

Overton Biodiversity Society

Glow-worm survey

2009-2010

In warm summer's nights, small spots of light can be seen scattered in the grass at St Mary's Churchyard. These are the glow of female glow-worms signalling their presence to males. Successive generations of glow-worm have been doing so on this site since at least the 1940s.

Nationally, glow-worms numbers seem to be in decline. OBS started monitoring this colony in 2009 in order to assess its strength and to help ensure the site is managed in such a way that the colony can thrive.

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Introduction

Glow-worms

Glow-worms, scientific name *Lampyris noctiluca*, are beetles. The common name refers to the 'worm-like' appearance of the wingless females and their ability to produce light. Adult females have a dark, segmented body, 15-25mm long (3/4-1"). The light-emitting organs are found on the underside, at the tip of the body. Males look quite different. They are shorter, 15-18mm (5/8") and bear on their backs a pair of membranous wings, folded at rest under a pair of leathery dark wing cases. They have only two small luminous spots at the tip of the abdomen. Both adult male and females emerge from their pupal case in June – July and live only for 2-3 weeks.

Females hide during the day and come out when darkness falls. They crawl up a blade of grass or up the stem of other plants and point their abdomen upwards, exposing the spots of bright greenish light which attracts males flying nearby. Mated females will soon lay eggs and die. Un-mated females will retreat after a few hours until another night.

Eggs hatch after about a month. The tiny larvae grow up to 25 mm over 2 years during which they feed on (a large number of) snails and slugs and moult multiple times as they grow bigger. Larvae are very similar to females in appearance but have a pale spot at the hind corners of each segment on the back. Like the males they only have two small luminous spots at the tip of the abdomen which can be seen glowing (and sometimes flashing) in dark summer's nights.

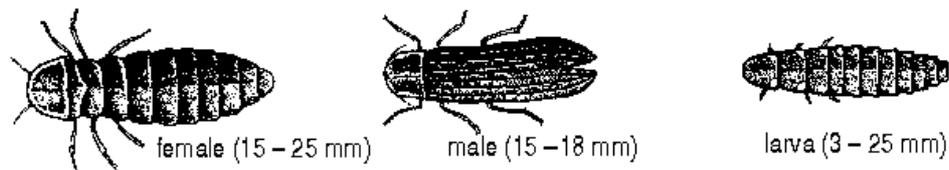


Figure 1: Glow-worm, *Lampyris noctiluca*.

The site

The site comprises St Mary's churchyard in Overton, Hampshire (grid reference SU 514500) and the adjacent parish cemetery on Kingsclere road. The total area covers approximately 1.2 ha (2.5 acres), including buildings, on calcareous soil.

The parish cemetery is bordered by a stone wall on the Western side. As it is an active cemetery the grass is kept short through regular mowing.

The churchyard is bordered by stone walls on 3 sides and by a steep verge on the Eastern side. The ground is sloped from West to East. The area South of the church is laid to grass which is mown frequently (approximately every 10 days in the summer months). The North side holds old grave stones surrounded by a variety of grasses and wild flowers strimmed at longer intervals. In 2010, this area was cut on the following dates: 23rd May, 6th June, 4th July, 1st August, 29th August, 12th September.

A botanical survey of the churchyard in June 2009 reported the following species:

| | | |
|-------------------------|---------------------|--------------------|
| Meadow Buttercup | Field Bindweed | Wetted Thistle |
| Yellow Corydalis | Field forget-me-not | Dandelion |
| Stinging Nettle | Forget-me-not sp | Nipplewort |
| Curled Dock | Ground Ivy | Hawkbit sp |
| Common Sorrel | White Dead Nettle | Smooth Sow-thistle |
| Tutsan | Large Thyme | Hedge Garlic |
| Common Mallow | Lemon Balm | Lime |
| Musk Mallow | Common Clary | Cherry |
| Primrose | Foxglove | Whitebeam |
| Yellow Loosestrife | Dark Mullein | Cotonaster |
| Rock Stonecrop | Greater Plantain | Box |
| Dog Rose | Ribwort Plantain | Privet |
| Bramble | Lady's Bedstraw | Elderberry |
| Agrimony | Cleavers | Hawthorn |
| Garden Lady's Mantle | Honeysuckle | Sycamore |
| Birdsfoot Trefois | Field Scabious | Ivy |
| Black Medick | Wild Teasel | Grape Vine |
| Red Clover | Feverfew | Virginia Creeper |
| White Clover | Daisy | Yew |
| Broad-leaved Willowherb | Ox-eye Daisy | Barren Brome |
| Sun Spurge | Yarrow | Timothy |
| Herb Bennett | Common Ragwort | Cocksfoot |
| Bloody Cranesbill | Groundsel | Wall-rue |
| Cow Parsley | Common Knapweed | Grasses sp. |

