



# ALASKA LANDOWNER DONNA MASSAY CONFRONTS SPRUCE BARK BEETLE



*Donna Massay lives on eleven forested acres on a lake situated three hours north of Anchorage, on the south side of the Alaska Range. Her mixed spruce and birch forest is alive with wildlife: moose, bears, spruce grouse, coyotes, minx, beavers, otters, ducks, owls, hawks, and eagles. Originally from New Hampshire, Donna moved to Alaska in 1968 and competed in the 1980 and 1981 Iditarod.*

*These days, Donna walks her property in all seasons, observing changes in the land. Recently, she has had to face more changes than she'd like, as the past four years have brought spruce beetle infestations. Watching most of the mature spruce trees in her forest succumb to the beetle, Donna has learned to steward her land with an eye to mitigating the damage, and in doing so is seeing some silver linings in the recovering forest.*

## DONNA'S FOREST STEWARDSHIP APPROACH

My home site is developed and Firewise, but the rest of the land is minimally "enhanced". I maintain but don't disturb the game trails. I've tried to promote nesting areas, and I leave birch snags for nesting habitat. Some brush I burn, but some I leave for ground-nesting birds. I use 3 cords of wood per year to heat the house, so my management plan includes firewood harvest for personal use, which my eleven acres can sustain. I do the felling and bucking with a chainsaw. For firewood, I look for a mix of spruce (faster burn and kindling) and birch (longer lasting fire). Now, with the beetle dieback, I'm burning a lot of spruce. In taking them down, I'm selective so as not to damage the understory. There are lots of small trees in the understory waiting for their opportunity!

"With any forest management I do, I ask myself, 'How can I do this so it benefits the critters?'"

## LOOKING OUT FOR THE WILDLIFE

In winter, I get out on a snow machine to see who's left tracks in the snow; in summer, I work the edge of the lake in my canoe or kayak, observing the beaver, loons, and common goldeneyes. There's a peninsula on the other side of the lake with a view of Denali, and also an island on the lake where moose camp out every year during calving season. The island provides protection from bears, which prey on new-born moose. Moose calves can swim almost as soon as they're born and follow their mothers. I've worked on enhancing the moose habitat on the island by encouraging willow growth. The spruce bark beetle has actually enabled my habitat management by letting in more sunlight.



# SPRUCE BARK BEETLE IMPACTS

The spruce bark beetles took out all the trees over 4" in diameter--they hit everything. After the beetle hatch in June, the spruce trees turned reddish brown and were dead in a couple of months. Just to keep my home Firewise, I've had to cut down more than one hundred trees. We've had a spruce bark beetle outbreak every year for the past four years; they've always been around and historically, but now, with the warmer summers, it may be a cycle that stays with us.

"It's amazing, with the older trees gone, to see the rapid growth in younger trees."

Right now I see recovery. The question is whether, when they get to be 8-10 inches, we'll see another wave of infestation come through. In the meantime, I'm seeing a lot of white birch coming in, and in the understory more grasses, soapberry, and ground-creeping black currants. With these low-growing food sources more plentiful, in the past couple of years the population of ground critters (voles, mice, shrews) has taken off, which has led to more small hawks and birds of prey hunting the forest—especially in more open forest where I've harvested the dead standing trees.



## GETTING FOREST MANAGEMENT ASSISTANCE

I applied for a grant from the Western Council of State Foresters Wildland Urban Interface Program specifically to help mitigate the damage from the spruce beetle. I also encouraged other area landowners to apply. The funds we were awarded helped about 110 homeowners remove spruce trees, mitigating beetle damage from their properties.

My forester walked the property with me, giving me suggestions. He followed up with a written strategy for spruce beetle mitigation and a management plan for my woodlands. The management plan has helped me stay on track to encourage regrowth of both beetle kill spruce and the over-mature birch I harvest for firewood. I've learned how important it is to keep grasses controlled so that natural tree reseedling can occur. I'm thinning crowded trees and am putting more emphasis on keeping the lower limbs of the smaller surviving spruce trees limbed to discourage future beetle infestations and to help with fire mitigation. These really small things, done at an easy pace as time and energy allow, are already showing big results.

