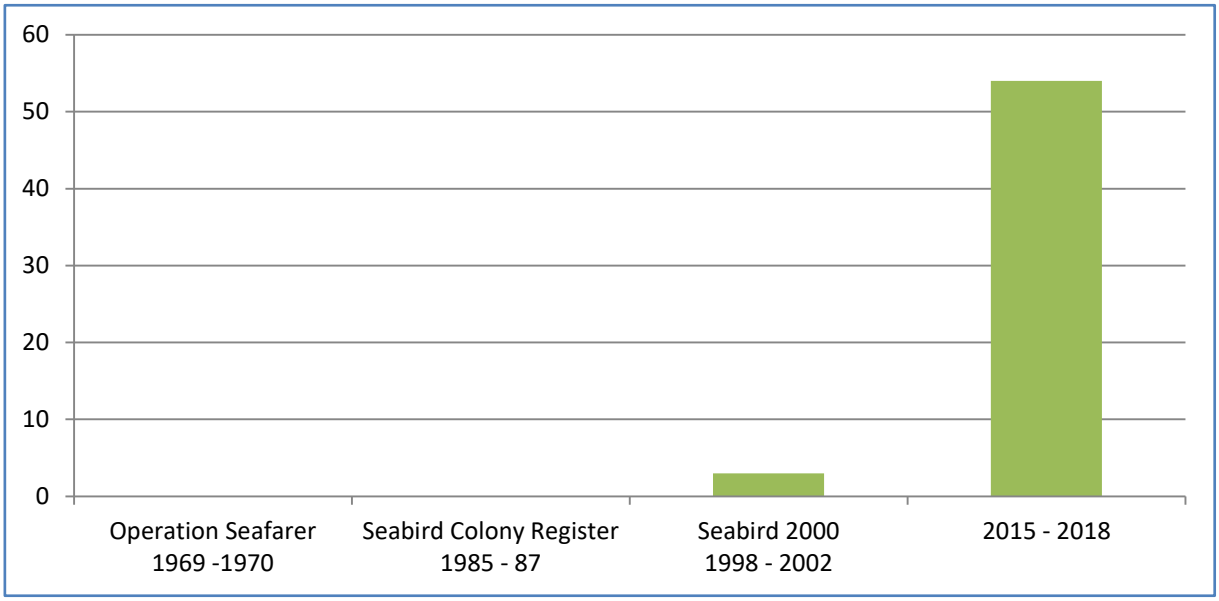

Figure 21 National breeding population estimates for Mediterranean Gull (AONs) from Operation Seafarer to the current survey

Figure 22 Mediterranean Gull adult and juvenile. Photograph Tony Murray

3.7 Black-headed Gull *Larus ridibundus* Sléibhín

Breeding population	**Population estimate (2016 – 2018):**	7,810 pairs
	Short-term trend (1998/2002 - 2015/2018):	+ 102%
	Long-term trend (1985/87 - 2015/2018):	- 11%
	Proportion within the SPA Network	88%
Breeding distribution	**Current (2016 – 2018):**	38 10 km grid squares
	Short-term trend (1998/2002 - 2015/2018):	+ 100%
	Long-term trend (1988/91 – 2015/2018):	- 67%

Data confidence: Approximately 70% of counts that inform the contemporary national population estimate are within the recommended survey window (i.e. mid - May to early June). The survey period extends over the period 2015 to 2018, with the majority of sites covered in 2016 and some sites were counted in more than one year (e.g. records for Lady's Island Lake, Lough Mask). Our confidence in our contemporary population estimate is **medium**. Historical population estimates (both short- and long-term) for this gull species, which has a sizable inland breeding component were constrained relative to the scope and overall targeted survey effort and therefore we have less confidence in these calculated trends and therefore trend figures should be treated with caution.

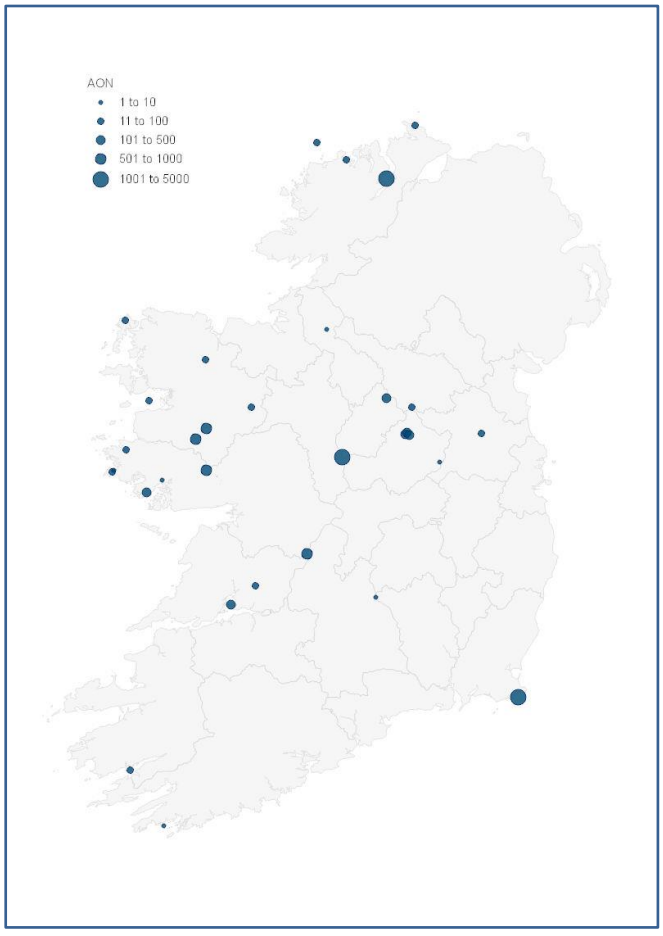

Figure 23 Breeding Black-headed Gull abundance and distribution for the period 2016 – 2018

Of all of Ireland's regularly breeding gull species, the Black-headed Gull has the most inland bias with regard to its breeding distribution (Balmer *et al.* 2013). Hutchinson (1989) describes the nesting preferences of Black-headed Gull in Ireland to include islands on the coast, along the edges of brackish lagoons, around boggy lakes, on marshes and on the midland bogs. Earlier Kennedy *et al*. (1954) noted that this increasing species nested in 'vast colonies' on some of the bogs and marshes of the midlands and west of the River Shannon.

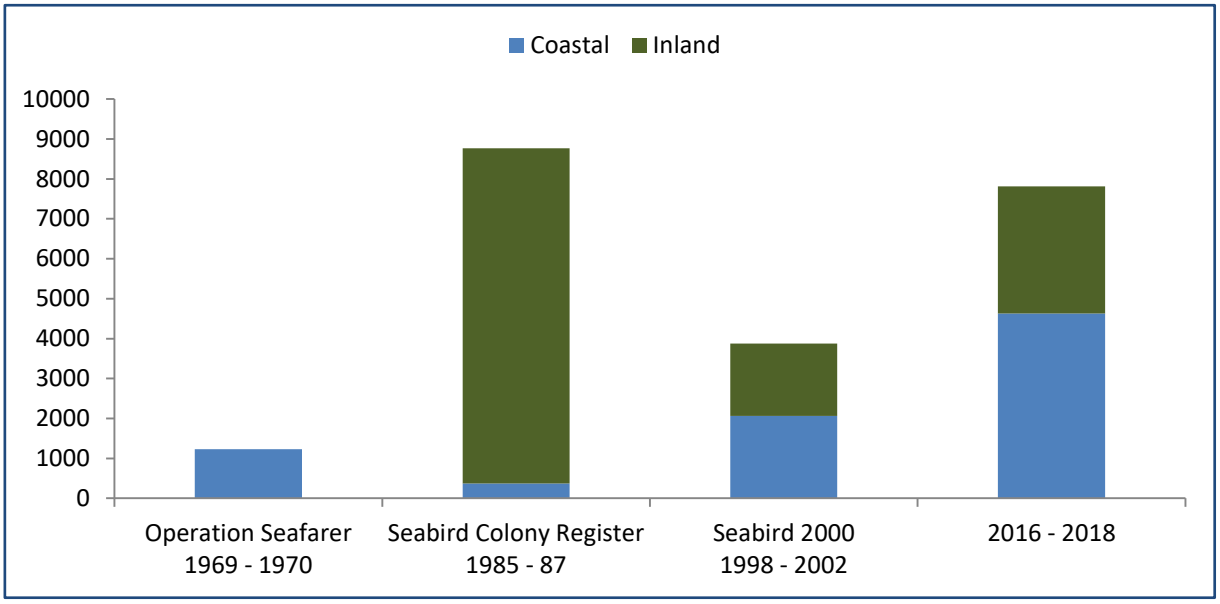

Figure 24 Recorded breeding abundances for Black-headed Gull (AONs) from Operation Seafarer to the current survey.

Figure 23, which sets out the distribution and recorded abundances of the Black-headed Gull derived from the current survey work, indicates that the relatively large colonies of the bogs and marshes of Ireland are no longer a feature in this species' biogeography with the main known inland strongholds being a small number of islands on some of the large loughs of the midlands and west. In terms of abundance, the two coastal lakes of Inch in Donegal and Lady's Island Lake in Wexford account for over half of the national contemporary population estimate. This consolidation is reflected in the estimated long-term range contraction based on the Gibbons *et al*. (1993)'s breeding bird atlas which may have overestimated the true breeding distribution.

Table 8 Black-headed Gull population estimates for a selection of sites (Sources include: Reynolds (1990); Hunt and Heffernan (2007); Mitchell *et al*. (2004) and McGreal (2011))

Site	1977-78	1985-88	2000 - 2002	2007 - 2010	2016 - 2018	% Change (since Seabird 2000)
Lough Carra	1670	1668	100	854	656	+ 556%
Lady's Island Lake	-	250	949	-	2526	+ 166%
Inch Lough	-	-	800	-	1450	+ 81%
Lough Mask	425	750	329	1041	535	+ 63%
Lough Corrib	2330	4342	425	431	669	+ 57%
Lough Derg	-	2176	-	-	400	

The long-term breeding population trend estimates equate to a modest decline (10.9%). As the SCR population estimate may well have been constrained by survey effort at inland sites, compounded by the fact that this is a relatively well dispersed species, the calculated decline may very well be an underestimate. Table 8 sets out a number of inland breeding sites (with the exception of Lady's Island Lake and Inch Lough): all of which are showing significant declines – an overall trend for these sites equates to a near 75% with Loughs Derg and Corrib showing the most stark declines at over 80%.

Conversely, the calculated short-term population trend, which essentially equates to an estimated doubling of the population over an approximate 15 year period is likely to be somewhat of an overestimate of the true increase. The strong increases in the populations of the two top sites (Lady's Island Lake and Inch Lough) and the addition of two possibly new colonies of significant size (i.e. Rat Island and Lough Derravaragh) all contribute to the overall national population increase but the short-term increase in breeding distribution of 100% underpins the argument that many of the smaller, but potential numerous, dispersed colonies may not have been picked up as part of Seabird 2000 and therefore this estimate of range increase should be treated with caution and as a maximum estimate.

Outside of the sites with concerted conservation management (i.e. Lady's Island Lady and Inch Lough) it is speculated that predation pressure is a likely cause of some of the recorded long-term declines however further research and monitoring of this species at its breeding sites would be needed to bring more certainty to identify and quantify the current pressures with a view to promoting appropriate conservation measures at key sites.

Figure 25 Black-headed Gull. Photograph Alan Lauder

3.8 Common Gull	*Larus canus*	Faoileán bán
Breeding population	**Population estimate (2015 – 2018):**	1,948 pairs
	Short-term trend (1998/2002 - 2015/2018):	+ 82%
	Long-term trend (1969/78 - 2015/2018):	- 25%
	Proportion within the SPA Network	61%
Breeding distribution	**Current (2015 – 2018):**	90 10 km grid squares
	Short-term trend (1998/2002 - 2015/2018):	+ 70%
	Long-term trend (1988/91 – 2015/2018):	+ 23%

Data confidence: Over 80% of the counts that led to the national population estimate were conducted during the survey window of mid-May to mid-June. The majority of these counts were undertaken during the 2016 breeding season and several of the inland Loughs (e.g. Lough Mask) were covered on several occasions and therefore mean values were used for these sites. Although this is both a coastal and inland breeding bird our confidence in our population estimate and range is at least a **medium**. Our estimates of change over both the short- and long - terms are less certain.

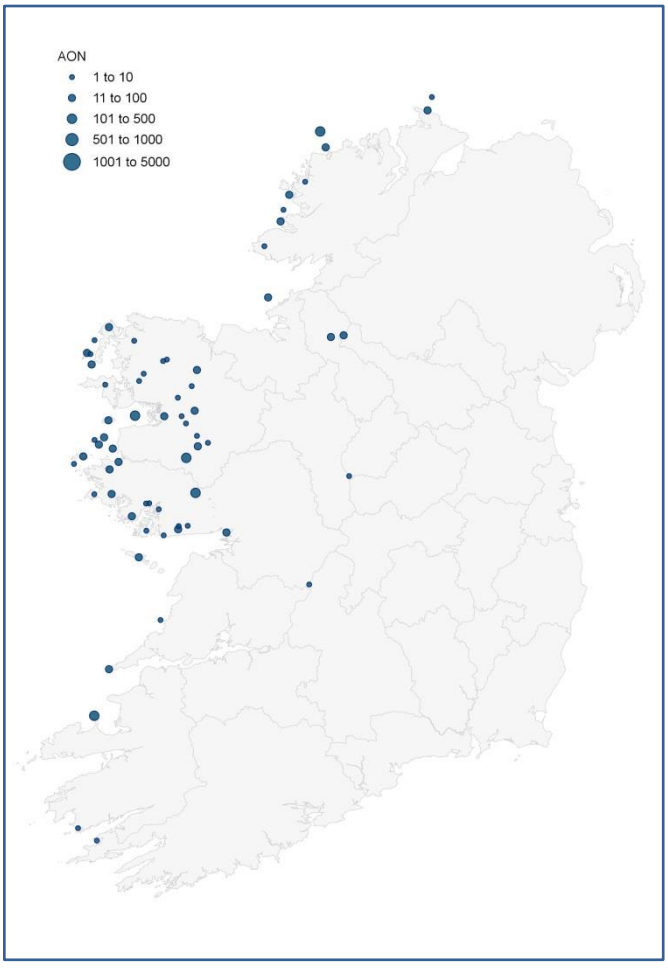

Figure 26 Breeding Common Gull abundance and distribution for the period 2015 – 2018

Common Gull breeds on islands of inland lakes and along the Atlantic coasts of Ireland with the western counties of Galway, Mayo, Sligo and Donegal considered to be this species' strongholds (Hutchinson 1989, Balmer 2013). The most recent survey findings reinforce this overview of the Common Gull's breeding distribution across Ireland (Figure 26).

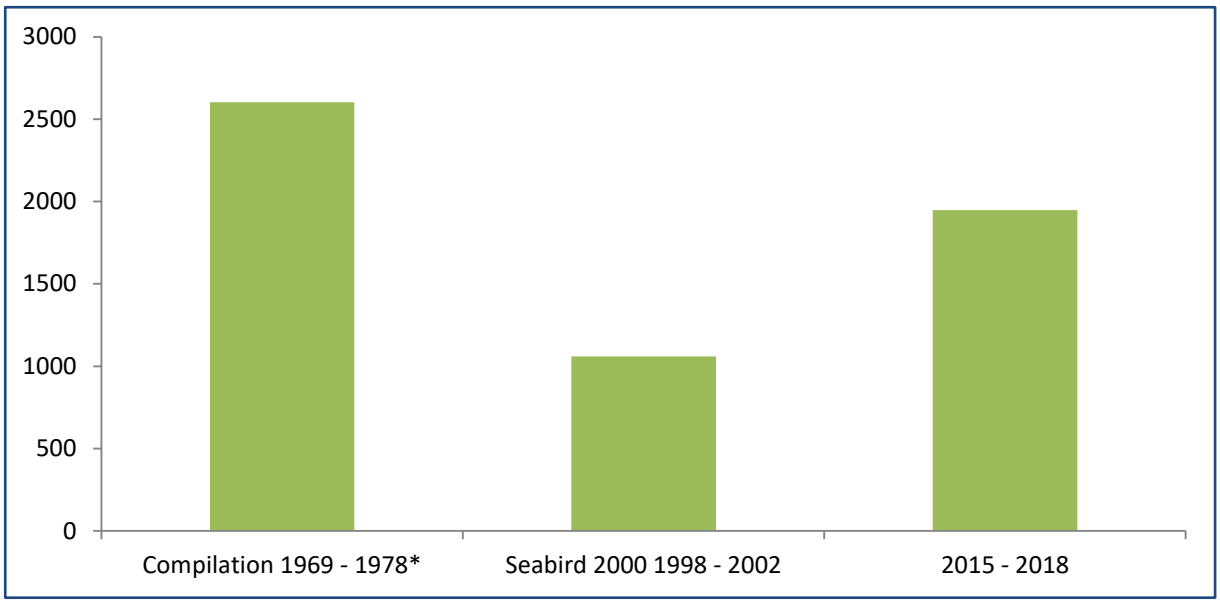

Figure 27 National population estimates for breeding Common Gull over the last 40 - 50 years (*after Whilde, 1984).

