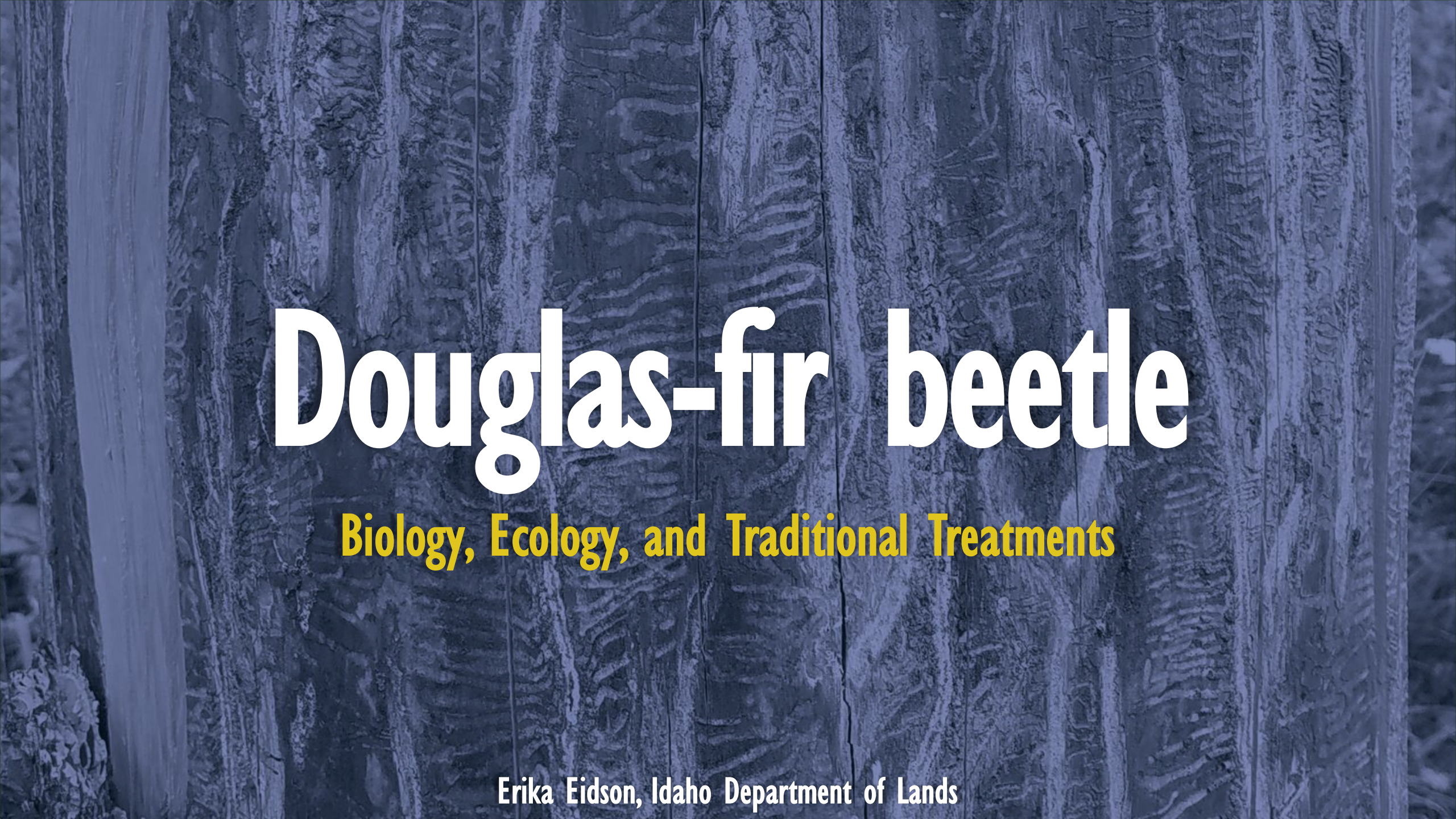


Douglas-fir beetle

Biology, Ecology, and Traditional Treatments

Erika Eidson, Idaho Department of Lands

Today’s Talk:

- Douglas-fir beetle biology
- How do I Identify Douglas-fir beetle?
- What increases the risk for Douglas-fir beetle?
- Douglas-fir beetle management

