

## 2021 IBFRA Conference

Changing Boreal Biome



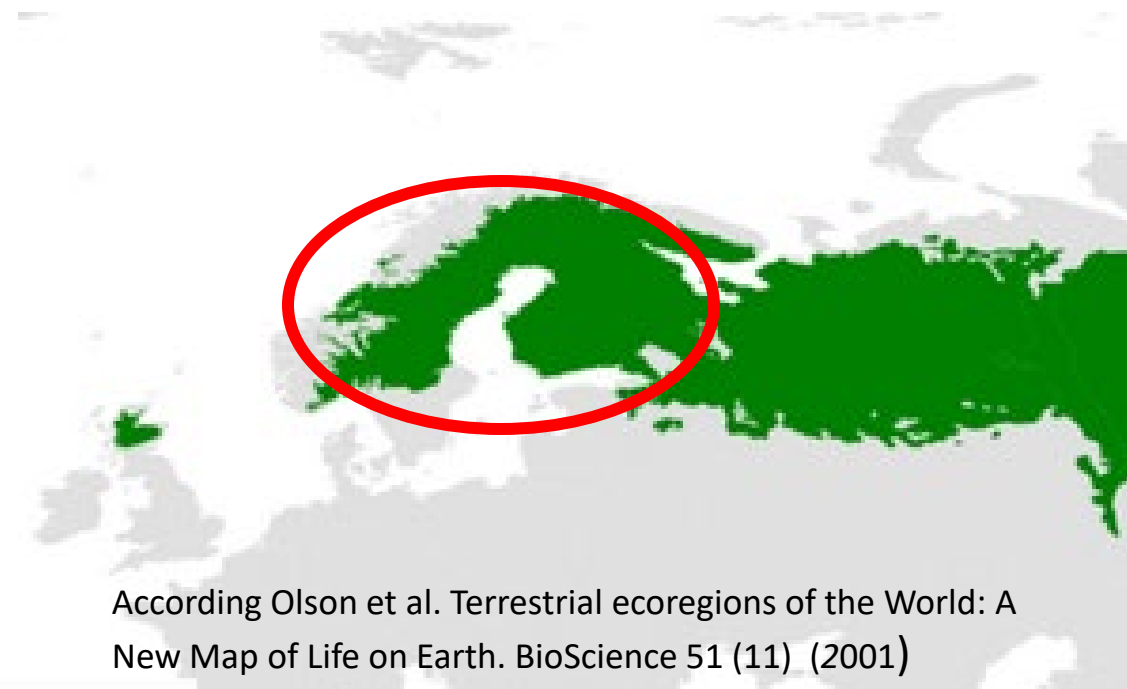
## The science and policy of wildfires in the boreal biome

Friday, 20 August 2021 – Day 5, 15:00-17:00 CET

### **State of wildfires in Boreal Europe**

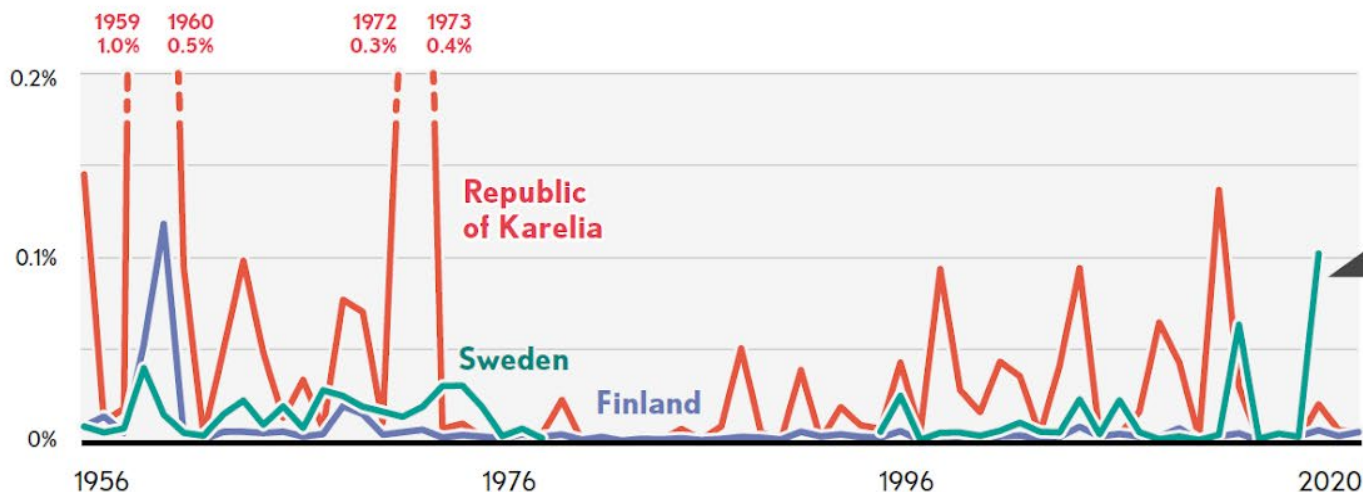
Henrik Lindberg, Häme University of Applied Sciences

