Scottish Natural Heritage Research Report No. 1064

Cape Wrath SPA – Site Condition Monitoring of cliff nesting seabirds 2017







RESEARCH REPORT

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SCM Reports

This report was commissioned by SNH as part of the Site Condition Monitoring (SCM) programme to assess the condition of special features (habitats, species populations or earth science interests) on protected areas in Scotland (Sites of Special Scientific Interest, Special Areas of Conservation, Special Protection Areas and Ramsar sites). Site Condition Monitoring is SNH's rolling programme to monitor the condition of special features on protected areas, their management and wider environmental factors which contribute to their condition.

The views expressed in the report are those of the contractor concerned and have been used by SNH staff to inform the condition assessment for the individual special features. Where the report recommends a particular condition for an individual feature, this is taken into account in the assessment process, but may not be the final condition assessment of the feature. Wider factors, which would not necessarily be known to the contractor at the time of the monitoring, are taken into consideration by SNH staff in making final condition assessments.

RESEARCH REPORT

Cape Wrath SPA – Site Condition Monitoring of cliff nesting seabirds 2017

Research Report No. 1064 Project No: 013952 Contractor: Atlantic Ecology and Murray Survey Year of publication: 2018

Keywords

Cape Wrath SPA; Clo Mor; seabird colony count; fulmar; kittiwake; guillemot; razorbill; puffin

Background

The seabirds breeding at Cape Wrath Special Protection Area (SPA) were last counted in 2000. Since then there have been major changes in many seabird populations throughout Scotland. Scottish Natural Heritage (SNH) commissioned this survey in 2017 to provide up-to-date population estimates of cliff nesting seabirds at Cape Wrath SPA.

The primary aim of the 2017 survey was to undertake counts of the four cliff-nesting, SPA qualifying species breeding within Cape Wrath SPA: northern fulmar, black-legged kittiwake, common guillemot and razorbill. Secondary aims were to count seabirds breeding in the seabird monitoring programme (SMP) count sections not included in Cape Wrath SPA, but are nevertheless part of the Cape Wrath site; to obtain counts of other seabird species breeding at Cape Wrath; to take photographs of colonies and define a number of representative count sub-sections that can be counted from the land; to undertake a comparison with Seabird 2000 counts on a section-by-section basis; and to recommend methods for future monitoring of Atlantic puffin breeding at Cape Wrath SPA.

Main findings

- Northern fulmar had 1,481 Apparently Occupied Sites (AOS) within Cape Wrath SPA, a reduction of 40% since 2000 (based on like-for-like comparison of sectors counted in both years).
- Black-legged kittiwake had 3,622 Apparently Occupied Nests (AON) within Cape Wrath SPA, a reduction by 65% since 2000 (based on like-for-like comparison).
- Common guillemot numbered 38,109 birds within Cape Wrath SPA, a reduction by 7% since 2000 (based on like-for-like comparison).
- Razorbill numbered 3,246 birds within Cape Wrath SPA, an increase by 8% since 2000 (based on like-for-like comparison).
- There were small populations within Cape Wrath SPA of herring gull, great black-backed gull and European shag in both 2000 and 2017.
- Small populations of Arctic skua, great skua and red-throated diver were recorded in 2017, mostly outside the landward extent of the SPA.

 Atlantic puffin continues to breed in reasonable numbers in the SPA, although largely in areas that are inaccessible. Differences in timing between counts in 2000 and 2017 mean that we cannot give a valid indication of population change for puffin over this period.

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1.	INTROE 1.1	DUCTION Survey aims	1 1
2.	METHO 2.1 2.2 2.3 2.4 2.5 2.6	DS Defining count sections and sub-sections Approach to seabird counts Survey timing and organisation Species count units Counting Vantage point plots	3 3 4 5 5 5
3.	RESUL 3.1 3.2 3.3 3.4	FS 2017 counts Count accuracy Records of other species Vantage point plots	7 10 10 11
4.	COMPA 4.1 4.1.1 4.1.2 4.1.3 4.1.4 4.1.5 4.1.6	RISONS WITH PREVIOUS COUNTS SPA qualifying species Fulmar Kittiwake Guillemot Razorbill Puffin Other species	13 14 14 15 16 17 17
F		SION	18
э.	5.1 5.2 5.3	Quality assurance Changes in methodology Merits of land <i>vs</i> sea counts	18 18 19
э. 6.	5.1 5.2 5.3 RECON 6.1	Quality assurance Changes in methodology Merits of land <i>vs</i> sea counts MENDATIONS Vantage points <i>vs</i> sea counts	18 18 19 20 20
5. 6. 7.	5.1 5.2 5.3 RECOM 6.1 REFER	Quality assurance Changes in methodology Merits of land <i>vs</i> sea counts MENDATIONS Vantage points <i>vs</i> sea counts ENCES	18 18 19 20 20 21
5. 6. 7. ANNI SPA	5.1 5.2 5.3 RECOM 6.1 REFER EX 1: PI A1.1 A1.2 A1.3 A1.4 A1.5 A1.6	Quality assurance Changes in methodology Merits of land <i>vs</i> sea counts MENDATIONS Vantage points <i>vs</i> sea counts ENCES ROPOSED STRATEGY FOR COUNTING PUFFINS AT CAPE WRATH Introduction Approaches to counting breeding puffins History of puffin counts at Cape Wrath and Clo Mor Limitations of 2017 puffin counts 2017 assessment of puffin areas and their accessibility Proposal for 2018 Clo Mor puffin survey	18 18 19 20 21 22 22 22 23 23 24
6. 7. ANNI SPA	5.1 5.2 5.3 RECOM 6.1 REFER A1.1 A1.2 A1.3 A1.4 A1.5 A1.6 EX 2: CA	Quality assurance Changes in methodology Merits of land <i>vs</i> sea counts IMENDATIONS Vantage points <i>vs</i> sea counts ENCES ROPOSED STRATEGY FOR COUNTING PUFFINS AT CAPE WRATH Introduction Approaches to counting breeding puffins History of puffin counts at Cape Wrath and Clo Mor Limitations of 2017 puffin counts 2017 assessment of puffin areas and their accessibility Proposal for 2018 Clo Mor puffin survey CPE WRATH SPA COUNT SECTION AND SUB-SECTIONS MAPS	18 18 19 20 21 22 23 23 24 25
6. 7. ANNI SPA ANNI ANNI	5.1 5.2 5.3 RECOM 6.1 REFER EX 1: PI A1.1 A1.2 A1.3 A1.4 A1.5 A1.6 EX 2: CA EX 3: CA	Quality assurance Changes in methodology Merits of land <i>vs</i> sea counts IMENDATIONS Vantage points <i>vs</i> sea counts ENCES ROPOSED STRATEGY FOR COUNTING PUFFINS AT CAPE WRATH Introduction Approaches to counting breeding puffins History of puffin counts at Cape Wrath and Clo Mor Limitations of 2017 puffin counts 2017 assessment of puffin areas and their accessibility Proposal for 2018 Clo Mor puffin survey SPE WRATH SPA COUNT SECTION AND SUB-SECTIONS MAPS APE WRATH SPA SECTION LOCATION PHOTOS	18 18 19 20 21 22 23 23 24 25
6. 7. ANNI SPA ANNI ANNI	5.1 5.2 5.3 RECOM 6.1 REFER EX 1: PI A1.1 A1.2 A1.3 A1.4 A1.5 A1.6 EX 2: CA EX 3: CA	Quality assurance Changes in methodology Merits of land vs sea counts IMENDATIONS Vantage points vs sea counts ENCES ROPOSED STRATEGY FOR COUNTING PUFFINS AT CAPE WRATH Introduction Approaches to counting breeding puffins History of puffin counts at Cape Wrath and Clo Mor Limitations of 2017 puffin counts 2017 assessment of puffin areas and their accessibility Proposal for 2018 Clo Mor puffin survey INPE WRATH SPA COUNT SECTION AND SUB-SECTIONS MAPS APE WRATH SPA SECTION LOCATION PHOTOS APE WRATH SPA VP PLOT DESCRIPTIONS AND MAPS	18 18 19 20 21 22 23 23 24 25 25
o. 6. 7. ANNI SPA ANNI ANNI ANNI	5.1 5.2 5.3 RECOM 6.1 REFER EX 1: PI A1.1 A1.2 A1.3 A1.4 A1.5 A1.6 EX 2: CA EX 3: CA EX 4: CA	Quality assurance Changes in methodology Merits of land vs sea counts IMENDATIONS Vantage points vs sea counts ENCES ROPOSED STRATEGY FOR COUNTING PUFFINS AT CAPE WRATH Introduction Approaches to counting breeding puffins History of puffin counts at Cape Wrath and Clo Mor Limitations of 2017 puffin counts 2017 assessment of puffin areas and their accessibility Proposal for 2018 Clo Mor puffin survey APE WRATH SPA COUNT SECTION AND SUB-SECTIONS MAPS APE WRATH SPA SECTION LOCATION PHOTOS APE WRATH SPA VP PLOT DESCRIPTIONS AND MAPS APE WRATH SPA VP PLOT LOCATION PHOTOS	18 18 19 20 21 22 23 24 25 25 25 25 25 25 25 25 25

