

BERRIEDALE AND LANGWELL WATERS SPECIAL AREA OF CONSERVATION (SAC)

CONSERVATION ADVICE PACKAGE



Image: Atlantic salmon ©Lorne Gill/NatureScot

Site Details

Site name: Berriedale and Langwell Waters

Site map: <https://sitelink.nature.scot/site/8206>

Location: Highlands and Islands

Site code: UK0030088

Area (ha): 58.25

Date designated: 17 March 2005

Qualifying features

Qualifying feature	SCM Assessed condition on this site	SCM visit date	UK overall Conservation Status
Atlantic salmon (<i>Salmo salar</i>) [S1106]	Favourable Maintained	July 2011	Unfavourable-Inadequate

Notes:

Assessed condition refers to the condition of the SAC feature assessed at a site level as part of NatureScot's [Site Condition Monitoring \(SCM\)](#) programme.

Conservation status is the overall condition of the feature throughout its range within the UK as reported to the European Commission under Article 17 of the Habitats Directive in 2019.

Other Protected Areas

Berriedale and Langwell Waters SAC overlaps with

- Caithness and Sutherland Peatlands SAC <https://sitelink.nature.scot/site/8218> and
- Caithness and Sutherland Peatlands Special Protection Area (SPA) <https://sitelink.nature.scot/site/8476>.

It also overlaps with parts of

- Berriedale Water Site of Special Scientific Interest (SSSI) <https://sitelink.nature.scot/site/201>,
- Langwell Water SSSI <https://sitelink.nature.scot/site/908> and
- Knockfin Heights SSSI <https://sitelink.nature.scot/site/878>.

It lies adjacent to

- Morven and Scaraben SSSI <https://sitelink.nature.scot/site/1195> and
- Dunbeath Peatlands SSSI <https://sitelink.nature.scot/site/560>.

Key factors affecting the qualifying feature

Atlantic salmon

Atlantic salmon live in both freshwater and marine environments as part of their lifecycle. They hatch and live in freshwater as juveniles and then migrate to sea as adults. After one year or more at sea the adults return to their natal river to spawn. This homing behaviour has resulted in the development of genetically distinct populations of Atlantic salmon between rivers and several populations may exist within the same river.

Atlantic salmon numbers have declined throughout their geographic range, including in Scottish rivers. They may be impacted by a range of pressures in the freshwater and marine

phases of their lifecycle. In the freshwater environment these pressures include: over exploitation, habitat degradation, climate change-related changes to surface water temperature and hydrology, diffuse pollution and (historically) inappropriate stocking of young salmon from as far away as the Rhine.

The river is also vulnerable to the introduction of other new species through a number of routes (anglers, canoes, etc.) which could have a negative impact.

In Scotland Atlantic salmon SACs extend to the tidal limit of rivers only. Marine mortality is however one of the key issues facing Atlantic salmon in Scotland and elsewhere. Environmental factors, climate change, marine developments, enhanced sea lice burdens associated with aquaculture, by-catch in pelagic fisheries, over-exploitation, prey availability and pollution are all key factors that could affect this species when it is in the sea. However, the exact nature of these interactions is not fully understood.

The feature has previously been assessed through NatureScot's Site Condition Monitoring programme as being in unfavourable condition at this SAC due to the low number of young salmon in the river. Management measures are in place in the catchments of the SAC enhance the river habitat for salmon through riparian planting. The number of young salmon in the river prior to the most recent assessment had increased enough for the feature to be in favourable condition.

Further information about Atlantic salmon can be found [here](#).

Conservation Priorities

The Berriedale and Langwell Waters SAC partly overlaps with the Caithness and Sutherland Peatlands SAC which includes blanket bog as a Priority Feature. Broadly similar management is likely to be suitable for both blanket bog and Atlantic salmon although careful consideration would be needed before planting trees adjacent to watercourses within Caithness and Sutherland Peatlands SAC to benefit salmon.

Any management for Berriedale and Langwell Waters SAC or assessment of plans or projects will need to take account of all the interests of both Caithness and Sutherland Peatlands SAC and SPA where the sites overlap. If any management conflicts were to arise between the qualifying features of the Berriedale and Langwell Waters SAC and Caithness and Sutherland Peatlands SAC where the sites overlap, blanket bog should be given priority, followed by any features in unfavourable condition. This is because blanket bog is a Priority Feature and because management to benefit the Berriedale and Langwell Waters SAC could be done outwith Caithness and Sutherland Peatlands SAC.

