Flamborough Head and Bempton Cliffs SPA Seabird Monitoring Programme

2012 Report

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Summary

The Flamborough Head and Bempton Cliffs seabird monitoring programme was initially a two-year partnership between Natural England and the RSPB, established in 2008. The aim of the project was originally to establish repeatable baseline census monitoring of the colony, and to pursue a number of key areas of research and surveillance required to inform the condition of this site. Continued monitoring and research will inform the review of the Special Protection Area (SPA) and Site of Special Scientific Interest (SSSI) and provide critical data to conservation agencies to enable the government to make informed decisions in the establishment of the Marine Protected Area (MPA) network.

The 2012 seabird monitoring programme was successfully completed by RSPB staff and dedicated team of volunteers.

The Bempton and Flamborough colony faced a challenging year with appalling weather conditions throughout the breeding season. Heavy rain, strong onshore winds and thick fog made for testing breeding conditions, as well as making monitoring difficult. However, productivity has remained relatively robust with only a minimal drop in productivity recorded on last year across all six species, with the exception of herring gull, which has seen a decline in productivity year on year since the monitoring programme began.

Common Guillemot study-plot counts were completed in 2012. The total average count was 1,092 individuals (IND) – this is the lowest recorded total average count since the study was set up, with a decline of 39 IND since 2010 and 33 IND since 2009.

Razorbill study-plot counts were also completed in 2012. The total average count was 535 IND – this is the highest recorded total average count since the study-plots were set up, with an increase of 193 IND since 2010 and 203 IND since 2009.

Black-legged Kittiwake study-plot counts were completed again in 2012. The results from 2012 show a reduction of 100 apparently occupied nests (AON) from 2067 AON in 2011 to 1967 AON in 2012.

Northern Gannet whole-colony count was successfully completed this year. The results from 2012 show a significant increase in Gannet numbers with 11,061 apparently occupied sites (AOS) recorded.

Herring Gull whole-colony counts were not completed for a second year due to unfavorable sea conditions, delaying the colony count late into the breeding season.

Razorbill productivity averaged 0.72 fledged chicks per AOS.

Common Guillemot productivity averaged 0.74 fledged chicks per AOS.

Northern Gannet productivity averaged 0.85 fledged chicks per AON.

Black-legged Kittiwake productivity averaged 0.88 fledged chicks per AON.

Northern Fulmar productivity averaged 0.50 fledged chicks per AOS.

Herring Gull productivity averaged 0.71 fledged chicks per AON.

The kittiwake tagging and gannet satellite tracking projects both took place again this year. The projects were led by Ellie Owen and Rowena Langston respectively, both conservation scientists from the RSPB.

The Future of the Atlantic Marine (FAME) kittiwake tagging project took place again at Flamborough Head for a fourth year running; led by Dr Ellie Owen, conservation scientist. This year, 16 GPS trackers were deployed on adult birds, two of which were designed to take salt readings allowing us to see when birds had been in contact with water along their journey. The 2 specially designed salt reading GPS devises and 9 GPS trackers were recovered, along with 5 Geo-locators that were originally deployed in 2010/11.

The Department of Energy and Climate Change (DECC) gannet satellite tracking project took place at Staple Newk on 16th July 2012; led by Dr Rowena Langston, principle conservation scientist. This was the third and final year for this project, which saw 15 satellite tags safely deployed on adult gannets. The project aim is to track foraging movements and key feeding areas away from the colony in relation to proposed offshore wind farms during chick rearing.

This year, Bempton was one of eight reserves included in a project studying the causes in declines of large gulls, particularly herring gull, linked to mammalian predation. The project, funded by RSPB and Natural England and led by Dr Sarah Davis – RSPB conservation scientist, looked at predator presence and density on the reserve.

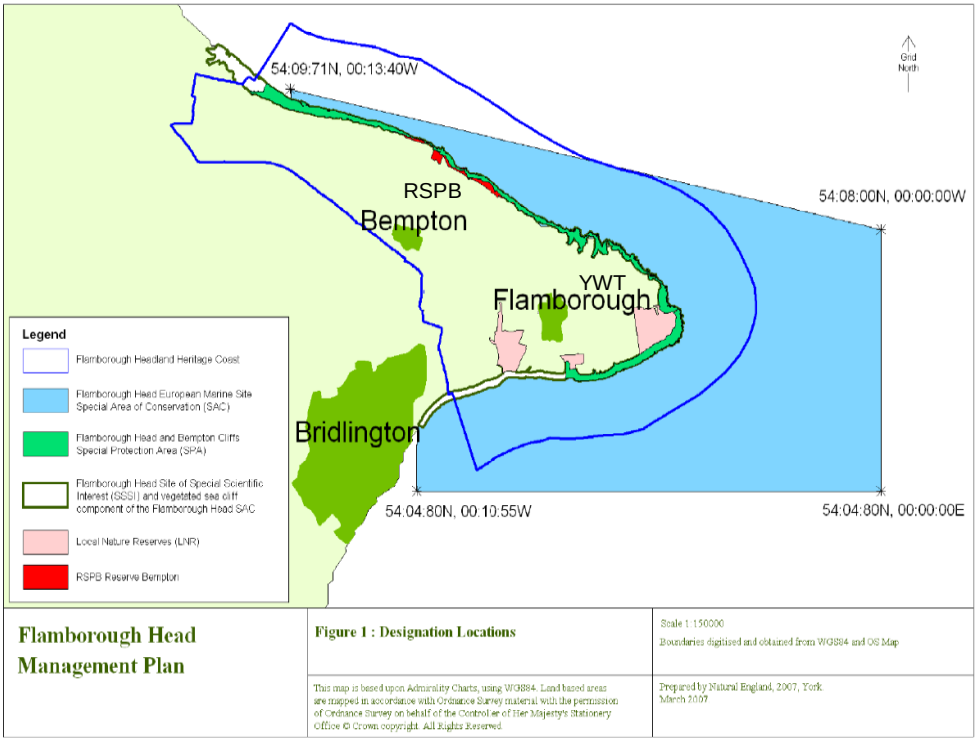
Funding support was provided by the RSPB East Yorkshire Local Members Group and the Flamborough Bird Observatory.

Introduction

Flamborough Head and Bempton Cliffs SPA supports the largest mainland seabird colony in England, the only mainland gannetry in England, and the largest mainland black-legged kittiwake colony in the UK.

Flamborough Head is a highly protected site both for its wildlife and unique chalk habitats. The site is designated as a Site of Special Scientific Interest (SSSI), a Special Protection Area (SPA), a Special Area of Conservation (SAC), a Heritage Coast site, includes three Local Nature Reserves (LNR), an RSPB nature reserve at Bempton Cliffs and a Yorkshire Wildlife Trust site at Flamborough Head (Figure 1).

Figure 1 – Site designations on Flamborough Headland



Bempton and Flamborough qualifies under Article 4.2 of the Birds Directive for the following reasons:

- Regularly supports internationally important populations of the following migratory species: black-legged kittiwake *(Rissa tridactyla)*
- Regularly supports an internationally important seabird assemblage; nationally important populations of common guillemot *(Uria aalge)*, razorbill *(Alca torda)* and atlantic puffin *(Fratercula artica)*.

Due to the importance of the seabird colony and level of site protection, Natural England and RSPB proposed a project to enable a baseline count, population monitoring and further research to collect data on the health of the colony. The data will inform the condition of the designated sites and the government to help establish a network of Marine Conservation Zones (MCZ) that will be set up to protect important areas at sea for all marine life including important sites for feeding seabirds.

The project aims are as follows:

- **Understanding variation and trends in seabird productivity**
  Guillemot, Razorbill, Gannet, Kittiwake, Fulmar and Herring Gull plots to be monitored annually

- **Understanding population numbers and trends**
  Whole colony census to be carried out every 5 years, commencing 2008
  Gannet colony counts to be carried out on alternate years, commencing 2009
  Herring Gull colony counts to be carried out on alternate years, commencing 2010
  Kittiwake, Guillemot and Razorbill study-plot counts to be carried out annually commencing 2009

- **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? For those activities that are of concern, develop specific research proposals which assess level of impact

- **Understanding foraging behaviours of colony including preferred foraging areas and trends in provisioning for example, determining key feeding areas for key species and factors influencing their location using range finders, remote tracking, and fish data and benthic mapping data, monitor annual variation in provisioning rates and prey types for Guillemot and Razorbill**

Seabird population data has been collected at Bempton and Flamborough since 1969 (Table 1). In 1969, all species were counted as part of 'Operation Seafarer' except for puffin and shag. In 1987, all species were counted during the 'Seabird Colony Register' census, in 2000 for 'Seabird 2000' and again in 2008. Whole-colony counts for gannet were completed in 1970-77, 1981-83, 1985-95, 1997-99, 2002, 2004-05, 2008-09 and 2012. In addition, whole -colony counts for herring gull were also completed in 2010.

Breeding success data has been collected for gannet during 1973-79, 1988-94, 1998, 2005-06, 2008-11 and 2012. Kittiwake breeding success has been monitored continuously between 1986 and 2012. Razorbill were monitored in 2005-06, 2009-11 and 2012, guillemot were monitored in 1991-95, 1998, 2005-06, 2009-11 and 2012. Fulmar and herring gull breeding success were monitored for the first time in 2009, and is still on-going (Table 2). Unfortunately, it is not possible to monitor breeding success for puffin and shag at this colony.

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

The results of the 2012 seabird monitoring and research programme are detailed in this document with the intention of providing all raw data and monitoring procedures to enable interpretation by others in the future.

Table 1 – Summary of whole-colony count data for each breeding seabird species at Bempton and Flamborough from 1969 to 2012

	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Gannet	✓	✓	✓	✓	✓	✓	✓	✓	✓				✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓			✓		✓	✓			✓	✓			✓
Kittiwake	✓																		✓													✓									✓				
Razorbill	✓																		✓													✓									✓				
Guillemot	✓																		✓													✓									✓				
Puffin																			✓													✓									✓				
Herring Gull	✓																		✓													✓									✓		✓		
Fulmar	✓																		✓													✓									✓				
Shag																			✓													✓									✓				

Table 2 – Summary of breeding success data for each breeding seabird species at Bempton and Flamborough from 1973 to 2012

	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Gannet					✓	✓	✓	✓	✓	✓	✓									✓	✓	✓	✓	✓	✓	✓				✓									✓	✓		✓	✓	✓	✓	✓
Kittiwake																		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Razorbill																																					✓	✓			✓	✓	✓	✓
Guillemot																							✓	✓	✓	✓	✓			✓							✓	✓			✓	✓	✓	✓
Puffin																																												
Herring Gull																																									✓	✓	✓	✓
Fulmar																																									✓	✓	✓	✓
Shag																																												

Methods

The seabird monitoring programme completed in 2012 followed the guidelines and methodologies set out in the *Seabird monitoring handbook for Britain and Ireland*. By Walsh, P.M., Halley, D.J., Harris, M.P., del Nevo, A., Sim, I.M.W., & Tasker, M.L. 1995. JNCC / RSPB / ITE / Seabird Group, Peterborough.

The handbook summarises the current census and productivity monitoring techniques for seabirds. The appropriate methods were followed according to resources and practicality for each species at this colony. Please refer to the '*Seabird monitoring handbook for Britain and Ireland, 1995'* for details on individual methodologies for each species.

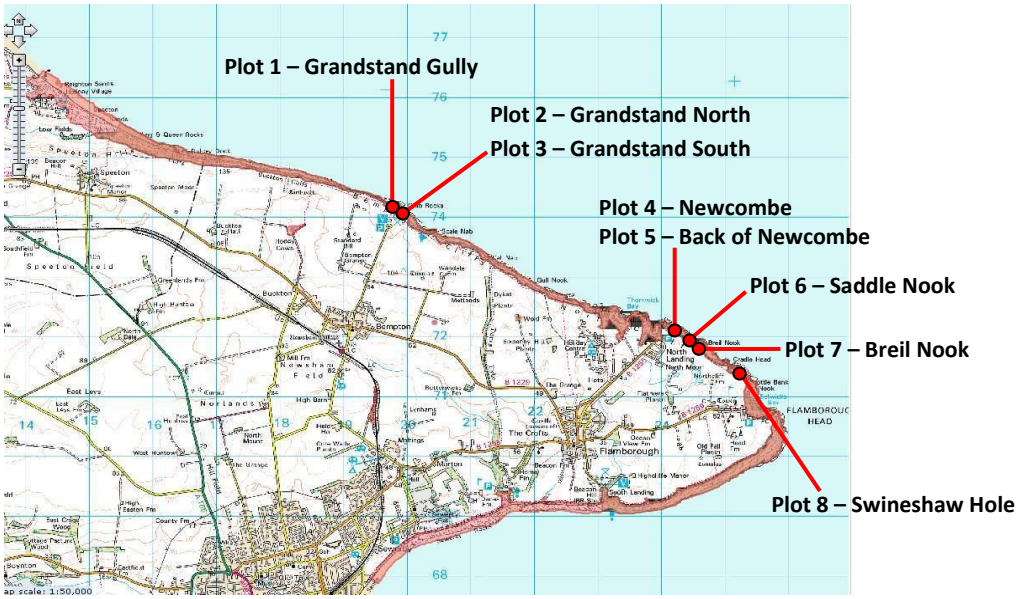
Productivity monitoring

In 2012, productivity monitoring was completed for a fourth year running at the Bempton and Flamborough colony. Monitoring was conducted for the following seabird species: Razorbill, Common Guillemot, Northern Gannet, Black-legged Kittiwake, Northern Fulmar and Herring Gull. For a detailed description of the methodologies followed, please refer to the 'Seabird monitoring handbook for Britain and Ireland, 1995'.

Razorbill (*Alca torda*)

Eight productivity plots were monitored at Flamborough and Bempton between April and July 2012 (Figure 2). Productivity plots were also monitored between 2005-06, and 2009-11.

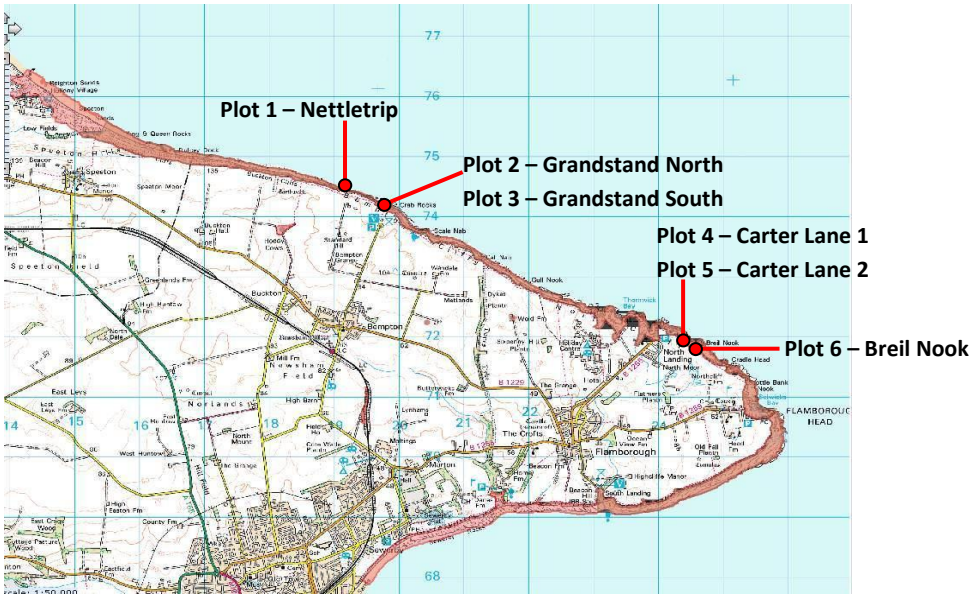
Figure 2 – Razorbill productivity plot locations



Common Guillemot (*Uria aalge*)

Six productivity plots were monitored at Flamborough and Bempton between April and July 2012 (Figure 3). Productivity monitoring has taken place at this colony over the years; 1991-95, 1998, 2005-06, and 2009-11.

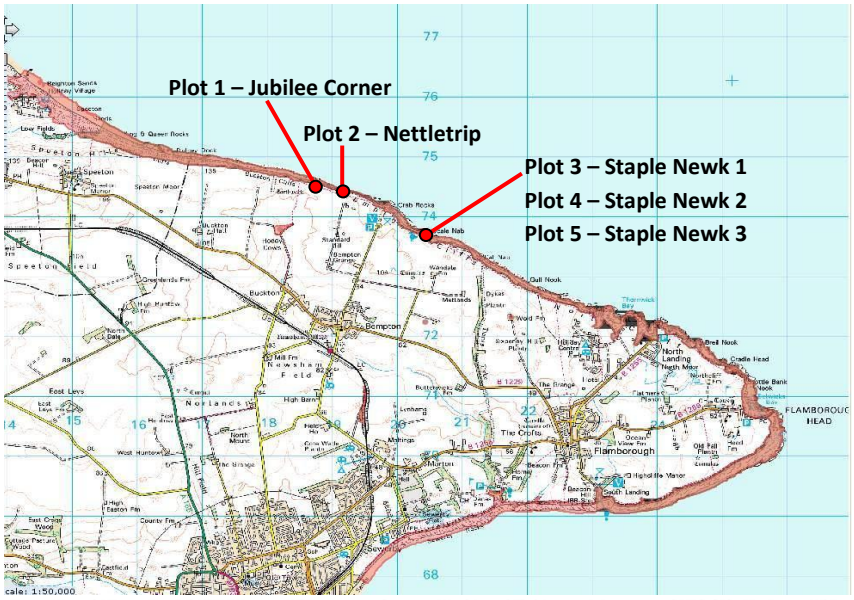
Figure 3 – Guillemot productivity plot locations



Northern Gannet (*Morus bassanus*)

Five productivity plots were monitored at Bempton between mid-April until the end of September 2012 (Figure 4). Historically, productivity monitoring has taken place at the reserve for the last twenty years. In recent years, two plots have been monitored; in 2009, 2010 and 2011 five plots were monitored.

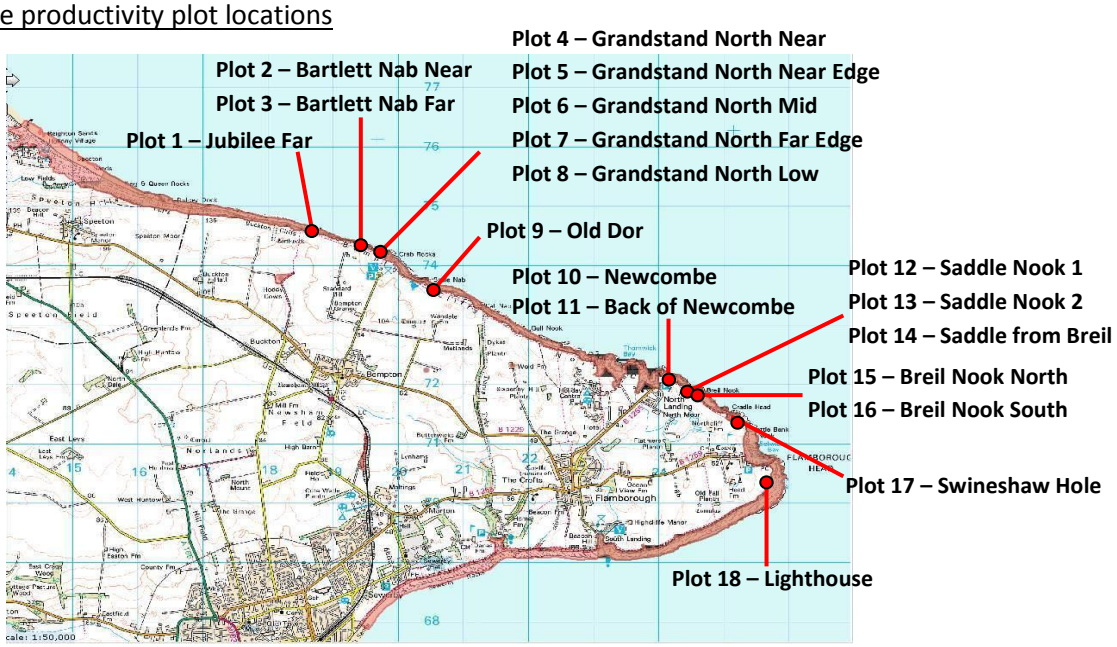
Figure 4 – Gannet productivity plot locations



Black-legged Kittiwake (*Rissa tridactyla*)

Eighteen productivity plots were monitored between Flamborough and Bempton from mid-May until August 2012 (Figure 5). Monitoring has taken place at this colony for the past twenty-four years; in 2009, eleven plots were monitored; in 2010, twenty-two plots were monitored and in 2011, twenty plots were monitored.

