Scottish Natural Heritage
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LOCH OF STRATHBEG
Site of Special Scientific Interest

SITE MANAGEMENT STATEMENT

Site code: 1040

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Purpose

This is a public statement prepared by SNH for owners and occupiers of the SSSI. It outlines the reasons it is designated as an SSSI and provides guidance on how its special natural features should be conserved or enhanced. This statement does not affect or form part of the statutory notification and does not remove the need to apply for consent for operations requiring consent.

We welcome your views on this statement.

Description of the site

The Loch of Strathbeg site is important for its coastal landforms and habitats and associated flora and fauna, in particular its loch, fen, sand dune and saltmarsh habitats and winter waterfowl.

Geomorphology

Strathbeg is a key geomorphological site for its extensive and varied dune topography. It provides one of the best active examples in Scotland of both accretionary and erosional processes to be found in large-scale coastal dunes.

These accretionary processes produce parallel lines of dunes separated by linear depressions. The beach-dune complex also contains some of the most impressive instances of erosional processes in large-scale coastal dune ridges to be found anywhere in the country. The massive high dunes contain spectacular blowouts cut down to a basement of raised beach shingle and in places extensive deflation surfaces have been produced by the merging of major blowouts. As a relatively undisturbed area, Strathbeg presents valuable opportunities to study these and other processes of landform evolution in a comparatively natural setting. Additional interest is provided by a variety of raised shoreline features, in particular relict raised shingle beaches and a backing fossil cliffline. These features provide a context to the setting of the dynamic beach-dune system, and a very detailed record of relative sea level change over at least the last 10 000 years.

Strathbeg is an outstanding site for studies in coastal geomorphology.

Biology

The loch and open water transition

The Loch of Strathbeg, located in an exposed location on the north-east coast, is one of very few large and naturally eutrophic (water rich in nutrients) lochs in northern Scotland. Indeed, it is the largest waterbody in the north-east lowlands and the largest dune lake in Britain.

The loch itself is of relatively recent origin, formed in about 1720 when encroachment of a coastal bar sealed the mouth of the Savoch Burn.

The loch is shallow (up to about 1.2 m deep), with a bottom comprising a mixture of sand and fine silt. Water levels vary significantly during the year and the maximum depth in summer is much lower. It is mainly fed by two burns: the Savoch Burn from the south-west and a smaller burn from the southeast, along with groundwater seepage. The outlet to the north-west drains out to the sea nearby. The turnover time at the north end of the loch is much shorter than the long arm of the loch and nutrient rich sediments are greatest at this end. Naturally nutrient-rich lochs, more often associated with machair lochs in the Northern and Western Isles, are relatively uncommon in north-east Scotland. Depending on water levels and tides, the loch is also subject to occasional salt water ingress from the sea. The submerged vegetation is highly unusual, with abundant rough stonewort, which is characteristic of lime-rich waters.

Plant surveys undertaken during the twentieth century, particularly since 1970, suggest that the aquatic flora was once more diverse. However, Pritchard (1990) found only 3 of 7 previously recorded pond weeds, suggesting a change from a more species-rich community characterised by fennel pondweed and spiked water-milfoil pondweed, towards the single-species fennel pondweed community. Shoreweed is also found, in a characteristic community.

At the loch's margins are extensive reed beds, particularly reed-grass and common reed, and these comprise one of north east Scotland's few extensive reed beds. There are also a number of interesting transitions from freshwater marsh to saltings and from marsh to lime-rich dune land. At the north-west end of the loch there is willow and alder carr.

Of the aquatic plants, the nationally rare bird's-nest stonewort is found amongst the rough stonewort, in the long arm of the loch. The nationally rare creeping spearwort has been recorded on the loch shore, as recently as 2003, and the nationally scarce slender-leaved pondweed has also been recorded.

The sand dunes and saltmarsh

The Loch of Strathbeg dunes run from the edge of the village of St Combs for about 9 km to just south of Rattray Head. The dunes originally developed over a shingle spit, enclosing a lagoon which then became the freshwater Loch of Strathbeg. This dune system is about 0.5 km wide and contains several dune ridges along most of its length.