A snails and slugs survey in the churchyard in May 2006 reported the following species:

| Scientific name | Common name |
|-----------------------------------------------|------------------------|
| <i>Arion ater</i> * | Great Slug |
| <i>Arion intermedius</i> | Hedgehog Slug |
| <i>Arion subfuscus</i> ([†]) | Dusky Slug |
| <i>Candidula intersecta</i> * | Wrinkled Snail |
| <i>Cepaea hortensis</i> ([†]) | White-lipped Snail |
| <i>Cochlicopa lubrica</i> ([†]) | Slippery Moss Snail |
| <i>Deroceras reticulatum</i> ([†]) | Common Grey Field Slug |
| <i>Discus rotundatus</i> ([†]) | Rounded Snail |
| <i>Helix aspersa</i> * | Common Garden Snail |
| <i>Lauria cylindracea</i> | Chrysalis Snail |
| <i>Limax flavus</i> | Yellow Slug |
| <i>Monacha cantiana</i> * | Kentish Snail |
| <i>Oxychilus cellarius</i> ([†]) | Cellar Glass Snail |
| <i>Trichia hispida</i> * | Common Hairy Snail |
| <i>Trichia striolata</i> ([†]) | Strawberry Snail |
| <i>Vallonia costata</i> | Ribbed Grass Snail |

Species marked with * are known to be eaten by glow-worm larvae in the wild. Those marked with ([†]) have been eaten in captivity (Tyler, 2002).

Survey Method

The aims of the survey was to count the number of females glowing at night in St Mary's churchyard, Overton. In the summer of 2009 and 2010 OBS volunteers walked a pre-defined route through the churchyard repeatedly at 3-4 days intervals throughout the glowing season and plotted on a map every glowing female observed. All visits started at about 11:00pm. In 2009, the survey ran from 4th July to 30th July and 8 visits were made. In 2010, the survey started on the 23 June and

ended on 8th August and 14 visits were made.

Figure 2 shows a map of the site and the survey route for each year.

