

SHORT COMMUNICATION

Response of glow-worms *Lampyris noctiluca* to coppicing in Essex, England

Tim Gardiner*

Environment Agency, Icen House, Cobham Road, Ipswich, IP3 9JD

SUMMARY: A small area of ancient woodland in Essex, England was coppiced. Glow-worms *Lampyris noctiluca* were observed in the cut area in the first four seasons after winter coppicing, whereas significantly lower numbers were recorded in an uncut control. The highest abundance was observed in the second season after coppicing, only for numbers to decline as the area became overgrown with bramble *Rubus fruticosus* and shading from the maturing canopy occurred. Coppicing may promote the conservation of glow-worms in ancient woodland.

BACKGROUND: Naturalists consider the glow-worm *Lampyris noctiluca* (Coleoptera: Lampyridae) to have declined since World War II in the UK (Tyler 2002). Standardised transect counts in Essex, England suggest a short-term reduction in numbers of 74% since 2001 (Gardiner 2011). Although the primary driver of population decline is thought to be climatic (dry springs and summers), habitat management such as coppicing of woodlands may be effective in enhancing numbers. Anecdotal evidence from ancient woods in Essex suggested that in the summer following winter coppicing there was often a small number (< 10) of glowing adult females in the coppiced area (Gardiner 2011). Once the coppice had re-grown the number of glowing females in the coppiced area declined.

ACTION: Pheasant House Wood is an ancient wood (of approximately 7 ha) in central Essex, England (51°43'44"N, 0°35'22"E). It forms part of a 100 ha mosaic of woodland, heathland and grassland on Danbury Ridge designated as a Site of Special Scientific Interest. Over winter 2009/10 a small area (about 0.5 ha) of sweet chestnut *Castanea sativa* was coppiced. Several mature trees (approximately 20/ha) were left as standards. Brash (side branches cut from trees during coppicing) was placed around the coppice stools to prevent deer grazing the regrowth. A patch of heathland adjoined the coppiced area's southern edge, while dense woodland bordered the other edges. An adjacent area of woodland, that had not been managed since the great storm of October 1987 (a violent cyclone with hurricane force winds), was left uncut as a control. Trees blown down after the 1987 storm were left in situ and the woodland allowed to regenerate without intervention.

To monitor the response of glow-worms to coppicing, evening transect surveys were undertaken along an approximately W-shaped 100 m transect (split into four 25 m sections) through the coppiced area. A similar 100 m long transect was walked along the edge of the control woodland for comparison, as it was too impenetrable to walk through. This

*To whom correspondence should be addressed tim.gardiner@environment-agency.gov.uk

Table 1. Total number (sum of the three surveys) of glowing adult females counted pre-coppicing (2009) and post-coppicing (2010-13) in the coppiced area and an uncut control plot.

Transect	2009	2010	2011	2012	2013	2014	Total
Coppiced	0	4	22	3	6	0	35
Control	1	0	1	0	0	0	2

may have resulted in some female glow-worms being overlooked during these control counts. The surveys involved counting glowing adult females using the survey methodology outlined in Gardiner (2011). Three transect surveys were undertaken (from June-August) each year, pre-coppicing in 2009 and post-coppicing from 2010-2014 (a total of 18 surveys each in coppiced area and control). Count data were square root transformed to allow comparison of the mean counts per year post coppicing (from 2010-14) between the coppiced area and control using a Student's t-test.

CONSEQUENCES & DISCUSSION: There were significantly higher numbers of glowing females in the coppiced area for the five seasons after coppicing than in the unmanaged control woodland (coppiced area mean count: 7.0, control mean: 0.2; $t = 2.51$, $p = 0.04$, Table 1). A small number of glowing females were observed in the coppiced area in the first season after coppicing in winter 2009/10 (Table 1). However, in 2011, the second season after coppicing took place, there were 22 females recorded in the coppiced area. Of these 22 glow-worms, 11 were observed in brash left as protection around the coppice stools, five in dense bramble *Rubus fruticosus*, three on bare earth, two in dense bracken *Pteridium aquilinum* and one on dead wood. There were far fewer glowing females observed from 2012-2014 as the coppiced area became increasingly overgrown by bramble. The most likely source of colonising individuals was the small area of heathland to the south. It is likely to be important for coppiced areas to be directly connected to habitats which contain glowing females to allow successful colonisation. This would allow the sedentary species to move around woodland as areas are cut, before they become unfavourable due to vigorous bramble growth and shading from the maturing canopy.

The surveys also highlighted the different habitats that may be used by glow-worms; piling up brash creates shelter and larval feeding areas where snails may be abundant, as well as offering protection from deer which may browse new shoots. The bare ground exposed during the winter tree-cutting works and for the first 1-3 years after coppicing may form important female display areas where they are easily located by flying males. This could lead to increased breeding rates and a successful female reproductive strategy. It is likely that larvae and glowing females vacate the area as it becomes overgrown and shaded which may occur 3-4 years after coppicing.

ACKNOWLEDGEMENTS: Thanks to Essex Wildlife Trust for coppicing the woodland and supporting the Essex Glow-worm Survey, and to Laura Weir for help with the 2014 surveys.

REFERENCES

- Gardiner, T. (2011) *Glowing, Glowing, Gone? The Plight of the Glow-worm in Essex*. British Naturalists' Association, Corby.
- Tyler J. (2002) *The Glow-worm*. Lakeside Press, Sevenoaks.