



# **Short-term responses of beetle assemblages to wildfire in a region with more than 100 years of fire suppression**

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# Background

- Sweden: intensive management for timber (95 % of productive forest land)
- Fire suppression from late 1800s
- Few and small natural fires, wood harvested
- Pyrophilous species threatened
- Increased interest in conservation
- Prescribed burnings
- Large fire -> what happens?



# Bodträskfors burned area

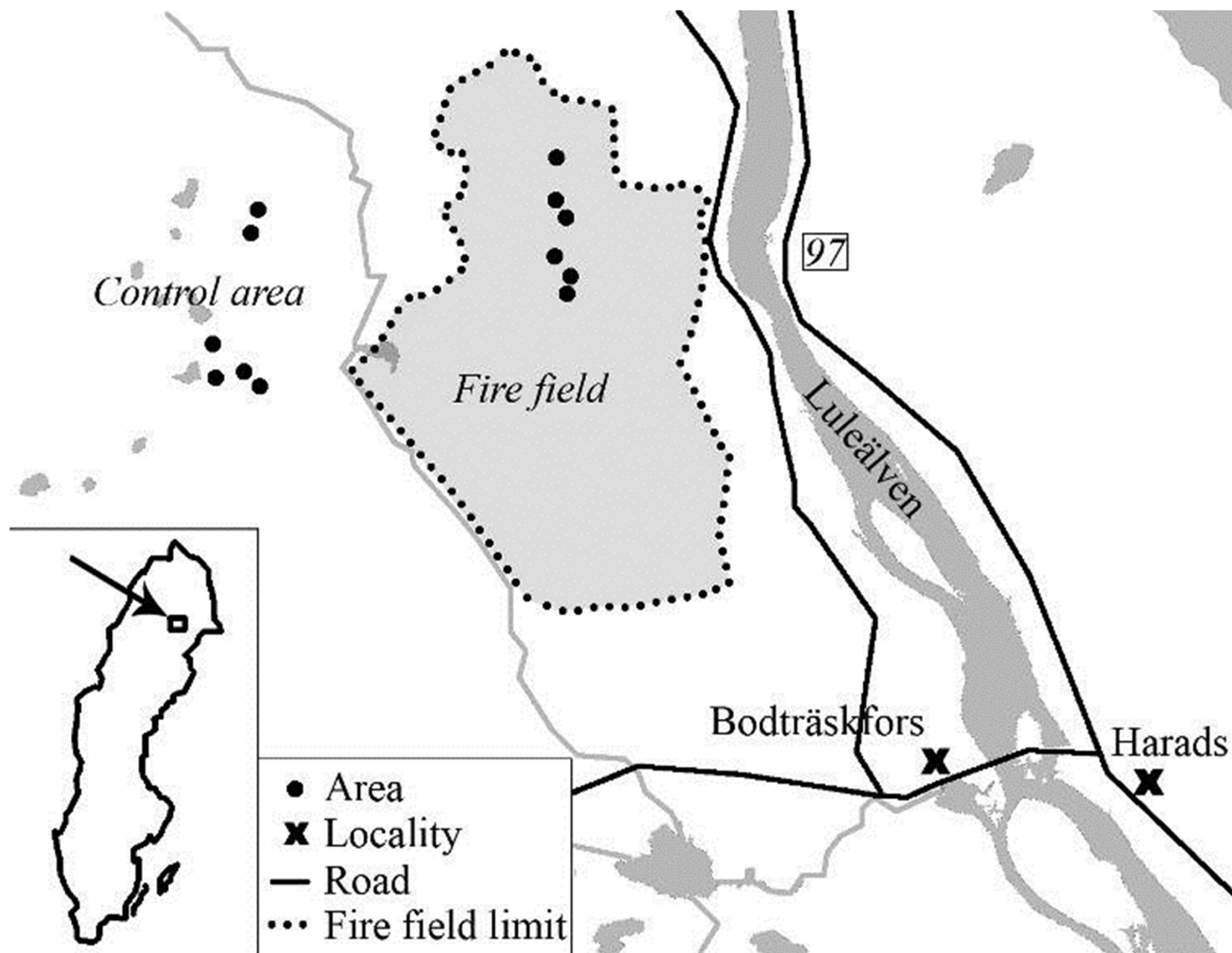
- Largest wild fire in Sweden in modern time: 1700 ha
- August 2006
- Extremely dry -> hard fire
- Most of the field layer was destroyed
- Pine dominated
- App. 250 ha will be set aside as a reserve



# Questions

- 1) What changes occur in saproxylic assemblages after a large scale forest fire?
- 2) How can conservation oriented measures in forestry be improved to better favour fire adapted beetles?

