International Union of Forest Research Organizations

DIVISION 7 - FOREST HEALTH

IUFRO Working Party 7.03.05 Ecology and Management of Bark and Wood Boring Insects
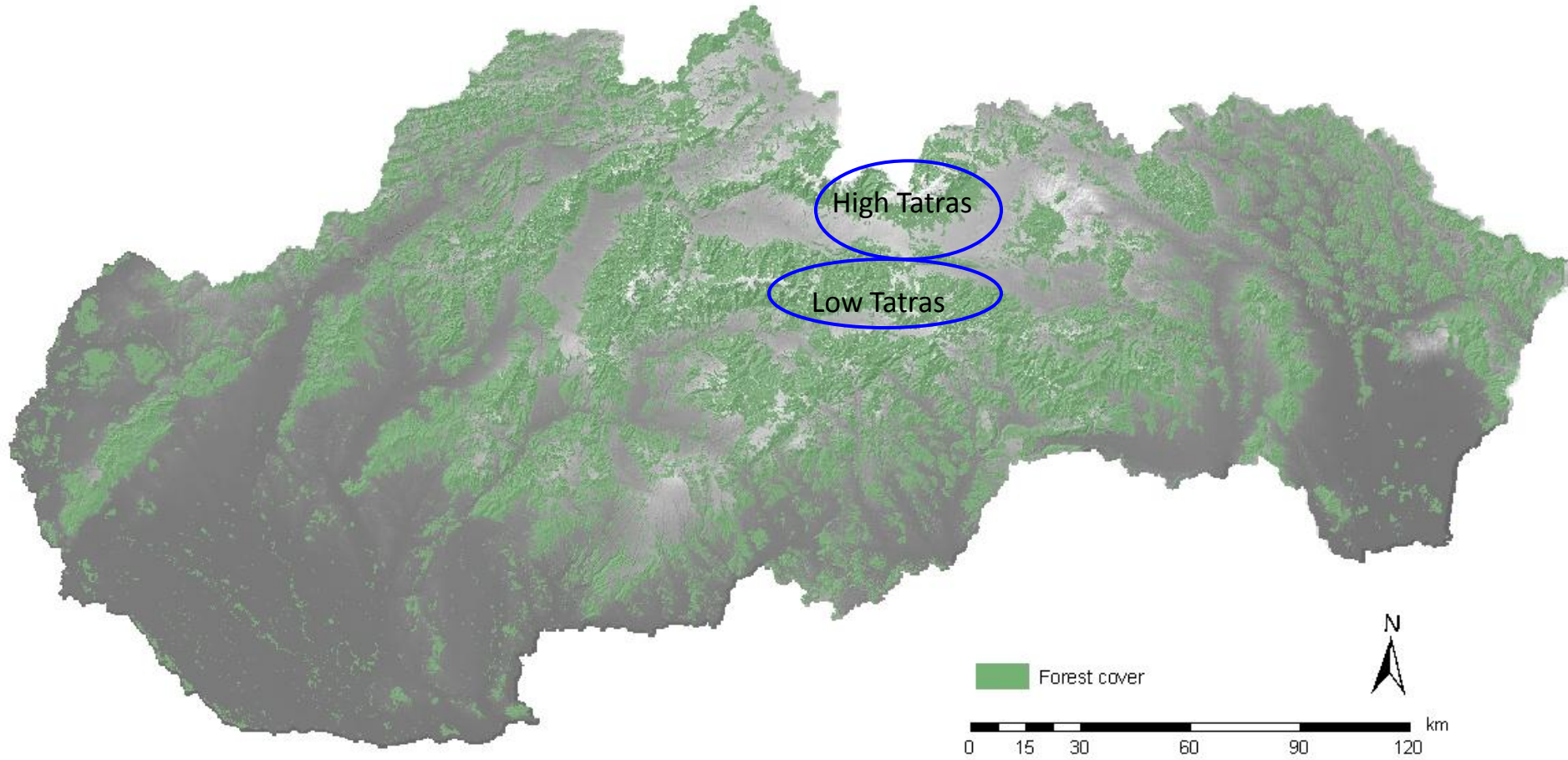"Novel Risks with Bark and Wood Boring Insects in Broadleaved and Conifer Forests"
7th September – 9th September 2011, Sopron, Hungary

