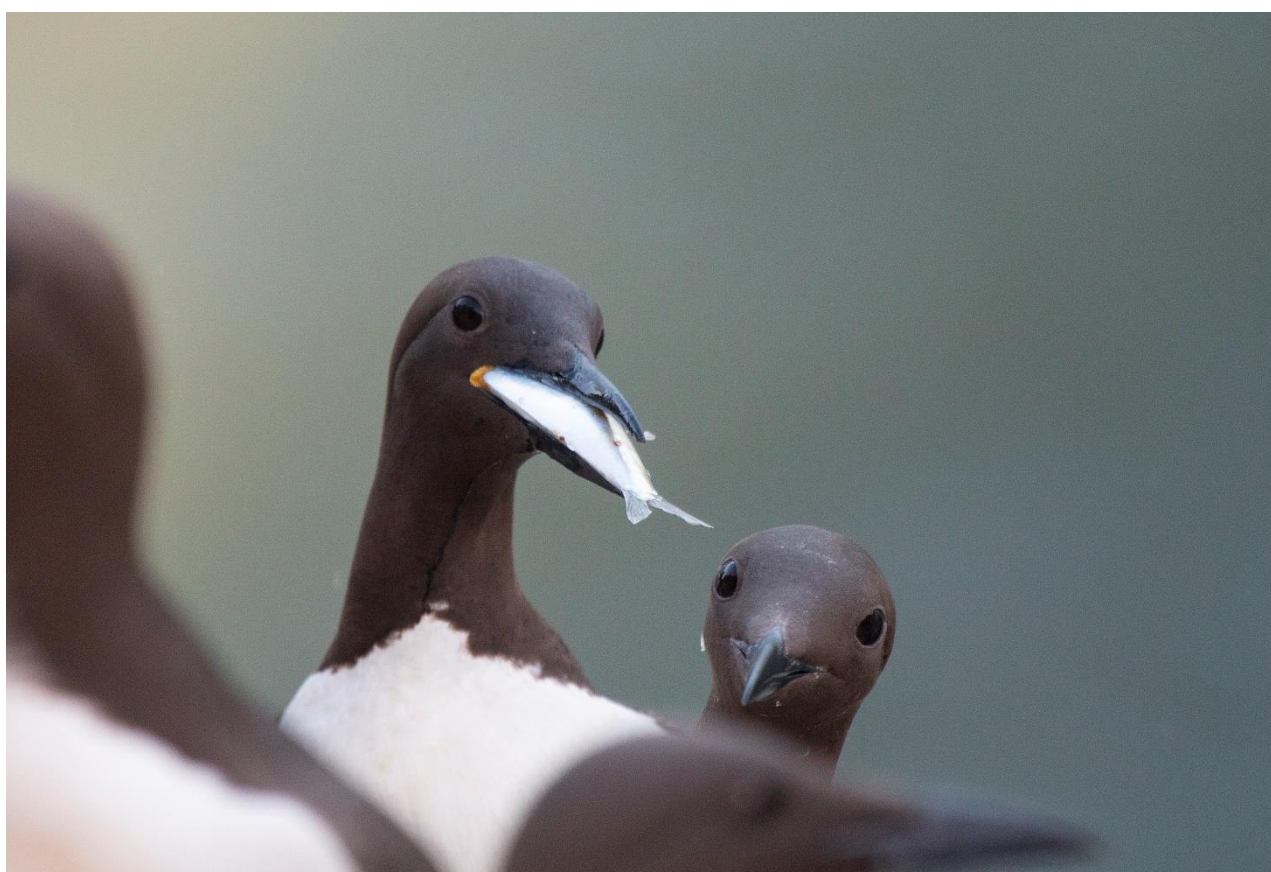


Flamborough and Filey Coast SPA Seabird Monitoring Programme

2019 Report



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Front cover image: Common Guillemot © Julia Wildi

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Summary

The Flamborough and Filey Coast Special Protection Area (SPA) seabird monitoring programme is a partnership between the RSPB and Natural England set up to monitor and report on the condition of this internationally important seabird colony, which is home to up to 300,000 breeding seabirds throughout the season (Table 1). The standardised historic monitoring project set up in 2009 has established repeatable baseline census monitoring of the colony and pursues a number of key areas of research required to inform the condition of the site. The results inform the SPA and underlying Site of Special Scientific Interest (SSSI) condition assessments and provide critical data to inform casework and the establishment of a Marine Protected Area (MPA) network.

Table 1: Summary of full colony counts for the Flamborough Head and Bempton Cliffs SPA (FH&BC SPA) between 1969-2017, with the addition of Flamborough and Filey Coast SPA (F&FC SPA) which was officially designated in 2018.

	1969 (FH&BC SPA)	1987 (FH&BC SPA)	2000 (FH&BC SPA)	2008 (FH&BC SPA)	2017 (FH&BC SPA)	2017 (F&FC SPA)
Northern Fulmar (pairs)	532	971	1,360	869	846	1,257
Northern Gannet (pairs)	21	780	2,552	6,386	13,392	13,392
European Shag (pairs)	-	31	31	24	25	25
Great Cormorant (pairs)	-	-	-	-	0	27
Black-legged Kittiwake (pairs)	30,797	85,395	42,582	37,617	45,504	51,535
European Herring Gull (pairs)	1,246	1,143	719	541	351	466
Common Guillemot (individuals)	12,570	32,578	47,215	59,817	84,647	90,861
Razorbill (individuals)	1,724	7,688	8,463	14,956	27,967	30,228
Atlantic Puffin (individuals on sea)	-	-	-	-	2,636*	2,879*
Total number of pairs						149,272**
Total number of individuals						298,544

* Early season count of pre-breeding Puffin rafting on the sea en masse. The count does not provide an accurate census of the breeding population, but rather an index which is hoped to capture large year-to-year changes in the number of birds at this colony.

** Includes Common Guillemot individuals to pairs conversion factor of 0.67 (Birkhead 1978, Harris 1989) $90,861 \times 0.67 = 60,877$ as well as Razorbill individuals to pairs conversion factor of 0.67 (Lloyd 1975, Harris 1989) $30,228 \times 0.67 = 20,253$.

In 2019, the seabird monitoring programme was successfully completed by the Bempton Cliffs Seabird Research Assistant, a seabird research residential volunteer and a dedicated team of staff and volunteers. The mild end to the winter, followed by a cold start to the spring saw birds arriving in large numbers early in the season, then returning back out to sea and trickling back throughout April. The cliffs were found to be full of auks one day and empty the next depending on the conditions. The season's timing felt much more in line with what would be expected, compared to a late start to the season in 2018 due to cold weather fronts in February and March. The coming and going of birds meant that a pre-breeding Puffin count could not be completed in 2019. The first eggs were found in April, with the first Gannet egg on 16 April and the first Guillemot and Razorbill eggs on 22 and 24 April respectively. The first Herring Gull, Kittiwake and Fulmar eggs were recorded on the 7, 17 and 23 May respectively.

2019 was a varied season for the seabirds of the colony (Table 2, Figure 1). Of particular concern, it was a poor year for Herring Gulls, and Kittiwakes continued to have low productivity, similar to the last three years but considerably lower than when the current monitoring programme began in 2009. Guillemot productivity appeared to continue to recover from a low point in 2017, however the Bempton Cliffs reserve continued to have lower productivity than Flamborough Head, possibly due to the presence of Gannets displacing breeding birds off ledges. Razorbills saw a drop in productivity compared to a particularly good year in 2018, but the overall trend since 2009 is positive. Fulmar had a successful year compared to 2018 and appear to be following a general positive trend in productivity. Gannets had the lowest recorded mean productivity since the monitoring programme began (Figure 1) with reports of birds never attempting to breed, or chicks being left unattended on the nest.

The productivity results were as follows (summarised in Table 2):

- Northern Fulmar – 126 pairs were monitored across seven plots from which 60 chicks successfully fledged producing a mean plot productivity of 0.63 (SE \pm 0.1090) chicks per apparently occupied site (AOS) and an aggregated productivity of 0.48 chicks per AOS across all plots.
- Northern Gannet – 264 nests were monitored across five plots from which 196 chicks fledged producing a mean plot productivity of 0.74 (SE \pm 0.0367) chicks per apparently occupied nest (AON) and an aggregated productivity of 0.74 chicks per AON across all plots.
- Black-legged Kittiwake – 961 nests were monitored across 19 plots from which 527 chicks fledged producing a mean plot productivity of 0.55 (SE \pm 0.0368) chicks per AON and an aggregated productivity of 0.55 chicks per AON across all plots.
- European Herring Gull – 113 nests were monitored across six plots from which 66 chicks fledged producing a mean plot productivity of 0.48 (SE \pm 0.1108) chicks per AON and an aggregated productivity of 0.58 chicks per AON across all plots.
- Common Guillemot – 318 pairs were monitored across six plots from which 212 chicks fledged producing a mean plot productivity of 0.66 (SE \pm 0.0687) chicks per AOS and an aggregated productivity of 0.67 chicks per AOS across all plots.
- Razorbill – 391 pairs were monitored across eight plots from which 245 chicks fledged producing a mean plot productivity of 0.63 (SE \pm 0.0364) chicks per AOS and an aggregated productivity of 0.63 chicks per AOS across all plots.

Table 2: Summary of productivity results across the Flamborough and Filey Coast SPA in 2019.

				<i>Productivity</i>		
	No. Plots	AOS or AON	Fledged Chicks	Mean	Aggregate	± SE
Northern Fulmar (AOS)	7	126	60	0.63	0.48	0.1090
Northern Gannet (AON)	5	264	196	0.74	0.74	0.0367
Black-legged Kittiwake (AON)	19	961	527	0.55	0.55	0.0368
European Herring Gull (AON)	6	113	66	0.48	0.58	0.1108
Common Guillemot (AOS)	6	318	212	0.66	0.67	0.0687
Razorbill (AOS)	8	391	245	0.63	0.63	0.0364

N.B: Mean productivity is the average of all the plot productivities, aggregate is the total number of fledged chicks divided by the total number of sites/nests monitored.

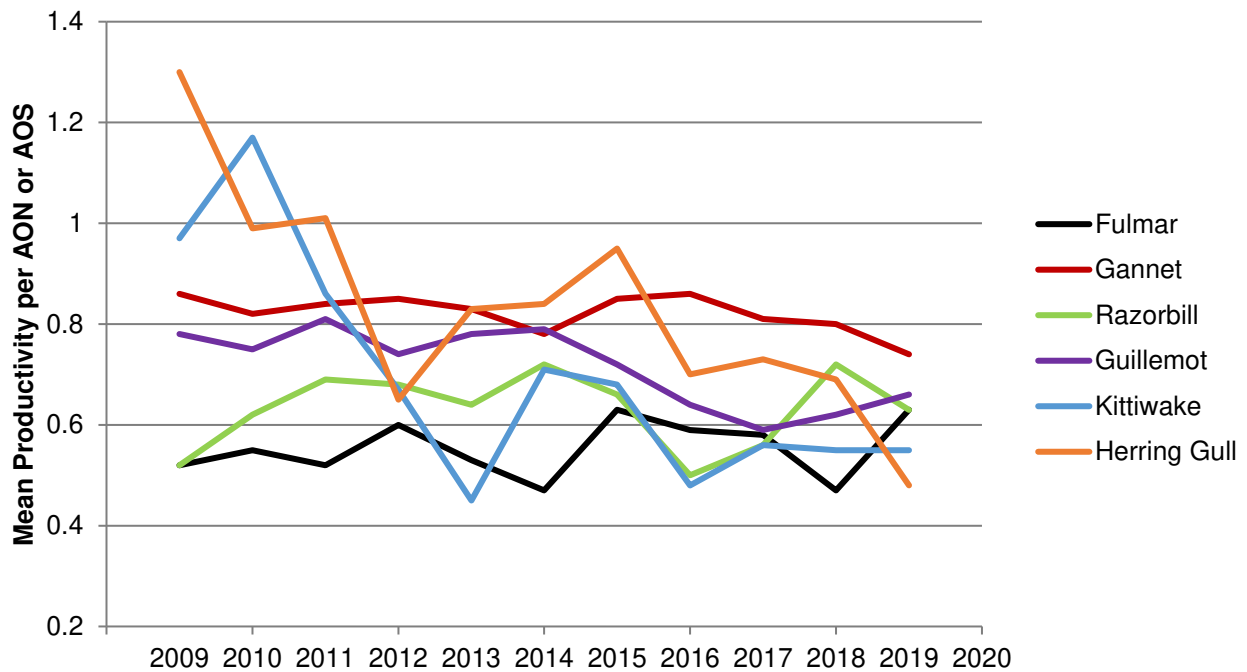


Figure 1: Summary of the productivity trends of the six seabird species monitored from 2009-2019. N.B: Black-legged Kittiwake and Northern Fulmar results include Filey in with the original Flamborough Head and Bempton Cliffs results from 2012 and 2017 respectively.

