

# **The Breeding Ecology of Great and Arctic Skuas on Handa Island**



## **Handa Island Skua Monitoring Programme Final Report 2012**

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Cover photo - Great Skua with rabbit on Chapel Beach, Handa Island 2012 by Tom Guerrier

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Laura Cunningham & Thomas Plant

## 1. Summary

2012 marked the tenth continuous year of the Handa Island Skua Monitoring Project. The productivity of Great Skuas (*Catharacta skua*) and Arctic Skuas (*Stercorarius parasiticus*) was determined, and chicks were ringed with BTO and Darvic colour rings. The diet of the Great Skuas was not studied, and no all island count of Great Skuas was conducted this year. The latter will be conducted once every three years and is next due in 2013.

Overall 2012 proved to be a successful and productive year for both Great and Arctic Skuas on Handa. The productivity of Great Skuas was monitored by focussing on a representative sample of 71 pairs (estimated to be one third of the total number of breeding pairs) across 2 study sites with 36 pairs in site 1 and 35 pairs in site 2. Over both study sites Great Skua productivity was 0.79 chicks fledged per pair, with site 2 showing higher productivity (0.83) than site 1 (0.75).

All of the Arctic Skua pairs were monitored, with a total of 13 pairs breeding on the island, and a further 2 pairs holding territories. 14 chicks survived until the end of the study period giving a productivity of 1.08.

12 Arctic Skua chicks were fitted with BTO and white Darvic rings (with black lettering). A further 2 chicks were fitted with BTO rings only. 111 Great Skua chicks were ringed with both BTO and black Darvic rings (white lettering) and a further 6 chicks with BTO rings only.

Towards the end of the study period adult Arctic Skuas with colour rings were sighted on the island. Resightings of ringed Great Skuas were recorded throughout the study period, on territories, at the club site in Site 2 and on and around Swaabie Loch

### 1.1. Outputs

A summary of the breeding results were provided for the annual Handa Rangers report with the full report being posted on the Handa Island Skua Project website. <http://www.handaskuas.org>.

Census and productivity data were also uploaded to the website of the JNCC seabird monitoring programme <http://jncc.defra.gov.uk/page>

A team from Tigress Productions visited the island to film a short piece on Great Skuas for the BBCs 'The One Show' in June, which was broadcast on 1st October 2012, reaching an estimated audience of 5.5 million viewers.

Previous reports of the Handa Island Skua Project, and other research and monitoring results are available at <http://www.handaskuas.org/research>

## 2. Methods

Claire Smith and Laura Cunningham began to map Great Skua nests on the 26<sup>th</sup> of May. Laura Cunningham monitored continuously until the 20<sup>th</sup> of August when all fieldwork was complete and nests had either successfully fledged or failed. Andrew Ramsay of the Highland Ringing Group visited on 5 separate occasions to assist with finding and ringing chicks, and was often accompanied by Nigel Richards. Laura was regularly assisted by Paul McDonald, Handa Island Ranger and fellow volunteers Thomas Plant, Duncan Leckie, Carol Hogan and Pranav Sharman.

Methods for locating and marking nests, monitoring productivity and recording post-fledging mortality were consistent with previous seasons (Jones, 2003; Smith & Jones, 2004, 2005, 2006, 2007; Jones, Green & Smith, 2008 & 2009). All Arctic Skua nests and a sample of 71 Great Skua nests (see APPENDIX) were monitored across 2 study sites. In previous years Study Site 1 has been consistently less productive than Study Site 2, which contains fewer breeding pairs of Greater Black Backed gulls. See Jones 2003 for a detailed methodology and Smith & Jones 2004 for a detailed explanation of selection of study sites.

The length and breadth of all eggs were measured to the nearest 0.5mm using callipers and egg volume calculated using  $0.00048 \times \text{length} \times \text{breadth}^2$  (Coulson, 1963). Lay-dates were estimated for all nests of known hatching date, by subtracting the gestation periods of 28 and 25 days for Great and Arctic Skuas respectively (Hamer, 2001; Phillips, 2001).

