Deer Consultancy Services

A Deer Management Plan for the

Ardnamurchan DMG

2016-2021

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Executive Summary

This Plan provides a vehicle to deliver fully informed and inclusive deer management within the Ardnamurchan Peninsula. In particular, it seeks to involve all land owners, land users and interested parties in discussions about deer management and its wider impact on other land users. This wider focus will be driven by the formation of a new Deer Management Group, which will work to a new Constitution and by the consultation surrounding this Plan. The Plan will seek to improve communication, collaborative deer management and habitat management. However, the two most important issues in a deer management plan are how many deer there are and how many deer there should be in order to meet all land management objectives. A helicopter based count by SNH in 2016 produced a total of 1803 deer at a density of 7.2 deer per km^2.

A judgement on how many deer there should be is influenced by the condition of habitats, the deer economy and by the degree of conflict surrounding deer management. Currently there is a lack of widespread habitat data but some designated sites are in Unfavourable Condition due to grazing by sheep and/ or deer (See SNH Sitelink). Deer management options for each designated site are addressed in this plan. Trends in sheep numbers suggest there has been a significant decrease in grazing pressure over the last 20 years. In general, there are few conflicts between the deer management objectives of estates.

Given the current state of information, this plan proposes that current culls are maintained by estates in 2015-16. Habitat monitoring systems should be put in place in 2016 which will allow habitat data to influence future cull targets. Count data, mortality and recruitment counts can be used in a simple population model to help set culls. Key areas of public interest to be addressed as a priority are the condition of designated sites and the condition of some native woodlands.

Summary of Actions Arising from the Ardnamurchan Deer Management Plan

A list of the actions arising from the plan is presented below:

Action		Who by	Timescale
1	Review and update targets and actions annually and carry out a full review of the plan after 5 years. Carry out an annual review of Group performance against the Benchmark and Public Interest actions after each AGM.	ArdDMG	At each AGM.
2	Form the Ardnamurchan DMG and include all relevant landholdings. Agree the deer management plan.	All relevant landowners and occupiers.	End Oct 2016.
3	Develop and agree a Constitution in line with ADMG's Template for DMG Constitutions.	ArdDMG	End Oct 2016.
4	Adhere to the Code of Practice on Deer Management	All members	Continuous requirement
5	Keep up to date with Wild Deer Best Practice Guidance as it evolves.	All members	Continuous requirement
6	Carry out actions arising from the Communications Policy including making relevant data, documents and contact information publicly available through the ArdDMG website accessed through the ADMG web portal.	Chair and Secretary	End Oct 2016.
7	All stalkers to attain DSC1 by end 2016 and be encouraged to attain DSC2 by end 2017. Identify training needs within the DMG and organise training courses where necessary. Consider inviting other rural workers to participate in training courses where possible.	All members	End Dec 2017.
8 & 9	Organise bi-annual co-ordinated foot count of DMG, discuss results at June meeting and make results publicly available through the ArdDMG website. Use count data in a population model which aids the setting of cull targets.	Stalkers, all Members, Chair, Secretary	In winter/ spring bi-annually.
10	Estates to consider whether methods to estimate deer populations within woodlands are necessary.	All members with significant areas of woodland.	End Dec 2016.

11 & 12	Use count, mortality and recruitment data to develop the population model within the deer management plan.	Stalkers, Secretary	Before July meeting annually.
13	Work towards meeting or exceeding SQWV standards and ensure a supply of venison is available for local sale.	All members who process deer.	Progress to be assessed annually
14	Gather better information on culls taken within the DMG. Members to report culls to the Secretary, ArdDMG. The Secretary to collate those culls and report to ArdDMG.	Chair and secretary	By end June annually.
15	Initiate a habitat monitoring scheme in line with SNH Best Practice guidelines and, where necessary, organise a group training event for Habitat Impact Assessments.	ArdDMG	1st round by end Oct 2016
16	Carry out an on-going programme of Habitat Impact Assessments.	All relevant land holdings	1st round by end Oct 2016
17	Review results from first round of HIA and set targets to reduce impacts caused by deer where they are found to be detrimental to land management objectives.	ArdDMG	End Dec 2016
18	Discuss the initial target population, develop thinking about target populations and agree a new target and the culls that are required to achieve it.	ArdDMG	End Oct 2016.
19	Consider the provision of woodland shelter available for deer now and in the future. This is linked to the “native woodland” action on page 35 and the “welfare” action on page 45.	All members	End Dec 2016.
20	Consider approaches to minimising stag mortality from sources other than sport stalking.	ArdDMG	End July 2017.
21, 22, 25, 26, 27, 48 & 52	Agree and implement plans to bring designated sites into favourable condition or maintain them in favourable condition. Detailed actions in section 4.2.	All relevant members	End Dec 2016.
23	Ensure there is positive engagement between the ArdDMG and the Sunart Oakwood’s Initiative (SOI) and that the SOI is invited to DMG meetings.	Sec	Dec 2017.
24	Ensure fenced woodland areas within the Sunart SSSI/SAC are regularly inspected for deer incursions and that deer densities are kept low. Deer fences should be regularly maintained.	All relevant estates.	Progress to be assessed annually.

27	With regards to native woodlands each landholding to use NWSS results to prepare condition assessments of each woodland within the High or Very High impact categories and produce management proposals to improve condition or justify current management.	All members owning a minimum of 0.5ha of native woodlands assessed as having High or Very High herbivore impacts.	End Dec 2018.
28	Dependent on the availability of funding ArdDMG will monitor woodland condition following Best Practice Guidelines and adaptively manage woodland dependant on the outcome of monitoring.	All relevant members	Work to begin once Action 27 is fulfilled.
29	Members will be encouraged to identify broad areas of Blanket bog and to monitor impacts on Blanket bog using habitat impact assessments.	All Members	End Dec 2016
30	Members will be encouraged to identify and map the location, extent and condition of degraded peat.	All members	End Dec 2017
31	The DMG will consider accessing the Peatland Restoration Fund to help fund mapping peatland and assessing peatland condition.	ArdDMG	End Dec 2016
32	Avoid burning on areas of peatland as outlined in the Muirburn Code.	All members	Continuous requirement.
33	Ensure that deer grazing regimes and deer densities allow for maintenance of peat integrity.	All members	Continuous requirement.
34	Where possible, only access peatland with vehicles which have low ground pressure.	All members	Continuous requirement.
35, 36, 37 & 38	Continue to resist colonisation by sika and by feral pigs through culling all observed individuals whenever possible. Maintain current management of fallow but prevent any range expansion. Cull or capture free living feral goat populations where they conflict with land management objectives.	All members	Progress to be assessed annually at Feb meeting.
39	Ensure DMG is open to communication regarding concerns of damage to historic and cultural features. Contact the Highland Council archaeologist to see if they have concerns. Encourage local Archaeology Clubs to attend	ArdDMG	End Dec 2016.

	meetings or raise any concerns.		
40	Ensure a supply of venison is available for local sales.	All members who process deer.	Progress to be assessed annually at Feb meeting.
41	Ensure DMG is open to communication re concerns about deer vehicle collisions.	ArdDMG	Continuous requirement.
42	Ensure estate guests are aware of the risks and symptoms of Lyme disease. Ensure First Aid kits include tick removers.	All members	Annually during stalking season
43	Maintain existing deer related wildlife tourism activities other than deer stalking and consider establishing more. These might include deer viewing, photography etc.	All members	Consider by end Dec 2017.
44	Ensure all crofters and Grazing Committee representatives are invited to become members of the DMG and that any concerns they may have are fully discussed.	ArdDMG	By Dec 2016.
45	Consider deer welfare issues at each DMG meeting and consider the implications for deer welfare when taking management decisions.	ArdDMG and all members	Annually at Feb meeting.
46	Consider the use of a signed Declaration form in relation to Chronic Wasting Disease for stalking guests from North America and Scandinavia.	ArdDMG and all members	End Dec 2016.

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Table of Abbreviations			
ADMG	Association of Deer Management Groups	SNH	Scottish Natural Heritage
ArdDMG	Ardnamurchan Deer Management Group	SOI	Sunart Oakwoods Initiative
AE	Ardnamurchan Estates	SQWV	Scottish Quality Wild Venison
DSC 1/2	Deer Stalking Certificate ½	SRDP	Scottish Rural Development Programme
NWSS	Native Woodland Survey of Scotland	SSSI	Special Site of Scientific Interest
SAC	Special Area of Conservation		

1.0 Introduction

1.1 Background

This Plan was commissioned following the Scottish Parliament's Rural Affairs, Climate Change and Environment Committee's review of deer management in 2013. The Committee called for increased professionalism in deer management planning across Scotland and challenged all Deer Management Groups to produce forward looking deer management plans by 2016. To support DMGs in plan preparation, the Association of Deer Management Groups produced a Benchmark against which DMG performance can be assessed. SNH also produced a list of Public Interest Actions which should all be addressed within a competent deer management plan.

In 2014, SNH carried out a review of the Group's performance against the Benchmark and the Public Interest Actions. This plan is broadly structured around the Benchmark and the Public Interest Actions and focuses on any weaknesses found during the review. The plan covers the 5-year period from 2016 to 2021. However, targets and actions outlined in the plan should be updated annually with a full review carried out in 2021. It is recommended that the Ardnamurchan DMG carries out an annual review of performance against the Benchmark and the Public Interest Actions after each AGM.

Action 1: *Review performance against the Benchmark and Public Interest Actions annually and update targets and actions. Carry out a full review of the plan after 5 years. Carry out a review of Group performance against the Benchmark and Public Interest actions after each AGM.*

1.2 The Plan Boundary

The plan covers the whole Ardnamurchan Peninsula. Before 2000 the Peninsula formed one DMG but gradually this fell into abeyance and it has not operated for some years. This plan aims to re-invigorate and re-form the Ardnamurchan DMG. The Ardnamurchan Peninsula has a very long coastline and only a short land boundary and arguably forms as discrete a deer management unit as exists on the Scottish mainland. In many ways the land holdings on the Peninsula are ideal for the formation of a Deer Management Group. The boundary of the Ardnamurchan DMG will be the coastline from Salen west along the south shore of the Peninsula to Ardnamurchan Point and then east along the north shore to the River Shiel. The boundary follows the River Shiel upstream to Acharacle and then follows the A861 from Acharacle to Salen (see Map 1). The land boundary neighbours the Moidart DMG and the East Loch Shiel DMG. Some deer will cross this boundary but numbers are small and there are few significant shared deer management issues.

The DMG can be further split into two deer populations. The boundary between the two populations is Glen More forest which is a large forestry block which runs north to south across Ardnamurchan, splitting the peninsula into two halves. The western side of this forest is securely deer fenced while the east side is open to deer. This fence effectively splits deer on the Ardnamurchan peninsula into two populations although some deer move between them around each end of the fence. At the western end of Ardnamurchan, another deer fence separates Ardnamurchan Estate from the croft land at the western tip. This fence is currently porous and deer

move through it with relative ease. However, this fence is due to be re-instated in 2016 and when complete it will then split the DMG into three largely separate deer populations.

1.3 Purpose of the Plan

The purpose of the plan is to aid the performance and function of the Ardnamurchan DMG (ArdDMG) in the following key areas:

- Communication both between DMG members and between the DMG and wider interests.
- Collaborative deer management through counting, population monitoring and cull planning.
- Habitat management through habitat monitoring and using habitat data to influence culling. Also in the protection of important habitats within designated sites.
- Delivery of the Code of Practice on Deer Management. ArdDMG endorses the Code and will use this plan to help deliver it.
- Balancing private and public interests including the local economy, public safety, native woodlands and a range of other issues.

1.4 Formation of a new Deer Management Group

Action 2: *Form the Ardnamurchan DMG. The Group will include all relevant landholdings. Agree the deer management plan.*

DMGs are generally structured so that landholdings pay an annual subscription which may be based on the level of their cull. Other interests can usually attend without paying a subscription. The Ardnamurchan DMG should include the following subscribing members: Shielbridge, Beinn Breac, Ockle, Eilagadale, Acairsaid, Laga, FCS (Salen Village, Camustorsa and Dun Ghallain forests), Ardtoe Crofts, Ardnamurchan Estates (including Ardnamurchan Estate, Gorteneorn, Glen Borrodale, and Swordale Farm), Glen Borrodale RSPB Reserve, Glenmore, and Ardslignish. Also Achnaha, Kilchoan, Ormsaigbeag and Ormsaigmore, Plocaig, Achosnich and Grigadale which make up the crofting townships west of Ardnamurchan Estate.

Representatives from relevant public bodies, NGOs and local bodies should also be invited to attend meetings of the Group.

1.5 The Member Estates

Brief descriptions of member estates, their objectives and management practices are set out below. All area figures were kindly supplied by the SNH GIS Team.

1.5.1 Shielbridge

Shielbridge covers an area of **4169 hectares** and lies at the east end of the Ardnamurchan Peninsula adjacent to the villages of Salen and Acharacle. The estate has a number of designations and wishes to ensure all are moved into Favourable Condition and then maintained in that state. It also wishes to maintain a sporting cull of 12 stags per annum and a population of deer commensurate with that objective. Most of the estate is acid grassland with sparse growth of heather throughout. The estate has crofting tenancies and is partly common grazing. Sheep numbers have declined dramatically over the last 20 years. There are several small

areas of native woodland which the estate aspires to expand and regenerate. The estate has a long history of positive, low key engagement with local people who are interested in deer management.

1.5.2 Ardtoe Crofts

This area of 164ha is culled by Shielbridge Estate with some culling also by crofters.

