NatureScot
Scotland's Nature Agency
Buidheann Nàdair na h-Alba

RIVER BORGIE
SPECIAL AREA OF CONSERVATION (SAC)

CONSERVATION ADVICE PACKAGE

Image: River Borgie SAC © Alexander Macdonald/NatureScot

Site Details

Site name: River Borgie

Map: https://sitelink.nature.scot/site/8356

Location: Highlands and Islands

Site code: UK0012995

Area (ha): 33.92

Date designated: 17 March 2005

Qualifying features

Qualifying feature	SCM assessed condition on this site	SCM visit date	UK overall Conservation Status
Freshwater pearl mussel (*Margaritifera margaritifera*) [S1029]	Unfavourable No change	3 September 2014	Unfavourable-Bad
Atlantic salmon (*Salmo salar*) [S1106]	Favourable Recovered	11 October 2011	Unfavourable-Inadequate
Otter (*Lutra lutra*) [S1355]	Favourable Maintained	6 October 2012	Favourable

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.

Overlapping Protected Areas

River Borgie Special Area of Conservation (SAC) has the same boundary as

- River Borgie Site of Special Scientific Interest (SSSI) https://sitelink.nature.scot/site/1685

and overlaps with parts of

- Invernaver SAC https://sitelink.nature.scot/site/8276
- Caithness and Sutherland Peatlands SAC https://sitelink.nature.scot/site/8218
- Caithness and Sutherland Peatlands Special Protection Area (SPA) https://sitelink.nature.scot/site/8476
- West Borgie SSSI https://sitelink.nature.scot/site/1602
- Invernaver SSSI https://sitelink.nature.scot/site/815
- Aird Torrisdale SSSI https://sitelink.nature.scot/site/24

Key factors affecting the qualifying features

Freshwater pearl mussel

Freshwater pearl mussels are long-lived freshwater molluscs that live in the gravel beds of clear, unpolluted rivers. For part of their lifecycle they are dependent upon a healthy population of salmonids (young salmon or trout) which act as host species. The mussel larvae attach to the gills of salmonid fish in mid to late summer and drop off the following spring. When they detach from their hosts they must land in sandy or gravelly substrates to settle and grow to adulthood. In suitable conditions they can live for over 100 years. However freshwater mussel populations are vulnerable to changes to water quality (including pollution), hydrological alterations (including river engineering and abstractions), habitat degradation of river beds and banks, illegal pearl fishing and availability of host species.

The feature has been assessed through NatureScot's site condition monitoring programme as being in unfavourable condition at this SAC due to water quality targets not being met, damage to the river resulting from forest harvesting, damage from a series of spates which have destroyed some significant pearl mussel beds, there being too few juvenile mussels and a high proportion of dead freshwater pearl mussel shells recorded. Since the most recent monitoring, the pearl mussel population has also been affected by exceptionally low water levels.

Further information about freshwater pearl mussel can be found here.

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 River Borgie these pressures include: over exploitation, climate change-related changes to surface water temperature and hydrology, built development (such as weirs that are designed to facilitate angling but sometimes do not enhance salmon habitat), and increased sediment and lower water quality in the run-off from the surrounding conifer plantations. Forestry drainage also appears to increase the speed of water run-off and alter water level fluctuations in the River Borgie. 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 salmon in the river. Marine mortality of adult salmon may be contributing to this, but the scope of this document covers only those measures that can be taken within the SAC. Management measures are however in place to increase the salmon population through a locally agreed catch-and-release policy and by working more closely with forestry managers to resolve water quality issues in the run-off from conifer plantations. The current assessment is therefore that the feature is in favourable condition.

Further information about Atlantic salmon can be found here.

Otter

Otter require proximity to unpolluted open water, a plentiful food supply and habitats for providing shelter. At this site, otter associated with the SAC are likely to have holts or resting places adjacent to the site boundary as well as within the site itself.

Further information about otters can be found here.

Conservation Priorities

There is unlikely to be any conflict between management of the features of the River Borgie SAC as they require similar environmental conditions and pearl mussels are dependent on salmon for part of their life cycle.

