Baildon Moor Bracken Management Plan

Contents

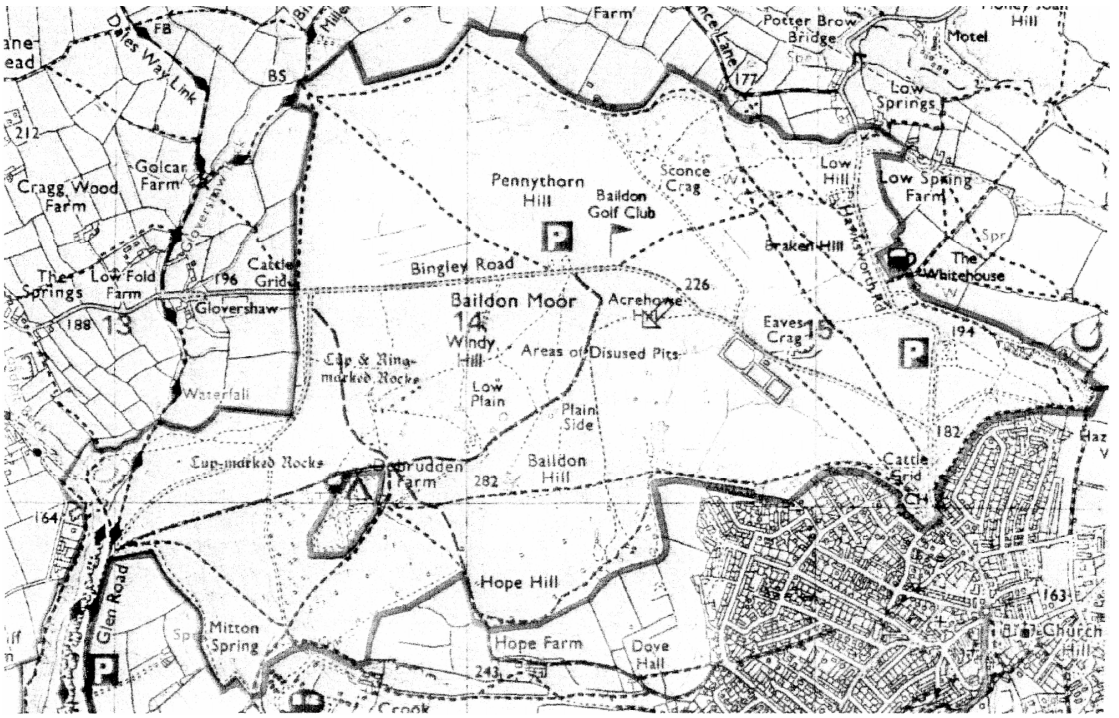
DRAFT V3

1. Introduction

1.1 General site description

Baildon Moor is an area of open moorland covering approximately 294 hectares and situated just to the north west of Baildon. Elevation ranges form 150m to 282m. It contains considerable nature conservation and historic/archaeological interest and is a popular site for public enjoyment. The extent of the site is shown in map 1 below.

Map 1. Baildon Moor Bracken Management Plan area. The area boundary is indicated by the red line.



The main habitats present are upland heathland, acid grassland and upland flushes. Other habitats include ponds, scrub and scattered young trees. Upland heathland, upland flushes and ponds are UK Biodiversity Action Plan Priority Habitats.

The moor is grazed by up to 130 sheep in any month (but none in November), subject to a winter average of 0.04 livestock units (LU) per hectare and a summer average of 0.07 LU/ha. 1 adult ewe is equivalent to 0.O8LU. The moor is in the Higher Level Stewardship Scheme (administered by Natural England) until Dec. 31 2020.

The moor contains considerable archaeological interest, ranging from pre-historic rock carvings, cairns, barrows and settlements to 19th century industrial archaeology. The West Yorkshire Archaeological Advisory Service holds records for 56 nationally designated historic environment sites and a further 27 non-nationally designated sites.

The main recreational activities are walking, horse riding and golf. The fairways of Baildon Golf Course occupy the northern and eastern parts of the moor.

1 .2 Objectives of the management plan

The objectives of this management plan are to:

1) Identify the location of the main areas of bracken on the moor.

2) Assess the condition of the bracken stands on the moor, for example density, leaf litter depth, underlying vegetation cover and encroachment on surrounding habitats.

