



Forest Health Highlights 2023

Minnesota DNR Forest Health Team



DEPARTMENT OF
NATURAL RESOURCES

The Minnesota Department of Natural Resources Forest Health Highlights was created by the Division of Forestry Forest Health Program.

Cover photo: Red oaks killed by twolined chestnut borer in 2023 in Carlos Avery Wildlife Management Area.

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2023 Forest Health Summary

There were five very extensive tree health problems in Minnesota's forests in 2023. These five problems caused widespread mortality to ash, oak, tamarack, and more concentrated mortality to balsam fir and white spruce in the Arrowhead Region. The most ecologically concerning problem in the short-term continues to be the outbreak of eastern larch beetle on tamarack, while long-range concerns continue with the spread of emerald ash borer and oak wilt northward through Minnesota. Though not a current ecological concern, recent extreme droughts coupled with aging oaks have predictably spurred widespread dieback and mortality of oaks, causing major concern of homeowners, woodland owners, and professionals.

Staffing

The DNR's longtime forest health coordinator, Val Cervenka, retired in January. Brian Schwingle, forest health specialist with the team since 2014, was hired as the new coordinator. The forest health specialist position that Brian left remains vacant, but we anticipate filling it early in 2024. Currently, there are three regional forest health specialists: Eric Otto in Grand Rapids, Megan O'Neil in Bemidji, and Rachael Dube in Brainerd.

Oak mortality and drought

The most widespread tree problem across Minnesota in 2023 was declining oaks, primarily caused by a combination of older age, consecutive years of significant drought, and two opportunistic pests that are only serious problems on stressed oaks.

The growing seasons for the last four years (April–September) have been dry in Minnesota, and a couple of those years have been exceptionally dry. The growing season in 2021 was the 11th driest on record, and growing season 2023 was the 9th driest. Our forests can tolerate some drought, but the more stress they experience from drought and other stressors (e.g., flooding, defoliation, and compaction), the more likely it is they'll suffer serious problems, like infestation, disease, and mortality. This year, scattered mortality of oak exploded across much of Minnesota, from the southern border to the northwest tip.

Two oak pests, Armillaria root disease and twolined chestnut borer, are notorious for attacking stressed oaks, and they were extremely common in woodlots this year. The scattered nature of declining forests is nearly impossible to map from aerial surveys, but we did map 50% more twolined chestnut borer-infested forests in 2023 than we did in 2022.

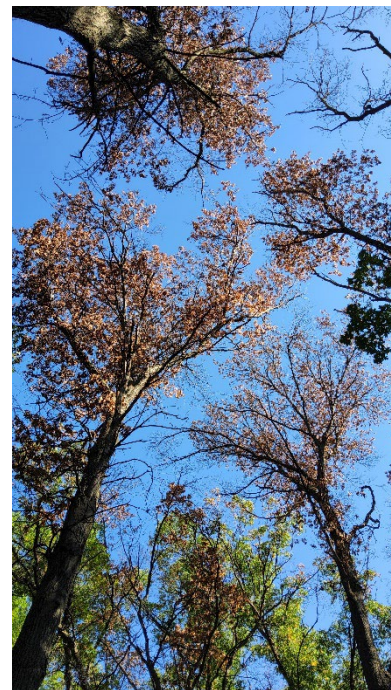


Figure 1. Rapid mortality from twolined chestnut borer in northern pin oaks in Anoka County.

We expect this decline to continue for a couple years following the conclusion of significant drought. We've advised forest managers to delay thinning forests during this stressful time when possible, and we've advised homeowners to strategically irrigate their yard oaks. This winter we plan to create an oak decline webpage to help explain this phenomenon and list ways to deal with it.



Figure 2. Declining bur oak woodland in Stearns County.

Oak wilt

The impacts of recent growing season droughts on oak forests made detecting and diagnosing oak wilt extremely challenging in 2023.

Oak wilt is a non-native fatal disease to oak. Its unique aspects are it's a slow spreader, and we know several different ways to control it. In fact, we consider it eradicated from Kanabec County through control efforts on private land there.



Figure 3. Pockets of expanding oak wilt, as seen in aerial detection surveys over Morrison County.

DNR forest health staff focus detection and control efforts along the northern leading edge of oak wilt. A grant from the U.S. Forest Service allowed managers in St. Croix State Park to control about 20 pockets of oak wilt in 2023. Oak wilt on private and tribal property continues to be found north of the park in Pine County and remains a focal point for detection and control.

