The Plan for Ariundle Oakwood National Nature Reserve 2009 - 2015

Foreword

Ariundle Oakwood National Nature Reserve (NNR) is on the west coast of Scotland, 3 kilometres (km) north-east of the village of Strontian in the Sunart area of Lochaber District. Ariundle Oakwood is an ancient, native broadleaved woodland which clings to south-east facing slopes on the northern side of Strontian Glen. It is a surviving fragment of an ancient oakwood that once spread along Europe's Atlantic edge from Spain and Portugal to Norway. It is associated with similar woodlands which surround Loch Sunart. Between them they make up the largest continuous area of this type of oak woodland in Britain and this habitat type requires special protection because it is so rare in Europe.

At Ariundle Oakwood, sessile and pendunculate oaks are the dominant tree species, together with their hybrids. However, the tree canopy also includes a range of other species such as birch, rowan, alder, willow, ash and wych elm. A lush growth of mosses, ferns, liverworts and lichens cover the trees and the woodland floor. These primitive plants thrive in the mild, humid climate of the west coast. The Reserve also supports a rich invertebrate fauna. It is one of the best sites in Scotland to catch a glimpse of the rare chequered skipper butterfly.

Ariundle Oakwood is one of 58 NNRs in Scotland. Scotland's NNRs help protect an amazing range of wildlife and landscapes, including many rare species and habitats of international importance. Whilst nature should come first on NNRs, they also offer special opportunities for people to discover the beauty and diversity of our natural world.

This booklet, the Reserve Plan, sets out how we intend to manage Ariundle Oakwood NNR for the next six years. It has sections outlining our projects for natural heritage management, management for people and more general property management. This plan is the outline for management of Ariundle Oakwood for the next six years, from which work programmes and budgets will be drawn up to implement the Plan.

The Reserve Story is a companion booklet which has more information about the wildlife of Ariundle Oakwood NNR and its history. The Story provides the foundation for managing the site, and is recommended reading for those wishing to understand more about the management of this very special place.

For more information about Ariundle Oakwood National Nature Reserve contact:
Scottish Natural Heritage, The Governor's House, The Parade, Fort William PH33 6BA
Tel: 01397 704716 Email: nnr@snh.gov.uk
Website: www.nnr-scotland.org.uk

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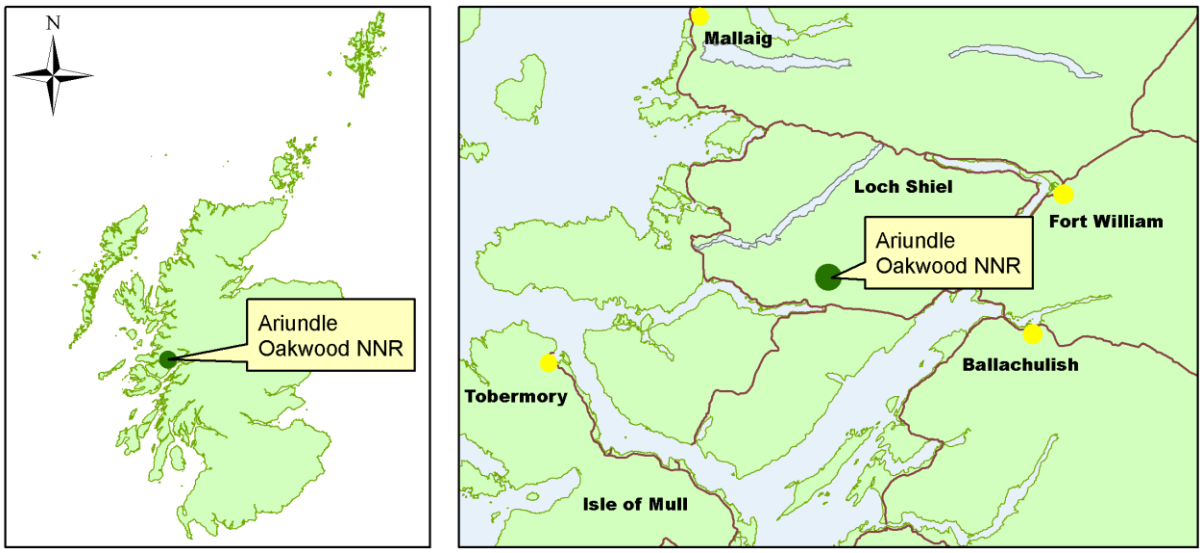
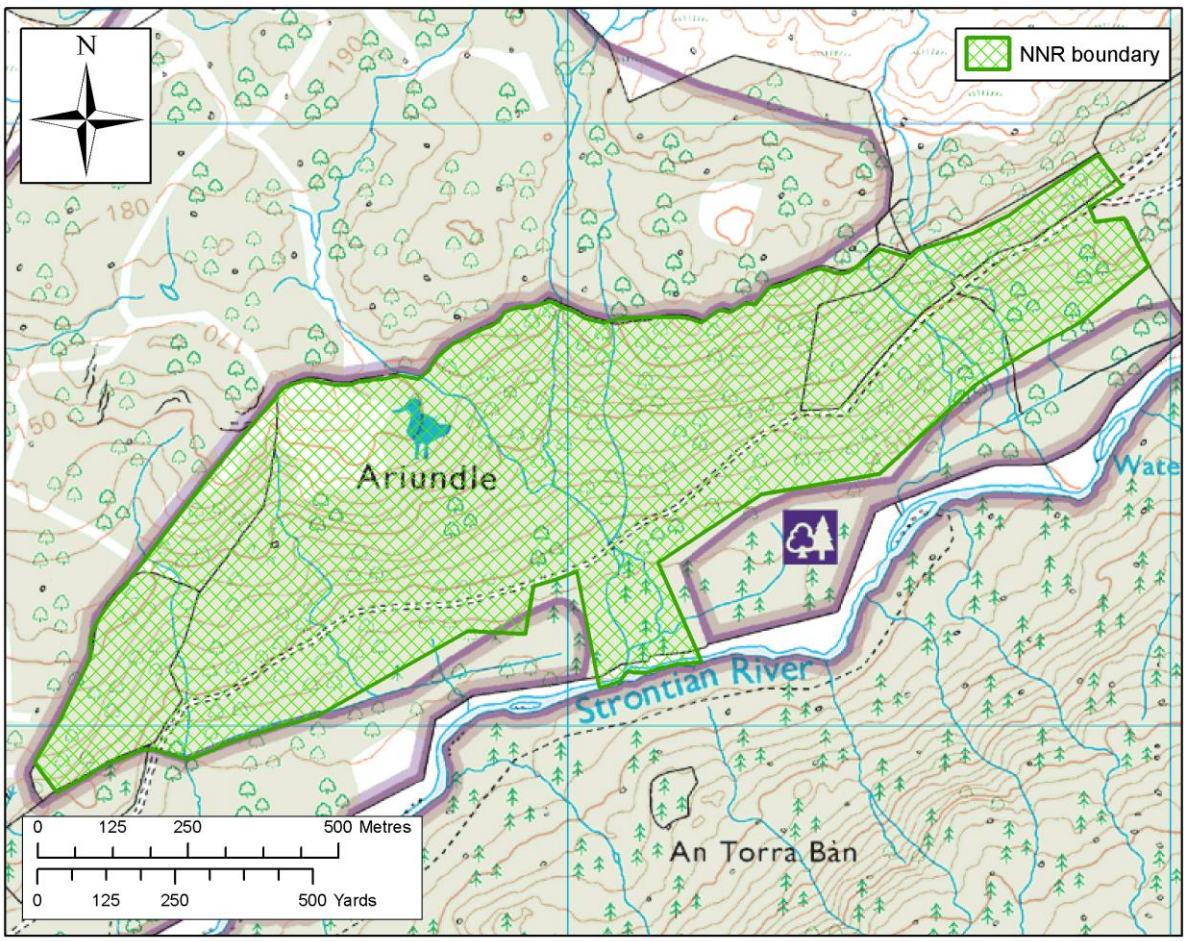
Maps of Ariundle Oakwood NNR

Location of Ariundle NNR



Boundary map



1 The Vision for Ariundle Oakwood NNR

SNH developed a new policy for NNRs in 1996 (see Appendix 1) and the management of Ariundle Oakwood should align with this. The NNR policy states that NNRs are nationally important places where nature comes first (primacy of nature) and best management practice is followed. The management proposed at Ariundle Oakwood should achieve this. The NNR policy also requires the Reserve to be used for one of three purposes: raising national awareness, specialised management and research or demonstration. We propose that Ariundle Oakwood will be used for all three purposes, although the main purpose will be raising national awareness.

