

Bark Beetle Outbreaks in Slovakia 2004 - 2021

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Content

- Forest structure - **overview**
- Largest **windstorms** and following BB outbreaks in Slovakia
- **Factors** affecting BB outbreaks
- Management and **obstacles**
- Conclusions

Forest structure Slovakia - overview

- Area of Slovakia: **4.9** mil. ha
- Forest Coverage: **1.95** mil. ha (**~41 %** of the total area of the SK)
- Average stand **age: 70.9 years**
- Total volume of **growing stock: 484.5 mil. m³ (249 m³/ha)**

European **beech**: 35%

Norway **spruce**: 22 %

Oaks: 10 %

Pines: 7 %

Bark beetle (BB) species on spruce and pine

- **Norway spruce** is the **most attacked** tree species by bark beetles.
- Other tree species: **pin**es and **1%** of other tree species.
- **98 %** of bark beetle damages on Norway spruce are caused by *Ips typographus*
- **2 %** by *Ips duplicatus* and *Pityogenes chalcographus*.
- **Pine** is attacked dominantly by *Ips acuminatus* and *Ips sexdentatus*

Ips typographus



Pityogenes chalcographus



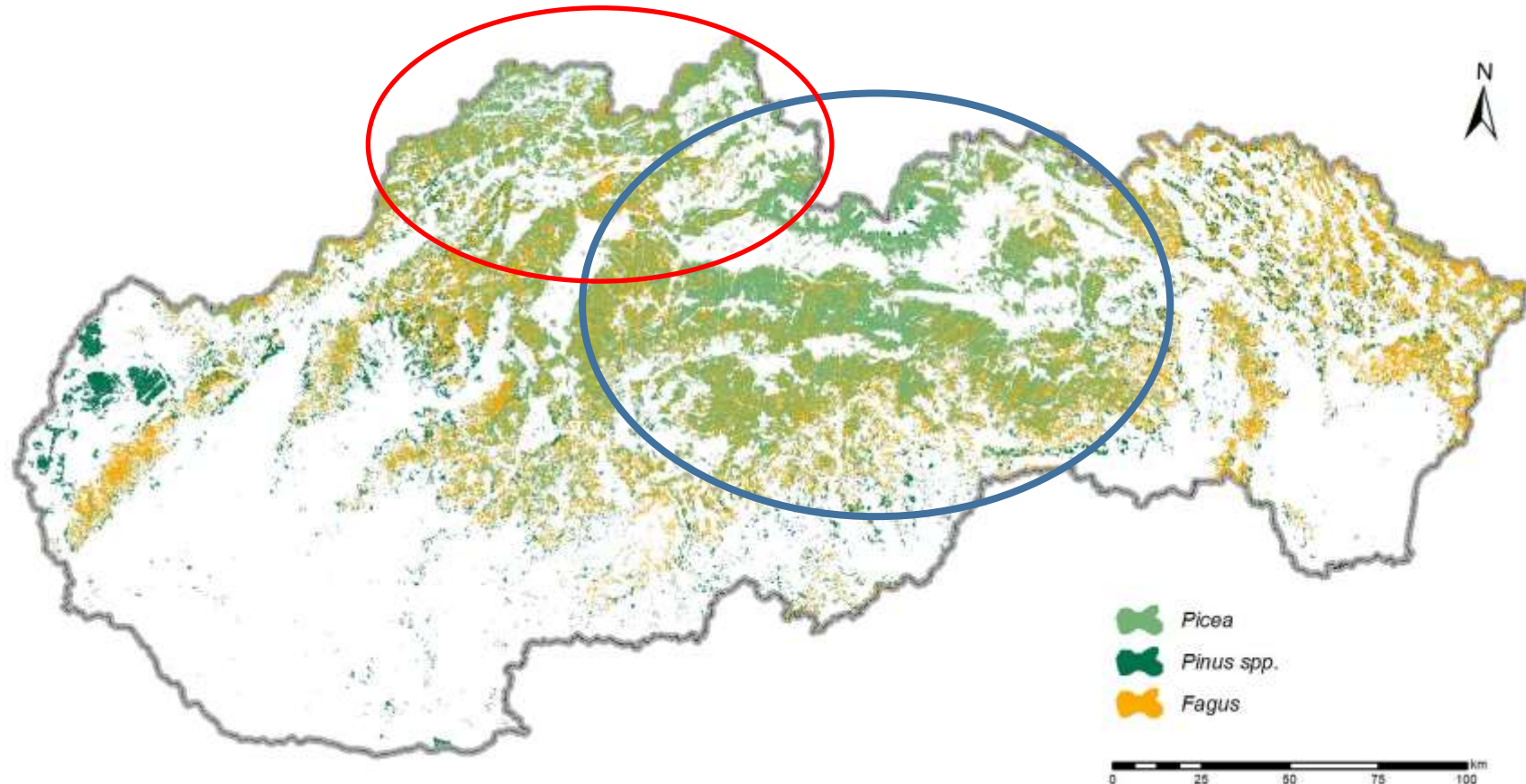
Ips duplicatus



Triggers of BB outbreaks in Slovakia

Windstorms - bark beetles outbreaks – Central Slovakia granite mountains, after 2004, strong impact of Law on Nature Conservation

Physiological weakening (drought, *Armillaria* spp.) - bark beetles outbreaks – NW Slovakia, sandstone mountains; 90s of the 20th century - also gradation of *Ips duplicatus*