Morrison County Soil and Water Conservation District (SWCD) utilized a grant from a state source (Environment and Natural Resources Trust Fund) to contract out oak wilt control work on approximately 15 properties in Morrison and Cass County in 2023. Unfortunately, the SWCD won't receive oak wilt control funding in 2024. DNR Forest Health plans to explore federal grant opportunities to cost-share oak wilt control in northern Minnesota next year.

Balsam fir and white spruce mortality concentrated in Lake and Cook counties

Eastern spruce budworm (budworm) damaged more acreage this year than it has since 1961!

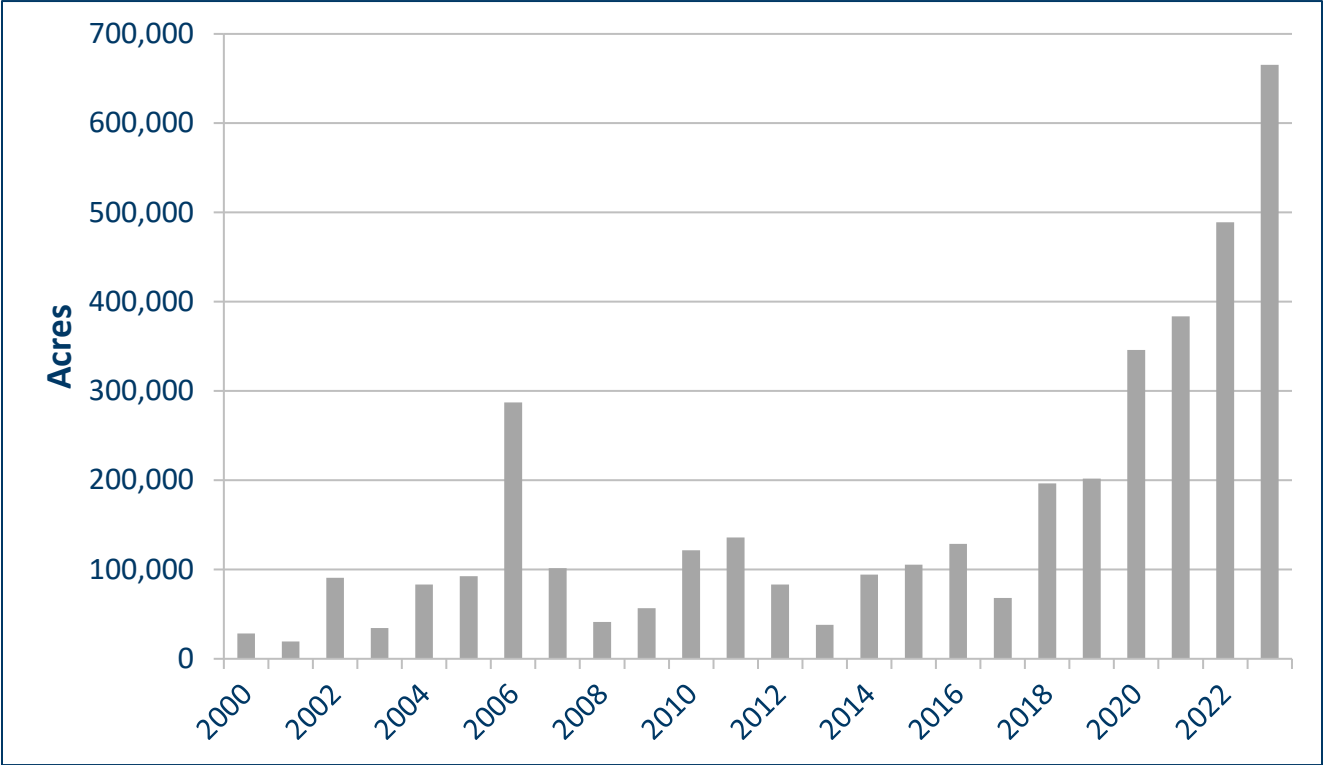


Figure 4. Acres with spruce budworm defoliation and mortality, 2000 through 2023.

This budworm is a native caterpillar that feeds on balsam fir and white spruce needles. It prefers older balsam fir. The more mature an area’s balsam fir, the more likely an outbreak of spruce budworm is to occur. Since the 1950s, outbreaks of budworm have marched across Minnesota’s Arrowhead Region. Cook County last experienced a budworm outbreak about 30 years ago, so we expected an outbreak to start there soon. Last year was the first year of outbreak throughout Cook County, and it continued strongly this year. We mapped over 1,000 square miles of budworm-damaged forests in Minnesota this year, 80% of which is in Lake and Cook counties.

