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INTRODUCTION

Coppicing is a method of management in deciduous woodland in temperate climates in Europe. Stems are cut down nearly to ground level at regular intervals; the regrowth is of relatively small, young stems which traditionally have been harvested for a number of uses, such as for charcoal. Because the canopy in coppiced woodland is often more dense than in mature stands of trees, coppicing has in recent years been used as a conservation tool. It is considered to increase diversity of both flora and fauna, particularly in the case of several bird species, often providing a wider range of structure, light-penetration and age groups of trees (Harmer & Howe, 2006).

Collyweston Great Wood and Eastern Hornstocks National Nature Reserve (coordinates: 52.59395,-0.507216 and National Grid Reference TF 013 006) consists of two adjacent woodlands with a total area of 155 ha that sit on the border of Northamptonshire and Cambridgeshire in the UK. It is under the management of Natural England. The reserve is designated a Site of Special Scientific Interest (SSSI) and is classified as broadleaved, mixed and yew woodland (Gardiner, 2011). The two major habitats are dominated by ash-maple and pedunculate oak: neither of these has been coppiced in this woodland. This study, however, focussed on areas dominated by coppiced small-leaved lime trees (*Tilia cordata*). These are unusual: coppiced trees in the UK are most commonly hazel, sweet chestnut or ash (Harmer & Howe, 2006). The limes were traditionally coppiced for centuries in order to make rope and firewood. There are also areas of open ground, which are maintained artificially through cutting. They are mostly made up of bracken (*Pteridium aquilinum*), tufted hair grass (*Deschampsia cespitosa*), creeping soft grass (*Holcus mollis*), wood sedge (*Carex sylvatica*) and stinging nettles (*Urtica dioica*). Brambles (*Rubus fructicosus*) are particularly dominant in four out of the six open sites used (Gardiner, 2011).

The reserve was chosen for the study for several reasons. Firstly, it is a fragmented part of an ancient woodland that has had reptiles recorded in various parts of it in the past. Secondly, there were enough coppiced areas of appropriate size and age for this study, as well as open areas. Thirdly, in terms of accessibility, the reserves were easy to visit daily on foot or by bicycle. Finally, Natural England management at this reserve specifically wanted information on the effect of coppicing on slow-worms. The overall aim of the study was to compare numbers of common lizards (*Zootoca vivipara*) and slow-worms (*Anguis fragilis*) in coppiced and open areas of the reserve.

METHODS

In each part of the reserve, three young coppiced sites (coppice under 2-6 years old) and three older coppiced sites (coppice over 9-17 years old) were selected. Due to the small number of homogeneously coppiced sites, there were restrictions to the sites available. The sites in each category were selected to have a relatively homogeneous level of coppicing and to be of similar ages to each other where possible. Three open areas were sampled in the Eastern Hornstocks and two open areas were sampled in Collyweston Great Wood, (due to there not being enough open areas of an appropriate size). Two weeks into sampling, another open area in Collyweston was included when it became apparent that reptiles were only being detected in open areas.

Numbers of common lizards and slow-worms were assessed using coverboards: these were chosen as refugia due to their reduced disturbance on animals and vegetation (Houze & Chandler, 2002; Wilson & Gibbons, 2009), their low cost (Ryan et al., 2002) and because they create suitable microhabitats for attracting these reptiles (Wilson & Gibbons, 2009). In addition to this, coverboards are less conspicuous and prone to vandalism (Reading, 1997) than other physical methods. Furthermore, coverboards have a higher detection probability than visual transects at detecting slowworms (Sewell et al., 2012). Ideally, it is best to use a combination of different survey techniques for maximum detection probability (Ryan et al., 2002), but this was beyond the scope of the project.

In each site selected, ten pieces of roofing felt and ten pieces of corrugated bitumen, all 50 square cms, were laid out in an array with an alternating grid of materials with 5 meters between them. Originally, corrugated tin was going

to be used instead of bitumen as this is one of the most common coverboard materials used in studies (Wilson & Gibbons, 2009) but the tin ended up being too difficult to source and get cut into standardised sizes, as well as being expensive. The coverboards were left at the sites for one week, for the local reptile population to acclimatise to them being there, as well as for them to sink further into the vegetation, as is standard with coverboard studies (Wilson & Gibbons, 2009). The sites were sampled 3-6 days a week for 8 weeks. Each day, alternately, one reserve was sampled in the morning and the other later in the day. The reserves were alternately sampled in the mornings (approximately 8-10am) and afternoons (approximately 2-5pm).

RESULTS AND DISCUSSION

Overall, 41 common lizards and 102 slow-worms were found in the open areas during the 8-week survey period. None were found in either category of coppice during the same period.

The importance of this finding is largely a practical one: no attempt is made here to explain the apparent absence of common lizards and slow-worms from coppiced areas, which was unexpected, although there is abundant evidence that under some circumstances, the exact nature of canopy cover can have an effect on reptile and amphibian populations (e.g. Greenberg, 2001; Webb et al., 2005; Pike et al., 2011; Sutton, 2013). One possibility, which needs to be investigated, is that the coverboards are not effective in coppiced areas because there is too little penetration of infra-red radiation to allow them to be used for thermoregulation. If this were to be the case, their attractiveness to reptiles would simply be as refuges. It is possible that this is insufficient to make them effective tools for assessing the presence of the animals, but this explanation seems unlikely, although there is some evidence that the efficiency of coverboards can vary depending on microhabitat conditions (Chavel et al. 2012). For the present, therefore, it seems prudent to assume that common lizards and slow-worms are either absent, or present at much lower densities, in both types of coppice than in open areas of woodland. While management of complex environments usually has many objectives – some of which may be conflicting – the fact that the coppiced areas in small-leaved lime woodland do not seem favourable for reptiles is a factor which managers of this habitat will need to take into consideration. The work reported here strengthens the case for continuing the practice of clear felling and maintaining open areas in woodlands, which is almost always beneficial for a wide range of flora a and fauna (for reptiles and amphibians, see for example Greenberg, 2001; Goldstein et al. 2005: Pike et al. 2011).

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