- Boreal Fennoscandia, particularly Sweden, Finland and Republic of Karelia
- Recent project focused on fire issues of this area



# The total area burnt has remained low in Fennoscandia during the recent decades

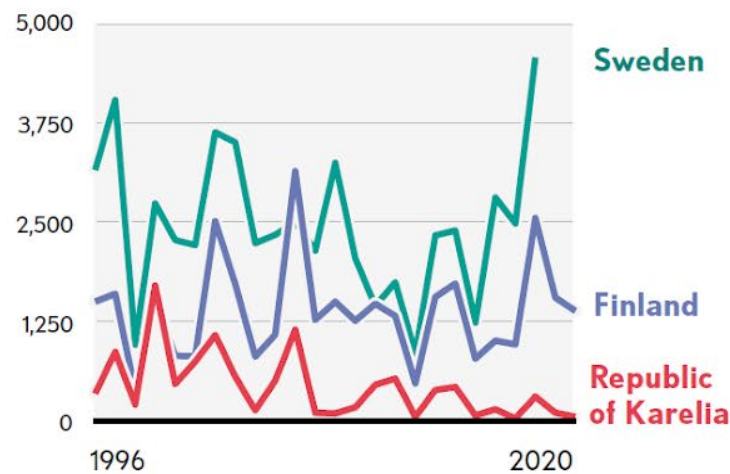
Annually burnt area in proportion to forested areas, ha



During 1956–2020, burnt area in Fennoscandian forests has been fairly stable with the lowest areas in Finland. In Sweden, the largest fires during the observation period have occurred in 2014 and 2018.

Total area burnt has remained low mostly due to effective fire mitigation and prevention, and active forest management.

Annual number of fires



Fire statistics have been compiled from various sources and are not directly comparable.