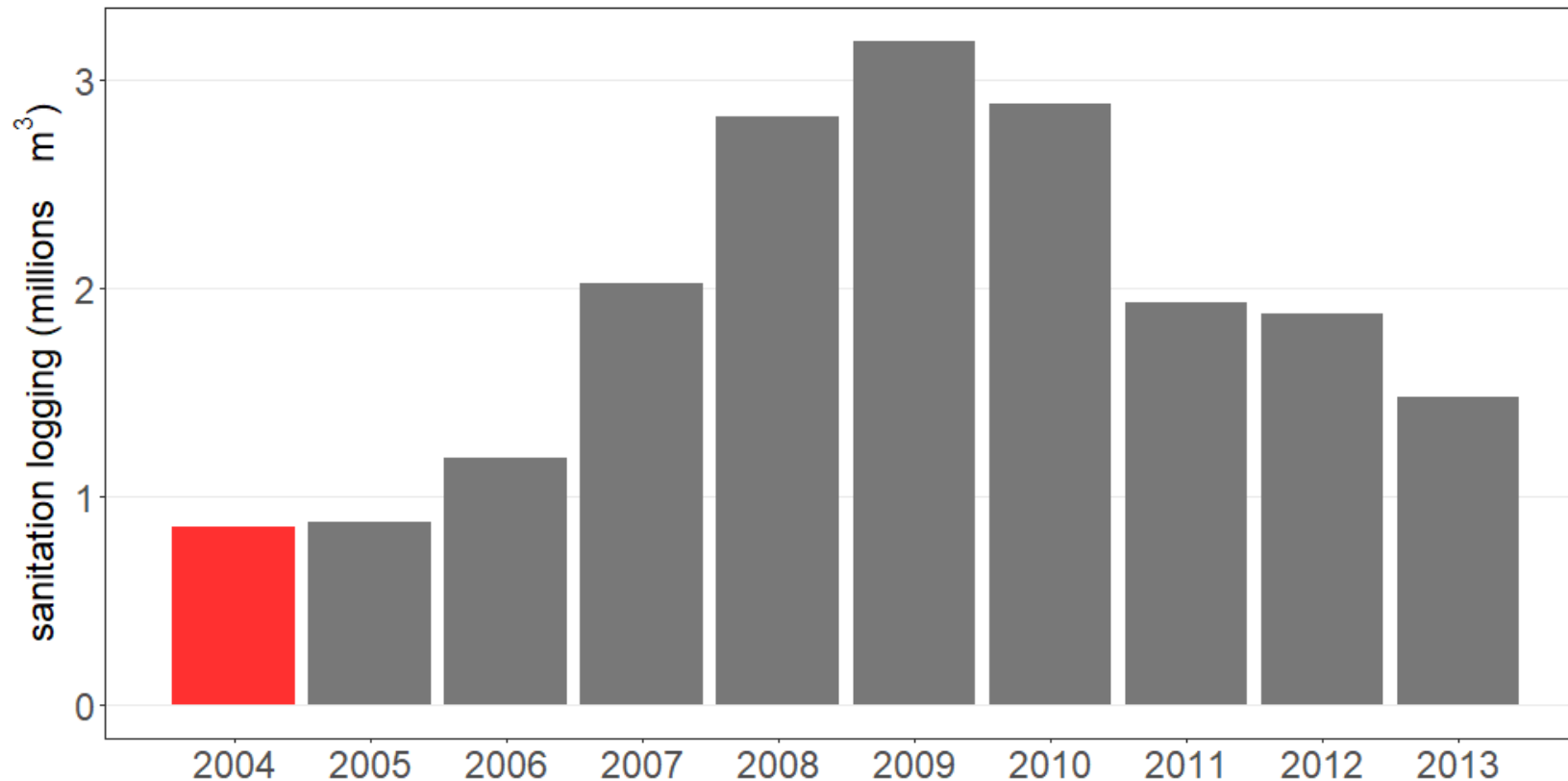
Windstorms and following BB outbreaks

- Windstorm Alžbeta **19. November, 2004**