Kittiwake study-plot counts produced a mean of 1754 AON; a slight increase on 2018, but lower than the previous four years. Guillemot study-plot counts produced a mean of 1472 individuals, the highest recorded count since 2009. Razorbill study-plot counts produced a mean count of 923 individuals, a new record high mean (in a year when we also recorded our highest ever high count of individuals) and in line with the general upward trend since the first counts in 2009 (Figure 2).

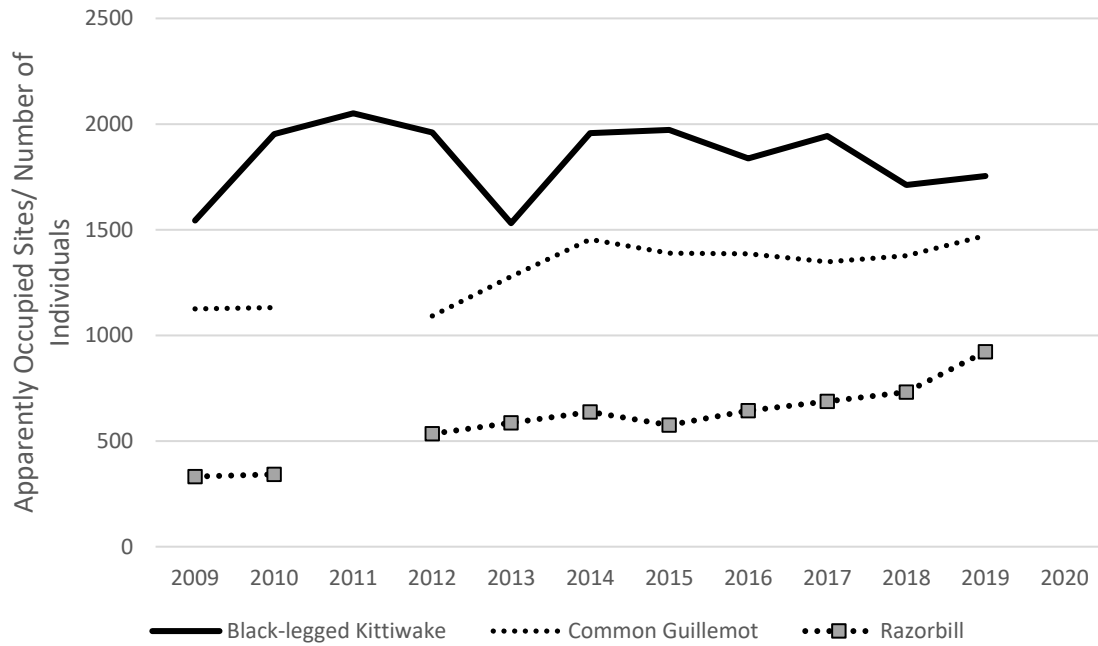


Figure 2: Historic study-plot count results for Black-legged Kittiwake, Common Guillemot and Razorbill from 2009-2019. N.B: Black-legged Kittiwake counted as AON and Guillemot and Razorbill counted as individuals.

Only casual observations of auk chick diet were made in 2019 alongside routine auk productivity monitoring due to a lack of resource to study this thoroughly. Of the observations that were made Guillemot were found to be mainly bringing medium and large Clupeids in for their chicks, while Razorbill chick diet mostly consisted of small and medium sized sandeel sp.

The Bempton Cliffs seabird team continued with a Kittiwake colour ringing project at North Landing, Flamborough Head, which was set up in 2018. Forty-three individuals were re-sighted from 51 ringed last year, and a further 60 birds were colour ringed this season to provide a sample of just over 100 birds. Each bird was fitted with an individually coded darvic ring, as well as a single red colour ring to indicate the year of capture (red=2019, blue=2018). The first re-sighting of a bird from this study outside of Flamborough was recorded on 22 September 2019 in Aberdeen Harbour. This is a long-term study and it will take several years for significant adult survival data to be generated, however it will provide valuable information on the health of our colony in future years.

Recreational disturbance continues to be a threat to the breeding success of the colony. Agreements or voluntary codes of conduct are now in place in respect of angling, personal watercraft and search and rescue training. However, breaches of these codes of conduct are regularly reported throughout the SPA, with clear disturbance effects on the breeding birds of the colony.

Introduction

Background

Seabird population data has been collected within the SPA since at least 1969. In 1969, all species but Shag and Puffin were counted as part of the 'Operation Seafarer' national seabird census. In 1987, all species were counted during the 'Seabird Colony Register' census. All species were counted again in 2000 for the 'Seabird 2000' census, in 2008 and in 2017 as part of the 'Seabirds Count' national seabird census. Whole-colony counts of Gannet were also completed in 1970-77, 1985-94, 1996-99, 2002, 2004-05, 2008-09, 2012 and again in 2015. In addition, whole colony counts for Herring Gull were completed in 2010 and 2014 and for Shag in 2014.

Before the commencement of the Flamborough Head and Bempton Cliffs seabird monitoring programme in 2009, breeding success data for Flamborough/Bempton was collected for Gannet during 1973-79, 1986-94, 1996-98, and 2006. Kittiwake breeding success has been monitored continuously since 1986. Guillemot productivity was monitored during 1991-98 and 2005-06 and Razorbill productivity was monitored in 2005-06. Fulmar and Herring Gull breeding success were monitored for the first time in 2009 and is ongoing. Unfortunately, it is not possible to monitor breeding success for Puffin at this vertical cliff-nesting colony and only limited monitoring of Shag is possible depending on nest site selection.

At Filey, a whole colony count was carried out in 1986 (Williams 1996). In 2002 the 'Seabird 2000' census team identified a significant colony of cliff-nesting seabirds on the cliffs to the north of Filey Bay (Mitchell et al. 2004). The significance of this colony came to light in 2008 in response to large numbers of Guillemot and Razorbill being caught and killed in gillnets set by fishermen in Filey Bay. It was recognised that birds caught in the nets could have originated from either the Flamborough/Bempton or Filey colonies. Unfortunately, at that time there was little current data about the state of the colony at Filey.

The Flamborough and Filey Coast SPA Seabird Monitoring Programme

Flamborough and Filey Coast SPA supports the largest mainland seabird colony in England, the only mainland gannetry in England and one of the largest mainland Kittiwake colonies in the UK. The landward boundary of the SPA generally follows the coast at Flamborough Head from South Landing in the south to Speeton in the north with an additional section from the forefront of Filey Brigg headland to Cunstone Nab. The seaward boundary extends approximately 2km parallel to the coast from the landward boundaries before moving seawards and extends approximately 2km into the marine environment (see maps at Appendix 1).

Flamborough Head is a highly protected site both for its wildlife and unique chalk habitats. The site is designated as a European Marine Site, a Special Area of Conservation, a Special Protection Area, a Site of Special Scientific Interest and a Heritage Coast site which includes three Local Nature Reserves, as well as RSPB Bempton Cliffs nature reserve and the Yorkshire Wildlife Trust Flamborough Cliffs nature reserve.

At the north end of the SPA the Filey Brigg SSSI falls within the SPA and the Gristhorpe Bay and Red Cliff SSSI is just to the north of the SPA.

The Flamborough and Filey Coast SPA qualifies under Article 4.2 of the EU Birds Directive for the following reasons:

- It supports over 1% of the biogeographical population of four regularly occurring migratory species: Black-legged Kittiwake (*Rissa tridactyla*); Northern Gannet (*Morus bassanus*); Common Guillemot (*Uria aalge*); and Razorbill (*Alca torda*).
- It supports a breeding seabird assemblage of European importance; during the breeding season the area regularly supports up to 300,000 breeding seabirds.

Due to the importance of the seabird colony and level of site protection, Natural England and the RSPB proposed in 2008 a project to enable a baseline count, population monitoring and further research to collect data on the health of the colony and the Flamborough Head and Bempton Cliffs SPA and underpinning SSSIs. This proposal led to the establishment of the Flamborough Head and Bempton Cliffs seabird monitoring programme, which began with the 2009 seabird breeding season.

In 2009 there was also evidence to suggest that the cliffs northwest of Bempton supported a sizeable colony that might also meet the EU Birds Directive criteria. A boat-based whole colony count of the breeding seabird assemblage nesting on the cliffs between Filey Brigg and Cayton Bay was carried out by the RSPB. The results suggested that the total number of breeding seabirds in this colony exceeded 20,000 birds, and therefore this site also met SPA qualifying criteria. In response to this evidence the RSPB, with funding support from Natural England, completed five consecutive years of colony count data to verify these findings. This data supported the proposed extension of the existing Flamborough Head and Bempton Cliffs SPA to include Filey Cliffs to create the Flamborough and Filey Coast SPA, which was formally designated in November 2018.

The data collected by the now enlarged Flamborough and Filey Coast seabird monitoring programme will inform the condition and management of the Flamborough and Filey Coast SPA and underpinning SSSI's. In addition, the results will also inform current and new planning enquiries and environmental assessments e.g. the proposed Hornsea and Dogger Bank offshore wind arrays that may have a detrimental impact on the features of the designated sites. It is also hoped that seabird tracking data collected from the colony will inform potential new offshore MPAs.

Data collected will also be used to inform the Seabird Monitoring Programme (SMP) coordinated by Joint Nature Conservation Committee (JNCC), the RSPB's Annual Reserve Monitoring (ARM) programme, the RSPB Bempton Cliffs reserve management plan and the Yorkshire Wildlife Trust's reserve management.

The key aims of the seabird monitoring programme, and how they are currently implemented, are as follows:

- **Understanding variation and trends in seabird productivity**

Northern Fulmar, Northern Gannet, Black-legged Kittiwake, European Herring Gull, Common Guillemot and Razorbill plots have been monitored for breeding productivity annually since 2009.

- **Understanding population numbers and trends**

Black-legged Kittiwake, Common Guillemot and Razorbill study-plot counts have been carried out annually since 2009. A whole colony census was carried out in 2008 and repeated in 2017. It is intended that a whole colony count be completed every five years within the reserve's management plan cycle.

- **Understanding the relationship between the colony and the larger marine environment**

As the relevant technologies improve we hope to better understand foraging behaviours of birds breeding in the colony and to identify preferred foraging areas and trends in provisioning such as determining key feeding areas for key species, and the factors that influence their location. This includes ongoing seabird tracking, currently focused on Black-legged Kittiwake, and monitoring of Common Guillemot diet composition. In the future this could extend to range finders, remote tracking, and increased use of fish population modeling data and benthic mapping.

- **Understanding how RSPB Bempton Cliffs relates to wider SPA and potential impacts on disturbance by developing research proposals to address the following management issues**

What are the types of human activities that could disturb the colony and what are their effects? Currently recreational disturbance is monitored and recorded by Bempton Cliffs and others on an ad-hoc basis. For those activities that are of particular concern, we hope to develop specific research proposals which assess level of impact.

The annual programme of monitoring is coordinated by the RSPB Bempton Cliffs seabird team lead by the reserve Warden, the Seabird Research Assistant and a team of dedicated volunteer seabird researchers including members of Flamborough Bird Observatory (FBO) and Filey Bird Observatory & Group (FBOG).

The results of the 2019 Flamborough and Filey Coast SPA seabird monitoring programme are detailed in this report. Access to the monitoring data collected during the seabird monitoring programme is available to researchers and conservation organisations by agreement with RSPB.

Productivity monitoring

Productivity monitoring was completed for the eleventh consecutive year for six of the eight breeding seabird species found in the colony: Fulmar, Gannet, Kittiwake, Herring Gull, Guillemot and Razorbill. A small number of Shag nests at Flamborough Head were monitored for the fifth year. Unfortunately, it is not possible to monitor Puffin productivity at this cliff-nesting colony.

