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Native woodlands inside and outside the main red deer range in Scotland

Introduction

The Native Woodland Survey of Scotland (NWSS) published in 2014 gave an up-to-date account of the status of native woodland areas throughout the country. At the time, the headline message was that herbivore impacts were the greatest threat to these woodlands, and red deer numbers in particular needed to be addressed. Since then, the ongoing deer management planning process has shown that the herbivore impacts in many deer management group areas are actually relatively low, and provisional analysis by Scottish Natural Heritage (SNH) has also shown this to be the case at a national level as well as within much of the main deer range. There are of course exceptions to this.

This paper analyses herbivore impacts within the recognised red deer range in Scotland and compares them with the rest of the country. It also looks at the other issues which result in 'unsatisfactory' condition, namely invasive species, non-native tree species, and poor canopy cover, in order to place herbivore impacts in a wider overall context.

The Scottish Government policy paper, *Wild Deer: A National Approach*, requires that 60% of all native woodlands outwith designated sites are in satisfactory condition by 2020, this to tie in with targets under the Scottish Biodiversity Strategy for that same period. "Satisfactory" condition requires low or medium herbivore impacts, canopy cover greater than 50%, native species greater than 90% and invasive species less than 10%.

This report has been compiled by Victor Clements, a Native Woodland Advisor and Executive Committee Member of the Association of Deer Management Groups. Analysis of the areas and figures and the necessary GIS work was undertaken by Ewan Purser on an independent basis in spring 2016.

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Open birch woodland.

Unless otherwise stated, all the data in the tables below came from interrogating the main NWSS mapping dataset gathered 2007-2013

Deer Management Group areas

For the purposes of this report, the Deer Management Group area (DMG area) is considered to be the area covered by the following 42 deer management groups, covering 3,562,381ha in total. These are the areas used by SNH in autumn 2014 in their initial analysis of herbivore impacts in native woodlands for the Deer Management Round Table. There are deer in other areas, and additional Groups have recently been set up, and others extended. But these Groups will hold the bulk of the Scottish red deer population.

These include: Ardnamurchan, Arran, Balquidder, Blackmount, Borders, Breadalbane, Cairngorms/Speyside, East Grampian, East Loch Ericht, East Loch Shiel, East Ross, East Sutherland, Eskdalemuir, Gairloch Conservation Group, Glenartney, Glenelg, Harris & Lewis, Inveraray & Tyndrum, Islay, Jura, Knoydart, Mid West Association, Moidart, Monadhliaths, Morvern, Mull, North Lanarkshire, North Ross, North Uist, North West Sutherland, Northern, South Lanarkshire, South Perthshire, South Ross, South Uist, South West Ross, Strathtay, West Grampian, West

Table 1: Summary of herbivore impacts within native woodland in Scotland.

	Scotland (ha)	%	DMG areas (ha)	%	Outwith DMGs (ha)	%
	32,4536		143,323	44	181,213	56
Herbivore Impact						
Low	45,745	14	15,984	11	29,761	16
Medium	172,402	53	79,755	56	92,647	51
High	44,707	14	18,254	13	26,453	15
Very High	61,680	19	29,330	20	32,350	18
Total	324,534		143,323		181,211	
High & Very High	106,387		47,584	45	58,803	55

Table 2: Distribution of herbivore impacts in native woodland outwith designated sites.

	Scotland (ha)	%	DMG areas (ha)	%	Outwith DMGs (ha)	%
	27,4402	85	111,682	41	162,720	59
Herbivore Impact						
Low	41,493	15	14,101	13	27,392	17
Medium	147,382	54	62,934	56	84,448	52
High	36,963	13	13,665	12	23,298	14
Very High	48,563	18	20,982	19	27,581	17
Total	274,401		111,682		162,719	
High & Very High	85,526		34,647	41	50,879	59

Table 3: Distribution of herbivore impacts in native woodland within designated sites.

