Flamborough and Filey Coast SPA Seabird Monitoring Programme

2021 Report

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Front cover image: Common Guillemot with chick. © Richard Cope

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Summary

Following the disruption to the monitoring programme in 2020, the full programme of seabird monitoring resumed in 2021 and was successfully completed by a full-time Seabird Research Assistant, seasonal Seabird Research residential volunteer and members of the Bempton Cliffs reserve staff and volunteer team.

The early season weather presented tricky conditions for both the seabirds and surveyors. An extraordinary mild spell at the end of March prompted Gannets and even a few early Kittiwakes to start nest maintenance, immediately followed by a northerly gale which continued as bitter cold northerlies and frequent wintry showers well into late April. As a result, large numbers of birds would appear to settle down on breeding sites one day, then be gone the next.
Again, the pre-breeding Puffin count was not completed as no notable large-scale arrival event was observed, and on the whole Guillemot and Razorbill appeared to be two-three weeks later than usual settling down to breed. The first Gannet egg was seen on 9th April although it was into May before the first Guillemot and Razorbill eggs were seen on 4th and 5th respectively, however, the latter was seen being eaten by a Carrion Crow in front of the Flamborough seawatching hide.

The results from this year's productivity monitoring were encouraging for most species. Herring Gull had their most successful year since 2015; increases were noted for Guillemot and Razorbill as well as Kittiwake to a lesser extent; Gannet productivity dipped again, and several nest sites were unoccupied and a number of unattended chicks were observed; Fulmar also dropped, however it is still in line with the overall long-term trend for this species at this colony (Figure 1).

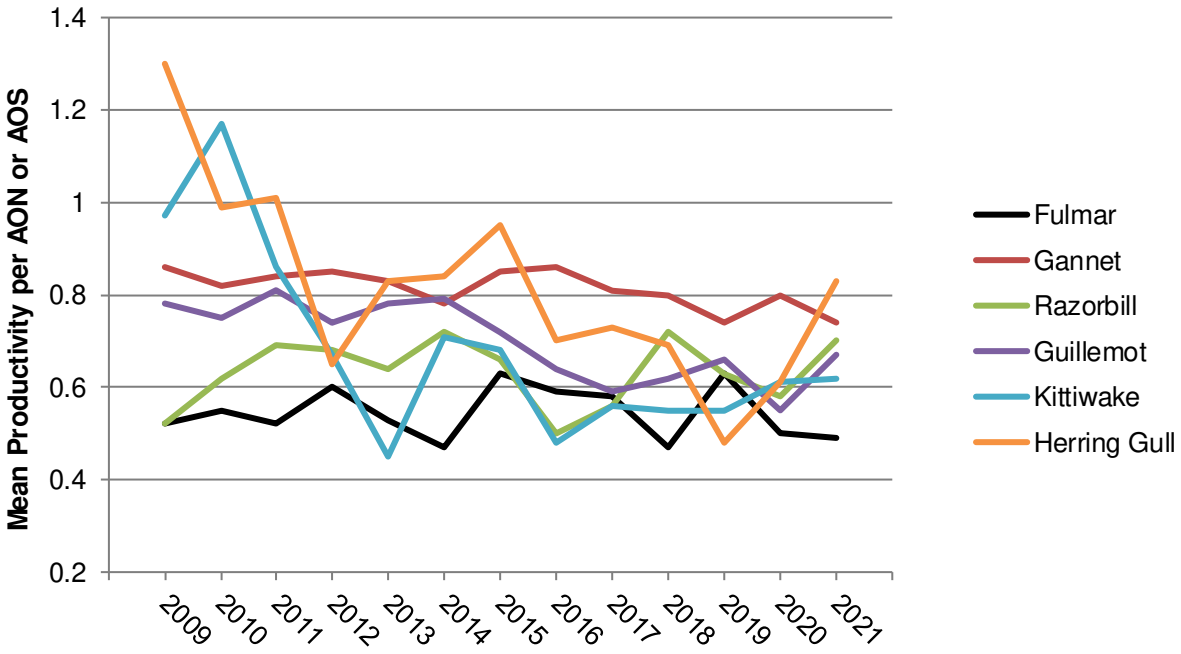

Figure 1: Summary of the productivity trends of the six seabird species monitored from 2009-2021.
N.B.1: Kittiwake and Fulmar results include Filey in with the original Flamborough and Bempton Cliffs results from 2012 and 2017 respectively.
N.B.2: In 2020, productivity monitoring followed a reduced programme with a late start, a reduced number of plots monitored and an altered method of analysis for some species.

The results from the 2021 breeding season are as follows:

Northern Fulmar: Monitoring returned to normal levels and an additional site was added north of Thornwick Bay, Flamborough. Fifty chicks fledged from 112 Apparently Occupied Sites (AOS), resulting in a mean productivity of 0.49 chicks fledged per pair. This represents a slight decrease from 2020, whilst the general productivity trend appears to be stable.

Northern Gannet: All five plots on the reserve were monitored in 2021, following the traditional methodology of visits every 7-10 days. A total of 198 chicks fledged from 269 Apparently Occupied Nests (AON), resulting in a mean productivity of 0.74 chicks fledged per pair. There appeared to be more empty nests this season, and an increase in unattended chicks, which may be a contributing factor to the slight drop in productivity, however the overall trend is robust.

Black-legged Kittiwake: Eighteen plots were monitored across the SPA and included a total of 913 AON. From those nests, 571 chicks successfully fledged producing a mean productivity of 0.62 chicks per pair. Again, this represents a diminutive increase on recent years, but the overall trend remains a concern.

European Herring Gull: Productivity increased for the second successive year with 82 chicks fledged from 95 AON, the mean productivity of 0.83 chicks fledged per pair was the highest since 2015. The long-term trend of continued decline is yet to be reversed, however, the number of AON returned to expected levels which was encouraging.

Common Guillemot: Productivity increased from the record low in 2020. One hundred and seventy-eight chicks fledged from 265 AOS producing a mean productivity of 0.67 chicks fledged per pair. Whilst Gannets were again present in both Nettletrip and Grandstand North plots, their impact didn't appear to significantly affect the results.

Razorbill: A total of 364 AOS were monitored in 2021, from which 261 chicks successfully fledged, producing a mean productivity of 0.70 chicks fledged per pair. This was higher than the last couple of years and as a result the long-term trend is of a slight increase.

Study-plot counts

The Kittiwake, Guillemot and Razorbill study-plot counts were successfully completed in the first three weeks of June. The mean Kittiwake count of 1819 AON was 16 AON fewer than in 2020, although still in line with the long-term trend. For the second successive year the second count was higher than the first, possibly due to the delayed start to the breeding season. The mean Guillemot count of 1583 IND was the fifth successive increase and once again the highest mean total for the third successive year. The mean Razorbill count continues to reach new levels for the seventh successive year, with 1000 IND recorded for the first time.

Common Guillemot and Razorbill chick diet study

This summer, three MSc students from Leeds University collected data at Bempton Cliffs on Guillemot and Razorbill chick diet as part of their dissertation. Over the 20-day period, 125

feeding events were recorded; feeding events were observed from 25 different nest sites, with 8 Razorbill and 17 Guillemot. As in previous years, Razorbills targeted sandeels over clupeids, with 47 feeding events being sandeels compared with 5 clupeid. Guillemots again showed preference towards clupeids, with 70 feeding events compared with 3 sandeel feeding events.

Black-legged Kittiwake RAS project

A Black-legged Kittiwake RAS colour ringing project was successfully completed for a fourth consecutive year at North Landing, Flamborough this summer. Resighting effort commenced in mid-April after several prolonged periods of unsettled weather. A total of 105 individuals were resighted from a potential 130 colour ringed birds (51 adults from 2018, 60 adults from 2019 and 19 adults in 2020). All 105 colour ringed individuals were recorded by late May, thereafter no new birds were noted despite repeated visits in June and July. As a result, it was not necessary to catch and colour ring any new birds to add to the project this summer.

Recreational disturbance

In 2021, the management scheme, in partnership with the RSPCA, Humberside and North Yorkshire Police forces and other key partners continued the work of Operation Seabird. Since its launch in August 2020, Operation Seabird has held a number of successful 'awareness days' and media campaigns to engage the public and raise awareness of disturbance caused by recreational activities. The success of Operation Seabird has seen the initiative launch nationally in other areas of UK coastline and has proven to be a useful tool in encouraging responsible use of the marine environment. Going forward, it is hoped to continue Operation Seabird's success into 2022 by continuing to build positive relationships with user groups, raise awareness of recreational disturbance and look towards targeted engagement and hosting workshops.

Introduction

Background

Seabird population data has been collected within the Special Protection Area (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 in 2000 for the 'Seabird 2000' census, again 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 and Cormorant nests 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 2 km parallel to the coast from the landward boundaries before moving seawards and extends approximately 2 km 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 (EMS), a Special Area of Conservation (SAC), a Special Protection Area (SPA), a Site of Special Scientific Interest (SSSI) and a Heritage Coast site which includes three Local Nature Reserves (LNR), as well as RSPB Bempton Cliffs Nature Reserve and the Yorkshire Wildlife Trust Flamborough Cliffs Nature Reserve.

At the northern 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 SSSI's. 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 5 km 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 Hornsea and proposed Dogger Bank offshore wind arrays that may have a detrimental impact on the features of the designated site. 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 and Razorbill 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, a 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 2021 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

Detailed productivity monitoring was completed for the thirteenth consecutive year for six of the nine breeding seabird species found in the colony: Fulmar, Gannet, Kittiwake, Herring Gull, Guillemot and Razorbill. In addition, a small number of Shag nests at Flamborough Head were monitored again this year, and for the first time a small number of Cormorant nests were also monitored at Filey. Unfortunately, it is not possible to monitor Puffin productivity at this vertical 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. 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 there 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.

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*

Eight productivity plots were monitored this year, with the addition of a new plot located to the north of Thornwick Bay, Flamborough. Both the Cunstone Nab plots at the north end of Filey Cliffs were monitored again this year as well as the original five plots.

Plots were photographed in early May and AOS marked on 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. The Cunstone Nab plots were photographed at a larger scale this season to aid accurate recording of AOS on parts of these distant plots.

The mean productivity for Fulmar was 0.49 (SE ± 0.0567) chicks per AOS. A total of 112 AOS were monitored across the eight plots, from which 50 chicks successfully fledged (Table 1, Figure 2).