The contemporary national population estimate represents a significant increase from the Seabird 2000 estimate (Figure 27). This estimated population growth is also coupled with the strong increase in the estimated breeding range trend with the latter most likely an overestimate. Separating out the factors (i.e. genuine increase or relatively more records through significantly increased survey effort) can be difficult but counts from some of the large loughs in Galway and Mayo and the more dispersed loughs of the Connemara region show a wide range of population change since Seabird 2000 indicating that recorded national increase is not driven by these site based population changes (Table 9). Indeed the overall change for these selected sites, which accounted for the majority of the inland sites represents a 10% decline since 2000.

Table 9 Common Gull population estimates for a selection of sites

Site	Seabird 2000	2006[#]-07[&]	2010*	This survey	Change since Seabird 2000
Lough Mask	124	271	230	191	+ 54%
Lough Conn	40		15	43	+ 8%
Lough Corrib	176	204	274	155	- 12%
Connemara Lakes	130		93	100	- 23%
Lough Carra	65		55	34	- 47%
Lough Carrowmore	59		55	10	- 83%

[#] Hunt and Heffernan (2006), [&] Hunt and Heffernan (2007) and *McGreal (2011)

Over 60% of the contemporary population estimate comes from inland sites which is notably larger than the corresponding value of just 45% from Seabird 2000. The percentage increase from Seabird 2000 for both coastal and inland sites equate to circa 105% and 57% respectively. Therefore the recent survey effort of McGreal (2011) and others at our inland loughs and particularly the increased survey effort at coastal sites (in addition to the large traditional seabird colonies) is allowing for the more accurate estimation of the national population of this and other dispersed gull species.

3.9 Lesser Black-backed Gull *Larus fuscus* Droimneach beag

Breeding population	**Population estimate (2015 – 2018):**	7,112 pairs
	Short-term trend (1998/2002 - 2015/2018):	+ 148%
	Long-term trend (1985/87 - 2015/2018):	+ 145%
	Proportion within the SPA Network	64%
Breeding distribution	**Current (2015 – 2018):**	116 10 km grid squares
	Short-term trend (1998/2002 - 2015/2018):	+ 132%
	Long-term trend (1988/91 – 2015/2018):	+ 87%

Data confidence: The majority of the records relate to 2016 survey work and for some sites with annual coverage, a mean value was used in the analyses. Our confidence in the estimated abundance and distribution of this relatively dispersed seabird species breeding around the coasts and on islands on inland land lakes is good by comparison to previous national surveys. However as the contemporary survey effort has not yet focussed on the roof-nesting portion of the national population, our confidence in the assessment is best described as **medium**. Estimating population trends through time is constrained by previous surveys primarily focussing on coastal sites only (e.g. SCR) and by survey effort (i.e. Seabird 2000).

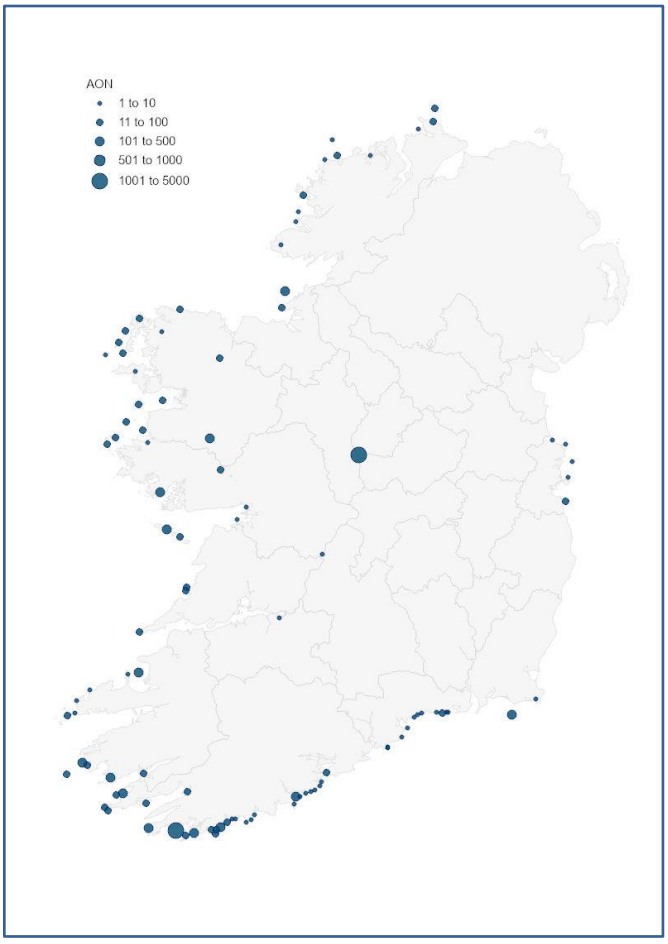

Figure 28 Breeding Lesser Black-backed Gull abundance and distribution for the period 2015 – 2018

In Ireland the Lesser Black-backed Gull population breeds along coastal counties and inland on islands at inland lakes (Balmer *et al*., 2013). Outside the breeding season, Lesser Black-backed Gulls range more widely across inland, coastal areas, including urban areas and our offshore waters. Breeding records complied for the period 2015 - 2018 clearly show the coastal bias with regard to breeding sites with approximately 20% of the recorded national population estimate nesting on islands of some inland loughs (Figure 28).

Both Operation Seafarer and the SCR restricted the survey of these gull species to coastal areas and therefore tracing the country-wide changes in the breeding population through time is difficult. However, stripping out the inland breeding population records of Lesser Black-backed Gull from this survey and from Seabird 2000 gives a sense of how estimates of its coastal breeding population have changed over the last 50 years or so (Figure 29). The long-term national trend estimate was based on comparison with partial data i.e. the SCR population estimate which was supplemented by an inland count at one site by Whilde (1983) and so should be treated with caution.

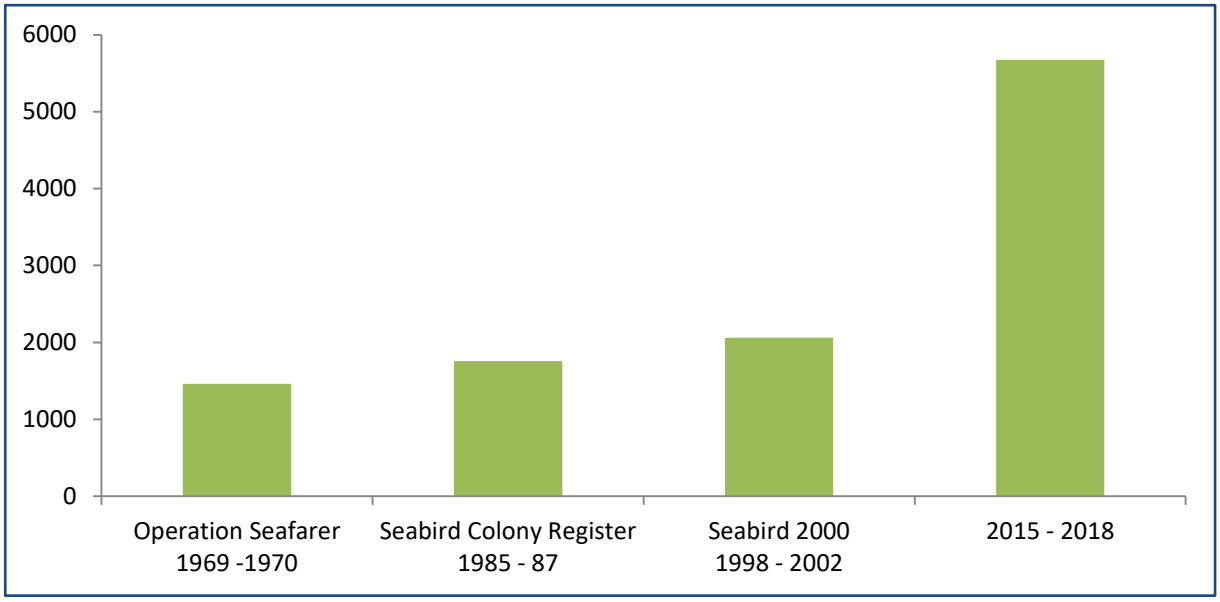

Figure 29 National coastal breeding population estimates for Lesser Black-backed Gull from Operation Seafarer to the current survey (please note the constraints stated above to these estimates).

The short- and long-term population trends, at a coastal and national level (including inland colonies), indicate an expanding population. However closer examination of the available data indicates that this recorded expansion is a complex one with variable trends at some of the traditional sites that have received repeated survey effort over the decade. Table 10 sets out some of these sites and it can be seen that one of the most important inland colonies (Inishgoosk of Lough Derg Co. Donegal) as identified in Seabird 2000, no longer holds a breeding Lesser Black-backed Gull population. This extirpation coincided with strong recorded growth at inland sites including Loughs Conn and Mask and elsewhere. The contemporary Lough Corrib population estimate, at 86 pairs, results in an extremely high percentage increase when compared to the low Seabird 2000 estimate but this Lough once supported a minimum of 1,153 breeding pairs in the 1980s. A colony at Lough Ree, not recorded as part of Seabird 2000, was recently surveyed and with a population estimate > 1,000 pairs is now considered to be the second largest colony in the country.

Along the coast, the selection of marine islands in Table 10 show further variations with regard to estimated site population trends: a strong increase at Puffin Island; a moderate increase recorded at Lambay in 2015; stasis at Scariff Island; and a decline on Cape Clear Island. As indicated by the calculated increases (both long- and short-term) in the breeding range, a number of sites that were previously unknown as Lesser Black-backed breeding sites have been recorded during this survey. One

site, Roaringwater Bay Outer, was particularly notable in that it supported the largest recorded breeding population during the current survey work with 1,288 AONs estimated in 2016.

Table 10 Change in the recorded breeding Lesser Black-backed Gull populations at a selection of Irish colonies with data from several survey years

Site	*SCR* 1985 - 1988	*Seabird 2000* 1998 - 2002	2015 - 2018	% Change (since *Seabird 2000*)
Lough Corrib	1,153*	6	86	+1333%
Lough Conn – Gull Island		10	35	+ 250%
Inishkeas		40	93	+133%
Puffin Island	55	139	291	+109%
Great Saltee	80	144	251	+74%
Lough Mask		286	422	+48%
Lambay Island	150	309	345	+12%
Scariff Island		97	97	0
Cape Clear Island	103	204	26	- 87%
Inishgoosk – L Derg, Donegal		500	0	- 100%

*Minimum estimate recorded in 1983 as per Whilde (1983)

In Seabird 2000 approximately 10% of the Lesser Black-backed Gull population sited their nests on roofs of buildings across Britain and Ireland; on an All-Ireland basis the proportion was 1.7%; and for Ireland only, 21 roof nesting pairs were recorded in Dublin which equates to only 0.7% of the population (Mitchell *et al* 2004).

Providing accurate estimates of roof nesting gulls is challenging. Thus far, the survey priority for Lesser Black-backed Gull and Herring Gull was to derive a robust picture of the populations at traditional breeding sites. However, Fingal County Council commissioned Roughan O'Donovan Ltd. to survey roof nesting gulls at three towns in North County Dublin in 2018 with three Lesser Black-backed Gull nests located in the Balbriggan area (ROD, 2018). The national population estimate, which incorporates these records, needs to be viewed as a minimum estimate, and will be added to in due course, when further survey effort is directed towards more urban areas.

Figure 30 Lesser Black-backed Gull. Photograph Brian Burke

3.10 Herring Gull	*Larus argentatus*	Faoileán scadán
Breeding population	**Population estimate (2015 – 2018):**	10,333 pairs
	Short-term trend (1998/2002 - 2015/2018):	+ 87%
	Long-term trend (1985/87 - 2015/2018):	- 33%
	Proportion within the SPA Network	58%
Breeding distribution	**Current (2015 – 2018):**	147 10 km grid squares
	Short-term trend (1998/2002 - 2015/2018):	+ 34%
	Long-term trend (1988/91 – 2015/2018):	+ 8%

Data confidence: The majority of the records from this species are derived from surveys undertaken in 2016 and for some sites with annual coverage, a mean value was used in the analyses. Our confidence in the estimated abundance and distribution of this relatively dispersed seabird species breeding around of coasts and on islands on inland land lakes is very favourable by comparison to previous national surveys. However as the current survey effort has not yet focussed on the roof-nesting portion of the national population, our confidence in the assessment is best described as **medium**. Estimating population trends are constrained by previous surveys primarily focussing on only coastal sites (e.g. SCR) and by survey effort.

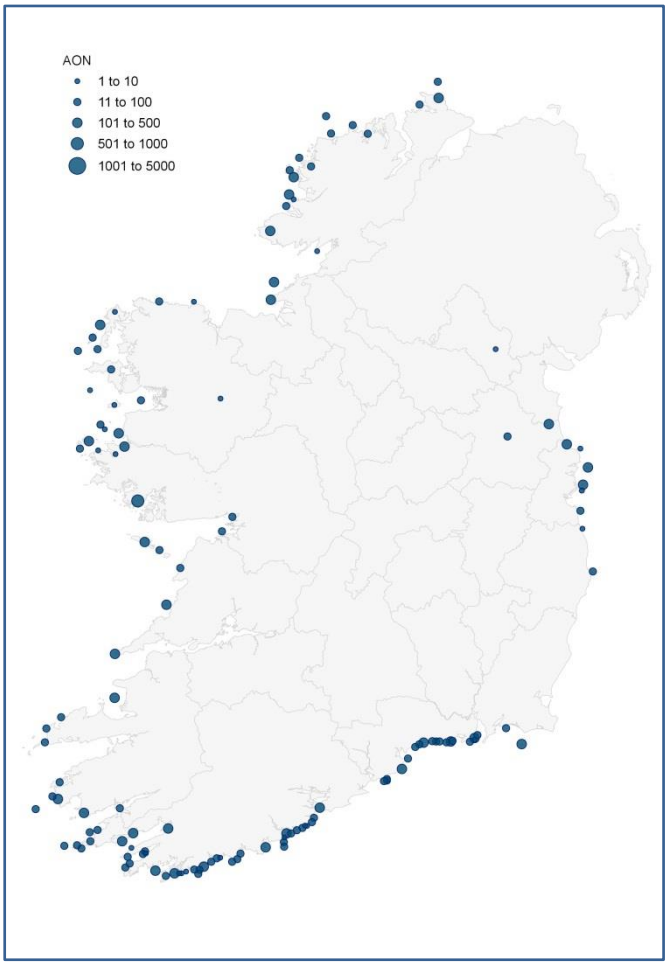

Figure 31 Breeding Herring Gull abundance and distribution for the period 2015 – 2018

The 2007 – 11 Bird Atlas depicts the Irish breeding Herring Gull population as largely confined to coastal sites with a limited number of more inland locations recorded (Balmer *et al*., 2013). Outside the breeding season, Herring Gull range more widely across inland, coastal areas, including urban areas and in our offshore waters. Breeding records compiled for the period 2015 - 2018 clearly show this coastal bias with regard to breeding sites, with almost 95% of the recorded national population estimated to nest along coastal areas (Figure 31).

Only those breeding sites at coastal areas were surveyed for Herring Gull as part of both Operation Seafarer and the SCR. Therefore tracking the change in breeding numbers compared to more contemporary estimates (which include inland sites) comes with caveats. However, stripping out the inland breeding population records of Herring Gull from this survey and from Seabird 2000 gives a sense of how estimates of its coastal breeding population have changed over the last 50 years or so (Figure 29). The long-term national trend estimate set out above was based on partial data i.e. the SCR population estimate which was supplemented by an inland count from one site (i.e. Lough Corrib) by Whilde (1983) and so should be treated with caution. The historical trend (i.e. comparing the contemporary population estimate with that from Operation Seafarer) indicates that the acute population decline that occurred during the 1970s – 1990s has now halted with the population in recovery.

