Minimization of secondary damages after storm events: Bark Beetles

Connections with risk and crisis management and preparation of action plans -

Experiences from Baden-Württemberg

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14. April 2014

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Main triggers of Bark Beetle mass propagations are abiotic incidents such as

- Storm damages
- Snow and Ice damages
  - ▶ Surplus of breeding material
  - ▶ Opened forests, unstable stands
- Drought and heat
  - ▶ Favourable conditions for insects development
  - ▶ Unfavourable conditions for trees vigour

⇨ Lead to infestation even of still living and standing trees

⇨ Lead to mass propagations of Wood Boring Beetle as well

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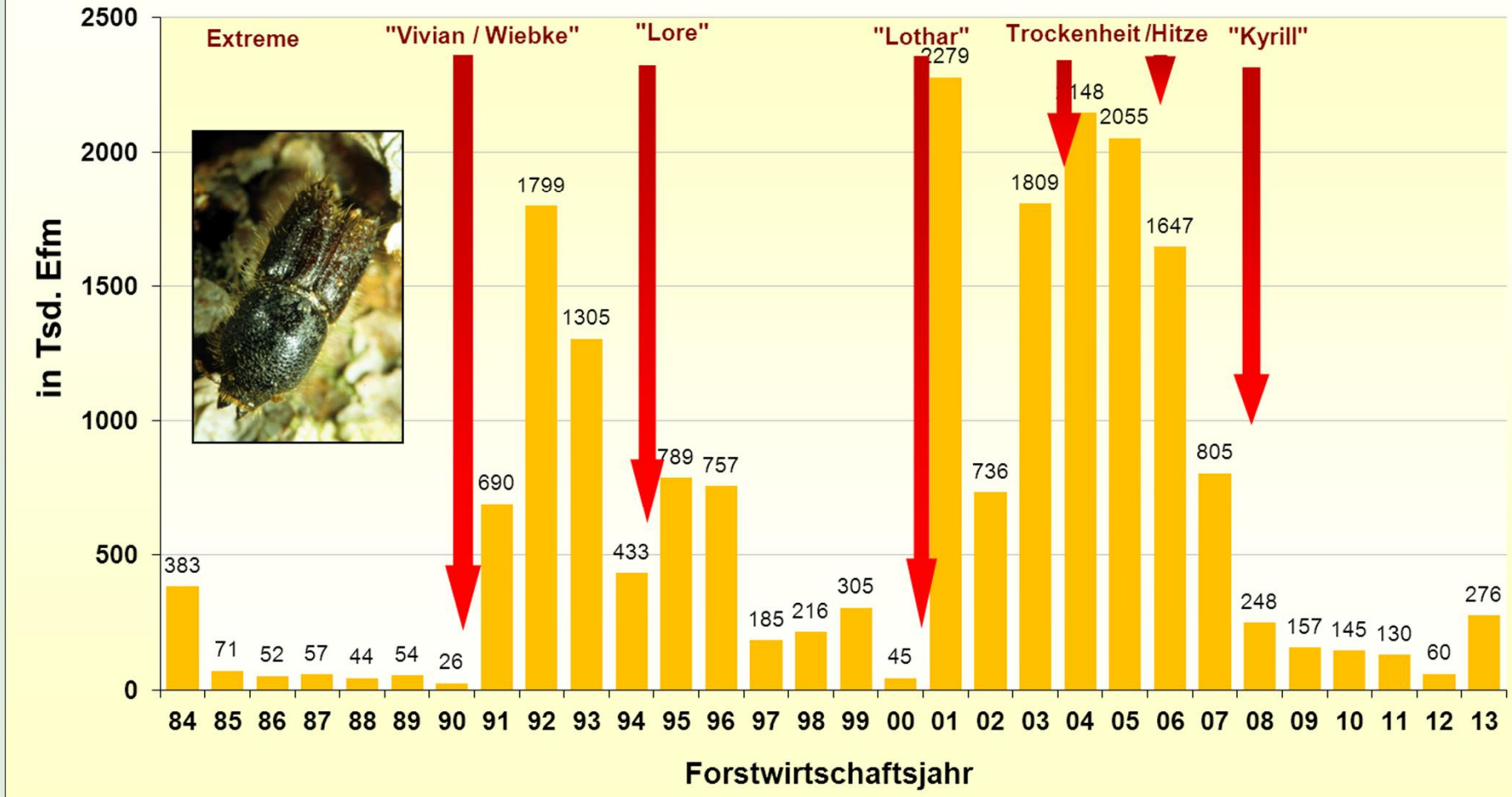
Holzeinschlag aufgrund von Insekten 1984 bis 2013

