ROOT DISEASE

Root disease is difficult to detect through aerial survey methods but is estimated to have damaged or killed trees on at least **three million** acres in western Montana. Root diseases persist on the site over long-term forest generations. Shifting current forest compositions of susceptible species, such as Douglas-fir and grand fir, to more resilient species, such as ponderosa pine and western larch, can reduce long-term impacts of root disease.

The root disease Armillaria in a Douglas-fir

WHITE PINE BLISTER RUST

The combined effects of the non-native invasive white pine blister rust and mountain pine beetle have killed mature, cone-bearing whitebark pine trees across Montana including the Greater Yellowstone Ecosystem and Crown of the Continent. The Department of Natural Resources and Conservation, with funding from American Forests and the USDA Forest Service, directly planted over 8200 seeds on private lands in 2014. Planting sites were revisited in 2015 to determine germination and survival. Trees that are potentially resistance to white pine blister rust, commonly referred to as "plus" trees, were identified on the Stillwater State Forest for future protection and propagation.

Whitebark pine mortality: a stand in the Greater Yellowstone Ecosystem

White pine blister rust

A whitebark pine seedling germinated in bare mineral soil

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Montana Forest Health Highlights 2015

Produced by the Forest Pest Management Program of the Montana Department of Natural Resources and Conservation (DNRC)

Limber pine mortality near Fairy Lake in Gallatin County

Montana's diverse forests range from whitebark pine high on mountain ridges to the ponderosa stands in draws along Fort Peck Reservoir. Our watersheds are forested with many different tree species including various pines, Douglas-fir, spruce, and larch. It's hard to miss the damage mountain pine beetle recently caused in pine stands, but there are numerous other insects and diseases impacting forests on a large scale as well. Western spruce budworm, root disease, and white pine blister rust are shaping current forest conditions in many watersheds.

Much of our understanding of Montana forest conditions comes from cooperative survey between the State of Montana DNRC and the USFS Aerial Detection Survey (ADS) Program. In 2015, ADS aerially surveyed nearly 30 million acres of forested lands. Additional ground surveys were conducted to reach areas not flown or requiring closer observation.

The Forest Health Highlights are a summary of the "Montana Forest Insect and Disease Conditions and Program Highlights 2015" which can be found at the following link: dnrc.mt.gov/divisions/forestry/forestry-assistance/pest-management/montana-forest-pest-condition-reports. The full report contains detailed narratives for each county surveyed, maps, and tables.

For paper copies or additional information, please contact the DNRC Forest Pest Management Program (406-542-4300).

Significant Forest Health Concerns in Montana

BARK BEETLES

Since the onset of the mountain pine beetle outbreak, pine trees have been killed on more than 6 million acres in Montana. Although the outbreak is waning, a total of **174,000** acres showed recent mortality in 2015, primarily in Beaverhead, Missoula, Granite, and Ravalli Counties. Mountain pine beetle continues to kill whitebark pine in high elevation ecosystems, thus impacting grizzly bear habitat and snowpack retention.