Ariundle Oakwood NNR is special; the aim is to keep it that way. Our vision for the Reserve paints a picture of what a visitor to the site would expect to find 25 years from now; the management proposed on the Reserve has been framed with this vision in mind.

Ariundle Oakwood in 2034
The Vision

A visitor to Ariundle Oakwood National Nature Reserve in 2034 would expect to find a healthy, ancient native oakwood covered with a lush growth of mosses, ferns, liverworts and lichens. There is diverse age range of oaks and a mix of native tree species found on the Reserve – all of which are regenerating naturally. The Reserve is home to a variety of woodland birds, mammals, butterflies and other insects. The majority of tree species present are native to the site, but individual 'specimen' non-native trees which are important for cultural and landscape reasons can also be seen. There is no regeneration of non-native species.

The local community is actively engaged in the management of the Reserve and there are opportunities for visitors to enjoy and appreciate the beauty and diversity of the wildlife. Several researchers are conducting work on aspects of the species and habitats. The Reserve is regularly used by school children from West Lochaber and elsewhere to deliver the curriculum. Individual pupils from Ardnamurchan High School run their own projects on the Reserve for their coursework.

Since declaring the Reserve, the aim at Ariundle Oakwood NNR has been to maintain and enhance the woodland habitat, the lichens and bryophytes, and the important invertebrate populations, especially butterflies such as the chequered skipper, pearl-bordered fritillary, small-pearl bordered fritillary and the northern emerald dragonfly.

Forestry Commission Scotland (FCS) owns the land surrounding Ariundle Oakwood NNR and is a key partner in the management of the Reserve. Under a long-term programme FCS intends to restore semi-natural habitat on their ground adjacent to the Reserve by removing non-native conifers previously planted in the oak woodland. A large ring fence surrounds both SNH and FCS ground to control

access by deer and ensure long-term tree regeneration and FCS carries out a deer cull on their ground and within the Reserve. We work in partnership with FCS to deliver various other aspects of the Reserve's management. A management agreement between FCS and SNH was signed in February 2008 whereby SNH remain responsible for overall management of the Reserve but FCS carry out routine maintenance work and Health and Safety Inspections on a quarterly basis.

Although bryophytes, lichens and butterflies are not in themselves qualifying features, they are important as typical species of the habitat and so their distribution and viability should be maintained.

Since its declaration, the Reserve has aimed to be an accessible place where visitors can come and enjoy the natural heritage. In partnership with FCS, we have built up visitor facilities on and around the Reserve with a view to encouraging even greater numbers of visitors to the Reserve and enhancing their experience whilst there. New interpretation panels were put up on the Reserve during 1997-98 and a new woodland walk was completed in 2003.

The following objectives are proposed to deliver this vision:

Management of the Natural Heritage	1. To encourage the natural regeneration of the native woodland communities while maintaining the conditions for the associated lichen and bryophyte flora. 2. To enhance the populations of butterflies on the Reserve and their habitats. 3. To enhance the populations of dragonflies on the Reserve and their habitats. 4. To encourage research, survey and monitoring appropriate to the Reserve and to use the Reserve to demonstrate specialised management.
Management for People	5. To encourage local people and visitors to enjoy and appreciate the natural heritage on the Reserve. 6. To encourage the local community to become actively engaged in the management of the Reserve.
Property Management	7. To manage the property on the Reserve responsibly following best practice.

2 Natural Heritage Management

Designations

There has been a NNR at Ariundle Oakwood since 1977. As well as being a NNR, Ariundle Oakwood is one of a network of sites protected under European legislation. The series of oakwoods around Loch Sunart collectively make up the Sunart Special Area of Conservation (SAC). The Sunart oakwoods are one of the most extensive and complete examples of ancient semi-natural western acidic woodland in Britain. Ariundle Oakwood itself has been selected to be part of the Sunart SAC because it is one of the best examples of old oak woods with holly and ferns in the British Isles. Otters are also a significant part of its importance, as they are known to forage and lie up on the Reserve. However, they are not present here in as high numbers as they are elsewhere within the SAC, which covers the whole of Loch Sunart and its shoreline. For a map and description of the SAC see Appendix 2.

Ariundle Oakwood NNR is part of the Sunart Site of Special Scientific Interest (SSSI). For a map and description of the SSSI see Appendix 3. Appendix 1 gives more information about the policy for NNRs in Scotland.

The management of Ariundle Oakwood has to take into account the features that are valued as important in a European and British context, as well as features that are locally important.

Whilst managing Ariundle Oakwood NNR we also have to take account of our legal obligations and Government policy to manage the features that are listed as important in a European or international context. Where a project may affect one or more of the qualifying interests of the SAC, we will carry out an 'appropriate assessment'. This includes all projects, whether they are direct habitat management or providing a new visitor facility on the Reserve. We will only proceed with projects that do not adversely affect the interests. Likewise, we will also ensure we take care of features that are important in a British context, as well as features that are locally important.

Table 1 Designations and qualifying features for Ariundle Oakwood NNR

Designation	**Special Area of Conservation**	**Site of Special Scientific Interest**
Habitats		
Old sessile oak wood with holly and Blechnum ferns	✓	✓
Mixed broadleaved woodland of slopes, screes and ravines. *	✓	
Northern Atlantic wet heaths with cross-leaved heath	✓	
European dry heaths	✓	
Reefs**	✓	✓
Saltmarsh**		✓
Upland assemblage**		✓

Designation	Special Area of Conservation	Site of Special Scientific Interest
Geology		
Caledonian igneous		✓
Moine		✓
Tertiary igneous		✓
Species		
Otter	✓	✓
Lichen assemblage		✓
Chequered skipper butterfly		✓
Dragonfly assemblage Northern emerald dragonfly		✓
Invertebrate assemblage (moths)		✓
Bryophyte assemblage		✓
Vascular Plant assemblage		✓
Egg wrack**		✓
Eel grass bed**		✓

* Ariundle Oakwood is a far-northern representative of a type of woodland which is found along the western seaboard of Europe. However, where the woodland normally grows, its main characteristic species are lime and maple which give the woodland type its classification. At Ariundle Oakwood, while the lime and maple are absent, many of the other characteristic species are present.

** Species or habitats found in the wider SAC or SSSI but not on the NNR.

The woodland of Ariundle Oakwood is the primary interest of the Reserve, with pedunculate and sessile oaks as the dominant mature tree species. However, the acidic soils also support a reasonable amount of birch with occasional rowan and alder. Willow can be found growing in the wetter areas of the Reserve along boggy ground and streams. Bands of basalt rock provide small areas of more base-enriched fertile soil, where ash is more common, as is wych elm on the rocky outcrops. Planted non-native species such as larch, beech and Norway spruce occur on the site. Scots Pine is also present, but it is unclear whether the trees are of west coast provenance, and whether they would naturally occur in Ariundle Oakwood. The Reserve includes a sparse shrub layer consisting of some hazel and holly and is rich in ferns, mosses, liverworts and lichens. It is an exceptionally good site for butterflies; species like the chequered skipper, pearl-bordered fritillary and small pearl-bordered fritillary can be found in open glades on the Reserve.

There is evidence of human occupation and management throughout the woodland. Many of the mature trees in the wood are multi-stemmed and appear to have been coppiced. Historical records suggest a twenty year rotation for coppicing. It is likely that past management deliberately favoured oak, which was the most valuable tree in terms of woodland products, resulting in the predominance of oak within the Reserve today. In some parts of the Reserve, oak tend to occur in lines, suggesting they were planted in the past for production of commercial products. A fuller description of the site can be found in the Reserve Story.

Woodland structure

Objective 1

To encourage the natural regeneration of the native woodland communities while maintaining the conditions for the associated lichen and bryophyte flora.

Background

To date, management of the wood for nature conservation has not been intensive. Natural regeneration has been encouraged on the Reserve by exclusion of domestic stock and control of deer numbers. In 1998 an agreement was reached between FCS and SNH with FCS being responsible for an annual cull of red and roe on the NNR and their own land which surrounds the NNR on three sides. The native woodland has been allowed to extend onto suitable adjacent ground where possible.

