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Eesti Maaülikool
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SKOGFORSK

Forest and tree pests in the Nordic and Baltic countries

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From Jan. 1. 2015, Metla is part of the Natural Resources Institute Finland. www.luke.fi

Luke

LUONNONVARAKESKUS

SUOMEKSI PÅ SVENSKA IN ENGLISH AUF DEUTSCH



LIETUVOS AGRARINIŲ IR MIŠKŲ MOKSLŲ CENTRAS
Lithuanian Research Centre for Agriculture and Forestry

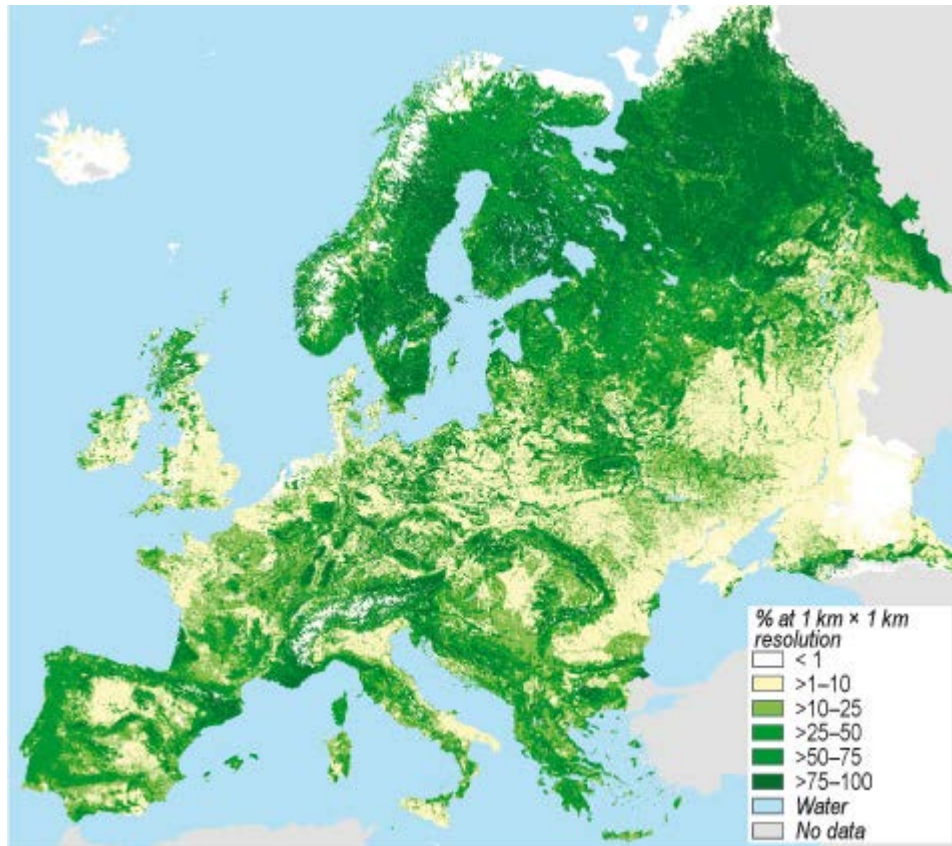


Nordic forest entomological cooperation goes back to 1949



Ekenäs, Jan 1981

- Focus on the last 5-10 years
- Economic importance, pesticide usage, new pests and change in pattern or behaviour



Forest cover in Europe, as percentage of land area (METLA)

“The Five Big”

- *Ips typographus* – Spruce Bark Beetle
- *Tomicus piniperda* – Pine Shoot Beetle
- *Hylobius abietis* – The Pine Weevil
- *Lymantria monacha* – The Nun Moth
- *Neodiprion sertifer* - European Pine Sawfly

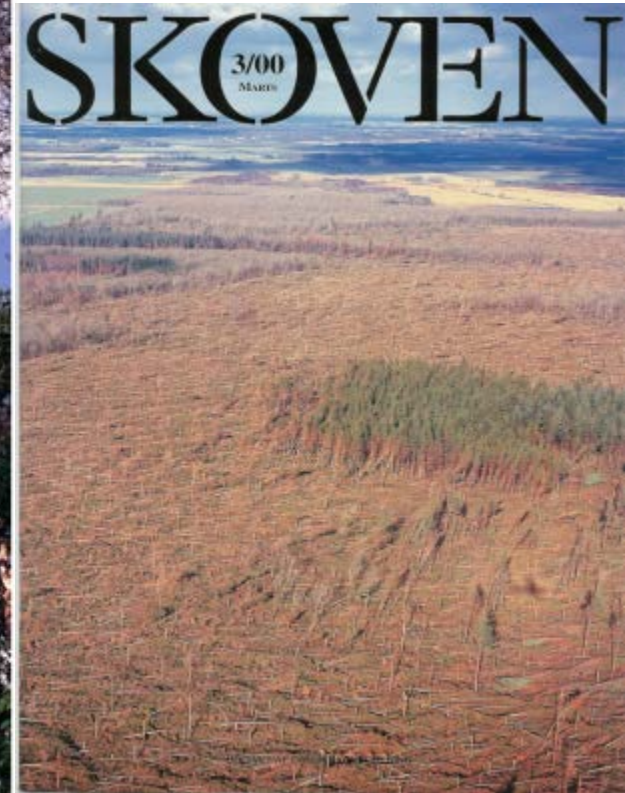
Seed insects, new pest species introduced or climate change facilitated

Ips typographus – The Spruce Bark Beetle

Spruce trees killed by *Ips typographus* during the previous summer (Photo: Juha Siitonen)