At the height of the beetle kill epidemic when I was pretty disheartened, my forester's assistance, the beetle mitigation grant, and the management plan encouraged me to continue taking care of my property and to again find joy in the woods.

"My forester helped me develop a way to adapt to the changing woods and encourage a recovery outcome that will improve the woods without changing their character."

"I'm amazed at how rapidly younger trees are growing. I miss the stately old spruce, but there is a vibrancy in the younger trees that's pretty neat!"



# ADVICE TO OTHER LANDOWNERS

At first it was devastating to see the trees dying—the sheer scale of it was overwhelming. My advice is to set your goals small based on what’s most important, like keeping your buildings safe and reducing fire risk. Instead of saying "I need to harvest 11 acres of standing dead spruce", decide on a small area to start with, and from there move on to tackle other areas. Working with a forester helped me define the priority areas.



## SPRUCE BARK BEETLE

The spruce beetle, *Dendroctonus rufipennis* (Kirby), is a native North American bark beetle. It represents the leading cause of spruce tree mortality in North America; beetle outbreaks can destroy entire forested stands of spruce, causing significant economic and ecological damage.

Spruce beetles have four life stages: egg, larva, pupa and adult. They complete their lifecycle in 1-3 years, depending on climate. Adult spruce beetles are about the size of a grain of rice and vary in color from black to reddish-brown. Each year, adult spruce beetles emerge from dead or dying trees between late May and July, or when temperatures reach 55-60 ° F to search for new host trees. They are attracted to windthrow, freshly cut logs or stumps, or mature, standing trees.

Females release pheromones to attract male beetles and bore through the outer bark of the host tree to create galleries (or tunnels) in the sapwood, where they lay their eggs. After the eggs hatch, the spruce beetle larvae spend the winter feeding and developing in the phloem layer under the bark of their host trees. Larval feeding prevents the flow of nutrients throughout the tree, ultimately leading to host tree death. The larvae pupate and transform into adults the following summer. Adult beetles typically overwinter in their pupal galleries and emerge the following year to look for a new host.