Table 1: Northern Fulmar productivity results 2021. Plots added in 2017 are marked* and in 2021 marked**

Plot	AOS	Chicks fledged	Productivity ch/pr
New Roll-up	5	3	0.60
Old Dor	17	11	0.65
Newcombe	4	2	0.50
Breil Nook	8	6	0.75
Swineshaw Hole	11	4	0.36
Thornwick**	12	4	0.33
Cunstone Nab A*	31	12	0.39
Cunstone Nab B*	24	8	0.33
Total	**112**	**50**	
Mean of plot results ± SE			**0.49 ± 0.0567**
Aggregate productivity			**0.45**

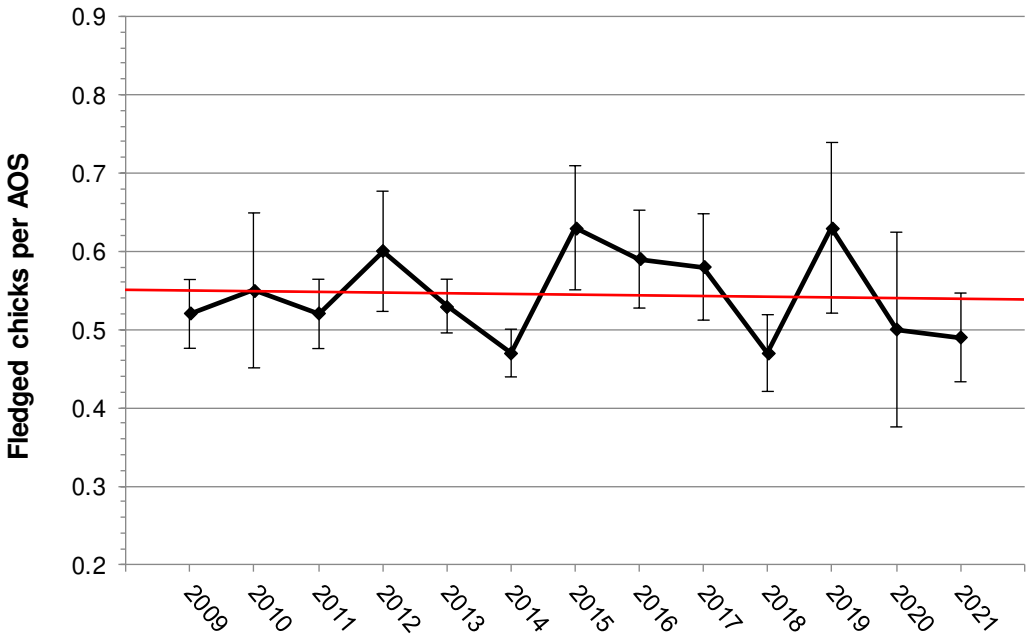

Figure 2: Northern Fulmar productivity 2009-2021, mean of plot productivity results plus/minus SE.
N.B.: The mean productivity from 2017 onwards includes plots from Filey, and an additional plot at Flamborough Head added in 2021.

Fulmar productivity dipped again for the second consecutive year, following a good year in 2019. There was a small difference between the mean and aggregate values (0.49 and 0.45 respectively), with a low standard error, with variation in plot results, ranging from 0.33 to 0.75 chicks fledged per pair. From 2017 the two Filey plots, Cunstone Nab A and B, were included in the mean and aggregate productivity values. The new Thornwick plot is likewise included

in 2021 and showed poor productivity at 0.33 chicks/pair. As a result, this did reduce the overall productivity down from 0.52 chicks/pair for the previously monitored plots.

Northern Gannet *Morus bassanus*

Five productivity plots were monitored between late April and October. Plots were photographed in mid to late April and up 60 AON were marked on 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.

The mean productivity for Gannet was 0.74 (SE ± 0.0113) chicks per AON. A total of 269 AON were monitored across the five plots, from which 198 chicks successfully fledged (Table 2, Figure 3).

Table 2: Northern Gannet productivity results 2021.

Plot	AON	Chicks fledged	Productivity ch/pr
Jubilee Corner	54	41	0.76
Nettletrip	53	40	0.75
Staple Newk 1	55	39	0.71
Staple Newk 2	52	39	0.75
Staple Newk 3	55	39	0.71
Total	**269**	**198**	
Mean of plot results ± SE			**0.74 ± 0.0113**
Aggregate productivity			**0.74**

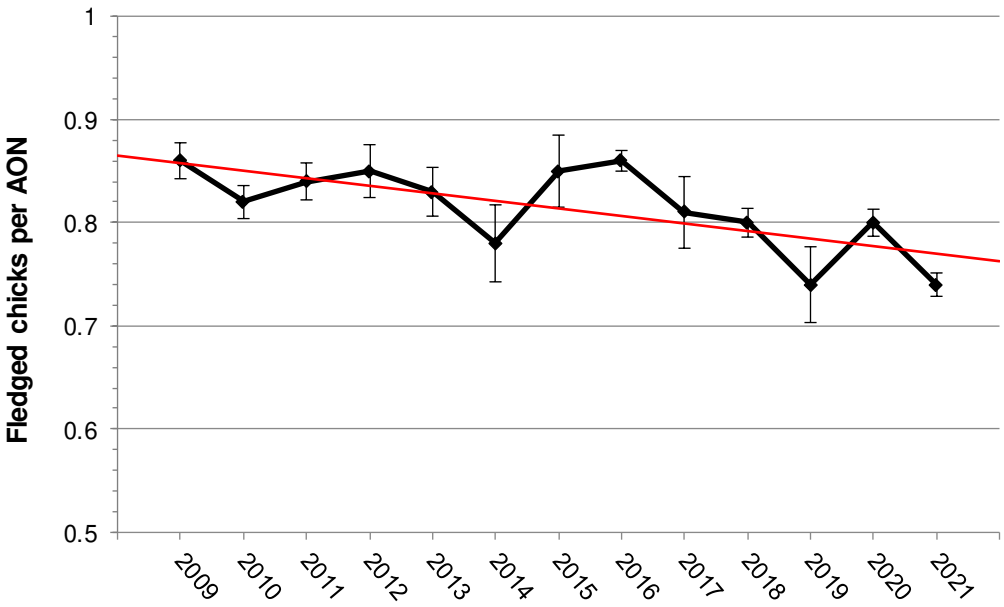

Figure 3: Northern Gannet productivity 2009-2021, mean of plot results plus/minus SE.

Gannet productivity was the second lowest recorded since monitoring began in 2009 with 0.74 chicks fledged per pair, identical to 2019. Productivity success seemed more or less consistent across the monitoring plots, with only slightly higher success at the northern end of the colony. As in 2019, it was noted that many birds built nests but did not go on to breed, some eggs failed to hatch, and a number of chicks were left unattended on the nest from a young age.

European Shag *Phalacrocorax aristotelis*

Four nests were monitored on Flamborough head, being those visible from existing monitoring plots. A total of just five chicks fledged, with two nests failing during a spell of strong northerly winds and large swell. Productivity from this small sample is therefore 1.25 chicks per AON. With only a limited number of Shag breeding at the colony (a total of 25 AON at the time of the last whole colony census in 2017) this sample represents 16% of the breeding population.

Great Cormorant *Phalacrocorax carbo*

A monitoring plot was set up along Filey Cliffs where a small number of nests can be viewed; from there, five AON were monitored with a total of 15 chicks fledged, giving a productivity of three chicks/pair. Whilst this is only a limited sample, it provides a valuable measure of how this small colony is doing. There were a total of 27 AON during the last whole colony census in 2017 and so this sample represents almost a fifth (18.5%) of the breeding population.

Black-legged Kittiwake *Rissa tridactyla*

Eighteen productivity plots were monitored across the SPA between May and August; 15 plots were between Flamborough and Bempton and three plots in Filey. Following the successful SPA extension in the autumn of 2018, the Filey plots have been included in the productivity calculations with Flamborough and Bempton from 2012 onwards.

Plots were photographed in early to mid-May and up to 60 AON were marked on 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.

An early season check of the plots revealed a large scale rockfall at Swineshaw hole had left the plot un-recognisable. As a result, the plot was dropped from 2021 monitoring. Birds did however re-colonise ledges, so the plot could continue to be monitored in future.

Two plots at Filey (Filey 9 and 10) have almost completely been abandoned and with the exception of plot 9 in 2019 (complete failure), haven't been monitored since 2016. Checks in the early season revealed no obvious nest sites from previous years and no birds. During the season a small number of birds did settle but only 10-15 AON were present and once again abandoned or failed soon afterwards.

The mean productivity for Kittiwake across the SPA was 0.62 (SE ± 0.0408) chicks per AON. A total of 913 AON were monitored across 18 plots, from which 571 chicks successfully fledged (Table 3, Figure 4).

Table 3: Black-legged Kittiwake productivity results 2021.

