

Metsähallitus

# *Management plan for the habitats of Cucujus cinnaberinus*

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29.3.2021



Funding for producing this material has been received from the European Union's LIFE programme. The content of the material reflects the views of its authors and the European Commission cannot be held responsible for any use which may be made of the information contained in it.

# Management plan for the habitats of *Cucujus cinnaberinus*

## Ecology and distribution



### Description

*Cucujus cinnaberinus* (Scopoli, 1763) is a red-black beetle 11 to 15 mm in length with a very flat body. Its head and pronotum and the elytra covering its abdomen are red with an orange tinge (cinnabar). The legs, antennae, eyes and mandibles are black. The protruding spherical temples behind the eyes give the head an almost triangular shape. The elytra have longitudinal grooves.

Other beetles with red or reddish elytra are also found in Finland. For example, *Lygistopterus sanguineus* and Pyrochroidae beetles contain such species. However, the head in these species is black, and there are also variations in the colour of the pronotum. Additionally, the body of *C. cinnaberinus* is significantly flatter than that of other species with similar colours.

The pale yellow-brown larvae are also flattened in shape. Characteristically, they have two larger and two smaller

straight, spine-like protrusions in the last larval segment. The larvae are very similar to *Lygistopterus sanguineus* and Pyrochroidae larvae, which species are much more common than *C. cinnaberinus* (Sverdrup-Thygeson 2008).

### Life cycle

*Cucujus cinnaberinus* breeds in May and June, the period during which adults are the most active (Ehnström and Axelsson 2002, Mattila 2017). Larval development takes at least two years. The larvae pupate in late summer or autumn. To protect themselves while pupating, the larvae collect thin strips of wood, forming a pupation chamber. Pupation takes two to four weeks, after which the adult beetle overwinters either under the bark or in some other habitat in the forest (Sverdrup-Thygeson 2008). As the larvae are exclusively found on recently dead trees, it is likely that the

species can only live on the same trunk for a single generation (Sverdrup-Thygeson 2008). It has been assumed that several generations can also be found on larger trunks (Mattila 2017).

## Nutrition

*Cucujus cinnaberinus* adults and their larvae live in the same habitat under the bark of dead aspens, feeding on the phloem layer decomposed by fungi and bacteria. They also eat other invertebrates.

## Habitats

*Cucujus cinnaberinus* lives under the bark of dead aspens. On trunks suitable for this species, the bark is still attached to the tree, and moist, black decomposed phloem is found under the bark. They may live in logs or upright trees that have died recently (approx. two to three years ago). In logs, the moisture conditions under the bark remain suitable for the species for longer.

Elsewhere in Europe, the species also lives in many other tree species, including oaks, willows and different conifers (Sverdrup-Thygeson 2008).

In Finland it typically lives in old-growth spruce forests with a good continuum of decaying aspens. Forests of this type contain plenty of aspens in different stages of decay as well as sturdy old aspens that will produce more decaying wood. In other parts of Europe, the species also lives in cultural environments with large old deciduous trees.

The aspen has declined in commercial forests due to historical forestry activities. In fear of pine shoot twist rust, in past decades efforts were made to prevent the growth of root suckers by ring-barking aspens and cutting grooves in the trunk as well as spraying seedlings. This disease, which causes losses of growth in conifers, is caused by *Melampsora pinitorqua*, a fungus which uses aspens as an intermediate host. Especially in the Nordic countries, the large ungulate populations also have a negative impact on aspens. Elk like to gnaw aspens and eat young aspen shoots. In the past, fires created gaps in natural forest landscapes, which were ideal for aspens. Efficient prevention of forest fires reduces the number of gaps created in nature reserves, for example, and prevents natural forest development following disturbances. Natural early succession forests are very rare today.

As the number of aspens at the landscape level is small, species dependent on decaying aspens have become endangered. The number of sturdy dead aspens is particularly low. A lack of microhabitats may be the key factor in *C. cinnaberinus* becoming endangered. The species can also live on dead aspens in clearings as it does not require a closed-canopy forest to preserve humidity in the microclimate. However, there must always be core areas where the continuum of decaying aspen has not been interrupted close by such sites (Mattila 2017).

## Distribution and status

*Cucujus cinnaberinus* belongs to the family Cucujidae, four species of which have been found in Finland. Of these four, the *Cucujus haematodes* has been lost. *Pediacus depressus* is found rarely on the southern coast. *Pediacus fuscus* is a saproxylic species that can be found in all parts of the country.