### LARVAE

Photo: Edward H. Holsten



### PUPAE

Photo: Edward H. Holsten

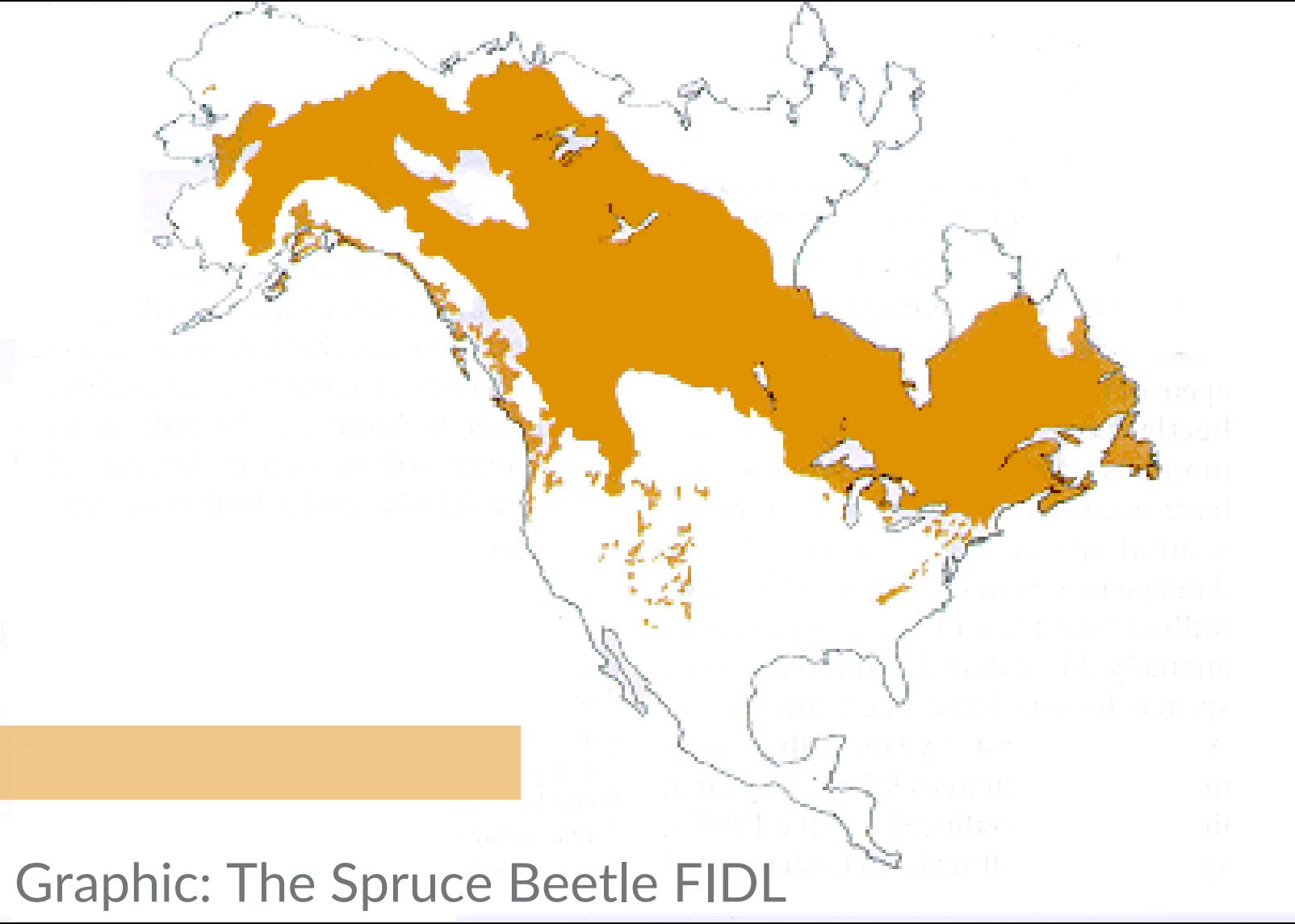


### ADULT

Photo: Steven Valley



## WHERE IT'S FOUND



Graphic: The Spruce Beetle FIDL

Spruce beetle populations range from Alaska and Newfoundland, as far south as Arizona and New Mexico, and as far east as Maine. The spruce beetle attacks all species of spruce within its geographic range, including the subalpine Engelmann spruce (*Picea engelmannii*), blue spruce (*P. pungens*), white spruce (*P. glauca*), Lutz spruce (*P. glauca x sitchensis*), Sitka spruce (*P. sitchensis*) and black spruce (*P. mariana*). Windthrown trees provide important habitat and are generally preferred for colonization by spruce beetles over standing trees. Freshly cut logs, stumps, and slash may also provide favorable habitat.