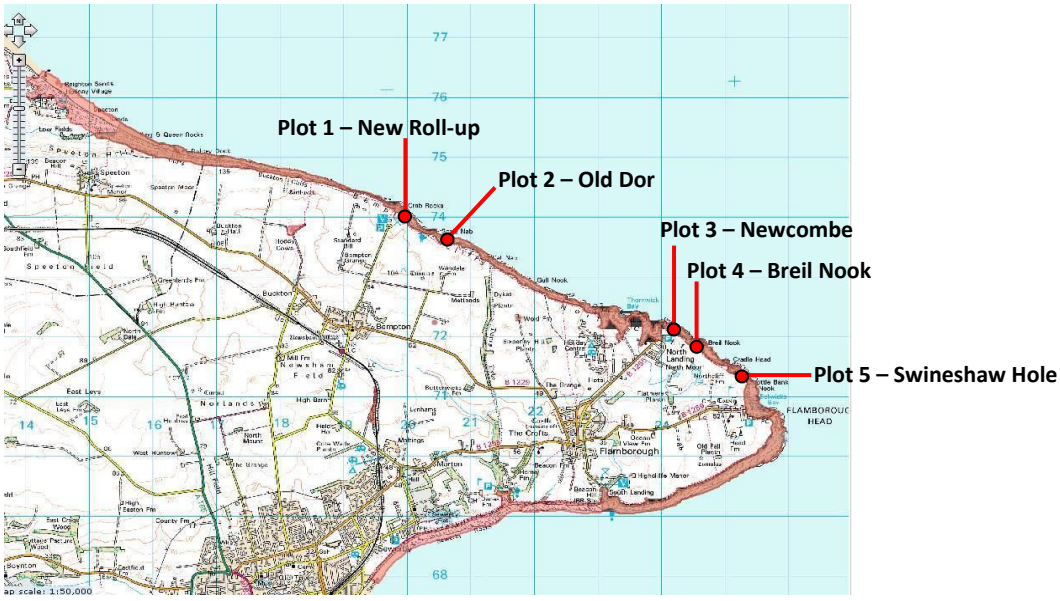
Figure 5 – Kittiwake productivity plot locations



Northern Fulmar (*Fulmarus glacialis*)

Five productivity plots were monitored between Flamborough and Bempton on three visits between the end of May and beginning of June, with a final visit mid-August (Figure 6). Productivity monitoring took place for the first time at this colony in 2009; these were repeated again in 2010 and 2011.

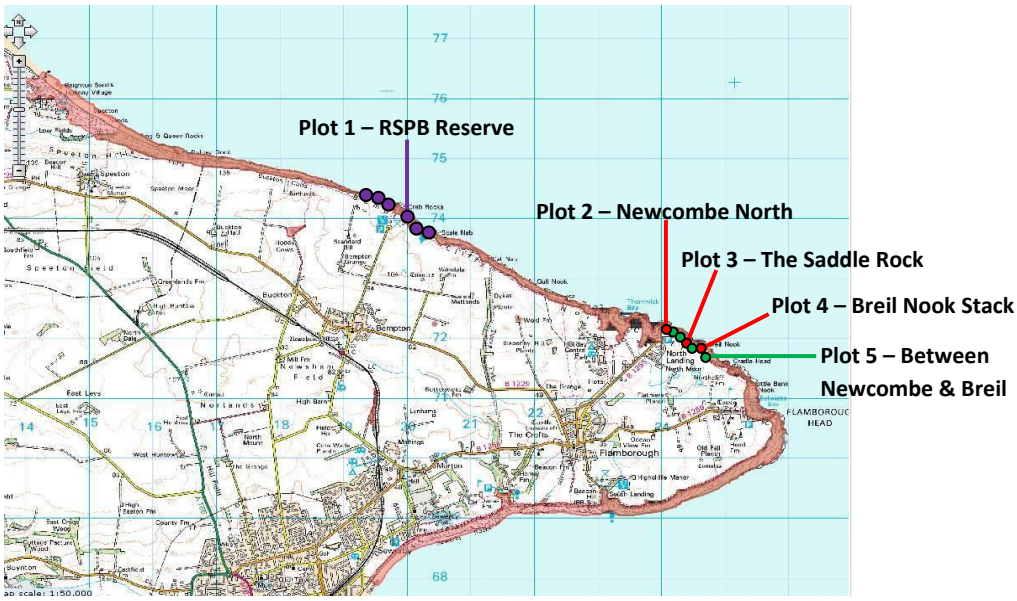
Figure 6 – Fulmar productivity plot locations



Herring Gull (*Larus argentatus*)

Eighty-three apparently occupied nests (AON) were monitored along the length of the colony from the middle of May through to the beginning of August 2012 (Figure 7). Productivity plots were monitored for the first time at this colony in 2009; these were repeated again in 2010 and 2011.

Figure 7 – Herring Gull productivity plot locations



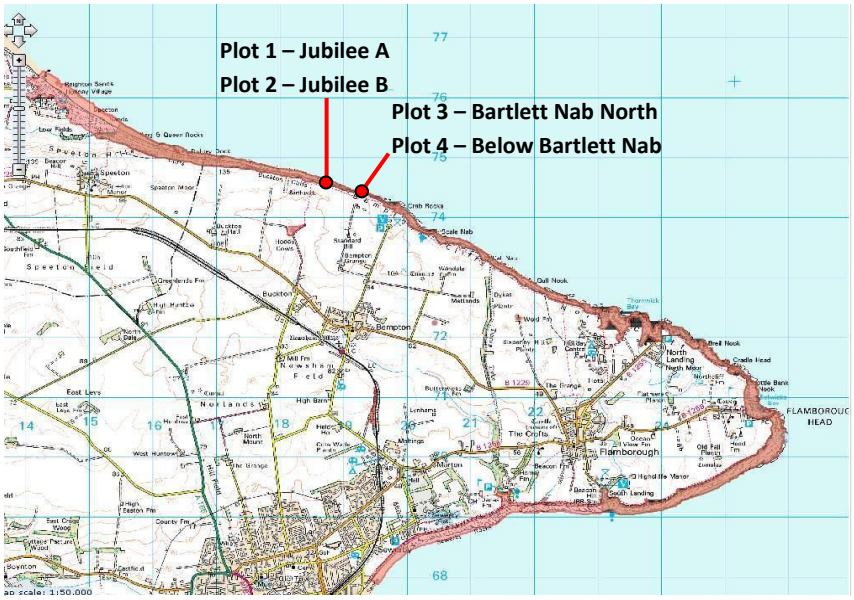
Common Guillemot diet and provisioning study

Four diet and provisioning study-plots were established in 2009 to collect data on different prey species fed to guillemot chicks, as well as calculating provisioning rates throughout an 18-hour foraging window. These plots were monitored again in 2010, 2011 and 2012 (Figure 8).

Four study-plots were identified where observers could record both rate of provisioning for chicks and the identity of prey species delivered by adult birds from a range of less than 30 metres, without causing disturbance. Since the rate of food delivered to chicks may vary during the course of the day, to obtain a reliable estimate of the overall daily provisioning rate, data was collected during all daylight hours: 05:00am – 21:00pm between 12th and 22nd June 2009, 04:00am – 22:00pm between 2nd and 11th June 2010, 04:00am – 22:00pm between 6th and 14th June 2011, and 04:00am – 22:00pm between 1st and 27th June 2012.

As different observers may vary in their ability to observe and record feeds, it was important to ensure that each observer collected data across all time periods and study-plots. In 2009, monitoring took place across four days with monitoring periods rotated back to back. In 2010 and 2011, sampling took place over nine days to accommodate differences in weather conditions and to allow the observer enough time for coverage of each time slot across all four monitoring plots; two-hour sampling periods were alternated on/off with each time slot monitored on each plot across the different days. In 2012, monitoring occurred over 14 days to accommodate enough time for one researcher to cover each time slot for all four study-plots. Monitoring varied between 1 and 6 hour windows, and was down to the discretion of the researcher.

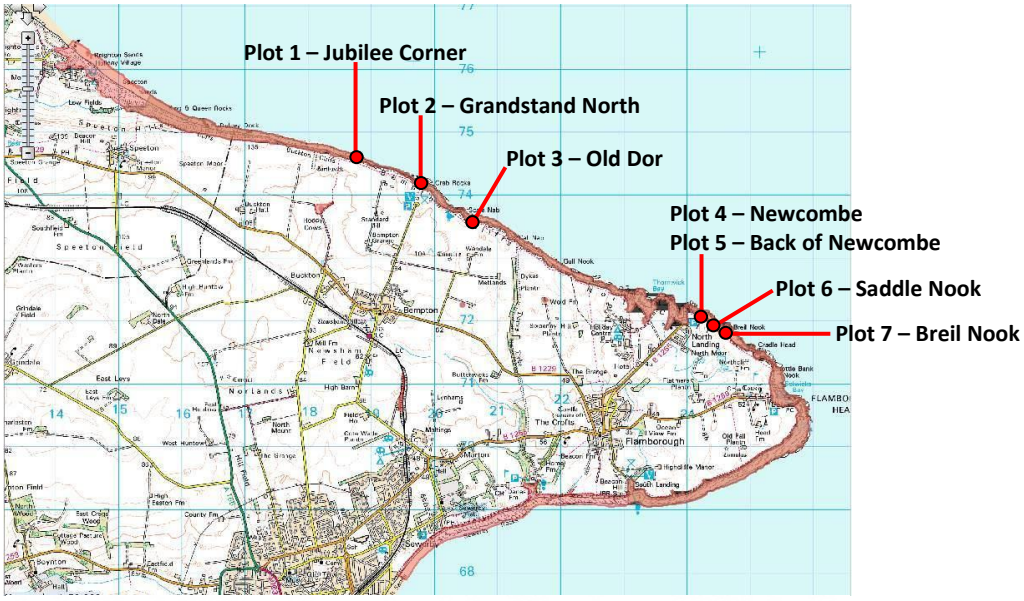
Figure 8 – Guillemot diet and provisioning plot locations



Black-legged Kittiwake study-plot count

Seven study-plots were counted twice in peak season (Figure 9). Guidance from the seabird monitoring 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 of birds within the colony or colony extensions, or losses rather than through changes of density across the colony. However, as the Bempton and Flamborough colony holds the largest mainland kittiwake population in the UK, it is important that trends in numbers are monitored.

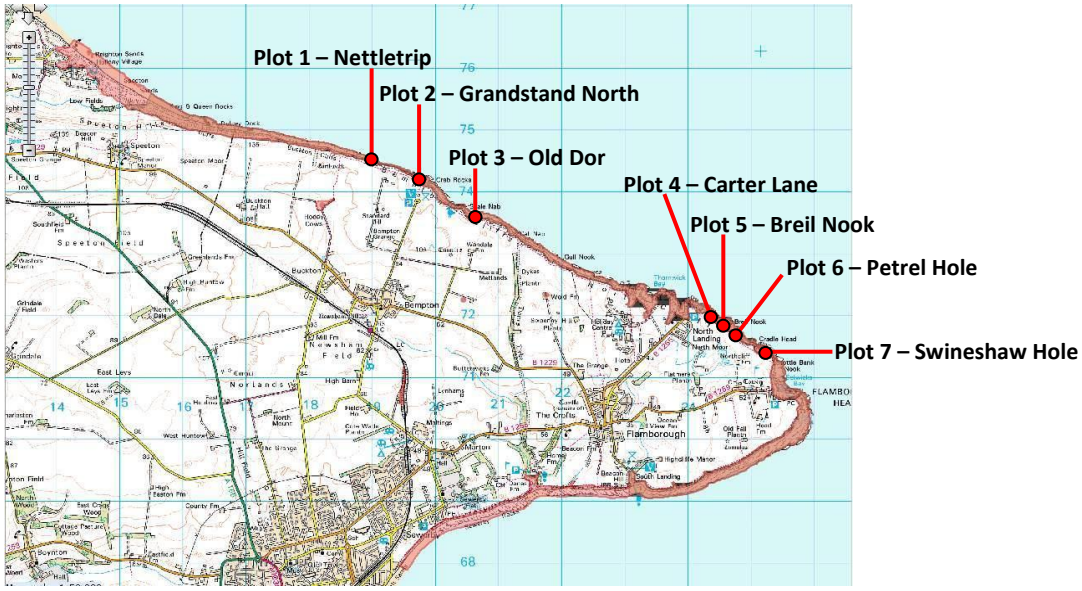
Figure 9 – Kittiwake study-plot locations



Common Guillemot study-plot count

Seven study-plots were counted on five occasions in the peak of the season (Figure 10).The study-plots were originally set up in 2009 and were repeated in 2010. In 2011, counts were abandoned due to an early breeding season leaving fewer birds in attendance when the study was conducted.

Figure 10 – Guillemot study-plot locations



Razorbill study-plot count

Seven study-plots were counted on five occasions in the peak of the season (Figure 11).The study-plots were originally set up in 2009 and were repeated in 2010. In 2011, counts were abandoned due to an early breeding season leaving fewer birds in attendance when the study was conducted.

Figure 11 – Razorbill study-plot locations

Results

Productivity monitoring

Razorbill (*Alca torda*)

In 2012, overall productivity for razorbill at Bempton and Flamborough from eight plots averaged 0.72 fledged chicks per AOS. This is above the national mean between 1986-2005 of 0.65 chicks per AOS recorded from between one and seven colonies annually (Mavor et al. 2008). There was a 0.02 drop in productivity on last year from 0.74 chicks per AOS; however, average fledging success was still robust (Table 3).

For full plot locations and boundaries, see Appendix 3.1.

Table 3 – Razorbill productivity results

Monitoring Site:	AOS 2009	Fledged Chicks '09	Productivity ch/pr '09	AOS 2010	Fledged Chicks '10	Productivity ch/pr '10	AOS 2011	Fledged Chicks '11	Productivity ch/pr '11	AOS 2012	Fledged Chicks '12	Productivity ch/pr '12
Grandstand Gully	13	3	0.23	14	6	0.43	11	4	0.36	13	5	0.38
Grandstand North	32	25	0.78	34	26	0.76	28	14	0.50	29	14	0.48
Grandstand South	16	6	0.38	17	11	0.65	18	12	0.67	18	15	0.83
Newcombe	52	34	0.65	61	43	0.70	66	52	0.79	47	40	0.85
Back of Newcombe	–	–	–	18	13	0.72	36	28	0.78	42	29	0.69
Saddle Nook	–	–	–	35	21	0.60	50	41	0.82	50	36	0.72
Breil Nook	19	11	0.58	40	26	0.65	49	41	0.84	49	38	0.77
Swineshaw Hole	–	–	–	34	16	0.47	48	35	0.73	53	39	0.74
Total	**132**	**79**	**0.60**	**253**	**162**	**0.64**	**306**	**227**	**0.74**	**301**	**216**	**0.72**

Common Guillemot (*Uria aalge*)

In 2012, overall productivity for guillemot at Bempton and Flamborough from six plots averaged 0.74 fledged chicks per AOS. This is above the national mean between 1986-2005 of 0.69 chicks per AOS recorded from between three and fifteen colonies annually (Mavor et al. 2008). This is the lowest recorded productivity since 2009 and a decline of 0.07 from 0.81 chicks per AOS in 2011 (Table 4).

For full plot locations and boundaries, see Appendix 3.2.

Table 4 – Guillemot productivity results

Monitoring Site:	AOS 2009	Fledged Chicks '09	Productivity ch/pr '09	AOS 2010	Fledged Chicks '10	Productivity ch/pr '10	AOS 2011	Fledged Chicks '11	Productivity ch/pr '11	AOS 2012	Fledged Chicks '12	Productivity ch/pr '12
Nettletrip	51	36	0.71	50	31	0.62	50	37	0.74	58	33	0.57
Grandstand North	48	39	0.81	50	36	0.72	–	–	–	55	35	0.64
Grandstand South	45	36	0.80	49	36	0.73	48	32	0.67	48	33	0.69
Carter Lane 1	47	39	0.83	48	39	0.81	50	46	0.92	48	40	0.83
Carter Lane 2	45	34	0.76	54	38	0.70	50	41	0.82	54	44	0.81
Breil Nook	–	–	–	50	46	0.92	50	46	0.92	65	57	0.88
Total	**236**	**184**	**0.78**	**301**	**226**	**0.75**	**248**	**202**	**0.81**	**328**	**242**	**0.74**

Northern Gannet (*Morus bassanus*)

In 2012, overall productivity for gannet at Bempton from five plots averaged 0.85 fledged chicks per AON. This is the second highest recorded productivity at this colony since the monitoring programme began in 2009 (Table 5), and above the UK mean between 1986-2005 of 0.69 chicks per AON recorded from between three and six colonies annually (Mavor et al. 2008).

For full plot locations and boundaries, see Appendix 3.3.

Table 5 – Gannet productivity results

Monitoring Site:	AON 2009	Fledged Chicks '09	Productivity ch/pr '09	AON 2010	Fledged Chicks '10	Productivity ch/pr '10	AON 2011	Fledged Chicks '11	Productivity ch/pr '11	AON 2012	Fledged Chicks '12	Productivity ch/pr '12
Jubilee Corner	52	43	0.83	50	41	0.82	49	40	0.82	51	46	0.90
Nettletrip	49	45	0.92	50	41	0.82	49	44	0.90	52	46	0.88
Staple Newk 1	50	43	0.86	50	41	0.82	49	40	0.82	50	45	0.90
Staple Newk 2	50	43	0.86	50	44	0.88	49	39	0.80	50	41	0.82
Staple Newk 3	50	41	0.82	50	39	0.78	50	43	0.86	52	40	0.77
Total	**251**	**215**	**0.86**	**250**	**206**	**0.82**	**248**	**206**	**0.83**	**255**	**218**	**0.85**

Black-legged Kittiwake (*Rissa tridactyla*)

In 2012, overall productivity for kittiwake at Bempton and Flamborough from eighteen plots averaged 0.88 fledged chicks per AON (Tables 7 & 8). This figure is identical to 2011 and is above the national mean between 1986-2005 of 0.68 chicks per AON, recorded from between thirty and sixty-one colonies annually (Mavor et al. 2008).

For full plot locations and boundaries, see Appendix 3.4

Kittiwake productivity has historically fluctuated at this colony over the years; however, the trend for the previous 7 years remains resilient, which is encouraging for this internationally important breeding seabird (Table 6).

Table 6 – Average kittiwake productivity at Bempton and Flamborough between 1995 and 2012

1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
0.93	-	0.44	0.87	1.34	1.28	1.07	0.76	0.25	**0.19**	0.62	0.82	0.83	0.83	0.97	**1.17**	0.88	0.88

Table 7 – Kittiwake productivity results

	Jubilee Far	Bartlett Nab Near	Bartlett Nab Far	Grandstand North Near	Grandstand North Near Edge	Grandstand North Mid	Grandstand North Far edge	Grandstand North Low	Old Dor	Newcombe	Back of Newcombe	Saddle Nook 1	Saddle Nook 2	Saddle from Breil	Breil Nook North	Breil Nook South	Swineshaw Hole	Lighthouse	Total
Nests Fledging 0 Chicks	16	9	5	22	6	10	2	21	9	7	15	28	16	13	16	13	19	10	**237**
Nests Fledging 1 Chicks	23	20	27	23	22	25	35	21	23	26	30	16	26	13	29	23	24	30	**436**
Nests Fledging 2 Chicks	4	15	5	4	14	8	13	10	13	8	7	1	4	1	3	10	7	8	**135**
Nests Fledging 3 Chicks	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	**1**
Total Fledged	31	50	37	31	50	41	61	41	49	42	44	18	34	18	35	43	38	46	**709**
Total AON	43	44	37	49	42	43	50	52	45	41	52	45	46	28	48	46	50	48	**809**
Total Fledged Per Nest	**0.72**	**1.14**	**1.00**	**0.63**	**1.19**	**0.95**	**1.22**	**0.79**	**1.10**	**1.02**	**0.85**	**0.40**	**0.74**	**0.64**	**0.73**	**0.93**	**0.76**	**0.96**	**0.88**

Table 8 – Kittiwake productivity plot comparison from 2009 to 2012

	Jubilee Far 2009	Jubilee Far 2010	Jubilee Far 2011	Jubilee Far 2012	Bartlett Nab Far 2009	Bartlett Nar Far 2010	Bartlett Nab Far 2011	Bartlett Nab Far 2012	Grandstand North Near Edge 2009	Grandstand North Near Edge 2010	Grandstand North Near Edge 2011	Grandstand North Near Edge 2012	Grandstand North Mid 2009	Grandstand North Mid 2010	Grandstand North Mid 2011	Grandstand North Mid 2012	Old Dor 2009	Old Dor 2010	Old Dor 2011	Old Dor 2012
Nests Fledging 0 Chicks	11	8	8	16	14	10	16	5	15	13	5	6	14	15	6	10	13	10	10	9
Nests Fledging 1 Chicks	24	24	34	23	22	25	22	27	22	24	31	22	18	20	31	25	19	19	23	23
Nests Fledging 2 Chicks	15	18	8	4	14	15	11	5	13	13	14	14	18	15	13	8	18	21	17	13
Nests Fledging 3 Chicks	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Fledged	54	60	50	31	50	55	47	37	48	50	59	50	54	50	57	41	55	61	57	49
Total AON	50	50	50	44	50	50	50	37	50	50	50	42	50	50	50	43	50	50	50	45
Total Fledged Per Nest	**1.08**	**1.20**	**1.00**	**0.72**	**1.00**	**1.10**	**0.94**	**1.00**	**0.96**	**1.00**	**1.18**	**1.19**	**1.08**	**1.00**	**1.14**	**0.95**	**1.10**	**1.22**	**1.14**	**1.10**

Northern Fulmar (*Fulmarus glacialis*)

In 2012, overall productivity for fulmar at Bempton and Flamborough from five plots averaged 0.50 fledged chicks per AOS. This is above the UK mean between 1986-2005 of 0.41 chicks per AOS recorded from between thirteen and forty-one colonies annually (Mavor et al. 2008). There has been a decline in productivity for fulmar at this colony, with 2012 being the lowest recorded productivity since the monitoring programme began in 2009 (Table 9).