*Cucujus cinnaberinus* is a deciduous and boreal forest species currently known to occur on two locations in Häme in Southern Finland. Apparently, first beetles of this species in Finland were found by C. R. Sahlberg in the early 19th century. As lately as the first decades of the 20th century, the species had a more extensive distribution in the southernmost parts of Finland. The northernmost historical observation was made in Korpilahti in Jyväskylä. In Mustametsä in Mäntsälä, the species was found as recently as the 1980s. It is today critically endangered, threatened by a decline in the volume of decaying wood and old heath forests as well as the reduced number of burned sites and other early succession sites.

Its distribution extends to Central and Northern Europe and even Siberia. However, its geographical distribution is very intermittent. The species has clearly declined in Sweden, Finland and Norway, as well as elsewhere on the margins of its range. The strongest populations in Europe are found in Hungary, Slovakia and the Czech Republic, where the species also lives on hybridised aspens.

## Administrative status and legislation

EU Habitats Directive Annexes II and IV

Protected under the Nature Conservation Act (Nature Conservation Decree 160/1997, Annex 2a 471/2013)

Endangered and under strict protection (Nature Conservation Decree 160/1997, Annex 4 471/2013)

Red list category in 2019: critically endangered (CR)

The national action plan for species protection (Finnish Environment Institute 2010–2011) lists *C. cinnaberinus* as a species requiring urgent protection. It is also included in the updated list of species requiring urgent protection from 2020.

The destruction and deterioration of breeding sites and resting places used by specimens of animal species referred to in Annex IV(a) of the Habitats Directive is prohibited under section 49 of the Nature Conservation Act. Strict protection means that the breeding sites and resting places of the species in question must always be preserved in connection with various projects and actions unless a derogation for their destruction or deterioration has been obtained under Article 16 of the Habitats Directive. On sites where *Cucujus cinnaberinus* is found, dead and damaged aspens suitable for this species which have retained their bark and in which moisture under the bark has not completely evaporated are defined as breeding sites and resting places.

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Mattila 2017, Hyvärinen et al. 2019, Finnish Environment Institute 2021

## Habitat management in protected areas

### Distribution in protected areas

The species has only been found on two Natura sites in Finland: Evo area (Kotiset old-growth forest) on the boundary between Kanta-Häme and Päijät-Häme as well as Kärppäjärvi area in Pirkanmaa. Evo, which is located in the municipality of Hämeenlinna and partly in Asikkala and Padasjoki, is an extensive wooded Natura site of 7,860 hectares. A state-managed hiking area and nature reserves are found in Evo. In 2021, the Ministry of the Environment appointed a working

group to investigate the possibility of establishing a national park in Evo. Kotiset Nature Reserve was established to preserve an old-growth forest. It is characterised by old spruce and mixed spruce forests with a rich variety of species dependent on decaying wood.

The two-part nature reserve of Sudenpesänkangas with its old-growth forest is also found in Evo. Additionally, there are smaller areas set aside for protection and private nature reserves with old forests and natural water bodies. For other parts, Evo is a mosaic of forests of different ages. Evo hiking area covers a large part of it. Forestry activities are pursued in the hiking area, however taking into account the habitats and species referred to in the Habitats Directive, plans and planning ordinances applicable to the area, and recreation needs. A significant share of the forests are preserved by landscape ecological means as ecological sites. Evo is a significant area for research and educational activities. A management plan has been prepared for it (Nordström 2015).

The second known occurrence of the species is located on the Natura site of Kärppäjärvi in Kuhmoinen. Kuoppa-aho old-growth forest reserve, which consists of two sections, comprises the most natural forests of the area, including mesic and herb-rich heath forest with spruces and old deciduous trees. There also is an esker area of local value in Kuoppa-aho. In Portinvuori, old spruce forest, a crag and herb-rich forest beneath the crag can be found. The rest of the Natura site consists of mixed conifer forests of varying ages. A management plan has been prepared for this area (Saloniemi and Salovaara 2016).

## Management of occurrences and measures carried out

The protected areas in which *C. cinnaberinus* beetles live are too small to enable the species to survive over the long term. Isolated populations are at an obvious risk of being lost.

In Evo, measures should primarily be carried out in managed forests within the Natura site to initiate the development of a natural forest in different ways and create preconditions for the aspen continuum. Prescribed burning can be used to trigger the development of a natural forest and promote the renewal of deciduous trees. The aspen reproduces from root suckers, in particular, which appear especially when the tree is felled or damaged. Breaking the ground surface may also promote the regeneration of aspens.