Photo: Seppo Neuvonen





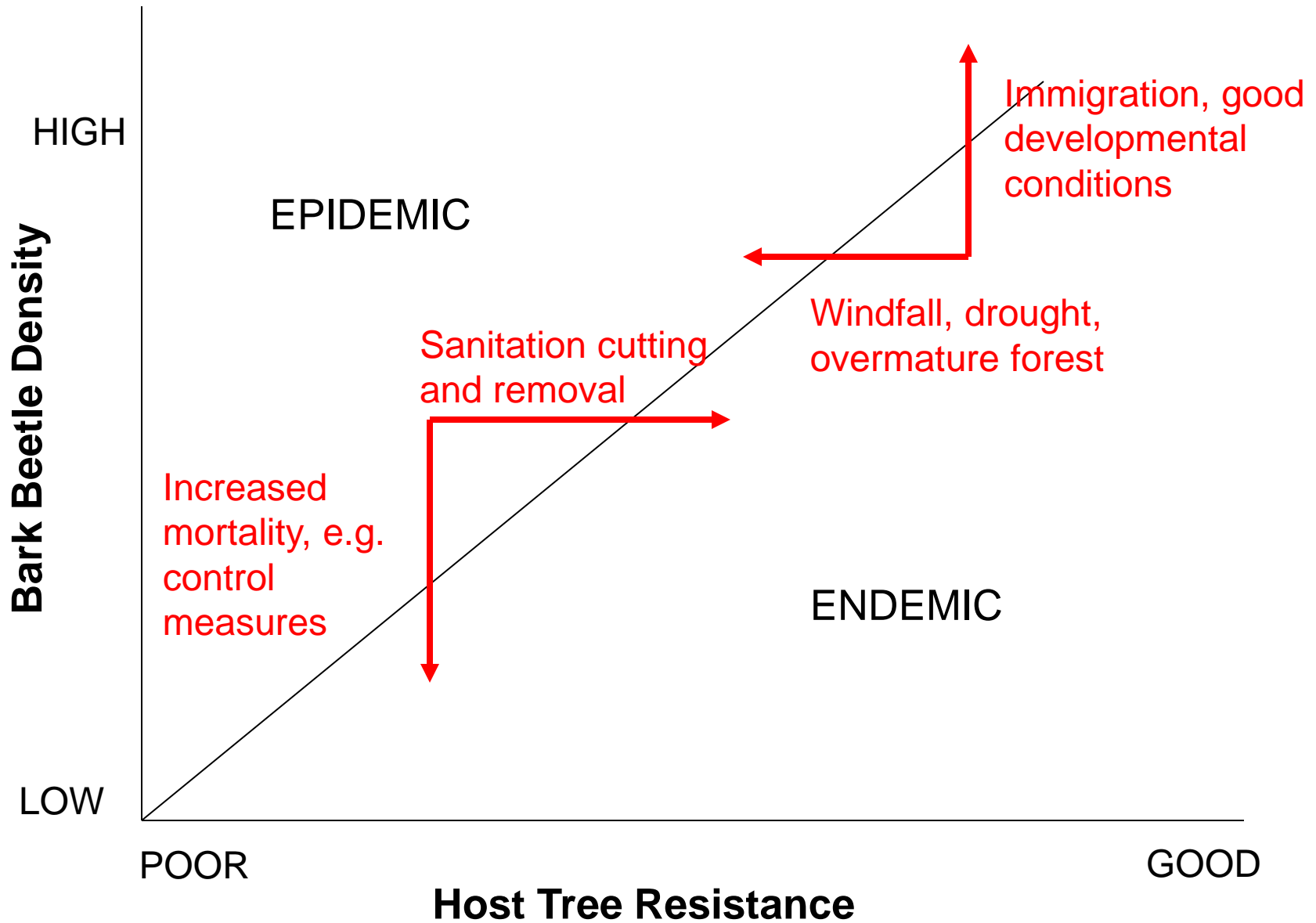




Rold skov, 18. aug. 2006

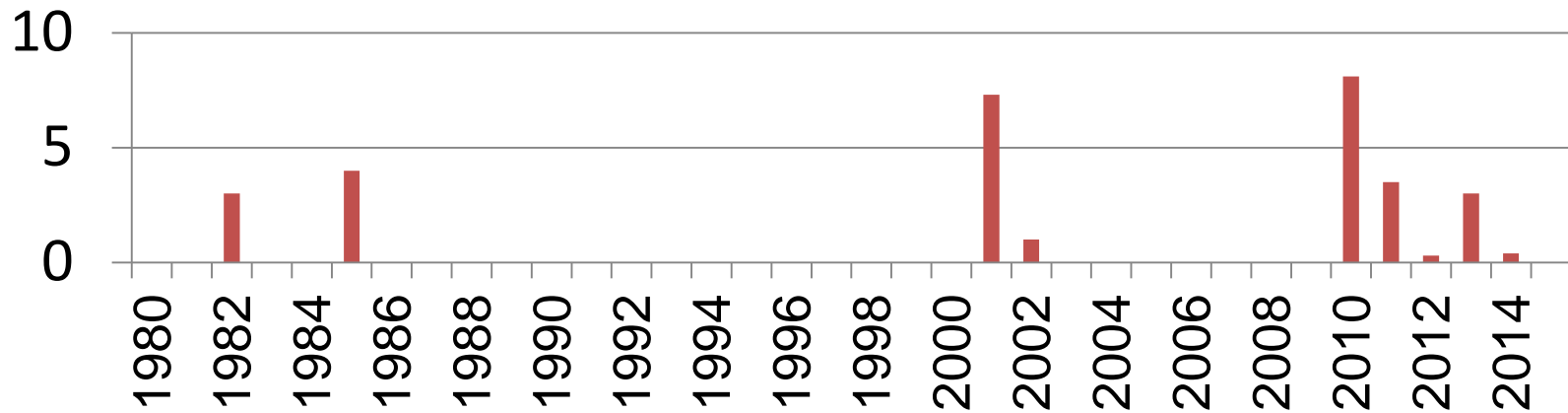


Risks of an epidemic situation depends of two conditions:
Bark beetle density and host tree resistance