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1. INTRODUCTION

Scottish Natural Heritage (SNH) commissioned this survey to provide up-to-date population estimates for all breeding seabirds within Cape Wrath Special Protection Area (SPA) and on certain adjacent non-designated stretches of coast and small islands.

Atlantic Ecology and Murray Survey were jointly commissioned by SNH to undertake counts of cliff-nesting seabird species at Cape Wrath SPA, as part of SNH's Site Condition Monitoring programme (SCM). Cape Wrath SPA comprises approximately 22 km of coastline in the extreme northwest of mainland Scotland, comprising the Cape Wrath headland and Clo Mor cliffs and nearby coastline and stacks (Figure 1). Cape Wrath SPA was designated in 1996 for its breeding seabird colonies, with the following species cited as qualifying interests: northern fulmar *Fulmarus glacialis*, black-legged kittiwake *Rissa tridactyla*, common guillemot *Uria aalge*, razorbill *Alca torda* and Atlantic puffin *Fratercula arctica* (hereinafter these species are referred to by their short vernacular names). A further cited qualifying feature is the breeding 'seabird assemblage' as a whole (http://jncc.defra.gov.uk/pdf/SPA/UK9001231.pdf).

Seabirds breeding at Cape Wrath SPA were last counted in 2000 as part of the Seabird 2000 census (Mitchell *et al.*, 2004). Given that there have been widespread declines in many of Scotland's seabird species since then, (JNCC, 2016) there was a need to establish current population estimates of the five SPA qualifying species. The results of the 2017 survey will be included within the fourth national seabird census (the 'Seabirds Count'). They will also contribute towards SNH's Site Condition Monitoring programme.

1.1 Survey aims

The aims of the survey were as follows:

Primary aim:

- Undertake counts of the four cliff-nesting SPA qualifying species breeding within Cape Wrath SPA, namely fulmar, kittiwake, guillemot and razorbill.

Secondary aims:

- Obtain counts of fulmar, kittiwake, guillemot and razorbill breeding in the Seabird Monitoring Programme count sections not included in Cape Wrath SPA, but are nevertheless, part of the Cape Wrath site (i.e., the islands of Na Glas Leacan (CM03) and An Garbh-Eilean (CM06), and the Cape Wrath north coast sections labelled CW01 and CW02).
- Obtain counts of other breeding seabird species, including herring gull *Larus argentatus*, great black-backed gull *Larus marinus*, shag *Phalacrocorax aristotelis*, puffin, Arctic skua *Stercorarius parsiticus* and great skua *Catharacta skua*.
- Take photographs to provide a photographic record of section and sub-section boundaries.
- Undertake a comparison with Seabird 2000 counts on a section-by-section basis.
- To recommend a strategy and possible methods for the monitoring of puffin breeding at Cape Wrath SPA.
- Define a number of representative count plots that can be counted from the land vantage points and therefore lend themselves to regular monitoring.



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Figure 1. Cape Wrath SPA count sections

2. METHODS

2.1 Defining count sections and sub-sections

The survey area (Figure 1) comprised a 22 km coastline of complex topography, particularly in the high cliff sections of Clo Mor. A fundamental aspect of undertaking the counts and achieving valid comparisons with other results (both past and future) is the division of the survey area into defined count sections and sub-sections. The 16 Cape Wrath count sections were first defined for the Seabird 2000 census and subsequently incorporated into the JNCC Seabird Monitoring Programme (SMP) database. The boundaries were adhered to as far as possible in 2017. However, as the only information available was approximate grid references (there were no previous marked photographs to refer to), there was some uncertainty about the exact location of the section boundaries used previously.

Prior to commencing counting in 2017, laminated A4 field maps were produced based on 1:25,000 Ordnance Survey series and marked-up with count section boundaries. There are five Cape Wrath count sections and the labels for these prefixed 'CW'. These sections are referred to as 'CW01' to 'CW05'. There are eleven Clo Mor count sections, i.e., east from Kearvaig Bay, and the labels for these are all prefixed 'CM'. These sections are referred to as 'CM01' to 'CM11'. The geographical extent of each section is shown in Figure 1.

To facilitate counting and increase the spatial resolution of the recorded data, the majority of the count sections were further divided into a series of sub-sections (no sub-section divisions appear to have been used in previous counts). The count sub-sections were defined in the field and considered appropriate to local circumstances, with sub-division boundaries being chosen to correspond to prominent geographic features that were apparent on the 1:25,000 OS map. Sub-section boundaries were marked on the field maps in permanent ink and labelled alphabetically: a, b, c etc. A total of 65 count sub-sections were defined. The sub-sections within each count section are demarcated on the maps provided in Annex 2.

During the course of the 2017 survey work digital photographs were taken of the count sections and these have subsequently been marked-up to show the boundaries of count section and sub-sections. The west coast photographs (i.e., count section CW05) were taken from the land and the north coast photographs (i.e., count sections CM01 to CM11 and CW01 to CW04) were taken at sea from a boat. Each image has section boundaries shown as a solid line and sub-section boundaries as a dotted line. These count section and sub-section definition images are provided in Annex 3.

2.2 Approach to seabird counts

Three survey approaches were used, according to what was considered most suitable for a particular count sub-section or part thereof. These were direct counts from the land, direct boat-based counts and counts from digital photographs taken either from the land or a boat. The aim was to obtain total coverage of every count sub-section even if this meant that count information for some sub-sections was derived from more than one approach.

The majority of the Clo Mor count sections (CM01 to CM11, totalling 11 km of coast), cannot be surveyed from the land and so need to be surveyed from a boat. However, some of the Clo Mor count sub-sections or parts thereof, (in particular Stack Clò Kearvaig and Stac à Chlò) are readily viewed and photographed from the nearby cliff tops. The count totals for the Clo Mor sections were almost entirely based on direct counts from the sea. The exceptions to this were as follows:

- A high, narrow gully partially obscured from sea views within count sub-section CM11-A. To avoid double counting, context photographs of this area were taken from the sea and, with the aid of these; the area was later identified and counted from the land (the cliff tops of CM11-B 200m away) from where it could be seen clearly.