Birds present at club and bathing sites were counted opportunistically throughout the season. Increased effort was placed on identifying colour-ringed birds as the numbers returning to the island increase to build up a picture of recruitment.

## 3. Results

### 3.1 Population

#### Great Skua

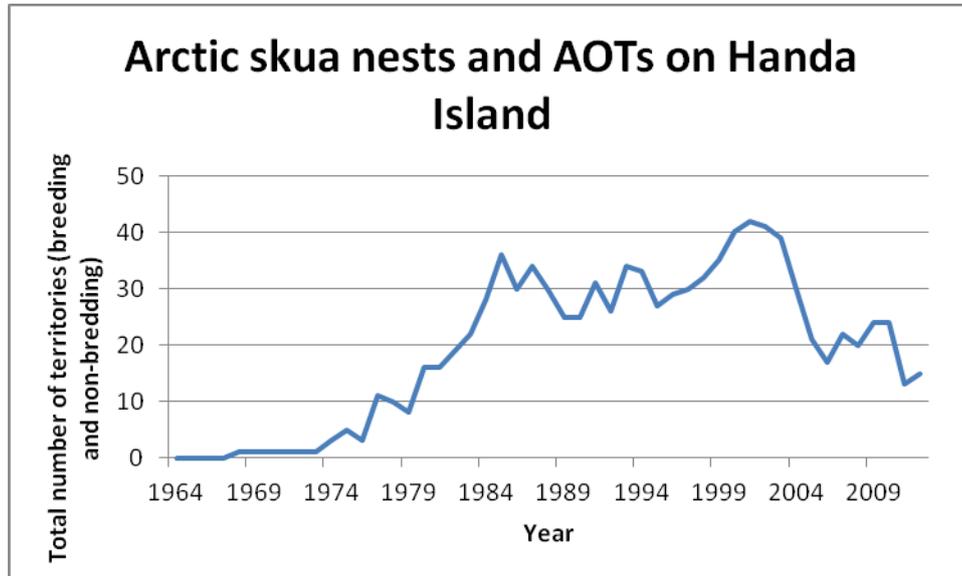
An all island count was not carried out in 2012, 249 apparently occupied territories (AOTs) were recorded in 2010 (Smith *et al*, 2010). The Club Site within Study Site 2 was well attended throughout the season with a maximum recorded count of 26 Great Skuas on June 13th. Swaabie Loch was used for bathing, with a maximum number of 70 Great Skuas recorded on June 4th. Great Black backed Gulls (including newly fledged chicks) also used Swaabie Loch for bathing alongside Great Skuas. Towards the end of the season, Great Skua fledglings were seen at both the club site in Study Site 2 and at Swaabie Loch.

#### Recruitment

At least 4 birds ringed as chicks on Handa bred on the island in 2012. A further 20 colour-ringed birds aged 3 to 8 years were recorded on the island throughout the study period. (See Section 4 – Ringing) One breeding female was at least 27 years old.

## Arctic Skua

A total of 13 Arctic Skua nests plus 2 AOTs were present on Handa in 2012. The number has declined in recent years from a stable number in the region of 30-36 pairs between 1985 and 2003 (*Figure 1*). Most Arctic Skua territories were located in the south east region of the island, between Bothy Loch and Otter Point, with 3 nests and 1 AOT out with this area (*Appendix 1*).



**Figure 1:** Number of Arctic skua territories on Handa Island since 1964

### Colour Phases

Of the 30 Arctic Skuas either breeding or holding territory 22 (73%) were dark phase and 8 (27%) were light phase adults. Pairs were composed of 1 light/light pair, 8 dark/dark pairs and 6 light/dark pairs.

### Recruitment

From the 19<sup>th</sup> of July onwards, the number of Arctic Skuas appeared to increase. During this time four Arctic Skuas aged 3-4 years and ringed as chicks on Handa were present and a club site was established north-west of Traigh Shourie in H3 at this time, for the first time since 2007 (Smith & Jones, 2007).