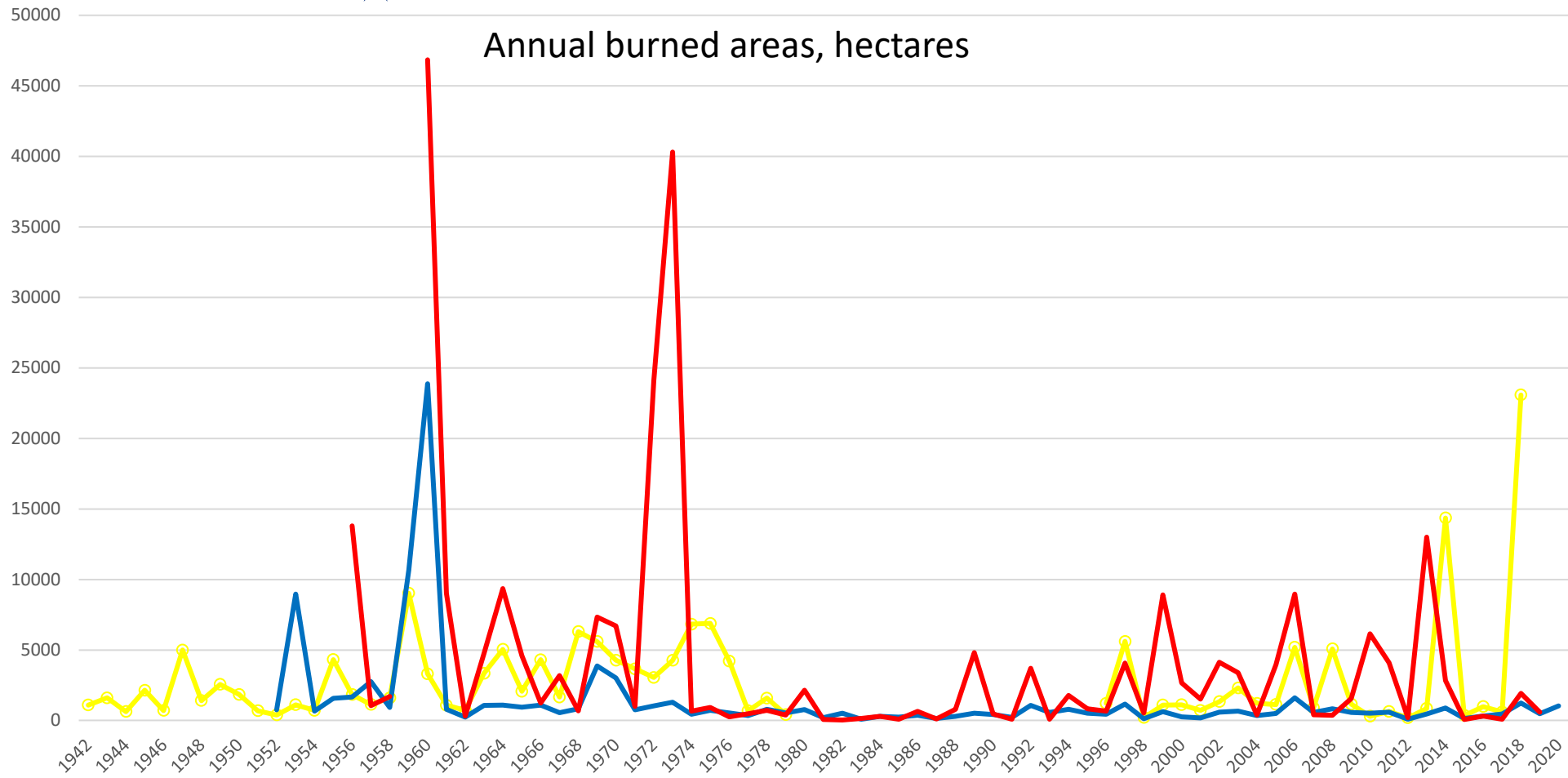
Over the past two decades, no clear changes in the number of forest fires can be detected.



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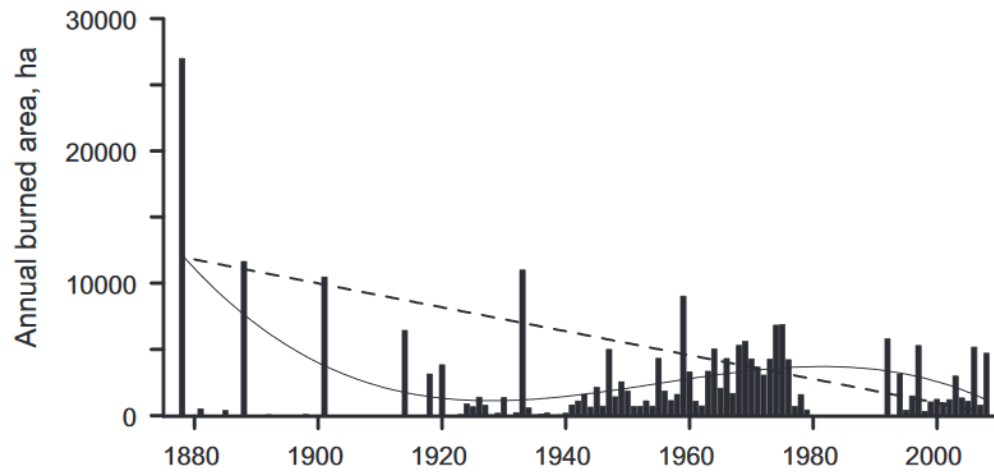


