

RIVER MOIDART SPECIAL AREA OF CONSERVATION (SAC)

CONSERVATION ADVICE PACKAGE



Image: Freshwater pearl mussel ©Sue Scott/NatureScot

Site Details

Site name:	River Moidart
Site map:	https://sitelink.nature.scot/site/8360
Location:	Highlands and Islands
Site code:	UK0012994
Area (ha):	16.19
Date designated:	17 March 2005

Qualifying Features	SCM assessed condition	SCM visit date	UK overall Conservation Status
Freshwater pearl mussel (<i>Margaritifera margaritifera</i>)	Unfavourable No change	September 2014	Unfavourable - bad

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 Moidart Site of Special Scientific Interest \(SSSI\)](#) and [Moidart and Ardgour Special Protection Area \(SPA\)](#).

Any pro-active management for the SAC or assessment of plans or projects will also need to take account of the SPA interests.

Key factors affecting the qualifying features

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 SNH's site condition monitoring programme as being in unfavourable condition at this SAC due to the low number and density of freshwater pearl mussels present and low levels of juvenile recruitment. The reasons for this decline are not

fully known, but could be due to a number of factors including: limited available habitat for mussels and fish spawning, pollution and climate change.

Further information about freshwater pearl mussels can be found on the JNCC website [here](#).

Conservation Objectives for Freshwater Pearl Mussel

1. To ensure that the qualifying features of the River Moidart 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 Moidart SAC is restored by meeting objectives 2a and 2b, and maintaining 2c and 2d for each qualifying feature

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.

2a. Restore the population of the species as a viable component of the site

The conditions for the species' long-term existence at the River Moidart 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. For a healthy mussel population the aim is to have at least 5 mussels per m².
- 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)
- Restore the distribution and viability of the freshwater pearl mussel's host species, and their supporting habitat (see conservation objective 2d).

Temporary short-term changes to a SAC qualifying interest due to anthropogenic influences may be considered not to compromise the conservation objectives within a site provided it can be demonstrated beyond reasonable scientific doubt that the population can fully recover. However, freshwater pearl mussels are in unfavourable condition at this site. Recovery of freshwater pearl mussel populations is notoriously difficult. This is partly due to their unusually long lifecycle and also due to their requirement for very high water quality and other habitat requirements, with the species requiring near natural conditions for important factors such as fine sediment and nutrients. These conditions generally need to be provided for all of the time. The early stages of the pearl mussels' lifecycle is also complex and delicate, as it relies on the presence of healthy, abundant, juvenile, native salmonid populations. It is therefore also important that the local salmonid populations are robust and able to access all relevant areas of an 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 the species throughout the site

Conditions should allow for the distribution of the species to be expanded.

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 in the site. It is important that both up- and down-stream distribution is maintained within the site. Freshwater pearl mussels may be present in the main-stem river within the site.

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

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

Sufficiently high water quality and natural flow conditions should be in place to provide the necessary conditions for freshwater pearl mussel.

Freshwater pearl mussels are typically found in soft-water, gravel bed rivers, with extremely high water quality. They feed by inhaling river water and filtering out fine organic particles. In order to maintain the supporting freshwater pearl mussels' habitat it is important that the species' high quality river habitat requirements are met. 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. However land use changes, such as the establishment of native riparian woodlands, also have the potential to improve habitat by providing shade that can mitigate damaging temperature peaks, stabilising river banks and reducing 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, or if this is exceeded then a site specific target of reference conditions, or the tighter of Water Framework Directive High status or the target for Common Standards Monitoring river habitat should apply.
- Mean Biochemical Oxygen Demand should be <1 mg/L.
- Filamentous algae should have <5% coverage of the river bed during the summer months.
- Excess fine sediment is a considerable danger to freshwater pearl mussels and there should be no pronounced difference in the redox potential between open water and interstitial water at 5cm depth.

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. It is important to note that in some sites, this can include naturally impassable waterfalls.

The host species can vary in different sites. At this site both Atlantic salmon and brown trout are known to be used by the local freshwater pearl mussel population as hosts. An abundance of more than 0.1 native juvenile host salmonid per m² 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 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) and favour areas with surface turbulence (riffle habitat). They require a rough bed of pebble, cobble and gravel. Trout fry prefer areas of relatively low velocity water near the streambed. Cover from stones, plants or debris is required and good cover 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 areas of relatively low current speed where cover is available. Juvenile trout are often to be found in cover alongside the banks, in undercuts, among tree roots or in marginal vegetation. Cover remains important for adult trout and Atlantic salmon particularly in smaller streams. In larger rivers this may be less important, as deep water, in pools and deep glides, provide refuge.

Conservation Measures

The River Moidart is a SSSI and changes to land management described on the list of Operations Requiring Consent must have prior consent from SNH (NatureScot).

Current and recommended management for freshwater pearl mussels

Issue	Measure	Responsible party
Low number and density of mussels present, including low levels of juvenile recruitment	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
	Where appropriate, support efforts to increase salmon as hosts for mussel larvae and improve pearl mussel recruitment.	Lochaber Fisheries Trust
	Management planning to evaluate and manage potential pressures arising from marine finfish aquaculture in Scotland.	Marine Scotland/NatureScot
	Research to better understand the	NatureScot/LFT

	reason for the low number and density of freshwater pearl mussels at the site.	
Beneficial habitat management	Evaluation of diffuse pollution and morphological pressures through the river basin planning process and the implementation of restoration measures to improve habitat.	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.	All
	Restore riparian and catchment peatlands to reduce fine sediment concentrations, improve floodplain connectivity and restore more natural hydrological regime.	All
	Applications for funding for improved water margin management, reduction of diffuse pollution and creation of native riparian woodlands through the Scottish Rural Development Programme that will be of benefit to the freshwater pearl mussel population are encouraged.	All
	Promote adherence to the Forest and Water Guidelines, and published best practice, during forest restructuring	All
Water quality monitoring	Implement and maintain monitoring of key water quality parameters.	NatureScot/SEPA

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