1.5.3 Laga

Laga is a small estate on the north shore of Loch Sunart much of which was planted with new native woodland in 2013. It covers an area of **495 hectares**. The planted area is deer fenced and the estate's objectives are to exclude deer from the fenced area while trees are vulnerable to browsing. The owners wish to protect the perimeter deer fence from external deer pressure and to cull a few deer for home consumption. There is a small area of improved grassland on Laga which is grazed by sheep but deer are largely excluded from in-bye land.

1.5.4 Beinn Bhreac and Ockle 1

Beinn Bhreac is a small estate of **1729 hectares** which is located on the north side of Ardnamurchan. The estate wishes to shoot 6 stags per year and maintain a population commensurate with that objective. Red deer are the only deer species found on Beinn Bhreac and numbers are thought to have diminished in recent years to the concern of the owners. It is likely that the removal of the fence on the eastern side of the Glen More forest has resulted in deer spending more time in woodland rather than on the open hills of Beinn Bhreac. Vegetation is dominated by acid grassland with sparse heather growth. There is one croft but this is not grazed by livestock and sheep numbers have declined to zero over the last 10 years. Beinn Bhreac and Shielbridge Estates collaborate closely in deer management matters and share a joint deer larder. There is one part-time employee who works on Beinn Bhreac about one day per week. The owners of Beinn Bhreac have the shooting rights on Ockle (363 hectares) which is in separate ownership. Deer are managed as one population across the two properties.

1.5.5 Acairsaid

Acairsaid is a small property of **340 hectares** on the north shore of Ardnamurchan where the land is rocky and infertile. Deer densities are very low and very few are ever shot.

1.5.6 Eilagadale

Eilagadale is a small property of **177 hectares** on the north shore of Ardnamurchan which is dominated by rough, rocky terrain. Similar to Acairsaid, deer densities are low and few are ever shot.

1.5.7 Glen Borrodale and Glenmore Forest (Ardnamurchan Estates)

Glen Borrodale is owned by Ardnamurchan Estates which also owns the Glen More forest block which splits the peninsula from east to west. It covers an area of **2190 hectares**. Ardnamurchan Estates also owns most of the ground to the west of Glen More as far the crofting townships at the west end of the Peninsula.

In common with the rest of Ardnamurchan Estates, deer stalking on Glen Borrodale is commercialised with all stags and hinds being shot by guests. Some 25 stags and 30 hinds are shot on Glen Borrodale annually. These deer have access to Glen More forest which is open to deer on its eastern side but securely fenced on its western side. Deer move freely between Glen More forest and Glen Borrodale and the population is treated as one. This fence on the western side of Glen More makes Ardnamurchan Estate an enclosed population. Some stags reared in deer parks have been introduced to the enclosed area of Ardnamurchan Estate with the objective of improving stag quality for stalking. These stags are selected for hardiness, antler quality and other genetic features. No attempt has been made to influence the genetics of the Glen Borrodale deer herd. However, it is accepted that some gene flow from the enclosed population to Glen Borrodale is possible. Deer are fed on Glen Borrodale and other parts of Ardnamurchan Estates, with the aim of improving stag quality and of holding deer on the ground.

Glen More forest contains a population of fallow deer which have been free-living for over a decade. There are thought to be 90-130 free-living fallow on Ardnamurchan. These are occasionally culled but are thought to be largely self-regulating and have not spread from Glen More.

Parts of Glen Borrodale Estate fall within the Sunart SAC and Glen Borrodale adjoins other estates which own other parts of the SAC. Deer fences separate hill deer from the Sunart SAC but there is some leakage through the fences. Glen Borrodale reports that fences are occasionally cut or gates left open which allow deer to enter. There is also some movement of deer across Loch Sunart from Morvern and deer can enter the Sunart woodlands via the sea.

1.5.8 Gorteneorn (Ardnamurchan Estates)

Gorteneorn is a plantation of commercial timber species which are largely mature and ready for felling. It adjoins Shielbridge and Beinn Bhreac Estates but is owned by Ardnamurchan Estates (AE). It also adjoins the Arevegaig woodlands which are part of the Kentra Bay and Moss SSSI. A small cull is taken annually with a population of 30-40 red deer thought to live in the forest but also frequenting neighbouring estates. Cull levels will change once restructuring begins. The intention is to maintain deer at low density to protect re-stocked commercial crops. Sika are present as a breeding population. AE policy is to reduce this population to zero through in season culling. There is no desire to see sika establish or to use them as a resource.

1.5.9 Glen Borrodale RSPB Reserve

Glen Borrodale RSPB Reserve (**102 hectares**) is part of the Sunart Oakwood's Initiative (http://www.natura.org/sites_uk_sunart.html). The small reserve lies within a deer fenced enclosure. Deer are culled by a contractor. Numbers are kept low within the fence but the exclosure is unfenced along its coastal edge.

1.5.10 Forestry Commission Scotland

FCS own three woodland blocks in Ardnamurchan totalling about **370 hectares**. These are Camustorsa, Salen Village and Dun Ghallain which are all part of the Sunart Oakwood's Initiative (see 4.2.3). These three woodlands are deer fenced on three sides but open to the sea. The objective is to regenerate oak woodland which

requires very low grazing pressure. Within existing deer fences, deer numbers are low and FCS woodland objectives are generally being achieved.

1.5.11 Swordale and Kilmory.

Swordale is owned by Ardnamurchan Estates (AE) while Kilmory is crofted by the Kilmory Crofting Township. These properties total some **750 hectares**. Despite land being in different ownerships, deer management objectives are consistent across the properties with the aim of maintaining a deer free zone to avoid conflict with crofting objectives. Deer are culled by AE staff but no stalking guests are involved. There are no resident hinds but a few stags are shot annually. There are some 60 cows and 150 sheep on the croft land.

1.5.12 Ardnamurchan Estate

This area is owned by AE and covers some **7200 hectares**. AE refers to all the properties, in one ownership on the peninsula. Ardnamurchan Estate is the largest of these properties and lies west of Glenmore Forest. The main objectives are farming and forestry. Deer stalking also takes place. The property is enclosed by deer fences which run along its eastern and western boundaries and by the coastline on the north and south shores of the peninsula. The fence along the western march is no longer deer proof and is due for re-instatement. There is some deer movement between Ardnamurchan Estate and the crofting townships to the west. AE wish to shoot 50 stags annually with all animals shot by paying guests. The hind cull ranges from 58-65 annually. To increase stalking opportunities, some stags raised on deer parks are introduced into Ardnamurchan Estate annually. These stags are not tagged and merge with the native population, being identifiable by size, antler quality and other genetic features. These stags are rarely culled in the same year they are released and the aim is to let them breed and hopefully increase antler quality. Some hinds are also added to the population to try and improve the genetics of the herd. Deer have been introduced into Ardnamurchan for over 100 years with high quality genetics brought in from Poland and other parts of the Continent. This practice has had mixed results across the Highlands but is believed to have been very successful in Ardnamurchan where antler quality is high and body weights are amongst the highest in Scotland. Deer are also given supplementary feed to improve trophy quality and to reduce pressure on sensitive habitats.

Farming is the main objective on Ardnamurchan Estate. The deer population share the range with some 3000 breeding ewes and 300 cows which are owned and managed by AE. The estate is keen to develop a well-known brand for meat products including beef, lamb and venison. Some 60% of venison culled on AE land is processed to a high standard and then sold locally or through the internet. Waste products are used to feed eagles. This is partly to provide a wildlife tourism opportunity and partly in an attempt to reduce eagle predation on lambs and goat kids.

There are a number of designated sites on Ardnamurchan Estate. These include native woodland designations and a number of geological sites. AE wish to move all designations into Favourable Condition and maintain them in that state. AE also wish to increase woodland cover by planting new woodland blocks.

1.5.13 Glenmore

This is a small property of **157 hectares** on the shores of Loch Sunart and at the midpoint of the peninsula. The objective is to regenerate native woodland as well as to graze cattle and sheep. Deer are largely excluded from the property by a deer fence around the property boundary. A few deer enter the property annually and are culled by the owner.

1.5.14 Ardslignish 76ha

1.5.15 Crofting townships at western end of Ardnamurchan

There are a number of crofting townships at the western end of the Ardnamurchan peninsula. These include Kilchoan, Ormsaigbeag and Ormsaigmore, Grigadale, Achosnich, Sanna and Plocaig and cover almost **4000 hectares**. A resident deer population now lives on the croft land west of the deer fence which separates the croft land from Ardnamurchan Estate. Plocaig and Sanna are run as one township with some 360 sheep on the hill. Achnosnich has some 60 sheep on the hill while Grigadale only has park sheep with no livestock on the hill. Sheep are grazed on Kilchoan, Ormsaigbeag and Ormsaigmore. Sheep numbers have declined across all townships in the last 10 years.

Deer range across all townships but are most prevalent on the southern crofting townships. Stags move into the croft land to rut with resident hinds before returning to Ardnamurchan Estate to winter. Most deer control is carried out by crofter, Alasdair McLaughlin. AE have an agreement with some townships where the estate buy stalking from crofters. A number of stags are sold to AE who supply guests. These guests are guided by Alasdair McLaughlin with venison processed by AE.

Deer used to be treated as pests on the crofting townships, but the agreement with AE means they are now valued and tolerated on most croft land.

2.0 Deer Management Group: Organisation, Functions & Policies

2.1 Developing a Constitution

The Ardnamurchan DMG should be formally constituted and adopt "The ADMG Template for DMG Constitutions" which sets out guidance on membership, office bearers, meetings and funding. (Appendix A). This Template reflects recent developments in deer management, particularly concerning the range of people and interests to be invited to DMG meetings.

Action 3: *Develop and agree a constitution.*

2.2 Code of Practice on Deer Management

The Code of Practice on Deer Management has been endorsed by all members of the Ardnamurchan DMG. The Code is endorsed within this deer management plan and within the DMG constitution.

Action 4: *All members to adhere to the Code of Practice on Deer Management.*

2.3 ADMG Principles of Collaboration

The ADMG Principles of Collaboration are endorsed within this Deer Management Plan and the DMG Constitution. In particular members will:

- Respect each other's range of management objectives.
- Communicate openly with each other and all relevant parties.
- Negotiate and, where necessary compromise, in order to accommodate the reasonable land management objectives of neighbours.
- Work together to resolve conflict.

2.4 Wild Deer Best Practice Guidance

Members agree that all deer management activities will be carried out in accordance with Wild Deer Best Practice Guidance. Best Practice Guidance will evolve over time and members will make reasonable efforts to keep up to date with developing Wild Deer Best Practice. The Secretary will keep members informed of all updates from ADMG and other relevant bodies.

Action 5: *Keep up to date with Wild Deer Best Practice Guidance as it evolves.*

2.5 Long Term Vision

Members of the ArdDMG support the long term vision for deer in Scotland as detailed in "Scotland's Wild Deer- A National Approach." Members agree to work together and manage deer in accordance with the Code of Practice on Deer Management and will work to ensure all management activities are carried out in accordance with Wild Deer Best Practice Guidance.

2.6 Strategic Objectives

The strategic deer management objectives agreed by the ArdDMG are listed below. These are not in priority order and are all of equal importance.

- To safeguard deer welfare.
- To manage the deer population to meet property owner and occupier land management objectives.
- To manage deer populations so they are in balance with their habitats.
- To minimise damage to other land uses.
- Where possible, to minimise risks to public safety arising from deer and their management.
- Within the constraints of above to achieve an annually agreed sporting cull and to manage the deer to maximise their social and economic value.
- To bring all designated sites affected by deer impacts into Favourable Condition and to maintain them in Favourable Condition.
- To openly communicate information relating to deer management between members and between the ArdDMG, local communities and other communities of interest.

2.7 Communications Policy

Good communication is a cornerstone of collaborative deer management. The ArdDMG is required to communicate internally between members and with local interest groups such as Community Councils. In addition, there may be wider communities of interest such as outdoor access groups and Environment LINK. In the future, members will agree to communicate openly and be pro-active in communicating about their plans and activities. There shall be a culture of "no surprises" amongst members in that future deer management changes will be fully discussed in advance of the change taking place. The DMG will function in a transparent manner and to this end will make the following information available:

- The Ardnamurchan Deer Management Plan including annual updates
- The DMG constitution
- Agendas and Minutes of DMG meetings.
- Count data.
- Future meeting dates.

ADMG are developing a web portal which will provide a central location for accessing information about local deer management throughout Scotland. This should be useful to a range of people who have an interest in deer. Once complete, anyone will be able to access a map showing the boundaries of all DMGs in Scotland and then click on the DMG of interest to them to access a website for that DMG. Over time, the information listed above should then be available for each DMG. The ArdDMG will use its own website, accessed through the ADMG web portal, to host the consultation on the first draft of the deer management plan. Other information about the Group will be added in 2016.

All enquiries to the DMG should be made to the Chair or Secretary by email.

Chair: Sarah Holman sarahcholman@hotmail.com

Vice chair: Alistair McLoughlin

Secretary: Niall Rowantree niall@westhighland-hunting.co.uk

Short term enquiries will be dealt with as soon as practical while more strategic issues may be discussed at DMG meetings. These will be scheduled to take place in February and July. The AGM in July will be open to all and representatives of Community Councils will be invited to attend and take a full part in the meeting.

