



Scotland's National Nature Reserves

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The Story of Hermaness National Nature Reserve



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Foreword

Hermaness National Nature Reserve (NNR) stands at the most northerly point of Britain amidst the wild Shetland landscape and exposed to the harsh North Atlantic Ocean. Magnificent cliffs adorn most of the Reserve coastline and are host to more than one hundred thousand breeding seabirds - one of the largest seabird colonies in Britain.

The seabird colony is internationally important and supports particularly large numbers of gannet, puffin and the World's third largest colony of great skua. Kittiwake, guillemot and fulmar also breed on the Reserve in large numbers and during the summer, the seascape is alive with streams of busy auks and gannets providing food for their offspring.

Inland, blanket bog covers much of the terrain and secluded bog pools provide nesting habitat for internationally important numbers of breeding red-throated divers.

Hermaness is one of 58 NNRs in Scotland. Scotland's NNRs are special places for nature, where some of the best examples of Scotland's wildlife are managed. Every NNR is carefully managed both for nature and for people, giving visitors the opportunity to experience our rich natural heritage.

The Reserve Story contains background information about the Reserve, describing the wildlife interest, its land use history and management since it became a Reserve. How we intend to manage the Reserve in future years is outlined in a separate document, the Reserve Proposals. Your comments will be invited on the Reserve Proposals and this feedback will inform the production of the final Reserve Plan, which is the blueprint for management of the Reserve for the next few years.

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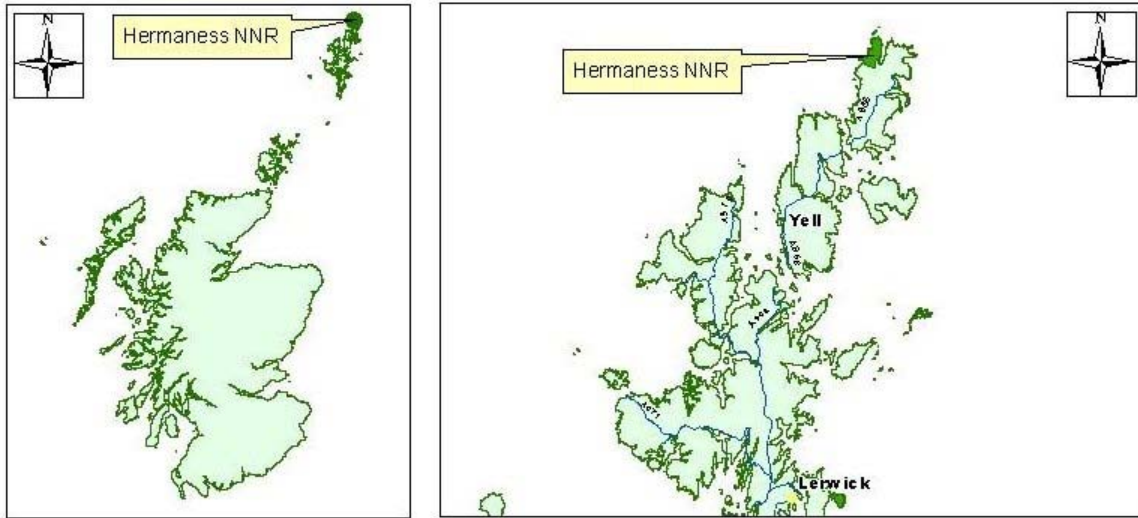
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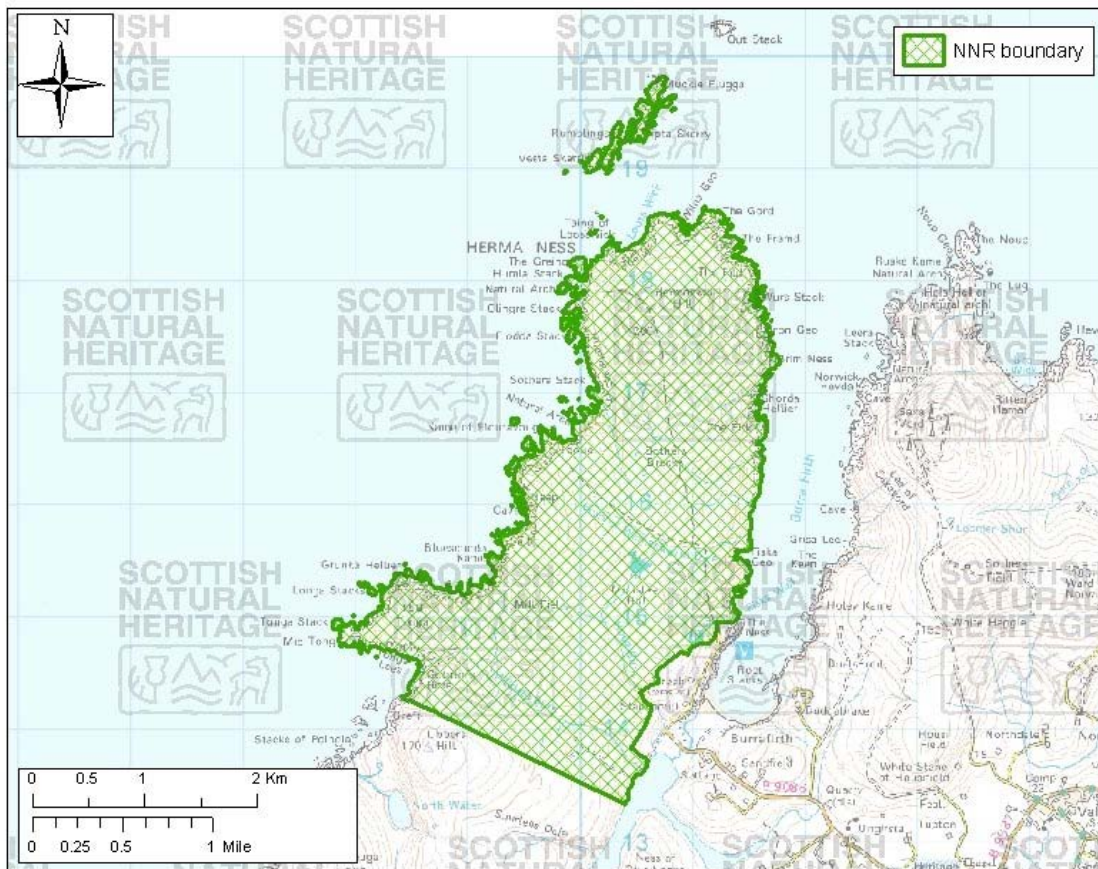
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Maps of Hermaness NNR

Location maps



Boundary of Hermaness NNR



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Map showing key locations at Hermaness NNR



1 Introduction to Hermaness NNR

Hermaness NNR is situated at the northern extremity of the Shetland Isles, at the northwest corner of the island of Unst, 95 kilometres (km) north of Lerwick. The Reserve extends over 965 hectares (ha) encompassing the whole of the Hermaness peninsula and including the rocky outpost of Muckle Flugga. Sheer cliffs, reaching a height of 170 metres (m) at The Neap, are a striking feature along the west side of the Reserve. The eastern side of the peninsula is lower and more sheltered, with cliffs rising to 100 m in the north but reaching only 20 m towards the head of Burrafirth. Hermaness Hill is the highest point on the Reserve at 200 m.

Erosion of the coastal cliffs by the wind and sea driven by westerly gales has shaped the characteristic coastline. The sea has exploited the faults and joins in the rocks to form geos and stacks, and has eroded caves and natural arches. The cliffs, stacks and the underlying inland rocks are predominantly gneiss formed under intense heat and pressure some 450 million years ago. Pink veins of granite can also be seen in the rock face. At Tonga, and at Greff just outside the Reserve, the cliffs and rock formations reveal crystals of staurolite and kyanite (two silicate minerals) – some of the best examples found in Britain.

It is the sea cliffs that provide a home for the Reserve's most important spectacle. During the summer, thousands of seabirds including gannets, puffins, fulmar, guillemot, kittiwake and shag return to nest on the exposed cliff faces. Their guano, which coats the cliffs in a white layer, and their raucous calling to one another means their presence is often smelt and heard well before they are seen. Great skuas also return to Hermaness each year and set about creating chaos amongst the cliff nesting seabirds with their constant aerial raids.

Inland, the Reserve is dominated by blanket bog, which provides habitat for breeding waders such as dunlin, golden plover and snipe, and the intensely territorial great skuas. Bog pools and small lochs also provide the seclusion preferred by nesting red-throated divers.

The climate in Shetland is influenced by Atlantic Ocean currents and weather patterns, and is known as hyper-oceanic. This means that the winters are mild but often stormy, whilst summers are cool and often windy with a high incidence of fog. Humid conditions prevail all year round. The coastal climate has a strong influence on the habitats found at Hermaness. The sea cliffs support salt-tolerant plants such as angelica and thrift, whilst the more sheltered eastern side of the Reserve is home to three species of rare hawkweeds, two of which are found only in Shetland.