Douglas-fir beetle biology

Photo: S. Kegley

Douglas-fir beetle

Dendroctonus pseudotsugae

1 generation per year in Idaho

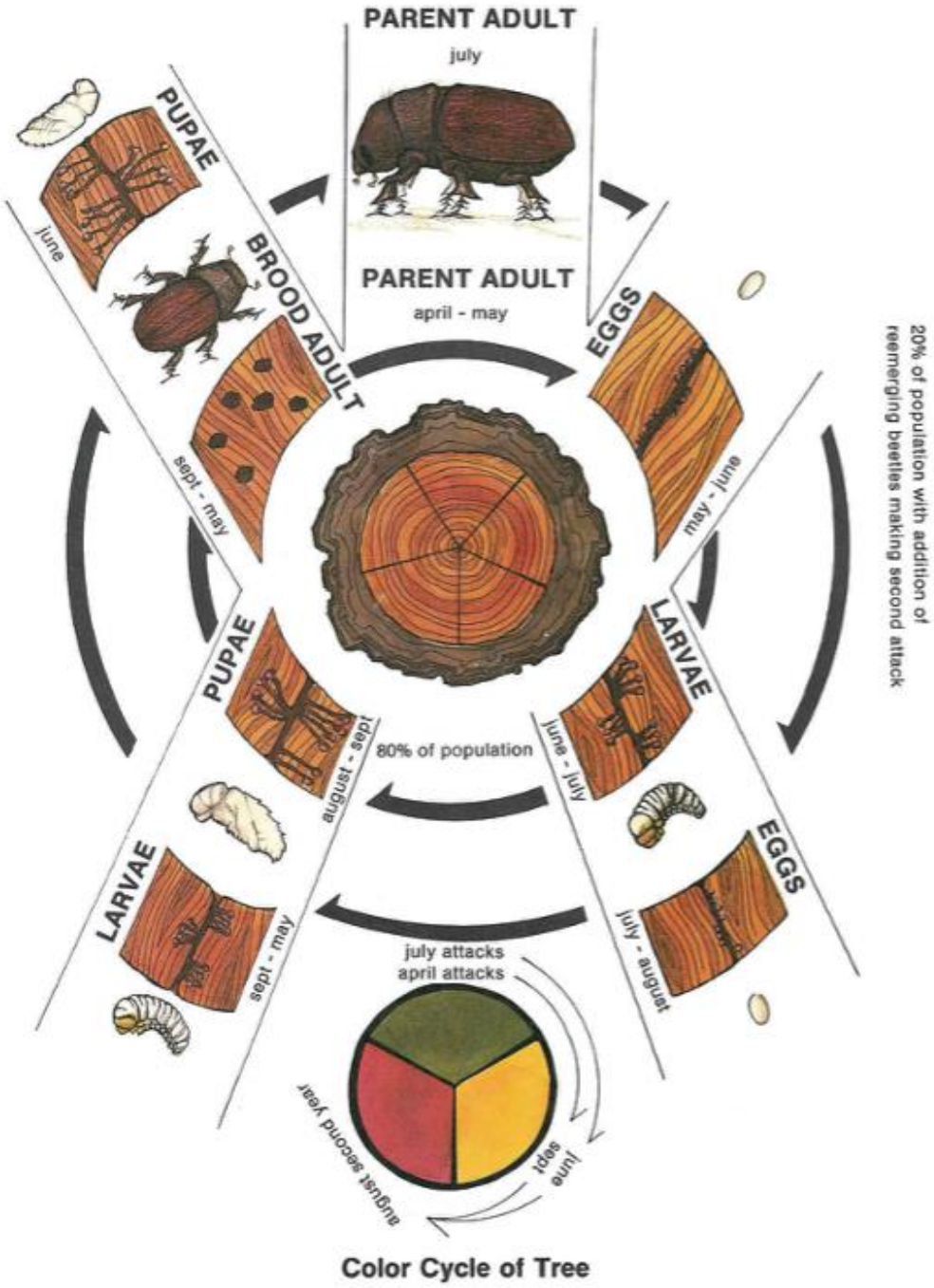
- Most overwinter as adults
- Most fly in mid to late spring

Host: Large diameter Douglas-fir trees

Western larch may occasionally be attacked by Douglas-fir beetle, but successful brood development has only been recorded in downed trees