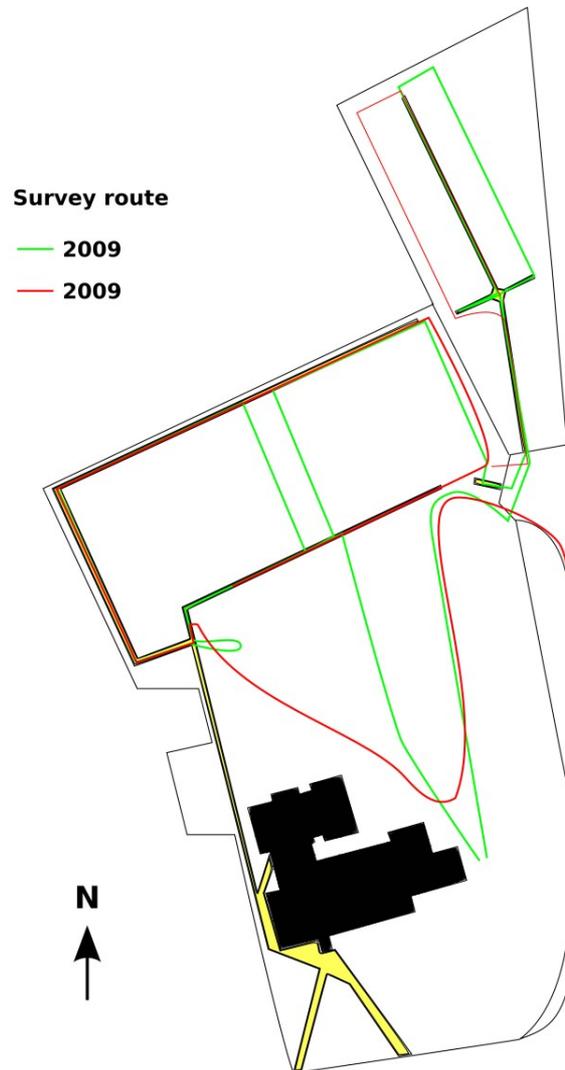


Figure 2: Map of the survey site including the survey route for each year

Survey results

Nightly numbers

Numbers of glowing females counted each night varied from night to night (see appendix for details). The pattern of variation can be seen on Figure 3. In July of both years the numbers of glowing females in one night increased progressively from the beginning of the month to peak in mid-July and subsequently dropped to single digit numbers by the end of the month or early August. In 2010 counting started earlier and showed that many females were active at night in June. In fact, the highest count of the survey was on the first night (23rd June). It is clear that we have missed the start of the glowing season and it is possible that more were glowing earlier. It seems that the true pattern of female activity throughout the summer season may be two cycles of increase and

decrease with the earlier peak possibly the highest. In light of these results, it was decided to start counting as early as late May - Early June in 2011.

The maximum number recorded on one night was 31 in 2009 and 53 in 2010. These numbers are comparable to numbers reported to the UK glow-worm survey in 1991 by Vivienne Brown (45) and in 2005 by Simon Frogley (47). This suggests that this glow-worm colony is probably not in decline although higher numbers (100 +) also have been reported in the past (Simon Frogley, 2002), but these may have been unusual.

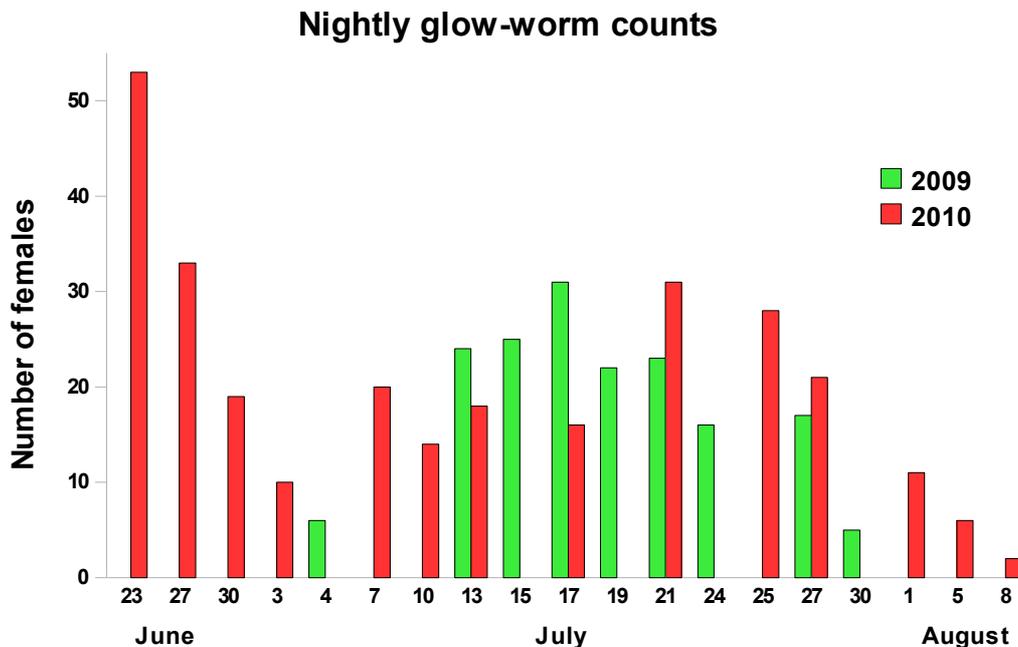


Figure 3: Number of female glow-worms counted on each survey night

Distribution

Female glow-worm are very sedentary and are likely to display from the same spot on successive nights. With this in mind, in our survey we assumed that a sighting at the same spot on several nights indicated the presence of the same female (but this was not verified by marking the females).