The relevant Scottish Natural Heritage contact for the Ardnamurchan DMG is Graeme Taylor, SNH, Great Glen House, Leachkin Road, Inverness IV3 8NW. Email: Graeme.taylor@snh.gov.uk

General deer enquiries to SNH should be addressed to wildlifeops@snh.gov.uk

It is recognised that individual estates will have established contacts with local communities and crofters etc. These existing networks should be retained and encouraged and in many circumstances it may be more appropriate for local issues to be discussed with individual estates rather than with the whole DMG. This plan does not seek to replace these existing contacts with a more formal communications route through the DMG. However, those who wish to communicate with the DMG should find an accessible, open and responsive culture.

2.8 Authorisations

From time to time members may require to apply for authorisations to take or kill deer under the various provisions of the Deer (Scotland) Act 1996. These may include authorisations to shoot deer at night to prevent damage or to shoot deer out of season. In the past, lack of communication about authorisations has been a common source of conflict within many DMGs. Members agree to communicate about their likely application for authorisations to the ArdDMG Chair or Secretary and to report the numbers of deer killed under authorisations at each DMG meeting. Where appropriate, the Group may discuss alternatives to the use of authorisations e.g. in season culls which

Action 6:	*Carry out actions arising from Communications Policy including making relevant data, documents and contact information publically available through the ArdDMG website.*

2.9 Training Policy

Within the Ardnamurchan DMG all stalkers should be adequately trained and deemed competent to cull deer. This includes lone stalkers (e.g. unsupervised) and those who supervise guests. Although not a legal requirement, the accepted definition of Competence within the Scottish deer sector is the attainment of Deer Stalking Certificate 1. In August 2015, 6 out of 8 lone stalkers held DSC 1. In addition, 5 out of 8 held DSC 2. Some AE staff hold the Advanced Deer Management Qualification. All stalkers within the DMG will attain DSC1 and will be encouraged to attain DSC2 by end 2017.

Stalkers who are required to shoot deer under legal authorisations must be on the SNH “Fit and Competent” register. To be registered, stalkers must hold DSC2 or DSC1 in combination with references from two relevant sources.

Members should aim to comply with Wild Deer Best Practice in all deer management activities.

Ardnamurchan stalkers often work in remote locations where self-reliance is important. A range of skills are required to work safely and efficiently in this environment. These skills include boat handling, first aid, chainsaw work, mechanical work and use of ATVs. As employers, individual estates have the legal responsibility of identifying and assessing potential risks to their employees and where necessary providing training to minimise or eliminate those risks. These responsibilities

will continue to lie with employers. However, the DMG has a role in co-ordinating the efficient provision of training. Training courses are often more cost effective with larger groups and the DMG may be able to identify and organise courses in areas where multiple estates require training. The DMG could highlight the value of its role as a training co-ordinator and increase community benefit by inviting crofters and rural worker from relevant professions to training courses. There could be important public relations benefits to this approach. AE is already a qualified training provider in many deer related activities and this facility could be a significant asset for the DMG.

Action 7: *All stalkers who shoot deer when unsupervised, to attain DSC 1 and be encouraged to attain DSC 2 by end 2017. Identify training needs within the DMG and organise training courses where necessary. Consider inviting other rural workers to participate in training courses where possible.*

2.10 Deer Counting Policy

Joint deer counts are another cornerstone of collaborative deer management. Currently estates in Ardnamurchan organise occasional co-ordinated ground counts of the DMG area. The most recent ground count was in 2015 but there have been large gaps between counts. In 2015 a team of around 10 stalkers moved across the area in a systematic way. Stalkers were recruited from within Ardnamurchan, from neighbouring DMGs and contractors were also employed. This provides a model for future counts which will be carried out every 2 years. In any DMG count, stalkers from different estates should work together so that stalkers count on estates other than their own. This builds trust in count results.

In 2015 the Ardnamurchan count took around 20 man-days to carry out. This compares closely with previous Deer Commission counts carried out in 1997 and 2003 and suggest some consistency of method. In the future the DMG will continue to count every year using its existing method. In addition, SNH may carry out helicopter counts from time to time as occurred in 2016.

Count data will be made public through DMG meeting Minutes, which in turn will be made available through the ArdDMG website which is accessed through the ADMG web portal. The DMG will discuss the count and its implications in the meeting following the count. Count results will be fed into a simple population model which is detailed later in this plan (3.7). This model can be used to help predict future populations and the cull targets which are required to achieve estate objectives.

Action 8: *Organise bi-annual collaborative ground counts, discuss results at the group meetings and make results public through ArdDMG website.*

Action 9: *Use count data in a population model which aids the setting of cull targets.*

2.11 Counting in Woodland

Direct counts of deer numbers are impossible in large areas of dense woodland. FCS have developed robust counting methods which provide useful estimates of deer population density in woodland and which are sufficiently accurate to enable cull targets to be set. These methods are most commonly based on estimating the amount of dung deposited by deer within the forest. Dung counts measure average deer density over a prolonged period of time and therefore cannot be added directly to open hill counts which count deer at one moment in time. Although dung counts have limitations, they are currently the most effective method available for estimating populations in dense woodland and have enabled FCS to achieve their management objectives. Those estates with large, dense woodlands may find dung counting beneficial. Currently this may apply to Glenmore Forest, Gorteneorn and, in time, Laga may also require to use dung counting.

Alternatively, the grazing impact of deer can be measured e.g. the proportion of planted seedlings which are browsed annually. Cull targets can be set to maintain deer impacts within acceptable limits. AE currently use the clearance plot method of dung counting to estimate population size in many of its woodlands.

Action 10: *Estates to consider whether methods to estimate deer populations within woodlands are necessary.*

2.12 Mortality Searches

Count data is vital for making deer management decisions but we also need to know how many animals die each year if we are to accurately predict future populations. The number of animals which are shot annually is relatively easy to determine but west coast populations are prone to regular episodes of weather driven natural mortality which are often unrelated to deer density. To determine numbers of deer dying from weather effects, estates should carry out mortality searches each spring. Mortality searches are already carried out by some estates. For the most part, these are carried out in conjunction with other routine tasks e.g. fence checks around plantations or spring rounds of fox dens. This is an efficient use of manpower as mortality searches are time consuming and labour intensive. Deer can die at a range of altitudes particularly in a mild winter and it is impossible to find evidence of all the deer that die naturally. Data from mortality searches are an index of winter mortality rather than an accurate estimate. The key requirements of a mortality search are that a standard amount of search effort is used each year, and that areas where deer gather and spend a lot of time during the winter are thoroughly searched. In order to standardise this approach, the same areas should be searched annually unless there is significant change in deer behaviour.

Data which is gathered can then be used in a population model to predict future population size and the culls required to achieve DMG objectives.

Action 11: *Estates to carry out annual mortality searches and to use these data to update the population model within the deer management plan.*

2.13 Recruitment Counts

As well as collecting data on how many animals die each year, we need to know how many calves enter the adult population as yearlings annually. If we know how many adults are recruited annually, then culls can be set to let the population grow or reduce as required. Recruitment counts can also be incorporated into other tasks e.g. they can be carried out during spring rounds of fox dens. Once annual culls have been completed and the peak of natural mortality has passed e.g. by early May, then most calves observed will survive the winter and will become yearlings in the following June. Each estate in the Ardnamurchan DMG should count and classify at least 20-50 hinds to determine how many hinds have a calf at foot. It is accepted that some estates may not hold 20-50 hinds in May. If 50 hinds are observed as having 17 calves at foot, then the average calving percentage is 34%. This average calving percentage can then be used in population models to estimate the number of animals entering the adult population each year.

Data which is gathered from mortality searches and recruitment counts can then be used in the population model as detailed later in this plan (3.7).

Action 12: *Estates to carry out annual recruitment counts and use these data to update the population model within the deer management plan.*

2.14 Venison Marketing

All the estates in the Ardnamurchan DMG are committed to the production of quality venison. None are yet members of Scottish Quality Wild Venison which is a quality assurance scheme for the whole venison industry and some are unconvinced of the benefits of joining the scheme. However, the scheme does set standards for larder design and hygiene and standards for carcase handling. All estates will be encouraged to meet or exceed SQWV standards. There are already good examples of collaborative working between Ardnamurchan venison producers e.g. there is shared larder use between three estates. Ardnamurchan Estates process some 60% of their venison for local markets and internet sales. Local consumers benefit from competition between local suppliers for limited local sales. Most venison from other estates is sold to game dealers but these estates will undertake to sell some Ardnamurchan venison direct to local buyers.

Action 13: *Work to meet or exceed SQWV standards and to make some venison available for local sale.*

2.15 Strategic fencing

Different land management objectives often require different deer densities and the need for different deer densities on adjacent properties is often the main source of conflict within DMGs. Strategic deer fencing plays a key role in reducing and preventing conflict within the ArdDMG by maintaining differential deer densities where these are required. Strategic deer fences are defined as long lengths of fencing which effectively separate one land management objective from another. Low deer densities are required in the woodlands within the Sunart Oakwood Initiative but higher deer densities are required to sustain sporting culls on Glen Borrodale and Shielbridge which are immediately adjacent. Conflict and damage would occur if there were no fences to separate deer densities. A strategic deer fence might be a measure which could reduce deer numbers on croft land and designated sites in the north east of the DMG.

The maintenance of deer fences is almost always the responsibility of individual estates. March fences may have shared maintenance responsibilities. Some estates within the ArdDMG put considerable effort and resource into maintaining deer fences e.g. Shielbridge and AE. Strategic deer fences will remain the responsibility of individual estates but the DMG recognises that all members gain some benefit from the maintenance of strategic deer fences. Any new fences should seek to comply with Joint Agency Fencing Guidance.

3.0 Native deer populations and their habitats

In recent decades the key herbivores in Ardnamurchan have been red deer and sheep. This section of the plan examines deer count and density data, trends in sheep numbers and the implications of those trends for grazing levels. Habitat monitoring systems for key habitats are then developed and we discuss how habitat data should influence future culls. Finally, we discuss an initial target population and look at how the use of population modelling can aid management.

3.1 Historical Red deer counts

Recent counts of red deer are shown in Table 1.

Year	Stags	Hinds	Calves	Total
1997	530	802	336	1668
2003	435	763	252	1450
2015	641	1364		2005
2016 (Heli count)	488	953	362	1803

Table 1. *Red deer count data in Ardnamurchan*

Count data for the Ardnamurchan area was limited but has improved in the last two years. Counts in 1997 and 2003 were carried out by the Deer Commission for Scotland while the count in 2015 was carried out by estate teams. All these counts were ground counts with counters moving through the area in a co-ordinated way. The count in 2016 was helicopter based with all deer counted and photographed from the air. Count results suggest the total deer population has risen by around 8% between 1997 and 2016. Hinds have increased by 19% in that time period while stags have declined slightly. However, between 1997 and 2016 access to woodland for deer has increased so it is likely there are now greater numbers of uncounted stags concealed in woodland e.g. within Glen More forest.

Calving percentages vary from 33-42% over three counts where animals are classified. The 2016 count shows a calving percentage of 37% which is probably close to average for Scottish hill populations in late February.

2016 count

SNH carried out a helicopter based count in February 2016 which provides an excellent baseline for the Ardnamurchan deer management plan. Count data were supplied by SNH and are shown in Table 2.

Table 2. Count figures for 2016.

Estate	Area (ha)	Stags	Hinds	Calves	Total	Density (deer per 100ha)
Acairsaid	341	0	3	2	5	1
Achosnich	445	4	23	7	34	8
Ardnamurchan Estate	7219	268	481	182	931	13
Ardtoe Crofts	164	10	13	8	31	19
Ardslignish		0	0	0	0	0
Beinn Bhreac	1189	26	70	27	123	10
Branault	214	1	0	0	1	0
Eigladale	177	5	12	2	19	11
Glenborrodale Castle	216	1	2	2	5	2
Glenborrodale	2191	28	120	42	190	9
Glenborrodale RSPB Reserve	103	1	0	0	1	1
Glenmore		0	0	0	0	0
Glenmore Forest	3725	0	4	1	5	0
Grigadale	91	4	0	0	4	4
Grigadale 2	624	4	19	5	28	4
Grigadale 3	134	6	18	6	30	22
Kilchoan, Ormsaigbeag and Ormsaigmore	1816	11	10	5	26	1
Kilmory	236	6	0	0	6	3
Laga	496	6	4	1	11	2
Ockle	363	8	9	4	21	6
Plocaig	203	0	1	2	3	1
Sanna	663	4	0	0	4	1
Shielbridge	4191	86	159	62	307	7
Swordale Farm	276	9	5	4	18	7
Total	25077	488	953	362	1803	7.2 deer per 100ha

3.2 Deer Densities

The area of open ground available to deer in Ardnamurchan is estimated to be some 25000 hectares. There are some additional areas of woodland where deer numbers have not been counted. These include securely fenced areas where deer are at very low density. Deer densities across the open area of 25000ha range from 6.5-8 deer per km^2 over the series of counts available for analysis. Deer densities vary between estates and locally within estates. Deer densities for each estate (open ground only) from the 2016 count are shown in Table 2 above.

Deer are moved around by the process of counting, so the densities recorded on these estates may not necessarily reflect the normal, undisturbed distribution of deer. Larger estates like Ardnamurchan Estate and Shielbridge encompass a range of habitats and altitudes and are likely to include significant areas of summer and winter range. This makes it more likely that deer will stay on the estate all year round and means that overall estate deer density will vary less over the year than on small estates. On smaller estates, deer may regularly cross boundaries making density more variable and perhaps deer will only utilise the estate at certain times of year e.g. for winter shelter. Locally, deer densities may be much higher than these figures e.g. in a sheltered glen on a stormy night.