- Windstorm Žofia **15. May, 2014**



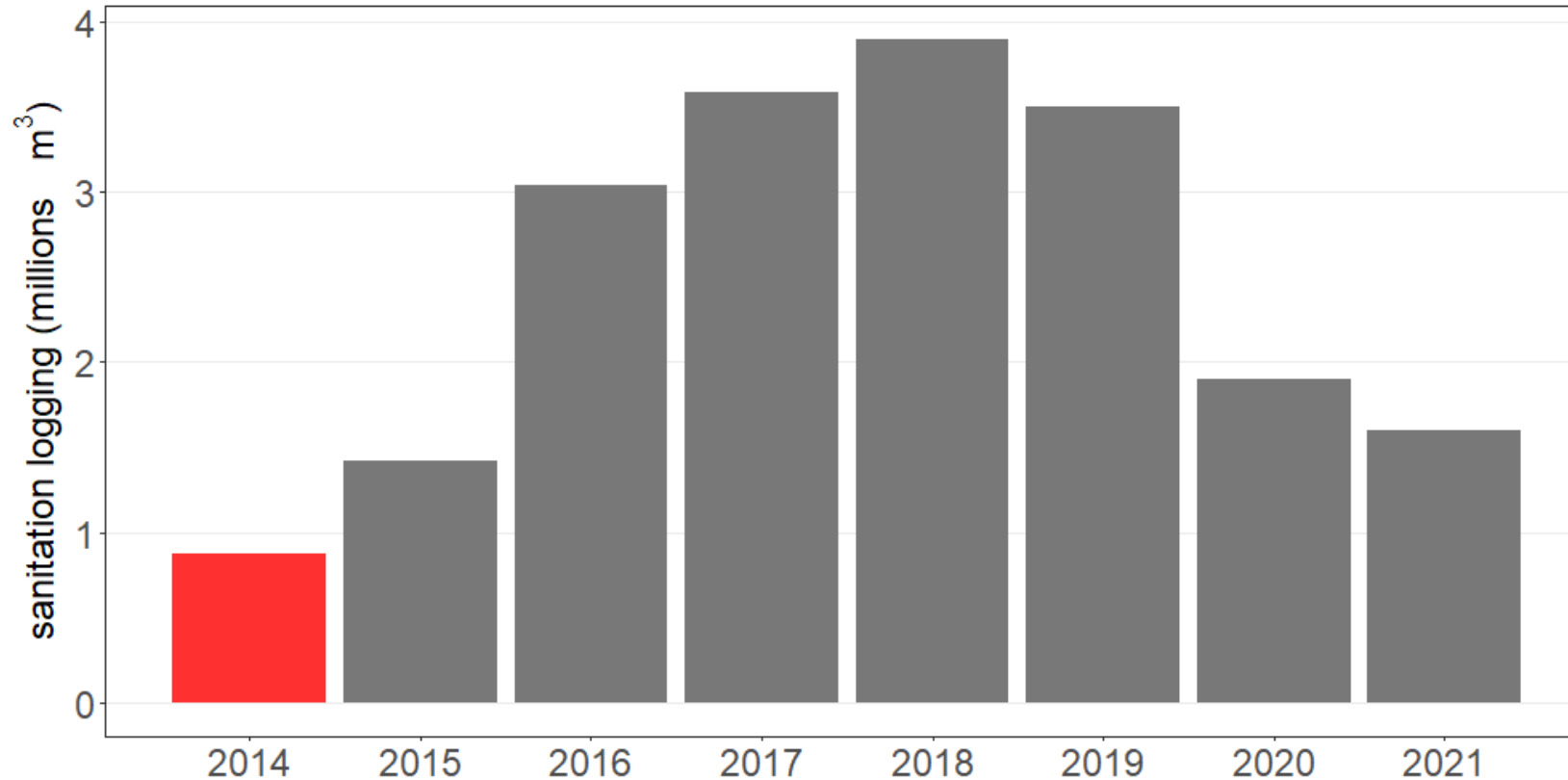
Windstorm Alžbeta 19. November, 2004 – 1st BB outbreak