Rep. of Karelia 1959, 97 223 ha



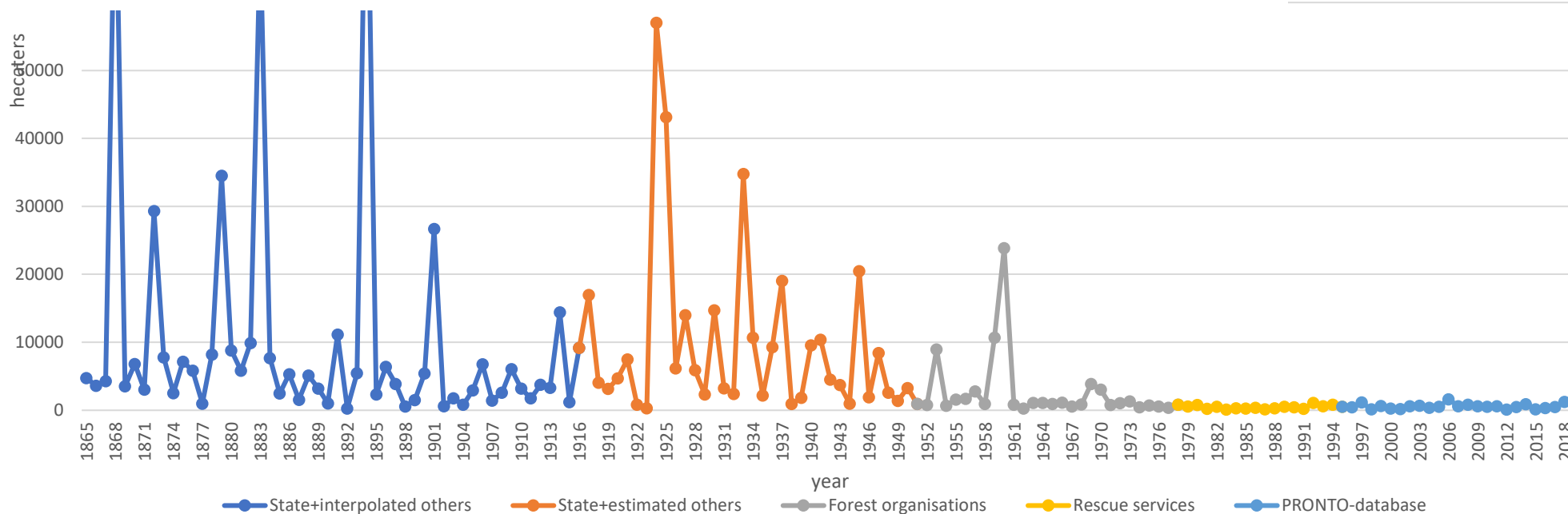
**Finlands fire regime differs, the burned areas are lower and there is less annual variation**

Sweden Finland The Republic of Karelia



and relatively rapid decrease  
in the 50s and 60s, after that has  
remained at a low level  
the annual burned areas are com-  
pared to situation in 1920's

**Fig. 1.** Total annual forest area burnt in Sweden since 1879 (data compilation from (Hansen, 2003; Högbom, 1934; Skogsstyrelsen, 1945). Polynomial fit (degrees of freedom = 3) for all years (solid line) and linear fit for the maximum annually burnt area in each decade (dashed line) are shown.



# To summarize

- In Republic of Karelia, burned areas are frequently larger, and also the average size of a fire
- In Sweden the burned areas in many years are similar to Finland, yet randomly but frequently there are also major fire years and large fires
- In Finland the burned areas and annual variation are low and large fires rare

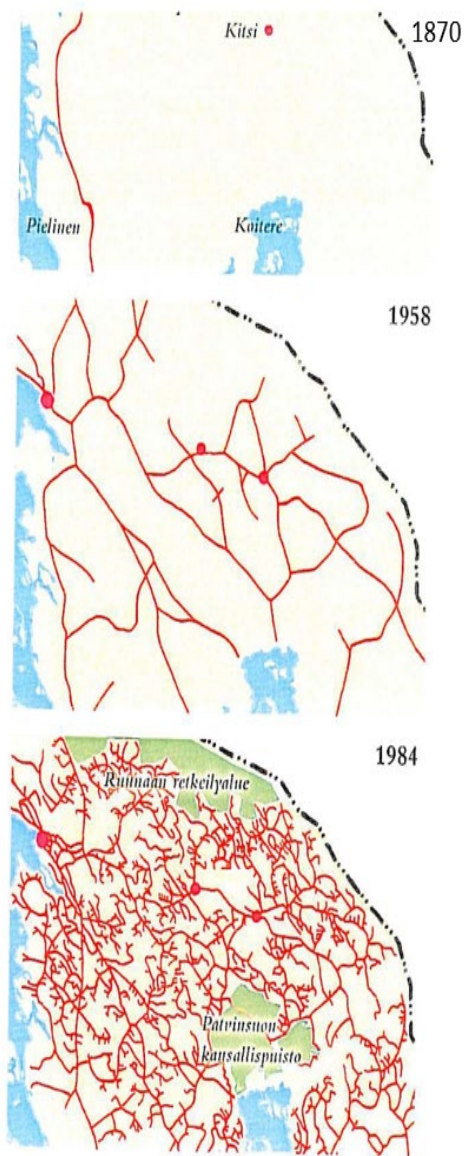
# Reasons for differences between regions and time periods

