



A summary of research projects undertaken on St Kilda in 2003

Introduction

This annual newsletter is intended to inform non-specialists of the varied research projects which are being carried out on St Kilda. It does not include reports on the day-to-day monitoring work of NTS staff based on the archipelago, which is varied and time-consuming. For example, cetacean and migrant bird records are kept, upstanding structures are monitored for decay, coastal erosion is monitored across Village Bay and the change in extent of bracken is recorded across the crofts. This work is reported in the annual reports produced by the St Kilda Ranger and St Kilda Archaeologist (see contact details below).



Archaeological monitoring work on Boreray

Fuller reports on the work outlined in this newsletter are either already in preparation as annual reports which will be available from the authors, or will appear in academic journals in the future. There are also certain research projects that are not reported here – in particular, the vegetation studies, and research into pollutants in the soils of St Kilda.

Any comments or suggestions on the subject of research projects on St Kilda should be sent to:

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Any errors resulting from the editing of this
newsletter are the fault of Jill Harden
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Seabird Monitoring on St Kilda 2003

In 2003 the Joint Nature Conservation Committee (JNCC) undertook its triennial monitoring of breeding seabirds on St Kilda. This is part of the Seabird Monitoring Programme that JNCC coordinates throughout the UK. On St Kilda it is supplemented by measurements of breeding success of fulmars and kittiwakes, which has been undertaken annually by the warden.

Counts were made of razorbills, guillemots and fulmars in 25 sub-sections of cliff ('plots') around Hirta. Plots are defined by natural features such as cracks, and vegetation patches (as shown below) and are standardised so that counts can be compared between years.



A cliff plot on Hirta

To put the results into a wider context, we can compare total numbers of breeding seabirds on St Kilda (rather than sample plots) using results from complete UK censuses undertaken in the mid-1980s and in 1998-2002

The complete censuses of St Kilda show that fulmar numbers increased by 7% between 1987 and 1999, although increases earlier in the century had been vastly greater, suggesting a tailing-off in the rate of increase. Most dramatic, however, is the decline in kittiwake breeding numbers on St Kilda - a decrease of 50% between 1987 and 1999. Comparison of the results of the triennial plot counts of 1999 and 2003 give evidence of more recent changes: fulmar numbers in most plots declined slightly, suggesting that the whole St Kilda population may now be declining, following past increases. Evidence of a continuing decline in kittiwakes was obtained; the number of nests on Hirta in 2003 was about 50% less than in 1999,

though recent changes on the other islands of the archipelago are unknown. Razorbill numbers in plots increased slightly between 1999 and 2003, while those of guillemots were similar.

St Kilda holds the largest known colony of Leach's petrels this side of the Atlantic: the first ever census of the species in the UK revealed 45,400 occupied 'sites' (equivalent to pairs) in the islands in 1999/2000, with 27,700 on Dun alone. In 2003 a repeat census of Dun was done, which revealed only 14,400 sites - a 48% decline since 1999. As to the possible causes of this decline, one line of enquiry is the effect of predation by great skuas, which have increased dramatically in number on St Kilda over recent decades. It has been estimated by a separate study that great skuas consume 15,000 Leach's petrels per year; indeed, the decline seen on Dun, if equalled elsewhere on St Kilda, is of this order of magnitude.

However, there is much about the Leach's petrel and its apparent decline on Dun that we do not know. For example, are skuas taking breeding or non-breeding petrels, as both are likely to be available to them? The decline may have been the result of a year in which the petrels 'chose' not to breed rather than an actual population decline. Further, we know nothing of the breeding success of the petrels on St Kilda and how this relates to food availability. There is clearly much more research to be done!

Ian Mitchell & Matt Parsons, JNCC, Aberdeen

St Kilda Artefacts and Manuports Project

In July Andrew Fleming, Professor of Archaeology at the University of Wales Lampeter, carried out the first campaign of a new season of work on the prehistory of St Kilda. Previous work on St Kilda, with Dr Mark Edmonds of the University of Sheffield, studied the prehistoric stone quarries on the slopes of Mullach Sgar, to the south-west of Village Bay. The production of dolerite hoe blades was also reviewed, and their distribution throughout the Village Bay area noted - most of them ending up in the recent buildings we see today - cleits, walls and blackhouses. The hoe blades probably date mostly from the Neolithic and earlier Bronze Age (c. 3500-1500 BC), as they do in the Northern Isles.

There are other interesting stones in the standing structures of Village Bay, and Andrew has returned to study them. Many stones, mostly dolerite, have been brought up from the beach and used without further modification ('manuports').