### 3.2 Breeding Statistics

**Table 1: Breeding statistics of Great and Arctic skuas on Handa 2012.**

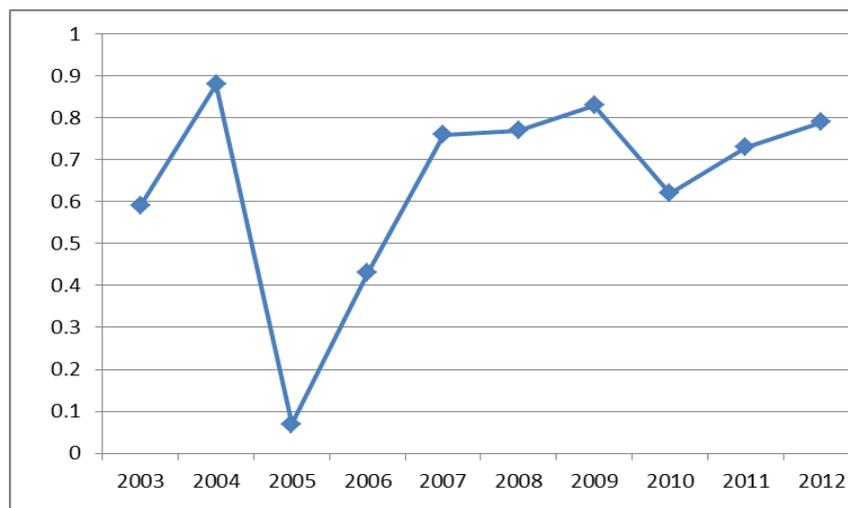
Sample sizes are in parentheses.

	<b>Breeding pairs monitored</b>	<b>Mean lay date</b>	<b>Mean alpha egg volume<sup>1</sup> (ml)</b>	<b>Mean clutch size</b>	<b>Hatching success (%)</b>	<b>Fledging success<sup>2</sup> (%)</b>	<b>Chicks fledged per pair</b>
Great skua Study Site 1	36	20/05/2012	79.40 (36)	1.89 (36)	89.7 (36)	38.2 (36)	0.75 (36)
Great skua Study Site 2	35	16/05/2012	79.85 (34)	1.89 (35)	87.9 (35)	48.3 (35)	0.83 (35)
Great skua total 2012	71	18/05/2012	79.62 (70)	1.89 (71)	88.8 (71)	45.4 (71)	0.79 (71)
<i>Great skua mean 2003 – 2011</i>	76.13 <sup>3</sup>	23/05	79.61	1.78	84.23	41.51	0.63
Arctic skua total 2012	13	01/06/2012	46.79 (13)	2 (13)	73.08 (13)	73.68 (13)	1.08 (13)
<i>Arctic skua mean 2003-2011</i>	<b>20</b>	<b>05/06</b>	<b>44.93</b>	<b>1.77</b>	<b>70.66</b>	<b>61.93</b>	<b>0.75</b>

<sup>1</sup> For both species we used the egg with the greatest volume (Furness, 1987).

<sup>2</sup> Great skuas were considered fledged if still alive after 40 days; Arctic skuas were considered fledged if still alive after 28 days.

<sup>3</sup> Mean of 2004-2010 -Exception: 202 pairs monitored in 2003



**Figure 2: Great skua productivity(chicks fledged per pair) 2003-2012.**

### **Lay-dates**

As in 2011, the mean lay-date was 18 May, this is the earliest mean lay-date recorded since this study began. It is six days earlier than the 2004-2010 mean and two days earlier than 2010.

### **Causes of failure**

In study site 1 six eggs did not hatch (addled), and one egg was crushed in the nest. Three large chicks were found predated. It is unknown whether these individuals died of natural causes and were subsequently eaten, or were killed by other Great skuas. 31 chicks were never found (most of these young chicks <10 days) and therefore the cause of death was uncertain, although likely predated by other Great skuas. Two chicks were never seen, however hatching success was assumed from signs at the nest and it is likely these chicks were predated within days of hatching.