Commercial conifers have been removed from selected areas along the lower parts of the Reserve to allow room for native woodland expansion. To ensure that the woodland develops as naturally as possible it is important that there is no competition from non-native trees. Mature non-native trees are allowed to grow old and die naturally, unless they pose a hazard to people enjoying the Reserve, but non-native regeneration is removed. In the case of the Scots pine, until further analysis identifies the provenance of these trees, management should favour native broadleaves in areas of regeneration containing both Scots pine and broadleaves. Fallen dead trees are cleared only if they are blocking the path and are then left on site as a habitat for wildlife. Fallen trees also open up areas for further regeneration.

There has been no active management for lichens and bryophytes, but when carrying out other management projects, great care has been taken to avoid disturbing the damp conditions they favour.

While the intention is to promote the natural regeneration of the woodland, the open butterfly and dragonfly glades should ideally remain. However, due to the fact that there is very little grazing on the Reserve nowadays, the open glades are in danger of being lost by invading birch and scrub. These glades require more active management to periodically remove the developing vegetation. Work to keep glades clear has been carried out in recent years, with the most recent in 2010.

The woodland in recent years has been assessed as approaching favourable condition as a result of using the Minimum Intervention model to manage the Reserve. Some management targets for the Reserve are considered to have been met while others have not. The target for the overall area of the woodland to be increased to suitable adjacent ground where possible has been met. A comparison of aerial photographs of Ariundle Oakwood NNR taken in 1946 with those taken in 1998 indicates some expansion of the woodland at its margins and some increase in the density of the canopy. A target of a significant proportion of mature trees of all native species being present has also been met.

However, a further target stating that there should be a significant proportion of saplings present for all native species has not been met. Successful regeneration of native trees (i.e. saplings greater than 1.5 metres) is still very localised and consists almost wholly of birch and rowan, with only occasional oak. Birch and rowan are pioneer species and with succession, oak, along with some hazel and holly, should come through in areas where the canopy is less dense and light reaches the woodland floor. Another target stating that all non-native regeneration should be removed has not been met. There are still saplings and young trees of beech and Norway spruce on the Reserve which should be removed as resources become available.

Research at Ariundle Oakwood has been about management of the woodland and butterflies. Lichen and bryophyte surveys have also been carried out on the Reserve over the years. Most of the management and monitoring is done by SNH or volunteers.

A small deer-fenced enclosure was put up on the Reserve in the 1970s to demonstrate the impact of the zero grazing on tree regeneration. Abundant tree regeneration has taken place in the last 35 years inside the enclosure whereas it has been very localised outside the enclosure.

Management and Monitoring

Forest management models

Peterken and Worrell (2001) produced a framework document for the management of the oakwoods in the Loch Sunart area for nature conservation which sets out five models of woodland management. This document sets out a short summary of the two management models considered most appropriate for the future management of Ariundle Oakwood. Both models aim to keep the woodlands in a favourable condition. Ariundle Oakwood is currently managed under the Minimum Intervention (or Natural Reserve) model.

In future Ariundle will be managed using a mixture of the minimum intervention and long-rotation high forest models. This will allow us to carry out work in the wood when needed. We will produce a Woodland Management Plan in which the Reserve will be mapped and divided into compartments. For each compartment we will then agree whether the Minimum Intervention or the Long Rotation model would be adopted.

The advantage of this system is the best features of the models can be applied to different compartments, depending on which is regarded as most appropriate, with the intention of accelerating the improvement in the site condition. This will also allow for the creation and management of butterfly glades. However, it also gives importance to the concept of letting natural processes continue to shape the development of area of the woodland such as low-level grazing, wind-blow of mature trees and their subsequent decay. A short description of each model is provided below.

Minimum Intervention Model

The Minimum Intervention model encourages natural woodland to develop through natural regeneration. Stands would be mainly of high forest structure and rich in bryophytes and lichens with a lot of standing and fallen wood. Standing and fallen deadwood is beneficial because it opens up gaps in the canopy for further regeneration and provides valuable habitat for deadwood flora and fauna. Deer grazing must be kept at low levels to allow a diversity of small tree and shrub species to develop. Planting should not take place and there should be no timber operations except the removal of threatening non-native trees such as larch, beech and Norway spruce. Conservation values on a "Natural Reserve" like Ariundle Oakwood are high.

As a result of this management option, as other species regenerate over time, the predominance of oak within the wood is likely to be reduced. It is hoped that overtime a more natural woodland will develop with a significant proportion of saplings and mature trees present for all native species. The only reason for intervention should be where the lichen, bryophyte or butterfly communities are threatened by tree regeneration.

Long-Rotation High Forest model

The Long-Rotation High Forest model encourages a diversity of tree species to develop through intervention to create gaps in the canopy for new regeneration. A typical ancient oak forest is likely to be managed using this model. This woodland type is characterised by mature old oak trees, stately and tall giants, some of which are left to go right onto biological maturity and become huge ancient oaks. Like the Minimum Intervention model, woodlands managed using this model will in time also develop large amounts of old, dead and decaying trees both standing and fallen. Large volumes of deadwood are a natural feature of this model and fallen and dead trees will open up large areas of the canopy for further regeneration.

A second feature of this model is that the conditions following thinning are excellent for the growth of bryophytes and lichens. Ideally the site will be an ancient woodland site with continuity of old trees – as this is how rare lichens are kept going over the centuries in a wood.

The distinction between this model and the Minimum Intervention model is that some timber is harvested in the form of thinnings and some group-fells are undertaken for woodland regeneration purposes. Once regeneration has taken place, this model will have patches of young oak and other species coming up in gaps in the canopy while also offering opportunities for colonisation by chequered skipper butterflies in the early stages.

As well as old oaks, this model actively encourages other tree species to develop such as birch, ash, hazel, holly or aspen. They are encouraged to the point where the growth of young hazel and rowan trees is visible in whole sections of the wood (currently unusual due to excessive grazing in the past).

It is likely that periodic limited seasonal grazing using native cattle took place in the past. At low levels which are carefully monitored, grazing using large herbivores can

yield biodiversity benefits by breaking up tight grass sward and trampling areas of dense bracken.

The disadvantage of the Long-Rotation High Forest model is that it involves a considerable amount of work in the form of thinnings and group-fells for afforestation purposes. It involves significant interference to the Reserve. Timber operations could potentially harm the internationally important lichen and bryophyte flora and the mammal, bird and invertebrate communities. Livestock management has to be undertaken very carefully in order to prevent excess trampling, grazing and browsing damage.

Woodland Enclosure

A deer-fenced enclosure was erected on the Reserve in the 1970s to demonstrate the impact of zero grazing on tree regeneration. Well-grown saplings are abundant inside the enclosure whereas they are very localised outside the enclosure. It is interesting to note that all the regeneration appears to have been checked by canopy cover and is therefore sub-canopy at the moment. Most young trees are rowan and birch as they naturally seed in first. Oak, hazel, alder and holly are only occasional. However, with succession oak will be expected to come through. Outside the enclosure regeneration consists almost wholly of birch and rowan. Aerial photography dating from 1998 shows no gaps within the tree canopy inside the enclosure. Because the canopy in the enclosure is more-or-less closed, further successful regeneration is only likely to occur when gaps form in the tree canopy. The trees can be expected to exploit gaps in the canopy caused by storm damage or mature trees dying. No non-native trees or shrubs have been noted inside the enclosure during monitoring.

Although SNH has used the enclosure as a demonstration to show the impact of zero grazing on tree regeneration, it is not the intention of SNH to exclude deer on Ariundle Oakwood completely. Deer are an important part of the woodland ecosystem. However, deer numbers do need to be controlled to allow significant regeneration to take place on the Reserve.

We will keep the enclosure as it has significant demonstration and research value. It is useful to show the impact of zero grazing on tree regeneration, and if it remains in place we can undertake a comparative study of the amount of regeneration and ground flora composition within and outwith the enclosure. However we will look at options for either retaining the enclosure at its current extent or only maintaining fence on half and allowing the other half to become permeable to deer for comparison.

Status of Scots Pine

Further analysis could be conducted to identify whether the Scots pine which occurs on the Reserve is of west coast provenance, and whether they would naturally occur in the woodlands of Ariundle Oakwood. However, this process is unlikely to be helpful in determining provenance and it is the considered opinion of the Research branch of FCS that the pine should be left intact and regeneration is not thought to be a threat.