Plot	AON	Chicks fledged	Productivity ch/pr
Jubilee Far	49	31	0.63
Bartlett Nab Near	46	24	0.52
Bartlett Nab Far	47	32	0.68
Grandstand North Near	50	31	0.62
Grandstand North Mid	50	45	0.90
Grandstand North Low	49	33	0.67
Old Dor	48	26	0.54
Newcombe	49	2	0.04
Back of Newcombe	50	37	0.74
Carter Lane 2	50	29	0.58
Saddle Nook 1	59	44	0.75
Saddle Nook 2	50	36	0.72
Saddle from Breil	47	33	0.70
Breil Nook North	54	38	0.70
Back of Breil Nook	61	38	0.62
Filey plot 1	50	33	0.66
Filey plot 7	46	30	0.65
Filey plot 8	58	29	0.50
Total	**913**	**571**	
Mean of plot results ± SE			**0.62 ± 0.0408**
Aggregate productivity			**0.63**

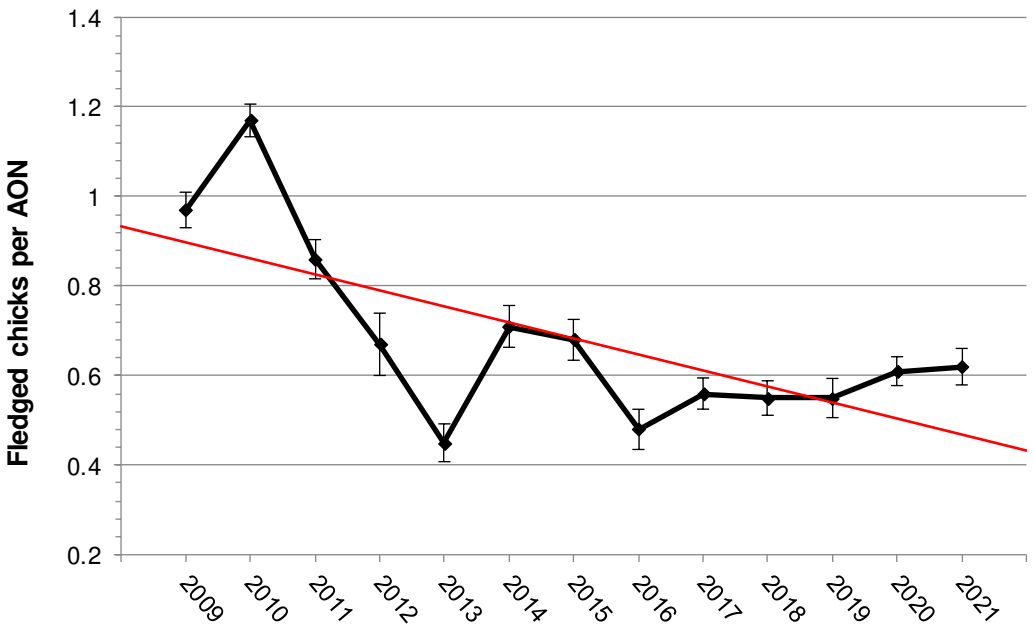

Figure 4: Black-legged Kittiwake productivity 2009-2021. Mean of plot results, plus/minus SE.
N.B.: Data between 2009-2011 are the mean of plots results for Flamborough and Bempton, from 2012 onwards the data include Filey.

Whilst the Kittiwake mean productivity increased slightly by 0.01 chicks per pair (chicks/pair), it remains lower than the national average of 0.68 between 1986 and 2005 (Mavor *et al.,* 2008). Results from within the colony varied only slightly; at Filey Cliffs productivity was the highest it has been since monitoring commenced there in 2012, with 0.60 chicks/pair compared with 0.61 chicks/pair at Flamborough Head. Bempton Cliffs overtook Flamborough Head for the first time since 2017 with 0.65 chicks/pair (Figure 5).

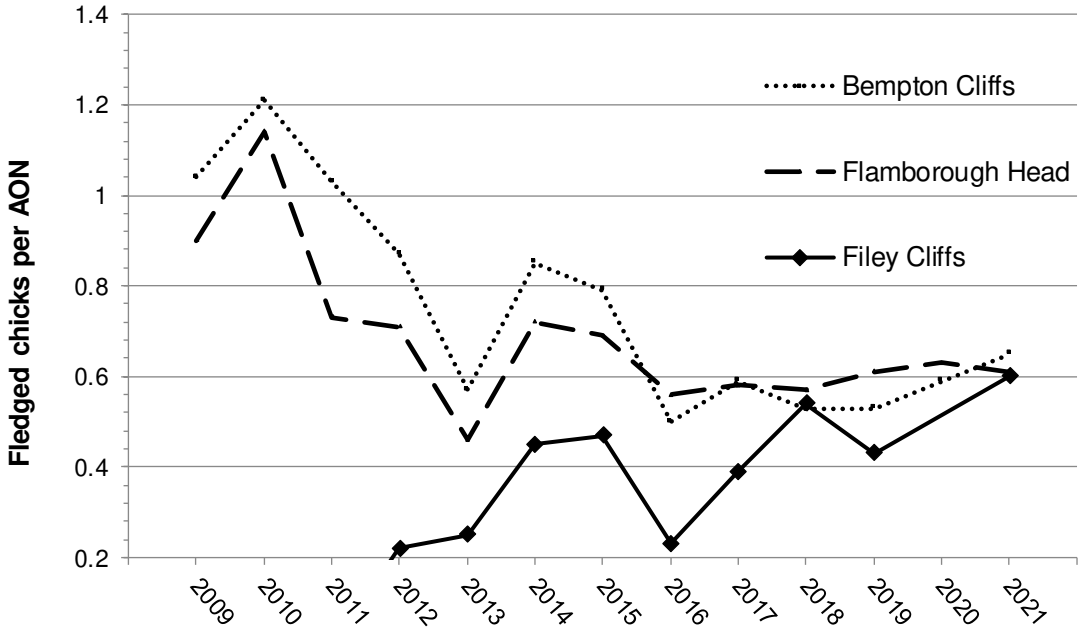

Figure 5: Black-legged Kittiwake productivity 2009-2021 comparing plots between Bempton Cliffs (dotted line), Flamborough Head (dashed line) and Filey Cliffs (solid line). Results for each year is the mean of the relevant plot results.

European Herring Gull *Larus argentatus*

Five Herring Gull productivity plots were monitored between May and August. 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 in late-May and AON marked on laminated photographs over two visits. Additional AON were added over the course of the season. Plots were then visited once a week, ideally on the same day so visits were seven days apart. Presence and number of eggs or chicks for each AON is recorded (if seen) each visit. Chicks were aged using standard codes to assess fledged or failed birds more precisely.

The mean productivity for Herring Gull was 0.83 (SE ± 0.0963) chicks per AON. A total of 95 AON were monitored across 5 plots, from which 82 chicks fledged successfully (Table 4, Figure 6).

Table 4: European Herring Gull productivity results 2021.

Plot	AON	Chicks fledged	Productivity ch/pr
Jubilee to Old Dor	17	17	1.00
Newcombe North	10	5	0.50
The Saddle Rock	25	26	1.04
Breil Nook Stack	17	14	0.82
Newcombe to Breil	26	20	0.77
Total	**95**	**82**	
Mean of plot results ± SE			**0.83 ± 0.0963**
Aggregate productivity			**0.86**

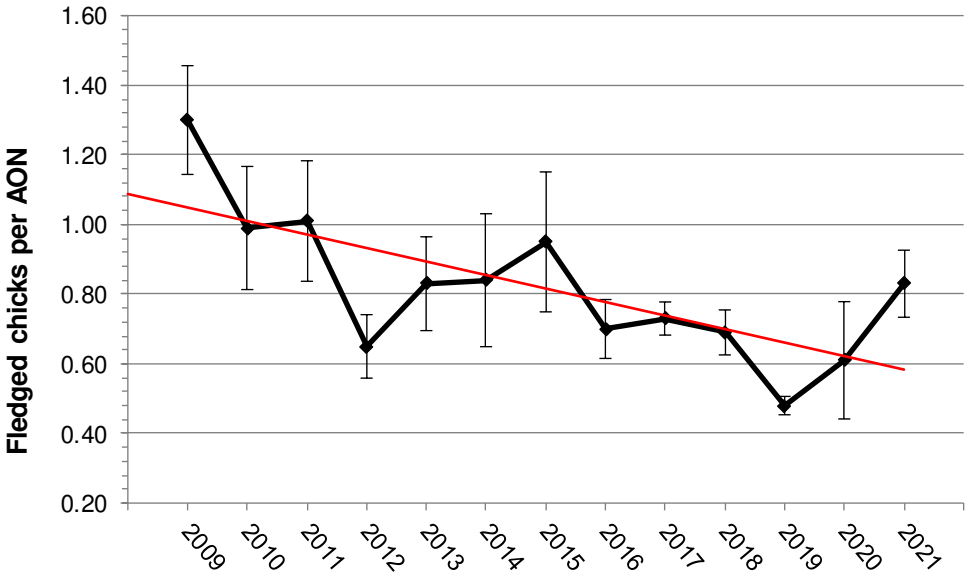

Figure 6: European Herring Gull productivity 2009-2021, mean of plot results plus/minus SE.

Herring Gull continues to show a recovery after the poor year in 2019, with 2021 having the highest productivity since 2015. However, productivity remains well down on the levels of the early years and the general trend still shows a continued slow decline (Figure 6).

The monitoring plots produced 95 AON this season, a return to normal levels following last year's apparent reduction in nesting activity. Significant vegetation growth was noted during the season being remarked upon by several observers across different species causing some monitored nests to become unexpectedly hidden. These were discounted from final productivity figures (Figure 7).

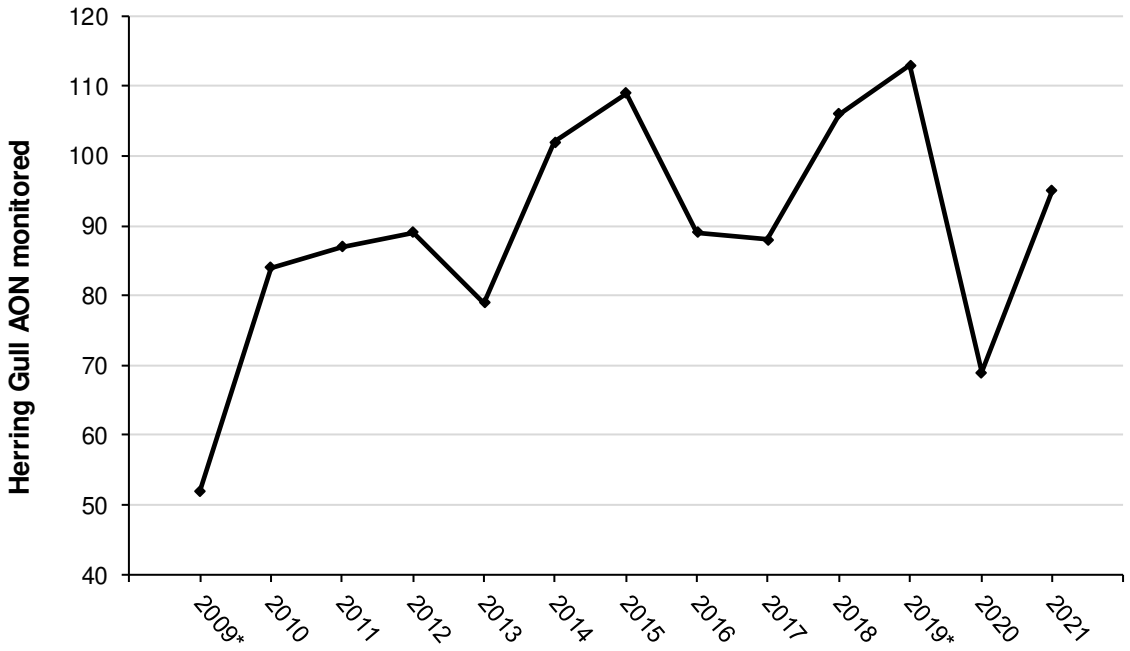

Figure 7: Number of European Herring Gull AON monitored 2009-2021.
N.B.: In 2009, only three plots were monitored and in 2019, six plots were monitored.

