

Impacts and management of the current and previous bark beetle outbreaks in Switzerland

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Waldschutz Schweiz
Protection de la forêt suisse
Protezione della foresta svizzera

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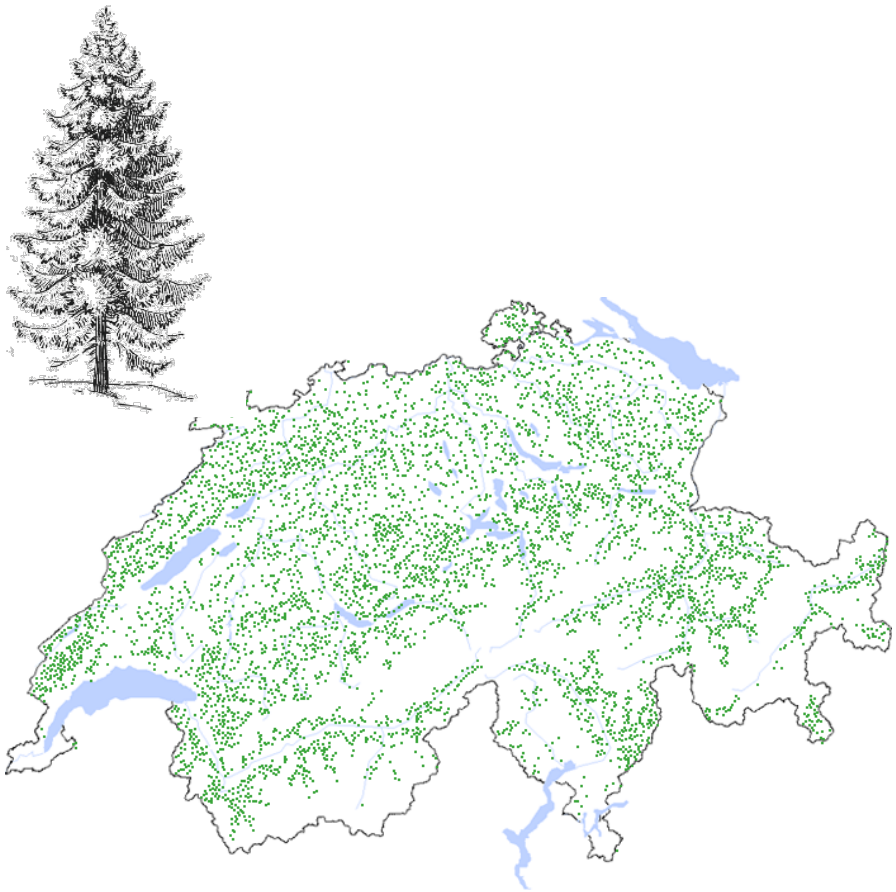
General information

- European spruce bark beetle (*Ips typographus*) is the main forest pest in Switzerland
  → Since 1984 in focus of forest health monitorings

- Swiss forest protection service collects yearly data on European spruce bark beetle outbreaks in ~ 700 forest districts

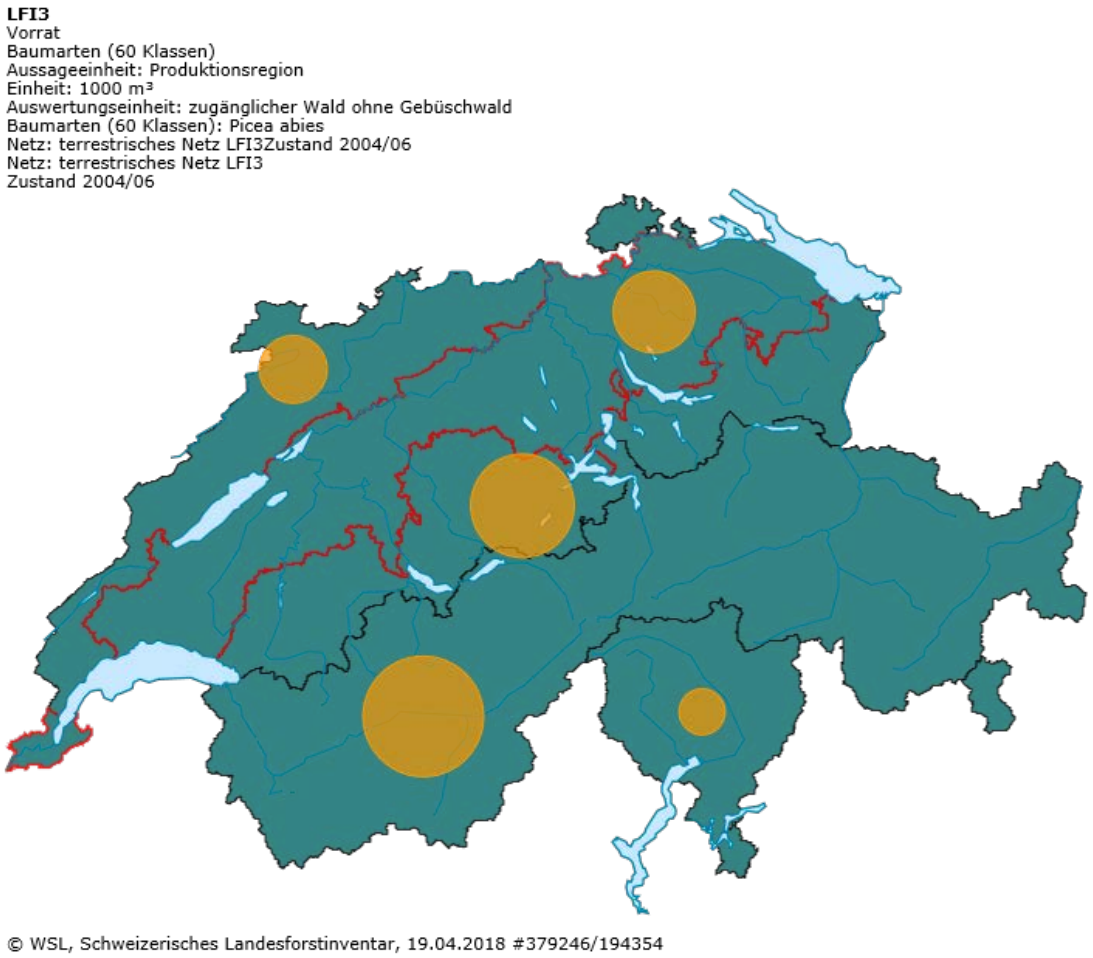
Norway spruce (*Picea abies*) in CH



https://www.lfi.ch/resultate/baumarten/verbreitung.php?specId=10

- One of the main tree species in Switzerland
- A main tree species of timber production
- Present on almost all forested sites
- Vertical distribution ranges from 250 to over 2200 m a.s.l.
- Spread beyond the natural distribution area → suboptimal site conditions → more susceptible