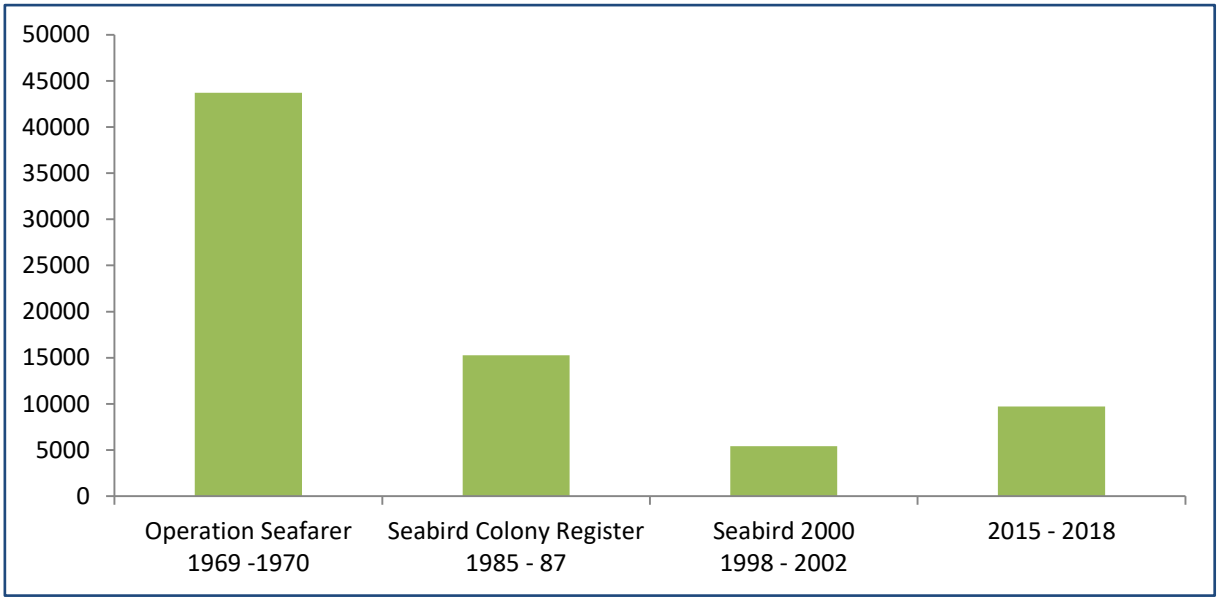

Figure 32 National coastal breeding population estimates for Herring Gull from Operation Seafarer to the current survey (please note the constraints stated above to these estimates).

The above scenario of long-term term decline and short-term increase in the recorded population at the national level merely summarises more complex variation at the site and regional level. Fluctuations at various sites and the recording of significant populations at hitherto unknown Herring Gull colonies are hidden within the national trend. Table 11, which presents site population abundances as recorded over the SCR, Seabird 2000 and the current survey broadly reflects the national pattern with strong recent increases estimated. However, the Lambay Island breeding population is only half of what is was in the 1980s. Of the new sites found in this survey, a notable one is Roaringwater Bay Outer and others in the southwest. Whether these are newly established colonies or previously undetected ones it is not known for certain and so should be borne in mind when interpreting recorded changes to both the national population estimate and changes in the national breeding distribution. The short-term breeding range increase should be treated as an upper or maximum estimate of change.

Table 11 Change in the recorded breeding Herring Gull populations at a selection of Irish colonies with data from several survey years

Site	SCR 1985 – 1988	Seabird 2000 1998 – 2002	2015 – 2018	% Change (since Seabird 2000)
Great Saltee	825	43	115	+ 167%
Inishmurray*	200	111	243	+ 119%
Glencolumbkille Peninsula	339	236	389	+ 65%
Ireland's Eye	540	246	318	+ 29%
Cape Clear Island	176	46	29	- 37%
Lambay Island	5500	1806	906	- 50%

*The SCR figure is based on a count of 400 individuals and the contemporary figure is based on a 2014 count

Based on the Seabird 2000 species account, Mitchell *et al* (2004) noted that the establishment of Herring Gull colonies on artificial surfaces (mainly roof tops) has extended the overall breeding distribution of the species but that this habitat was very localised in Ireland and in parts of Scotland. The total proportion of the Herring Gull breeding population in Seabird 2000 that nested on such structures was 13.5%. At an all-Ireland level this proportion was estimated to be 3.5% and in Ireland this value was 3.8%, of which the north County Dublin towns of Howth, Skerries and Balbriggan held the recorded colonies. Using the recently collected data from these three towns (see ROD 2018), the combined roof nesting population increased by approximately 273% since Seabird 2000. Combing the north Dublin data with data from other roof top colonies that were recorded during the survey period 2015 – 2018 (i.e. Navan, Drogheda and Dunmore East) the total proportion of the Irish population that nest on artificial structures is estimated to be 6.2%. Until further urban gull survey effort in the coming years is undertaken, this calculated proportion must be considered an underestimate of the true proportion of urban-nesting Herring Gulls.

Figure 33 Herring Gull. Photograph Brian Burke

3.11 Great Black-backed Gull *Larus marinus* Droimneach mór

Breeding population	**Population estimate (2015 – 2018):**	3,081pairs
	Short-term trend (1998/2002 - 2015/2018):	+ 38%
	Long-term trend (1985/87 - 2015/2018):	+ 6%
	Proportion within the SPA Network	78%
Breeding distribution	**Current (2015 – 2018):**	135 10 km grid squares
	Short-term trend (1998/2002 - 2015/2018):	+ 59%
	Long-term trend (1988/91 – 2015/2018):	+ 14%

Data confidence: The majority of the records from this species relate to 2016 survey work and for some sites with annual coverage, a mean value was estimated and surveys of two sites (totalling approximately 7% of the contemporary estimate were brought forward from 2010 and 2011 surveys). Over 70% of the contemporary counts were conducted in the mid-May to mid-June period. Our confidence in the estimated abundance and distribution of this relatively dispersed breeding seabird species is **medium**. Our estimate of change from the historical surveys for this primarily coastal breeding species is also **medium**.

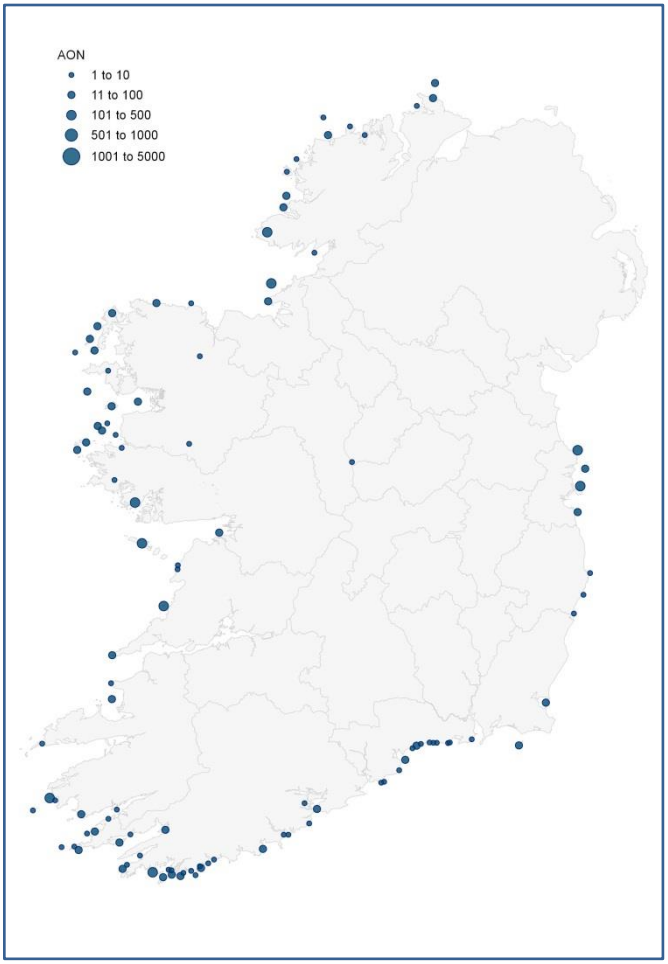

Figure 34 Breeding Great Black-backed Gull abundance and distribution for the period 2015 – 2018

The Great Black-backed Gull breeds across the North Atlantic region and is considered one of the most marine of all our nesting *Larus* gull species. In Ireland and Britain the breeding population nests almost exclusively in coastal counties (Snow & Perrins, 1998; Balmer *et al*., 2013). In Ireland the results of surveys largely undertaken during the period 2015- 2018 confirm that this remains the case (Figure 34). Based on the available records to hand and of the three large *Larus spp.* of gulls that breed in Ireland the Great Black-backed Gull is considered the least likely to breed on artificial structures in urban and peri-urban areas.

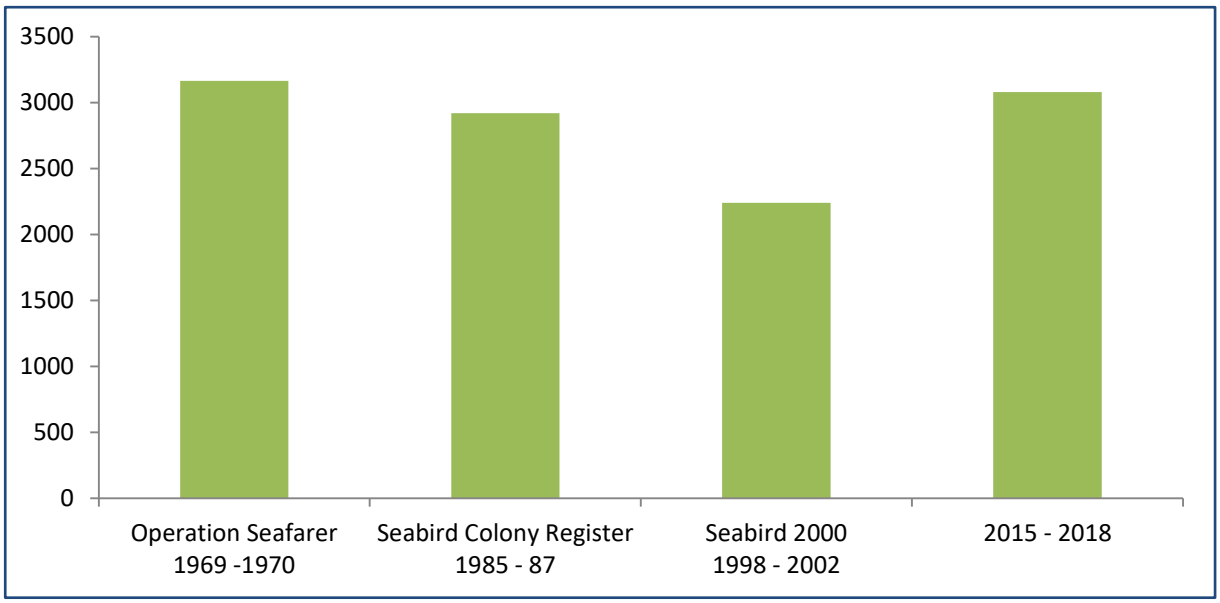

Figure 35 National population estimates for Great Black-backed Gull from Operation Seafarer to the current survey.

The contemporary population estimate, when compared to previous estimates (Figure 35) equates only to a marginal increase since the mid-1980s. The calculated short-term population increase and associated breeding range increase is large but is likely to be explained, in part at least, by the increased recent survey effort compared to Seabird 2000. Table 12 sets out the population estimates of a selection of sites that were covered at least twice during the large survey initiatives since the 1980s.

Table 12 Change in the recorded breeding Great Black-backed Gull populations at a selection of Irish colonies with data from several survey years

Site	*SCR* 1985 - 1988	*Seabird 2000* 1998 - 2002	2015 - 2018	% Change (since *Seabird 2000*)
Roaninish	250	29	58	+ 100%
Inishmurray	81	117	108	- 8%
Lambay Island	145	193	99	- 49%
Duvillaun Islands	217	144	65	- 55%

It is noted that much variation has occurred at well counted sites around the country with Inishmurray broadly stable since the mid-1980s. This contrasts with the breeding Great-backed Gull populations of Lambay and the Duvillauns, both experiencing notable declines. Seabird 2000 recorded a near 90% decline from the 1980s but the population seems now to be in recovery with a 100% increase recorded since then. Other sites that were previously not noted for their Great-backed Gull breeding populations have been identified as being relatively important during the course of the contemporary survey e.g.

Glencolumbkille Peninsula with 199 AONs; Roaringwater Bay Outer with 109 AONs; Cliffs of Moher with 253 AONs; and Slyne Head to Cashla Bay where a total of 249 AONs were recorded.

The noted population change between SCR (1985 - 1988) and Seabird 2000 (1998 – 2002) was thought to be due to a redistribution of breeding birds rather than a decline *per se* with the species adapting to changing environmental conditions (see Mitchell *et al*., 2004 for further discussion).

Figure 36 Great Black-backed Gull. Photograph Brian Burke

3.12 Kittiwake	*Rissa tridactyla*	Saidhbhéar
Breeding population	**Population estimate (2015 – 2018):**	24,728 pairs
	Short-term trend (1998/2002 - 2015/2018):	- 32%
	Long-term trend (1985/87 - 2015/2018):	- 35%
	Proportion within the SPA Network	84%
Breeding distribution	**Current (2015 – 2018):**	65 10 km grid squares
	Short-term trend (1998/2002 - 2015/2018):	+ 38%
	Long-term trend (1988/91 – 2015/2018):	+ 23%

Data confidence: Approximately 90% of the total contemporary population estimate is derived from single visit surveys undertaken across Ireland in 2015. Over 80% of the counts were undertaken during the period mid-May – June with the remaining sites covered in July. We have **high** confidence in both our contemporary population and distribution estimates. The confidence in our short-term estimates of change is **medium** based on greater recent coverage and more targeted (with regard to timing of surveys) compared to Seabird 2000. The long-term estimates of change are also qualified as **medium**.

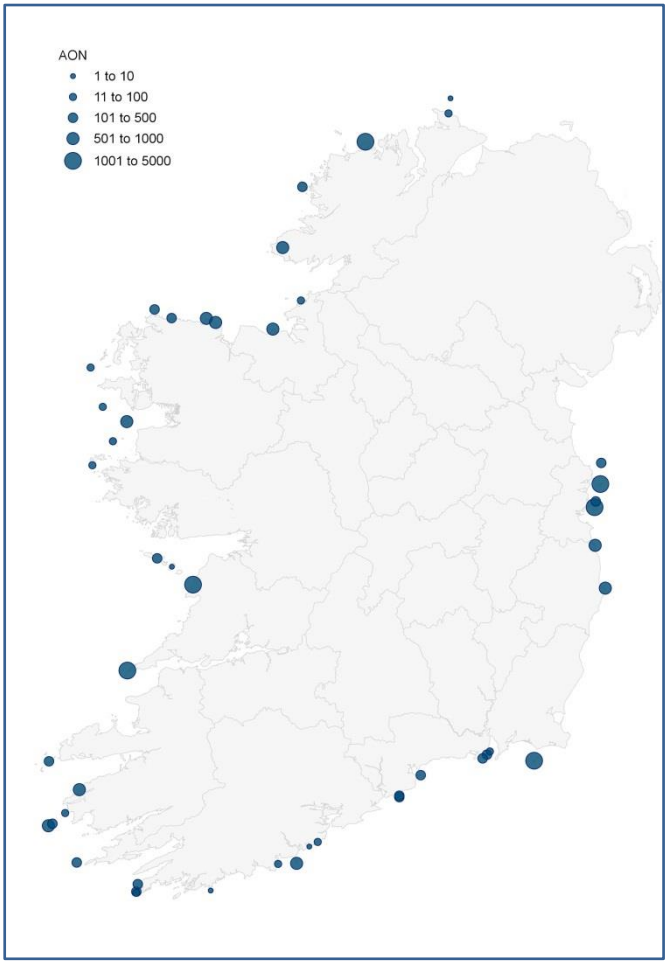

Figure 37 Breeding Kittiwake abundance and distribution for the period 2015 – 2018

The Kittiwake (also referred to as Black-legged Kittiwake) is the most numerous gull species globally and is the most oceanic in its habits (Mitchell *et al.*, 2004) preferring to nest on vertical rocky sea cliffs in colonies from a few pairs to several tens of thousands. Kittiwakes feed primarily on small pelagic shoaling fish and invertebrates, preferring live fish over discards and more specifically preferring energy-rich sandeels, Sprat (*Sprattus sprattus*) and young Herring (Shealer, 2002, Chivers *et al*., 2012a, 2012b and 2012c). Tracking studies indicate 80% of the 4.5 million Atlantic adult population winter west of the mid-Atlantic Ridge with birds from Ireland and Britain mainly remaining on the European side of the ridge (Frederiksen *et al*., 2012).

The contemporary national population estimate for Kittiwake is significantly down from that of Seabird 2000 and previous survey estimates, despite an increase in survey effort (Figure 38). The fact that the recorded increase in breeding range, picking up a number of smaller colonies not recorded last time around, lends support to the contention that the true population decline for this species could well be greater that the estimated decline.