The influence of uncleared windthrow areas on bark beetle outbreak in the High Tatra mountains
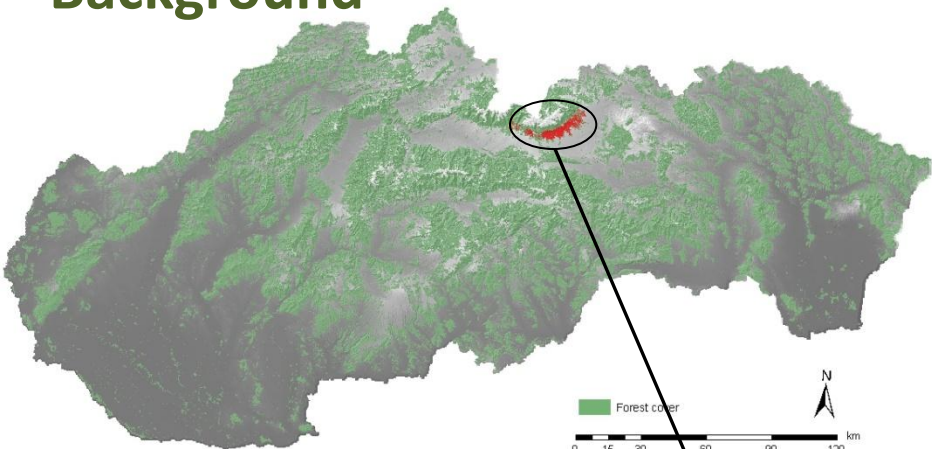
Ch. Nikolov. M. Bošeľa. A. Gubka. J. Vakula. J. Galko . A. Kunca.
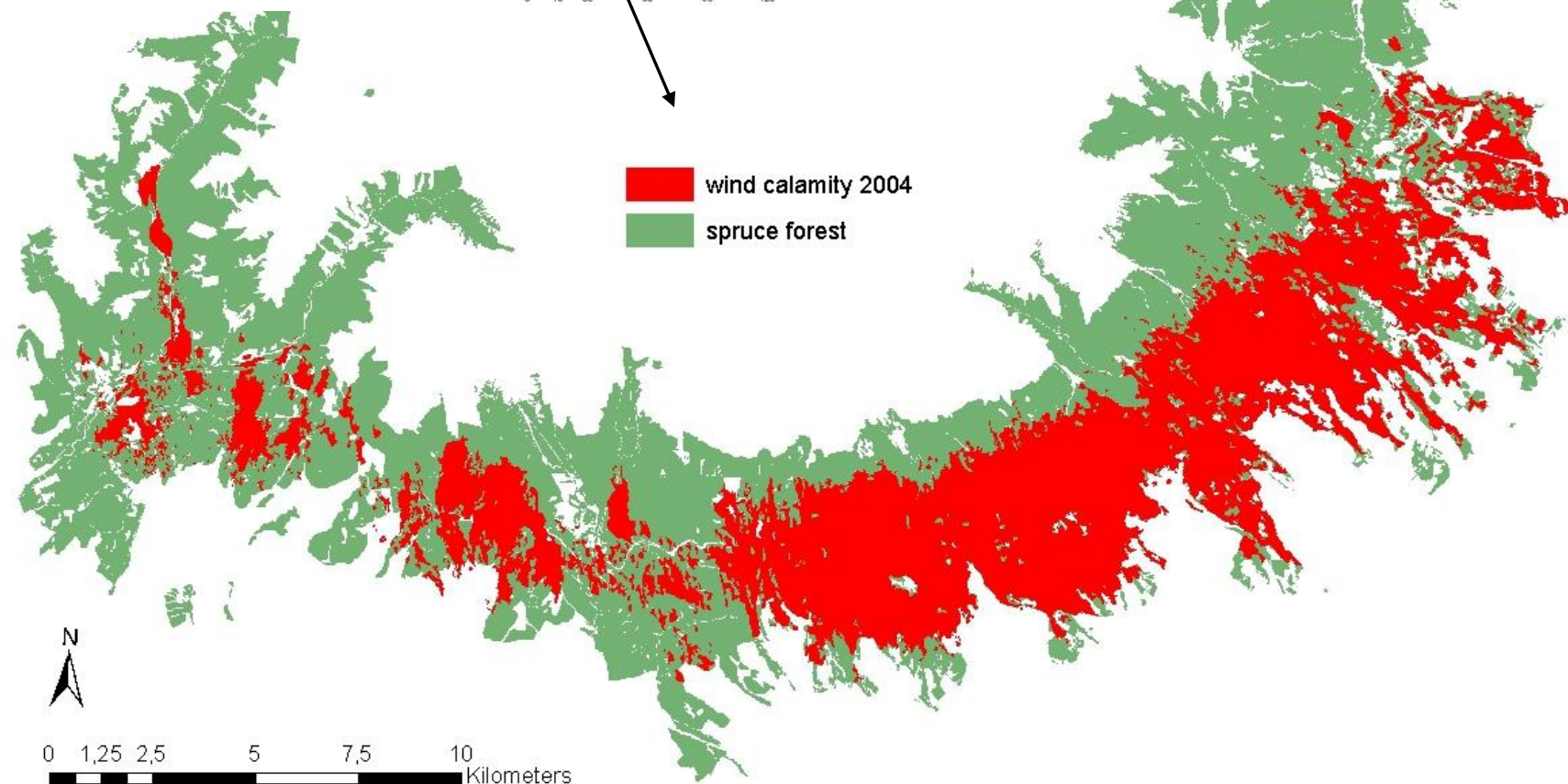B. Økland

Background

High Tatras

Low Tatras

Forest cover

N

km
0   15   30   60   90   120

Slovak Republic. Windthrow november 2004. **5.3 mil. m³**
Mainly High and Low Tatras NP

Background

- **12 000 hectares**
- **2.5 mil. m³**

Forest cover

wind calamity 2004
spruce forest
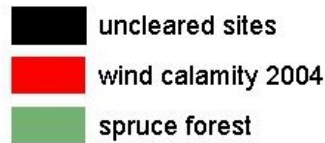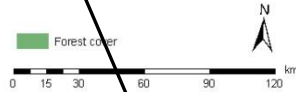
Background

-165 000 m³ of damaged forests left uncleared
- High Tatra coniferous forest is mostly formed by Norway spruce (*Picea abies*)
-Uncleared sites good breeding material for Spruce Bark Beetle (SBB)