Norway spruce stocks (National Forest Inventory)



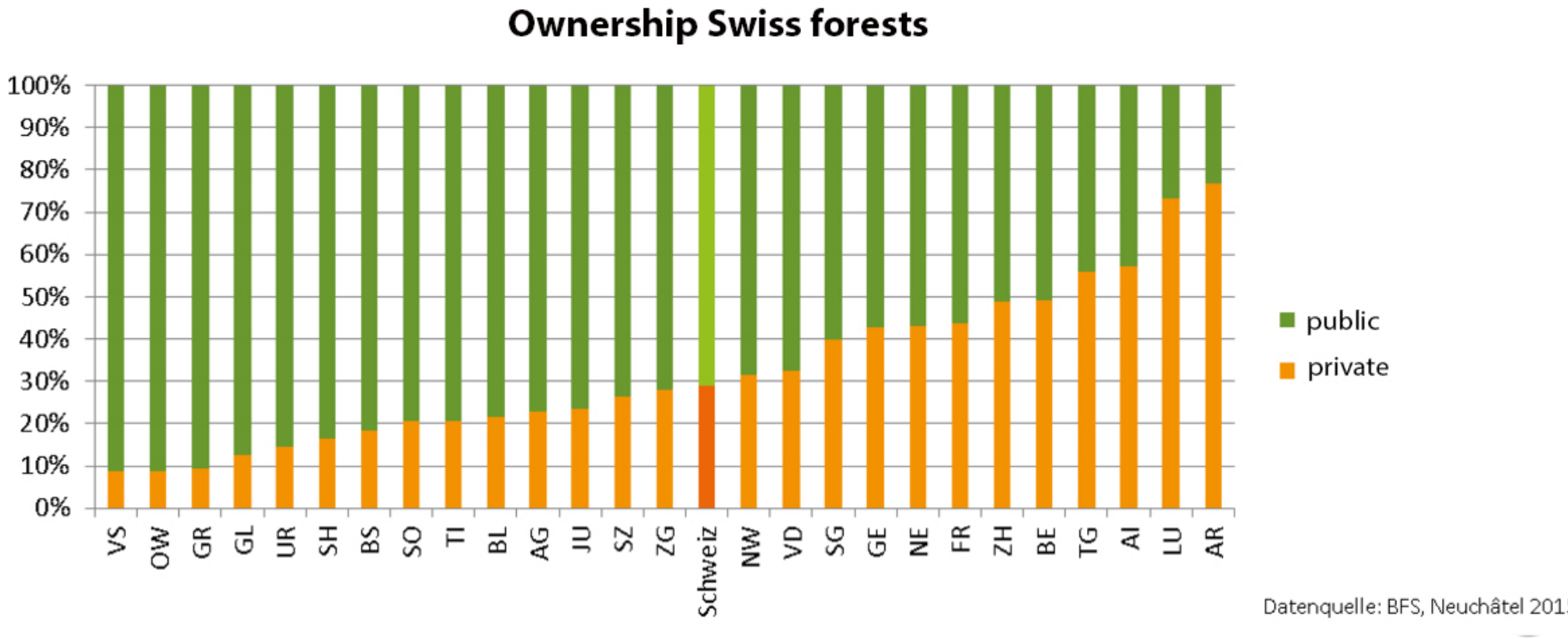
Production Region	Spruce stock [m³]
Jura	21’690’000
Mittelland	30’718’000
Pre-Alps	49’139’000
Alps	66’681’000
Southern Alps	9’986’000
Total	**178’215’000**

https://www.lfi.ch/resultate/baumarten/verbreitung.php?specId=10

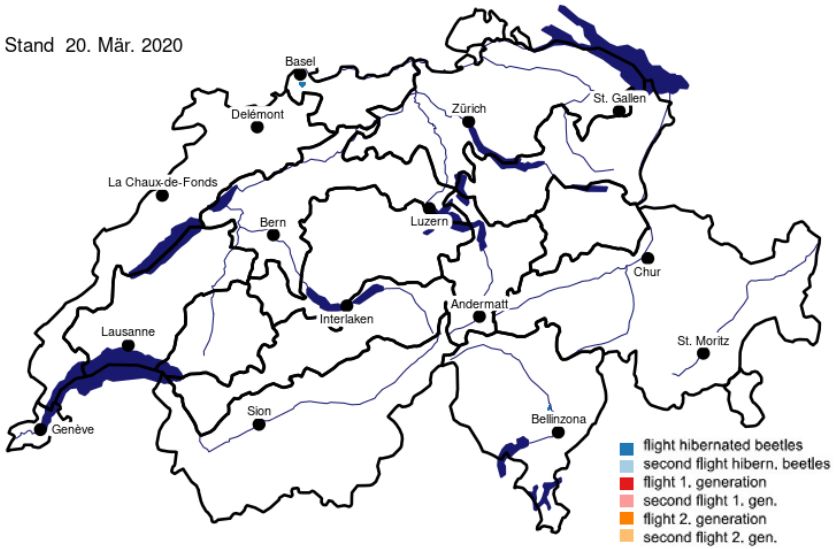
Swiss Forests - Ownership

CH forests:

