

**GREENLAND WHITE-FRONTED & GREENLAND BARNACLE GOOSE ROOST SURVEY
ISLE OF TIREE, ARGYLL - WINTER 2001/2002**

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ggroostcounttiree02.xls	Roosting and dawn flight data
ggroostGPStiree02.xls	GPS grid references of the boundary points of the significant roost sites

¹ Maps and spreadsheets are not included in the body of this report. They can be located at the offices of SNH, Oban.

LIST OF TERMS USED IN THE REPORT

Core roost area	Area of significant roost sites where geese are seen to come to, from a distinct feeding catchment.
Feeding catchment	Area consisting of one or more feeding sites used by geese that generally roost in one core roost area, that is separate from other feeding catchments.
Feeding site	Area of land visited by geese for feeding.
GPS	Global Positioning Satellite receiver.
<hr/>	
Non-significant roost site	Site used by less than 100 geese of one species on at least one occasion.
Roost pile	Single large pile of several droppings from one goose, produced whilst roosting on one spot.
Roost site	Site used for roosting by geese of any number on at least one occasion.
Significant roost site	Site used by at least 100 geese of one species on at least one occasion.

ACKNOWLEDGEMENTS

Thanks go to all the crofters and farmers who gave permission to access their land and for their interest in the project; to Dr John Bowler (RSPB Tiree) for valuable information on feeding sites, goose numbers and landowners, and for access to The Reef Reserve; and to Dr Clive MacKay (RSPB Islay) for information on past Greenland goose survey work on Tiree.

SUMMARY

GREENLAND WHITE-FRONTED & GREENLAND BARNACLE GOOSE ROOST SURVEY, ISLE OF TIREE, ARGYLL - WINTER 2001/2002

Report No.:

Contractor: Janet M Hunter

Contract No.: BAT/LG25/01/02/145

BACKGROUND

The Isle of Tiree supports internationally important numbers of wintering Greenland white-fronted geese *Anser albifrons flavirostris* and Greenland barnacle geese *Branta leucopsis*. With confirmation of the notification of Sleibhtean agus Cladach Thiriodh Site of Special Scientific Interest (SSSI), also Special Protection Area (SPA) and RAMSAR designation, and the establishment of a local goose forum in 2001, information on the current use of areas by Greenland geese for roosting is required to ensure that these bodies address current goose management issues on Tiree.

The aim of the study was to establish the current use of roost areas on Tiree, and its associated islands, by conducting a repeat of the SNH winter 1995/1996 survey carried out by Young (1996).

MAIN FINDINGS

Core roost areas used by Greenland geese in winter 2001/2002 were similar to those in 1995/1996, though there were some differences in use of specific sites. Extensive and prolonged flooding during the study period may have forced the geese away from the 1995/1996 sites and allowed them to make use of alternative sites.

Core roost areas are listed below along with their significant roost sites (i.e. those that were used by at least 100 geese of one species on at least one occasion), and grid references (eastings, northings) in parentheses.

- White-fronted geese made use of three core roost areas:
 - *The Reef/An Fhaodhail - Cnu Lochanan area*: Reef/An Fhaodhail (01300 746000).
 - *Bhirceapol bogs/Loch Stanail area*: Bhirceapol bogs/Loch Stanail (97000 744800).
 - *Loch Riaghain to the bogs west of Vaul*: Vaul bogs SW lochans (03900 748200).
- Barnacle geese made use of two core roost areas:
 - *Reef/An Fhaodhail, Cnu Lochanan, Loch Riaghain and the bogs west of Vaul*: Reef/An Fhaodhail (01300 746000), Loch Ghrianal (03930 747970), Balephetrish Hill NE pool?¹ (01680 747770), Loch nan Ob?¹ (02800 748470), Vaul track end (04020 748530), Cnu Lochanan S (02640 747200), Vaul bogs N (03950 748940), Cnu Lochanan N?¹ (02600 747720), Loch Riaghain S shore (03380 746830), Loch na Gile SW shore (02450 748020).
 - *Soa and Carsamull*: Carsamull/Point Field beach (06950 746900), Soa (07070 746350).

¹ Suspected roost site: exact location unknown.

1. INTRODUCTION

The Isle of Tiree supports internationally important numbers of wintering Greenland white-fronted geese *Anser albifrons flavirostris* (1200-1500; 10% of UK population) and Greenland barnacle geese *Branta leucopsis* (1200-1600; 5% of UK population). With confirmation of the notification of Sleibhtean agus Cladach Thiriodh Site of Special Scientific Interest (SSSI), also Special Protection Area (SPA) and RAMSAR designation, and the establishment of a local goose forum in 2001, information on the current use of areas by Greenland geese for roosting is required to ensure that these bodies address current goose management issues on Tiree.