Forest cover

uncleared sites

wind calamity 2004

spruce forest
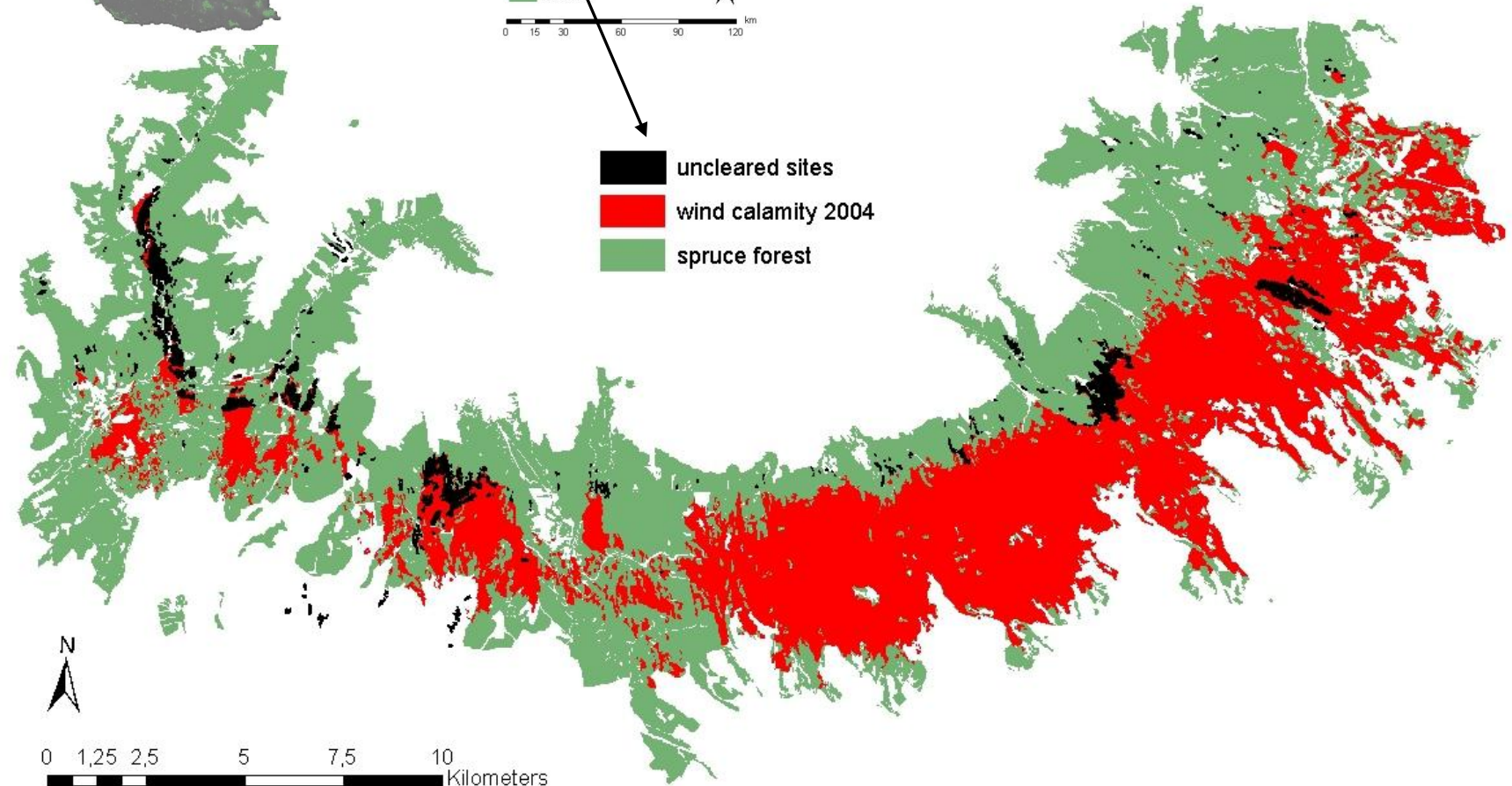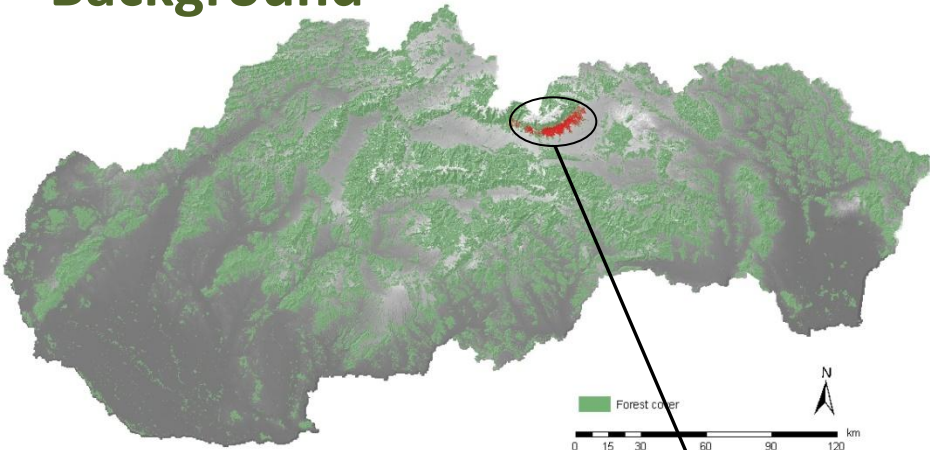
AIM