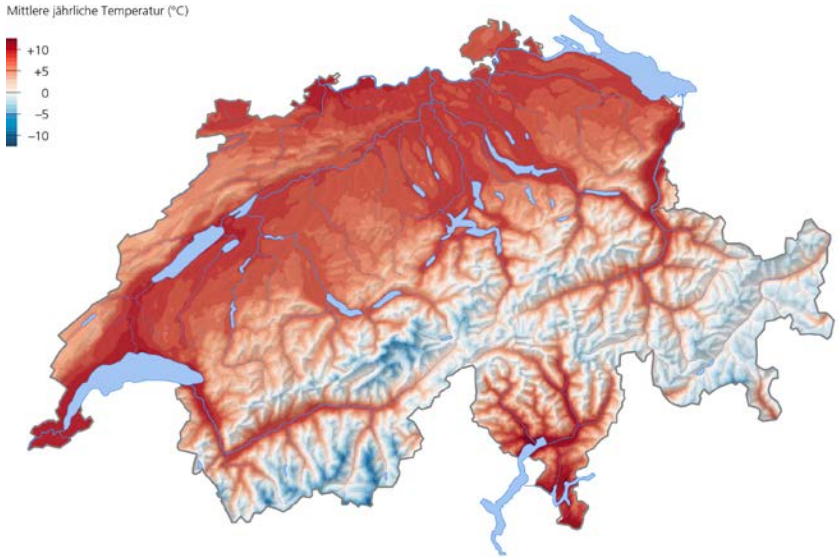
- ~ 250’000 different owners of which ~ 244’000 private individuals
- Public owners are: Confederation, cantons, municipalities, civic communities, corporations



Spruce bark beetle online simulation

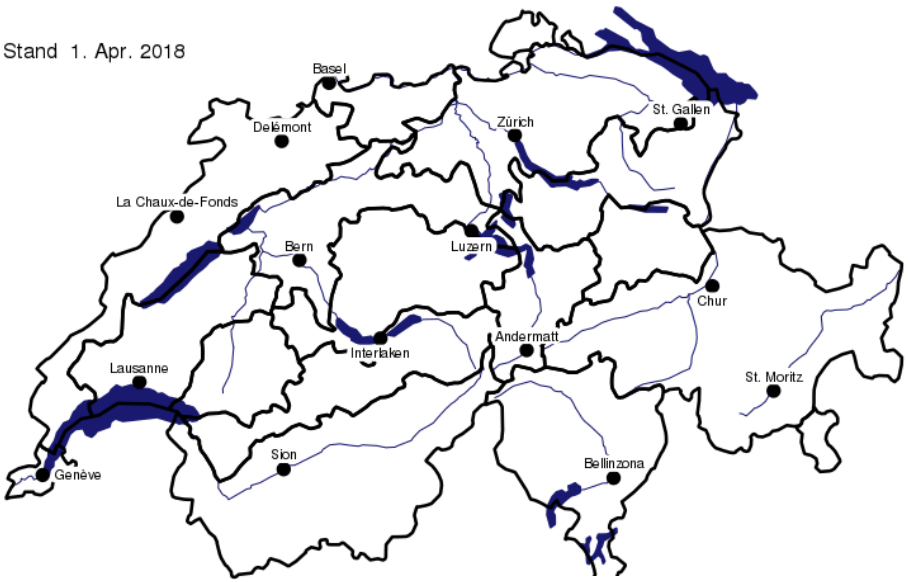


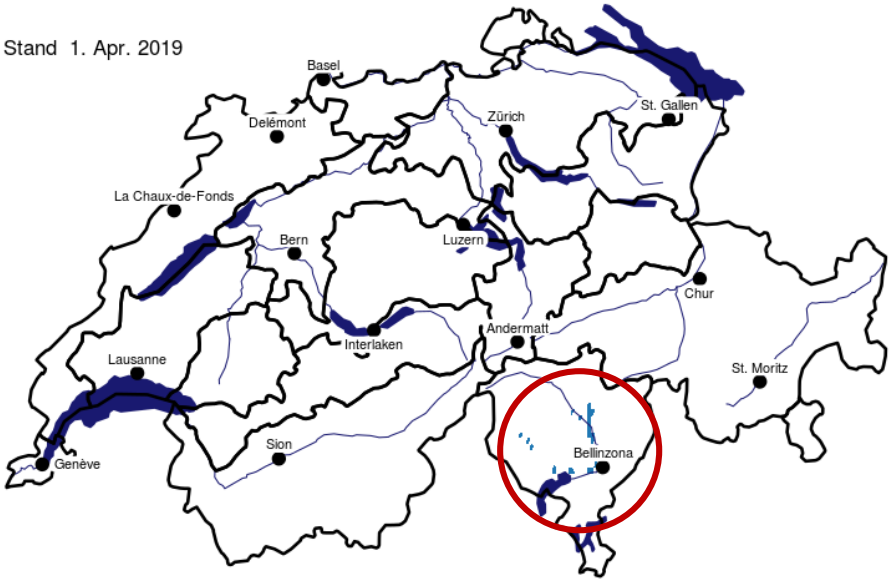
Mean annual temperature in Switzerland for the years 1981-2010