During the winter of 1995/1996, the first surveys of roost sites of Greenland white-fronted and barnacle geese were carried out on Tiree by Janette Young for Scottish Natural Heritage (Young 1996). The aim of the winter 2001/2002 study was to establish the current use of roost areas on Tiree and its associated islands by following the methodology of Young (1996). This survey was conducted under contract to Scottish Natural Heritage (Contract no: BAT/LG25/01/02/145).

2. OBJECTIVES

- 2.1 To re-survey core Greenland goose roost areas reported in Young (1996).
- 2.2 To locate any additional Greenland goose roosts.
- 2.3 To assess which roosts mentioned in 2.1 and 2.2 above, are currently used by significant numbers of Greenland geese (i.e. at least 100 individuals of one species on at least one occasion).

3. METHODOLOGY

- 3.1 Methodology closely followed that used by Young (1996).
- 3.2 Roost counts were carried out during 4 January to 13 March 2002. GPS data were collected during early April 2002.
- 3.3 The first few days were spent with the Tiree RSPB Conservation Officer locating feeding flocks of Greenland white-fronted and barnacle geese, discussing potential roost sites for these flocks, identifying possible vantage points for carrying out the observations, and identifying the landowners of these areas.
- 3.4 Relevant landowners were contacted for permission to access vantage points and roost areas, and to complete a Foot & Mouth Disease risk assessment.
- 3.5 Core roost areas identified during the 1996 survey were revisited. These were Bhirceapol bog/Loch Stanail, Loch Garradh nan Capull, The Reef/An Fhaodhail and Beinn Ghott bogs area, Loch Riaghain to Loch Dubh bogs, Cnu Lochanan bogs, Soa/Carsamull.
- 3.6 Other potential goose roost sites considered were: Loch Bhassapol, Loch a' Phuill, Linne Thorramhuill, Loch a' Chlair, Loch an Eilein, Orisgal, Gunna, Fadamull.

- 3.7 From vantage points where one or more roost sites were visible, and where roost sites were found to be significant, three dusk and dawn counts were conducted at approximately one month intervals: 7-24 January, 6-19 February and 5-13 March. Sites that were found to be non-significant in the first round of counts were not revisited. The following data were collected:
- 3.7.1 Numbers of geese of each species as they flew in to roost at dusk and as they flew out of the roost the following dawn.
 - 3.7.2 Whether the counts were complete or partial.
 - 3.7.3 The flight paths of flocks as they arrived and departed from the roost sites.
 - 3.7.4 The feeding sites to/from where the geese were flying, where known.
 - 3.7.5 Notes, sketches and compass bearings, in order to map and re-locate roost boundaries.
 - 3.7.6 Wind speed and direction, air temperature, cloud cover and precipitation just prior to each count.
 - 3.7.7 Location of observer during counts.
- 3.8 Grid references of the boundaries of significant roost sites were recorded in early April (when water levels had receded and access easier), whilst walking around roost site perimeters with a Garmin *etrex* Global Positioning Satellite receiver (GPS). The levels of accuracy of the GPS data were also recorded.
- 3.9 Counts were conducted during the new moon phase (no moon), and first and last quarters. Young (1996) found that goose roosting behaviour altered during bright moonlight.
- 3.10 Counts were not attempted during prolonged rain, winds of greater than force 6 or poor visibility due to low cloud/mist.
- 3.11 The observer was in place at the vantage point from approximately the time of sunset until 1 hour after, and one hour before sunrise until sunrise.
- 3.12 Although the geese were still present in April, counts were not conducted because of potential pre-migration changes in numbers and roosting behaviour.

4. RESULTS

4.1 Significant roost sites

The important Greenland goose roost sites on Tiree are listed in Table 1.

Table 1. Significantly important Greenland goose roost sites on Tiree (sites used by at least 100 geese of one species on at least one occasion), January - March 2002.

