

Breadalbane Deer Management Group Summary of Herbivore Impacts on Dwarf Shrub Heath, Grasslands and Blanket Bog Habitats 2018

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1. Introduction & Aims

As a part of the DMG's ongoing commitment to carrying out environmentally responsible deer management in line with the [Code on Deer Management](#), the aim of this report is to provide a summary of herbivore impacts across the DMG. This assessment of current grazing and trampling impacts will help to monitor trends over time and to help inform future management.

The specific aims of this report are to:

- Collate, review and summarise the information presently available on the current distribution, extent and condition of the various habitats present within the whole of the Breadalbane DMG area.
- Assess the importance of different habitats for their land use interest (for example sheep grazing, deer grazing, grouse moors, woodlands and any others), for their biodiversity, for their condition and for their sensitivity to land management practices such as grazing and burning.

2. Background

As part of the Breadalbane Deer Management Plan, Group members agreed in 2018 to undertake a baseline Habitat Impact Assessment of wider habitats within the Group area. This assessment will be used to help inform future management.

Blanket bog and Heather moorland are two of the main habitats that Scottish Natural Heritage have recommended upland deer managers monitor for herbivore grazing and trampling impacts. The Deer Management Plan also highlighted the importance of Smooth grassland as a key habitat within parts of the DMG area.

There are many benefits to setting up a programme of habitat monitoring. These include:

- Building confidence in current deer management practices;
- Informing future deer management actions;
- Demonstrating responsible deer management.

3. DMG Area

The DMG area extends to approx 90,000 ha, of which over 72,000 ha was previously within a Section 7 agreement from 2010-15. Over 20 percent of the total area is designated (Figure 1), and the area contains a nationally significant proportion of upland designated features (Table 1). HIA surveys were carried out within the area in 2008, 2011 & 2014, and the general direction of travel from these has been very positive.

The area is notable for the proportion of grassland habitats present, much of which is designated at both SSSI and SAC level. Montane habitats and undifferentiated heather moorland are the other two main upland habitat types. Areas of blanket bog are very much more restricted in their distribution. The main vegetation types are mapped in Figure 2 and approximate areas were calculated using Land Cover 88 vegetation data set.

The DMG area has been further divided into 4 Sub Areas. Figure 3 shows the Sub Areas and Table 2 shows the distribution of the three main habitat types within each Sub Area.

Figure 1: Designated Sites

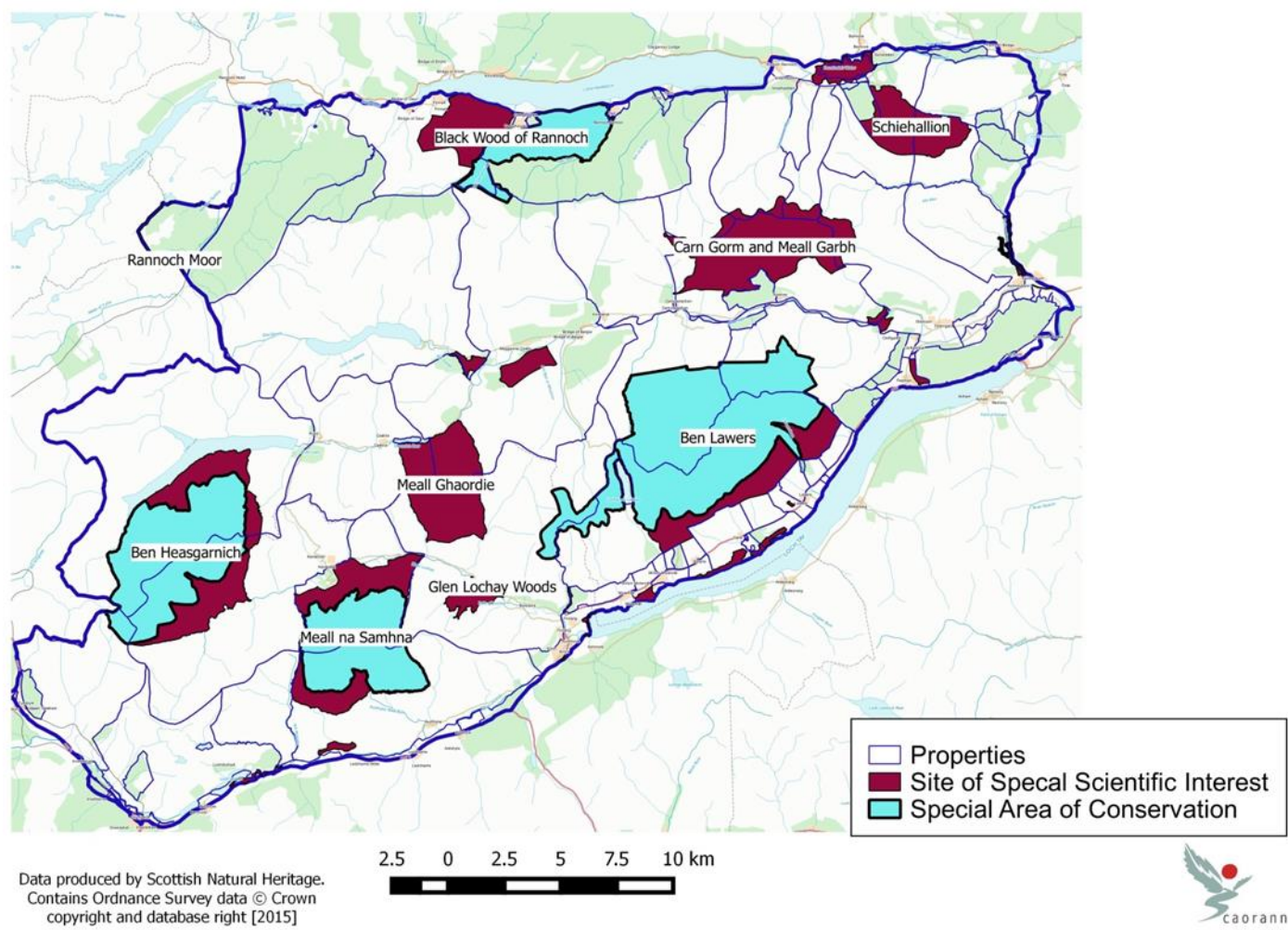


Table 1: Feature Condition

Type of Site	Site	Feature	Deer Related Only	Last SCM	Last SCM
Grasslands/ Wetlands	Fearnan Cowpark SSSI	Spring Fen	Fav Maintained	2011	2011
Grasslands/ Wetlands	Fearnan Cowpark SSSI	Lowland Neutral grassland		2011	2011
Grasslands/ Wetlands	Fearnan Cowpark SSSI	Lowland calcareous grassland		2007	2007
Grasslands/ Wetlands	Morenish Meadow SSSI	Lowland neutral grassland		2007	2007
Grasslands/ Wetlands	River Dochart Meadows SSSI	Lowland neutral grassland	favourable maintained	2006	2006
Grasslands/ Wetlands	River Dochart Meadows SSSI	Fen meadow	favourable maintained	2012	2006
Large Upland Sites	Ben Heagsarnich SAC	Plants in crevices on acid rocks	Favourable Maintained	2014 draft condition	2010
Large Upland Sites	Ben Heagsarnich SAC	Plants in crevices on base-rich	Favourable Maintained	2014 draft condition	2010
Large Upland Sites	Ben Heagsarnich SAC	Base-rich fens	Unfavourable No change	2014 draft condition	2010
Large Upland Sites	Ben Heagsarnich SAC	Tall herb communities	unfavourable recovering	2014 draft condition	2010
Large Upland Sites	Ben Heagsarnich SAC	Alpine and subalpine calcareous	Unfavourable Recovering	2014 draft condition	2010
Large Upland Sites	Ben Heagsarnich SAC	High-altitude plant communities associated with areas of water	Unfavourable Recovering	2014 draft condition	2010
Large Upland Sites	Ben Heagsarnich SAC	Montane acid grasslands	Favourable Recovered	2014 draft condition	2010
Large Upland Sites	Ben Heagsarnich SAC	Mountain willow scrub	Unfavourable Recovering	2010	2010
Large Upland Sites	Ben Heagsarnich SAC	Species-rich grassland with mat-grass in upland areas	Unfavourable Recovering	2010	2010
Large Upland Sites	Ben Heagsarnich SSSI	Vascular plant assemblage	Favourable Declining	2014 (draft condition)	2010
Large Upland Sites	Ben Heagsarnich SSSI	Alpine calcareous grassland	Unfavourable Recovering	2010	2010
Large Upland Sites	Ben Heagsarnich SSSI	Snowbed	Unfavourable Recovering	2010	2010
Large Upland Sites	Ben Lawers SAC	High-altitude plant communities associated with areas of water	Favourable Maintained	2010	2010
Large Upland Sites	Ben Lawers SAC	Base-rich fens	Favourable Recovered	2010	2010
Large Upland Sites	Ben Lawers SAC	Tall herb communities	Favourable Recovered	2010	2010
Large Upland Sites	Ben Lawers SAC	Blanket bog	Unfavourable No change	2013	2010
Large Upland Sites	Ben Lawers SAC	Alpine and subalpine calcareous	Unfavourable Recovering	2013	2010
Large Upland Sites	Ben Lawers SAC	Alpine and subalpine heaths	Unfavourable No change	2010	2010
Large Upland Sites	Ben Lawers SAC	Dry heaths	Unfavourable No change	2014	2010
Large Upland Sites	Ben Lawers SAC	Montane acid grasslands	Unfavourable No change	2010	2010
Large Upland Sites	Ben Lawers SAC	Species-rich grassland with mat-grass in upland areas	Unfavourable No change	2010	2010
Large Upland Sites	Ben Lawers SAC	Mountain willow scrub	Unfavourable Recovering	2010	2010
Large Upland Sites	Ben Lawers SSSI	Bryophyte assemblage	Fav Maintained	2013	2010
Large Upland Sites	Ben Lawers SSSI	Lichen assemblage	Favourable Maintained	2010	2010
Large Upland Sites	Ben Lawers SSSI	Montane assemblage	Favourable Maintained	2010	2010
Large Upland Sites	Ben Lawers SSSI	Vascular plant assemblage	Favourable Maintained	2010	2010
Large Upland Sites	Carn Gorm and Meall Garbh SSSI	Vascular plant assemblage	Favourable Maintained	2010	2010
Large Upland Sites	Carn Gorm and Meall Garbh SSSI	Montane assemblage	Unfavourable No change	2005	2010
Large Upland Sites	Meall Ghaordie SSSI	Upland assemblage	Favourable Maintained	2010	2010
Large Upland Sites	Meall Ghaordie SSSI	Vascular plant assemblage	Favourable Maintained	2013	2010
Large Upland Sites	Meall na Samhna SAC	Tall herb communities	Favourable Maintained	2014	2010
Large Upland Sites	Meall na Samhna SAC	Mountain willow scrub	Unfavourable No change	2014 (draft condition)	2010
Large Upland Sites	Meall na Samhna SAC	Species-rich grassland with mat-grass in upland areas	Unfavourable No change	2010	2010
Large Upland Sites	Meall na Samhna SAC	Alpine and subalpine calcareous	Unfavourable Recovering	2014 (draft condition)	2010
Large Upland Sites	Meall na Samhna SAC	Montane acid grasslands	Unfavourable Recovering	2014 (draft condition)	2010
Large Upland Sites	Meall na Samhna SSSI	Vascular plant assemblage	Favourable Recovered	2013	2010
Large Upland Sites	Meall na Samhna SSSI	Upland assemblage	Unfavourable No change	2014 (draft condition)	2010
Large Upland sites	Schiehallion SSSI	Montane habitats	Favourable Maintained	2011	
Woodland Sites	Black Wood of Rannoch SAC	Caledonian Forest		1999	1999
Woodland Sites	Black Wood of Rannoch SSSI	Upland birch woodland	Unfavorable Declining	2011	2011
Woodland Sites	Black Wood of Rannoch SSSI	Native pinewood		1999	1999
Woodland Sites	Carie & Cragganester Woods SSSI	Upland oak woodland	Unfavorable No Change	2009	2009
Woodland Sites	Glen Lochay Woods SSSI	Upland oak woodland	unfavourable declining	2011	2001
Woodland Sites	Glen Lochay Woods SSSI	upland mixed ash woodland	unfavourable declining	2011	
Woodland Sites	Glen Lochay Woods SSSI	upland birch woodland	unfavourable declining	2011	
Woodland Sites	Glen Lochay Woods SSSI	wet woodland	unfavourable declining	2011	
Woodland Sites	Glen Lyon Woods SSSI	Wet woodland	Unfavourable Declining	2013	2013
Woodland Sites	Innishewan Wood SSSI	Upland oak woodland	unfavourable recovering	2008	2008
Woodland Sites	Keltneyburn SSSI	Lowland acid grassland	Unfav Declining (URDTM)	2012	2012
Woodland Sites	Meggernie & Cnoc na keys Woods SSSI	Native pinewood	Unfav Recovering	2006	2006