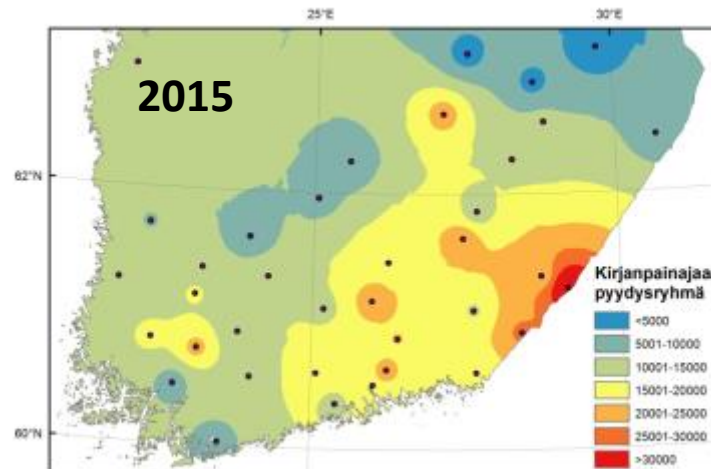
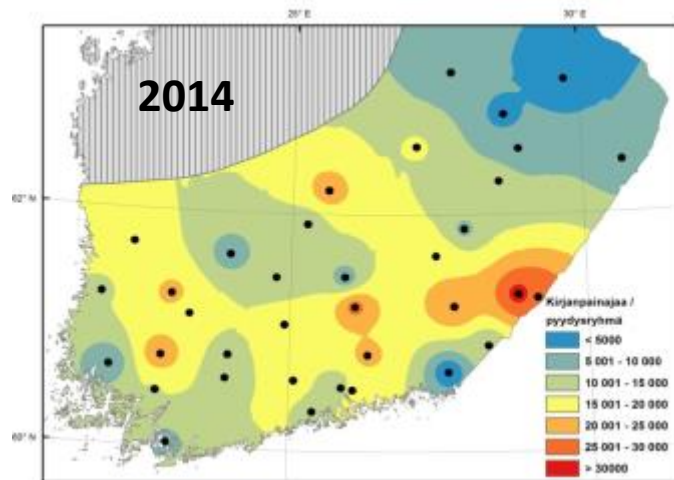
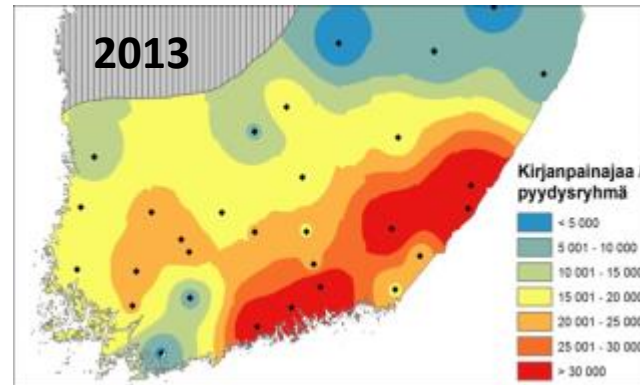
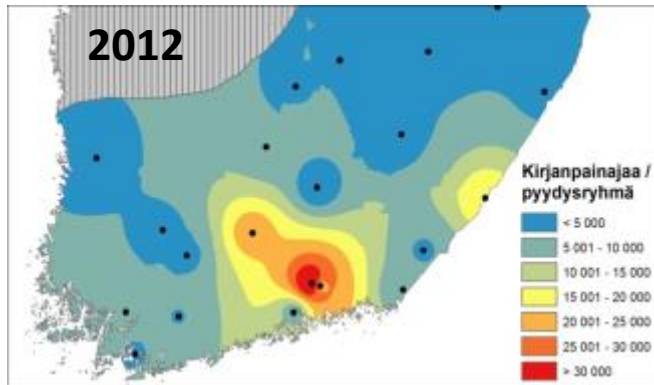


Finland /Seppo Neuvonen

- Traditionally, older Norway spruce trees have been quite free from insect problems in Finland, but the situation has changed
- **Eurasian spruce bark beetle (*Ips typographus*):** Has benefited from more frequent storm damages since 2010 (Fig. below) and from warmer summers; a nuisance especially in South-eastern Finland during the last years (see next slide)



The endemic population level of *I. typographus* has been exceeded widely in southern Finland during recent years (yellow – red colours)/ Seppo Neuvonen