Site name	Grid reference		Maximum Count
	Easting	Northing	
White-fronted goose:			
Reef/An Fhaodhail	01300	746000	642
Bhirceapol bogs/Loch Stanail	97000	744800	556
Vaul bogs SW lochans	03900	748200	114
Barnacle goose:			
Reef/An Fhaodhail	01300	746000	1100
Carsamull/Point Field beach	06950	746900	791
Soa	07070	746350	504
Loch Ghrianaid	03930	747970	500
Balephetrish Hill NE pool? ¹	01680	747770	500
Loch nan Ob? ¹	02800	748470	450
Vaul track end	04020	748530	430
Cnu Lochanan S	02640	747200	428
Vaul bogs N	03950	748940	421
Cnu Lochanan N? ¹	02600	747720	420
Loch Riaghain S shore	03380	746830	190
Loch na Gile SW shore	02450	748020	125

¹ Suspected roost site: exact location unknown

4.2 Core roost areas

Roost sites for each species could be grouped into core roost areas according to the direction of movements of birds between roost sites and feeding areas. Geese feeding in certain groups of fields nearly always roosted within the same core area, with little overlap between feeding areas. Summaries of counts of birds flying between roost and feeding sites at dusk and dawn are tabulated in Annexes 1 – 5, with roost sites arranged in descending order of importance. The location of roost sites and movements between roosts and feeding areas are plotted on 1:25,000 maps that accompany this report (Maps 1 & 2).

4.2.1 *White-fronted goose*

4.2.1.1 Core roost area 1- Reef/An Fhaodhail and Cnu Lochanan

Geese that roosted at the Reef/An Fhaodhail and Cnu Lochanan bogs, fed in fields at Balephetrish, Kenovay, the area between Orisgal and Beinn Ghott, and Cnu Lochanan (Map 1).

The area consisting of the Reef Reserve pools and northern parts of An Fhaodhail made up the only significant roost site within this core roost area. Other non-significant sites existed on the Cnu Lochanan bogs, and bogs west and southwest of Beinn Ghott (see Map 3).

Site name	Grid reference		Maximum Count
	Easting	Northing	
Reef/An Fhaodhail	01300	746000	642
Loch Caol	03000	745400	55
Orisgal	01540	745350	52
Cnu Lochanan NW of S lochan	02700	747450	18
Cnu Lochanan NW lochan	02580	747580	5
Loch a' Chapuill	02280	745820	4

4.2.1.2 Core roost area 2 - Bhirceapol bogs/Loch Stanail

White-fronted geese that roosted at Bhirceapol bogs/Loch Stanail fed west of the airport in fields at Heylipol, Balinoe and Balemartine, at Middleton, Kilkenneth and Hough, and at Kilmoluaig and Cornaig (Map 1).

A long stretch of lochans and bogs running north-south from north Loch Stanail to south Bhirceapol bogs made up the only significant roost site within this core area. Several other non-significant roost sites within the core roost area were recorded in the surrounding lochs and bogs (see Map 4).

Site name	Grid reference		Maximum Count
	Easting	Northing	
Bhirceapol bogs/Loch Stanail	97000	744800	556
Loch Garradh nan Capull	96850	741830	59
East of Bhirceapol/Stanail	97400	744850	42
Loch a' Phuill S shore	95700	741200	16
Loch a' Phuill SW shore	95400	741420	8
Heylipol Church lochan	96250	743150	7

4.2.1.3 Core roost area 3 - Loch Riaghain and Vault bogs

Geese that roosted at Loch Riaghain and Vault bogs generally fed at Gott, Kirkapol, Cnu Lochanan and Vault (Map 1). There was some overlap where a small number of birds feeding at Cnu Lochanan would roost at either the Reef or Loch Riaghain.

The only significant roost site consisted of two small un-named lochans situated ca. 550m southwest of the end of the Vault track (Map 3). Small flocks of White-fronted geese were recorded roosting at only two non-significant sites.

Site name	Grid reference		Maximum Count
	Easting	Northing	
Vault bogs SW lochans	03900	748200	114
Loch Riaghain	03450	747250	69
Loch Dubh	03580	748550	42
Loch Dubh SE of	03650	748250	20

4.2.2 Barnacle goose

4.2.2.1 Core roost area 1 - Reef/An Fhaodhail, Cnu Lochanan, Loch Riaghain and Vault bogs.

Geese roosting on the Reef/An Fhaodhail, Cnu Lochanan bogs, Vault bogs and Loch Riaghain moved between feeding sites at Balephetrish, the coast north of Balephetrish Hill, Gott Farm, Kirkapol and Vault (Map 2). Observations of movements of birds between these feeding sites during the study period are supported by ring sightings (J. Bowler pers. comm.).

Barnacle geese were recorded at several significant roost sites within the core area (Map 5), the greatest numbers being recorded on the Reef Reserve pools/northern An Fhaodhail site. Roosting geese appeared to frequently alter their choice of site, often nightly and even during the night (see Annex 4). There were very few non-significant roost sites within this area as the barnacle geese usually roosted in large numbers.