Gesamtwald Baden-Württemberg



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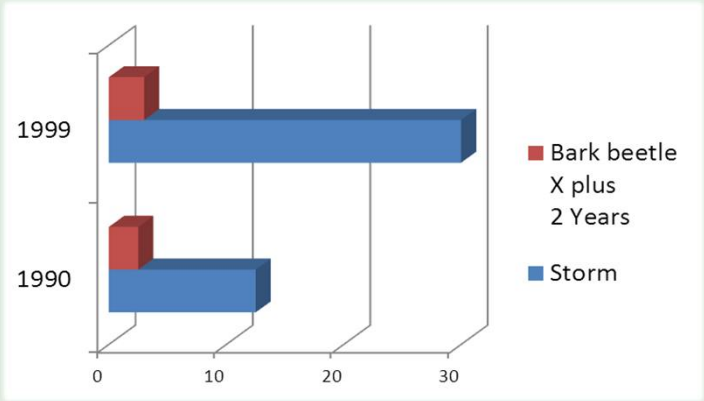
„Vivian and Wiebke“ __ February 1990

- timber due to storm damage: 12,5 million cubic meter
- timber due to subsequent beetle infestation 1991/92: 2,5 million cubic meter => **20%**
- year before: 54.000 m^3



„Lothar“ __ December 1999

- timber due to storm damage: 30,0 million cubic meter
- timber due to subsequent beetle infestation 2001/02: 3,0 million cubic meter **=> 10%**
- year before: 300.000 m^3 (x6)

Successful strategy consequent on 1999

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Important underlying circumstances (1)

- Extent of storm damage
- Ratio small- and large area damage
- Number of broken, pushed and thrown trees
- Bark beetle population level right before the storm event
- Date of storm incident: e.g. late winter 1990, early winter 1999
- Amount of unstable forest stands
  - tree species composition
  - tree age
  - vertical structure
  - amount of already torn and open stands

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Important underlying circumstances (2)

- Weather conditions
  - warmth sum and precipitation in the course of the following years
- Elevation, exposition, topography, stand structure …
  - site conditions concerning pests and hosts
  - Processing, removal and transport of timber
  - Forest stand infestation surveillance

Fundamental principle:

INTEGRATED FOREST PROTECTION (based on the Law of Plant Protection)

- Main goal:
  - minimize the necessity of applying insecticides = last resort (ultima ratio)
- **Prevention prior to control measures**
  - silvicultural, biological and mechanical methods
    - **Clean forest management**
    - **Storm:** Strategy in terms of the order of timber processing

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- Control measures to decimate the population
  - Continuous INFESTATION SURVEILLANCE and immediate timber processing and removal or debarking in time: **Sanitation cuttings**
  - Treatment with insecticides
- Object protection
  - e.g. Pheromone traps exceptionally
  - Treatment of woodpiles with insecticides

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Storm damages - broken, pushed and thrown timber
picture: H. Delb

Bark beetle PREVENTION STRATEGY after storm damage:

Prioritization of timer processing and removal due to Risk Potential on damaged forest areas under given timeframes:

- Focus on common spruce (*Picea abies*)
- Single trees and Small before Large storm damage areas (earlier brood material consumption and infestation of standing trees)
- Areas with a higher ratio of broken timber first
- Bigger before Smaller dimensions (> 20 cm BHD)
- Hillsides (in particular summer slopes) before plane sites or plateaus