-To examine the influence of uncleared windthrow sites on SBB outbreak

-Compare 3 localities with different characteristics (analysed separately)

1st. Locality – "VIRGIN"
- old-growth forest (virgin forest).
- almost any SBB attacks from previous years.
- cold climatic conditions (one swarming per year)
- no management

3rd. Locality – "STATE"
- SBB attacks from previous years.
- one/two swarmings per year

1st locality
2nd locality
3rd locality
spruce forest

2nd. Locality – "PRIVATE"
- exceptions for sanitary cuttings
-any SBB attacks from previous years.
- one/two swarmings per year

N

0 1,25 2,5 5 7,5 10
Kilometers
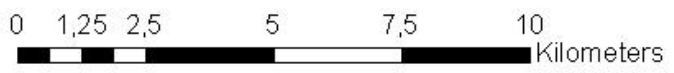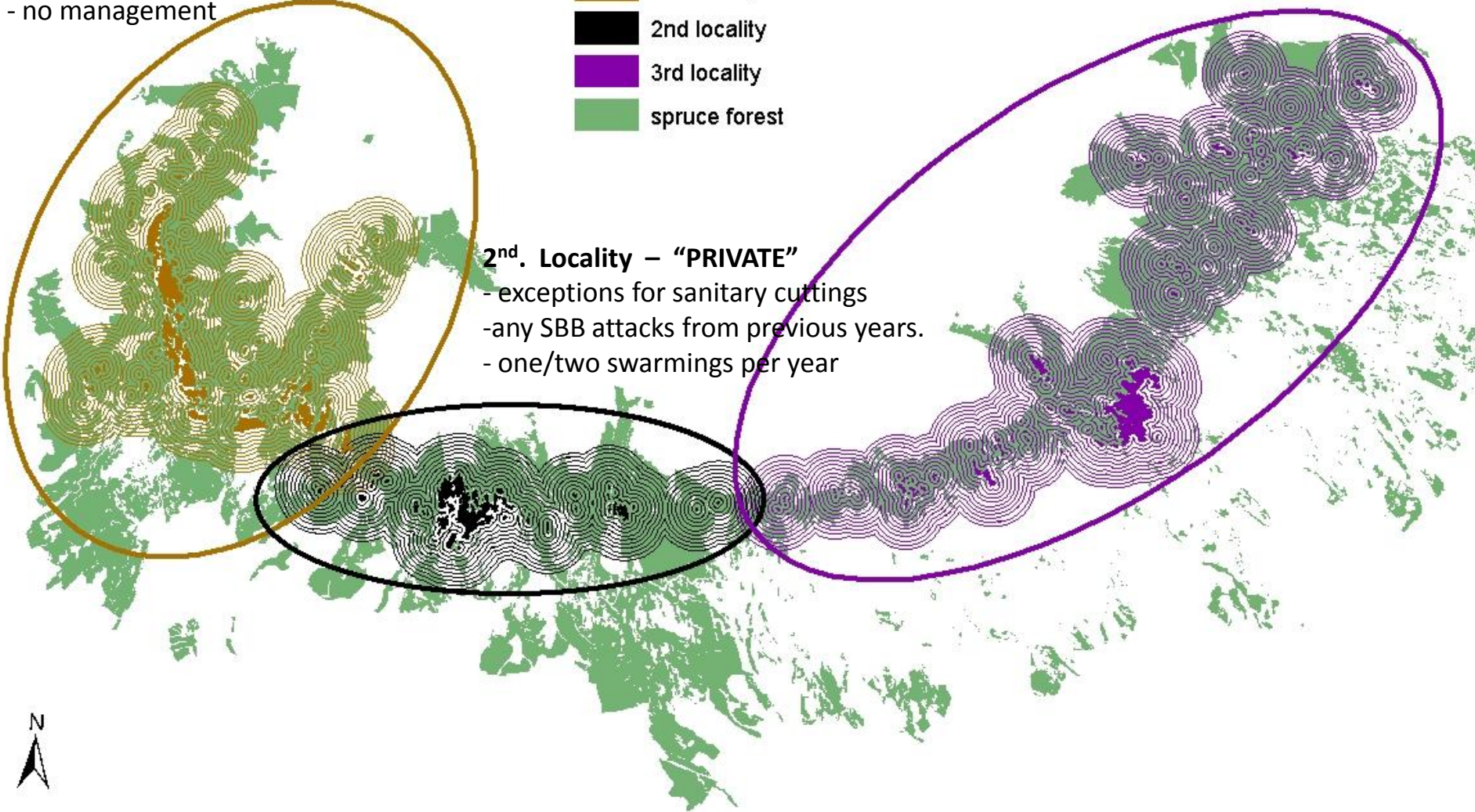
Example of the time series of infrared aerial photography (2005 – 2009)

