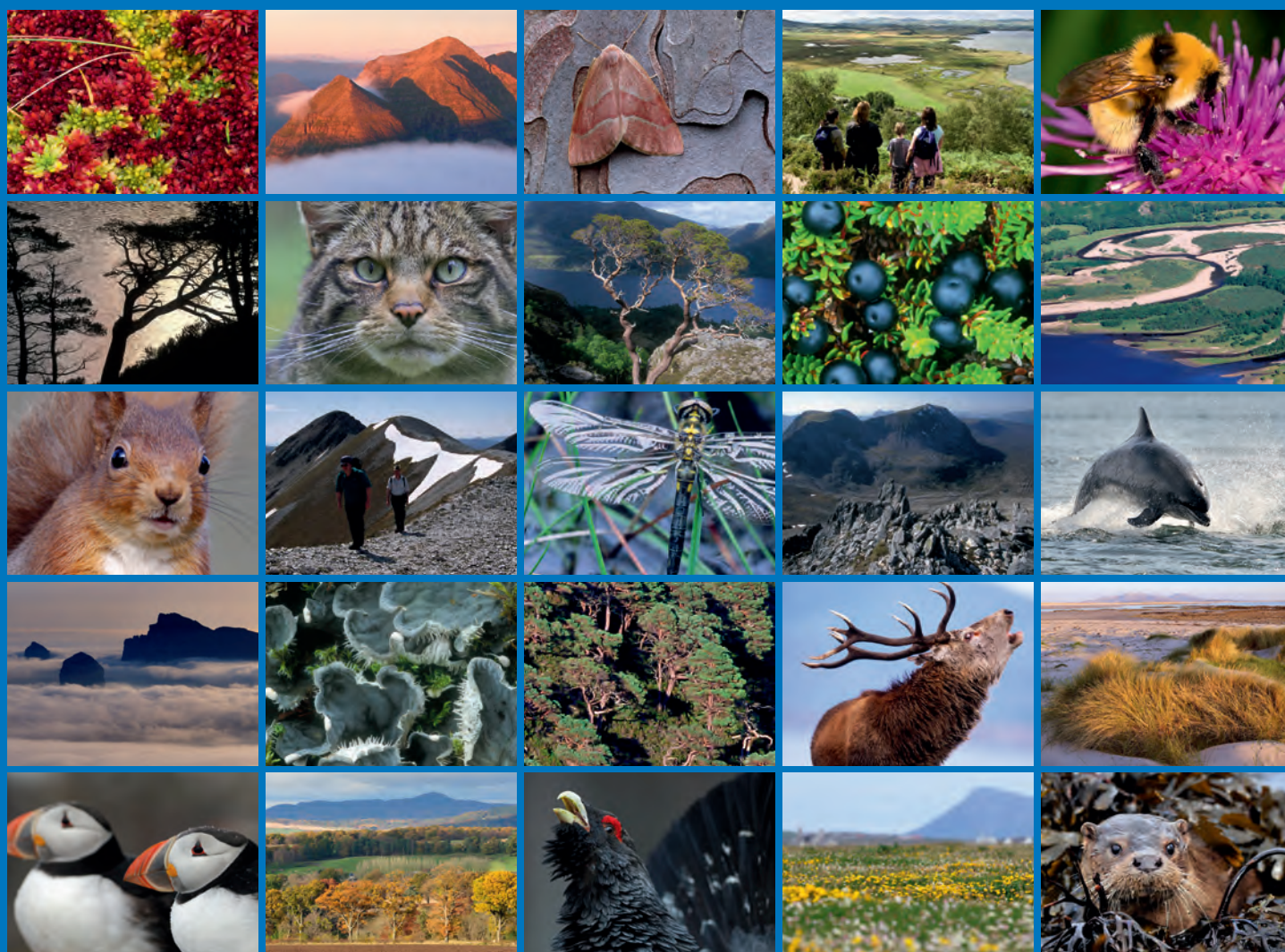


Seabird counts at East Caithness Cliffs SPA for marine renewable casework





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COMMISSIONED REPORT

Commissioned Report No. 902

Seabird counts at East Caithness Cliffs SPA for marine renewable casework

For further information on this report please contact:

Alex Robbins
Scottish Natural Heritage
Battleby
Redgorton
PERTH
PH1 3EW
Telephone: 01738 458653
E-mail: alex.robbs@snh.gov.uk

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COMMISSIONED REPORT

Summary

Seabird counts at East Caithness Cliffs SPA for marine renewable casework

Commissioned Report No. 902

Project No: 16004

Contractor: Bob Swann, North Scotland Ornithological Services

Year of publication: 2016

Keywords

Special Protection Area; seabirds; Caithness Cliffs; colony count.

Background

The East Caithness Cliffs SPA was last counted in 1999 (Callaghan *et al.*, 1999). Since then there have been major changes in many seabird populations throughout Scotland (Foster & Marrs, 2012). There are plans for major offshore windfarm developments off the Caithness coast which have now been consented. It is important to have up to date information on the current status of the east Caithness seabird populations.