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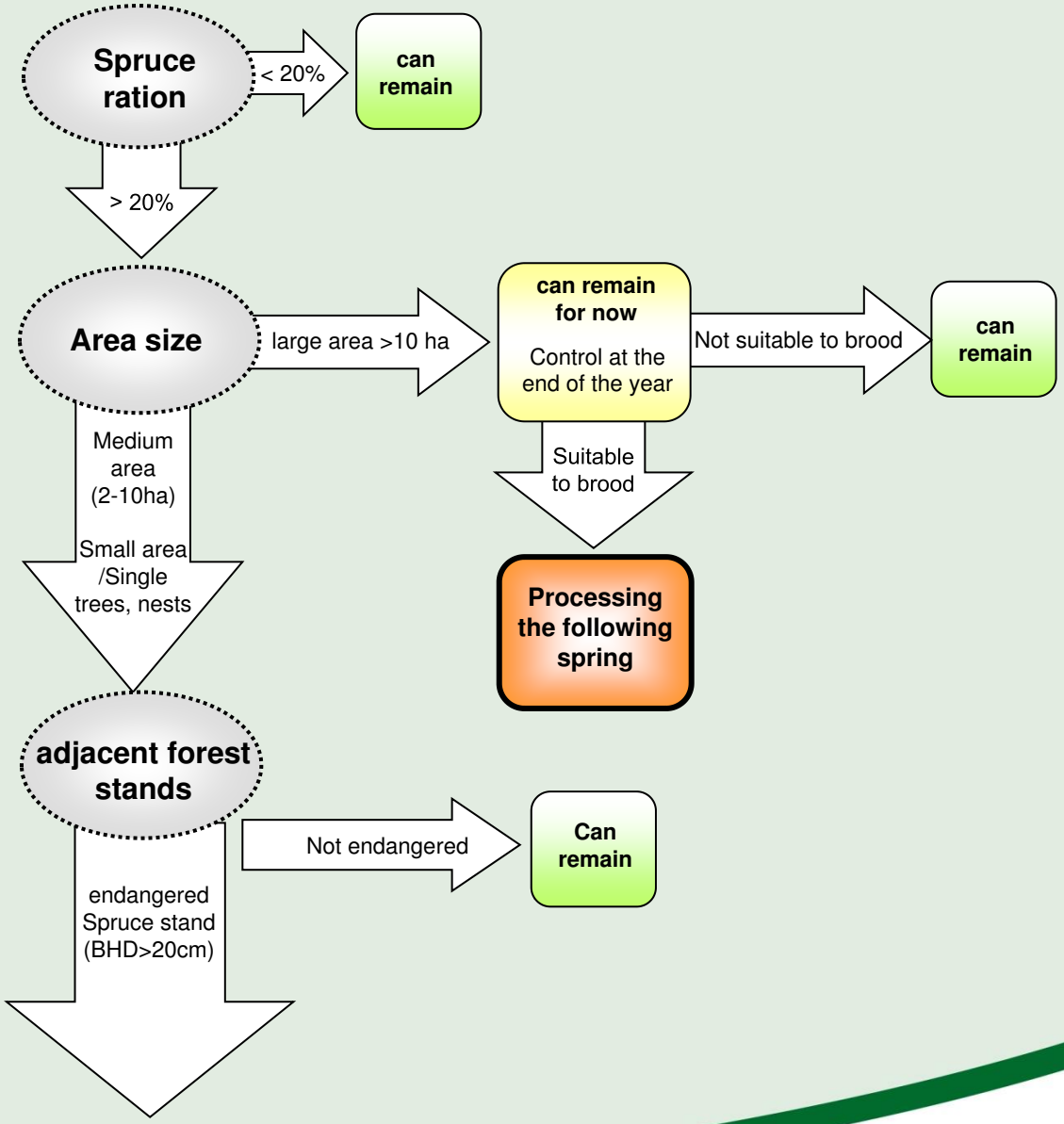
Decision diagram for operating forest practitioners

Determination of the order and time span of timber processing and removal



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Decision diagram for operating forest practitioners