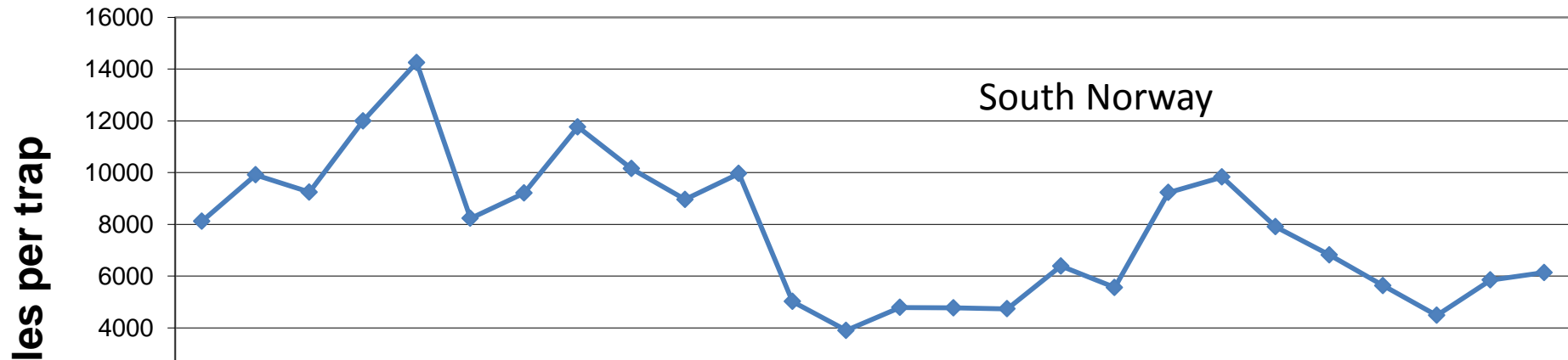
Sweden since 1990 / Martin Schroeder

- 1994 – 1999 in southern Sweden (Götaland), about 350 000 m³sk were killed.
- 2006 – 2010 in southern Sweden (Götaland), about 3.5 million m³sk were killed
- 2008 – 2011 in northern Sweden (Norrrland) about 2 million m³sk were killed*
- 2015 - ? northern Sweden (Norrrland) - so far about 350 000 m³sk been killed

*) *Polygraphus poligraphus* took part in this

From 2006 – 2016 at least 6 million m³sk (0.5%) were killed, compared with about 4.2 million m³sk in the preceding 45 years (1960 – 2005, most of this killed during the large outbreak in 1971 - 1982).

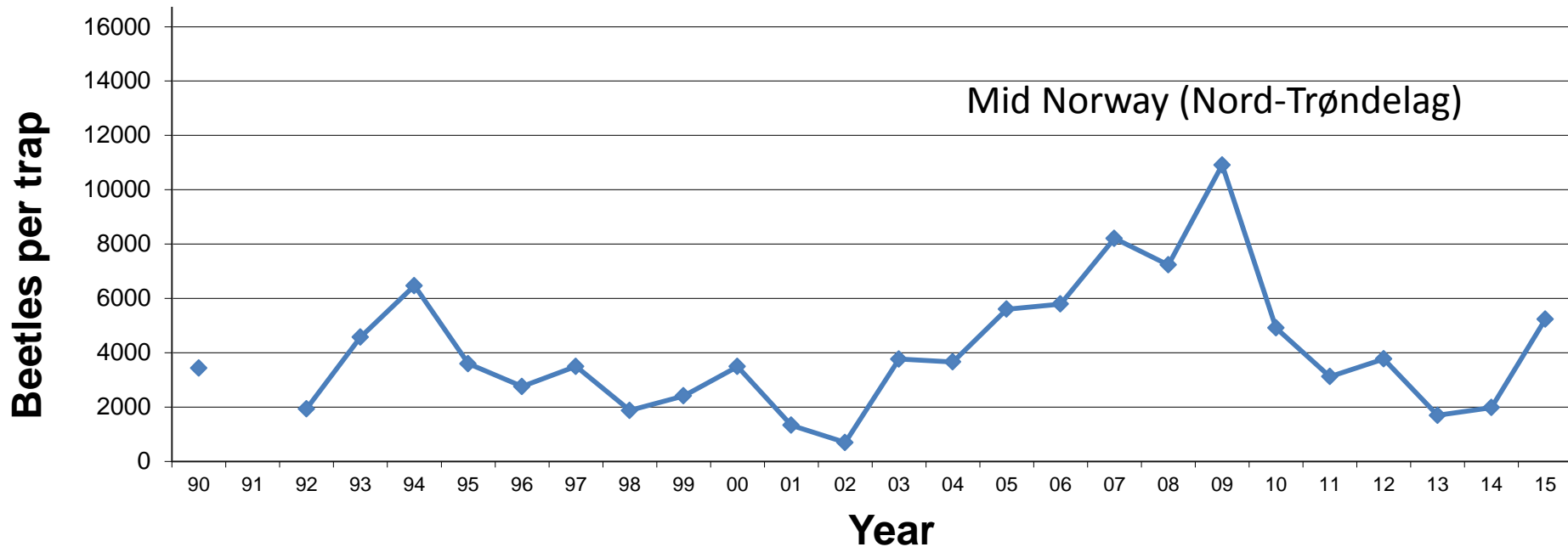
Ips typographus / Bjørn Økland



All former bark beetle outbreaks were in South Norway

In Mid Norway extensive forests population density increased after 2002 to 2009 => tree-killing

Since then both regions has experienced declining populations due to rainy summers, but a warm and dry summer in 2014 gave a new increase of the populations in Mid Norway.



- EE: *Ips typographus* everywhere, every time
- LT: The main insect pest in spruce stands in Lithuania, continuous monitoring, yearly damage registered. 5.700 ha in 2009, 4.200 ha in 2010 and 6.400 ha in 2013
- DK: Monitor in high risk years (storm and drought), pheromone baited trap trees.
- IS: Introduce, not established.