Douglas-fir beetle life cycle

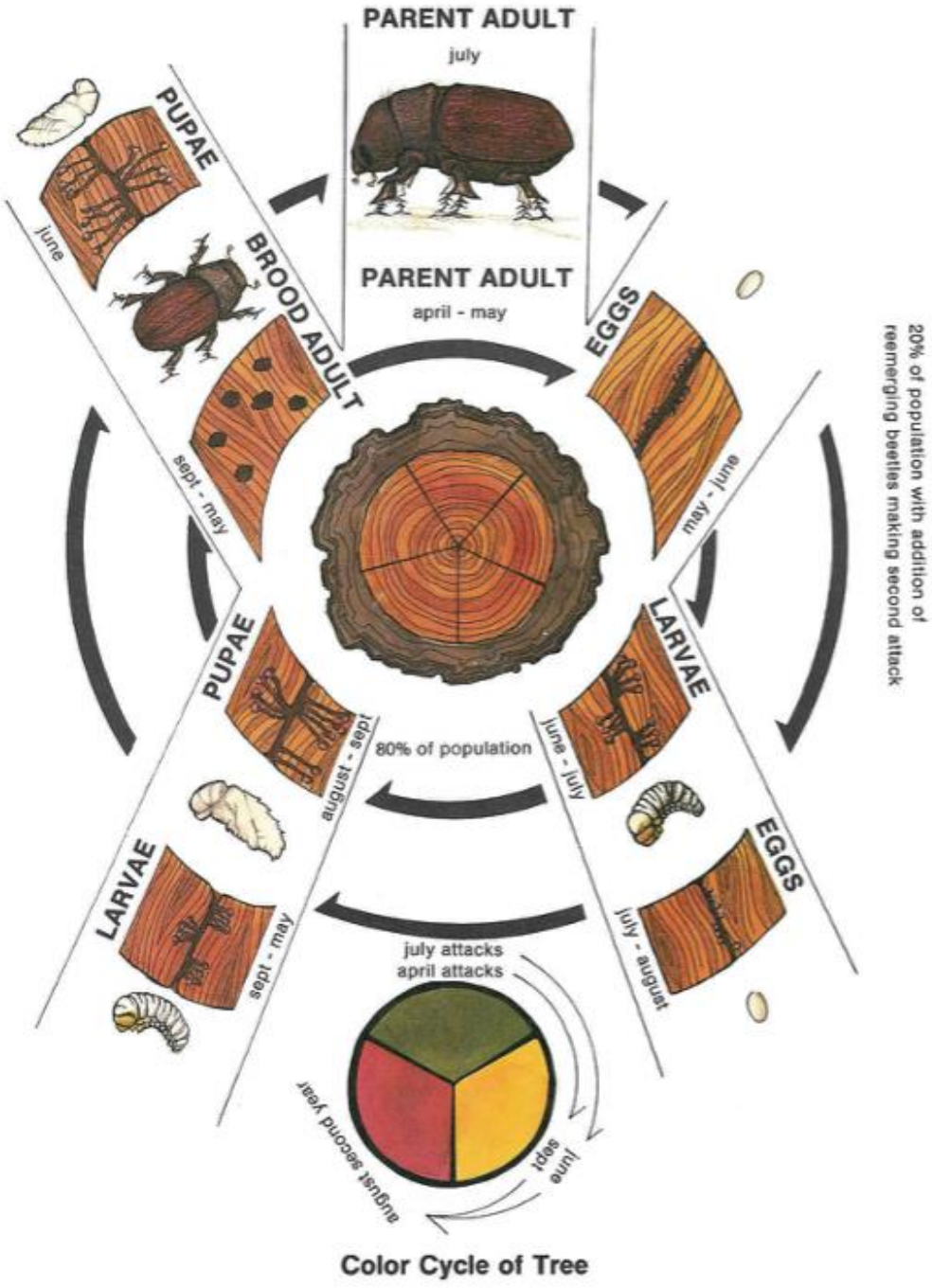
- **April & May** – Adults fly to attack new trees
- **Early Summer** – Beetles mate, mine galleries, and lay eggs under bark
- **Summer** – Larvae feed in phloem. Tree needles may begin to yellow
- **Late summer** – Larvae pupate
- **Fall** – Beetles become adults. Tree needles may fade to orange/red
- **Winter** – Beetles overwinter as adults beneath the bark
- **April & May** – Adults fly to attack new trees



Douglas-fir beetle life cycle

- **Flights may occur later in summer**
  - Small, second cohort
  - Some beetles re-emerge for 2nd attack
  - Temperatures vary

- **Beetle development timing depends on temperature**
  - Spring flight occurs when temps are consistently >60 degrees F



Trees and logs that have been dead for two summers or longer:

- Douglas-fir beetles have already completed their life cycle and left the tree
- No longer contain Douglas-fir beetles and are not a threat


How do I identify Douglas-fir beetle?

Bark Beetle Identification

What is the host tree species?

What do the galleries look like under the bark?

What are the other signs and symptoms?

Douglas-fir beetle galleries

Use a hatchet to look for galleries under the bark

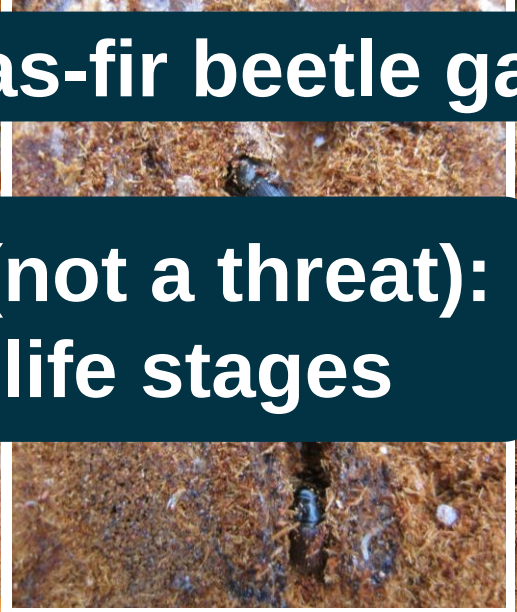
Douglas-fir beetle galleries

Current infestation: contains Douglas-fir beetle life stages

Use a hatchet to look for galleries under the bark

Douglas-fir beetle galleries

Old dead (not a threat):
Dry, no life stages



Use a hatchet to look for galleries under the bark


Douglas-fir beetle frass
Look for frass on down trees, green firewood, and susceptible trees

