

Stag Beetle (Flagship) Species Action Plan



“As adults, they will only live for a few weeks, but their short lives will nonetheless be dramatic!”

Sir David Attenborough

1 Aims

- To protect, conserve and enhance the nationally significant population of stag beetles in the Royal Borough of Kingston.
- Promote stag beetles as a 'Flagship Species', to encourage a wealth of beneficial conservation practices that support an array of other less known and less charismatic species.
- To raise the awareness amongst Council Officers and the public of the importance of stag beetles to encourage greater levels of council & community driven conservation and appreciation across the borough.

Acknowledgements

We thank Mark Wagstaff for their time and expertise in reviewing this plan.

2 Introduction

Very few invertebrate species in the United Kingdom can typically elicit the wonder and awe that is associated with the European stag beetle (*Lucanus cervus*). Its fascinating form has inspired an array of theatrical names over time including thunder-beetle, oak ox and horse pincher. The stag beetle is the United Kingdom's largest beetle, with adult males reaching up to 7cm in length. The males are adorned with spectacular mandibles reminiscent of deer antlers, thus giving them their common name. These 'antlers' are used by males to attract females by competing with other males. After mating the female lays her eggs in suitable decaying wood of deciduous trees such as stumps and roots, or even old fence posts.

Much of this beetle's life cycle is spent in the larval stage, where they consume dead wood to build up fat stores. In the UK this stage can last up to 7 years depending on temperature and the nutritional content of the wood. From mid-May to late July the metamorphosed adults emerge with the primary purpose of mating. They remain in adult form for only a few weeks, as they are reliant on the energy stored during the larval stage and can only absorb moisture and sap from rotting fruit with their feathery tongues. This means that the availability of dead wood is inextricably interlinked with the species' survival and is a key component of any conservation action.

Sadly, the species is considered to be globally threatened. Stag beetles are in significant decline across Europe and have become extinct in a number of countries including Denmark and Latvia. The South East of England, particularly London, has a nationally important population. However the UK has recorded declines in the species since the 1940s.

In 2018 the 'People's Trust for Endangered Species' published the 'State of Britain's Stag Beetles' report, which stated that stag beetle records were recorded more in Greater London than in any other British county. The species also appears to be significantly more common in the South and West of London. Indeed, in the Summer months across the borough, the beetles can be seen clumsily flying around our local nature reserves and parks.

Due to their widespread distribution across the borough, conservation efforts would be likely effective if implemented correctly in locations throughout the borough from our parks, gardens and new developments.

As with all the species highlighted in this biodiversity action plan, the charismatic stag beetle is a flagship species for an array of other species that also depend on similar habitats. Indeed, there are hundreds of saproxylic invertebrates which rely on deadwood for survival and make up around 7% of British invertebrates, including 700 species of beetle as well as flies, parasitic wasps, moths, bugs, sawflies and spiders (Alexander, 2002).

3 Current status

- a. **Legal / policy status** – Stag beetles are protected from sale under Schedule 5 of the Wildlife & Countryside Act 1981 (as amended), as collection for sale was once a major threat to their populations. In fact, in certain parts of the world, the stag beetle trade is still thriving. Their presence is not an obstacle to development, but as a priority Biodiversity Action Plan species sympathetic measures should be considered to accommodate their needs wherever possible.
- b. **Conservation status** – Stag beetles are a London Priority Species
- c. **Distribution**

Heatmap of Stag Beetle Records in Kingston upon Thames

Produced by Greenspace Information for Greater London CIC, on behalf of RB Kingston upon Thames, May 2022