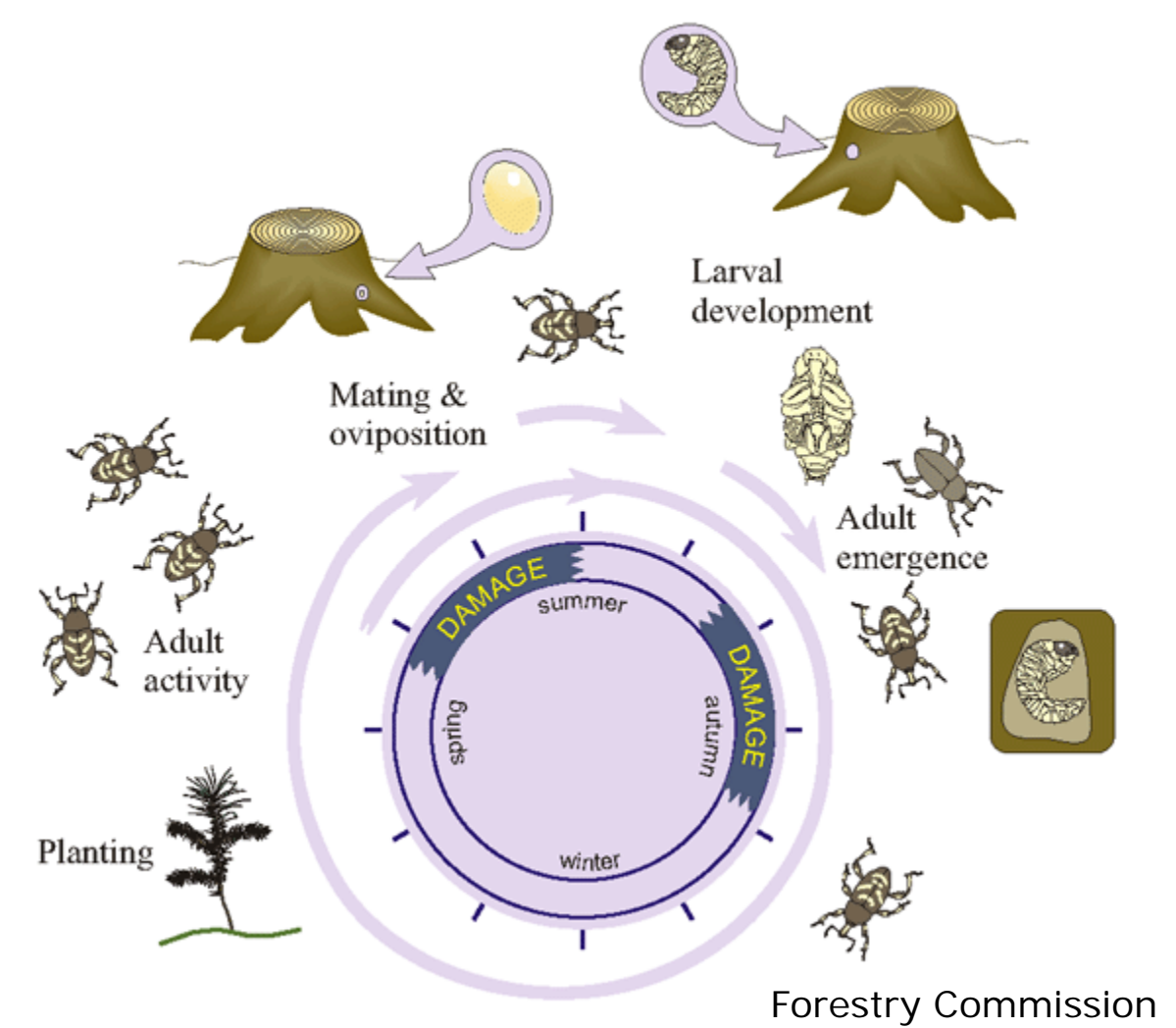
Tomiscus piniperda – Pine Shoot Beetle



Tomiscus piniperda – Pine Shoot Beetle



Hylobius abietis – The Pine Weevil



Rune Axelsson



SE: chronic problem, annual economic losses of several hundred million SEK, most important forest insect pest in Sweden.

NO: 7-11% *P. abies* seedlings killed and 23-26% were damaged 1-2 years after planting

FI: Commonplace pest and controlled by treating the seedling in nurseries before planting.

LT: *Hylobius abietis* are recorded every year in young (especially pine) stands in Lithuania.

EE: *Hylobius abietis* – everywhere, every time

DK: All conifer seedlings, ave. 25%, prefers pine

Hylobius abietis / Göran Nordlander

- Since 2010, alternative, non-chemical protection methods physically protects, coatings on the stem or a sleeve around the seedling. Applied to aprox 50% of protected sedlings
- Increasing in the northern half of Sweden – particulatly along the coast
- A recently conducted (yet unpublished) field study at SLU has revealed that there appears to be a useful genetic variation for pine weevil susceptibility in the Swedish breeding population of Norway spruce. There was a significant family effect for debarked area by pine weevil and there was a lack of relevant GxE interaction. These encouraging results indicate that the exploitation of variation in genetic resistance can contribute to the integrated pest management methods against the pine weevil. Continued work on this is in progress.