Site name	Grid reference		Maximum Count
	Easting	Northing	
Reef/An Fhaodhail	01300	746000	1100
Loch Ghrianaid	03930	747970	500
Balephetrish Hill NE pool? ¹	01680	747770	500
Loch nan Ob? ¹	02800	748470	450
Vault track end	04020	748530	430
Cnu Lochanan S	02640	747200	428
Vault bogs N	03950	748940	421
Cnu Lochanan N? ¹	02600	747720	420
Loch Riaghain S shore	03380	746830	190
Loch na Gile SW shore	02450	748020	125
Cnu Lochanan NW lochan	02570	747540	88
Loch Dubh	03580	748550	80

¹ Suspected roost site: exact location unknown.

4.2.2.2 Core roost area 2 – Soa and Carsamull

Geese using the islets of Soa and Carsamull for roosting generally fed east of the golf course, at Ruaig and Caoles (Map 2).

The most used significant roost site was the area consisting of the northern part of Carsamull, its northern beach and the Ruaig Point Field beach (Map 6). Use of the roost site appeared to depend on the state of the tide and wind direction. The roost site on the island of Soa consisted of a boggy depression near the island's peak, containing a fresh-water pool and providing shelter from several wind directions. There were no non-significant sites within this core area.

Site name	Grid reference		Maximum Count
	Easting	Northing	
Carsamull/Point Field beach	06950	746900	791
Soa	07070	746350	504

4.3 Other potential sites

Of the other sites checked for roosting activity, Loch Bhasapoll, Linne Thorramhuill, Loch a' Chlair, Loch an Eilein, Gunna and Fadamull were not used by Greenland geese.

4.4 Weather

The weather during January to March 2002 was generally wet and windy with heavy rain and hail, and frequent gales of up to force 8. There were, however, enough calmer days of suitable moon phase to conduct the counts. Flooding of most low-lying areas was severe and prolonged. Temperatures at dusk and dawn were generally between 4°C and 11°C.

4.5 Description of maps

Two types of map accompany this report. If they are not included with this report, they can be located at SNH, Oban.

4.5.1 Two 1:25,000 maps showing significant roost sites and feeding areas, along with examples of main flight paths between roosts and feeding areas. One map per species:

4.5.2 Four 1:10,000 maps showing significant, non-significant and suspected roost sites. One map per core roost area per species.

4.6 Descriptions of spreadsheets

Two Excel spreadsheets accompany this report. One contains the roosting and dawn flight data, while the other contains the GPS grid references of the boundary points of the significant roost sites. These spreadsheets are held at the offices of SNH, Oban.

4.6.1 *ggroostcounttree02.xls*

The fields of the spreadsheet are described below. Records include flocks of geese arriving at/departing from the roost site targeted by the observer during each roost/dawn count, plus any incidental observations of geese flying to/from other areas visible from the targeted site. Data for non-significant roost sites are included in this spreadsheet.

Field	Description
UID	Unique identifier for each record
Roost_Site	Name of roost site
Easting	OS grid reference (east) for approximate mid-point of roost site
Northing	OS grid reference (north) for approximate mid-point of roost site
Date	Date of observation
Roost/Dawn	Time of observation (R = roost, D = dawn)
Common_Name	Common name of goose species counted
Latin_Name	Latin name of goose species counted
Total_Count	Total number of geese counted arriving/departing from one direction
Flight_Path	Direction of flight to/from roost
Feed_Area	Name of area geese observed flying from/to
Complete/Partial	Whether the count of geese was C = complete or P = partial
Wind_Speed	Wind speed - Beaufort scale 1-12
Wind_Direction	Wind direction
Temp.	Air temperature just before dusk/dawn - °C
Cloud_Cover	Cloud cover - %
Rain	Description of any precipitation
Moon_Phase	Phase of the moon
Vantage_Point	Location of observer during counts
Notes	Short notes
Observer	Name of observer

4.6.2 *ggroostGPStiree02.xls*

The British National Grid coordinates of points along the boundaries of significant roost sites, collected using a GPS receiver, are recorded here. Only those sites where the exact location was known were included. Where the exact location of a site was not known, an approximate grid reference for the mid-point of the site is given in *ggroostcounttree02.xls*. The fields of the spreadsheet are described below.