Figure 2: Distribution of Habitat Types across DMG (LCS 88 Data)

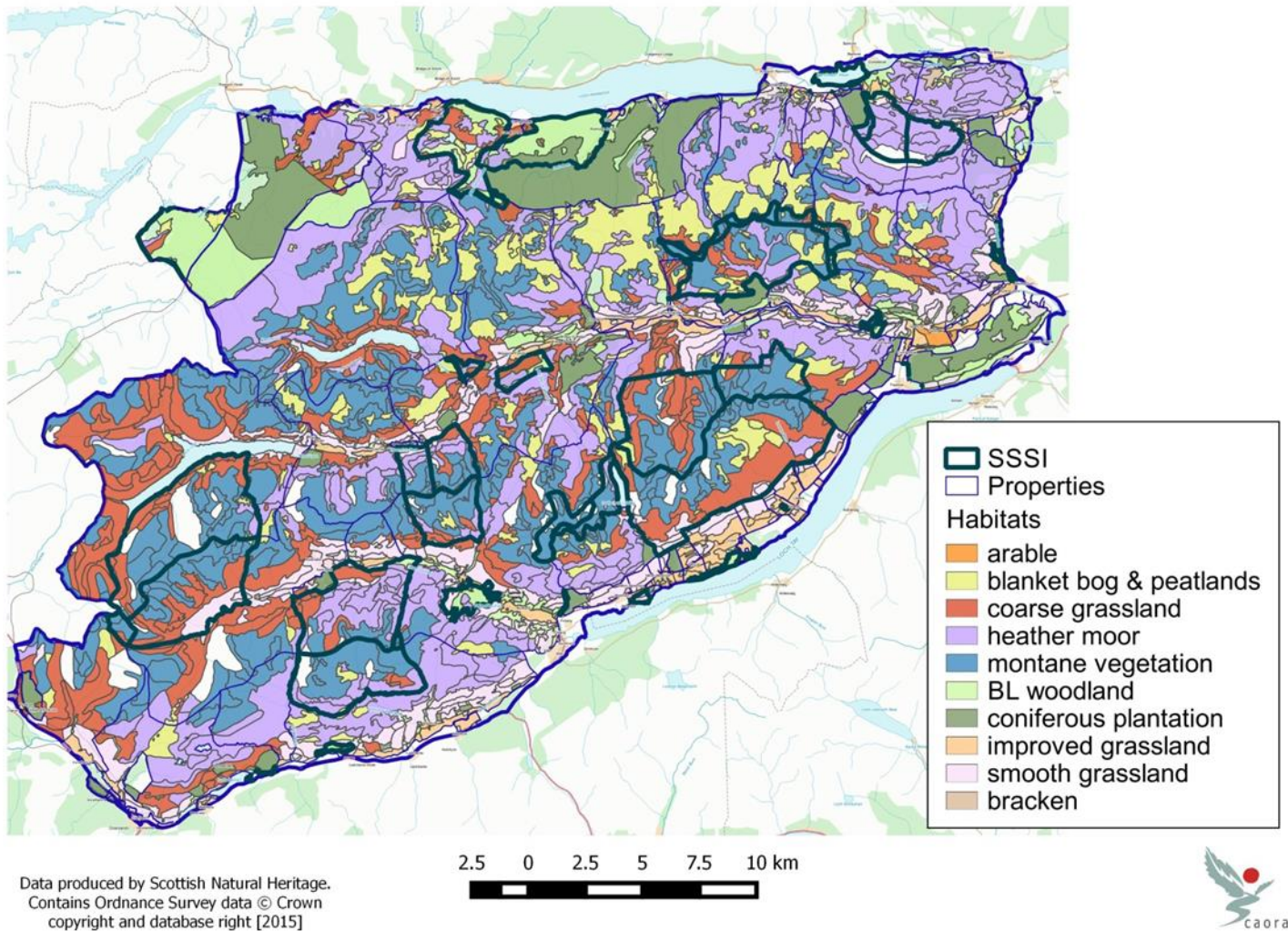


Figure 3: Distribution of Soil Types across DMG

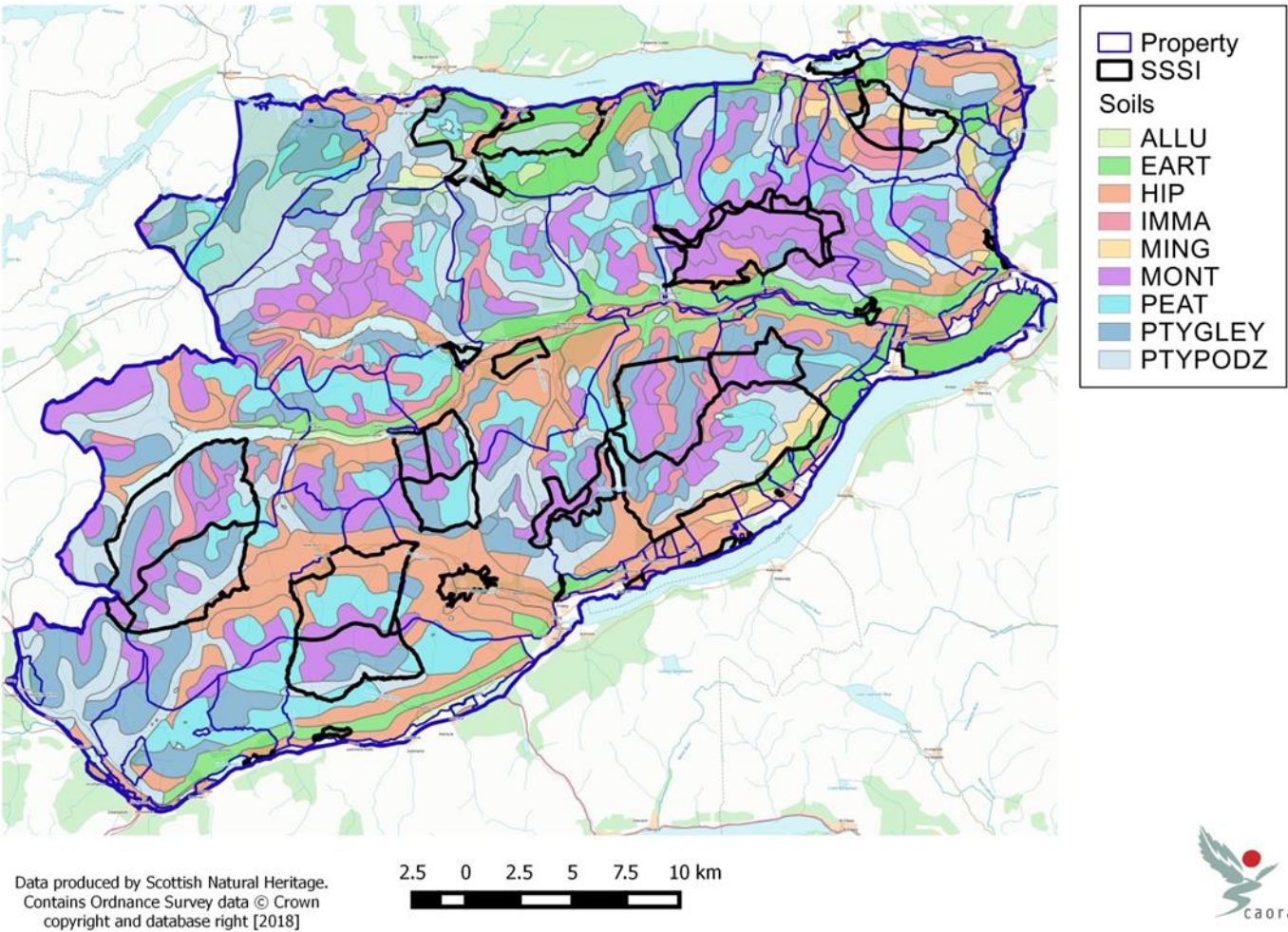


Figure 4: DMG Sub Areas

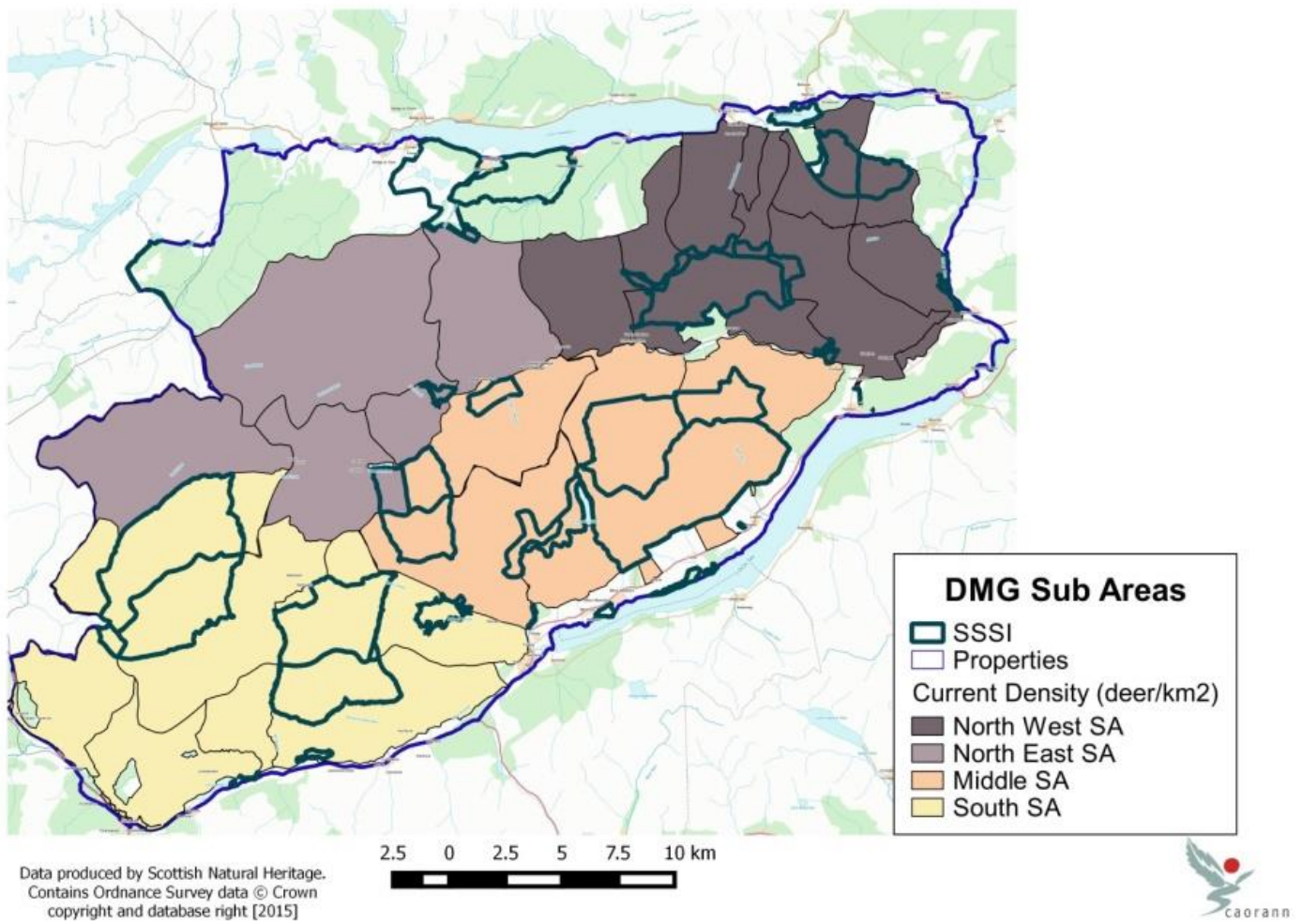
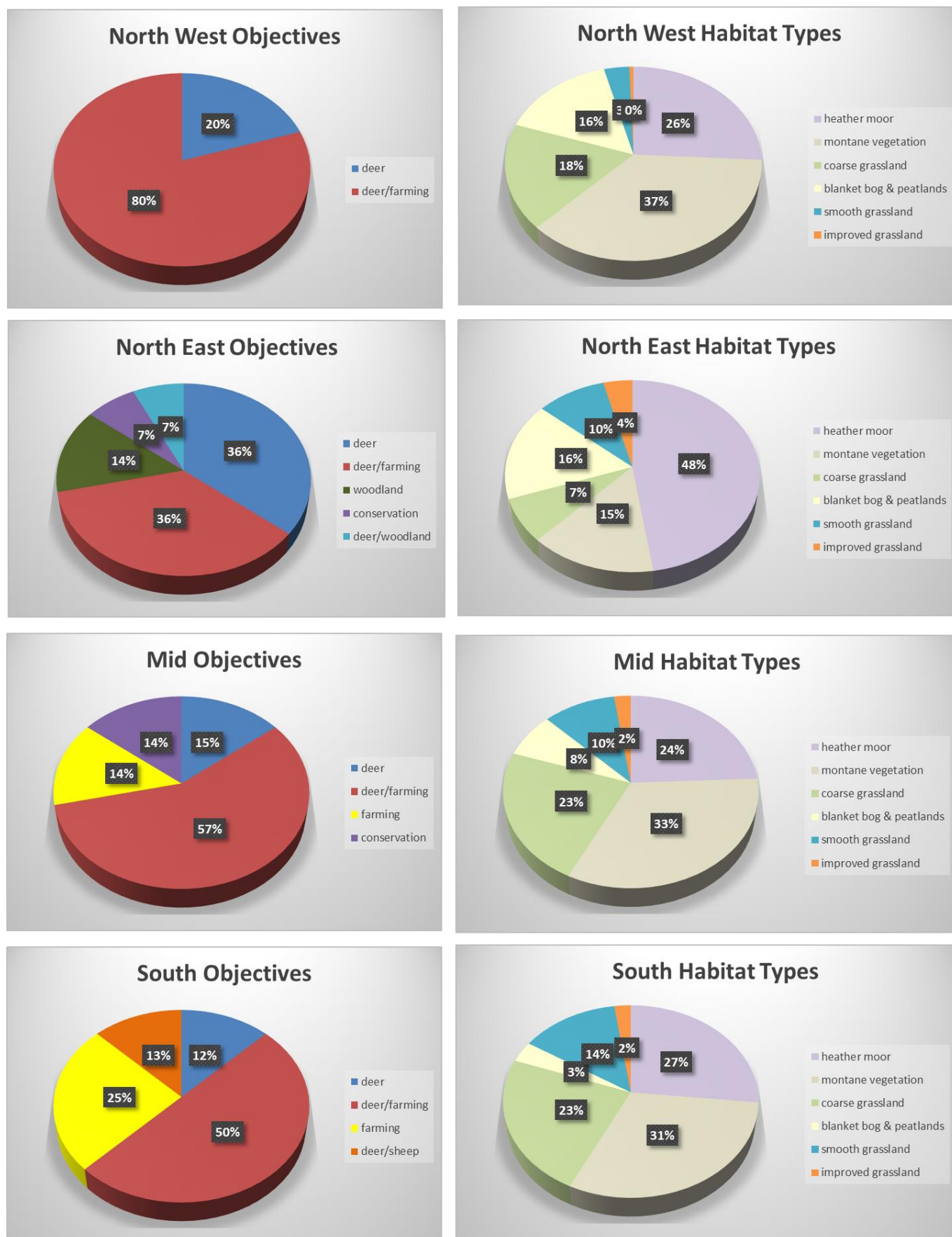


Table 2: Management Objectives and Distribution by Sub Area

Sub-Area	Number of Properties	Objective Type	% Objectives	Area (Ha)	heather moor	montane vegetation	coarse grassland	blanket bog & peatlands	smooth grassland	improved grassland
North West	5	deer deer/farming	20% 80%	17,906	4334 26%	6122 36%	2961 17%	2647 16%	585 3%	93 1%
North East	14	deer deer/farming woodland conservation deer/woodland	36% 36% 14% 7% 7%	15,661	7499 44%	2313 14%	1164 7%	2613 15%	1521 9%	640 4%
Mid	7	deer deer/farming farming conservation	14% 57% 14% 14%	20,560	4598 23%	6265 32%	4291 22%	1415 7%	1914 10%	436 2%
South	8	deer deer/farming farming deer/sheep	13% 50% 25% 13%	22,951	5497 26%	6298 29%	4815 23%	714 3%	2821 13%	469 2%

Figure 5: Sub-Area Objectives and Habitat Type Distribution



4. Herbivore Numbers

4.1 Changes in Herbivore Density

Under a Section 7 Agreement, Breadalbane DMG has been committed to reducing deer numbers across all 4 Sub Areas. Helicopter counts conducted between 2008 and 2015 showed a decrease in the population from a density of 17 deer per km² to a density of 12 deer per km² (Table 3 & Figure 6), a figure similar to that counted by foot in 2017 (Table 4). In the Deer Management