The Flamborough and Filey Coast SPA seabird monitoring programme follows the methods and guidelines set out in the '*Seabird monitoring handbook for Britain and Ireland*' (Walsh et al., 1995 – "the Handbook" hereafter), which summarises census and productivity monitoring techniques for seabirds at colonies in Britain and Ireland. The appropriate methods are followed for each species at this colony taking into account the resources available and the physical geography of the site. All productivity monitoring is based on marking apparently occupied sites (AOS) or apparently occupied nests (AON) on a laminated photograph of the relevant plot. Please refer to the Handbook for more details on methodologies for each species and survey undertaken.

The productivity monitoring plots were identified when the Flamborough Head and Bempton Cliffs seabird monitoring programme was established in 2009. Plots were selected with a view to providing, where possible, a sample size in the region of 50 AOS or AON per plot and a total sample in excess of 250 AOS/AON for each species, while providing safe vantage points for the observer with little or no disturbance to breeding seabirds. In 2011, five additional monitoring plots for Kittiwake were established at Filey Cliffs in conjunction with the census work at Filey which led to the extension of the Flamborough Head and Bempton Cliffs SPA to include Filey Cliffs; in 2014 one of the original plots was dropped as it was too difficult to observe and an additional monitoring plot added on Filey Brigg. In 2017, two additional Fulmar plots were added at Cunstone Nab at the north end of Filey Cliffs in an effort to extend the monitoring of other species to Filey. Indicative maps of the productivity plot locations are included in Appendix 2. In 2019, a small Herring Gull plot was added at Swineshaw Hole, which was monitored alongside regular Razorbill productivity monitoring.

As recommended by the Handbook, we present productivity calculated as the mean of the individual plot results for each species as well as presenting species productivity data by aggregating the results of each plot (total chicks fledged / total nests (or sites) monitored).

Northern Fulmar *Fulmarus glacialis*

Seven productivity plots were monitored including the two plots at Cunstone Nab at the north end of Filey Cliffs which have been monitored for the last two years. Plots were photographed in early May and AOS were marked on the laminated photographs over three visits over the late May/early June period. A final visit was made in early-mid August and large chicks present at that time were assumed to have fledged.

Mean productivity for Fulmar was 0.63 (SE \pm 0.1090) chicks per AOS. A total of 126 AOS were monitored across the seven plots, from which 60 chicks successfully fledged (Table 3, Figure 3). The mean productivity for Fulmar recorded between 1986-2005 from between thirteen and forty-one colonies annually was 0.41 (SE \pm 0.01) chicks per AOS (Mavor et al., 2008).

Table 3: Northern Fulmar productivity 2019. Plots added in 2017 are marked *.

Plot	AOS	Fledged chicks	Productivity ch/pr
*Cunstone Nab A	43	18	0.42
*Cunstone Nab B	30	12	0.40
New Roll-up	3	3	1.00
Old Dor	22	10	0.45
Newcombe	5	5	1.00
Breil Nook	9	7	0.78
Swineshaw Hole	14	5	0.36
Aggregate productivity	126	60	0.48
Mean of plot results		0.63	± 0.1090
Original plots aggregate	53	30	0.57
Mean of original plots		0.72	± 0.1347

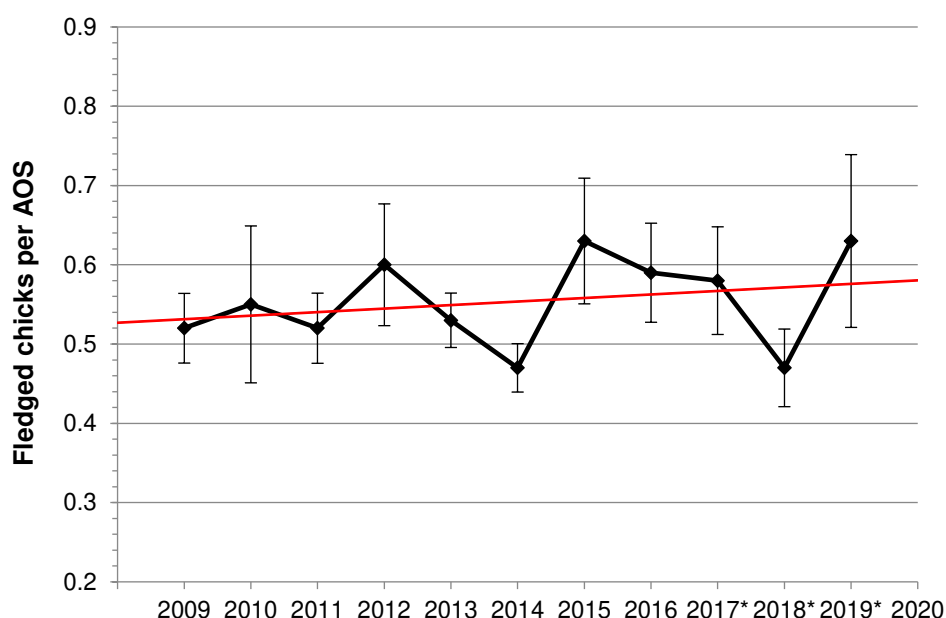


Figure 3: Northern Fulmar productivity 2009-2019, mean of plot productivity results plus/minus SE. *Note: the mean productivity from 2017 onwards includes plots in Flamborough, Bempton and Filey, compared to just Flamborough and Bempton from 2009-2016.

Fulmar productivity recovered after a poor year in 2018, however there was a large variation between plots. A considerable difference was found between the mean and aggregate values (0.63 and 0.48 respectively), with a large standard error, showing the variation in plot results, from 0.38 to 1.00 chicks fledged per pair. From 2017 the two Filey plots, Cunstone Nab A and B, were included in the mean and aggregate productivity values.

Northern Gannet *Morus bassanus*

Five productivity plots were monitored between late April and October. Plots were photographed in mid to late April and up to 50 or 60 AON were marked on the laminated photographs. The plots were then visited every 7-10 days. Average visit time early in the season was 2 to 2.5 hours per plot but reduced dramatically once chicks got larger and were more visible. Presence of an egg or chick was recorded (if seen) each visit.

Mean productivity for Gannet was 0.74 (SE ± 0.0367) chicks per AON. A total of 264 AON were monitored across the five plots, from which 196 chicks successfully fledged (Table 4, Figure 4). The mean productivity for Gannet recorded between 1986-2005 from between three and six colonies annually was 0.69 (SE ± 0.01) chicks per AON, (Mavor et al., 2008).

Table 4: Northern Gannet productivity 2019.

Plot	AON	Fledged chicks	Productivity ch/pr
Jubilee Corner	54	45	0.83
Nettletrip	52	43	0.83
Staple Newk 1	52	35	0.67
Staple Newk 2	52	37	0.71
Staple Newk 3	54	36	0.67
Aggregate productivity	264	196	0.74
Mean of plot productivity ch/pair		0.74	± 0.0367 SE

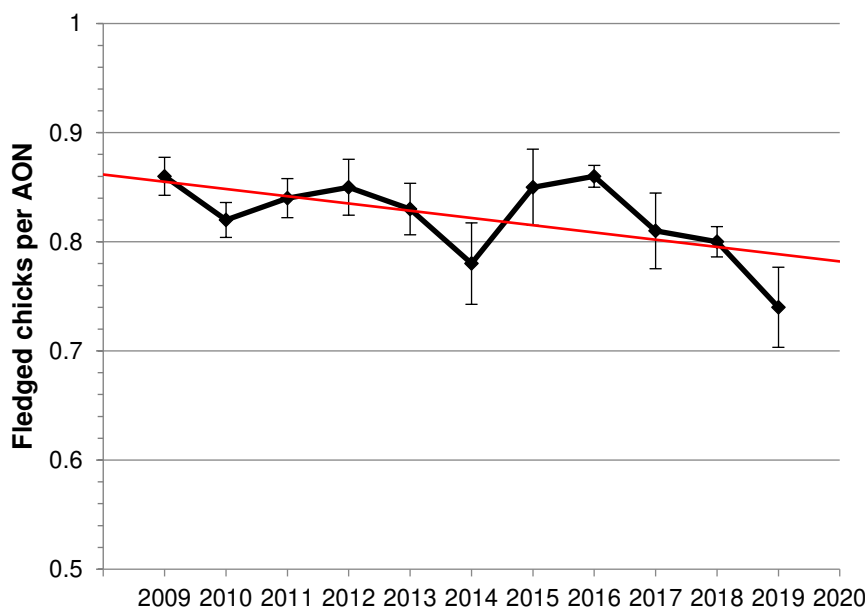


Figure 4: Northern Gannet productivity 2009-2019, mean of plot productivity results plus/minus SE.

Gannet productivity was the lowest recorded since the monitoring began in 2009, with 0.74 chicks fledged per pair. The norther end of the colony appeared to be more successful, with the two plots at Jubilee and Nettletrip, however the three plots at Staple Newk at the southern end had a much lower productivity than historic values. Volunteers reported many birds building nests but never attempting to breed, some eggs never hatching, and chicks left unattended on the nest.

European Shag *Phalacrocorax aristotelis*

Six Shag nests were monitored by a dedicated volunteer at Breil Nook and Saddle Nook in Flamborough from late April to late August. These nests were not selected at random and were the only nests visible from existing seabird monitoring points. A breeding site on the south face of Saddle Nook was monitored for the first time in 2019. The nests were marked on laminated photographs of the cliffs and were monitored weekly for 1 to 2 hours each visit. Presence and number of eggs or chicks (to the extent visible) were recorded on each visit.

Of the nests observed, three of the clearly visible nests each fledged three chicks. One nest which was impossible to see into until the chicks were large had one large chick seen at the entrance late in the season, the remaining two nests had at least two large chicks seen at the entrance.

It is therefore estimated from this small sample that Shag productivity at Flamborough Head was 2.33 chicks per AON.

Black-legged Kittiwake *Rissa tridactyla*

Nineteen productivity plots were monitored across the SPA between May and August, 16 plots were monitored between Flamborough and Bempton and three plots in Filey. Following the successful SPA extension in the autumn of 2018, the Filey plots were included into the productivity calculations with Flamborough and Bempton from 2012 onwards.

Plots were photographed in early to mid-May and up to 50 or 60 AON were marked on the laminated photographs. Plots were then visited every week, ideally on the same day so visits were seven days apart. Presence and number of eggs or chicks at each AON was recorded (if seen) each visit. Volunteers were also asked to record chick size using standard codes, but not all did. Average visit times varied according to the volunteer, but 1 to 1.5 hours per visit was typical.

Two plots at the far extremity of the colony in Filey (Filey 9 and 10) were not monitored in the last two years but were regularly visited at the start of the season in 2019 to check for any signs of nest building. No birds were present on Plot 10 on any of the visits, however the number of pairs on Plot 9 increased throughout the start of the season and was therefore monitored in 2019.

Mean productivity for Kittiwake across the SPA was 0.55 (SE \pm 0.0438) chicks per AON. A total of 961 AON were monitored across 19 plots, from which 527 chicks successfully fledged (Table 5, Figure 5). The mean productivity for Kittiwake recorded between 1986-2005 from between thirty and sixty-one colonies annually was 0.68 (SE \pm 0.03) chicks per AON (Mavor et al., 2008).

Table 5: Black-legged Kittiwake productivity 2019.