Common Guillemot *Uria aalge*

Five productivity plots were monitored between early May and the end of July. Plots were photographed in early May and up to 60 AOS were marked on 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.

The mean productivity for Guillemot was 0.67 (SE ± 0.0667) chicks per AOS. A total of 265 AOS were monitored across five plots, from which 178 chicks successfully fledged (Table 5, Figure 8).

Table 5: Common Guillemot productivity results 2021.

Plot	AOS	Chicks fledged	Productivity ch/pr
Nettletrip	49	31	0.63
Grandstand North	54	25	0.46
Grandstand South	-	-	-
Carter Lane 1	55	43	0.78
Carter Lane 2	55	35	0.64
Breil Nook	52	44	0.85
Total	**265**	**178**	
Mean of plot results ± SE			**0.67 ± 0.0667**
Aggregate productivity			**0.67**

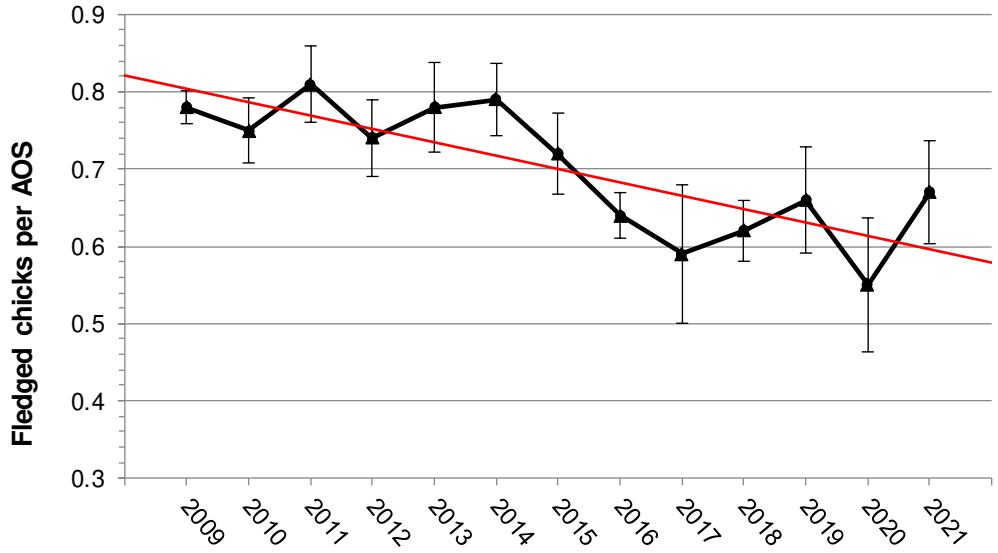

Figure 8: Common Guillemot productivity 2009-2021, mean of plot results plus/minus SE.

In 2021, Guillemot productivity appeared to recover following the lowest recorded productivity in 2020, however, it continues to show a slow downward trend (Figure 8).

There were 88 failures recorded across the five plots. Of these, 47% occurring during the egg incubation stage, 43% during the chick rearing stage and 10% were apparently occupied sites that did not go on to produce an egg or chick. Whilst a difference in productivity remains between the Bempton Cliffs and Flamborough Head plots, it should be noted that productivity on the reserve remained the same for a third consecutive year (Figure 9). Conflict with Gannet still remains an issue at both the Nettletrip and Grandstand North monitoring sites at Bempton Cliffs and account for single figures of egg and/or chick losses within these plots.

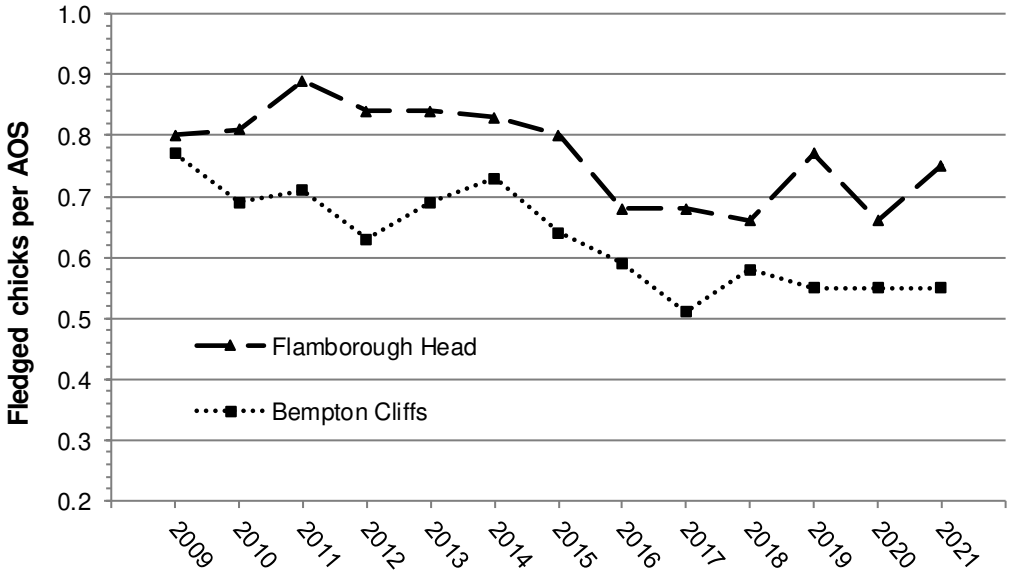

Figure 9: Comparing Common Guillemot productivity plots against Flamborough Head (dashed line) and Bempton Cliffs (dotted line) between 2009-2021. Results for each year are the mean of the relevant plot results.

Razorbill *Alca torda*

Eight productivity plots were monitored between early May and the end of July. Plots were photographed in early May and up to 60 AOS were marked on 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.

The mean productivity for Razorbill was 0.70 (SE ± 0.0435) chicks per AOS. A total of 364 AOS were monitored across eight plots, from which 261 chicks successfully fledged (Table 6, Figure 10).

Table 6: Razorbill productivity results 2021.

Plot	AOS	Chicks fledged	Productivity ch/pr
Grandstand Gully	25	13	0.52
Grandstand North	45	39	0.87
Grandstand South	32	21	0.66
Newcombe	52	38	0.73
Back of Newcombe	55	47	0.85
Saddle Nook	45	29	0.64
Breil Nook	57	43	0.75
Swineshaw Hole	53	31	0.58
Total	**364**	**261**	
Mean of plot results ± SE			**0.70 ± 0.0435**
Aggregate productivity			**0.72**

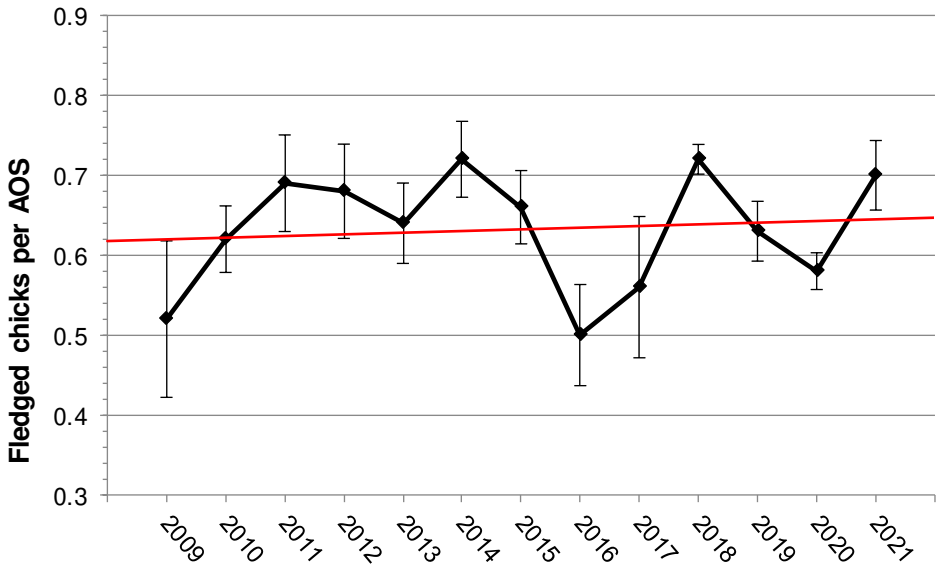

Figure 10: Razorbill productivity 2009-2021, mean of plot results plus/minus SE.

Razorbill productivity in 2021 increased after several poor years and continues to show a general trend for a gradual increase in productivity since 2009 (Figure 10). The lowest productivity was on the Grandstand Gully plot, which although down on the record years of 2018 and 2019, is still one of the higher productivities recorded. Conflict with Gannet and Fulmar wasn't noted as potentially being an issue although some interchange between Kittiwake were noted.

One hundred-two failures were recorded across the eight monitoring plots. Of those, 51% were at the egg stage, 42% were during the chick rearing stage and 7% were apparently occupied sites that did not go on to produce an egg or chick. There were big differences between the Bempton Cliffs and Flamborough Head plots and between the plots themselves. At Bempton Cliffs, 66% of sites failed at egg stage, whereas 45% failed at egg stage at Flamborough Head. Grandstand South represented the highest plot for egg failure with 82%, whilst the Back of Newcombe plot had the lowest egg failure rate at just 25%.

Whilst a difference can still be seen between the plots at Bempton Cliffs and those at Flamborough Head, the reserve has closely mirrored the Flamborough Head productivity for the last two seasons with productivity being within 0.02 in 2020 and 0.03 in 2021 (Figure 11). This is a trend that will hopefully continue in future years.