3) Assess the suitability of the bracken on the moor for management measures. Relevant factors include:
a) The density of the bracken stand.
b) The condition and type of under canopy ground flora (if any).
c) Identify invasive species (e.g. Himalayan balsam) that may be present within bracken stands.
d) Slope gradient, and vulnerability to soil erosion following bracken removal.
e) Proximity to water courses, sensitive wetland habitats and other ferns; the need for buffer zones if herbicide spraying is recommended.
f) Accessibility to vehicles such as quad bikes, which may be employed in herbicide application.

4) Identify Bracken stands that will require habitat recreation works to be planned in advance of any bracken management being carried out. This applies to bracken with a dense litter layer and no underlying habitat (e.g. upland heathland) that can regenerate following bracken removal.

5) Identify Bracken stands that can be managed without the need to plan habitat recreation works in advance.

6) Recommend management methods to be used.

2 Bracken survey

A desk study was carried out in March 2011 to identify areas of bracken using aerial photographs. Between April and early May, a field survey was carried out to assess the condition of the bracken stands and suitability for management measures. The survey was carried out in spring because at this time of year it is possible to assess the condition and type of under canopy ground flora and the depth of the bracken litter layer.

3 Bracken survey results

The survey carried out during April and early May 2011 revealed that there are two types of bracken on Baildon Moor:

1) Moderately dense bracken that is spreading onto upland heathland or acid grassland vegetation and where a moderate to good cover of dwarf shrubs and *I* or acid grassland still remains under the bracken canopy. A example is shown in figure 1 below. This type of bracken usually occurs around the edges of large, dense stands of bracken.

Figure 1. Moderately dense bracken spreading onto upland heathiand dominated by heather and bilberry on the north west slope below Sconce Crag (grid ref SE145410)

2) Dense bracken with a deep litter layer, with sparse or no underlying vegetation.
This type of bracken accounts for over 85% of the bracken on Baildon Moor. It has a litter layer up to 25cm deep, or 80cm during the winter if the tangle of dead stems above the ground litter is included. Where present, underlying vegetation cover is less than 10% per square metre of canopy area. Species include mat grass, common bent, Yorkshire fog, heath bedstraw, bryophytes and bramble. A typical area of dense bracken with a deep litter layer is shown in figure 2 below.

Figure 2. A dense bracken stand with a deep litter layer in the western part of Baildon Moor (grid ref. SEI 32402)

The survey also revealed that:

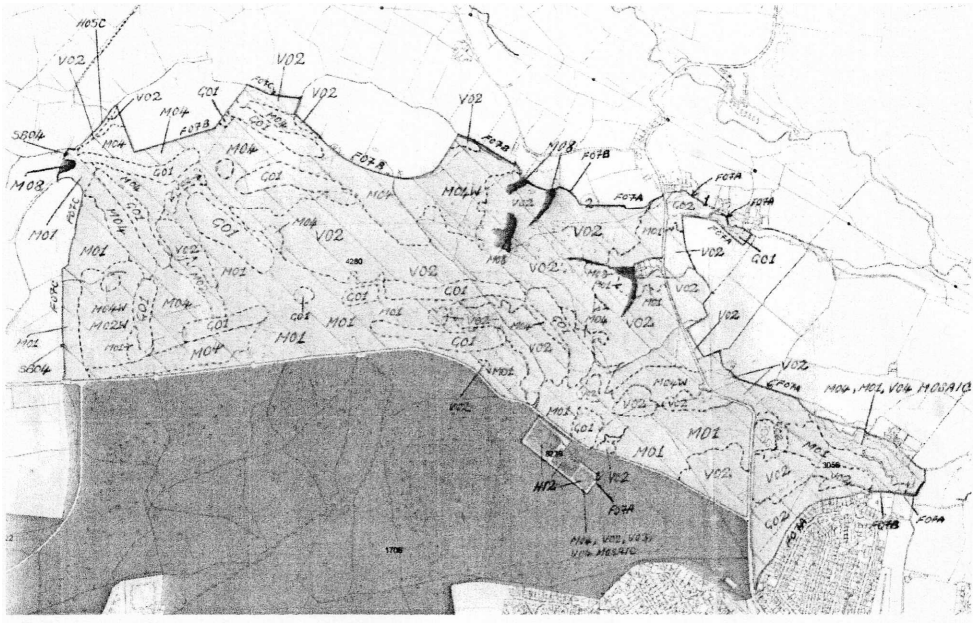
1) There is frequently an abrupt transition from bracken to acid grassland and flushes. Where the bracken borders upland heathland, the transition is often more gradual, with bracken spreading into the heathland as scattered patches or individual fronds. The heath land is typically dominated by heather and bilberry, with locally abundant crowberry

2) There are sensitive areas on site such as water courses, flushes and other ferns that would require buffer zones to be observed if herbicide spraying is to be employed. Further details are given in section 4.1.