These densities have implications for habitats. The habitats present today in Ardnamurchan are a product of many decades, even centuries, of climate interacting with grazing and burning. Trends in sheep discussed below will suggest grazing levels may have been much higher in the past. Habitat monitoring on heaths and blanket bog is now required to determine the current state and the trends in condition of these habitats. Habitat monitoring systems to monitor heaths and blanket bog are described in 3.5. These systems should be implemented and monitoring data should then influence cull planning. Populations may require to be reduced in future if there are deleterious trends in habitat condition, but populations may be kept stable where habitat condition is stable or where habitats are being enhanced. Native woodland monitoring is discussed in 4.3. Deer densities of 6-8 deer per km^2 generally mean native woodland remnants will have to be protected if they are to regenerate.

3.3 Trends in sheep numbers

Data on sheep numbers are publically available at the agricultural parish level. The agricultural parish of Ardnamurchan includes the whole Ardnamurchan peninsula as well as substantial parts of Moidart and East Loch Shiel DMGs. Trends in sheep numbers across this area are shown in fig 1.

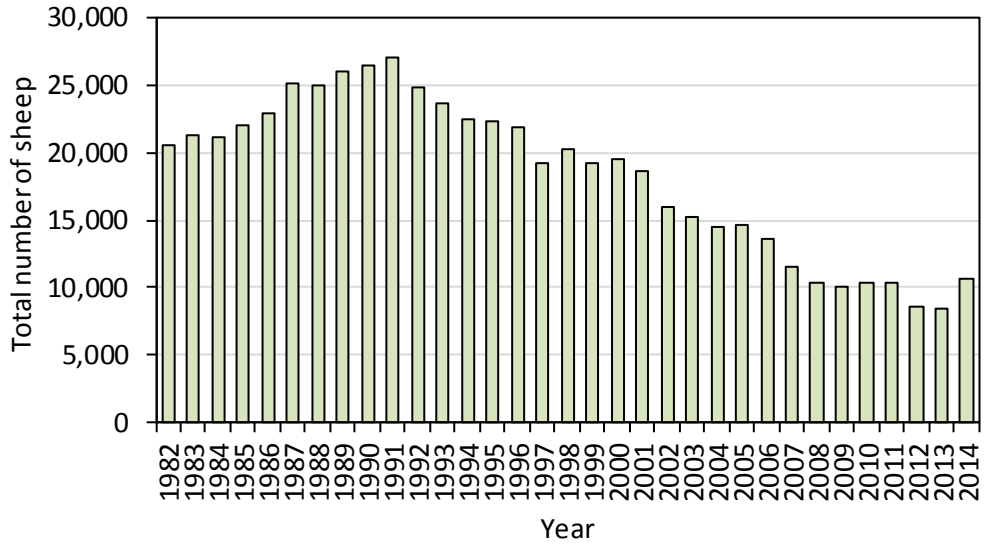

Figure 1 *Sheep numbers in the Ardnamurchan agricultural parish.*

Between 1982 and 1991 the total number of sheep including lambs steadily increased from 20000 to a peak of 27000 in 1991. Thereafter there was a steady decline from 1991 to 2013 when only 8426 sheep were recorded. This was a decline of some 69% in 22 years. These reductions have largely

been driven by changes in grant regimes and also partly because the crofting population has generally been ageing. These data record total sheep numbers on hill and in bye land and reductions will have taken place across both types of land. Data are not available to show the scale of reductions on hill ground alone. Reductions have taken place across the whole of the agricultural parish and there is no formal data available to chart the scale of reductions solely on the Ardnamurchan peninsula. Anecdotally, there is evidence that sheep numbers on the hill land of Ardnamurchan have declined in line with the parish trend. Sheep numbers on Shielbridge Estate have declined from 200 breeding ewes to almost zero. Sheep numbers on Beinn Bhreac have also declined to almost zero. Crofters report a significant decline in sheep numbers in the crofting townships at the west end of the peninsula. However, between 2013 and 2014 sheep numbers increased in the whole Ardnamurchan parish from 8400 to 10600. This demonstrates that sheep reductions are not inevitable or irreversible.

Over the period between 1997 and 2016 counted deer numbers in Ardnamurchan have increased by some 150 animals. Given the scale of sheep reductions reported, it seems unlikely that deer numbers have risen to maintain the same grazing pressure as the combined sheep and deer population produced in the 1990s. It seems reasonable to assume, although not proven, that there has been a significant decrease in overall grazing pressure between the 1990s and the current decade. Certainly most estates believe that to be the case.

3.4 Red deer culls

Culls taken by estates in Ardnamurchan are recorded by SNH. Recorded cull levels across the last 10 years show big variation. In season stag culls vary from 20 to 150 animals while in season hind culls vary from 40-150 animals. Out of season stag culls vary from 4-50 stags and in some years the out of season stag cull reportedly taken by estates exceeds the in season cull. This seems unlikely to be a true record and, indeed, one year is recorded as being incomplete. In reality it seems plausible that the records from several recent years are incomplete. Culls taken by estates are only part of the picture as there is likely to be an additional cull taken legally on crofts and also some level of illegal cull. The extent of these culls are poorly recorded. There are different opinions between estates on the size of the crofting cull and the level of poaching. Uncertainty about the size of culls taken on crofts can cause estates to be overly cautious and can lead to under culling. Better information on cull levels is required to enable better decision making by ArdDMG. Cull levels throughout the peninsula need to be better reported and collated by ArdDMG. In future, crofters will be invited to be DMG members. This will hopefully result in better information exchange between crofts and estates.

Action 14: *ArdDMG will gather better information on the level of culling throughout the DMG. Members to report culls to ArdDMG. The Secretary will collate cull data and report to ArdDMG.*

3.5 Habitat monitoring

The aim of a habitat impact assessment is to allow deer managers to monitor habitat condition both spatially and temporally, to inform management decision making. Initial habitat surveys should aim to collect data which will help categorise areas in terms of grazing pressure, particularly areas of moderate to severe overgrazing. More importantly, the surveys should establish a baseline from which changes in grazing and trampling pressure can be monitored. Subsequent monitoring can then be used to identify areas where the grazing pressure has changed, allowing overall habitat management and cull targets to be adjusted accordingly. Monitoring these impacts can allow managers to assess and understand the impacts of deer in their area under different deer densities.

This can then be used to inform future management decisions for example increasing cull targets where high impacts are found. Ardnamurchan DMG do not currently have a plan for habitat monitoring and as such will use the SNH recommended methodology. Full details of the best practice guidelines a can be found at http://www.bestpracticeguides.org.uk/impacts/principles. These guidelines are summarised below.

The standardised approach to habitat assessment within the deer industry and at a landscape scale is to select "permanent" sample plots on two discrete habitat types on each estate. A minimum of 30 plots per property will be allocated to both dwarf shrub heath and blanket bog habitats as selected by SNH. Where there is a large enough expanse of suitable habitat of either type a minimum of 30 plots should be completed. However, some properties in ArdDMG are small and some may have limited resources. In such circumstances 30 plots per habitat may be unrealistic. To aid deer managers in completing habitat monitoring, SNH has selected 60 plots at random in each of the habitats. The locations of the plots suggested by SNH are available on request.

Plots should be laid out in 2 × 2m squares, and then further subdivided into 0.5 × 0.5m squares, giving a total of 16 sub-plots per square. Each plot should be orientated to align North-South and marked by a wooden post (approximately 5 x 5 x 20cm) located at the south-east corner of each plot. The plot location will be recorded using a GPS, a fixed point photograph will be taken facing north, as well as additional photographs showing any distinguishing landscape features, in order to relocate the plot in subsequent years.

Dwarf shrub heath assessment concentrates on identifying the extent of grazing and trampling across the habitat. Grazing is analysed by looking at 3 or 4 handfuls of Common Heather *Calluna vulgaris,* and assessing the amount of browsing on last year's shoots. If *Calluna vulgaris* is not present, then Blaeberry, *Vaccinium myrtillus,* may be used. If other less palatable species such as Cross Leaved Heath *Erica tetralix* also show signs of browsing, this is indicative of significant grazing pressure which over a period of years is likely to lead to habitat degradation. Trampling is assessed by looking at heather stem breakage which is categorised as light/moderate (inconspicuous) or heavy (conspicuous). Again, the presence of heavy trampling may result in habitat degradation in the future.

As with dwarf shrub heath, the assessment of blanket bog focuses on recording the grazing and trampling impact in the defined survey plots. Trampling is measured by recording the presence or absence of deer hoof prints on bare peat (if present) in each of the 16 sub-plots. Grazing is again analysed by looking at heather shoot browsing and the presence or absence of bog moss is recorded in each of the 16 sub-plots.

Surveying of dwarf shrub heath plots will be carried out during the period between March and August, while blanket bog plot will be carried out in the period between May and September. The survey time will be constant between years so that comparisons to the baseline data are easier to draw. The habitat analysis will be carried out every 3 years.

It is recognised that the DMG members may not currently have the skills to complete habitat surveys. Where this is the case, the DMG will aim to organise a group training event for members (in line with the training policy). Alternatively, members have the option of recruiting an appropriately qualified surveyor to complete the surveys on their behalf. Funding for habitat monitoring may be available through SRDP.

Action 15: *Ardnamurchan DMG will initiate a habitat monitoring scheme which will fall in line with SNH Best Practice Guidance. The DMG will organise a group training event for habitat impact assessment if required.*

Action 16: *Each member will carry out an on-going programme of habitat impact assessments.*

In order to fully utilise the results of the habitat impact assessments, members will review the impacts after the first round of assessments and will set targets to reduce grazing pressure where it is found to be detrimental to land management objectives.

Action 17: *Members will review results from the first round of habitat impact assessments and will set targets to reduce impacts where they are found to be detrimental to land management objectives.*

Woodland monitoring will also be carried out following Best Practice guidelines (http://www.bestpracticeguides.org.uk/impacts/woodland) if funding is available. The monitoring methodology is fully outlined in the management of native woodland section (4.3).

3.6 Developing an initial target population for red deer in Ardnamurchan

There are a number of factors to consider when setting an initial target population for Ardnamurchan. These include:

- Red deer are part of the natural fauna of Ardnamurchan and are ecologically and culturally important.
- Deer stalking is economically important to some, but not all, members of the DMG.
- It is likely there has been a significant decrease in grazing pressure on the hills of Ardnamurchan over the last 25 years.
- Habitat monitoring should shortly be in place to provide data which should influence cull targets.
- However, some designated sites are not in favourable condition due to grazing by deer and/ or sheep. (See SNH Sitelink).
- Some native woodland is failing to regenerate.
- A number of members have nature conservation and/or forestry objectives which could be damaged by deer.
- Crofting is economically and culturally important to Ardnamurchan and crofting interests can be damaged by deer.

A starting point in calculating an initial target population for Ardnamurchan is to calculate the size of population required to sustain sporting requirements. Red deer stalking is an important objective for most of the larger land holdings in Ardnamurchan. Beinn Bhreac and Shielbridge wish to shoot a small number of stags each year with guests largely consisting of friends and family and little commercial activity involved. On the other hand, Ardnamurchan Estates wish to sell most of the stags they shoot. The total sporting requirement from those estates is around 110 stags per year. All land holdings in Ardnamurchan wish to maintain habitats in good condition and wish to minimise damage to crofts and crops. It therefore makes sense to set an initial target population as the smallest deer population which produces 110 stags per year with some safety margin for years with high, weather induced, winter mortality. This target population can then be adjusted up or down depending on habitat monitoring data, the impacts deer are having on other land management objectives and the agreed management strategies for each designated site. (Management strategies

for each designated site are outlined in 4.2. Discussion of the target population should be an agenda item at each DMG AGM.

Estimating the size of deer population required to sustain an annual cull is not an exact science. High winter mortality is often density independent and unpredictable in timing. Legal culls on croft land and levels of illegal culling are also variable from year to year and imprecisely known. To counter these unknowns, it is reasonable to build in safety margins to any model, but if these safety margins are excessive then conservation objectives could be compromised.

In order to maintain a stable stag population which can sustain an annual cull of 110 stags, then around 130 male calves need to survive their first year and become adult yearlings each year. This gives a safety margin of 20 stags per year which die for reasons other than sport stalking. Given an approximate 1:1 sex ratio at birth a total of 260 male and female calves need to survive their first year. With a Scottish highland average of 33% of hinds having a surviving calf at foot at the end of the winter then around 780 hinds are required to produce 260 calves each year. If stags are culled at an average age of 6 years old, then 6 times 110 stags are required in the population. This gives an initial target population of 660 stags, 780 hinds and 260 calves. This would give a total population of 1700 red deer and a density of 7 deer per km^2. Count data is compared with the target population in Table 3.

Table 3. Count data in comparison to the target population.

Year	Stags	Hinds	Calves	Total
1997	530	802	336	1668
2003	435	763	252	1450
2016	488	953	362	1803
Initial target population	660	780	260	1700

The calculated initial target population has similar numbers of hinds and calves as the population counted in 2003 although it has more stags. The initial target population has a larger number of stags than any count. However, there are unknown numbers of uncounted stags concealed in woodland which will be available for culling. The 2016 count shows a sex ratio of 1 stag to 1.95 hinds. The sex ratio in the count may accurately reflect the actual sex ratio in the population or it may be caused by under counting stags which are more likely to be concealed in the woodland of Glen More forest. The counted stag population has remained broadly stable since 1997 suggesting current stag culls are not reducing numbers.

The initial target population provides a starting point for discussion. In particular, management strategies to bring each designated site into Favourable Condition need to be overlaid with discussions on sporting requirements. These strategies are set out in 4.2 and some strategies may require compensatory culling.