Field	Description
UID	Unique identifier for each record
Roost_Site	Name of roost site
Boundary_Point	Number of each point recorded on the roost site boundary
GPS_Easting	Five-digit easting recorded using a GPS receiver
GPS_Northing	Six-digit northing recorded using a GPS receiver
Accuracy	Level of accuracy (in metres) of readings as indicated by GPS

5 DISCUSSION

5.1 Comparison with previous study

Core roost areas, and their associated feeding areas, used by Greenland geese on Tiree during January to March 2002, were similar to those recorded by Young (1996) during winter 1995/96. There were, however, some differences between the exact location and extent of roost sites within core areas. For example, the Reef and An Fhaodhail were presented as separate roost sites in Young (1996), as were Bhirceapol bogs and Loch Stanail. In 2002, however, extensive flooding of both areas meant that geese made use of these entire areas. They were therefore treated as single larger roost sites. Individual sites used within the roosting areas of Orisgal/Ghott, Cnu Lochanan, Loch Riaghain and Vault bogs also differed from sites located in 1995/96. For example, in 1995/96 barnacle geese roosted on islands in Loch Riaghain, whereas during January to March 2002, this was not observed. However, hundreds of barnacle geese were reported roosting on the islands in early April 2002 (D. MacIntyre pers. comm.) and it is thought that the geese were only able to use the islands once the water levels had receded to near normal, and the islands were no longer submerged.

Loch Garradh nan Capull was excluded as an important roost site for White-fronted Geese in this study as there was no evidence of a separate feeding catchment. A flock of 110 white-fronted geese feeding only 500m east of Loch Garradh nan Capull flew almost 3000m northwest to roost at Bhirceapol bogs/Loch Stanail instead of using the nearer loch as a roost site. Only on one occasion (7/01/02), 59 white-fronted geese were seen flying to roost on Loch Garradh nan Capull.

5.2 Quality of data

The assumption that all major roost sites were located during the survey periods, was supported by the similarity between total numbers counted at roosts and two all-island censuses of feeding flocks conducted by the RSPB (J. Bowler pers. comm.) (Table 2). It is not impossible, however, that additional unrecorded roost sites were used between counts, particularly by barnacle geese in the Reef/An Fhaodhail/Cnu Lochanan/Vault bogs area, where they frequently shifted between roost sites (see Annex 4). White-fronted geese, on the other hand, appeared to be more site faithful. Some roost sites may also have gone undetected because of the timing of the survey: other additional sites may have been used earlier in the season.

Discrepancies between roosting totals and feeding totals of White-fronted geese are assumed to be due to scattered non-significant roosts.

Table 2. Total numbers of Greenland geese counted feeding on Tيرة (RSPB data) vs total numbers counted during roost/dawn flights, January to March 2002.

Month	White-fronted goose		Barnacle goose	
	Feed	Roost	Feed	Roost
January	960	835	2130	2385
February	990	796	1968	2070
March	no count	866	no count	1939
April	1076	no count	1968	no count

5.3 Visibility

Dawn counts were generally more accurate than dusk counts. On some dusk counts, both species were heard flying in to roost when it was too dark to count them. At dawn, both species generally waited for reasonably good light before flying.

5.4 Influence of moonlight on roosting behaviour

Between 24 February and 4 March, there were only ca. 1100 barnacle geese visible on Tيرة. Simultaneously, there was an increase in numbers at the west end of the neighbouring island of Coll (J. Bowler, S. Money pers. comm.). These observations coincided with a full moon, clear night skies and a decrease in wind speed, thus supporting Young's (1996) findings, and the decision to avoid conducting counts during the brightest phases of the moon in this study.

5.5 Nocturnal movements

Despite avoiding moonlit nights for surveys, there was still often significant movement of geese from/to sites during the night as indicated by the differences in roost and dawn counts in Annexes 1 - 5. Nocturnal movements between roost sites may have been due to changes in weather conditions during the night, and/or poor weather during the day, which may have prevented geese from feeding, thus forcing them to forage during the night (R. Lilley pers. comm.).

5.6 GPS roost boundary data

GPS positioning of roost site boundaries was aided by the presence of numerous roost piles at most sites. The accuracy of GPS data varied between five and 33 metres. The boundaries of significant roost sites on the 1:10,000 maps have been extended to include this margin of error.

5.7 Satellite roost sites

Young (1996) discussed the concept of some sites being satellite sites of main roost sites within core roost areas. In this study, the concept of satellite roosts is not included as, although some sites were observed to be used only once, there was no evidence to suggest that geese were not using these sites between counts.