People have been visiting Hermaness for its wildlife long before it became a NNR. The area has a long history of seabird conservation; the protection of the great skua, or bonxie as it is locally known, goes back as far as 1831, when there were only 3

pairs on Hermaness. Hermaness was declared a NNR in 1955 and provision for visitors now includes a visitor centre in the old lighthouse shore station at Burrafirth, close to the Reserve entrance, showing displays and information on the wildlife of Hermaness and Keen of Hamar NNR. There is also a boardwalk that takes visitors out onto the moorland and from here it is only about a 2 km walk out to the impressive seabird colonies on the west coast.



The gannetry at Saito viewed from the Neap

Hermaness has been designated for its wildlife interest at UK, European and international level. It forms part of the larger Hermaness, Saxa Vord and Valla Field Special Protection Area (SPA) which means that Hermaness is recognised as part of a European site of international importance and belongs to a Europe wide network of areas referred to as 'Natura' sites. This extremely important group of sites includes other seabird hotspots such as Skomer Island off the Welsh coast, the Portuguese Berlenga and Farilhões Islands, and Cape Corse Point, a Reserve in the north of Corsica. This reinforces the message that Hermaness can be considered as being amongst the best sites in Europe.

At a national level, Hermaness is designated as a Site of Special Scientific Interest (SSSI) and the Reserve forms part of the Shetland National Scenic Area (NSA). The

Tonga-Greiff area on the south-west coast of Hermaness is also a Geological Conservation Review site (GCR).

Table 1: Designations and qualifying features for Hermaness NNR

Designation	Special Protection Area	Site of Special Scientific Interest
	European	UK
Site Name	Hermaness, Saxa Vord & Valla Field	Hermaness
Species		
Red-throated diver	✓	
Seabird assemblage including:	✓	✓
Gannet	✓	✓
Great skua	✓	✓
Puffin	✓	✓
Guillemot ¹	✓	✓
Fulmar ¹	✓	
Shag ¹	✓	
Habitat		
Maritime cliff		✓
Geology		
Mineralogy		✓

¹ Hermaness supports more than 1% of the Great Britain population of these species but they qualify only as part of the SPA seabird assemblage.

Further detail on all these designations can be found in the appendices.

2 The Natural Heritage of Hermaness NNR

Earth Science

The rocks of Hermaness are formed from sediments (mud and sand) laid down in a shallow sea at the edge of an ancient continent. Around 450 million years ago this continent collided with another one, crumpling and folding the rocks into a chain of mountains along the collision zone. The rocks of Hermaness were buried deep under these mountains where they were subjected to heat and pressure. This altered them into the characteristic banded gneiss and schist we see today. The extreme geological activity also formed the granite veins easily visible in the cliffs at Neap and Saito, and the spectacular silicate crystals of kyanite and staurolite at Tonga and Greff.

The minerals kyanite and staurolite are characteristic of high intensity mountain-building environments. Kyanite is particularly significant as it forms within a distinct temperature and pressure range, and can be used by geologists to map ancient rock sequences and the conditions under which they were formed.

The Reserve also contains several features that point to the presence of a glacial lake during the last Ice Age (Flinn, 1992). The north and west of Hermaness are believed to have been beyond the northern edge of the ice-sheet, and consequently remained free from ice. Meltwater however trapped by the upward slope of the land along the west of the headland, formed a lake, referred to as the Milldale Glacial Lake. The lake-water overflowed to the west, across the main Hermaness ridge between Libbers Hill and Tonga, cutting the steep gorge that can be seen at Cat Houll. On the eastern flanks of the Reserve, the water also found an exit eastwards, under the ice-sheet, into Burrafirth. Evidence of its sub-glacial drainage channels can still be seen today on the eastern side of the headland between The Fidd and the Loch of Cliff to the south of the Reserve (Flinn, 1983).

It has taken a geological lifetime of tectonic upheaval, glaciation, fluctuating sea level, and exposure to the high energy environment of the Atlantic Ocean, to sculpt the ancient rocks and create the landscape of today.

Fauna and Flora

Birds

Hermaness is a mecca for seabirds, with over 100 000 breeding pairs of 15 different species, making up this internationally important seabird assemblage. The colonies of breeding great skua, gannet and puffin are also of international importance and numbers of guillemot, fulmar and shag at Hermaness all exceed 1% of the British population. Internationally important numbers of breeding red-throated diver also

return to Hermaness, Saxa Vord and Valla Field each year, making this area one of the most important strongholds for this striking, rare bird.

Great skua

There is little chance of missing the great skuas, or bonxies, of Hermaness during the spring and summer. There are around 750 bonxie territories on the Reserve, tribute to the conservation effort started by Dr Laurence Edmondston of Bunes in 1831, when there were just 3 pairs.



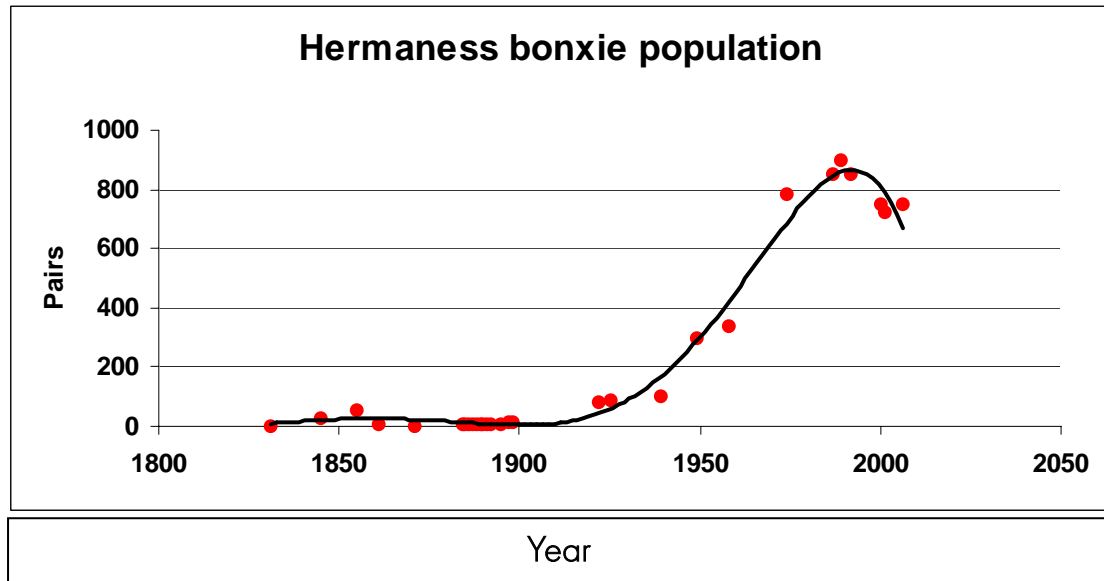
Great skua

The bonxies nest inland, on the large expanse of moorland. Here birds vigorously defend their territories against intruders, by dive-bombing and striking them with their feet as they fly past. It is the other seabirds that attract bonxies to Hermaness. Bonxies are the aerial pirates of the seabird world, ruthlessly pursuing and plundering fish catches from other seabirds. They are fearless and are just as likely to attack a gannet as a puffin, grabbing a wingtip to stall them and make them disgorge their catch. Increasingly at Hermaness, as elsewhere on Shetland, we have noticed that bonxies are taking young birds, eggs, and even adult birds.

Despite their reputation, they deserve our admiration for their audacity and survival skills; they are opportunists, beautifully adapted to the sometimes harsh environment of the North Atlantic.

In 1989, the population at Hermaness reached its highest, with 896 territories recorded. Since then the population has fallen slightly, probably in response to declining food supplies. Worldwide, there are about 16 000 pairs, of which 60% nest in Scotland, mainly in Shetland and Orkney. The colony on the Reserve is the third largest in Europe, and accounts for around 4.5% of the World population. Their breeding range is restricted to the northeast Atlantic despite dispersing as far as the coasts of West Africa and South America during winter.

Graph showing changes in the Hermaness bonxie population



Gannet

The huge gannetries at Hermaness transform the stark cliffs and stacks during the summer months. With space at a premium, gannets will often be engaged in noisy squabbling over territories. That is unless they are performing their precisely choreographed, and largely silent, courtship displays to their mate.