Mountain pine beetle activity in the Pintler Mountains

A adult mountain pine beetle on whitebark pine

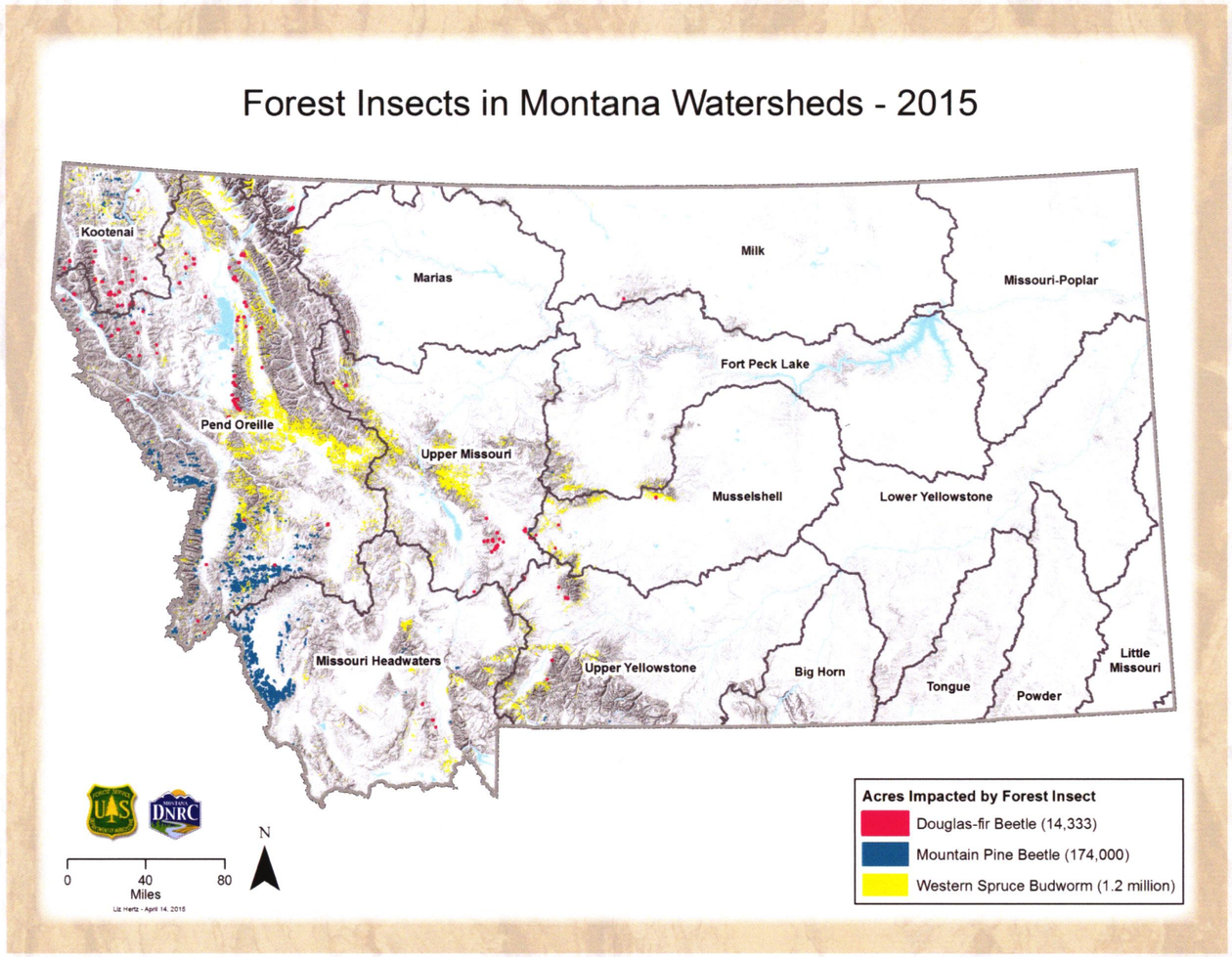

Figure 1. Distribution of Forest Insect Infestations in Montana, 2015

The map shows that Douglas-fir beetle is increasing throughout its host range. Western spruce budworm activity is widespread and chronic in the Pend Oreille and Upper Missouri watersheds. Mountain pine beetle is currently active in the western portion of the Missouri headwaters and southern Pend Oreille watersheds.

Douglas-fir beetle continues to kill Douglas-fir trees throughout Montana. In 2015 **14,333 acres** of mortality were detected from aerial survey. Douglas-fir beetle typically attacks trees that are stressed due to root disease, fire scorch, overstocking, or western spruce budworm defoliation – all conditions that are prevalent in Montana forests.

An adult Douglas-fir beetle

DEFOLIATORS

Western Spruce Budworm

Western spruce budworm defoliated over **1.2 million** acres of Douglas-fir, spruce, and grand fir in 2016. While defoliation does not outright kill trees, repeated, chronic damage can severely compromise tree vigor and predisposes trees to Douglas-fir beetle.

Western spruce budworm damage at Rock Creek

Western spruce budworm defoliation