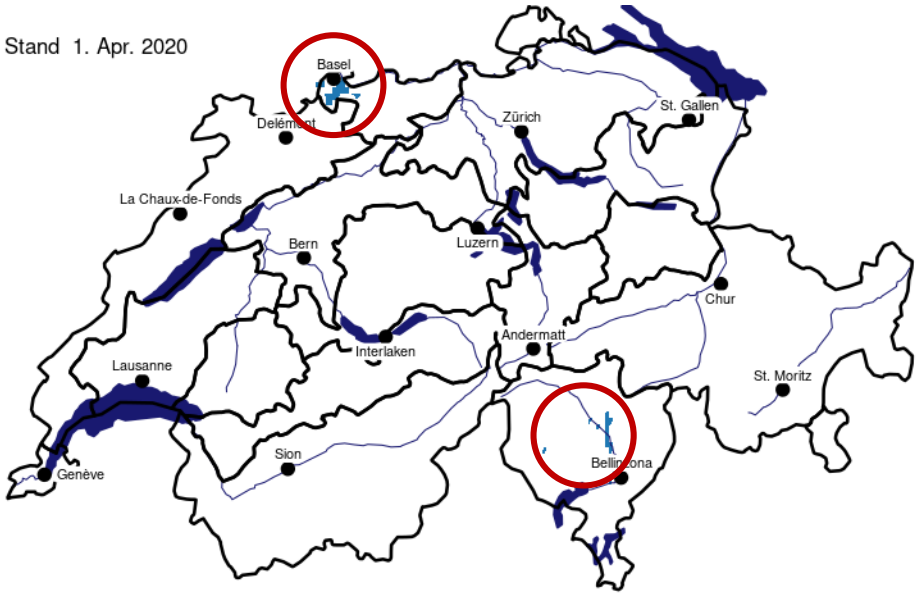


- Computer model based on the daily temperatures provided by MeteoSwiss.
- Population development is modeled throughout Switzerland on a 2 km grid.
- See www.borkenkaefer.ch (Jakoby et al.)

Beetle flight - April







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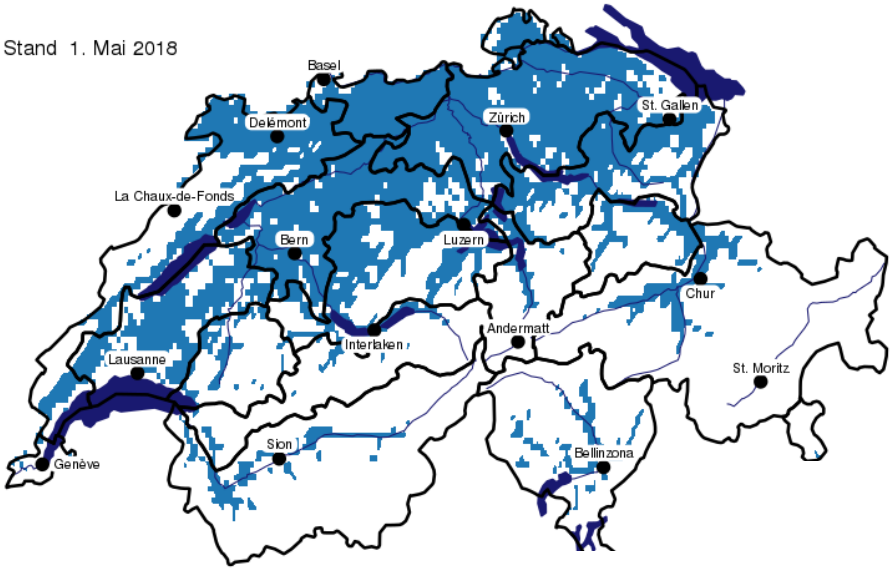
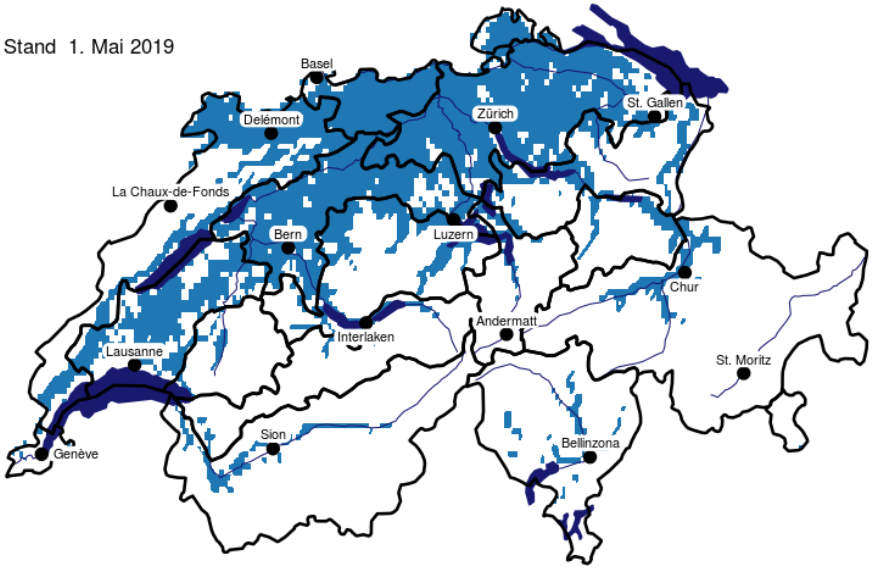
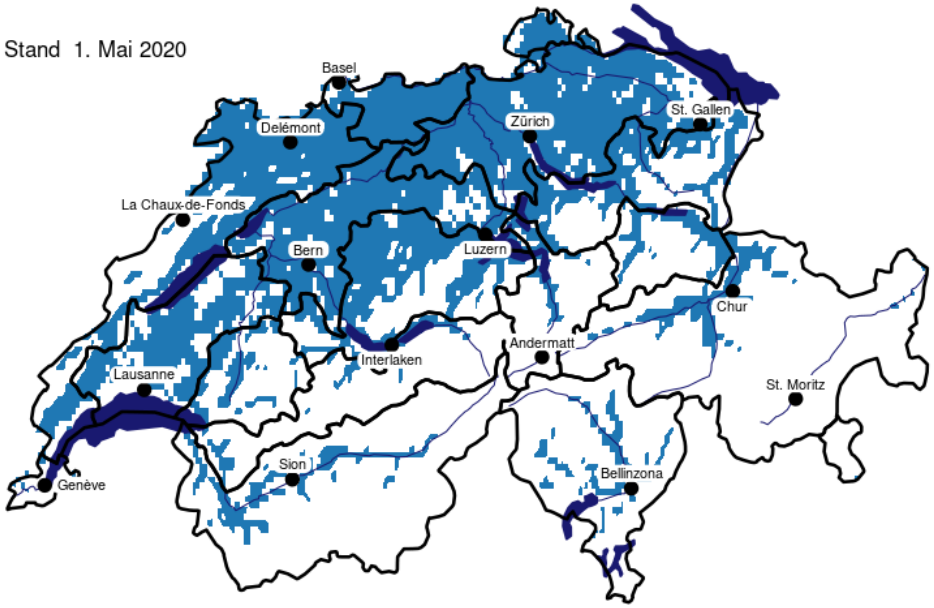
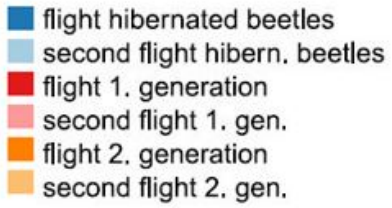
Beetle flight - May