- The landward facing ledges and summits of Stack Clò Kearvaig (part of sub-section CM10-H). These were photographed from a land vantage point and counted later from images displayed on a computer screen.
- The landward facing ledges and summits of Stac à Chlò (part of sub-section CM10-D). These were photographed from a land vantage point and counted later from images displayed on a computer screen.
- The whole of sub-section CM10-B, a large area of boulder scree at the base of the Co Mor cliffs that has high densities of nesting seabirds (especially guillemots). This was photographed from the sea and counted later from images displayed on a computer screen.

The Cape Wrath west coast count sub-sections (CW05-A to CW05-N) can all be surveyed from the land. This is also the case for the Cape Wrath north coast between Kearvaig Bay and the lighthouse sections (i.e., sections CW01 to CW04), with the exception of some small, north-facing areas in count section CW04. Thus, the count totals for the Cape Wrath sections were almost entirely based on counts from the land. The exceptions that could not be clearly viewed from the land (cliff tops) were as follows:

- The north facing parts (i.e., those near and below the lighthouse) of sub-sections CW04-A, CW04-B and CW04-C. These were counted from the sea.

2.3 Survey timing and organisation

The survey was undertaken by Digger Jackson (Atlantic Ecology) and Stuart Murray (Murray Survey) in the period 31 May to 4 June 2017. The work undertaken on each day is summarised below:

30 May: Made arrangements with local contact for survey vessel and transport to Cape Wrath.

31 May. Travel to Cape Wrath lighthouse by public ferry and mini-bus. Undertook landbased counts from cliff tops and headlands of all 14 west coast sub-sections (labelled CW05 A to N) of the SPA. All these sub-sections were clearly viewable from various vantage points, and count quality was aided by excellent weather and lighting conditions. Only low numbers of birds were present in the west coast sub-sections and thus counting was relatively easy and quickly completed.

1 June. Undertook counts from cliff tops and headlands of the north coast of Cape Wrath as far east as Kearvaig Bay (count sections CW01 to CW04). With the exception of the north facing aspects of section CW04, the section closest to the lighthouse, (these were counted from a boat on the 3rd June), all sections were clearly visible from various vantage points, and count quality was aided by excellent weather and lighting conditions. Only low numbers of birds were present in the north Cape Wrath sections and thus counting was relatively easy and quickly completed.

2 June. All day spent counting Clo Mor sections from the creel boat *Issia-J*. Sea state 2 and bright sunshine prevailed for the first seven hours, providing excellent conditions for counting. Despite the good platform and favourable sea conditions, the combination of very large numbers of birds present and the height of cliffs (up to almost 300 m in places) made for challenging counting. Around mid-afternoon the sea state increased to 3-4, making counting increasingly difficult, so the survey was ended for the day.

3 June. Continued boat survey, joining the *Issia-J* in Balnakeil Bay at 05:30 BST, taking c1 hour to cruise to previous days' end point, beginning counts at c07:00 BST. Excellent

weather and sea conditions (sea state 1-2) and good light aided counting. Finished off counting the Clo Mor sections and then continued on to count Cape Wrath north coast sections, paying particular attention to the north facing aspects that were not possible to see well from the land. Returned to Balnakeil Bay in late morning. In the afternoon, took public ferry and mini-bus to Cape Wrath and were dropped at Kearvaig road end. Walked to Kearvaig bothy, which was used as an overnight base. In the late afternoon took advantage of good weather and walked western parts of Clo Mor cliff tops, undertaking further counts and taking photographs of selected sections.

4 June. Most of the day spent undertaking land-based counts of visible sections of cliffs before commencing return travel. Arrival at Kyle of Durness coincided with commencement of heavy rain, marking the end of the five-day spell of fair weather.

2.4 Species count units

The count units for each species follow Walsh *et al* (1995) and were as follows:

- Individual birds on suitable nesting habitat: common guillemot, razorbill, puffin, black guillemot *Cepphus grylle* (birds seen on the sea also counted for this species).
- Apparently occupied nest (AON): shag, kittiwake, herring gull, great black-backed gull.
- Apparently occupied site (AOS): fulmar
- Apparently occupied territory (AOT): great skua, Arctic skua.

The conventional seabird species codes were used for recording count data as follows: FU, fulmar; SA, shag; HG, herring gull; GB, great black-backed gull; KI, kittiwake; GU, guillemot; RA, razorbill; PU, puffin; AC, Arctic skua; NX, great skua; and TY, black guillemot. These species codes are also used in some of the table headings (Tables 1, 6, 7 and 8).

2.5 Counting

With the exception of guillemot, all counts of AOSs, AONs and colony attending birds was based on counting individuals. In the case of guillemot, counting birds one at a time was only feasible where densities were low and number modest (i.e., up to a few hundred in a subsection). Therefore, in high density areas guillemots were counted in units of ten birds with the aid of a tally counter, i.e., the observer added one tally counter click for every ten individuals observed.

When numbers in a count sub-section were modest a running tally was kept and then recorded when the section was complete. However, if numbers in a sub-section were relatively large (100s), or the sub-section covered a large area of cliff or length of coast, then that sub-section was usually further subdivided into smaller parts and each counted separately. In sub-sections of cliff with high bird densities a rough field sketch was usually made to help surveyors subdivide the area and count more effectively.

2.6 Vantage point plots

Establishing a series of colony plots that can be counted from land to provide a subsample for monitoring the populations of key species was not an original aim of the 2017 survey work. During the course of visiting the Clo Mor cliff tops (after the boat survey) to look for puffin colonies and fill-in a few minor areas that could not be well seen from the boat, it became apparent that there was good potential to count some parts of the Clo Mor cliffs from the land. Therefore advantage was taken of the opportunity to find potential plots that could be used for future monitoring.

The main criteria for vantage plot (VP) selection, was that the VP should be safely accessible, the viewing distance to the plot should not exceed 300 m horizontally and the

plot should contain reasonable numbers of one or more of the SPA qualifying species. There was limited choice in combining safe vantage points with visible birds on this site. All VPs were on the top edge of vertiginous cliffs ranging from approximately 100 m to 180 m above sea level.

In total, 13 VP plots were selected, described and photographed (counts were undertaken at eight of these in 2017) (Annex 4, Table A4.1 and Figures A4.1 and A4.2). The selected plots were spaced approximately evenly from count section CM11-B to CM08-D and thus provide a reasonable spread geographically of the main seabird nesting areas used at Clo Mor. Overview images were taken of each site, with 15 selected to show the context of the plots in relation to adjacent cliffs (Annex 5 - 15 images, note that Plot 7 and Plot 10 both have two images, labelled a and b) followed by a series of overlapping close-ups using telephoto (55mm to 400mm). The selected telephoto images were also marked up in Photoshop with labelled sub-divisions, using as many as appropriate to facilitate counting e.g., some plots had over 50 sub-divisions. The downloaded images were then manually counted on computer screens using Photoshop software. This enabled images to be viewed at different magnifications and colour contrasts. Each bird/nest/AOS (depending on species) was marked with a coloured dot and the totals for each subdivision entered into Excel.

It is likely that additional plots with good visibility from the cliff tops also occur further east (in particular in the eastern half of count section CM08 and in section CM07); unfortunately the onset of dusk prevented us selecting further VPs and we were unable to return the next day.