Recommendations:

- ArdDMG members should conduct a bi-annual collaborative ground count, with stalkers from all estates counting on all estates.
- Management strategies are developed to bring each designated site into Favourable Condition.
- The deer population is reduced if compensatory culling is required.

- Habitat monitoring plots are established on heath and blanket bog and that data from these are collected annually.

- The deer population is reduced if there are negative trends in habitat monitoring data which are likely to be caused by deer.

- The deer population should be kept stable or allowed to slowly increase if there are positive trends in habitat monitoring data, if designated sites are in Favourable Condition and if other legitimate land management objectives within Ardnamurchan are not being compromised by deer.

3.7 Developing a population model

Data from counts, culls, mortality searches and recruitment counts can be used to make simple estimates of future population size. Once future population size has been estimated it can be compared with a target population. The target population should be influenced by habitat monitoring data once a robust data set has been collected and trends in habitat condition become apparent. Culls targets can then be based on the difference between the estimated population and the target population. An example (which is purely for illustrative purposes) is given in Table 4. A population model with formulas built in to an Excel spreadsheet is presented in Appendix D.

Table 4. An example population model.

Data	Stags	Hinds	Calves
Count in March 2016 (fictitious data)	500	950	360
Mortality searches in May 2016	40	10	50
Population post natural mortality	460	940	310
Population adjusted for calving percentage recorded in recruitment counts in May 2016 showing 33% calving	460	940	310 (33% of 940)
Adult population in July 2016 once all 2015 calves have	615 (460 stags + 310/2 male calves which become yearlings in	1095 (940 hinds + 310/2 female calves which become	

become yearlings	June)	yearlings in June)	
Target population (fictitious example)	660	780	260
Cull for 2016-17 (for illustrative purposes only)			Calves as appropriate

Population models are rarely precise as there are many unknowns and inaccuracies in the data collected. They need to be treated with scepticism but do provide a basis for discussion and decision making.

Action 18: *Discuss the initial target population, develop thinking about target populations and agree a new target and the culls that are required to achieve it.*

3.8 Minimising non-cull mortality

The key economic benefit of deer arises from the value of stags culled by paying guests. Those guests spend money on accommodation, food and other services but the ability to provide stags for sport drives much of that spend. It is possible to calculate the approximate size of the deer population required to sustain a particular stag cull. In very simple terms experience around Scotland has shown that the larger the deer population present in an area the greater the potential for deer related conflict. If a DMG has to produce stags for paying guests to shoot but also has to sustain significant stag mortality from other sources, then the DMG will have to carry a larger deer population than would be necessary to produce a cull of sporting stags alone. The higher the level of mortality the stag population has to sustain, the bigger the total deer population that is required and the greater the potential for conflict. It therefore makes sense for estates which benefit from sport stalking of stags to try and minimise mortality from sources other than culling for sport.

Within Ardnamurchan significant sources of stag mortality are likely to arise from winter mortality and some out of season culling. Poaching occurs but the level is unknown. There are obviously good reasons for minimising mortality from those causes relating to deer welfare and damage prevention but there is also a sound deer management reason. The fewer stags that die from causes other than sport culling then the less deer the DMG has to carry and the less conflict there will be.

Deer throughout the west coast are subject to occasional episodes of high natural mortality following wet winters. Research has shown these episodes are not density dependent. However, it's likely they can be influenced by habitat. Red deer in Scotland have adapted to open hill environments but undoubtedly benefit from access to woodland for shelter in wet and windy weather. Some deer do die in woodland but it is likely that access to woodland shelter will greatly increase an individual's chances of survival during a hard winter. There are several areas of woodland scattered across Ardnamurchan although many are fenced against deer. Some are large areas like Glenmore Forest and Gorteneorn but there are several small pockets of woodland. Impacts on some native woodlands may be high as discussed in 4.3. It is in the interests of deer stalking estates and of the deer themselves to safeguard these native woodlands and expand them to provide shelter for current and future deer populations.

Action 19: *Consider the provision of woodland shelter available for deer now and in the future. This is linked to the "native woodland" action in 4.3 and the "welfare" action in 4.14.*

This section is not in any way critical of those who cull deer out of season. Deer are culled out of season to reduce damage to agriculture and forestry. Out of season culling is entirely legitimate and currently necessary for many objectives to be achieved. However, it makes sense for estates who benefit from sport stalking to try and reduce the need for this cull as much as practically possible while respecting the rights of others to protect crops etc. There may be some scope for strategic deer fencing or for estates to target stags in the sporting cull which are most likely to damage crops out of season. Larger estates could for example, consider some sort of zoning policy when taking their sporting cull and target stags from areas where deer movement to agricultural or forestry land is likely.

Action 20: *Consider ways of minimising stag mortality from sources other than sport stalking.*

3.9 Roe deer management

Roe occur at low density in Ardnamurchan. They are present in many woodland areas but rarely occur on open ground. Density is such that they are rarely used as an economic resource but individual animals are occasionally culled. SNH records show an average of 5 roe are culled annually within Ardnamurchan. Roe may cause some local impacts to some areas of native woodland but there is no firm evidence for this. Grazing by red deer and sheep is likely to cause more significant impacts than roe.

DMG members do not think there are any issues concerning roe deer management within Ardnamurchan.

3.10 Wildfire

Ardnamurchan has suffered in the past from large scale wildfires. In 2003 over 3500 hectares burned in one fire. Wildfire can have very damaging impacts on habitats and can reduce the amount of vegetation deer can eat. A large wildfire has the effect of significantly increasing deer density on unburnt habitats. In the event of any future large scale wildfire the impacts on the deer population should be carefully considered.

4.0 Public Interest Actions

4.1 Development of mechanisms to manage deer

These actions are developed throughout the plan. A complete list of Actions is presented in the Executive Summary on page 2.

4.2 Delivery of designated features into Favourable Condition.

There are a number of designated sites within the Ardnamurchan Peninsula. Some are in Unfavourable Condition due to over grazing by sheep and/ or deer (see SNH Sitelink). The steps to progress each site to Favourable Condition are discussed below.

4.2.1 Kentra Bay and Moss SSSI

Kentra Bay and Moss SSSI lies on Shielbridge Estate and includes the woodlands at Arivegaig. It is designated for blanket bog, upland oak woodland, bryophyte, lichen, vascular plant assemblages and saltmarsh as well as some maritime features. It is assessed as being in Unfavourable Condition for the whole woodland feature, the whole moss feature, the saltmarsh and part of the lichen feature.

Over grazing is cited as a key threat to the site. The woodland is grazed by deer which use the area for winter shelter. It is also part of a crofting tenancy and is grazed by sheep. There are no common grazing rights within the woodland. Past discussions have focussed on fencing the entire wood which would exclude deer but would allow grazing levels to be manipulated through introducing known numbers of sheep. However, this would exclude deer from shelter and perhaps increase deer pressure on other designated features or crofts. The compensatory cull required to prevent excluded deer causing damage to other features would potentially reduce deer numbers below the population required to achieve estate objectives. Future management should consider a rotational fencing solution where part of the woodland is fenced and part left open to grazing animals for an agreed length of time. The estate, the crofter and SNH would need to agree how much of the wood is fenced, how much is left open and the levels of grazing which should occur within the open area of the woodland. Deer welfare should be considered whenever deer are excluded from significant parts of their range and some level of compensatory cull may be required under this approach.

An alternative approach would be to cull deer regularly using the woodland, while attempting to feed deer away from the wood through the provision of supplementary food.

Action 21: *Develop a management plan for the SSSI based on a rotational fencing plan which defines how much of the woodland is fenced, for how long, how many deer and sheep should be allowed to graze the unfenced area and what compensatory culls are required. Alternatively develop a management plan based on culling and supplementary feeding. Plan to be developed and agreed by end Feb 2017.*

The saltmarsh feature is also in Unfavourable Condition partly due to overgrazing. The Site Management Statement states that the saltmarsh turf is very heavily grazed by sheep and a few cattle. The impact of deer on the saltmarsh is currently unknown. Grazing levels on the saltmarsh need to be carefully managed. Grazing should be heavy enough to maintain a low sward height but light enough to allow saltmarsh plants to flower.

Action 22: *Estate and SNH to discuss how to manage grazing levels on the saltmarsh and agree a plan by the end of February 2017.*

4.2.2 Claish Moss and Kentra Moss SAC

Kentra Moss is designated as a blanket bog and for depressions in peat substrates. It is grazed by deer, sheep, some cattle and also by a small flock of Greenland white fronted geese which are present from November to January. Currently designated features are assessed as being Favourable Maintained. However, over grazing is cited as being a Feature Pressure. Several crofts graze sheep on the Moss and the pattern of grazing rights is complicated. There is some confusion as to who is responsible for what and this lack of control makes management decisions difficult. Claish Moss is part of the East Loch Shiel DMG and is not within ArdDMG.

There is a need to determine which herbivores are causing the most significant impacts. Once this has been determined, management can then be put in place to reduce the impacts caused by the most significant herbivores. A monitoring scheme to determine the impacts caused by different herbivores is set out in Appendix C.

Action 23: *Agree and implement a monitoring scheme to determine the impacts caused by different herbivores. Implementation to begin in Jan 2017.*

4.2.3 Sunart SSSI and SAC

The **Sunart SSSI and Sunart SAC** overlap significantly within the Ardnamurchan DMG. The designations jointly covers some 10000 hectares over much of the northern shore of Loch Sunart and seeks to protect both marine and terrestrial features. This SAC/SSSI is in multiple ownership and stretches beyond the boundaries of Ardnamurchan into neighbouring DMGs. In an effort to bring collective management to this large and ecologically complex site, neighbouring landowners formed the Sunart Oakwood's Initiative. The aims of the Initiative include public engagement and education but the key aim is habitat restoration. The Ardnamurchan DMG should engage regularly with the Sunart Oakwood's Initiative.

Action 24: *Ensure there is positive engagement between the ArdDMG and the Sunart Oakwood's Initiative (SOI) and that the SOI is invited to DMG meetings.*

Within the Sunart SSSI/SAC, designated marine and geological features are unaffected by deer. The status of the relevant designated terrestrial features are shown in Table 5 (copied from SNH Sitelink).

Table 5. Designated features in the Sunart SSSI and SAC.

Feature (SSSI)	Feature Category	Latest assessed condition	Summary Condition
Bryophyte assemblage	Non vascular plants	Unfavourable. No change	Unfavourable
Chequered skipper	Invertebrates	Favourable maintained	Favourable
Dragonfly assemblage	Invertebrates	Favourable maintained	Favourable
Lichen assemblage	Non vascular plants	Unfavourable. No change	Unfavourable
Moths	Invertebrates	Favourable maintained	Favourable
Upland assemblage	Upland habitat	Favourable maintained	Favourable
Upland oak woodland	Woodland	Unfavourable. No change	Unfavourable
Vascular plant assemblage	Vascular plants	Unfavourable. No change	Unfavourable

Feature (SAC)	Feature Category	Latest assessed condition	Summary Condition
Dry heath	Upland habitat	Unfavourable. No change	Unfavourable
Mixed woodland on base rich soils associated with rocky slopes	Woodland	Unfavourable declining	Unfavourable
Western acidic oak woodland	Woodland	Unfavourable. No change	Unfavourable
Wet heathland with cross leaved heath	Upland habitat	Unfavourable. No change	Unfavourable

Many parts of the Sunart SSSI/SAC are small woodland areas on the edge of stalking estates. Realistically these can only be protected by deer fencing. Most woodlands are currently deer fenced and deer numbers are maintained at low density. Most of these exclosures are fenced on three sides with the coastline unprotected by fencing. Deer will occasionally enter enclosures by swimming around the end of fences from other parts of Ardnamurchan. They are also likely to cross Loch Sunart from time to time and enter enclosures. This means rigorous deer control is required within fenced areas.

Action 25: *Ensure fenced woodland areas within the Sunart SAC/SSSI are regularly inspected for deer incursions each month and that, within those fences, deer densities are kept sufficiently low to allow natural regeneration of oak, ash and rowan to take place. Deer fences should be inspected bi-monthly and regularly maintained.*

Some of the woodland sections of the SSSI/SAC within the Ardnamurchan area are in good condition and are in sympathetic management e.g. woods managed by FCS and within the jointly owned RSPB Scotland/ Ardnamurchan Estates enclosure. Some woodland sections are currently unfenced and threatened by overgrazing and by invasive spread of rhododendron. The ash and oak dominated woodlands owned by Shielbridge Estate are in Unfavourable Condition due to over grazing and are heavily used by deer. Deer fencing the wood would provide a solution but the owners are concerned this would compromise deer welfare by removing valuable shelter in an area where there little alternative shelter. Options include:

- A combination of culling within the woodland and provision of supplementary feed to draw deer away from the site.
- A rotational fencing plan where a proportion of the wood is fenced for a period of time before deer are allowed back in again and a further area of woodland is fenced.

- Creating alternative shelter for deer in an area where they would not cause damaging impacts.

The owners would prefer to try the first option at least for a limited number of years while monitoring is carried out to see if impacts decrease.

Action 26: *SNH and Shielbridge Estate to agree the way forward from the options above for the portion of the Sunart SAC within Shielbridge ownership. Agreement on management actions should be reached by end Feb 2017.*

Invasive rhododendron is widespread in many woodlands within the Sunart SAC. In recent years estates and other parties have made strenuous efforts to reduce rhododendron. ArdDMG may provide a useful focus for discussion about collaborative rhododendron control.