attacked trees

year
- 2005
- 2006
- 2007
- 2008
- 2009

Legend:
- uncleared sites
- spruce forest
- buffer 100 - 1000 meters
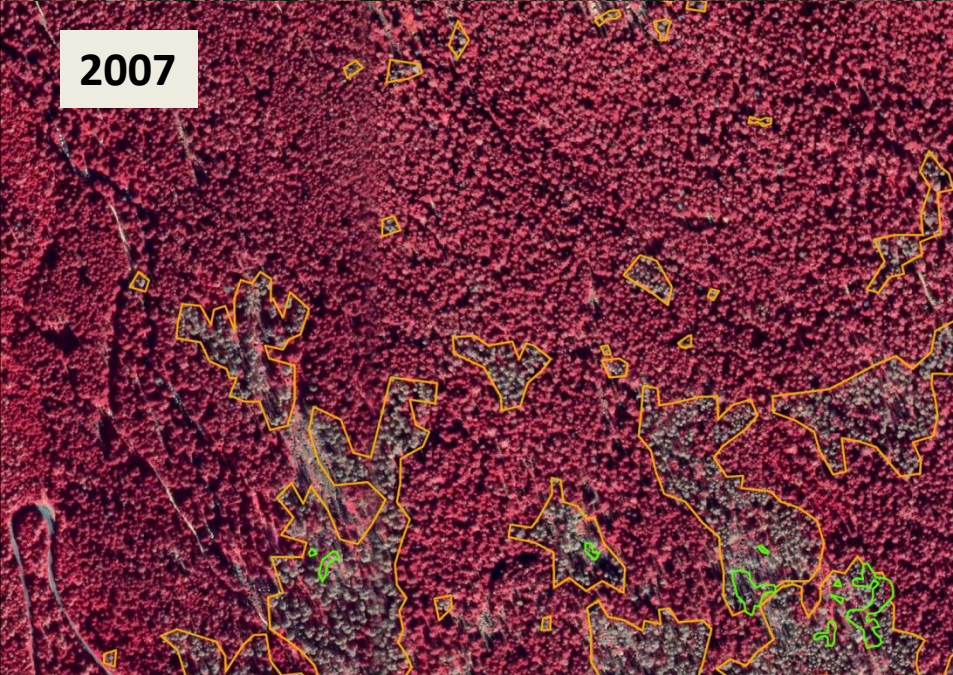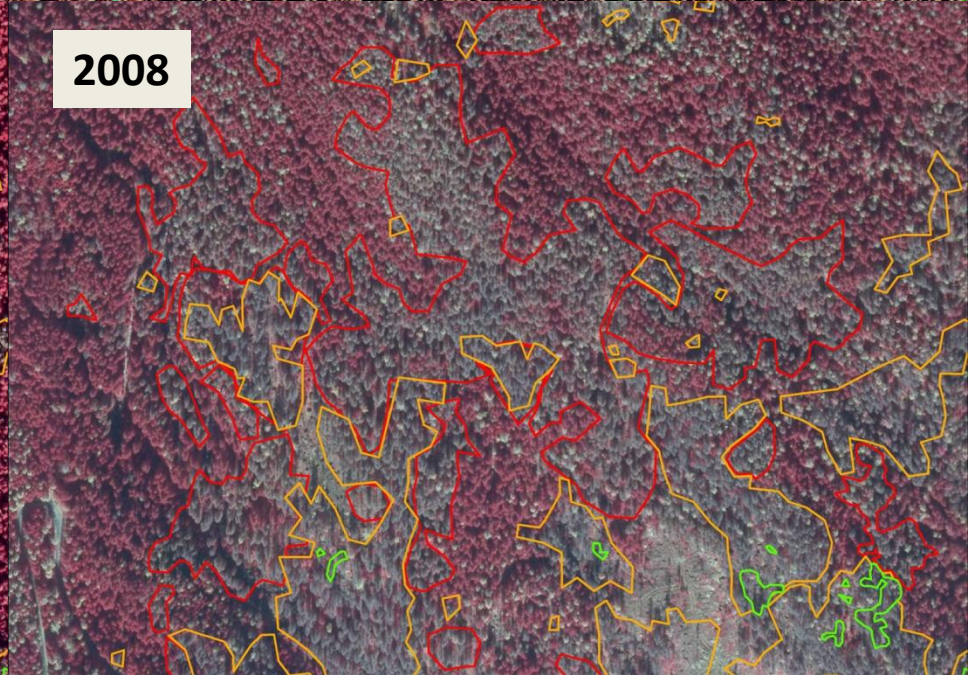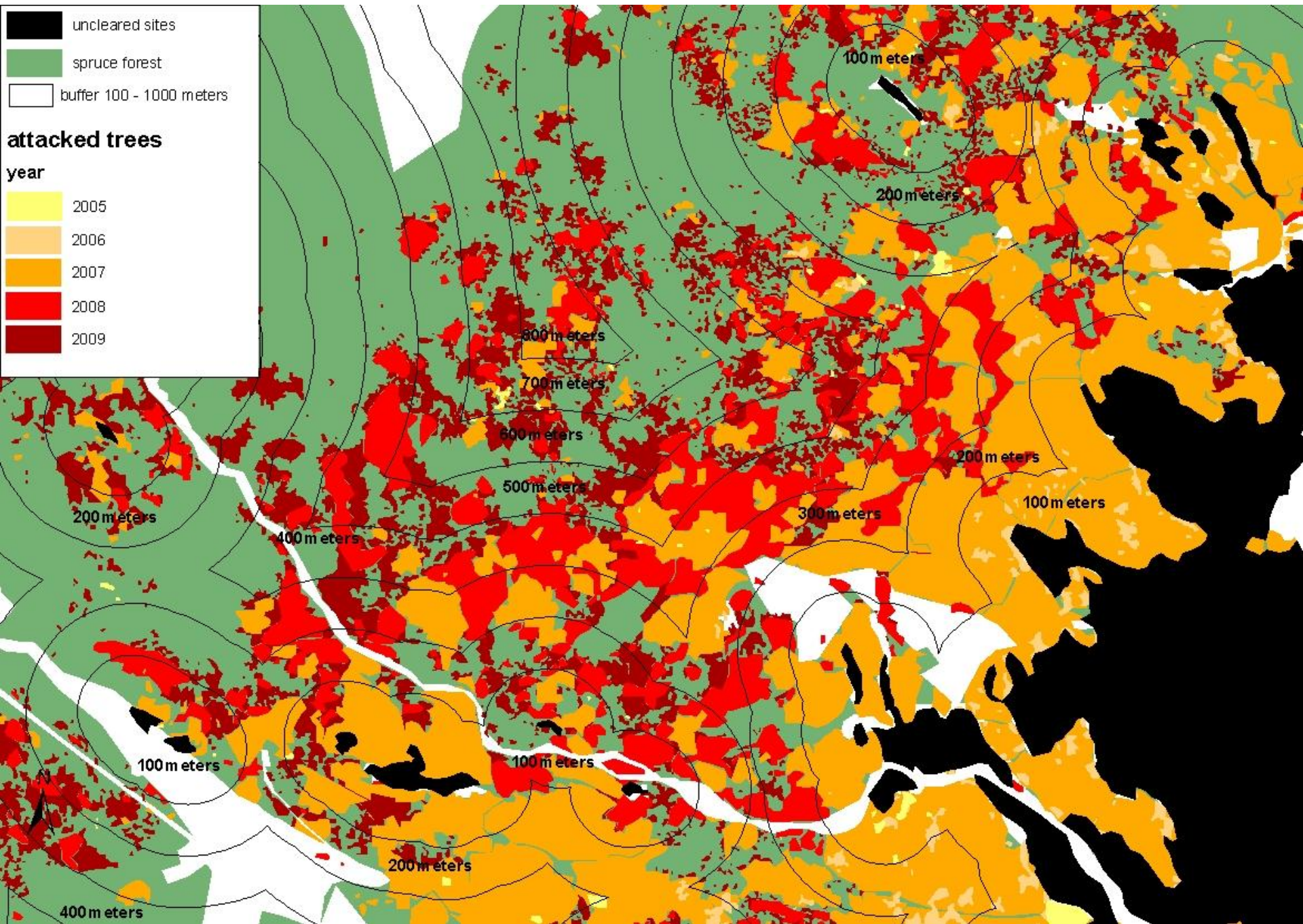
Results - 1st. locality "Virgin" (2005 – 2009)