The River Borgie SAC partly overlaps with Caithness and Sutherland Peatlands SAC, which has blanket bog as a Priority Feature. Broadly similar management is likely to be suitable for both blanket bog and the river SAC features although careful consideration would be needed before planting trees adjacent to the river to benefit the river SAC features within Caithness and Sutherland Peatlands SAC.

Any pro-active management for the River Borgie SAC or assessment of plans or projects will need to take account of the all 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 River Borgie 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 River Borgie SAC could be done outwith Caithness and Sutherland Peatlands SAC.

Overarching Conservation Objectives for all features of River Borgie SAC

1. To ensure that the qualifying features of the River Borgie SAC are in favourable condition and make an appropriate contribution to achieving favourable conservation status
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 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 the River Borgie SAC is restored by meeting objectives 2a, 2b, 2c for each qualifying feature (and 2d for freshwater pearl mussel)
The aim at this SAC is to maintain, or where appropriate restore, the qualifying species in a favourable condition as a contribution to their wider conservation status. Therefore any impacts to the objectives shown in 2a, 2b, 2c or 2d 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 restoring site integrity, specifically by meeting the objectives outlined in 2a, 2b, 2c and 2d. If these are met then site integrity will be restored. Note that not all of these will be relevant for every activity being considered. Any impacts on the objectives shown in 2a, 2b, 2c or 2d below must not persist so that they prevent the restoration 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 features 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.

Conservation Objectives for freshwater pearl mussel (*Margaritifera margaritifera*)

2a. Restore the population of freshwater pearl mussel as a viable component of the site
The conditions for the species' long-term existence at the River Borgie SAC should be restored. This includes encouraging and allowing the number and density of mussels to increase.

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

- Avoiding effects that could lead to an inability of the population to successfully reproduce and recruit sufficient juveniles into the population (e.g. >20% of the population should be juvenile (<65mm long). Very young juveniles (<30mm long) should also be present).
- Avoiding effects that could lead to a permanent reduction in the density and number of freshwater pearl mussels in the population, or that prevent a recovery in density and numbers, through mortality, injury or impacts caused by disturbance. These effects could be caused by development, water pollution, river engineering, land-use change, abstractions, and wildlife crime (illegal pearl mussel fishing). For a healthy mussel population the aim is to have at least 5 mussels per m^2 in appropriate habitat.
- Ensuring high quality habitat in river reaches that support freshwater pearl mussels (see conservation objective 2c).
- Allowing the species distribution within the site to be maintained or expanded (see conservation objective 2b).
- Maintaining the distribution and viability of the freshwater pearl mussel's host species, and their supporting habitat (see conservation objective 2d).

Freshwater pearl mussels are in unfavourable condition at this site. The focus of this objective will therefore be to stop the decline in population and subsequently promote its increase. Recovery of freshwater pearl mussel populations is notoriously difficult. This is partly due to their unusually long lifecycle and their requirement for both, very high water quality and the associated natural, habitat conditions, with particular regard to nutrient and oxygen levels, flow rates and sediment load. These conditions generally need to be provided for all of the time.

The early stages of the pearl mussels' lifecycle are also complex and delicate, as it relies on the presence of healthy, abundant, juvenile, native salmonids. It is therefore also important that the local salmonid populations are robust and able to access all relevant areas of this SAC.

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.

2b. Restore the distribution of freshwater pearl mussel throughout the site

Conditions should allow for the distribution of the species to be restored to at least their previous known extent.

Distribution of mussels within the site can be affected by disturbance originating both within and outwith the site. Factors such as abstraction, water pollution, illegal pearl fishing, river engineering and intensification of land use can risk directly affecting freshwater pearl mussels.

The species can be directly affected, or the species' habitat quality reduced such that recruitment is unsuccessful, leading to a contraction in the species' distribution. It is important that the distribution of mussels is maintained. Freshwater pearl mussels may be present in the main stem of the river, as well as in tributaries (and tributaries may contain populations that are not currently known).

