

Metsähallitus

Management plan for the habitats of Phryganophilus ruficollis

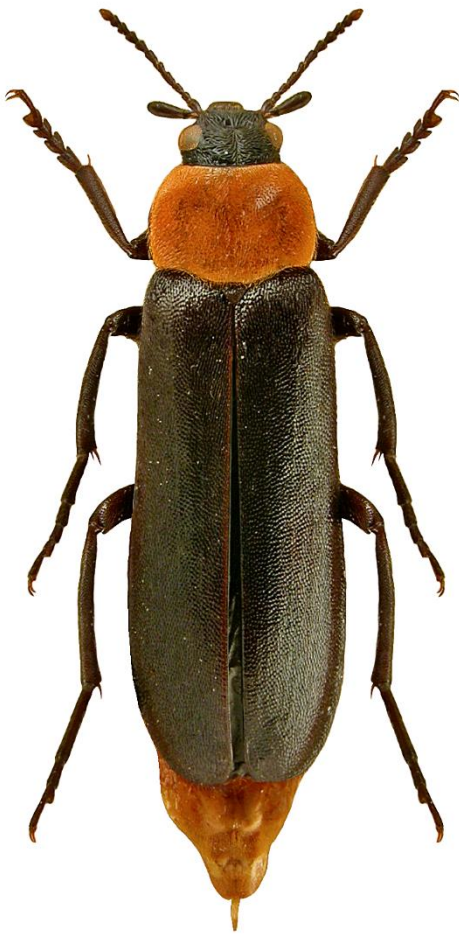
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Ecology and distribution



Description

Phryganophilus ruficollis (Fabricius, 1798) is a relatively large, two-coloured beetle 12 to 16 mm in length. The head and elytra are black and the pronotum is orangey red. The elytra have dense small pits that are partly joined together as well as fine hairs. The body shape is elongated, and the antennae are of an even width. Many other species, for instance soldier beetles, with very similar colouring are found in Finland. However, other species with similar colours have clearly longer antennae than *P. ruficollis*, or other distinguishing features.

The light-coloured, cylindrical larvae at most approx. 2 cm in length may be confused with other beetle larvae living on decaying wood. *Phryganophilus ruficollis* larvae are relatively slim, and the front segments are slightly thicker than the rest of the body. The larva's head is brown, quite small and attached to the body slightly below the first segment. While the larvae of many other species are similar, very few of them live in decaying wood of a similar composition as that favoured by *Phryganophilus ruficollis* (Ødegaard and

Hanssen 2013).

Life cycle

Adults are active from June until early July (Ødegaard and Hanssen 2013). While the species appears to be the most active in daytime, observations are rare as they tend live in hiding (Gutowski and Sućko 2009). In southern parts of Finland, they have been caught in traps between late May and mid-June. Females lay their eggs on suitable trunks of conifers or deciduous trees in early summer. Larval development takes two to three years, after which the larvae pupate in a

pupation chamber in late summer. The pupation chamber is found at a depth of 3 to 5 cm in hard wood (Mattila 2017). Fully grown or pupating larvae live over winter.

Nutrition

Phryganophilus ruficollis larvae feed on wood decomposed by wood-decay fungi. In particular, the species lives on trees decomposed by *Canopora subfuscoflavida* but also other wood-decay fungi causing white rot (Mattila 2017). In addition, *Phryganophilus ruficollis* beetles have been found on decaying birch trunks with *Trametes versicolor* fungi (Lundberg 1993). *Canopora subfuscoflavida* occurs in low numbers across the country in forests on rocky terrain, old-growth forests, herb-rich forests, clear fellings and forest fire sites (Kaisa Junninen and Otto Miettinen, personal communication). While it mostly grows on spruces, it has also been found on pines and birches as well as on many other deciduous trees and conifer species. In addition to sturdy decaying logs, stumps in clear fellings and scorched trees are suitable substrates for *Canopora subfuscoflavida*. Adult beetles feed on the spores of wood-decay fungi, including *Fomes fomentarius*, *Phellinus igniarius* and *Fomitopsis betulina*.