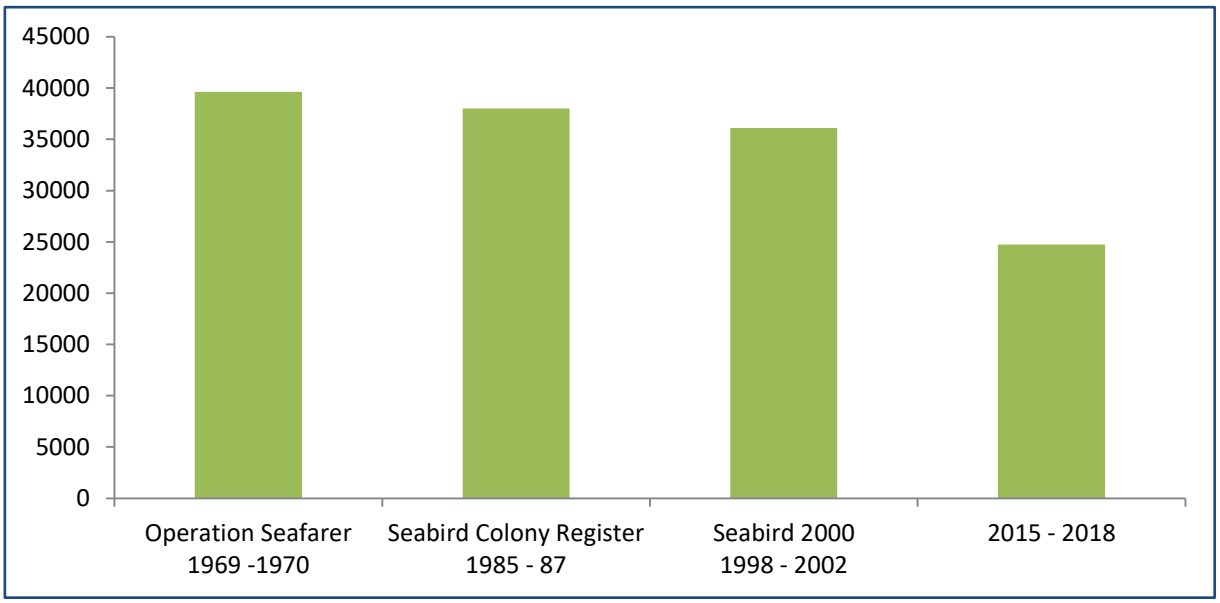

Figure 38 National breeding population estimates for Kittiwake (AONs) from Operation Seafarer to the current survey (please note the constraints noted above to these estimates).

Table 13 sets out survey results from a selection of Kittiwake colonies around Ireland. The large estimated national population decline is, in part driven, by acute (circa 50%) short-term population declines at some of our most important colonies i.e. Horn Head, Co. Donegal, Cliffs of Moher, Co. Clare and Great Saltee, Co. Wexford. A near 20% decline was recorded at Lambay Island, which owing to its relative colony size, also drives the estimated national population decline.

Data from the UK show that Kittiwake declined by 72% between 1983 and 2013 (Leonard & Wolsey, 2015). According to a recent study (Coulson, 2017), Kittiwakes need to produce a mean of 0.8 - 1.5 fledged young per pair each year to maintain breeding numbers in Britain, with a fall in breeding productivity considered the primary driver of breeding population declines. Annual Kittiwake productivity estimates at Rockabill Island fell from 1.2 chicks per pair (1999-2007) to 0.86 chicks per pair more recently (Burke *et al*., 2015). The practice of pair-trawling of spawning inshore Sprat has increased in recent years. With a herring fishery in the Irish and Celtic Seas, the existence of these fisheries operating within the foraging areas of Kittiwakes and other seabirds may have implications for the breeding success of Kittiwakes along these coasts, particularly if they target young Sprat (Cummins *et al*., 2016).

Table 13 A comparison of breeding Kittiwake numbers (AONs) between Seabird 2000 of Kittiwake at selection of Irish colonies for the period 1985 – 1988 to 2015 – 2018

Site	SCR 1985 – 1988	Seabird 2000 1998 – 2002	2015 – 2018	% Change (since Seabird 2000)
Great Skellig		694	789	+ 14%
Howth Head		1906	1773	- 7%
Doulus Head		1150	994	- 14%
Lambay Island	3005	4091	3320	- 19%
Downpatrick Head to Creevagh Head		1653	1163	- 30%
Little Skellig		250	173	- 31%
Old Head of Kinsale	2059	1188	711	- 40.2
Clare Island		1605	840	- 47.7
Cliffs of Moher	4313	7698	3981	- 48.3
Great Saltee	2908	2125	1038	- 51.2
Horn Head	4256	3854	1820	- 52.8

Note: Seabird 2000 published figures taken from Mitchell *et al.*, 2004, otherwise site totals taken from the Seabird 2000 database

Figure 39 Kittiwake. Photograph David Tierney

3.13 Sandwich Tern *Thalasseus sandvicensis* Geabhróg scothdhubh

Breeding population	**Population estimate (2016 – 2018):**	2,519 pairs
	Trend since the 1995 All-Ireland Tern survey:	+ 37%
	Trend since the 1984 All-Ireland Tern survey:	+ 97%
	Proportion within the SPA Network	86%
Breeding distribution	**Current (2016 – 2018):**	15 10 km grid squares
	Trend since the 1995 All-Ireland Tern survey:	+ 25%
	Trend since the 1984 All-Ireland Tern survey:	- 6%

Data confidence: This species' colonies are confined to six counties. They can move *en masse* between breeding sites between years. Most colonies were surveyed 2016 and where multiple surveys were undertaken at particular colonies during the period 2016 – 2018 a mean value was used in the analysis. Coverage is considered comprehensive and our confidence in the population estimate is **high**. The confidence in our trend estimates of population abundance change is considered to be at least **medium** as the baseline data is derived from targeted All-Ireland breeding tern surveys.

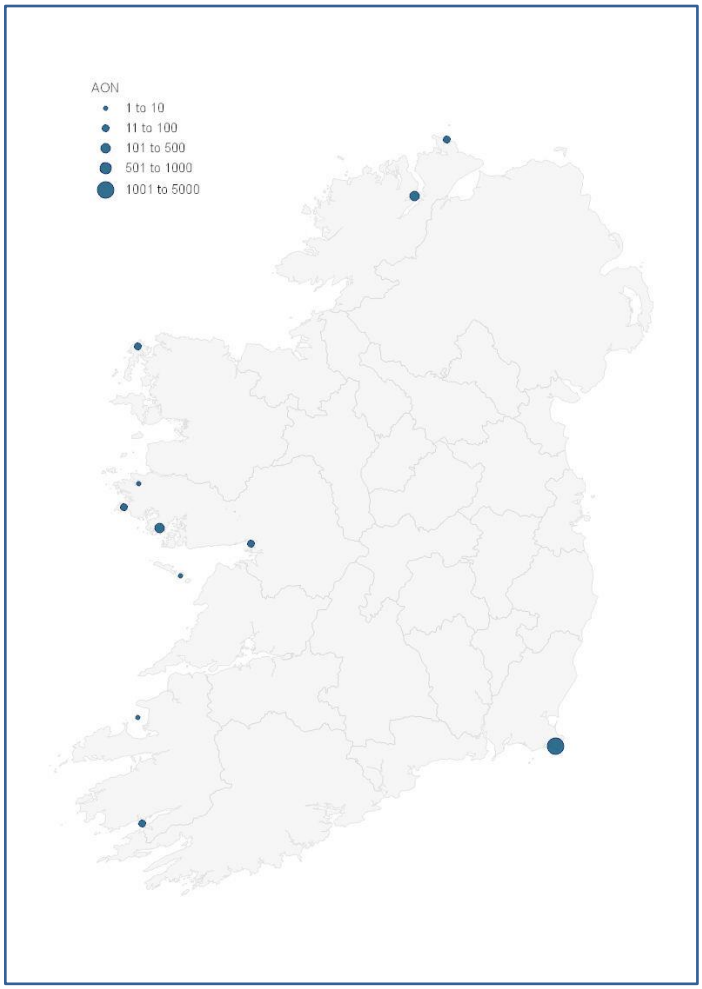

Figure 40 Breeding Sandwich Tern abundance and distribution for the period 2016 – 2018

Sandwich Tern populations can exhibit low site fidelity traits; entire colonies may move site within a year or two in response to changing environmental conditions (Lloyd *et al*., 1991, Ratcliffe *et al*., 2000). For the latest national survey, almost all colonies were surveyed in 2016, with average totals for the period 2014/2018 taken for Lady's Island which is monitored annually. Assessing long-term changes are predicated with the proviso that losses at some colonies are accompanied by gains at others and their distribution is less fixed than most terns.

Data recorded from seabird surveys during the period 2016 – 2018 show that Sandwich Tern breed or attempt to breed at a relatively small number of coastal locations along Ireland's Atlantic margin (Figure 40). Although these colonies significantly contribute to the breeding range of this species, it is primarily the colony at Lady's Island Lake in the southeast, but also the colony at Inch Lough in Lough Swilly that contribute most to the overall national population estimate. Together these two sites, where direct conservation management is on-going, account for almost 84% of the contemporary national population estimate.

Figure 41 shows the incremental increase in the national breeding population estimates from the All-Ireland Tern Survey of 1984 through the All-Ireland Tern Survey of 1995 (see Hannon 1996, Hannon *et al*., 1997) to the contemporary estimate. Comparing the contemporary population and distribution estimates with Seabird 2000 data increases of 43.0% and 114% is reckoned.

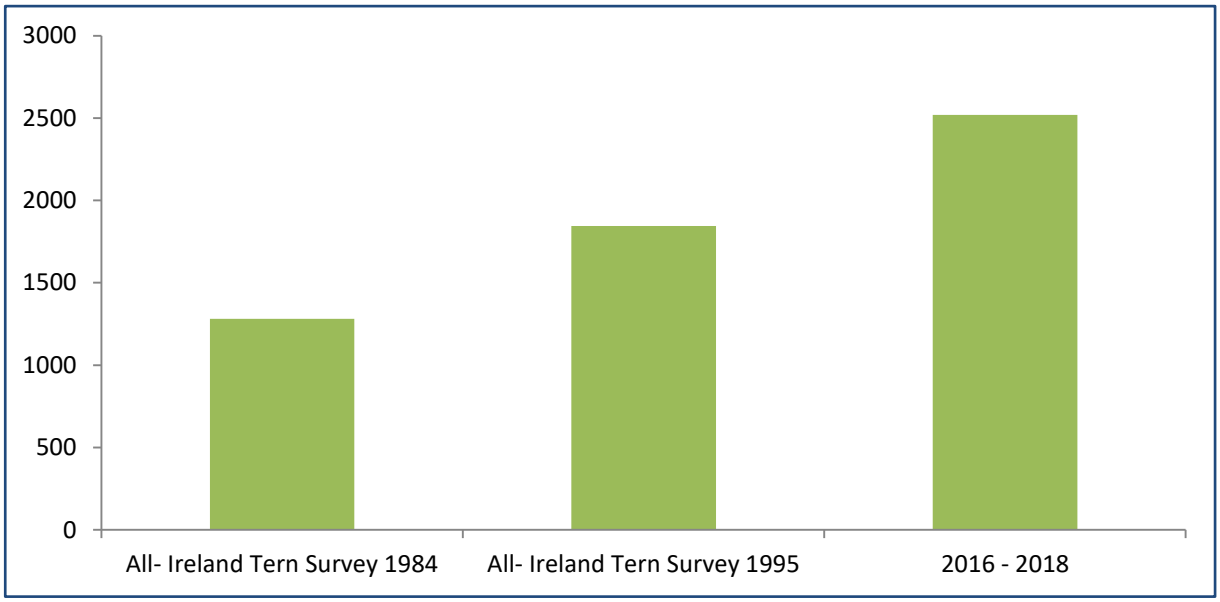

Figure 41 National breeding population estimates for Sandwich Tern from the 1984 All – Ireland Tern Survey to the current survey.

The upward national population trend is driven by strong population growth at Lady's Island Lake where records show that the population has increased from its initial colonisation in the 1980s to almost 1800 breeding pairs in 2018 (see Daly *et al*., 2018). However these statistics indicating steady growth in the overall population abundance are at odds with an estimated decrease in the distribution and number of recorded colonies since the mid-1980s. Reductions in the overall size of traditional sites have been noted e.g. Inishderry, Co Mayo, which has declined by over 86% since 1995 and extirpation of colonies noted at other sites (e.g. Cross Lough, Killadoon, Co Mayo).

Sandwich Terns require extensive, sheltered, shallow waters with a sufficiency of Clupeids (sandeels and Sprat) to support young chicks and adults and low-lying islands or remote beaches to nest on (Cramp, 1985, Shealer, 1999).

Changes in the abundance or presence of Sandwich Tern colonies may be driven, in part, by site specific conditions including recreational disturbance, excessive predation but changes may also be associated with the availability of suitable prey at key times including the breeding season. Therefore commercial overfishing of such prey would be considered a threat along with the increasing effects of climate change e.g. an increase in storms and their potential to erode low lying islands combined with sea level rise.

Figure 42 Lady's Island Lake the site of Ireland's largest Sandwich Tern breeding colony. Photograph Tony Murray

3.14 Roseate Tern	*Sterna dougallii*	Geabhróg rósach
Breeding population	**Population estimate (2016 – 2018):**	1,820 pairs
	Trend since the 1995 All-Ireland Tern survey:	+ 192%
	Trend since the 1984 All-Ireland Tern survey:	+ 579%
	Proportion within the SPA Network	100%
Breeding distribution	**Current (2016 – 2018):**	Three 10 km grid squares
	Trend since the 1995 All-Ireland Tern survey:	+ 50%
	Trend since the 1984 All-Ireland Tern survey:	- 40%

Data confidence: In Ireland this species is a regular breeder at only two colonies which are monitored annually. The vast majority or more usually all of the national population are considered to be located at these two colonies. Therefore our contemporary and historical abundance estimates are considered to be **high**.

Figure 43 Breeding Roseate Tern abundance and distribution for the period 2016 – 2018

The Roseate Tern, once common in Ireland in the first half of the nineteenth century, may have ceased to breed here at the turn of the twentieth century, subsequently recovered but the population collapsed again by the mid-1980s (Hutchinson, 1989). However now Ireland's breeding Roseate Tern population is internationally important and supports circa 80% of the French, UK and Irish population and almost 50%, with the inclusion of the Azores, of the entire European population (Acampora *et al*., 2018).

Significant conservation management is on-going at the two colonies namely Rockabill and Lady's Island Lake (Acampora *et al*., 2018, Daly *et al*., 2018). Outside of the two aforementioned colonies a single pair was recorded at the Maiden Rock (Figure 43). Figure 44 below shows a strong incremental increase in the national breeding population estimates from the All-Ireland Tern Survey of 1984 through the All-Ireland Tern Survey of 1995 (see Hannon 1996, Hannon *et al*., 1997) to the contemporary estimate. Comparing this population estimate with Seabird 2000, an increase of 148% is estimated with the range being stable (i.e. 0%). A more recent trend, based on the annual monitoring at both wardened sites, is that the national population has increased by a calculated 82% over the last 12 years (Acampora *et al*., 2018, Daly *et al*., 2018).

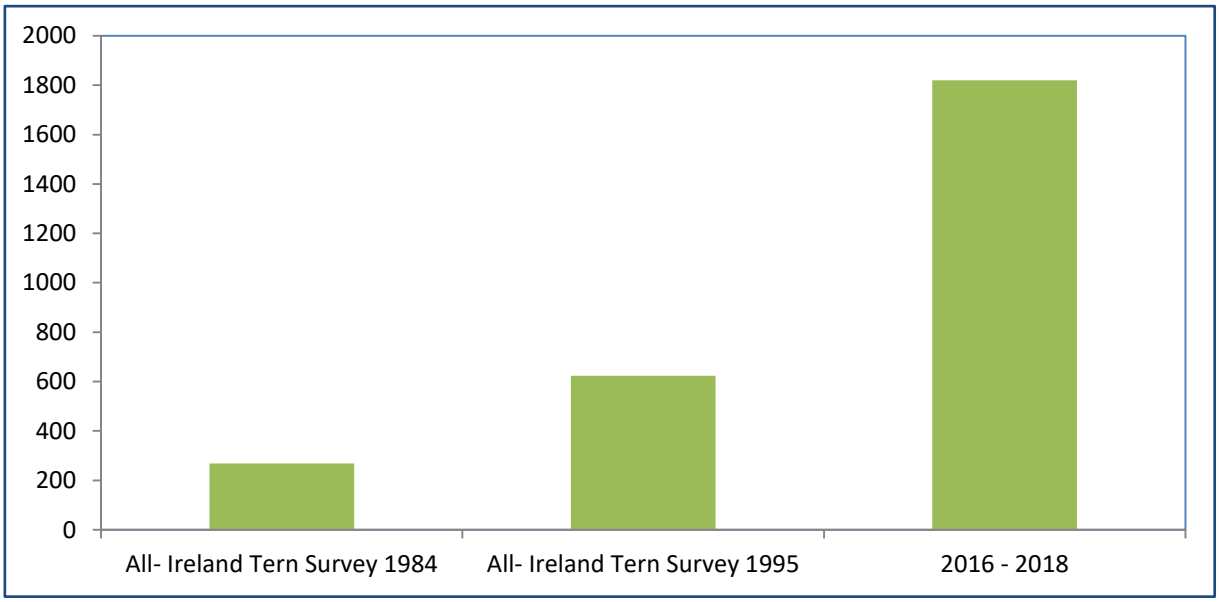

Figure 44 National breeding population estimates for Roseate Tern from the 1984 All – Ireland Tern Survey to the current survey.

Somewhat similar to the Sandwich Tern's pattern, the national Roseate Tern population's remarkable increase from the 1980s onwards coincided with a decline in its breeding range. For Roseate Tern this long-term range contraction resulted in the extirpation of those breeding sites along Ireland's Atlantic coast.