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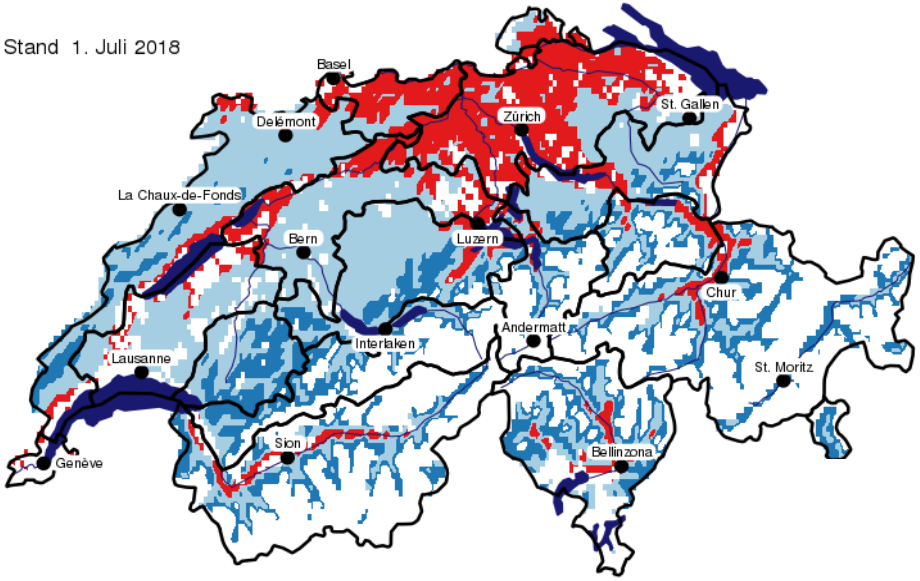
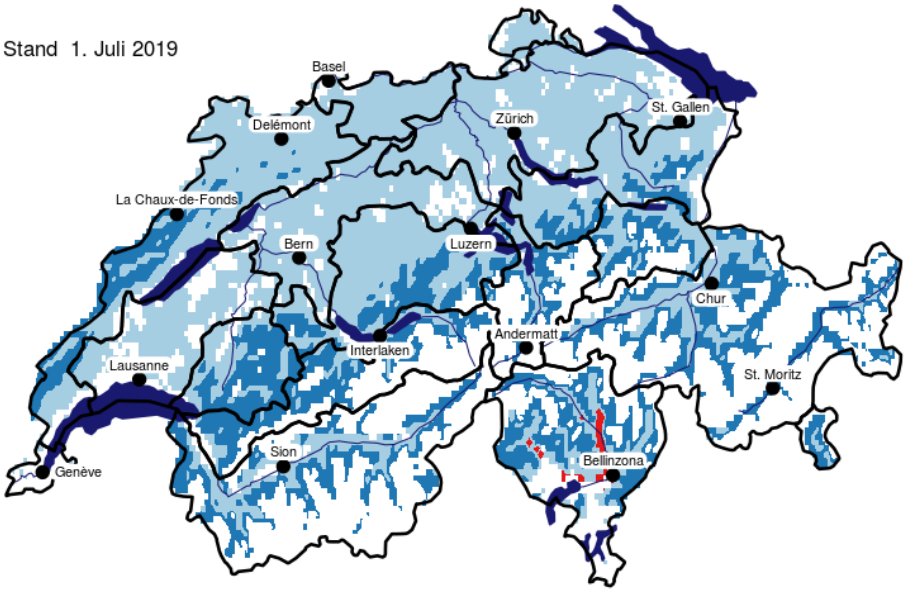
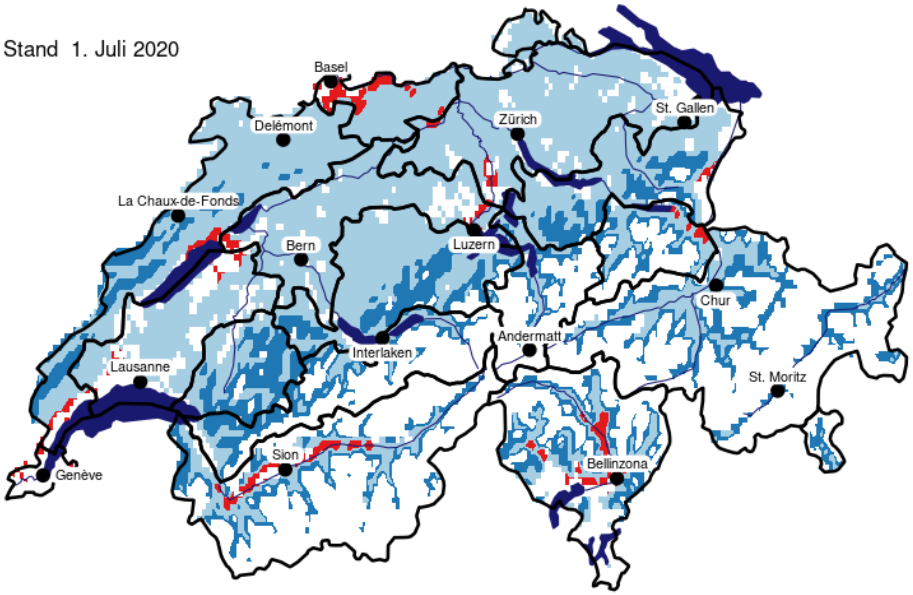
Beetle flight - July







flight hibernated beetles
second flight hibern. beetles
flight 1. generation
second flight 1. gen.
flight 2. generation
second flight 2. gen.