Ben Hiant, at the western end of the Sunart SSSI/ SAC, has a range of designated heaths. These are grazed by sheep and deer. Surveys in 2016 suggest these have moved into Unfavourable Condition. In general, Ardnamurchan Estates have tried to maintain a low deer density on Ben Hiant by culling and also by diversionary feeding. There is a need to develop a plan to ensure levels of deer grazing are compatible with heathland designations.

Action 27: *Develop a plan to ensure deer densities on Ben Hiant are compatible with heathland designations. Plan to be developed by end Feb 2017.*

4.2.4 Ardnamurchan SSSI

Ardnamurchan SSSI is designated for geological features arising from ancient volcanic activity. These are unaffected by deer grazing or trampling.

4.2.5 Ardnamurchan Burns SAC

This site is designated for freshwater pearl mussels which are assessed as being Unfavourable Declining. The reason for the decline is not known but deer grazing and/ or trampling are not thought to threaten the pearl mussels.

4.3 Management of deer for retention of native woodland

The Native Woodland Survey of Scotland (NWSS) was carried out over the whole of Scotland between 2006-13 to establish the baseline condition of Scotland's native woods. All native woodlands of over 0.5 ha were surveyed and, within Ardnamurchan, the impacts caused by deer and sheep were assessed over some 1038ha. Results are summarised in Table 6 and shown on Map 2.

Table 6. The proportion of native woodland within each Herbivore Pressure Category from the NWSS.

Herbivore Pressure Category	Area of native woodland within category (ha)	Proportion of East Ardnamurchan native woodland within category
Low	75	7%
Medium	363	35%
High	164	16%

Very High	436	42%

High and Very High herbivore impacts include trampling, canopy fragmentation, heavy browsing and bark stripping. Woodlands are unlikely to regenerate under High or Very High impacts. The native woodland resource in Ardnamurchan is of high importance for biodiversity as well as being important for shelter, carbon storage, recreation and tourism. These results are therefore concerning.

Some areas of High and Very High impact are likely to be recovering and the results may record historically high impacts. For example, both High and Very High impacts were recorded in woodland owned by FCS and RSPB. These woodlands are securely fenced with sheep excluded and deer managed at low densities. Other areas may show Very High impacts from historical sheep grazing with sheep numbers now being much reduced.

However, there are clearly issues to be addressed in some woodlands. Currently only 42% of Ardnamurchan native woodlands are in the Low/ Medium impact class. The national target is for 60% of native woodlands to be in the Low/Medium impact class so some improvement is required. As the NWSS states, the Herbivore Impact Category is valuable as a general indication of impacts, but each woodland site needs to be assessed on its individual merits. It is beyond the scope of this deer management plan to do so at this stage. However, each estate should use NWSS results as illustrated on Map 2 to prepare a brief condition assessment of each woodland within the High or Very High impact categories and produce management proposals to improve condition or to justify current management. These management proposals need to be supported by regular monitoring of woodland condition which should be carried out in accordance with Wild Deer Best Practice Guidance (see below). Estates should explore Scottish Rural Development Programme (SRDP) funding for management of native woodlands in Ardnamurchan.

Action 28: *Each property with at least 0.5ha of native woodland within the High or Very High Impact categories will prepare condition assessments for those native woodlands and produce management proposals to improve condition or justify current management. Condition assessments and management proposals to be prepared by end Dec 2018.*

In addition to this, habitat monitoring in woodland would allow an assessment of deer impacts to be made. The following methodology can be used for assessing impacts in woodland:

<u>Plot based survey method</u>.

This methodology establishes circular plots with an area of 0.01 – 0.05 hectares marked by a central post whose coordinates are recorded using GPS. The circular plots are marked out by using string of length 5 – 12m from the central post. The number, size and location of plots is based on the area and the distribution of mature trees using the Nearest Neighbour Method for Quantifying Wildlife Damage to Trees in Woodland (Forestry Commission Practice Note).

In each plot record the following data are recorded:

- Number and species of seedlings/saplings that are less than 1.3m tall and/or less than 7cm in diameter at breast height)
- Number and species of all trees greater than 1.3m tall and/or greater than 7cm diameter at breast height
- Number of seedlings/saplings exhibiting deer damage
- Number of trees exhibiting deer damage

- Number of standing dead, fallen dead and tree stumps
- "Age Class" of all mature trees – i.e. young, mature, over mature, veteran. NB this is dependent on species, for example a 30-year-old silver birch would be mature, but a 30-year-old sessile oak would be classed as young.
- Number of seedlings/saplings frayed by deer
- Number of trees with bark stripped by deer

For each compartment:

- Calculate the frequency of leaders browsed for each species of seedling/sapling
- Calculate the frequency of other shoots browsed for each species of seedling/sapling
- Average the number of seedlings/saplings frayed per species per compartment
- Average the number of seedlings/saplings bark stripped by deer

Full guidance can be found at www.bestpracticeguides.org.uk/impacts/woodland.

Action 29: Dependent on the availability of funding the *Ardnamurchan DMG will monitor woodland condition following Best Practice guidelines and will adaptively manage woodland dependant on the outcome of these surveys.*

4.4 ArdDMGs commitment to Woodland Expansion

The Scottish Government has set a target of 25% for expansion of Woodland Cover. Currently 15% of Ardnamurchan is covered in woodland. In 2007, 17% of Scotland was covered in woodland so Ardnamurchan is marginally less afforested than Scotland as a whole. Probably the most important woodlands in Ardnamurchan are the Sunart Oakwoods which are found along much of the north shore of Loch Sunart. These woodlands are designated as SAC and SSSI and are in multiple private and public sector ownership including a significant landholding owned by FCS. There has been considerable cross boundary collaboration in their management including the use of strategic deer fencing and joint monitoring of herbivore impacts across boundaries.

Elsewhere there are commercial timber plantations at Glenmore, Gorteneorn and Glen Borrodale and smaller area of native woodland near Shielbridge, Arivegaig and the north of Ardnamurchan Estate. Some 90 hectares of new native woodland has been planted in recent years at Laga.

The extent of woodland created with public funding since 1991 within Ardnamurchan is shown in Table 7.

Table 7. Woodland created in Ardnamurchan with public funding since 1991.

Time period	Woodland Creation Scheme	Area of woodland established (ha)
1991-92	WGS 1	6
1993-94	WGS 2	2658

1995-2004	WGS 3	1174
2005-06	SFGS	184
2007-13	SRDP	109
Total 1991-2013	**All schemes**	**4131 ha**

Between 1991-2013 some 4131ha of new woodland have been created in Ardnamurchan and ArdDMG members have shown a considerable historic commitment to woodland expansion. Current management includes protecting regenerating native woodland e.g. within the Sunart Oakwoods and the new native woodland planting at Laga. There is an aspiration to protect and expand areas of native woodland on Shielbridge. Ardnamurchan Estates wish to plant some new woodland blocks. The proposal is to create 392ha of native broad leaved woodland and 300ha of new commercial timber. Many estates feel the new SRDP grant regime is favourable to planting productive timber species but is unfavourable to native woodland expansion. However, some estates feel they have sufficient commercial timber already planted and that further expansion would compromise other land uses. Planting plans for commercial timber on those estates are currently limited to re-stocks. Other estates feel their ground is too remote to allow extraction of a harvested crop at a profit so planting does not make commercial sense. Collectively, ArdDMG members plan a modest expansion of woodland on Ardnamurchan over the next few years.

4.5 Monitoring & management of deer impacts in the wider countryside.

It is important that the Ardnamurchan DMG monitor the impact of deer out-with designated sites to ensure deer are not having a detrimental effect on land management objectives. The DMG's policy for monitoring deer populations is outlined in 2.10. In line with the ArdDMG's commitment to managing designated sites, each member will also ensure that Habitat Impact Assessments are conducted in the wider countryside following Best Practice guidelines. The combination of monitoring both the deer population and the habitat will ensure that ArdDMG can adaptively manage the area and will ensure that deer do not have an adverse effect on the landscape.

4.6 Actions to improve Scotland's ability to store carbon.

Climate change is one of the biggest global threats to biodiversity. The Scottish Government has set targets to reduce the amount of carbon released into the atmosphere, and also to find measures to increase carbon sequestration. On a national scale there are many measures which can be taken in relation to carbon storage, however the most pertinent to Ardnamurchan DMG, is the ability of peatlands to store carbon.

Peat deposition occurs in cool, wet climates where plant growth is faster than the rate of decomposition. The difference in the rate of growth and decomposition results in peat being deposited, and the carbon from organic matter being sequestered within the peat. Since the end of the last Ice Age, approximately 10,000 - 12,000 years ago, peat bogs in the UK have sequestered in the region of 5.5 billion tonnes of atmospheric carbon (Joint Nature Conservation Committee webpage). This figure is equivalent to the amount of industrial emissions released over a 20-year period (*National Trust*).

In terms of carbon richness, much of Ardnamurchan's soil is classified as" organo minerals with peat" (*Bruneau & Johnson, 2014*). The areas around Kentra Moss are classified are peat soils (www.soils-scotland.gov.uk). The classification of organo mineral with peat indicates it is a high carbon storage peat soil, which is likely to reach an upper storage limit marginally below the 1200 tonnes of carbon per hectare of deep peat, but substantially above that of other soils (*ECOSSE report, Scottish Executive 2007*). In addition to this, peat soils are likely to be close to 1200 tonnes of carbon per hectare storage capacity.

The carbon storage capacity of peat is affected by peat erosion and degradation from inappropriate burning, grazing, peat extraction and drainage practices. These not only release the carbon already stored, but also reduce the soils ability to sequester atmospheric carbon. The inability of peat to perform its function has huge implications for climate change, due to its capacity to store large amounts of carbon worldwide.

Within a carbon storage context, Ardnamurchan DMG will aim to maintain the overall integrity of the peatlands by limiting degradation and erosion, and by maintaining vegetation cover. Where peat degradation has already occurred, the DMG will aim to reinstate peatland function and biodiversity. In particular, Shielbridge estate will organise for grazing pressure to be assessed and monitored at Kentra Moss and Claish Moss and a management plan will be formulated in response to this assessment. Assessment and monitoring guidelines for Kentra can be found in Appendix C.

Blanket bog is defined by peat depth, with true peat being classified as having a depth of 0.5m or more (Scottish Government guidance on developments on Peatlands*).* Habitat maps and soil maps can be used as a baseline for assessing peat coverage. Blanket bog coverage within the Ardnamurchan DMG is available from SNH, and soil maps are available from the James Hutton Institute.

Action 30: *Members will be encouraged to identify broad areas of Blanket bog and to monitor impacts on Blanket bog using habitat impact assessments.*

It is then necessary to determine the extent of peatland degradation, and to map this at an appropriate scale, which will allow management decisions to be made at a landscape level. Where available, aerial photos may allow areas of severe degradation to be identified.

In order to standardise peat condition assessment, and taking into consideration the likely inexperience of employees, a simple and easily repeatable method of assessing peat should be used. In simple terms, peat degradation can be classified into the following five broad categories: active, degraded, bare, archaic and wasted/lost (as defined by Lindsay & Immirzi, 1996). Full category descriptions are available from http://www.snh.gov.uk/docs/A1916874.pdf . Due to the large areas requiring assessment, the DMG will use a rapid assessment methodology, consisting of a walk over survey. This will grade the peat into the above categories and will record and map the outer boundaries of each area using a GPS. Funding for mapping and assessing peatland can be sought from the Agri-Environment Climate Scheme (ScotGov).

Action 31: *Members will be encouraged to identify and map the location, extent and condition of degraded peat*

Action 32: *The DMG will consider accessing the Peatland Restoration Fund to help fund mapping peatland and assessing peatland condition*

Where areas of active peat (solid peat with a full coverage of vegetation) is identified, the DMG will ensure that future damage is limited by; reducing grazing levels where poaching or overgrazing is identified and avoiding burning on areas of blanket bog. Where necessary, the DMG will also use low impact vehicles to access the site, and ensure peat extraction and drainage of peatlands does not increase.

Action 33: *Avoid burning on areas of peatland as outlined in the Muirburn Code (www.gov.scot/publications/2011/08/09/125203/0).*

Action 34: *Ensure that deer grazing regimes and deer densities allow for maintenance of peat integrity.*

Action 35: *Where possible, only access peatland with vehicles which have low ground pressure.*

In areas of degraded or bare peat, and where restoration is a viable option, clear aims and realistic timescales for work must be outlined. If possible these should link areas of bog together. Where overgrazing has been identified but there is little damage to the underlying peat, a reduction in livestock would serve to protect the peat. However, where restoration is required, the removal of livestock alone is likely to take many years and may not be successful and other techniques will likely need to be used (Littlewood *et. al*., 2010). In broad terms these techniques are:

- Gully blocking
- Re-profiling
- Re-vegetation of bare peat

It is worth noting that although peatland restoration best practice is currently being updated, technical guidance on peat restoration can be sought from the Yorkshire Peatland Partnership (Pilot UK Peatland Code) and Moors for the Future. The James Hutton Institute is also currently developing a tool which will enable the identification of the most appropriate areas for restorative action, and those which would benefit most from peat restoration (Scotland's National Peat Plan).

4.7 Management of non-native invasive species.

This plan will not encompass all non-native species in Ardnamurchan but will cover non-native deer, goats and feral pigs.