Conservation Objectives for Atlantic salmon (*Salmo salar*)

1. To ensure that the qualifying feature of Berriedale and Langwell Waters SAC is in favourable condition and makes an appropriate contribution to achieving favourable conservation status
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Favourable Conservation Status (FCS) is considered at a European biogeographic level. When determining whether management measures may be required to ensure that the conservation objectives for this site are achieved, the focus should be on maintaining or restoring the contribution that this site makes to FCS.

When carrying out appraisals of plans and projects against these conservation objectives, it is not necessary to understand the status of the feature in other SACs in this biogeographic region. The purpose of the appraisal should be to understand whether the integrity of the site (see objective 2) would be maintained. If this is the case then its contribution to FCS
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across the Atlantic Biogeographic Region will continue to be met. Further details on how these appraisals should be carried out in relation to maintaining site integrity is provided by objective 2 (including parts a, b, c – and for freshwater pearl mussel - d). If broader information on the feature is available then it should be used to provide context to the site-based appraisal.

Note that “appropriate” within this part of the conservation objectives is included to indicate that the contribution to FCS varies from site to site and feature to feature.

2. To ensure that the integrity of Berriedale and Langwell Waters SAC is maintained by meeting objectives 2a, 2b and 2c for Atlantic salmon

The aim at this SAC is to maintain Atlantic salmon in a favourable condition as a contribution to its wider conservation status. Therefore any impacts to the objectives shown in 2a, 2b or 2c below must not persist so that they prevent the achievement of this overall aim. When carrying out appraisals of plans or projects the focus should be on maintaining site integrity, specifically by meeting the objectives outlined in 2a, 2b and 2c. If these are met then site integrity will continue to be maintained. Note that not all of these will be relevant for every activity being considered. Any impacts on the objectives shown in 2a, 2b or 2c below must not persist so that they prevent the maintenance of site integrity. Temporary impacts on these objectives resulting from plans or projects can only be permitted where they do not prevent the ability of a feature to recover and there is certainty that the feature will be able to quickly recover.

This objective recognises that the qualifying species are exposed to a wide range of drivers of change. Some of these are natural (e.g. population fluctuations/ shifts or habitat changes resulting from natural processes) and are not a direct result of human influences. Such changes in the qualifying species' distribution and use of the site, which are brought about by natural processes, directly or indirectly, are normally considered compatible with the site's conservation objectives. An assessment of whether a change is natural or anthropogenic, or a combination of both, will need to be looked at on a case by case basis.

2a. Maintain the population of Atlantic salmon, including range of genetic types, as a viable component of the site

The conditions for the species' long-term existence at Berriedale and Langwell Waters should be maintained.

This conservation objective is considered to be met if the conditions for the species' long-term existence are in place. These conditions include:

- Effects should be avoided that could lead to a permanent reduction in the Atlantic salmon population, or that prevent the population from recovering, through mortality, injury, or impacts caused by disturbance or displacement. This includes for example the effects caused by the construction of in-stream barriers to migration, changes in water flow rates or water quality. Observed densities therefore need to be assessed in relation to the expectation for Berriedale and Langwell Waters overall and for each river reach, based on productivity and natural habitat character of the system. However, these should not differ significantly from those expected for the river type/reach under conditions of high physical and chemical quality.
- The numbers of returning Atlantic salmon should be sufficient to maintain the long-term viability of each life history type. All returning adults and emigrating smolts must have unhindered access between freshwater and marine habitats (see conservation objective 2b). All supporting freshwater habitats must be of sufficient quality and quantity to support both adult and juvenile fish (see conservation objective 2c). Different rivers have

different seasonal patterns of adult migration associated with the environmental characteristics of the catchment and river system.

- Multi-sea winter fish are an important component of a natural Atlantic salmon run and the spring run component has declined considerably in recent years. The seasonal pattern of migration characteristic of the river and, in particular, the multi-sea-winter stock component should be maintained.

When assessing the effects of any plan or project consideration should be given to whether impacts outwith the SAC could affect achievement of this conservation objective. The appraisal should also consider the life history traits of the species, including maintaining all genetic types of Atlantic salmon, and the scale and duration of the impact being assessed. Impacts resulting in the loss of genetically distinct populations of Atlantic salmon would not be considered temporary in nature as these adaptive traits may have evolved over generations and could not be recovered if lost.

2b. Maintain the distribution of the species throughout the site

Atlantic salmon distribution within the site should not be restricted by pollution or human activities.