5.8 Spring migration

The first evidence of Greenland goose migration was on 11 April when two neck-collared white-fronted geese, that had wintered on Islay, appeared at Heylipol on Tiree (J. Bowler pers. comm.). Another 70 (probably also from Islay), were observed flying over Tiree from south to north on 13 April. These observations support the decision not to conduct counts in April.

6 REFERENCES

Young, J. 1996. Greenland white-fronted and Greenland barnacle goose roost survey, Isle of Tiree, Argyll. Report to Scottish Natural Heritage.

*Annex 1. WHITE-FRONTED GOOSE CORE ROOST AREA 1 – THE REEF/AN FHAODHAIL AND CNU LOCHANAN BOGS
Summary of data collected on Tíree, January to March 2002.*

Roost Site	Date	Roost/ Dawn	Total Count	Comp/ Partial	Temp. (°C)	Wind	Cloud (%)	Rain	Vantage Point
Reef/An Fhaodhail	10/01/02	R	201	C	8.5	S 4	100	0	Halfway along Bluff
Reef/An Fhaodhail	11/01/02	D	223	C	9.0	S 4	100	light rain	E end of Bluff enclosure
Reef/An Fhaodhail	10/02/02	R	642	P	7.0	SE 2	90	0	W end of Bluff enclosure
Reef/An Fhaodhail	11/02/02	D	464	P	9.0	W 6	60	showers	W end of Bluff enclosure
Reef/An Fhaodhail	05/03/02	R	261	C	9.0	WSW 5	100	light rain	W end of Bluff enclosure
Reef/An Fhaodhail	06/03/02	D	206	C	10.5	W 5	100	showers	W end of Bluff enclosure
Loch Caol	16/01/02	R	55	C	10.5	SW 2	100	0	End of Orisgal road
Orisgal	11/01/02	D	20	C	9.0	S 4	100	light rain	E end of Bluff enclosure
Orisgal	11/02/02	D	11	C	9.0	W 6	60	showers	W end of Bluff enclosure
Orisgal	13/02/02	D	52	C	7.0	NE 3	40	0	Gott Farm House
Beinn Ghott lochans area	10/02/02	R	22	C	7.0	SE 2	90	0	W end of Bluff enclosure
Cnu Lochanan NW of S lochan	14/01/02	R	18	P	8.0	W 3	25	showers	Cottage NE of B8068
Cnu Lochanan NW lochan	15/01/02	D	5	C	6.0	W 4	80	showers	Cottage NE of B8068
Cnu Lochanan bogs area	17/02/02	R	0	C	7.0	SW 4	50	0	Cottage NE of B8068
Cnu Lochanan bogs area	19/02/02	D	0	C	5.0	NW 1	80	0	Cottage NE of B8068
Cnu Lochanan bogs area	06/03/02	R	0	C	7.0	W 5	50	0	Cottage NE of B8068
Cnu Lochanan bogs area	07/03/02	D	0	C	7.5	W 6	20	0	Cottage NE of B8068
Loch a' Chapuill	17/01/02	D	4	C	7.0	SW 1	30	0	End of Orisgal road

*Annex 2. WHITE-FRONTED GOOSE CORE ROOST AREA 2 – BHIRCEAPOL BOGS/LOCH STANAIL
Summary of data collected on Tiree, January to March 2002.*

Roost Site	Date	Roost/ Dawn	Total Count	Comp/ Partial	Temp. (°C)	Wind	Cloud (%)	Rain	Vantage Point
Bhirceapol/Stanail	08/01/02	R	221	P	7.0	0	90	0	Cottage W of Loch Stanail
Bhirceapol/Stanail	09/01/02	D	227	C	9.5	S 2	100	drizzle	End of Kilmoluaig road
Bhirceapol/Stanail	07/02/02	R	128	C	8.5	SW 4	30	0	End of Kilmoluaig road
Bhirceapol/Stanail	09/02/02	D	141	C	7.0	W 1	15	0	End of Kilmoluaig road
Bhirceapol/Stanail	07/03/02	R	556	P	9.0	W 2	80	0	End of Kilmoluaig road
Bhirceapol/Stanail	08/03/02	D	116	C	10.5	SSW 5	99	0	End of Kilmoluaig road
Loch Garradh nan Capull	07/01/02	R	59	C	9.0	S 3	100	0	Passing place on B8067
Loch Garradh nan Capull	08/01/02	D	0	C	11.0	SW 3	100	0	Passing place on B8067
Loch Garradh nan Capull	06/02/02	R	0	C	5.5	W 2	40	0	Passing place on B8067
East of Bhirceapol/Stanail	08/03/02	D	42	C	10.5	SSW 5	99	0	End of Kilmoluaig road
Loch a' Phuill	17/01/02	R	0	C	7.0	SW 4	75	0	MacFadyen's barn
Loch a' Phuill S shore	18/01/02	D	16	C	7.5	SE 4	80	0	MacFadyen's barn
Loch a' Phuill SW shore	06/02/02	R	8	C	5.5	W 2	40	0	Passing place on B8067
Heylipol Church lochan	18/01/02	D	7	C	7.5	SE 4	80	0	MacFadyen's barn

