

I: Scots pine, 2: Birch, 3: Wet, 4: Oak, 5: Ash, 6: Atlantic hazel

Woodland habitats

Until 5,000 years ago as much as 80% of Scotland was wooded. Then, people and a changing climate caused progressive deforestation to a low point of around 4% woodland cover by the 18th century, when significant woodland planting by landowners began. Native woods today comprise both selfsown woods and areas that have been planted with native species at some time, and include a range of woodland types, such as the above.

In the last 100 years, forest and woodland cover in Scotland has increased from around 5% to 18.5%; this percentage is higher than the rest of the UK but is still well below the European Union (EU) average of 38%. The majority of this total area of forest and woodland in Scotland is comprised of plantations of coniferous and broadleaved species.

This guidance is applicable to all types of forest and woodland, although where more commercial species or objectives exist (for example to establish trees to a specific density) other site-specific targets may be set.

Why assess impacts within woodlands?

All woodlands in Scotland have been subject to various forms of grazing management over many decades. When impacts are low, this can be beneficial to both the woodland and animals, but high impacts have often resulted in an interruption in tree recruitment (succession); leading to woodlands with mature trees but few young trees or recent regeneration. These woods usually also lack an understorey of shrubs and have few flowering plants due to the sustained level of herbivore impacts.

The Native Woodland Survey of Scotland (2006-2010) found that only 46% of all native woodlands were in satisfactory overall health for biodiversity. The survey also found that the most frequent issue affecting native woodlands was herbivore impact, with 33% (103,506 ha) of the total area of native woodlands recorded as highly or very highly impacted.

Herbivores are therefore currently the most significant factor affecting woodland condition, with woodland structure, composition and productivity all significantly impacted by grazing and browsing.

Woodlands are dynamic habitats that change over time, and in response to a range of environmental pressures such as climate, pests and pathogens, invasive non-native species (INNS) and of course herbivores. These changes can be monitored using a number of different tools depending on management objectives. It may be helpful to think of woodlands as being on an ecological trajectory from establishment through to a mature and complex ecosystem, and eventually into decline as individual trees get old, die and create opportunities for the process to start all over again through regeneration in the gaps, known as "understorey re-initiation" (see Diagram 1).

Regular monitoring of the ecological condition of your woodland should include consideration of the impacts herbivores may be having. This is a specific requirement of UKFS where owners are expected to Monitor forest damage, and intervene to protect vulnerable trees from browsing and grazing mammals, including voles, deer, rabbits, hares, grey squirrels and livestock. The UKFS states that in areas where deer are a threat, (you should) develop and monitor deer management plans – ideally in co-operation with neighbours and local deer management groups.

Monitoring will enable you to decide where your woodland is on the ecological trajectory, and then allow you to develop a set of actions designed to move the woodland towards an appropriate point on the trajectory. Remember that ecologically healthy woodlands invariably have a positive impact on the health and quality of deer.

What tools are available to assess herbivore impacts?

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There are a number of different tools available that can be used to provide an assessment of the current level of herbivore impact in your woodland, and these are summarised in Table I below ranked in order of the preferred method, together with a brief description of each method, how it should be used, and an indication of the level of expertise or training required. The first three methods in Table I are concerned with assessing woodland condition for ecological restoration purposes, and the latter two are intended to assess economic damage of herbivore impacts on trees, intended predominately for use in commercial plantations.

It is important to understand the difference between the overall condition of the wood (which is the result of a combination of historic management with historic and current environmental pressures) and the current level of herbivore impact. It is possible for current herbivore impacts to be low, but for the woodland still not to be in good condition due to a range of other factors including historic management, soil moisture/drainage and lack of an appropriate seed source.