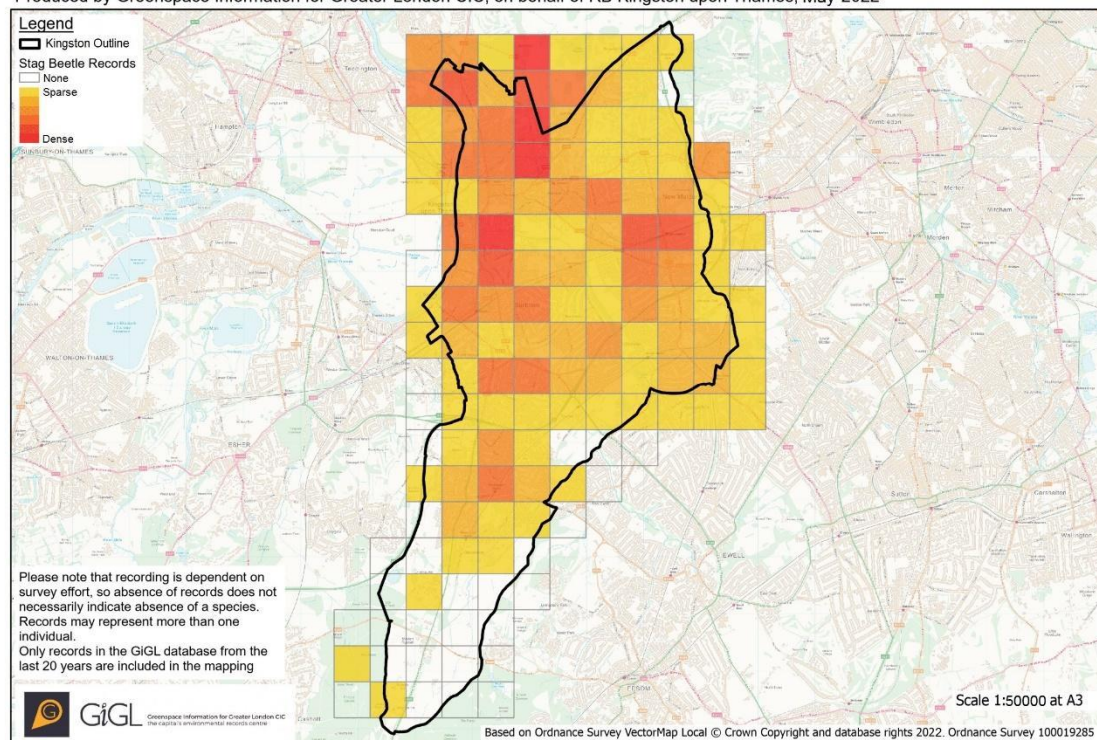


Figure 1 Heat map showing European stag beetle distribution in RBK. Note that this map is subject to data deficiencies. This plan encourages greater recording of stag beetle data.

4 Key Habitats

Stag beetles can be found in habitats where there is plenty of tree cover and a sufficient resource of dead wood is available including parks, gardens, allotments, woodlands (preferably broadleaved), wood pastures and old landscapes with networks of hedgerows. They do not appear to be particularly selective about the host wood but tend to avoid coniferous species such as fir and pine because of the acidic sap produced, and softwood species such as willow and birch as these decompose too quickly to provide significant habitat. Generally, stag beetles feed on the rotting stumps and roots of a wide range of broadleaved species.

While the pattern behind their distribution in the UK is somewhat unexplained, stag beetles are strongly associated with climate and soil type. Females prefer soft soils that can easily be burrowed into to lay their eggs and are rarely found in hard soils such as chalk or heavy clay. In order to metamorphosize into adults, larvae create cocoons underground in the surrounding soil. It is therefore important that the soil around the deadwood habitat is also soft and is not negatively impacted by high footfall or compaction. This could be achieved by allowing ground cover such as brambles to grow around the area.

Climate seems to be a limiting factor for their range, as they are currently restricted to southern areas of Britain which are warmer and drier. Winter temperatures, particularly frosty periods, seem to affect their persistence in an area.

As a flagship species, stag beetles promote awareness and protection of a host of important animals, plants and fungi that are also dependent on dead wood. Taking measures to conserve stag beetles across the borough would not only be beneficial for these saproxylic organisms but also for the habitats in which they reside, as their nutrient cycling service boosts health and productivity within ecosystems.

5 Ecosystem Functionality and Services (Role in the Climate Emergency)

5.1 Bio-productivity

Stag beetles spend the majority of their lifecycle feeding on dead wood underground. This makes the larvae important agents of decay which help return nutrients and carbon to the soil. By doing so, stag beetles and other saproxylic insects play a central role in biomass production in woodland and forest ecosystems. This lays the foundation for wider ecosystem services such as domestic timber production, climate regulation, erosion control, water quality and water quantity (Augustynczyk, Yousefpour, & Hanewinkel, 2018).