Douglas-fir beetle: galleries, signs & symptoms

Vertical “J” galleries

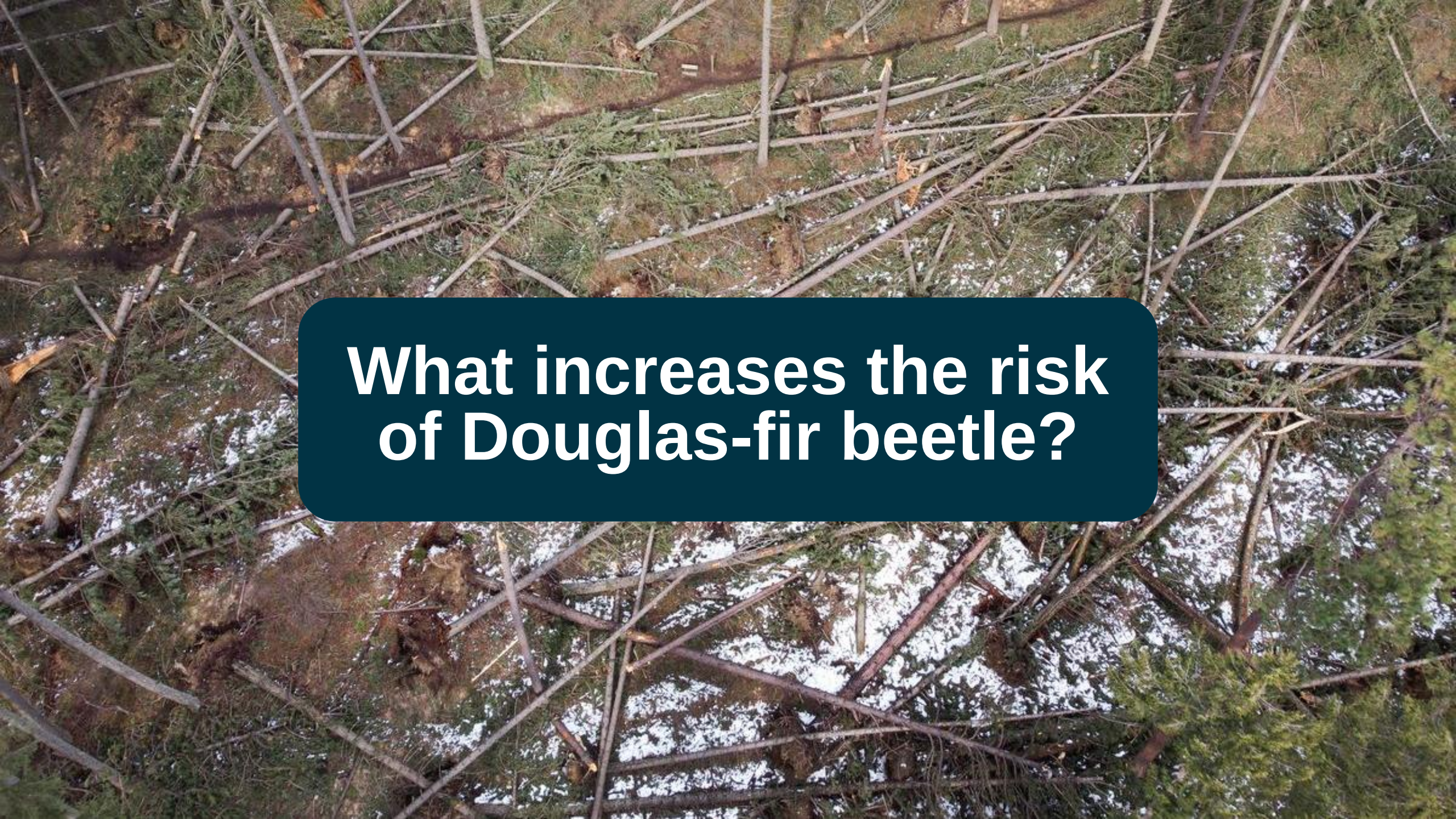
No pitch tubes, reddish frass

Douglas-fir beetle: galleries, signs & symptoms

Vertical “J” galleries

Pitching is not a good diagnostic feature

No pitch tubes, reddish frass



What increases the risk of Douglas-fir beetle?