Mortality in the wintering grounds of Ghana is thought to be at least partially responsible for the observed declines (Mitchell *et al*., 2004) but the availability and quality of colony sites enhanced by direct conservation management during the breeding season is also a key factor the recent population growth (Acampora *et al*., 2018, Daly *et al*., 2018). The recorded composition of prey provisioned to young chicks (largely sandeels, Herring and Sprat) identifies the importance of Clupeids in Roseate Tern diet and breeding success (Acampora *et al*., 2018).

Figure 45 Roseate Tern. Photograph Brian Burke

3.15 Common Tern	*Sterna hirundo*	Geabhróg
Breeding population	**Population estimate (2016 – 2018):**	5,058 pairs
	Trend since the 1995 All-Ireland Tern survey:	+ 185%
	Trend since the 1984 All-Ireland Tern survey:	+ 201%
	Proportion within the SPA Network	89%
Breeding distribution	**Current (2016 – 2018):**	43 10 km grid squares
	Trend since the 1995 All-Ireland Tern survey:	- 28%
	Trend since the 1984 All-Ireland Tern survey:	- 32%

Data confidence: Our contemporary population estimate is derived from known colonies around Ireland the majority of which were surveyed in 2016. The national population is disproportionately influenced by two large colonies of which average values for the period 2016 – 2018 were used in the analysis. Notwithstanding that this species can be difficult to separate out from Arctic Tern in mixed colonies, we have at least a **medium** level of confidence in both the contemporary population and range estimates for this species. As this is a relatively widespread breeding species occurring both in coastal and inland areas, earlier survey work may not have been as comprehensive which should be borne in mind when comparing both short- and long-term trends.

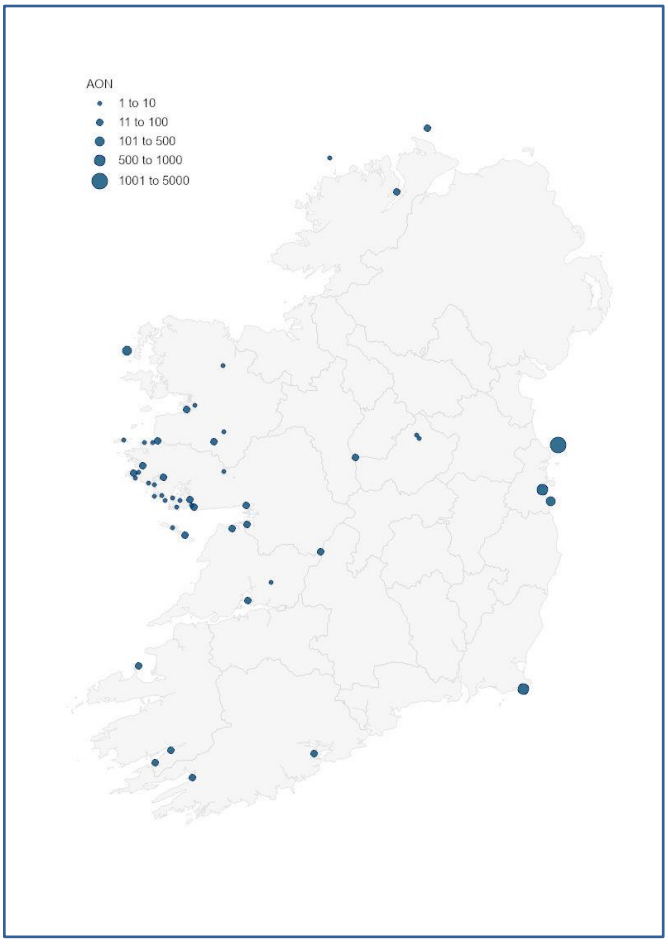

Figure 46 Breeding Common Tern abundance and distribution for the period 2016 – 2018

The Common Tern is Ireland's most abundant and widespread breeding tern. This species nests colonially on islets of freshwater lakes, particularly in the west of Ireland and offshore islands but also in more urban settings e.g. on artificial structures close to or within the ports of Cork and Dublin. Despite the relatively numerous inland colonies over 95% of the contemporary population estimate breed in coastal areas (Figure 46). This strong coastal bias is up from the already high proportions derived from the survey findings of both the 1984 and 1995 All-Ireland Tern Surveys (83% and 86% respectively).

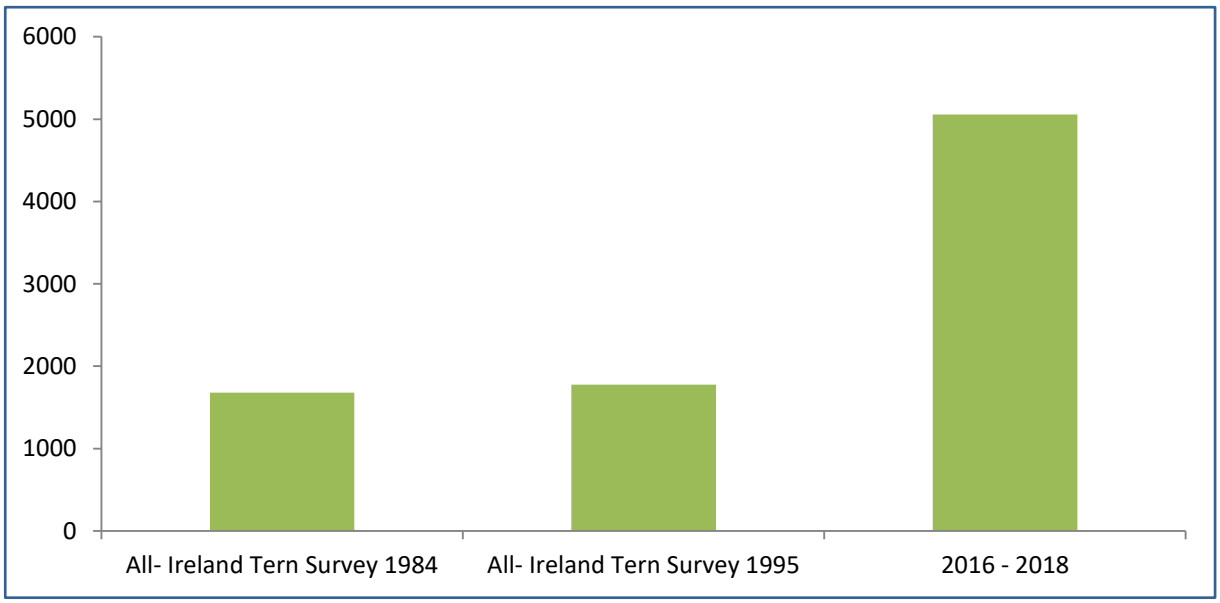

Figure 47 National breeding population estimates for Common Tern from the 1984 All – Ireland Tern Survey to the current survey

The contemporary population estimate is a near threefold increase over those estimates generated from the All-Ireland Tern Survey of 1984 and the subsequent All-Ireland Tern Survey of 1995 (see Hannon 1996, Hannon *et al*., 1997, Whilde, 1985) which were broadly similar in approach (Figure 47). Comparing the contemporary estimate with that of Seabird 2000 gives an increase of 104% indicating that this significant increase in the national population may have started in the late 1990s. The recorded decrease in the breeding range from the all-Ireland Tern surveys (as set out above) differs with the range trend based on Seabird 2000, which equates to an increase of some 83%. This latter figure is likely to be an overestimate and related to the increase in survey effort across the country (both inland and coastal areas) for Seabird 2000.

Table 14 Common Tern population growth at Rockabill and Lady's Island Lake (with the percentage of their respective share of the national population estimate in parenthesis)

Site	All-Ireland Tern Survey 1984	All-Ireland Tern Survey 1995	Seabird 2000	This survey	Change since Seabird 2000
Rockabill	89 (5%)	429 (24%)	610 (25%)	2034 (40%)	+ 233%
Lady's Island Lake*	< 12 (< 1%)	< 401 (< 23%)	480 (19%)	979 (19%)	+ 104%

*Earlier surveys at Lady's Island Lake did not separate out the proportions of Common and Arctic Terns

Notwithstanding the influence of increased survey effort to positively contribute to the inflation of the both the short- and long-term trends, there is little doubt that the strong national increase in the population is driven by the now long-standing and on-going direct conservation actions at Lady's Island Lake and Rockabill where near year on year increases in the population have been recorded (for

more information on the on-going conservation works see Acampora *et al*., 2018, Daly *et al.*, 2018). Table 14 sets out in more detail the increasing numbers. Other conservation initiatives for this and other tern species are at various stage of development across the county (e.g. Dublin Port, Boland *et al.,* 2018; Port of Cork, Wilkinson 2018; and Galway Bay, Ian O'Connor pers. comm.).

Figure 48 Common Tern. Photograph Brian Burke

3.16 Arctic Tern	*Sterna paradisaea*	Geabhróg Artach
Breeding population	**Population estimate (2016 – 2018):**	2,778 pairs
	Trend since the 1995 All-Ireland Tern survey:	+ 17%
	Trend since the 1984 All-Ireland Tern survey:	+ 40%
	Proportion within the SPA Network	69%
Breeding distribution	**Current (2016 – 2018):**	35 10 km grid squares
	Trend since the 1995 All-Ireland Tern survey:	- 49%
	Trend since the 1984 All-Ireland Tern survey:	- 59%

Data confidence: Our contemporary population estimate this species includes average totals (2015 – 2018) for sites that are monitored annually (e.g. Lady's Island, Rockabill Island). However these sites equate to less than 30% of the total estimate and therefore we have a **medium** level of confidence in our contemporary population estimate for this relatively mobile and dispersed coastal seabird species. Our confidence on our estimates of change (both population size and distribution) is also considered to be **medium**, as they are based on data from two previous All-Ireland Tern surveys.

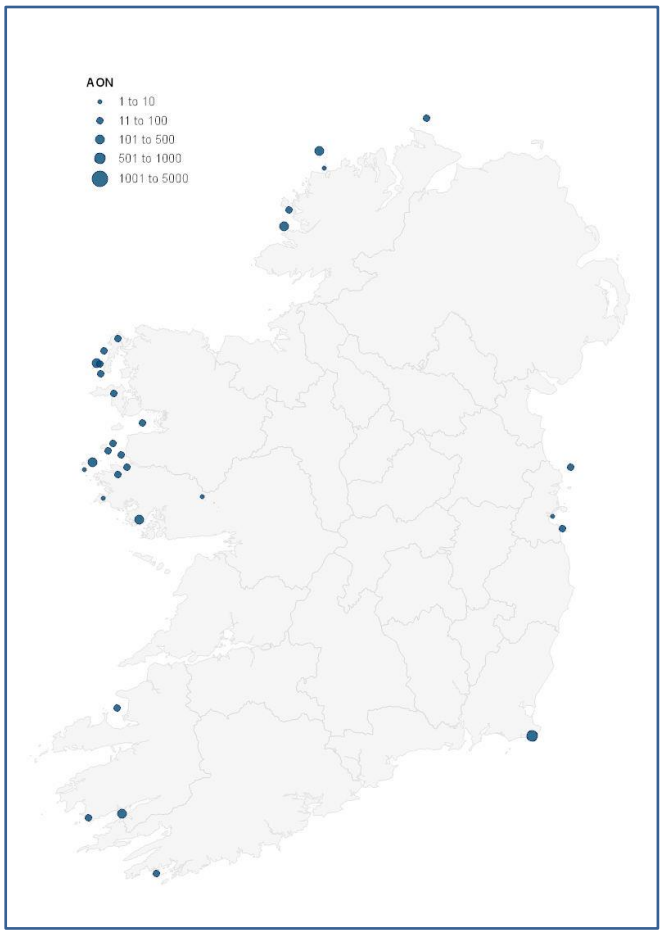

Figure 49 Breeding Arctic Tern abundance and distribution for the period 2016 – 2018.

Arctic Tern, which are at the southern limit of their breeding distribution in Britain and Ireland, breed predominantly in coastal areas of Ireland and Scotland (Balmer *et al.*, 2013). The Irish population in the last century has undergone significant change starting with a widespread decline and a subsequent recovery starting in the late 1960s (Hutchinson, 1989). The strong coastal bias is evident in our contemporary distribution set out in Figure 49 and the population recovery, as determined by a comparison of the contemporary population estimate with those from the 1984 and 1995 All-Ireland Tern surveys, continues (Figure 50).

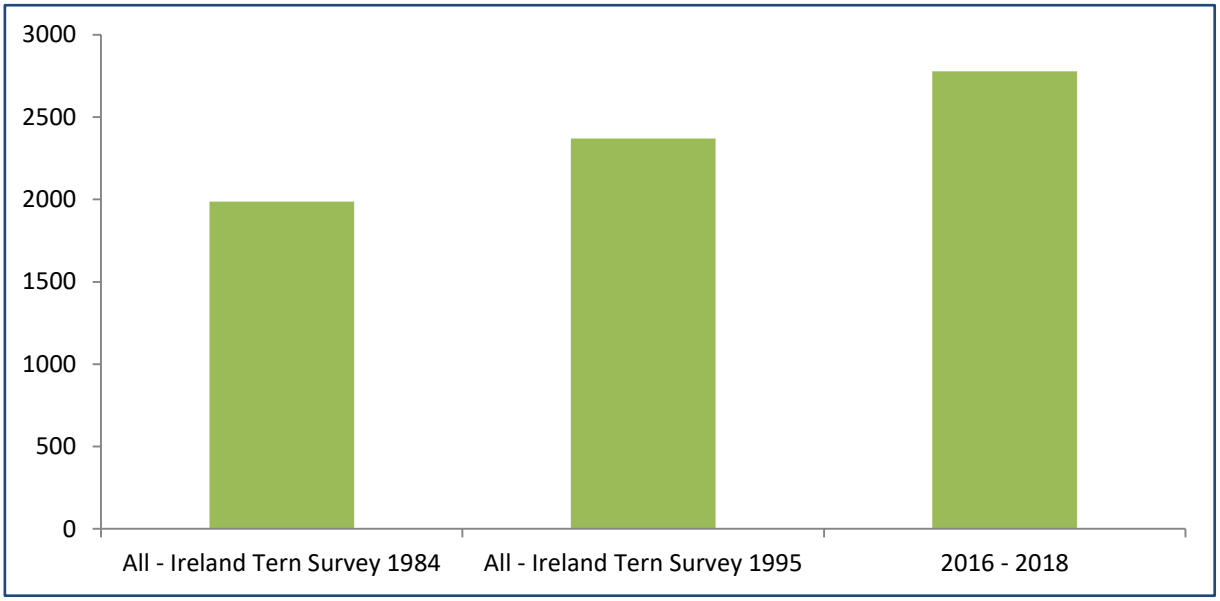

Figure 50 National breeding population estimates for Arctic Tern from the 1984 All – Ireland Tern Survey to the current survey.

A more recent short-term population trend can be calculated by comparing the contemporary estimate with that of Seabird 2000 – this equates to a 1.6% increase which indicates that the aforementioned population recovery has now stabilised. However this scenario is juxtaposed by examining the number of 10 km grid squares that had recorded breeding Arctic Tern present during the All-Ireland Tern Survey compared to the current recorded breeding distribution. Both trends indicate strong contractions in this species' distribution. However if one uses Seabird 2000 as the baseline, then a breeding range increase of some 46% is estimated. This may well be somewhat of an inflated value due to the disparity in recording effort between the two surveys. Our contemporary estimated distribution is a slightly more conservative value than that of Balmer *et al.*, 2013.

Figure 51 Arctic Tern. Photograph Brian Burke

3.17 Little Tern *Sternula albifrons* Geabhróg bheag

Breeding population	**Population estimate (2016 – 2018):**	388 pairs
	Trend since the 1995 All-Ireland Tern survey:	+ 123%
	Trend since the 1984 All-Ireland Tern survey:	+ 51%
	Proportion within the SPA Network	86%
Breeding distribution	**Current (2016 – 2018):**	23 10 km grid squares
	Trend since the 1995 All-Ireland Tern survey:	+ 28%
	Trend since the 1984 All-Ireland Tern survey:	- 28%

Data confidence: This species' colonies are situated along both the east and west coasts of Ireland and can move *en masse* between breeding sites between years. However we consider that confidence in the contemporary population estimate is **medium** as most colonies were surveyed 2016 and where multiple surveys were undertaken at particular colonies during the period 2016 – 2018, a mean value was used in the analysis. However some flush counts (as opposed to AONs) were used in the totals. The confidence in the trend estimates is **medium** notwithstanding the possibility that the 1984 All-Ireland Tern Survey may be an underestimation of the true population.