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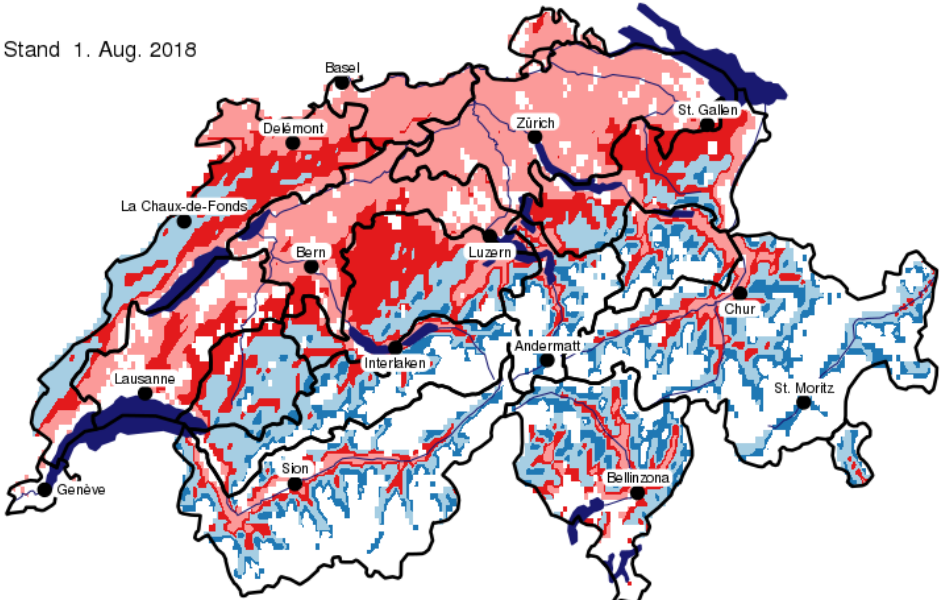
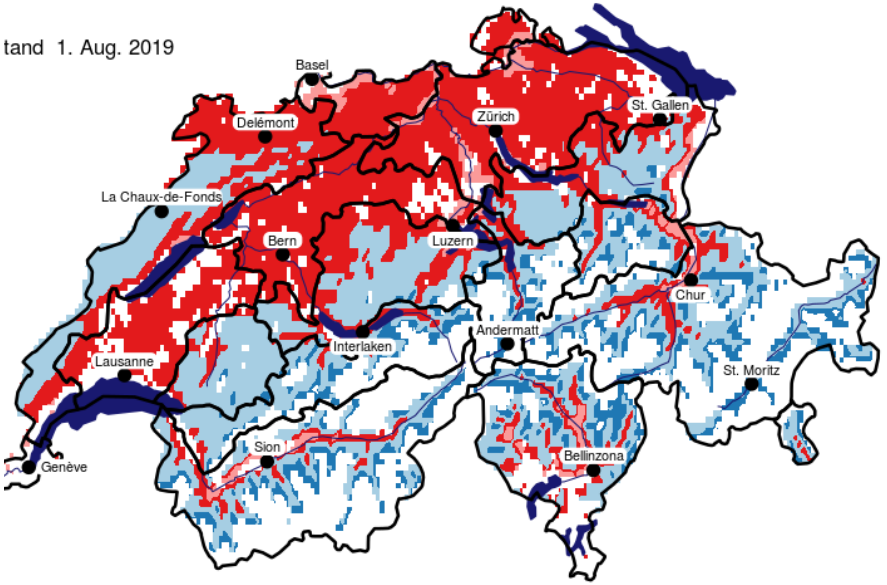
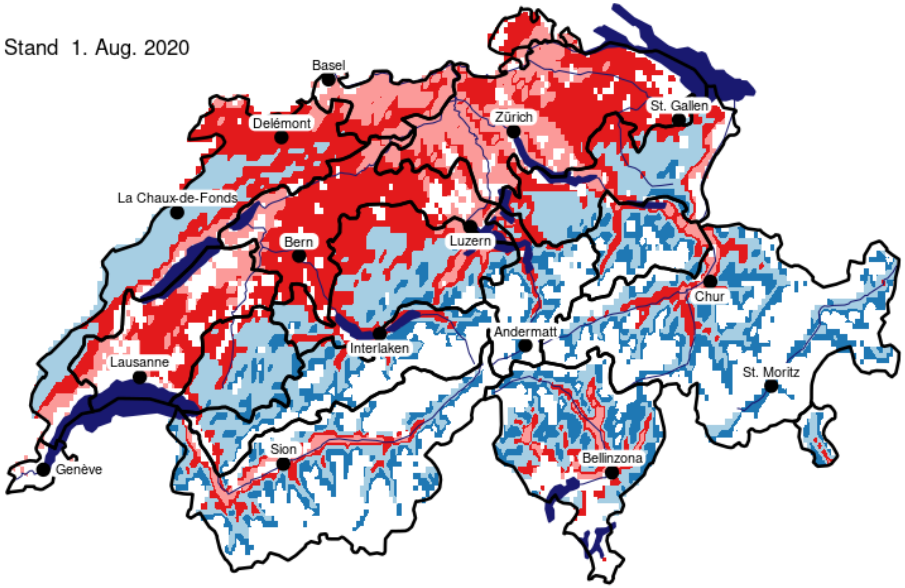
Beetle flight - August