- Windstorm **5.3 mil. m³** (cca 50 % of the annual logging)
- 2005 – 2013 (9 years): spruce sanitation logging **18.3 mil. m³**
- 2009: **3.2 mil. m³**
- Drought and *Armillaria*



Windstorm Žofia 15. May, 2014 – 2nd BB outbreak

- Windstorm **5.2** mil. m³
- 2014 – 2021 (7 years): spruce sanitation logging **18.9** mil. m³
- 2018: **3.9** mil. m³

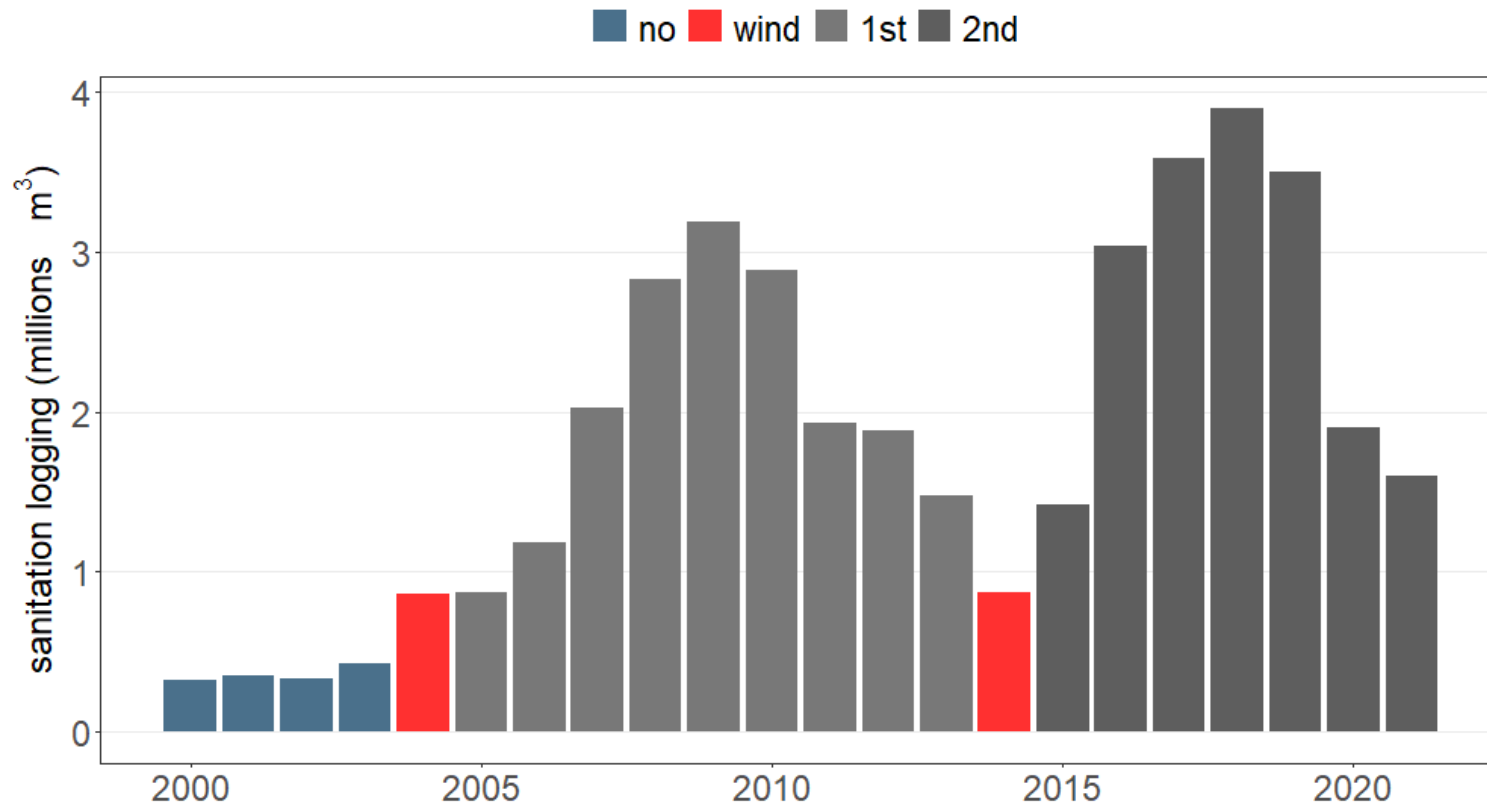


Spruce and Pine composition change

- 2000 -> 2020 **spruce** from **26.8 %** to **21.8 %**
- 2000 -> 2020 **pine** from **10 %** to **7 %**