	Scotland (ha)	%	DMG areas (ha)	%	Outwith DMGs (ha)	%
	49,961	15	31,640	63	18,321	37
Herbivore Impact						
Low	4,207	8	1,882	6	2,325	13
Medium	24,946	50	16,820	53	8,126	33
High	7,719	15	4,590	15	3,129	17
Very High	13,089	26	8,348	26	4,751	26
Total	49,961		31,640		18,321	
High & Very High	20,808		12,938	62	7,880	38

Lochaber, West Lothian, West Ross and West Sutherland.

A number of deer management groups have not been included in this. Skye has not had an operational group for several years. Several other deer group areas are more concerned with low-ground stalking, and their membership is relatively fragmented, covering only a part of the overall area. These areas are Buchan & District, Inverclyde & Dunbartonshire, South Ayrshire & Wigtownshire, Central Galloway, East Lothian, East Dumfries & Galloway. In addition, Rum is excluded as it is under a single ownership and cannot be viewed as a deer management group.

Relevant DMG areas can be seen in the map on the following page.

Herbivore impacts in native woodlands in Scotland

Table 1 shows some summary statistics for herbivore impacts within native woodland in Scotland.

There are 324,536ha of native woodland overall, which includes 13,383ha of "nearly-native" woodland, which had between 40-50% of native species in the canopy. Of this, 143,323ha or 44% lies within the DMG areas, with the remaining 181,213ha or 56% lying outwith DMG areas. This 324,536ha of native woodland is the area referred to in the main NWSS report.

Of the 324,536ha of total native woodland, 106,387ha or just less than 33% of the whole shows herbivore impacts at high or very high levels. Such impacts will comprise a mixture of deer and livestock impacts, at different proportions in different areas, depending on what is actually present.

Of this area, 47,584ha or 45% of the total lies within the DMG area, and 58,803ha or 55% lies in the rest of the country, i.e. the greater area of native woodland impacted by herbivores lies outwith the main deer range. Interestingly, for each of the three categories above, the proportion of impacted woodland is the same in each case, namely 33%, i.e. there is no difference in the overall proportion of impacted woodlands between the DMG area and other parts of Scotland.

Table 2 shows the herbivore impacts in native woodlands outwith designated sites.

274,402ha or 85% of the total native woodland resource lies outwith designated sites, with 111,682ha or 41% of this lying within the main deer areas, and 162, 720ha or 59% lying outside these areas.

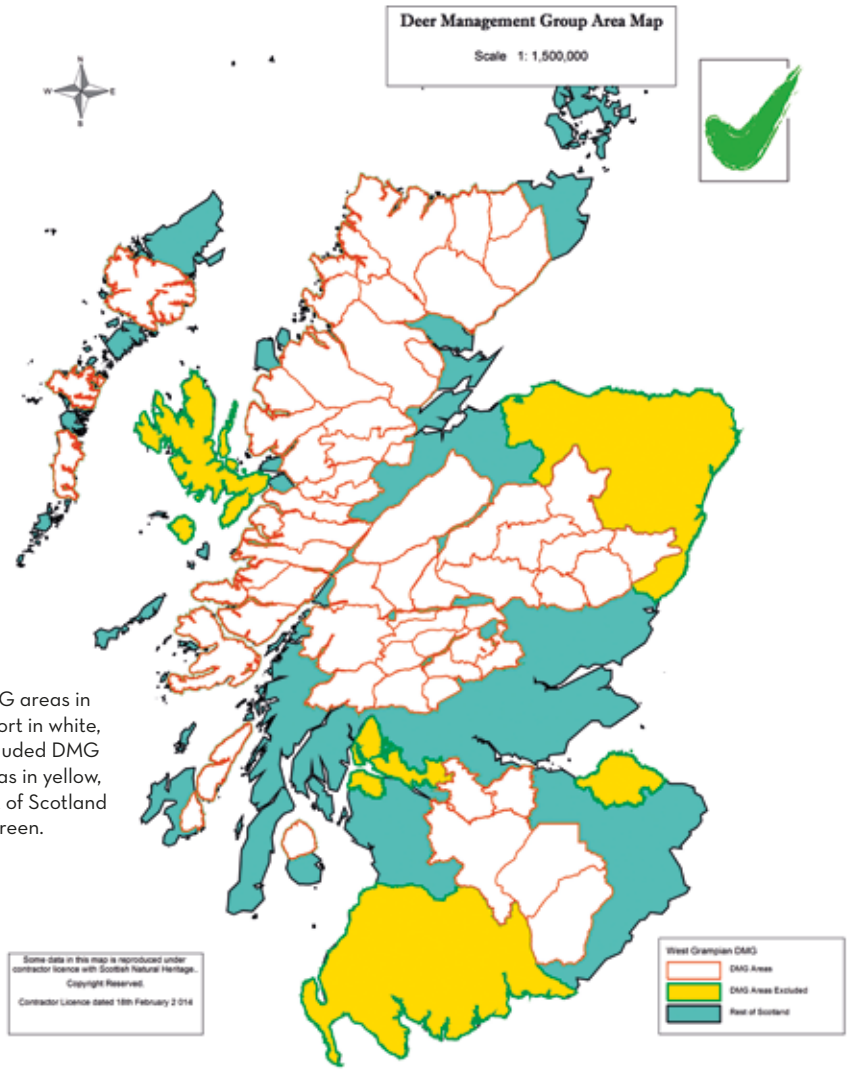
Of this total woodland area, 31% or 85,526ha is impacted by herbivores. Again, exactly the same proportion is impacted both within and without the main deer range, but with the area outwith comprising 59% of the total. Therefore, the greater part of the native woodland area impacted by herbivores outwith designated sites lies outside the main DMG area.