In study site 2, seven eggs did not hatch and one egg was predated. The remains of one large chick was found in a neighbouring territory. 27 chicks were never found. Two chicks less than a week old were found dead close to their nests for which there was no obvious cause of death.

### **Diet**

Casual observations were made of Great Skua diet. The remains of sandeels, rabbits, puffins, kittiwakes, guillemots, crabs and various unidentified chicks were commonly found in territories. An arctic tern ring was recovered from a Great Skua pellet. Great Skuas were observed taking guillemot chicks from the cliffs. Toward the end of the season the remains of several Great Skua chicks, almost at fledging stage, were found. A possible explanation is that the high productivity of seabirds on Handa this year allowed a large number of Great Skua chicks to thrive initially, however as the seabirds left the cliffs and food became scarce, Great Skuas struggled to find enough food and resorted to cannibalising weak individuals. It was not possible to determine if these chicks had died first and were subsequently eaten, or were killed by fellow Great Skuas. One Great Skua discovered the burn used as a fridge by workers on the island and continuously obtained meat products from this source.

### **Arctic Skuas**

#### **Causes of failure**

One egg was predated, five eggs did not hatch and one chick died hatching. One chick was found predated in a nearby great skua territory shortly after fledging. Four chicks were never found.

One Arctic Skua nest, with a clutch size of 3, was located on the boundary of Study Site 1 (grid square F5) surrounded by Great Skua territories. Three or more adults were regularly observed defending this nest. On the 20<sup>th</sup> of June four light phase adults were present and on July 2nd one dark phase adults and two light phase adults were present. This may be an example of co-operative defence, or two females using the same nest. However the smaller than average egg volumes suggest that one female laid all 3 eggs. This is unusual, with clutches of 3 generally thought to have been laid by two females (Hamer, 2001) and has not

been observed on Handa in previous years. The nest failed at the egg stage, probably due to the inability of the adults to incubate three eggs successfully (having only two brood patches), compounded by the location of the nest within the Great Skua colony, requiring constant aerial defence. O’Donald (1983) described how one female Arctic Skua on Fair Isle consistently laid clutches of three eggs each year which generally failed to hatch.

One Arctic Skua nest was situated very close to the path (grid square G3) See map 1. The adults spent a significant amount of time off the nest due to disturbance from humans. These eggs also failed to hatch.

#### 4. Ringing

13 Arctic Skua chicks were fitted with BTO and white Darvic rings (with black lettering). A further 2 chicks were fitted with BTO rings only. 111 Great Skua chicks were ringed with both BTO and black Darvic rings (white lettering) and a further 6 chicks with BTO rings only.



(a)



(b)

**Figure 3: The style of Darvic rings deployed on (a) Great skua and (b) Arctic skua pulli on Handa in 2012.**

Since annual monitoring started in 2003, 1078 Great skuas have been fitted with BTO rings and 742 colour-ringed. 157 Arctic chicks have been fitted with BTO rings and 99 colour ringed (Table 3).

Year	Great skua		Arctic skua	
	BTO	Colour	BTO	Colour
2003	106	0	27	0
2004	117	50	29	0
2005	22	22	12	12
2006	47	47	2	2
2007	121	88	13	13
2008	188	63	5	5
2009	138	138	24	24
2010	111	111	16	16
2011	113	112	14	14
2012	115	111	15	13
<b>Total</b>	<b>1078</b>	<b>742</b>	<b>157</b>	<b>99</b>