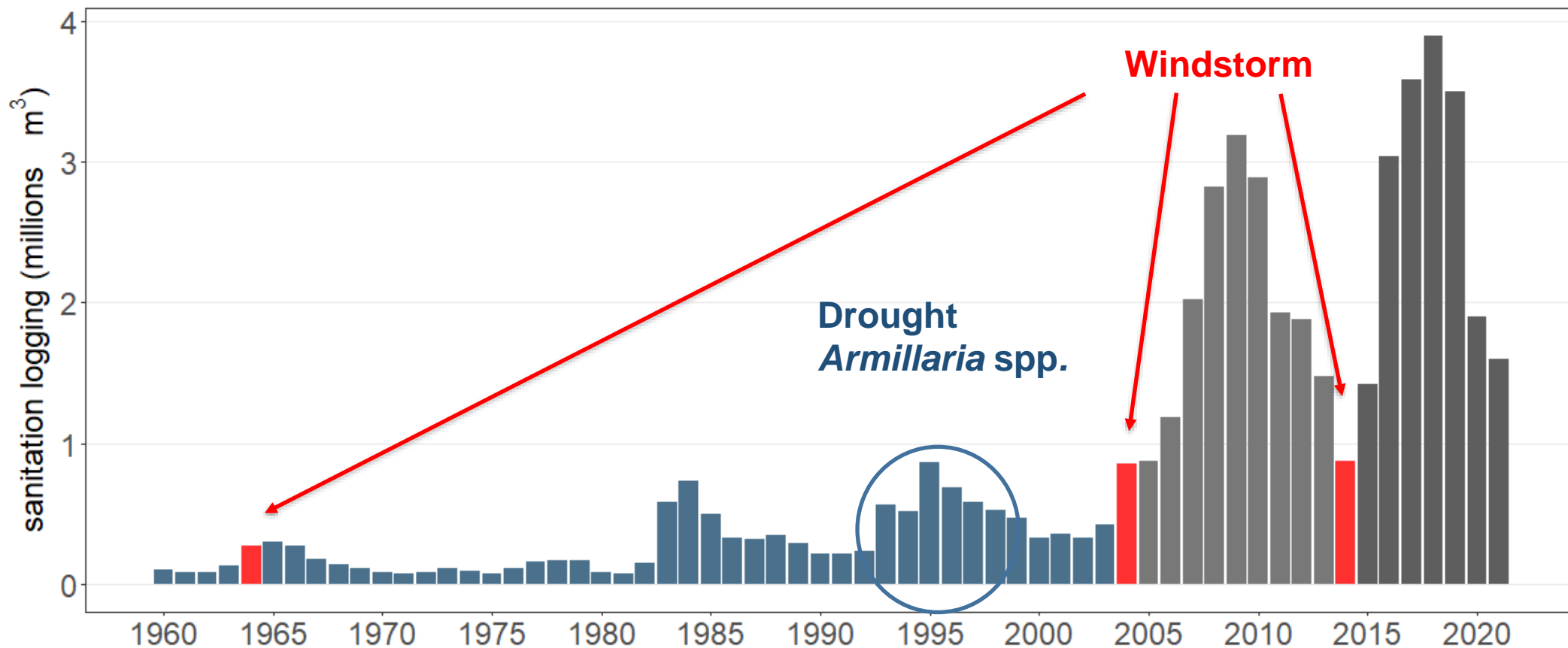
Spruce: -5%

Pine: -3%



Biotic pests - sanitation logging 1960 - 2021

- **1960 – 2003 total** sanitation logging **12.5** mil. m³ + **5.1** mil. m³ **1964** windstorm
- **2004 – 2021 total** sanitation logging **37.2** mil. m³ + 2 windstorms **10.5** mil. m³