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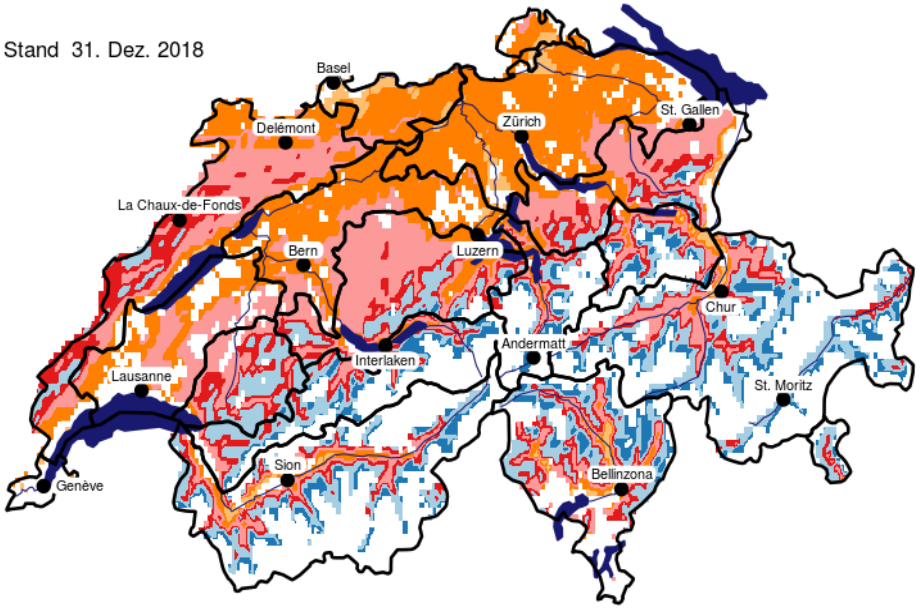
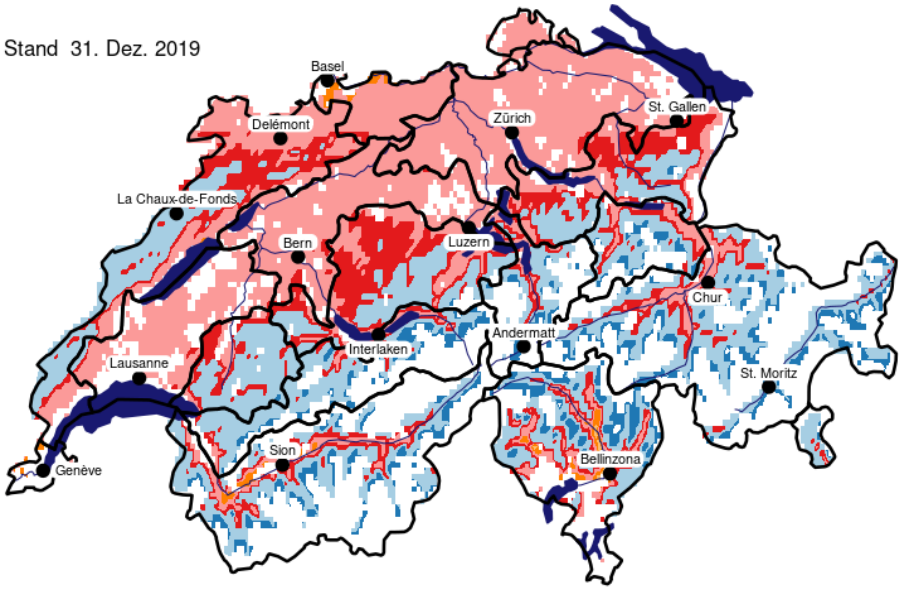
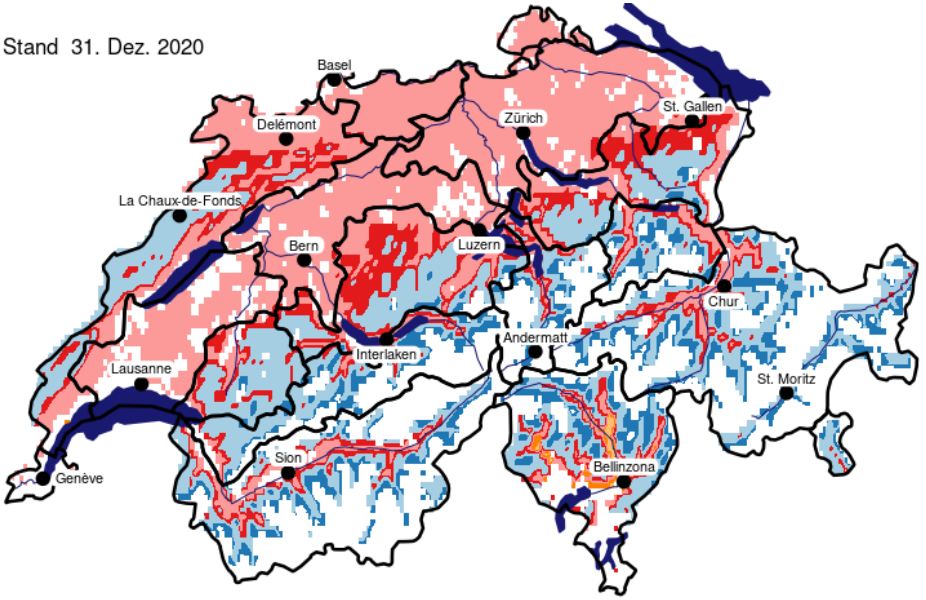
Beetle flight – end of season