Table 3 shows the distribution of herbivore impacts within designated sites.

49,961 ha of native woodland or 15% of the total lies within designated sites. 63% of designated woods lie in the DMG areas, 37% outwith this area.

Within designated sites as a whole for the country, 20,808ha or 41% of the total are heavily impacted by herbivores, this being higher than for woods outwith such sites. The proportions within and outwith the deer areas is very similar, with 62% of heavily impacted woods lying within the deer areas, and 38% outwith. This is almost a mirror image of native woodlands outwith designated sites, in Table 2 above.

It is useful to point out at this stage that deer and livestock pressures will exist within each of the two main zones. Within the deer areas, it is likely that deer pressures will predominate in locations where they are not effectively fenced out. In the lowland areas, while



DMG areas in report in white, excluded DMG areas in yellow, rest of Scotland in green.

roe deer will be present throughout, and also fallow deer in some locations, it will be likely that herbivore pressures there are predominantly down to livestock.

Variation within the deer areas

SNH has done some provisional research into deer impacts within each of the above DMG areas. This SNH data was provided for the autumn 2014 Deer Management Table and is used in Tables 4 and 5 opposite. These figures include an area of PAWS woodland in addition to the 324, 536ha mentioned above. This is mentioned later in this document.

Table 4 shows the ten DMG areas with highest proportions of native woodland impacted by herbivores.

Table 5 shows the ten DMG areas with the lowest herbivore impacts.

While the average proportion of native woodland impacted throughout the country is 33%, there is clearly much variation within this, suggesting that efforts need to be targeted within key geographical areas. DMG areas such as Strathtay can have a very large proportion of woods impacted, although virtually none of this is related to designated sites. Other very large DMG areas such as Cairngorms/ Speyside can have very small proportions of impacted woods, which is important when a high proportion of them are likely to have several layers of designations. This wide variation is likely to be the case outwith deer areas as well, with local authority boundaries perhaps being the obvious administrative unit in which to collate the above information. A breakdown of such information would be extremely useful, but was beyond the capacity of this current research.

Other reasons for 'unsatisfactory' condition in native woodlands

As previously noted, the other reasons for 'unsatisfactory' condition in native woodlands are poor canopy coverage, invasive species, and non-native tree species.

Table 6 above shows that there are 108,262ha of native woodlands affected by one or other of these issues. While this suggests that combined, they are marginally more important than herbivore pressure, in reality, there will be a certain amount of overlap between the categories, and some overlap with high and very high herbivore impacts as well. We will return to this later. The poor canopy coverage is slightly more dominant within the deer range. As might be expected, the other two categories are heavily dominated by woods outside the main DMG areas. Both invasive species and non-native tree species tend to perform better in more fertile soils and in woods that are closer to habitations.