5.2 Trophic position

As primary consumers, stag beetles provide a nutritious, seasonal food source for a wide range of animals including birds, amphibians and mammals such as badgers and hedgehogs.

5.3 Model Species for Genetic Studies

Due to their sedentary lifestyle and specialised habitat, stag beetles can be used as model species for genetic based studies, such as hybridisation or detecting historical processes relating to climate change. For example, their distribution

over time has been used to identify areas of refuge during ice-ages (glacial refugia locations) and the re-colonisation of broadleaved tree areas (post-glacial expansion dynamics) (Cox *et al.*, 2019).

Since European stag beetles are rare and threatened, and London's population is internationally significant, protecting the genetic reservoir in Kingston is extremely important.

5.4 Culture

Stag beetles have played and continue to play a widespread and meaningful role in

human culture and can be found in many art forms such as murals, sculptures, and paintings. Due to their habit of appearing on warm and humid summer evenings, mediaeval peasants believed that stag beetles summoned lightning storms and so they were associated with Thor, god of thunder and protector of the harvest. Stag beetles were also symbols of evil and bad luck in European folklore, due to the widespread belief that by carrying coals "from the hearth up to the attic with their strong mandibles", they were responsible for the frequent domestic fires during that time period (Sprecher-Uebersax, 2008).

6 Threats to Species

6.1 Habitat Loss

A major factor in stag beetle decline has been the reduction or removal of appropriate habitat – dead wood. A number of management practices that are unsympathetic and have contributed to this decline in the borough include:

- The tidying of parks and gardens including removal of felled trees
- Removal of veteran trees
- Wood chipping and stump grinding

Other practices which are not relevant to the borough but should be acknowledged at the national level are:

- The intensification of commercial forestry
- The substitution of broadleaved trees for coniferous species
- The intensification of agriculture leading to the removal of hedgerows and other wooden elements such as old fence posts

The enhancement of greenspaces for biodiversity in recent decades has

somewhat reduced this trend of decline (Frith, 2000). However, more needs to be done, especially given that vegetation loss in London gardens is generally on the rise.

6.2 Low Dispersal Power

Since the 1940's the stag beetle's distribution has contracted to south-eastern areas of the UK, with significant concentrations in London and the Thames Valley. Females prefer soils that can be easily burrowed into to lay and hatch their eggs. Thus, the species cannot be found in chalk soil regions that surround the south-east, such as the North and South Downs. This may limit expansion and recovery outside of their contracted range, as stag beetles are rather sedentary, they are unlikely to travel large distances in the search for habitat or a mate. Alongside their slow lifecycle and short mating period, these factors make the stag beetle extremely poor colonisers compared to other species living in similar habitats.

6.3 Predation

Stag beetles have a number of predators,

some of which are priority species such as badgers and hedgehogs. In the urban context, there is high predation pressure from cats, foxes and corvid birds such as crows and magpies who often eat stag beetles in their mating stage and may prevent them from completing their lifecycle. These animals have greatly increased in number over recent years, especially in suburban areas where stag beetles tend to have strongholds.

Much predation also occurs around the deadwood habitat where stag beetles develop and emerge, and many are dug from the ground in their larval stage. Allowing the growth of ground cover such as brambles around the deadwood habitat may afford these beetles some protection

from predators and may also prevent high footfall from compacting the surroundings.

6.4 Accidental Trampling or Collision

Female stag beetles invest their energy in producing eggs which are preferably laid in the location where they hatched (providing there is a large enough source of dead wood left to support the next generation). Males, however, will disperse up to 500 metres in search of females, using pheromones to locate them. Despite being a relatively short distance, male stag beetles may encounter a number of busy roads during this journey which poses a threat from accidental trampling or collision. Additionally, adult beetles are often found basking on roads and pavements to conserve energy during the day, which only furthers their plight.