3. RESULTS

3.1 2017 counts

The five SPA qualifying species were all counted in large to very large numbers. All these species were very unevenly distributed between the count sections (Table 1). Details of the sub-section counts for fulmar, kittiwake, guillemot and razorbill are presented in Tables 2 to 4 respectively. Only small numbers of non-SPA qualifying species were recorded in the count sections, namely shag, great black-backed gull, herring gull and black guillemot (Table 1).

Table 1. Summary	of counts	made o	f the	count	sections	at (Cape	Wrath	SPA	and	between
31 May and 4 June	e 2017										

Count section	SPA?	FU AOS	HG AON	GB AON	SA AON	KI AON	GU birds	RA birds	PU birds	TY birds
CM01	Yes	5	0	0	3	0	0	4	0	5
CM02	Yes	14	0	0	0	0	0	1	0	0
CM03	No	9	3	4	0	0	0	0	0	0
CM04	Yes	60	0	0	2	0	168	50	0	0
CM05	Yes	25	1	0	14	39	352	24	0	0
CM06	No	0	0	0	0	0	0	0	0	0
CM07	Yes	33	0	0	4	350	1,479	254	0	0
CM08	Yes	274	0	0	1	906	6,010	809	250	0
CM09	Yes	345	0	0	9	1,633	16,466	1,347	975	0
CM10	Yes	69	0	0	4	329	8,443	431	232	0
CM11	Yes	61	0	0	1	170	4,878	277	66	0
CW01	No	1	1	0	0	0	0	0	0	9
CW02	No	7	0	1	1	0	0	0	0	0
CW03	Yes	120	3	2	20	0	0	9	0	4
CW04	Yes	134	2	6	8	195	310	33	2	0
CW05	Yes	341	0	0	16	0	3	2	0	0
All sec	tions	1,498	10	13	83	3,622	38,109	3,246	1,525	18
SPA sec	ctions	1,481	6	8	82	3,622	38,109	3,246	1,525	9

Count	6042	Count subsection														
section	SPA	Α	В	С	D	Е	F	G	Н	Ι	J	Κ	L	М	Ν	Total
CM01	Yes	3	2	0												5
CM02	Yes	14														14
CM03	No	9														9
CM04	Yes	6	16	38												60
CM05	Yes	1	4	3	17											25
CM06	No	0														0
CM07	Yes	0	10	23												33
CM08	Yes	84	45	42	31	72										274
CM09	Yes	125	6	45	109	3	48	9	0							345
CM10	Yes	1	21	5	0	17	4	14	7							69
CM11	Yes	3	23	35												61
CW01	No	1														1
CW02	No	7	0													7
CW03	Yes	37	9	31	27	16										120
CW04	Yes	7	39	88												134
CW05	Yes	21	8	0	96	23	0	7	0	1	0	0	1	2	182	341

Table 2. 2017 counts of fulmar AOSs in each count section and sub-section. Grey shading indicates count sub-sections that were not needed.

Table 3. 2017 counts of kittiwake AONs in each count section and sub-section. Grey shading indicates count sub-sections that were not needed.

Count	6042	Count subsection														
section	SPA	Α	В	С	D	Е	F	G	н	Ι	J	Κ	L	Μ	Ν	Total
CM01	Yes	0	0	0												0
CM02	Yes	0														0
CM03	No	0														0
CM04	Yes	0	0	0	0											0
CM05	Yes	0	6	33	0											39
CM06	No	0														0
CM07	Yes	0	210	140	0											350
CM08	Yes	37	333	251	70	215										906
CM09	Yes	481	0	422	291	60	31	307	41							1633
CM10	Yes	61	31	38	38	47	64	37	13							329
CM11	Yes	75	72	23												170
CW01	No	0														0
CW02	No	0	0													0
CW03	Yes	0	0	0	0	0										0
CW04	Yes	94	36	65												195
CW05	Yes	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Count	6042	Count subsection														
section	JFA:	Α	В	С	D	Е	F	G	Н	Ι	J	Κ	L	Μ	Ν	Total
CM01	Yes	0	0	0												0
CM02	Yes	0														0
CM03	No	0														0
CM04	Yes	0	51	117												168
CM05	Yes	4	192	76	80											352
CM06	No	0														0
CM07	Yes	0	1,109	370												1,479
CM08	Yes	440	2,025	755	1,030	1,760										6,010
CM09	Yes	1,120	1,805	1,245	2,700	1,030	3,930	3,570	1,066							16,466
CM10	Yes	510	1,480	340	1,732	620	580	1,700	1,481							8,443
CM11	Yes	2,050	2,370	458												4,878
CW01	No	0														0
CW02	No	0	0													0
CW03	Yes	0	0	0	0	0										0
CW04	Yes	210	40	60												310
CW05	Yes	0	0	0	3	0	0	0	0	0	0	0	0	0	0	3

Table 4. 2017 counts of guillemot (adults at colony) in each count section and sub-section. Grey shading indicates count sub-sections that were not needed.

Table 5. 2017 counts of razorbill (adults at colony) in each count section and sub-section. Grey shading indicates count sub-sections that were not needed.

Count	6042	Count subsection														
section	JFA!	Α	В	С	D	Е	F	G	Н	Ι	J	Κ	L	Μ	Ν	Total
CM01	Yes	2	2	0												4
CM02	Yes	1														1
CM03	No	0														0
CM04	Yes	22	5	23												50
CM05	Yes	4	10	6	4											24
CM06	No	0														0
CM07	Yes	12	121	121												254
CM08	Yes	248	174	142	172	73										809
CM09	Yes	183	155	115	334	83	272	136	69							1347
CM10	Yes	38	58	38	54	76	47	52	68							431
CM11	Yes	69	126	82												277
CW01	No	0														0
CW02	No	0	0													0
CW03	Yes	1	0	3	4	1										9
CW04	Yes	19	4	10												33
CW05	Yes	0	0	0	2	0	0	0	0	0	0	0	0	0	5	7

3.2 Count accuracy

The counts are in all cases of unknown accuracy. The occupied nests of kittiwake, herring gull, great-black-backed gull and shag nests, and occupied fulmar sites are all typically 'easy' to see and the numbers of all these species at Cape Wrath are either low or moderate. So the counts for these species are likely to have high accuracy. It is likely that some shags are nesting in caves and these nests would have been overlooked. A flock of 52 shags seen on 1 June feeding close inshore off count section CW01 was curious as it did not correspond to the numbers breeding in this area (only two nests were seen in count sections CW01 and CW02 combined). The possibility of a moderate-sized cave-based colony in this stretch cannot be ruled out although these may also have included non-breeding birds or birds associated with nests that were counted.

Guillemots are particularly difficult to count accurately (especially from a boat) due to their habit of cramming closely together, with the birds at the front of ledges often obscuring those behind. Furthermore, where ledges are wide or form deep undercuts in the rock face an unknown proportion of guillemots will have been out of view and thus gone unrecorded. It is also known that some guillemots nest in caves in section CM09 (AJ Crease personal communication) and these too would have not have been counted. For these reasons it is considered likely that there may have been modest undercounting of guillemots in 2017.

Razorbills, although much less numerous and not typically so closely packed as guillemot are also difficult to count accurately as they have a tendency to nest in fissures and under boulders where they may be out of view. Razorbills also commonly nest higher up than guillemots, as high as the cliff tops. Thus viewing distances to razorbills on the upper cliff sections typically exceeded 200 m (but not more than 400m), and obviously at these distances they are potentially harder to detect and identify. In poor light, razorbills can be difficult to distinguish from guillemot and it is likely that a few were misidentified. For these reasons it is considered likely that there may have been modest undercounting of razorbills in 2017.