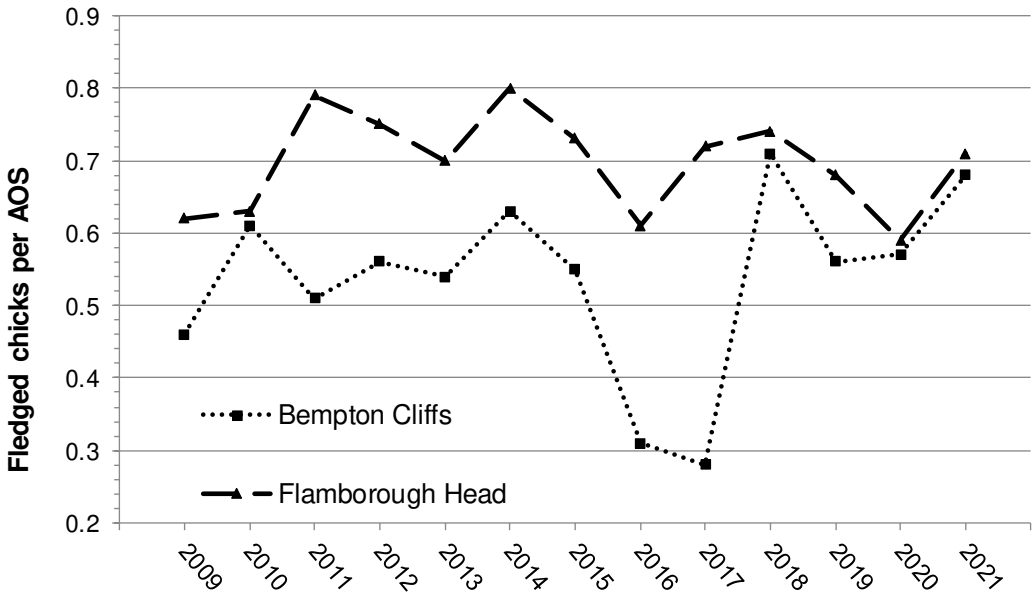

Figure 11: Comparing Razorbill productivity plots against Bempton Cliffs (dotted line) and Flamborough Head (dashed line) between 2009-2021. Results for each year is the mean of the relevant plot results.

Early season Atlantic Puffin survey

An early season Atlantic Puffin survey has been carried out or attempted for the last six years, in an effort to study large scale trends and changes in 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 cannot be considered an accurate census of the breeding population, however, it is useful to observe year-on-year large scale changes.

Unfortunately, the early season survey wasn't completed in 2021 due to combination of factors including cold wintry conditions and unpredictability of birds off the cliffs at the beginning of the season, however the table below shows the data for 2016 to 2018 when successful counts were completed (Table 7).

Table 7: Results of the early season Atlantic Puffin survey 2016-2018.
*N.B.: *Estimated that several hundred birds were on the cliffs along the length of the colony; these were not included in the survey.*

	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

Study-plot counts

The size and nature of the Flamborough and Filey Coast SPA colony means that 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 Head and Bempton Cliffs 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, with the exception 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.

The study-plot count results were encouraging for all species. Although the mean Kittiwake count of 1819 AON was 16 AON fewer than in 2020, the long-term trend appears stable. The mean Guillemot count of 1583 IND was the highest mean total and the fifth successive increase within the study-plot areas. The mean Razorbill count continues to reach new levels for the seventh successive year, with 1000 IND recorded for the first time (Figure 12).

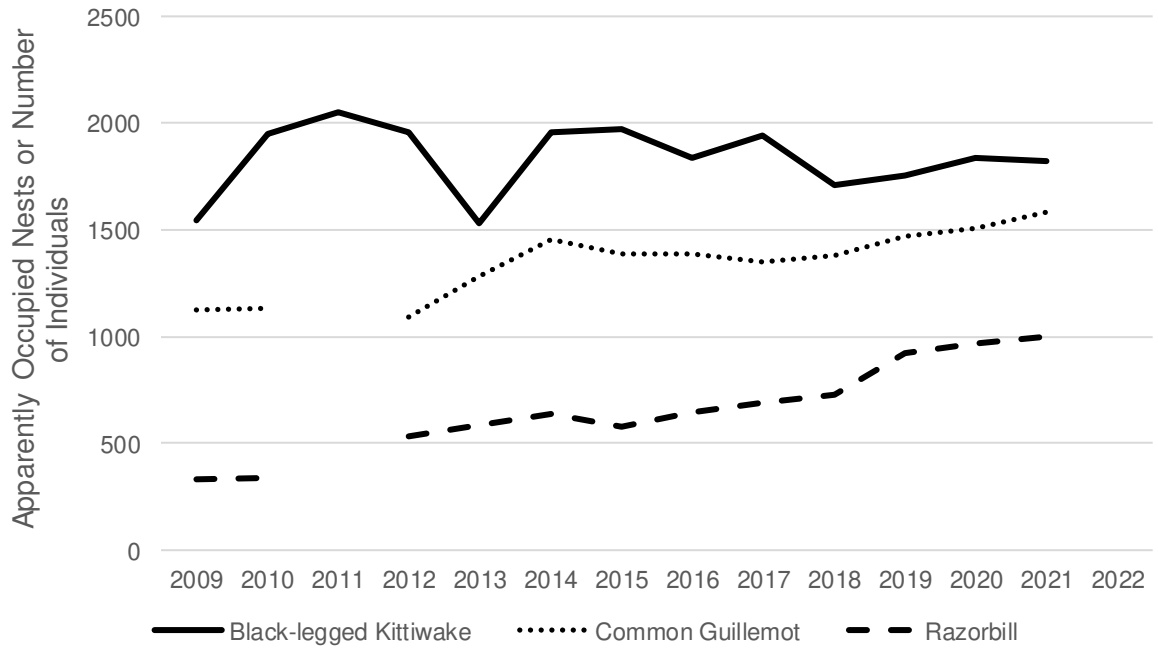

Figure 12: Historic study-plot count results for Black-legged Kittiwake, Common Guillemot and Razorbill from 2009-2021 at Flamborough Head and Bempton Cliffs.
N.B.: Black-legged Kittiwake counted as AON, Common Guillemot and Razorbill counted as individuals (IND).

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 1819 AON (Table 8). There was a slight decrease of AON (16 AON fewer than in 2020), however, the mean was again higher than 2018 and 2019 and continues a stable long-term trend. For the second year running, the second count was higher than the first possibly due to the delayed start to the breeding season.

Table 8: Black-legged Kittiwake study-plot count results – last 5 years.

Visit	2017 AON total	2018 AON total	2019 AON total	2020 AON total	2021 AON total
1	1945	1733	1802	1812	1801
2	1940	1688	1705	1858	1837
Mean	**1943**	**1711**	**1754**	**1835**	**1819**

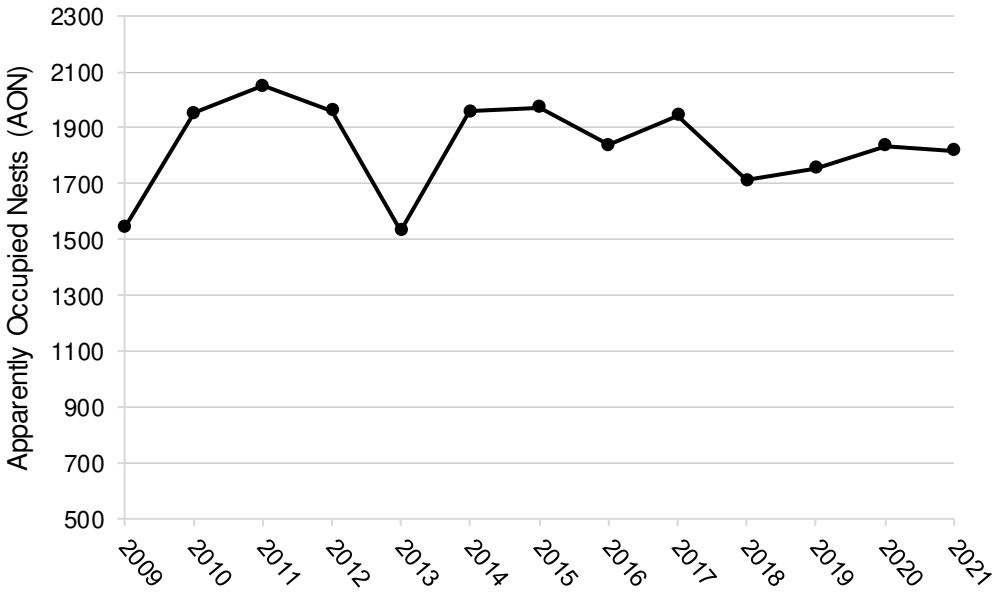

Figure 13: Number of Black-legged Kittiwake AON from 2009-2021 across seven study-plot areas.

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 five study-plot counts was 1583 IND (Table 9). This was the highest mean Guillemot count to date and continues a year-on-year increase within the study-plot areas for the last 5 years.

Table 9: Common Guillemot study-plot count results – last 5 years.

Count	2017 IND total	2018 IND total	2019 IND total	2020 IND total	2021 IND total
1	1335	1265	1486	1505	1574
2	1428	1363	1416	1417	1694
3	1424	1424	1428	1555	1526
4	1323	1460	1553	1528	1580
5	1231	1372	1478	1546	1540
Mean	**1348**	**1377**	**1472**	**1510**	**1583**

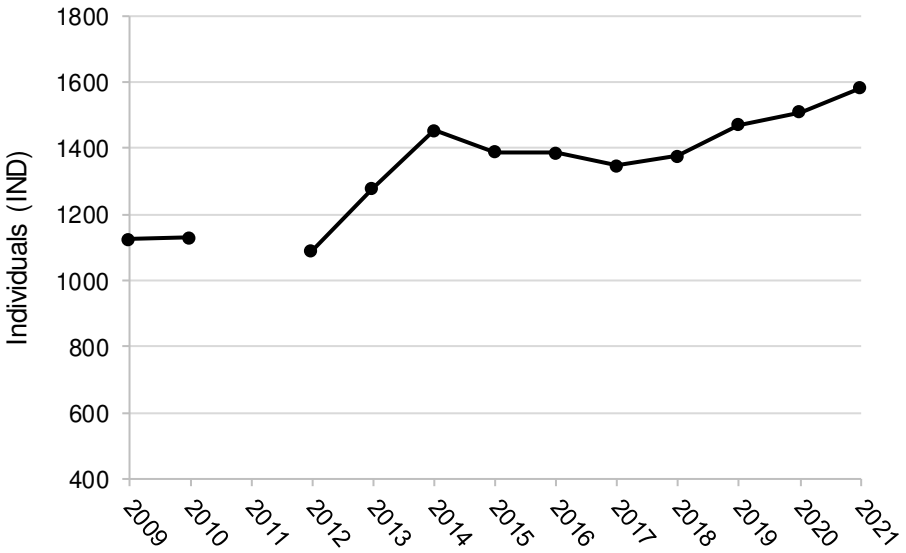

Figure 14: Number of Common Guillemot IND from 2009-2021 across seven study-plot areas.