Main findings

The counts revealed:

- Northern fulmar – 13,864 AOS in 2015, 3.6% lower than 1999 and part of a slow decline since 1986.
- Great cormorant – 53 AON in 2015, 41.1% lower than 1999 and a continuation of a long term 81% decline since 1977.
- European shag – 1,098 AON, 3.6% higher than 1999, but overall 53% down on the peak recorded in 1986.
- Black-legged kittiwake – 24,460 AON, a decline of 39.5% since 1999.
- Herring gull – 3,267 AOT, 4.2% lower than in 1999 and a continuation of a 79% decline since 1977.
- Great black-backed gull – 266 AOT, an increase of 47.8% since 1999, though still 74% lower than the peak recorded in 1977.
- Common guillemot – 149,228 birds, a decline of 6.2% since 1999, but still 40% higher than the numbers present in 1977 and 1986.
- Razorbill – 30,042 birds, an increase of 69.5% since 1999 and a continuation of a long term 147% increase since 1977.
- Atlantic puffin – 189 birds counted, 70% lower than the 1977 count.
- Rates of increases at East Caithness Cliffs SPA tended to be far higher than those reported nationally (at Scottish and UK levels) and rates of decline were far less.
- Changes in methodology between the 1999 and 2015 surveys may have had some effects on these results, but these were thought to be minor.

- It appeared that 2015 was a particularly good year for breeding seabirds in east Caithness resulting in high attendance rates of both breeders and non-breeders in the colonies.

For further information on this project contact:

Alex Robbins, Scottish Natural Heritage, Battleby, Redgorton, Perth, PH1 3EW.

Tel: 01738 458653 or alex.robbsins@snh.gov.uk

For further information on the SNH Research & Technical Support Programme contact:

Knowledge & Information Unit, Scottish Natural Heritage, Great Glen House, Inverness, IV3 8NW.

Tel: 01463 725000 or research@snh.gov.uk

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1. INTRODUCTION

Scottish Natural Heritage (SNH) commissioned this survey to provide up-to-date population estimates for complete colony counts at East Caithness Cliffs Special Protection Area (SPA). This is in order to provide an evidence base that can be used to inform Habitat Regulations Appraisals (HRA), Appropriate Assessment (AA) and Environmental Impact Assessments (EIA) for renewable energy applications, as well as post consent monitoring. Two major offshore wind farms have recently been given consent in the Moray Firth, with a number of areas for lease have been awarded by The Crown Estate to developers for the generation of renewable energy at various sites along the east coast of Scotland.

The HRA and EIA processes, and any post consent monitoring require up-to-date population estimates to accurately assess the impacts of these developments on the SPA qualifying features and other sensitive species. However, the lack of recent counts, particularly for colonies such as East Caithness Cliffs SPA, has increased uncertainty within these assessments. The foraging ranges of seabird qualifying features at this SPA overlaps with the two consented offshore wind sites.

Up-to-date counts will enable SNH to provide sound advice to both Marine Scotland as the regulator and to the individual developers. These counts will also be used as part of the next National Seabird Census and SNHs Site Condition Monitoring (SCM).

Complete colony counts were undertaken in 2013 for both North and East Caithness Cliffs SPAs, however, due to methodological issues, these results are considered unreliable. The most recent reliable counts for these SPAs were undertaken in 1999-2002 ('Seabird 2000'). SNH's recently published trend note (<http://www.snh.gov.uk/docs/B1163280.pdf>) has highlighted the declines of many seabird species in Scotland, therefore there is an urgency to establish current population estimates and condition status for these SPAs. Without these up-to-date estimates it is difficult to ascertain how much uncertainty previous counts have introduced into the population assessments, increasing the risk of inaccurate future impact modelling undertaken as part of the application process.

These counts will also be included within the next national seabird census (Seabirds Count). Site Condition Monitoring (SCM) is undertaken on a six yearly cycle. The third cycle commenced in 2014.



Figure 1. East Caithness Cliffs SPA location. © Crown copyright and database right 2016. All rights reserved. Ordnance Survey Licence number 100017908.

2. METHODS

2.1 Timing and organisation of visits

All visits were undertaken between 30th May and 20th June 2015 and counts made between 0700 and 1700 hours. In order to allow comparisons with the previous survey (Callaghan *et al.*, 1999) each section was counted using the same boundaries and in most instances from either land or sea as was done in 1999. Some sections, as was the case in 1999, were counted from both land and sea. In these instances the land counts were conducted first and the sub-sections noted on a sketch map so that uncounted sections could then be recognised and counted from the sea. All land counts were undertaken by Bob Swann (North of Scotland Ornithological Services) whereas the sea counts were undertaken by Bob Swann and Alex Robbins (SNH).

In a few complicated sections photographs were taken using a Canon SX50 HS camera and a Nikon D50 camera with a 18-55mm and a 70-300mm lens. This enabled counts to be undertaken later from a computer, rather than in the field. In a few instances field counts were compared with counts taken from photographs.

The counts were undertaken in suitable weather and sea conditions as per the Seabird Monitoring Handbook (Walsh *et al.*, 1995). Details of the count sections, the count type, weather and sea conditions are given in Annex 1 and 2.