Plan (2016-2021), the Group committed to delivering an overall target population of 9,860 deer (representing a target density of 12.8 deer per km²) which has been achieved -although relative numbers of stags and hinds remains unbalanced at a ratio of 1:1.9. .

Although the overall population across the DMG has reduced, changes in density are not uniform across properties. Changes in the over all density of deer as well as relative changes in the distribution of stags and hinds are shown in Figures 7, 8 & 9. As the relative distribution of deer changes across the DMG, this may have an affect on the distribution of impacts over time.

Table 3: Historic Deer Counts

Year	Area (Ha)	Stags	Hinds	Calves	Total	Density (deer/km ²)	Calving %
2021	77, 078	4,200	4,200	1,460	9,860	13	
2017	77, 078	2,427	4,667	1,977	9,071	12	42%
2015	77, 078	2,745	4,914	1,350	9,009	12	27%
2011	77, 078	3,563	6,288	1,616	11,467	15	26%
2008	77, 078	4,513	6,341	2,436	13,290	17	38%

**DCS/ SNH Helicopter Count*

Table 4: Foot Counts 2017 and 2015

Sub-Group	Area (Ha)	2017 Foot Count						2015 Foot Count					
		Stags	Hinds	Calves	Total	Density (deer/km ²)	Calving %	Stags	Hinds	Calves	Total	Density (deer/km ²)	Calving %
North West	17906	621	1284	568	2473	14	44	789	955	285	2029	11	30
North East	15661	767	1159	511	2437	16	44	793	1408	356	2557	16	25
Mid	20560	603	1399	514	2516	12	37	553	1482	369	2404	12	25
South	22951	436	825	384	1645	7	47	467	812	258	1537	7	32
DMG	77078	2427	4667	1977	9071	12	42	2602	4657	1268	8527	11	27