Conniflex-treated Bugstop-plant. Foto:
Claes Hellqvist, SLU



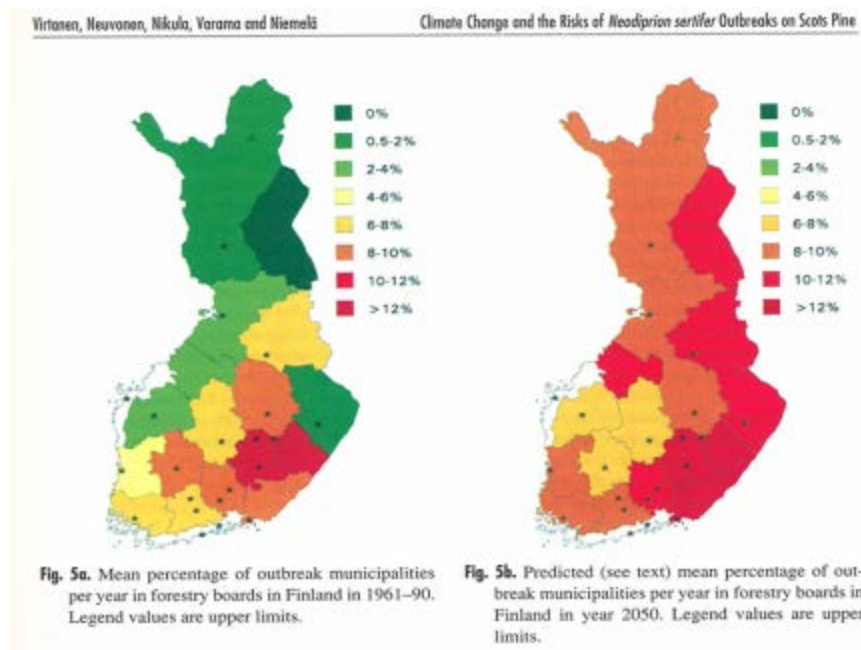
Lymantria monacha – The Nun Moth



- EE: 2012-2013 an outbreak in Saaremaa island (25 ha), spruces completely defoliated, pines partly.
- FI: Has spread (probably due to warmer winters) into Southern Finland since 1990; small scale outbreak 1,5 ha in the SW Archipelago during the last years
- SE: 1997 and 1998 large outbreak was affecting ca. 1100 ha in Skåne. Bt was used to control
- DK: common, 1978-83, 1000 ha, poor soils

Neodiprion sertifer / Seppo Neuvonen

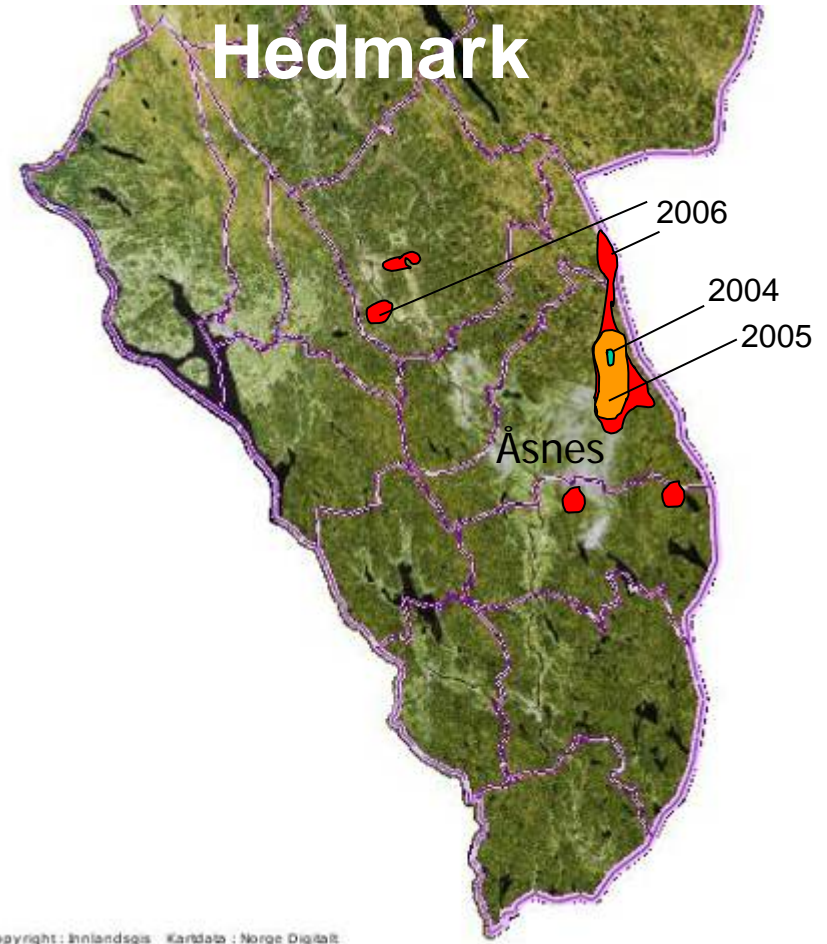
- European pine sawfly continues as the most important pest; outbreaks may become more frequent in Eastern and Northern Finland due to warmer winters



- SE: The most frequently reported damage is defoliation on *Pinus* by *N. sertifer*
- DK: Common but rarely at a damaging level

Neodiprion sertifer / Paal Krokene

- Major outbreak in the municipality of Åsnes, Hedmark county: 10 000 ha infestations.
- Major outbreak 2004-2007
- Yield loss ca. 25 mill. NOK



Great spruce bark beetle - *Dendroctonus micans*

The 6th "big"?





Most important natural enemy
Rhizophagus grandis

Great spruce bark beetle - *Dendroctonus micans*

- DK: 70-80.000 KFM *P. sitchensis* cut 2007-08
- EE: Numerous in the 1970s in young (about 20 years old) pine stands in western Estonia.
- LT: Till now infested only *Picea pungens*. Recently colonized Norway spruce. Mostly in seed orchards of 40 years of age or older.



Dendroctonus micans outbreak in Swedish spruce seed orchards /Olle Rosenberg



D. micans has been observed in spruce seed orchards, and may kill trees by girdling.

Outbreak can be facilitated by warm summers in combination with different stress factors, such as draught and mechanical damage (including pruning).