2.2 Species methodology - counts

Northern fulmar. A site was counted as occupied only when a bird was sitting tightly on a reasonably horizontal area large enough to hold an egg. Two birds on such a site, apparently paired, count as one site.

Great cormorant. Apparently occupied nests were counted, including all substantial or well-constructed nests occupied by at least one bird.

European shag. Apparently occupied nests were counted. This was straightforward on cliff sections, but not so in boulder areas. Here the number of adults present were used to estimate the number of nests.

Black-legged kittiwake. All apparently occupied nests were counted. These were substantial or well-constructed nests capable of holding eggs, occupied by at least one bird standing on or within touching distance of the nest.

Herring gull, lesser back-backed gull and great black-backed gull. In small colonies on or below cliffs all apparently occupied nests were counted. Where actual nests were likely to be obscured by vegetation, but sitting/standing birds were visible the count was of apparently occupied territories.

Common Guillemot, Razorbill and Atlantic puffin. All individual birds on land above the spring high water mark were counted.

2.3 Counts from photographs

In certain sections, notably most of BAD4 and parts of ORD6, ORD7, ROC1, RAM1, COR1 and IRE1, birds were counted from photographs. JPEGs were loaded onto a computer and opened in paint. Section boundaries were added. The cliffs were then split up into sub-sections and these boundaries were added to the photographs. By zooming in (x100 to x200) individual birds/nest sites could be seen. These were then counted with each bird/nest site given a coloured spot, according to species, using the airbrush setting from the top

menu bar (see example in Figure 2). In the large BAD4 section the photographs were also printed out and these proved useful to help identify the exact boundaries of each of the 60 subsections and to ensure that all parts of the cliff had been counted. This work was also undertaken by Bob Swann (NOSOS).



Figure 2. Boundary of subsection 2 on BAD4 with marked birds/ nest sites

3. RESULTS

3.1 Counts according to individual sections

All sections of the East Caithness Cliffs SPA were counted from ORD1 just north of Helmsdale to BRO1 at Wick. In addition four sections were counted between Keiss and Skirtza Head. The results from all visits to each counted section are given in Table 1.

Table 1. Summary of data collected from individual count sections.

Site code	FU	CA	SA	HG	LB	GB	KI	GU	RZ	PU
ORD1	7									
ORD2a	250	38	1	212	3	2		425	186	1
ORD2b	85		19	81		1	168	350	695	
ORD3a	82		18	69	1	1	62	283	255	
ORD3b			15	77		1	81	235	208	3
ORD4	108		47	218		6	286	4040	638	2
ORD5	111		84	80		11	500	1155	621	
ORD6a	374		45	80		4	235	6765	750	
ORD6b	7		2				224	660	81	
ORD7	335		36	24		6	29	3885	542	
ORD8	21		18	22		2	280	3290	632	
BAD1	50		9	13		5		537	110	
BAD2	95		400	200		33			35	3
BAD3a	202		1				47	162	214	
BAD3b	36		1	23		1	406	1095	275	
BAD4	70		16	164		1	5249	27644	1558	
BAD5	115			181		5	271	430	142	
BER1	406		18	72		15	74	355	178	
NEW1	113	7	1	13		3		164	28	
NEW2	41		10			7	5	440	60	
NEW3	43		4				14	150	78	
NEW4	705		6	53		9	2	59	95	
ROC1a	53						1490	6350	935	
ROC1b	1330		4	2			4068	17158	4565	
RAM1a	749		9	27		3	523	1417	935	
RAM1b	22					11	710	40	85	
RAM2	150		3					423	169	
RAM3	32		1	1			258	2980	405	2
DUN1	350		7	93		4	690	1205	914	
DUN2	63			16					32	
DUN3	627		54	392	1	22	245	1120	487	139
LAT1	191		17	153		3		90	115	
LAT2	239		6	122					42	
FOR1a	160		16	10			90	200	192	
FOR1b	13		7				187	660	75	
BUR1	272		4	38		1			125	
LYB1	134		11	119		3			65	
LYB2	174		35	52		6	167	123	108	

OCC1	304	8	8	30	24		53	1	
ROY1	226		7	1		138	98	1	
CLY1	111			16	2	143	60		
CLY2a	130		18	39	1	40	373	372	2
CLY2b			3			54	450	63	
HAL1a	643		26	19	9	773	8774	866	
HAL1b	12		7	5		90	1720	90	
NES1a	498		22	57	5	235	3262	361	6
NES1b	41		4	1		900	4780	260	
WAH1	434		14	94	12	514	7410	628	4
ULB1a	674		25	9	4	608	3216	1457	12
ULB1b						44	280		
ULB2	157		12	62	2	70	450	290	
GEA1	117		6	99	3		180	184	
SAR1	116			54				58	4
COR1a	553		3	7	4	1645	10796	1544	
COR1b	25		3	22	2	288	2075	678	
IRE1a	774		3	9	2	1926	14689	4739	5
IRE1b	5		1			614	3135	738	1
MAN1	519		3	16	2	77	440	241	1
BRO1	710		8	120	28	221	3027	632	2
KEI1	11				1				
NYB1	97			1	1				
NYB2	667		14	24	7		35	102	
FRE1	15								

Notes:

Site codes: These are detailed in annex 1 and 2. For sections where counts were done both from land and sea a = land count and b = sea count.