Habitats

A typical tree on which *Phryganophilus ruficollis* beetles are found is a spruce or deciduous log with white rot that has been lying on the ground for a lengthy period, or 10 to 15 years (Lundberg 1993, Mattila 2017). The wood is yellowish in colour and porous, and it has a strong odour of fungi. The rhizome of such species as *Canopora subfuscoflavida* has a sharp and sour smell (Niemelä 2005). In addition to logs, *P. ruficollis* can also live on snags. The larvae typically live on the boundary between soft and hard wood (Gutowski and Sucko 2009).

Whereas the species mainly lives on birches and spruces in the Nordic countries, it has also been observed on an oak, at least once on a pine and, in Central Europe, on a beech (Ehnström and Axelsson 2002). The stage of decay and fungus species appear to be more important for it than the tree species (Lundberg 1993).

The low numbers of sturdy decaying logs in commercial forests limits the *Phryganophilus ruficollis* range. Consequently, it mostly lives in, or in the vicinity of, old natural forests with plenty of decaying wood. Burned sites and areas with storm damage also offer suitable habitats. The species is presumed to benefit from a warm and even sun-lit microclimate (Pettersson et al. 2007, Mattila 2017). In addition to forests that have suffered various types of damage, the sparse natural spruce forests of the north are the most typical areas in which the species is found in such countries as Norway (Ødegaard and Hanssen 2013). In Finland, adult individuals have also been caught in window traps on rocky sites with deciduous trees.

It has additionally been suggested that the high numbers of *Phryganophilus ruficollis* in certain parts of central Norway stem from the practice of burning any unharvested trees in a felling, which

was common until the 1970s and 1980s (Ødegaard and Hanssen 2013). A forest fire creates suitable decaying wood over a longer term, not only when trees are damaged and die slowly but also through an increased number of windfalls on the edges of the burned area and in refuges. A forest fire could additionally benefit the wood-decay fungi on which the *Phryganophilus ruficollis* depends. Such fungi as *Canopora subfuscoflavida* are also found on burned sites.

However, *Phryganophilus ruficollis* does not appear to be an actual pyrophile. Similarly to many other species living on decaying wood, it rather benefits from fires indirectly as they create deadwood. Microclimatic conditions may also facilitate and speed up larval development, whereas a faster life cycle improves the possibilities of the species to respond to temporal and local availability of habitats.

Distribution and status

Phryganophilus ruficollis is a species of the deciduous and boreal zone. In Finland, it has been found on six locations from Lappeenranta to Kolari since the early 1990s. The sites in the southern part of the country are mostly located in Eastern Finland. The most recent verified observations were made in Lappeenranta in 2019, where beetle enthusiasts found the species on three sites close to the Russian border. The westernmost observation in Southern Finland was made in Kuhmoinen.

The species is found in Central and Northern Europe (including in Poland, Norway and Sweden) and elsewhere in northern Eurasia as far as Siberia and Japan (Ødegaard and Hanssen 2013).

In Finland, *Phryganophilus ruficollis* is classified as vulnerable. Factors putting the species at risk include 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. In Sweden, the species is endangered.

Habitat management in protected areas

Distribution in protected areas

Phryganophilus ruficollis is known to occur on the following Natura 2000 sites in Finland:

Pirkanmaa and partly Central Finland: Isojärvi-Arvajanreitti (Isojärvi National Park),

Kainuu: Pahamaailma and Oulanka (Oulanka National Park).

The national parks contained in Natura sites are given in brackets. For more information on Natura sites, visit the Finnish Environment Institute's map services (Finnish Environment Institute 2018).

In addition, the species has been found in Kivimäensalo Nature Reserve, a part of which belongs to the Natura site of Jäppilä and Joroinen old-growth forests, and in the immediate vicinity of the

Administrative status and legislation

EU Habitats Directive Annexes II and IV. A priority species.

Protected under the Finnish 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: vulnerable (VU)

The national action plan for species protection (Finnish Environment Institute 2010–2011) lists *Phryganophilus ruficollis* 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. Logs with white rot and in an advanced state of decomposition on sites where the species occurs can be interpreted as breeding sites. Additionally, decaying wood with bracket fungi on sites where the beetle occurs are resting places.

Natura site of Kolvananuuro and its surroundings. Occurrences in Lappeenranta have been found outside protected areas.

The following sections describe the distribution of *Phryganophilus ruficollis* by regional unit of Parks&Wildlife Finland.