- Climate??
- Topography
- Fire suppression efforts
- Fire fighting policies
- Fire fighting organisation
- Changes in human behaviour
- Rural demographics
- Forest management and impact on forest structure

# Like:

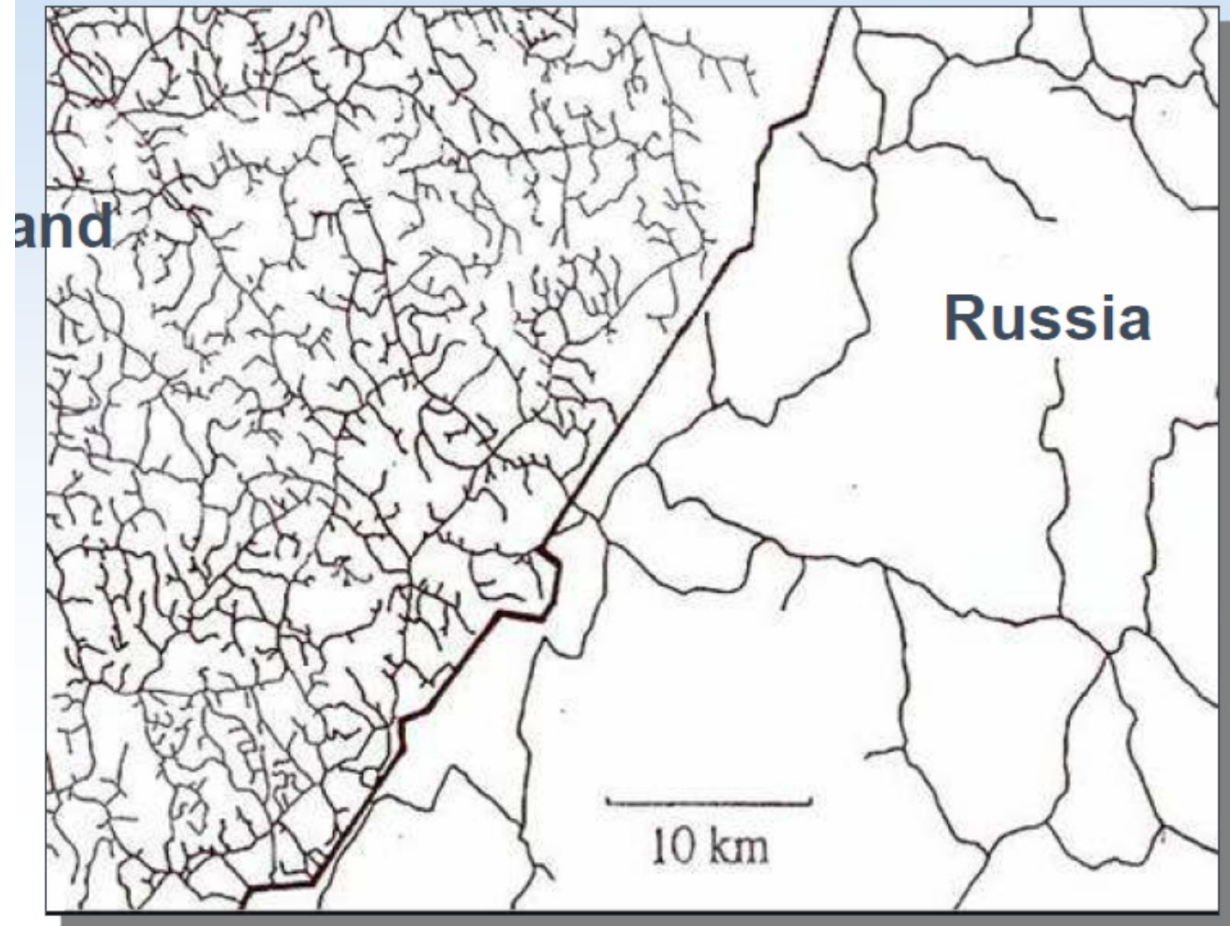
- **Crucial: how the fires are "caught" and limited, the earlier the better, which keeps them small and prevents them to escalate into major fires**
  - **Density of forest road network:** In Rep. of Karelia 1.5-3 m/ha, in Finland ca 10 m/ha
  - **Forest compartment size** (e.g in Finland average size of final cutting area 1-1.5 ha, in Sweden 3-4 ha and even larger in Central and in Northern Sweden)
  - **Silvicultural policies:** tree species: spruce-pine ratio (crown fire risk)
  - **Silvicultural policies:** thinnings, density, stand structure
  - **The organization and strategy of fire fighting**