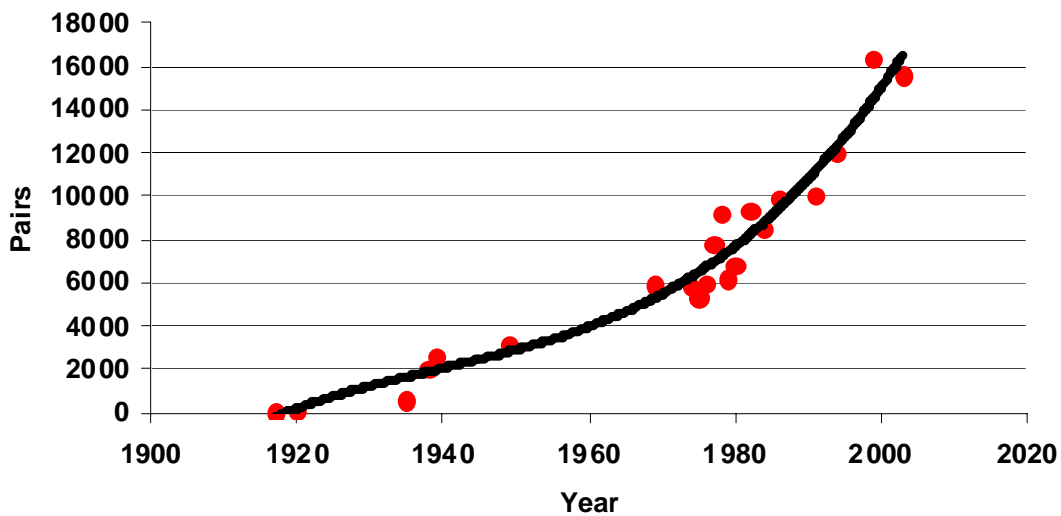


Gannets

The Hermaness gannets are another great success story. The first breeding pairs were recorded on Vesta Skerry in 1917. Since then, their numbers have increased steadily at a rate of around 6% per year, which is well above the national average of 2%. Numbers now are around 16 000 pairs, with nesting sites extending along the north-west stacks and cliffs, and the Neap.

The UK is an important stronghold of the gannet, with 60% of the World population breeding here in 21 gannetries. The largest colony on gannets is on St Kilda, whilst Hermaness, with around 6% of the breeding North Atlantic population, is the sixth largest British colony.

Graph showing changes in the Hermaness gannet population



Puffin

The soft turf along the cliff tops of the Reserve provide ideal burrowing habitat for puffins. They use their strong claws and characteristic multi-coloured beaks to excavate burrows in which to raise their chicks, away from the threat of predatory birds. Remarkably, these little birds spend their whole winter far out at sea, travelling as far west as Newfoundland, and returning each spring to the same burrow at their traditional breeding site.

Puffins on Hermaness probably number somewhere between 20,000 and 30,000 pairs. They are notoriously difficult to count because of their underground nesting habit, but the numbers on the Reserve appear to be stable and account for around 6% of the British population. Over 100,000 puffins nest in Shetland, which is about 2% of the total World breeding population.

Fulmar, guillemot, kittiwake and shag

Fulmar and guillemot also occur on the Reserve in large numbers and, together with kittiwake and shag, form an important component of the seabird assemblage. Until the end of the 19th Century, the only British population of fulmar was on St. Kilda, but it is now one of the commonest seabirds in northern Britain and can be seen all year round on the Reserve. Fulmars first bred at Hermaness in 1897, with numbers gradually increasing to 14,000 breeding pairs in 1989. Since the early 1990s fulmar numbers throughout the UK have been in decline, a trend also apparent at Hermaness, with the count in May 2006 recording approximately 5,000 pairs.

It has been a similar story for kittiwake, guillemot and shag on the Reserve. Kittiwake numbers have plummeted from over 3,500 pairs in 1989, down to 376 pairs at the

last count in 2005, and many of the traditional colonies at Saito and Neap are now deserted. Worldwide, the kittiwake is the most numerous of the gull species. In the UK however, the kittiwake population as a whole is declining, and Shetland has shown some of the biggest population reductions in recent years.

Guillemots breed on the north and west cliffs and offshore skerries of the Reserve.

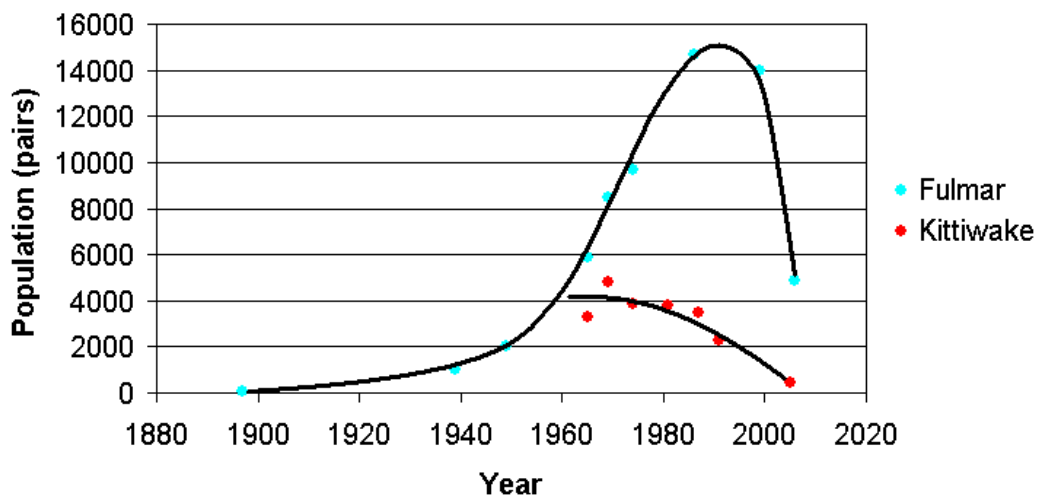


Guillemots

Around 30% of the breeding birds are not visible from land, but land-counts nevertheless give us a good indication of the status of the Hermaness population. Numbers show a steep decline in recent years, from almost 23 000 birds in 1978 to approximately 6 000 in 2005, a situation mirrored throughout Shetland over recent years, although the UK population is generally stable.

Obtaining reliable estimates of the shag population on the Reserve has been more problematic. The majority of shags nest on relatively inaccessible boulder beaches along the west coast making population assessment difficult and often perilous. Population counts carried out from 1974 to 1997 at beaches between Humla Stack and the Clett show a marked decrease in numbers from 199 to 27 nests. The accessibility of these sites for counting also makes them vulnerable to predation by rats and feral cats, and this is thought to have had an impact on population numbers in the area. The total number of breeding pairs at Hermaness in 1995 was estimated to be 400, but the population has since declined to around 150 pairs (2002).

Graph showing changes in the Hermaness fulmar and kittiwake population



Several factors may contribute to the population decreases in great skua, fulmar, kittiwake, guillemot and shag, but the principal cause is believed to be shortages of food – principally sandeels. In recent years, low numbers of sandeel in the seabirds' feeding grounds, outwith the Reserve, have led to food shortages and widespread breeding failures in species that are dependent on them, particularly terns and kittiwakes. As well as affecting bird populations directly, the food shortages have brought about increased predation of eggs, chicks and adult birds by bonxies because there are fewer opportunities for them to steal fish from birds returning from the feeding grounds. This has reduced adult populations and breeding productivity amongst their prey species and may also have driven some birds away to adjacent colonies.

Other seabirds

The Reserve is also home to a number of other seabirds which occur in smaller numbers. Until the 1960s, large numbers of Arctic skuas (a UK Biodiversity Action Plan (UKBAP) species) nested on Hermaness Hill. Competition for nesting sites and predation of their young by the rapidly increasing bonxie population is thought to have forced them to seek alternative sites on Unst. Nowadays, one or two hardy pairs still brave it out amongst the bonxies whilst a few more nest around the edge of the Reserve boundary.

Dispersed amongst the great skua breeding colonies there are small numbers of herring gulls (UKBAP species) and great black-backed gulls. Razorbills and black guillemots nest discreetly in rock crevices and boulder beaches, whilst common and Arctic terns nest sporadically at the Fidd and at Fiska Wick.

The seabird picture is not complete at Hermaness without mentioning Albert, a black-browed albatross (normally a species resident of the South Atlantic), who spent several seasons sitting among the gannets at Saito. He attracted many visitors and remained faithful to Hermaness for 25 years, returning most summers in the hope that a fellow albatross would also find itself in the wrong hemisphere. Albert was last seen at Hermaness in 1995.

Red-throated diver

Shetland is the UK stronghold of the rare red-throated diver, or 'raingoose', as it is known locally; as it is supposed to be able to forecast wet weather! Divers return to Hermaness from their coastal wintering grounds, in March and April, to breed on the small secluded moorland pools.

The population of red-throated divers on the Reserve has declined since the 1980s, when there were 14 breeding pairs. This decline may also be linked to food shortages. Since about 1990 there has been a stable population of 7 to 8 pairs, and

despite the reduction in numbers, the Hermaness divers are consistently among the most successful breeders in Shetland.

There are around 900 breeding pairs of red-throated divers in Britain, all confined to Scotland, with more than half nesting in Shetland. The UK holds about 30% of the European Union breeding population.

Other birds

The moorland also provides a home for many other birds including 3 UKBAP species – skylark, twite and curlew. Waders are well represented including considerable numbers of dunlin and snipe, and a dozen or so golden plover. The distinctive white flash and clicking call of the wheatear, along with the shrill, high altitude warbling of the skylark, epitomise the summer moorland.