A typical group of stone tools found during the repair of a drystone structure

They vary considerably in size. The big ones may have been used as seats, pillows or anvils; smaller ones may have been thatch-weights or loom-weights. Some small, long beach pebbles have been used as pestles, as they have been visibly ground down at one or both ends; sometimes there is impact damage suggesting that they were also used as hammers. There are also fire-cracked beach pebbles, forming a thin 'background' scatter across the Village Bay structures. A couple of specific concentrations of fire-cracked pebbles, probably come from 'burnt mounds' - usually interpreted as indicators of late prehistoric settlement sites. To date, only a few burnt mounds have been identified in the Western Isles; but at least one likely one, almost intact, has now been identified in Village Bay. There are also a few fragments of flat querns, and possible rubbers (which would have been used with them); these finds may go a little way towards picking up the other end of the intensive agriculture represented by the hoe blades.

Interpreting the distribution of these finds is a complex matter; one has to try to understand how far their present day find-spots reflect where they were used in their heyday. Are they from demolished structures? Have they been spread around in recent times, in baskets of compost? Do heavy stones behave like lighter ones in this respect? - and so on. There *are* some interesting patterns, however, and involving other experts in further investigations into the under-explored prehistory of St Kilda is underway.

Andrew Fleming, Lampeter

Soay Sheep Project Activities in 2003

Our spring expedition (March – May) conducted standard censuses of the sheep living in Village Bay and of the Village Bay vegetation communities. 217 lambs were born to Village Bay ewes of which 148 were caught, weighed, sampled and tagged, and 22 died of natural causes before tagging.



Soay lambs at rest

The Summer expedition (July – September) conducted standard censuses of sheep and vegetation, and also caught 289 Village Bay sheep for measurement and sampling. 42 of the 47 lambs missed in the spring were tagged. The island population census in August counted 1568 sheep, up from 907 the previous year and giving one of the highest rates of increase ever recorded for a large vertebrate. Despite this number of sheep, benign climatic conditions mean that forage is abundant this year.

The Autumn expedition (October – December) is still in progress at the time of writing. It has conducted standard censuses of sheep and is now observing rutting behaviour and catching rams that immigrate to Village Bay at this time, who are potential fathers of Village Bay lambs.

Project achievements for this year include:-

1. A substantial effort by Kate Byrne in Edinburgh to DNA profile Village Bay sheep at more genetic markers means that we now have identified fathers for more than 2,500 Village Bay sheep that have lived over the years of the study. The resulting pedigree is one of the largest known for a free-living population and will allow important studies of the role of inbreeding in the population and the measurement of the extent to which characteristics of individuals are inherited.

2. To further our understanding of host-parasite relationship on St Kilda, Barbara Wimmer in Edinburgh has worked out a method for identifying which of nine worm species are laying eggs expelled in the sheeps' faeces. The eggs of most species are indistinguishable under microscopy; the new method uses species-specific DNA markers and hundreds of samples can be assayed very quickly. Meanwhile Barbara Craig, also in Edinburgh and studying the protozoan parasites of Soays, has positively identified *Cryptosporidium* on the island.

3. Ongoing studies of male rutting behaviour have revealed remarkable new insights into the highly promiscuous mating system of Soay sheep. In particular, work by Brian Preston at Stirling University has shown that rams are surprisingly selective in their choice of mates, preferring the heaviest and most fecund ewes.

4. After a long gestation, our book about the current phase of Soay sheep research will be published (allegedly) on December 18. Publication details are:-

Soay Sheep. Dynamics and Selection in an Island Population

Ed. T.H. Clutton-Brock and J.M. Pemberton
Cambridge University Press.