Aspen saplings are vulnerable to grazing by elk and hares. Fencing can be used in places to help aspens survive through the most vulnerable stage. Beavers can also cause damage by felling aspens, mainly in forests close to watercourses. The North American beaver (previously known as the Canadian beaver) has felled at least young aspens in Kotiset old-growth forest. The North American beaver is included in the list of alien species in the National Strategy on Invasive Alien Species, and they can be hunted by permission of the landowner or the party that controls the hunting rights. To hunt European beavers, a permit issued by the Finnish Wildlife Agency is required. Aspens can also be protected with nets in acute situations.

Prescribed burning for forest and ecological management purposes has been carried out in Evo over quite a long period by different actors, also for training purposes. The area belongs to Metsähallitus' fire continuum network (Hyvärinen and Aapala 2009). Areas that have been burned and left to develop naturally are valuable for conservation purposes. Burning promotes the regeneration of deciduous trees, including the aspen.

The Evo LIFE project administrated by HAMK University of Applied Sciences (2002–2005) also contained measures for promoting the growth of aspens (HAMK 2005). The project planted 11,000 saplings of deciduous trees, mainly aspens, and fenced in aspen saplings over an area of almost four hectares in Evo. The restoration measures included prescribed burning.

The Species-rich LIFE project continued the management work aiming to promote aspens in 2016 by clearing space for aspens on around 20 sites in Evo. The project also cleared space for aspen groves planted in the Evo LIFE project.

In Beetles LIFE, plans have been made to support the regeneration of aspens in the private Harjula nature reserve. The old-growth forests in this area of approx. 40 hectares contain old aspens, but only few new saplings appear in the closed-canopy forest.

While Kärppäjärvi area is not included in any fire continuum site, it is located in the vicinity of Isojärvi fire continuum site. Prescribed burning for restoration purposes has taken place in Kärppäjärvi at least once in 2014. To support the regeneration of aspens, the management plan notes that the elk population can be reduced under derogations.

*C. cinnaberinus* has been searched for more extensively outside the current occurrences, however without results. When inventorying species in suitable habitat types, *C. cinnaberinus* should still be born in mind. The species is protected, and specimens must not be collected or disturbed. For inventory guidelines, see Mattila (2017).

## Recommendations for habitat management in protected areas

- Safeguarding the regeneration of aspens more extensively in nearby areas. The techniques can include prescribed burning, breaking the ground surface, and building a fence around aspen saplings that are vulnerable to damage caused by elk and hares. The measures should target compartments where the age and structure of the trees are significantly different from those in natural forests.
- In Evo, taking aspens into consideration in forest management and other use of the area by preserving aspens on all Natura sites. Aspens should be always preserved in spruce forests and mixed spruce forests. Aspen saplings should also be preserved in connection with stand management work.
- Measures that support the regeneration of *C. cinnaberinus* and its habitat, or aspens, in plans that direct the use of areas.

## Consideration for the species in forest management and safeguarding its habitats by ecological management

Safeguarding the occurrence of aspens is essential for preserving *C. cinnaberinus* and many other species dependent on aspens as part of Finnish forest ecology. The occurrence of old and sturdy aspens and decaying aspen wood, in particular, is distorted at the landscape level and concentrates on sites with relatively small areas in old-growth forests. A cultural landscape may also contain old deciduous trees that provide important habitats for organisms living on decaying deciduous wood. In addition to commercial forestry areas, old and decaying trees in gardens, field margins, parks, graveyards and urban areas are sites where habitats for these species can be created and maintained.

For *C. cinnaberinus*, reinforcing the aspen continuum more extensively in areas near the two occurrences would be important.

### Recommendations for habitat management on lands used for commercial forestry

- Preserving aspens of different ages in all types of fellings on suitable sites: game thickets, retention tree groups and different protection zones.
- Preserving decaying aspen wood in all forest management. For *C. cinnaberinus*, recently dead, relatively sturdy decaying aspens are the key, either logs or snags. As so many other threatened species depend on aspens, too, also preserving dead aspens with a smaller diameter and in different stages of decomposition is always a good idea.

### Acknowledgements

The management plan was commented on in its various stages by Seppo Karjalainen, Panu Kuokkanen, Anneli Suikki, Teijo Heinänen, Ville Vuorio and Ari Lahtinen from Metsähallitus Parks & Wildlife Finland. Consideration for the species in forest management was commented on by Riitta Raatikainen and Matti Välimäki from the Finnish Forest Centre and Maarit Kaukonen from Metsähallitus. We would like to thank Senior Ministerial Adviser Esko Hyvärinen from the Ministry of the Environment for commenting on the final version.

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