General Management

We will continue to work with Forestry Commission Scotland to manage and monitor deer on the Reserve.

We will remove non-native tree and shrub regeneration.

Habitat and Species Monitoring

To discover the pre-historic composition of the wood it is proposed that we conduct pollen analysis of peat cores taken from the site to establish which species were present.

The condition of the woodland will be assessed as part of the National Programme of Site Condition Monitoring on a six yearly cycle.

The condition of the internationally important bryophyte and lichen flora on the Reserve is currently favourable. It is important to continue to monitor the bryophyte and lichens to make sure that their condition has remained favourable and that management projects on the Reserve are having no adverse effect on their condition. It is proposed that we set up monitoring plots/quadrats to investigate the diversity of lichens, bryophytes and higher plants on the Reserve.

The key projects are to:

- write a woodland management plan;
- continue with the deer control strategy for the Reserve;
- continue to monitor deer numbers on the Reserve;
- remove non-native tree and shrub regeneration;
- conduct provenance test to identify the provenance of Scots Pine;
- conduct pollen analysis of peat cores;
- monitor the woodland condition in 2009 and continue to monitor on a six year cycle;
- monitor the bryophyte and lichen communities on the Reserve; and
- set up monitoring plots/quadrats to investigate the diversity of lichens, bryophytes and higher plants on the Reserve.

Butterfly management

Objective 2

To enhance the populations of butterflies on the Reserve and their habitats.

Background

Ariundle Oakwood is an excellent site for butterflies. The nationally scarce chequered skipper butterfly is perhaps the most prized of the Reserve's butterflies. This species is accorded priority status in the UK Biodiversity Action Plan (UKBAP). The Reserve also supports populations of the nationally scarce pearl-bordered fritillary and small pearl-bordered fritillary both of which are UKBAP species.

Pre-NNR management of Ariundle Oakwood created open areas in the woodland which are favoured by butterflies. Trees were cut down to make charcoal, bark for tanning, firewood and building materials. They were also grazed by domestic stock such as sheep, cattle and goats. Open areas such as glades and clearings are favoured by butterflies because they provide them with warmth through direct sunlight, shelter and essential food plants.

There are two different types of glade that occur at Ariundle Oakwood – wetland glades and bracken glades. Wetland glades mainly occur on the bottom western end of the Reserve between the track and the river. Bracken glades occur in drier areas and can be found along the lower boundary of the Reserve but tend to be found higher up the Reserve's slopes.

Due to the low grazing pressure on the Reserve nowadays, there is a tendency for regenerating birch and bracken to shade out and encroach on the glades used by important butterfly populations. Regenerating birch (scrub) and bracken smother small nectar plant sources that butterfly species require. Active management has been ongoing on the Reserve for several years to prevent young birch and bracken encroachment and enhance the value of the glades. This management for skippers and fritillaries also benefits other butterflies and invertebrates that depend on woodland edge habitats. We let a contract for the glades to be cut periodically (cutting on cycles of 7-10years). Bracken whipping is the preferred method of control on designated sites such as Ariundle Oakwood NNR, as important lichen, bryophyte and fern communities may be affected by chemical treatments.

Management and Monitoring

Management will focus on the maintenance and enhancement of the existing woodland glades. Core butterfly breeding and nectaring areas will be closely monitored and kept free of regenerating birch and bracken. Status quo management of the existing glades will retain the current number of butterflies coming to the Reserve but not increase them. Therefore, where possible the overall area of glades will be extended through the creation of new glades on the Reserve and in the adjacent conifer plantations and the extension of existing glades. The intention is that the glades will form a network that butterflies can move between. If glade areas

are enhanced this will encourage more butterflies to come to the Reserve. However, this enhancement will have to be balanced with tree regeneration and woodland expansion on the lower boundary of the Reserve.

All butterfly species found on the Reserve are monitored under a National Butterfly Monitoring Scheme (NBMS). A butterfly transect is carried out at Ariundle Oakwood along a set route by a volunteer and our staff. This transect is walked on as many dry days as can be managed in the chequered skipper season, between late May and early July. All the information on the butterflies is collated and sent to the NBMS who then produce a population index on the number of butterflies that have been recorded at Ariundle Oakwood in a particular year. This gives an idea of whether the numbers are rising or falling or whether they are stable. The numbers of scarce skippers and fritillaries at Ariundle Oakwood have been variable from year to year due to the weather conditions but have, on the whole, fluctuated around a stable level. This suggests that the active management of the wetter butterfly glades has been effective.

The key projects are to:

- maintain the existing woodland glades by keeping them clear of scrub and bracken;
- record and map habitat management specific to butterflies for future reference;
- monitor and map the extent and condition of core butterfly areas (glades), including the assessment of scrub invasion and abundance of nectar sources by fixed point photography and/or permanent quadrats and manage as necessary;
- continue to carry out the butterfly transects on the Reserve. Monitor population numbers and habitats as part of the National Butterfly Monitoring Scheme;
- encourage research into habitat requirements particularly in relation to bracken glades; and
- develop a network of woodland glades showing varying stages of woodland regeneration which would be suitable for the expansion of the woodland butterflies.

Dragonfly management

Objective 3

To enhance the populations of dragonflies on the Reserve and their habitats.

Background

Several species of dragonfly and damselfly occur at Ariundle Oakwood including the northern emerald dragonfly. This species has vanished from many other parts of Britain, and is nationally rare, with a distribution restricted to north-west Scotland and south-west Ireland. This species is included in the Local Biodiversity Action Plan for Lochaber. All the dragonfly and damselfly species on the Reserve occupy the similar areas as the butterflies, being associated with the wetland glades between the track and the river.

Although the wetland glades between the track and the river are actively managed to prevent scrub encroachment and to encourage butterflies to these areas, this management also encourages dragonflies. Owing to the fact that dragonflies have occupied these wetland glades for many years, this management appears to have been successful where dragonflies are concerned.

Active management, specifically for dragonflies, has taken place on the Reserve in previous years. A previous Reserve Manager encouraged volunteers to dig small ponds amongst the wetland glades between the track and the river for dragonflies to colonise. The butterfly transect, which follows a set route on the lower part of the Reserve, also records the numbers of dragonflies. This gives an idea of the numbers of all dragonfly species present on the Reserve from year to year.

Management and Monitoring

We recommend that, while not a priority, more dragonfly pools should be created in suitable places throughout the wood to encourage the dragonflies and other water based species. Other animals such as frogs and toads would also use the ponds. However, there are not many places suitable for building further ponds without compromising other interests such as the regeneration of the native woodland and this will need to be considered before new pools are created.

The key projects are to:

- maintain the existing woodland glades by keeping them clear of regenerating birch and bracken;
- continue to monitor the numbers of dragonflies on the Reserve; and
- create more dragonfly ponds in suitable places in the wood, should the opportunity present itself.

Research and Demonstration

Objective 4

To encourage research, survey and monitoring appropriate to the Reserve and to use the Reserve to demonstrate specialised management.

Background

Research at Ariundle Oakwood has been about management of the woodland and butterflies. Lichen and bryophyte surveys have also been carried out on the Reserve over the years. Most of the management and monitoring is done by SNH or volunteers.

The small deer-fenced enclosure was put up on the Reserve in the 1970s to demonstrate the impact of the zero grazing on tree regeneration. Abundant tree regeneration has taken place in the last 35 years inside the enclosure whereas it has been very localised outside the enclosure.

Management and Monitoring

More could be done in terms of interpretation and research of the oak woodland habitat. Such research could probably be accomplished best by outside bodies and universities. The Reserve is currently under-used by universities and researchers because we have limited time available to promote the site and support work on the ground.

Research should be encouraged on the Reserve to further knowledge and understanding of the habitat requirements of key species such as the chequered skippers and fritillaries, particularly in relation to the active management of glades.

One research project currently taking place on the Reserve is looking at the effect of air-borne pollution on lower plants. A monitoring station has been set up on the Reserve which records the amount of atmospheric nitrogen deposition in lower plants. In 2004, samples of moss and liverwort were collected to analyse their nitrogen composition.

Ariundle Oakwood has the potential to be a demonstration site for practical management of butterflies. We would like to encourage groups and individuals to visit Ariundle Oakwood for this purpose.