See <http://books.cambridge.org/0521529905.htm>

Josephine Pemberton & Jill Pilkington, Soay Sheep Project, Edinburgh

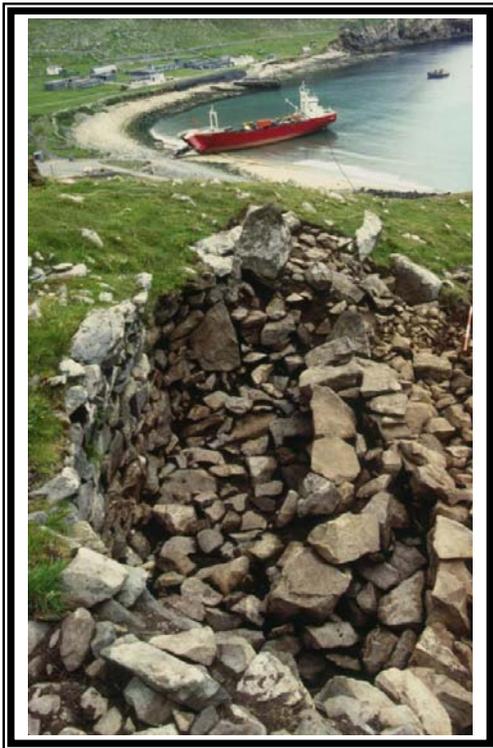
St Kilda 2003 excavation results

Excavations led by Glasgow University's Archaeological Research Division, on two adjoining terraces on the east-facing slopes of Mullach Sgar began in 1998, and were completed this year. The aim has been to investigate the character and date of a horned enclosure – similar to enclosures associated with the Amazon's House and other chambered structures in Gleann Mor – and to discover whether this was indeed the site of the medieval St Columba's chapel.

The excavations concluded in 2003 with the exploration of two areas to the east of the horned enclosure. Over the five seasons of excavation, several lengths of earlier walling had been found running up to, and in some cases beneath, the horned enclosure, indicating different periods of re-use and rebuilding. In their latest form, these walls defined a small, kidney-bean shaped structure that had been filled with decomposed organic material. Heather charcoal at the base of this midden was dated by radiocarbon to around AD980-1250, the

first-ever radiocarbon date from Hirta indicating activity here in the Norse to Medieval period.

The earlier walls in this complex were associated with Iron Age pottery (from around 300BC), and indeed the other main building excavated, to the east of the Norse/Medieval midden on the lower terrace, also dated to later prehistory. This was a small, oval, semi-subterranean building with corbelled walls, built into fossilised scree deposits. It had a paved floor and an elaborately terraced and revetted entranceway. It contained a number of stone tools, along with pottery dating to 200BC-AD100.



The Iron Age building

While no evidence was revealed for the site of St Columba's chapel, the evidence from the excavations, (which were carried out with assistance from Work Party members under the direction of archaeologists from the GUARD), has revealed that people were active on the slopes of Mullach Sgar over a very long period of time. Finding the remains of buildings from two such widely separated chronological periods - around 2,000 years ago and around 1,000 years ago - is a very exciting addition to our knowledge of the human occupation of Hirta in the distant past.

Olivia Lelong & Bob Will, GUARD, Glasgow

Dietary Specializations of Great Skuas on Hirta

The St. Kilda great skua population has increased rapidly in numbers over recent decades, and feeds extensively upon seabirds. An important factor to consider if we need to evaluate the impact of this predation on seabird populations is that skuas frequently show a considerable degree of individual dietary specialization. We therefore aimed to study the composition of the diet of breeding great skuas, the amounts taken and any possible causes of dietary specialization. Fieldwork was carried out on Hirta during the skua chick rearing period. Additionally, a census of great skuas was undertaken by counting apparently occupied territories (AOTs). The total number of AOTs was 165: 83 in Gleann Mor, 36 on Mullach Mor, 32 on Conachair and 9 on Oiseval.

Pellets were collected in these four main breeding areas and assigned to one of seven categories, including storm petrel (Leach's & European), fulmar, goose barnacle and fish. Total number of pellets collected was 2068. The percentages of the different types of prey were very different between territories and between locations. For example, the proportion of storm petrels in pellets from Gleann Mor was considerably higher than in the other breeding areas. This could be caused by the proximity of Gleann Mor skuas to the storm petrel colony in Carn Mor, but how and where skuas catch storm petrels is still uncertain.

If 50% or more of the pellets found on a territory were of one type, the resident birds were considered to be specialized foragers. In Gleann Mor, of the 23 territories prospected, 5 specialized on storm petrels. Mean storm petrel predation rate in this area was 1.16 /day, although it varied a lot between territories - from 0 to 4.7 storm petrels/day. So, the estimated total consumption of storm petrels by great skuas could be around 100 per day in Gleann Mor alone.

Previous papers published on this subject and our preliminary results clearly show that predation should be carefully monitored as any trend towards a higher intensity of predation is likely to influence the size of the populations of storm petrels on St Kilda. In particular, St Kilda holds the only large colony of Leach's storm petrels in Europe, and so this predation impact may influence bird biodiversity not only locally on St Kilda, but also at a European scale.

Ana de León, Eduardo Mínguez and Robert W. Furness, with funding from the EC Marie Curie Programme