Plot	AON	Fledged chicks	Productivity ch/pr
Jubilee Far	50	27	0.54
Bartlett Nab Near	54	25	0.46
Bartlett Nab Far	50	23	0.46
Grandstand North Near	50	28	0.56
Grandstand North Near Edge	50	21	0.42
Grandstand North Mid	50	32	0.64
Grandstand North Far Edge	-	-	-
Grandstand North Low	50	23	0.46
Old Dor	50	34	0.68
Newcombe	50	23	0.46
Back of Newcombe	55	44	0.80
Carter Lane 1	52	23	0.44
Carter Lane 2	-	-	-
Saddle Nook 1	-	-	-
Saddle Nook 2	50	21	0.42
Saddle from Breil	45	24	0.53
Breil Nook North	-	-	-
Breil Nook South	-	-	-
Back of Breil Nook	52	42	0.81
Swineshaw Hole	49	29	0.59
Lighthouse	51	44	0.86
Filey 1 (Filey Brigg)	50	35	0.70
Filey 7	50	29	0.58
Filey Cayton 9a	53	0	0.00
Aggregate productivity	961	527	0.55
Mean of plot productivity ch/pair		0.55	± 0.0438

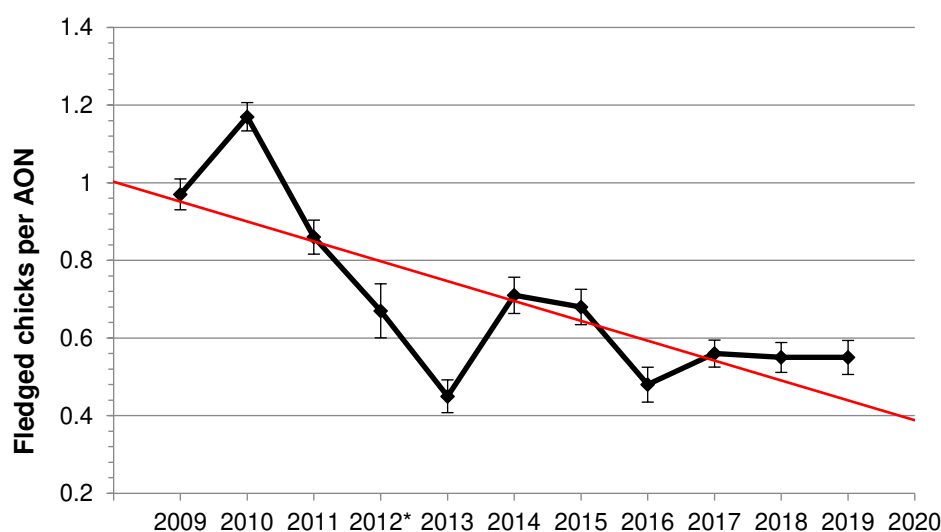


Figure 5: Black-legged Kittiwake productivity 2009-2019. Mean of plot results, plus/minus SE. *Note: 2009-2011 shows the mean of plots results in Flamborough and Bempton, 2012-2019 shows the mean of plots results for the whole colony including Filey.

There continues to be a difference in productivity between the plots in Flamborough, Bempton and Filey, with those at Flamborough Head being most successful (Figure 6).

The productivity in Filey has varied considerably since 2012 (Figure 6), however so has the number of plots monitored every year. In 2019, three plots were monitored including one at Cunstone Nab (Filey Cayton 9a), which didn't fledge any chicks from 53 AON. This was suspected to be due to predation from Herring Gulls, taking chicks off the nest when left unattended.

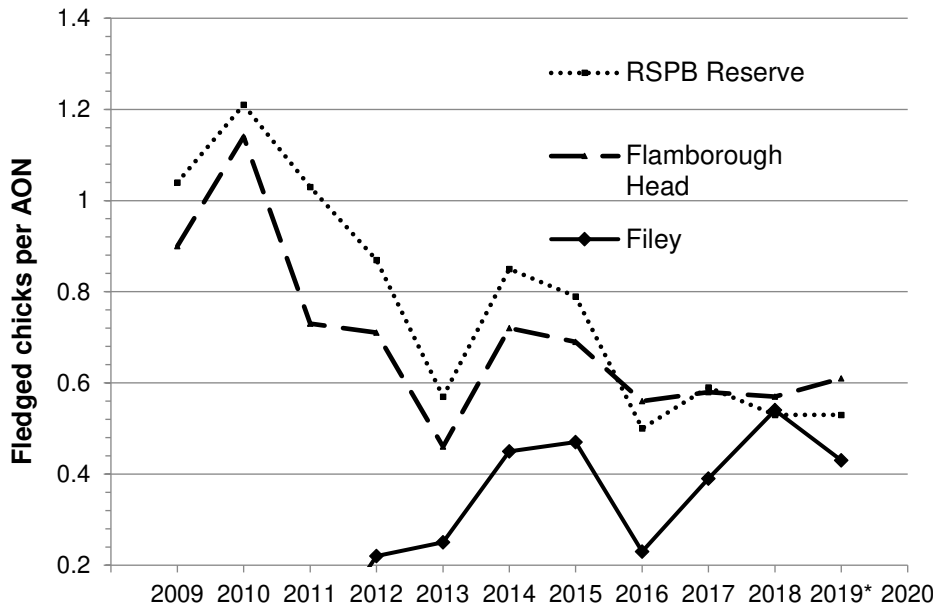


Figure 6: Black-legged Kittiwake productivity 2009-2019 comparing plots between RSPB Bempton Cliffs reserve (dotted line), Flamborough Head (dashed line) and Filey (solid line). Result for each year is the mean of the relevant plot results.

European Herring Gull *Larus argentatus*

Six productivity plots were monitored between May and August, including an additional new small plot at Swineshaw Hole, monitored alongside regular auk monitoring. Two of the plots are linear and include all safely observable nests found on a defined stretch of cliff. One linear plot is at Bempton Cliffs and one is at Flamborough Head. Plots were photographed around early/mid-May and AON were marked on laminated photographs over two visits. Additional AON may have been added over the course of the season. Plots were then visited every week, ideally on the same day so visits were seven days apart. Presence and number of eggs or chicks for each AON are recorded (if seen) each visit. Volunteers are also asked to use size codes for chicks but not all do. Average visit time varied according to the volunteer, but 1 to 2 hours per visit was typical.

Mean productivity for Herring Gull was 0.48 (SE \pm 0.1108) chicks per AON. A total of 113 AON were monitored across six plots, from which 66 chicks fledged successfully (Table 6, Figure 7).

Table 6: European Herring Gull productivity 2019.

Plot	AON	Fledged chicks	Productivity ch/pr
Jubilee to Old Dor	29	15	0.52
Newcombe North	9	3	0.33
The Saddle Rock	27	19	0.70
Breil Nook Stack	18	12	0.67
Newcombe to Breil	26	17	0.65
Swineshaw Hole	4	0	0.00
Aggregate productivity	113	66	0.58
Mean of plot productivity ch/pair		0.48	± 0.1108

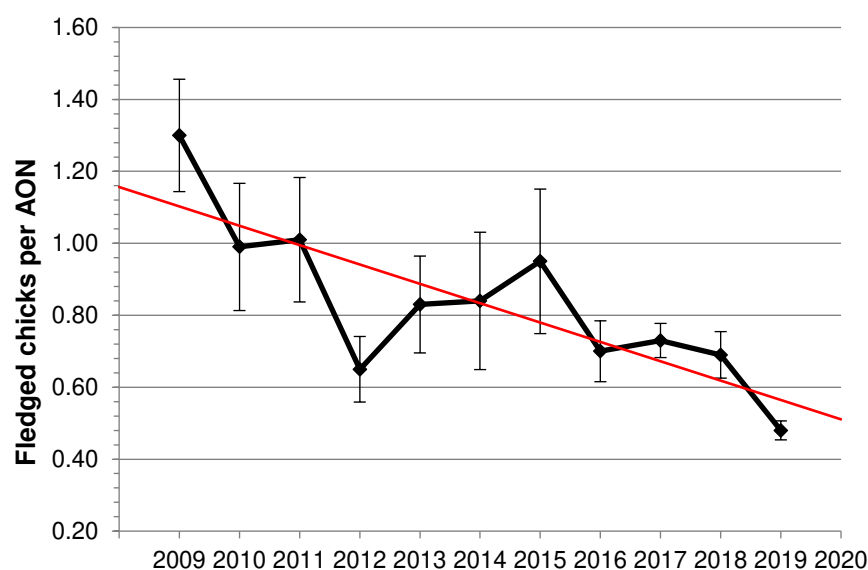


Figure 7: European Herring Gull productivity 2009-2019, mean of plot results plus/minus SE.

Herring Gull productivity took a plunge in 2019, with the lowest recorded productivity since the monitoring programme began in 2009. Returning to a plot week after week expecting more failed nests appeared to be the feeling among monitoring volunteers, with nests failing both at the egg and chick stage. It is difficult to know the causes of such low productivity, but possible causes include lack of suitable prey or stormy weather conditions during the critical chick rearing period.

While Herring Gulls appear to be struggling on the cliffs, very little is known about the urban Herring Gull population in the neighbouring towns of Bridlington, Filey and Scarborough, where productivity could be higher.

The addition of a small number of nests at Swineshaw Hole and a few new nests on other plots meant that the number of apparently occupied nests monitored in 2019 provided the largest sample since the current monitoring programme commenced in 2009 (Figure 8).

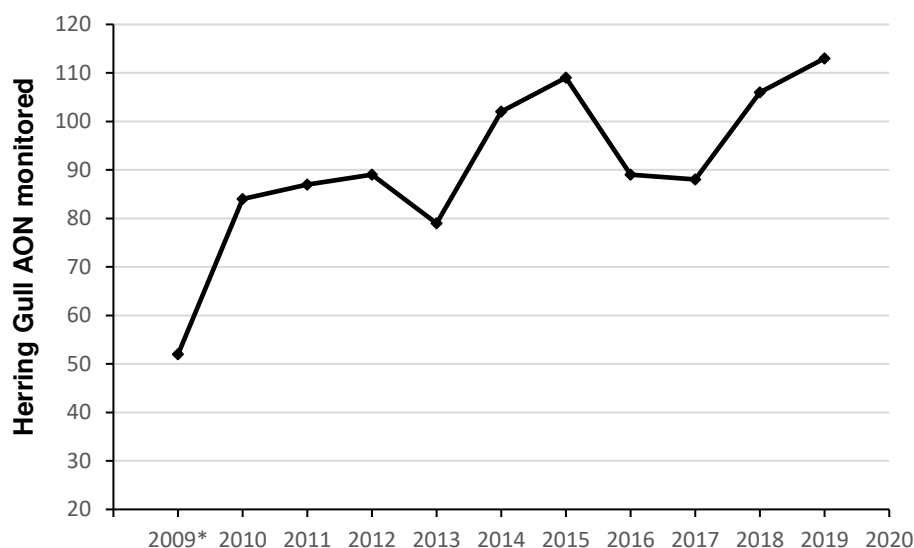


Figure 8: European Herring Gull AON monitored 2009-2019; *In 2009 only three plots were monitored, from 2010-2018 five plots were monitored, and in 2019 six plots were monitored.

Common Guillemot *Uria aalge*

Six productivity plots were monitored between late April and end of July. Plots were photographed in late April/early May and up to 50 to 60 AOS were marked on the laminated photographs over two visits. Plots were then visited every third day. Additional sites may have been added over the course of the season, especially if it was hard to get 50 AOS. Presence of an egg or chick was recorded (if seen) each visit. Average visit time early in the season was 2 to 2.5 hours, but reduced once chicks got larger and were more visible.

Mean productivity for Guillemot was 0.66 (SE \pm 0.0687) chicks per AOS. A total of 318 AOS were monitored across six plots, from which 212 chicks successfully fledged (Table 7, Figure 9). The mean productivity for Guillemot recorded between 1986-2005 from between three and fifteen colonies annually was 0.69 (SE \pm 0.02) chicks per AOS (Mavor et al., 2008).

Table 7: Common Guillemot productivity 2019.

Plot	AOS	Fledged chicks	Productivity ch/pr
Nettletrip	50	19	0.38
Grandstand North	47	25	0.53
Grandstand South	55	40	0.73
Carter Lane 1	54	43	0.80
Carter Lane 2	55	40	0.73
Breil Nook	57	45	0.79
Aggregate productivity	318	212	0.67
Mean of plot productivity ch/pair		0.66	\pm 0.0687

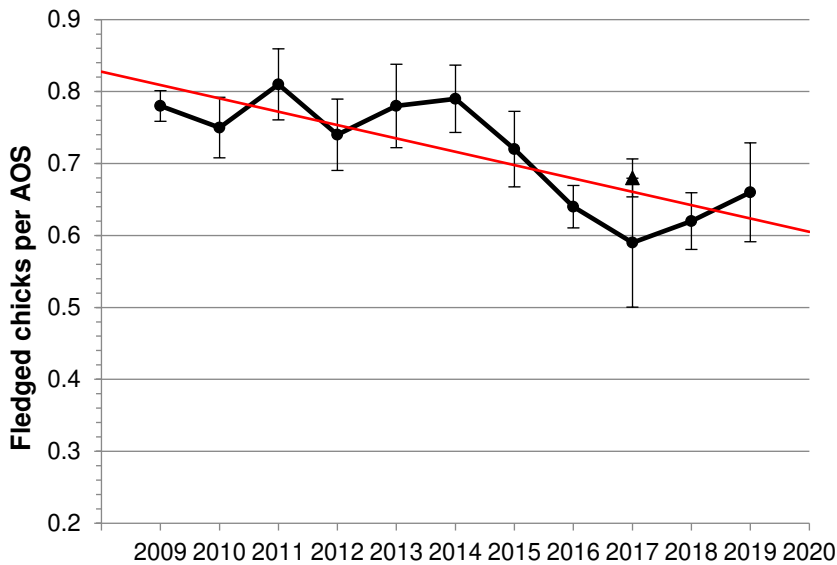


Figure 9: Common Guillemot productivity 2009-2019, mean of plot results plus/minus SE. ▲ = mean of 2017 plot results excluding Grandstand North plus/minus SE.