Plans and projects that cause disturbance, displacement and barrier effects to the host species can also affect mussel distribution (see conservation objective 2d).

2c. Restore the habitats supporting freshwater pearl mussel within the site and availability of food

The distribution and extent of the species' habitat within the site, together with the structure, function and supporting processes of the habitat should be restored.

Freshwater pearl mussels are typically found in rivers with 'soft' high water quality conditions, combined with abundant gravel river beds. They feed by filtering fine organic particles from the water. In order to maintain the supporting freshwater pearl mussels' habitat it is important that the species' high quality habitat requirements are met.

High water quality and natural flow conditions should be in place to provide the necessary conditions for freshwater pearl mussel. The restoration of peatlands (e.g. drain-blocking) and creation of native riparian woodlands will also lead to more sustainable river flow regimes. These land management practices will help to reduce the potential for damaging flood impacts and also create more sustainable steady flows during droughts.

Freshwater pearl mussel populations are particularly vulnerable to nutrient enrichment and fine sediment increases, both of which can affect the juvenile mussels that predominantly live buried in river gravels. River engineering can also directly damage populations, as well as interrupt the supply of sediment that maintains habitat. Changes in land use have the potential to increase nutrient and fine sediment concentrations in the river, such as those caused by poorly managed forest harvesting. However land use changes, such as the establishment of native riparian woodlands, have the potential to improve habitat by providing shade that can mitigate damaging peaks in summer temperature, stabilise river banks and reduce erosion.

Specific targets for some water quality parameters include:

- Nutrient concentrations should be near-natural. Soluble reactive phosphorus is particularly important (the annual mean should be <0.005mg/l).
- Mean Biochemical Oxygen Demand (BOD) should be <1 mg/L. BOD measures the oxygen consumed by bacteria from the decomposition of organic matter (such as sewage or run-off from eroding land) in water. Unpolluted water has a low BOD (i.e., well oxygenated water with a low level of organic matter). Freshwater pearl mussels need river water to have some organic particles, as this is what they feed on. However pearl mussels can be harmed by excessive levels of organic particles, and associated low levels of oxygen in water.
- Filamentous algae should have <5% coverage of the river bed during the summer months (indicating that the river does not have excess nutrients).
- Excess fine sediment should be avoided in the river as this can smother freshwater pearl mussels or interfere with filter feeding.

The quality of the riverbed habitat is particularly important for freshwater pearl mussels, and is best assessed by measuring the 'redox potential' (a measure of how much oxygen there is in the water).

- There should be no pronounced difference in the redox potential between open water and interstitial (within sediment) water at 5cm depth (a typical depth for juvenile freshwater pearl mussels which are normally buried within the gravels).

2d. Maintain the distribution and viability of freshwater pearl mussel host species and their supporting habitats

Sufficient salmonid fish hosts should be present to support juvenile mussel recruitment.

Salmonid fish (native salmon and trout) are an integral part of the freshwater pearl mussels' lifecycle and should be available in sufficient numbers to ensure continued recruitment of

juvenile mussels to the population. It is important that juvenile host salmonids, including any range of genetic types, are present in all areas of the catchment to which they, and adult fish, have natural access and where freshwater pearl mussels have historically been present.

The host species can vary in different sites. However at this site the host species are unknown. An abundance of > 0.1 native juvenile host salmonid per m^2 in appropriate habitat should ensure sufficient host species are available. More generally, the density of host juvenile salmonids should not differ significantly from those expected for the river type/reach under conditions of high physical and chemical quality.

Freshwater pearl mussel population viability is dependent upon host salmonid population viability, so any threats to host species stocks should be avoided. Factors that can affect the viability of host species include those that affect freshwater pearl mussel, but potential barriers to fish migration, inappropriate fish stocking and biosecurity are also further increased risk factors. Factors that also affect the marine survival, and therefore viability, of Atlantic salmon and sea trout populations should also be considered.

Host species should be able to continue to use and access all areas of importance within the site. Plans and projects that cause disturbance, displacement and barrier effects to host species can affect their distribution and in turn the distribution of freshwater pearl mussels.