Species codes: FU northern fulmar, CA great cormorant, SA European shag, HG herring gull, LB lesser black-backed gull, GB great black-backed gull, KI black-legged kittiwake, GU common guillemot, RZ razorbill, PU Atlantic puffin.

Counts. For units see methods section. Counts in red are estimated counts. In the case of gulls these are AOTs, rather than AONs.

3.2 Counts according to designated areas

Large parts of the East Caithness cliffs have been given designations under various Acts. As well as the SPA there are two SSSIs notified in part for their important seabird populations. These are the Berriedale Cliffs SSSI (sections ORD1-DUN1) and the Craig Hammel to Scaps Geo SSSI (sections HAL1-IRE1). The total number of seabirds counted in these two SSSIs is given in Tables 3 and 4.

4. COMPARISON WITH PREVIOUS COUNTS

4.1 Counts according to designated areas

The East Caithness Cliffs SPA was last counted in 1999 as part of the Seabird 2000 survey (Callaghan, *et al.*, 1999). Table 2 gives details of the total numbers counted in both 1999 and 2015 and the percentage changes.

Table 2. Summary of data collected from all count sections East Caithness Cliffs SPA

	FU	CA	SA	HG	LB	GB	KI	GU	RZ	PU
1999	14375	90	1060	3411	0	180	40450	159108	17727	275
2015	13864	53	1098	3267	5	266	24460	149248	30042	189
% change	-3.6	-41.1	3.6	-4.2		47.8	-39.5	-6.2	69.5	-31.3

Table 2 shows varying fortunes in the numbers of different species since 1999. Razorbill (+69.5%) and great black-backed gull (+47.8%) have shown substantial increases in numbers, whilst European shag has shown a slight increase (+3.6%). Northern fulmar (-3.6%), herring gull (-4.2%) and common guillemot (-6.2%) have all shown small declines, whilst Atlantic puffin (-31.3%), black-legged kittiwake (-39.5%) and great cormorant (-41.1%) have shown major declines.

There have been variations in the degree of these changes within the SPA as shown by the figures from the two SSSIs (Table 3 and 4).

Table 3. Summary of data collected from all count sections Berriedale Cliffs SSSI

	FU	CA	SA	HG	LB	GB	KI	GU	RZ	PU
1999	6663	88	833	1428	0	57	24387	79051	6610	115
2015	5942	45	775	1705	4	131	15672	81697	15389	11
% change	-10.8	-48.9	-7.0	19.4		129.8	-35.7	3.3	132.8	-90.4

The Berriedale Cliffs SSSI showed major declines in Atlantic puffin and great cormorant (albeit overall numbers were always fairly low) and black-legged kittiwake in parallel to the changes shown throughout the SPA. In addition declines of 10.8% were shown in this section for northern fulmar and 7% for European shag. Herring gull, great black-backed gull, common guillemot and razorbill all showed higher increases in the Berriedale Cliffs SSSI compared to the SPA as a whole.

Table 4. Summary of data collected from all count sections Craig Hammel to Scaps Geo SSSI

	FU	CA	SA	HG	LB	GB	KI	GU	RZ	PU
1999	3521	2	97	710	0	55	14081	72721	9261	35
2015	4049	0	126	438	0	43	7707	60767	11893	32
% change	15.0	-100.0	29.9	-38.3		-21.8	-45.3	-16.4	28.4	-8.6

The Craig Hammel to Scaps Geo SSSI showed much higher declines in herring gull, great black-backed gull, black-legged kittiwake and common guillemot than recorded in the SPA as a whole. The increase in razorbill numbers was far less than that recorded in the whole of the SPA but the increases in northern fulmar and European shag were greater.

4.2 East Caithness Cliffs SPA – long term trends

The East Caithness Cliffs SPA was also counted in 1977 (Mudge, 1979) and 1986 (Sally Ward, SNH *pers com*). Table 5 gives details of these historic counts and how they compare with the counts in 1999 and 2015.

Table 5. East Caithness Cliffs SPA counts 1977 – 2015 and percentage changes.

	FU	CA	SA	HG	GB	KI	GU	RZ	PU
1977	14984	284	1661	15836	1011	41692	107336	12154	632
1986	15037	227	2335	9370	789	32466	106753	15776	
1999	14375	90	1060	3411	180	40450	159108	17727	275
2015	13864	53	1098	3267	266	24460	149228	30042	189
% change 1977-2015	-7.5	-81.3	-33.9	-79.4	-73.7	-41.3	39.0	147.2	-70.1
% change 1986-2015	-7.8	-76.7	-53.0	-65.1	-66.3	-24.7	39.8	90.4	
% change 1999-2015	-3.6	-41.1	3.6	-4.2	47.8	-39.5	-6.2	69.5	-31.3

Table 5 suggests that great cormorant, herring gull, great black-backed gull and puffin have undergone large declines in numbers since 1977. European Shags and to a lesser extent northern fulmars have been in decline since 1986. Black-legged kittiwake numbers fluctuated between 1977 and 1999 and have since shown a dramatic decline. Common Guillemots increased markedly between 1977 and 1999 and although they have recently declined they are still well above the levels recorded in 1977 and 1986. Razorbills have shown a marked increase in numbers since 1977.