Breeding puffins are particularly challenging to count accurately (see Annex 1: Proposed strategy for counting puffins at Cape Wrath SPA). The 2017 counts were undertaken at a time of year (early June) when puffin numbers are unlikely to give a reliable indication of the numbers breeding. Further counts of this species at a more appropriate time of year would be needed to obtain a more reliable estimate of their numbers.

A total of 18 black guillemots were counted: 13 in the Cape Wrath sections and five in the Clo Mor sections. The majority of these birds were seen on the sea below suitable nesting areas. It is likely that some black guillemots were overlooked in the high-density Clo Mor sections (CM07 to CM11). The recommended count method for this species is early morning counts in April, therefore counts made in June probably give only a rough indication of the numbers present. Nevertheless, it is clear that the Cape Wrath coastline is of relatively low importance for this species.

3.3 Records of other species

Five breeding territories (nesting was confirmed at three of these) of Arctic skua were found on the moorland near to the Cape Wrath track (Annex 6, Figure A6.1). None of these territories were inside the boundary of the SPA. Of the adult birds seen, seven had dark morph plumage and one had pale morph plumage.

Two territories of great skua were found on moorland areas. One of these was inside the landward extent of the SPA, approximately 2 km south of Cape Wrath lighthouse. The other

was outside the SPA on moorland approximately 300 m east of Kearvaig Bay (Annex 6, Figure 6.1). Breeding was not confirmed at either territory.

One pair of red-throated diver was noted nesting on a blanket bog pool system approximately 3.5 km south-east of Cape Wrath lighthouse, outside the SPA boundary (Annex 6, Figure A6.1).

A pair of adult sea eagles was flushed from low sea cliffs in count section CM05, during the boat survey on the 2 June. There was no evidence that these birds were breeding and no signs of nests (old or active) were seen on the cliffs.

Peregrine are reputed to have a breeding territory on the north coast of Cape Wrath (John Ure personal communication) but this species was not seen on the cliff-top surveys of this stretch of coastline made on the 1 June.

Small numbers of breeding golden plover (3 AOT), ringed plover (4 AOT), dunlin (1 AOT), oystercatcher (8 AOT) and common sandpiper (2 AOT) were encountered during survey work. All these wader territories were inside the SPA boundary apart from two territories of ringed plover and two of common sandpiper.

Small numbers of raven were seen frequenting the cliffs. A recently active raven nest was seen near Cape Wrath lighthouse (section CW04) and another close to Kearvaig Bay (section CM11). Raven, gulls or peregrine may have been responsible for some of predated seabird eggs and predated remains of adult auks and kittiwake (mainly discarded skulls and wings) found on the Clo Mor cliffs tops.

Foxes were clearly common in the vicinity of the Cape Wrath/Clo Mor coast judging by the number of fox scats seen along the cliff tops. Many of these scats contained feathers and it is likely that foxes are an important potential predator of seabirds where they can gain access to colonies. A fox was seen running across steep grassy slopes at mid-level cliffs in count section CW03. This sighting reinforces how vulnerable some potentially suitable puffin breeding habitat is to fox predation. A badger set was noted near the old lighthouse jetty in count section CW03, but there was no evidence that this species was targeting seabirds. A stoat was seen on moorland approximately 1 km south of Cape Wrath lighthouse.

3.4 Vantage point plots

The number of the five SPA qualifying species counted in the VP plots is summarised in Table 6, together with the percentage total of Clo Mor birds estimated to occur in the plots.

A total of 9,564 guillemots were counted in the eight plots, together 25% of the SPA total. The number of razorbill counted in the plots was 540 birds and these represent 17% of the SPA total. A total of 628 puffins were counted in 11 plots, representing 41% of all the puffins seen in the SPA. Although the counts of puffin are likely to underestimate breeding numbers, it is clear that a substantial proportion of the Clo Mor puffins nest in areas that can be readily counted from the cliff tops (see Annex 1: Proposed Strategy for Counting Puffins at Cape Wrath SPA).

Thus, for the three SPA qualifying, breeding auk species, shore-based counts of the VP plots provide good opportunities to monitor a reasonable proportion of the SPA population.

Plot	Count section/ sub- section	Count method	FU AOS	KI AON	GU birds	RA birds	PU birds
1	CM08D	Photo count	0	0	0	13	168
2	CM08E (upper)	Photo count	46	0	0	0	11
3	CM08E (lower)	Photo count	4	93	705	28	5
4	CM09D	Photo count	14	117	720	81	16
5	CM09F	Photo count	8	33	2,188	195	183
6	CM09G	Photo count	2	60	2,066	136	9
7	CM10A	Direct count, PU only ¹	n/a	n/a	n/a	n/a	44
8	CM10B	Direct count, PU only ¹	n/a	n/a	n/a	n/a	73
9	CM10D	Photo count	0	38	1,612	32	0
10	CM10F	Direct count, PU only ¹	n/a	n/a	n/a	n/a	75
11	CM10H	Photo count	7	13	1,111	42	0
12	CM11A	Photo count, PU direct count	1	0	341	13	44
13	CM11B	GU photo count, F. direct count	10	0	821	0	0
	VP plot	ts total	92	354	9,564	540	628
	Clo Mc	or total	895	3,427	37,796	3,197	1,523
	% in VI	P plots	10.3%	10.3%	25.3%	16.9%	41.2%

Table 6. Count totals of delineated monitoring plots viewed from land vantage points on 3 June 2017.

¹ The habitat in these plots was suitable for puffin but not the other qualifying species of Cape Wrath SPA

The numbers of fulmar in the VP plots (92 AOSs spread across 8 plots) represent 10% of the Clo Mor total. In addition 85% of fulmars (amounting to 512 AOSs) nesting in the Cape Wrath count sections can also be readily counted from the land. Thus, between the Cape Wrath sections and the VP plots, some 603 fulmar AOSs are countable from land (40% of the SPA total).

The numbers of kittiwakes in the VP plots (354 AONs spread across 6 plots) represent 10.3% of the estimated Clo Mor total. Although this is probably an adequate sample size for monitoring purposes, ideally a larger monitoring plot baseline would have been obtained. It is recommended that in future years at least one additional VP plot is found for kittiwake with the aim of increasing the proportion of monitoring plot birds to at least 15% of the SPA total.

4. COMPARISONS WITH PREVIOUS COUNTS

Comparisons between the counts for the SPA undertaken in 2017 with counts made in 2000 are presented in Tables 7 and 8. These comparisons are restricted to counts made within the SPA boundary and are on a like-for-like basis, i.e. they include only count sub-sections that were counted in both years (some west coast sub-sections were not covered in 2000).

Count sections ¹	Year	FU AOS	KI AON	GU birds	RA birds	PU ² birds
Clo Mor within SPA	2000	1,286	9,886	40,605	2,858	1,507
	2017	886	3,427	37,796	3,197	1,523
CM05, CM07 to CM11)	change	-31%	-65%	-7%	12%	(1%)
Cape Wrath north coast	2000	452	430	180	114	95
within SPA	2017	254	195	310	42	2
(CW03 and CW04)	change	-44%	-55%	72%	-63%	(-98%)
Cape Wrath west coast	2000	369	28	50	20	0
within SPA	2017	119	0	3	2	0
(CW05 D to F)	change	-68%	-100%	-94%	-90%	(0%)
All sections within SPA	2000	2,107	10,344	40,835	2,992	1,602
	2017	1,259	3,622	38,109	3,241	1,525
	change	-40%	-65%	-7%	8%	(-5%)

Table 7. Comparisons of counts of SPA qualifying species made within Cape Wrath SPA for sectors that were counted in both 2017 and 2000, and percentage change since 2000.