Overall, this band of dunes provides a clear example of successional dune formation from strandline vegetation, lyme grass foredune, marram communities on mobile and semi-fixed dunes, to calcareous dune grassland and finally to leached acidic grassland. Other variations and transitions occur within the dune system, for example, along moisture and pH gradients. The relatively extensive area of saltmarsh is found between dune ridges at the northern outlet from the loch. There are also transitions to other coastal habitats and inland habitats including mesotrophic grassland.

The Rattray end of the dune system is highly mobile with numerous and extensive blowouts that expose the underlying shingle. It is characterised by large expanses of bare sand and fragmented dune vegetation. Further north, a low fossil cliff runs along the back of the sand dunes. This cliff predates the shingle spit.

Two of the plants previously found in the dune slacks, baltic rush and coral root orchid, are nationally scarce but have not been recorded from the site recently.

Birds

The site provides wintering habitat for a number of important wetland bird species, particularly wildfowl. It is also an important staging area for migratory wildfowl from Scandinavia and Iceland/Greenland. It regularly supports internationally important numbers of whooper swan, greylag, pinkfooted and barnacle geese and nationally important concentrations teal and goldeneye. Strathbeg is also one of the best-known localities for migrant birds in Scotland and adjacent fields and pools provide important roosting and feeding sites for geese. A wide range of bird species characteristic of lowland open waters and their margins breed at the site. A nationally important population of up to 2000 Sandwich terns formerly nested on islands in the north-west corner of the loch.

Other fauna

Otters are regularly seen on the loch, and the site also supports badgers, roe deer, water vole and water shrew. Pine martin occasionally move through the site. The site supports a wide range of insects including a number of locally rare or declining species such as the grayling butterly and the moths *Nonagria typhae* and *Eudonia pallida*. The water scorpion *Nepa cinerea* and the beetle *Xantholinus* (*Acanthophallus*) *laevigatus* also occur.

Natural Features of Loch of Strathbeg SSSI	**Feature Condition (date monitored)**	**Other relevant designations**
Coastal Geomorphology of Scotland	Favourable, maintained (October 2010)	
Sand dune	Unfavourable, declining (April 2003)	
Eutrophic loch	Unfavourable, declining (August 1999)	
Open water transition fen	Unfavourable, declining (February 2005)	
Fen meadow	Unfavourable, declining (February 2005)	
Saltmarsh	Not yet assessed	
Breeding bird assemblage	Favourable, maintained (July 2004)	
Goldeneye, non-breeding	Favourable, maintained (April 2001)	
Greylag goose, non-breeding	Unfavourable, declining (April 2001)	SPA
Pink-footed goose, non-breeding	Favourable, maintained (April 2001)	SPA
Whooper swan, non-breeding	Favourable, maintained (April 2001)	SPA

Natural Features of Loch of Strathbeg SPA that are not notified as SSSI natural features	**Feature Condition (date monitored)**
Sandwich tern, breeding	Unfavourable, declining (July 2004)
Svalbard Barnacle goose	Favourable, maintained (August 2001)
Waterfowl assemblage, non-breeding	Favourable, maintained (August 2001)

The Coastal geomorphology feature was assessed as favourable maintained in October 2010. Natural dune erosion may have been accelerated in places by recreational use of the site. A site visit in April 2003 found that quad-biking was causing major damage and erosion. Up to 70 bikes were using the site on weekends. Following a partnership project with the owners, local people and the police, the situation has since improved considerably and the vegetation is recovering.

There is a small conifer plantation on the dunes which is mature and it is proposed to carry out sensitive removal of this over the next few years.

The open water loch feature was last surveyed in 1999. Water levels have fluctuated in the loch, both within and between years but there has been no significant loss of extent. It appears that some types of vegetation have decreased in extent, possibly in responses to changes in water chemistry. The loch is demonstrating a shift in the vegetation structure with an increase in algae at the expense of other aquatic plants. These changes are taken as evidence of increasing nutrient levels in the loch. Although the use of the site as a protected wildfowl roost makes a significant contribution, the main cause of this is thought to be diffuse pollution in the catchment. The open-water transition fen and fen meadow were also declining, suffering from drying and possibly nutrient enrichment. The Savoch burn was re-meandered and an area of reeds planted in 2007 to improve water quality; but it is too early to tell whether this will prevent decline in condition of the loch and fen habitats. Removal of scrub in 2006 (which had encroached onto the fen vegetation, drying it out over a number of decades), and changes in the grazing management of the transition fen appear to be improving the fen habitats.