In 2019 Guillemot productivity continued to improve following a low point in 2017, however, it continues to follow a general slow downward trend (Figure 9). A significant difference in productivity was observed between the Bempton Cliffs and Flamborough Head plots, especially on the two plots with most Gannet activity, Nettletrip and Grandstand North (Figure 10). One particular Guillemot ledge at Nettletrip, which was occasionally occupied by a Gannet in previous years, was regularly occupied in 2019, including by a pair on one occasion, displacing breeding Guillemots off the ledge. Many Guillemot and Gannet interactions were observed throughout the monitoring season, with eggs and chicks being lost as a result of conflict on ledges.

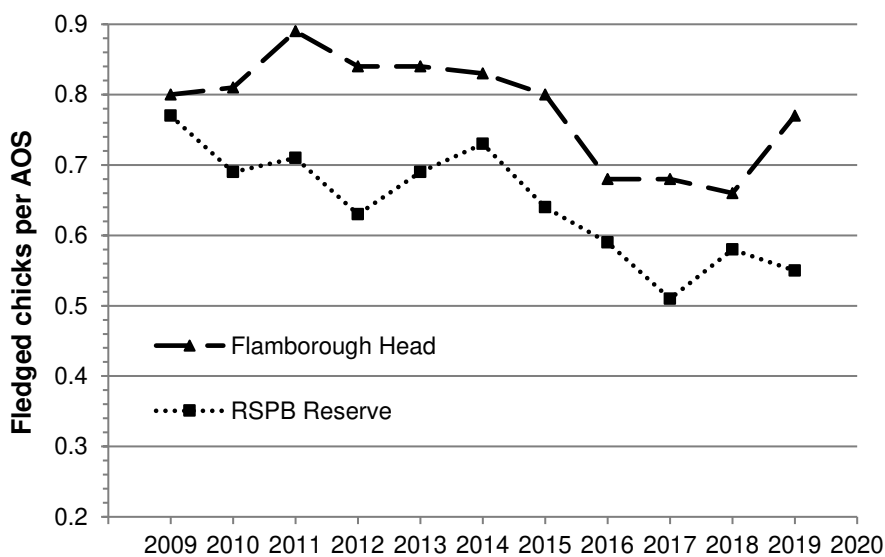


Figure 10: Common Guillemot productivity 2009-2019 comparing plots on the RSPB Bempton Cliffs reserve (three plots; dotted line) and at Flamborough Head (three plots; dashed line). Result for each year is the mean of the relevant plot results.

Razorbill *Alca torda*

Eight productivity plots were monitored between late April and the end of July. Plots were photographed in late April/early May and up to 50 to 70 AOS were marked on the laminated photographs over two visits. Plots were then visited every third day. Additional sites could be added over the course of the season, especially if it was hard to get 50 AOS. Presence of an egg or chick was recorded (if seen) each visit. Average visit time early in the season was 2 to 2.5 hours, but reduced once chicks got larger and were more visible.

Mean productivity for Razorbill was 0.63 (SE \pm 0.0364) chicks per AOS. A total of 391 AOS were monitored across eight plots, from which 245 chicks successfully fledged (Table 8, Figure 11). The mean productivity for Razorbill recorded between 1986-2005, from between one and seven colonies annually, was 0.65 (SE \pm 0.02) chicks per AOS (Mavor et al., 2008).

Table 8: Razorbill productivity results 2019.

Plot	AOS	Fledged chicks	Productivity ch/pr
Grandstand Gully	35	25	0.71
Grandstand North	56	29	0.52
Grandstand South	53	24	0.45
Newcombe	56	37	0.66
Back of Newcombe	46	28	0.61
Saddle Nook	45	33	0.73
Breil Nook	50	32	0.64
Swineshaw Hole	50	37	0.74
Aggregate productivity	391	245	0.63
Mean of plot productivity ch/pair		0.63 \pm 0.0364 SE	

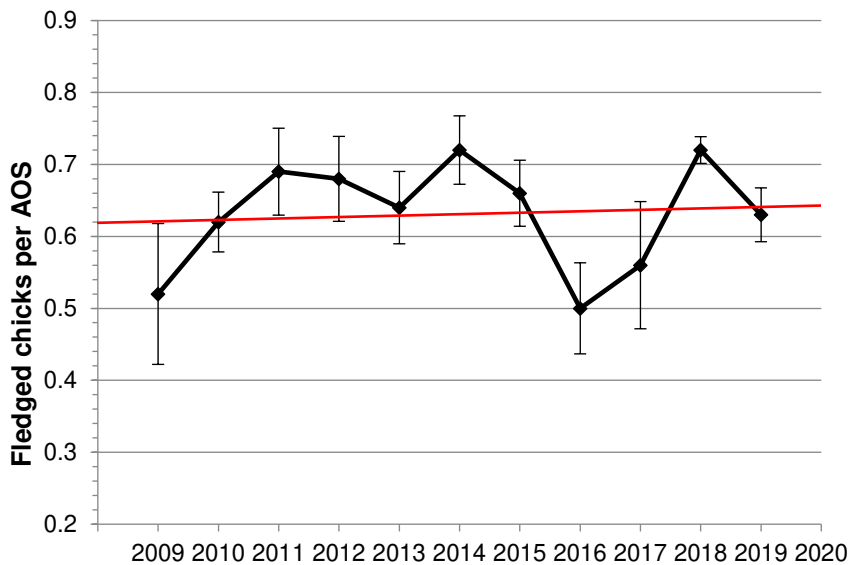


Figure 11: Razorbill productivity 2009-2019, mean of plot results plus/minus SE.

Razorbill productivity in 2019 dropped following a particularly good year in 2018, but the general trend is for a gradual increase in productivity since 2009 (Figure 11). Two plots on the reserve, Grandstand North and Grandstand South, had particularly low productivity in 2019, with eggs and chicks regularly failing on one or two breeding attempts. Some displacement activity was observed at Grandstand South throughout the season, with Fulmar and Gannet seen on both Razorbill and Guillemot breeding ledges, possibly explaining the low productivity.

A Carrion Crow nest at Saddle Nook was observed whilst carrying out productivity monitoring, and appeared to fledge at least five chicks, however this seemed to have very little effect on the Saddle Nook Razorbill plot, which had a productivity of 0.73 chicks per AON.

A difference can still be observed between the productivity of the Bempton Cliffs reserve plots and the Flamborough Head plots in 2019 (Figure 12). Both parts of the colony had a lower productivity compared to 2018, however Flamborough Head continues to have a higher productivity than the reserve.

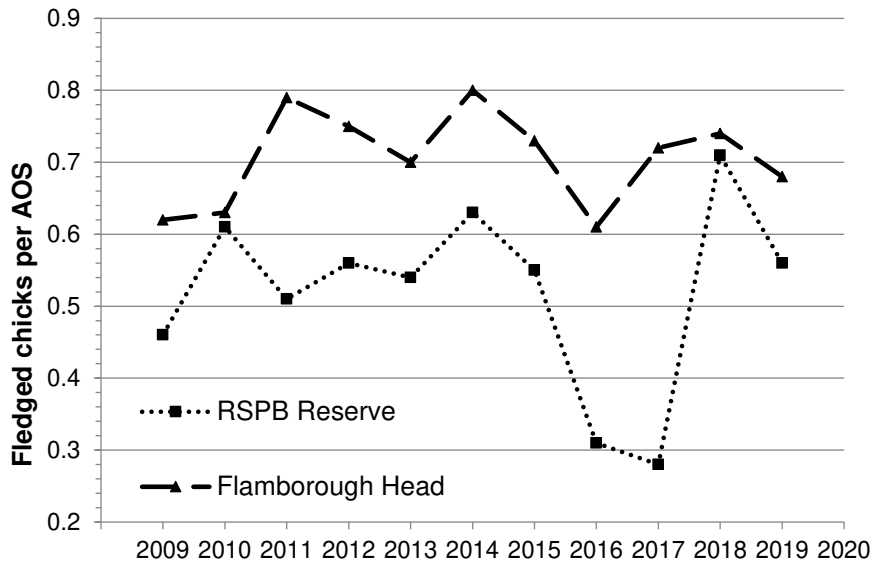


Figure 12: Razorbill productivity 2009-2019 comparing plots between RSPB Bempton Cliffs reserve (three plots; line) and Flamborough Head (usually five plots; dashed line). Result for each year is the mean of the relevant plot results.

Early season Atlantic Puffin survey

An early season Puffin survey has been carried out or attempted for the last four years, in an attempt to study large scale trends and changes in Puffin numbers throughout the Flamborough and Filey Coast SPA. The methodology for this survey is based on advice from Professor Mike Harris, who recommended that we count adults staging on the sea when large numbers of birds return to the colony at the very start of the season (M Harris pers. Comm., 2016). This unfortunately cannot be considered an accurate census of the breeding population; however it is useful to observe year-on-year changes.

Puffin numbers were monitored on the sea every morning from late-March to late-April in order to catch the arrival of Puffins in big numbers. While numbers fluctuated from day to day, with a few high counts of 100+ individuals, birds did not return in the numbers to be expected in order to carry out the survey. This could be due to the mild end of winter, followed by a cold early spring, meaning some birds were returning to the colony, but not settling on the cliffs with large numbers of birds returning back out to sea and trickling back to the colony in steady numbers. A survey was therefore not carried out in 2019, as it would not have provided a comparable figure to previous and future years.

The table below shows the data for the previous three years:

Table 9: Results of the early season Atlantic Puffin counts 2016-2018.

	Flamborough Head to Thornwick	Thornwick to Speeton	Filey	SPA Total (not incl Filey)	SPA Total
2016	805	1462	n/a	2267	n/a
2017	712	1924	243	2636	2879*
2018	493	3612	174	4105	4279

* Estimated that several hundred birds were on the cliffs along the length of the colony; these were not included in the survey.

Study-plot counts

The size and nature of the Flamborough and Filey Coast SPA colony means that it is not practicable to conduct annual whole colony population monitoring. Accordingly, study-plots for population monitoring of Kittiwake, Guillemot and Razorbill were established at Flamborough and Bempton in 2009. Plots were selected to be dispersed through the colony as randomly as possible given the need to provide a safe vantage point and minimise disturbance to breeding birds. Counts have been conducted each year since 2009 (except 2011, when counts of Guillemot and Razorbill were abandoned due to an early breeding season).

For each species the same plots are used each year as required by the Handbook; plot boundaries, based on clear cliff features, are marked on laminated photographs of the relevant area of cliff. Indicative maps of the study-plot locations at Flamborough and Bempton are included in Appendix 3.

The Handbook suggests that study-plot counts are not recommended for general use when counting Kittiwake, as population changes may not be detected due to movements within the colony or colony extensions, or losses rather than through changes of density across the colony. However, as the SPA holds one of the largest mainland populations in the UK, it is important that trends are monitored.

Black-legged Kittiwake study-plot counts

Seven study-plots were counted between 0800 and 1600 on at least two occasions during the period from 1 June to 22 June. The mean of the two counts was 1754 AON (Table 10), a similar count to 2018, but lower than the previous four years. The first count in early June remained the highest of the two counts, in line with the monitoring observations of birds building nests and failing or abandoning the nest early.

Table 10: Black-legged Kittiwake study-plot count results – last five years.

Visit	2015 AON Total	2016 AON Total	2017 AON Total	2018 AON Total	2019 AON Total
1	1966	1858	1945	1733	1802
2	1977	1816	1940	1688	1705
Mean	1972	1837	1943	1711	1754

While Kittiwake numbers appear to have remained steady since the study-plot counts began in 2009 (Figure 13), the decreasing productivity of Kittiwake throughout the colony could be a cause for concern for numbers in future years.