4.3 East Caithness Cliffs SPA counts v national counts

Nationally northern fulmars have shown an 18% decline in UK numbers between 2000 and 2014 (JNCC 2015) with a 38% decline in Scotland between 1999 and 2014 (http://jncc.defra.gov.uk/docs/Data_points_1986-2013.xls). The decline at the East Caithness Cliffs SPA since 1999 has been much lower with only a 3.6% reduction in numbers. Monitoring plots on the East Caithness cliffs counted in 2005 and 2013 showed a 1% increase (Swann, 2016) during a period when declines were taking place nationally.

European shags have shown a slight 3.6% increase since 1999 at the East Caithness Cliffs SPA. This increase in numbers contrasts with a 38% decline in UK numbers between 2000 and 2014 (JNCC, 2015) and with a 24% decline in Scotland between 1999 and 2014 (http://jncc.defra.gov.uk/docs/Data_points_1986-2013.xls). Monitoring plots on the East Caithness cliffs counted in 1999 and 2013 showed a 10% increase (Swann, 2016).

Black-legged kittiwakes have shown a 39.5% decline in numbers at the East Caithness Cliffs SPA since 1999. This compares with a 47% decline in UK numbers between 2000 and 2014 (JNCC, 2015) and with a 63% decline in Scotland between 1999 and 2014 (http://jncc.defra.gov.uk/docs/Data_points_1986-2013.xls). Monitoring plots on the East Caithness cliffs counted in 2005 and 2013 showed a 29% decline in numbers (Swann, 2016).

Herring gulls have shown 4.2% decline in numbers at the East Caithness Cliffs SPA since 1999. This compares with a 17% decline in UK numbers between 2000 and 2014 (JNCC, 2015) and with a 5% decline in Scotland between 1999 and 2014 (http://jncc.defra.gov.uk/docs/Data_points_1986-2013.xls).

Great black-backed gulls have shown a 47.8% increase in numbers at the East Caithness Cliffs SPA since 1999. This compares with a 6% decline in UK numbers between 2000 and

2014 (JNCC, 2015) and with a 49% decline in Scotland between 1999 and 2014 (http://jncc.defra.gov.uk/docs/Data_points_1986-2013.xls).

Common guillemots have shown a 6.2% decline in numbers at the East Caithness Cliffs SPA since 1999. This compares with a 22% increase in UK numbers between 2000 and 2014 (JNCC, 2015), but with a 26% decline in Scotland between 1999 and 2014 (http://jncc.defra.gov.uk/docs/Data_points_1986-2013.xls). Monitoring plots on the East Caithness cliffs counted in 2005 and 2013 showed a 37% decline in numbers (Swann, 2016).

Razorbills have shown a large 69.5% increase in numbers at the East Caithness Cliffs SPA since 1999. This compares with a 6% increase in the UK numbers between 2000 and 2014 (JNCC, 2015), but with a 22% decline in Scotland between 1999 and 2014 (http://jncc.defra.gov.uk/docs/Data_points_1986-2013.xls). Monitoring plots on the East Caithness cliffs counted in 2005 and 2013 showed a 10% decline in numbers (Swann, 2016).

5. DISCUSSION

5.1 Changes in methodology

The changes shown in this report between the 1999 survey and the present survey could be real, could be due to methodological changes or could be a combination of both these factors.

Overall the 2015 count followed the methodology used by the 1999 count. There were however two exceptions. These were the use of photographs to help count some of the more complex sections of cliff and secondly additional land and sea counts to improve coverage.

5.1.1 Use of photographs

A large number of the 1999 counts were noted as estimates (Callaghan *et al.*, 1999). We feel the counts for 2015 were all fairly accurate. Many of the land counts were done using a telescope, whilst modern optics such as the 10x40 Swarovski binoculars used probably helped improve the accuracy of sea based counts. Another major improvement was the use of photographs. Table 6 compares counts of common guillemots done in the field and then the same sections counted from a photograph. Overall counts from photographs were 12% higher. This was most noticeable on some of the larger more complex sections. The discrepancy in ORD7_1 where the field count was much higher was probably due to double counting of some sections.

Table 6. Comparison of field counts v counts from photographs of common guillemots at 8 sites.

	Field	Photo
An Dun N Geo	2450	2979
ord6_1	916	907
ord6_2	1776	1707
ord6_3	1345	2100
ord6_4	320	420
ord7_2	650	530
ord7_1	941	765
ord7_3	250	277
	8648	9685

At An Dun N Geo, a very dense complex section, razorbills were also counted. The photo count of 816 was 25% higher than the field count of 655.