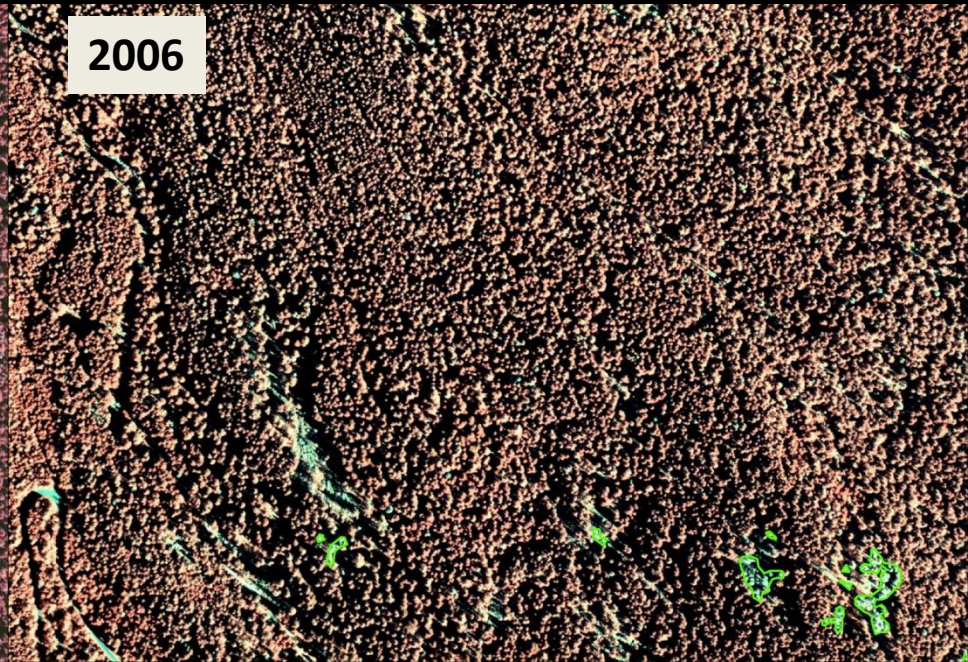| Year		Distance									Sum %
	100	200	300	400	500	600	700	800	900	1000	
2005	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.2
2006	0.2	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4
2007	**17.7**	6.8	3.4	1.6	0.9	0.6	0.8	0.4	0.2	0.1	32.6
2008	9.3	9.3	6.4	4.4	2.5	2.0	1.9	1.1	0.7	0.5	**38.1**
2009	5.0	4.8	4.5	4.0	3.2	2.3	2.3	1.2	0.9	0.7	28.7
% infested areas from the whole damage	**32.2**	21.0	14.4	10.0	6.6	4.9	5.0	2.7	1.8	1.3	100.0