¹ To allow like-for-like comparison between years, only data from sections counted in both 2000 and 2017 are shown in this table (sections CW05 A to C and G to N were not counted in 2000 so the 222 fulmar AOS and 5 razorbill counted in these sections in 2017 are not included in this table).

² The comparison for puffin is not considered valid (and thus the % change is in parentheses) as the 2017 counts were undertaken at a time of year (early June) when puffin numbers are unlikely to give a reliable indication of the numbers breeding.

Table 8. Compa	risons of counts	s for non-SPA-q	qualifying species	made at Cape	Wrath SPA in
2017 and 2000	(2001 for black	guillemot), and	percentage chan	ge.	

Count sections ¹	Year	HG	GB	SA	TY ²
All north coast sections	2000	7	1	35	28
within SPA	2017	4	2	63	18
	Change	-43%	100%	80%	(-35%)

¹ To allow like-for-like comparison between years, only data from sections counted in both 2000 and 2017 are shown in this table. Apart from a short stretch of coast (sub-sections CW05-D to F), the west coast of Cape Wrath SPA was not counted in 2000. This means that 2 herring gull AON, 6 great black-backed gull AON and 19 shag AON counted in the west coast section in 2017 are not included in this table.

² Note, the comparison for black guillemot is not considered valid (and thus the % change is in parentheses) as the 2017 counts were undertaken at a time of year (early June) when black guillemot numbers are unlikely to give a reliable indication of the numbers breeding. The Seabird 2000 count for black guillemot was undertaken by boat on 20 April 2001, the recommended time of year for counting this species.

4.1 SPA qualifying species

4.1.1 Fulmar

1,481 AOS of breeding fulmar were counted within Cape Wrath SPA in 2017. Based on a comparison of SPA count sections that were counted in both years, numbers breeding in the SPA have reduced by 40% since 2000 (Table 7). The spatial pattern of change between count sections is illustrated in Figure 2. The observed decline in fulmar trend is likely to closely reflect actual changes, as this species is relatively easy to count accurately. The observed change is broadly in line with the magnitude of declines observed elsewhere in Scotland (JNCC, 2016).

The Cape Wrath SPA citation states that there were 2,300 pairs of breeding fulmar when the SPA was designated. On the basis of the 2017 results it is likely that the SPA's breeding fulmar feature will be considered in **unfavourable** condition, as there appears to have been a decline of greater than 25% both since designation and since the count in 2000.



Figure 2. Histogram of numbers of fulmar AOSs in each count section in 2000 and 2017

4.1.2 Kittiwake

3,622 AON of breeding kittiwake were counted within Cape Wrath SPA in 2017. Based on a comparison of SPA count sections that were counted in both years, numbers breeding in the SPA have reduced by 65% since 2000 (Table 7). The spatial pattern of change between count sections is illustrated in Figure 3. The observed decline is likely to closely reflect actual changes, as this species is relatively easy to count accurately. The observed change is broadly in line with the magnitude of declines observed elsewhere in Scotland (JNCC, 2016).

The Cape Wrath SPA citation states that there were 9,700 pairs of breeding kittiwake when the SPA was designated. On the basis of the 2017 results it is likely that the SPA's breeding

kittiwake feature will be considered **unfavourable**, as there appears to have been a decline of greater than 25% both since designation and since the count in 2000.



Figure 3. Histogram of numbers of kittiwake AONs in each count section in 2000 and 2017

4.1.3 Guillemot

38,109 individual guillemots were counted within Cape Wrath SPA in 2017. Based on a comparison of SPA count sections that were counted in both years, numbers breeding in the SPA have reduced by 7% since 2000 (Table 7). The spatial pattern of change between count sections is illustrated in Figure 4. The observed decline is likely to be only a coarse indication of actual changes, as this species is difficult to count accurately at Cape Wrath, particularly in the sections requiring boat-based counts. Colonies in Scotland have shown varying trends since Seabird 2000, with large declines at some sites (e.g., 42% decline at Handa Island, Sutherland) and more modest declines or even increases at others (JNCC, 2016).

The Cape Wrath SPA citation states that there were 13,700 individual guillemot when the SPA was designated. On the basis of the 2017 results it is likely that the SPA's breeding guillemot feature will be considered **favourable**, as there appears to have been a large increase since designation and only a small decline since 2000 (although there is some doubt as to the accuracy of the 1986 counts used for designation purposes).



Figure 4. Histogram of numbers of guillemots in each count section in 2000 and 2017

4.1.4 Razorbill

3,239 individual razorbills were counted within Cape Wrath SPA in 2017. Based on a comparison of SPA count sections that were counted in both years, numbers breeding in the SPA have increased by 8% since 2000 (Table 7). The spatial pattern of change between count sections is illustrated in Figure 5. The observed increase in razorbill is likely to be only a coarse indication of actual changes as this species is difficult to count accurately at Cape Wrath. Counts of selected monitoring colonies in Scotland show that numbers have fluctuated since Seabird 2000, with numbers in 2015 being approximately 10% below 2000 levels (JNCC, 2016).

The Cape Wrath SPA citation states that there were 1,800 individual razorbill when the SPA was designated. On the basis of the 2017 results it is likely that the SPA's breeding razorbill feature will be considered **favourable** as there appears to have been a large increase since designation and a small increase since 2000 (although there is some doubt as to the accuracy of counts used for designation purposes).



Figure 5. Histogram of numbers of razorbills in each count section in 2000 and 2017

4.1.5 Puffin

1,525 individual puffins were counted within Cape Wrath SPA in 2017. A direct comparison between the number of puffin counted in 2017 and 2000 will not give a valid indication of any population change over this period. The 2017 counts were undertaken at time of year (early June) when puffin numbers are unlikely to give a reliable indication of the numbers breeding. The counts in 2000 were undertaken later in the year (late June) as part of a separate exercise. Nevertheless, it is clear that puffins continue to breed in reasonable numbers in the SPA. The 2017 counts excluded puffins that were only seen in flight or on the sea (these were in any case very few birds).

Further work is required to establish the condition of the SPA's breeding puffin feature (see Annex 1: Proposed Strategy for Counting Puffins at Cape Wrath SPA).

4.1.6 Other species

Gull numbers were virtually unchanged from 2000, but shag showing a modest increase (Table 8). Black guillemots and skuas were not counted in the June 2000 survey and so no direct comparisons are possible for these species. A boat survey of black guillemots of the north coast of Cape Wrath and Clo Mor was undertaken on 20 April 2001, and this recorded 28 birds (7 in the Cape Wrath sections and 21 in the Clo Mor section all east of Cleit Dubh, JNCC SMP database). Although the numbers of black guillemots counted in 2017 was 35% lower than in 2001 (Table 8), this is not considered to be a valid comparison due to the differences in survey timing.

5. DISCUSSION

5.1 Quality assurance

Counts made from the sea in 2017 are single counts only, of each section, sub-section and species. Potential count time was reduced on each of the two sea days by the need to familiarise with the cliffs and recognise and agree on section and sub-section boundaries, leaving no time over the course of the two sea days to do replicate counts. The two observers each made careful, single counts, of two species only (DJ, guillemot and fulmar; SM, razorbill and kittiwake). Sea conditions were excellent for the most part and when sea state became too rough to count accurately on day one, the survey was ended. Overall, the counts were carefully made by two highly experienced counters in calm and clear weather and are considered to be the best that could be achieved in the circumstances.

Counts made from the land were made by both observers, both counting at the same time, from the same position, of all species in the sections. Final totals were agreed to be the mean of both counts, though in all cases any differences were very small.