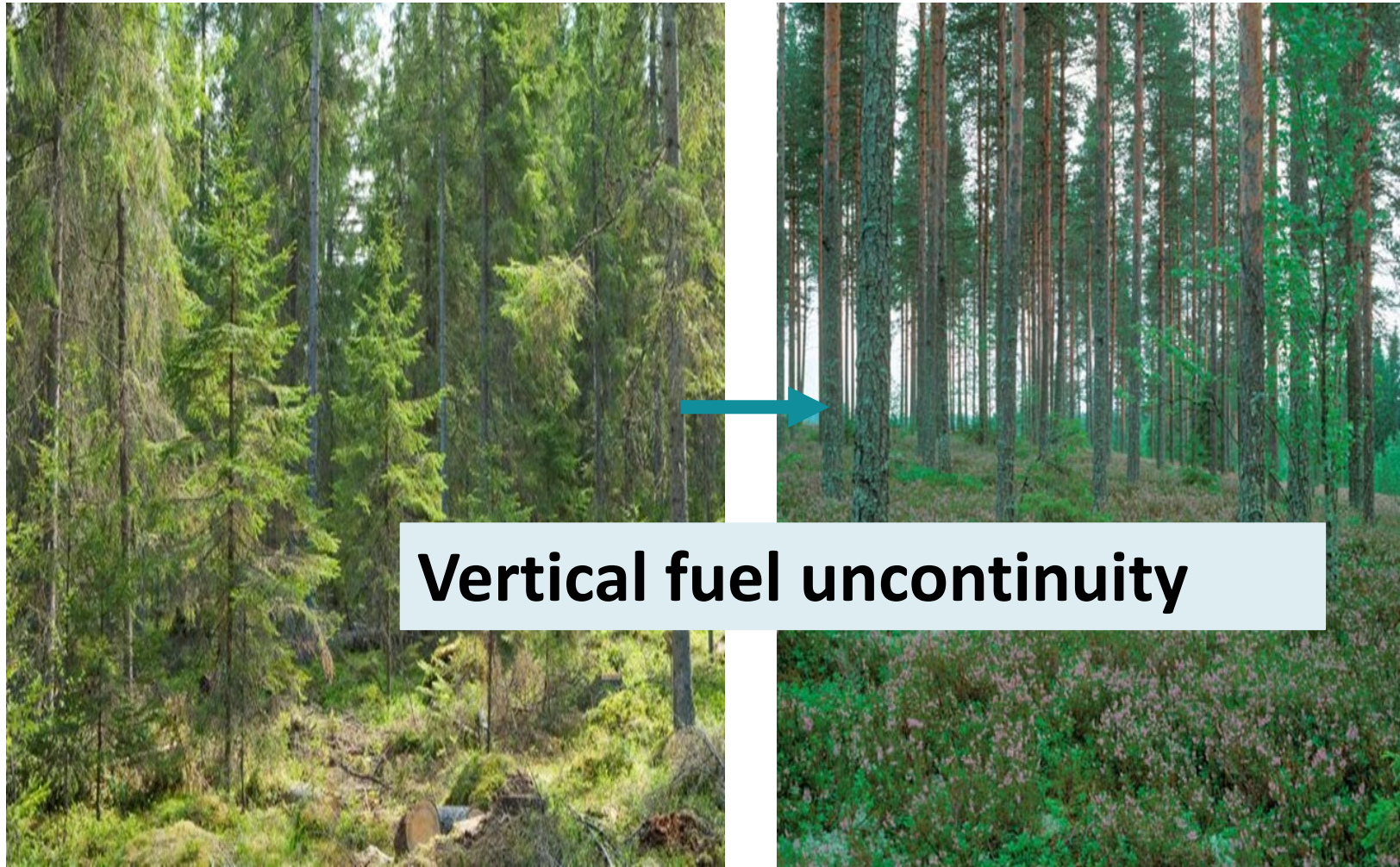
Tieverkoston kehitys Piellisen itäpuolella sijaitsevalla metsä-  
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From: Björn  
2000, *Kaikki irti  
metsästä.*