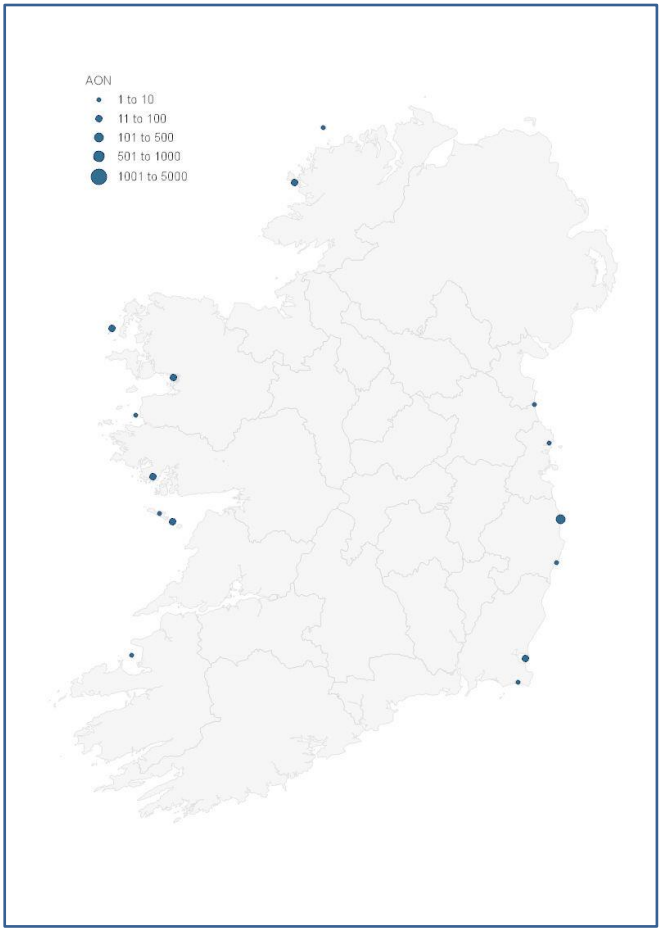

Figure 52 Breeding Little Tern abundance and distribution for the period 2016 – 2018

Little Terns nest exclusively along the coast in well-camouflaged shallow scrapes on bare shingle, shell-beach or sand, often only just above normal tide or flood limits and frequently immediately adjacent to areas of sheltered, shallow clear water (saline or fresh) where fish of suitable size can be caught by plunge diving (Snow & Perrins, 1998, Mitchell *et al*., 2014). In Ireland the Little Tern is both the smallest and the scarcest of the five species of tern that breed here. Figure 53 shows the fluctuations in the national breeding population estimates from the All-Ireland Tern Survey of 1984, the All-Ireland Tern Survey of 1995 (see Hannon 1996, Hannon *et al*., 1997) to the contemporary estimate. Since the turn of the century, based on Seabird 2000 numbers, the national Little Tern breeding population is estimated to have increased by 88% with a concurrent range increase of 156%. This latter figure is likely to be an overestimate perhaps due to inter-annual colony movements.

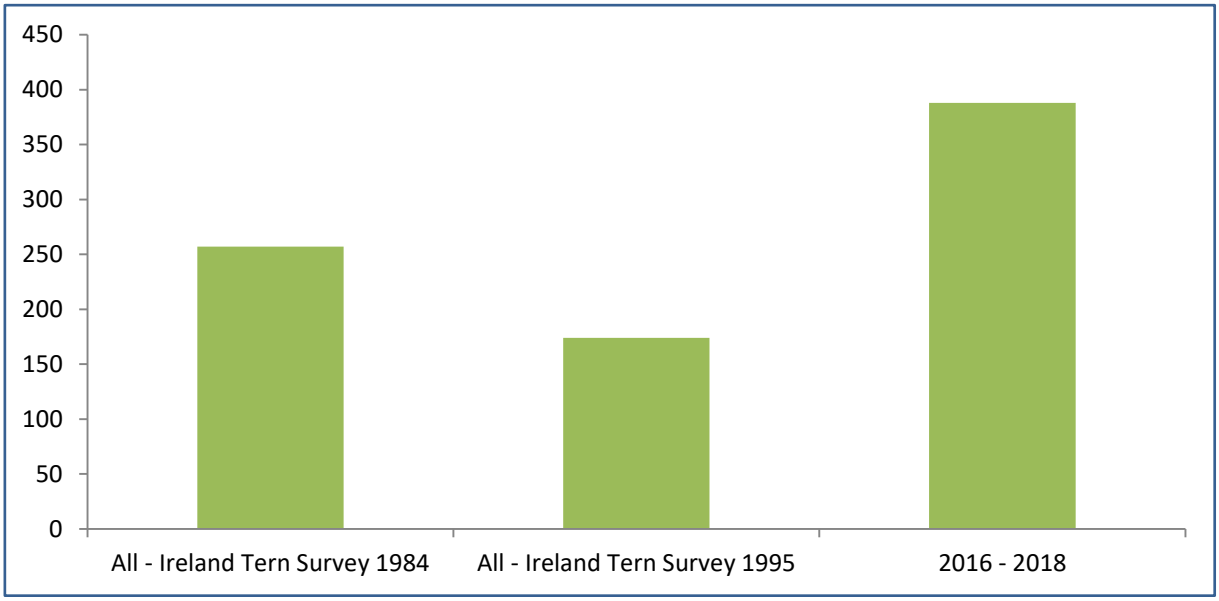

Figure 53 National breeding population estimates for Little Tern from the 1984 All – Ireland Tern Survey to the current survey.

On the east coast of Ireland, Little Tern is the subject of direct conservation management by way of wardened colonies at various sites and to varying degrees (see Johnson *et al*., 2018, Kavanagh 2018, Lynch *et al*., 2017, Murray 2016, 2017 and 2018). Ireland's largest Little Tern colony at Kilcoole accounts for over one third of the national population, which has increased by 255% since the Seabird 2000 estimate.

Figure 54 Little Tern. Photograph Tim Melling

3.18 Guillemot	*Uria aalge*	Foracha
Breeding population	**Population estimate (2015 – 2018):**	177,388 individuals
	Short-term trend (1998/2002 - 2015/2018):	+ 28%
	Long-term trend (1985/87 - 2015/2018):	+ 72%
	Proportion within the SPA Network	97%
Breeding distribution	**Current (2015 – 2018):**	56 10 km grid squares
	Short-term trend (1998/2002 - 2015/2018):	+ 27%
	Long-term trend (1988/91 – 2015/2018):	+ 8%

Data confidence: Over 95% of the total contemporary population estimate is derived from single visit surveys undertaken in 2015. As the recommended count unit is the number of individual adults on breeding ledges, a mean value based on multiple counts during one year's survey window would be ideal. Therefore we have a **medium** level of confidence in this national population estimate and a **high** level of confidence in our estimated breeding range. Short-term range changes are based on changes that have occurred since Seabird 2000 (Mitchell *et al.*, 2004). The confidence in our short-term population trend estimate is at least a **medium** due to the fact that similar survey coverage was achieved for both Survey 2000 and the current one.

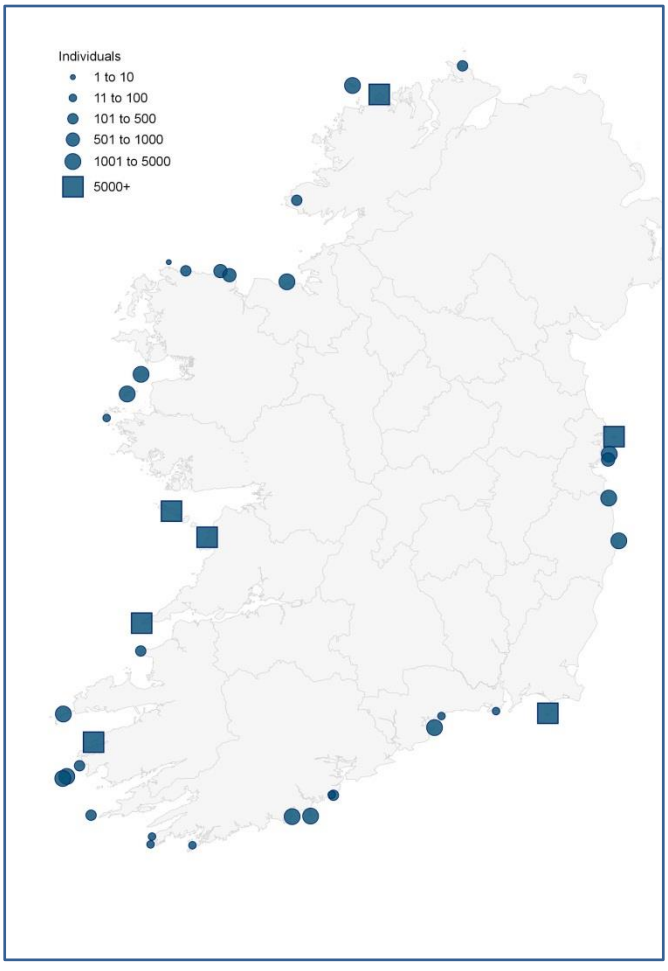

Figure 55 Breeding Guillemot abundance and distribution for the period 2015 – 2018

The Guillemot (also referred to as Common Guillemot) is one of the most abundant seabirds of the northern hemisphere and in the northeast Atlantic this species' breeding distribution extends from Portugal to Svalbard with the sub-species *albionis* occurring in Ireland, Wales, England, France, Iberia and Heligoland (Snow & Perrins, 1998, Mitchell *et al*., 2004).

This survey recorded Guillemot colonies at a total of 40 sites (Figure 55) via both boat- and land-based surveys. Although the recommended count unit is the number individual adults on breeding cliffs it was not always the case. Previously, for both SCR and Operation Seafarer, surveyors estimated the number of apparently occupied sites (Guillemots do not build nests) at each colony. This presents a difficulty when interpreting historical change. As per Mitchell *et al*. (2004) one can convert the number of individuals recorded to an approximation of the likely number of breeding pairs at a site by employing a conversion factor of 0.66. Thus the 2015 – 2018 national breeding population of Guillemot can be estimated to be 117,076 pairs. This contemporary population estimate is the highest ever recorded for Ireland and marks a substantial increase in the various population estimates through time (Figure 56) although it should be noted that different levels of survey effort and methods (i.e. the earlier surveys included counts of Apparently Occupied Sites as well as Individuals) and therefore should be treated with caution. For both Table 15 and Figure 56 data, totals from surveys earlier than Seabird 2000 have been converted where necessary to display estimates of individuals.

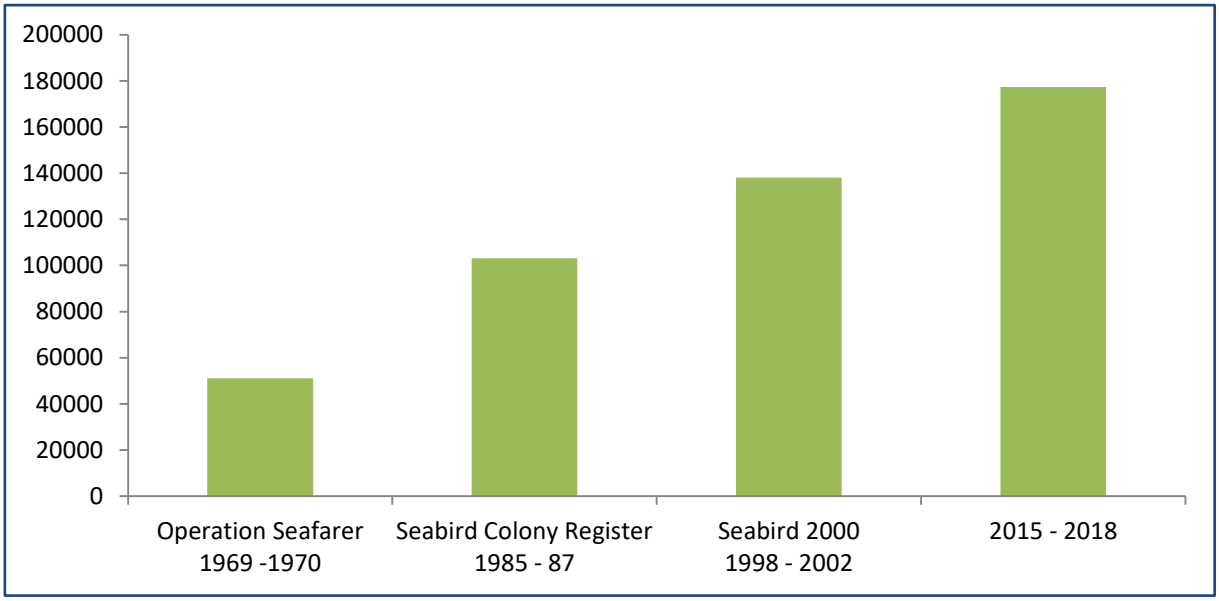

Figure 56 National breeding population estimates for Guillemot (INDs) from Operation Seafarer to the current survey (please note the constraints noted above to these estimates).

Both the short- and the long-term population trend estimates identify a strong increase in breeding Guillemot in Ireland. The largest colonies are located at the Cliffs of Moher, Loop Head, Doulus Head, Great Saltee and Lambay Island. Almost 40% of the national breeding population (2015 - 2018) occurs on the east coast. The recorded distribution of Guillemot has also increased in the short-term with the long-term estimate considered more stable with only an 8% recorded increase.

Since Seabird 2000, there has been a strong (i.e. >50%) recorded increase in the southern and western colonies which contrasts with the northwest and eastern colonies which recorded only marginal (i.e. circa <10%) increases.

Two major colonies, the Cliffs of Moher (75%) and Great Saltee (21%), have recorded substantial increases. Lambay Island, the largest colony in Ireland, has remained relatively stable. This regional variation in colony growth may well be driven by local food availability with the abundance of their preferred prey species (young Sprat and sandeels). Studies have shown that annual variation in

Guillemot population growth rate can be explained by variation in abundance of their preferred prey species (Erikstad *et al*., 2013).

Table 15 Population estimates (INDs) of Guillemot at selection of Irish colonies for the period 1985 – 1988 to 2015 – 2018

Site	SCR 1985/1988	Seabird 2000 1998/2002	2015 - 2018	% Change (since Seabird 2000)
Ireland's Eye	1458	2191	4410	+ 101%
Little Skellig	-	1129	2069	+ 83%
Cliffs of Moher	12957	19962	34829	+ 75%
Great Skellig#	-	1422	2297	+ 62%
Doulus Head	3497	4253	6881	+ 62%
Loop Head	4010	5000	7709	+ 54%
Great Saltee	16329	21436	25851	+ 21%
Old Head of Kinsale	4179	3610	4157	+ 15%
Lambay Island	44495	60754	59983	- 1%
Clare Island		2280	2168	- 5%
Horn Head	4806	6548	5442	- 17%

Figure 57 Guillemots. Photograph Tim Melling

3.19 Razorbill	*Alca torda*	Crosán
Breeding population	**Population estimate (2015 – 2018):**	33,689 individuals
	Short-term trend (1998/2002 - 2015/2018):	+ 23%
	Long-term trend (1985/87 - 2015/2018):	+ 45%
	Proportion within the SPA Network	95%
Breeding distribution	**Current (2015 – 2018):**	64 10 km grid squares
	Short-term trend (1998/2002 - 2015/2018):	+ 46%
	Long-term trend (1988/91 – 2015/2018):	+ 21%

Data confidence: Over 95% of the total contemporary population estimate is derived from single visit surveys undertaken in 2015. As the recommended count unit is the number of individual adults on breeding ledges, a mean value based on multiple counts during one year's survey window would be ideal. Therefore we have a **medium** level of confidence in this national population estimate. Short-term range changes are based on changes that have occurred since Seabird 2000 (Mitchell *et al.*, 2004). The confidence in our short-term population trend estimate is also **medium** due to the fact that similar survey coverage was achieved for both Survey 2000 and the current one.

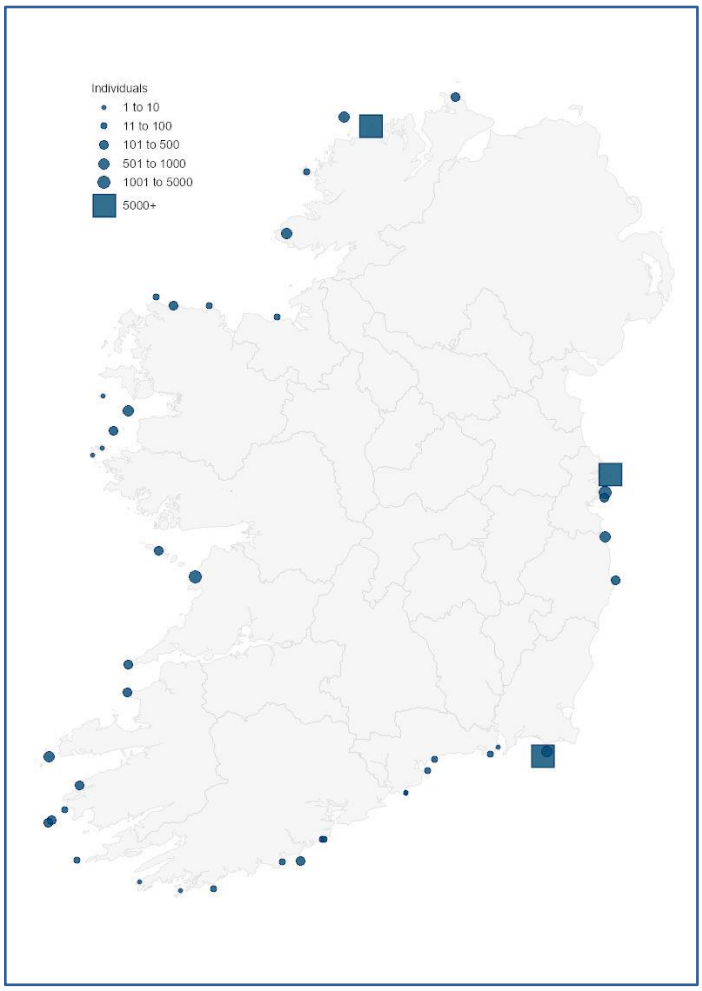

Figure 58 Breeding Razorbill abundance and distribution for the period 2015 – 2018

The Razorbill breeds along Ireland's coasts with its known breeding range extending as far as Scandinavia, Iceland, Greenland and the east coast of North America (Snow & Perrins 1998). In Ireland this species breeds in loose colonies varying in density on cliff ledges and crevices and across boulder fields.