Figure 6: Deer Density Distribution

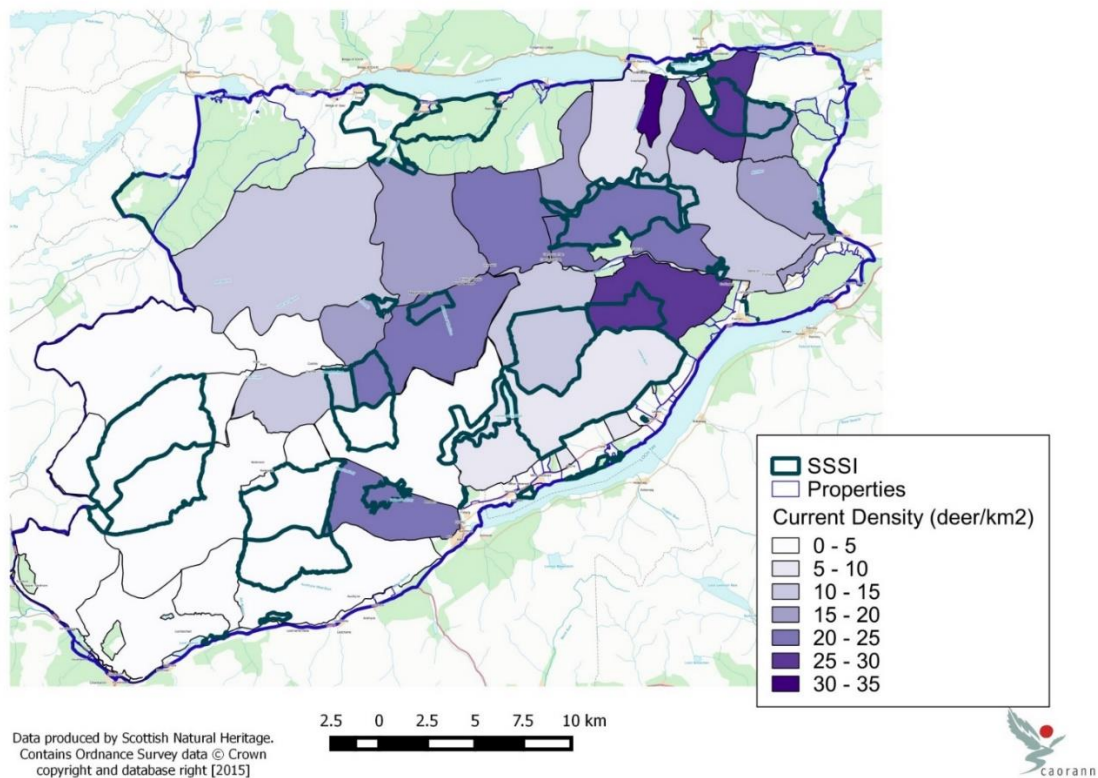


Figure 7: Changes in Overall Deer Density 1987 to 2015

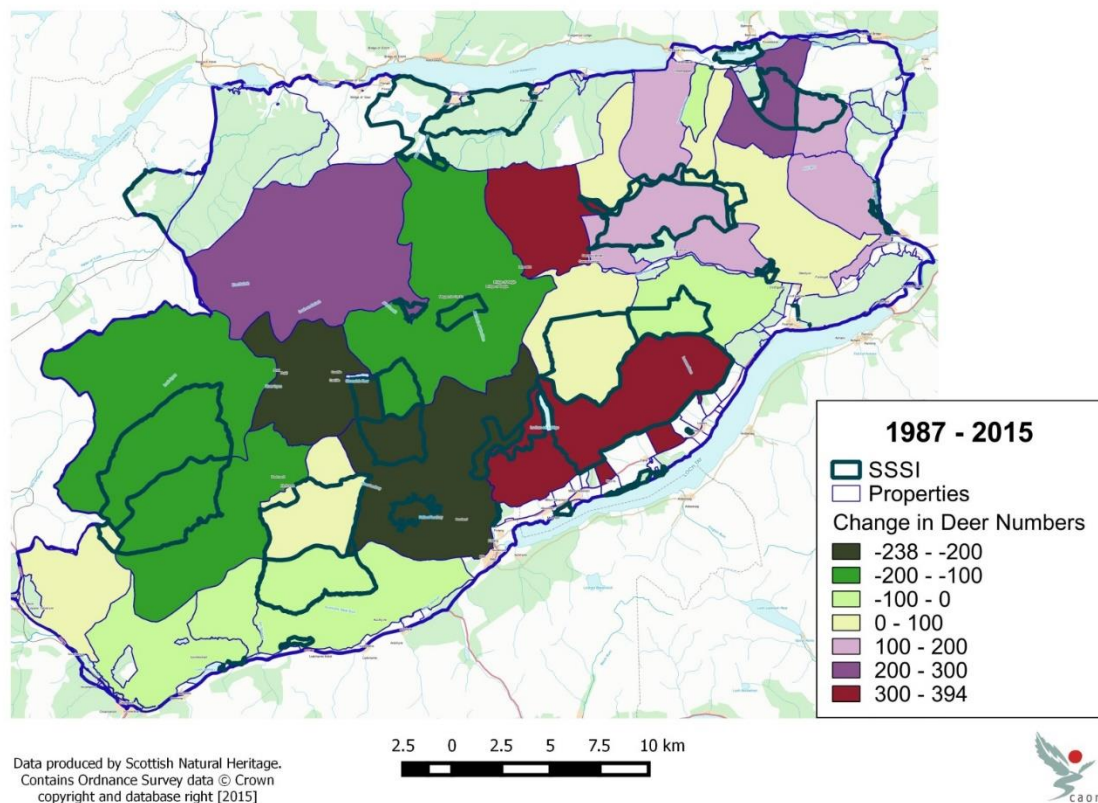


Figure 8: Changes in Hind and Stag Density 1987 to 2015

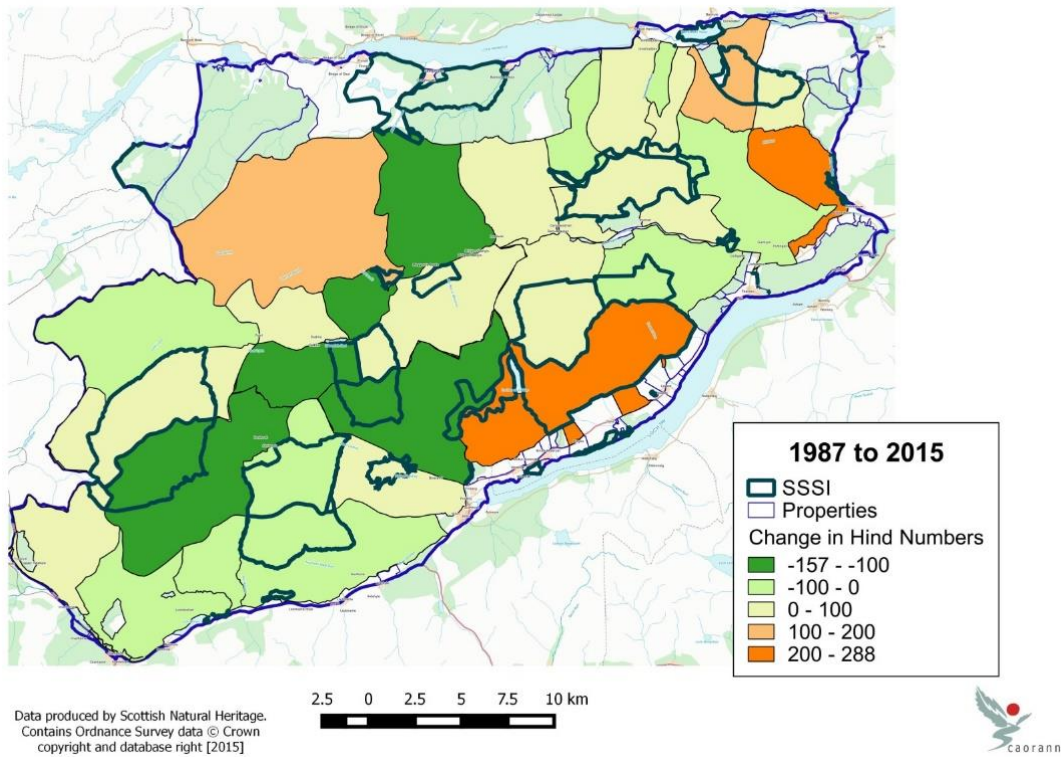
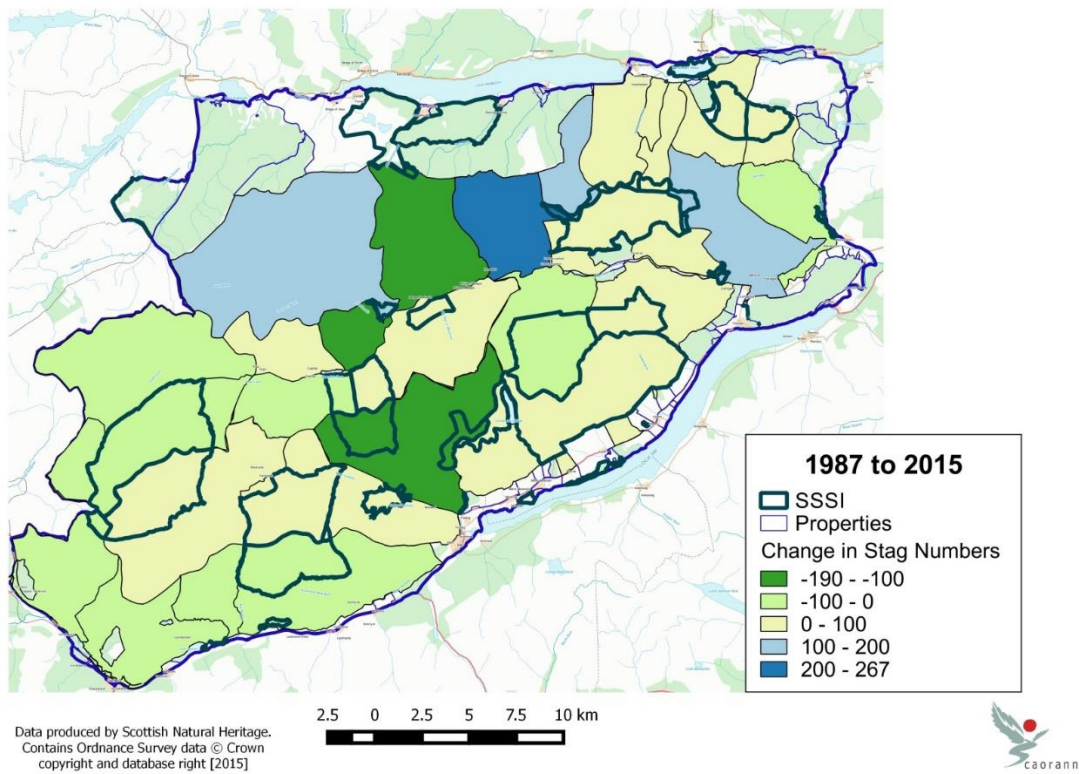


Figure 9: Changes in Stag Density 1987 to 2015



5. Methodology

5.1 Methodology & Training

The assessments carried out by DMG members followed the methodology as set out in industry-standard Wild Deer Best Practice Guides (<http://www.bestpracticeguides.org.uk/guides/impacts-intro>) for Dwarf Shrub Heath (DSH) and Blanket Bog (BB). These guides are a simplified version of the methodology used by Agencies described in [A Guide to Upland Habitats: Surveying Land Management Impacts](#). DMG Members undertook training from a qualified Ecologist in Spring 2018 prior to undertaking the work.

5.2 Field Survey Methodology

Using the 4 Sub Areas within the Group, a subset of plot coordinates was randomly selected from points generated by Scottish Natural Heritage for Blanket bog and Dwarf shrub heath using LCS88 vegetation data. Although Grassland is a significant habitat type within some Sub Areas, it was decided not to carry out an assessment of this habitat as appropriate guidance is currently unavailable. Sample plots were located using a hand-held GPS receiver and plots verified in the field.

A 2m x 2m plot (subdivided into 16 0.5m x 0.5m quadrats) was established at each location with a small wooden post marking the bottom right corner of the plot to enable the plot to be relocated. The right hand edge of the plot was orientated north using a compass. Two photographs were taken for each plot: one to identify the general location to assist future relocation, and one of the actual plot itself. The plot was assessed according to amended* [Best Practice Guidance](#) HIA methodology. A series of measurements and observations were recorded for each plot.

For Blanket bog these were:

- the average height of the dwarf-shrubs;
- the % of last year's heather shoots that had been browsed and browsing on cross-leaved heath;
- the frequency of quadrats with some bare peat showing*;
- the proportion of those quadrants with bare peat that have evident hoof-prints*;
- the frequency of quadrats with bogmoss present*;
- the proportion of quadrats with bogmoss with evidence of disruption including hoofprints*.

For Dwarf shrub heath these were:

- the average height of the dwarf-shrubs;
- the frequency of quadrats with heather;
- the % of last year's heather shoots that had been browsed ;
- evidence of broken heather stems indicating trampling.

Additional elements were noted including presence of sheep & deer dung, occurrence of muirburn and any other factor likely to contribute to the plot attributes. A summary of the data is contained in Appendices 1a&b.

The assessment of herbivore impacts was be scored on a scale from Low through Medium to High. Where heather wasn't present in a plot, browsing impact on cross-leaved heath was be used, with some browsing indicating a High impact.

5.3 Designated Site Data Information from the 2014 SNH Commissioned Report '*An assessment and evaluation of herbivore impacts on designated habitats in the Breadalbane Hills*' was used to provide summary information on designated sites.

6. Impact Targets

The following are recommended targets for the habitats surveyed in this report.