The use of photographs in 2015 could therefore explain why some species like common guillemot had not declined as much as expected, whilst other like razorbill had increased more than expected. However, it should be noted that at the largest site counted from photographs – BAD4 common guillemots showed a 28% decline far greater than the overall decline throughout the SPA, whilst razorbills showed a 20% decline as opposed to the major increase recorded across the entire SPA.

5.1.2 Land v sea counts

On most occasions if a land count was done in 1999 it was repeated in 2015 and the same with sea counts. There were however some exceptions. The main differences were in the northern part of the SPA particularly in IRE1 and to a lesser extent in COR1. Here several large sub-sections were covered by land, whereas in 1999 all IRE1 and most in COR1 were done by sea. The main impact that this had was that the inner narrow parts of geos, which

cannot be seen from the sea were counted. This almost certainly led to the large increases in northern fulmar numbers in these two sections.

There were a few instances where sea counts were done in 2015 but not in 1999 these involved parts of ORD3, ORD6 and FOR1 where it was obvious that some sections (headlands, back of stacks) could not be seen from land. In addition at HAL1 it was impossible to get onto the headland, due to the growth of a dense bank of gorse, so this section also had to be counted from the sea.

Thirteen sections in 2015 had both land and sea counts (nine in 1999). These in some instances proved quite tricky to deal with. GPS readings taken on land are difficult to match up with GPS readings taken at sea. Even though sketch maps were drawn of the sections counted by land at the top of the cliff, these often looked very different when seen from a different perspective at the bottom of the cliff. This led to problems in a few sections, most noticeably in the convoluted coastlines found in NES1 and ULB 1, and may have resulted in some under or over counting if sections were missed out or counted twice.

Another issue in some sections was exactly where they started at ended. No GPS was available in 1999 so there was probably some lack of precision regarding start and end points. On some headlands it could be difficult to determine exactly where a section started or ended. These discrepancies will have no effect on the overall results, but may explain some of the major differences seen at the individual section level between the 1999 counts and the 2015 counts.

5.1.3 Gulls and shags

Walsh *et al.* (1995) recommend that gulls are counted using AONs, though where it is not possible to see all incubating birds, or when chicks have already hatched then counts of AOTs based on the number of adults present need to be used. It is acknowledged that the errors involved in the use of AOTs can be high. At many of the east Caithness sites this problem was exacerbated by the presence in and around some colonies of flocks of non-breeding birds. This means that gull counts on many sections may be overestimates of the actual number of breeding pairs.

It is also recommended that AONs are counted for European shags. On many sites where the birds nested on ledges this was not a problem. However, where birds nested amongst boulders this was generally impossible. Here estimates were based on the number of adults visible. At the largest colony at BAD2 an estimate of the number of nests present was provided by Robin Sellars, who visited the colony in late June to ring chicks. This estimate is used in this report. It is not known how the accuracy of this estimates compares with the estimate used in 1999.

5.2 East Caithness Cliffs SPA trends v national trends

The SNH Biodiversity indicator (www.snh.gov.uk/docs/B424907.pdf) which highlighted trends in abundance and productivity of Scottish seabirds showed that between 1986 and 2011 mean seabird abundance in Scotland had declined by 53% and breeding productivity had declined by 37% over the same period. Breeding seabird numbers are affected by both short term and long term changes in various environmental factors such as sea surface temperature, food availability and weather conditions (Wanless & Harris, 2012). This may lead to different species or different areas showing different trends over different time scales.

For the seven key species breeding at the East Caithness Cliffs SPA the changes in numbers since the 1999 survey suggest that they are faring better than either the total UK or Scottish populations of these species. As discussed above this could be due to changes in

methodology. Perhaps the high number of estimated counts under-estimated the actual numbers present in 1999. Correspondingly perhaps the use of photographs, better optics and improved coverage of certain sections boosted the 2015 counts.

When compared to the national trends most of the changes noted at the East Caithness Cliffs SPA are so different it would suggest that different environmental factors are operating locally compared to other parts of the country, particularly so in 2015. The most likely one being food supply. It was evident during the fieldwork that food was in plentiful supply locally. Feeding frenzies were noted on most visits just offshore from the cliffs. This local abundance of food may have led to high attendance rates of both breeding adults and immatures on the cliffs in 2015.

The suggestion that 2015 was a particularly good year for seabirds in east Caithness is backed up by information from the monitoring plots. For common guillemot information for five plots that had been counted in 1999, 2005 and 2013 was also available for 2015 (Table 7). The 2005, 2013 and 2015 plots were all counted by the same observer.

Table 7. Counts of common guillemots on five monitoring plots 1999-2015

Plot	1999	2005	2013	2015
Riera Geo	1315	1637	924	1420
Ashy Geo Arch	433	575	406	624
Bad 1	1295	1195	711	907
An Dun plots1-3+	785	818	466	650
Inverhill plot3	486	481	340	390
	6313	6711	4860	6006

These figures show that following a 28.6% decline in numbers between 2005 and 2013, there was a rapid 24% increase in numbers between 2013 and 2015.