Douglas-fir beetle risk

Endemic populations levels are often associated with root disease stressed trees

Douglas-fir beetle risk

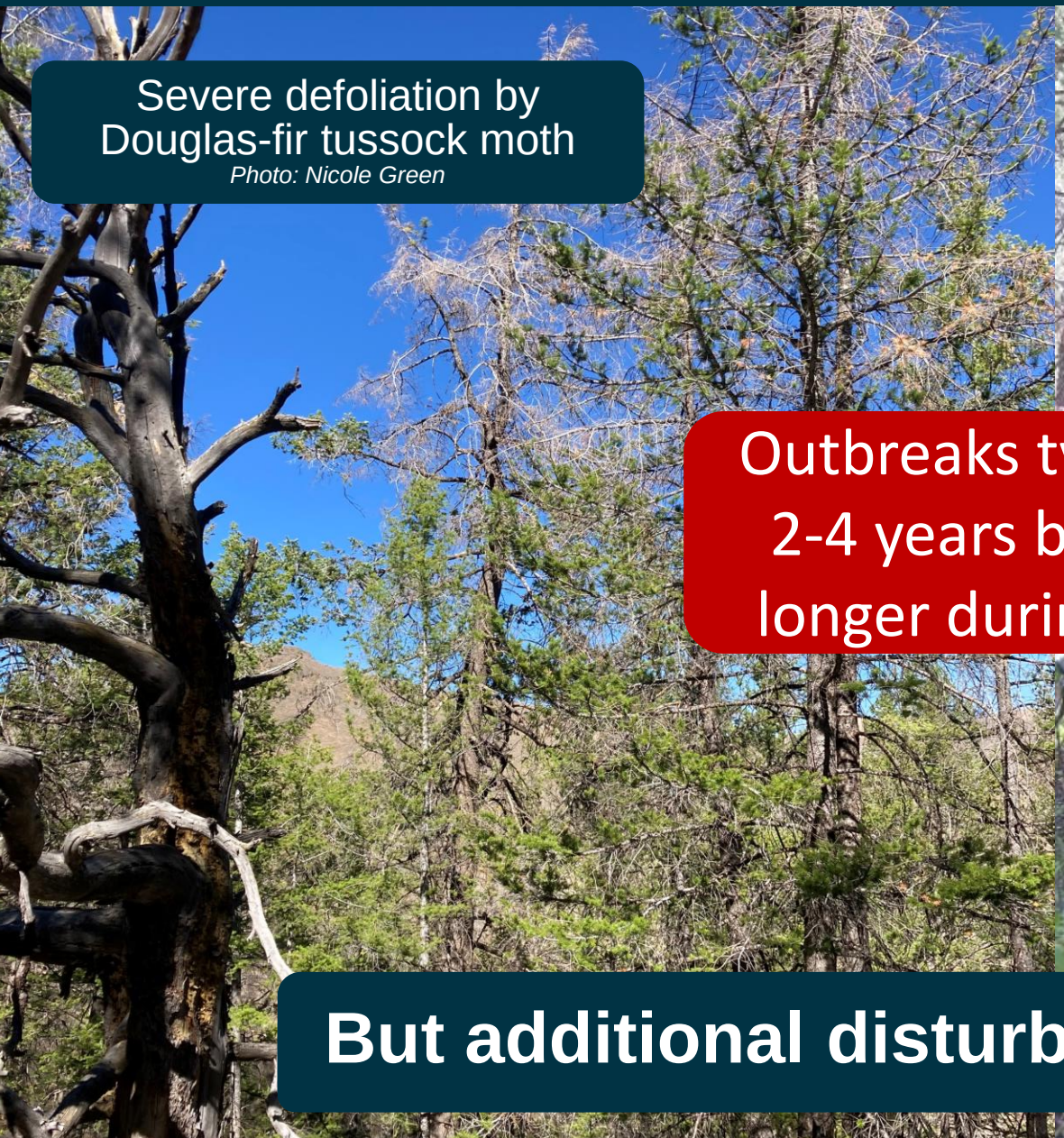
Severe defoliation by Douglas-fir tussock moth

Photo: Nicole Green

Wildfire scorch

But additional disturbance can cause an outbreak

Douglas-fir beetle risk



Severe defoliation by Douglas-fir tussock moth

Photo: Nicole Green

Wildfire scorch

Outbreaks typically last 2-4 years but may be longer during drought

But additional disturbance can cause an outbreak

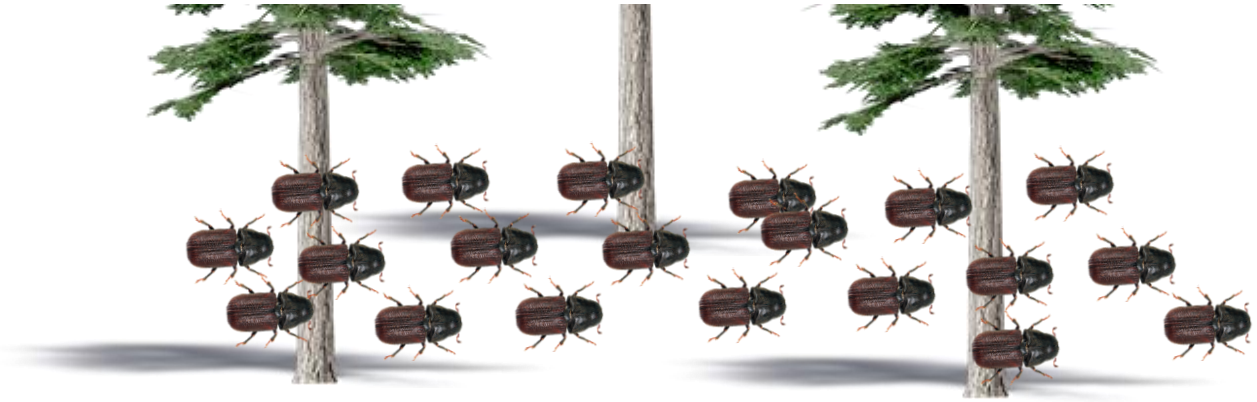
Douglas-fir beetle risk

Large down logs of Douglas-fir or larch are highly attractive

Outbreaks often associated with wind events

Outbreaks often associated with wind events

- Major windstorm in January, 2021 blows down green Douglas-fir trees
- Douglas-fir beetles infest green logs in April, 2021
- Beetles reproduce in down logs
- Beetles fly to infest nearby standing trees in **April, 2022**
- Standing trees killed



Outbreaks often associated with wind events

Beetles infest blowdown

Offspring can move to nearby standing trees

Douglas-fir beetle management

Douglas-fir beetle management

Prevention

Eliminate brood sites

- Remove/destroy infested trees or materials prior to beetle emergence in spring
- Disturbance: promptly salvage windthrown, fire damaged, or defoliated Douglas-fir
- Logging: promptly remove or dispose of logs, large slash, and cull material

Douglas-fir beetle management

Prevention

Eliminate brood sites

- **Remove/destroy infested trees or materials prior to beetle emergence in spring**
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Think: when is the next time that the beetles will be flying to attack standing trees?