By far the greatest category of these three is non-native tree species, accounting for 77,674ha of native woodland, almost a quarter of the total native woodland area.

How much of our native woodland is in 'satisfactory' condition?

The Scottish Biodiversity Strategy for 2020 requires that 60% of our native woodlands outwith designated sites are in satisfactory condition by that year.

This is defined by:

- Herbivore impacts being low or medium
- Canopy cover being 50%-90%
- No more than three invasive species present, and being less than or equal to 10% cover
- Native species being more than or equal to 90% of the canopy.

Table 7 shows the native woodland area that is 'satisfactory' for canopy cover, invasive species AND non-native tree species. There are 183,379ha in total, or 67% of the total area outwith designated sites (274,402ha).

For Scotland as a whole, 121,382/274,402ha or 44% of native woodlands are in satisfactory condition.

Within the DMG area, 55,952/111,682ha or almost exactly 50% are in satisfactory condition.

Outwith the DMG area, 65,430/162,720ha or almost exactly 40% of the native woodlands are in satisfactory condition. The difference is due to the much higher proportions of invasive species and non-native tree species outwith the deer range, the herbivore impacts being almost exactly the same, with only a small difference with regards to canopy cover.

To achieve the stated targets of having 60% of native woodlands outwith designated sites in satisfactory condition by 2020, the following areas are required:

• An improvement in the status of 10% of the 111,682ha within the DMG area, or 11,168ha, and
• An improvement in the status of 20% of the 162, 720ha outwith the deer area, or 32,544ha.

The area required for improvement outwith the DMG area is therefore almost three times that required within the DMG area.

Options going forwards

There are three main options for improving the status of our native woodlands, and, in reality, a combination of these should be used.

1. There will be a correlation between low canopy cover and herbivore pressure in that as the latter is reduced, the canopy of a wood should start to fill in, assuming other factors are suited to regeneration. However, given that a relatively low proportion of woods are at high or very high impacts at present, and use of native woods for shelter and feeding for both farmers and estate managers is important, then careful targeting of areas will be required. Almost certainly, improvements in the other two areas will be required as well as changes to grazing practices, and government will not be able to rely solely on reducing herbivore impacts to achieve the area of woodland they require in satisfactory condition.

2. There are over 12,000ha of woods in Scotland where the level of invasive species is greater than 10%, with almost 80% of this being outwith the DMG areas. The problem with invasive species is very obvious in that they spread quickly and therefore, expensive as this might be in some areas, it is important to greatly reduce or eliminate this threat to the area of infected native woodland. To not do so will cause continued degradation of affected woodlands and present a continual threat to other native woodlands. It is appreciated that the cost of doing this will be very high, but to protect native woodlands in any sort of sustainable manner, invasive species need to be reduced more quickly than current efforts are achieving. Indeed, progress in this area is notoriously poor and underfunded, with efforts made being on a small scale where easy options exist.

3. Finally, there are very significant areas of native woodlands with non-native

Table 4: The ten DMG areas with highest proportion of native woodlands impacted by herbivores.

Name	Total area of Native woodland (ha)	Area of herbivore impacted native woodland (ha)	Percentage of native woodland impacted
Strathtay	2,129	1,262	59
West Lochaber	4,233	2,458	58
Arran	754	370	49
South Uist	72	34	47
West Grampian	1,415	630	45
Jura	609	254	42
Moidart	1,848	710	38
Mull	3,344	1231	37
Glenelg	1,743	598	34
East Loch Shiel	3,854	1,241	32
TOTAL	20,001	8,788	44

Table 5: The ten DMG areas with lowest proportion of native woodland impacted by herbivores.

Name	Total area of Native woodland (ha)	Area of herbivore impacted native woodland (ha)	Percentage of native woodland impacted
Mid West Association	5,721	913	16
Eskdalemuir	2,172	345	16
East Sutherland	3,610	473	13
Islay	259	31	12
North Lanarkshire	3,383	339	10
East Loch Ericht	2,444	190	8
Borders	1,414	106	8
Cairngorm/Speyside	14,321	1,018	7
Gairloch Conservation Group	1,944	120	6
North Uist	45	2	4
TOTAL	35,313	3,538	10

Table 6: Extent of other issues in native woodland within and outwith DMGs.