Habitat Type	Description	SNH Recommended Impact Target
Smooth Grassland	Moderate grazing impacts are likely to give rise to the highest diversity of characteristic flora and invertebrates and are likely to maintain the condition of the habitat. High and Low impacts will both favour some components of these communities and can lead to deterioration if uniformly present. A range of impacts is desirable hence the target range described is quite large, with the expectation that impacts are experienced throughout the range. Scale of variation within and between habitat patches will depend on the distribution of the habitat on a site.	90% of impacts in Low/Moderate to Moderate/High
Wind Clipped Heath	Alpine heaths are subject to both browsing and trampling impacts. Both are more likely to reflect summer utilisation by herbivores, other than possibly where attributed to mountain hares. The proportion of dwarf shrubs that are browsed is a key target for promoting favourable condition of these habitats.	90% of impacts Low to Low/Moderate
Flushes	This community is influenced by both grazing and trampling impacts. It tends to be a favoured habitats for foraging and also can be favoured as routes through taller vegetation or to traverse steeper ground. High impacts lead to significant deterioration of these habitats, while Moderate impacts can help prevent the crowding out of some of the smaller cushion and mat forming species, but are likely to lead to the loss of any tall-herb elements. Low impacts are likely to promote a stable favourable condition.	75% of impacts Low to Low/Moderate Up to 25% impacts Moderate
Tall Herbs	Tall herbs tend to have limited distribution as a result of the history of grazing and browsing. Browsing impacts are probably of greatest significance. High impacts will lead to significant deterioration and Moderate impacts will likely lead to some decline, but can help to maintain species diversity. The habitat is likely to be stable at higher altitudes under low impacts, but may be colonised by trees and shrubs at lower altitudes.	90% of impacts Low to Low/Moderate
Salix Scrub	Montane willows also tend to be restricted to less accessible locations where they can experience Low impacts, but otherwise might be more extensive. High and Moderate impacts are likely to lead to the loss and reproductive isolation of these plants. Low impacts are likely to promote the greatest diversity of characteristic species and allow flowering and seed setting.	90% of impacts Low
Dwarf Shrub heath	Browsing impacts on dry heaths tend to be more significant for the condition of the habitat than trampling and dunging. Under High browsing impacts there may be a reduction in the cover of dwarf shrubs, for vegetation to be short and consequently reduced nesting opportunities for moorland birds. Conversely Low impacts will promote dwarf shrub cover, but will tend to produce a taller, less diverse structure. Moderate impacts will tend to create the most diverse structure, but may still lead to localised loss of dwarf shrub cover in the long-term. A small proportion of samples in the Moderate range may help to maintain structural diversity.	90% of impacts Low to Low/Moderate
Blanket Bog	Trampling impacts on blanket bog tends to be more significant than browsing impacts (as these habitats are not particularly attractive for foraging and soft ground makes them sensitive to trampling). Moderate or higher impacts may lead to a deterioration of these habitats; disruption of the <i>Sphagnum</i> moss species and potentially erosion.	90% of impacts Low to Moderate to Low.

7. Results

7.1 Overall DMG

The overall overall results for the whole DMG (230 plots) are presented in Table 5 and show that:

1. Overall Browsing on Dwarf Shrub Heath and Blanket Bog: **69% Low**.
2. Browsing on Dwarf Shrub Heath: **62% Low**. Sheep associated with 73% of High Impacts and 30% of Moderate Impacts
3. Browsing on Blanket Bog: **84% Low**. Sheep associated with 67% of High Impacts and 44% of Moderate Impacts
4. Trampling on Blanket Bog: **91% Low**.

In addition, trampling on Dwarf Shrub Heath was 100% L/M (Figure 10).

Table 5: Overall DMG results

1. Overall Browsing	Low	Moderate	High	Total	% LOW	% MOD	% HIGH
Dwarf Shrub Heath	97	30	30	157	62%	19%	19%
Blanket Bog	61	9	3	73	84%	12%	4%
	158	39	33	230	69%	17%	14%

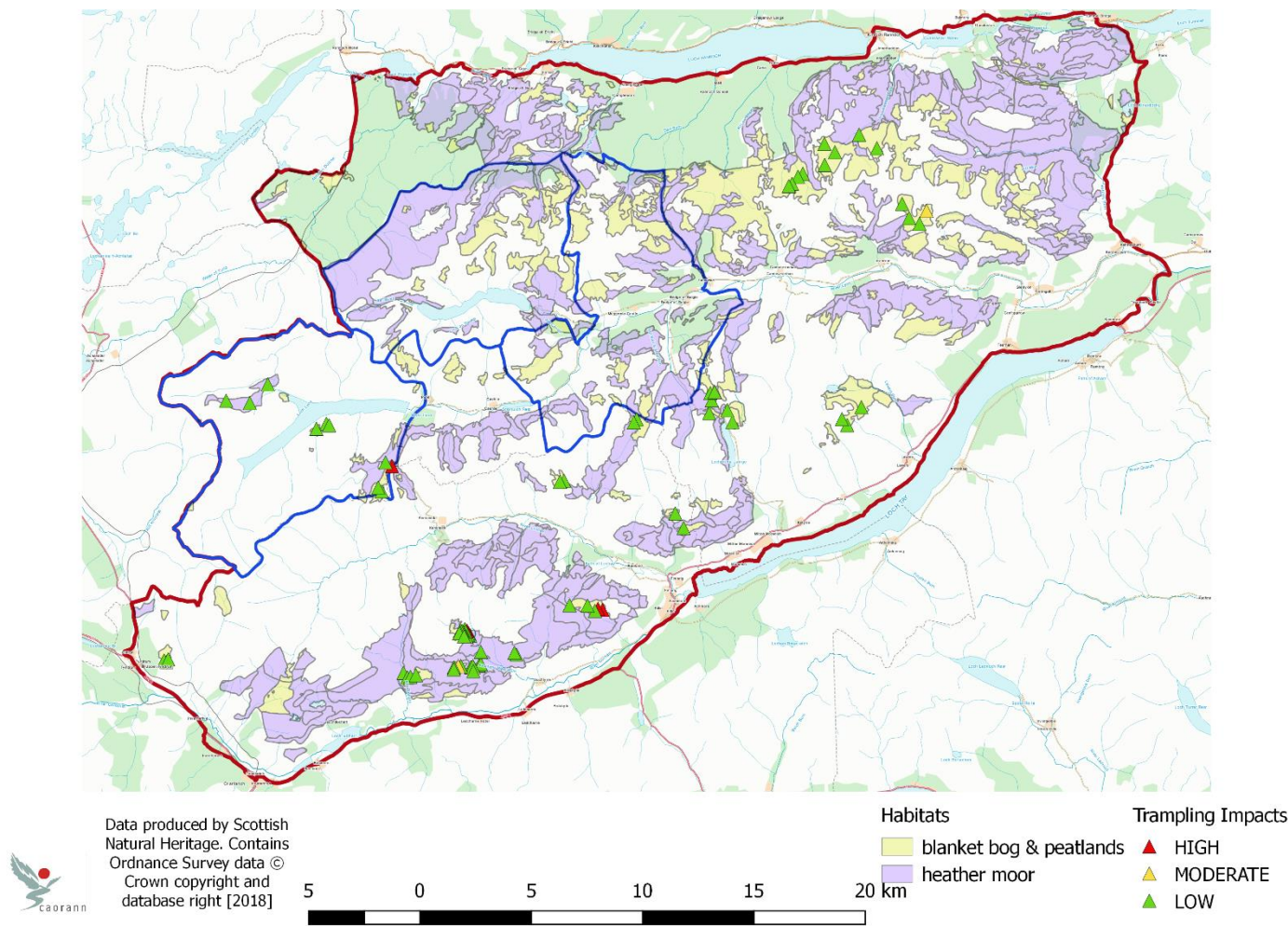
2. Browsing DSH	Low	Moderate	High	Total	% LOW	% MOD	% HIGH
Dwarf Shrub Heath	97	30	30	157	62%	19%	19%
Sheep Present	54	9	22				
% Sheep Present	56%	30%	73%				

3. Browsing BB	Low	Moderate	High	Total	% LOW	% MOD	% HIGH
Blanket Bog	61	9	3	73	84%	12%	4%
Sheep Present	11	4	2				
% Sheep Present	18%	44%	67%				

0

4. Trampling BB	Low	Moderate	High	Total	% LOW	% MOD	% HIGH
Blanket Bog	69	3	4	76	91%	4%	5%
Sheep Present	16	0	0				
% Sheep Present	23%	0%	0%				

Figure 10: Overall Trampling Impacts



6.2 North West Sub Area

The overall results for North West Sub Area (19 plots) in Table 6 show that:

1. Overall Browsing on Dwarf Shrub Heath and Blanket Bog: **31% Low**.
2. Browsing on Dwarf Shrub Heath: **11% Low**. Sheep associated with 67% of High Impacts and 40% of Moderate Impacts
3. Browsing on Blanket Bog: **57% Low**. Sheep associated with 50% of High Impacts
4. Trampling on Blanket Bog: **90% Low**.

Table 6: 2018 Results for North West Sub Area

1. Overall Browsing	Low	Moderate	High	Total	% LOW	% MOD	% HIGH
Dwarf Shrub Heath	1	5	3	9	11%	56%	33%
Blanket Bog	4	1	2	7	57%	14%	29%
	5	6	5	16	31%	38%	31%

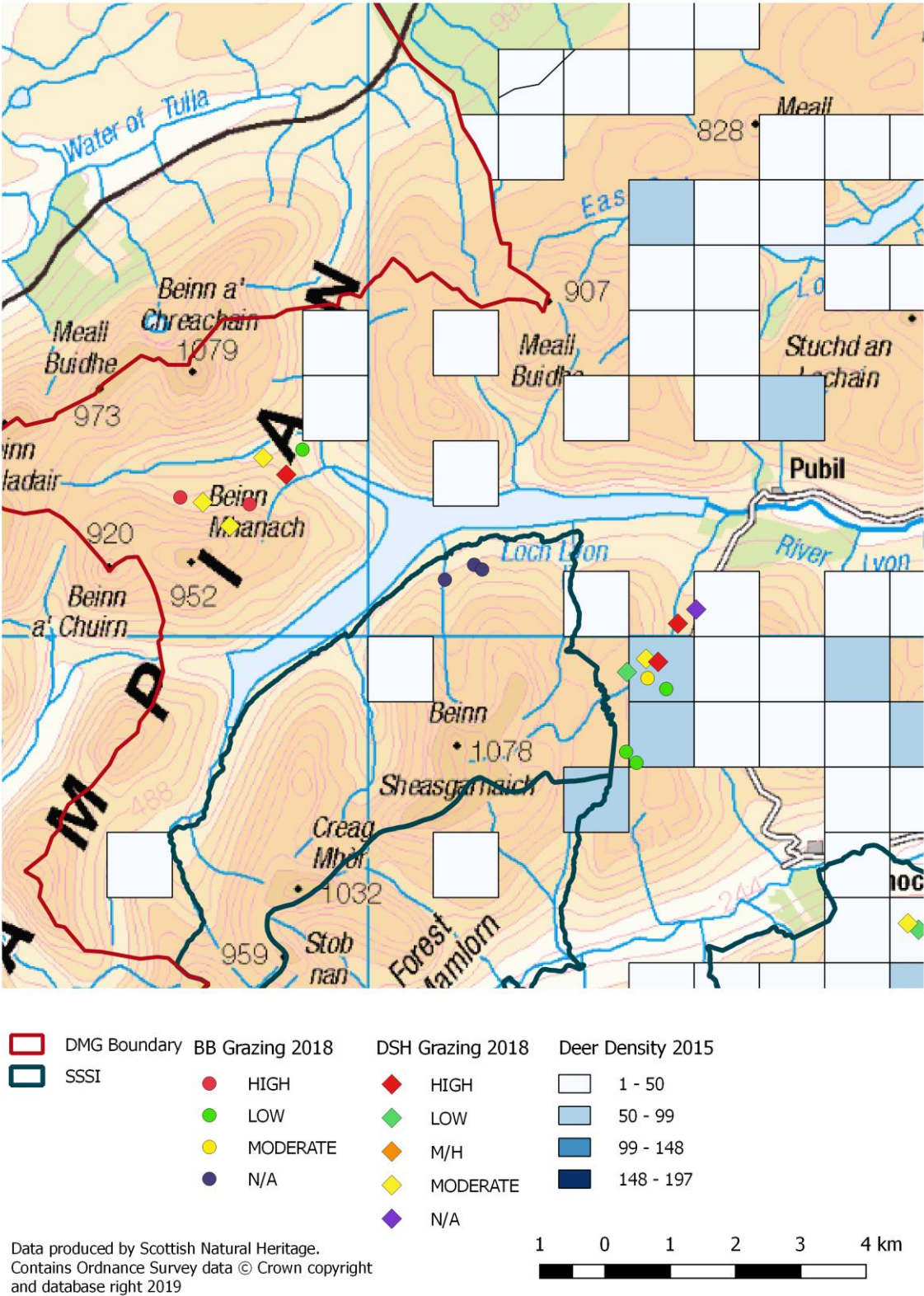
2. Browsing DSH	Low	Moderate	High	Total	% LOW	% MOD	% HIGH
Dwarf Shrub Heath	1	5	3	9	11%	56%	33%
Sheep Present	1	2	2				
% Sheep Present	100%	40%	67%				

3. Browsing BB	Low	Moderate	High	Total	% LOW	% MOD	% HIGH
Blanket Bog	4	1	2	7	57%	14%	29%
Sheep Present	1	0	1				
% Sheep Present	25%	0%	50%				

0

4. Trampling BB	Low	Moderate	High	Total	% LOW	% MOD	% HIGH
Blanket Bog	9	0	1	10	90%	0%	10%
Sheep Present	5	0	0				
% Sheep Present	56%		0%				

Figure 11: Grazing/Browsing Impacts North West Sub Area



6.3 North East Sub Area

The overall results for the North East Sub Area (60 plots) in Table 7 show that:

1. Overall Browsing on Dwarf Shrub Heath and Blanket Bog: **82% Low**.
2. Browsing on Dwarf Shrub Heath: **79% Low**.
3. Browsing on Blanket Bog: **92% Low**.
4. Trampling on Blanket Bog: **92% Low**.