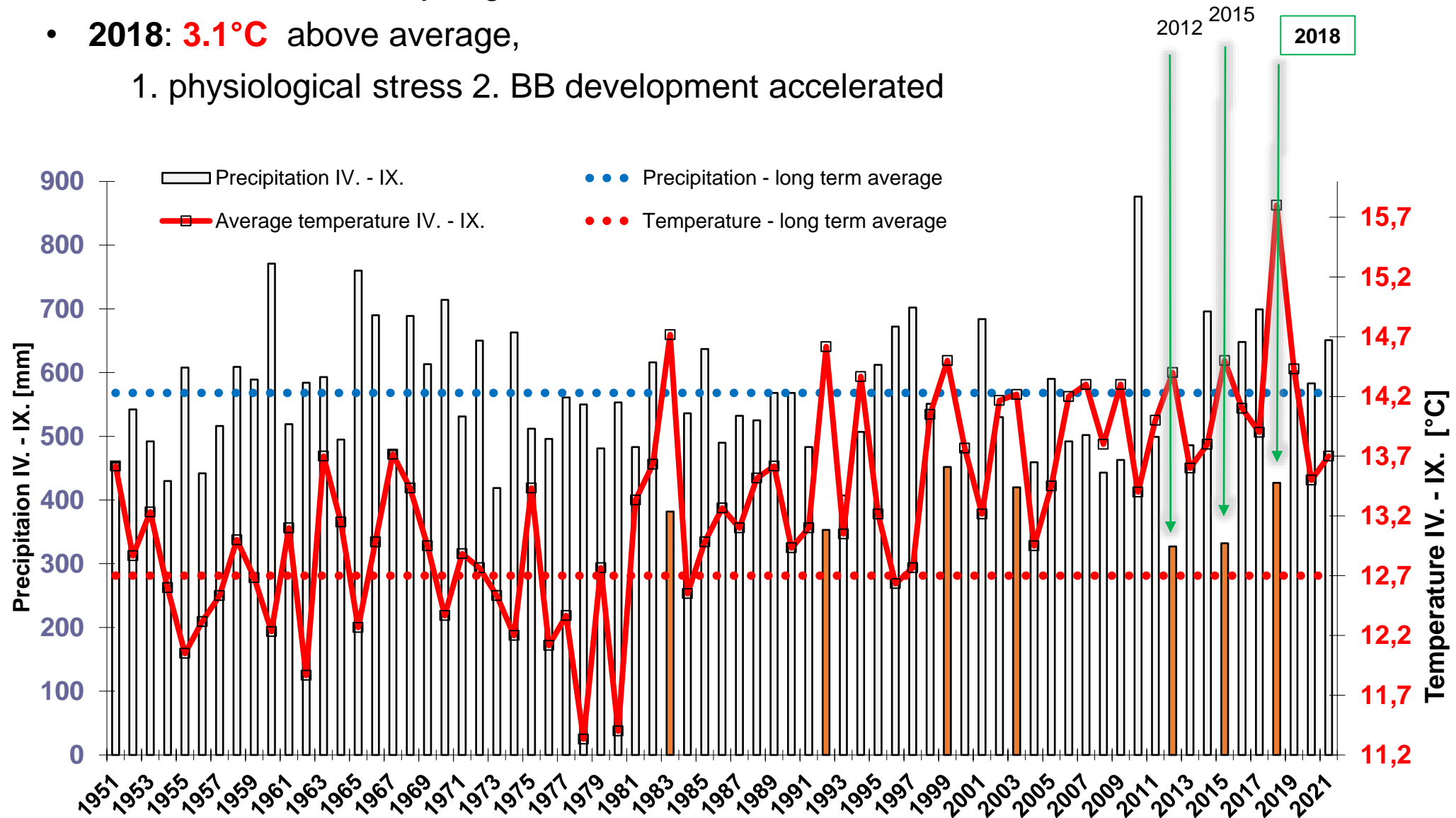


Factors affecting BB outbreaks in Slovakia

- **Climatic conditions (drought, temperature increase, extreme events)**
- **2002: Law on Nature Conservation** – administration, obligations
- **2020:** additional restriction
- **Forest management**

