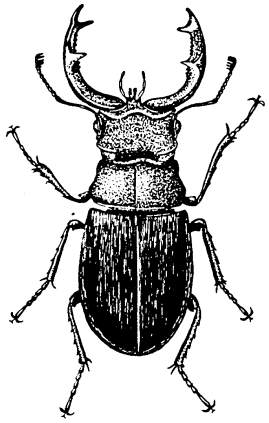
Species Action Plan for Sussex

Stag Beetle

Lucanus cervus



1. Introduction

1.1 Biology

Identification

At an impressive and conspicuous five centimetres in length from tip of mandible to tip of abdomen, male specimens of this dark brown and black beetle have been recorded as the largest native terrestrial beetle found in Great Britain. Physical size and the magnificently antlered mandibles are therefore a good guide to the identification of this species when specimens are of this gender, although the female is only around three and a half centimetres in length with much smaller mandibles.

The size of both sexes varies considerably, such variety amongst other wood-boring insects being normal due to differences in the nutritive properties of the various trees upon which larvae feed (Imms, 1971).

Life-cycle

Adult *L. cervus* may hibernate, as they have been discovered below ground level during March, although several more months pass by before beetles are generally observed on the surface. The mature stage is mainly seen from mid May to early August, although they have been observed foraging during every week from early May to early October.

The beetle feeds on fruit and tree exudates, and most often come to notice during the day when wandering on the ground. It takes flight at dusk, preferring warm and windless conditions in which to become airborne, when males seek out females with which to mate. The resultant eggs are laid in decaying wood.

Larvae Requirements

Larvae are gregarious and generally take around four years to fully develop. A life-cycle of up to seven years has been mentioned by some but, as with the size of the adult, the length of time spent at this early stage of development is probably dictated by the differing quality of the nutritive input. Grubs usually inhabit the decomposing deep roots and stumps of a wide range of mature deciduous trees, sometimes long-dead fallen timber or fence posts down to around 3" in diameter, and occasionally even large heaps of old sawdust.

It has been traditionally thought that this species only lives in deciduous timber (UK Biodiversity Group, c.1996) but there are records of the species utilising the remains of evergreen trees. Larvae bore fantastical architecture in chestnut fence-posts, and rotting elm, oak, poplar, willow, birch, Monterey cypress, and holly, these being the only trees known to

have hosted the early stages of this beetle in Sussex - although a number of other susceptible tree species will have gone unlisted.

Habitat Association

The beetle shows little willful favour towards any particular type of habitat in Sussex so long as rotting tree-stumps are present in a comparatively dry and sheltered district, although dense dark woodland may be avoided. There is no doubt that the insect is extremely local in its numbered habits, larvae often being confined to one particular tree-stump within a district. Beetles are therefore only sporadic in appearance away from breeding sites. On the other hand, a recent national survey of the species was a great success in Sussex, as more than 500 individual records were collated during one year of public observation from about 60 different 2 kilometre squares.

1.2 Current Status

- Listed on **Annex II of the EC Habitats Directive**.
- Listed on **Appendix III of Berne Convention**
- Listed on **Schedule 5, Section 9 of the Wildlife and Countryside Act**.
- UK Biodiversity Steering Group **Priority Species.**
- Nationally Scarce category B.

Europe

L. cervus is widespread on the continent, and in most countries this insect is protected by statute. However, the beetle is under no immediate threat on the European mainland, although the stag beetle has almost disappeared from a few northern states.

UK

Here in Great Britain, as early as 1941 it was realised that this enigmatic insect held a restricted and discontinuous range, and explanations were being sought. Since that time it has been consistently been listed as a national rarity, although its status as a rarity has been questioned recently. The stag beetle’s distribution in the UK is concentrated in the south-east.

In about 1960 an organised survey was undertaken, when many important records were gathered and eventually published. Then, as a result of the United Nations Conference on the Environment and Development held in Rio de Janeiro in 1992, *L. cervus* was included on the UK Biodiversity Steering Group's lists of threatened and declining species, and was deemed a priority for action. Six years later another national survey of *L. cervus* was performed, when the profile of the insect was raised, many new facts learnt, and important leads were uncovered in the hunt to unravel little-understood aspects of its biology. This was an exceptionally well-supported survey which proved that the species is currently densely distributed in three main zones in this country - from southern Hampshire to mid Sussex, in parts of Greater London, Surrey, and Berkshire, and in Suffolk - and less so elsewhere in the south.