Lake Region

Mauno Pohjola found *Phryganophilus ruficollis* beetles in Kuhmoinen in 1938. Pohjola observed an adult beetle on a scorched trunk of a birch tree. The species was later caught in a window trap on decaying birches in Isojärvi area in 2006. A significant section of the Isojärvi-Arvajanreitti Natura site belongs to Isojärvi National Park, which has an extremely varied topography. There are many areas of exposed rock, and also crags in fissure valleys. Herb-rich and mesic heath forests with spruces, and mixed forests consisting of spruces and deciduous trees, are found in hollows and lower mounds in this terrain with plenty of small detail. Rocky terrains are more barren and dominated by pines. The age of the trees varies from young forests to those aged 150 years. Woods dominated by birches can also be found in the conifer-dominated landscape. The terrain with small detail in this area may offer suitable south-facing slopes with a warmer microclimate.

In Kivimäensalo Nature Reserve, an individual was found in a trunk window trap placed on a dead aspen in 2002. A young spruce stand and deciduous trees currently grow on this site. Kivimäensalo Nature Reserve, similarly to the more extensive Joroinen and Jäppilä old-growth forest, has a varied topography with many rocky areas and boulder fields. The old spruce and pine forests contain plenty of decaying wood and, in places, signs of old forest fires.

Near the Natura site of Kolvananuuro and its surroundings, a *Phryganophilus ruficollis* individual was caught in a window trap in a rocky area on private land preserved under the Forest Act. Korvananuuro ravine, which has slopes with old spruce forests and younger mixed forests dominated by deciduous trees is a key part of the protected area.

In addition, a few recent observations of the species have been made in Lappeenranta in the immediate vicinity of the Russian border. This area contains undulating terrain with small detail and exposed rock here and there. The forests are fragmented and mostly in commercial forestry use, but large aspens and birches have been preserved in many places. There are some older mixed spruce forests and also pine forests on rocky terrains, whereas otherwise the forests mainly are relatively young mixed forests of spruces and deciduous trees.

Ostrobothnia–Kainuu

The most recent observation was made in 2006 on the site of a restoration burning carried out as part of the Light&Fire LIFE project on Pahamaailma Natura site. The Finnish Forest Research Institute caught beetles for monitoring purposes on this site before it was burned. *Phryganophilus ruficollis* beetles were caught in a window trap between mid-June and early July, after which period

the compartment was burned. Before burning, the compartment contained a 140-year-old pine forest. Restoration burning had been carried out nearby during the monitoring period. Mature and old pine forests on rocky terrain on either side of a fissure valley with crags and boulder fields are typical of the southern part of Pahamaailma area. The northern part contains a higher number of spruces. The deciduous trees are mainly birches and, to a lesser extent, aspens.

Observations of the species were made in Oulanka in 1983–1984. The forests of the National Park mainly comprise natural old boreal forests. On the slopes of Oulankajoki River valley, both pine forests and lush spruce forests are found along streams and rivulets. The topography is variable, and there is plenty of decaying wood in places.

Lapland

Phryganophilus ruficollis has so far not been found in protected areas, but in the 1990s, the species was caught in a window trap in Kolari, close to the Natura site of Sieppijänkä-Pieruvuoma. Most of this area consists of a mire reserve of the same name with flark-surfaced aapa mires. The observation was made in Metsähallitus' multiple-use forest, and the observation site has been protected in the landscape ecological plan as an ecological site.

Monitoring and habitat management

It is possible that more *Phryganophilus ruficollis* occurrences exist than are known, as the species is obviously low in numbers and difficult to discover even where it does occur. The species should be searched for on suitable decaying trees in forests with decaying wood close by the sites of known observations but also more extensively in protected areas. The species is protected, which means that a derogation from the protection regulations is always needed for seeking it in the vicinity of known occurrences. Trees suitable for the species must always be examined judiciously and with as light a touch as possible, as when decaying wood is broken up, the beetles' habitat is destroyed. The search on the site must be called off immediately if the species is observed on it, or its occurrence is suspected.