Table 7: 2018 Results for North East Sub Area

1. Overall Browsing	Low	Moderate	High	Total	% LOW	% MOD	% HIGH
Dwarf Shrub Heath	37	7	3	47	79%	15%	6%
Blanket Bog	12	1	0	13	92%	8%	0%
	49	8	3	60	82%	13%	5%

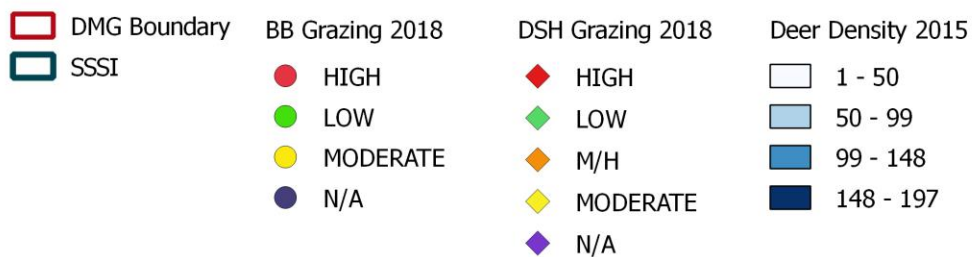
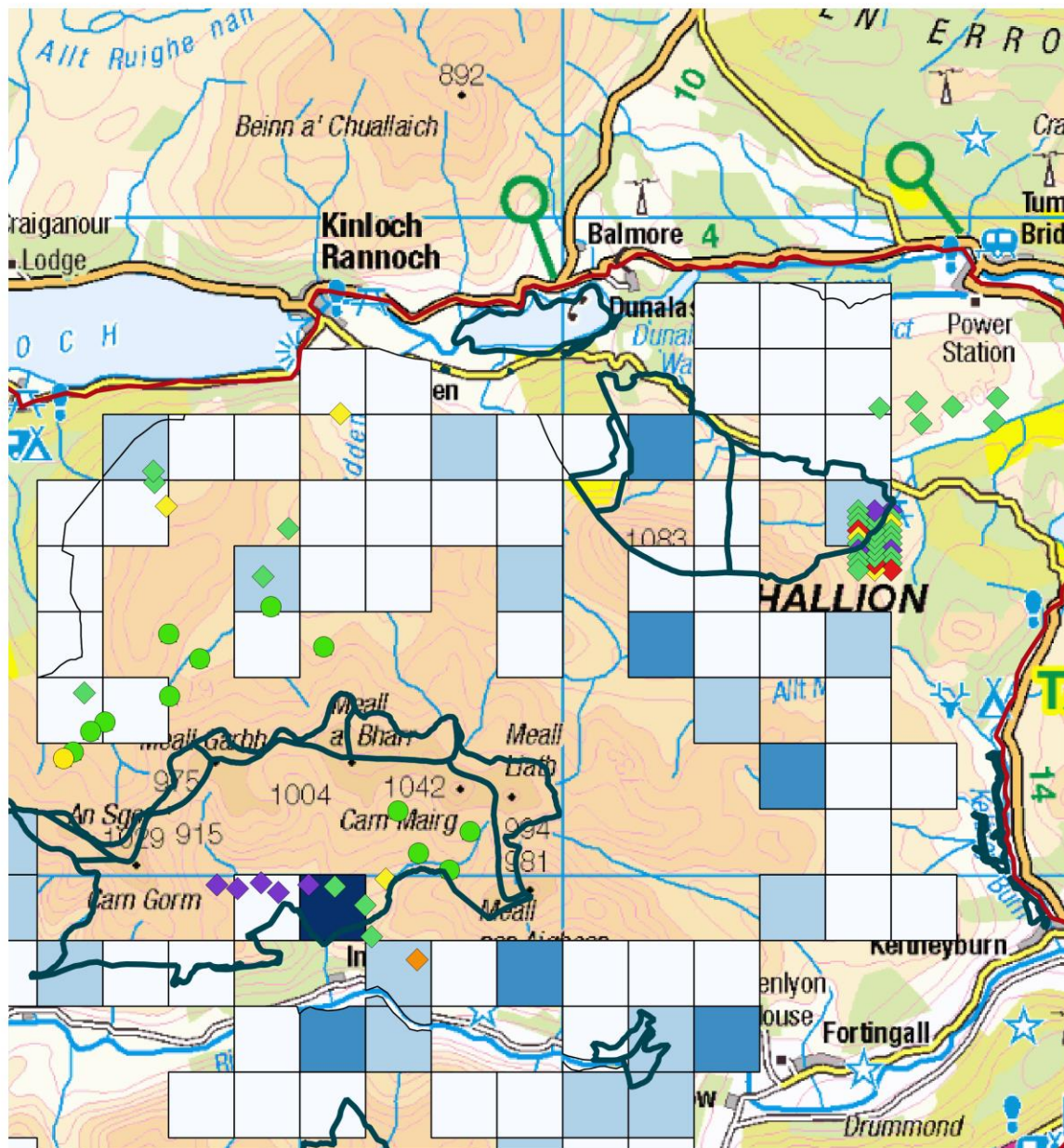
2. Browsing DSH	Low	Moderate	High	Total	% LOW	% MOD	% HIGH
Dwarf Shrub Heath	37	7	3	47	79%	15%	6%
Sheep Present	2	1	0				
% Sheep Present	5%	14%	0%				

3. Browsing BB	Low	Moderate	High	Total	% LOW	% MOD	% HIGH
Blanket Bog	12	1	0	13	92%	8%	0%
Sheep Present	1	0	0				
% Sheep Present	8%	0%					

0

4. Trampling BB	Low	Moderate	High	Total	% LOW	% MOD	% HIGH
Blanket Bog	12	1	0	13	92%	8%	0%
Sheep Present	1	0	0				
% Sheep Present	8%						

Figure 12: Grazing/Browsing Impacts North East Sub Area



Data produced by Scottish Natural Heritage.
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6.4 Mid Sub Area

The overall results for the Mid Sub Area (44 plots) in Table 8 show that:

1. Overall Browsing on Dwarf Shrub Heath and Blanket Bog: **39% Low**.
2. Browsing on Dwarf Shrub Heath: **8% Low**. Sheep associated with 87% of High Impacts and 29% of Moderate Impacts.
3. Browsing on Blanket Bog: **75% Low**. Sheep associated with 60 % of Moderate Impacts.
4. Trampling on Blanket Bog: **90% Low**.

Table 8: 2018 Results for Mid Sub Area

1. Overall Browsing	Low	Moderate	High	Total	% LOW	% MOD	% HIGH
Dwarf Shrub Heath	2	7	15	24	8%	29%	63%
Blanket Bog	15	5	0	20	75%	25%	0%
	17	12	15	44	39%	27%	34%

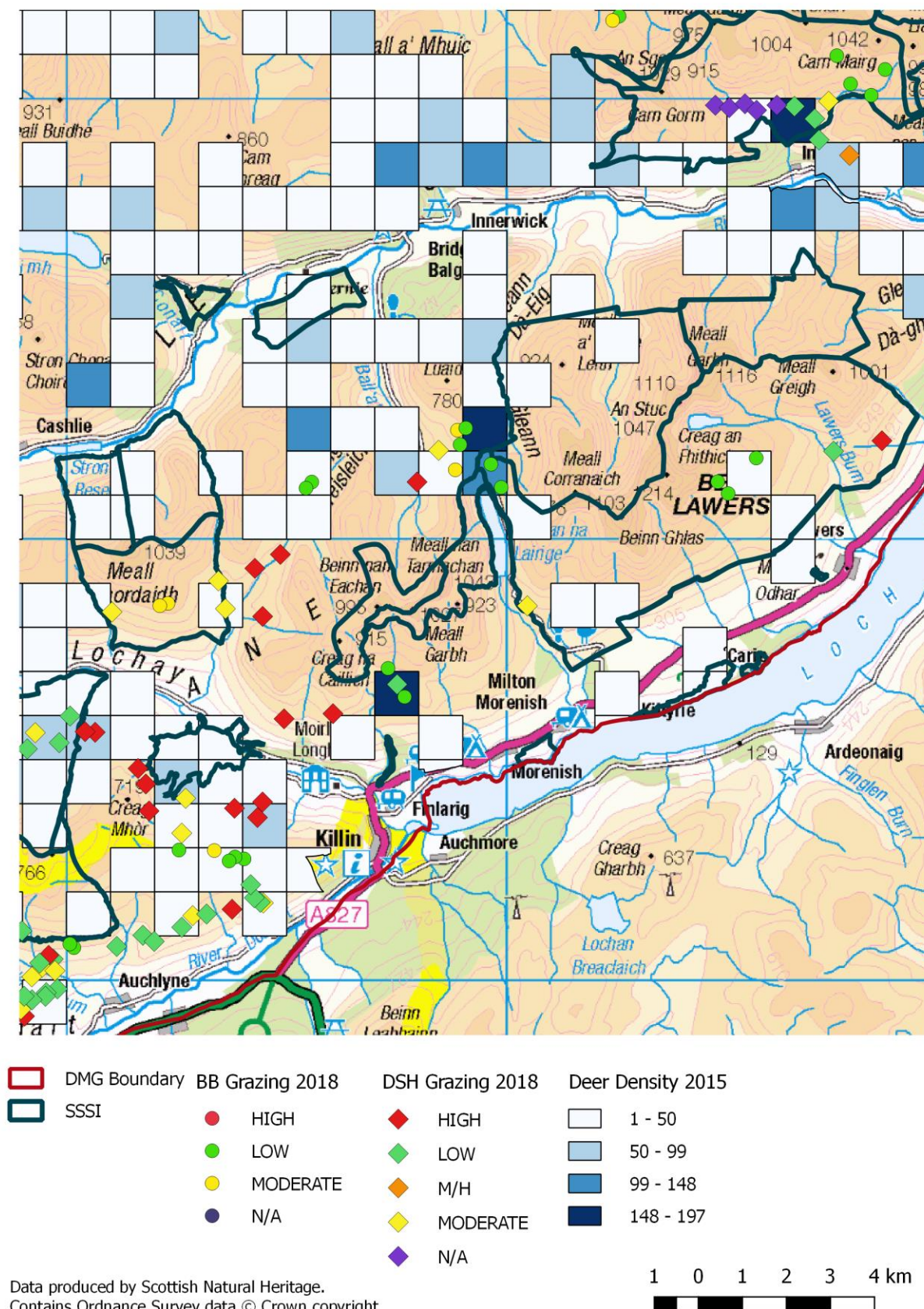
2. Browsing DSH	Low	Moderate	High	Total	% LOW	% MOD	% HIGH
Dwarf Shrub Heath	2	7	15	24	8%	29%	63%
Sheep Present	0	2	13				
% Sheep Present	0%	29%	87%				

3. Browsing BB	Low	Moderate	High	Total	% LOW	% MOD	% HIGH
Blanket Bog	15	5	0	20	75%	25%	0%
Sheep Present	5	3	0				
% Sheep Present	33%	60%					

0

4. Trampling BB	Low	Moderate	High	Total	% LOW	% MOD	% HIGH
Blanket Bog	18	0	2	20	90%	0%	10%
Sheep Present	8	0	0				
% Sheep Present	44%						

Figure 13: Grazing/Browsing Impacts Mid Sub Area



6.5 Sub Area 4: South

The overall results for South Sub Area (110 plots) in Table 9 show that:

1. Overall Browsing on Dwarf Shrub Heath and Blanket Bog: **79% Low**.
2. Browsing on Dwarf Shrub Heath: **74% Low**. Sheep associated with 78% of High Impacts and 55% of Moderate Impacts.
3. Browsing on Blanket Bog: **91% Low**. Sheep associated with 100% of High Impacts and 50% of Moderate Impacts.
4. Trampling on Blanket Bog: **91% Low**.