Figure 3 shows all glow-worms seen in 2009 and 2010 plotted on a map of the site. However, this map is only a best estimate of the glow-worms distribution. Each recording night glowing females were plotted on a map but no markers were placed on the ground to pinpoint precisely the location. Night after night it was difficult to tell with certainty whether the same spot was lit or whether it is was another spot very close. Consequently, when preparing the map below, nearby records were combined as a single sighting. This way, we identified 59 glowing females in 2009 and 160 in 2010. Taking into account the imprecision of the recording method true numbers were probably somewhat higher.

Glow-worms are known to prefer habitats made of mixture of open grassland and some cover in the form of woodland or scrub. They also tend to prefer medium high grass. This was also observed in our survey: results show that on both years, glow-worms were scattered over most of the site, in the churchyard including in the steep verge on the Eastern side (in 2010) and also (in small numbers) in the parish cemetery; however, no glow-worms were found on the more open South side of the church where the grass is mown short.

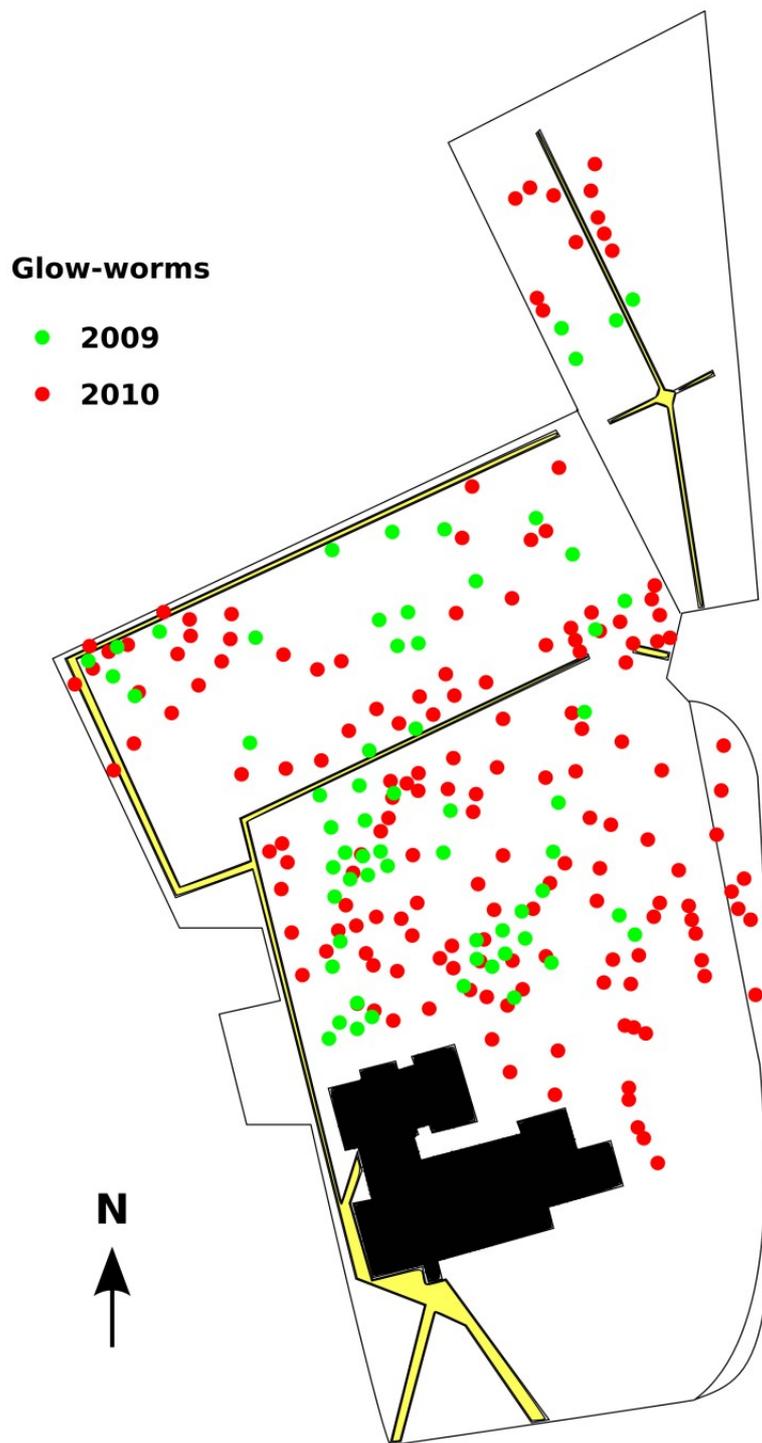


Figure 3: Spatial distribution of glowing females in both years

Duration of displays

Female glow-worm glow until they have attracted a male and mated. Records in the literature indicate that 73% of female glow-worms display for 1 to 3 nights; most females glow for only one night (43%) (Tyler, 2002). To determine whether the Overton's glow-worm population was similar in that respect we tried to estimate the duration of display of each female identified earlier.

First, for each year we converted the calendar dates on our records to number of nights since the first recording date. For example in 2009, 13/07/2009 was night 1, and the second visit on 15/07/2009 was night 3. Then, the duration of display for a female was calculated by counting the number of nights from the first to the last night that spot was recorded as glowing.