7 Conservation actions (Tabulated)

Action	Timeframe	Lead	Partners	Evidence base
SB01 - To have deadwood habitat in all parks in the borough.	2023 - Ongoing	RBK	Glendale, ATS, Friends groups	N/A
SB02 - Maintain and enhance conditions through positive management, including the retention of dead wood, on all sites where the species is known to occur.	2023 - Ongoing	RBK		Conserving Stag Beetles in Forests – stag beetle monitoring.org Managing Deadwood Habitat - BugLife
SB03 - Identify sites where stag beetle range can be expanded from existing populations across the borough or	2023 - 2028	RBK		See SB02

into neighbouring boroughs through the implementation of deadwood habitat (within 500 metres of existing sites).				
SB04 - Ensure landowners and managers are aware of stag beetle presence and importance, and of appropriate conservation management methods.		RBK		See SB02
SB05 - Establish long-term, standardised monitoring of at least three key sites. Ensure that information is shared with relevant organisations and recording schemes.	2023 - Ongoing	RBK		European Stag Beetle Monitoring Network Non-Invasive Techniques such as Acoustic Monitoring or Bait Trapping/Transects
SB06 - Encourage the protection of populations that are threatened by development. As a last resort, consider translocating larvae and conduct long-term monitoring of translocation populations. This can be done using deadwood from existing sites to ensure the transmission of beneficial organisms.	2023 - Ongoing	RBK		Case Study of Stag Beetle Translocation - Conservation Evidence

Engagement & Awareness	Timeframe	Lead	Partners	Evidence base
SB07 - Develop a campaign for raising public awareness (especially at the local community level) of the conservation needs of stag beetles and saproxylic insects, including educational events / press releases and encouraging the creation of habitat piles in private gardens.	2023 - 2028	RBK		Build a Log File for Stag Beetles – PTES
SB08 - Implement / encourage positive interpretation material and displays about stag beetle conservation in public greenspaces, schools, allotments or similar.	2023 - 2028	RBK		N/A
SB09 - Encourage citizen science stag beetle surveys and ensure information is shared with recording schemes.	2023 - Ongoing	RBK		European Stag Beetle Monitoring Network – Citizens Science Project Stag Beetle Count Survey

8 Planning Context - Biodiversity Net Gain

As priority species for the borough, stag beetles should be protected through the planning system and, where possible, habitat creation and enhancement for stag beetles is encouraged. Planning conditions should be applied which enhance connectivity between the relevant habitats and prevent or mitigate their deterioration

9 Monitoring

Metric	Process of Monitoring	Timeframe	Lead	Partners
SB01 – Database recording the presence and state of deadwood in all parks. Encourage habitat creation in parks without good deadwood habitat.	Annual update	2023 – ongoing	RBK	
SB02, SB03 – Number of habitat creation or enhanced projects supported / undertaken.	Annual report	2023 – ongoing	RBK	
SB04 – Collation of materials used to engage landowners and managers.	Ad hoc	2023 – 2028	RBK	
SB05, SB06 - Number of monitoring programmes supported / undertaken. Encourage all Friends Groups to report sightings.	Annual report	2023 – ongoing	RBK	
SB06 – Number of stag beetle larvae translocated as a result of development.	Ad hoc, Monitoring and annual report	2023 – ongoing	RBK	

SB07 – Collation of materials used in the campaign. Number of events and number of attendees.	Ad hoc	2023 – 2028	RBK	
SB08 - Number of positive interpretation material and displays implemented.	Ad hoc	2023 - 2028	RBK	
SB09 – Number of citizen science surveys supported / undertaken and spreadsheet of records.	Ad hoc, Annual report	2023 – ongoing	RBK	

10 Other relevant HAPs/ SAPs

- a. Hedgerow
- b. Pollinator Parks
- c. Rivers and Streams
- d. Woodland
- e. Badger
- f. Hedgehog

11 References

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12 Abbreviations

ATS - Advances Tree Services

RBK – Royal Borough of Kingston upon Thames

13 Contact information

Elliot Newton (Biodiversity Officer)

The Royal Borough of Kingston upon Thames

Guildhall 2

High Street

Kingston upon Thames

KT1 1EU

Email: elliott.newton@kingston.gov.uk