# BEETLE IMPACTS



Photo: A. Steven Munson

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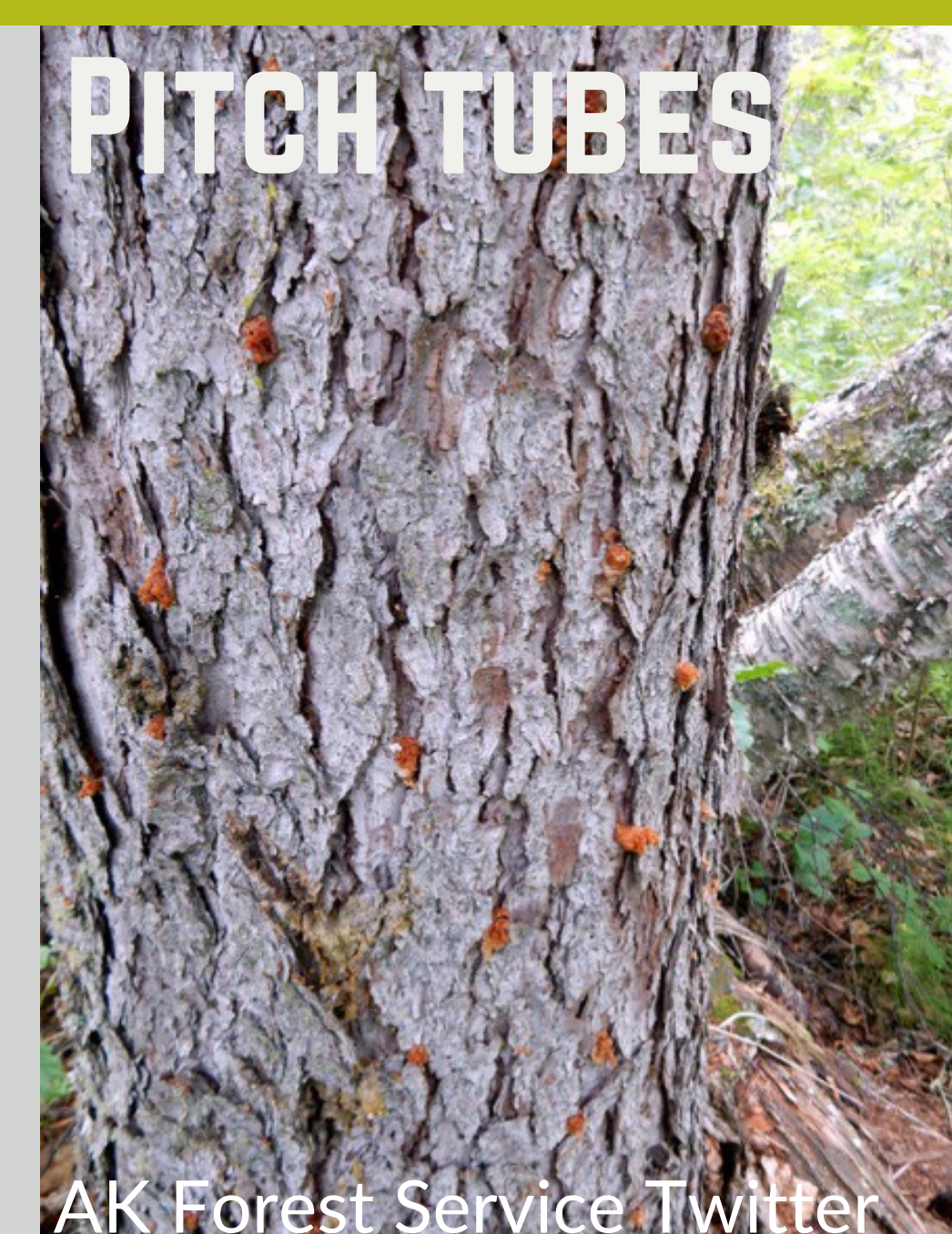
Greater infestations of this native beetle appear to correlate with a changing climate, which provides longer breeding/feeding seasons, while high wind events or avalanches can provide the downed wood for a population to explode. Underlying poor forest health leaves stressed trees vulnerable to attack.

During a major outbreak, after attacking fallen or damaged trees, beetles will quickly move to standing trees. Slow-growing, mature trees ( $\geq 16$  in) are especially susceptible, but spruce beetles may attack trees as small as 3 inches in diameter. These outbreaks can be devastating over vast acreages, and economic impacts often result. Spruce beetle damage results, annually, in the loss of nearly 500 million board feet of spruce saw timber [1].

## WHAT TO LOOK FOR

Spruce beetles spend most of their lives under the bark of trees, so we rarely see the insects before we see their damage. Knowing how to identify spruce beetle damage to trees is an important first step; look for:

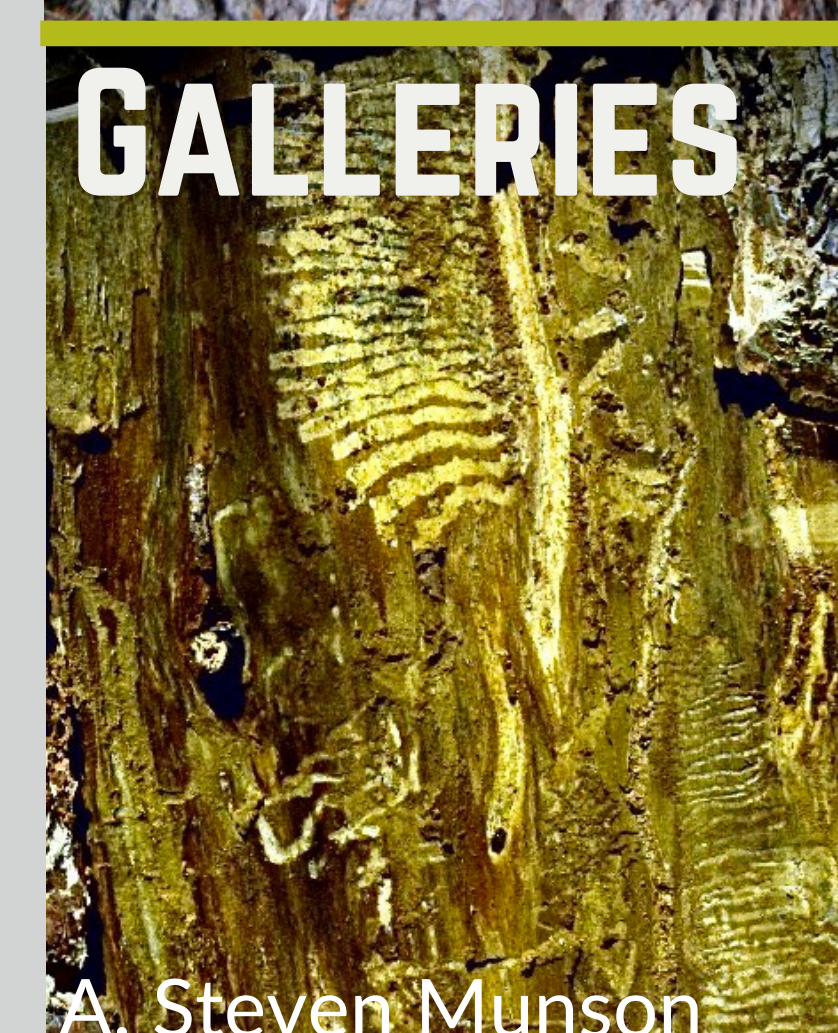
- Reddish-brown dust in bark crevices and on the ground around the base of the tree.
- Pitch (resin) accumulated around small, round beetle exit holes in tree bark.
- Increased woodpecker activity as they feed on spruce beetles--look for bark removal and flakes of bark accumulating on the ground below infested trees.
- Yellowish-green needles on previously healthy spruce trees.
- Feeding galleries, or tunnels, found beneath bark