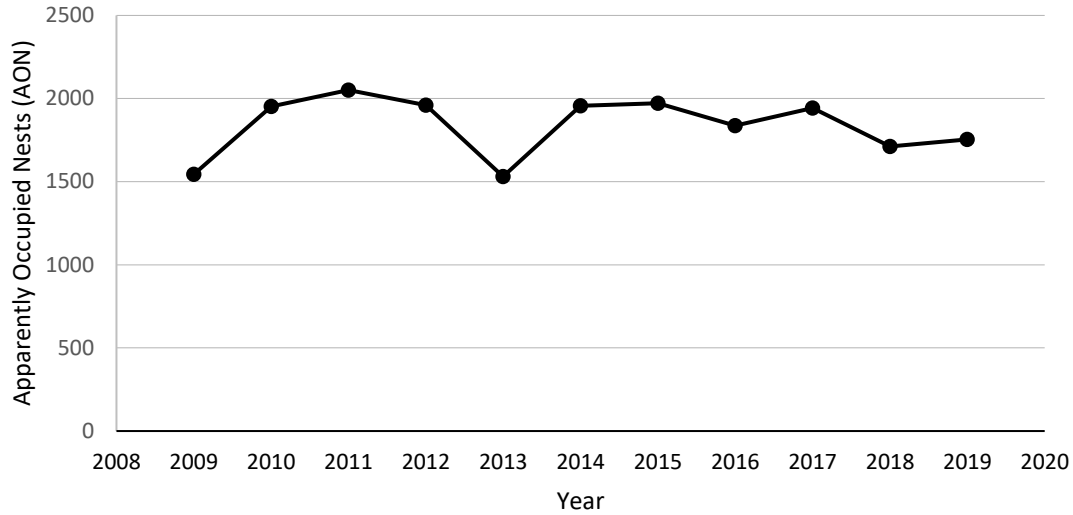


Figure 13: Number of Black-legged Kittiwake AON from 2009-2019 across seven study-plot areas.

Common Guillemot study-plot counts

Seven study-plots were counted between 0800 and 1600 on five occasions during the period from 1 June to 22 June. The mean of the study-plot counts for Guillemot was 1472 IND (Table 11). This was the highest mean Guillemot count to date since the study plot counts begun in 2009.

Table 11: Common Guillemot study-plot count results – last five years.

Count	2015 Total Ind	2016 Total Ind	2017 Total Ind	2018 Total Ind	2019 Total Ind
1	1396	1491	1335	1265	1486
2	1410	1342	1428	1363	1416
3	1494	1361	1424	1424	1428
4	1420	1351	1323	1460	1553
5	1226	n/a	1231	1372	1478
Mean	1389	1386	1348	1377	1472

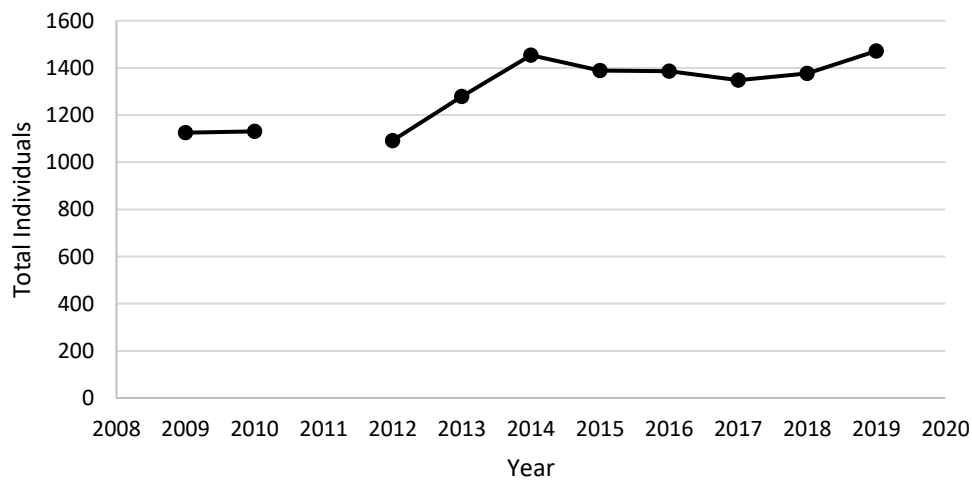


Figure 14: Total number of individual Common Guillemots from 2009-2019 across seven study-plot areas.

Razorbill study-plot counts

Seven study-plots were counted between 0800 and 1600 on five occasions during the period from 1 June to 22 June. The mean of the study-plot counts for Razorbill was 923 IND (Table 12); this is the highest mean count and high count recorded since 2009. This is in line with the general upward trend of Razorbill numbers since the first counts in 2009, and with the results of the whole colony count in 2017.

Razorbills have been seen laying on many new sites and ledges, including Kittiwake platforms and Fulmar nest sites, possibly due to the increase in population numbers or displacement by other seabirds, with birds looking for new breeding sites.

Table 12: Razorbill study-plot count results – last five years.

Count	2015 Total Ind	2016 Total Ind	2017 Total Ind	2018 Total Ind	2019 Total Ind
1	592	570	731	753	832
2	535	654	700	718	842
3	662	686	657	766	859
4	607	660	689	766	1004
5	482	n/a	658	650	1077
Mean	576	643	687	731	923

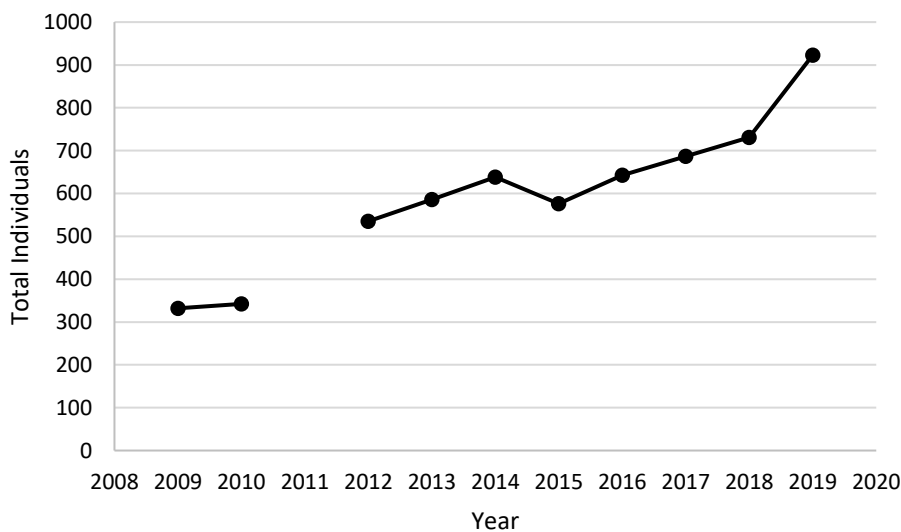


Figure 15: Total number of individual Razorbills from 2009-2019 across seven study-plot areas.

Common Guillemot and Razorbill chick diet study

In 2019, only casual diet observations were recorded over the course of the productivity monitoring period, by the Seabird Research Assistant and the seabird research residential volunteer. Any birds which returned with a single or several fish were observed and the details recorded, including date, time and location. The fish were identified as sandeel sp., Clupeid, Gadoid or Other/Unknown, and were sized small, medium or large. Identification and sizing was done using an identification guide produced for the RSPB's STAR project. Display fish were recorded but omitted from this study, as the composition and size of these fish can differ from those fed to chicks (Harris and Wanless 1985).

Thirty-seven feeds were recorded for Guillemot, of which 95% were Clupeids and 5% sandeel sp. (Figure 16).

Thirty-eight feeds (127 fish) were recorded for Razorbill, of which 98% were sandeel sp. and 2% Clupeids (Figure 16).

The abundance of each prey species in the Guillemot and Razorbill diet appears similar to previous years, however more work would be required to analyse any subtle changes in the dietary preferences.

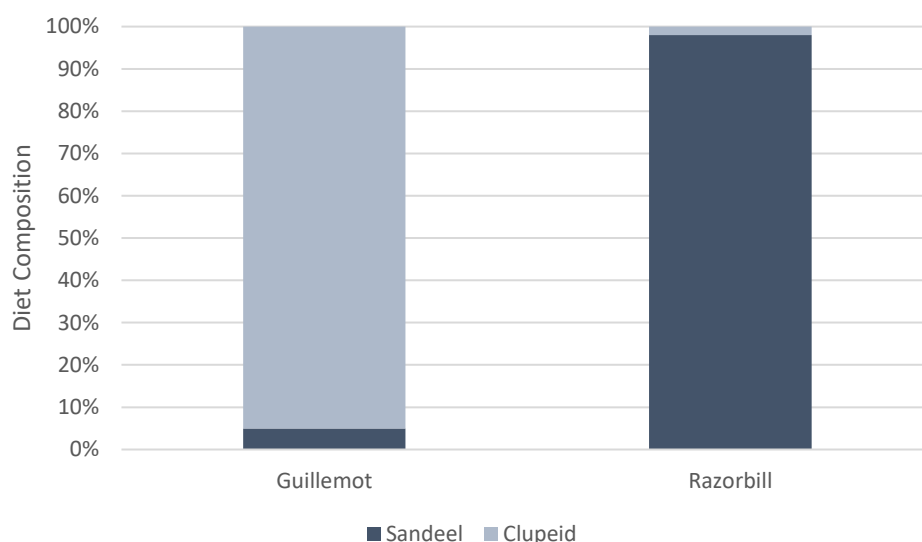


Figure 16: Comparison of the diet make-up of Common Guillemot and Razorbill in 2019. Only casual observations were made alongside auk productivity monitoring.

Guillemot were observed to bring mostly Clupeid fish in to feed their chicks (Figure 16), of which 2% were categorized as small, 52% were medium sized and 46% were large (Figure 17).

Razorbill mostly brought sandeel sp. in for the chicks (Figure 16), of which 55% were small, 35% were medium and 10% were large (Figure 18).

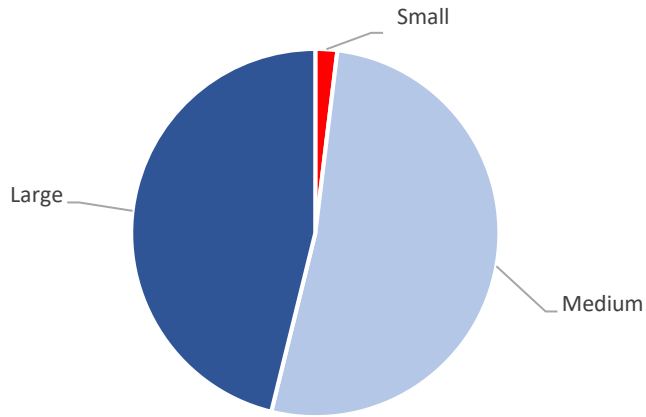


Figure 17: The size and proportion of Clupeid fish brought in by Common Guillemot (red=small, pale blue=medium, dark blue= large).

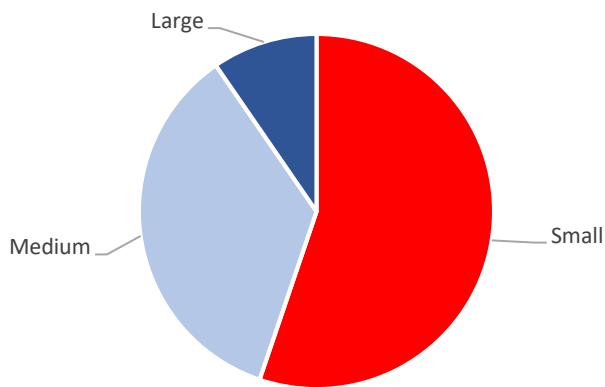


Figure 18: The size and proportion of sandeel sp. brought in by Razorbill (red=small, pale blue= medium, dark blue= large).

Black-legged Kittiwake colour ringing project

In 2018, RSPB staff commenced a Kittiwake colour ringing project at North Landing, Flamborough to look at adult survivorship. To date, detailed population and productivity monitoring has been carried out within the SPA to assess the state of the colony, however, understanding adult survival, which is a key monitoring tool for assessing the health of a species, has not been undertaken.

Last year, 51 breeding adults were caught and each fitted with a plain colour ring to identify the year (blue in 2018) above a metal BTO ring on the right leg, and a yellow alpha-numeric colour ring on the left leg. Following re-sighting efforts by reserve staff in 2019, 43 of those birds were successfully re-sighted. This year, a further 60 breeding adults were added to the project, again fitted with a plain colour ring (red in 2019) above a metal BTO ring on the right leg, and a yellow alpha-numeric colour ring on the left leg, providing the project with a sample of just over 100 birds.

The project will be registered as a Retrapping Adults for Survival (RAS) with the BTO with the aim of maintaining the sample at 100 birds for the next 3+ years and considerable effort invested in re-sighting birds each year. This should provide an adequate sample of birds over a sufficient period of time to enable reliable survival estimates to be calculated.