For full plot locations and boundaries, see Appendix 3.5.

Table 9 – Fulmar productivity results

Monitoring Site:	AOS 2009	Fledged Chicks '09	Productivity ch/pr '09	AOS 2010	Fledged Chicks '10	Productivity ch/pr '10	AOS 2011	Fledged Chicks '11	Productivity ch/pr '11	AOS 2012	Fledged Chicks '12	Productivity ch/pr '12
New Roll-up	6	4	0.67	10	4	0.40	6	2	0.33	9	3	0.33
Old Dor	16	8	0.50	19	8	0.42	17	8	0.47	30	16	0.53
Newcombe	7	4	0.57	11	6	0.55	12	7	0.58	10	7	0.70
Breil Nook	7	3	0.43	15	14	0.93	16	12	0.75	20	12	0.60
Swineshaw Hole	9	4	0.44	16	7	0.44	15	7	0.47	19	6	0.32
Total	**45**	**23**	**0.51**	**71**	**39**	**0.55**	**66**	**36**	**0.54**	**88**	**44**	**0.50**

Herring Gull (*Larus argentatus*)

In 2012, overall productivity for herring gull at Bempton and Flamborough from a sample of eighty-three nests averaged 0.71 fledged chicks per AON. A steady decline of successfully fledged chicks is visible from the last four years of data collected (Table 10). Overall, productivity is down 0.33 fledged chicks per AON on last year, a significant decline for this BoCC Red Listed species.

For full plot locations and boundaries, see Appendix 3.6.

Table 10 – Herring Gull productivity results

Monitoring Site:	AON 2009	Fledged Chicks '09	Productivity ch/AON '09	AON 2010	Fledged Chicks '10	Productivity ch/AON '10	AON 2011	Fledged Chicks '11	Productivity ch/AON '11	AON 2012	Fledged Chicks '12	Productivity ch/AON '12
RSPB Reserve	–	–	–	13	10	0.77	18	12	0.67	12	11	0.92
Newcombe North	–	–	–	12	9	0.75	9	12	1.33	12	5	0.42
The Saddle Rock	19	19	1.00	16	18	1.13	21	27	1.29	20	10	0.50
Breil Nook - Stack	14	19	1.36	16	11	0.69	15	10	0.67	18	17	0.94
Between Newcombe & Breil	19	29	1.53	27	44	1.63	19	24	1.26	21	16	0.76
Total	**52**	**67**	**1.29**	**84**	**92**	**1.10**	**82**	**85**	**1.04**	**83**	**59**	**0.71**

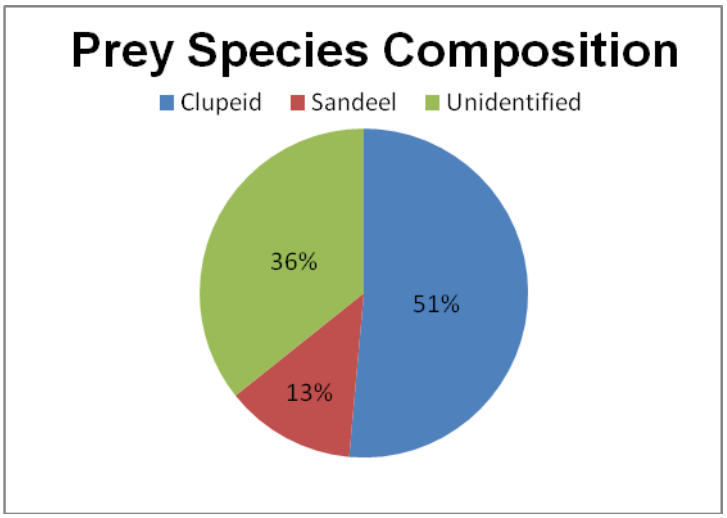
Common Guillemot diet and provisioning study

Diet study results

The survey was carried out between 1st and 27th of June 2012. Feeds were recorded every time an adult bird returned with a fish, including whether it was used to provision or for display purposes. If possible, the species of fish was recorded, however if the feed is too fast to identify, or the bird is positioned in such a way that a good view of the prey is not possible, the species is recorded as 'Unidentified'. In addition, weather conditions such as cloud cover, wind speed, sea state and temperature are also recorded.

A total of 70 feeds were recorded during the study. Clupeids were the most numerous prey species comprising 51% of total feeds observed, sandeels comprised 13% and 36% of feeds were unidentified (Figure 12).

Figure 12 – Prey species composition from diet study



NB: There is always some variation in the data collected on prey species. As each new observer has had limited experience in the identification of prey species, coupled with the brief window of opportunity to make each observation, it is not possible to draw comparisons between years and prey species composition data should not be used in any external publications. A variation in the proportion of unidentified prey will affect the relative proportion of the other prey classes as it is unlikely that the unidentified items were an equal split between clupeids and sandeels.

Due to the difficulty in identifying many of the prey items, it is only possible to determine provisioning rates and not the nutritional value of the prey provided.

Provisioning rate results

Data is collected on each feed made within a monitoring plot. A provisioning rate for each two-hour time slot is calculated based on the number of chicks on each plot. The number of feeds is divided by the number of chicks being provisioned and then divided by 2 to provide a rate per hour within that particular window of time.

NB: We are currently waiting on the 2012 data to calculate provisioning rates for guillemot chicks.

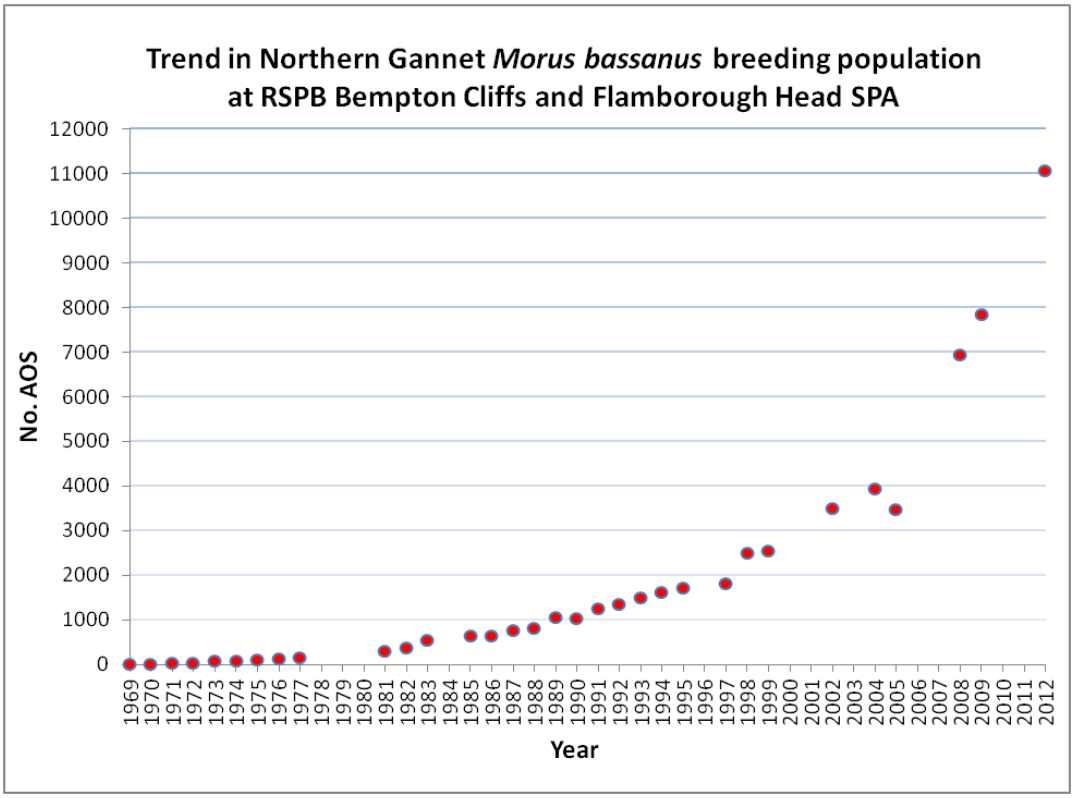
Whole-colony and population study-plot counts

Northern Gannet whole-colony count

The whole-colony count for gannet was conducted on 22nd July 2012 and took approximately seven and a half hours to complete, during the hours of 9.30am and 5.00pm. This was a boat-based count, comparable to previous years, and was carried out by RSPB staff with assistance from Filey Sailing Club. The colony is divided into 178 sub-sections, with gannets present between sub-sections 120 and 174. The results from 2012 show a significant increase in gannet numbers with 11,061 AOS recorded (Figure 13). The number of breeding pairs in 2009 was 7,859; the data shows an increase of 3,202 AOS in the last three years. A total of 798 non-breeding birds were in attendance at the time of the count.

For gannet whole-colony count results, see Appendix 1 (Table 14).

Figure 13 –Population trend of Northern Gannet at Bempton and Flamborough SPA



Black-legged Kittiwake study-plot count

Kittiwake study-plot counts were completed in 2012 for a fourth year running. The results show a reduction of 100 AON from last year, with the highest count being identical to the highest count in 2010 (Table 11). Plots were originally selected to provide representation across the main body of the colony whilst making sure minimum disturbance to the birds was maintained, as well as ensuring safe access for the observer.

For individual study-plot count results, see Appendix 2. For full study-plot count locations and boundaries, see Appendix 4.1.

Table 11 – Kittiwake study-plot count totals (Green = peak count)

Date	Total AON count	Date	Total AON count	Date	Total AON count	Date	Total AON count
26/06/2009	1585	17/06/2010	1967	09/06/2011	2035	05/06/2012	1967
06/07/2009	1541	21/06/2010	1938	14/06/2011	2067	12/06/2012	1952
09/07/2009	1554						
13/07/2009	1497						

Common Guillemot study-plot count

Seven study-plots were counted on five separate dates in the first three weeks of June. The third count on 11th June 2012 provided the highest count of 1,228 individuals; the fifth count on 17th June 2012 provided the lowest count of 926 individuals (Table 12). The average total count for guillemot was 1,092; this is the lowest recorded total average count since the study was set up, with a decline of 39 individuals from 2010 and 33 individuals from 2009.

For individual study-plot count results, see Appendix 2. For full study-plot count locations and boundaries, see Appendix 4.2.

Table 12 – Guillemot study-plot count results (Green = peak counts)

Date	Total count	Date	Total count	Date	Total count
08/06/2009	1191	03/06/2010	1164	06/06/2012	1120
11/06/2009	1138	06/06/2010	1123	09/06/2012	980
14/06/2009	1069	08/06/2010	1151	11/06/2012	1228
18/06/2009	1101	10/06/2010	1114	14/06/2012	1205
20/06/2009	1126	14/06/2010	1103	17/06/2012	926
Average	**1125**	**Average**	**1131**	**Average**	**1092**

Razorbill study-plot count

Seven study-plots were counted on five separate dates in the first three weeks of June. The third count on 11th June 2012 provided the highest count of 629 individuals, the second count on 9th June 2012 provided the lowest count of 455 individuals (Table 13). The average total count for razorbill was 535; this is the highest recorded total average count since the study was set up, with an increase of 193 individuals from 2010 and 203 individuals from 2009.

For individual study-plot count results, see Appendix 2. For full study-plot count locations and boundaries, see Appendix 4.3.

Table 13 – Razorbill study-plot count results (Green = peak count)

Date	Total count	Date	Total count	Date	Total count
08/06/2009	338	03/06/2010	316	06/06/2012	476
11/06/2009	365	06/06/2010	344	09/06/2012	455
14/06/2009	320	08/06/2010	348	11/06/2012	629
18/06/2009	309	10/06/2010	358	14/06/2012	591
20/06/2009	328	14/06/2010	343	17/06/2012	522
Average	**332**	**Average**	**342**	**Average**	**535**

Discussion and conclusion

The 2012 seabird monitoring programme at Bempton and Flamborough was a successful one, despite difficulties with severe weather throughout the season. Productivity monitoring, guillemot diet and provisioning studies, kittiwake, razorbill and guillemot study-plot counts and gannet whole-colony counts were all completed this year.

The recruitment of two seabird research residential volunteers allowed us to maintain high levels of monitoring in 2012, contributing c.425 hours' worth of time to the monitoring programme. The residential volunteer placement for seabird research is now well established at Bempton and will continue to provide much needed assistance to the project each year, as well as offering someone the opportunity to gain invaluable experience in seabird research monitoring techniques.

The existing volunteer team is still in place with many volunteers showing long-term commitment to the project. A number of repeat volunteers contributed again in 2012 and show genuine interest in continuing their involvement. Three new volunteers were recruited this year allowing us to maintain coverage. There were a total of 22 volunteers and staff members involved in the 2012 monitoring programme, with a total of 1035 hours given to the project.

Links with universities continued again this year with a student from Anglia Ruskin University undertaking the guillemot diet and provisioning study. This programme of work has enabled us to add to our knowledge and understanding of provisioning rates and prey species provisioned to chicks during chick rearing. With four years of data collected so far, we are keen for this monitoring work to continue so that we can build up an idea on trends and changes in this area of research. However, some difficulties were experienced with interpreting the data collected this year highlighting the risk of using graduate students for some areas of important research. In light of these quality control issues, it was decided to discontinue the provisioning studies in 2013.

Gannet whole-colony counts were completed allowing analysis of the change in population size since the last count was undertaken in 2009. Gannet numbers have risen dramatically over the last few years, with an increase of 3202 AOS since the last count. There were still challenges around completing this area of research, as poor weather and unfavourable sea conditions limited the ability to undertake the counts earlier in the season as would have been ideal; for this reason, whole-colony counts for herring gull were not completed. The relationship with Filey Sailing Club has developed well and there appears to be genuine support and commitment from Chris Place and his team at the sailing club.

Recreational activity, in particular by fisherman descending the cliffs and by boat users, was observed on several occasions during the breeding season. However, whilst birds certainly react to these events, it is not possible to quantify any reproductive cost. Productivity remains good on most of the monitored plots and it seems unlikely that recreational disturbance is having a significant effect on the performance of the colony at current levels. However, any escalation in activity or any increase in the proportion of users who disregard current safeguards could have a significant effect. It is not known to what extent different activities impact on breeding seabirds at Bempton and Flamborough and this information might inform future stakeholder engagement.

Predation by carrion crows caused the failure of a large number of kittiwake nests at Saddle Nook. This appeared to be a single pair of crows targeting nests at the egg and chick stage. At present, the effect is confined to a small section of the cliff and will not have any significant effect on the overall productivity of the colony.

The expansion of the gannet colony inevitably displaces other seabirds from the cliffs. Interestingly, auk productivity appears to be lower on plots around Grandstand, where the number of breeding gannets are increasing. It is not currently possible to link the lower productivity of auks with the dynamics of the gannet colony but it will be interesting to see if this pattern continues over future seasons, assuming the expansion of the gannet colony continues. If there is an effect, this could be directly caused by interactions between gannets and auks or an indirect effect caused by interactions between displaced auks and those still breeding on the plots.

Bempton Cliffs staff and resources assisted with gannet and kittiwake tagging projects that again took place on the SPA. Dr Rowena Langston and Dr Ellie Owen, both RSPB conservation scientists, conducted independent tagging projects which successfully saw the deployment of satellite tags on gannets and the deployment and recovery of tracking devises on kittiwakes. These projects took place during June and July, the results of which will go towards our understanding of key foraging ranges and areas during chick rearing and wintering movements away from the colony. This was the final year for the DECC funded gannet satellite tracking project which was produced as part of the UK Department of Energy and Climate Change's offshore energy Strategic Environmental Assessment programme (Langston 2012). The FAME kittiwake project is due to continue next year, subject to EU funding.

This year, the reserve was included in a project studying the impact of mammalian predation on the decline of herring gull. The project was led by Dr Sarah Davis, RSPB conservation scientist, and looked at predator density on the reserve using a combination of scat transects, baited camera traps and ink tunnels. The project was assisted by the reserves assistant warden, supporting Sarah and her team during the course of the project.

In addition to the Bempton and Flamborough seabird monitoring programme, productivity monitoring was carried out and reported for the first time on black-legged kittiwake at Filey, as well as a full colony census (Aitken and Clarkson 2012). This work is part of the proposed SPA extension to the Bempton and Flamborough colony, covering Filey Brigg to Cayton Bay, where productivity monitoring for kittiwake and full colony count monitoring priorities have been agreed between Natural England and RSPB to assess and inform on the state of this sub-colony in relation to the proposed SPA extension. This work was coordinated out of RSPB Bempton Cliffs office and led by the assistant warden, with support from volunteers. These monitoring priorities are due to be met again in 2013, funding permitting.

The project is making significant progress against its population and productivity monitoring objectives, informing the assessment and review of SPA and SSSI condition and boundaries. However, progress to determine the impacts of recreational disturbance, predation and to identify key foraging areas and dietary trends are more resource hungry and will need to be reviewed.

Overall, it has been a successful year for meeting monitoring and research priorities at the Bempton and Flamborough colony, despite the challenges with poor weather. Both the breeding seabirds and research

team faced difficulties with heavy rain and persistent onshore winds throughout the year, highlighting how different seasons can be year on year, and this contrasted with an early breeding season in 2011. No measures can be taken to prepare for poor monitoring conditions, the commitment and perseverance shown from everyone involved is a credit to the seabird monitoring programme. We will look to recruit two residential volunteers again in 2013 to undertake monitoring and research; with the development of monitoring works at Filey, more resources are needed to cover productivity and colony census research between the two sites.

References

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Langston R.H.W & Teuten, E (2012) Foraging ranges of northern gannets *Morus bassanus* in relation to proposed offshore wind farms in the UK: 2011 RSPB Report to DECC, August 2012

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Lastly, thanks to Pam and her team at the Caravel Cafe for providing us with parking permits for North Landing car park.

Without the help and support of all of these people involved, either directly or indirectly, the seabird monitoring programme would not be the success that it is and for this, I am eternally grateful.