Ravens nest on the high cliffs, whilst the tiny Shetland wren noisily proclaims its territories all around the coast. Eider duck, rock dove, meadow pipit, rock pipit, starling and twite also all breed on the Reserve.

Mammals

There are few wild mammals on the Reserve other than the Shetland long-tailed field mouse, which is widely distributed, and otters which occasionally cross the Reserve from Burrafirth and the Loch of Cliff. Much of the mammalian interest is offshore where dolphins, whales and porpoise have been recorded around the Hermaness coast. The numbers and diversity of dolphin and whale species seen is increasing in recent years and sightings of harbour porpoise, minke whale and killer whale are now relatively common. White-sided, white-beaked and Risso's dolphin have also been seen off the coast.

Grey and common seal are also common around the coastline. Grey seals pup on beaches and in caves at the foot of the north and west cliffs whilst, common seals tend to breed around Clingra.

Invertebrates

The Reserve has a typical mix of moths that are associated with the coastal grasslands and moorland habitats. But, there is something special about these moths. Many of them are widespread throughout the UK but in Shetland, these common species are present as distinct sub-species. Nearly all of them are darker than their counterparts on the British mainland and include the northern rustic, autumnal rustic and the rare, northern arches or Exile. These sub-species only occur on Shetland.

Surveys of the Reserve for beetles and spiders have recorded a total of 53 species of

beetle, many of them rove beetles, and 46 spiders. These include *Athous subfuscus*, a Red Data Book (RDB) listed rove beetle and a small upland spider, *Latithorax faustus*, which is rare in Shetland, as well as the more widespread *Pirata piraticus*, a tiny wolf spider that inhabits wet marshy areas.

The Shetland bumblebee is also found on the Reserve between May and October. This particular sub-species is found only in Shetland and the Outer Hebrides; its characteristic orange body makes it easy to identify.

Higher plants

Hermaness has an interesting flora and includes rare plant species such as the three species of hawkweed that are endemic to Shetland, *Hieracium gratum*, *H. australius* (both UKBAP species) and *H. sparsifolium* (a Local Biodiversity Action Plan (LBAP) species). None of the hawkweeds have common names. Hawkweeds are apomictic, which means that their seeds ripen without the need for pollination. As a result, seedlings are usually genetically identical to their parent plant and consequently, any mutation is passed on to the next generation, rather than being diluted by cross-pollination. This has given rise to over a hundred species (or micro-species) of hawkweed in Britain, often distinguished by very subtle differences in appearance.

The sea cliffs provide an oasis for salt-tolerant plants, which are specially adapted to this wind-blown environment. Red campion, thrift, Scots lovage and wild angelica provide seasonal colour. Moss campion is also found along the rock crevices and lesser sea spurrey, with its tiny pink flowers, grows extensively around Humla and Clingra stacks.

The blanket bog is home to the usual variety of bog plants including heather, cotton grass and sphagnum mosses. Bog blaeberry and chickweed wintergreen add to the diversity of the moorland. On drier areas, where the bog has been modified by drainage, the bog plants are interspersed with a variety of grasses and woodrush.



Sea cliff vegetation

Habitats

The most striking feature of Hermaness NNR are the sea cliffs that surround the peninsula, providing 10 km of ideal nesting sites for the seabird population. Maritime cliffs are a nationally important habitat at Hermaness, most significantly for the diversity of seabird species that they support, but also for the specialised flora that grow on the exposed ledges.

The scale of the sea-cliffs at Hermaness is awe-inspiring, with sheer faces up to 170m high at the Neap. It is a harsh and unforgiving environment, often wind-blown and spray-soaked, where only the hardiest of plants survive. Much of the vegetation on the cliff top and accessible cliff ledges on the Reserve is grazed, adding to the natural pressures, but species such as angelica, Scots lovage and red campion thrive in inaccessible niches among the crags.

Further inland, the diminishing influence of the salt spray is evident in the changing nature of the flora. A fringe of lush coastal grassland grades into coarser, species-poor acidic grassland, and then moorland. There are a few areas of dry heath on the better drained ground, and some wet heath close to the Reserve entrance, but the core of the Reserve is dominated by blanket bog. Blanket bog, a priority UKBAP habitat, forms the main habitat type at Hermaness covering more than 600 ha, and making up nearly two thirds of the Reserve. *Sphagnum* moss hollows and bog pools are frequent with some peaty lochs at Sothers Brecks.



Blanket bog and bog pools

Summary

Hermaness NNR has outstanding natural heritage based around the magnificent sea cliffs and inland blanket bog. The cliffs not only provide a breeding ground for tens of thousands of seabirds, but also support cliff vegetation and are home to 3 endemic species of hawkweed. The largely intact blanket bog supports a range of moorland birds as well as important numbers of red-throated divers and the third largest bonxie colony in the world.

3 Management of Hermaness before it became a NNR

History of Hermaness

Bronze Age - 700 BC	Burial chambers found on Unst provide evidence of the earliest human activity in the area.
Iron Age - 2000 years ago	A broch (defensive tower) is built on the western shore of Burra Firth, just south of the Reserve entrance.
800 AD	Norse longships arrive on Unst. There are seasonal settlements at Setter and the cave at Goturm's hole is used for refuge by Guthrum, a Danish Viking who was shipwrecked there.
1854	The first lighthouse is built to protect naval traffic, temporarily.
1857	Work starts on the new lighthouse which is called North Unst. It is overseen by Thomas and David Stevenson, father and uncle of Robert Louis Stevenson. The map from his novel "Treasure Island" is said to closely resemble a map of Unst that the young Stevenson saw on a visit to the island.
1858	A semaphore signalling station is erected on Hermaness Hill.
1964	North Unst lighthouse is renamed Muckle Flugga.

Land use history

Hermaness has been influenced by man's activities since at least Viking times, when the first sheep would have been brought onto the peninsula to graze the summer pastures.

Grazing

The early Norse settlers were largely livestock farmers, and would have found the islands attractive as they were free from the predators that roamed mainland Britain and Scandinavia. There is a suggestion that Hermaness had at least seasonal habitation at Setter, at the foot of Sothers Dale on the west of the headland. 'Setter' comes from the old Norse word 'sætr', meaning 'summer pasture'. This was probably the beginning of a tradition of sheep grazing on Hermaness that has continued to the present day.

In the 19th century, Hermaness was part of the Bunes Estate Farm and attempts were made to improve the pasture by cutting a pattern of drains across the south-west face of Hermaness Hill and the Neap. In 1919, the grazing rights were passed to Bunes Estate's crofting tenants, and this marked the start of formally regulated grazing at

Hermaness, with limits placed on the number of sheep to be grazed on each of the 31 shares. These grazing rights are still active and used today.

Cattle were also grazed at Hermaness in the past and an agreement remains in place for a small number of cattle to be grazed in the lower pasture of the 'cattle park'. Local people also formerly cut peat at Hermaness for domestic fuel. The peat appears to have been entirely stripped from the south eastern side of Mouslee Hill in the distant past, leaving a thin mineral soil that now supports dry heathland rather than blanket bog. Peat has also been cut on the south of Milldale Burn, and on the south face of Mouslee Hill.

Coastal navigation

The sea waters and hidden rocks around the Hermaness peninsula make this area notoriously dangerous to navigate and have resulted in many shipwrecks. Muckle Flugga is home to a lighthouse which was manned from 1858 to 1995.

During this time the lighthouse keepers were left on Muckle Flugga to carry out their day and night duties, their only contact with the mainland coming from daily signals sent by signallers from a semaphore station on Hermaness Hill.

The remains of the circular signalling hut are still visible on the hilltop. The path to the hut was marked by stakes to prevent the signaller losing his way in poor weather, and this remains the traditional route to Hermaness Hill today.



Muckle Flugga lighthouse

Seabird conservation

In 1831, the landowner and naturalist, Dr Lawrence Edmondston took steps to protect the bonxies nesting on Hermaness - at that time numbering just 3 breeding pairs - so beginning the long history of conservation at Hermaness. Over the next quarter century the population rose to 55 pairs only to fall again due to persecution by egg collectors. Recognising this, from 1891, the Edmondstons employed a dedicated 'watcher' to oversee and protect the breeding birds. Under their care the bonxie numbers soared.

The 'watcher' system was taken over by the Royal Society for the Protection of Birds (RSPB) in 1906. They built a hut for the 'watcher' and also started to monitor other seabird populations. The first hut burnt down and was subsequently replaced.