We expect high levels of defoliation in eastern Lake and Cook counties through 2028. Most of this impacted area is on U.S. Forest Service (USFS) land. Local USFS, DNR, and private forest managers are dealing with the aftermath of this predictable outbreak in the Arrowhead, including removing killed fir and spruce to reduce wildfire potential, planting trees, and salvaging some timber. Decreasing market demand for balsam fir has made managing the aftermath of budworm-induced mortality very challenging.

Fortunately, these outbreaks are predictable and primarily driven by lots of older balsam fir in the landscape. Outbreaks crash, and forests recover with time.



Figure 5. Spruce budworm defoliation and mortality in Lake County, June 2023.

Tamarack mortality continues for 23rd consecutive year

Minnesota experienced its 23rd straight year of an outbreak of the eastern larch beetle. The area impacted over these years reached over 1 million acres in 2023, an area equivalent to about 75% of Minnesota's tamarack forests.

Eastern larch beetle is a native bark beetle that attacks tamarack over about 4 inches in diameter. The bigger the tamarack, the more attractive it is to this bark beetle. There are several factors that initiated and continue the outbreak, including larger-diameter tamarack (in the beginning of the outbreak), flooding, drought, defoliation by larch casebearer (a non-native caterpillar), and extended growing seasons resulting in increased reproductive success of the beetle population.

DNR offered more harvest permits in tamarack forests in recent years to ensure a future healthy forest. The wet and remote sites on which tamarack forests tend to grow, and low market demand for tamarack, resulted in less management through harvesting in these stands than in earlier years. Fortunately, research that University of Minnesota and DNR Forestry have conducted in recent years show that some of these infested and unharvested forests that have lost their mature tamarack are recovering naturally over time, so there is hope for tamarack in some areas.