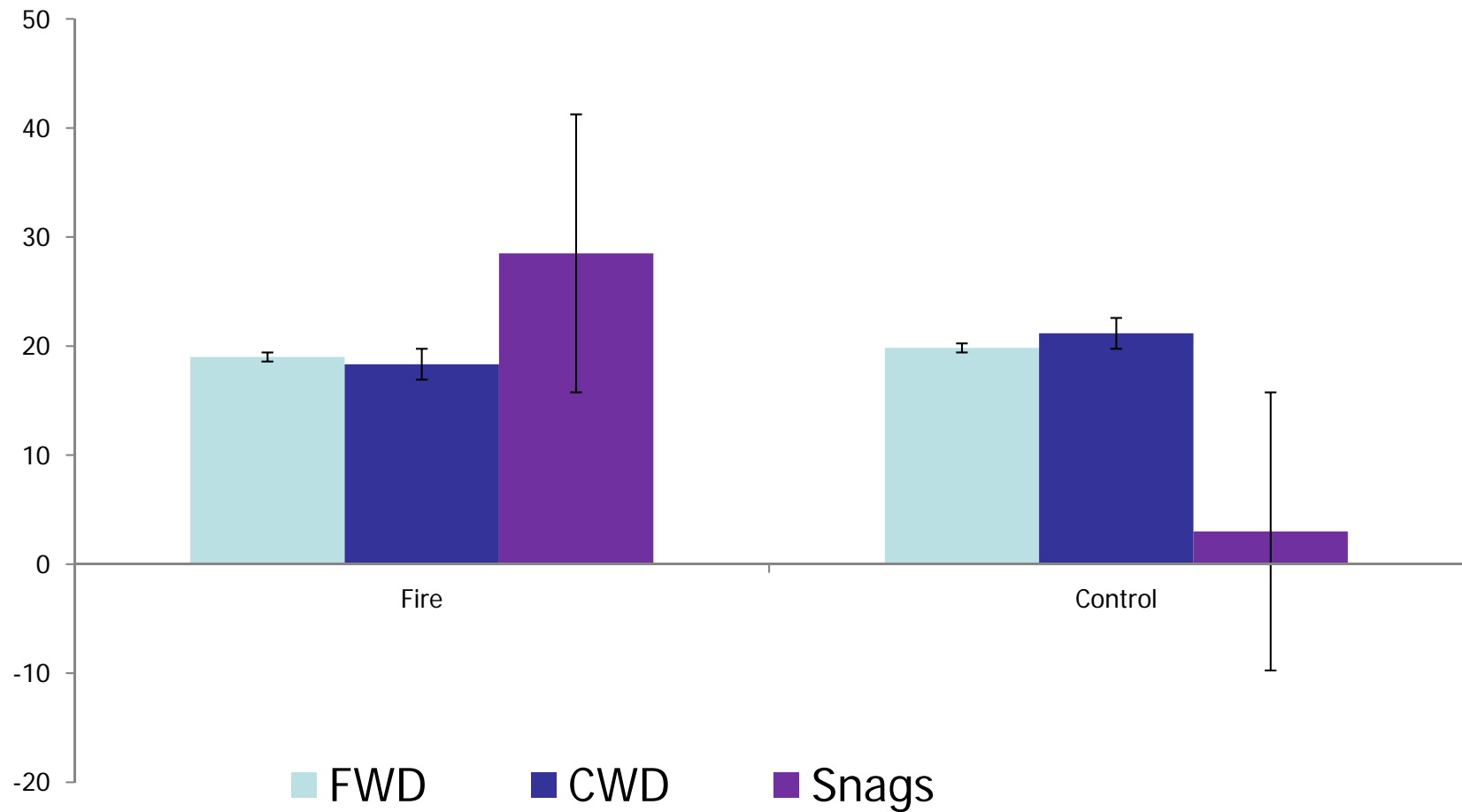




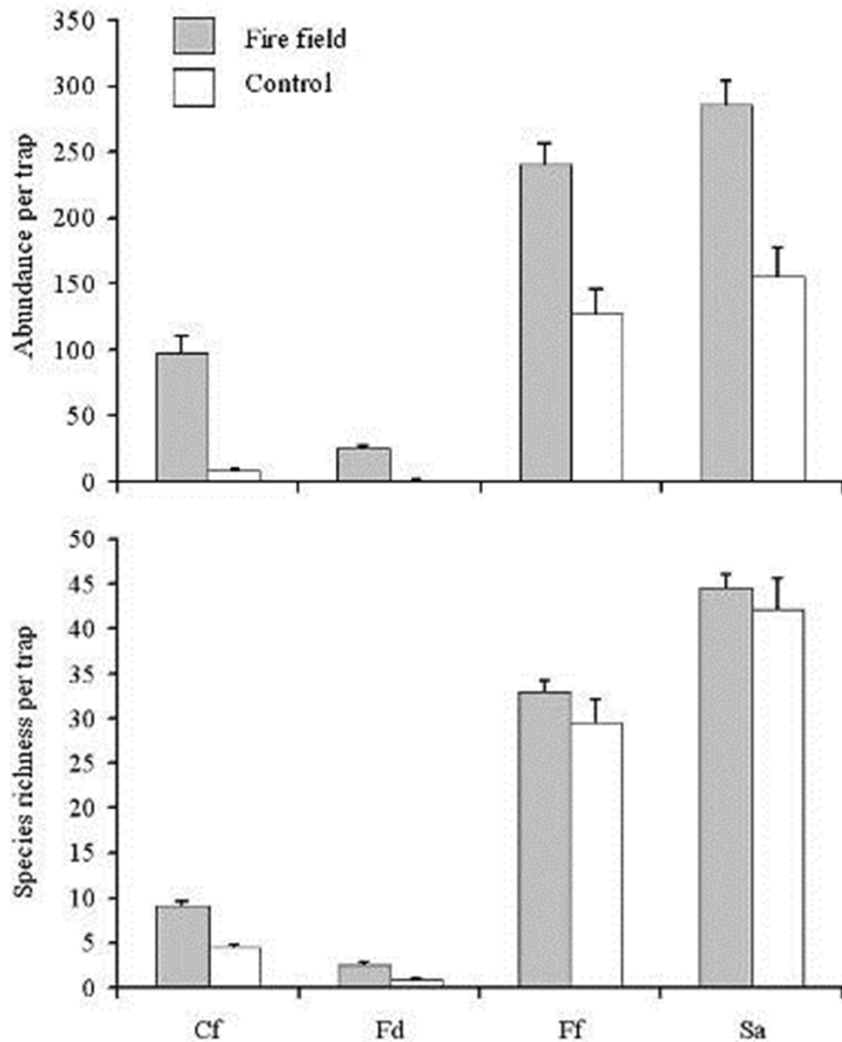




# Dead wood volume



# Species richness and abundance



**Cf = cambium feeders**    **Fd = Strongly fire favoured**

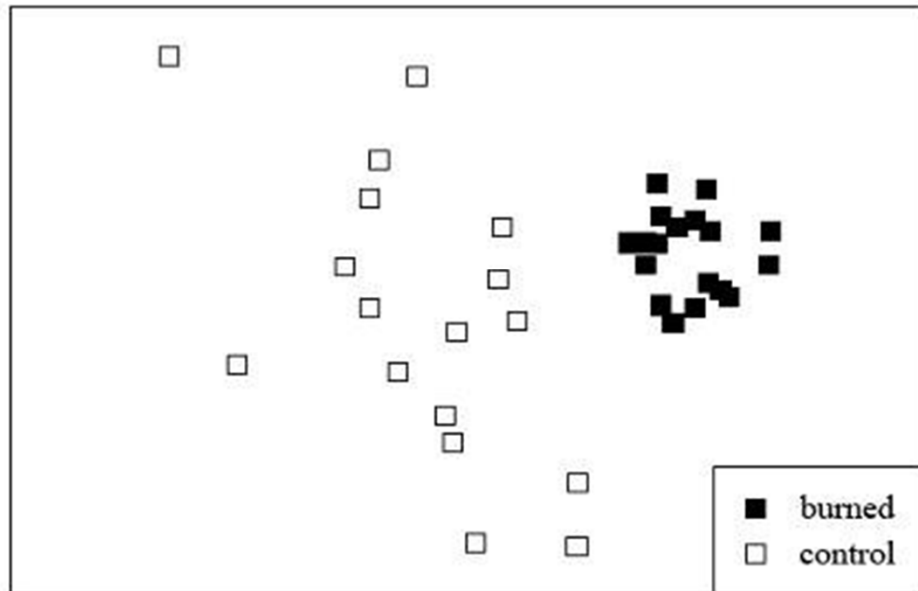
**Ff = Fire favoured**      **Sa = Saproxylic species**