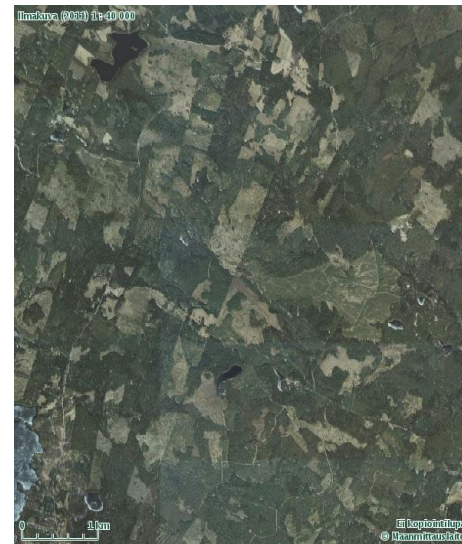
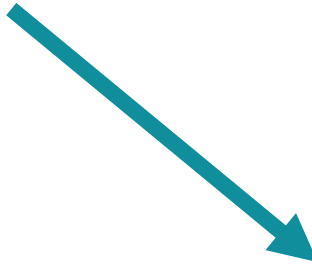
From: Siitonen J., Martikainen P., Kaila L., Nikula A., Punttila P. (1995). Kovakuoriaislajiston monimuotoisuus eri tavoin käsitellyillä metsäalueilla Suomessa ja Karjalan Tasavallassa (Julkaisussa Hannelius, S. & Niemelä, P. (toim.). Monimuotoisuus metsien hoidossa). Metsäntutkimuslaitoksen tiedonantoja 564: 43-63.