Sussex

The complete history of the stag beetle in Sussex has been published in detail, where all known sightings are represented and the most important records are individually referenced (Pratt, 2000). In summary of the first 100 years of local entomological recording, up until the middle of the 20th century the beetle's range extended as far east as Ringmer and Eastbourne. Only three colonies had ever been detected in the north of the county, these being the most southerly of the largest national area for *L. cervus* which encompassed Surrey and London, and which were isolated from the main Sussex settlements. It is also noteworthy that after 1905 no East Sussex records are known to have been made for half a century. Still, encounters at Knepp Castle and Battle in 1957 signaled that an unprecedented increase in territory was under way - sourced from the main swathe of traditional

colonies situated in the south-west - towards the north and well into the previously completely barren far east.

L. cervus is under no significant new threat and is not endangered in Sussex. In fact the species has been gradually extending its empire here for at least half a century, its current range now far exceeding that ever recorded within the last 150 years.

The insect is currently well distributed in much of West Sussex and around Ringmer, and less so elsewhere; its local range is discontinuous, being distinctly and characteristically patchy throughout. The mid 20th century colonising push towards the north finally reached the Surrey border near Haslemere by the late 1990's and is now poised to reach Tunbridge Wells in Kent, although the early thrust towards the far east of the county seems to have stalled at Battle. Starting from an historical baseline of around 15%, the insect's range now extends to more than three-quarters of the area of Sussex in widely varying densities of distribution. Around one hundred of the county's two-kilometre squares boast records of this species, some holding multiple colonies - but the dichotomy in the general density of distribution between west and east remains. Whether this expansion is due to an increase in the recording of this species or a true increase is as yet unknown.

Despite the great change in distribution, there is no evidence that the numerical strength of individual colonies has altered within entomologically historical times - that is, during the past 150 years. Adults are still generally casually encountered in singletons, either roaming by day or more occasionally at night where tungsten light illuminates domestic windows or in mercury vapour sourced moth-traps. But some colonies situated in traditional geographical hot-spots, such as near Shoreham and in Chichester, regularly produce much higher numbers of beetles. Larvae are quite common in particular tree-stumps throughout it’s range, levels ranging from half a dozen to a dozen grubs per tree-stump - although as many as 50 have been counted.

2. Current Factors Affecting the Species

Climate and Habitat Availability

The stag beetle has always held a patchy distribution and a restricted range in Sussex. The fastidious insect's failure to colonise some wind-blasted districts within its normal range, totaling up to 6% of the vice-counties, is due to an insufficiency of its tree-associated food - but it is climate that has overwhelmingly dictated this insect's local distribution and territorial limits (Pratt, 2000). In East and West Sussex the beetle is almost exclusively found in low-lying areas where rainfall does not consistently exceed 900 millimetres per annum, and where it prefers the quickest-draining of all soils. A shortage of trees and the consistent presence of high rainfall precisely account for the uncolonised patches within the species overall range, this cumulatively amounting to perhaps 15% of the county.

While high rainfall and treeless downland explain the barren areas within the beetle’s local range, they do not explain just why the insect increased its territory towards the Surrey and Kent borders during the last half of the 20th century. But a comparison of the timing of above average long-term annual temperatures and the pioneering *L. cervus* records does show a good agreement - during advantageous climatic sequences the insect proceeded to colonise northern areas at a rate of around half a mile per annum.

Habitat Loss

A whole series of reasons have been proposed to explain this beetle's patchy and restricted national distribution, and the perception of fluctuating numbers and territorial decline. Almost all conservationists believe that by far the main threat facing L. cervus is the removal of fallen timber

and the grubbing up of tree stumps, along with general habitat loss. It is certainly true that a few Sussex colonies are physically destroyed annually - but, however deplorable, the losses are peripheral and are quickly replaced naturally.

It has also been said that the results of Dutch elm disease and serious storms have made a positive contribution to this insect's welfare, but there is no evidence or likelihood that the range or numbers of *L. cervus* had been previously restricted by a shortage of rotting wood in any area away from the East Sussex downs.

Predation

Other listed threats are cats and pedestrians in towns, and birds, foxes, frogs, squirrels, automobiles, open water, lawnmowers, and collectors, elsewhere. However, few of these perceived endangerments bear much scrutiny as reasons for a serious reduction in the potential modern-day status of this beetle in Sussex, and all have been dismissed as numerically irrelevant (Pratt, 2000).