# Aradidae

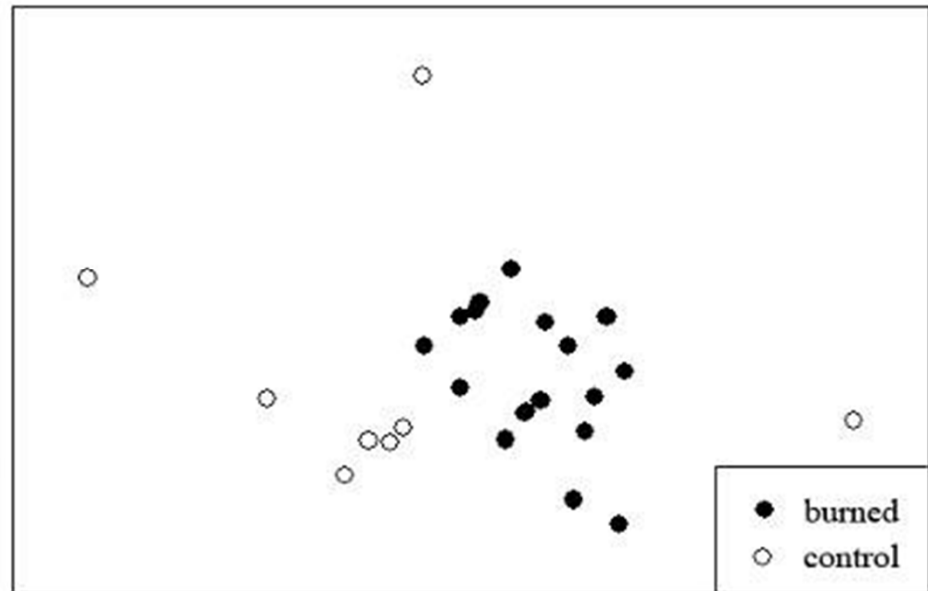
Species	Burned	Unburned	Mann-Whitney U Test Statistic	Kruskal-Wallis <i>p</i>
Species richness	5	0	36.00	0.002
<b>Abundance</b>				
<i>Aradus betulae</i> *	6	0		
<i>Aradus brevicollis</i>	14	0	36.00	0.002
<i>Aradus cinnamomeus</i>	1	0		
<i>Aradus crenaticollis</i>	3	0		
<i>Aradus lugubris</i>	6	0	30.00	0.021
Total	30	0	36.00	0.002