3) Himalayan balsam is growing within the bracken in the north eastern part of the site, within 500m of Low Hill, to the west of Potter Brow Road. If the bracken is removed, the balsam may spread into species rich upland flushes in that area, where it could displace native plant species. A programme of Himalayan Balsam removal should be part of any bracken management works carried out in this area.

The distribution of bracken on the moor in relation to other habitats is shown in Maps 2 and 3; bracken is represented by the code V02.

Map 2. Habitats including bracken (V02) in the northern half of Baildon Moor



The main habitat types are represented by these codes:

MOl	Acid grassland
M02	Fragmented upland heath *I* acid grassland mosaic
M04	Upland heath
MO4W	Upland heath wet
M08	Upland flush (coloured purple) Buffer zones to be observed for chemical treatment, see section 4.1.
V02	Bracken (mostly dense)
W07	Pond
T08	Woodland (coloured green)
GOl	Golf course fairway
G02	Semi-improved grassland

Map 3. Habitats including bracken (V02) in **the southern half of Baildon Moor**

The main habitat types are represented by these codes:

MOl Acid grassland
M02 Fragmented upland heath *I* acid grassland mosaic
M04 Upland heath
MO4W Upland heath wet
M08 Upland flush (coloured purple) Buffer zones to be observed for chemical treatment, see section 4.1.
V02 Bracken (mostly dense)
W07 Pond
T08 Woodland (coloured green)
GUI Golf course fairway
G02 Semi-improved grassland

4. Practical management advice

4.1 Options for bracken management

There are four main options for bracken management:

1) Mechanical, e.g. cutting and crushing.
2) Chemical, e.g. application of the herbicide asulox, which is selective for ferns.
3) Cattle grazing. Certain hardy breeds of cattle will graze amongst the bracken and trample it down.
4) Allowing woodland to develop where there is already frequent native tree regeneration.

Option 1 is practical where machinery access can be gained without difficulty. Repeated cutting will be required for several years. Figure 3 shows a typical situation where cutting is practical.

Figure 3 Cutting of large areas of bracken is practical where the land is gently sloping and there are no rock outcrops or boulders, and where wetland habitats and archaeological features will not be damaged by vehicles. Repeated cutting will **be required for several years.**

Option 2 is practical where buffer zones can be observed in the vicinity of sensitive habitats such as watercourses and flushes. Acceptable buffer zones for different methods of delivery for asulox are shown in Table 1 below.

Table 1: Acceptable buffer zones around watercourses and other sensitive features for different methods of asulox / asulam herbicide application

CHEMICAL	METHOD OF APPLICATION	NO-HERBICIDE ZONES
Asulox / Asulam	**Helicopter** with conventional hydraulic nozzles	No spraying within 180 m of: • a gill • a water course (Environment Agency **=** 160 m) • any Additional Sensitive Areas, e.g. upland flushes, ponds, other ferns • Environment Agency (EA) permission required for land within 250m of a watercourse.
	Helicopter with Delavan RD raindrop nozzles	No spraying within 50 m of: • a gill • a water course (EA = 50 m) • any Additional Sensitive Areas • EA permission required for land within 250m of a watercourse.
	Hand held **Micron Ulva drift sprayer**	No spraying within 50 m of: • a gill • a water course (EA = 50 m) • any Additional Sensitive Areas
	Tractor boom sprayer	No spraying within 10 m of: • a gill o a water course (EA = 5-20 m)
	Knapsack sprayer	No spraying within 3 m of: • a gill • a water course (EA = 5-20 m) •any Additional Sensitive Areas
	Spot-gun	No treatment within I m of: • a gill • a water course • any Additional Sensitive Areas
	Weedwiper	No treatment within I m of: • a gill • a water course (EA = 1 m) • any Additional Sensitive Areas

Option 3 is not available on Baildon Moor due to the difficulty of managing cattle on the site.

Option 4 could be considered for parts of Baildon Moor, see section 4.3.2.