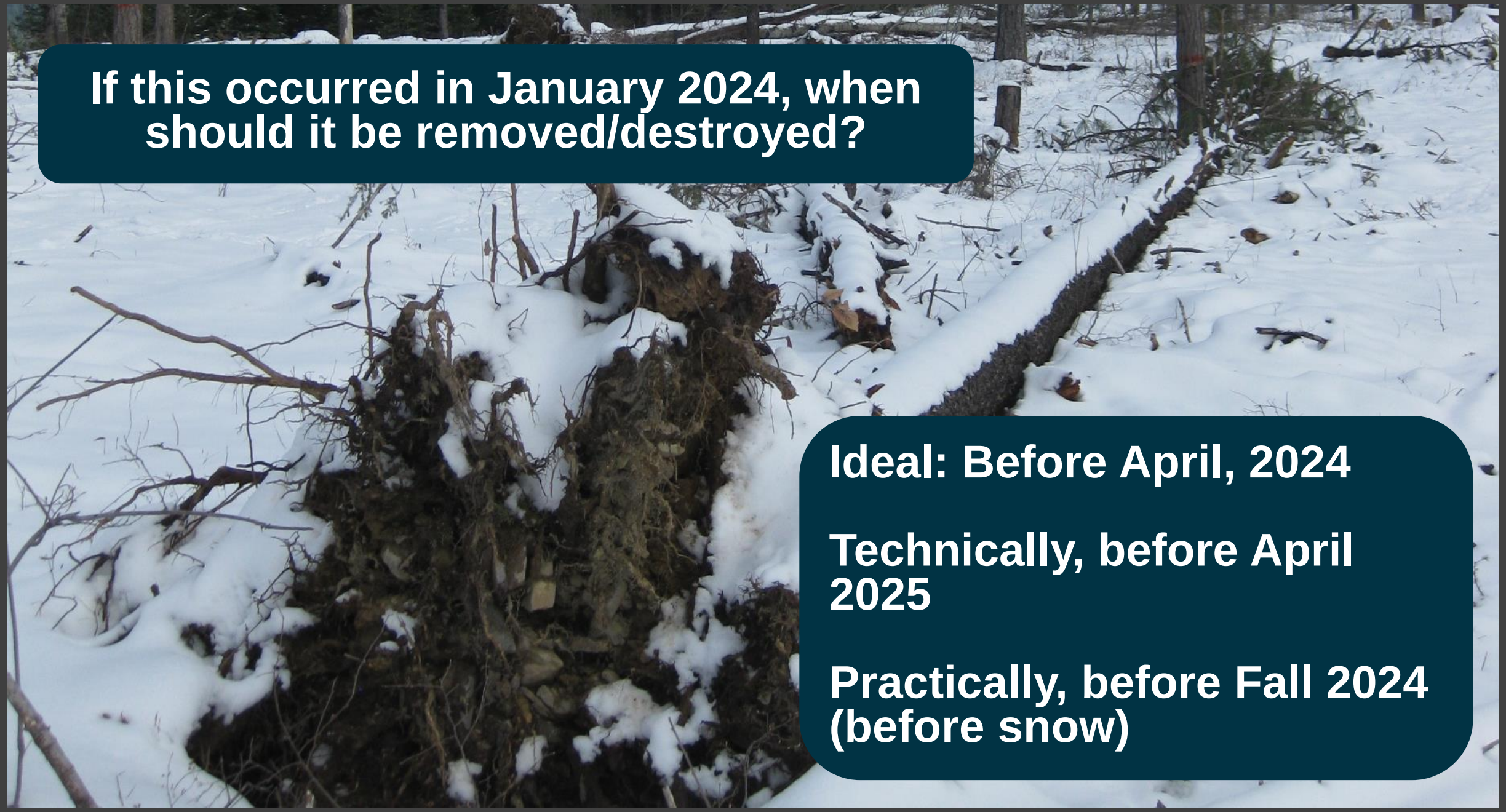
You notice this tree in July, 2024, when should it be removed/destroyed?

You notice this tree in July, 2024, when should it be removed/destroyed?

Technically, before April 2025

Practically, before Fall 2024 (before snow)


If this occurred in January 2024, when should it be removed/destroyed?


If this occurred in January 2024, when should it be removed/destroyed?
Ideal: Before April, 2024
Technically, before April 2025
Practically, before Fall 2024 (before snow)


If these trees were severely defoliated in August, 2024, when should they be salvaged?