4 Management of Hermaness NNR

Key events in the history of Hermaness since it became a NNR are as follows:

Date	Event
1955	Hermaness Hill and Muckle Flugga, Rumbings and associated skerries (421 ha), are declared a NNR.
1958	The Reserve is extended to include a further 531 ha. of the headland to the south of the Burn of Winnaswarta Dale. Responsibility for Hermaness Hut is passed to The Nature Conservancy and the first Management Plan is produced.
1968	Nature Conservancy staff are based in Shetland for the first time.
1969	Hermaness is included in 'Operation Seafarer' - a National seabird census.
1970-1995	A black-browed albatross (Albert) is recorded at Saito and returns for several seasons.
1975	A cairn is erected at the Reserve entrance gate.
1976	Annual monitoring of selected guillemot nesting sites commences.
1982	The first honorary wardens for the Reserve are appointed.
1984	The first summer warden is appointed.
1986	Wooden boardwalks are installed on way-marked paths. Hermaness is included in the 'Seabird Colony Register' - which is a National seabird census.
1988	Annual monitoring of Arctic skua and red-throated diver starts
1989	Regular monitoring of fulmar, gannet, shag, puffin, bonxie and kittiwake starts.
1991	The 'watchers' hut on Hermaness Hill is blown away during hurricane-force winds with the loss of 2 lives.
1992	SNH purchase a flat in the shore station for a new visitor centre, and to accommodate the seasonal warden.
1994	Hermaness and Saxa Vord are designated a Special Protection Area (SPA).
1995	Hermaness NNR visitor centre is opened to public by Bill Oddie.
2000	The visitor centre is extended to include a third room.
2004	We upgrade the first 700 m of the Reserve footpath to a hardcore path and an experimental section of recycled plastic duckboards are laid.
2005	Three exclosures are erected to assess grazing impact on cliff-top vegetation.

Management of the Natural Heritage

Management of the Reserve since its establishment has largely been non-intervention, as far as possible, to maintain the 'natural' feel of the Reserve.

Seabird monitoring

The seabird colony manages itself and there is little we can do on the Reserve to influence their numbers or breeding success. The focus of our efforts with the seabird colony is maintaining the long-standing, systematic monitoring programme. Monitoring of the seabird populations gives us an indication of wider environmental issues, especially where a trend is recognised on a national scale. For example, the decline of several seabird species in the UK provided an early indication of fluctuating numbers of sandeels, the staple diet for many breeding seabirds. Monitoring data is also invaluable when comparing the status of geographically separated bird colonies. Annual seabird counts from the Reserve are passed to the Joint Nature Conservation Committee (JNCC) for inclusion in their UK Seabirds Monitoring Programme.

Since the mid-1980's, when the first Reserve Warden was appointed, we have carried out regular seabird population and productivity monitoring on the Reserve. Bird counts now take place annually, with a full census of the main species once every six years, as part of our 'site condition monitoring' programme. Table 2 provides a breakdown of our monitoring programme.

Table 2: Bird population and productivity monitoring

Species	Monitoring			
	Six yearly census	Annual productivity	Annual census	Annual attendance counts*
Red-throated diver		✓	✓ ¹	
Fulmar	✓	✓		
Gannet	✓	✓		
Shag	✓			
Arctic skua		✓	✓ ¹	
Great skua	✓	✓		
Kittiwake	✓	✓		
Common tern		✓ ²	✓ ²	
Arctic tern		✓ ²	✓ ²	
Guillemot	✓			✓
Razorbill	✓			✓
Puffin	✓			

* At six monitored sites.

¹ Small numbers so annual population counts possible.

² Census and productivity estimate every season when present.

Other monitoring

We also monitor the number of adult birds and breeding success of red-throated divers on an annual basis, which feeds into our six yearly site condition monitoring programme for this species. The maritime cliff and earth science interest at Hermaness are also monitored as part of our site condition monitoring programme, to ensure that they remain in favourable condition.

Grazing management

Sheep are grazed across the Reserve as part of the traditional grazing rights established on the peninsula in 1919. Sheep are present throughout the year except during lambing when they are taken down to the Burrafirth Links, to protect the new born lambs from the bonxies.

In recent years, our site condition monitoring results have shown us that grazing might be having an impact on the Reserve's vegetation, especially of the maritime cliff. So, in 2005 we established 3 exclosures around the north and west cliffs, at Boelie, The Fild and The Fidd, to monitor the relative impacts of grazing and climatic suppression to determine whether further management is required. Our initial results indicate that the severe climate is more significant than grazing pressure in restricting the flowering of cliff-top plants.

Research

The Reserve has provided important research opportunities for other organisations and specialists. In 1978, Shetland Ringing Group started a long-term research project on the breeding success, site fidelity and age at first breeding of red-throated diver (Okill and Wanless, 1990). Their work continues today and has shown that nesting divers are site faithful and may return to the same nesting pool for ten years or more. Males that are hatched on Hermaness will usually come back to nest there, often on the pool that they hatched on or one next door. Females however disperse further afield to avoid pairing with close relatives. Females from Hermaness have been found nesting in the south mainland of Shetland over a 100 km away.

The Reserve was also used as the study site between 1998 - 2002 for a PhD thesis that looked at the feeding behaviour and diet of the great skuas (Votier, 2001). The study showed that some pairs of skuas specialised in predating seabirds rather than attempting to steal their food or take chicks and eggs.

Management for People

Visitors

Despite its remote location Hermaness is a popular Reserve, receiving about 5000 visitors each year. This is approximately 20% of holiday tourists who visit Shetland annually, making it one of the major attractions for visitors to the isles. The numbers of entries in the Reserve visitor book suggest that this figure varies relatively little from year to year.

A visitor survey carried out in 1993 concluded that most visitors come to the Reserve primarily for bird watching, but also to walk and sightsee and to take the opportunity to stand at the most northerly point of the UK. Most visitors tend to be couples and few families, especially with young children visit. Organised walking and bird watching holiday groups visit the Reserve throughout the seabird breeding season.

The Reserve visitor centre is located just off the Reserve in the lighthouse shore station, which is a category C(S) listed building. The visitor centre is not staffed, although the shore station also provides the accommodation for the Reserve's seasonal warden from Easter to the end of September. There are also honorary wardens who are available all year round. We have provided interpretive panels and displays in the visitor centre describing the natural heritage of the Reserve. There are also public toilets and a car park below the visitor centre with provision for disabled parking adjacent to the visitor centre itself.

We have installed three stone monoliths at the Reserve entrance, a short walk from the visitor centre, that give information about the Reserve wildlife and display a map of the Reserve showing the way-marked routes. The popularity of the Reserve has meant that there has been some erosion of the blanket bog along the path, particularly at the entrance to the Reserve. So, in 1989 we started to install wooden boardwalk sections along the path in an attempt to protect the blanket bog from erosion. The wooden path however, is prone to rot in the damp and acidic environment and, as visitors leave the path, new sections of blanket bog start to get eroded. The maintenance of the wooden path and the addition of new sections of path require annual attention. Fortunately, we are assisted with much of this work by volunteers from British Trust for Conservation Volunteers (BCTV) but recognise that this is a labour intensive and potentially costly form of action.

In an attempt to look at alternatives, in 2004 we upgraded the first 700 m of the Reserve path to a hardcore path, and installed a trial section of recycled plastic duckboard. We hope that the plastic duckboards will halt the path erosion whilst lasting longer and being less intrusive, than the boardwalk. We have deliberately kept way-marking on the Reserve discreet to preserve the natural landscape. Main routes are marked by occasional stakes and by indicator posts at the junction of the

paths and at the coast.

Many of the bird colonies are inaccessible, and discreet observation by visitors causes few problems. Our visitor management has concentrated on promoting responsible access and identifying sensitive areas so that visitors know to take care not to cause disturbance, primarily to red-throated divers. These areas are marked on the Reserve map. The interpretive displays and educational material in the visitor centre, and the Reserve leaflet, also encourage responsible enjoyment of the Reserve and its natural and cultural heritage.

The Reserve leaflet 'At the edge of the world', was published in 2005 and is available at the visitor centre, reserve entrance and throughout Shetland. During the summer, we promote a programme of guided walks on to the Reserve led by a local tour guide who took over this role from the Shetland Amenity Trust's Ranger Service in 2008.



Shetland Amenity Trust Ranger with visitors at the Reserve entrance

Making the most of the captive(!) Shetland tourist trade we also regularly add advertisements for the Reserve to 'Shetland Visitor' and 'Visit Scotland' brochures. The Reserve is also promoted on the 'Scotland's NNRs' website and Reserve bird records and monitoring results feature in the annual Shetland Bird Club 'Bird Report'.

Property Management

Most of the land at Hermaness NNR is owned by Bunes Estate with the stacks and skerries around Muckle Flugga owned by the Northern Lighthouse Board. We manage all the land at Hermaness NNR through nature reserve agreements with the 2 owners. The agreements extend to 99 years, and expire in 2054. The agreement with Bunes Estate recognises the rights of local crofters to exercise their historic grazing rights on the Hermaness peninsula.