Counts from photographs, taken from vantage points or the sea, were made by SM only. Overall results are expressed as single totals, but the counts were carefully made from enlargements on a computer screen of small, sub-divisions within each image. In the case of close packed guillemots several counts were made of each ledge.

5.2 Changes in methodology

Designation of the SPA was based on counts of breeding seabirds made in 1986. How the counts were done is unclear and count totals appear to refer to the entire SPA without any reference to sub-dividing the cliffs for ease of counting and future reference. As a result it is difficult to draw firm conclusions about changes in populations since then.

So far as is known the 2017 count largely followed the methodology used in the 2000 count. All the species counts made of the north coast of Cape Wrath (CW01-04) and Clo Mor (CM01-11) in 2017 were done from the sea, except for the landward facing ledges and tops of Stack Clo Kearvaig and Stac a Chlo. It is not known how counts were made of these subsections in 2000. The west coast (CW05) was counted from the land in 2017, and the incomplete 2000 counts of this section (sub-sections CW05 D, E and F) were made from the sea. All species counts in both years used the same count definitions (i.e., count units) and were made on approximately similar dates, the exception being puffin, counts of which are not comparable between years, regardless of whether they were made from the sea or the land. There is inevitable observer variation between the years, which cannot be easily quantified, however methodological differences were minimised by the similarity of survey dates, timing and count units. Changes in seabird numbers shown in this report between the 2000 survey and the present survey (other than puffin and black guillemot which have been discussed in Section 4) are likely to largely represent real changes in seabird numbers rather than reflect variation in count methods.

The coastal distribution of breeding seabirds in the SPA is very uneven (Table 1, Figures 2 to 5), the great majority (98%) breeding in five count sections west from Cleit Dhubh to Kearvaig Bay, which includes the highest cliffs of Clo Mor (i.e., CM07 to CM011). The west coast section (CW05) holds very few breeding seabirds, mainly fulmars. The north coast Cape Wrath sections (CW01 to CW04) also hold relatively few breeding seabirds, most of which are on the cliffs in the vicinity of the lighthouse. Although there appear to have been no gross changes in the overall distribution and relative importance of individual count sections since the Seabird 2000 counts, there are some small between-section differences in the degree of change since 2000, especially in the cases of fulmar (Figure 2) and razorbill (Figure 5).

5.3 Merits of land vs sea counts

Counting from a boat was the only practical way to count the Clo Mor cliffs, as a high proportion of the nesting areas are not visible from any safely accessible part of the land. Nevertheless, counting the seabirds nesting on cliffs of the height, extent and topographical complexity as those at Clo Mor from a small boat is not easy for several reasons. As a result the boat counts are inevitably subject to counting errors. This is particularly so for guillemot and razorbill for the reasons discussed in Section 3.

Typically at Cape Wrath, kittiwake nest at comparatively low levels, from near sea level to 100 m. This, combined with counting prominent nests on largely open faces, makes them easy to detect and count from the sea but next to impossible to fully census from the land.

Fulmar also nest in mainly open situations, up to the cliff tops in places and often in cracks or fissures which can make them difficult to detect over combined heights and distances, in places of 500 m or more. Overall, the majority are visible and can be more accurately counted from the sea than the land, where views of the upper cliffs are hampered by verticality and lack of vantage points.

Puffins, seen from the sea, are on grass terraces, boulder areas and on the steepest and highest rock faces, but many of the sites that were identified as breeding sites were also seen from the land. It is likely that land counts would give higher counts of birds than sea counts, given the greater flexibility in timing that land visits allow, compared to a single offshore visit for multi-species counts that was not optimally timed for puffins in 2017.

Observing from a boat is necessary to get total counts of the Clo Mor sections, however, given the potential for counting errors and the sheer scale of the cliffs, a comparison of boatbased counts is likely to give only a relatively crude measure of population trends of guillemot and razorbill. For these species at least (and puffin also but for different reasons) consideration should be given to using sample, shore-based counts to establish population trends. It would also be desirable to compliment a sample of boat-based counts with shore-based counts to check their accuracy. Unfortunately this did not prove to be possible in 2017 as none of the boat count sub-sections proved to be entirely visible from the land.

6. **RECOMMENDATIONS**

6.1 Vantage points *vs* sea counts

With the exception of the puffin counts (many more puffins were seen from the VPs than during the boat survey) and some small 'in fill' areas that could not be satisfactorily counted from the boat, the 2017 Clo Mor VP plots do not significantly add to the count totals made from the Clo Mor boat counts. Rather, the main value of the VP results lies in setting a baseline for future population trend monitoring of the five SPA qualifying species based on highly accurate and repeatable land-based counts. Compared to repeating the boat-based counts, the VP plots can be re-surveyed relatively easily, with a much more modest investment of time and money, and without the need for calm sea conditions. Only eight of the 13 plots were counted in 2017 so a case could be made for returning in 2018 to make complete counts and perhaps identify further plots in unvisited cliff sections CM08-ABC and CM07. However, this does not preclude the need for an occasional whole SPA offshore survey. The suite of section and sub-section images (Annex 3) should greatly aid the accurate repeatability of future sea counts and it is recommended that laminated prints are made for use in the field.

Note: Vantage point counts and photographs are best undertaken after 16:00 BST, when the sun is in the west to north-west. In the middle part of the day, if skies are clear with bright sun there is a dazzle effect when looking up at cliff tops, conversely, the cliffs are then mostly in deep shade, which also has implications for sea counts. Early morning visits (before 10:00 BST) would potentially give good light conditions for vantage point counts/photos and sea surveys. High overcast and neutral light are the preferred conditions for counts at Cape Wrath.

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ANNEX 1: PROPOSED STRATEGY FOR COUNTING PUFFINS AT CAPE WRATH SPA

A1.1 Introduction

Surveying breeding puffins at Cape Wrath SPA is particularly challenging and to date no reliable estimate of population size has been made, nor a reliable monitoring baseline established. It was not an aim of the 2017 Cape Wrath survey to obtain a valid count of breeding puffins. Rather it was to aim, on the basis of fieldwork experience and evidence gained in 2017, to recommend a survey and monitoring strategy and to identify possible survey methods. This section of the report presents background information on monitoring puffins at Cape Wrath, presents a reasoned survey and monitoring strategy, and outlines a proposal for undertaking puffin surveys in 2018.

A1.2 Approaches to counting breeding puffins

Puffins typically nest in high densities in burrows on grassy ledges and slopes or in areas of boulder scree. They are notoriously difficult to count accurately as the nests and attending adults are out of sight, either underground or under boulders. Although birds in adult plumage standing around colonies are usually easily visible and therefore straightforward to count, the numbers so counted may correlate poorly with the actual numbers breeding in a colony. The reasons for this are because the numbers standing about have been shown to vary greatly and rather unpredictably, changing with time of day, stage of breeding cycle and weather conditions (e.g., they tend to be present in greater numbers when it's raining or foggy). To complicate matters further, large numbers of non-breeding birds (these are mostly indistinguishable from breeding adults) appear in increasing numbers later in the breeding season (Harris & Wanless, 2011). Despite equating individuals with AOB in past censuses, counts of individuals do not equate to AOB and also underestimate the true number of birds present and thus colony size (Brooke 1972). Therefore, counts of individuals indicate only the minimum number of those likely to be breeding. This is particularly so for one-off counts, especially if made at times when conditions are not conducive for birds to be standing about at colonies. The problem of unreliable one-off counts can be reduced by taking a series of replicate counts and targeting these as far as is practical to coincide with conditions that are conducive for birds to be present.

