Distribution of insects in relation to short term forest fire history

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Background

Several boreal insect species are pyrophilic and are more or less dependent on substrates created in recently burned forest. Modern forestry has dramatically decreased the amount and size of forest fires in northern Europe in the last century. Due to the decrease of forest fires, several of the pyrophilic species are now threatened.

Aim

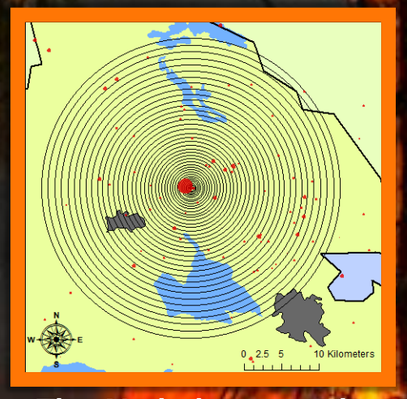
- To analyse how the distribution of insects is affected by temporal and spatial scales of the short term forest fire history.
- This was done using smoke attraction traps, a unique method for catching fire favoured insects without an actual forest fire, and analysing the results with a unique regional short term forest fire history.

The forest fire history divided into three periods in Östergötland county. Darker red shows higher fire frequency. The lower right map shows the proportion of the pyrophilic Microsania genus (grey bars), saproxylic obligate beetles (blue bars), pyrophilic beetles (red bars) caught in each site.

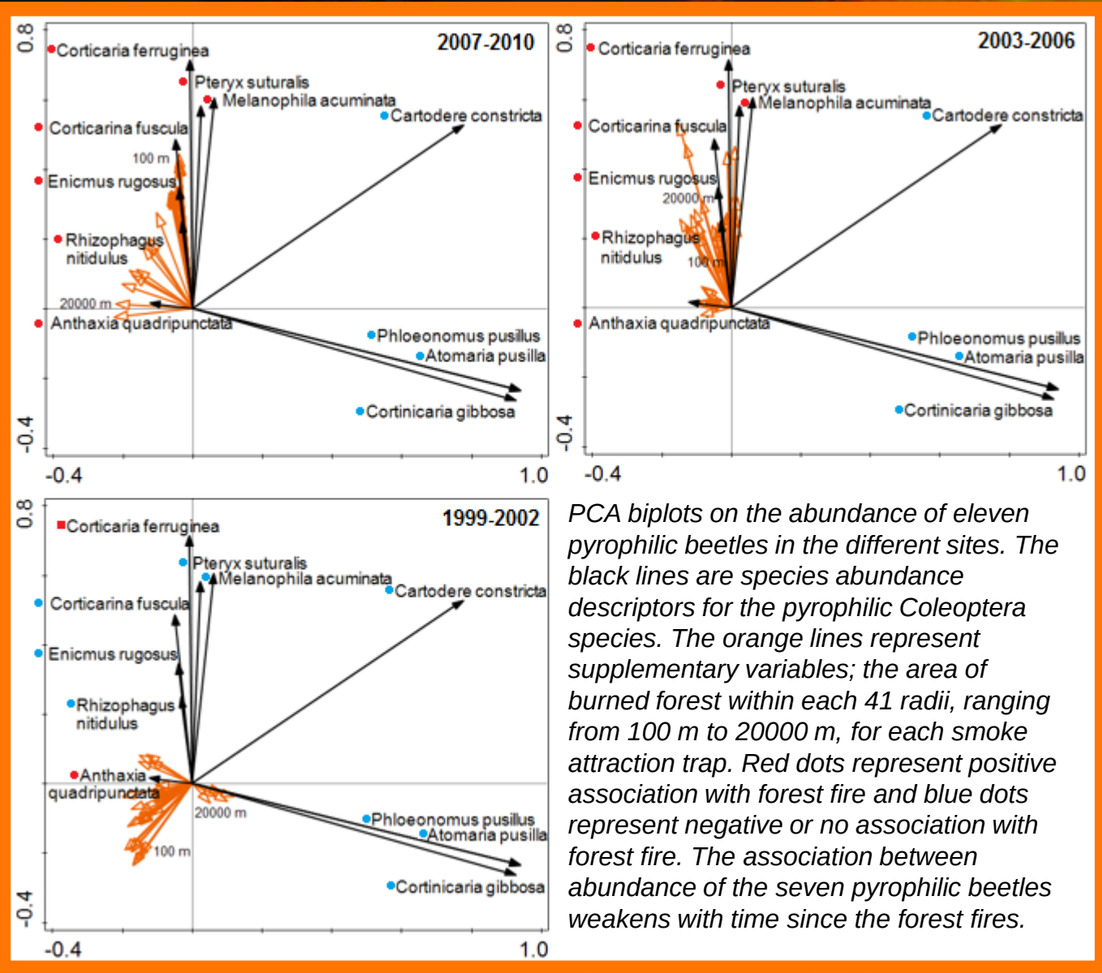
Smoke attraction trap.

The 21 study sites in Östergötland county.

To be able to analyse the effect of the spatial distribution of the forest fires, 41 circles with radii from 100 m to 20000 m was defined. The area of forest fires were calculated within each of 41 circles around each smoke attraction trap. The fire history was separated into three periods to be able to analyse the temporal scale.



The 41 circles around one site. Red dots represent forest fires.



PCA biplots on the abundance of eleven pyrophilic beetles in the different sites. The black lines are species abundance descriptors for the pyrophilic Coleoptera species. The orange lines represent supplementary variables; the area of burned forest within each 41 radii, ranging from 100 m to 20000 m, for each smoke attraction trap. Red dots represent positive association with forest fire and blue dots represent negative or no association with forest fire. The association between abundance of the seven pyrophilic beetles weakens with time since the forest fires.

Conclusions

- Seven out of eleven pyrophilic beetles were positively associated with recent forest fires.
- The pyrophilic beetles were more associated with forest fires in the smaller spatial scale ranging from 100 m to 5000 m.
- Forest fires were more abundant in the eastern parts of Östergötland county and so were pyrophilic beetles, obligate saproxylic beetles and the pyrophilic flies *Microsania* spp.

Melanophila acuminata

Pyrophilic beetles

Diplocoelus fagi (NT)

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