If these trees were severely defoliated in August, 2024, when should they be salvaged?
Best before Fall, 2025

Douglas-fir beetle management

Silviculture

Identification and silvicultural treatment of high-hazard stands to reduce susceptibility

High hazard stand:

Stand density: Stocking greater than 250 square feet basal area

Percent Douglas-fir in stand: Greater than 50 percent

Average stand age: Greater than 120 years

Average diameter Douglas-fir sawtimber: Greater than 14 in

Weatherby and Thier (1993) Hazard Rating system for the Intermountain West

Douglas-fir beetle management

Silviculture

Identification and silvicultural treatment of high-hazard stands to reduce susceptibility

- Any method to reduce stand density, percent of Douglas-fir, average stand age or size, will produce stand less susceptible stand conditions
    - Regeneration Harvest
    - Thinning
        - Need to consider root disease

Douglas-fir beetle management

Trap trees

Create beetle ‘sinks’ to suppress population

- Cut green Douglas-fir trees between late fall and April 1
- Trees should be cut in groups of 3-5, be >15” diameter, and left unbucked and unlimbed in the shade
- Leave them as ‘beetle bait’ through mid-July
- Remove logs before fall
- Thousands of beetles get removed with logs; beetle populations are reduced

Douglas-fir beetle management

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Douglas-fir beetle management

Attractive pheromone traps and tree baits can be risky

Douglas-fir beetle management

Pesticides

Prevent attacks on high-value, accessible trees

- Bark must be fully coated up to ~6” diameter top
- Preventative ONLY
- Short term, 1-2 years
- Broad spectrum, kills many insects
- Many restrictions
- Expensive, usually need professional applicator
- Very effective, but not practical on a larger scale

If only there was a simple way to create a non-toxic, invisible, repellent pheromone plume around at-risk trees and stands….

What about when the tree is full?

Beetles release anti-aggregation pheromones to deter more colonization

MCH is the Douglas-fir beetle anti-aggregation pheromone

It has been synthesized into a liquid that slowly diffuses through a plastic bubble pouch

It creates an invisible, repellent pheromone plume

MCH Pouches to Repel Douglas-fir Beetle

MCH: anti-aggregation pheromone for Douglas-fir beetle

Staple to healthy trees to trick beetles into thinking they are already fully attacked

DFB Management

For Large Areas:

- Staple to trees about 6’ off the ground on shady side of tree
- Apply at 30 per acre (single caps) 38 ft. grid
  Apply at 15 per acre (double caps) 54 ft. grid
- Once per year: early spring before beetles fly
  - *This often means snow*

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MCH Pouches to Repel Douglas-fir Beetle

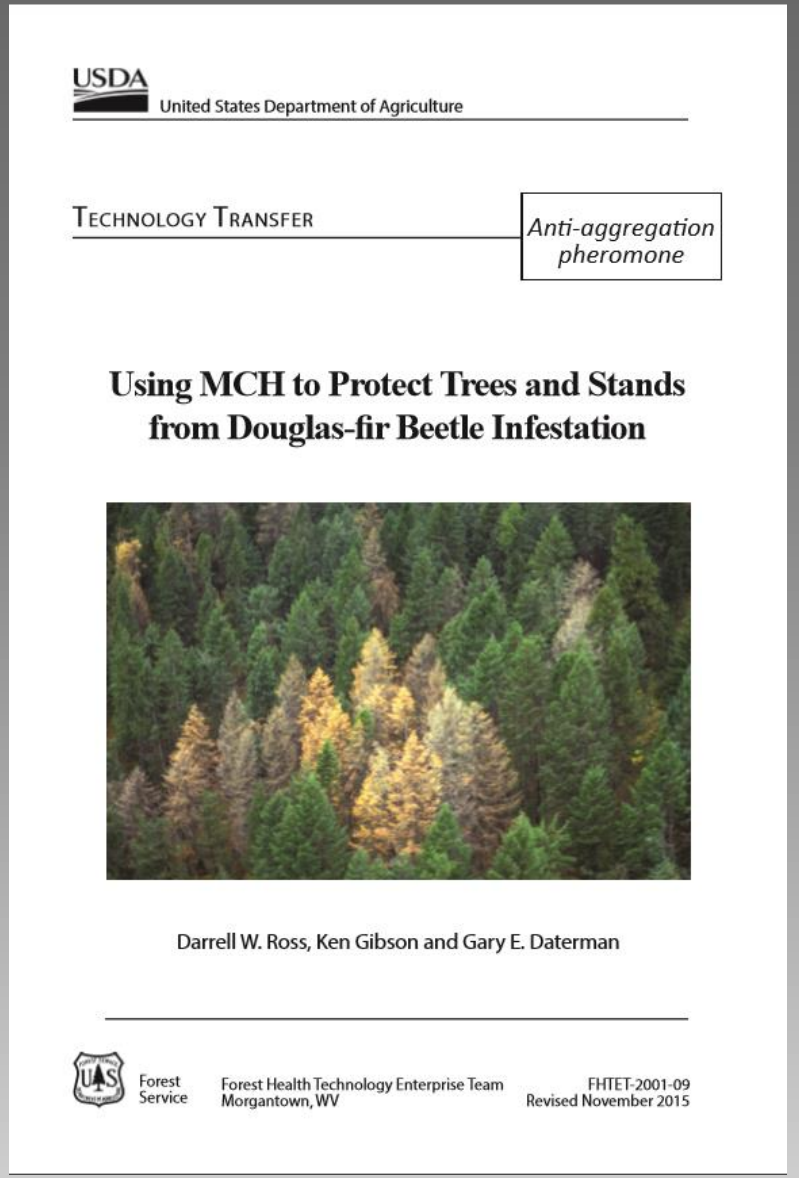
Grid application to protect entire stand: $50-$60 per acre

30 foot wide buffer Bubble capsule

Figure 5. Diagram of the grid method of deploying MCH bubble capsules. Bubble capsules are spaced about 40 feet apart. *Not drawn to scale.*

Single tree or log protection: ~$3.95 for double bubble

Get this publication!