6. CONCLUSIONS AND RECOMMENDATIONS

The monitoring results indicate that since 1999 there has been a 69.5% increase in the numbers of razorbills, a 47.8% increase in great black-backed gulls and a 3.6% increase in European Shags at the East Caithness Cliffs SPA. Over the same period the number of northern fulmars declined by 3.6%, herring gulls by 4.2%, common guillemots by 6.2% and black-legged kittiwakes by 39.5%. These rates of increases tended to be greater than those recorded for these species nationally (up to 2014), while the decreases tended to be less than those recorded nationally (up to 2014). It appears that 2015 was a particularly good year for breeding seabirds and that this resulted in some particularly high counts. Changes in methodology may have also influenced the results, but probably to a lesser extent.

In order to reduce the effects of changing methodology the following recommendations are made.

1. All section start and end points are carefully GPS'd and if necessary illustrated on a photograph (particularly when the counting/GPS position is well back from the actual boundary).
2. Where there is a mixture of land and sea counts in a section photographs are taken to try and clearly mark the sub-sections counted from land so that these are available during the boat based surveys.
3. On all complex sections of coastline a series of overlapping photographs are taken to enable any field counts to be double checked.

7. REFERENCES

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ANNEX 1: COUNT SECTIONS

Section	Site code	Grid start	Grid end
Ord of Caithness	ORD1	ND057173	ND059173
Ord of Caithness	ORD2	ND059173	ND070179
Cnoc na Stri	ORD3	ND070179	ND071181
Cnoc na Stri	ORD4	ND071181	ND076185
Creag na Cuinse	ORD5	ND076185	ND081190
Creag na Cuinse	ORD8	ND081190	ND081191
Creag na Cuinse	ORD6	ND081191	ND087195
Creag na Cuinse	ORD7	ND087195	ND089198
Badbea	BAD1	ND089198	ND092200
Badbea	BAD2	ND092200	ND102207
Cnoc na Croiche	BAD3	ND102207	ND108208
Inver Hill	BAD4	ND108208	ND117218
Poll Gallon	BAD5	ND117218	ND120225
Berriedale	BER1	ND120225	ND127235
Llama Farm	NEW1	ND127235	ND132238
Ceann Leathad nam Bo	NEW2	ND132238	ND132240
Ceann Leathad nam Bo	NEW3	ND132240	ND134241
Screadan	NEW4	ND134241	ND138254
Rockhead	ROC1	ND138254	ND141260
The Clett	RAM1	ND141260	ND148268
Badaidh na Gaoithe	RAM2	ND148268	ND149268
Ramsgate	RAM3	ND149268	ND151270
Sithean Dubh	DUN1	ND151270	ND158280
Dunbeath Bay	DUN2	ND158280	ND168293
Cleit Bheag	DUN3	ND168293	ND181309
Gotten Dubh	LAT1	ND181309	ND191321
Latheronwheel	LAT2	ND191321	ND216333
Forse Head	FOR1	ND216333	ND221337
Burrissil	BUR1	ND221337	ND231340
Invershore	LYB1	ND231340	ND244348
Hill Head	LYB2	ND244348	ND264353
Occumster	OCC1	ND264353	ND274354
Roy Geo	ROY1	ND274354	ND279357
Skerry Mor	CLY1	ND279357	ND291363
Overton	CLY2	ND291363	ND297371
Halberry Head	HAL1	ND297371	ND306383
Ness Castle	NES1	ND306383	ND314394
Whaligoe	WHA1	ND314394	ND325405
Whaligoe	ULB1	ND325405	ND331413
Stack of Ulbster	ULB2	ND331413	ND342419
Gearly Head	GEA1	ND342419	ND348428
Sarclet Head	SAR1	ND348428	ND354436
Corbiegeo	COR1	ND354436	ND359450
Ires Geo	IRE1	ND359450	ND362463
Helman Head	MAN1	ND362463	ND367478
The Brough	BRO1	ND367478	ND371489
Wick Bay	WIK1	ND371489	ND388523
Staxigoe	STA1	ND388523	ND389542
Noss Head	NOS1	ND389542	ND378549
Ackergillshore	NOS2	ND378549	ND349550
Sinclair's Bay	SIN1	ND349550	ND344599
Keiss	KEI1	ND344599	ND363622
Nybster	NYB1	ND363622	ND373637
Auckingill	NYB2	ND373637	ND381667
Freswick Bay	FRE1	ND381667	ND394681