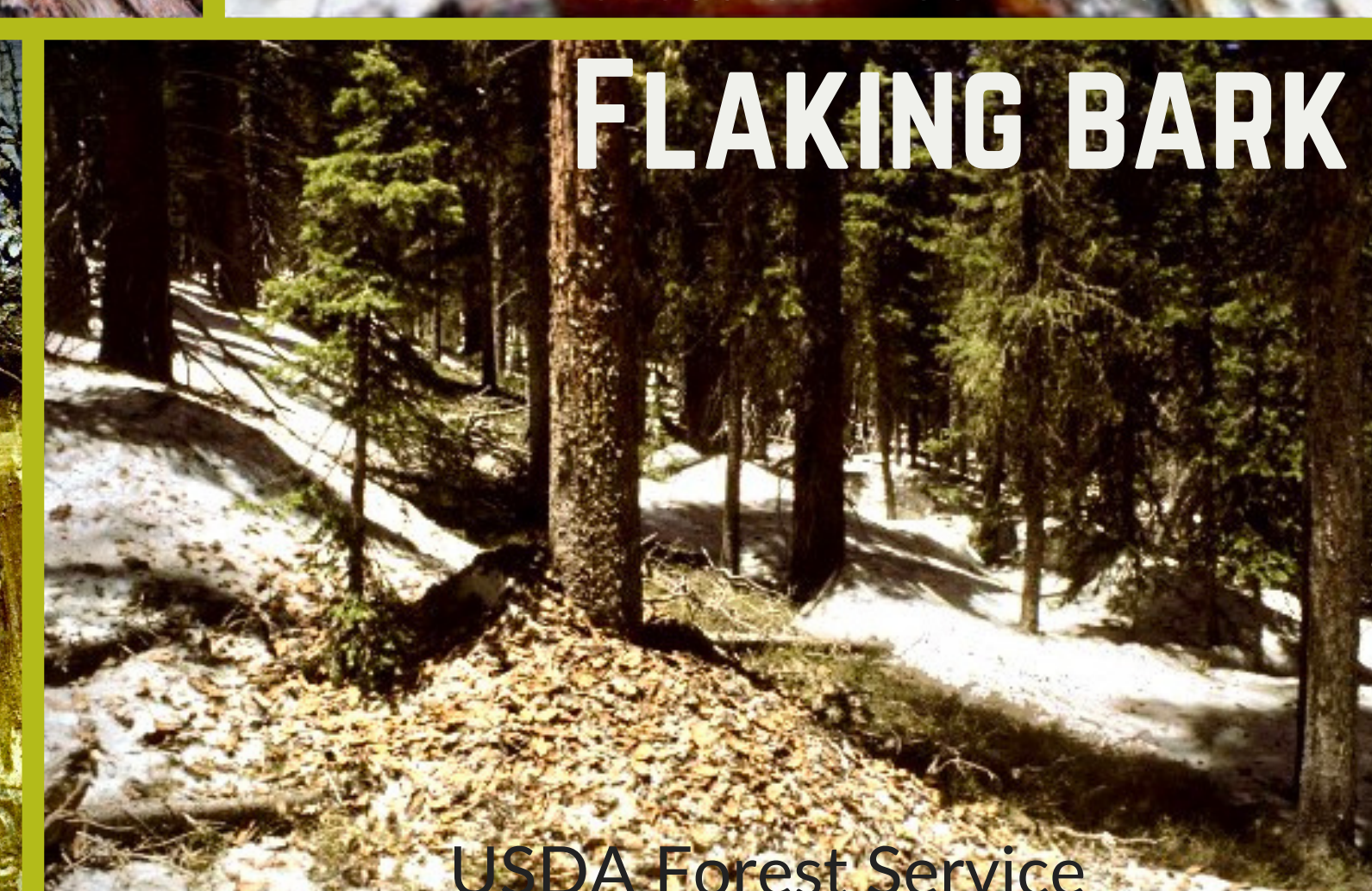
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## FOREST MANAGEMENT IMPLICATIONS

Multiple natural controls, such as woodpeckers and predatory insects, keep spruce beetle populations in check when numbers are low. However, these predators do not have a significant impact on populations during outbreaks.

One of the best ways to mitigate the effects of spruce beetle outbreaks is to manage for overall forest health and resiliency. Creating diversity in tree species and age classes will maintain and support healthy forest stands and reduce the potential impacts of future spruce beetle attacks. Removing diseased, infested, and susceptible (overmature and slow growing) spruce trees as well as downed spruce and slash piles may also prevent large population explosions locally. Avoid thinning and pruning in the summer months, however, as the smell of freshly cut trees could attract beetles to your property.

Spruce beetle outbreaks may permanently alter the ecology of spruce-dominated stands. By causing mortality among larger spruce trees, spruce beetles reduce tree density and cover. This, in turn, impacts habitat, wildlife composition, stream temperatures, and can increase the severity of ground fire. Greater wildfire risk can pose a threat to public safety in developed areas. Your district forester may be able to help you prioritize treatment areas to mitigate wildfire risk on your property.

## FURTHER RESOURCES:

1. The Spruce Beetle - Forest Insect & Disease Leaflet: <https://www.alaskasprucebeetle.org>
2. Alaska Spruce Beetle Identification: <https://www.alaskasprucebeetle.org/identification/>
3. Colorado Spruce Beetle Quick Guide: <https://csfs.colostate.edu/media/sites/22/2014/02/Spruce-Beetle-QuickGuide-FM2014-1.pdf>
4. USDA FS Region 10 - Spruce Beetle: <https://www.fs.usda.gov/detailfull/r10/forest-grasslandhealth/?cid=FSEPRD536861&width=full>
5. USDA FS Region 10 - Pesticides to Protect Trees from Spruce Beetle: <https://www.fs.usda.gov/detailfull/r10/forest-grasslandhealth/?cid=FSEPRD575833&width=full>

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