This survey recorded Razorbill colonies at a total of 45 sites (Figure 58) via both boat- and land-based surveys. As per Guillemot, although the recommended count unit is the number of individual adults on breeding cliffs, it was not always the case. Previously, for both SCR and Operation Seafarer, surveyors estimated the number of apparently occupied sites at each colony. This presents a difficulty when interpreting historical change. As per Mitchell *et al*. (2004) one can convert the number of individuals recorded to an approximation of the likely number of breeding pairs at a site by employing a conversion factor of 0.66. Thus the 2015 – 2018 national breeding population of Razorbill can be estimated to be 22,235 pairs. For both Table 15 and Figure 59 data, totals from surveys earlier than Seabird 2000 have been converted where necessary to display estimates of individuals.

At the national level this contemporary population estimate indicates that this species has undergone a strong increase (with an associated increase in breeding range) over the last 35 years or so but the *Operation Seafarer* data identified significant colonies across Ireland whose total estimated population is marginally higher than the contemporary population estimate (by circa 6%). The historical trend shows that this species continues to recover from an acute decline in the estimated population that occurred during the 1970s – early 1980s (Figure 59).

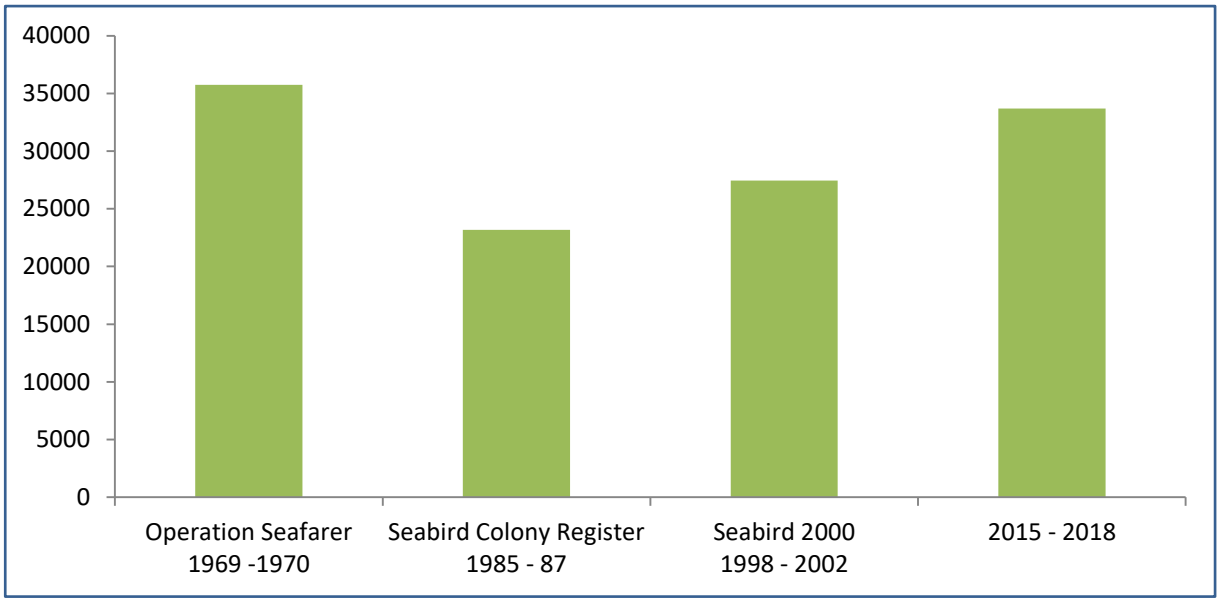

Figure 59 National breeding population estimates for Razorbill (INDs) from Operation Seafarer to the current survey (please note the constraints noted above to these estimates).

Although the national trend is positive, the site level trend analysis (as per Table 16) for this breeding seabird species indicates a more variable situation. Most notable of these is the estimated breeding population change of the Cliffs of Moher, which in 2000 was second only to Raithlin Island in terms of size on the island of Ireland, where a near 50% decline has been estimated. Compared to the Cliffs of Moher population trend, other important Razorbill colonies have fared differently with Horn Head remaining largely stable and Great Saltee experiencing a substantial increase.

Further attention on the recorded decline in estimated breeding numbers at the Cliffs of Moher. Reiertsen *et al.* (2018) has identified tourist pressure as a potential cause to long-term declines for some seabird species in Norway. Compared to Guillemot, Chivers *et al.* (2012d) concluded that Razorbill chicks at breeding colonies can be more vulnerable to predation. The abundance of Razorbills at colonies

can be closely associated with prey abundance e.g. Sprat (Hjernquist & Hjernquist, 2009) and therefore it is possible that local changes in food availability are driving the apparent regional differences in population trends.

Table 16 Ranked census totals (INDs) of Razorbill at selection of Irish colonies for the period 1985 – 1988 to 2015 – 2018

Site	SCR 1985 - 1988	Seabird 2000 1998 - 2002	2015 - 2018	% Change (since Seabird 2000)
Ireland's Eye	272	522	1600	+ 207
Inishnabro	193	319	641	+ 101
Great Saltee	4673	3239	5669	+ 75
Lambay Island	3648	4337	7353	+ 70
Little Saltee	450	500	850	+ 70
Clare Island	-	528	618	+ 17
Horn Head	5628	6739	6812	+ 1
Cliffs of Moher	2398	7700	4046	- 48
Tory Island	614	1002	951	- 5

Figure 60 Razorbill. Photograph Brian Burke.

3.20 Black Guillemot *Cepphus grylle* Foracha dhubh

Breeding population	**Population estimate (2017 – 2018):**	> 3,917 individuals
	Short-term trend (1998/2002 - 2015/2018):	> + 16%
	Long-term trend (1985/87 - 2015/2018):	unknown
	Proportion within the SPA Network	N/A
Breeding distribution	**Current (2015 – 2018):**	>152 10 km grid squares
	Short-term trend (1998/2002 - 2015/2018):	> + 12%
	Long-term trend (1988/91 – 2015/2018):	> + 20%

Data confidence: These data from part of an on-going species- specific survey and although the majority of Ireland's suitable breeding habitat was surveyed, as per standard methods, the survey is incomplete. Thus the estimate of the areas surveyed is robust, but it can only be considered as a minimum estimate at the national population level. The short-term estimates of change are also to be treated as minimum estimates. The mid-1980s survey for Ireland was undertaken outside of the preferred survey window and therefore a direct comparison was not undertaken. The long-term range estimate was based on the number of 10 km for both breeding and seen records therefore we consider this to be constrained and class it at a poor level of confidence.

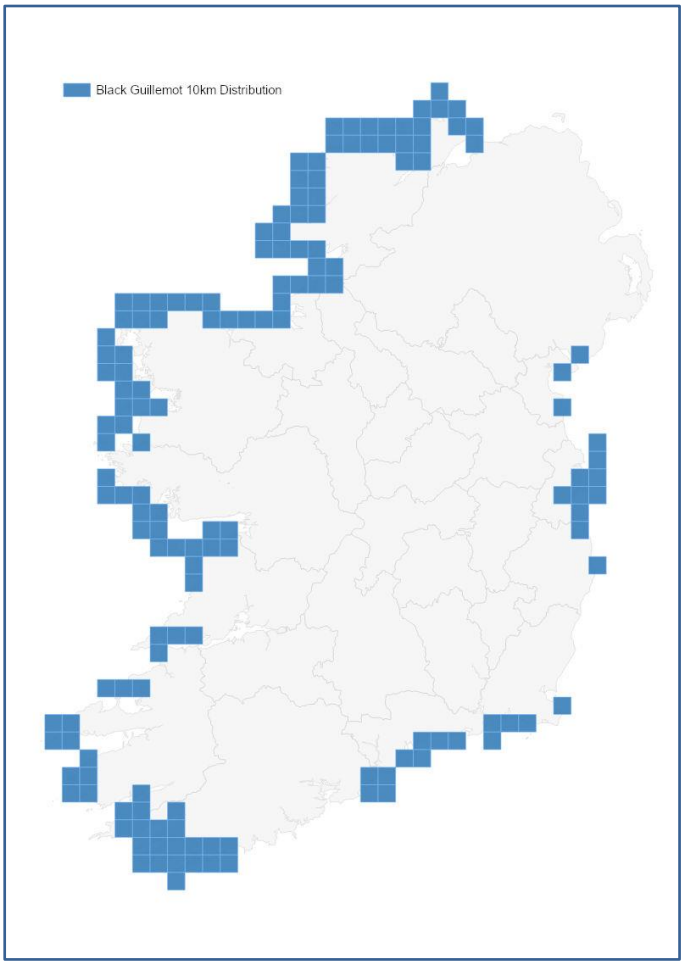

Figure 61 Black Guillemot breeding distribution based on an on-going survey (2017 - 2018)

This is an interim assessment using the current available population data for Black Guillemot breeding in Ireland. The survey data collected thus far is very comprehensive for the majority of the suitable habitat around Ireland's coastline. However it is still incomplete. The data gaps are to be addressed following additional surveys during the 2019 and 2020 breeding seasons. It is intended that a standalone report/paper on this species will be published in due course.

Figure 62 Black Guillemot. Photograph Brian Burke

3.21 Burrow nesting seabirds

Of the twenty-four species of seabird that regularly breed in Ireland, burrow nesters form a minority, yet sizable portion (i.e. approx. 20%). Due to their cryptic breeding ecology, they require specialised survey methods which are not suitable to be undertaken alongside the more typical multi-species seabirds' surveys. These species typically site their nests in the enclosed environs of burrows or in cracks, gaps and crevices of scree, rocky outcrops, stone walls and harbours.

Although technically the Black Guillemot can fall into this category, a sufficient amount of survey work and analysis has been undertaken to allow for a reasonably robust assessment which is described above. The remaining species, namely: Storm Petrel (*Hydrobates pelagicus*), Leach's Storm Petrel (*Hydrobates leucorhous*), Manx Shearwater (*Puffinus puffinus*), and Puffin (*Fratercula arctica*) are subject to on-going survey work. This on-going survey work consists of revisiting known breeding colonies as well as surveying other islands where no previous breeding records exist. This work is being undertaken by BirdWatch Ireland (under the MarPMM Interreg Project), by NPWS staff (e.g. McGreal *et al*., 2013), by University College Cork (Arneill & Quinn, 2018) and by Envirico (an environmental constancy under contract to NPWS).

The methods used in the aforementioned survey work are similar to those surveys which fed into Seabird 2000 but have been refined further on foot of NPWS-funded PhD work carried out by Gavin Arneill in UCC (see Arneill, 2018 for further details).

However at the time of writing there is an insufficient amount of survey data available to produce breeding assessments for these burrow-nesting seabirds. Therefore the species population assessments that were used for the previous Article 12 Reporting (i.e. for the period 2008 – 2012) have been reproduced for this reporting cycle. The population estimates for Ireland that were derived from Seabird 2000 have been reproduced in Table 17 for context. It is expected that a sufficient amount of survey work will be completed during the period 2019 – 2020 in order for robust contemporary population estimates for these species to be reported on in the *Seabirds Count* publication or similar.

Table 17 Population estimates of burrow nesting seabirds based on Seabird 2000 data

Species	Population estimate (1998 – 2002)	95% upper and lower confidence limits	Breeding distribution (number of 10 km grid squares)
Manx Shearwater	32,545 AOS^	23,643 – 54,558	10
Storm Petrel	57,110 AOS	50,313 – 66,508	18
Leach's Storm Petrel	310 AOS	n/a	1
Puffin	19,641 AOB#	n/a	19

^Apparently Occupied Site; #Apparently Occupied Burrow

4 Pressures & Threats

This section serves to provide some context to the pressures and threats to Ireland's breeding seabird populations that have been estimated for the Article 12 reporting period (2013 – 2018). As per DG Environment's (2017) guidance, the reporting process seeks to capture information about the principal factors responsible for causing individual species to decline, suppressing their numbers or restricting their ranges. With regard to the nomenclature, a *pressure* is an impact that has acted within the current reporting period and is likely to have had some level of impact on the long-term viability of the species or its habitat(s); whilst *threats* are future/foreseeable impacts (within the next two reporting periods) that are likely to affect the long-term viability of the species and/or its habitat(s). The guidance suggests that these threats should not cover theoretical threats, but rather those issues judged to be reasonably likely. This may include continuation of pressures.

The precise description and coding of the various pressures and threats described here confirm to the EU reporting standard. The assessment process identified 16 sources of pressures and/or threats across Ireland's breeding seabird species. **Table 18** sets out the various pressures and/or threats ranked with regard to their percentage relevance to Ireland's 24 breeding seabirds that were assessed.

Table 18 The nature and frequency of occurrence of pressures and/or threats (medium and/or high) across Ireland's 24 species of breeding seabirds

Code	Description	Percentage relevance
D01	Wind, wave and tidal power, including infrastructure	92
G12	Bycatch and incidental killing (due to fishing and hunting activities)	79
N06	Desynchronisation of biological / ecological processes due to climate change	75
N07	Decline or extinction of related species (e.g. food source / prey, predator / parasite, symbiote, etc.) due to climate change	75
I02	Other invasive alien species (other than species of Union concern)	71
F22	Residential or recreational activities and structures generating marine macro- and micro- particulate pollution (e.g. plastic bags, Styrofoam)	54
F23	Industrial or commercial activities and structures generating marine macro- and micro- particulate pollution (e.g. plastic bags, Styrofoam)	54
F07	Sports, tourism and leisure activities	46
G01	Marine fish and shellfish harvesting (professional, recreational) causing reduction of species/prey populations and disturbance of species	46
I04	Problematic native species	33
A09	Intensive grazing or overgrazing by livestock	29
J02	Mixed source marine water pollution (marine and coastal)	29
M08	Flooding (natural processes)	25
L06	Interspecific relations (competition, predation, parasitism, pathogens)	21
G10	Illegal shooting/killing	4
N04	Sea-level and wave exposure changes due to climate change	4

Seabirds are characterised as being late to mature and slow to reproduce but they are long-lived, with natural adult mortality typically very low. Thus, their populations can only increase slowly, even if environmental conditions are favourable and any additional pressure increasing adult mortality or affecting annual breeding productivity can have a particularly strong negative influence on overall population dynamics (Furness, 2003).

Seabird populations can face cumulative pressures and threats at both their colonies and at sea. Undertaking assessments of whether a current pressure or future threat will affect individual species/species groups is difficult and often hampered by a lack of up-to-date research and targeted monitoring programmes. However such assessments, even those based on extrapolation of relevant studies and/or using expert judgement, can prove to be a useful exercise to identify particular issues for further consideration, survey and/or monitoring.

The full list of high and medium pressures and threats identified for each species, including reference materials, rationale and notes, is available in a supplementary file available at the following URL: www.npws.ie/publications/irish-wildlife-manuals. Only high and medium pressures and threats are included in this supplementary file, as per reporting requirements under Article 12 of the Birds Directive.

4.1 Renewable Energy

As a pressure, no seabird species was assessed as a medium or high for the pressure/threat known as *Wind, wave and tidal power, including infrastructure* (Code D01). However as a threat is was the most frequently assigned one across the suite of Irish breeding seabirds. This assessment was primarily informed by the report *Feasibility study of Marine Birds Sensitivity Mapping for Offshore Marine Renewable Energy Developments in Ireland* (Ramiro & Cummins 2016). Although tidal and wave technologies were considered in the report, this assessment focuses on the potential impact of offshore windfarms on Ireland's seabirds primarily on account of planned future offshore wind farm development, which is considered to be relatively much more advanced and specifically in the Irish Sea (see www.seai.ie for further information).

The main risks of offshore wind farms to seabirds have been identified as: collision mortality, disturbance, barrier effects and habitat loss or displacement (Desholm & Kahlert, 2005, Fox *et al*., 2006, Langston & Pullan, 2003). Therefore tables five and six of the Ramiro and Cummins' (2016) report, which relate to the various seabirds' ranked sensitivity scores to wind farm collision and displacement/disturbance scores respectively, led to defining the magnitude of this threat at a species specific level in this report. A weakest link approach helped derive overall scores e.g. although Razorbill is deemed to have a relatively low risk score with regard to colliding with offshore turbines, it is ranked relatively highly in terms of being potentially displaced from preferred foraging areas by the presence of turbines – which in turn led to an overall high threat score for this species.