The numbers of goldeneye had declined by 48% in the last monitoring round, only narrowly missing the 50% drop threshold for unfavourable condition. Other diving ducks at the site had also declined, although the cause is unknown. It is speculated that this is due to vegetation changes linked to nutrient enrichment.

The decline in the number of greylag geese was thought to be due to hunting pressure in the greylag's breeding grounds and a shift in wintering distribution. Svalbard barnacle geese pass through the reserve on migration, with only a small number staying to over winter. The numbers of this species were favourable during the last monitoring round in 2001.

Sandwich terns used to nest on an island in the loch. However, in 2000 the island flooded causing breeding failure. Erosion of the islands led to loss of habitat and works to restore the islands have not yet resulted in the return of this species.

Past and present management

The loch was cut off from the sea by influxes of sand and encroaching dunes in the 18th century. It lies within an intensively farmed agricultural catchment of 55.7 km^2. Land immediately adjacent to much of the loch has been enclosed and farmed for both pasture and arable production, though the present marshland area is now considerably more extensive than in 1870. There used to be a viable trout fishery on the loch, with angling carried out from boats. Fish numbers have dwindled, despite the experimental stocking of the loch with brown trout. The loch has not been fished for several years.

Part of the site was used as a seaplane base in c.1914 and as part of an airfield in about 1942.

Both the loch and surrounding farmland have been used for wildfowling for much of the last century, during which time considerable keepering activity took place. The majority of the site was shot over until, in 1973, the RSPB established a nature reserve, and later a visitor

centre at the Loch of Strathbeg. It now manages 1120 ha (of which 740 ha lie within the SSSI), for wildlife benefit. A former Management Agreement with the landowner on the southern and eastern shores of the loch also restricted wildfowling. There is now little shooting in the vicinity of the loch itself. Limited wildfowl shooting still takes place on some other parts of the site.

Under RSPB management, fields close to the loch at Savoch have been returned to pasture and flooded for part of the year. Wildfowling has ceased to take place from much of the dunes at the back of the Loch.

In 1997, SNH successfully completed a goose management demonstration scheme in the Loch of Strathbeg area. The scheme demonstrated efficient and relatively cost-effective methods of influencing the distribution of pink-footed geese on farmland, thereby reducing conflict between farming and conservation interests. The results of the demonstration scheme were rolled out as part of the national programme addressing this issue and has run since.

The outlet from the Loch of Strathbeg is artificially maintained. The loch is subject to periodic salt-water incursions and there may be some salt influence through groundwater.

The main land use of the catchment is mixed or arable agriculture. Diffuse inputs from agriculture, and the large number of waterfowl roosting on/near to the loch in winter, both contribute to, and accelerate the natural enrichment of the loch.

The RSPB manage the water table on the Savoch low ground, to the west of the Loch, to make it more attractive to waders and wintering wildfowl. They have installed a series of ditches and bunds on the Savoch low ground for this purpose. People are encouraged to visit the visitor centre at Starnafin and a number of bird hides on the site.

Anglers have experimented with stocking the loch with brown trout to improve the fishery.

There is an emergency discharge outlet for storm sewage at a pumping station at the southwest end of the Loch and a pipeline runs through the site to the shore.

The dunes are grazed by rabbits and sheep and grazing has recently been introduced to the marsh and fens to the north-west of the loch.

There is a walk along the dunes both within the RSPB reserve and on privately owned land at Rattray Head.

Giant hogweed is present in the catchment and has been controlled on the site.

Objectives for management (and key factors influencing the condition of natural features)

We wish to work with the owners and occupiers to protect the site and to maintain and where necessary enhance its features of special interest. SNH aims to carry out site survey, monitoring and research as appropriate, to increase our knowledge and understanding of the site and its natural features.

The EU Habitats and Birds Directives oblige Government to avoid, in SACs and SPAs, the deterioration of natural habitats and the habitats of species, as well as disturbance of the species for which the areas have been designated, where such disturbance could be significant in relation to the objectives of these Directives. The objectives below have been assessed against these requirements. All authorities proposing to carry out or permit to be carried out operations likely to have a significant effect on the European interests of this

SSSI must assess those operations against the relevant Natura conservation objectives (which are listed on our website through the SNHi – SiteLink facility).

1. To maintain the open standing water habitat and associated flora and fauna

- Maintain current complement of aquatic flora and, if possible, encourage its recovery, particularly of stoneworts, by improving water quality.