- SE: 2007-2012, 10-80 % of the cones were infested by the diptera *Strobilomyia anthracina*

Foto: Olle Rosenberg



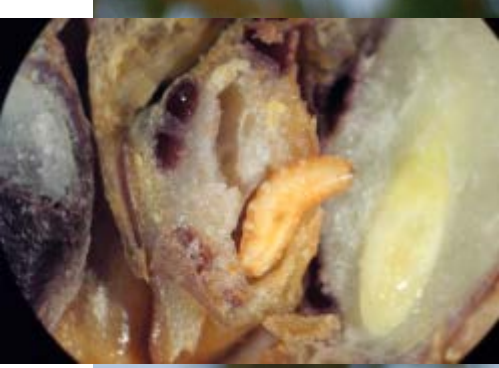
Foto: Olle Rosenberg



Foto: Mats Wilhelm Pettersson

- SE: 2007-2012, 70-100 % of the cones were infested by the lepidoptera *Cydia strobilella*





- SE: 2007-2012, 10-80 % of the cones were infested by the lepidopterans *Eupithecia abietaria* (to the left) and *Dioryctria abietella* (to the right).



FI: Three lepidopteran species *Cydia strobilella*, *Dioryctria abietella*, *Eupithecia abietaria* and dipteran *Strobilomyia anthracina* lower the seed crop of Norway spruce (*Picea abies*) remarkably.



DK: *Dioryctria abietella*, *Megastigmus* spp (Spruce seed chalcids), *Resseliella piceae*(Cecidomyiidae) . In *Abies* seed production



New seed pest species introduced

- SE: A new species that can be of importance in the future is *Leptoglossus occidentalis*. The species has been observed twice in Sweden and twice in Denmark
- FI: it has not been detected so far in Finland.

Alien species of forest insects discovered in Sweden since 2000

Species	Year of detection	
	SE	DK
<u><i>Ips amitinus</i></u>	2012	-
<u><i>Ips cembrae</i></u>	2011	2005
<u><i>Ips sexdentatus</i></u>	Native	2006
<u><i>Phloeosinus thujae</i></u>	2011	
<u><i>Leptoglossus occidentalis</i></u>	2011	2009
<u><i>Cyclorhipidion bodoanum</i></u>	2009	
<u><i>Tetropium gabrieli</i></u>	2007	1890
<u><i>Pityophthorus pityographus</i></u>	2007	
<u><i>Pulvinaria regalis</i></u>	2006	2006
<u><i>Xyleborinus attenuatus</i></u>	2005	
<u><i>Cameraria ohridella</i></u>	2003	2002
<u><i>Arge pullata</i></u>	2002	1971
<u><i>Cryphalus piceae</i></u>		2007

Those, we really fear:

- *Agrilus planipennis*, Emerald Ash Borer
- *Anoplophora* spp. Asian Longhorned Beetle, Citrus Longhorned Beetle
- *Polygraphus proximus*, Four-eyed fir bark beetle
- Pine Wood Nematode



Iceland/ Brynja Hrafnkelsdóttir



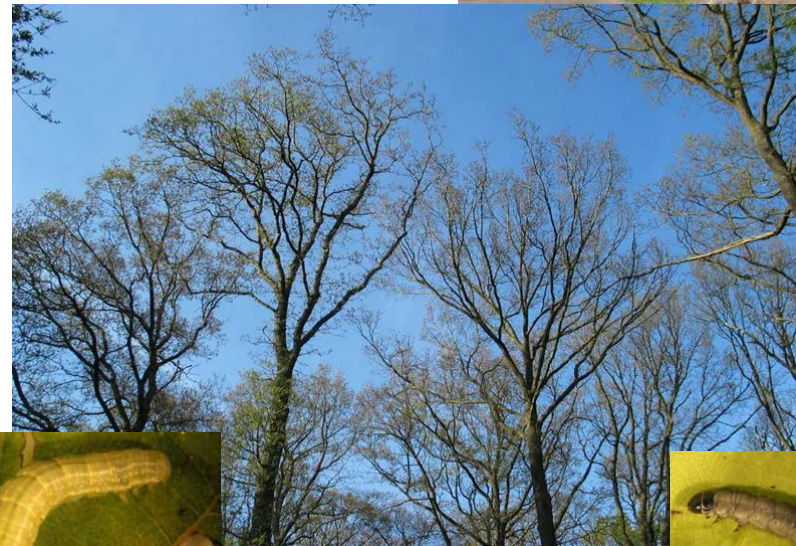
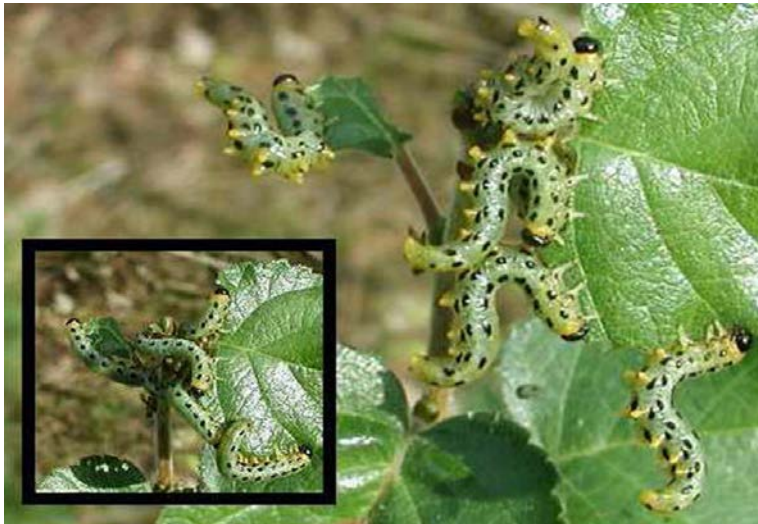
- The brassy willow beetle *Phratora vitellinae* L. is new in Iceland. It was first found in SV Iceland in 2005 and has been spreading fast in that area (Halldórsson et al. 2013). Both adult and larvae feed on *Populus spp.* and *Salix spp.*. In Iceland it has been causing damage on *Populus trichocarpa* and many *salix* species. In good conditions it can cause major damage, especially on young trees (Urban 2006).
- Number of *Phratora vitellinae* L. generations per year are often three in countries, where conditions for the insects are very good. It is likely that with higher mean annual temperature in Iceland the number of *Phratora vitellinae* L. generations per year will get from 2-1 to 3.
- It is likely that some success will be gained by breeding for host residence, especially with *Populus trichocarpa* as a host.