4.7.1 Sika

Sika were introduced to Scotland in the 1890s as a decorative species. They spread from numerous introduction sites and now cover about one third of the Scottish red deer range. They were not thought to occur as a breeding species in Ardnamurchan until recently and no sika have been culled in the last 10 years. However, there is now evidence they occur in the Gorteneorn plantation and a young stag was seen recently in Glen Borrodale. The Gorteneorn population is thought to number a few tens of animals but both sexes are present. Gorteneorn is owned by Ardnamurchan Estates and their policy is to reduce this population to zero through in season culling. There is no desire to see sika establish or to use the species as a resource.

Action 36: *The Ardnamurchan DMG will resist sika colonisation by culling all animals whenever it is possible to do so and within legal constraints on culling.*

4.7.2 Fallow

Glen More forest contains a population of fallow deer which have been free-living for over a decade. There are thought to be 90-130 free-living fallow on Ardnamurchan. These are occasionally culled but are thought to be largely self-regulating and have not spread from Glen More.

Action 37: *The Ardnamurchan DMG will resist further spread of fallow deer if this occurs. The population within Glen More forest will continue to be managed through culling as required to prevent range expansion.*

4.7.3 Feral pigs

Feral pigs have occurred in Lochaber for about 10 years. These animals are often described as being wild boar which implies they have been re-introduced as a former native species. However, any such official re-introduction would involve a widespread public consultation and a programme approved by Scottish Government.

Feral pigs are now being sighted over a wide area around Fort William and the Great Glen. They have not been recorded in Ardnamurchan and estates will resist any spread into the peninsula by culling any animals encountered whenever opportunity allows.

Action 38: *Estates to continue to resist colonisation by feral pigs by culling all observed individuals where possible.*

4.7.4 Feral Goats

Feral goats are reasonably widespread in the Scottish Highlands although populations are often small and localised. Some populations were established after livestock was abandoned during the Highland Clearances. Perhaps because of this historic link, many communities in the Highlands feel an emotional attachment to their feral goat populations and do not wish to see them eradicated. Ardnamurchan Estates have recently established a population of 40 goats within an enclosure at Glen Borrodale. These are kept for culling by trophy hunters and they have a high economic value. Some have escaped and have appeared on neighbouring properties. Highland feral goat populations typically experience high juvenile mortality and slow population growth. Stalkers report frequent predation by eagles on Ardnamurchan. Populations are often self-regulating or require minimal culling so it is unlikely that the escaped population will show rapid population growth. AE argue that there is little risk of an escaped population expanding rapidly and individuals should be protected because of their high economic value. However, goats are likely to have negative impacts on Ardnamurchan's important native woodlands. Escaped goats should be culled or re-captured and it is highly desirable that goats in Glen Borrodale should be kept within secure enclosures

Action 39: *Cull or re-capture any free living goats where they conflict with land management objectives.*

4.8 Protection of historic and cultural features

Ardnamurchan has been settled by man for many thousands of years. There are likely to be numerous features and sites which have historic and cultural significance. Light grazing can help conserve archaeological features as it may keep them visible and prevent them being lost amidst growing vegetation. Estates are not currently aware of any historic or cultural features being damaged by deer or sheep grazing. If concerns about damage to features are raised, the DMG will undertake to consider those concerns and address issues if possible. The DMG will contact the Highland Council Archaeologist to see if HC have any concerns and invite local Archaeology Groups to attend meetings or communicate any concerns.

Action 40: *Be open to communication with regards to concerns of deer damage to historic and cultural features. DMG to contact the Highland Council Archaeologist to see if HC have any concerns by end Dec 2016. Encourage local Archaeology Groups to attend meetings or communicate any concerns.*

4.9 Delivering high standards of competence in deer management.

Of 9 stalkers who shoot deer unsupervised within ArdDMG, 6 have DSC 1 and 5 have DSC 2 (with 1 unknown). There is already a high level of competence as defined by the deer sector. All stalkers who shoot deer unsupervised will aim to achieve DSC 1 by end 2016 and all stalkers will be encouraged to attain DSC2 by end 2017.

Deer managers in ArdDMG have many skills and qualifications and there is a strong commitment to Wild Deer Best Practice within the Group. A full training policy is provided in 2.9.

Action 7: *All stalkers who shoot deer unsupervised to attain DSC 1 by end 2016 and all stalkers to be encouraged to attain DSC 2 by end 2017.*

Identify training needs within the DMG and organise training courses where necessary. Consider inviting other rural workers to participate in training courses where possible.

4.10 Contributing to public health and well-being

Deer contribute to public health and well-being in ways which are both positive and negative although often their contribution is relatively small. Deer are regularly voted as one of Scotland's favourite wild animals by the public. As such they contribute to public well-being by being a relatively accessible, visible and often exciting part of the natural world which many people can enjoy. Deer stalking is a healthy outdoor activity which can involve variable levels of exercise. In common with many outdoor recreational activities, it contributes to public health to some degree. Access to the hills for outdoor activities is an important contributor to public health and well-being. Ardnamurchan attracts some hill walkers and other outdoor enthusiasts as its on the door step of Fort William which is a centre for outdoor recreation. There are no high hills but lower level walks to access beaches are popular. However, there are few data on the numbers of people who access Ardnamurchan. Despite the popularity of the area, estates report little conflict between access and deer management with most walkers sticking to defined paths.

ArdDMG members recognise the importance of outdoor recreation to the area as a whole and have a welcoming attitude to walkers. There are a number of popular walks on Ardnamurchan. Ben Hiant and Ben Laga are regularly climbed and the beaches on the northern shores of Ardnamurchan and at the western point are popular. Visiting these beaches can involve a lengthy walk over hill and moorland. There is very little conflict between access and deer stalking and current informal systems for managing access work well. Where there is a lack of conflict there is little need to devote scarce resources to formalising the management of access in relation to stalking.

Venison is a lean and healthy source of protein which can contribute towards a healthy, balanced diet. Venison is increasingly popular and accessible as a regular part of the UK diet. As such, the supply of venison to the local community can be seen to contribute to improving public health.

Ardnamurchan Estates currently supply Ardnamurchan shops and hotels with venison. Members of ArdDMG will ensure there is supply of venison available for local purchase.

Action 41: *Ensure a continued supply of venison is available for local sales.*

4.10.1 Deer Vehicle Collisions

Deer collisions with vehicles are an obvious risk to public health. There are few reports of deer vehicle collisions within Ardnamurchan with only one being reported in 2015. Deer do regularly move across roads in a few localities e.g. regular daily movements across the B8007 between hill and shoreline. There is therefore potential for deer vehicle collisions but slow driver speeds largely act to prevent accidents. Local communities should be encouraged to report deer vehicle collisions to the DMG and the DMG should address any concerns raised. The DMG should consider the risk of deer vehicle collisions when making management decisions e.g. when siting new deer fences.

Action 42: *Be open to communication regarding deer vehicle collisions.*

4.10.2 Lyme disease

Lyme disease is a bacterial infection passed to humans from infected ticks. Deer play a peripheral role in Lyme disease transmission as they act as a host for ticks and can spread ticks across big areas. However, there is no evidence that deer control reduces Lyme disease. All countryside users should be made aware of ticks and the risks of Lyme disease. The public should be aware of early symptoms of Lyme disease so they can seek medical attention at an early stage of infection. DMGs have a very small role in raising public awareness about Lyme disease. However, deer stalkers and their guests are very prone to tick bites as they may work in tick infested areas and spend time crawling through vegetation while they attempt to approach deer. Stalking guests who may be new to the area or to the UK should be made aware of the risks and symptoms. Estate First Aid kits should include tick removers.

Action 43: *Ensure estate guests are aware of the risks and symptoms of Lyme disease. Ensure First Aid kits include tick removers.*

4.11 Maximising the economic benefits of deer management

Deer stalking in Scotland is currently very popular. Demand is high for deer stalking at all cost levels e.g. from a week's stag stalking for a large group with accommodation which may cost a five figure sum, or for a morning stalking roe does which might cost £50. Demand is both international and domestic. This popularity means deer stalking can play an important role in generating economic activity particularly in the remoter parts of Scotland such as Ardnamurchan.

Ardnamurchan Estates (AE) have a commercial approach to deer management. All culled stags and hinds are taken by paying guests. Stags are graded by trophy quality and guests are charged differing amounts depending on the size of trophy. In addition to stalking on Ardnamurchan, a number of other estates out-with the peninsula are leased for additional stalking under the banner of West Highland Hunting. Guests stay in a variety of accommodation within Ardnamurchan, with a range of standards available. Guests are almost all international with the main market being Continental Europe and the USA. In 2015 some 197 high value guests hunted with West Highland

Hunting based in Ardnamurchan and the value of sport stalking within AE is considerable. This business supports two full time stalkers and five seasonal contractors on Ardnamurchan. There is also one student and a Conservation Officer employed on AE. The agreement between AE and the crofting townships at the west end of the peninsula means that deer, that were formerly regarded as a pest damaging crofting objectives, are now viewed by many crofters as an economic asset. AE buy stags from crofters and one crofter makes part of his living from guiding guests. This is an innovative arrangement which may have wider application across other crofting areas.

Deer management in Ardnamurchan is less commercial on some other estates. Shielbridge has occasional let days, but the majority of stalking is by family and friends and by local enthusiasts. This is also the case across a number of smaller properties on Ardnamurchan. However, the enjoyment of deer stalking provides some of the incentive to support two part-time jobs with wages being spent in the local economy. While the friends and families of owners may not pay fees directly to estates, they will spend money locally. There is a clear argument that deer stalking attracts visitors and contributes to overall tourist spend. Although it is hard to quantify the sums involved, deer will contribute to the range of features which attract tourists to stay in guest houses and hotels and spend money in local shops.

Deer are consistently voted as one of Scotland's most popular animals and are seen as an icon of Highland Scotland. As such the general ease of visibility of deer is one element that attracts tourists to remoter parts of Scotland and Ardnamurchan is well known as a place where deer can be easily seen. Ardnamurchan Estates have an access agreement with Wild Highland Tours www.wildhighlandtours.co.uk , a local eco-tourism business. This business attracts AE stalking guests and the wider public, with deer- viewing a popular and important part of this business. AE keep a small population of hinds undisturbed in an accessible location. In October, visitors can experience the spectacle of rutting stags attracted by these hinds.

There may be scope for further ecotourism activities based around deer although it is likely commercial operators will be limited by the general accessibility and visibility of deer. People will pay for interpretation e.g. of deer management and also deer based photography does have a commercial value. However, experience suggests the market is probably limited and much smaller than the deer stalking market.

Action 44: *Maintain existing commercial deer related activities other than deer stalking and consider establishing new ones. These might include deer viewing, photography etc.*

4.12 Minimising the economic costs of deer.

It is often argued that the costs and benefits of deer management are distributed in a way that is inequitable. Those that incur costs sometimes do not share benefits. Those members of ArdDMG who do benefit from deer undertake to minimise the costs caused by deer to others, where it is reasonable to do so.

There are a number of properties in Ardnamurchan who may view deer management as a cost. Laga is almost entirely planted with new native woodland and deer are excluded from the planted area. The owners cull deer that break into the planted area and try to minimise external pressure on their deer fence. The owners of Laga cull some deer for home consumption but gain few other benefits. However, they respect that deer are a natural feature of Ardnamurchan and that they have to be managed. Management costs are accepted and not thought to be excessive. This is true also of RSPB Scotland who own the Glen Borrodale Reserve.

FCS manage deer at a cost. Deer management within the Ardnamurchan DMG helps support a full time ranger who covers a much wider area than Ardnamurchan. Nationally, FCS has reduced their deer management costs over recent years through the use of stalking leases and contractors rather than full time staff. However, FCS deer management costs remain high and a very significant part of this total cost is the cost of fencing. It is believed that deer fences around FCS properties in the ArdDMG are jointly maintained by FCS and neighbours i.e. those that seek to benefit from deer, pay a share of the cost for protecting the crops of others.

Another group of people who may incur costs associated with deer are the crofting community. Deer may damage crops or restrict the crops that can be grown. Most importantly, deer compete for grazing with livestock. Crofters have the right to protect their crops and grazing by shooting deer and some exercise this right, which may give some compensation for damage. The agreement between AE and some crofters at the west end of the peninsula has turned deer from a cost into an economic asset. There may be scope for such agreements being adopted elsewhere. ArdDMG will invite crofting and Grazing Committee representatives to DMG meetings and will try to find solutions to concerns that they raise.

Action 45: *Ensure crofting and Grazing Committee representatives are invited to become members of ArdDMG and that any concerns they may have are fully discussed.*

4.13 Effective communication on deer management issues

The Constitution of ArdDMG will ensure meetings involve a wide range of interests (Appendix A). A communications policy for the ArdDMG is shown in 2.7. ArdDMG will develop an open and inclusive communications culture both within the DMG and between the DMG and outside interests. The Group will make various documents e.g. DMG Minutes available to the public through the ArdDMG website.

A draft of this deer management plan was circulated for public consultation. Direct consultees included Community Councils, Highland Councillors and HC staff, Highland MSPs, Members of the Rural Affairs and Climate Change Committee (Scottish Parliament), MP, SNH, Transport Scotland, Environment LINK, outdoor access organisations and a range of Lochaber contacts. The link was also sent to the West Highland Free Press and the Oban Times. The covering email encouraged all to send the link to the draft plan on to anyone who may have had an interest. This should have reached a wide audience and ensured a genuine consultation.