A decision needs to be made as to whether it is worth keeping the old deer-fenced enclosure, which requires maintenance. The reasons for maintaining the fence for demonstration purposes are evaluated in Woodland management option 2 above. There may also be sound research reasons for retaining the enclosure, including research into the changes which have taken place in the enclosure when compared with the existing vegetation outside. The future of the fence will be considered as part of the development of the woodland management plan.

There may be other research projects but we have identified the following possibilities:

- conduct Scots pine provenance tests;
- conduct analysis of peat core samples in order to determine the species composition of the wood in pre-historic times;
- encourage research to further knowledge of the habitat requirements of key species, particularly in relation to active management of glades;
- to continue with ongoing monitoring on the Reserve; and
- organise demonstration days on woodland and butterfly management.

Key projects are to:

- encourage research on the Reserve; and
- deliver demonstration days on the Reserve.

3 Management for People

Although the traditional task of the NNR was to protect and manage the wildlife of Scotland, a key purpose of NNRs today is to provide opportunities for people to visit these special places, come to understand them better and enjoy their natural heritage to the full.

Ariundle Oakwood is an attractive site to which visitors have been coming for many years. A nature trail begins in the FCS car park, situated approximately a kilometre from the current NNR entrance. This gives the option of a route through the upper woodland, a lower walk along the south side of the Strontian River or combining these to create a longer route. There is an additional route back into Strontian. An orientation board for visitors can be found in the car park.

We have been steadily building up more facilities on the Reserve, in partnership with the FCS, with a view to encouraging visitors to the Reserve and informing them of the special qualities of Ariundle Oakwood. At the entrance to the NNR a sign informs visitors they are entering the Reserve and gives a brief description of the natural history. A boardwalk was put in place on the lower part of the Reserve in 1996 and upgraded in 2005. Interpretation panels were put up in 1997-98. These panels are on subjects such as the chequered skipper and the importance of dead wood in the woodland. The woodland walk was completed in 2003 and a new panel erected at its start in July 2004. Two interpretative leaflets on Ariundle Oakwood have been produced, explaining the cultural and natural history to visitors. The West Lochaber Highland Council Ranger provides guided walks for interested groups on the Reserve.

FCS is currently updating the interpretation on their land – in the car park and along the walks by the Strontian River.

Visitors

Objective 5

To encourage local people and visitors to enjoy and appreciate the natural heritage on the Reserve.

Background

FCS-installed automatic car counters in the car park and people counters on the nature trail have shown that Ariundle Oakwood is a very popular facility with visitors. Ten thousand people are known to use the nature trail each year. A pressure pad has been put in place at the beginning of the woodland walk to ascertain the number of visitors using it.

Management and Monitoring

The construction of the woodland walk and the installation of new signs and interpretation panels were major developments for Ariundle Oakwood NNR. However we will review the onsite signage, orientation and interpretation to bring the Reserve up to national standards and to ensure it is in keeping with the NNR brand guidelines.

Ariundle Oakwood does not easily lend itself to access by people with mobility issues. However, a recent audit identified possible improvements which could be made in the future in order to make access easier for people with disabilities, including providing improved car parking facilities. The report also recommended that when we replace the boardwalks we consider different surfaces to minimise the changes in surface type to improve accessibility and that when we replace signs and interpretation we should look at the contrast between text and the background to improve their readability.

The key projects are to:

- monitor visitor numbers at Ariundle Oakwood NNR;
- maintain the carpark, trails, signs and interpretation panels and leaflets; and
- provide guided walks for interested groups on the Reserve;
- provide improved parking facilities;
- replace some of the boardwalks with stone-built paths to minimise surface changes; and
- review signage and interpretation and update as identified.

The Local Community

Objective 6

To encourage the local community to become more actively engaged in the management of the Reserve.

Background

The local community has been reasonably involved in the running of Ariundle Oakwood NNR, but more could be done to actively involve them in its running. We are committed to encouraging local involvement with NNRs and would like to continue working with the local community to explore the opportunities at Ariundle Oakwood NNR.

Management

Despite the links that we have begun to have made with local schools, the Reserve still appears to be under utilised. We are at present trying to create close links with local primary schools and the local Ardnamurchan High School. The Reserve could be used as a way of delivering parts of the curriculum. It is also suitable for school pupils to use for Standard Grade and Higher projects. We will work with the ranger service to promote more active engagement between local schools and the Reserve.

A local liaison group exists comprising local Community Councillors, neighbours and interested individuals. The group meets occasionally to discuss Reserve management and any wider management issues. We will ensure this continues but will review its role and who is included on the group.

The key local community projects are to:

- engage with the local community to identify ways for people to become involved with the NNR;
- support local schools to visit;
- encourage more active involvement with local schools on the Reserve; and
- try to create closer links with local schools.

4 Property Management

SNH owns Ariundle Oakwood NNR and is responsible for maintaining the property, including the land, the buildings, the trails and the fences. Our ambition is to exhibit good practice in all aspects of stewardship of the land.

Property

Objective 7

To manage the property on the Reserve responsibly following best practice.

Background

Part of the network of paths is owned by SNH and part by FCS. The woodland walk in the upper part of the oakwood is wholly owned by SNH while the trail alongside the east bank of the Strontian River is owned by FCS. The main track is owned in places by SNH and in others by FCS. There is a Service Agreement between FCS and SNH for the daily maintenance of all infrastructure and Health and Safety inspections on both properties, while SNH remains responsible for major works and retains overall responsibility for Health and Safety on the Reserve. A review of management and ownership is currently underway (November 2010).

The few buildings on the Reserve do not require much maintenance by SNH as they are derelict and unused. SNH shares responsibility for maintaining the boundary fences with the FCS who own the surrounding land. The exclosure fence is solely the responsibility of SNH.

Management

Regular checks are carried out to ensure that the property is safe, and repairs and maintenance are undertaken as necessary. These are undertaken by FCS. Health and Safety inspections are carried out quarterly.

The key projects are to:

- maintain the trails and fences in a good condition;
- check the property and ensure they are not a risk to visitors on the Reserve;
- replace the boardwalk;
- ensure the management of the property conforms with all Health and Safety Regulations, this includes carrying out risk assessments and updating the fire plan; and
- liaise with neighbours.

The Budget

In recent years the Reserve has been managed on a budget of some £2,500 per annum. Additional funds, amounting to approximately £50,000 were spent on installing the new visitor facilities. These figures exclude staff salaries.

The estimated budget for delivering the work proposed in this booklet is £6,000 per annum, for each of the next 3 years. At the end of the first three years the budget will be reviewed, in time for the final three years of the Plan.

Document properties

Acknowledgments

The Proposals for Ariundle Oakwood NNR has been written by Brian Eardley (Area Officer), Derrick Warner (Area Officer) and Susan Luurtsema (Managed Sites Officer) and approved by Kristin Scott, (Area Manager – West Highland).

We would like to thank the following SNH staff for their contribution and comments on earlier drafts: Fraser Symonds (Operations Manager – West Highland), Liz McLachlan (Area Officer), Kenny Nelson (Area Officer), Jeanette Hall (Policy and Advice Officer – Woodlands), and Susi Hodgson (Geographic Information Officer).

Photographs

Photography by Lorne Gill/SNH.

Web links

Ariundle Oakwood NNR
http://www.snh.org.uk/nnr-scotland/reserve.asp?NNRId=25

National Nature Reserves
http://www.nnr-scotland.org.uk

Scottish Natural Heritage
http://www.snh.org.uk

Scottish Outdoor Access Code
http://www.outdooraccess-scotland.com
http://www.snh.org.uk/soac/

Appendix 1 - National Nature Reserves (NNR)

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

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

The attributes are

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

The purposes are

- **National awareness** of NNRs – on these Reserves people can take pride in the natural heritage 'on display' and come to understand it better and enjoy it to the full.
- **Specialised management** of NNRs - the character of the interest requires specialised and pro-active management, which is best, delivered by a nature Reserve.
- **Research-related** NNRs - These NNRs will offer opportunities for research into the natural heritage and its management, which specifically require a nature Reserve location and which are not available elsewhere.