D. Aitken

Appendix 1

Table 14 – Gannet whole-colony count results for 2008, 2009 and 2012

Plot No.	AOS 2008 (30/6/08)	Non-breeders	AOS 2009 (4/7/09)	Non-breeders	AOS 2012 (22/7/12)	Non-breeders
120	4	24	6	29	59	14
121	31	34	49	11	103	5
122	34	39	88	18	130	11
123	0	0	0	1	5	2
124	0	0	0	0	4	6
125	0	0	6	10	69	0
126	0	0	0	0	0	0
127	0	0	0	0	0	0
128	0	0	0	0	0	0
129	0	0	0	0	0	0
130	0	0	0	0	0	0
131	0	0	0	0	0	0
132	517	45	430	27	538	5
133	198	396	275	219	335	25
134	68	15	80	52	146	70
135	115	30	150	7	291	6
136	0	0	0	0	0	0
137	0	0	0	0	0	0
138	0	0	0	0	0	0
139	0	0	0	0	0	0
140	0	0	0	0	0	0
141	0	0	0	0	0	0
142	0	0	0	0	0	0
143	0	0	0	0	0	0
144	3	9	6	54	51	2
145	192	19	202	5	269	5
146	42	6	94	15	90	0
147	43	0	75	1	76	0
148	66	224	92	243	192	79
149	244	43	220	5	233	5
150	179	12	194	10	195	24
151	131	0	173	14	214	6
152	248	0	271	9	347	0
153	369	0	306	29	447	26
154	251	33	237	6	350	18
155	281	50	226	11	485	3
156	63	27	85	4	131	5
157	72	8	39	8	63	5
158	298	24	180	14	285	5
159	440	44	540	16	520	51
160	263	251	280	187	447	89

161	155	1	125	15	360	26
162	311	101	405	44	458	30
163	38	4	50	0	56	0
164	187	92	246	20	396	15
165	455	103	606	43	871	52
166	386	169	445	50	564	23
167	386	163	550	117	519	20
168	206	160	230	30	444	31
169	145	14	250	4	285	29
170	55	5	28	9	128	5
171	258	87	290	85	412	63
172	219	120	330	50	433	29
173	1	0	0	1	24	0
174	0	0	0	0	36	8
175	0	0	0	0	0	0
176	0	0	0	0	0	0
177	0	0	0	0	0	0
178	0	0	0	0	0	0
Total	**6954**	**2352**	**7859**	**1473**	**11061**	**798**

Appendix 2

Table 15 – Kittiwake study-plot count data

Plot 1: Jubilee Corner									
Date	**Total count**	**Cloud cover (in eights)**	**Rain**	**Sea conditions**	**Swell**	**Light conditions**	**Visibility**	**Wind Speed (Beaufort scale)**	**Wind direction**
05/06/2012	281	8/8	1	2	2	2	1	4	S
12/06/2012	273	8/8	1	1	2	2	1	4	N
Average	**277**								

Plot 2: Grandstand North									
Date	**Total count**	**Cloud cover (in eights)**	**Rain**	**Sea conditions**	**Swell**	**Light conditions**	**Visibility**	**Wind Speed (Beaufort scale)**	**Wind direction**
05/06/2012	438	7/8	1	2	2	2	1	4	S
12/06/2012	443	6/8	1	2	2	3	1	4	N
Average	**441**								

Plot 3: Old Dor									
Date	**Total count**	**Cloud cover (in eights)**	**Rain**	**Sea conditions**	**Swell**	**Light conditions**	**Visibility**	**Wind Speed (Beaufort scale)**	**Wind direction**
05/06/2012	240	7/8	1	2	2	2	1	4	S
12/06/2012	237	8/8	1	2	2	2	1	4	N
Average	**239**								

Plot 4: Newcombe									
Date	**Total count**	**Cloud cover (in eights)**	**Rain**	**Sea conditions**	**Swell**	**Light conditions**	**Visibility**	**Wind Speed (Beaufort scale)**	**Wind direction**
05/06/2012	206	8/8	1	2	2	3	1	4	S
12/06/2012	204	6/8	1	2	2	3	1	6	N
Average	**205**								

Plot 5: Back of Newcombe									
Date	**Total count**	**Cloud cover (in eights)**	**Rain**	**Sea conditions**	**Swell**	**Light conditions**	**Visibility**	**Wind Speed (Beaufort scale)**	**Wind direction**
05/06/2012	279	8/8	1	2	2	1	1	4	S
12/06/2012	272	3/8	1	2	2	3	1	4	N
Average	**276**								

Plot 6: Saddle Nook									
Date	**Total count**	**Cloud cover (in eights)**	**Rain**	**Sea conditions**	**Swell**	**Light conditions**	**Visibility**	**Wind Speed (Beaufort scale)**	**Wind direction**
05/06/2012	390	8/8	1	2	2	3	1	4	S
12/06/2012	392	7/8	1	2	2	3	1	6	N
Average	**391**								

Plot 7: Breil Nook									
Date	**Total count**	**Cloud cover (in eights)**	**Rain**	**Sea conditions**	**Swell**	**Light conditions**	**Visibility**	**Wind Speed (Beaufort scale)**	**Wind direction**
05/06/2012	133	8/8	1	2	2	2	1	4	S
12/06/2012	131	6/8	1	2	2	3	1	4	N
Average	**132**								

Table 16 – Guillemot study-plot count data

Plot 1: Nettletrip									
Date	**Total count**	**Cloud cover (in eights)**	**Rain**	**Sea conditions**	**Swell**	**Light conditions**	**Visibility**	**Wind Speed (Beaufort scale)**	**Wind direction**
06/06/2012	114	8/8	1	1	2	2	2	3	S
09/06/2012	98	8/8	2	2	2	2	1	5	W
11/06/2012	134	8/8	1	1	1	2	1	2	NE
14/06/2012	114	6/8	1	2	1	2	1	3	ESE
17/06/2012	104	4/8	1	2	1	2	1	2	WSW
Average	**113**								

Plot 2: Grandstand North									
Date	**Total count**	**Cloud cover (in eights)**	**Rain**	**Sea conditions**	**Swell**	**Light conditions**	**Visibility**	**Wind Speed (Beaufort scale)**	**Wind direction**
06/06/2012	141	8/8	1	1	2	2	2	3	S
09/06/2012	97	8/8	1	2	2	2	1	5	W
11/06/2012	122	8/8	1	1	2	2	1	2	NE
14/06/2012	135	6/8	1	2	2	2	1	3	ESE
17/06/2012	108	5/8	1	2	2	3	1	2	WSW
Average	**121**								

Plot 3: Old Dor									
Date	**Total count**	**Cloud cover (in eights)**	**Rain**	**Sea conditions**	**Swell**	**Light conditions**	**Visibility**	**Wind Speed (Beaufort scale)**	**Wind direction**
06/06/2012	94	8/8	1	1	2	2	2	3	S
09/06/2012	84	7/8	1	2	2	2	1	5	W
11/06/2012	121	8/8	1	1	2	2	1	2	NE
14/06/2012	115	5/8	1	2	2	2	1	3	ESE
17/06/2012	108	5/8	1	2	2	2	1	2	WSW
Average	**104**								

Plot 4: Carter Lane									
Date	**Total count**	**Cloud cover (in eights)**	**Rain**	**Sea conditions**	**Swell**	**Light conditions**	**Visibility**	**Wind Speed (Beaufort scale)**	**Wind direction**
06/06/2012	178	7/8	1	2	2	3	1	4	S
09/06/2012	168	8/8	1	2	2	2	1	5	W
11/06/2012	219	8/8	1	2	2	2	1	3	NE
14/06/2012	211	1/8	1	2	2	3	1	4	ESE
17/06/2012	139	7/8	1	2	1	2	1	3	WSW
Average	**183**								

Plot 5: Breil Nook									
Date	**Total count**	**Cloud cover (in eights)**	**Rain**	**Sea conditions**	**Swell**	**Light conditions**	**Visibility**	**Wind Speed (Beaufort scale)**	**Wind direction**
06/06/2012	186	7/8	1	2	2	3	1	4	S
09/06/2012	174	8/8	1	2	2	2	1	5	W
11/06/2012	199	8/8	1	2	2	2	1	3	NE
14/06/2012	196	1/8	1	2	2	3	1	4	ESE
17/06/2012	129	7/8	1	2	1	2	1	3	WSW
Average	**177**								

Plot 6: Petrel Hole									
Date	**Total count**	**Cloud cover (in eights)**	**Rain**	**Sea conditions**	**Swell**	**Light conditions**	**Visibility**	**Wind Speed (Beaufort scale)**	**Wind direction**
06/06/2012	261	8/8	1	2	2	2	2	3	S
09/06/2012	236	8/8	1	2	2	2	1	5	W
11/06/2012	264	8/8	1	2	2	2	1	3	NE
14/06/2012	278	1/8	1	2	2	3	1	4	ESE
17/06/2012	214	7/8	1	2	1	2	1	3	WSW
Average	**251**								

Plot 7: Swineshaw Hole									
Date	**Total count**	**Cloud cover (in eights)**	**Rain**	**Sea conditions**	**Swell**	**Light conditions**	**Visibility**	**Wind Speed (Beaufort scale)**	**Wind direction**
06/06/2012	146	8/8	1	2	2	2	2	3	S
09/06/2012	123	6/8	1	2	2	3	1	5	W
11/06/2012	169	8/8	1	2	2	2	1	3	NE
14/06/2012	156	1/8	1	2	2	3	1	4	ESE
17/06/2012	124	7/8	1	2	1	2	1	3	WSW
Average	**144**								

Table 17 – Razorbill study-plot count data

Plot 1: Grandstand Gully									
Date	**Total count**	**Cloud cover (in eights)**	**Rain**	**Sea conditions**	**Swell**	**Light conditions**	**Visibility**	**Wind Speed (Beaufort scale)**	**Wind direction**
06/06/2012	26	8/8	1	1	2	2	2	3	S
09/06/2012	24	8/8	1	2	2	2	1	5	W
11/06/2012	30	8/8	1	1	1	2	1	2	NE
14/06/2012	39	6/8	1	2	1	2	1	3	ESE
17/06/2012	36	5/8	1	2	1	3	1	2	WSW
Average	**31**								

Plot 2: Grandstand North									
Date	**Total count**	**Cloud cover (in eights)**	**Rain**	**Sea conditions**	**Swell**	**Light conditions**	**Visibility**	**Wind Speed (Beaufort scale)**	**Wind direction**
06/06/2012	40	8/8	1	1	2	2	2	3	S
09/06/2012	31	8/8	1	2	2	2	1	5	W
11/06/2012	50	8/8	1	1	2	2	1	2	NE
14/06/2012	47	6/8	1	2	2	2	1	3	ESE
17/06/2012	57	5/8	1	2	2	3	1	2	WSW
Average	**45**								

Plot 3: Old Dor									
Date	**Total count**	**Cloud cover (in eights)**	**Rain**	**Sea conditions**	**Swell**	**Light conditions**	**Visibility**	**Wind Speed (Beaufort scale)**	**Wind direction**
06/06/2012	37	8/8	1	1	2	2	2	3	S
09/06/2012	37	7/8	1	2	2	2	1	5	W
11/06/2012	52	8/8	1	1	2	2	1	2	NE
14/06/2012	47	5/8	1	2	2	2	1	3	ESE
17/06/2012	46	5/8	1	2	2	2	1	2	WSW
Average	**44**								

Plot 4: Newcombe									
Date	**Total count**	**Cloud cover (in eights)**	**Rain**	**Sea conditions**	**Swell**	**Light conditions**	**Visibility**	**Wind Speed (Beaufort scale)**	**Wind direction**
06/06/2012	95	8/8	1	2	2	3	1	4	S
09/06/2012	92	8/8	1	2	2	2	1	5	W
11/06/2012	119	8/8	1	2	2	2	1	3	NE
14/06/2012	103	2/8	1	2	2	3	1	4	ESE
17/06/2012	114	7/8	1	2	1	2	1	3	WSW
Average	**105**								

Plot 5: Back of Newcombe									
Date	**Total count**	**Cloud cover (in eights)**	**Rain**	**Sea conditions**	**Swell**	**Light conditions**	**Visibility**	**Wind Speed (Beaufort scale)**	**Wind direction**
06/06/2012	108	8/8	1	2	2	2	1	3	SSW
09/06/2012	103	8/8	1	2	2	2	1	5	W
11/06/2012	152	8/8	1	2	2	2	1	3	NE
14/06/2012	132	1/8	1	2	2	2	1	4	ESE
17/06/2012	101	7/8	1	2	1	2	1	3	WSW
Average	**119**								

Plot 6: Saddle Nook									
Date	**Total count**	**Cloud cover (in eights)**	**Rain**	**Sea conditions**	**Swell**	**Light conditions**	**Visibility**	**Wind Speed (Beaufort scale)**	**Wind direction**
06/06/2012	57	8/8	1	2	2	3	1	4	S
09/06/2012	67	8/8	1	2	2	2	1	5	W
11/06/2012	86	8/8	1	2	2	2	1	3	NE
14/06/2012	73	1/8	1	2	2	3	1	4	ESE
17/06/2012	72	7/8	1	2	1	2	1	3	WSW
Average	**71**								

Plot 7: Swineshaw Hole									
Date	**Total count**	**Cloud cover (in eights)**	**Rain**	**Sea conditions**	**Swell**	**Light conditions**	**Visibility**	**Wind Speed (Beaufort scale)**	**Wind direction**
06/06/2012	113	8/8	1	2	2	2	2	3	S
09/06/2012	101	6/8	1	2	2	3	1	5	W
11/06/2012	140	8/8	1	2	2	2	1	3	NE
14/06/2012	111	1/8	1	2	2	3	1	4	ESE
17/06/2012	96	7/8	1	2	1	2	1	3	WSW
Average	**112**								

Appendix 3

Productivity plot locations:

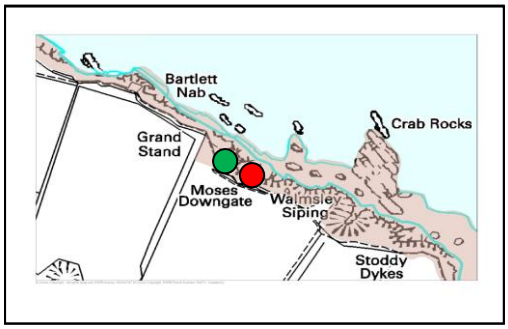
3.1 Razorbill *(Alca torda)* productivity plot locations
3.2 Common Guillemot *(Uria aalge)* productivity plot locations
3.3 Northern Gannet *(Morus bassanus)* productivity plot locations
3.4 Black-legged Kittiwake *(Rissa tridactyla)* productivity plot locations
3.5 Northern Fulmar *(Fulmarus glacialis)* productivity plot locations
3.6 Herring Gull *(Larus argentatus)* productivity plot locations

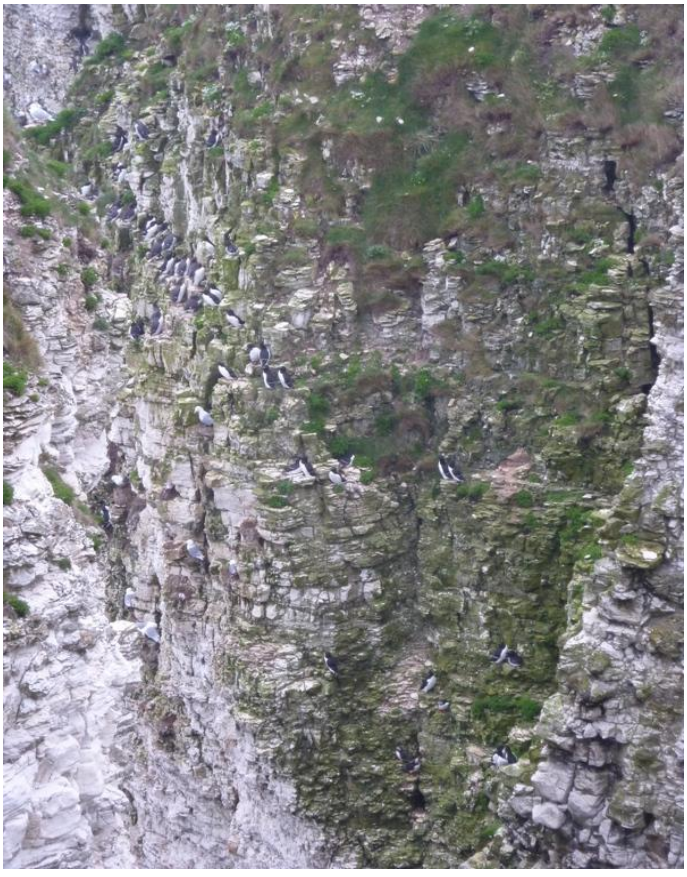
Key:
- Plot location
- Observer location

3.1 Razorbill productivity plots:

Plot 1: Grandstand Gully

Observer: Tim Morley
Dates monitored: 2nd May – 14th July
Visit requirements: Every third day



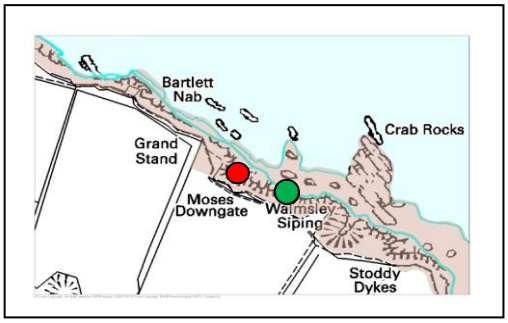


Plot 2: Grandstand North

Observer: Nev Jones

Dates monitored: 14th May – 11th July

Visit requirements: Every third day

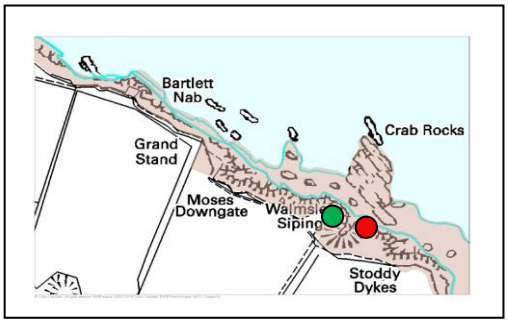


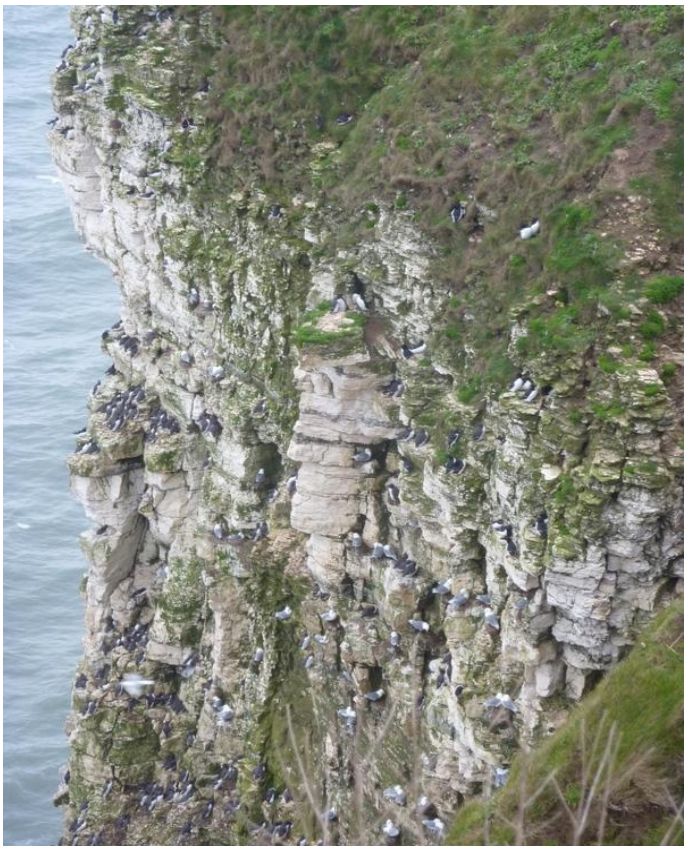
Plot 3: Grandstand South

Observer: Mike Crowther

Dates monitored: 14th May – 25th July

Visit requirements: Every third day



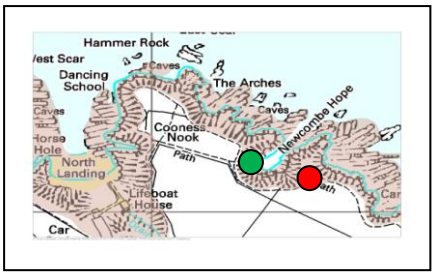


Plot 4: Newcombe

Observer: Fiona McKenna

Dates monitored: 3rd May – 27th July

Visit requirements: Every third day

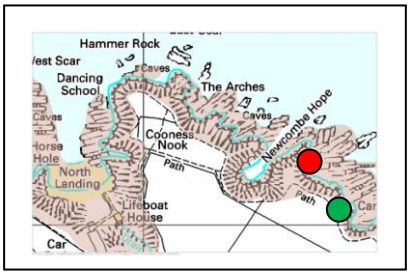


Plot 5: Back of Newcombe

Observer: David Aitken

Dates monitored: 3rd May – 25th July

Visit requirements: Every third day

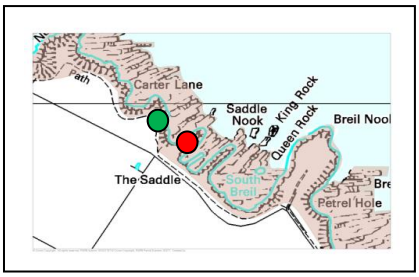


Plot 6: Saddle Nook

Observer: Fiona McKenna

Dates monitored: 3rd May – 23rd July

Visit requirements: Every third day

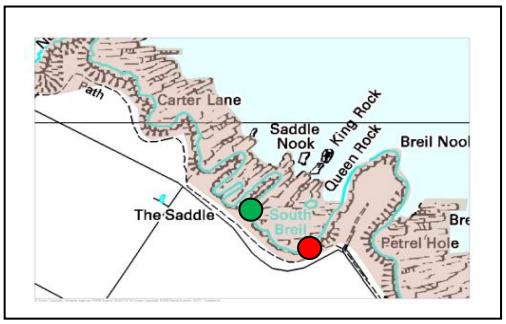


Plot 7: Breil Nook

Observer: Fiona McKenna

Dates monitored: 3rd May – 12th July

Visit requirements: Every third day

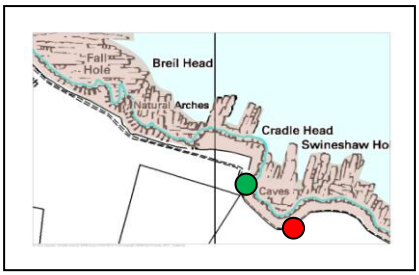


Plot 8: Swineshaw Hole

Observer: Tim Morley

Dates monitored: 3rd May – 20th July

Visit requirements: Every third day



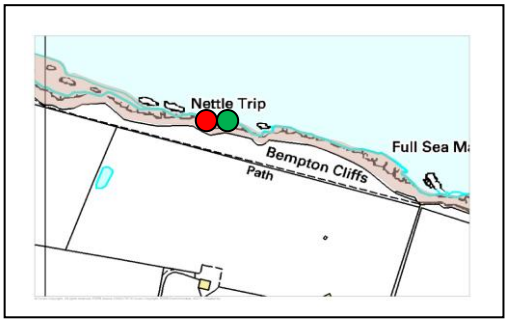
3.2 Common Guillemot productivity plots:

Plot 1: Nettletrip

Observer: Tim Morley

Dates monitored: 30th April – 30th July

Visit requirements: Every third day

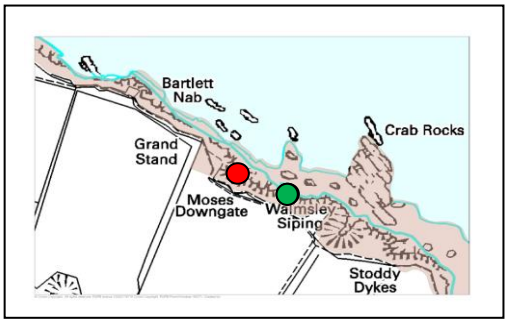


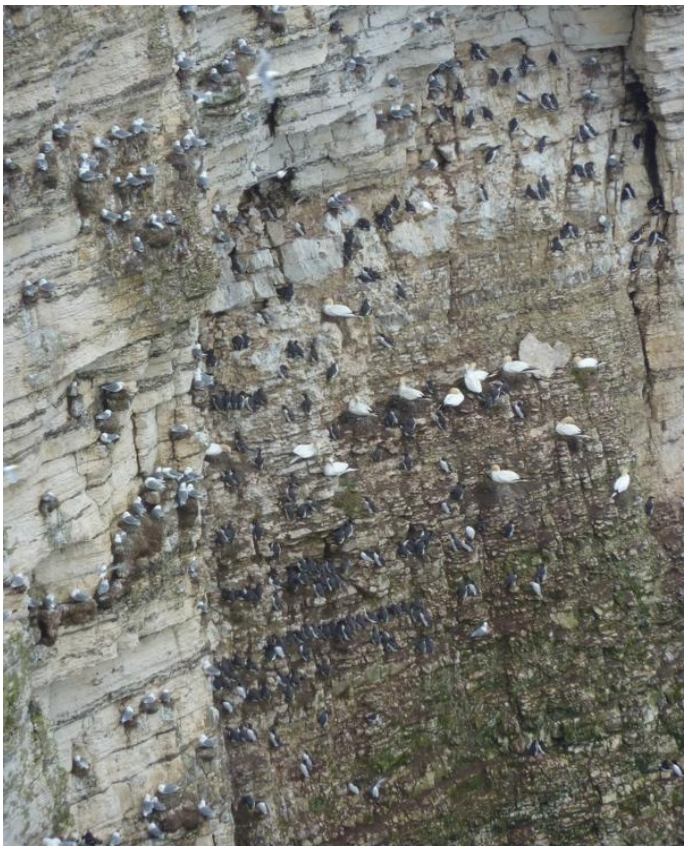
Plot 2: Grandstand North

Observer: David Aitken

Dates monitored: 30th April – 17th July

Visit requirements: Every third day



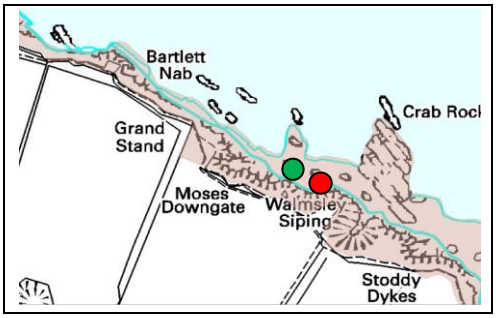


Plot 3: Grandstand South

Observer: James Oliver

Dates monitored: 2nd May – 30th June

Visit requirements: Every third day

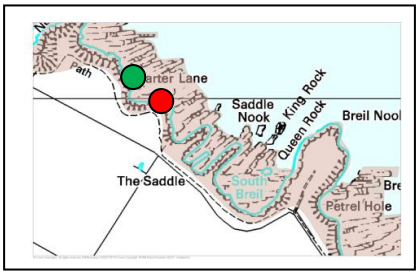


Plot 4: Carter Lane 1

Observer: Fiona McKenna

Dates monitored: 27th April – 7th July

Visit requirements: Every third day

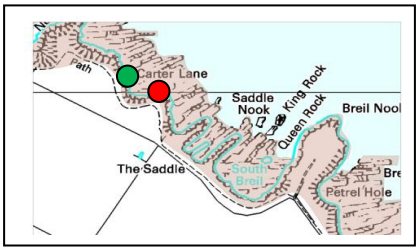


Plot 5: Carter Lane 2

Observer: Fiona McKenna

Dates monitored: 27th April – 14th July

Visit requirements: Every third day

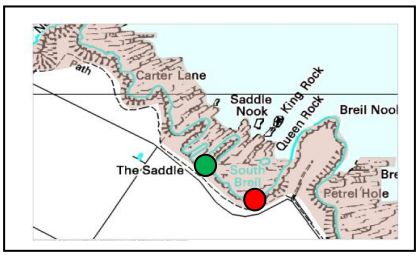


Plot 6: Breil Nook

Observer: Tim Morley

Dates monitored: 27th April – 9th July

Visit requirements: Every third day



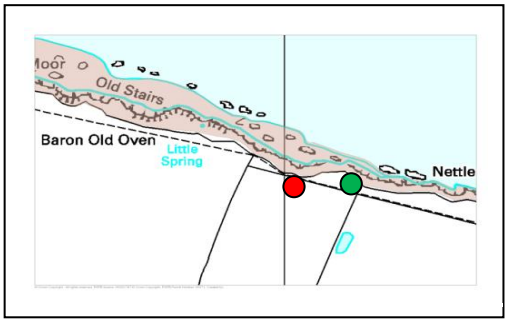
3.3 Northern Gannet productivity plots:

Plot 1: Jubilee Corner

Observer: Tim Morley & Alan Bellerby

Dates monitored: 17th April – 26th September

Visit requirements: Once a week

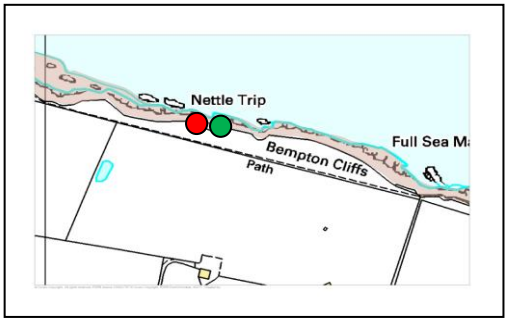


Plot 2: Nettletrip

Observer: Fiona McKenna & David Aitken

Dates monitored: 17th April – 28th September

Visit requirements: Once a week

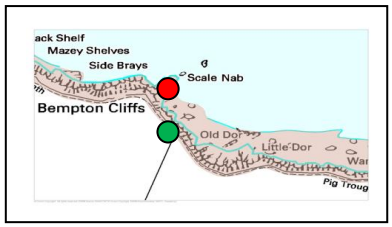


Plot 3: Staple Newk 1

Observer: Linda McKenzie

Dates monitored: 3rd April – 25th Sept.

Visit requirements: Once a week

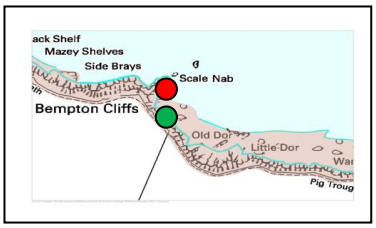


Plot 4: Staple Newk 2

Observer: Linda McKenzie

Dates monitored: 3rd April – 25th September

Visit requirements: Once a week

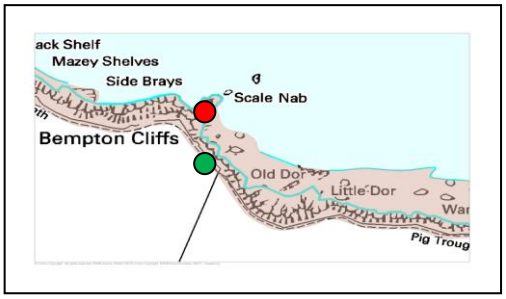


Plot 5: Staple Newk 3

Observer: Alan Bellerby

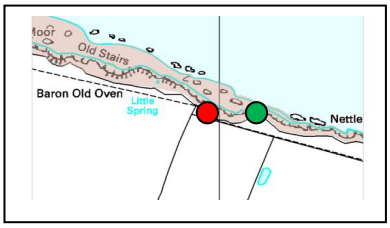
Dates monitored: 2nd May – 26th September

Visit requirements: Once a week

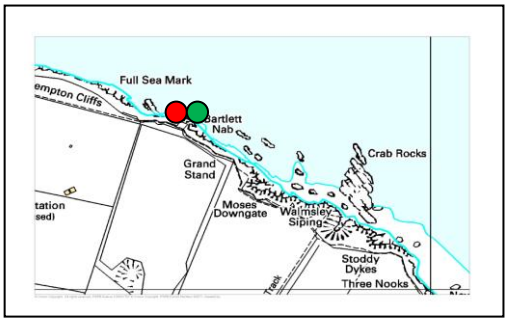


3.4 Black-legged Kittiwake productivity plots:

Plot 1: Jubilee Far
Observer: David Clarke
Dates monitored: 28th May – 16th July
Visit requirements: Once a week



Plot 2: Bartlett Nab Near
Observer: Alice Smith
Dates monitored: 27th May – 5th August
Visit requirements: Once a week

