

## SHORT COMMUNICATION

### Response of glow-worms *Lampyris noctiluca* to scrub clearance on a sea wall flood defence at Creeksea, Essex, England

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**SUMMARY:** The response of glow-worms *Lampyris noctiluca* to winter scrub clearance on a sea wall flood defence in Essex, England was monitored. The number of glowing adult females did not show a significant difference in the two seasons (one life cycle) after scrub clearance, or at a control site with no clearance.

**BACKGROUND:** The glow-worm *Lampyris noctiluca* is thought to have declined since the 1940s in the UK (Tyler 2002). Standardised transect counts in Essex suggest a recent reduction in numbers of 74% since 2001 (Gardiner 2011). Although the primary driver of population decline is thought to be climatic (Gardiner 2011), habitat management such as scrub clearance may be effective at enhancing numbers locally (Gardiner 2013). Glowing adult females may find open areas created by scrub clearance effective display sites. Clearing back scrub on heavily overgrown sites may also provide the 'edge' habitat required by snails, their larval prey (Tyler 2002).

**ACTION:** A sea wall flood defence (earthen embankment covered in grassland and scrub) at Creeksea in Essex (51°37'4"N, 0°47'3"E) has the only known sea wall population of glow-worms in the county (Gardiner 2011). Surveys for larvae using roof felt tiles (1 x 0.5 m) undertaken during July and August of 2010 found that they were present in tussocky grassland within 1 m of isolated hawthorn *Crataegus monogyna* bushes and on the edge (grassland within 1 m) of a blackthorn *Prunus spinosa* and elm *Ulmus* spp. thicket (0.1 ha in area) where there were numerous snails (Gardiner 2011). These pre-clearance surveys identified the importance of scrub for larvae, so mitigation measures were adopted during the proposed winter scrub clearance to avoid deleterious impacts on glow-worms. These involved leaving logs and brash *in situ* on the slope to replace larval habitat removed by clearance.

The sea wall was cleared of scrub by the Environment Agency during January and February 2011. All woody vegetation was cut back to ground level using chainsaws and brushcutters. Patches of hawthorn, blackthorn, oak *Quercus robur*, bramble *Rubus fruticosus*, tamarisk *Tamarix tetrandra* and elm scrub were cut. A dense area of elm and blackthorn (approximately 335 m<sup>2</sup> or 34% of thicket area) on the thicket edge was cleared on the landward slope of the sea wall. Blackthorn and bramble scrub along a landward fenceline bordering the raised embankment was left uncut to retain woody vegetation as larval habitat. In total approximately 535 m<sup>2</sup> (27 % of 1970 m<sup>2</sup> sea wall area) of scrub was cut on the sea

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**Table 1.** Median number (minimum/maximum) of glowing adult females on the scrub cleared sea wall (Creeksea) and control site (Finches Nature Area) pre-clearance (2009/10) and post-clearance (2011 and 2013).

Site	2009/10	2011	2013
Creeksea sea wall	6.5 (1/12)	16 (1/20)	9 (2/34)
Finches Nature Area	19 (5/32)	34 (8/47)	12 (12/16)

wall with 143 m<sup>2</sup> retained (approximately 21% of scrub area pre-cutting). There was no treatment of cut species with herbicide and follow up management was an annual cut of the seaward face and crest with a remote controlled rotary mower. Scrub on the landward slope was not managed.

To monitor the response of glow-worms to scrub clearance, evening transect surveys were undertaken along the entire 400 m long stretch of the sea wall where scrub was cleared. The surveys involved counting glowing adult female glow-worms using the survey methodology outlined in Gardiner (2011). Pre-clearance transect surveys were undertaken in July 2009 and July 2010 with a further three surveys (from June-August) in both 2011 and 2013 on the Creeksea sea wall. A control site (Finches Nature Area in Canewdon; 51°36'6"N, 0°45'3"E) less than 3 km from Creeksea was also surveyed for glow-worms three times in 2010, 2011 and 2013. This site was largely unmanaged scrub. Mann-Whitney U tests were used to compare the number of glow-worms counted pre-clearance (in 2009 and 2010) and after clearance (2011 and 2013 data combined) at Creeksea and at the control site.

**CONSEQUENCES & DISCUSSION:** On the Creeksea sea wall the number of glowing females was not significantly different before and after scrub clearance ( $U = 8.5$ ,  $p = 0.43$ ); similarly there was no difference at the largely unmanaged control site ( $U = 10$ ,  $p = 0.90$ ) (Table 1). This suggests that the fluctuation in numbers was not due to scrub clearance at Creeksea and may for example be due to climatic factors. However, on the sea wall immediately post-clearance in 2011, 33 glowing females (89% of the total number observed across the three surveys) were recorded on bare ground (exposed soil with patchy vegetation cover) cleared of scrub, where they could be easily located by flying males, and this may have led to higher breeding success. It is therefore possible that the bare ground and 'edge' habitat created by scrub clearance offset any deleterious impacts of the clearance, such as killing of overwintering larvae and removal of habitat. By the summer of 2014, scrub regrowth on the uncut landward slope was well-advanced with most cut bushes 1-2 m in height.

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