2007: largest damage within 100 meters from uncleared areas

2008: "peak of the outbreak"

Results – 2nd. locality "PRIVATE" (2005 – 2009)

Year	Distance										Sum %
	100	200	300	400	500	600	700	800	900	1000	
2005	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0
2006	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1
2007	3.4	2.4	1.7	1.0	1.1	0.7	2.0	1.6	2.8	1.1	17.8
2008	15.1	8.0	4.3	4.1	1.6	1.2	1.6	1.5	1.2	1.0	39.5
2009	12.7	10.1	6.9	2.0	2.0	2.1	2.1	1.7	2.0	0.8	42.6
% infested areas from the whole damage	31.2	20.5	13.0	7.2	4.7	4.0	5.7	4.8	6.0	2.9	100.0

2005: no SBB outbreak recorded (sanitary cutting)

2008: largest damage within 100 meters from uncleared areas
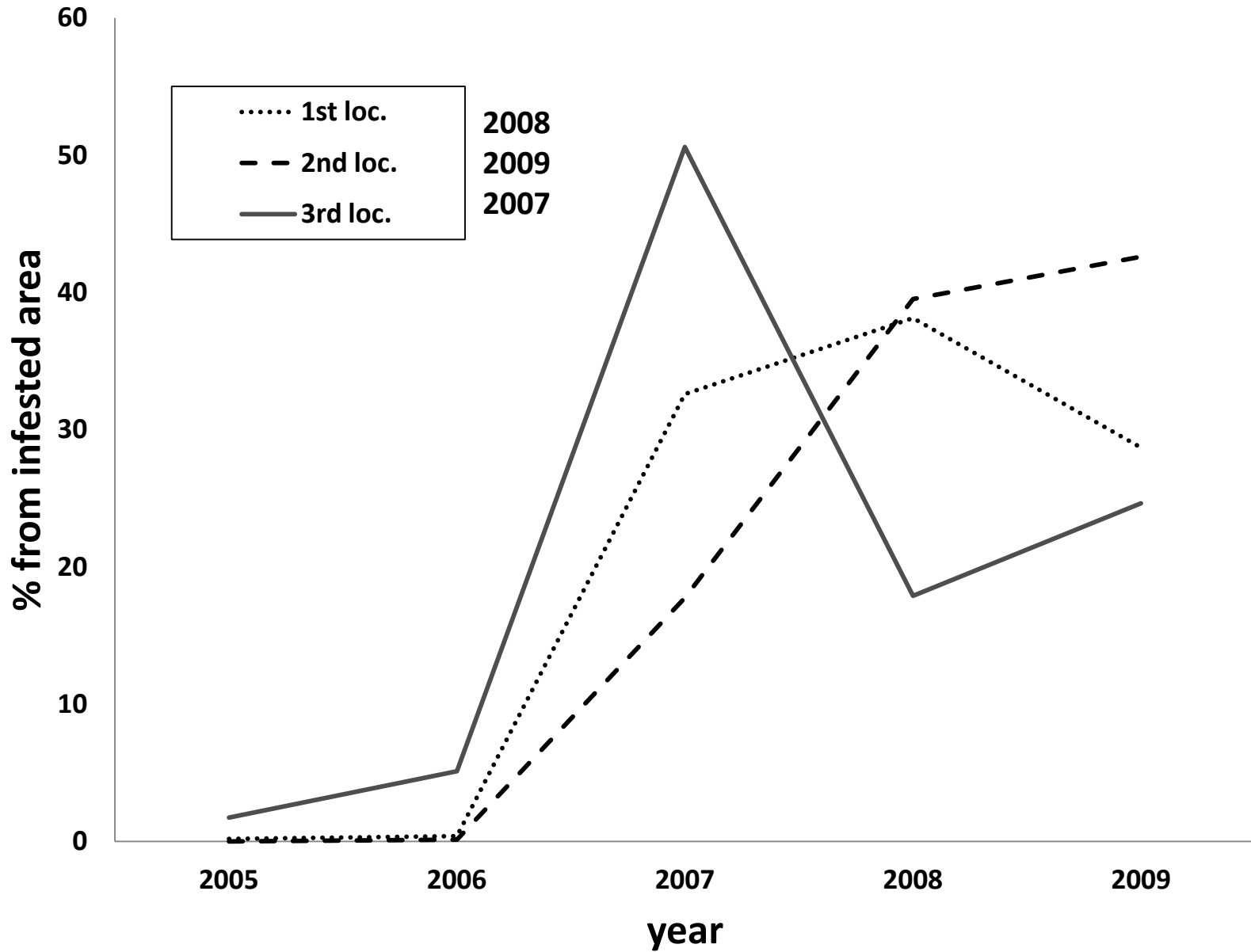
2008 – 2009: "peak of the outbreak"

Results – 3rd. locality "STATE" (2005 – 2009)

| Year	Distance 100	200	300	400	500	600	700	800	900	1000	Sum %
2005	0.14	0.04	0.31	0.26	0.46	0.41	0.06	0.04	0.01	0.01	1.74
2006	1.77	0.88	0.61	0.49	0.33	0.42	0.22	0.17	0.13	0.10	5.13
2007	18.27	11.29	8.31	4.42	2.97	2.11	1.47	0.82	0.46	0.46	50.59
2008	3.29	4.40	3.57	2.55	1.71	0.90	0.77	0.35	0.12	0.23	17.89
2009	3.89	5.02	4.27	3.55	3.20	2.21	1.42	0.59	0.27	0.22	24.64
% infested areas from the whole damage	27.37	21.63	17.08	11.28	8.67	6.05	3.94	1.97	0.99	1.02	100.00

2007: largest damage within 100 meters from uncleared areas. "peak of the outbreak"

2008 – 2009: damage within 200 meters from uncleared areas

Results - peaks of spruce bark beetle outbreaks (2005 – 2009)

Legend:
- ...... 1st loc.
- – – 2nd loc.
- —— 3rd loc.