Outside the Reserve itself, SNH owns one of the four flats within the lighthouse shore station. The flat serves a dual purpose, with the front three rooms housing the visitor centre, and the remaining kitchen, bedroom and bathroom providing accommodation for the seasonal warden. We also own the boiler house, one of the garages and the building housing the public toilets. The public toilets are maintained under an agreement with the Shetland Islands Council (SIC).

The car park at the Reserve entrance was originally constructed by the crofters on land belonging to Bunes Estate, although more recently we have re-surfaced both the

car park and access track. In 2008, the crofters upgraded the car park and access track, with financial support from Shetland Islands Council, Highland and Islands Enterprise, the Community Council and SNH. The long-term aim is to have the access road and car park adopted and maintained by Shetland Islands Council. We maintain the boardwalk and hardcore path within the Reserve, and contribute to the upkeep and maintenance of the southern boundary fence.

Summary

The internationally important Hermaness seabird colonies at the northern extreme of the British Isles are a world-famous feature of Shetland, and draw thousands of visitors to Unst each year. The visitor centre, situated in the historic lighthouse shore station, promotes responsible enjoyment of the Reserve, and provides a cultural link with Hermaness Hill and the Muckle Flugga lighthouse. A comprehensive leaflet provides information about the history, habitats and species of the Reserve.

There is little active management of the natural heritage, and way-marking on the Reserve is low-key, to preserve the wild and natural landscape. Erosion of the blanket bog is an area of concern and is controlled by installing sections of duckboard across the moorland. Monitoring of species, particularly seabirds and red-throated diver, is continuous, and the data forwarded for inclusion in European statistics on seabird populations and productivity.

5 Document properties

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Photography

Photography by Lorne Gill/SNH.

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Links

Scotland's NNRs www.snh.org.uk/nnr-scotland

Scottish Natural Heritage www.snh.org.uk

SNH Sitelink www.snh.org.uk/snh/

Historic Scotland www.historic-scotland.gov.uk

Joint Nature Conservation Committee www.jncc.gov.uk

Appendix 1 - National Nature Reserves (NNR)

Scotland's National Nature Reserves are special places for nature, where many of the best examples of Scotland's natural heritage are protected. Whilst nature always comes first on our NNR's, they also offer special opportunities for people to enjoy and find out about the richness of our natural heritage. NNRs are declared under the National Parks and Access to the Countryside Act 1949 or the Wildlife & Countryside Act 1981.

A policy for NNRs in Scotland was developed in 1996. This policy requires NNRs in Scotland to have four attributes and be managed for one or more of the three purposes.

The attributes are:

- **Primacy of nature** – The needs of nature will be placed at the heart of decisions about land-use and management of our NNRs, and nature conservation will be the overriding land use, although it may not be the sole purpose of management.
- **National importance** – The NNR must be managed for the features of interest, which are of national importance on the NNR i.e. for the protection of geological features, habitats or species found there.
- **Best practice management** – NNRs must be well managed, not only to safeguard the nature conservation interests, but also to provide for people's enjoyment and understanding.
- **Continuity of management** – Both research and management on NNRs require us to take a long-term view, so it is important that management continuity is assured.

The purposes are:

- **National awareness of NNRs** – The NNR is managed so that people can take pride in the natural heritage 'on display' and come to understand it better and enjoy it to the full.
- **Specialised management of NNRs** - The character of one or all of the features of interest on the Reserve requires specialised and pro-active management, which is best, delivered by a Nature Reserve.
- **Research-related NNRs** - These NNRs will offer opportunities for research into

the natural heritage and its management. The research specifically requires a Nature Reserve location.

From 2000 - 2003 all of Scotland's NNRs were reviewed against this policy. Because of the review there are now (2008) 58 NNRs in Scotland. There are currently a number of NNRs identified during the review which have still to be taken through the de-declaration process. As a result of this a search on many SNH systems will show more than 56 NNRs until this work is completed.

More information can be found at:

Scotland's National Nature Reserves: A policy statement:
<http://www.snh.org.uk/pdfs/polstat/nnrpolcy.pdf>

National Nature Reserves - General Information:
<http://www.nnr-scotland.org.uk>

Appendix 2 - Special Protection Area (SPA)

Special Protection Areas are areas classified under Article 4 of the European Community Directive on the Conservation of Wild Birds 1979 (EC79/409), commonly known as the Birds Directive. SPAs are intended to safeguard the habitats of birds which are rare or vulnerable in Europe as well as all migratory birds which are regular visitors. Together with Special Areas of Conservation (SAC), which are designated under the Habitats Directive for habitats and non-bird species, SPAs form the Natura 2000 network of sites. The Natura 2000 network is designed to conserve natural habitats and species of animals and plants which are rare, endangered or vulnerable in the European Community. Natura sites in Great Britain are protected via the Conservation (Natural Habitats &c.) Regulations 1994, which transpose the Habitats directive into GB law and are relevant to both SACs and SPAs. Natura sites are also generally underpinned by the SSSI mechanism in the terrestrial environment. The Scottish Executive Rural Affairs Department Circular No. 6/1995 (Revised June 2000) on the Habitats and Birds Directives gives further details of how the Regulations apply in Scotland.

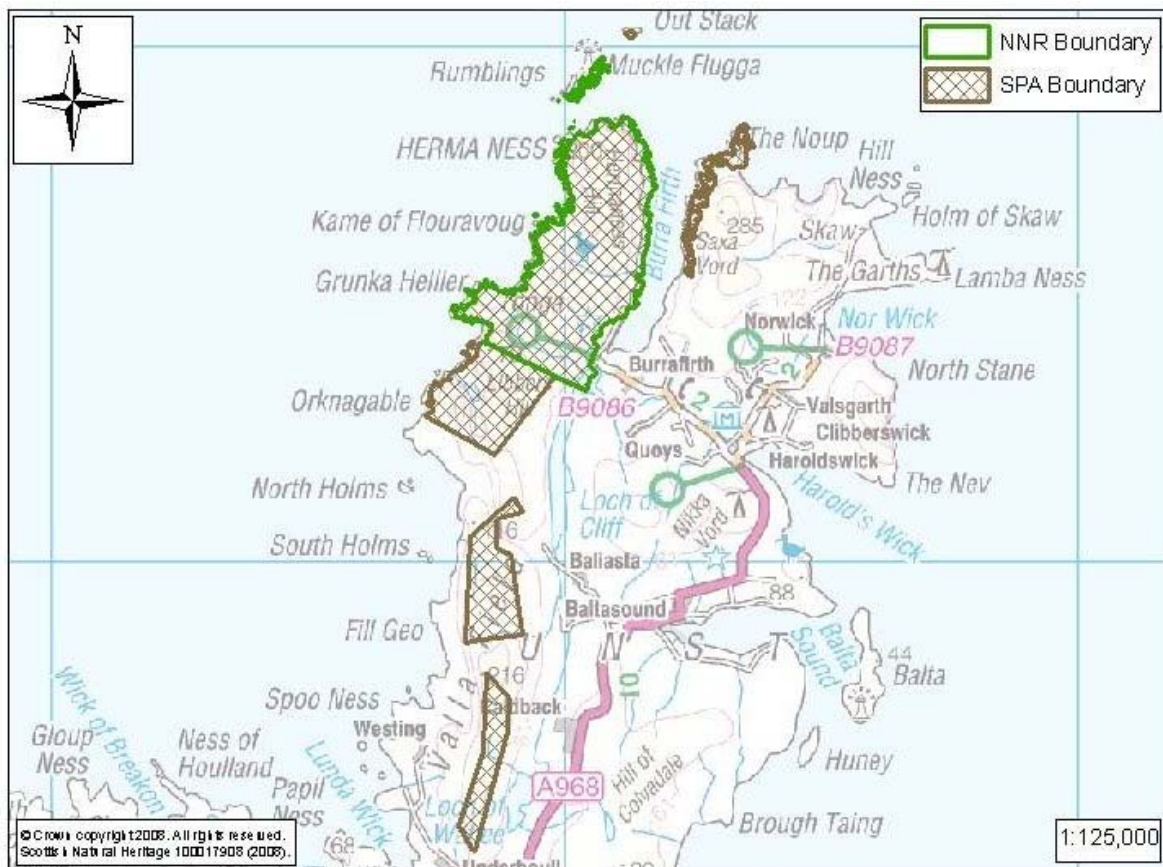
SNH acts as the advisor to Government in proposing selected sites for ministerial approval as proposed SPAs. SNH then consults with key parties over the site proposals on behalf of Scottish Ministers. The consultees, who include owners and occupiers of land, local authorities and other interested parties, are sent details of the proposed site boundaries and the species for which the site qualifies. SNH also negotiates the longer-term management of these sites. Following consultation, SNH forwards all responses to Scottish Ministers who then make a decision about whether to classify the site as a Special Protection Area.