However, when looking at the data it appeared that at some spots, the pattern of female displays was very unusual: alternating between display and no display throughout the survey. This suggested that our data was sketchy. It is possible that sometimes we may have simply missed those females on some nights creating incomplete records or maybe the weather conditions or intensity of darkness where such that those females were not displaying at that time on those nights. In addition, it is likely that the imprecision of our mapping method caused confusing records. Some spots may have been recorded as one when in fact they were two nearby spots. Furthermore, on the same spot it is also possible that different females were displaying on different nights.

Therefore, for the purpose of our calculations we corrected the data to minimise the effect of such factors (which would tend to overestimate duration of display). At each spot we dropped any record of display that was more than 2 recording nights (i.e. 6-8 nights) earlier than the next record or later 2 recording nights later than the next. Thus, some records of display were dropped at 4 spots (out of 59) in 2009 and at 26 spots (out of 163) in 2010.

Figure 4 shows the corrected data for each year. Each vertical bar represents when an individual 'female' was displaying (days are displayed on the y-axis with day 1 as the first recording day on that year).

Even with the inherent imprecision of our method, our results reported that most females displayed for one night only: 34% in 2009 and 57% in 2010 although some seemed to display for up to a (unlikely) fortnight. This suggests that there were plenty of males nearby to ensure another generation will follow. However, we do not know whether these males came from other locations or belonged to the same colony. The biggest danger for many species is habitat fragmentation whereby small populations find themselves isolated from other populations. The lack of influx of individuals from other populations can lead to a decline of an isolated colony. It would be interesting to know where the nearest glow-worm colonies are to find out how isolated St Mary's glow-worm population might be.