Based on data saved to the Laji.fi database, around ten observations of *Canopora subfuscoflavida* are made in different forest habitats annually, and also in fellings and around their edges if suitable decaying wood and felling residue have been left in the clearing. Inventories could be targeted at different forests with a variable topography and thus also warm, south-facing slopes. Old birch forests on sites used for slash-and-burn farming ('white-backed woodpecker forests') could be suitable for the species as they typically have large decaying birches, both logs and snags.

For inventory guidelines for finding the species, see Mattila (2017). Those carrying out bracket fungus inventories should also be on a lookout for *Phryganophilus ruficollis*, and especially larvae and the tunnels they leave in the wood. Olberg (2015) and Olberg and Hansen (2019 and 2020) contain pictures of trees with fungi suitable for the species, the larvae and their feeding traces.

In nature reserves, the occurrence of the species could be promoted by maintaining a fire continuum. While the species does not arrive on the site immediately after it has been burned, it may benefit from old burned sites with spruces and birches or other deciduous trees lying on the ground which have decayed to the point of being almost soft. Forest fires also encourage deciduous trees and affect the microclimate. In inventories of Aphyllophorales species before prescribed burning, attention could be paid to the occurrence of *Canopora subfuscoflavida*. Based on this information, the location of these trunks could, if necessary and as far as possible, be excluded from the area to be burned in the action plan.

There is no scientific evidence of *Phryganophilus ruficollis* benefiting from increasing the volume of decaying wood. The presence of certain wood-decay fungi is required before it can live on a tree trunk. As far as is known at the moment, there is no need to artificially create decaying wood on the sites of the known occurrences listed in this plan.

Recommendations for habitat management in protected areas

- Searching for new occurrences.
- Prescribed burning for restoration purposes may support the preservation of a *Phryganophilus ruficollis* population by creating decaying wood and warm, sun-lit habitats. Burning on sites used for slash-and-burn farming in the past may produce habitats needed by the species.

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

Phryganophilus ruficollis beetles live in many types of forests with trees decomposed by a suitable wood-decay fungus. In the Nordic countries it typically lives on spruces and birches. Outside protected areas, suitable sites would appear to include forests on slopes with a warm microclimate, forests on rocky terrain, and forests with sturdy, decayed spruce or birch logs and snags. As the species is listed in the European Union Habitats Directive Annex IV, its known occurrences must be taken into consideration in all land use. The places where the species reproduces and rests must not be destroyed or deteriorated.

Stumps in clear fellings are suitable substrates for *Canopora subfuscoflavida* fungi. However, *Phryganophilus ruficollis* beetles have so far not been found in them.

Saving decaying trees at all stages of forest management benefits this and other saproxylic species. In particular, it is highly recommended that all trees in a more advanced state of decomposition are left in the forest, and care is taken not to damage them in connection with mechanical harvesting. Permanent groups of retention trees produce decaying wood over a longer term. They should contain trees of different ages and preferably hardwoods to give the trees a better possibility of

staying upright as the microclimate changes following the felling. They also provide suitable habitats at different times. The retention tree groups should be as large as possible. Low-productivity sites or those where harvesting is technically difficult with old spruces or deciduous trees could be important for the species. At landscape level, increasing the number of old trees which, when they die, produce sturdy decaying trees would be important.

Recommendations for habitat management on lands used for commercial forestry

- Retaining decaying wood in connection with final felling and when harvesting trees damaged by wind or snow loads. Retaining dead spruces and deciduous trees, both snags and logs. Trees that have died more than a year ago can be selected for this, eliminating the risk of insect damage. Less care is needed when preserving decaying deciduous trees.
- Preserving decaying wood in connection with thinning and intermediate felling.
- Favouring a deciduous tree mix in silviculture.
- Preserving retention tree groups with multiple tree species.
- In connection with harvesting, care should be taken not to damage trees lying on the ground that have bracket fungi and that have decomposed to the point of becoming soft.
- Prescribed burning for forest management purposes in compartments with trees. For example, retention trees or tree groups.
- Preserving wooded exposed bedrock and boulder field sites with lower wood production potential than barren heath forests (habitats of special importance and similar near-natural sites referred to in section 10 of the Forest Act).
- Preserving trees on sites where harvesting is difficult or the expected yield is low, including steep slopes, forests on rocky terrain or their parts. The trees may be left to develop towards a more natural state, or into an uneven-aged forest where decaying wood is created at a more even rate.

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