The first colour ringed Kittiwake re-sighting away from the Flamborough Headland was recorded on the 22 September 2019 in Aberdeen Harbour.



European Shag colour ring re-sighting

Winter roost counts of Shag, begun in 2014 at Breil Nook, Flamborough Head, were discontinued in 2017 after several years of counts did not show the numbers originally anticipated. It remains possible that this is due to the impracticality of seeing some of the areas used to roost from land and with little to no access to boat-based observations in winter.

Throughout the seabird monitoring season, however, colour ring codes are recorded, where practicable, and during the autumn and winter specific visits are made in appropriate conditions. In each case records are submitted to the Centre for Ecology & Hydrology's winter Shag distribution project. Colour ring re-sightings provide valuable insight in to the origins and movements of Shag using the colony. To date, 33 individuals have been re-sighted (Table 13).

Table 13: European Shag colour ring re-sightings at Flamborough Head 2014-2019

Code	BTO ring number	Year Ringed	Age	Colony	First and last date recorded at Flamborough Head
EUH		2014	Pullus	Fidra	10/11/14 - 13/05/17
CLR		2014	Pullus	Farnes	10/11/14 - 21/10/15
END	1478565	2014	Pullus	Inchmickery	10/11/14 - 22/05/17
CHC	G8898	2006	Pullus	Isle of May	25/11/14 - 04/08/17
CNE		2014	Pullus	Farnes	04/12/14
ACE	1472974	2014	Adult	Craigleith	19/01/15 - 18/02/16
ESB	1478625	2014	Pullus	Inchmickery	19/01/15
ARI		2014	Pullus	Craigleith	24/07/15
NEJ		2015	Pullus	Farnes (Inner)	21/10/15
DAN	1485389	2016	Pullus	North Sutor, Inverness-shire	06/02/17
UWE		2016	Pullus	Farnes (Inner)	20/05/17
FTA		2016	Pullus	Isle of May	21/05/17
IAX		2016	Pullus	Isle of May	21/05/17
HUD		2016	Pullus	Isle of May	22/05/17 - 07/08/17
DAN		2016	Pullus	Isle of May	04/08/17
LRR		2016	Pullus	Farnes	13/06/18
TPC	1396622	2009	Adult	Craigleith	10/11/14 - 28/02/17
RZF		2013	Adult	Farnes	21/10/15
PCA		2010	Pullus	Farnes (Staple)	21/10/15 - 26/08/16
AUL	1483281	2015	Adult	Isle of May	18/02/16 - 06/02/17
AFP		2014	Pullus	Isle of May	10/11/14- 18/04/19
AUH	1483074	2014	Pullus	Isle of May	18/02/16 - 31/10/18
ADA	1473962	2014	Pullus	Isle of May	18/02/16
IPJ		2016	Pullus	Isle of May	13/09/16 - 3/10/18
DAP	1472058	2015	Pullus	Isle of May	11/03/17
IDT		2016	Pullus	Isle of May	04/08/17
CUX	1472024	2015	Pullus	Isle of May	13/02/17
HZA		2015	Pullus	Isle of May	19/06/17
EZS		2018	Pullus	Farnes	10/10/18 - 31/10/2018
NDC		2014	Pullus	Isle of May	10/11/14
FTX		2012	Pullus	Isle of May	16/12/14
CTF		2018	Pullus	Isle of May	15/11/18
AFN	1453306	2011	Pullus	Isle of May	28/02/17

Recreational Disturbance

The Flamborough Head European Marine Site (EMS) Management Scheme's study into the frequency and impacts of recreational activities around the protected area has been established since 2013. This research has identified a number of activities which have the potential to disturb the natural behaviour of the breeding seabird colony. Wherever possible, disturbance events are recorded and photographed. The information is passed to the EMS Project Officer, Heather Davison-Smith, who is gathering data on recreational disturbance in order to inform and support management actions.

Currently, a number of activity-specific voluntary codes of conduct are in place around the EMS. An agreement with local angling clubs incorporates a closed season for cliff-top angling from 1 March to 30 September along the length of the RSPB reserve. Annual meetings between managers and the local angling clubs continue, ensuring positive working relationships and an effective agreement.

A personal watercraft (Jet Ski) code of conduct also applies from 1 March to 30 September; users are asked to maintain a no-wake speed within 300m of the cliffs and near rafts of birds. The EMS Project Officer continues to work with personal watercraft users, the Personal Watercraft Partnership, local authorities, Natural England, the Marine Management Organisation and the RSPB in order to ensure the voluntary agreement is effective and to identify any new management measures which may need to be implemented.

Additionally, between 15 March and 15 August, the Humberside Search and Rescue helicopter teams have agreed not to carry out training exercises between North Landing and High Stacks. This agreement complements the existing Ministry of Defense 'Environmental Avoidance' area around Bempton Cliffs and does not affect emergency responses, which will continue as normal. Similarly, a commercial aviation operator which carries out investigative work on behalf of Northern Powergrid in the area, has agreed to implement a 'no-fly' zone around the SPA to prevent disturbance to the breeding seabird colony.

In 2019, an MSc student from York University conducted a study to identify whether there was any link between seabird energy expenditure and recreational activities around the SPA. By calculating average disturbance-response flight times and basal metabolic rates for each species, it became clear that some activities elicited a larger physiological response in the seabirds than others. Whilst the energy expenditure associated with these responses was small on an individual basis, cumulatively, should other pressures such as climate change and offshore developments be taken into account, the energy spent in reacting to recreational activities could be significant. It is hoped that future research will be carried out to test this theory further.

Comments

The Flamborough and Filey Coast SPA Seabird Monitoring Programme was successfully completed for the eleventh consecutive year by the Seabird Research Assistant, seabird research residential volunteer and a large team of staff and volunteers. It continues to provide important data on seabird population numbers and productivity and has now built up a considerable eleven-year comparable dataset.

Productivity was varied in 2019, with most species having an average or poor year with natural fluctuations. Herring Gulls had a particularly poor year in 2019, and Kittiwakes continued to have low productivity for the fourth consecutive year. Gannets had the lowest recorded productivity since the monitoring programme began in 2009, with reports from volunteers of birds not attempting to breed and chicks being left unattended on the nest. A conflict continues to be apparent between Guillemots and Gannets on the reserve, with young Gannets prospecting new breeding sites, therefore displacing breeding Guillemots off ledges. A considerable difference in productivity was found yet again between the plots at Flamborough Head and on the Bempton Cliffs reserve, which could be due to several factors including Gannet activity. Razorbills had a slight drop in productivity after a good year in 2018, however the general upward trend is encouraging. 2019 didn't see many reports of corvid predation, despite a Carrion Crow nest at Saddle Nook, Flamborough Head, which fledged a minimum of five chicks. Two Razorbill plots on the reserve had a particularly low productivity in 2019, of which the cause is unknown, however the presence of prospecting Gannets and Fulmar could be one reason for this.

European Herring Gull productivity

Herring Gull productivity took a plunge in 2019, with a mean 0.48 chicks fledged per pair, a record low since the monitoring programme began in 2009. The causes of this are hard to determine, however nests failed both at the egg and chick stage, with eggs and young chicks left unattended and vulnerable to predation. The number of nests monitored increased in 2019 due to the addition of a small plot at Swineshaw Hole, which despite a positive start did not manage to fledge any chicks. While the productivity on the cliffs appears to be in serious decline, little is known about the productivity of Herring Gulls in the neighbouring towns of Bridlington, Filey and Scarborough. Gulls nesting on roofs in towns was unheard of before 1940 (Rock, 2005), and it wasn't until 'Operation Seafarer', the national seabird count, in 1969-70 when numbers of gulls were discovered nesting in urban environments (Cramp, 1971). Herring Gulls being opportunistic, the number of urban nests has increased dramatically since the first reports in 1970. Raven and Coulson (1997) recorded 13,591 pairs of Herring and Lesser Black-backed Gulls nesting in towns and cities, a ten-fold increase since 1970. With a plentiful supply of food from human waste, pairs in towns would possibly be able to successfully fledge more chicks than those pairs nesting in their natural cliff environment. Survey work would be required to study the productivity of those gulls nesting in the towns surrounding the Flamborough and Filey Coast SPA.

Black-legged Kittiwake productivity

Kittiwakes had yet another poor year, with a productivity of 0.55 chicks/pair, similar to the last four years, but considerably lower than the figures in 2009-11. No nests fledged three chicks, and a large number of those with two chicks only managed to successfully fledge one. The southern end of the

colony at the Flamborough Lighthouse continues to be the most successful part of the colony, while the plot at the other extremity of the colony to the north in Filey did not fledge any chicks from 53 nesting attempts. This was predicted to be due to Herring Gull predation.

Kittiwakes are under pressure from various factors such as climate change, over-fishing and new off-shore windfarm developments causing potential collisions and displacement from key foraging areas. The number of breeding Kittiwakes along the British North Sea coast declined between 20-50% between c.1986 and 2000 (Heubeck et al., 1999; Heubeck, 2004). The underlying cause of this decline in population and productivity is likely to be the low availability of sandeels (Frederiksen et al., 2004), with lesser sandeels being the main prey source of Kittiwakes (Lewis et al., 2001). The quantity and quality of lesser sandeels available is under pressure from various factors including over-fishing and climate change. Higher winter sea temperatures have been shown to reduce the recruitment of sandeels (Arnott & Ruxton, 2002), therefore affecting their availability throughout the early spring when birds are getting into breeding condition, and throughout the breeding season when feeding chicks. Over fishing is a major concern for the seabirds of the North Sea, including Kittiwakes, with thousands of tonnes of lesser sandeel being brought in every year.

The Flamborough and Filey Coast SPA supports over 1% of the biogeographical population of Kittiwake, and the monitoring of their productivity continues to be a priority to understand population trends. While the current whole colony counts and study-plot counts suggest the population to be steady at the moment, being long lived species, the low productivity trend witnessed in the last few years could be a cause for concern in future years.

Auk chick diet studies

Seabirds are important indicators of the health of our oceans, and they currently face pressures including over-fishing, habitat degradation and climate change (Croxall et al., 2012), factors which are sure to affect their populations across the world. While it can be difficult to monitor the causes and consequences of these pressures, seabirds are at the top of their food chain, and any changes in the lower trophic levels will affect their populations (Parsons et al., 2008). It is therefore critical to monitor any changes in their diet.

Different seabird species are adapted to feed in different ways, and many regurgitate to their chicks, including Gannet, Kittiwake, Herring Gull and Fulmar, making them difficult to study. The RSPB launched the second round of the Puffarazzi project in 2019, asking for photographs, past and present, of Puffins carrying fish in their bills back to their chicks. This is national project to monitor Puffin provisioning changes over time, however the cliff environment of this colony makes this difficult due to the speed at which they fly in. However, Guillemot and Razorbill carry one or several whole fish back to their chicks, which provides an opportunity to identify the species and size as they fly in. Auks feed on a variety of fish, including Ammodytidae (Sandeels), Clupeidae (Sprats or young Herring) and Gadidae (young Whiting, Saithe or Cod) (Mitchell et al. 2004), and differences in the diet of these birds have been observed between regions. The abundance of each of these food sources fluctuates naturally every year, however climate change and over-fishing is predicted to change their abundance and distribution throughout the North Sea, therefore affecting the foraging range of these seabirds.

Monitoring these changes in diet is one of the few opportunities we have to study food supply and provisioning at this colony and monitoring any trends or changes in their diet composition could provide an insight into, and better understanding of, what is happening in our oceans.

Information on auk (Guillemot and Razorbill) chick diet has been collected at this colony in some capacity since the start of the seabird monitoring programme in 2009. The quantity and quality of data gathered each year has varied and has been collected differently each year, either with the seasonal Seabird Research Assistant, the seabird research residential volunteer, university Undergraduate or Masters students or a dedicated residential volunteer. The Flamborough and Filey Coast SPA seabird monitoring programme relies heavily on volunteers to deliver on the objectives set out at the start of every season, however, it is currently stretched to full capacity. It has often been difficult to resource this study due to the demanding time commitments of the other aspects of the monitoring programme. However, this study could be critical in understanding the fate of our seabirds in the face of climate change and would therefore benefit hugely from being properly resourced in future years.