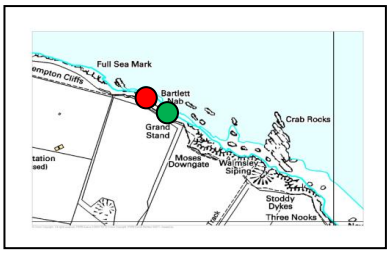


Plot 3: Bartlett Nab Far

Observer: David Clarke

Dates monitored: 28th May – 16th July

Visit requirements: Once a week

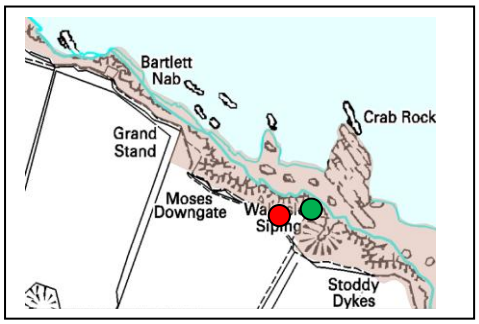


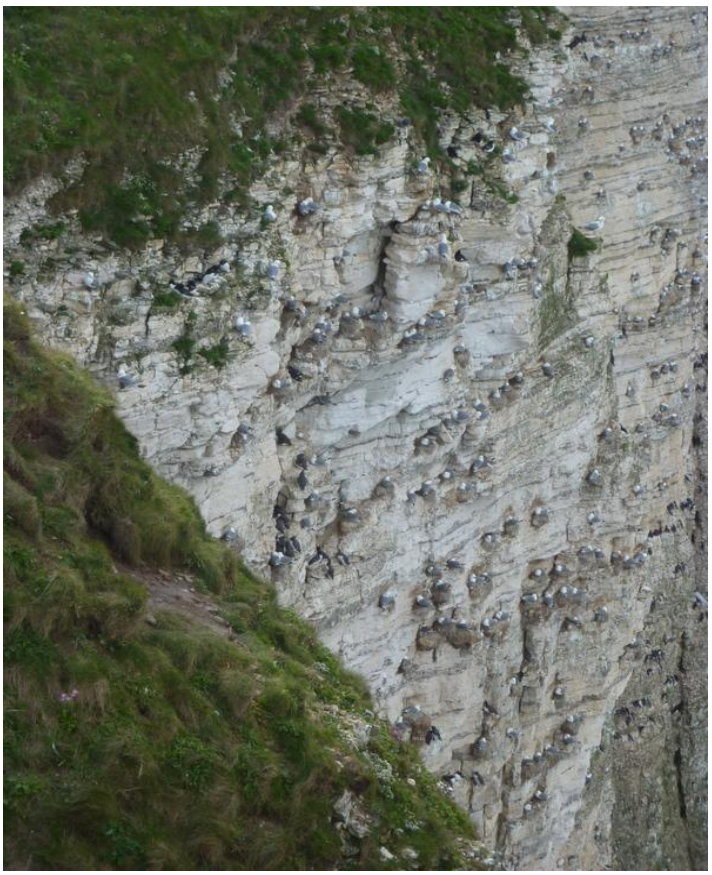
Plot 4: Grandstand North Near

Observer: John Bairstow

Dates monitored: 24th May – 24th July

Visit requirements: Once a week



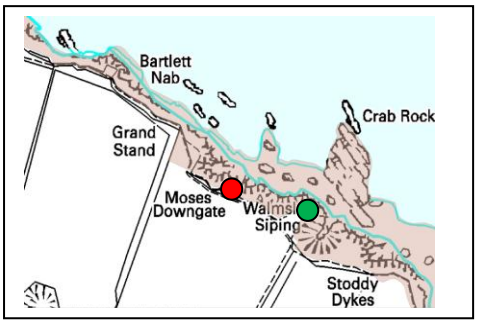


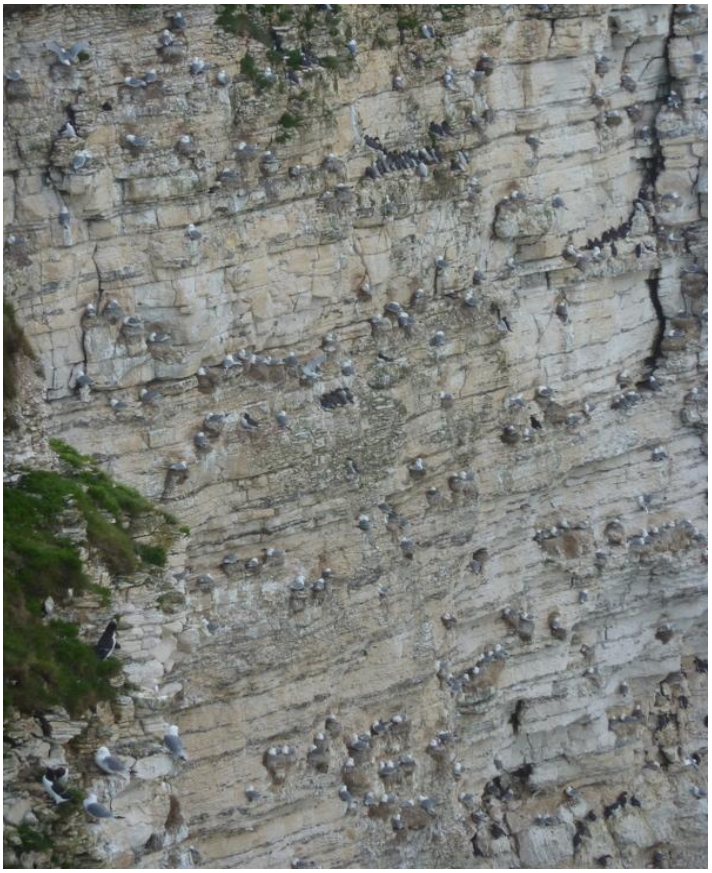
Plot 5: Grandstand North Near Edge

Observer: David Clarke

Dates monitored: 28th May – 16th July

Visit requirements: Once a week



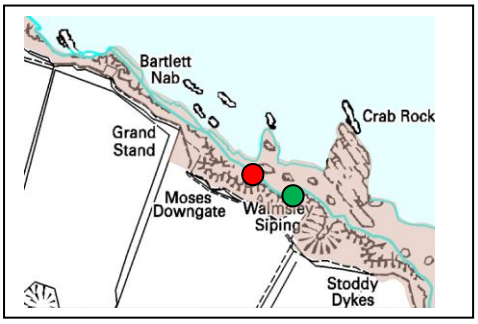


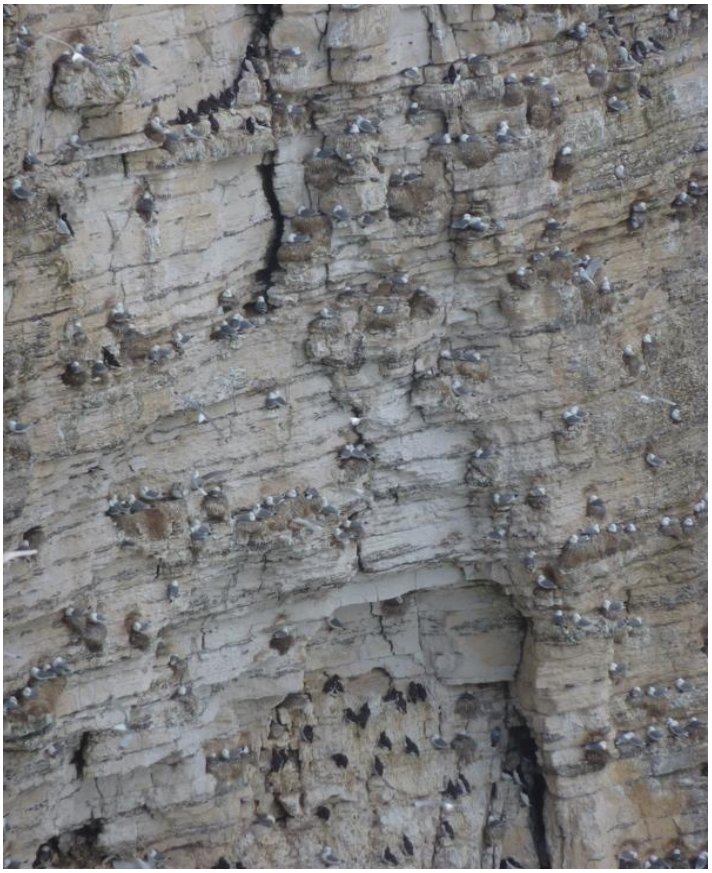
Plot 6: Grandstand North Mid

Observer: David Clarke

Dates monitored: 28th May – 16th July

Visit requirements: Once a week



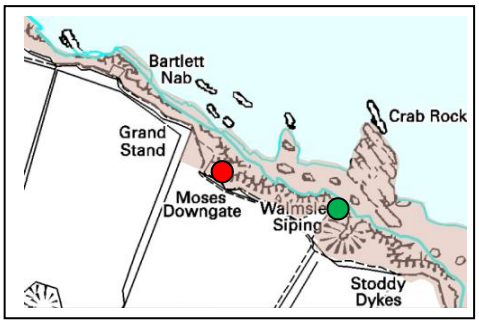


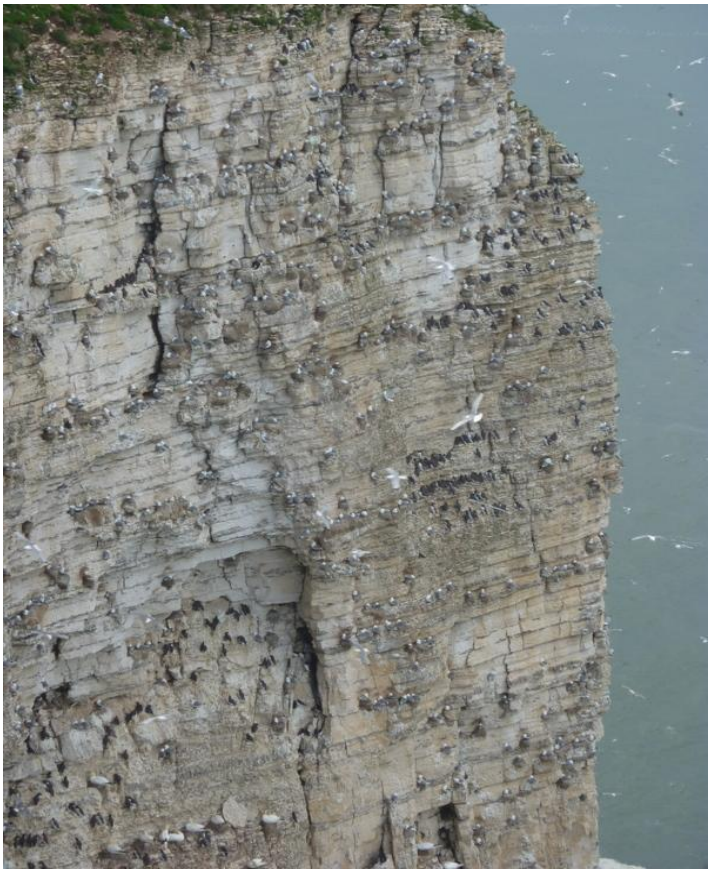
Plot 7: Grandstand North Far edge

Observer: Dawn McKie

Dates monitored: 24th May – 27th July

Visit requirements: Once a week



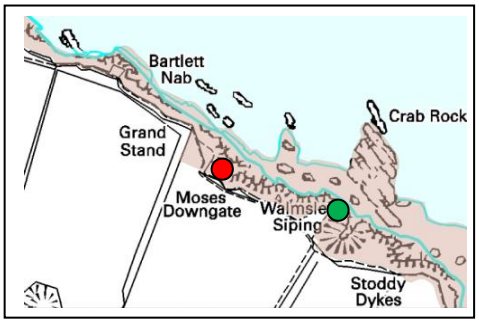


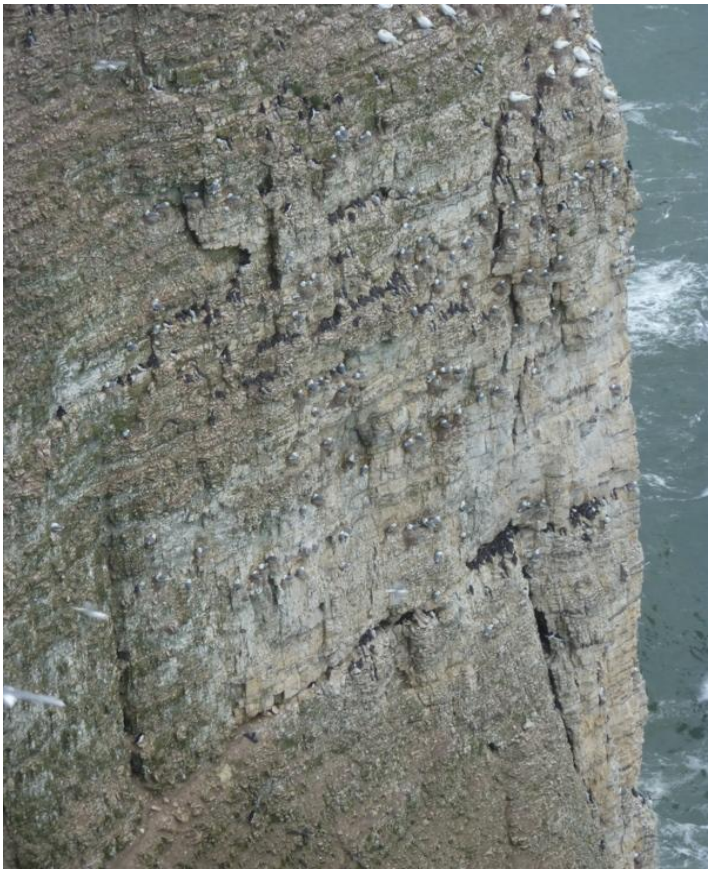
Plot 8: Grandstand North Low

Observer: David Aitken

Dates monitored: 25th May – 8th August

Visit requirements: Once a week



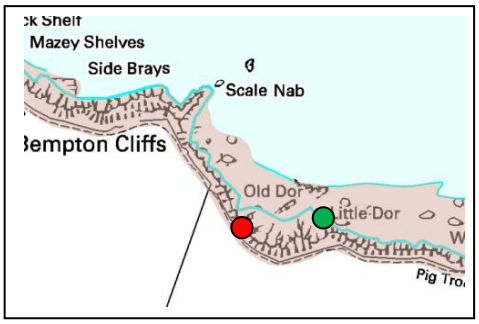


Plot 9: Old Dor

Observer: David Clarke

Dates monitored: 28th May – 16th July

Visit requirements: Once a week

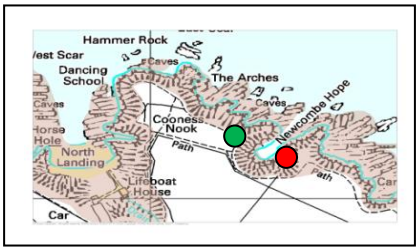


Plot 10: Newcombe

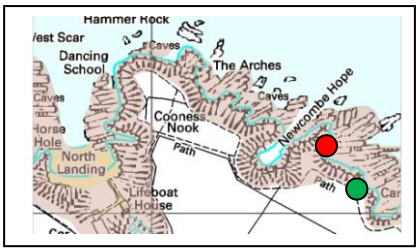
Observer: Angela Belk

Dates monitored: 27th May – 16th July

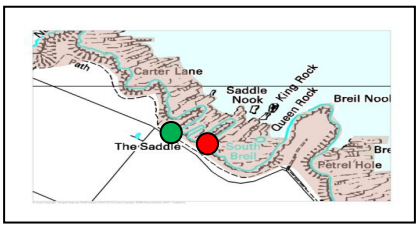
Visit requirements: Once a week



Plot 11: Back of Newcombe
Observer: Fiona McKenna
Dates monitored: 22nd May – 2nd Aug.
Visit requirements: Once a week



Plot 12: Saddle Nook 1
Observer: Sarah Wilkinson
Dates monitored: 16th May – 2nd Aug.
Visit requirements: Once a week

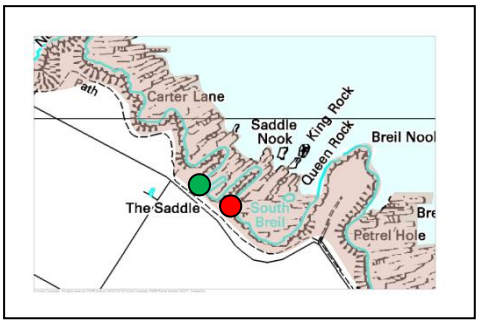


Plot 13: Saddle Nook 2

Observer: James Oliver

Dates monitored: 16th May – 2nd August

Visit requirements: Once a week

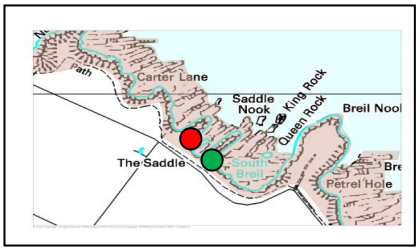


Plot 14: Saddle from Breil Nook

Observer: Kat Sanders

Dates monitored: 24th May – 13th July

Visit requirements: Once a week

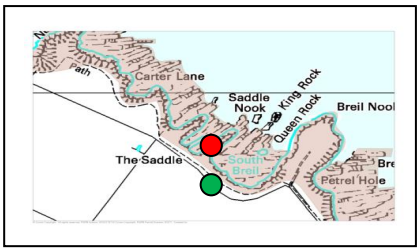


Plot 15: Breil Nook North

Observer: Lucy Murgatroyd

Dates monitored: 24th May – 29th July

Visit requirements: Once a week

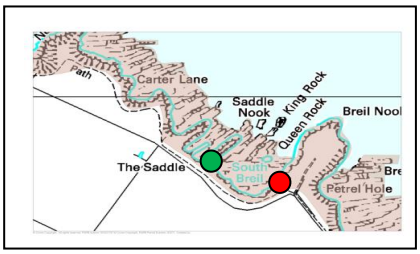


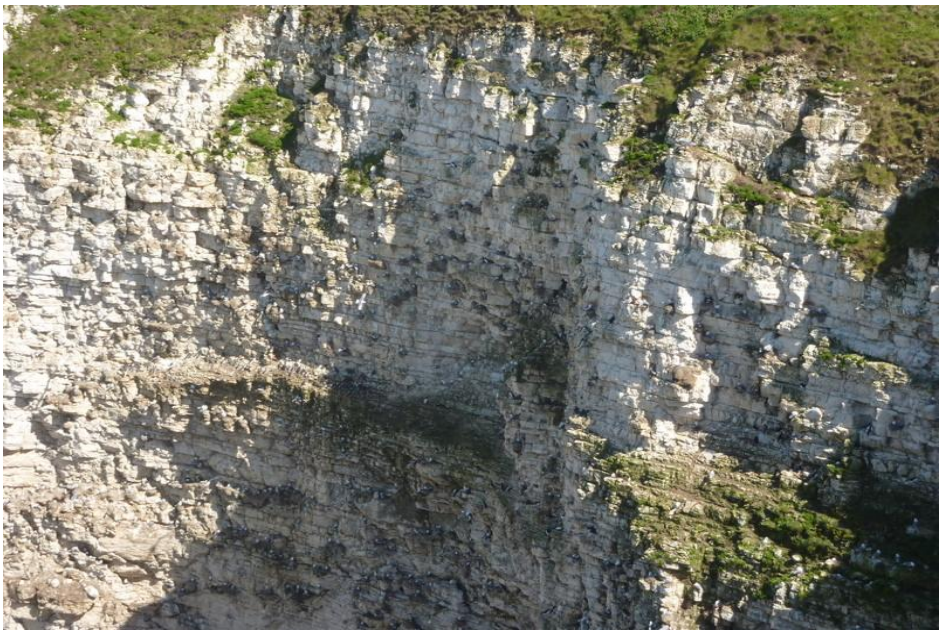
Plot 16: Breil Nook South

Observer: Lucy Murgatroyd

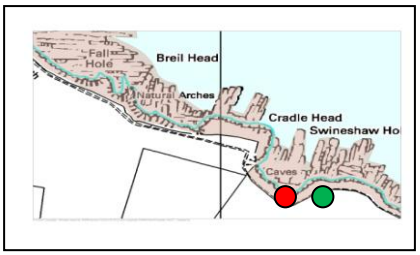
Dates monitored: 26th May – 29th July

Visit requirements: Once a week

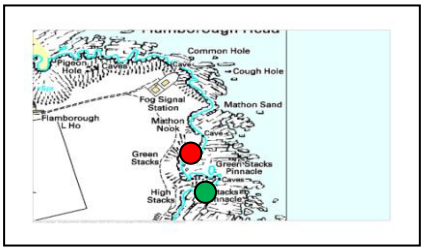




Plot 17: Swineshaw Hole
Observer: Jake Tomlinson
Dates monitored: 17th May – 6th Aug.
Visit requirements: Once a week



Plot 18: Lighthouse
Observer: Richard Baines
Dates monitored: 25th May – 22nd July
Visit requirements: Once a week



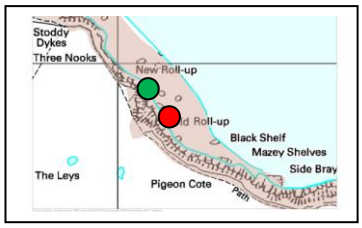
3.5 Northern Fulmar productivity plots:

Plot 1: New Roll-up

Observer: Ian Kendall & Raewyn Newmarch

Dates monitored: 25th May – 18th August

Visit requirements: Four visits in May & August

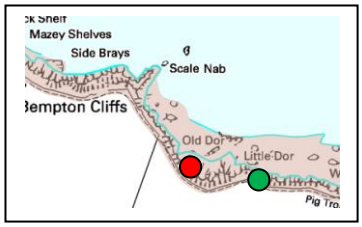


Plot 2: Old Dor

Observer: Ian Kendall & Sarah Mitchell

Dates monitored: 25th May – 10th August

Visit requirements: Four visits in May & August

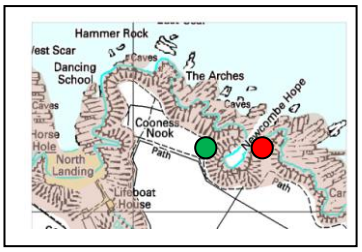


Plot 3: Newcombe

Observer: Keith Clarkson

Dates monitored: 25th May – 6th August

Visit requirements: Four visits in May & August

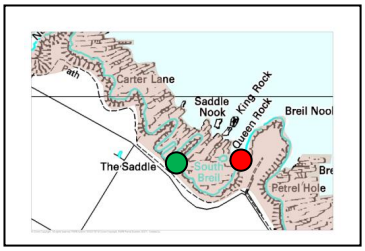


Plot 4: Breil Nook South (a & b)

Observer: Ian Kendall

Dates monitored: 23rd May – 16th August

Visit requirements: Four visits in May & August

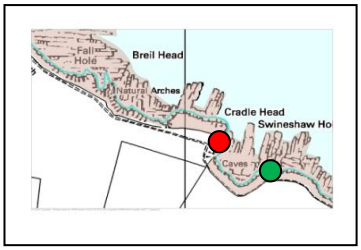


Plot 5: Swineshaw Hole

Observer: Ian Kendall

Dates monitored: 23rd May – 16th August

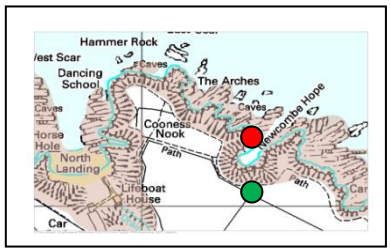
Visit requirements: Four visits in May & August



3.6 Herring Gull productivity plots:

Plot 1: RSPB Reserve
Observer: Glenis & Allen Dawson
Dates monitored: 6th June – 3rd August
Visit requirements: Once a week

Plot 2: Newcombe North
Observer: Fiona McKenna
Dates monitored: 16th May – 2nd August
Visit requirements: Once a week

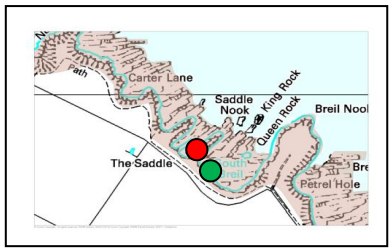


Plot 3: The Saddle Rock

Observer: Tim Morley

Dates monitored: 16th May – 2nd August

Visit requirements: Once a week

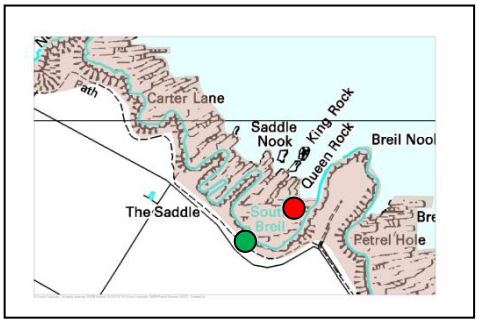


Plot 4: Breil Nook Stack

Observer: David Aitken

Dates monitored: 17th May – 2nd August

Visit requirements: Once a week



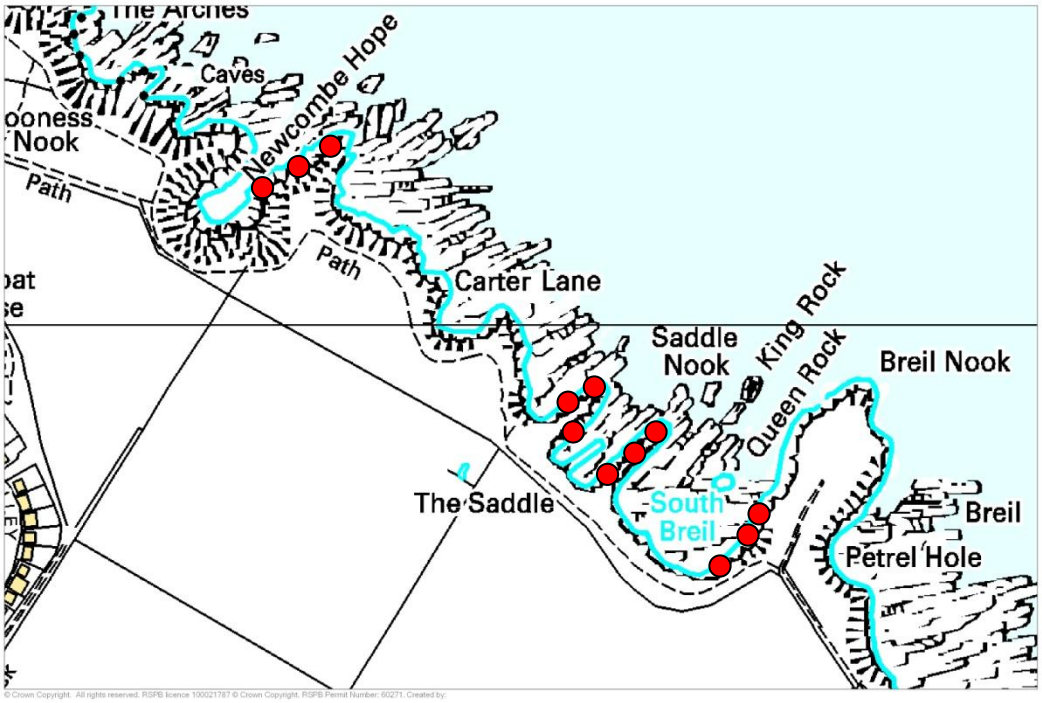
Plot 5: Between Newcombe and Breil

Observer: Tim Morley

Dates monitored: 16th May – 2nd August

Visit requirements: Once a week







Appendix 4

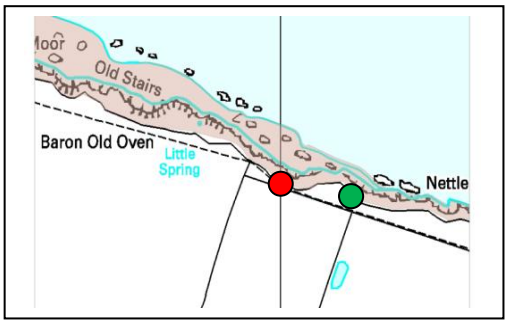
4.1 Black-legged Kittiwake study-plot count locations and boundaries:

