

Ancient grassland species take a century to return

July 22 2014, by Tom Marshall



Common Sainfoin

Old chalk grasslands that have been disturbed by farming can take more than a hundred years to recover their full diversity of plants, new research shows.

This underscores the importance of protecting the few areas of undisturbed ancient chalk grassland left in the UK – once they're lost, it takes a long time to get them back.

The findings are based on a detailed study of land-use change over 150 years from the British Army's long-established training ground on Salisbury Plain. Because it's off-limits to the public and has never been used for modern farming, its core is the largest section of undisturbed ancient chalk grassland left in Western Europe. And it has been extended over time, taking in new farmland at various points. This means it

contains pieces of land that were removed from cultivation at various times, letting scientists compare the mix of plants growing in grasslands of different ages.

Researchers from NERC's Centre for Ecology & Hydrology (CEH) analysed the results of a comprehensive survey of the military range's vegetation alongside historical data detailing how long different areas have been uncultivated.

They found huge differences between the range of plants found on truly old chalk grassland and those growing on younger habitats, even on land that's been left alone for several decades. The ancient grassland has a suite of plants including very rare species like dwarf sedge, tuberous thistle and bastard toadflax.

Middle-aged areas have some of the more mobile chalk-grassland specialists, including stemless thistle and autumn gentian, but also feature more [common species](#) found on biodiverse grasslands across much of the UK, including greater knapweed, crested dog's-tail, pale flax and common sanfoin.



Six-spot Burnet moths on Viper's Bugloss (*Echium vulgare*)

'It's more like the kind of community you get on a nice roadside verge; it's quite biodiverse and has a few ancient grassland species, but it doesn't have anything like the range of plants found on undisturbed habitats,' says John Redhead, a spatial ecologist at CEH and lead author of the paper. 'Once the original grassland is gone, it takes a very long time to come back – a century or more.'

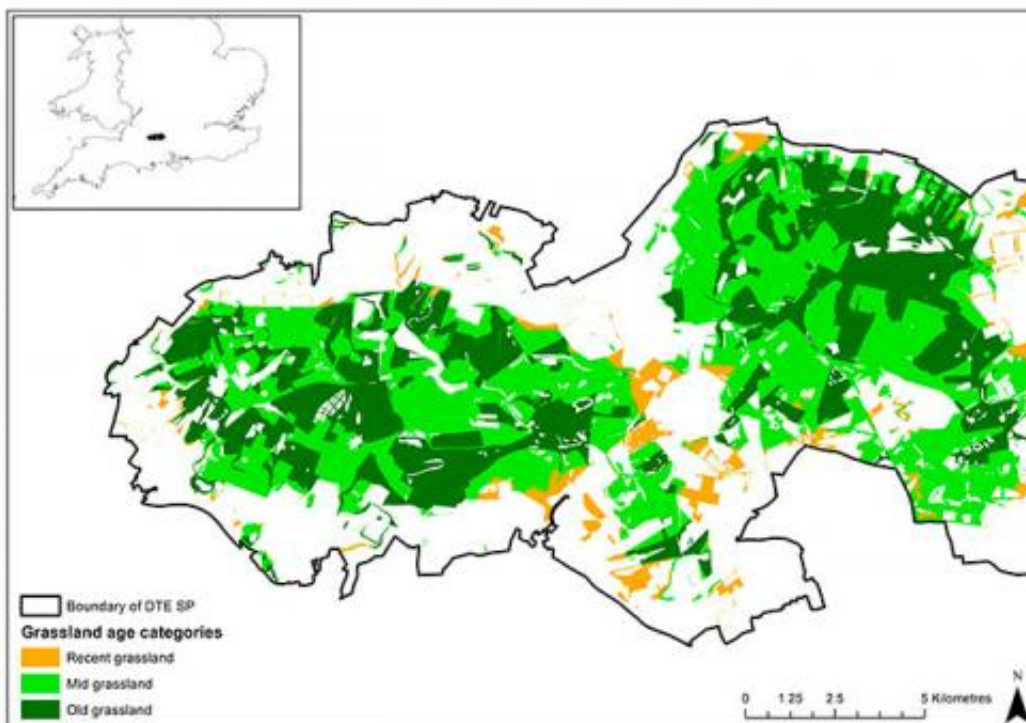
Areas that have only been undisturbed for less than a decade were characterised by a few common species like dock, thistles and nettles – typical weeds of fertile grasslands managed for agriculture.

When farming stops on a piece of land above chalky soil, the range of species increases quickly for the first decade or so, arriving at the kind of middle-aged habitat the scientists identified. But it then plateaus, taking many decades more to return to something like its original grassland state – and this is true even in a well-connected landscape like Salisbury Plain, where true ancient grassland is nearby so the plants living on it don't have to travel far.

Many of these plants thrive in dry, nutrient-poor conditions but spread slowly with rhizomes or runners, expanding just a few inches at a time. 'They need stable conditions, although not ones you'd normally consider particularly good for plants,' says Redhead. 'If there are too many nutrients, they tend to get overtaken by other species, so the spread of modern agriculture has been very bad for them.' The plants that colonise newly-abandoned farmland, meanwhile, tend to spread quickly via windborne seeds.

Salisbury Plain's long history of minimal disturbance by farmers make it an incredibly valuable wildlife, and scientific, resource. The many rare plants and animals there seem largely unfazed by occasional tank manoeuvres and artillery practice; it turns out that in conservation terms these are a small price to pay for the absence of modern fertilisers, pesticides and ploughing.

CEH scientists have been monitoring Salisbury Plain in detail since the 1990s, when the MoD called them in to survey its plant diversity because conservationists had expressed concern about military training's impact on wildlife. The work they did then provided much of the data used for this piece of work; it also prompted some changes in how the armed forces use the plain, including hardened tracks to reduce damage from tracked vehicles to ancient grassland, and better assessment of the environmental impact of military training exercises.



Map of the Salisbury Plain Defence Training Estate showing a mix of grasslands

of different ages.

Redhead says CEH scientists are now doing follow-up work on how the wider benefits or 'ecosystem services' provided by ancient grassland differ from those of younger habitats. We know that ancient grassland plants support an exceptionally rich set of pollinating insects, for example, as well as storing more carbon.

One wider benefit of the study is a better understanding of vegetation succession – how plants colonise a site and organise themselves into a community – which we can apply to how we manage the countryside. For example, many farmers managing their land to benefit wildlife under agri-environment schemes by recreating flower rich grasslands may need to sow appropriate mixes of wildflowers on field margins as they may not necessarily be able to get there themselves. Regular mowing and removal of hay to limit soil nutrients could also help to speed up the natural process of return to something like an ancient grassland.

'Chalk grasslands can have 40 species in a square metre, whereas a farmer's goal is to grow just one species by making the conditions as favourable as possible for it,' Redhead says. 'So it's not surprising that it takes a long time for the original range of [plants](#) to come back – but we can still aim to produce biodiverse grassland with a good mix of species even if it's not totally equivalent to an ancient grassland.'

The study is published in *Applied Vegetation Science*.

More information: "The natural regeneration of calcareous grassland at a landscape scale: 150 years of plant community re-assembly on Salisbury Plain, UK." John W. Redhead, John Sheail, James M. Bullock,

Andrea Ferreruela, Kevin J. Walker, Richard F. Pywell. *Applied Vegetation Science*; Volume 17, Issue 3, pages 408-418, July 2014

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