Twenty-two seabird species were classed as medium or higher for this threat. This level of threat is justified on the grounds that there are several offshore windfarm projects which are currently at various stages along the consent process and thus, such cumulative pressures acting on seabirds will need to be assessed. Ireland's marine SPA network is not yet finalised. Therefore the *ex-situ* aspects of appropriate assessments of potential impacts are of particular importance.

4.2 Commercial Fishing

This section considers the fishing industry under the following pressures/threats: G12, Bycatch and incidental killing (due to fishing and hunting activities); and G01, Marine fish and shellfish harvesting (professional, recreational) causing reduction of species/prey populations and disturbance of species. This latter pressure/threat may be direct impacts with regard to coastal and deep sea fishing vessels

competing with seabird populations over a common prey resource (e.g. sandeels, Sprat), affecting food webs by selective harvesting of particular fish species, and/or directly impacting the benthic habitat of particular fish and shellfish species, with knock-on effects on food availability for breeding seabirds.

While some seabirds are able to adapt to fluctuations in food availability (Montevechhi & Myers, 1996), several studies have shown that seabird survival, breeding success and chick growth are closely correlated to food availability (Furness & Tasker, 2000, Barret *et al*., 2007, BirdLife International, 2008). During the breeding season, seabirds are effectively 'tied' to their breeding colonies meaning that local fluctuations in fish recruitment and availability can have a pronounced effect on the reproductive output for some species. In the worst-case scenario, if prey levels are reduced below the level needed to generate and incubate eggs, or if the fish species and prey sizes needed to feed chicks are unavailable, then fewer or no young are fledged due to starvation or depredation or indeed, seabirds fail to reproduce at all if the shortfall occurs early in the season.

Breeding colonies are particularly vulnerable, with all birds reliant on the same area, and while some seabirds are generalists (Gannet) other specialists show declines earlier (Kittiwake). For some species (e.g. Manx Shearwater and Storm Petrel) there is very little data available. Post-breeding (late July-September) large concentrations of tern occur in Dublin Bay and the nearby sandbanks (e.g. Kish Bank), originating not only from local colonies, but from further afield in Ireland (e.g. Lady's Island Lake in Wexford) and overseas (North Sea, Baltic Sea). Terns feed on forage fish such as sandeels and Sprat which can be superabundant in the late summer (Merne *et al*. 2008, Tierney *et al*., 2016, Newton & Crowe, 1999). One less understood impact of fisheries, with indirect impact upon seabirds, is the habitat damage caused by fishing gear with subsequent effects on benthic community structure and changes to marine food webs. A review of supporting literature was used to inform the species assessments with Irish studies used, where available for pressure/threat G01. The threat was assessed as high for Kittiwake and moderate for a range of species including Fulmar, Shag, Gannet, Guillemot, Puffin, and Sandwich Tern.

Some fishing methods or activities are a threat to seabird populations through the increased risk of incidental drowning in fishing gear (nets or longline hooks) or collision with gear cables (Žydelis *et al*., 2009, Žydelis *et al*., 2013). There are significant data gaps with regard to quantifying the extent of bycatch in Irish waters but some exist and are a cause for concern (e.g. ICES, 2013) but work on this area has been improving in recent years with collaboration between NPWS and the Marine Institute. However for the purposes of Article 12 reporting on the estimated magnitude of pressure/threat G12, the reported work of Bradbury *et al*. (2017) on risk assessing seabird bycatch in UK waters was used. This report sets out in their Appendix II the Species Sensitivity Index (SSI) for each relevant species with regard to: (i) surface entrapment risk; (ii) pelagic entrapment risk; and (iii) benthic entrapment risk. For this assessment we ranked these SSIs for each of the aforementioned three categories, then grouped the ranked species and assigned a group score of 1 – 5 for each species under each categories. Then for each species we summed the total group score to produce an overall combined score in order to assign a high, medium or low sensitivity for the threat G12. Species that were considered as high included Gannet, Guillemot and Shag. For all species that scored at least a medium threat we estimated a medium pressure for G12.

4.3 Climate Change

Climate change acts on a global scale and has the potential to negatively and significantly impact on the patterns and phenology of breeding seabirds due to changes in their available prey base and other associated ecological processes. Therefore it is unsurprising that both EU pressure/threats: N06, Desynchronisation of biological / ecological processes due to climate change; and N07, Decline or extinction of related species (e.g. food source / prey, predator / parasite, symbiote, etc.) due to climate change) rank highly as frequent threats to Ireland's breeding seabirds (**Error! Reference source not found.**).

Seabird distribution and abundance are indirectly influenced by factors that cause variation in their prey abundance including sea temperature (Dulvy *et al*., 2008), regional climate variability (e.g. North Atlantic oscillations) and climate change (Barbraud *et al*., 2012). The seabird community in our waters is largely made up breeding species at the southern edge of their range (Mitchell *et al*., 2004). Sandeel stocks in the North East Atlantic are changing due to both fisheries and climate change (Arnott & Ruxton, 2002) and any shift in the distribution of these forage fish could have significant impacts on our breeding seabirds. For example, Guillemot productivity is directly influenced by sandeel availability, and in years when fewer sandeels are available, chick growth and survival rates are lower (Heubeck, 2009). Climate change is now being linked to changes in marine food webs which in combination with fisheries and other pressures, can impact seabird populations. Food shortages or changes in prey species can affect some species, particularly those with narrow dietary preferences (Paredes *et al*., 2014).

The threat of sea-level rise and increasing wave exposure (EU code N04) was considered to be most acute for one breeding seabird in particular, Little Tern. Little Tern site their breeding colonies on shingle beaches just above the high water mark (Johnson *et al*. 2018). Sea level rise, compounded by increasing storm surges associated with climate change is likely to increase the risk of such colonies being washed out at crucial times of the breeding season.

4.4 Predation

The primary standardised EU pressure/threats relevant to current predation pressure and future (near term) threats on a subset of Ireland's seabird species are: I02, *Other invasive alien species (other than species of Union concern)* – which primarily relate to American Mink and Brown Rat; and I04, *Problematic Native Species* – which include Fox, Black Rat, Badger, Hedgehog and Stoat.

The seabird species that are least vulnerable to mammalian predation, be they native or invasive aliens, are those species that typically site their colonies on sheer cliff faces which are relatively inaccessible to mammalian predators (e.g. Guillemot, Kittiwake, Gannet). Those seabirds that are more vulnerable can be broken broadly into two groups: (i) tern and gull colonies often situated on inland and/or marine islands; and (ii) burrow-nesting seabirds situated on offshore marine islands that traditionally are free from all mammalian predators.

With regard to the latter group (i.e. ii, which contain Puffin, Manx Shearwater and Storm Petrel) this assessment considers that the all the aforementioned species are currently under a medium level of pressure this is based on known occurrences of mammalian predators on islands that are considered to be of important for at least one species of burrow nesting seabirds. Such examples include: Black Rat on Lambay Island, Brown Rat on Great Saltee and occasional reports of Mink on Puffin Island and the Blaskets. The threat assessment for these burrow-nesting species is high due to the relatively restricted range of important breeding sites.

With regard to breeding terns and some gulls, several of these species' national population estimates have increased significantly over the last decades, primarily or in part at least, due to effective wardening actions. Although the populations have increased, the breeding ranges of some of these species have decreased since the 1980s. This decreasing breeding range makes these national populations more vulnerable to unsustainable predation events and thus increases the importance of ensuring that the levels of predator control at such wardened sites are sufficient to ensure that negative population level impacts due to predation are eliminated. In addition to pressure/threats I02 and I04 the pressure/threat L06 *Interspecific relations (competition, predation, parasitism, pathogens)* was deemed to be a threat for a subset of these species e.g. Kestrel (*Falco tinnunculus*) at Boyne Estuary SPA, Pine Marten (*Martes martes*) at Lady's Island Lake SPA and Herring Gull at Rockabill SPA.

4.5 Plastics and other marine particulate pollution

In recent years concerns at the global scale on the negative impact on marine life of macro- and micro-particulate pollution in our marine waters, whether originating from *Residential or recreational activities and structures* (EU pressure code F22) or *Industrial or commercial activities and structures* (EU code F23), have grown significantly. This concern has sparked some degree of research and monitoring efforts in Ireland e.g. Acampora *et al.* (2016) and elsewhere (e.g. O'Hanlon *et al*., 2017).

Numerous marine species are affected by plastic debris through entanglement, nest incorporation, and ingestion, which can lead to lethal and sub-lethal impacts. However, in the northeastern Atlantic Ocean, an area of international importance for seabirds, there has been little effort to date to assess information from studies of wildlife and plastic to better understand the spatiotemporal variation of how marine plastic affects different seabird species.

The use of plastics, originating from the fishing industry and other sources, as nesting material by seabirds is not uncommon at colonies in Ireland (Figure 63) and elsewhere. This activity, which is a reflection of the state of the seas that these seabirds range over, can cause nestlings and adults to become entangled which may result in the death of individual birds. In Ireland, there is no precise and accurate estimate of whether this phenomenon is having a negative impact at the population level. Proximate conservation action i.e. the removal of plastics from seabird colonies may not be practicable and may cause unintended impacts (nest damage, direct disturbance). Clearly a more holistic approach to this problem is required including the reduction of single use plastics and ensuring that fisheries related plastic waste does not remain in the marine environment.

Not only is our understanding on the prevalence of ingested plastics by seabirds not comprehensive, the desk review indicates that precise impacts (lethal and sub-lethal) of plastic ingestion on seabird individuals and populations is very much incomplete. It is considered that those seabird species that regurgitate the hard parts of their diet, such as the gulls and also cormorants, are less at risk than species that cannot, as plastic does not accumulate as much within the gastro-intestinal tract of these species compared with others (Ryan 1987). However for the purposes of this assessment, all tubenoses (i.e. Procellariidae) and all those Irish breeding species that have had positive records of plastic ingestion were assigned a medium score as both a pressure and threat under EU codes F22 and F23.

4.6 Recreational disturbance

In this assessment recreational disturbance to Ireland's breeding seabird species is categorised under the EU pressure/threat *Sports, tourism and leisure activities* (F07). Coastal tourism started in the 19th Century and has increased in non-linear fashion ever since, stimulated by a combination of developments in transport technology and rising prosperity (Davenport & Davenport, 2006). While some seabirds in Ireland breed in relatively inaccessible locations (offshore uninhabited islands), many are found along our coastal cliffs and beaches, and some on islands on inland lakes or on buildings in our cities and towns. The very nature of where they breed, can place seabirds at close quarters with humans, especially where sites are located near urban centres of population. Recreational disturbance to breeding seabirds is likely to occur across the country but may well be localised in its impact. The threat of this disturbance to Ireland's breeding seabirds is considered to be highest for Little Tern, Roseate Tern, Mediterranean Gull and Sandwich Tern due to the very restricted number of breeding colonies that these species occur in, combined with their choice of nest site location (i.e. ground nesters relatively close to urban centres). Currently, the pressure for these species is low due to the fact that the majority of the aforementioned species' national population occur within wardened sites. Other species that may be relatively more vulnerable compared to those cliff nesting seabirds are those that can site their nest, like the aforementioned gulls and terns, on low lying or level islands or on the upper sections of cliff faces include Puffin and Cormorant, Shag among others. At a Norwegian seabird colony Reiertsen *et al.* (2018) concluded that tourist traffic near the colony, both on land and at sea, most likely

caused reduced breeding success for both Guillemot and Shag, and that efforts to avert and direct the traffic around the colony are necessary to mitigate these effects and to protect the populations.

4.7 Others

The remaining pressures identified in this assessment consisted of:

- A09, *Intensive grazing or overgrazing by livestock*, which is relevant to: several tern species; Common Gull; and both Manx Shearwater and Storm Petrel where inappropriate grazing levels (be it under or overgrazing) may affect nesting habitat suitability;
- J02, *Mixed source marine water pollution (marine and coastal)* – this pressure/threat is relevant to potentially all species of seabird and a subset including Cormorant, Shag, Razorbill and Guillemot is given;
- M08, *Flooding (natural processes)* this threat is most relevant to those important seabird breeding populations at Lady's Island Lake SPA, where the extent of their nesting habitat is contingent upon annual interventions to the water levels of the lake; and finally
- G10, *Illegal shooting/killing*, which was identified solely for Cormorant – a species that may be subject to some levels of persecution at a very localised level.

Figure 63 Discarded fishing industry material incorporated into a Cormorant nest. Photograph Clare Heardman

5 Conclusions

The National Seabird Monitoring Programme, established in 2013, has started to deliver results. Robust contemporary population estimates at site and national population level have been produced for the majority of Ireland's breeding seabird species with others in progress. Such data is fundamental to the sound conservation management of breeding seabirds in Ireland.

With the resources to hand, and relying heavily on the NPWS staff and the procurement of contracted work where required, the phased and targeted approach to data collection over a multi-year period is proving successful. However significant work remains to update site and national breeding population estimates of Puffin, Manx Shearwater and Storm Petrel species. Getting further information on the breeding abundances and distributions of our urban nesting gulls is also a necessity.

We should strive to ensure that optimal use is made of the data collected thus far and into the future as part of this programme. The sharing of data at the national level with the Marine Institute for marine spatial planning purposes or with the Department of Housing with regard to the Marine Strategy Framework Directive will help inform strategic planning in these sectors; but also at the international level including EU Birds reporting obligations and with our colleagues under the aegis of The Seabird Monitoring Programme of Britain and Ireland which is led and co-ordinated by the Joint Nature Conservation Committee. For this aim to be achieved, the regular maintenance including updating with new data of the seabird spatial database is an integral step.

Synergising the findings of this monitoring programme thus far, and into the future, including the identification of the range of pressures and threats relevant to Ireland's seabirds with other research and monitoring work (including *inter alia* the ObSERVE programme as well as the various seabird tracking studies led by UCC and BirdWatch Ireland) can only be beneficial to help inform Ireland's approach to addressing such aforementioned pressures.

Reflecting on the latest population trends and other findings various items are worthy of comment and future work but arguably the four points set out here are at the forefront:

Targeted seabird conservation management can produce dividends

There are now several examples of tern wardening initiatives especially along the east coast, which are responsible for driving population increase both at the target site and at the national level. Having robust data to describe objectively the efficacy or otherwise of bird conservation projects is a central tenet of sound conservation management. It is now obvious for a selection of tern projects that conservation management can work. However with success comes responsibility and in light of the increasing relative importance of these sites, the ongoing need to ensure that our most important tern colonies continue to be effectively managed cannot be understated and the effectiveness of management should be carefully monitored.

The recorded decline of Ireland's breeding Kittiwake population is a cause for concern

This is our most abundant breeding gull but the numbers of adults attempting to breed have declined by 35%. Adult Kittiwakes can live up to 28 years of age and so further information about this species' productivity rates at colonies around Ireland and of the Irish population's over-winter survival, should be a priority. Such information would help identify the likely drivers to this species' decline in order that they can be addressed via policy change and/or on the ground actions.

Biosecurity and burrow nesting seabirds

Preliminary surveys coupled with available reports and records, of the presence of invasive predatory mammals occupying some of our most important offshore islands for burrow nesting seabirds such as Puffin, Manx Shearwater and Storm Petrel is a cause for acute concern. If such mammals (e.g. American Mink, Brown Rat) are left unchecked and allowed to occupy further seabird islands, then significant

declines in seabird breeding populations and range declines are inevitable. A programme of eradication projects in association with the creation of biosecurity plans for our important offshore colonies is urgently required.

Sustainable seabird monitoring for the future

As stated above there is now a need to complete our population estimates of the remaining seabirds species. However the monitoring programme cannot end there if it is to continue to provide relevant data on the status of Ireland's breeding seabirds. In the near to medium term the following are examples of preferred potential paths:

- Between the large seabird census initiatives, which are regular but infrequent, there should be an objective to undertake seabird surveys at a selection of sites on an annual basis that would inform future contemporary species specific trend estimates: at the national level; via the SMP partnership, across Ireland and Britain; and across Europe via the Article 12 reporting vehicle.
- To complement the above, the collection of productivity data for a number of key species would be of significant benefit in increasing our understanding of what seabird pressures and threats are most relevant in an Irish context.
- As previously mentioned, the maintenance of a fit-for-purpose spatial database to house relevant breeding seabird data is necessary for both continued data analysis and sharing purposes.
- Finally, and perhaps of greatest importance, no seabird monitoring programme can progress without the continued input of skilled field surveyors. This input needs to be valued and supported by various means including: the establishment of more efficient pathways to manage the provision of data – the introduction of an online data entry would be relevant here; regular feedback of recent analysis, reports etc. relevant to the National Seabird Monitoring Programme via workshops and other fora; and the development of the seabird monitoring database as a resource for individual surveyors to manage, store and view their own data would increase the overall value and utility of the database. In addition, the training and upskilling of NPWS field staff and of volunteers in seabird survey techniques would be of great benefit.

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