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 five study-plot counts was 1000 IND, the highest mean total recorded since monitoring began (Figure 15). Three counts exceeded over 1000 individuals, with the first count resulting in the highest of the 5 visits (Table 10). Again, there has been a year-on-year population increase within the study-plot areas for the last 5 years.

Table 10: Razorbill study-plot count results – last 5 years.

Count	2017 IND total	2018 IND total	2019 IND total	2020 IND total	2021 IND total
1	731	753	832	868	1055
2	700	718	842	944	1027
3	657	766	859	1087	903
4	689	766	1004	998	1047
5	658	650	1077	951	967
Mean	**687**	**731**	**923**	**970**	**1000**

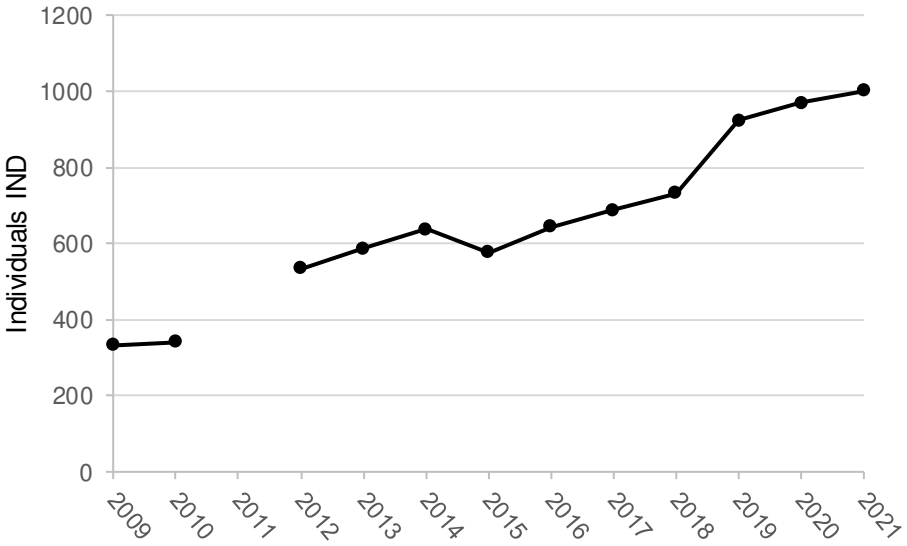

Figure 15: Number of Razorbill IND from 2009-2021 across seven study-plot areas.

Common Guillemot and Razorbill chick diet study

The following extracts have been taken from an unpublished MSc thesis on auk chick diet studies undertaken at Bempton Cliffs this summer, kindly provided by the author.

Methods

Data was collected between June 1st -June 21st, this data collection period aimed to cover the period of highest chick presence of both Auk species, with the chicks then leaving the nest while only part-grown at 18-25 days for guillemots and 14-24 days for razorbills (Ferguson-Lees et al., 2011). In order to observe chick provisioning activity, nests were observed during two three-hour periods (6am-9am and 5pm-8pm). These observation periods were chosen because of the higher level of activity closer to sunrise and sunset due to the prey species migrating up the water column to shallower waters during the night (Regular et al., 2010). The observation periods also gave the observers time to travel to and from site with a sufficient amount of sleep to prevent fatigue.

During the observation period, researchers were stood at one of two observation points: on the Bartlett Nab observation platform or from the cliff side, observing the area beneath the platform. Two researchers would be observing the nests at all times whilst the third researcher would take a break and every 30 minutes there would be a swap in position. This removed observer bias whilst also preventing fatigue and maintaining concentration. Binoculars were used by the researchers in order to closely observe the nest when a parent arrived with prey, these were chosen over a telescope due to the close distance to the nest and the higher mobility of the binoculars meaning the observer could focus on a new focal nest quickly.

The location of each nest was mapped out and labelled and during a feeding event the observer would make note of the nest number in order to calculate mean prey load values for each nest. A feeding event was defined as any event where an individual brings prey back to the nest which is then eaten by the chick. Mean values were calculated to remove any bias created from chicks hatching on different days and was calculated by dividing the number of feeding events by the number of observation periods where the chick was present. Following a similar methodology used by Chivers et al. (2012), the size of prey was estimated by determining the length of the prey relative to the bird's bill to the nearest quarter of a bill length. This was then multiplied by bill length, which was assumed to be 7cm in guillemots and 5cm in Razorbills (Chivers et al, 2012) to give the prey load. As razorbills carry multiple prey items back to the nest during a feeding event, the mean length was estimated and then multiplied by the amount of prey items to give the prey load. These values were then entered into equations created by Hislop et al. (1991) in order to calculate the total energy (kj). These equations use the length of the prey species to calculate the total energy, for both species, prey load was inserted as length in order to calculate the total energy of the whole catch.

Calculating total energy allowed comparisons to be made between species, as guillemots only brought one large prey item to the nest whereas razorbills would bring multiple smaller prey items. The identification of prey also followed the methodology of Chivers et al. (2012). As both species carried the prey to the nest in their beaks, it was possible to identify the prey species and categorise them into two groups: Sandeels (Ammodytes spp.) and Clupeids (likely

Sprattus sprattus or Clupea harengus). Identification of species enabled the calculation of prey species composition and was also important in establishing total energy of the prey load.

Results

Over the 20-day survey period, 125 feeding events were viewed. This number was lower than expected due to delayed egg laying as a result of the harsh spring conditions, meaning all nests were observed for less time than expected. Both species had one failed nest and so these were removed from the study. Feeding events were observed from 25 different nests, with eight razorbills and 17 guillemots. Guillemots were much easier to observe due to individuals nesting closely together on exposed ledges, whereas razorbills tended to nest in cracks or crevices on the cliff face and were much more spread out from other nests. Three guillemot nests only exhibited one feeding event during the observation periods whereas all razorbill nests had at least five feeding events occur. This may be due to the earlier hatching of razorbill chicks, ranging from 08/06-16/06/21, whereas guillemots ranged from 12/06-20/06/21, with the three nests with only one feeding event hatching on 19/06 and 20/06.

Razorbills targeted sandeels much more often than clupeids, with 47 feeding events being sandeels opposed to five Clupeid feeding events. These five feeding events came from four different razorbill nests. Guillemots showed preference towards Clupeids, with 70 feeding events and only three sandeel feeding events from three separate nests (Figure 1) (X^2 (1) = 90.623, $p < 0.001$, Cramer's V= 0.851). Clupeids were targeted most by both species combined, accounting for 61.17% (SE±8.44) of all feeding events, significantly more than sandeels which only accounted for 31.83% (SE±8.44) (V= 75, p =0.025)

Razorbills had a mean prey load number of 3.98 sandeels per catch (SE ±0.26) and 1.20 Clupeids (SE ±0.20), whereas guillemots only ever brought back one prey item, regardless of species. This was expected given the method of carrying prey (Chivers et al, 2012). It was found that razorbills delivered more energy to the nest per feeding event, with the mean total energy (kj) delivered to the nest 232.56kj (SE±46.09) in razorbills and 189.59kj (SE±37.47) in guillemots (W= 893, $p < 0.001$). Razorbills showed more variability in the total energy delivered to the nest per feeding event than in guillemots, with the coefficient of variation in razorbills being 216.19 compared to 208.23 in guillemots. A Levene's test showed this difference to be significant ($F(1, 123) = 28.955$, $p = <0.001$).

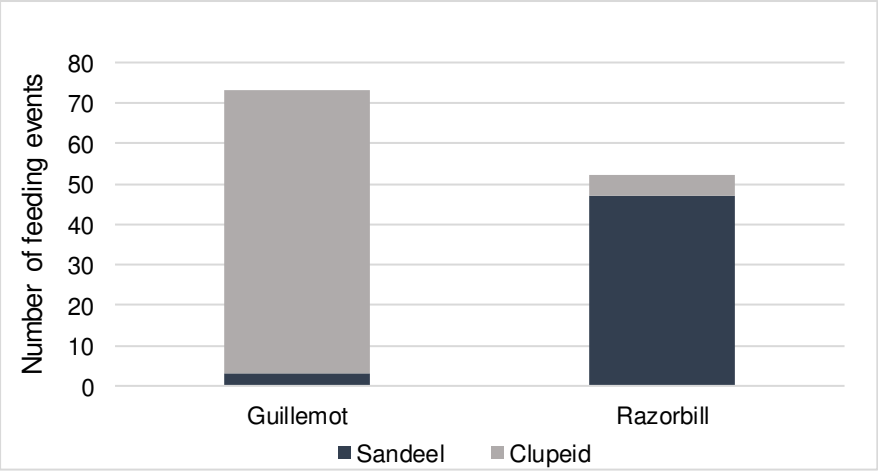

Figure 1: The targeted prey species of each feeding event for both Guillemot and Razorbill.

Black-legged Kittiwake Retrapping Adults for Survival (RAS) project

A Black-legged Kittiwake RAS colour ringing project was successfully completed for a fourth consecutive year at North Landing, Flamborough this summer. The results from this project will compliment detailed population and productivity monitoring already carried out within the SPA and provides a key monitoring tool for assessing the health of this species at this colony.

Resighting effort commenced in mid-April, after several prolonged periods of unsettled weather including snow showers at the beginning of the month which resulted in very low attendance of birds on the cliffs, and concluded at the end of July.

In 2021, a total of 105 individuals were resighted from a potential 130 colour ringed birds (51 adults from 2018, 60 adults from 2019 and 19 adults in 2020). All 105 colour ringed birds were resighted by late May, thereafter no new individuals were added despite repeated visits in June and July. As a result of the high return and achieving the required resighting sample, no new birds were added to the project this year.

Sightings of birds from this project away from the colony include two individuals, one in Aberdeen Harbour on 22 September 2019 and another in Gormanston, Co. Meath, Ireland on 1 September 2020.

