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### Northern forests under seige by drought

Sawyer County Record  
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by Terryl Buchman

The last three dry years have placed the forests of Sawyer County under siege.

Lack of moisture puts all trees under a lot of stress. Drought stress manifests itself in many ways, but the general rule applies: "When it stays dry, trees will die."

However, different kinds of trees vary greatly in how they respond to drought. Three major factors play a big role in determining how badly trees will be damaged.

First, trees growing in light sandy soils tend to suffer more during dry spells than those growing in heavy loam. Course sands are low in organic matter, nutrients, and moisture-holding capacity.

Second, trees which host secondary cambial-mining insects or opportunistic diseases will suffer much higher rates of mortality. Those insects or diseases take advantage of trees weakened by drought stress, killing many trees that otherwise would survive.

Third, tree species which were under attack before, or come under attack during a drought by defoliating insects or bark beetles face a grim future. The additional stress caused by those damaging agents often overcomes the trees' ability to

survive drought.

Most of our trees will survive this test. Trees have large, extensive root systems which are most efficient at squeezing water out of dry ground. This is especially true of jack pine, red pine, and scrub oak that normally make a good living on soils little better than beach sand.

Trees also have natural physiological responses to reduce their water use during dry times. That includes marginal leaf scorch, smaller-than-normal leaves, and premature leaf or needle coloration and leaf fall. All of those reduce water loss through transpiration from the leaves. All of these symptoms are readily apparent right now.

But it doesn't mean the tree is ready to throw in the towel right yet.

Before discussing what's happening on a species-by-species basis, it is critical to point out that dry weather actually provides some benefits to trees and humans. Oak and ash anthracnose and fungal leaf spot disease of hardwoods such as maple become rare during droughts.

On the conifers, needle rust and needlecast diseases (including Rhizospora needlecast of spruce) are greatly reduced by dry weather. Also, the deadly root weevils of pines are killed off by drought.

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## Conifers

### White Pine

This tree should come through the drought quite well. The major disease of white pine, White Pine Blister Rust, becomes less prevalent during a drought as its spores require 100 percent relative humidity to germinate on the needles. Some smaller white pines that are growing under hardwood trees are experiencing increased mortality due to Armillaria Root Rot, a native soil fungus which becomes more deadly with trees under moisture stress.

### Red or Norway Pine

This species is showing high levels of mortality in all age classes. We are commonly seeing over 50 percent mortality of newly planted seedlings in each of the past three years. Young red pines (3 to 15 years old) are dying from Armillaria Root Rot and to Diplodia, a canker disease which girdles the branches and stems of drought-stressed red pines.

Red pines of all ages except the seedlings are also being killed in large numbers by the Pine Engraver Beetle, *Ips pini*. This tiny bark beetle can attack the pines when their sap flow is reduced by drought stress. During normal rainfall this weak invader is easily pitched out by healthy pines. The symptoms of Pine Engraver attack are "pockets" of dead pines with full crowns of bright orange needles and trunks riddled by thousands of round holes the size of bird shot pellets.

### Jack Pine

This hardy species thrives on some of our sandiest soils and can weather drought with ease. Unfortunately, the drought coincided with a major outbreak of Jack Pine Budworm, a native moth whose caterpillars eat the needles of Jack Pines. Our current outbreak started in 2003, increasing each year until 2006 when the outbreak subsided in size and severity. Regrettably, the combination of defoliation and drought stress caused thousands of acres of mature jack pine to die from Pine Engraver attacks while many of the young saplings were being killed by Armillaria and Diplodia. Fortunately, our population surveys indicate a continued decline in the Jack Pine Budworm population.

### Balsam Fir and Spruce

Fir and spruce trees growing on heavier soils are holding up pretty well. However, when those trees grow on sand — as they do in the towns of Bass Lake, Hayward, Hunter, and Lenroot — they suffer high levels of top kill and mortality. Drought stress on light soils makes the trees susceptible to Armillaria Root Rot. Those weakened trees are then finished off by Balsam Fir Bark Beetles and Fir Sawyers which eat the cambium and girdle the trees. Blue Spruce does very well during dry spells, as it is well-adapted to dry conditions, and its major diseases (Rhizosphaera Needle Cast and Cytospora Canker) are suppressed by drought.

### Tamarack

This swamp-dweller is suffering in many locations around the area. Being a shallow-rooted species, it is less able to tolerate severe droughts than many other tree species. In swamps, the water level has dropped so low that the roots are left high and dry. Fortunately, a major outbreak of the Eastern Larch Bark Beetle is on the decline. That outbreak has caused the death of many thousand acres of tamarack across the entire Lake States Region, including Manitoba and Ontario, Canada. This aggressive native bark beetle needs no help from the drought to kill tamarack trees.

### Hardwoods

#### Popple or Aspen

These trees are weathering the drought with little more than some reduction in growth, and an individual tree biting the dust here and there. And fortunately the armyworms (Forest Tent Caterpillars) are not expected to visit us again for another five years or so.

