The return of the Large Blue butterfly

It took scientists more than 40 years to bring the Large Blue butterfly back from extinction in Britain – but how did they do it?

In the 1970s, the International Union for Conservation of Nature (IUCN) selected three butterflies, including the Large Blue (*Maculinea arion*) as global flagships for the cause of lepidopteran conservation. These insects and others had mysteriously disappeared over many decades, despite attempts to save them. At one stage, butterfly collectors were generally blamed for the decline but researchers sought a more ecological explanation.

Scientists knew that the Large Blue had an amazing life cycle. Adult females lay their eggs on thyme flowers in the summer. After hatching, the caterpillars feed on developing flowers for a few weeks, then drop to the ground. The caterpillars were found to secrete a chemical scent that attracts red ants and fools them into thinking the caterpillars are their own ant grubs. The ants “adopt” the tiny caterpillars and carry them into their underground nests where the caterpillars spend the next 10 months being protected by the duped ants while feeding on ant grubs. In early June, the caterpillars form a chrysalis and then two weeks later emerge to crawl above ground, still assisted by the ants, as adult butterflies.

However, despite abundant thyme and red ants, the Large Blue gradually declined on all sites in Britain. The cause only came to light after Professor Jeremy Thomas of Oxford University and the Centre for Hydrology and Ecology (CEH) began an intensive study of Britain’s last Large Blue colony, recording egg numbers, caterpillar survival on plants, adoption into ants nests and emergence from those nests. Professor Thomas and colleagues found that although the caterpillars are adopted by any *Myrmica* red ant species, they will generally survive to adulthood only in nests of one specific species *Myrmica sabuleti* to which they “smell” most similar. They realised that the grass in the butterflies' habitat had grown too long, as farmers had gradually stopped grazing their livestock on these hillsides and a viral infection had killed many of the wild rabbits in the 1950s. As a result, soil temperatures dropped below that required for *Myrmica sabuleti* to flourish and it replaced by more cool-tolerant red ant species. Without enough

‘friendly’ ants to raise their young, the Large Blue butterflies dwindled as well. Turf height increasing from one to three centimeters is all it takes.

In the 1980s, after 40 unsuccessful years of efforts to save the Large Blue, conservationists followed Thomas’ recommendations and restored the butterfly’s proper habitat by clearing scrub and reintroducing grazing animals in a project led by the CEH Thomas and co-author David Simcox from CEH began introducing large blue butterflies imported from Sweden into restored habitat sites and monitoring the long-term restoration success. In 2008 the butterflies occupied 30% more colonies than they had in the 1950s, before the major decline began.

Restoring the large blue’s habitat may also provide collateral benefits for other species that live there, the authors speculate in their study. On some of its conservation sites there have already been dramatic increases in rare birds, plants and other butterflies, such as the woodlark, pale heath violet and the pearl-bordered fritillary.

The butterfly’s rebound following extensive conservation efforts by a host of organisations has closely followed the predictions generated by the model published in *Science* by Thomas, Simcox and BU Professor Ralph Clarke.