	Scotland (ha)	%	DMG areas (ha)	%	Outwith DMGs (ha)	%
	183,379	67	82,519	45	100,860	55
Issue						
<50% Canopy	18,063	6	9,519	53	8,544	47
>10% Invasives	12,525	4	2,671	21	9,854	79
<90% native	77,674	24	21,781	28	55,893	72
Total	108,262	34	33,971	31	74,291	69

Table 7: Native woodland areas that are 'satisfactory' for other issues within and outwith DMGs.

	Scotland (ha)	%	DMG areas (ha)	%	Outwith DMGs (ha)	%
	183,379	67	82,519	45	100,860	55
Herbivore Impact						
Low	23,737	13	10,048	12	13,689	14
Medium	97,645	53	45,904	56	51,741	51
High	23,593	13	9,487	11	14,106	14
Very High	38,404	21	17,081	21	21,323	21
Total	183,379		82,520		100,859	
Low & Medium	121,382	66	55,952	68	65,430	65

Table 8: Deer Impacts as relating to other issues outwith designated sites in DMG areas.

DMG Area outwith designated sites	Very High	High	Medium	Low	Total ha
<50% CANOPY	1,358	846	4,256	1,388	7,848
%	17	11	54	18	
>10% INVASIVES	497	377	1,353	200	2,427
%	20	16	56	8	
<90% NATIVE	2,328	3,260	12,371	2,693	20,652
%	11	16	60	13	

Table 9: Deer impacts as relating to other issues outwith designated sites in lowground areas.

Low ground outwith designated sites	Very High	High	Medium	Low	Total ha
<50% CANOPY	1,293	889	3,444	2,269	7,895
%	16	11	44	29	
>10% INVASIVES	1,102	1,531	5,081	1,371	9,085
%	12	17	56	15	
<90% NATIVE	4,520	8,029	28,426	11,826	52,801
%	9	15	54	22	

Table 11: Herbivore impact levels within PAWS woodland.

Herbivore Impact level	DMG Area	%	Scotland	%
Low	5,543	33	12,986	33
Medium	8,360	50	20,690	52
High	1,898	11	4,364	11
Very High	944	6	1,632	4
Total	16,745		39,672	

Table 12: Unsatisfactory condition summary, with and without PAWS area added in.

Reasons for Unsatisfactory Condition	Report Area	%	PAWS Area	Total Area	%
<50% Canopy	18,063	6			
>10% Invasives	12,525	4			
<90% native	77,674	24	39,668	117,342	32
High or Very High Herbivore impacts	106,387	33	5,996	112,383	31

tree species in excess of 10% of their area, extending to over 77,000ha in total across the country, with 72% of this found outwit h the DMG area. Some of this area will contain naturally seeded sycamore or beech, but a large area of it will certainly be underplanted or part-planted with non-native conifer species. Much of the total area can be regarded as being Plantations on Ancient Woodland Sites (PAWS), but even if the area is not on an ancient woodland site, the prescription for reducing the non-native element should be the same, namely reducing the proportion of these species gradually over a period of time. In some cases this might take 30-40 years or more. It is likely therefore that a high proportion of PAWS or similar sites may be undergoing appropriate management already, but the proportion of non-native species will still be well above 10%, perhaps for several decades to come. An investigation should be made of this area of native woodland, and that area under appropriate management but with more than 10% non-native species should be reassessed so that this aspect of their condition is listed as 'satisfactory'. **Tables 8 and 9** suggest that in both the deer areas and outside, that there are options for bringing a full 60% of native woodlands outwith designated sites back in to satisfactory condition. Reducing herbivore impacts will be one part of that, but there are significant areas of non-native tree species where herbivore impacts are already low enough for stand management in itself to deliver the required result without the need for herbivore impact reduction in those stands.