2008
2009
2007

Y-axis: % from infested area (0, 10, 20, 30, 40, 50, 60)

X-axis: year (2005, 2006, 2007, 2008, 2009)

Results - distances of spruce bark beetle (SBB) patches from uncleared sites (2005 – 2009)
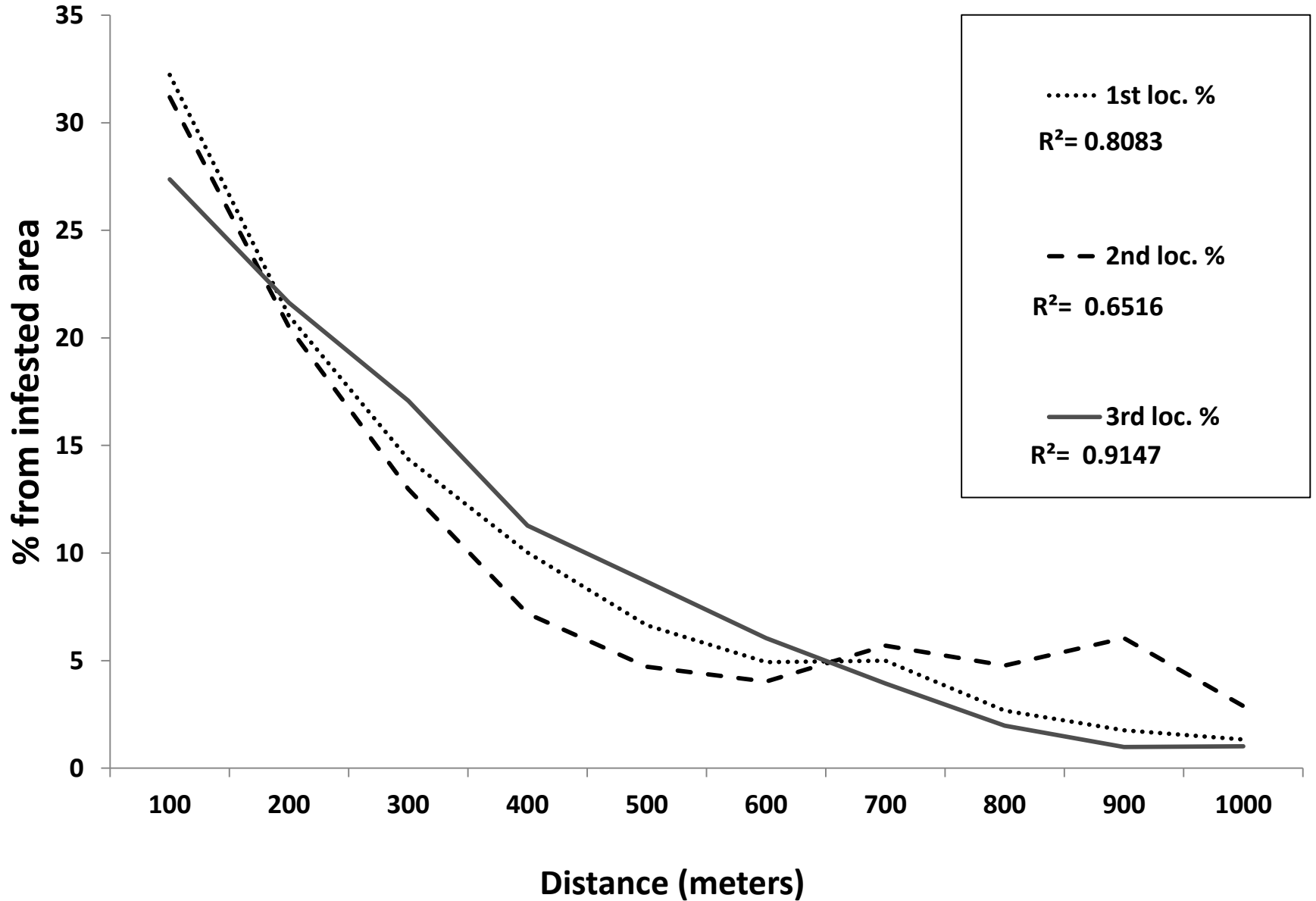
Conclusions:

- There was a significant **difference in outbreak progress**, which may be caused by sanitary cutting strategy and climatic characteristics of the localities

- Just a **difference of temporarily delaying** outbreak peak

-The outcome could be different in a region with a less comprehensive bark beetle outbreak

-At small scale **differences in peak year** were found even **for neighboring localities**

-Most affected area was always within **100 meters** from uncleared sites, more then 65 % of all attacks were recorded within 300 meters

Thank you for Attention.