Image: Colour ringed Black-legged Kittiwake, North Landing, Flamborough, 2021. © Richard Cope

European Shag colour ring resighting

Three colour ringed Shag were noted at the colony this summer. Two individuals have been recorded here previously (Green DAN and LRR) with the former likely to be an established breeder, as well as a new individual (White UDA) who had been ringed the previous year on the Isle of May as a nestling. To date, 34 individuals have been recorded here (Table 11).

For the first time, a colour ringed Cormorant (F624) was noted at Flamborough Head. The individual was amongst loafing Shag at Breil Nook on 5 August. The bird had been ringed as a nestling two months previously on 3 June at Wallnau nature reserve, Fehmarn, northern Germany.

Table 11: European Shag colour ring re-sightings at Flamborough & Filey Coast SPA 2014 – 2021.

Code	BTO ring number	Year Ringed	Age	Colony	Year recorded at Flamborough & Filey Coast SPA
EUH		2014	Pullus	Fidra	2014, 2017
CLR		2014	Pullus	Farne Islands	2014, 2015
END	1478565	2014	Pullus	Inchmickery	2014, 2015, 2016, 2017
CHC	G8898	2006	Pullus	Isle of May	2014, 2015, 2016, 2017
CNE		2014	Pullus	Farne Islands	2014
ACE	1472974	2014	Adult	Craigleith	2015, 2016
ESB	1478625	2014	Pullus	Inchmickery	2015
ARI		2014	Pullus	Craigleith	2015
NEJ		2015	Pullus	Farne Islands	2015
DAN	1485389	2016	Pullus	Isle of May	2017, 2018, 2020, 2021
UWE		2016	Pullus	Farne Islands	2017
FTA		2016	Pullus	Isle of May	2017
IAX		2016	Pullus	Isle of May	2017
HUD		2016	Pullus	Isle of May	2017
LRR		2016	Pullus	Farne Islands	2018, 2021
TPC	1396622	2009	Adult	Craigleith	2014, 2015, 2016, 2017
RZF		2013	Adult	Farne Islands	2015
PCA		2010	Pullus	Farne Islands	2015, 2016
AUL	1483281	2015	Adult	Isle of May	2016, 2017
BLJ		2017	Adult	Isle of May	2018, 2019
AFP		2014	Pullus	Isle of May	2014, 2019
AUH	1483074	2014	Pullus	Isle of May	2016, 2017, 2018
ADA	1473962	2014	Pullus	Isle of May	2016, 2018†
IPJ		2016	Pullus	Isle of May	2016, 2018
DAP	1472058	2015	Pullus	Isle of May	2017
IDT		2016	Pullus	Isle of May	2017
CUX	1472024	2015	Pullus	Isle of May	2017
HZA		2015	Pullus	Isle of May	2017
EZS		2018	Pullus	Farne Islands	2018
NDC		2014	Pullus	Isle of May	2014
FTX		2012	Pullus	Isle of May	2014
CTF		2018	Pullus	Isle of May	2018
UDA	1495246	2020	Pullus	Isle of May	2021
AFN	1453306	2011	Pullus	Isle of May	2017

Recreational disturbance

Since 2013, the Flamborough Head European Marine Site (EMS) Management Scheme has been monitoring the frequency and impacts of recreational activities around the site. Volunteers record disturbance events around the Flamborough to Filey stretch of coastline; this data is then passed on to the EMS Project Officer, Rachel Riddell. Data on recreational activities is used to inform and support management of the Flamborough Head EMS. Over the years this research has helped to identify a number of activities that have the potential to disturb the natural behaviour of the breeding seabird colony. In 2021, recreational disturbance monitoring has gone ahead despite some COVID-19 related restrictions still being in place. Due to these restrictions still being in place we expect there to be a reduction in the number of reports of recreational disturbance received by the management scheme compared to previous years.

Thanks to the data collected, the Management Scheme has been able to work with various user groups to establish a number of voluntary codes of conduct. Between 1 March and 30 September, local angling clubs have agreed to a closed season for cliff top angling along the length of the RSPB Bempton Cliffs Nature Reserve. Additionally, a voluntary code of conduct is in operation between 1 March and 30 September for personal watercraft, which sets guidelines for operating personal watercraft around the EMS and aims to reduce disturbance to the breeding seabird colony and improve awareness of the site's sensitivities. The Project Officer continues to work with user groups, local authorities, Natural England, the Marine Management Organisation, and the RSPB to ensure that effective management measures are in place to minimise disturbance from recreational activities. Furthermore, the Management Scheme continues to work with a wide variety of partners to explore other mitigation measures, for example through the planning system.

In 2021, the management scheme, in partnership with the RSPCA, Humberside and North Yorkshire Police forces and other key partners have continued the work of Operation Seabird. Since its launch in August 2020, Operation Seabird has held a number of successful 'awareness days' and media campaigns to engage the public and raise awareness of disturbance caused by recreational activities. The success of Operation Seabird has seen the initiative launch nationally in other areas of UK coastline and has proven to be a useful tool in encouraging responsible use of the marine environment. Going forward we hope to continue Operation Seabird's success into 2022 by continuing to build positive relationships with user groups, raise awareness of recreational disturbance and look towards targeted engagement and hosting workshops.

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Acknowledgements

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Rachel Riddell, the Flamborough Head Project Officer, for her work on recreational disturbance issues and bringing together user groups to produce voluntary codes of conduct to help protect the SPA, and for producing a summary of her work for inclusion in this report.

James O'Leary et al for carrying out auk diet monitoring as part of their MSc dissertation and kindly providing their raw data and access to his thesis for inclusion in this report.

Natural England for granting the necessary permissions to carry out research projects and their continued support of the monitoring programme.

The Flamborough Bird Observatory for their ongoing supporting and dedicated recording of seabirds on the headland.

Members of Filey Bird Observatory & Group for their continued commitment to monitoring Black-legged Kittiwake at Filey Cliffs.

The Yorkshire Wildlife Trust who provide access to their Flamborough Cliffs reserve and ongoing support of monitoring and research projects.

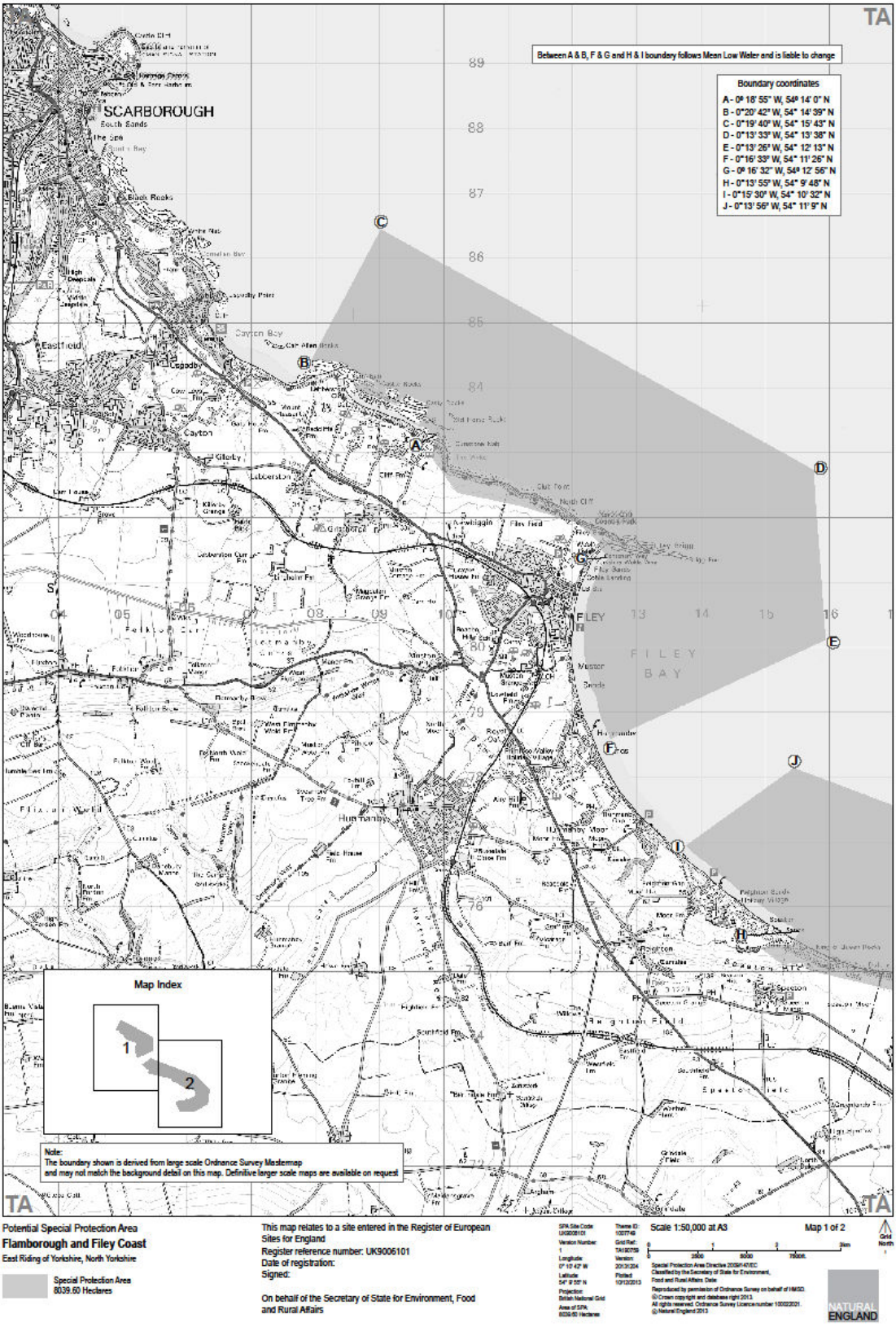
Blue Dolphin Holiday Park at Filey for allowing access to reach important sections of the colony for essential monitoring works.

And lastly, the owners and management at Thornwick Bay Holiday Village at Flamborough for providing invaluable parking permits for North Landing car park.