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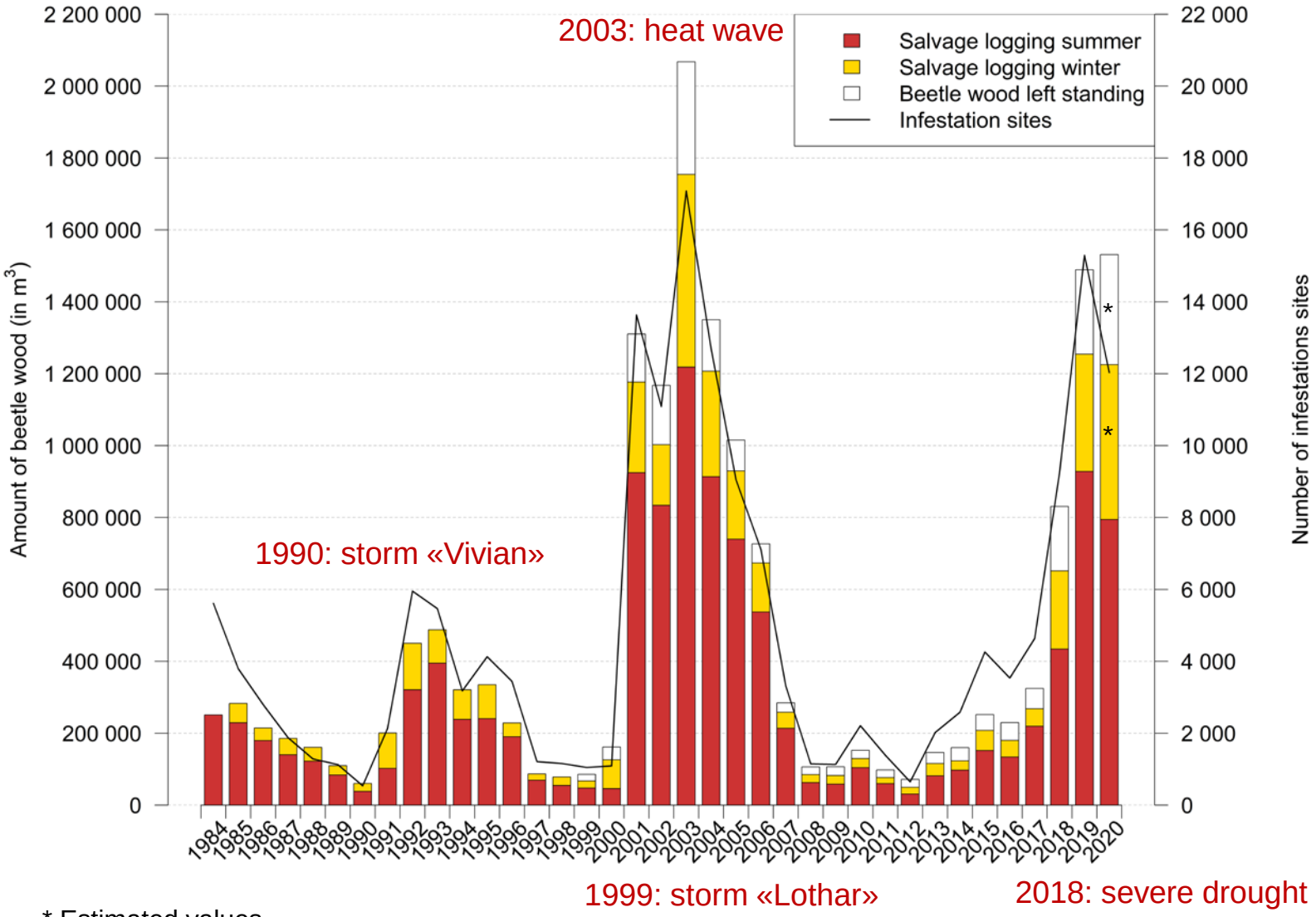
Development of beetle infested wood



* Estimated values

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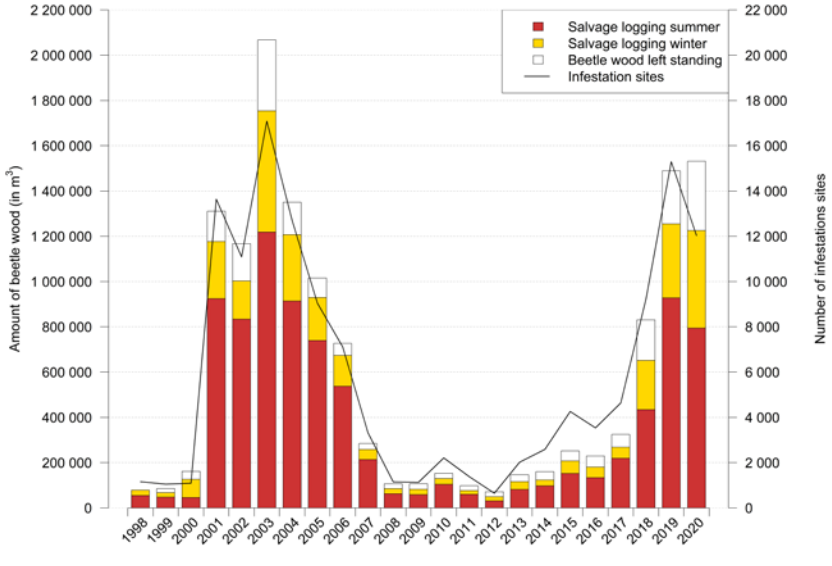

2020

- With estimates for winter salvage logging & beetle infested wood left standing, second highest infestation since begin of data collection
- Decrease in infestation sites, but strong increase in # of beetles in traps (+ ~20%)
  → larger infestation areas with bigger populations

Management practices

For containment, infested wood should/will be quickly removed from the forest or its bark should be removed → As much wood as possible is removed from the forests.

Freshly harvested not yet beetle infested wood oftentimes sprayed with insecticides – (Cypermethrin nets or spray)

Storage of the fresh or infested wood outside the forest (> 500 m away, often too close).

However: for some time, more and more infested wood remains in the forest, due to:

- Saturated timber market → lack of profitability
- Lack of personnel and machines → workload not covered (infestation sites often only cleared after several years)
- Small-scale ownership / many forest owners
- Inaccessible terrain (steep slopes) → bb infestations threat to protection forests (although dead timber still has a protective function and should not be removed everywhere even if access is not a problem)

Other relevant bark beetles of conifers

Name	Name (Lat.)	Records+
sixtoothed spruce bark beetles	*Pityogenes chalcographus*	4237*
fir engraver beetle	*Pityokteines curvidens*	2588*
common pine shoot beetles	*Tomicus piniperda & T. minor*	822
large larch bark beetle	*Ips cembrae*	423
great spruce bark beetle	*Dendroctonus micans*	301
sharp-dentated bark beetle	*Ips acuminatus*	162
small spruce bark beetle	*Ips amitinus*	105

+ in Swiss Forest Protection database
* annually surveyed in the cantons

Outlook

- Continued warming trend in Central Europe → up to 3 generations per year
- More bark beetle generations also at higher altitudes
- Increased dry periods → stressed spruce trees → more breeding material
- High volumes of beetle wood left in the forest → larger starting populations and sufficient breeding material
- Spruce is likely to progressively disappear from lower altitudes – exceptions: good sites for spruce, low spruce proportion forests


Thank you for your attention ☺