#### Maples

Sugar and silver maples are holding up quite well through the drought except for those that are planted on sandy soils. Sugar maple is normally found growing on our better soils. Silver maples make their living by tapping into a reliable water source on a floodplain or banks of major rivers. Red maple on sandy soils is showing some major stress. Many trees show marginal leaf scorch, some are taking on their fall coloration far earlier than normal, while a few smaller samplings have already withered and died.

#### Ash

Most ash trees should have suffered little more than growth loss during this drought. Ash Anthracnose, a fungal leaf spot disease, should have dropped in severity, while premature leaf drop caused by the Ash Plant bug, a native plant sap-sucking insect, may have increased. Black Ash growing on our near-perched water tables may suffer high rates of mortality and dieback if their isolated water sources dry up.

#### Basswood

Basswood leaves are turning yellow and falling off all around the county. This is a survival tactic the trees use to prevent excessive water loss. The trees lose some growth but should survive and recover quickly once rain arrives. Basswoods' high rate of survival during the severe, prolonged drought during the late 1980s proves it is a survivor.

#### Birch

White or Paper Birch face very great danger during drought. Birch is a boreal species which is near the edge of its natural southern range. It just doesn't tolerate heat very well. Drought-weakened trees are attacked by the Bronze Birch Borer, a native flat-headed wood-boring beetle that mines the cambium. It girdles the branches and stems, killing the tree from the top down.

Fully 40 percent of the merchantable White Birch in Northwest Wisconsin died during and immediately after the late 1980s drought. We have not yet seen Bronze Birch Borer mortality, but I won't be surprised if it comes. Birch across much of the area is currently turning yellow and dropping their leaves, a sure sign they were under substantial moisture stress.

#### Oak

This normally tough, sturdy group of hardwoods is already dying at abnormally high levels. Our red oaks, northern pin (scrub or jack oak) and northern red are highly susceptible to the Two-Lined Chestnut Borer. This native cambial-mining beetle attacks oaks weakened by moisture stress, killing them from the top down. Symptoms start appearing in mid-July and progress as summer wanes until the oak is left holding a full crown of dead orange-brown leaves rattling in an autumn breeze. This insect was already above its normal population level when the drought began due to the aftermath of the last Forest Tent Caterpillar outbreak. May dead oaks can be found in the northern part of Sawyer County.

#### Outlook and Recommendations

The question of how our forests will fare will be more apparent next spring when the trees begin to leaf out. Dead trees will not come back to life, and pines with defoliation or cankers will continue to suffer. Further widespread tree mortality will only be averted if the populations of Pine Engravers, Bronze Birch Borers, and Two-Lined Chestnut Borers collapse.

Increased mortality can be expected in red pine, jack pine, and red oaks, and a widescale die-off of white birch is highly likely. Homeowners working to save individual trees should start by watering, watering over a period of time to allow deep soaking of the soil. Fertilizing in the spring is also helpful but not critical (Jobe's tree spikes are simple to use and work if used as directed).

If a tree is healthy, it is much more able to ward off the pests that attack them. If your birch or oak starts showing top dieback (branches with dead, withered leaves), you have a chance to save the tree by pruning off the withered branches as soon as the symptoms occur. Make sure to cut at least a yard into healthy tissue, as the beetle grubs feed ahead of the withered area and must be removed for the tree to live.

Water the trees liberally. A new systemic insecticide called imidacloprid may protect trees from the borers. Its most common trade name is MERIT. It can be applied as a soil drench, but it does not yet have a proven record of successfully stopping the beetles.

For woodlot management during a drought, avoid thinning red pine stands in spring or summer. If you must thin during the growing season, cut to the smallest possible top diameter and do not leave logs decked in your pine woods for more than three weeks.

If your stand of high-quality northern red oak is attacked by the Chestnut Borer, you can save most of the timber value by prompt salvage harvest. If most of your oaks are dying — say, 70 percent — clearcut as soon as possible. That will save the value of the oak lumber and kill the tiny beetle larvae in the branches by desiccation.

If your stand has enough live oaks to save (at least 40 percent live trees), mark the dead trees as soon as possible but do not cut them until the ground is well-frozen. Winter logging avoids soil compaction, which greatly reduces moisture stress.

If your oak stand has stayed healthy during the drought, do not do any kind of partial cutting until at least two years after the drought is over. The added stress of logging during a drought or Armyworm outbreak has proven fatal to red oak stands in the past.

It's important to remember too that our trees are suffering the cumulative effects of three successive years of drought. They have been steadily weakened over this time and one or two good rains are not going to restore them to perfect health, though it will bide them over for a bit longer.

If you have a particularly important tree you are concerned about, you'd better give it some tender loving care and water right now. And pray for rain.

Terryl Buchman is a forester with the Wisconsin Department of Natural Resources in Hayward, providing forest management assistance to forestland owners in Sawyer County.

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