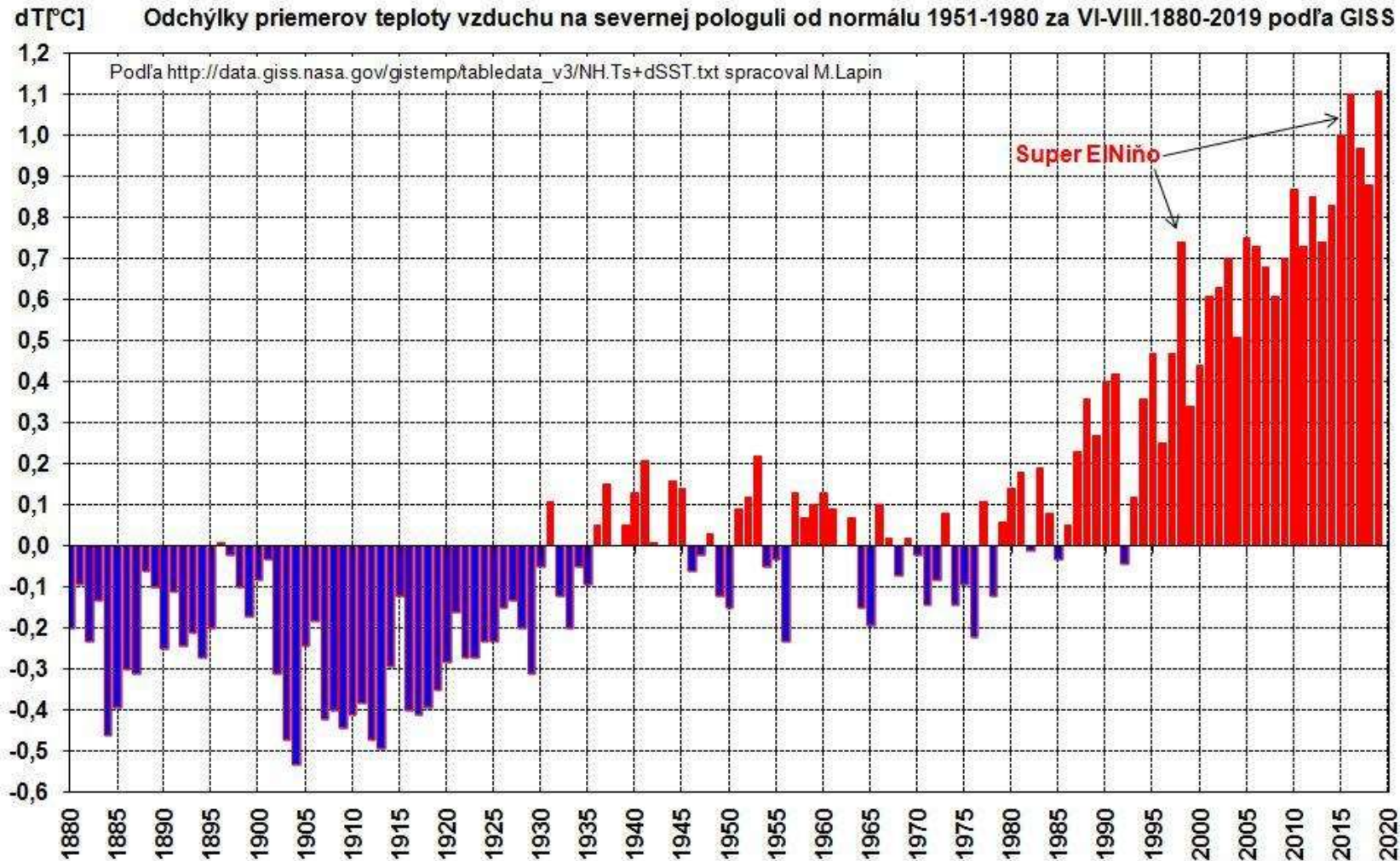
Factors – climatic conditions (April – September, NW Slovakia)

- 2012, 2015, 2018 – dry vegetation seasons
- 2018: **3.1°C** above average,
1. physiological stress 2. BB development accelerated



Factors – climatic conditions

Deviation of average temperatures from the normal (mean 1951 – 1980), June – August, Northern hemisphere 1880 – 2019



