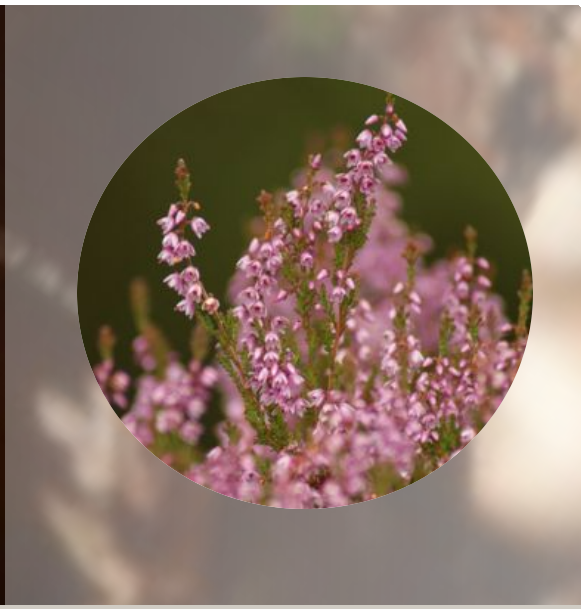
THE HEATHER TRUST

Promoting Integrated Moorland Management



Heather Beetle

Heather Beetle have been eating heather for thousands of years, but they were only identified as the cause of dead or damaged heather in the mid-nineteeth century. The Heather Trust believes that, in many areas, Heather Beetle has been a driving force behind the conversion of heather moorland into white hill, dominated by coarse grass.

The Heather Trust has been carrying out studies on beetled moorland at two sites in the Peak District (Crag Estate and Combs Moss) and on Langholm Moor in southern Scotland, and has run a 12-year beetle attack recording service. The aim of this work has been to a) identifying whether there is any advantage to altering management regimes post-beetle attack to aid heather recovery, and b) to see if a simple reporting survey could tell us anything about where and in what conditions beetle is most prevalent.

This briefing gives information on the heather beetle's lifecycle and the timing and nature of the damage it causes, and it provides the outcomes of our recent heather beetle work to assist with management decisions for recovery post-attack.

The Heather Trust
PO Box 7749, Lochmaben, Lockerbie, DG11 1SH
www.heathertrust.co.uk

Heather Beetle Lifecycle

Heather beetles *lochmaea suturalis* belong to a large and very widespread family of leaf beetles. Small, olive and unremarkable in appearance, adult heather beetles are approximately 6mm from end to end. There is one generation of beetles every year, and immature adults pass the winter hibernating either in up to 5cm of soil, or, on the surface, in Sphagnum moss or heather litter.

- Beetles emerge in spring to feed on heather when the day temperature reaches an average of 9°C
- Being weak flyers they are dispersed by wind. As a result, outbreaks will often spread downwind, and it is common to find beetle damage occurring in quite narrow swathes across the moor.
- Females become sexually mature towards the end of April and deposit up to 700 eggs in small groups on Sphagnum moss, or other suitable vegetation, over a period of up to ten weeks.
- Eggs take 1-4 weeks to hatch, and the peak emergence of larvae is usually in early July.
- After hatching, the larvae climb up the heather plant and browse on the young shoots and leaves. Within six weeks – (i.e. about mid-August) – they are fully grown and drop off the heather, crawling into the soil and litter to pupate.
- Immature adults may start to emerge towards the end of August but are not abundant until late September. They hibernate when the average temperature falls below 9°C, so consequently there is not a great deal of activity in autumn.
- No stages are seriously affected by normal frost but high levels of humidity are required for eggs to hatch successfully. This explains why the first signs of an outbreak are often observed at the edges of Sphagnum beds and bog flushes.

Natural Control Mechanisms

Weather

A run of warm damp springs and early summers will provide suitable conditions for a large build up of beetle numbers. Cool, dry springs severely inhibit egg-laying and so put a brake on the spread of the beetle.

Habitat

The presence of Sphagnum moss is commonly regarded as a prerequisite for the occurrence of beetle larvae in large numbers. Its absence reduces the production of larvae, but they can still be produced in numbers from damp soft soil or heather litter.

Parasites & Predators

The main parasite and indeed a controlling factor on beetle populations is the small wasp *Asecodes [entodon] mento*, which lays its eggs in the beetle larvae. So effective is this wasp as a control mechanism that in the years when beetle breeding is inhibited by the weather (e.g. a cold, dry May), almost every larvum carries an immature wasp and the population of beetles crash in consequence.

The ladybird *Coccinella hieroglyphica* preys on larvae, and several species of spider and ant will feed on heather beetles at various stages of their lifecycle.

Recognising Signs of Heather Beetle

Heather beetles themselves are not easy to see. It is perfectly possible to suffer from extensive heather beetle damage and never see a heather beetle. Damaged heather used to be attributed to cold conditions, and heather which was killed or affected, was described as having been “frosted”.