## Changes in tree species composition and stand structure



Photos: Luke/Erkki Oksanen

# Horizontal fuel discontinuity



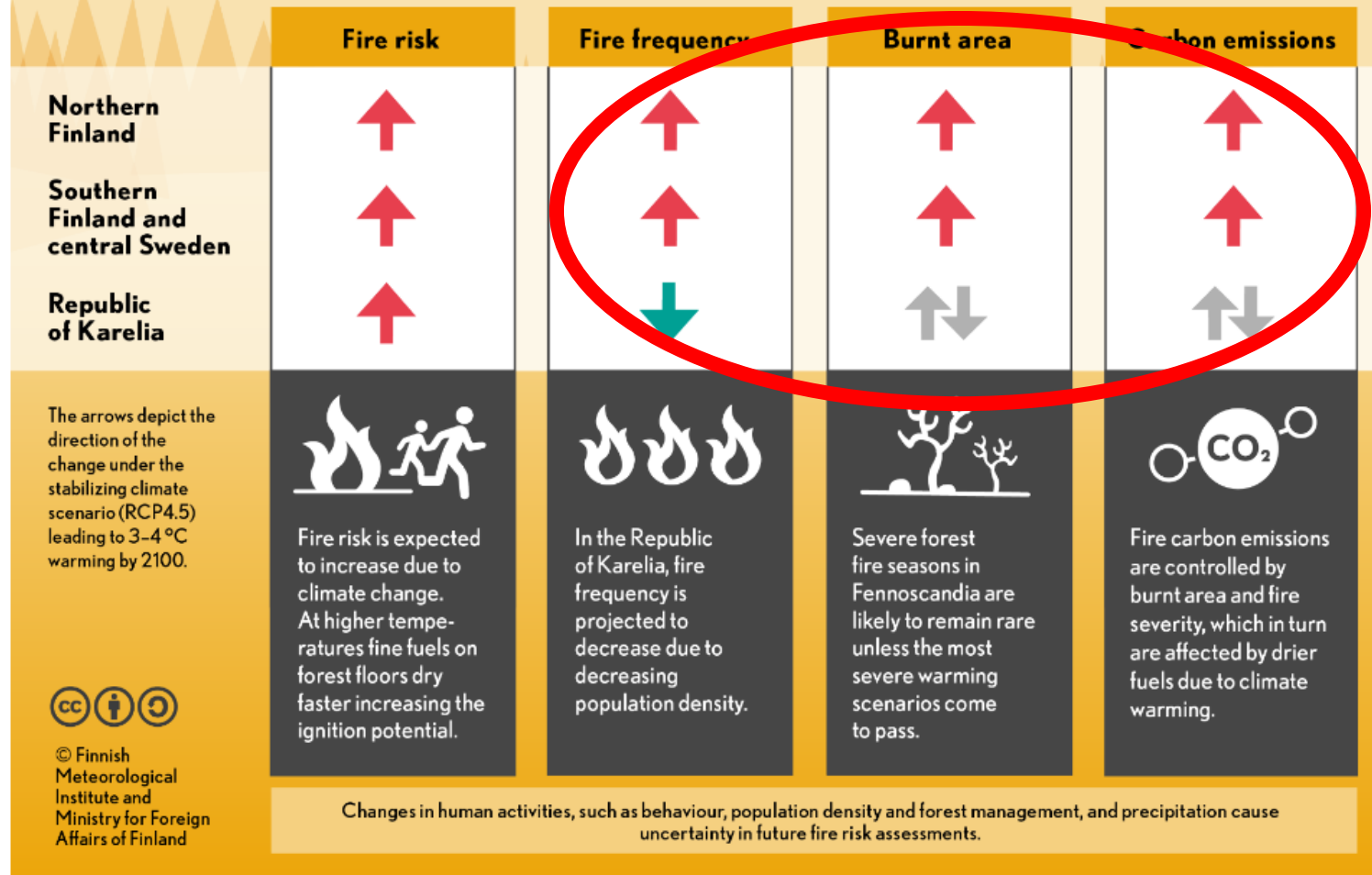
# Lately...

- ... several uncommonly large fire events have occurred:
  - Västmanland fire in Sweden 2014 (appr 13 000 hectares)
  - The exceptional fire summer in Sweden 2018 (appr 25 000 hectares with four major fires forming abt 20 000 hectares)
  - Two 200-300 hectare large fires in Finland 2020 and 2021 (last ones with similar size in 1997 and 1970`s)
  - Extreme fire summer 2021 in Republic of Karelia (10-20 000 hectares?)

# Trends and recent years

- Meteorologically an increase of fire risk during last century has not been found ...
- ...but it has been predicted to increase during coming decades
- ... it is unclear whether the fire events during last years can be explained by warming climate, or if they (or some) are just stochastic coincidences "bad luck", or explained by "bad handling" (both kinds of opinions exist)

## Climate change increases the risk of forest fires



These can be affected by actions and because of this, the future development is hard to predict (“the strength of the arrows”)

**Figure 4.1.** Infographics ‘Climate change increases the risk of forest fires’ summarising the main findings of the chapter.

# Conclusions

- In last century, the burned areas have decreased yet there are regional and temporal differences in fire regimes in Fennoscandia, that can not likely be explained by climatic factors
- In recent years there have been several extreme fire events in Fennoscandia
- The climatic fire risk is predicted to increase
- ... yet since the current fire regimes are mostly controlled by fire prevention and forest management the climatic fire risk does not necessarily directly correlate with the occurrence of fires
- ... so with these actions we can mitigate the increasing climatic fire risk

# More: a fresh comprehensive report: "Climate change and forest management affect forest fire risk in Fennoscandia"

<https://helda.helsinki.fi/handle/10138/330898>



**Thank You!  
Kiitos!**