**Table 3: The numbers of Great and Arctic skuas ringed since 2003.**

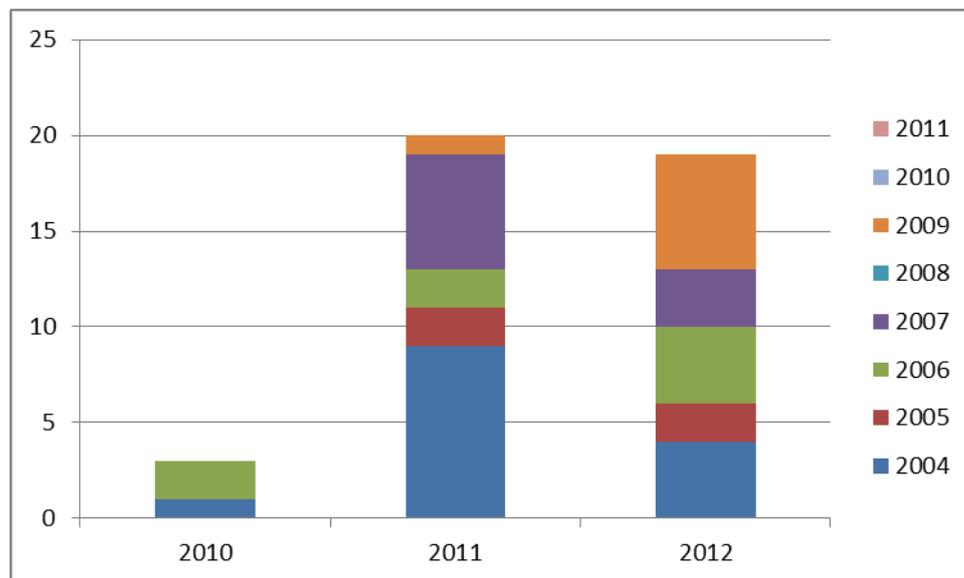
## 4.1 Re-sightings and recoveries

### Great skua

#### *Within the Colony*

A great skua found dead on the 4 August which was identified as being ringed as a chick in 1986 on Hoy, making it 26 years old at time of death.

Two birds ringed as adults by Bob Furness were present during the breeding season. One ringed in 1989 (red/orange), making it at least 27 years old, bred in Study Site 1 (grid square F5), producing a clutch of 1 egg, which hatched and then failed early. Another colour ringed individual was seen on 27 June in grid square D9 with green over yellow colour rings. It is probable this bird was ringed in 1993 and the orange ring has faded to yellow over time. This bird was a minimum of 23 years old in 2012.



**Figure 4:** Number of Great skuas colour-ringed as chicks returning to Handa 2010-2012

Nineteen birds were identified as individuals in the colony during the 2012 breeding season. Three birds were confirmed as breeding. Ten were recorded on the club-site and so were not likely to be breeding in 2012, six of these were 2009 birds so at three years old were likely to be on their first return to the colony. Three of the birds at the club site were only recorded in July and August so may have been failed breeders. One 2006 bird was recorded at Swaabie loch so it was not possible to determine its breeding status and the remaining birds were on the coast when their colour-rings were read so it was not possible to determine their breeding status.

During filming for The One Show on the 27<sup>th</sup> of June a Great Skua with colour rings (left leg from top to bottom orange, green, yellow, right leg white) was present at Swaabie Loch. This individual was only sighted on this occasion. This bird was not ringed on Handa, at the time of writing it has not been possible to determine where this bird was ringed.

### Away from the Colony

Three birds were reported away from the colony. A 2011 bird on the 22 June over Colonsay. A 2004 bird was found dead on Aird Thunga, Lewis and a 2007 bird at Gairloch on 8 July.

### Arctic skua



**Figure 5:** An un-ringed light phase with dark phase I2 ringed as a chick on Hand in 2008. Prospecting in H3 at the end of the season.

Four Arctic skuas ringed as chicks on Handa were seen between 19 July and 15 August. G8 and I3 ringed in 2008 and E2 and E6 ringed in 2009.

## 5. Discussion

The productivity of both Great and Arctic Skua's on Handa Island was higher in 2012 when compared with the average productivity of years 2004 to 2012. Great Skua productivity in 2012 was 0.79 compared to the 2004-2012 mean of 0.65. Arctic Skua productivity in 2012 was 1.08 compared with the 2004-2012 mean of 0.78.