The following websites provide further information:

Special Protection Areas: <http://www.jncc.gov.uk/UKSPA/default.htm>

Hermaness, Saxa Vord & Valla Field SPA

Country	Scotland
Unitary Authority	Northern Isles
Grid Ref*	NO 445005
Latitude	60 49 19 N
Longitude	00 54 00 W
SPA EU code	UK 9002011
Status	Classified SPA
Area (ha)	1662.92



Site description:

Hermaness, Saxa Vord & Valla Field Special Protection Area lies in the north-west corner of the island of Unst, Shetland, at the northernmost tip of Britain. It consists of 100-200 m high sea cliffs and adjoining areas of grassland, heath and blanket bog. The boundary of the SPA is coincident with that of the Hermaness SSSI, Saxa Vord SSSI, and Valla Field SSSI. Part of the site (Hermaness SSSI and Saxa Vord SSSI) was previously classified as Hermaness and Saxa Vord SPA on 29 March 1994 for fulmar *Fulmarus glacialis*, gannet *Morus bassana*, great skua *Catharacta skua*, guillemot *Uria aalge* and puffin *Fratercula arctica*.

Qualifying interest:

The site qualifies under Article 4.1 by regularly supporting a breeding population of European importance of the Annex I species red-throated diver *Gavia stellata* (average of 26 proven breeding pairs for 1994 - 1999, 3% of the British breeding population).

The site also qualifies under Article 4.2 for its internationally important breeding populations of three migratory seabird species. These are gannet *Morus bassana* (16,400 pairs in 1999, 8% of the British and 6% of the world population), great skua *Catharacta skua* (788 pairs in 1997, 9% of the British and 6% of the world population) and puffin *Fratercula arctica* (55,000 individuals in 1999, 6% of the British and 3% of the total population of the sub-species *F. a. grabae*).

The site qualifies further under Article 4.2 by regularly supporting over 20,000 individual breeding seabirds. The sea-cliffs of Hermaness and Saxa Vord host particularly dense concentrations, contributing to the overall total of approximately 157,500 seabirds. The breeding seabird assemblage includes numbers of European importance of the migratory species fulmar *Fulmarus glacialis* (19,539 pairs in 1999; 4% of British), shag *Phalacrocorax aristotelis* (450 pairs in censuses in 1995 and 1999; 1% of British) and guillemot *Uria aalge* (25,000 individuals over two surveys carried out in 1996 and 1999; 2% of British). In addition, the assemblage includes a large population of kittiwake *Rissa tridactyla* (922 pairs).

Conservation objectives for Hermaness, Saxa Vord & Valla Field SPA

To avoid deterioration of the habitats of the qualifying species (listed below) or significant disturbance to the qualifying species, thus ensuring that the integrity of the site is maintained; and

To ensure for the qualifying species that the following are maintained in the long term:

- Population of the species as a viable component of the site
- Distribution of the species within site
- Distribution and extent of habitats supporting the species
- Structure, function and supporting processes of habitats supporting the species
- No significant disturbance of the species

Qualifying Species:

- Fulmar (*Fulmarus glacialis*)*
- Gannet (*Morus bassana*)
- Great skua (*Catharacta skua*)
- Guillemot (*Uria aalge*)*
- Kittiwake (*Rissa tridactyla*)*
- Puffin (*Fratercula arctica*)
- Red-throated diver (*Gavia stellata*)
- Shag (*Phalacrocorax aristotelis*)*
- Seabird assemblage

* indicate assemblage qualifier only.

Appendix 3 - Site of Special Scientific Interest (SSSI)

Scottish Natural Heritage is the key statutory agency in Scotland for advising Government and for acting as the Government's agent in the delivery of conservation designations in Scotland. Site of Special Scientific Interest (SSSI) is the main nature conservation designation in Great Britain (GB). These sites are special for their plants or animals or habitats, their rocks or landforms or a combination of these.

The Site of Special Scientific Interest (SSSI) designation is the main nature conservation designation in Great Britain (GB). The SSSI series has been developed over the last 50 years, and since 1981 as the national suite of sites providing statutory protection for the best examples of GB's flora, fauna, or geological or physiographical features. Originally notified under the National Parks and Access to the Countryside Act 1949, many SSSIs were renotified and others newly notified under the Wildlife and Countryside Act 1981 or the Nature Conservation (Scotland) Act 2004. Further changes in the protective mechanisms were introduced by the 2004 Act.

These sites are also used to underpin other national and international nature conservation designations. Most SSSIs are privately owned or managed; others are owned or managed by public bodies or non-government organisations. There are more than 1400 SSSIs in Scotland.

Web Links:

'The Nature of Scotland – A Policy Statement'

<http://www.scotland.gov.uk/library3/environment/nas-00.asp>

'People and Nature: A New Approach to SSSI Designations in Scotland'

<http://www.scotland.gov.uk/library/documents-w1/pandn-00.htm>

Guidelines for selection of biological SSSIs

<http://www.jncc.gov.uk/Publications/ssi/default.htm>

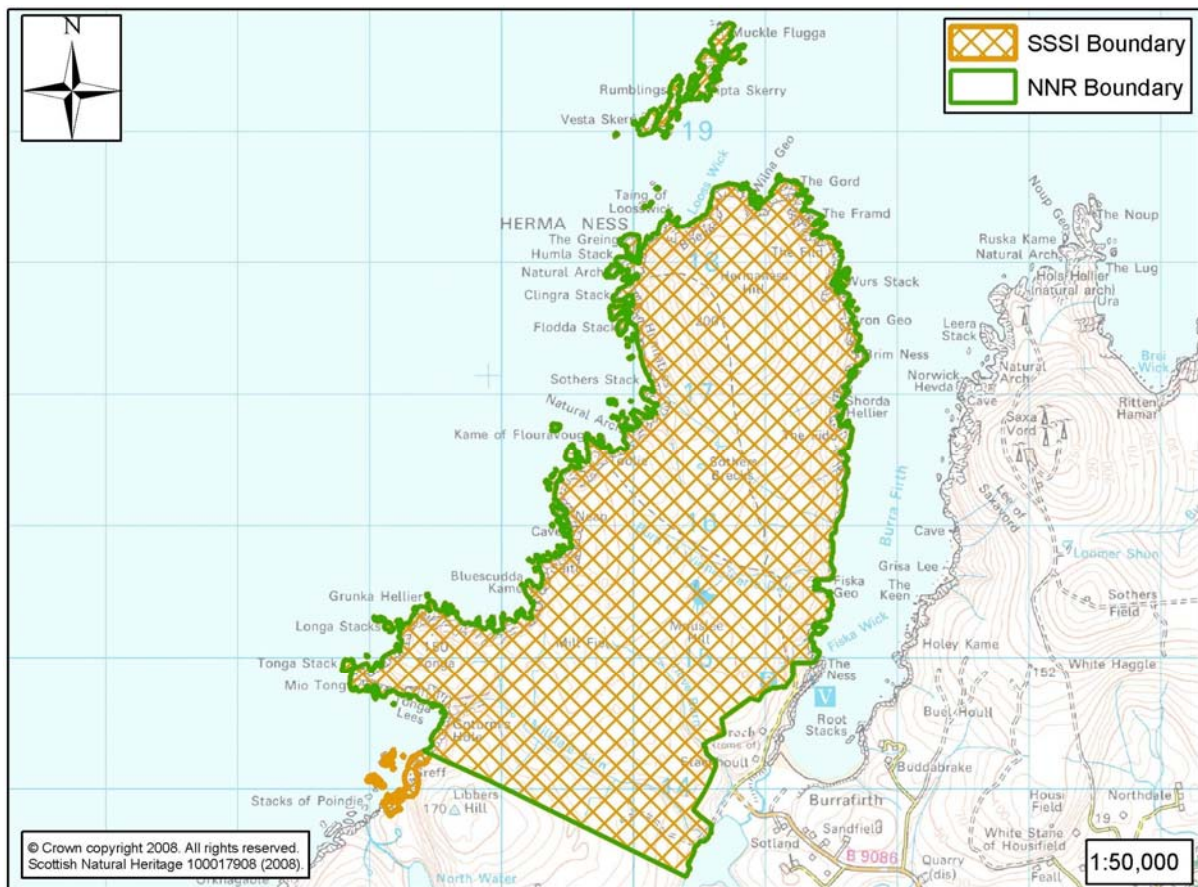
Site of Special Scientific Interest (SSSI):

<http://www.snh.org.uk/about/ab-pa01.asp>

Hermaness SSSI

Country	Scotland
Unitary Authority	Northern Isles
Grid Ref*	HP 605160
Renotified	2 October 1986
Area (ha.)	980.32

*This is the approximate central point of the SSSI. In the case of large, linear, or composite sites, this may not represent the location where a feature occurs within the SSSI.



DESCRIPTION:

Biological Interest

The peninsula of Hermaness (964 ha) consists predominantly of acid grassland dominated by Mat grass *Nardus stricta* and Heath Rush *Juncus squarosus* bounded by closely grazed maritime grasslands. To the west and north are the cliffs and stacks (including Muckle Flugga) representing the northernmost examples of coastal cliff vegetation in Britain.