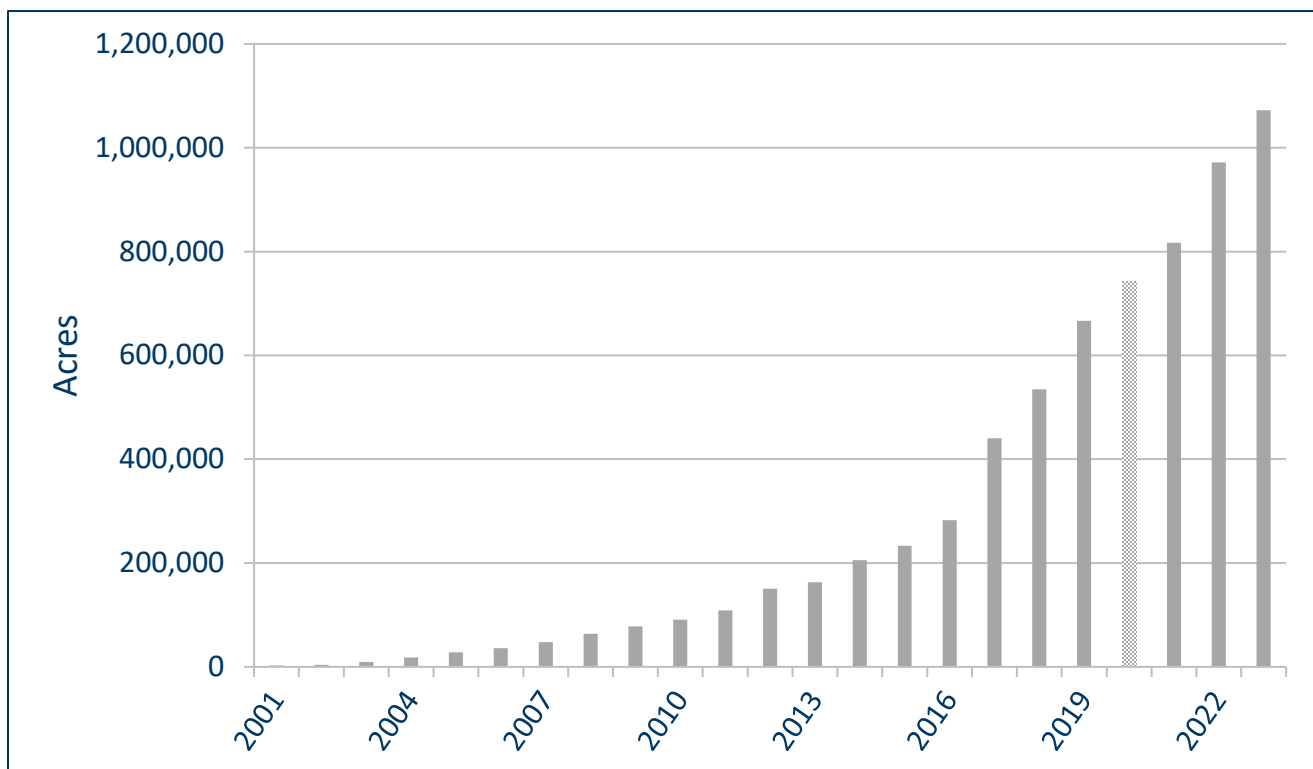


Figure 6. Accumulated forests impacted by eastern larch beetle from 2001 through 2023. (Aerial survey data was not collected in 2020 due to the COVID-19 pandemic. The 2020 value is an estimate based on the midpoint between 2019 and 2021 values.)

Emerald ash borer confirmed in north-central Minnesota

Emerald ash borer (EAB) is a non-native flatheaded wood borer that was first discovered in southern Minnesota in 2009. It kills all native ash species. Since 2009, it has predictably spread, covering all southeastern Minnesota and the Twin Cities Metro area. Up until 2023, it had never been found in north-central Minnesota or on one of our two national forests. It was confirmed in October on the southern edge of the Chippewa National Forest in Cass County. Intensive surveys in late 2023 and early 2024 will determine the extent of this local infestation.

We aerially surveyed the impact of EAB in Minnesota's southeastern forests in 2023. From 2009 through 2023, we mapped 24,600 acres of forest in southeastern Minnesota visibly impacted by EAB. Most of these forests are diverse, so the impact of EAB is not great. As EAB spreads northward, the ecological impact will be much greater, since wet forest communities are common in northern Minnesota and black ash frequently is the dominant tree species in those wet forests.

We expect EAB to continue to be found throughout Minnesota at any time. However, its impact in the northland will take decades. In the meantime, DNR and other foresters are working to diversify select black ash swamps to prepare them for the inevitable impact of EAB.

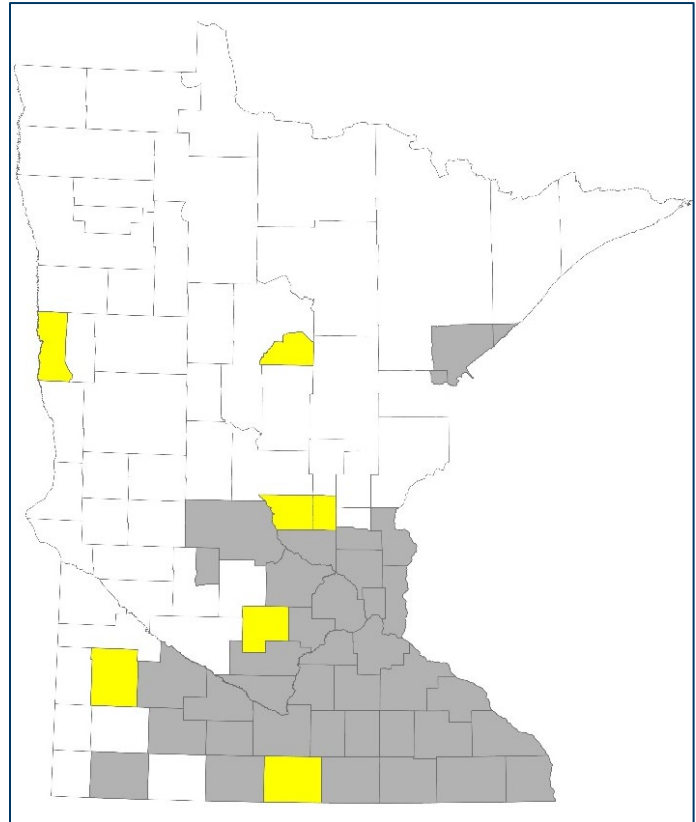


Figure 7. Newly quarantined areas for EAB in 2023 are in yellow (as of November 14, 2023). Areas with EAB confirmations prior to 2023 are in gray.

Additional forest health information from 2023

For descriptions of all of the pests and pathogens we found damaging Minnesota trees and forests in 2023, including more details on the problems described in this report, please view our 2023 annual report at [Forest Health Annual Reports](#), which will be posted online in early 2024.