Annex 3. WHITE-FRONTED GOOSE CORE ROOST AREA 3 – LOCH RIAGHAIN AND VAUL BOGS
Summary of data collected on Tiree, January to March 2002.

Roost Site	Date	Roost/ Dawn	Total Count	Comp/ Partial	Temp. (°C)	Wind	Cloud (%)	Rain	Vantage Point
Vaul bogs SW lochans	13/01/02	D	110	C	10.0	S 5	100	0	Gott Farm House
Vaul bogs SW lochans	13/01/02	R	114	P	10.5	SSW 2	20	0	End of Vaul track
Vaul bogs SW lochans	14/01/02	D	64	C	10.0	S 4	100	light rain	End of Vaul track
Vaul bogs area	13/02/02	R	0	C	4.0	NE 1	10	0	End of Vaul track
Vaul bogs area	14/02/02	D	0	C	7.5	SW 3	100	0	End of Vaul track
Vaul bogs area	11/03/02	R	0	C	7.0	SW 3	100	rain	End of Vaul track
Loch Riaghain	12/01/02	R	33	P	9.5	S 5	100	light rain	Gott Farm House
Loch Riaghain	13/01/02	D	69	C	10.0	S 5	100	0	Gott Farm House
Loch Riaghain	12/02/02	R	0	C	8.5	0	95	drizzle	Gott Farm House
Loch Riaghain	13/02/02	D	13	C	7.0	NE 3	40	0	Gott Farm House
Loch Riaghain	14/02/02	D	4	C	7.5	SW 3	100	0	End of Vaul track
Loch Riaghain	08/03/02	R	0	C	6.0	NW 5	90	squalls	Gott Farm House
Loch Riaghain	09/03/02	D	7	C	5.0	W 3	70	squalls	Gott Farm House
Loch Dubh	12/03/02	D	42	C	4.5	N 3	10	0	End of Vaul track
Loch Dubh SE of	13/01/02	R	20	C	10.5	SSW 2	20	0	End of Vaul track

Annex 4. BARNACLE GOOSE CORE ROOST AREA 1 – THE REEF/AN FHAODHAIL, CNU LOCHANAN, LOCH RIAGHAIN AND VAUL BOGS. Summary of data collected on Tiree, January to March 2002.

Roost Site	Date	Roost/ Dawn	Total Count	Comp/ Partial	Temp. (°C)	Wind	Cloud (%)	Rain	Vantage Point
Reef/An Fhaodhail	10/01/02	R	0	C	8.5	S 4	100	0	Halfway along Bluff
Reef/An Fhaodhail	11/01/02	D	0	C	9.0	S 4	100	rain	E end of Bluff enclosure
Reef/An Fhaodhail	16/01/02	D	1100	C	10.0	SW 3	100	drizzle	Balephetrish Hill
Reef/An Fhaodhail	17/01/02	D	1000	C	7.0	SW 1	30	0	End of Orisgal road
Reef/An Fhaodhail	10/02/02	R	288	P	7.0	SE 2	90	0	W end of Bluff
Reef/An Fhaodhail	11/02/02	D	211	P	9.0	W 6	60	showers	W end of Bluff
Reef/An Fhaodhail	05/03/02	R	0	C	9.0	WSW 5	100	light rain	W end of Bluff
Reef/An Fhaodhail	06/03/02	D	218	C	10.5	W 5	100	showers	W end of Bluff
Loch Ghrianal	13/01/02	D	200	C	10.0	S 5	100	0	Gott Farm House
Loch Ghrianal	13/01/02	R	500	C	10.5	SSW 2	20	0	End of Vaul track
Loch Ghrianal	13/02/02	R	60	C	4.0	NE 1	10	0	End of Vaul track
Loch Ghrianal	14/02/02	D	0	C	7.5	SW 3	100	0	End of Vaul track
Loch Ghrianal	09/03/02	D	500	P	5.0	W 3	70	squalls	Gott Farm House
Pool NE of Balephetrish Hill? ¹	05/03/02	R	500	C	9.0	WSW 5	100	light rain	W end of Bluff
Loch nan Ob? ¹	11/02/02	R	450	C	9.0	SW 4	60	0	Balephetrish Hill
Vaul bogs area	11/03/02	R	0	C	7.0	SW 3	100	rain	End of Vaul track
Vaul track end	12/03/02	D	430	C	4.5	N 3	10	0	Vaul track

(continued on next page...)