Author: M. Lapin; Data source: GISS, Goddard Institute for Space Studies

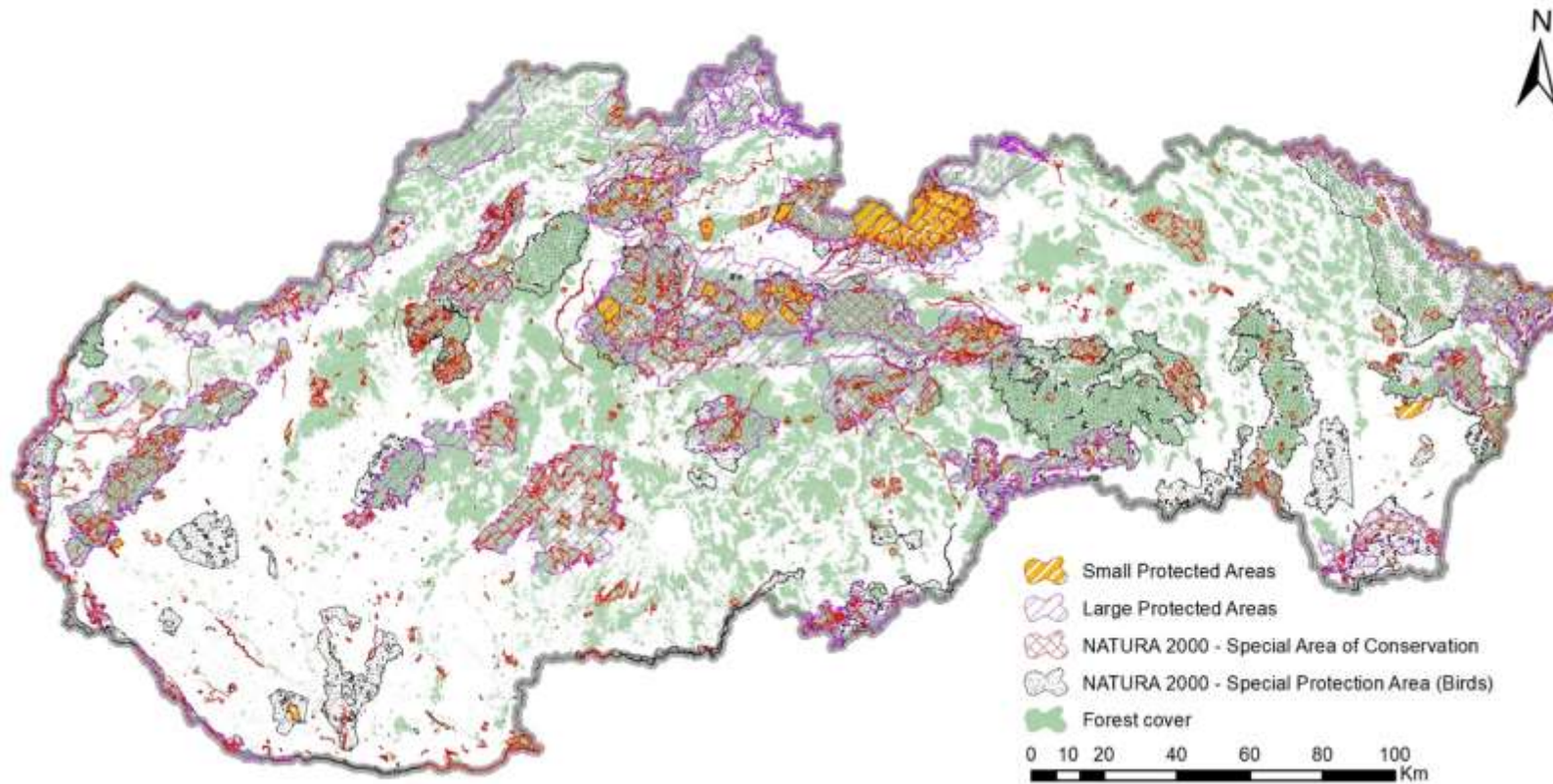
Factors – management

- **Economic problems** to manage forests
- The price of wood in previous years were low
- Forest jobs **financially not attractive** - not enough labor
- **Law on Nature Conservation** – more administration, obligations



Factors – protected areas

57.1% forests in protected areas



Conclusions

- Most important pest in Slovakia (biotic) *Ips typographus*
- Forest **composition change/shift**
- **Extreme weather events more frequent**
- **Factors affecting BB outbreaks:** windstorms, dry and warm seasons, low - nature protection, forest management
- **Young spruce** stands (10-20 years) decline due to drought and *Armillaria*
- More often **BB** attack **new host species:**
 - IT, ID, on *pinus silvestris* and IT on *p. strobus*
- Fagus attacked by *Taphrorychus bicolor* – emerging pest



Pinus silvestris



Ips typographus



Ips duplicatus

Pinus strobus
Ips typographus



Fagus silvatica
Taphrorychus bicolor
Drought, bark burn by sun



Ash dieback - *Fraxinus excelsior*
Hymenoscyphus fraxineus + *Armillaria* spp. + *Hylesinus varius*





2004



2013

Thank you!!!