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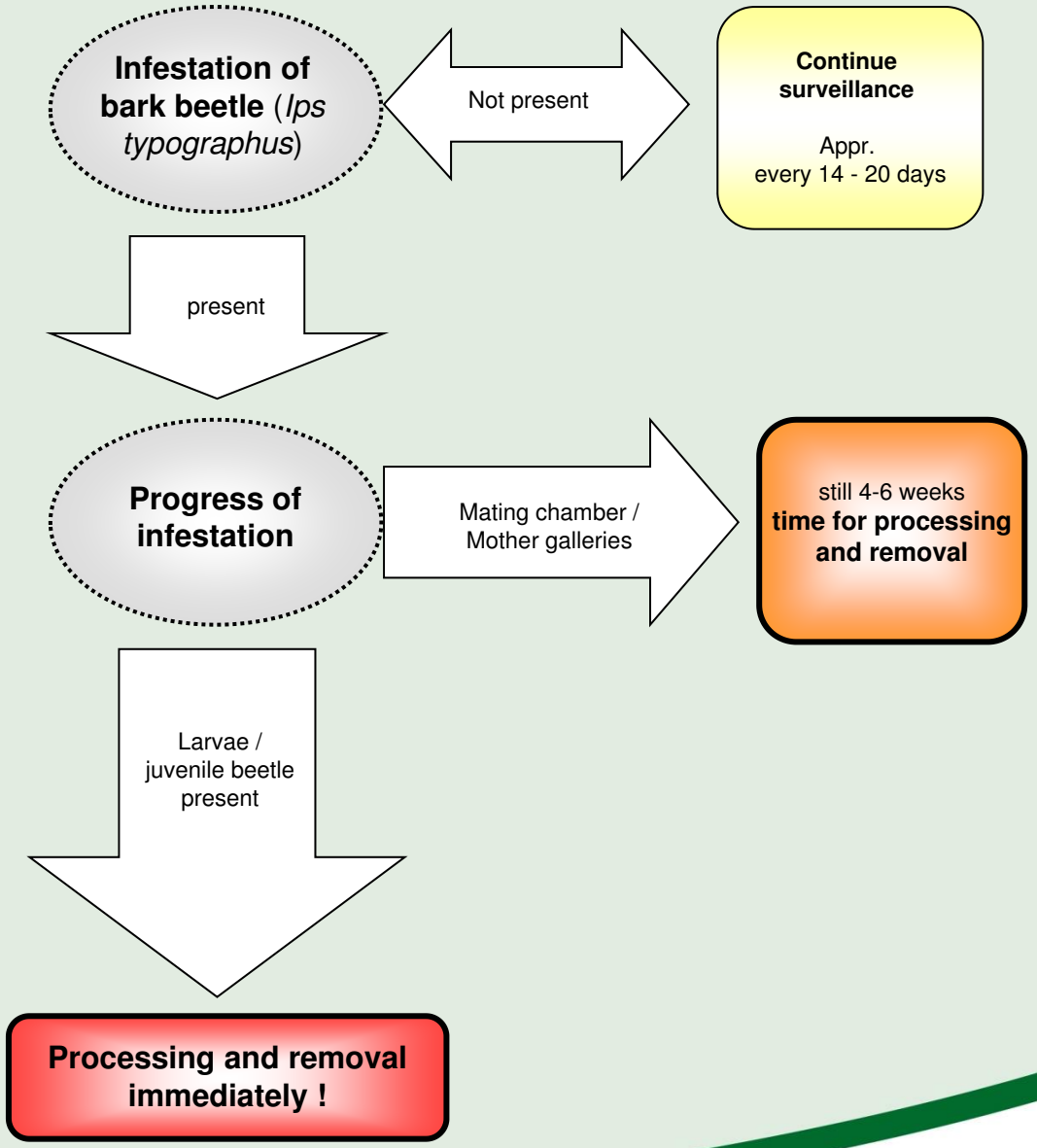

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Processing guidelines

- Harvesting, removing or debarking as soon as possible (asap)
- Exceptionally treating of logging debris: burning, chipping or mulching: only on small forest areas with a high infestation risk
- Stumps (> 20 cm BHD, > 3 m tall) were treated
- Preservation (e.g. water storage) only of trunk wood without any beetle infestation

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Bark beetle infested
standing tress
subsequent to storm
picture: H. Delb

Active control measures concerning infested standing trees (1)

- Goal: minimize the time span between detection of infestation and sanitation cutting
  - **CUTTING THE GREEN TREE** with “white stages” (larvae, pupae) before the imaginal beetle stage developed

    ⇔ time span from flying out, loosen bark

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Active control measures concerning infested standing trees (2)

- **MONITORING** using Pheromone traps, Catch trunks and Weather measurement stations:

  ⇨ COURSE OF SWARMING and INSECT DEVELOPMENT

- **CONTINUOUS SURVEILLANCE** in spruce stands older 50 Years
  - **Inspection** and **Identification** of infestation: borehole cuts, pitch drops, woodpecker holes
  - Thorough **Documentation**
  - Passing the **Information** to the processors in time

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Monitoring *Pheromone traps*: swarming

pictures: R. John

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Monitoring *Catch trunk*: insect development

pictures: R. John

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Active control measures concerning infested standing tress (3)

- Harvesting, processing, removing of the infested trunks asap: **Sanitation Cutting**
- If removing can't take place right in time:
  - Debarking while "white stages" are present (May/June)
  - Later last resort (ultima ratio): treatment of the trunks with insecticides, on forest roads only
  - Bark occupied by imaginal beetles: eliminating or decontamination with insecticides as well
- Follow-up check of the adjacent trees

Occasional difficulties

- Processing progress was much faster than removing the trunks due to limited **Transport Capacities = main minimum factor**

  ⇒ Danger of beetles flying out the infested trunks

  ⇒ Occasional necessitation of insecticide treatments

- Non-consideration of the priority: Small before large area due to a high rate of mechanisation and contractors = lack of local knowledge

- Neglect of documentation of windthrow areas and bark beetle infestation e.g. on maps as well as bark beetle surveillance