However, large-sized bats - probably the Noctule, Serotine, or Greater Horseshoe (M. Love) - do significantly attenuate adult levels annually in some colonies. For example, about two dozen dismembered bodies were collected from a lawn at Lancing College during one morning in 1995, and the beetle was culled nightly, every summer for a decade following the mid 1970's, by bats at Lodge Hill, Coldwaltham, where up to 10 carapaces could be gathered each morning. During the same era, similar records were made under lamp-posts at Midhurst.

3. National Species Action Plan

The national objectives and targets for this species as listed in the UK Biodiversity Group Report, 1996 are as follows:

- Raise awareness of the threats to, and the European importance of, the species among local conservation groups and communities.
- Identify a series of key sites and monitor these to establish long-term trends.
- Maintain strong populations at key sites throughout the current range.
- Carry out further research to establish habitat requirements.

4. Current Action

Surveys

Several organisations and private enthusiasts have been promoting *L. cervus* as an important species for conservation and publicly requesting records to add to our knowledge, including English Nature, the People's Trust for Endangered Species, the Joint Nature Conservation Committee, and the Sussex Wildlife Trust.

A very successful national survey was undertaken in 1998, organised by the People's Trust for Endangered Species, which garnered many Sussex records. Further investigative laboratory and field research into the species was started in September 2000 at Southampton University.

More parochially, immediately after the 1998 survey, public requests for records made by the author of this work resulted in a good data base of Sussex records - both modern and, crucially, historic - which, after collation, analysis, and further research, allowed the publication in August 2000 of a definitive paper on the local history and current status of the stag beetle.

Habitat Management

Little officially-sponsored field management of stag beetle colonies has been attempted in Sussex. However, the recommended national strategies for the practical preservation of the insect has always concerned habitat defense, this amounting to a retention of both individual old tree-trunks and woodland in general, and the maintenance of a continuous series of tree ages within woods. Sometimes it is even recommended that artificial garden log piles be constructed but, while this particular tactic has been shown to be of peripheral benefit to Coleoptera as a group, there is no known incident when it has attracted a single stag beetle (R. Key).

5. Objectives

i To improve our knowledge of the status and biology of the stag beetle.
ii To minimise the unnecessary destruction of colonies.
iii. Raise awareness of the European importance and habitat requirements of *Lucanus cervus.*

6. Targets and Costs

This Species Action Plan is now archived

7. Potential

Changes in weather and climate have probably been the main source of territorial fluctuation and limitation in *L. cervus*, and in the face of completely unpredictable and immutable future climatic alterations, the successful realisation of commonplace conservation objectives for this species - such as attempts to materially increase the number of colonies by field management, or to increase the species range - is currently a difficult to attain goal. In short, devising genuinely effective practical tactics and field management plans to substantively assist the territory held by this Lucanus will be difficult to effect with current knowledge of the species requirements. While numerical levels within a few individual weak colonies might be enhanced by micro-habitat attenuation, even the satisfying realisation of such management would have no strategic merit.

Even ‘though our ability to dictate status trends within this species is currently severely limited, as the beetle is provenly prone to serious range change in Sussex, continued monitoring of it’s status is essential if we are to increase our biological knowledge and thus the chances of successful interventions in the future. Annually renewed public requests for records by all local conservation organisations and the future funding of research into the insect’s local distribution are therefore a prerequisite. Despite it’s recommended deletion as a flagship species, the continued promotion of the stag beetle as an attractive inhabitant of dead wood will ensure that the unnecessary loss of colonies will be minimised and that public awareness of Coleoptera in general will be raised further.

In addition to annual monitoring, to promptly forewarn of any future territorial decline within *L. cervus* it is also recommended that specific well publicised surveys be carried out at intervals of five or ten years - especially with regard to East Sussex - and the results compared to the distribution maps reproduced earlier in this plan. An annual exchange of records between the Sussex Biological Record Centre with the People’s Trust for Endangered Species would also be mutually advantageous.

While much of West Sussex and the Ringmer district have been the stag beetle's local headquarters for at least a century, it is events in the north and east of the county which will probably first signal any future serious change in status. A loss of the species from Ashdown Forest would indicate a

retreat in range back to traditional strongholds; a disappearance from the historically key parish of Ringmer would testify that a grave and unprecedented loss of territory was taking place. Future records made in the Tunbridge Wells district, or further east than Battle, would confirm that the modern-day trend for the colonisation of new areas is continuing.

8. Action plan

This Species Action Plan is now archived

9. Monitoring/Review

This action plan will be monitored by the Sussex Biodiversity Partnership annually and reviewed and updated by the Sussex Biodiversity Partnership every five years.

10. References

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10.1 Further Reading

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11. Consultation

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12. Appendices

12.1 Acknowledgements

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