Annex 4. (continued) BARNACLE GOOSE CORE ROOST AREA 1 – THE REEF/AN FHAODHAIL, CNU LOCHANAN, LOCH RIAGHAIN AND VAUL BOGS. Summary of data collected on Tiree, January to March 2002.

Roost Site	Date	Roost/ Dawn	Total Count	Comp/ Partial	Temp. (°C)	Wind	Cloud (%)	Rain	Vantage Point
Cnu Lochanan NW lochan	14/01/02	R	88	C	8.0	W 3	25	showers	Cottage NE of B8068
Cnu Lochanan N? ¹	12/02/02	D	420	C	8.5	WSW 4	30	0	Balephetrish Hill
Cnu Lochanan S	17/02/02	R	13	C	7.0	SW 4	50	0	Cottage NE of B8068
Cnu Lochanan bogs area	19/02/02	D	0	C	5.0	NW 1	80	0	Cottage NE of B8068
Cnu Lochanan S	06/03/02	D	428	C	10.5	W 5	100	showers	W end of Bluff
Cnu Lochanan S	06/03/02	R	72	C	7.0	W 5	50	0	Cottage NE of B8068
Cnu Lochanan S	07/03/02	D	31	C	7.5	W 6	20	0	Cottage NE of B8068
Cnu Lochanan S	08/03/02	R	28	P	6.0	NW 5	90	squalls	Gott Farm House
Vaul bogs north	14/01/02	D	421	C	10.0	S 4	100	0	End of Vaul track
Loch Riaghain	12/01/02	R	0	C	9.5	S 5	100	light rain	Gott Farm House
Loch Riaghain	13/01/02	D	15	C	10.0	S 5	100	0	Gott Farm House
Loch Riaghain	12/02/02	R	0	C	8.5	0	95	drizzle	Gott Farm House
Loch Riaghain S shore	13/02/02	D	190	C	7.0	NE 3	40	0	Gott Farm House
Loch Riaghain	08/03/02	R	0	C	6.0	NW 5	90	squalls	Gott Farm House
Loch Riaghain	09/03/02	D	0	C	5.0	W 3	70	squalls	Gott Farm House
Loch na Gile SW shore	15/01/02	D	125	C	6.0	W 4	80	showers	Cottage NE of B8068
Loch Dubh	14/01/02	D	80	C	10.0	S 4	100	light rain	End of Vaul track

¹ Suspected roost site: exact location unknown.

Annex 5. BARNACLE GOOSE CORE ROOST AREA 2 – SOA AND CARSAMULL
 Summary of data collected on Tiree, January to March 2002.

Roost Site	Date	Roost/ Dawn	Total Count	Comp/ Partial	Temp. (°C)	Wind	Cloud (%)	Rain	Vantage Point
Carsamull	10/01/02	R	360	P	8.0	S 3	80	0	End of Ruaig road
Carsamull	11/01/02	D	585	C	9.5	SSW 4	100	0	End of Ruaig road
Carsamull	09/02/02	R	45	C	4.0	SW 1	70	0	Tip of Point Field
Carsamull	10/02/02	D	480	C	7.0	W 2	50	0	End of Ruaig road
Carsamull/Point Field beach	12/03/02	R	560	C	4.0	NW 3	20	0	Tip of Point Field
Carsamull/Point Field beach	13/03/02	D	791	C	1.5	SW 1	50	0	Tip of Point Field
Soa	10/01/02	R	0	P	8.0	S 3	80	0	End of Ruaig road
Soa	11/01/02	D	156	C	9.5	SSW 4	100	0	End of Ruaig road
Soa	09/02/02	R	504	C	4.0	SW 1	70	0	Tip of Point Field
Soa	10/02/02	D	90	C	7.0	W 2	50	0	End of Ruaig road
Soa	12/03/02	R	0	C	4.0	NW 3	20	0	Tip of Point Field
Soa	13/03/02	D	0	C	1.5	SW 1	50	0	Tip of Point Field