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

More information can be found at:

Scotland's National Nature Reserves: A Policy Statement
http://www.snh.org.uk/pdfs/polstat/nnrpolcy.pdf

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

Appendix 2 - Special Area of Conservation (SAC)

Special Areas of Conservation are areas designated under the European Community Council Directive on the Conservation of Natural Habitats and Wild Fauna and Flora (92/43/EEC), commonly known as the Habitats Directive. Together with Special Protection Areas, which are designated under the Wild Birds Directive for wild birds and their habitats, SACs form the Natura 2000 network of sites. The Natura 2000 network is designed to conserve natural habitats and species of animals and plants which are rare, endangered or vulnerable in the European Community. Appendixes I and II of the Habitats Directive list the habitats and (non-bird) species respectively for which SACs are selected. In Great Britain the Directive was transposed into domestic legislation via the Conservation (Natural Habitats &c.) Regulations 1994, which are relevant to Special Protection Areas (SPAs) as well as SACs. Natura sites are generally underpinned by the SSSI mechanism in the terrestrial environment, although there are a few exceptions where other management measures are employed. The Scottish Executive Rural Affairs Department Circular No. 6/1995 (Revised June 2000) on the Habitats and Birds Directives gives further details of how the Regulations apply in Scotland.

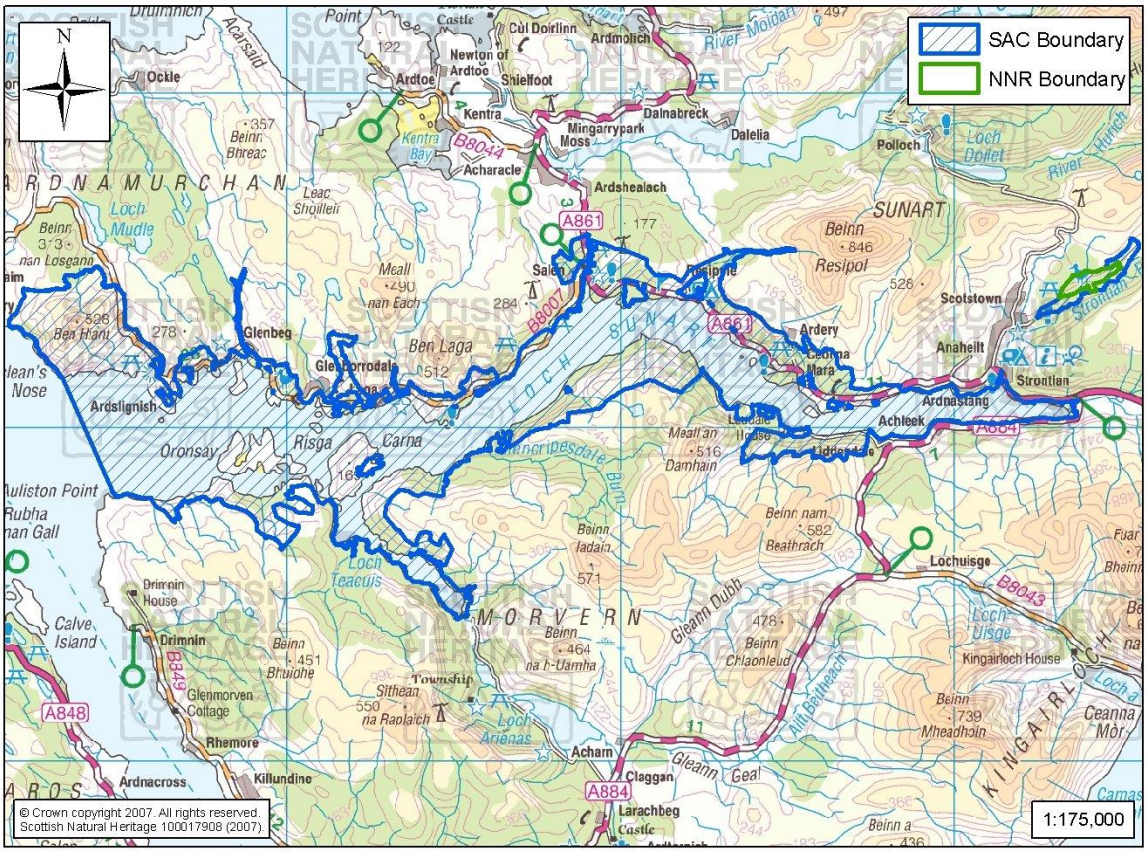
SNH acts as the advisor to Government in proposing selected sites for ministerial approval as possible SACs. SNH then consults with key parties over the site proposals on behalf of Scottish Ministers. The consultees, who include owners and occupiers of land, local authorities and other interested parties, are sent details of the proposed site boundaries and the habitats and/or species for which they qualify. SNH also negotiates the longer-term management of these sites. Following consultation, SNH forwards all responses to Scottish Ministers who then make a decision about whether to submit the site to the European Commission as a candidate SAC. Once submission of all candidate sites is completed, the Commission, together with Member States, will consider the site series across Europe as a whole. At this stage sites which are adopted by the Commission become Sites of Community Importance (SCIs), after which they can be finally designated as Special Areas of Conservation by national governments.

The following websites provide further information:

Special Areas of Conservation:
http://www.jncc.gov.uk/ProtectedSites/SACselection

Sunart SAC

Country	Scotland
Unitary Authority	Highland
Latitude	56 34 00 N
Longitude	05 14 55 W
SPA EU CODE	UK0019803
Area	10246.72



Annex I habitats that are primary reason for selection of this site

Old sessile oak woods with holly and ferns in the British Isles

Sunart on the west coast of Scotland contains the richest complex of Atlantic bryophyte-rich old sessile oak woods in the UK and is representative of the mid-west Highlands bryophyte zone. The site is also characterised by one of the UK's most extensive area of ancient semi-natural woodland, much of which is oak-dominated. However, the woodland canopy is varied, with areas of birch species, ash and hazel, and alder on wet ground. Typically, oak-dominated woodland on lower slopes gives way to birch woodland at higher altitudes, and uninterrupted transitions to marine habitats are found along the shore, a rare situation in British woodlands. The woods support a rich fauna and flora and an impressive range of lichens, including well-

developed *Lobarion* spp. communities and many rarities. The rare chequered skipper butterfly has a strong population within these woods.

Annex I habitats present as a qualifying feature, but not a primary reason for selection of this site

Reefs
Northern Atlantic wet heaths with cross-leaved heath
European dry heaths
Lime - Maple forests of slopes, screes and ravines

Annex II species that are a primary reason for selection of this site

Otter (*Lutra lutra)*

Sunart supports a relatively high density of otter. Records show that the site has supported consistently strong populations, indicating that the habitat is suitable for the species. The site is representative of coastal otter populations on the west coast of Scotland, which is the stronghold for the species. The otters mainly forage in the extensive wrack and kelp beds that occur throughout shallow areas of Loch Sunart and which serve as habitat for important prey species. Over 1400 otter holts, typically in areas of dense vegetation and rock boulder cover, have been recorded in the terrestrial areas bordering the edge of the loch on the main islands. There is also a large influx of freshwater from numerous streams and rivers around the site which are important to the otter for washing.

Sunart citation web link:
http://www.jncc.gov.uk/ProtectedSites/SACselection/sac.asp?Eucode=UK0019803

Appendix 3 - Site of Special Scientific Interest (SSSI)

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

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

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

Web Links:

'The Nature of Scotland – A Policy Statement'
http://www.scotland.gov.uk/library3/environment/nas-00.asp

'People And Nature: A New Approach To SSSI Designations In Scotland'
http://www.scotland.gov.uk/library/documents-w1/pandn-00.htm