To ensure a viable population of host species is present supporting salmonid habitat should be maintained throughout the site. Atlantic salmon and trout, both require the presence of clean gravels for spawning. For Atlantic salmon and large trout, these typically occur at the tail-end of pools, although spawning may take place if suitable gravels and flows are present. On emergence, usually between March and early May, the young fry disperse and set up territories which they defend aggressively. Atlantic salmon fry prefer fast flows (>30 cm/s) in addition to a rough bed of pebble, cobble and gravel; favouring these areas which provide a surface turbulence (riffle habitat). Trout fry prefer areas of relatively low water velocity near the streambed. Cover from stones, plants and debris is essential for maintaining high fry densities.

Atlantic salmon that have survived their first winter (parr) prefer deeper water than fry (typically 15-40 cm) and a coarser substrate of pebbles, cobbles and boulders. Trout parr generally favour currents of relatively low speed, where cover is available. Juvenile trout are often to be found under bankside cover, within undercuts, among tree roots or in marginal vegetation. Cover remains important for adult trout and 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 temperature combined with low water levels.

Conservation objectives for Atlantic salmon (*Salmo salar*)

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 the River Borgie SAC 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 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 the River Borgie 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 Atlantic salmon 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 Atlantic salmon within the site and availability of food

The distribution and extent of the species' 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 may be 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 aquatic or 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. Where the river is larger, this may be less important as deep water can provide cool refuge.

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 objectives for otter (*Lutra lutra*)

2a. Maintain the population of otter as a viable component of the site

The conditions for the long-term existence of the otter at the River Borgie SAC should be maintained.

An estimate of the number of otter occupying the site is not available and therefore there is no numerical baseline that can be given for the site.

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

- Avoiding effects that could lead to a permanent reduction in the otter population through mortality, injury, or impacts caused by disturbance or displacement. This includes for example the effects caused by development, river engineering, water pollution, roads without adequate crossing provision for otters or suitable culverts, or entanglement in fishing gear. Otters can drown in unprotected or disused fishing gear such as eel traps or fyke nets, so these should be removed, or if active, an otter guard fitted.
- Maintaining the species' ability to use all areas of importance within the site (to be considered under conservation objective 2b).
- Maintaining access to, and availability of, undisturbed resting places.
- Maintaining access to, and availability of, supporting habitats and prey (to be considered under conservation objective 2c).

Otter is a wide-ranging and highly mobile species. The population at the River Borgie SAC is reliant on suitable habitat in the surrounding countryside, including the adjoining Caithness and Sutherland Peatlands SAC, it is unlikely to be viable (capable of being self-sustaining) in isolation. The home range of an otter will vary depending on their sex, habitat quality and food availability. It will also vary between freshwater and coastal environments. At this SAC some otters that have parts of their territories within the site may also feed in coastal waters that lie outwith the boundary of the site (for example in Torrisdale Bay). In coastal areas otter densities may be as high as 0.5 - 0.7 animals/km. Males living in rivers and streams can have a mean linear range size of around 40km and females living in the same habitat can have a linear home range of 20km. Males have been known to range as far as 80km.

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.

Otter is a European protected species (EPS) and it is an offence to deliberately or recklessly capture, injure, kill, harass or disturb them in certain circumstances, or to damage or destroy their breeding or resting places anywhere in Scotland unless a licence has been issued to do

so. A licence can only be issued for particular purposes which the law allows. Further, there must be no satisfactory alternative and no detrimental impact on the contribution to the maintenance of otter at a favourable conservation status for a licence to be issued. This assessment considers impacts on the otter population at a local and regional level. The licensing requirement is in addition to considering whether a plan or project will result in any impacts (including incidental impacts) to the otter population within the SAC.

2b. Maintain the distribution of otter throughout the site

The spatial extent of otter within the River Borgie SAC should be maintained.

The ability for otter to use and access all areas of importance within the SAC should be maintained.