Table 9: 2018 Results for Mid Sub Area

1. Overall Browsing	Low	Moderate	High	Total	% LOW	% MOD	% HIGH
Dwarf Shrub Heath	57	11	9	77	74%	14%	12%
Blanket Bog	30	2	1	33	91%	6%	3%
	87	13	10	110	79%	12%	9%

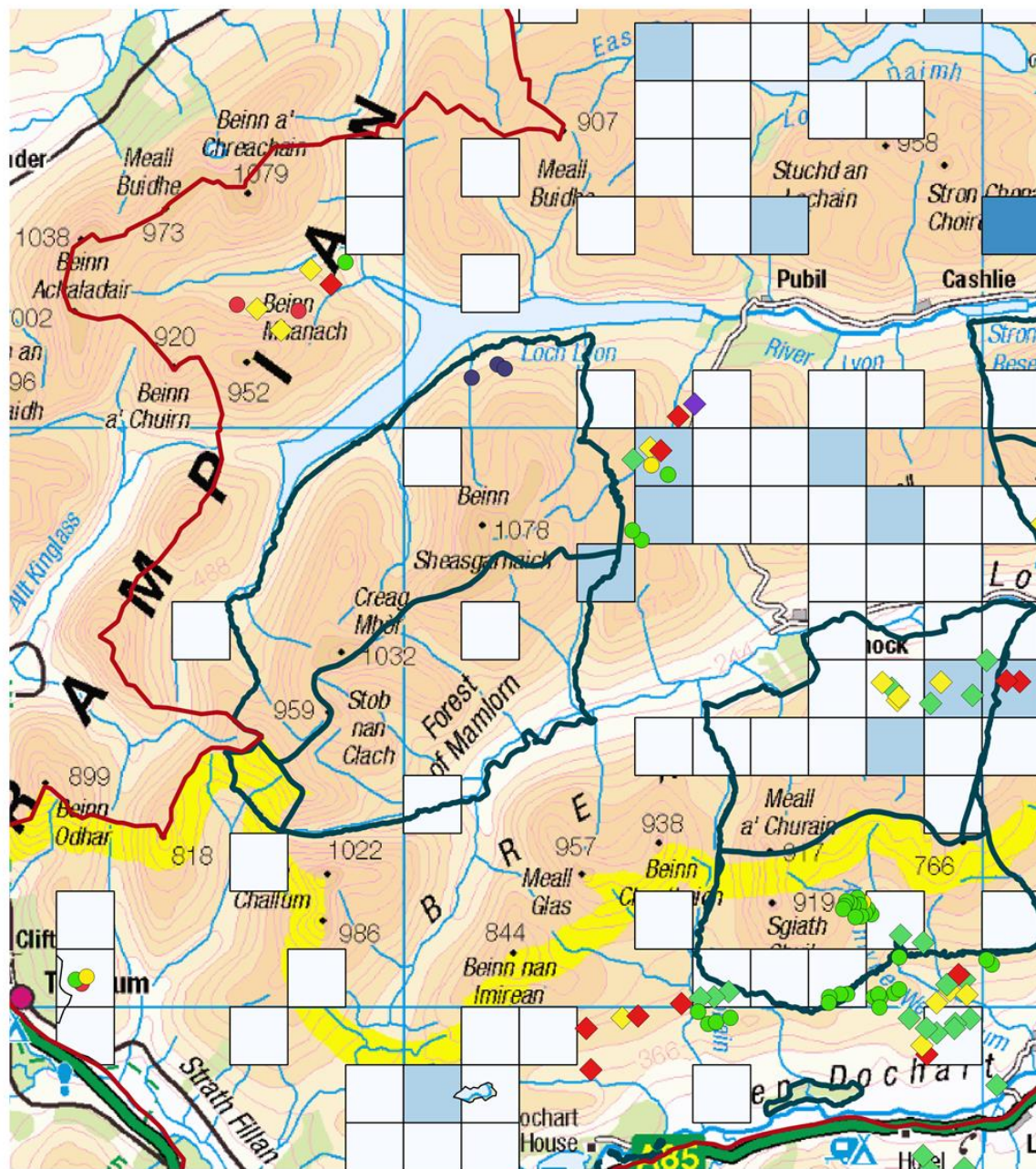
2. Browsing DSH	Low	Moderate	High	Total	% LOW	% MOD	% HIGH
Dwarf Shrub Heath	57	11	9	77	74%	14%	12%
Sheep Present	33	6	7				
% Sheep Present	58%	55%	78%				

3. Browsing BB	Low	Moderate	High	Total	% LOW	% MOD	% HIGH
Blanket Bog	30	2	1	33	91%	6%	3%
Sheep Present	0	1	1				
% Sheep Present	0%	50%	100%				

0

4. Trampling BB	Low	Moderate	High	Total	% LOW	% MOD	% HIGH
Blanket Bog	30	2	1	33	91%	6%	3%
Sheep Present	2	0	0				
% Sheep Present	7%						

Figure 14: Grazing/Browsing Impacts South Sub Area



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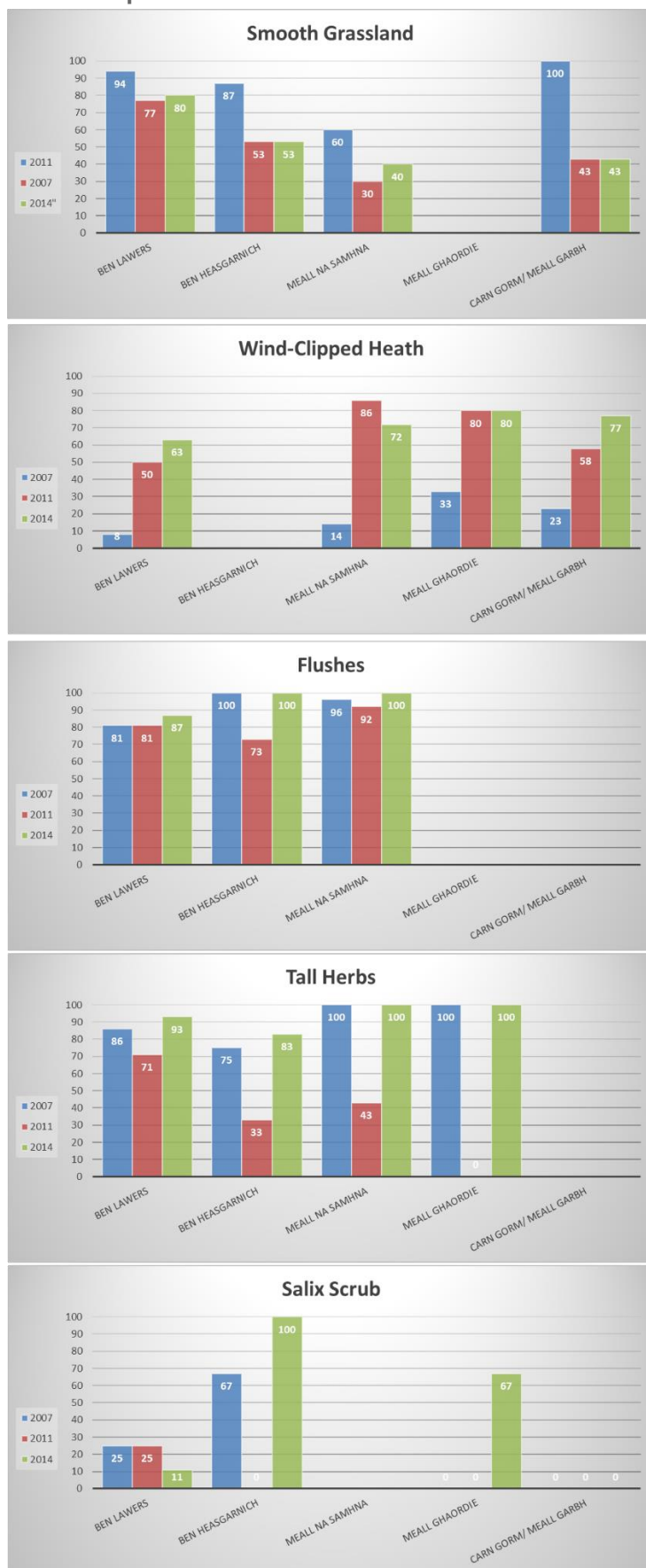
6.6 Designated Sites in 2014

A repeat habitat condition assessment survey was carried out in 2014 by Dayton et al for Breadalbane DMG. Current trampling and grazing impacts were surveyed for five upland habitat types: smooth grassland, wind-clipped heath, flushes, tall herbs and salix scrub. The information in Table 10 and Figure 15 summarises the changes in impacts across 5 habitat types between 2007 and 2014.

Table 10: Results from 2014 HIA Report (Dayton et al.)

		Smooth Grassland 90% LM,M,MH		Wind-Clipped Heath 90% L, LM		Flush 75% L, LM		Tall Herb 90% L, LM	Salix scrub 90% L	
		Grazing	Trampling	Grazing	Trampling	Grazing	Trampling	Grazing	Grazing	Trampling
Ben Lawers	2007	94	100	8	88	81	55	86	25	63
	2011	77	100	50	88	81	69	71	25	0
	2014	80	86	63	96	87	69	93	11	0
Ben Heasgarnich	2007	87	100			100	61	75	67	0
	2011	53	95			73	80	33	0	0
	2014	53	86			100	50	83	100	0
Meall na Samhna	2007	60	50	14	85	96	46	100		
	2011	30	100	86	100	92	67	43		
	2014	40	90	72	100	100	66	100		
Meall Ghaordie	2007			33	73			100	0	0
	2011			80	86			0	0	0
	2014			80	93			100	67	0
Carn Gorm/ Meall Garbh	2007	100	72	23	89				0	100
	2011	43	86	58	64				0	0
	2014	43	100	77	97				0	0

Figure 15: Changes in Habitat Impacts across 5 SSSIs



From the 2014 report, the following summaries were provided:

Ben Lawers SAC/SSSI:

- Grazing and trampling impacts were predominantly in the Low and Moderate-Low classes for all habitats, except for wind-clipped vegetation where about 50% were in the Moderate class, as in 2011.
- The most evident change was a shift in grazing and trampling impacts on wind-clipped vegetation from Moderate to Moderate-Low and Low impacts.
- Higher impacts in fairly similar locations to 2011 with areas such as Beinn Ghlas and the Tarmachan ridge still showing some Moderate and High-Moderate grazing impacts, on wind-clipped communities in particular. A group of Moderate grazing and trampling impacts on flushes was also noted from the valley east of Meall Corranaich and Meall a Choire Leith.