Access to spawning sites, juvenile rearing sites and areas where adult Atlantic salmon may rest prior to spawning (some may be present within the river for a year prior to spawning), should all be maintained. Juvenile Atlantic salmon should be present in all areas of the catchment to which they, and adult fish, have natural access. This does not include areas above naturally impassable barriers, but areas where access has been limited by man-made obstructions.

The distribution of Atlantic salmon within the site may be affected by disturbance originating both within and outwith the site (including estuarine and coastal areas). Plans and projects that cause displacement and barrier effects to the species, for example by impeding access to spawning areas or downstream passage of smolts to the sea, can also affect species distribution. Examples may include: the provision of compensation flows which are inadequate to allow adult Atlantic salmon to reach known spawning areas; the presence of physical in-stream structures such as flow deflectors, coffer dams etc. which may increase flow velocity to that which is beyond the swimming capacity of migrating fish or sustained noise generation (such as that caused by piling) in places that cannot be avoided by migrating Atlantic salmon.

2c. Maintain the habitats supporting the species within the site and availability of food

The distribution and extent of Atlantic salmon habitat within the site, together with the structure, function and supporting processes of the habitat should be maintained.

High water quality and natural flow conditions should be in place to provide the necessary conditions for Atlantic salmon survival and recruitment.

Atlantic salmon spawn in late autumn and early winter, depositing their eggs in redds which they excavate in gravel and pebble beds. Eggs are often deposited in areas of accelerating flow, such as the tail end of pools and glides, upstream from riffles. However, in upland streams eggs may be deposited in any areas of gravel that can be physically moved by the fish. A good supply of oxygen is essential for eggs to develop and this is facilitated by a flow of water through the gravel. Therefore, clogging these fine sediments with silt and fine sand can reduce the water and oxygen flow resulting in egg mortality.

Egg survival is also affected by redd 'washout' during winter spates, resulting in the physical scouring out of eggs from the gravel. Substrate stability, the dynamics of water flow and the weather all influence the extent of siltation and scale of washouts.

After hatching, the young fry remain in the gravel until March to early May, when they disperse and set up territories. Atlantic salmon fry prefer fast flows (>30 cm/s) and favour areas with surface turbulence (riffle habitat). They require a rough bed of pebble, cobble and gravel and water <20 cm deep. Good cover is essential for maintaining high fry densities, such as cover from stones, plants or debris.

Atlantic salmon that have survived their first winter (parr) prefer deeper water than fry (typically 20-40 cm) and a coarser substrate of pebbles, cobbles and boulders. Cover remains important for adult Atlantic salmon particularly in smaller streams and rivers. In larger rivers and lochs this type of cover is less important.

Favoured habitat used by adult fish include pools of at least 1.5 m depth, with cover from features such as undercut banks, instream vegetation, submerged objects and even surface turbulence. Spawning habitat is defined as stable coarse substrate without an armoured layer, in the pebble to cobble size range (16-256 mm) but with the majority being <150 mm. Water depth during the spawning and incubation periods should be 15-75 cm. Coarse woody debris should be retained where appropriate, as it plays a significant role in the formation of new gravel beds.

Juvenile Atlantic salmon (fry and parr) maintain feeding stations within rivers and defend these aggressively. The invertebrates which they feed upon are intercepted by juvenile fish as they drift downstream, and may be of both aquatic and terrestrial origin.

At sea, adult Atlantic salmon feed on range of prey items, including marine amphipods, shrimps and squid and fish, such as sand eels, capelin and herring. Adults do not feed once they return to freshwater.

As a result of their life history, Atlantic salmon stocks can be impacted in both freshwater and marine habitats. In freshwater, both water quality and water quantity are key issues. Salmonids require access to rivers with unpolluted and well-oxygenated water with a habitat mosaic which comprises suitable spawning gravels, cobbles and boulders. In terms of water quality, these fish also require enough water to ensure access to and from spawning areas, as well as enough water to maintain an adequate level of juvenile habitat.

Over-exploitation, inappropriate stocking activities, riparian land management operations (such as those related to forestry and agriculture), in-stream engineering and alterations to natural water flow regimes (including those relating to hydropower development), invasive non-native species, physical barriers to migration (such as historic caulds and lades), pollution (direct and diffuse) and direct damage to spawning habitat (e.g. through mineral or gravel extraction) can all impact the quality of freshwater environments and their value to Atlantic salmon. Climate change, and the rises in water temperatures during summer, may also be a factor in determining the suitability of some waterbodies for Atlantic salmon. Therefore cover is important for Atlantic salmon, particularly in smaller streams. The shade from bushes next to the river or overhanging trees is likely to help to prevent fish from becoming stressed due to high water temperatures which often occur in combination with low water levels.