# nMDS beetles 2007

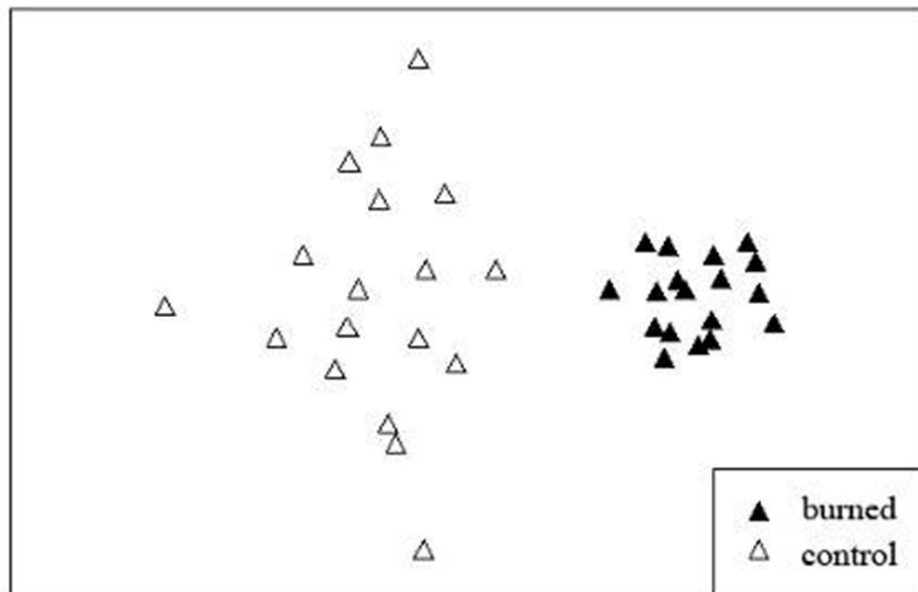
Cambium consumers



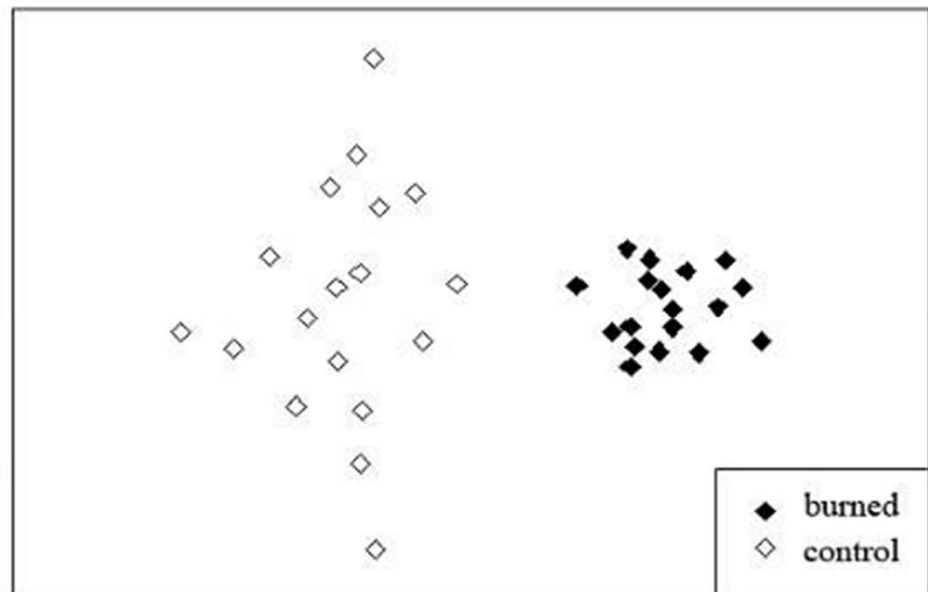
Strongly fire favoured



Fire favoured

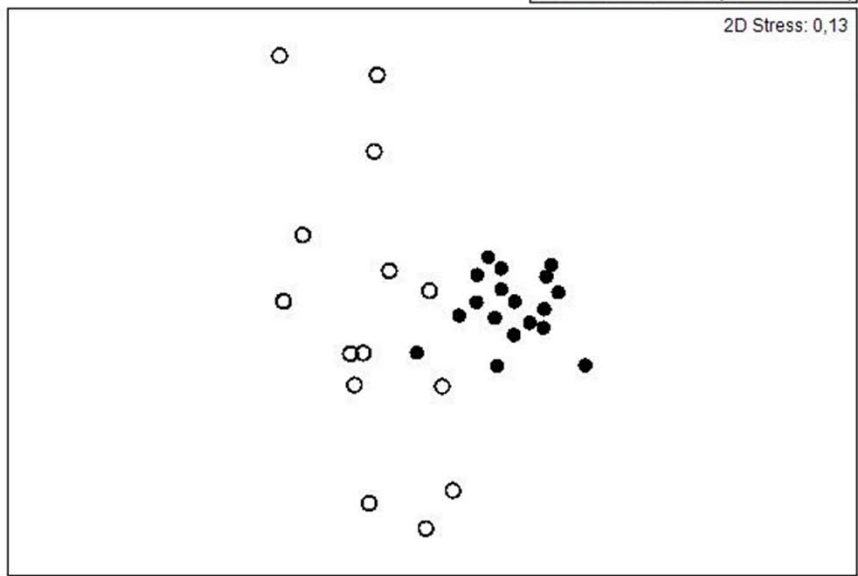


Saproxylic

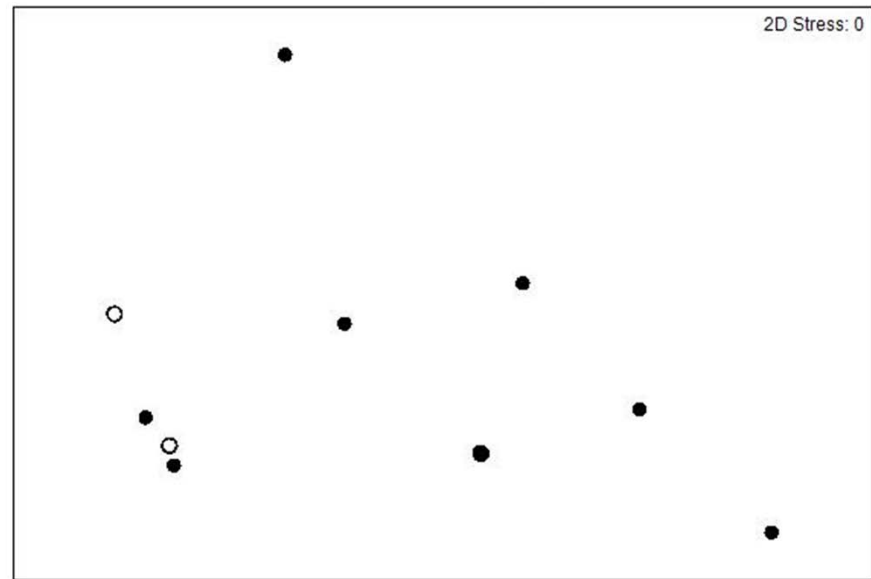


# nMDS beetles 2008

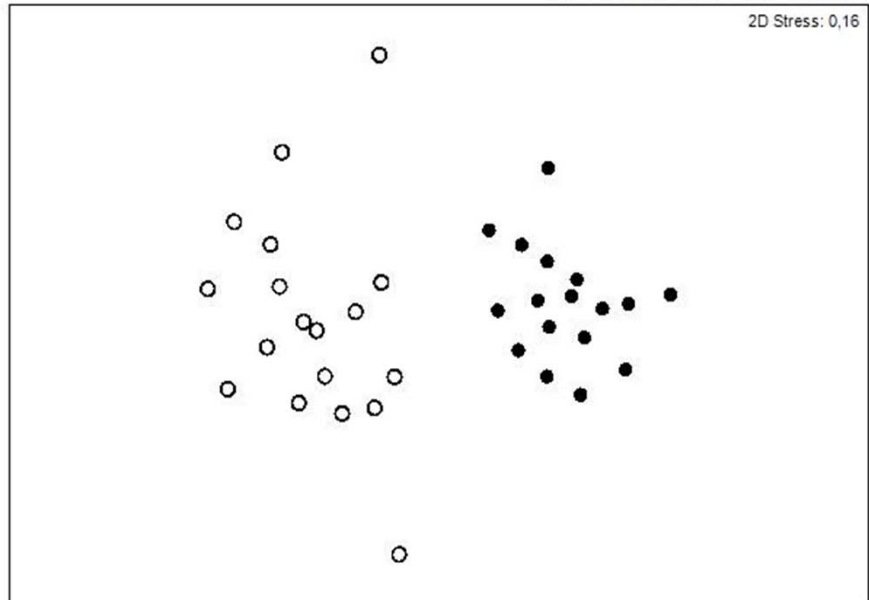
Cambium consumers



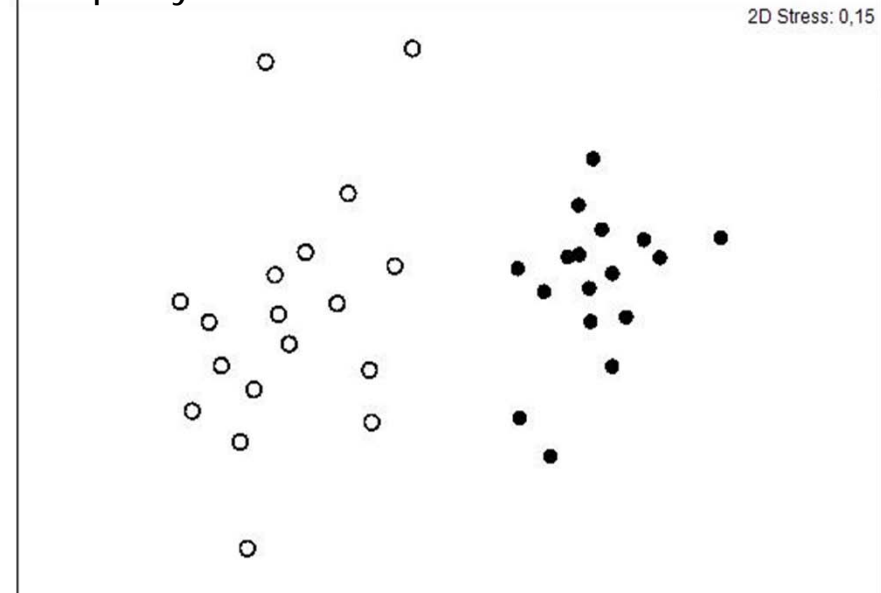
Strongly fire favoured



Fire favoured



Saproxylic





# SIMPER 2007



## Cambium consumers

<i>Tomicus piniperda</i>	B > C
<i>Hylobius abietis</i>	B > C
<i>Rhagium inquisitor</i>	B > C
<i>Hylastes brunneus</i>	B > C
<i>Pityogenes bidentatus</i>	na B > C

## Fire favoured

<i>Tomicus piniperda</i>	B > C
<i>Atomaria pulchra</i>	B > C
<i>Corticaria rubripes</i>	B > C
<i>Hylastes brunneus</i>	B > C
<i>Phloeonomus lapponicus</i>	B > C

## Strongly fire favoured

<i>Hylobius abietis</i>	B > C
<i>Henoticus serratus</i>	B > C
<i>Placusa atrata</i>	B > C
<i>Asenum striatum</i>	B > C