Distribution of otters within the site can be affected by disturbance originating both within and outwith the site. Plans and projects that cause displacement and barrier effects to the species can also affect species distribution. Examples include use of night-time floodlighting of watercourses, road and bridge construction works and general disturbance from human activity (and dogs) by watercourses especially at dusk/night-time.

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

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

Sufficiently high water quality and natural flow conditions should be maintained to provide the necessary conditions for otter and their prey.

Otters require suitable habitat for foraging, breeding and resting. In freshwater environments abundant boulders, crevices and/or peat, or other cavity-forming features such as tree root systems are needed to provide secure holt sites above high water. Dense scrub is also valuable for providing lie-ups and couches. Suitable areas supporting a healthy fish population within a nearby watercourse or still water body are required within each otter's home range, to enable foraging for key prey species such as salmonids and eels. Access to ponds, ditches, reedbeds and wetlands where amphibians may breed is also important. Otters which forage along the coast as well as using the SAC also need freshwater within the SAC to remove salt from their fur.

Changes to water flow and water quality can adversely affect otter habitat and prey on which they depend. Otters' food supply is normally associated with good water quality and therefore the water quality 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

The River Borgie SAC is notified as a Site of Special Scientific Interest (SSSI) and management changes described on the SSSI list of Operations Requiring Consent must have prior consent from SNH (NatureScot).

Current and recommended management for freshwater pearl mussel, Atlantic salmon and otter

Issue	Measure	Responsible party
High proportion of dead freshwater pearl mussel shells found and a decline in density of freshwater pearl mussels at the site	Freshwater pearl mussels are fully protected under Schedule 5 of the Wildlife and Countryside Act 1981 as amended. Offences include intentionally or recklessly killing, injuring or taking from the wild a freshwater pearl mussel.	All
	Continue to monitor for signs of illegal freshwater pearl mussel fishing, report any findings to the Police and implement agreed actions to deter criminal activity.	All
Ongoing species protection for salmon	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.	District Salmon Fisheries Board, Fisheries managers, Fisheries Trusts
Ongoing species protection for otter	Otter are a European protected species and therefore the species protection provisions of the Habitats Regulations apply.	All
Forest harvesting operations resulting in silt/nutrients entering the river – may affect freshwater pearl mussel and 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.	Scottish Forestry, Forestry & Land Scotland, Forestry owners and managers

	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 as both very high and very low river levels can damage freshwater pearl mussels.	
Sediment load in river from un-forested land – may affect freshwater pearl mussel and salmon	Ensure minimal poaching, tracking, or trampling by red deer, livestock, visitors and vehicles to prevent an unnatural sediment load from being washed into the river.	Land managers, NatureScot, SGRPID (GEAC)
	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
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 all three species.	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 all three species.	All
	Restore riparian and catchment peatlands to reduce fine sediment concentrations, improve floodplain connectivity and restore more natural hydrological regime to benefit salmon and freshwater pearl mussel.	All
Population size	Encourage the natural processes of river flow and morphology through a policy of non-intervention and thereby improve freshwater pearl mussel and salmonid recruitment and survival. The only case where intervention is	All

	definitely beneficial is that when the river level is particularly low, it may be appropriate to move pearl mussels to deeper pools if they would otherwise die due to their habitat drying out.	
By-catch – otter	Any disused eel or fyke nets should be removed when found. Any active nets should use otter guards.	Land managers
Research – salmon	Development and introduction of long-term monitoring protocols for juvenile Atlantic salmon in SACs.	Marine Scotland Science
	Develop and implement monitoring protocol to allow robust, catch independent, assessment of adult population size.	Marine Scotland Science
	Monitor the presence and distribution of aquatic non-native species which may adversely impact Atlantic salmon.	SEPA
Marine survival - salmon	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

Contact details:
NatureScot
The Links
Golspie Business Park
Golspie
KW10 6UB

Tel: 01463 701608
E-mail: north@nature.scot

Approved on 11 February 2020 by:

Greg Mudge
Principal Advisor
International Designations

Graham Neville
Area Manager,
Northern Isles & North Highland