Water quality, hydrology, and habitat standards for Good Ecological Status (GES) under the Water Framework Directive should be met. These targets are intended to support a healthy, naturally functioning riverine ecosystem which protects the whole biological community and individual species to a degree characteristic of the river.

Conservation Measures

Berriedale and Langwell Waters SAC is part of several Sites of Special Scientific Interest and management changes described on the SSSI lists of Operations Requiring Consent must have prior consent from SNH (NatureScot).

Current and recommended management for Atlantic salmon

Issue	Measure	Responsible party
Ongoing species protection	Legislation is in place to manage and protect Atlantic salmon in freshwater and at sea. This includes a statutory close season and catch & release period.	All
	Develop an Atlantic salmon conservation plan for all rivers, or Atlantic salmon management units (if several small rivers are considered to be so close in terms of geography and stock size as to merit a single plan).	Marine Scotland Science Fishery managers NatureScot SEPA
	Voluntary catch and release policy for anglers.	Land/fishery managers, District Salmon Fisheries Board, Fisheries Trusts
	Restriction of catch from net and coble fishery at the river mouth.	Land/fishery managers, District Salmon Fisheries Board
Forest harvesting operations resulting in silt/nutrients entering the river – may affect salmon spawning areas	Planning and implementation of forest harvesting operations should better identify high risk areas. Management should include improved pollution control, blocking of drains and careful harvesting in riparian areas.	Scottish Forestry, Forestry & Land Scotland, Forestry owners and managers
	Promote adherence to the Forest and Water Guidelines, and published best practice, during forest restructuring and highlight the need to strictly control fine sediment and other diffuse pollution release into the river. Forestry planting and harvesting in the catchment needs to be planned so that heavy rainfall and droughts are buffered by the forest rather than exacerbating high/low extremes in flow.	Scottish Forestry, Forestry & Land Scotland, Forestry owners and managers
Woodland management	Woodland management has been undertaken within the catchment (including measures to increase the cover of native trees), this is likely to be beneficial to Atlantic salmon.	Land/fishery managers, Scottish Forestry, Forestry & Land Scotland

	Drain blocking in open peatland in the catchment to help to buffer high/low extremes in flow rate and reduce sediment run-off into the river.	Land managers
Water quality	Implement and maintain monitoring of key water quality parameters.	NatureScot/SEPA
	Any development proposals in the catchment should include appropriate measures to minimise sediment run-off and prevent pollutants from entering the river.	Highland Council, developer
Beneficial habitat management	Evaluation of diffuse pollution and morphological pressures through the river basin planning process and the implementation of restoration measures to maintain or improve habitat for Atlantic salmon.	SEPA
	Promotion of measures to increase resilience to climate change, particularly the creation of native riparian woodland and improved connection with floodplains. Measures to promote coordinated, catchment-scale activity are particularly important. Native tree planting in appropriate locations would help improve the riparian habitat for Atlantic salmon.	All
	Restore riparian and catchment peatlands to reduce fine sediment concentrations, improve floodplain connectivity and restore more natural hydrological regime to benefit Atlantic salmon.	All
Population size	Encourage the natural processes of river flow and morphology through a policy of non-intervention and thereby improve salmonid recruitment and survival.	All
Research	Development and introduction of long-term monitoring protocols for juvenile Atlantic salmon in SACs.	Marine Scotland Science, District Salmon Fisheries Boards, Fisheries Trusts, NatureScot
	Develop and implement monitoring protocol to allow robust, catch independent, assessment of adult population size.	Marine Scotland Science, District Salmon Fisheries Boards, Fisheries Trusts, NatureScot
	Monitor the presence and distribution of aquatic non-native species which may adversely impact Atlantic salmon.	SEPA, District Salmon Fisheries Boards, Fisheries Trust
Marine survival	Monitoring of post-smolt Atlantic salmon to determine their behaviour at sea and better understand the impact of enhanced sea lice burdens.	Marine Scotland (Marine Scotland Science and Farmed Fish Health Inspectorate)

Invasive species	All anglers and other water users (such as canoeists or researchers) should follow the Check, Clean, Dry biosecurity procedures to help prevent the spread of problem non-native species.	All
Water flow	Manage abstraction and water transfers to ensure that access to essential habitats by Atlantic salmon is maintained and water quality is not compromised.	SEPA, NatureScot, Scottish Water

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