  ⇒ No timely detection of infested trees

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Beech

picture: H. Delb

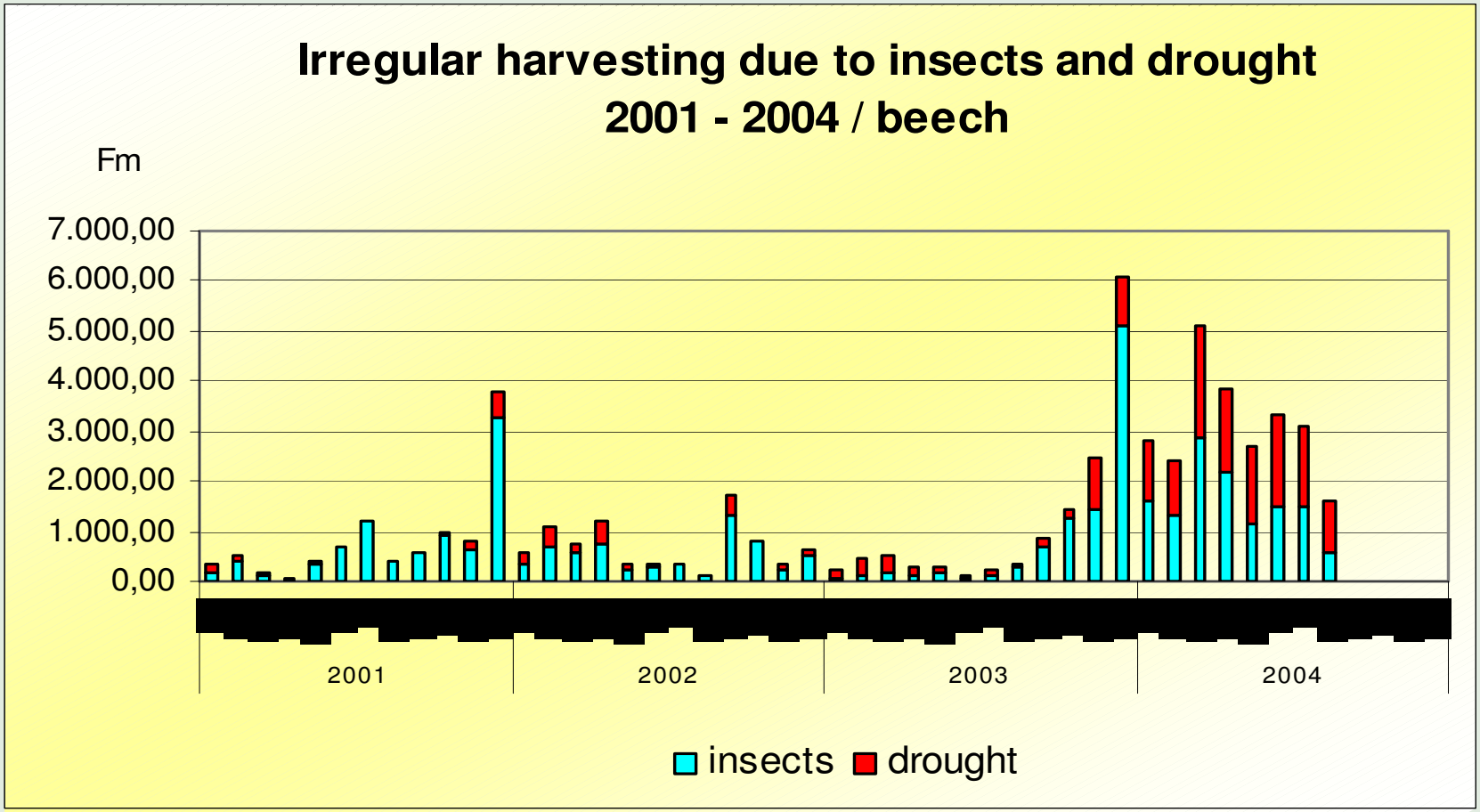
Storm “Lothar” 1999 (…) coincident with Drought and heat 2003 (…) ⇨ bark breeding beetle

Agrilus viridis

Taprorhychus bicolor

pictures: H. Delb

Irregular harvesting due to insects and drought ◆ monthly cubic meters 2001 - 2004



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Transfer of knowledge

- **Information meetings and events**
- Implementation of **Regional Forest Protection Officers**
- **Training material** for **multipliers** on CD-Rom : pamphlets and exemplary presentations
  - Basic information on the biology of pests
  - Strategy in terms of the order of timber processing
  - Information concerning timber storage
  - Instructions for control measures
  - Information concerning plant protection agents

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Thank you!

picture: H. Delb