Black-legged Kittiwake and Northern Gannet tracking work

No tracking work was undertaken within the SPA in 2019 following a successful tagging season in 2018. It is hoped that further tracking work of Kittiwake and Gannet will be continued in 2020.

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LEADER for funding optics and other monitoring equipment that continue to provide essential tools for our volunteer team.

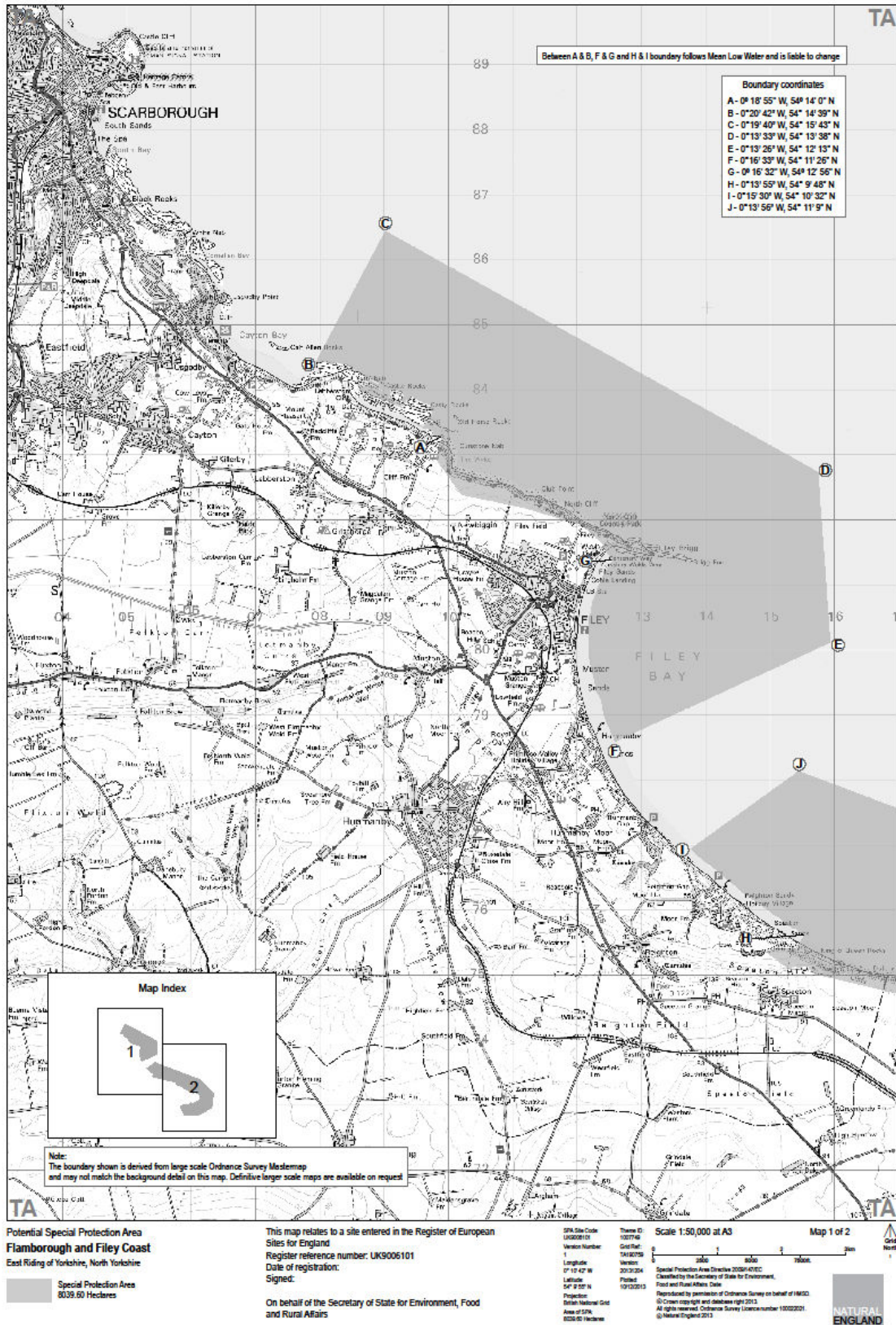
Blue Dolphin Holiday Park at Filey for allowing access to reach important sections of the colony for essential monitoring works.

And last but not least, the owners and management at Thornwick Bay Holiday Village at Flamborough for providing invaluable parking permits for North Landing car park.

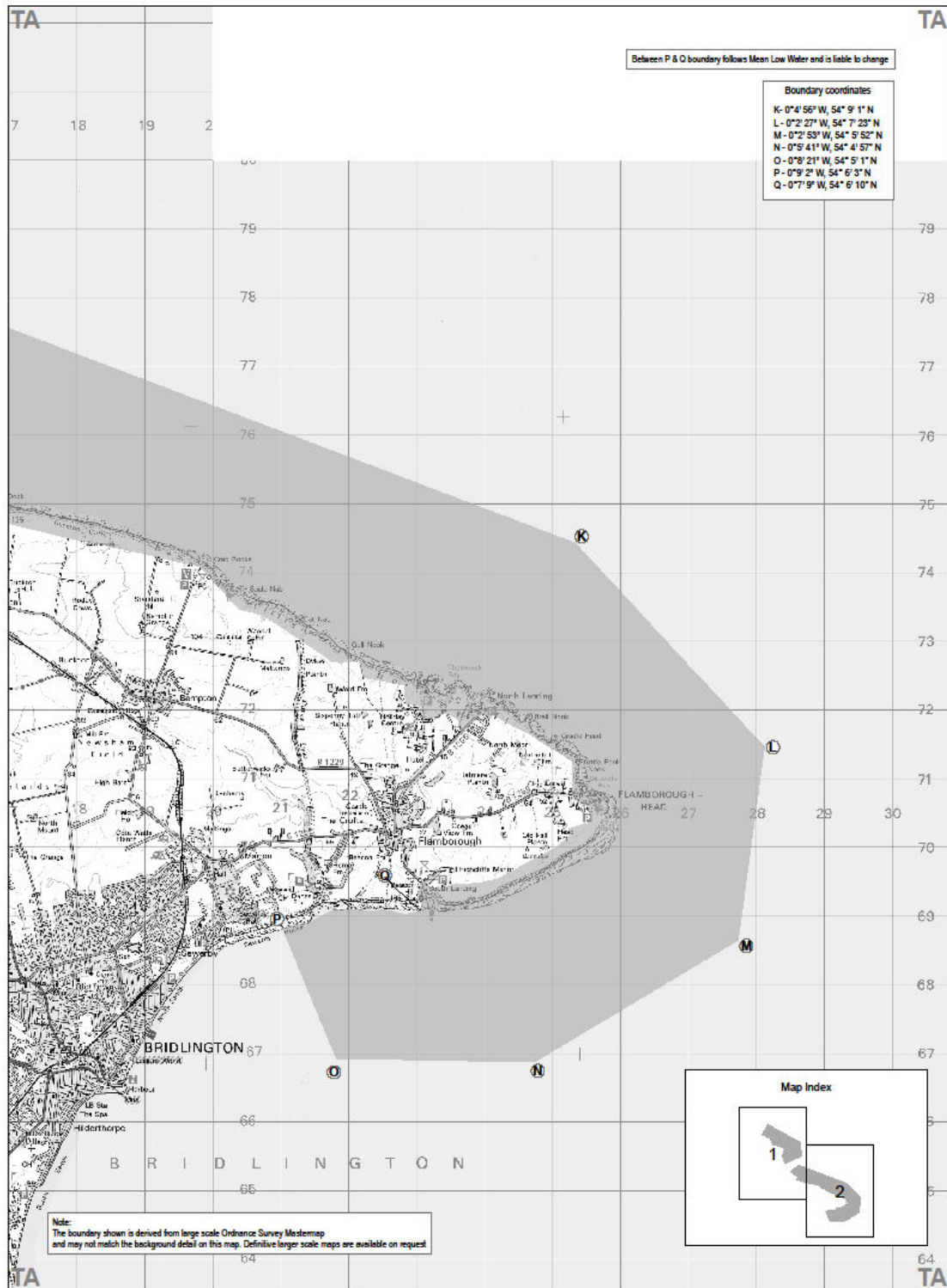
Without all of the aforementioned, the Flamborough and Filey Coast SPA seabird monitoring programme would not be the success that it is.

Appendix 1: Flamborough and Filey Coast SPA boundary maps

North



South



Potential Special Protection Area
Flamborough and Filey Coast
 East Riding of Yorkshire, North Yorkshire

Special Protection Area
 6639.50 Hectares

This map relates to a site entered in the Register of European Sites for England
 Register reference number: UK9006101
 Date of registration:
 Signed:

On behalf of the Secretary of State for Environment, Food and Rural Affairs

SPA Site Code
 UK9006101
 Version Number
 1
 Longitude
 0°12'42" W
 Latitude
 54° 8' 22" N
 Projection
 British National Grid
 Area of SPA
 6639.50 Hectares

Theme ID
 1007746
 GridRef
 1640296
 Version
 2013/204
 Planned
 10/10/2013

Scale 1:50,000 at A3
 Map 2 of 2
 Special Protection Area Directive 2009/147/EC
 Classified by the Secretary of State for Environment, Food and Rural Affairs Date
 10/10/2013
 Reclassified by permission of Ordnance Survey on behalf of HMGO.
 © Crown copyright and database right 2013.
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Appendix 2 - Productivity monitoring plot locations

Northern Fulmar productivity plots



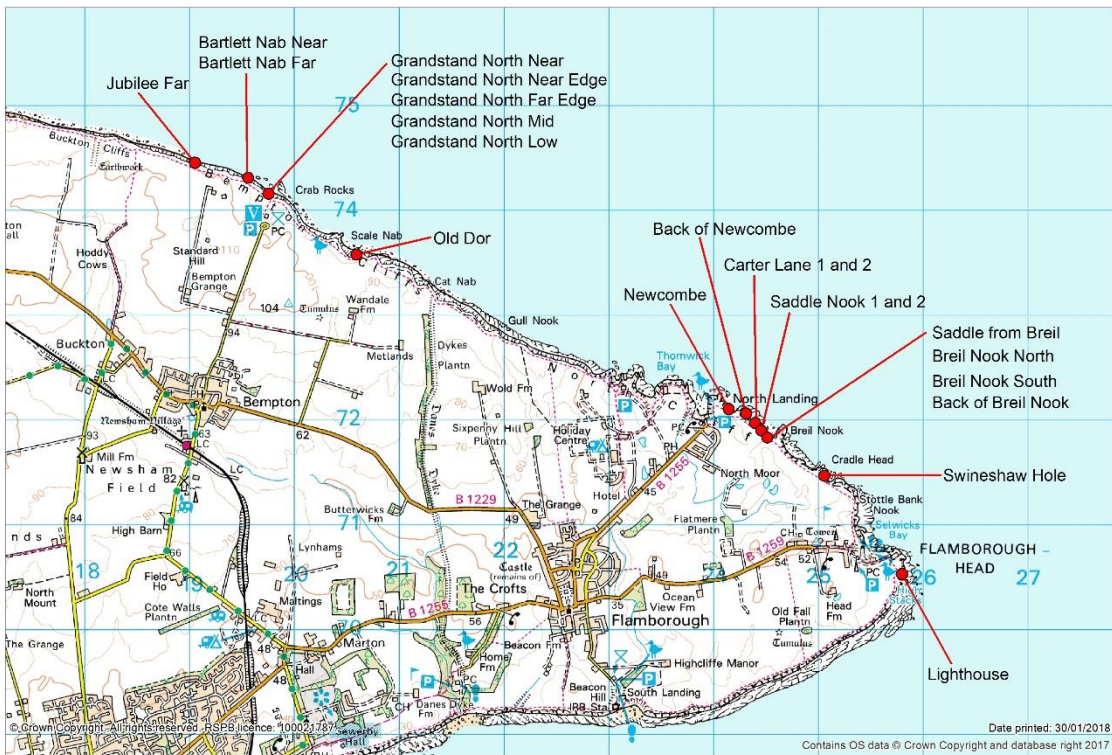
Northern Gannet productivity plots



European Herring Gull productivity plots



Black-legged Kittiwake productivity plots – Flamborough Head and Bempton Cliffs



Black-legged Kittiwake productivity plots – Filey



Common Guillemot productivity plots



Razorbill productivity plots



Appendix 3 – Study-plot monitoring locations

Black-legged Kittiwake study-plot locations



Common Guillemot study-plot locations



Razorbill study-plot locations