The high productivity of both Great and Arctic Skuas may be attributed to several factors. The weather conditions were favourable during spring and summer. The mild conditions may have contributed to the early lay dates and high hatching success observed in 2012. Productivity was also high for the other seabird species on Handa in 2012 (Handa Island Ranger Report, 2012). The high number of seabird eggs and chicks will have provided an abundant food source for the Great Skuas. Arctic terns did very well on Handa Island in 2012 (Handa Island Ranger Report, 2012). The high number of arctic terns present on the island will have enabled the Arctic skuas to benefit by kleptoparasitism.

Another factor contributing to the high productivity observed in the Great Skuas may be the reduction in numbers of Great Black Backed Gulls nesting within the Skua colony. There were no Great Black Back Gull nests in Study Site 2 (nearest in grid square H6 or 7) and only 3 nests were located in Study Site 1 (grid squares C3, E4, F5). This is a decline from 4 in study site 2 and 10 in study site 1 in 2004 (Smith & Jones, 2004). Great skuas now breed on all suitable habitat on the island and 2012 saw the establishment of pairs in the South-East for the first time. Although individuals and pairs have been seen in this area for the last few years, with a resident individual at the bothy since 2011. Colour-ringed birds from every

year except those too young to return have been seen back at the colony, the exception being 2008.

As no Arctic Skuas ringed as chicks on Handa have as yet bred on the island, the lack of recent recruitment into the colony suggests that Arctic Skuas breeding on Handa are experienced pairs able to successfully incubate, feed and defend young.

Arctic skua chicks were first ringed on Handa in 2005. Surviving Arctic skua chicks hatched and ringed on Handa (20 are known to have made it off the island between 2006 and 2009) would be beyond the normal breeding age range of 3 to 7 years. As yet, no Arctic skua chicks ringed on Handa have returned to breed and no sightings of Handa colour-ringed birds breeding elsewhere. However, 2012 saw the first return of colour-ringed Arctic skuas to breed within the colony with birds aged 3 and 4 years prospecting at the end of the season. These individuals may be immature birds or failed breeders moving southward for winter. However it is also known that some immature Arctic Skuas migrate north from their wintering ground behind the breeding adults, and move south again before the end of the breeding season, often visiting their natal colony and establishing themselves at club sites (Furness, 1987). Alternatively immature Arctic Skuas may wander extensively, prospecting possible breeding areas. It will be interesting to see if these individuals (White G8, I3, E6 and E2) breed on Handa next year and if the number and distribution of pairs changes.

Arctic skua populations in Scotland have declined 37% between 1985 and 2002 and 58% between 2000 and 2011 (JNCC 2012). Handa's population has declined 36% over the same period with a slight increase in 2012. The low numbers of Arctic skuas in the colony leaves the remaining pairs vulnerable to attack and predation by Great Skuas. Co-operative defence was observed on numerous occasions. However in 2012 Great Skuas held territories within the Arctic Skua colony (see map 3) for the first time since the project began. One pair bred successfully (grid square I3) while the other pair failed (grid square I4, close to the path). No Arctic Skuas bred in the northwest region of the island in 2012, however one pair did hold a territory slightly south of puffin bay.

## **6. Funding**

In 2012 the Handa Island Skua Project received a small grant from the Scottish Ornithologists Club. Scottish Wildlife Trust also supported the project by accommodating Claire Smith, Laura Cunningham and members of the Highland Ringing Group.

## **7. Acknowledgements**

We are grateful to Dr Jean Balfour, the Handa Island Management Committee and Scottish Wildlife Trust (SWT) for their continued support of the project and allowing us the incredible privilege of working on Handa. To Andrew Ramsay and Nigel Richards from the Highland Ringing Group, for training, advice and supplying BTO and colour rings. To Paul McDonald, Handa Island Ranger, for continuous moral support and great company, along with fellow island volunteers Thomas Plant, Duncan Leckie, Carol Hogan and Pranav Sharman, always willing to help find elusive chicks and assist with ringing. Thanks to Thomas Plant for producing the map. To Sven Rasmussen for supporting the project, thank you. Thanks also to Paul and Roger for trips to the mainland. The project relies on the continued support and generosity of everyone above. Finally thank you to all the short term volunteers who helped in the field, and for providing entertainment and meals!

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