Extreme or unseasonal cold weather can have an effect on heather, turning it grey and brittle (these symptoms are similar because both frosting and beetles cause heather plants to lose water and become dehydrated) but frosting can be distinguished from beetle damage in the following ways:

- Heather plants which have been damaged by heather beetle have often been stripped of their leaves, leaving little more than naked red or grey stalks with tufts of surviving greenery here and there.

- Heather beetle outbreaks are spread with equal severity across areas of shelter and shade, making it impossible for cold weather to have had such a unilateral effect.

- Heather damaged by beetle turns a very distinctive fox red colour in the early autumn.

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Managing "Beetled" Heather

The traditional method used by moor managers and keepers has been to burn beetled heather as soon as possible. In areas of deep peat in England, changes in regulation mean this will often not be possible, and in all other areas it will usually not be possible outwith the controlled burning season.

Our studies suggest that this may not matter – the heather will probably recover equally well over a five-year period, without any treatment.

We tested treatment of various damaged areas by burning, cutting and doing nothing – and then measuring the recovery of the heather. While burnt heather recovered quicker than cutting in the short term, after 5 years the two treatments and control (do nothing) produced similar results in terms of heather cover. Heather cover was however, still lower in all cases than before beetle attack.

None of the treatments stopped re- infestation – and one of the series of tests suggested young heather produced by burning, is more susceptible to further heather beetle attack – resulting in higher level of damage - compared to older heather.

The key message is that although heather looks dead after a heather beetle attack, there is no evidence from these trials that burning or cutting of the heather is necessary to re-establish heather after a beetle attack. Heather cover in the areas uncut and unburnt was not significantly different than in the areas burnt or cut.

Heather beetle damage may look unsightly, but there appears little gain in removing the ‘dead’ heather, which in many cases will revive in time.

Areas of heather beetle damage may be best integrated into the moorland management rotation in the normal manner, rather than targeted for intervention measures immediately after beetle attack.

Heather plants are however weakened by beetle attack, so particular care should be taken to ensure they are not further compromised by excessive trampling or by over-grazing by livestock.

Heather Trust Research

The Heather Trust is leading the way on research into heather beetle in Britain, helping land managers gain access to the best and most up to date information relating to outbreaks

The Peak District – 2013 to 2018 study of Crag Estate and Combs Moss

The report can be accessed here

This is scientifically rigorous study comparing three different treatments, i.e. burning, cutting and no action at all on a number of badly beetled heather moorland plots across two sites in the Peak District. Some plots at one site were also treated with heather seed several years after burning as the young heather regrowth had been killed by a second infestation of beetle.

All of the plots suffered renewed heather beetle attack during the 6-year period. By the end of the study all plots in each subset of plots showed a similar rate of heather recovery indicating there is no 'best way' to regenerate heather following beetle damage.

It is hoped we will be able to continue with some further follow-up monitoring.

Langholm Moor - 2009 to 2013 study at Langholm Moor in southern Scotland

The report can be accessed here

The study was designed to compare different recovery rates in beetled heather on plots either burnt, sprayed with herbicide and burnt, cut or untreated. The plots were monitored after 1, 3 and 5 years. All the sites were hit by a second heavy infestation in year 4-5, at around the same time as the land management regime was being terminated for other reasons. However, after 3 years, good recovery of young heather had taken place on all sites regardless of the treatment applied.

Heather Beetle Survey Work

Fieldwork and our Beetle Survey indicate high rates of infestation countrywide during 2018 and 2019. The climatic conditions have been quite different in these two years – 2018 had a cold, late spring and a very dry summer, whereas 2019 had a dry, warm spring and a wet summer with very high temperatures at times. In their different ways, these weather extremes, possibly linked to climate change, may have contributed to more severe than normal beetle attacks, but this is currently speculation rather than fact.

Throughout the 12 years of the survey there was a mixed picture in terms of severity of attacks, with 2011 and 2014 showing high levels of reporting, and 2012, 2013 and 2017 moderate, while in other years reports were low countrywide, but may still have been locally severe. Reports could come from anywhere in the country, but with some areas definitely fairing worse in some years than others.

Future Work

As of Autumn 2019, The Heather Trust is considering how it might fund further research into Heather Beetle and, in particular, the conditions under which beetle may get to infestation levels.

Funding support for our Heather Beetle work

We are grateful for the funding support we received from Natural England in support of the early phases of the Peak District study, and to HDH Wills Charitable Trust for its financial support for the final year of the study.

For Natural England's review into heather beetle research, see http://publications.naturalengland.org.uk/category/4993022171283456

Much of our heather beetle and other work undertaken by The Heather Trust is funded by the Trust itself, that is by its members and supporters.

THE HEATHER TRUST

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This is one of a series of guides put together by the Heather Trust to provide an overview on a range of topics that are relevant to people with an interest in the management of moorland.

Free for download from the Heather Trust website

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