  The site is likely to be affected by successional changes which may result a reduction in the area of open water and encroachment of woodland in fen and swamp areas.

  Nutrient enrichment is a natural process, but recent increases in the number of pink-footed geese roosting on the loch, coupled with changing farming practices, have both helped to accelerate this process. A desk study undertaken in 1991 indicated that up to 25% of the loch's phosphorus inputs might come from wildfowl, with the remainder coming from agricultural sources. Ultimately, this enrichment may lead to a further decline in the aquatic habitat and associated flora and fauna. About thirty years ago, the loch's flora was more diverse. Recent surveys indicate that it now has a less diverse and less abundant aquatic flora. Birds which feed on these aquatic plants no longer visit the loch in such large numbers and this trend is likely to continue with further reductions in the numbers of coot, pochard and mute swan.

  Pollutants (e.g. accidental diesel spills on farms), could get into the loch via its inflow burns and could adversely affect its water chemistry and aquatic flora. Emergency overflow or accidental discharges from the sewage pumping station at the southern end of the Loch could have a similar affect.

  A non-native plant, Canadian pondweed is present in the loch but it has not flourished, possibly because the water is generally quite turbid.

- Maintain conditions suitable for supporting important numbers of wintering wildfowl, in particular whooper swans, pink-footed and greylag geese, and teal.

  Migratory birds, such as greylag geese, are subject to factors outwith the site, e.g. patterns of agricultural practice which affect winter food supply. The numbers of these species are likely to fluctuate for reasons which are not related to the management of the site.

  Manipulation of the water levels on the Savoch low ground can provide additional roosting and feeding areas for both wildfowl and waders. In recent years geese have chosen to roost on this area in preference to the loch, and they will therefore have less of an impact on the nutrient status of the loch. It is hoped that this management will encourage more waders to breed on the reserve and support more wintering wildfowl.

- Wildfowling activity could disturb or affect numbers of wintering and roosting wildfowl. Previously, shooting in close proximity to the loch was considered a problem, mainly in terms of disturbance. Since purchase by the RSPB, wildfowling around the loch margins and adjacent land is now limited.

- Maintain and, if possible, enhance range of breeding bird species, in particular maintain condition suitable for Sandwich tern and birds associated with open waters and their margins

Although now illegal, lead shot has been widely used in the past and will be present in the loch sediment. There are no records of fatalities from lead and this will become less of an issue as time passes but the shot presently occurring in the sediment of the loch may have a damaging effect upon species which feed on the bottom of the loch.

Mink may be present at the Loch of Strathbeg but no data exists regarding their impact on breeding bird populations.

- Maintain conditions suitable for the rare bird's-nest stonewort.

2. To maintain current extent and diversity of fen and swamp habitats along with zonal transitions

- Continue to control scrub and graze marsh and fen areas.

3. To maintain the physical and visual integrity of the coastal landforms and associated habitats

- Ensure the continued natural evolution of the beach-dune system.

The beach-dune system will evolve naturally in response to natural changes in the sediment supply, changes in local wind patterns, and relative sea-level change, together with any associated increases in wave action and storminess. In the long term this could mean dramatic changes in the form of the foredunes and coastal edge through coastal erosion and retreat, and the extent and morphology of the dune ridges inland through deflation and redepositional processes. These processes should be allowed to occur as they are natural and form part of the geomorphological interest of the site.

Of critical importance to the continued natural and dynamic evolution of the coastal edge is the maintenance of the sediment supply which currently moves along shore to the north-west from Rattray Head. Rattray Head itself is fed by sediment moving northwards along the coast from St Fergus. Some aspects of this supply will naturally diminish, such as the offshore glacial reserves. However, the longshore drift of sediment north and north westwards along the coast, where possible, should not be hindered or prohibited by the construction of further coastal protection works at any point along the coast encompassed by, or downdrift of, the site.

The physical integrity of the assemblage of dynamic coastal landforms which comprise the beach-dune system and raised shoreline features could be affected by operations such as sediment removal, interference with water table levels, re-grading, vehicle tracking, overgrazing or other disturbance of the vegetated parts of the landforms.

The grazing regime on the sand dunes will influence the dune flora.

4. To maintain existing visitor facilities for encouraging public awareness and understanding of the site

Date last reviewed: 6 October 2011.