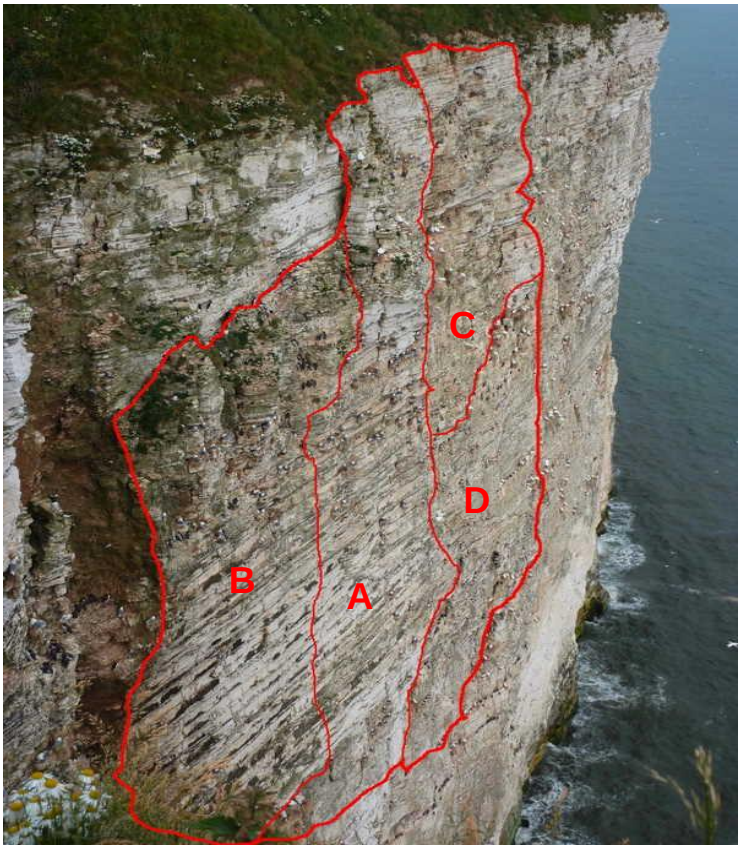
Plot 1: Jubilee Corner

Observer: Tim Morley

Count dates: 5th and 12th of June 2012

Number of visits: Two visits start of June



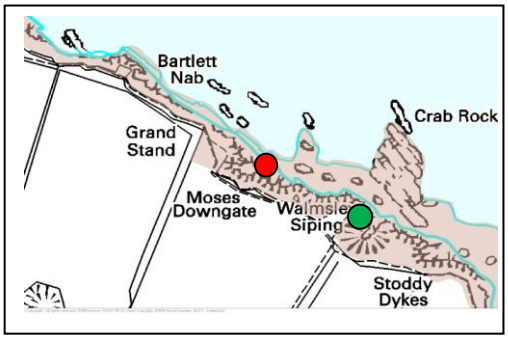


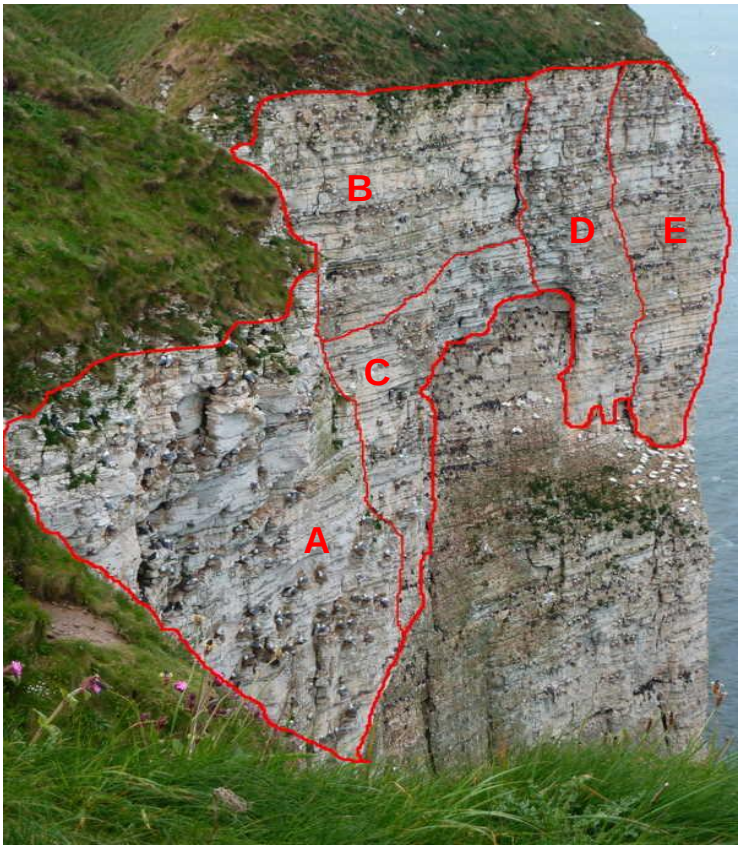
Plot 2: Grandstand North

Observer: David Aitken

Count dates: 5th and 12th of June 2012

Number of visits: Two visits start of June



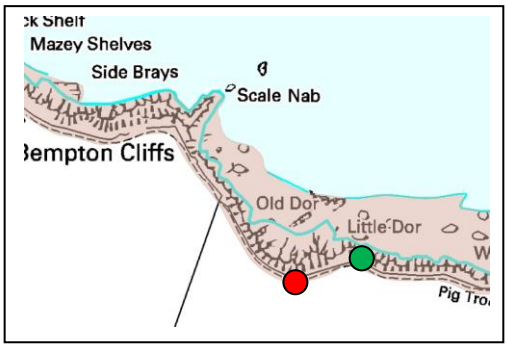


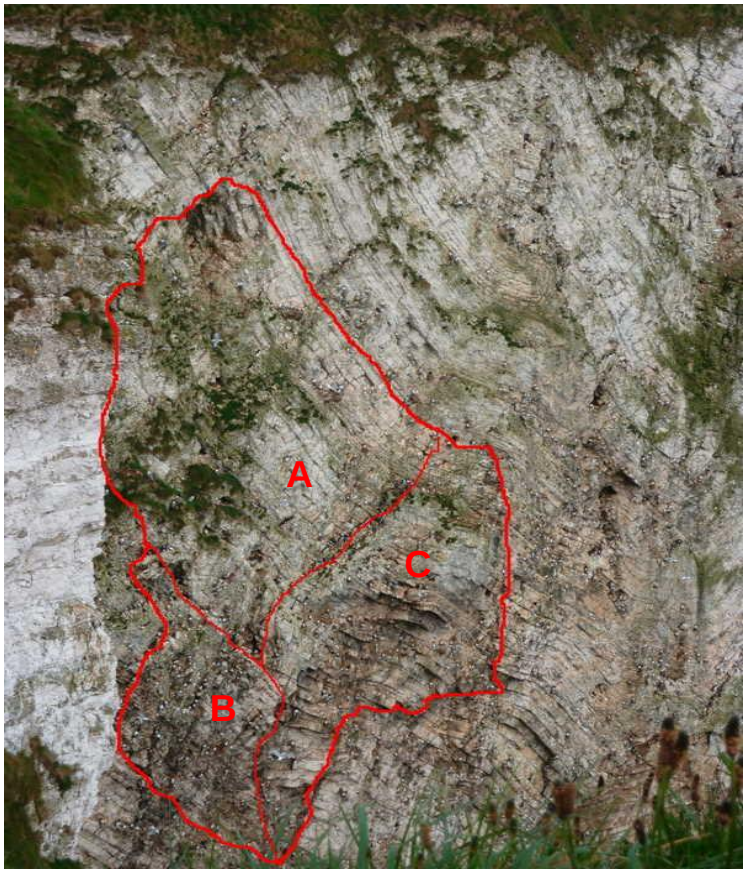
Plot 3: Old Dor

Observer: David Aitken

Count dates: 5th and 12th of June 2012

Number of visits: Two visits start of June



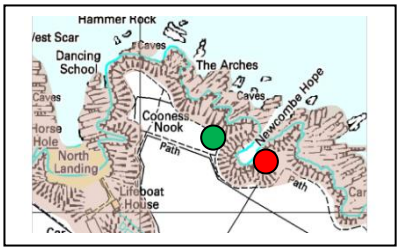


Plot 4: Newcombe

Observer: Fiona McKenna

Count dates: 5th and 12th of June 2012

Number of visits: Two visits start of June

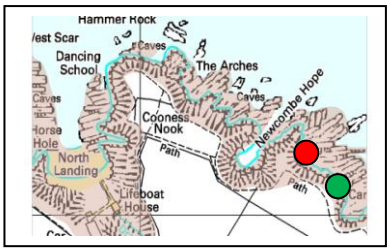


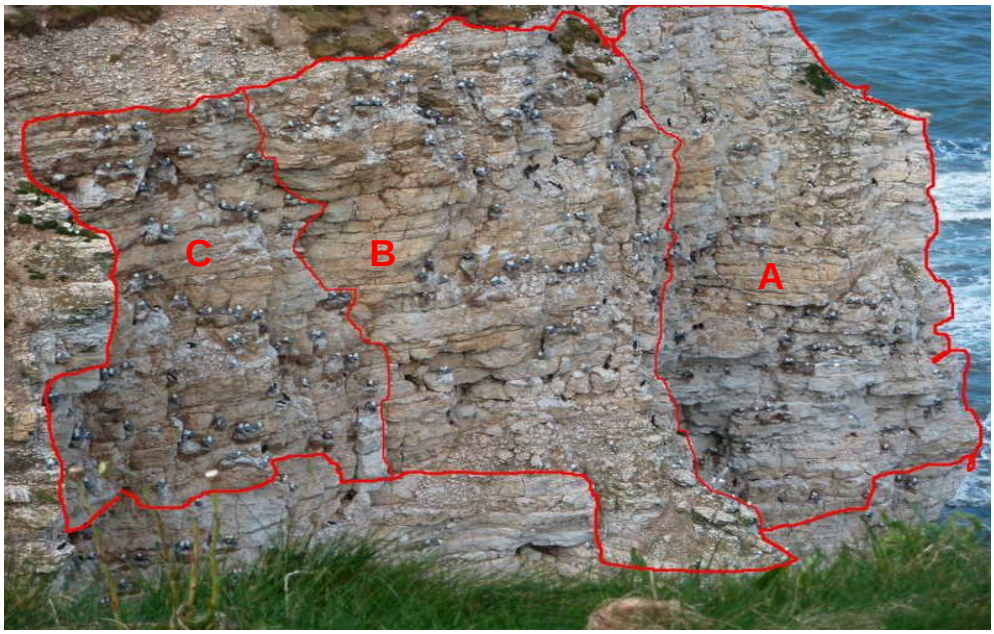
Plot 5: Back of Newcombe

Observer: Fiona McKenna

Count dates: 5th and 12th of June 2012

Number of visits: Two visits start of June



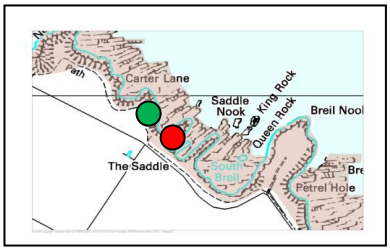


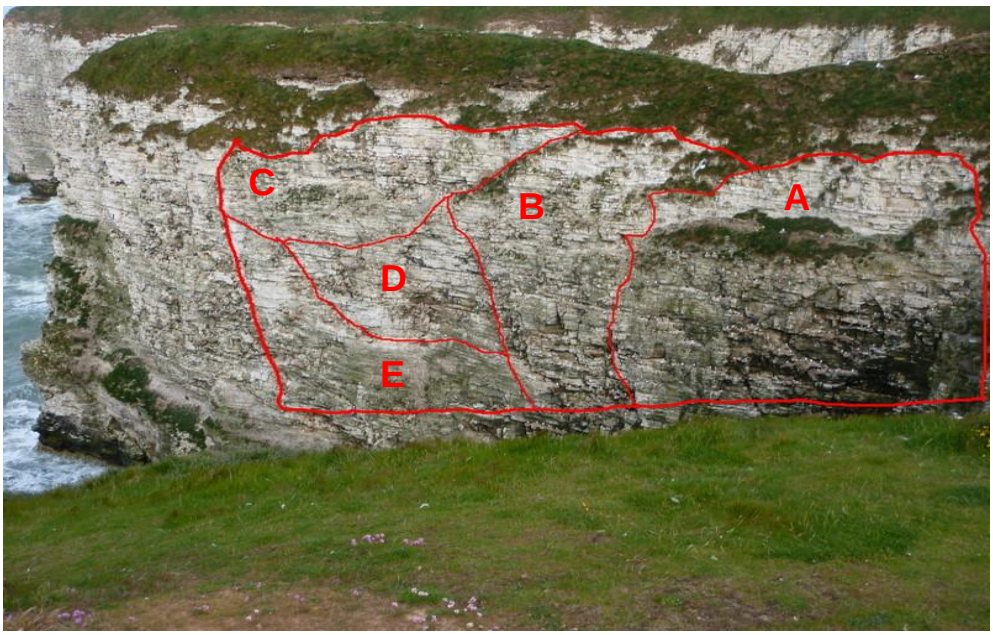
Plot 6: Saddle Nook

Observer: Fiona McKenna

Count dates: 5th and 12th of June 2012

Number of visits: Two visits start of June



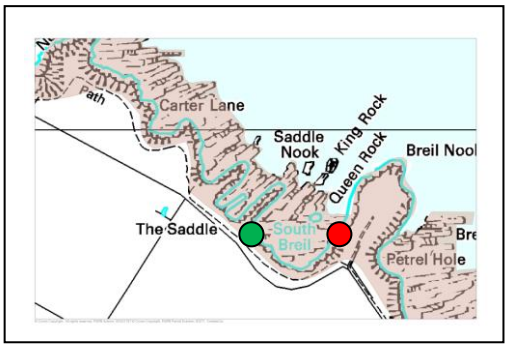


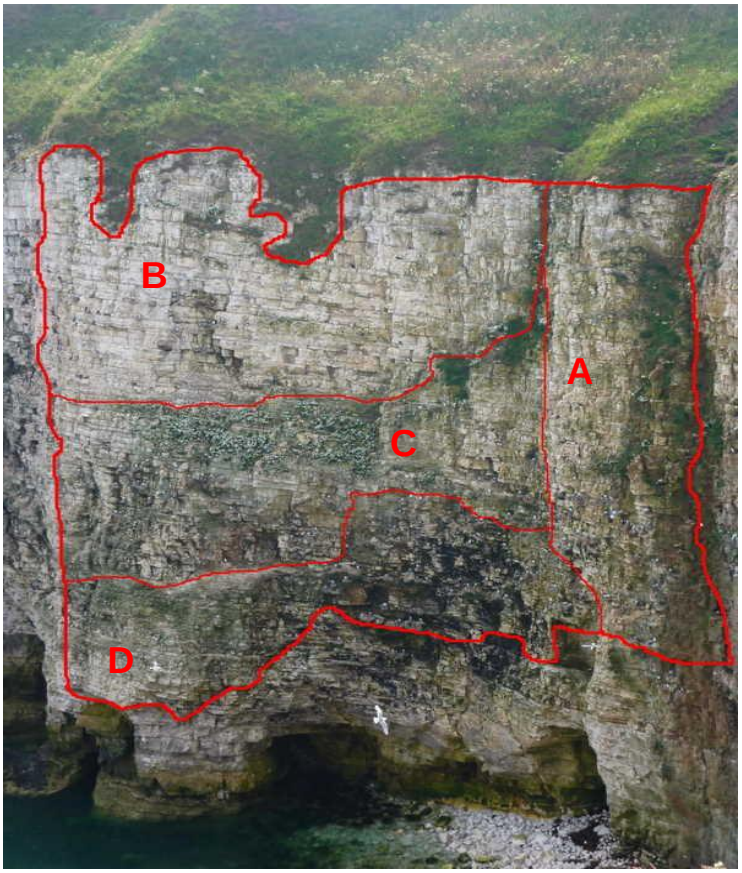
Plot 7: Breil Nook

Observer: Tim Morley

Count dates: 5th and 12th of June 2012

Number of visits: Two visits start of June





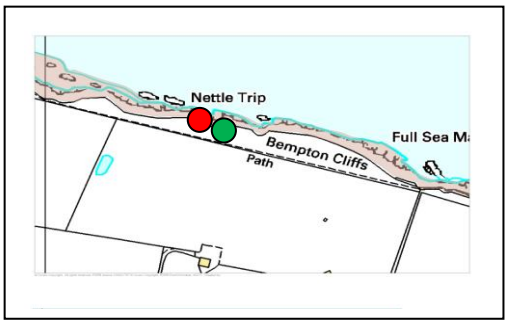
4.2 Common Guillemot study-plot count locations and boundaries:

Plot 1: Nettletrip

Observer: David Aitken

Count dates: 5th and 12th of June 2012

Number of visits: 5 visits, first 3 weeks June

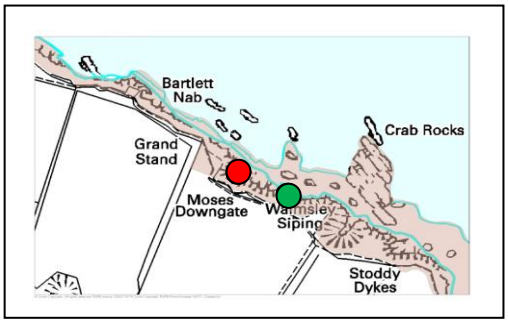


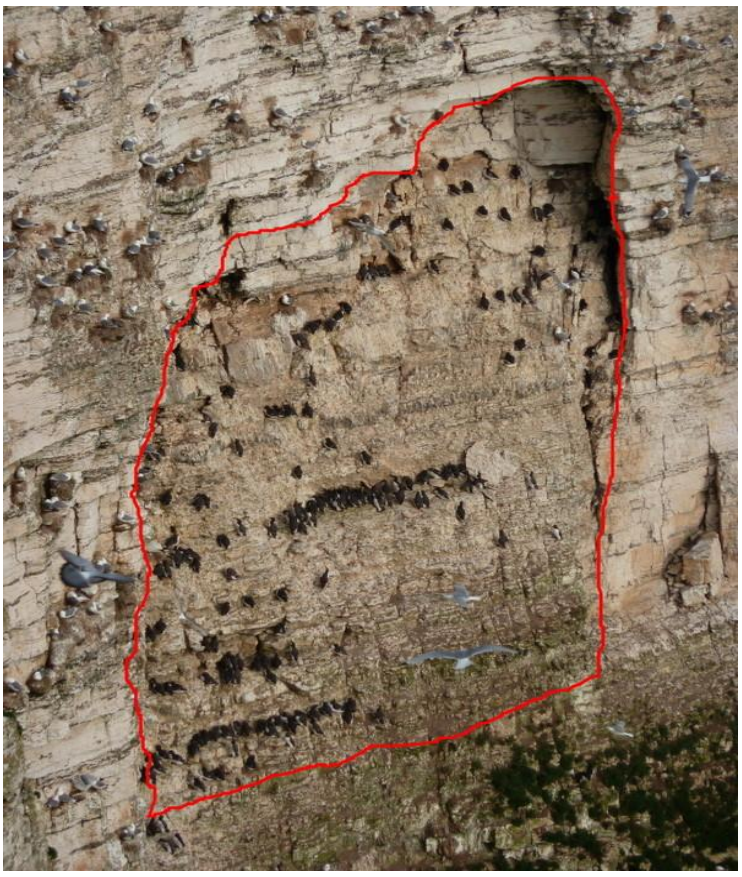
Plot 2: Grandstand North

Observer: David Aitken

Count Dates: 6th 9th 11th 14th 17th June 2012

Number of visits: 5 visits, first 3 weeks June



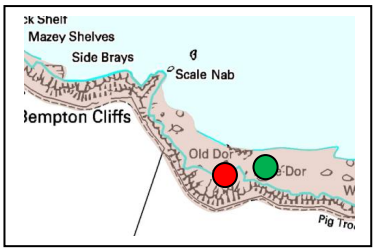


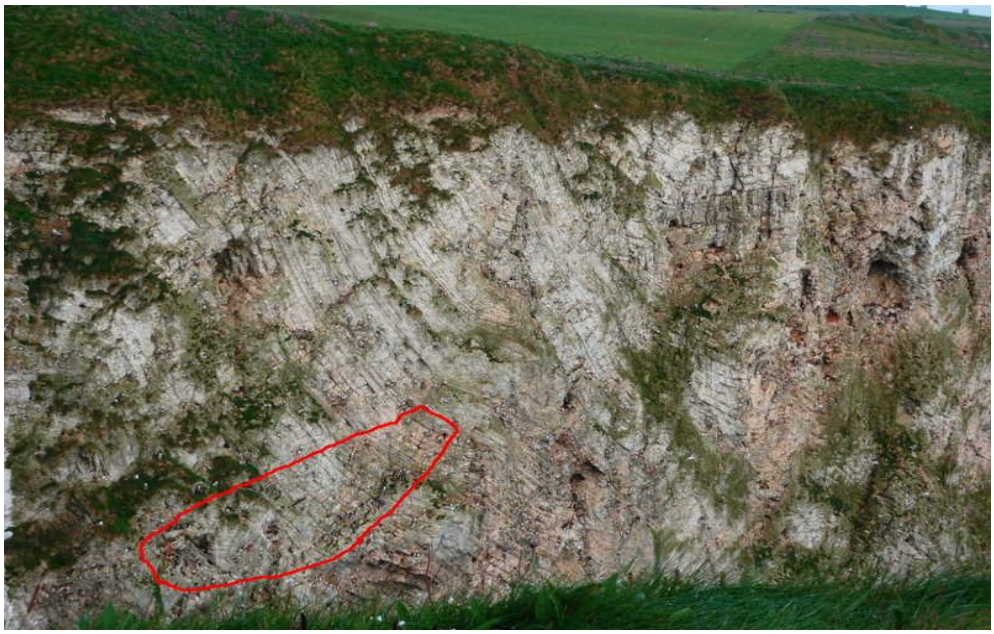
Plot 3: Old Dor

Observer: David Aitken

Count Dates: 6th 9th 11th 14th 17th June 2012

Number of visits: 5 visits, first 3 weeks June



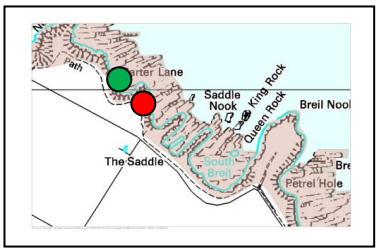


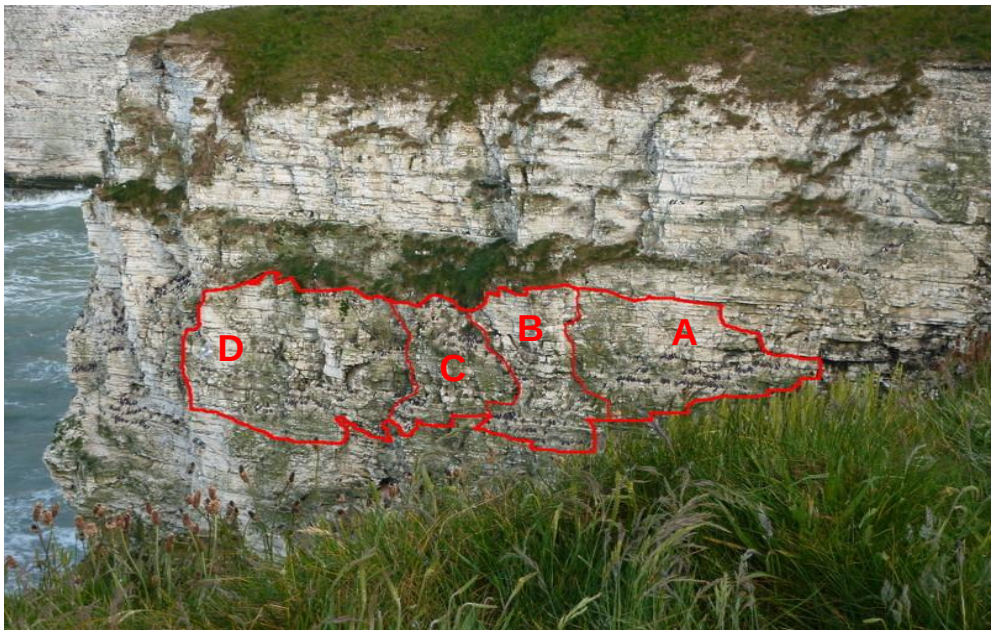
Plot 4: Carter Lane

Observer: David Aitken

Count Dates: 6th 9th 11th 14th 17th June 2012

Number of visits: 5 visits, first 3 weeks June



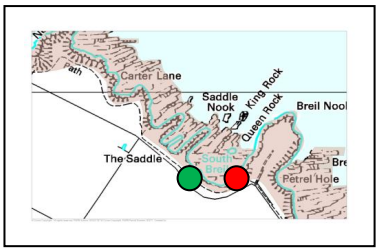


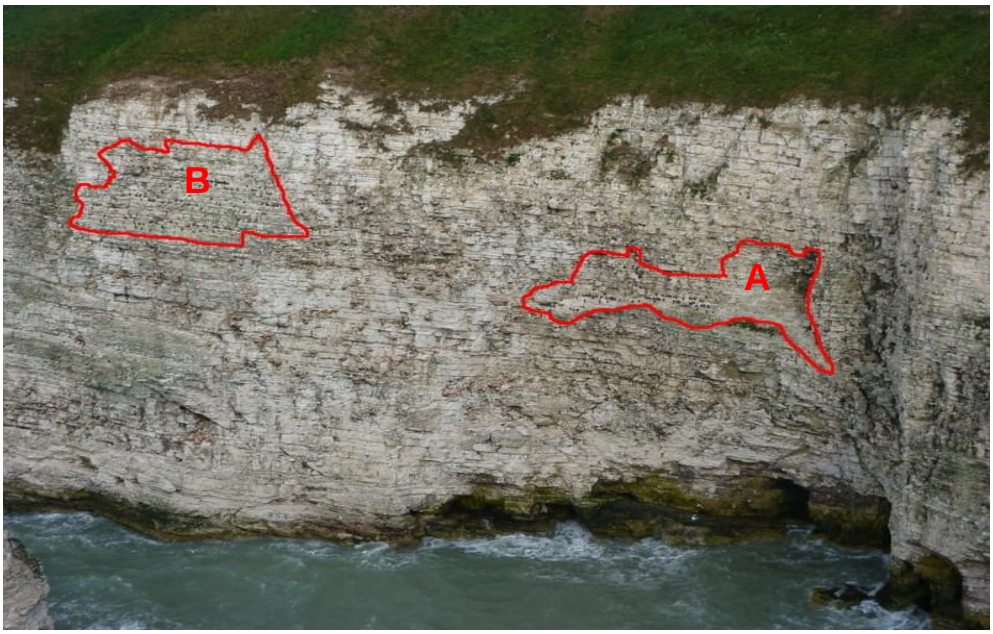
Plot 5: Breil Nook

Observer: David Aitken

Count Dates: 6th 9th 11th 14th 17th June 2012

Number of visits: 5 visits, first 3 weeks June



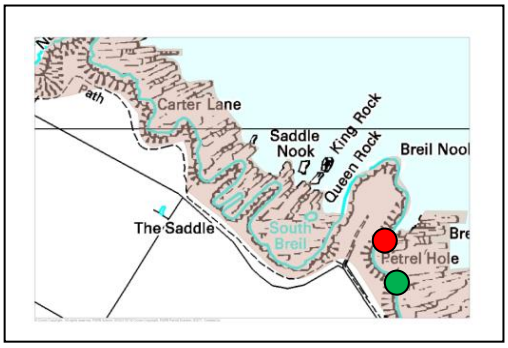


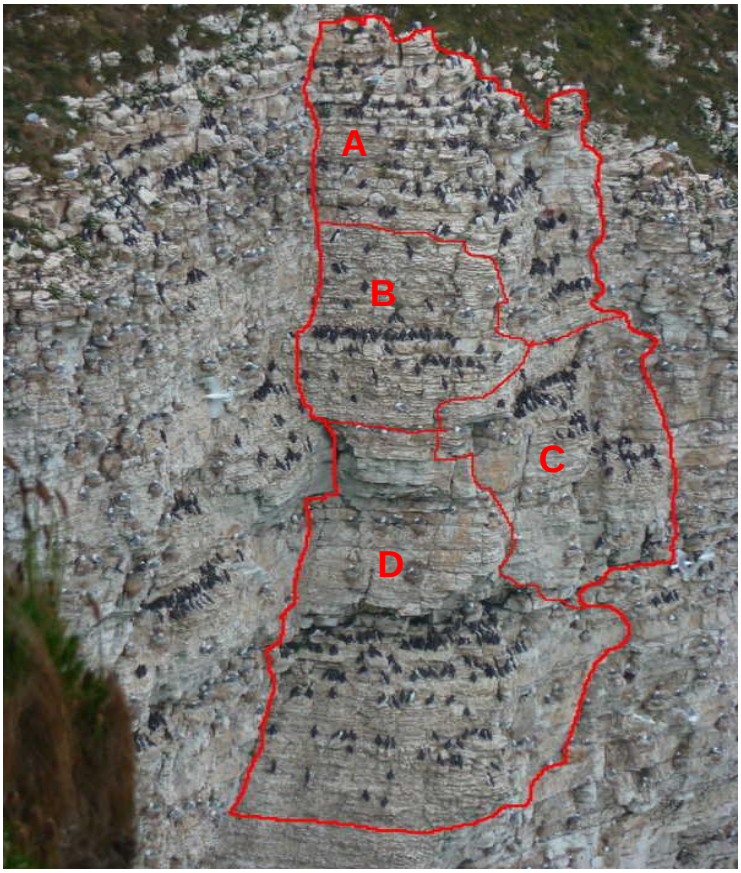
Plot 6: Petrel Hole

Observer: David Aitken

Count Dates: 6th 9th 11th 14th 17th June 2012

Number of visits: 5 visits, first 3 weeks June



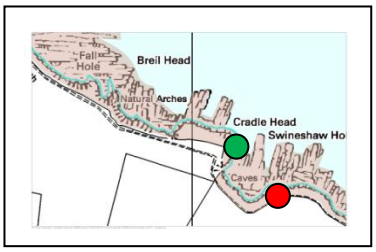


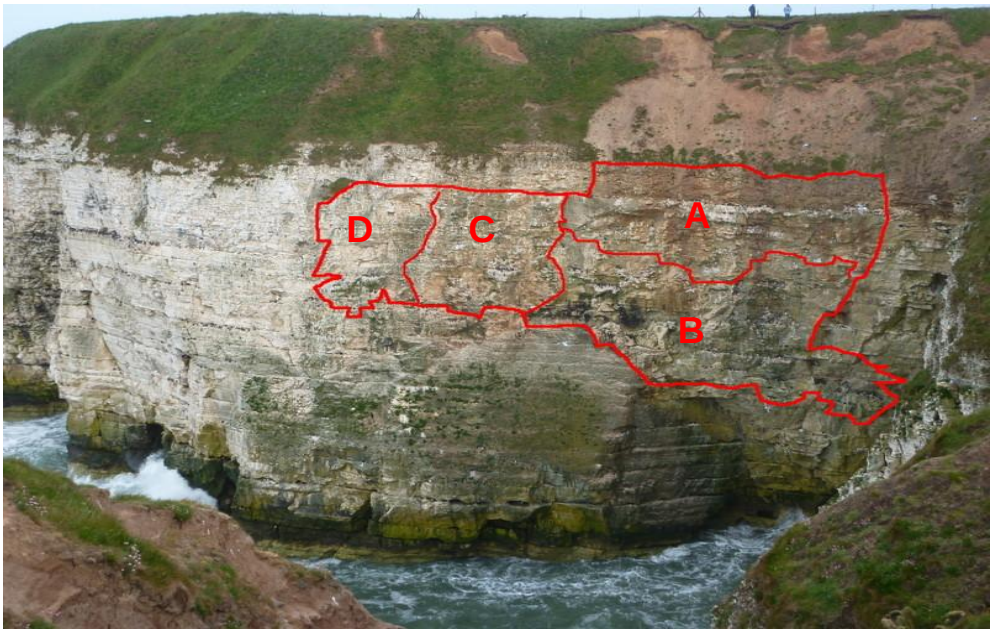
Plot 7: Swineshaw Hole

Observer: David Aitken

Count Dates: 6th 9th 11th 14th 17th June 2012

Number of visits: 5 visits, first 3 weeks June





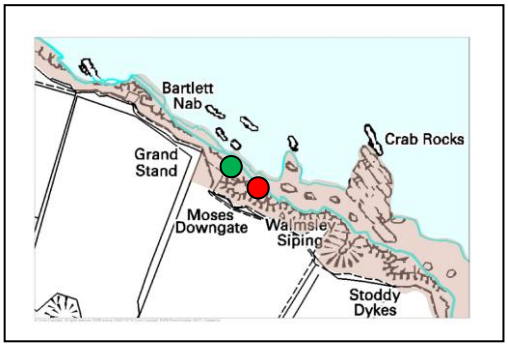
4.3 Razorbill study-plot count locations and boundaries:

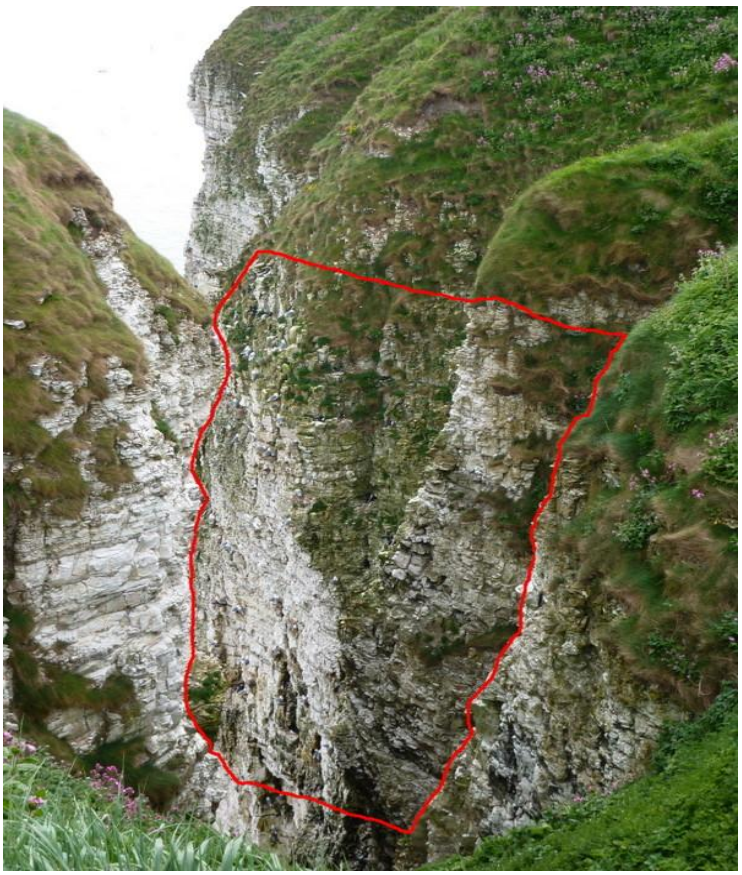
Plot 1: Grandstand Gully

Observer: David Aitken

Count Dates: 6th 9th 11th 14th 17th June 2012

Number of visits: 5 visits, first 3 weeks June



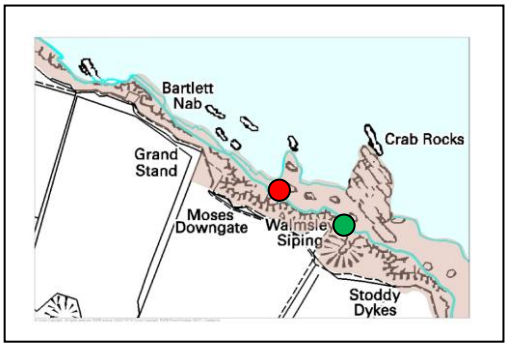


Plot 2: Grandstand North

Observer: David Aitken

Count Dates: 6th 9th 11th 14th 17th June 2012

Number of visits: 5 visits, first 3 weeks June

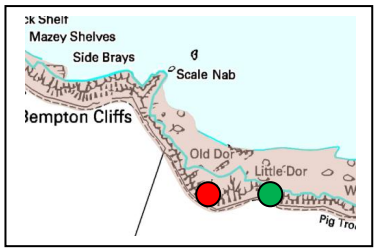


Plot 3: Old Dor

Observer: David Aitken

Count Dates: 6th 9th 11th 14th 17th June 2012

Number of visits: 5 visits, first 3 weeks June

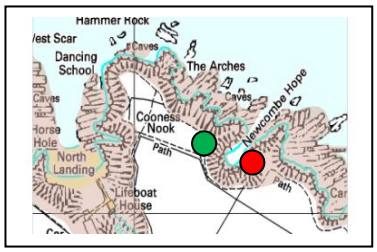


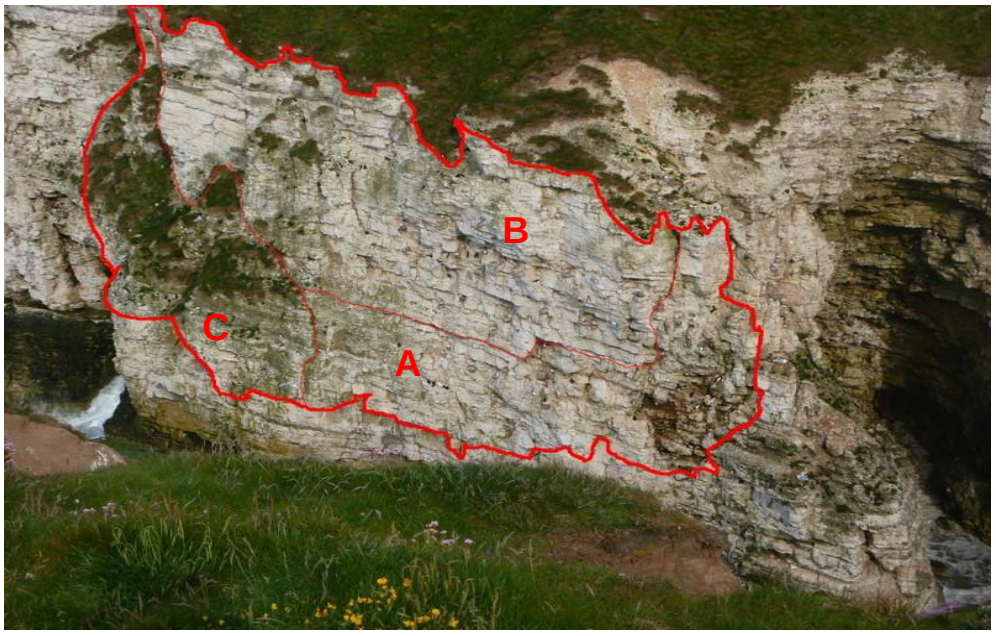
Plot 4: Newcombe

Observer: David Aitken

Count Dates: 6th 9th 11th 14th 17th June 2012

Number of visits: 5 visits, first 3 weeks June



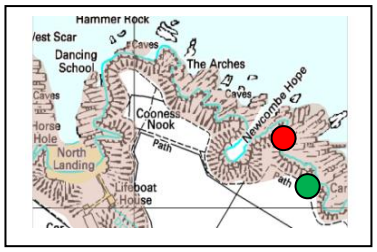


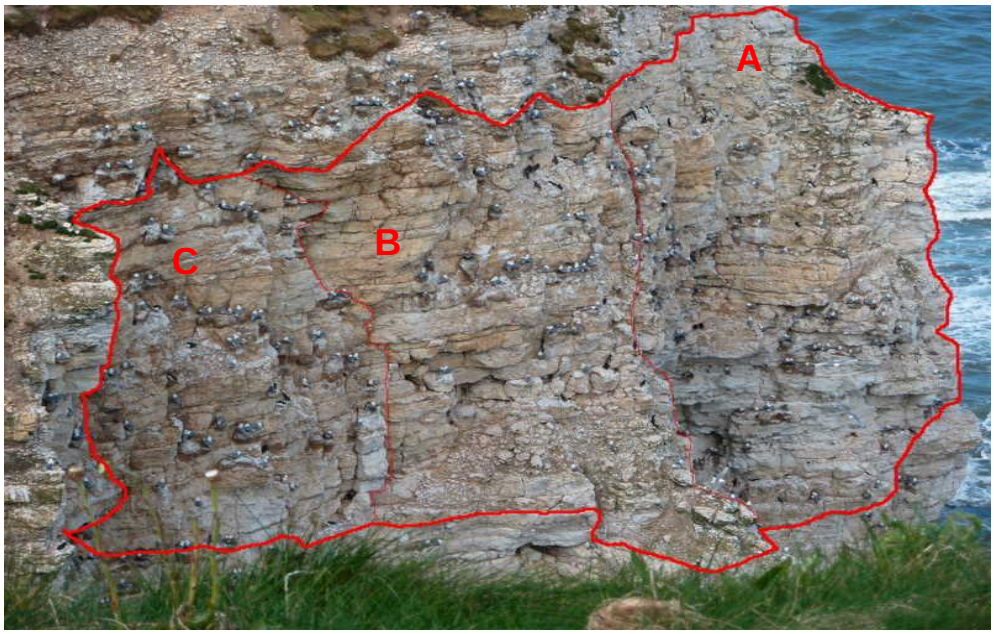
Plot 5: Back of Newcombe

Observer: David Aitken

Count Dates: 6th 9th 11th 14th 17th June 2012

Number of visits: 5 visits, first 3 weeks June



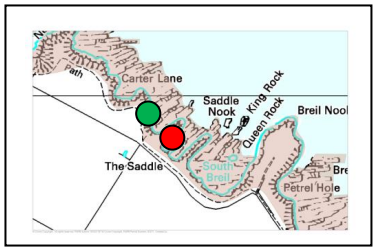


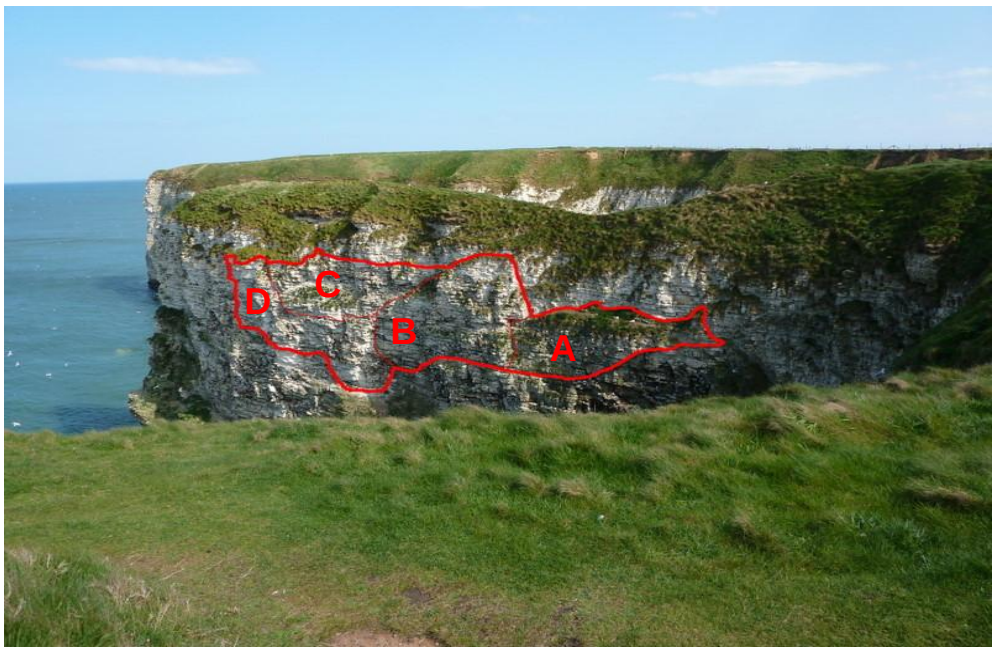
Plot 6: Saddle Nook

Observer: David Aitken

Count Dates: 6th 9th 11th 14th 17th June 2012

Number of visits: 5 visits, first 3 weeks June





Plot 7: Swineshaw Hole

Observer: David Aitken

Count Dates: 6th 9th 11th 14th 17th June 2012

Number of visits: 5 visits, first 3 weeks June