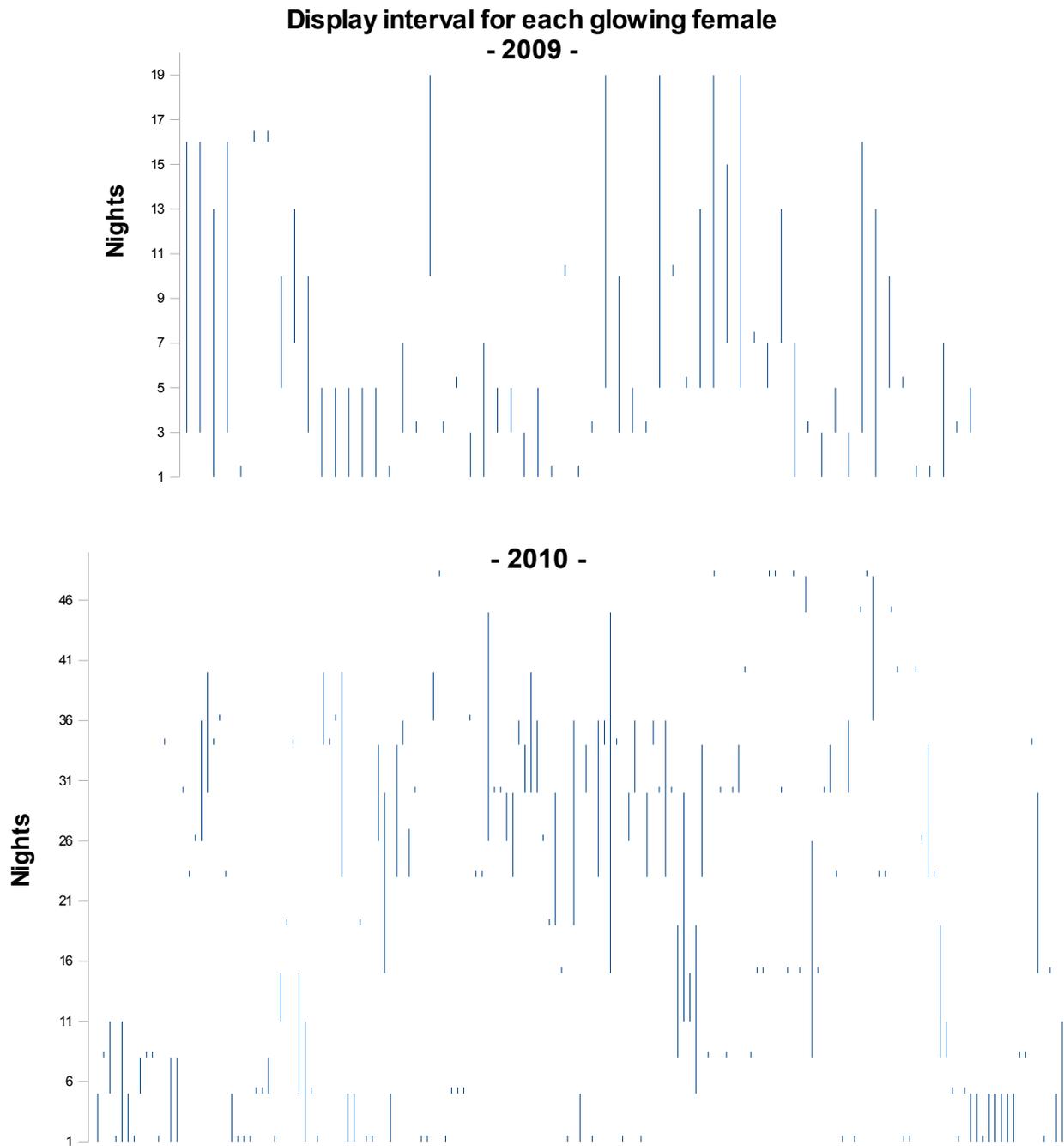


Figure 4: Individual display window for each recorded female in each year

Conclusion

Although glow-worm numbers may be in decline nationally, the colony in Overton seems sound. The churchyard provides a favourable habitat with snails for larvae to feed on and a suitable environment for females to display and find mates. OBS will continue to survey and to communicate with the church warden to help maintain a healthy population there.

Credits

St Mary's church: Moira Hilton (church warden) and Rev. Ian Smale (rector)

Liaison with church warden: Jane Beckman, Valda Stevens

Botanical survey: Peter Hutchins

Mollusc survey: June Chatfield

Glow-worm counts: Alan & Valda Stevens, Ken & Jane MacKenzie, Tanya Ashton.

Historical records: Vivienne Brown, Simon Frogley

Glow-worm information: *The Glow-worm*, John Tyler, 2002. ISBN 0 9523526 1 3

Pictures: Robin Scagell (<http://www.glowworms.org.uk/>), John Tyler

Report: Veronique Kerguelen

Appendix

Number of glowing females recorded in the survey:

| Date | Number of glow-worms |
|-------------|----------------------|
| 2009 | |
| 04/07/09 | 6 |
| 13/07/09 | 24 |
| 15/07/09 | 25 |
| 17/07/09 | 31 |
| 19/07/09 | 22 |
| 21/07/09 | 23 |
| 24/07/09 | 16 |
| 27/07/09 | 17 |
| 30/07/09 | 5 |
| 2010 | |
| 23/06/10 | 53 |
| 27/06/10 | 33 |
| 30/06/10 | 19 |
| 03/07/10 | 10 |
| 07/07/10 | 20 |
| 10/07/10 | 14 |
| 13/07/10 | 18 |
| 17/07/10 | 16 |
| 21/07/10 | 31 |
| 25/07/10 | 28 |
| 27/07/10 | 21 |
| 01/08/10 | 11 |
| 05/08/10 | 6 |
| 08/08/10 | 2 |