4.2 Managing moderately dense bracken that is spreading onto upland heathland or acid grassland

The under canopy upland heathiand or acid grassland is still capable of regeneration when the bracken is removed. The heath / grass cover will protect soil from erosion following treatment and post treatment habitat creation schemes are not required. For these reasons, moderately dense bracken stands are easier to treat than dense bracken. An example of this type of bracken is shown in figure 1, section 3.

The main areas of moderately dense bracken suitable for treatment are:

1. On the northern slopes of Pennythorn Hill and Sconce Crag, where the bracken is spreading onto heather and bilberry dominated heathiand, an example is shown in Figure 1, Section 3. There cover of heather and bilberry is sufficient to hold the soil together and regenerate once the bracken cover is removed.

2. Around the cup and ring marked rocks (SE137404), to the west of Low Plain, where the bracken is spreading on to heather and bilberry dominated heathiand. This bracken also contains locally abundant rosebay willowherb, which may become more prolific once the bracken has been removed.

Access for machinery in these areas may be problematic, and so mechanical treatment may not be feasible. Chemical treatment using a hand sprayer may be employed, or a weed wiper mounted on an all terrain vehicle where access is possible. Both should be outside the buffer zones for flushes, which are coloured purple in Map 2.

The first year of treatment may not be completely effective, and an annual programme of monitoring and follow up treatments will be required. The purpose of monitoring is to assess how much regrowth has occurred each year, to enable follow up treatments to be planned. A field visit will be required in the fortnight before follow up treatment. Spot treatment with asulox using a hand held sprayer or spot gun will be required. An all terrain vehicle (ATV) mounted weed wiper may be used on the more accessible ground.

4.3 Dense bracken with a deep litter layer, with sparse or no underlying vegetation

4.31 Chemical treatment

This type of bracken accounts for most of the bracken on Baildon Moor. There is no underlying habitat that can regenerate by itself once the bracken canopy has been removed, especially where chemical treatment is used. Areas of exposed soil that can appear following treatment are vulnerable to erosion, especially on slopes greater than 15 degrees

The vulnerability of the land to soil erosion once the bracken canopy has been removed means that habitat creation works should be planned in advance of any treatment that could remove the whole canopy cover. Factors to consider include:

1. Identification of the habitat to be created in place of bracken.
2. Habitat creation works and schedule, including provision for preventing soil erosion, such as using temporary grass cover to stabilise the soil.
3. Sources of native seed or dwarf shrub brash for habitat creation.
4. Exclusion of livestock from the treated areas while the replacement habitat becomes established. Requirements to install temporary fencing.
5. Follow up treatment schedule.
6. Publicity schedule because of the heavy public access.
7. Costs for works and follow up treatment.
8. Is it worth while treating the bracken?
9. Where there is frequent tree regeneration, this could be allowed to progress to broad leaf woodland.

If the decision is made to treat areas of dense bracken, the recommended priority areas are those with a shallow gradient (<15 degrees) because they are less vulnerable to soil erosion than the steeper slopes. They are also more accessible and it will be feasible to complete habitat creation works following removal of the bracken canopy. Chemical control will yield the quickest results, but the buffer zones (see section 4.1) must be observed for the application method used. As this land is gently sloping and easily accessible to vehicles, cutting is an alternative to chemical treatment, but several years of repeat cuts will be necessary. Examples of areas where treatment of dense bracken could be attempted initially are:

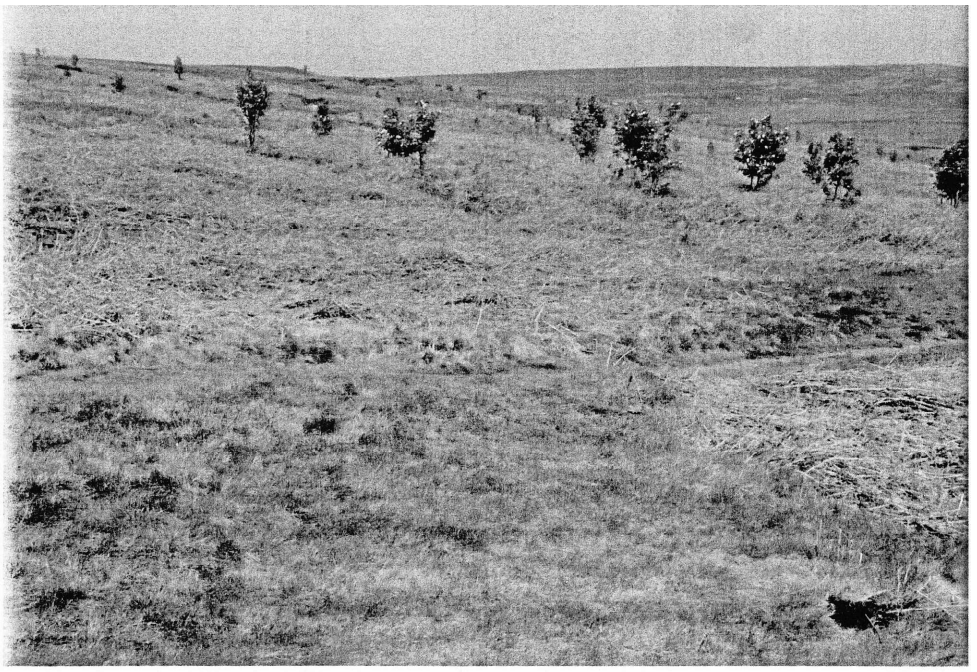
1. The land between Glen Road and Shipley Glen Woodland. This roughly triangular area is centred on grid ref. SE132402 and is illustrated in figure 2, section 3.
2. Land just north of the junction between Bingley Road and Hawksworth Road, centred on grid ref. SE153403.
3. Land to the north west of Low Hill below the 190m contour. Centred on grid ref. SE149150. Note that there is Himalayan balsam within the bracken here and bracken management should include a follow up programme of Himalayen balsam removal to prevent it spreading to nearby flushes. Buffer zones (see section 4.1) around the flushes must be observed if chemical treatments are used. The flushes are coloured in purple in Map 2, section 3.

For dense bracken stands, first year spraying and cutting is not completely effective, and an annual programme of monitoring and follow up treatments will be required. The purpose of monitoring is to assess how much regrowth has occurred each year, to enable follow up treatments to be planned. A field visit will be required in the fortnight before follow up treatment. If the regrowth consists of isolated, scattered fronds, spot treatment with asulox using a hand held spot gun will be more cost effective than respraying all of the previously treated areas. If the regrowth consists of frequent scattered fronds, then an all terrain vehicle (ATV) mounted weed wiper may be used on the accessible ground.

4.3.2 Woodland regeneration

There is a large area of dense bracken on the eastern slope of Baildon Hill, centred on grid ref.SE144401. Within the dense bracken, there are frequent scattered tree saplings; approximately 95% of them are rowan, with the rest a mix of birch, and hawthorn plus very occasional ash and holly. One oak seedling was found. The area is shown in figure 4 below.

Figure 4 Frequent regenerating rowan amongst dense bracken on the eastern slope of Baildon Hill (grid ref. SE145401)



As well as the young trees shown in Figure 4, there are frequent scattered young saplings ‘ess than 1 metre high that cannot be seen in the photo. This area has the potential to succeed to woodland during the next 10 to 15 years.

Leaving the trees to regenerate and form woodland over the bracken could be considered as a management option. A possible disbenefit would be that skylarks nest on top of Baildon Hill, and tree encroachment above 260m could provide cover for predators such as corvids. This could be avoided by preventing tree regeneration above 260m,

5. Summary of action to be taken

1) Areas of moderately dense bracken can be treated without the need to plan for habitat creation works following treatment; sufficient vegetation cover present to hold the soil together following removal of the bracken canopy. The priority areas should be where the bracken is spreading onto upland heath land, a UKBAP Priority Habitat (see section 4.2) Chemical treatment using hand sprayers would be the most effective in these areas.

2) Most of the bracken on site on Baildon Moor is dense with little or no ground flora that can regenerate by itself once the bracken canopy has been removed (see Figure 2, section 3). Slopes of over 15 degrees will be especially vulnerable to soil erosion once the bracken canopy has been removed.

3) If any attempt is to be made to manage dense bracken:

a) Decide on areas to be treated. The easiest areas, on the most gently sloping ground, are listed in section 4.2.

b) Decide on the methods to be used, taking account of buffer zones (see section 4.1).

c) If aerial spraying is to be used, obtain Environment Agency permission (at least 3 weeks in advance) for areas within 250m of watercourses.

d) Decide on a programme of habitat creation to be implemented when the bracken has died out. Heath land creation would be appropriate for Baildon Moor. Methods include seeding and brash spreading. A temporary grass cover may be required to stabilise the soil.