Action 6: *Carry out actions within the Communications Policy.*

4.14 Safeguarding Deer Welfare

Safeguarding deer welfare is a strategic objective of the DMG. In simple terms this means that deer should not be made to suffer as a result of management activities. It does not mean that there should be no natural mortality as some is inevitable and indeed, natural, in hard winters. Deer welfare can be safeguarded in a practical sense by maintaining deer numbers in balance with the habitat and by providing adequate shelter for the deer population in times of severe weather. The importance of deer having access to woodland for shelter cannot be overstated in this regard. Currently extensive areas of woodland on Ardnamurchan provide shelter for deer e.g. Glenmore and Gorteneorn. Deer welfare can also be safeguarded by ensuring they are humanely culled by competent people and that deer vehicle collisions and levels of poaching are minimised.

Members of ArdDMG undertake to consider deer welfare when planning management activities. For example, if there are plans for any new deer fencing then the implications of fence lines for deer welfare will be considered. Levels of training and competence within the DMG are considered to be compatible with maintaining a high standard of deer welfare. Members currently have few concerns about deer welfare and think welfare is being safeguarded. Members agree to continue to keep deer welfare under review.

Action 46: *Consider deer welfare issues at each meeting and consider the implications for deer welfare when taking management decisions.*

4.14.1 Chronic Wasting Disease

Chronic Wasting Disease is a highly infectious disease of deer, present in North America, which has so far proved 100% fatal to deer. It is not thought to affect humans. Two cases have recently been identified in Scandinavia. The arrival of CWD in the UK could be devastating to deer. It is thought that the most likely transmission route is via hunters from infected areas bringing the disease into the UK on clothing or equipment. This situation is analogous to the potential risk of *Gyrodactylus* spreading to salmon rivers in Scotland from Scandinavia. Some Fishery Boards have introduced a Declaration form which all visitors must sign before they can fish in the river. This process raises awareness of the issue amongst visitors and seeks to modify behaviour so as to improve bio-security. It should be noted that Ardnamurchan Estates have already taken stringent measures to ensure their American guests do not inadvertently bring disease into Scotland. Some estates feel that the risk of walkers bringing CWD into the UK should also be risk assessed.

Action 47: *Estates within the DMG should consider asking visiting stalkers from North America and Scandinavia to sign the draft declaration in Appendix B.*

5.0 Appendix A

Ardnamurchan DMG Constitution

Name

The Group name shall be the Ardnamurchan Deer Management Group (ArdDMG).

Objectives

The Group's objective is to promote the sustainable management of deer in the ArdDMG area in accordance with the ArdDMG Deer Management Plan.

Group Area

The geographic area covered by the ArdDMG is as depicted on the attached map (Map 1). The boundary may be open to amendment should the Group so decide.

Membership

The Members of ArdDMG will be the owners of land within the Group area or their authorised representatives. For the avoidance of doubt private, public sector, voluntary body or corporate land owners are entitled to be members of the Group.

Representatives from relevant public bodies, NGOs and local bodies may be invited to attend meetings of the Group.

Members' obligations

Members agree to support the effective running of the Group by:

- Attending or being represented at all DMG meetings.
- Paying an annual subscription to the ArdDMG at such rates as may be agreed.
- Collaborating with other Members and other relevant interests as set out in the ADMG Principles of Collaboration.
- Advising the Group of any relevant changes in terms of ownership or land management in respect of their individual landholdings.
- Carrying out deer management in accordance with all relevant legislation, the SNH Code of Practice for Deer Management and Wild Deer Best Practice.

Office Bearers

Office bearers will comprise Chair and, if required, Vice Chair, who shall be elected annually at the Group AGM. Re-election on a rolling basis is permitted with no restriction on the period of time that an office bearer may serve.

The administrative positions of Secretary and Treasurer (which may be combined) and external Auditor are appointed positions and such appointments and any terms of employment shall be for approval annually at the Group AGM.

Meetings

- The Group will meet twice annually or more frequently as may be necessary.
- The Secretary will prepare an Agenda in advance of meetings and take a Minute of all meetings and circulate copies to all Members.
- An Annual General (AGM) meeting shall be held at such a place, date and hour as the Group shall decide. Advance notice will be given to Members not less than 28 days in advance of the AGM.
- A voting majority shall be defined as two thirds of the full Membership of the Group.

Funding and Financial Arrangements

The Group will be self financing and the subscription will be set annually at the AGM. The basis of subscription calculation shall be agreed by the Group and approved by members at an AGM. Subscriptions will be set a rate sufficient to cover all the operating expenses of the Group. Subscriptions will be payable at a date to be determined by the Group.

The Treasurer will operate a Bank Account for the Group and all financial transactions will be made on this account. Joint signatures of the Treasurer and Chair will be required on all cheques or debits drawn on the account in excess of £500.

A financial Statement will be prepared by an Auditor appointed by the Group and presented at the AGM for approval by Members. In the event of funds being left upon the winding up of the Group the disbursement of these funds will be determined by the Members.

Conflict resolution

It shall be the duty of all Members to seek agreement in respect of Group objectives and, where a dispute arises between Members, to resolve such dispute by negotiation and compromise. When agreement cannot be reached it shall be in the option of the Chairman to refer the matter to arbitration by the Chairman of the Association of Deer Management Groups or such other independent expert as the parties may agree.

Membership information, records and data

Storage of membership information will be the responsibility of the Secretary, such information to be used solely for the administration of the Group and stored in accordance with the law.

The Group shall determine such deer management and related data as will be required to fulfil the objectives of the ArdDMG.

6.0 Appendix B

Declaration by Hunter

Chronic wasting disease (CWD) is a highly infectious disease which has had devastating effects on many populations of deer. Scottish red deer are susceptible. CWD only affects deer and until recently CWD was thought to be restricted to the United States of America and Canada. Two recent cases have now been identified in Scandinavia.

CWD is caused by a prion and belongs to the same group of diseases as 'mad cow disease' (bovine spongiform encephalopathy or 'BSE'). This group of diseases are known collectively as 'transmissible spongiform encephalopathies' or 'TSE' for short. CWD is the most infectious of these. The prion is transmitted in deer body fluids and body parts including urine, faeces and in meat. The prion can remain infectious for up to ten years when bound to soil, several years on stainless steel and it defies normal farm disinfection processes.

CWD has resulted in the death of every known infected deer. There are currently no treatments or vaccines available to control the disease and efforts to control the spread of CWD in the USA/Canada have so far failed. If it were to become established in wild deer in the UK it would be likely have the following major consequences:

- Loss of large numbers of the wild deer population
- Restrictions on sales of venison and live deer
- Restrictions on stalking activities

If the disease became established, stopping its spread might be practically impossible.

A possible (likely) route of transmission into the UK could be through hunters or stalkers bringing in contaminated clothing and equipment from North America or Scandinavia. We therefore ask you to make the following declaration:

I declare that, to the best of my knowledge, none of my equipment, clothing or footwear has been in contact with an animal infected or likely to have been infected with CWD.

Signed……..

Print name……

Date……...

I declare that my equipment, clothing and footwear has been meticulously cleaned of all adherent debris or dirt.

Or

I declare that my equipment, clothing and footwear is bought in the UK and has not been worn in North America or Scandinavia.

Signed……..

Print name……...

Date……..

7.0 Appendix C

Kentra Bay and Moss SSSI Monitoring Scheme

Kentra Bay and Moss is designated as an SSSI with designated features which include blanket bog. Kentra Moss and neighbouring Claish Moss are low lying, oceanic areas of blanket bog which cover a combined area of almost 1019 hectares. They are currently in unfavourable condition and monitoring is required to determine the cause of impacts. These bogs are good examples of the relatively rare habitat, 'eccentric' mire which is characterised by being highly patterned and species rich. Kentra Moss and Claish Moss are known to have 14 species of *Sphagnum* and many other important plant species such as white beak-sedge (*Rhynchospora alba*), round leaved-sundew (*Drosera rotundifolia*) and brown beak-sedge (*Rhynchospora fusca*).

A combination of red deer, geese, sheep and cattle all graze the bogs during the course of the year and due to this, the site is being overgrazed and degraded. Several crofters graze animals on the Moss and there is general disagreement over which specific species is causing damage and in turn, which grazier is responsible for the management of the site. As it is likely that each species is contributing to both the grazing pressure and trampling pressure, it is likely that all parties will be required to modify management in order to benefit the area as a whole.

In order to progress management of the bogs, Shielbridge Estates will facilitate the implementation of a simple monitoring program in order to assess the density and grazing impacts of the four species outlined above.

Establishing the relative grazing activity and impact of four species on the same site is complex.

As a first step, Ardnamurchan DMG will collate sheep and cattle stocking dates and numbers from the relevant parties. Running concurrently with this, Shielbridge Estate will summarise seasonal deer movements onto and off Kentra Moss i.e. they will indicate which months and times of day that deer utilise Kentra Moss. This information will allow habitat impact assessments to be carried out during the most appropriate times of year. It is suggested that this data is recorded in weekly block. The following table is an example of how this might be recorded:

Date (week starting)	Observer	Site Name	Day or Night	Deer present or absent	Estimated number of deer

Action 48: *Ardnamurchan DMG to collate current sheep, cattle and deer movement data.*

Action 49: *Shielbridge Estate to summarise deer movement on to and off Kentra Moss.*

Following this, a simple experiment will be set up to assess the number of deer accessing the sites during times of deer usage (as outlined in the previous step). This experiment will be conducted by an independent party. The assessment of deer usage will be achieved by setting up a study exclosure area on the moss. This will be a 100m x 100m, stock fenced exclosure which allows deer in but restricts access for sheep and cattle. Within this area, dung plots will be set up following Best Practice guidelines (http://www.bestpracticeguides.org.uk/planning/dung-counting). These will be

established as geographically 'fixed' plots which will initially be cleared of dung. After 10 weeks a standardised area around the point will then be assessed for dung. This method will allow an estimated density of deer to be calculated for the moss during times when deer are known to access the site. It should be noted that an exclosure is required as previous studies by SNH have shown that experienced surveyors cannot consistently correctly distinguish between deer and sheep dung. This exclosure must be large enough that deer are not discouraged from entering the study area.

Action 50: *Relevant parties will source an independent body to conduct deer density estimates from dung plots.*

Using the data collected on sheep and cattle numbers and the calculated deer density, the overall annual stocking density will be calculated. Research suggests that blanket bog can sustain the equivalent of around 0.4 sheep per hectare (IUCN, 2014). This equates to 0.048 livestock units per hectare. Above this level trampling is likely to become an issue and the bog cannot produce enough dry matter to successfully feed the stock without incurring damage to the habitat. It should be noted that at this stocking rate the habitat should remain in the same condition but an improvement in habitat quality will not be seen. In order to improve the habitat, the stocking rate would need to be lower. On Kentra Moss, a stocking rate of 0.048 LU/ha relates to 61.14 livestock units (LU) in total. SAC suggests that each red deer equates to 0.25LU, sheep 0.12LU and 2 year-old cows 0.8LU (SAC, 2007). Across a year an overall stocking rate of 0.048 LU/ha can be achieved in more than one way. For example, where sheep are the only grazing units it could amount to 407 sheep out all year or 814 sheep out for 6 months. However, it should be noted that as blanket bog is particularly sensitive to damage from trampling in winter, the maximum winter stocking density must not exceed the overall average stocking density i.e. 0.048LU/ha (SAC, 2007).

Action 51: *Current annual and seasonal stocking rates will be established in order to assess the likely impact the current stocking (livestock and wild deer combined) regime is having on the habitat and at which point these may need modified.*

In conjunction with this, a second study area will be established with the aim of assessing the habitat impact of red deer versus the combined habitat impact of sheep, cattle and deer. The second study area will not be fenced and as with the first enclosure, will cover 100m x 100m with corners marked using small stakes. To simplify the data collection, geese will not be monitored at this stage but will be monitored at a later time. In order to simplify the assessment, the same method as the broader habitat monitoring will be used. Full guidelines can be found at http://www.bestpracticeguides.org.uk/impacts/principles and a description of the methodology can be found in 3.5. Given the scale of the problem at Kentra Moss, it is suggested that 10 plots are established in each of the two study sites. Although this number of plots will not be rigorous enough for scientifically purposes, it will allow a basic assessment to be made.

Action 52: *Habitat impact assessments will be conducted on two study plots to compare impacts in the presence and absence of livestock.*

Finally, the grazing impact of geese will be assessed using the methods tested by Van Gils (http://pure.ilvo.vlaanderen.be/portal/files/965404/5120_Van_Gils_final_Pure2.pdf). This method relies on goose dropping being counted in an unfenced area and is used to calculate the number of 'goose days' of grazing which have occurred. This can be used for geese as goose dung is easily identifiable from deer, cattle or sheep dung.

8.0 Appendix D

Example of a simple deer population model

	A	B	C	D
1		**Stags**	**Hinds**	**Calves**
2	**Count (late winter or spring)**	1000	1000	300
3	**Mortality (late spring)**	10	10	30
4	**Population post mortality**	990	990	270
5	**Recruitment %**			35
6	**Population adjusted for recruitment count**	990	990	346.5
7	**Adult pop in July**	1163.25	1163.25	
8	**Target population**	1000	1000	300
9	**Cull target**	163.25	163.25	

Formulas entered into Excel to calculate the above results

	A	B	C	D
1		**Stags**	**Hinds**	**Calves**
2	**Count (late winter or spring)**	1000	1000	300
3	**Mortality (late spring)**	10	10	30
4	**Population post mortality**	= B2-B3	= C2-C3	= D2-D3
5	**Recruitment %**			35
6	**Population adjusted for recruitment count**	= B4	= C4	= C4*(D5/100)
7	**Adult pop in July**	= B6+(D6/2)	= C6+(D6/2)	
8	**Target population**	1000	1000	300
9	**Cull target**	= B7-B8	= C7-C8	