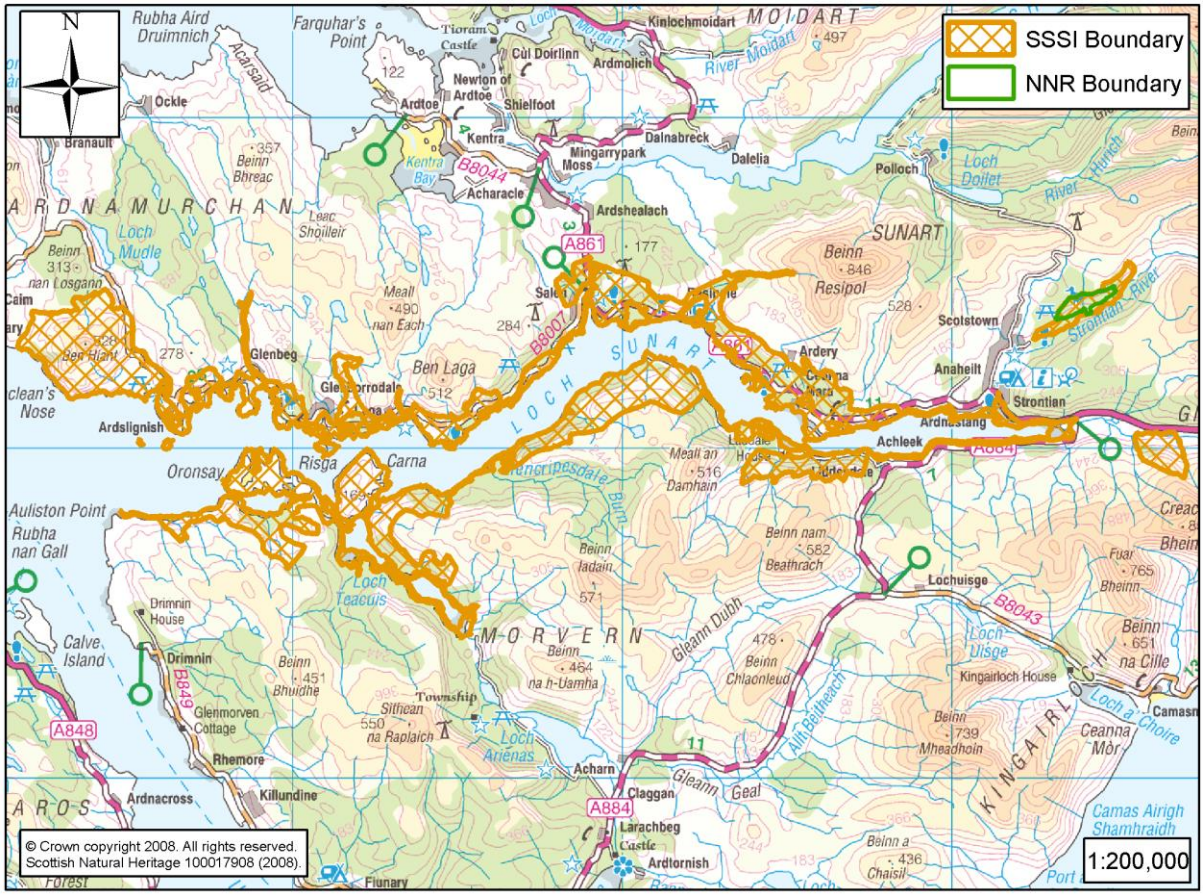
Guidelines For Selection Of Biological SSSIs
http://www.jncc.gov.uk/Publications/sssi/default.htm

Site of Special Scientific Interest (SSSI):
http://www.snh.org.uk/about/ab-pa01.asp

Sunart SSSI

Country	Scotland
Unitary Authority	Highland
Grid Ref*	NM 680620 * This is the approximate central point of the SSSI.
Notified	21/5/01
Area	5515.83

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



SSSI Citation

BIOLOGICAL

This site is characterised by one of the most extensive areas of ancient semi-natural woodland in Britain. It displays relatively intact transitions from marine to woodland habitats, a feature no longer common in this country. Throughout the woodlands, differences in altitude, aspect and geology are reflected in the dominance of different species both in the tree canopy and the ground flora.

In addition to its woodland interest, the site illustrates the varied coastline characteristic of west coast sea lochs. Steep coastal cliffs and steeply sloping rocky shores are interspersed with small saltmarshes and gravely bays. Rocky islands are

numerous. The extensive undisturbed transitions from marine to terrestrial conditions around Loch Sunart are an important feature of this site.

Encompassed within the boundary are upland habitats and there are a range of notable plant and animal species too. The woodlands support an avifauna characteristic of the habitat and its location. Several elements of the geology of the site are of national significance.

Woodland

Mature deciduous woodland dominated by oak, birch and ash dominates much of the site. An understorey of rowan, holly and hazel has a more patchy distribution. Willow and alder occur in wetter areas and in places alder and aspen fringe the shore. At Ben Hiant, in the north west of the site, there is an expanse of wind-cut blackthorn. Fine ravine and gorge woodland of ash, birch and wych elm with hazel, bird cherry and rowan also occurs, extending up to 300 meters in parts. Typically, oak dominated woodland on lower slopes gives way to birch woodland at higher altitudes.

Much of the woodland is on Moine rocks and the acidic soils that result support a grassy or heathy ground flora with heather *Calluna vulgaris*, blaeberry, wavy hair grass and bracken filled glades. More nutrient rich areas overlying basalt (often present as intruded dykes) and in gorges support a rich ground flora with dog's mercury, enchanter's nightshade and sanicle. Tall herbs such as meadow sweet *Filipendula ulmaria* and valerian *Valeriana officinalis* are found in flushes near the shore, Iris *Iris pseudacorus* and brookweed occur. Base rich flushes in the Ariundle Oakwood woods and elsewhere, support grass of parnassus and butterfly orchids.

Ferns, mosses and liverworts, including many 'Atlantic' species, such as hay scented buckler fern, Tunbridge filmy fern, and *Dicranum scottianum,* are well represented within the woodlands. One stage of the life cycle (gametophyte) of the Killarney fern is also known to be present.

Upland

Between and beyond the woodlands there is a mix of wet heathland and blanket bog, and drier acidic grasslands and moorlands. A wide range of communities and sub-communities are present and for the most part these do not appear to have been damaged by activities such as overgrazing or frequent burning. Dry heath habitats are patchily distributed, typically being associated with rocky outcrops and knolls. In maritime locations, crowberry and bearberry are an important dry heath component. Acidic and calcicolous (growing on limestone) grasslands are found throughout much of the site and often form mosaics with dry heath. Wet heath and blanket bog are widely distributed; base rich and acidic flushes are numerous. Purple moor grass and heather are widespread and abundant species. In places, there is a good complement of plants characteristic of an 'oceanic' climate, such as white-beaked sedge, black bog rush, pale butterwort and intermediate sundew. Whorled caraway is locally abundant in mires between Resipole and Camuschoirk. At Poll Luachrain, Ben Hiant and elsewhere on basalts, herb rich grassland contains wild thyme, fairy flax and bird's-foot trefoil.

Intertidal

Particularly extensive representations of sheltered shore communities dominated by brown algae are present and the intertidal rocky shore is an important component of the area's reef habitats. A variety of shore substrates and degrees of exposure are represented. Bedrock, boulders and cobbles dominate much of the shore and these are interspersed with small sediment filled bays.

Tideswept communities are present at a number of locations throughout the loch. Three community types of particular note are present at a number of locations, including Laudale Narrows, and the channels to the south east and south west of the island of Carna. Those significant communities are characterised by the algae knotted wrack, toothed wrack and oarweed, growing in tide swept conditions.

The intertidal shore is typically dominated by lush growths of knotted wrack. Beds of the internationally important variety *Ascophyllum nodosum* ecad *mackaii* have developed at a number of extremely sheltered locations with freshwater influence. An ecad is a distinctive form of a species which develops in response to particular environmental conditions; in this case, the extreme shelter and fluctuating salinity found within the loch.

Under-boulder communities and rockpools are present and, notably, the nationally scarce eelgrass *Zostera marina* is recorded from one lower shore rockpool. An extensive sedimentary shore to the north and west of Eilean Mor (Laudale Narrows) also supports the nationally scarce dwarf eelgrass *Zostera noltii*.

Throughout the site the intertidal area and shallow sub tidal is used by the resident otter population as essential feeding habitat.

Coastlands

Fringing the shore of Loch Sunart are scattered areas of saltmarsh. The majority of this habitat is dominated by sea plantain Plantago maritima, red fescue Festuca rubra, saltmarsh rush Juncus gerardii, and sea milkwort. Where there is freshwater seepage saltmarsh flat-sedge Blysmus rufus and slender spike-rush Eleocharis uniglumis are locally abundant. In numerous places there are uninterrupted transitions from shore, through saltmarsh and Iris beds to woodland and heath. Crevice vegetation with thrift forms a narrow zone on more exposed coasts.

Vascular plants

Eight nationally scarce (NS) and two Red Data Book (RDB) vascular plant species are recorded from within the site. On the south side of Loch Sunart, Irish Lady's tresses (RDB) is found in coastal lazy beds, quillwort (NS) occurs at Glencripesdale, and small cow wheat (NS) is recorded from the woodlands at Rahoy. On the north shore, the range of habitats around Ben Hiant support populations of northern rock cress (NS), bog orchid (NS), and rock whitebeam (NS). Lapland marsh-orchid (RDB) occurs in heathland in Glenborrodale, there is narrow-leaved helleborine in

woodland near Woodend, and along parts of the shore of Loch Sunart there is eelgrass *Zostera marina* (NS) and dwarf eelgrass *Zostera noltii* (NS).