Ideally, puffin numbers are best assessed by counting apparently occupied burrows (AOB) on the ground, with counts of individuals a second best if this cannot be done (Harris in Lloyd *et al.*, 1991). With burrow counting methods, surveyors systematically search a marked area of a colony for burrows and determine occupancy largely on the basis of direct inspection of burrow entrances. Two potentially major limitations of burrow-counting methods are that they are not well suited to birds nesting in boulder scree and search areas must be safely accessible to surveyors.

A1.3 History of puffin counts at Cape Wrath and Clo Mor

Historic accounts of Cape Wrath, that is of all the cliffs, including Clo Mor, between the lighthouse east to the Cleit Dhubh (Figure 1), suggests that puffins were once present in many places where they no longer occur (Harvie-Brown, 1888; Pennie, 1951). No attempts were made by either author to put a number to the population but Pennie considered the colony to be the largest on the British mainland. The main colony on Clo Mor stretched for 3 miles (4.8 km) over all suitable breeding places from base to summit of the cliffs between Kearvaig Bay and Cleit Dhubh (i.e. the whole extent of count sections CM07 to CM11).

Later assessments of numbers concentrated on Clo Mor and in the 1960s the colony was estimated at between 25,000 and 50,000 pairs but these figures were later considered to be

little better than guesswork, albeit by experienced observers (MP Harris personal communication).

The Seabird Colony Register (1985-88) gave a count of 5,870 individuals and, following the usual convention, that one bird equalled one apparently occupied burrow (AOB), was assumed at the time to translate to 5,870 apparently occupied burrows (AOBs) or breeding pairs. The Seabird 2000 (1998-2002) count, undertaken in late June, was 1,502 individuals (also assumed to translate directly to AOBs/pairs) suggesting a decline in numbers.

A1.4 Limitations of 2017 puffin counts

In 2017, just over 1,500 individual puffins were counted from the sea and land on the Clo Mor survey sections; a single bird only was seen in the Cape Wrath count sections. These counts are not considered to give a reliable indication of the numbers potentially breeding because the counts were not conducted at the optimum time of year or time of day, and there were no replicates. The 2017 counts were undertaken in early June when most breeding birds are incubating eggs; no reasonable estimate of the numbers breeding can be implied from a single count of individuals ashore and above ground at this time of year. Indeed, the 2017 counts represent little more than incidental data collected during the course of surveying the cliff-nesting species.

Furthermore, any comparison between the 2017 and the 2000 puffin counts (or with earlier counts) cannot be considered valid, and would not be expected to give a reliable indication of the recent population trend or the condition of the breeding puffin SPA feature.

At Clo Mor in 2017 we counted individuals from the sea but were unable to do more than limited, comparative counts from the land, but it is unlikely that sea counts deliver higher numbers of individuals than counts made from the land.

A1.5 2017 assessment of puffin areas and their accessibility

Short land visits in June 2017 established that sub-colonies seen from the sea could mostly be identified from the cliff tops. The survey work showed that almost all the breeding puffin within Cape Wrath SPA are currently restricted to steep grassy terraces (typically at around mid-cliff level) and high cliffs at various places along the Clo Mor cliffs. Puffins were nesting in considerable numbers on some grass terraces, and were thinly distributed in cracks in rock faces on the highest cliffs. The 2017 land counts totalled 42% of the numbers seen from the sea but these were in the limited areas defined for future multi-species monitoring.

More importantly, the walks along to the Clo Mor cliff tops in June 2017 showed that, unlike most of the sites used by the cliff-nesting seabird species, almost all of the grass terraces shown from the sea counts to hold breeding puffins can be satisfactorily viewed for counting from at least one cliff-top location. It is therefore concluded that undertaking comprehensive (or very nearly so) counts of the Clo Mor puffin nesting areas from cliff-top vantage points is feasible.

The authors consider it likely that were land counts to be made of the whole length of Clo Mor and these were timed later in the season and at the optimum time in the day, the total numbers counted would be considerably higher than the sea and land counts made in 2017.

All the Clo Mor puffin breeding areas noted in 2017 were visually examined to assess whether it was likely they could be safely accessed, and thereby ascertain if there could be any potential for undertaking burrow count survey methods. The fundamental problem with counting/monitoring puffin numbers at Cape Wrath is the height and verticality of the cliffs. This makes access to the present, dispersed sub-colonies mostly impossible without using advanced rope techniques and gear. Indeed, no puffin breeding areas were noted that were potentially safely accessible. It is concluded that systematic burrow counting techniques for monitoring puffins at Clo Mor are not likely to be feasible.

A1.6 Proposal for 2018 Clo Mor puffin survey

Proposals for work in 2018 are based on the experience of 2017 and would have the following aim:

To provide new, comprehensive survey data on puffin that would provide a reliable comparison (as far as is possible) with the Seabird 2000 count, and provide a solid baseline of information for future monitoring. The results of the 2018 surveys would be included within the fourth national seabird census ('Seabirds Count'). They will also contribute towards SNH's Site Condition Monitoring programme (SCM.

The proposed 2018 puffin counts would include the following components:

- Survey the Clor Mor count sections for breeding puffins (CM07 to CM11). The potentially suitable Cape Wrath sections (CW03 to CW04) would also be surveyed with the expectation that this would confirm that puffin do not currently breed here in appreciable numbers.
- Identify and mark on large-scale maps and cliff-section photographs monitoring plots for breeding puffin and within these count all visible individuals ashore. Aim would be to find an evenly spread number of sub-colonies along the full length of Clo Mor, holding a significant sample of birds (say, 2,000), that can be safely viewed and photographed from cliff-top vantage points.
- The optimum timing for this work would be late evening to sunset in the last week of June or first few days of July, when hatching is complete and young are being fed. Ideally when raining (but not in fog due to impaired visibility) as attendance rates tend to higher during rain. Given the cliff top distances involved, it may not be possible to count all the breeding sites found at the optimum time of late evening, in one day. Thus a series of replicate counts are proposed over several days, which would give a more accurate indication of breeding numbers. (Note: the Seabird 2000 puffin counts of Clo Mor were made on a single day, the 28 June).
- Produce a report on the status of puffin at Clo Mor and Cape Wrath, giving details of replicate counts, and a suite of marked photographs (land and sea) showing the locations and extent of low density puffin areas, medium-sized sub-colonies and monitoring plots.

ANNEX 2: CAPE WRATH SPA COUNT SECTION AND SUB-SECTIONS MAPS

This annex can be provided on request in electronic format (Figures A2.1 to A 2.4)

ANNEX 3: CAPE WRATH SPA SECTION LOCATION PHOTOS

This annex can be provided on request in electronic format in separate folders (A3.1 to A3.4): the north coast, CM01-07 (A3.1, image nos. 1 to 13), CM07-11 (A3.2, image nos. 1 to 17), and CW01-04 (A3.3, image nos. 1 to 19), with the west coast covered by CW05 (A3.4, images 1 to 5 and A to N).

ANNEX 4: CAPE WRATH SPA VP PLOT DESCRIPTIONS AND MAPS

This annex can be provided on request in electronic format (Table A4.1 and Figures A4.1 and A4.2).

ANNEX 5: CAPE WRATH SPA VP PLOT LOCATION PHOTOS

This annex can be provided on request in electronic format (image nos. Plot 1 to Plot 13 including two images for Plot 7 (a and b) and two images for Plot 10 (a and b)).

ANNEX 6: CAPE WRATH SPA MAP OF SKUA AND DIVER TERRITORIES

This annex can be provided on request in electronic format (Figure A6.1).

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