Climate change challenges probably influences regulation on defoliators

Operophtera – winter moth - outbreaks

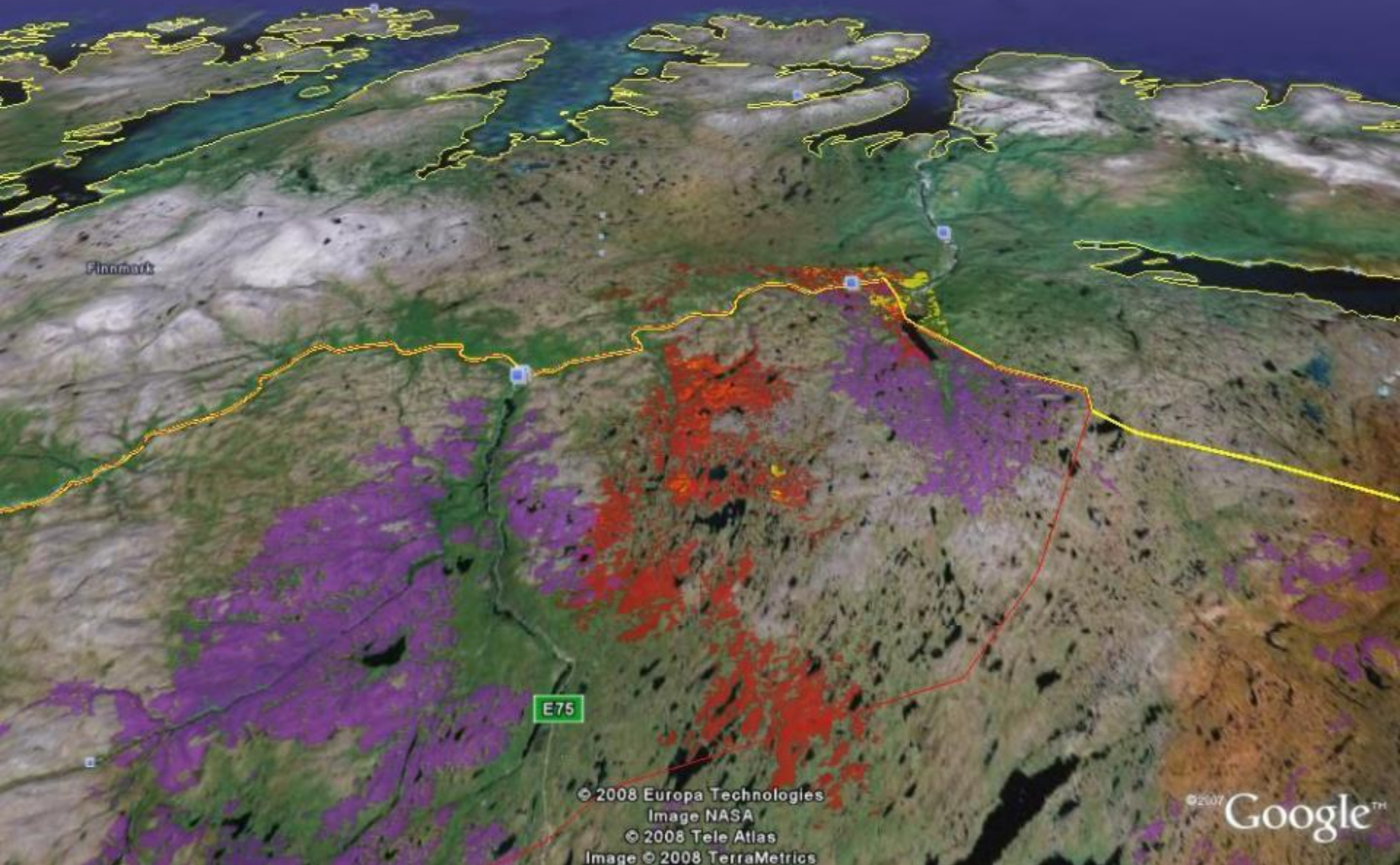
Yponomeuta evonymella, *Arge pullata* a.o.

Performance of defoliating insects have a strong link to the genetics of the host tree through the phenology – but also to the genetics of the insect it self



Birch forests damaged by
Autumnal Moth in mid-1960s

Birch forests damaged by
Winter Moth in 2008



Picture prepared by: Kari Mikkola / Metla, Rovaniemi

Conclusions

Some/many general general challenges – *Ips typographus*, *Hylobius*, Pine shoot beetle etc – importance varies depending on importance of host tree species, but also depending of latitude/longitude/altitude

Behaviour and importance of defoliating insects varies between countries, but some are of common interest and show same pattern across countries

New species introduce themselves from South and East, some are climate change driven some are driven by human introduction

- strong network might help us anticipate the challenges 😊