ANNEX 2: COUNT SECTION VISIT DETAILS

Site code	Date	Start time	End time	Visit rel	Method	Visibility	Sea state	Rain	Wind
ORD1	30/05/15	07:00	07:10		Land	1	2	1	2
ORD2a	30/05/15	07:10	09:15		Land	1	2	1	2
ORD2b	15/06/15	07:55	08:35	+	Sea	1	1	1	1
ORD3a	30/06/15	09:15	10:00		Land	1	2	1	2
ORD3b	15/06/15	08:35	08:50	+	Sea	1	1	1	1
ORD4	15/06/15	08:50	09:36		Sea	1	1	1	1
ORD5	15/06/15	09:36	10:25		Sea	1	1	1	1
ORD6a	30/05/15	14:30	16:15		Land	1	2	1	3
ORD6b	15/06/15	11:00	11:15	+	Sea	1	1	1	1
ORD7	30/05/15	10:50	14:30		Land	1	2	1	3
ORD8	15/06/15	10:25	11:00		Sea	1	1	1	1
BAD1	01/06/15	07:00	07:50		Land	1	2	1	3
BAD2	01/06/15	07:50	08:50		Land	1	2	1	3
BAD3a	01/06/15	08:50	09:30		Land	1	2	1	3
BAD3b	15/06/15	11:30	12:00	+	Sea	1	1	1	1
BAD4	15/06/15	12:00	13:30		Sea	1	1	1	1
BAD5	01/06/15	10:00	11:25		Land	1	2	1	3
BER1	01/06/15	11:50	13:00		Land	1	2	1	3
NEW1	01/06/15	13:00	14:30		Land	1	2	1	3
NEW2	15/06/15	13:40	13:55		Sea	1	1	1	1
NEW3a	01/06/15	14:30	15:00		Land	1	2	1	4
NEW3b	15/06/15	13:55	14:05	+	Sea	1	1	1	1
NEW4	01/06/15	15:00	16:10		Land	1	2	1	4
ROC1a	02/06/15	07:10	15:10		Land	1	2	2	4
ROC1b	15/06/16	14:15	15:26	+	Sea	1	1	1	1
RAM1a	02/06/15	15:10	16:15		Land	1	2	2	4
RAM1b	15/06/15	15:26	15:50	+	Sea	1	1	1	1
RAM2	02/06/15	16:15	17:00		Land	1	2	2	4
RAM3	15/06/15	15:50	16:15		Sea	1	1	1	1
DUN1	15/06/15	16:16	17:10		Sea	1	1	1	1
DUN2	15/06/15	17:10	17:20		Sea	1	1	1	1
DUN3	16/06/15	07:45	09:25		Sea	1	2	1	3
LAT1	16/06/15	09:25	09:50		Sea	1	2	1	3
LAT2	16/06/15	09:50	10:10		Sea	1	2	1	3
FOR1a	03/06/15	07:30	08:35		Land	1	2	1	2
FOR1b	16/06/15	10:50	11:04	+	Sea	1	2	1	3
BUR1	03/06/15	08:35	09:30		Land	1	2	1	2
LYB1	03/06/15	09:30	10:32		Land	1	2	1	2
LYB2	03/06/15	10:35	12:30		Land	1	2	1	2
OCC1	03/06/15	12:30	13:36		Land	1	2	1	2
ROY1	03/06/15	13:36	14:15		Land	1	2	1	2
CLY1	03/06/15	14:15	14:50		Land	1	2	1	2
CLY2a	06/06/15	07:00	08:30		Land	1	2	3	3
CLY2b	16/06/15	11:04	11:11	+	Sea	1	2	1	3
HAL1a	06/06/15	08:30	13:25		Land	1	2	3	4
HAL1b	16/06/15	11:15	12:00	+	Sea	1	2	1	3
NES1a	06/06/15	14:00	16:30		Land	1	2	3	5
NES1b	16/06/15	12:00	12:33	+	Sea	1	2	1	3
WHA1	16/06/15	12:33	13:56		Sea	1	2	1	3
ULB1a	07/06/15	07:16	11:14		Land	1	2	1	3
ULB1b	16/06/15	13:56	14:20	+	Sea	1	3	1	3
ULB2	16/06/15	14:21	14:55		Sea	1	3	1	3
GEA1	16/06/15	14:55	15:10		Sea	1	3	1	3

SAR1	17/06/15	08:50	09:00		Sea	1	2	1	3
COR1a	08/06/15	11:50	16:10		Land	1	2	1	3
COR1b	17/06/15	09:00	10:40	+	Sea	1	2	1	3
IRE1a	09/06/15	07:45	14:40		Land	1	2	1	3
IRE1b	17/06/15	10:40	12:10	+	Sea	1	2	1	3
MAN1	17/06/15	12:10	12:56		Sea	1	2	1	3
BRO1	07/06/15	12:00	14:50		Land	1	2	1	3
KEI1	08/06/15	07:00	07:45		Land	1	2	1	3
NYB1	08/06/15	07:45	08:25		Land	1	2	1	3
NYB2	08/06/15	08:25	10:51		Land	1	2	1	3
FRE1	08/06/15	10:51	11:30		Land	1	2	1	3

Notes:

Site Code: Refers to count sections as listed in Annex 1.

Visit rel; Counts marked + are additional counts in the section and should be added on to the counts from the previous visit

Method: Counted from land or sea

Weather codes:

Visibility: 1 good, 2 fair, 3 poor. **Sea State:** 1 flat calm, 2 small waves, 3 large waves, 4 white wave crests, 5 waves breaking high onto rocks. **Rain:** 1 none, 2 discontinuous light, 3 discontinuous heavy, 4 continuous light, 5 continuous heavy. **Wind (beaufort Scale):** 0, 1, 2, 3, 4, >4

For details of habitat codes on each section see Appendix 1 Callaghan, *et al.* 1999.

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Policy and Advice Directorate, Great Glen House,
Leachkin Road, Inverness IV3 8NW
T: 01463 725000

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