Woodland herbivore impact assessment tools ranked in order of preferred method

ΤοοΙ	Description	Expertise/ training
Woodland Herbivore Impact Assessment tool	The WHIA uses 7 key indicators to assess the current level of browsing of the woodland. Provides an indication of the level of current herbivore impact on tree recruitment and woodland ecosystem. Normally assessed by measuring the indicators at 10 stops	••
Plot based approach:	This 'Seedling Sampling Assessment' approach provides a slightly more quantitative assessment of the level of tree recruitment into the wood. This method does not make any assessment of impacts on the woodland habitat	٠
10m method	This provides detailed quantitative assessment of the impact of herbivores on tree recruitment and the woodland ecosystem and may be used where more statistically robust data on herbivore impacts is required	•••
Nearest neighbour	Only intended to assess economic damage of herbivore impacts on trees. This method is most appropriate when a single damage assessment on a particular compartment is needed. Used predominately for commercial plantations.	٠
Stand Density Assessment - SDA	Only intended to assess planting densities and economic damage of herbivore impacts on trees. Used predominately for commercial plantations.	٠

some training and basic knowledge of woodland habitat and plant id required

🗰 prior knowledge of woodland habitats and monitoring essential

How these methods will be integrated into management

In order to consider the impacts that herbivores are having on the condition of native woodland, and for the woods to be placed on a trajectory to favourable condition to meet management requirements for the grant programme, the following system of monitoring is proposed:

- The Woodland Herbivore Impact Assessment (WHIA) should be used to determine if the desired trajectory of woodland improvement is being met, or if herbivores are limiting this. This is especially important where tree seedlings/saplings are currently absent, for this method allows an assessment of the impact of herbivores to be based on more than just tree seedling/sapling damage, as it incorporates an annual assessment of tree, site and understorey vegetation condition in relation to herbivore impacts.
- The Plot-based approach which measures damage to tree regeneration, can be used to compare plots measured on different occasions to show specifically if there has been any change in damage over the same period of time herbivore management effort has been supported through e.g. grant.

Additional information, such as cull records and dung pellet assessments (covered in other guides) can provide some additional insight into how deer are using woodlands. While this is of limited value in informing cull targets from an overall population perspective, understanding this occupancy and how it relates to herbivore impact data is useful for informing targeted cull planning.

Undertaking WHIA for the first time will establish a baseline by determining the extent to which herbivores are impacting on the current condition of the woodland. Through future successive WHIA we can then begin to understand whether herbivore management intended to improve woodland condition is being effective.

SUIDANCE

In woodlands which are not part of a grant scheme, a WHIA should be undertaken every three years to ascertain whether the management is having the desired impact. Managers may consider supplementing this with a plot based seedling approach if it is considered this would add value in line with objectives for a particular woodland.

Herbivore impact monitoring should be linked through a forest management plan to indicate whether (or not) current management is leading to a direct improvement in woodland condition (refer to Diagram 1).

In a grant scheme situation, and in order to comply with its requirements, the WHIA should be repeated annually as part of ongoing management, which will enable an annual adjustment of livestock numbers or wild herbivore culls. Cull data will be submitted annually and dung pellet based monitoring to assess deer occupancy levels will be undertaken at the beginning and end of each five year period to assess whether the woodland is on the right trajectory towards improvement, and whether grant can be paid. Where additional quantitative data on herbivore impacts is required, the plot based method can be added in years one and five.

This information will provide feedback on the woodland's response to herbivore management giving both an immediate annual assessment of the response to deer or livestock management, as well as a periodic quantitative measure of the improvement in woodland condition

How this approach will fit with incentives and regulation

Annual culls should be recorded and reviewed each



year and if necessary adjusted so that woods are on the trajectory to good condition. There should be a proportionate improvement in woodland condition each year to show that the wood is moving along the trajectory in the right direction. However, it should be recognised that, depending on site type and environmental conditions, it may take longer than a single five year cycle of grant for the target woodland condition indicators (set out in the woodland management requirements for the grant programme) to be delivered. Where this information points to impacts which agencies determine to be a decline in condition, then they will undertake further, more detailed assessment of the woodlands to inform discussion on the actions needed to remedy this.

The ecological trajectory: Woodland condition in response to reductions in herbivore impacts over time





20 - 50 years (depending on site type and environmental conditions)



*BPG Habitat Impact Assessment: Principles **BPG Habitat Impact Assessment: Principles in Practice ***BPG Blanket Bog Analysis Workbook ****BPG Habitat Impact Assessment: Interpretation and Management Actions * Guide to Upland Habitats, Surveying Land Management Impacts. Angus Macdonald, Penny Stevens, Helen Armstrong, Philip Immirzi and P Reynolds. SNH https://www.nature.scot/ guide-upland-habitats-surveying-land-management-impactsvolumes-1-and-2

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Diagram 4. The increased