<i>Scolytus ratzeburgi</i>	B < C

## Saproxylic

<i>Tomicus piniperda</i>	B > C
<i>Hylobius abietis</i>	B > C
<i>Atomaria pulchra</i>	B > C
<i>Corticaria rubripes</i>	B > C
<i>Hylastes brunneus</i>	B > C



# SIMPER 2008



## Cambium consumers

<i>Pityogenes bidentatus</i>	B > C
<i>Hylastes brunneus</i>	B > C
<i>Pityogenes chalcographus</i>	B > C
<i>Tomicus piniperda</i>	B > C
<i>Dryocoetes autographus</i>	B > C

## Strongly fire favoured

<i>Placusa atrata</i>	B > C
<i>Hylobius abietis</i>	C > B
<i>Acmaeops septentrionis</i>	B > C
<i>Asemum striatum</i>	B > C

## Fire favoured

<i>Pityogenes bidentatus</i>	B > C
<i>Enicmus rugosus</i>	C > B
<i>Hylastes brunneus</i>	B > C
<i>Trypodendron lineatum</i>	B > C
<i>Rhizophagus parvulus</i>	B > C

## Saproxylic

<i>Pityogenes bidentatus</i>	B > C
<i>Trypodendron laeve</i>	B > C
<i>Enicmus rugosus</i>	C > B
<i>Hylastes brunneus</i>	B > C
<i>Trypodendron lineatum</i>	B > C

# Fire dependent species

2007

*Stephanopachys linearis*



2008

*Sphaeriestes stockmanni*



# Conclusions

- The assemblage composition in a burned area differs from an unburned area
- Mainly because a few species increase in abundance
- Succession of species
- Highly fire favoured species like several *Aradus* species were found in the burned area but in low numbers
- The local species pool important for colonisation



# Applications

- Restoration burnings: select sites close to known occurrences of target species
- Areas with long history of fire suppression can have less fire dependent species – less effect of burning
- Adapted restoration burning regime to maximise effects



A large, intense bonfire burns at night in a forest. The fire is composed of a large pile of wood and debris, with bright orange and yellow flames reaching high into the dark sky. The surrounding trees are silhouetted against the fire's glow.

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