Conclusion

When analysed in this way, the data suggests that if we want to bring 60% of our native woodlands in to satisfactory condition, we need to look at the picture across the country, and we need to look at the full range of issues which compromise current condition, not just deer. Herbivore impacts within the deer zone are, in reality, no different to herbivore impacts across the country as a whole. The bigger area of herbivore impacted woodland is outwith the DMG core area, and by far the greater woodland area impacted by the other factors is outwith this area. The area required to be upgraded outwith the deer area is three times that required within the deer area.

From an ecological perspective, a better result will arise should we have a core 60% of robust woodland in all geographical locations. Some provisional work has been carried out by SNH in splitting up the NWSS data in to appropriate DMG areas, and this allows efforts to be targeted better.

It is recommended that for the area outwith existing DMG areas, that the NWSS data is summarised on a local authority basis, so that local action plans for woodland condition improvement can be allocated on an appropriate basis, and that the data on other issues is collated within the DMG areas as well.

Finally, it is very likely that a proportion of the woodland area with more than 10% non-native species will actually already be in an appropriate form of management, but that it may take many decades for this proportion to fall below 10%. An adjustment should be made to allow for this.

Important Postscript

An initial draft of this report revealed that an important sub-set of our native woodlands were not actually included in the main NWSS report though available from NWSS mapping. In addition to the 324, 536ha of native and nearly native woods, there were 39, 672ha of PAWS woodlands (Plantations on Ancient Woodland Sites) omitted from the report. Although now largely planted with conifers, these sites are actually some of our most valuable woodland sites, and should certainly be regarded as native woodlands. They just need to be restored, and there is good evidence now to show that this should be possible in most cases.

All but a tiny four hectares of these

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Above: Old oaks released by felling conifers on PAWs site in Galloway Forest Park. Top right: A red deer stag. Bottom right: Sheep in birch wood – here regeneration is getting away and the sheep create diversity of structure.

PAWS sites had greater than 10% non-native species at the time of survey, as noted in **Table 10** below:

Table 10: Areas of PAWS woodland at different levels of native species

Native %	Hectares
0	15,053
5	12,511
10	4,901
15	1,945
20	2,272
25	1,137
30	1,087
35	738
40	11
50	11
90	3
95	1
Total	39,672

For much of this PAWS woodland, herbivore impacts are already at low or medium impacts, with 83% within the DMG areas, and 85% for Scotland as a whole. See **Table 11** (opposite). It should be noted however that in many of these woods where no ground vegetation or regeneration is present, that it would actually be very difficult to demonstrate higher levels of impact. In such woods however, the non-native tree species are clearly the priority and overriding factor, at least in the short term.

Table 12 (opposite) demonstrates what happens when the PAWS area and the herbivore impacted PAWS area are added in to the data set showing how each of the different issues affect the area of woodland in unsatisfactory condition:

Using the 324,536ha of native and nearly native woodland summarised in the NWSS report, herbivore impacts at 33% represent the largest threat to native woodlands in terms of area. However, when the PAWS area is added, it becomes apparent that the greatest threat, in terms of area, is actually non-native tree species, not herbivore impacts, although the order of magnitude is broadly the same.

This is important as it means the narrative surrounding the launch of the NWSS report is not actually correct. Herbivore impacts are not the most significant issue affecting native woodlands at all, although their effects are not denied in many cases.

A more appropriate narrative would be that we have a number of issues impacting on native woodlands in Scotland, with non-native species and herbivore impacts being the most important, in almost equal measure. Although invasive species are a distant third, they do, by definition, spread quickly, and therefore, we must not be complacent about these.

To develop a narrative around herbivore impacts only misses the important conclusion that should be drawn, especially if it is assumed from this that only deer require to be targeted. The wider issues are much more insidious and entrenched in many ways, and will be much more difficult and expensive to address, but if we want to improve our native woodlands, we need to look at all the factors that might be negatively affecting them, and then build a suitable locality strategy for moving things forwards. If the 2020 Scottish Biodiversity Strategy targets are to be achieved, then land managers have to be aware of all the options available to them, so that they can use a combination of these to achieve the results required.

Full references are available from the author on request to victor@nativewoods.co.uk.