The primary interest of the site is ornithological, with large colonies of seabirds nesting along the western and northern fringes; Gannet (9,000+ pairs), Fulmar (960+ pairs), Guillemot (9,000+ pairs) and Puffin (50,000+ ind.) significant amongst them.

In the hinterland the hummock-hollow blanket mire/heath community provides nesting habitat for more than 800 pairs of Great Skua; the second largest colony in the world, of this restricted northern seabird. There is a small colony of Arctic Skuas; Golden Plover, Twite and Red-throated Diver also nest.

Hermaness is noted for the occurrence of local dark forms of certain widespread moths including Northern Rustic *Ammogrotis lucerna*, Autumnal Rustic *Paradiarsia Glareosa* var: *Edda* and the rarer Arctic Northern Arches *Apamea exulis*.

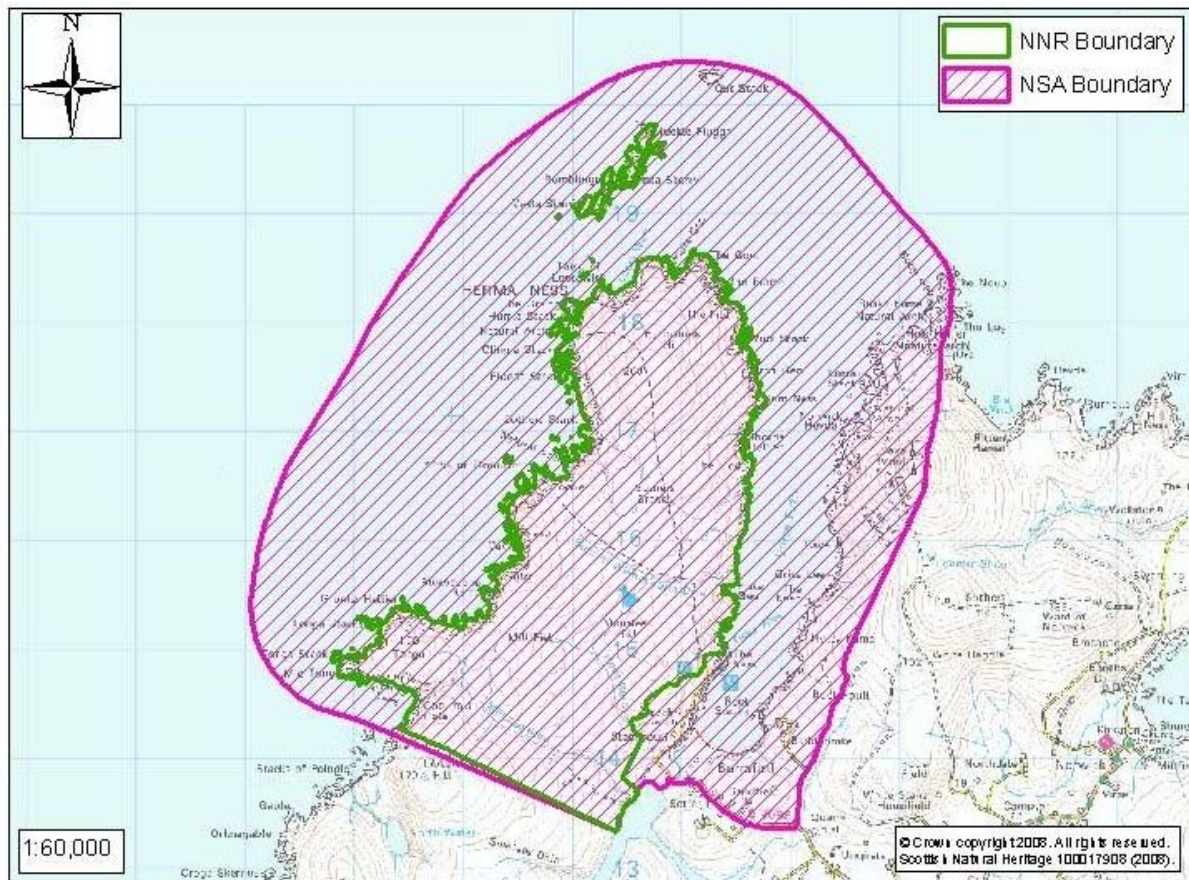
Geological Interests

The geological interest is concentrated primarily around Tonga and Greff (partly outside the existing NNR boundary) where rock exposures yield some of the best-developed crystals of the aluminium silicate, kyanite and of the iron-aluminium silicate, staurolite to be found anywhere in Britain. At Greff, zoned bodies of rocks exceptionally rich in iron and magnesium minerals occur below the large granite sill exposed near the base of the cliffs, and demonstrate concentric mineral zoning of two types. These occur either as elongated balls of actinolite (an iron-magnesium aluminosilicate) sheathed in black mica, or as a core of talc with actinolite nodules sheathed in a rock consisting of black mica and talc.

Appendix 4 - National Scenic Area (NSA)

National Scenic Areas (NSA) are Scotland's only national landscape designation. They are those areas of land considered of national significance on the basis of their outstanding scenic interest, which must be conserved as part of the country's natural heritage. They have been selected for their characteristic features of scenery comprising a mixture of richly diverse landscapes including prominent landforms, coastline, sea and freshwater lochs, rivers, woodlands and moorlands. There are currently 40 NSAs in Scotland, covering a total area of 1,001,800 ha.

Shetland NSA



Extent of Area

Seven separate small areas of coastal landscape in Shetland have been identified as of outstanding scenic interest. They lie principally in the south-west and northern extremities of the archipelago and include Fair Isle, Foula, the western flank of Dunrossness and the Deeps, part of Muckle Roe, Esha Ness, Uyea Isle and Fethaland, and Herma Ness.

Description

Scenic interest in Shetland is predominantly coastal. Fair Isle is a combination of green fields, moors and sandstone cliffs, all related to the coast. Remote from the mainland of Shetland, it has a great diversity of cliffs, geos, stacks, skerries, natural arches, isthmuses and small bayhead beaches. It is one of the foremost bird observatories in Europe. While it lacks great absolute relief, it has the distinctive features of Sheep Rock and the several eminences of its west coast which add further variety to the coastal scenery.

Foula, because of its greater height (418m), enjoys a more direct visual relationship to the mainland and boasts cliffs in the Kame rising to 366m. The striking form of the island contributes greatly to the coastal scenery of the South West Mainland. The coast of the island itself exhibits a diversity of natural features, including stacks, cliffs, skerries, caves and headlands.

Within the South West Mainland area, stretching from Fitful Head to the Deeps, there is a variety of contrasting landscapes ranging from cliffed coastline of open aspect in the south to fjord-like indentation in the voes of Weisdale and Whiteness. The larger islands of Burra and Trondra have distinctive settlement patterns, and the other numerous small islands and stacks lying in the bight known as the Deeps all combine to make a western oceanic seascape of strong character and atmosphere in which the constantly changing skies play an important part. The area is further diversified and enhanced by the softer features of St. Ninian's Isle with its fine tombolo and the adjacent enclosed and humanised landscape around the Loch of Spiggie.

At Muckle Roe a further significant element of Shetland scenery is found in the remarkable high red sandstone cliffs which make a significant contribution to the wider coastal scene of St. Magnus Bay of which they are the outstanding feature, together with the fine headlands, cliffs, skerries and stacks of Esha Ness.

Further north, the northern extremities of the North Roe peninsula again exhibit a similar range of skerries, stacks, islets, geos, caves, headlands and natural arches, to which the complex geology lends further variety of colour and form between Fugla Ness, Uyea Isle, Fethaland and the Ramna Stacks, and the Ness of Burravoe, Hermaness and Burrafirth including Muckle Flugga and Out Stack, at the northern extremity of the British Isles, are of the same outstanding character.

Appendix 5 - Protected species found at Hermaness

The list indicates which species are European Protected Species, Red Data Book species or species with a UK Biodiversity Action Plan.

	E P S	W & C A	R D B	U K B A P	S B L	L B A P
Species						
Otter	✓	✓		✓	✓	
Red-throated diver		✓			✓	✓
Dunlin					✓	
Hooded crow					✓	
Herring gull				✓	✓	
Curlew					✓	
Arctic skua				✓	✓	
Comon tern					✓	
Arctic tern					✓	
Skylark			✓	✓		✓
Starling			✓			
Twite			✓	✓		
Curlew				✓		
Breeding waders						✓
Shetland bumble bee (<i>Bombus muscorum</i>)					✓	✓
Bumblebees						✓
Heather					✓	
<i>Hieracium australius, H.gratum</i>				✓	✓	✓
<i>H. sparsifolium</i>						✓
Heath cudweed?					✓	

Notes:

EPS - European Protected Species

W&CA - Wildlife and Countryside Act (1981)

RDB - Red Data Book

UKBAP - UK Biodiversity Action Plan

SBL - Scottish Biodiversity List

LBAP - Local Biodiversity Action Plan