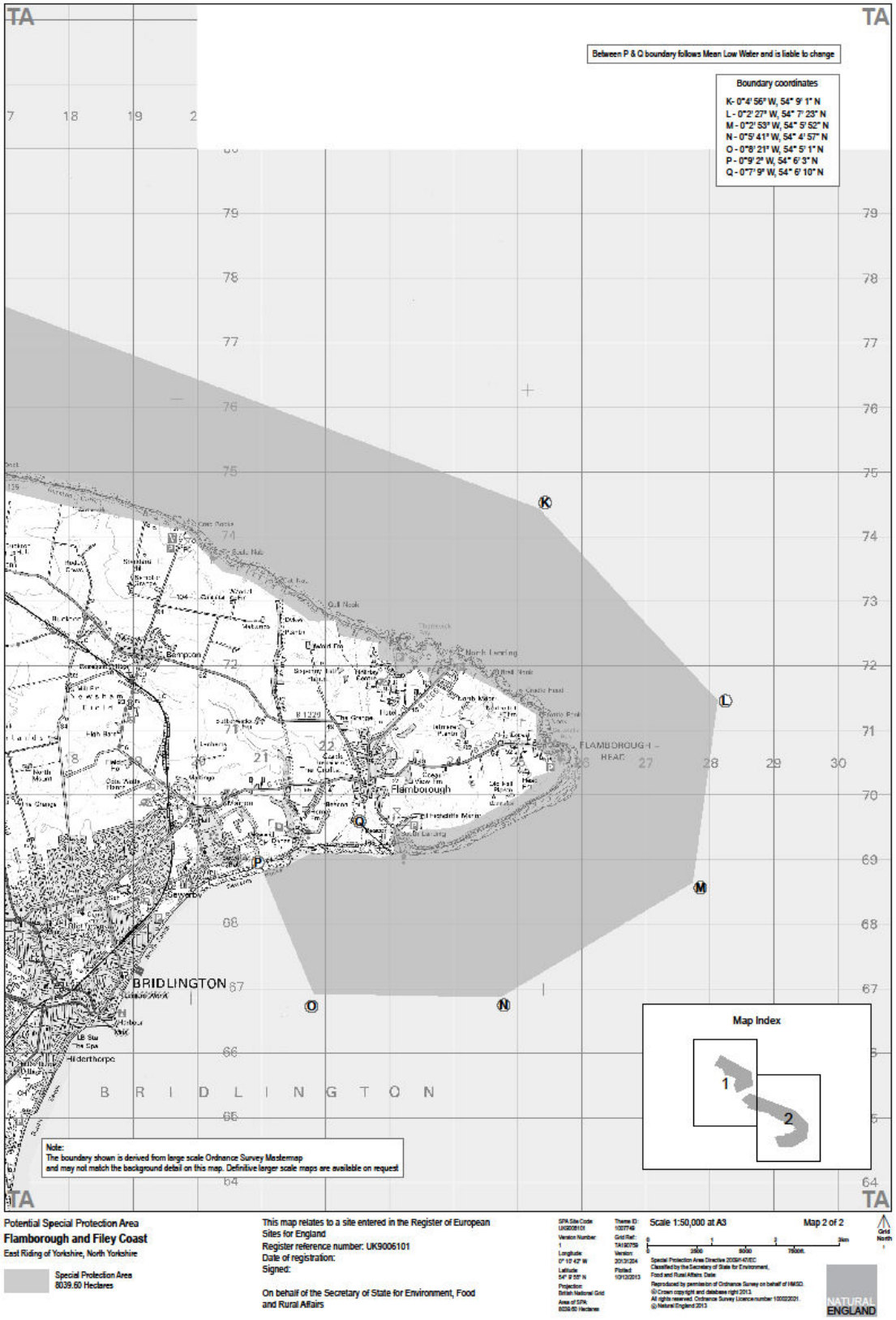
Without all of whom the Flamborough and Filey Coast SPA seabird monitoring programme would not be the success that it is.

Appendix 1: Flamborough and Filey Coast SPA boundary maps

North



South


TA
TA
Between P & Q boundary follows Mean Low Water and is liable to change
Boundary coordinates
K- 0°4' 56" W, 54° 9' 1" N
L - 0°2' 27" W, 54° 7' 23" N
M - 0°2' 53" W, 54° 5' 52" N
N - 0°5' 41" W, 54° 4' 57" N
O - 0°8' 21" W, 54° 5' 1" N
P - 0°9' 2" W, 54° 6' 3" N
Q - 0°7' 9" W, 54° 6' 10" N
K
L
M
N
O
P
Q
Bempton
Flamborough
FLAMBOROUGH HEAD
BRIDLINGTON
Hilderthorpe
B R I D L I N G T O N
Map Index
1
2
Note:
The boundary shown is derived from large scale Ordnance Survey Mastermap
and may not match the background detail on this map. Definitive larger scale maps are available on request
Potential Special Protection Area
Flamborough and Filey Coast
East Riding of Yorkshire, North Yorkshire
Special Protection Area
8039.60 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
Scale 1:50,000 at A3
Map 2 of 2
Grid North
NATURAL ENGLAND

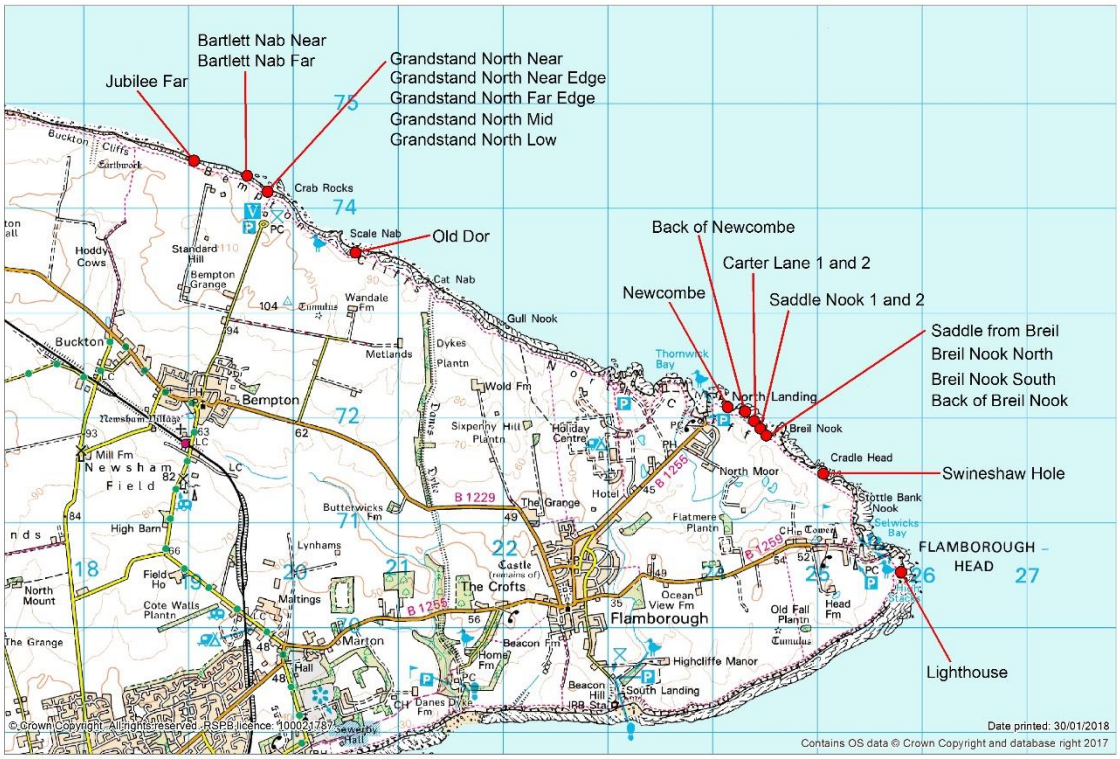
Appendix 2 - Productivity monitoring plot locations

Northern Fulmar productivity plots

Northern Gannet productivity plots

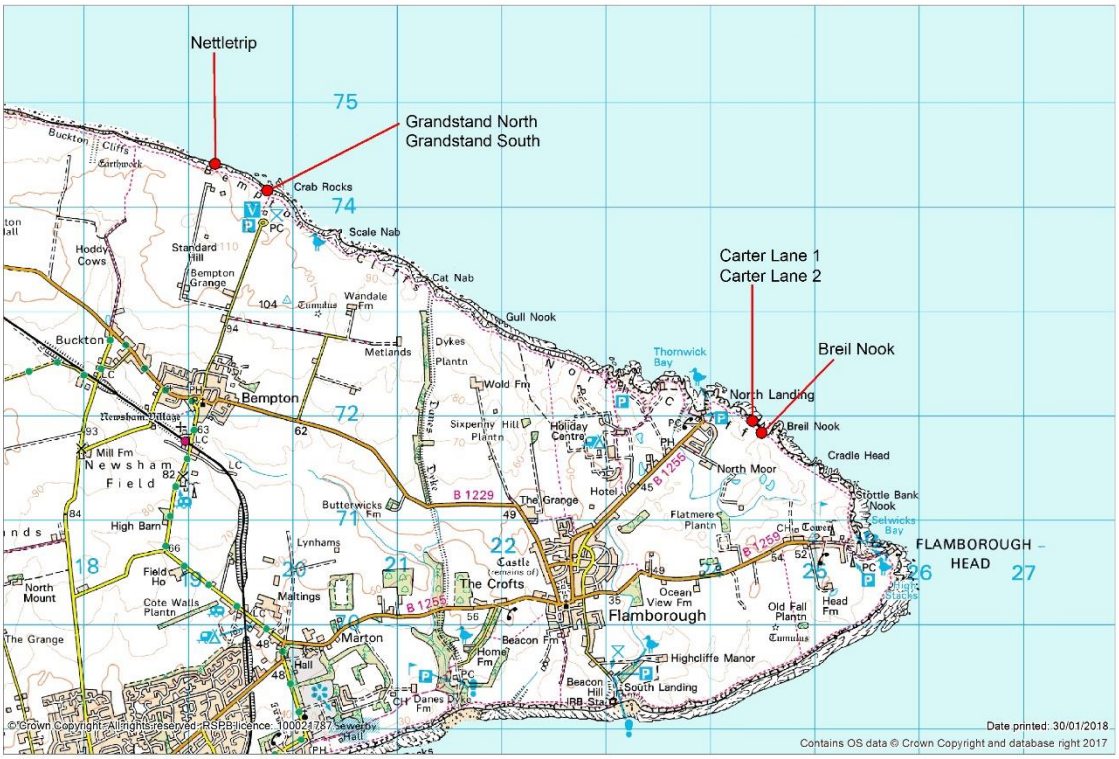
European Herring Gull productivity plots

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