Non-vascular plants

The ancient and oceanic nature of the woods has enabled a rich diversity of non-vascular plants to develop. Of particular significance is the range of 'Atlantic' species present. The bryophyte flora includes one nationally rare species of moss *Dicranodontium denudatum*, one nationally scarce species of moss *Sematophyllum micans*, and several nationally scarce species of liverwort. Bryophyte carpets are particularly well developed on areas of boulder scree. The woodland lichen flora includes numerous nationally rare and nationally scarce species. The woods at Laudale are amongst the best in the area for lichens and the lichen flora there includes one species at its only British locality. Woods at Glencripesdale support all four British species of Lobaria.

Mammals

The high level of usage made of the site by the Loch Sunart otter population for shelter, feeding and breeding is particularly important. The site also supports wild cat, pipistrelle bat *Pipistrellus* sp., and pine marten. Islands are frequented by common seals.

Invertebrates (including dragonflies)

The site supports a good diversity of terrestrial, freshwater and marine invertebrates. Several rare and scarce craneflies and hoverflies have been recorded. The SSSI supports a notable dragonfly and damselfly fauna which includes the nationally rare northern emerald dragonfly. Sunart is also important for its strong populations of: chequered skipper butterflies, a nationally scarce species. In addition, the juxtaposition of grassland, heathland and scrub habitats on warm south-facing slopes supports nationally important populations of several species of moth.

GEOLOGICAL

Moine

Coarse sandy deposits laid down in a shallow sea around a thousand million years ago.

The Moine rocks of Ardnamurchan form part of the most westerly exposure of the Moine Assemblage on the Scottish mainland and contain some of the coarsest sediments within the Moine succession. These Upper Morar Psammites have retained much of their original structure and character despite major crustal upheavals that have totally metamorphosed similar aged rocks in other parts of Scotland. It is possible to recognise clearly the environment in which the sediments accumulated, close to their source lying to the west. Excellent exposures revealing a variety of sedimentary structures are displayed in coastal sections at Camas Choire Mhuilinn and from Camas Fearna to Glenmore Bay.

Caledonian Igneous

Granite formed as the land masses which would become England and Scotland collided:

At the eastern end of Loch Sunart, and on the south side of Glen Tarbert, the site includes a section through the Strontian Complex. This is composed of varieties of intermediate and acid plutonic igneous rocks injected into the earth's crust 435 million years ago when NW Scotland was part of an ancient continent into which another continent was colliding. As a result of the associated earth movements, the Great Glen Fault (a large fracture in the Earth's crust) produced an opening through which the magmas ascended to form the Strontian Complex. The overall shape of the intrusions and their internal structure provides clues to the process of igneous intrusion formation and the timing of movement along the Great Glen Fault.

Tertiary Igneous

The remains of a 60 million year old volcano:

Ben Hiant is carved from a small volcano and reveals an excellent cross-section through the volcanic crater. Remnant volcanic vents are filled with agglomerates, tuffs and crater lavas, including an andesitic pitchstone unique within the British Tertiary Volcanic Province. Two major dolerite intrusions within the vents build most of the highest ground. The larger is of particular interest as it appears to have formed by injection of confluent pulses of magma. Several episodes of minor intrusions, including an early cone-sheet swarm are represented.

REMARKS

Sunart SSSI is a new site which encompasses the following previously notified SSSIs: Poll Luachrain and Druimbuidhe SSSI, Rahoy Woodlands SSSI, Glencripesdale SSSI, Laudale Wood SSSI, Ariundle Oakwood SSSI, Salen to Woodend SSSI, and Ben Hiant & Ardnamurchan Coast SSSI.

The Sunart SSSI underpins the terrestrial component of the Loch Sunart Woodlands candidate Special Area of Conservation and its proposed extension, proposed for designation under the 1992 European Community Directive on the conservation of natural habitats and wild fauna and flora (The Habitats Directive). The following habitats and species, listed in Annexes 1 and 2 of the Habitats Directive, are qualifying features: Old sessile oak woods with holly and *Blechnum* ferns in the British Isles; lime-maple forests of slopes, screes and ravines; European dry heaths; Northern Atlantic wet heaths with cross-leaved heath*;* Reefs; otter.

Appendix 4 - Species Information

There are a number of laws protecting species in the UK; this is only a brief synopsis.

The Wildlife and Countryside Act 1981
This is a key Act, which makes it an offence to intentionally or recklessly kill, injure, or take any wild bird or their eggs or nests (except for species listed in Schedule 2). There are additional offences of disturbing birds listed on Schedule 1 at their nests, or their dependent young. The Act also prohibits certain methods of killing, injuring, or taking birds, restricts the sale and possession of captive bred birds, and sets standards for keeping birds in captivity.

The Act makes it an offence (subject to exceptions) to intentionally or recklessly kill, injure, or take, possess, or trade in any wild animal listed in Schedule 5, and prohibits interference with places used for shelter or protection, or intentionally disturbing animals occupying such places. The Act also prohibits certain methods of killing, injuring, or taking wild animals.

The Act makes it an offence (subject to exceptions) to pick, uproot, trade in, or possess (for the purposes of trade) any wild plant listed in Schedule 8, and prohibits the unauthorised intentional or reckless uprooting of such plants.

Other Acts protect Wild Mammals, Badgers, Deer and Seals.

The Habitats Directive

Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora requires Member States to take the requisite measures to establish a system of strict protection for the animal species listed in Appendix IV, ie animal and plant species of community interest in need of strict protection. There are 13 European Protected Species in Britain.

In summary, for any European Protected Species of animal, the legislation makes it an offence to deliberately or recklessly capture, kill, injure or, in certain circumstances, disturb any such animal. This includes taking or destroying eggs of such animals. It is also an offence to damage or destroy their 'breeding sites' or 'resting places' (this does not have to be deliberate or intentional for an offence to have been committed). For any European Protected Species of plant, the legislation makes it an offence to deliberately or recklessly pick, collect, cut, uproot or destroy any such plant. This applies to all stages of their biological cycle. European Protected Species of plants and animals are also protected from being transported, kept, sold, exchanged, advertised for sale etc.

The Biodiversity Convention

The Convention on Biodiversity was adopted at the Earth Summit in Rio de Janeiro, Brazil in June 1992. In the UK the Government launched the UK Biodiversity Action Plan, a national strategy which identified broad activities for conservation work over

the next 20 years, and established fundamental principles for future biodiversity conservation. A number of Biodiversity Action Plans (UKBAP) have been produced for selected habitats and species, and some areas have developed local biodiversity action plans (LBAP) too.

Red Data Book Species

Red Data Books list species that are threatened or endangered. In the past species in Britain were included as Red Data Book species if they occurred in fewer than 15 10km x 10km squares. Britain is moving towards the IUCN (The World Conservation Union) criteria which categories species as Extinct, Extinct in the Wild, Critically Endangered, Endangered or Vulnerable.

Protected Species found at Ariundle NNR

		W&CA	EPS	RDB Species	Biodiversity Action Plans	
Common name	***Scientific Name***				**UK Plans**	**Local Plans**
MAMMALS						
Otter	*Lutra lutra*	✓	✓		✓	✓
Pine marten	*Martes martes*					✓
Pipistrelle bat	*Pipestrellus pipestrellus*	✓			✓	All bats
Red Deer	*Cervus cervus*					✓
Roe Deer	*Capreolus capreolus*					✓
Wildcat	*Felix silvestrus*	✓				✓
BIRDS						
Crossbill/ Scottish Crossbill	*Loxia curvirostra/ Loxia Scotia*			✓	✓	
BUTTERFLIES						
Chequered Skipper	*Carterocephalus palaemon*	✓		✓	✓	✓
Pearl-bordered fritillary	*Bolaria euphrosyne*	✓		✓	✓	✓
Small pearl-bordered fritillary	*Bolaria selene*					✓
DRAGONFLIES						
Northern emerald dragonfly	*Somatochlora artica*			✓		✓
PLANTS						
Norwegian specklebelly (lichen)	*Pseudocyphellaria norvegica*				✓	✓

RDB – Red Data Book
EPS – European Protected Species
W&CA – Wildlife and Countryside Act 1981