Ben Heasgarnich SAC/SSSI:

- Grazing impacts continue to be Low or Moderate-Low. Montane willow especially was little grazed in 2014, and trampling levels in this feature were also Moderate-Low.
- The decrease was most notable in tall herb and montane willow vegetation where levels have returned to 2007 levels and below.
- Trampling levels have increased slightly in grasslands and flushes. Small patches of bare ground were most widespread in grassland plots, especially in areas with obvious sheep grazing.

Meall na Samhna SSSI/SAC:

- Light decrease in impacts since 2011, with grazing impacts were generally Low and Moderate-Low for all habitats.
- Trampling impacts were also generally Low and Moderate-Low on most habitats, particularly on wind-clipped vegetation.
- Some Moderate trampling impacts were noted on flush vegetation around the flanks of Sgiath Chrom and Sgiath Chuil. Flushes are sensitive to trampling as the small herbs and mosses within wet ground can be easily uprooted.

Meall Ghaordie SSSI:

- Herbivore levels are now at an acceptable level for most of the site, with the exception of Meall Ghaordie summit plateau where impacts on wind-clipped vegetation have increased
- Decrease in impacts on montane willow vegetation, with few current grazing impacts recorded in 2014.
- Grazing levels were higher in willow plots assessed for Site Condition monitoring in the Cam Chreag area, probably reflecting the higher number of sheep still present there.

Carn Gorm, Meall Garbh SSSI:

- Impact levels were predominantly Low or Moderate-Low for all habitats
- Slight decrease in impacts across all habitats with the assessment results for most squares staying the same or decreasing.
- The few Moderate and High impacts recorded are still clustered to the north-east of the site along the high ridges and between Carn Gorm and Meall Garbh.

8. Discussion and Recommendations

7.1 Overall Changes in Impact 2007 to 2014

Between 2007 and 2014, repeat Habitat Impact Assessments carried out by Dayton et al, showed that overall impacts had been decreasing across the five Designated sites with Low and Moderate-Low impacts dominant for all habitats. This overall change corresponds with an overall reduction in both sheep and deer. Past management across the Breadalbane Hills range has been predominantly sheep but some of the larger sheep estates have reduced sheep stocking densities, for example north Ben Heasgarnich, and west Ben Lawers and this is likely to have contributed to much of the overall decrease in impacts.

It was noted that although impacts on tall herbs and dwarf willow vegetation were generally found to be Low or Moderate-Low, these were only really present at less accessible locations and are only thriving in situations where herbivores have been excluded. It would appear that both willow and tall-herb habitats are limited by herbivores and would be considerably more extensive if grazing were excluded from other areas of flushed open rock.

In 2014, some areas still showed local clusters of moderate and high impacts. Of particular note were grazing impacts on the wind-clipped communities of the high ridges on west Meall na Samhna (South Sub Area), the summit of Meall Ghaordie and east of Ben Lawers and Beinn Ghlas (Mid Sub Area) and the high ridge around the north and east of the Carn Gorm/Meall Garbh SSSI (North Sub Area). The areas highlighted above as still indicating Moderate and High impacts are all those where sheep are still managed at moderate stocking densities. They are also areas of highest deer densities in the Group area (Figure 6).

7.3 Sub Area 1: North West

In 2014, the overall results for Ben Heasgarnich suggested continuing moderate and low impact levels across the site following a strong drop in impacts between 2007 and 2011 but with very little change noted between 2011 and 2014. There was a slight increase in bare-ground patches and a thinning of litter within smooth grassland plots indicating an increase in herbivory on exposed plots, though grassland plots of the less attractive flanks of the hills were generally under-grazed, making a balance hard to achieve. In general, it was found that impacts to all habitats were at acceptable levels and that a stable situation, tending towards more Chronic Low indications would be expected.

Although the sample size was small results from the HIA monitoring in 2018 found overall browsing distributed evenly between the Low, Moderate and High categories, with sheep associated with half of the browsing impacts. This is consistent with Dayton's report which indicated that sheep were widespread on the upper slopes, especially along the ridges and in Coire Ban Mor to the East, where higher grazing and trampling impacts were recorded. The deer density in this area of the DMG is relatively low although the results of the foot count in 2017 indicated an increase in density in this area from 11 deer per km² in 2015 to 14 deer per km² which may lead to an increase in impacts.

Dayton commented that grazing levels in grasslands remained too low for maintaining a good, structurally and floristically diverse sward in many areas whereas the current grazing pressure on dwarf shrub heath maybe considered to be higher than desirable. Grasslands have a medium vulnerability to overgrazing, blanket bog has a medium vulnerability to overgrazing and dwarf shrub heath a low to medium vulnerability to overgrazing. Without further detailed analysis it is difficult to conclude what management measures if any may be required.

7.4 North East Sub Area

The 2014 HIA report indicated that impacts had decreased on Carn Gorm, Meall Garbh SSSI, especially for wind-clipped and grassland habitats, with a general shift from Chronic High to Chronic Low indications across most of the SSSI. The 2018 HIA results would indicate that this trend has been maintained in this Sub Area with the majority of browsing and trampling impacts falling in the Low impacts category. Sheep are associated with relatively few moderate impacts so deer are likely to be the main impacting herbivore in this Sub Area.

As the overall deer density has remained stable between 2015 and 2017, provided deer numbers don't increase, it is suggested that the level of impacts currently being experienced is sustainable for both the designated and wider habitats.

7.5 Mid Sub Area 3

There are two designated sites within the Mid Sub Area. In 2014, most habitats on Ben Lawers SAC/SSSI were found to be improving in condition. The increase in the number of squares indicating a Chronic Low impact showed that the structure of those vegetation communities is changing away from the issues caused by herbivory such as an overabundance of fine-leaved grasses in wind-clipped heath and poached ground in flushes. The HIA results from 2018 also showed most of the browsing impacts falling in the Low category with localised Moderate and High browsing identified on lower slopes. However, the 2014 report found low levels of herbivory on lower slopes leading to 'undergrazing' of particularly smooth grassland in places, and this is likely to get more evident under current conditions. Ben Lawers is grazed across most of its extent by sheep and deer, and management is dependent on various landownerships. To the north, sheep numbers have been reduced across most of the area, particularly to the north-east where the ground is managed primarily for deer and relatively higher densities of deer can be seen in Figure 6 and Figure 13.

The 2014 report found decreasing impacts on Meall Ghaordie SSSI with the exception of the immediate main summit area, where grazing had increased in wind-clipped vegetation plots. This was attributed to both deer and sheep although changes in stock grazing patterns mean most sheep now excluded from the northern corries and cliffs for much of the year. In 2018, the wider area to the south of the designated site was found to have a high proportion of impacts on Dwarf Shrub Heath in the Moderate and High ranges. A significant proportion of High impacts (87%) were associated with sheep.

As deer densities in the areas of highest impact are relatively low and have overall remained stable from 2015 to 2017, it is likely that sheep are the main contributing factor to impacts in this area. Under current levels of grazing/browsing there may be a risk of reduction in the cover of dwarf shrubs, for vegetation to be short and consequently reduced nesting opportunities for moorland birds. Impacts should continue to be monitored in this area and possible actions to reduce sheep grazing considered.

7.6 South Sub Area

In 2014, decreasing impacts were recorded for all habitats on **Meall na Samhna SSSI/SAC**, including a general shift from Chronic High to Chronic Low indicators suggesting an improvement in habitat condition as well as impact levels. The main concern at this site was and still remains, the increase in signs of 'under-grazing' of smooth grassland habitat, especially around the flanks of the hills to the south. This was previously attributable to the decrease in sheep stocking levels on these habitats. Deer numbers have remained relatively stable since 2015. In 2018, the results of the HIA indicated that impacts (grazing and trampling) remain predominantly Low on Dwarf Shrub Heath and Blanket Bog.

As noted in 2014, a possible negative consequence of the decreasing grazing impact is under-grazing of species-rich *Nardus stricta* grassland. The proliferation of grasses and subsequent build-up of litter may result in a loss of species diversity in these grasslands since smaller herbs will be out-shaded and out-competed by taller, more vigorous herbs and grasses.

9. Summary

Overall, it was reported that in 2014 herbivore impacts were continuing to decrease across all habitats on all sites within the Breadalbane Hills. The trend indicators also suggested that for some habitats, the signs of long-term damage were fading and there was an increase in the number of samples indicating a long-term (chronic) Low impact. This implies an improving situation for general habitat condition. The results of the 2018 indicate a similar picture on the wider Dwarf Shrub Heath and Blanket Bog habitats in all but the Mid Sub Area, where relatively higher impacts were found. These were associated mainly with sheep and could result in habitat degradation if sustained over a period of time. Removing the Mid Sub Area from the Dwarf Shrub Heath analysis, increases the percentage of Low grazing impacts from 62% to 71% on Dwarf Shrub Heath for the remaining three Sub Areas.

The 2007 survey concluded that the density of sheep was a major factor dictating the levels of impact observed and, following the 2011 survey, decreases in impact were particularly noted where sheep stocking densities had been reduced. Since 2007, deer numbers across the DMG have also been reduced from 13,290 in 2008 (17 deer per km²) to 9,071 in 2017 (12 deer per km²). The Deer Management Group has met the overall target density as set out in the DMP and the evidence from both the 2014 HIA report and the results of the 2018 HIA would suggest that impacts are moving towards a sustainable range for most of the habitats within the DMG, with the exception of smooth grasslands which may require higher levels of browsing than currently being experienced and Salix scrub which are currently not found outwith locations inaccessible to most herbivores and which would require a significantly lower density of herbivores to regenerate without the use of fencing. Both undergrazing and overgrazing may result in a loss of biodiversity and the Group may now have to prioritise habitats for further action.

Moving forwards, if the DMG members wish to address the remaining localised impacts, it is likely that effective deer and sheep management decisions will have to consider more than just the overall population size and take full account of a range of factors in determining the appropriate stocking density for the Breadalbane Hills area. Research has shown that the activities of deer and other free-grazing herbivores are not distributed evenly across the landscape and the availability of key resources such as shelter, access to water as well as the quality and quantity of preferred vegetation types will all influence where, when and how the landscape is utilised. Distribution may also be influenced by other factors such as human activity through disturbance, live-stock grazing or exclusion from preferred habitats.

10. References & Acknowledgements

Dayton N. M. (2014). Site Condition Monitoring Survey of Notified Features on Designated Sites, Meall na Samhna 2014, SNH Battleby.

JNCC (2006&2008) *Common Standards Monitoring Guidance Notes*
<http://www.jncc.gov.uk/csm/guidance/upland.htm>.

MacDonald A. Stevens P, Armstrong H., Immirzi P and Reynolds P. (1998). A Guide to Upland Habitats, Surveying Land Management Impacts. Part 1 and 2. Scottish Natural Heritage, Battleby.

Rodwell J.S. (Ed) (1990-2001). British Plant Communities Vols 1-5. Cambridge University Press.

Stace C. (1997). New Flora of the British Isles (2nd edition). Cambridge University Press.

Wild Deer Best Practice Guidance (2008) Deer Commission for Scotland.

Breadalbane Deer Management Plan (2016) Victor Clements.

The author would like to thank the Chair and Secretary of Breadalbane DMG (Alan Cory Wright & Victor Clements) for useful discussion and assistance in the production of this report.