USDA
United States Department of Agriculture

TECHNOLOGY TRANSFER

Anti-aggregation pheromone

Using MCH to Protect Trees and Stands from Douglas-fir Beetle Infestation

Darrell W. Ross, Ken Gibson and Gary E. Daterman

Forest Service
Forest Health Technology Enterprise Team
Morgantown, WV

FHTET-2001-09
Revised November 2015

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https://www.fs.fed.us/foresthealth/technology/pdfs/MCH_handbook_11_15_508.pdf

What’s the catch?

Must be ordered ahead of time and stored in a non-food freezer

Should be applied in mid-April before beetle flight

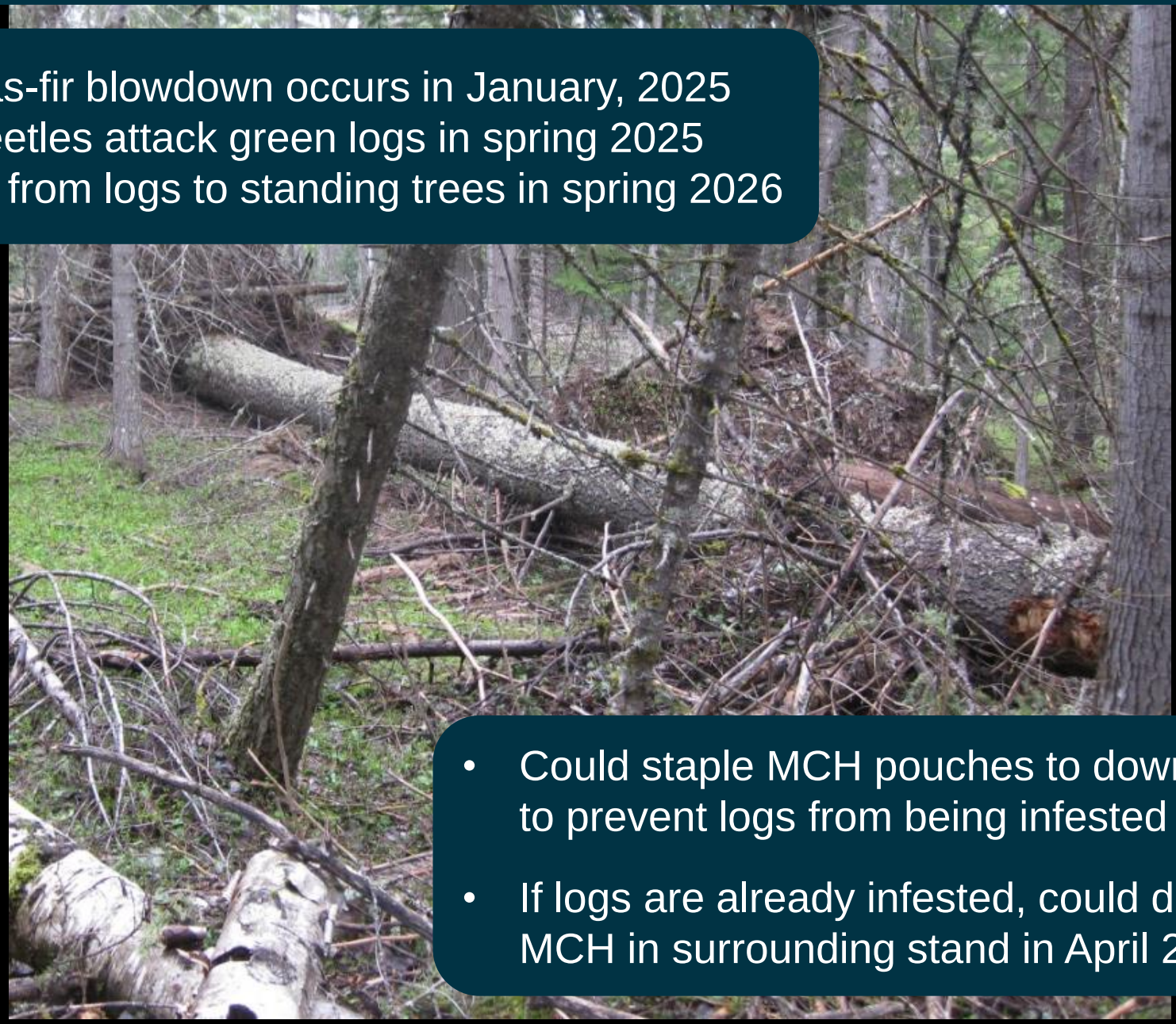
Only provides one season of protection

Does not protect against other species of bark beetles

Proper application is critical; consult an entomologist

“Push” Repellents: MCH Pouches to Repel Douglas-fir Beetle

- Green Douglas-fir blowdown occurs in January, 2025
- Douglas-fir beetles attack green logs in spring 2025
- Beetles move from logs to standing trees in spring 2026



- Could staple MCH pouches to down logs in April 2025 to prevent logs from being infested
- If logs are already infested, could do application of MCH in surrounding stand in April 2026

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