



Drying Firewood in Interior Alaska

When to harvest wood for the most efficient drying times

The Fairbanks North Star Borough experiences some of the worst air quality in the United States in the winter due to temperature inversions and low wind speeds that trap pollutants near the ground. These pollutants are primarily composed of fine particulate matter 2.5 micrometers or smaller (PM_{2.5}). Inefficient burning of wet firewood to heat homes is a significant source of PM_{2.5} pollution, which can travel deep into the lungs and even enter the bloodstream, and can become a serious health problem.

One effective and cost-saving strategy to mitigate high winter PM_{2.5} concentrations is to burn sufficiently dry wood for heating homes. Burning wood with a moisture content of less than 20% significantly reduces fine particulate matter while optimizing energy output. Wetter wood produces more smoke, while wood drier than 10% moisture content burns more quickly and becomes less efficient for heating purposes. Burning properly dried wood is healthier and saves time and money on harvesting or purchasing wood.

Burning wood with a moisture content between 10% and 20% is the most efficient way to heat while limiting pollution.

By harvesting firewood strategically, wood users can reduce the time it takes to dry wood to a moisture content of 20% or lower. University of Alaska Fairbanks researchers designed a study to determine strategies for reducing firewood drying time. They found that drying time is determined primarily by the environmental conditions following the wood harvest. Firewood harvested before snowmelt and after green-up is exposed to hot and dry weather early in its drying process, drastically reducing drying time. Most moisture within the wood is driven off in these first few months, and the wood is sufficiently dry and ready to burn by the upcoming winter.

Number of days for firewood moisture content to drop to 20%*

Time of harvest	Paper birch <i>Betula neoalaskana</i>	White spruce <i>Picea glauca</i>
Pre-snowmelt	102	126
After green-up	67	63
Midsummer	316	298
After freeze-up	382	292

* Wood drying data is from Young-Robertson et al. (2025), conducted in 2022 and 2023. Due to yearly variations in weather, drying periods may be longer or shorter than those observed during this study.

Wood harvesting and drying recommendations

- ♦ For the quickest drying times, harvest, split and stack wood two to three weeks after birch green-up (when leaves develop).
- ♦ For the second shortest drying time, harvest, split and stack firewood right before snowmelt and a few weeks before birch sap starts to flow.
- ♦ To maximize drying efficiency, immediately cut and stack your wood to stove length. Stacking whole logs will result in much longer drying times.
- ♦ Properly stack wood to expedite the drying process.
- ♦ Use a moisture meter on freshly split wood that is not frozen to determine when the firewood has reached 20% water content.
- ♦ Before harvesting on public lands, consult the proper management agency for harvesting regulations and permits.

Due to its density, birch burns longer and hotter than white spruce and works better for overnight heating.



Follow these tips when storing firewood:

- ♦ Immediately split and stack.
- ♦ Stack wood in a way that air can circulate.
- ♦ To protect your firewood from rain and snow, cover the top, not the sides, with boards or a tarp.
- ♦ Stack firewood on a pallet or two-by-fours to keep wood off the ground.
- ♦ Don't store firewood beside your house or other structures to prevent introducing wood decay organisms (insects and fungi) into the structure.



Checking, or cracks in the wood, do not confirm the drying process is complete and can appear in the wood before the wood is below 20% moisture content.



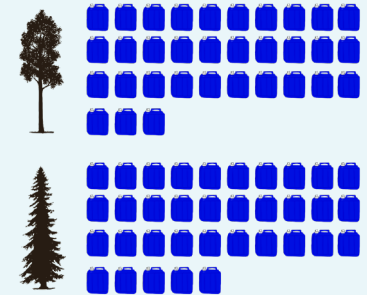
Little to no drying occurs when daily temperatures are below zero, even though it's very dry out. Additionally, the longer the cut and stacked wood spends in below-freezing temperatures, the longer it takes to dry once it warms up.



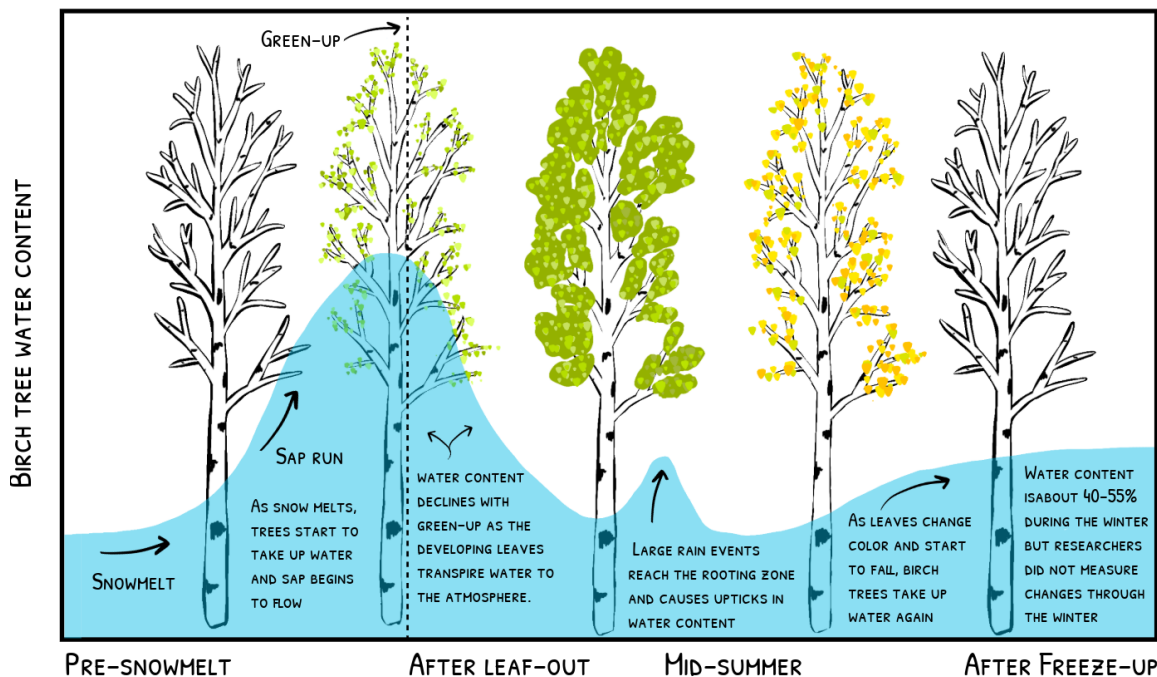
Seasonal hydrology of trees

As living birch and spruce trees uptake and release water throughout the year, the moisture content of their wood varies seasonally. Researchers explored whether seasonal variation in the moisture content of trees at harvest affected the drying time of birch and spruce wood. Contrary to what they thought, moisture content at harvest did not affect drying time, rather drying time was affected by the environmental conditions immediately after harvest.

A cord of cut and stacked wood harvested 2-3 weeks after green-up lost the equivalent of 33 to 35 blue jugs (5 gallons each) of water within the first month.



Seasonal Trend in the Moisture Content of Birch Trees

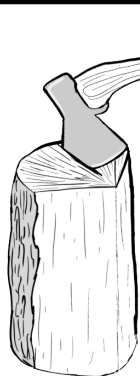


This graphic generalizes data from Young-Robertson et al. (2025) to show the trend of moisture content in birch trees throughout the season. While white spruce follows a similar seasonal moisture content pattern to birch, birch moisture content is generally higher and more dynamic.



MOISTURE METERS CAN BE USED TO DETERMINE IF OUR FIREWOOD IS BELOW 20% MOISTURE CONTENT AND READY TO BE BURNED

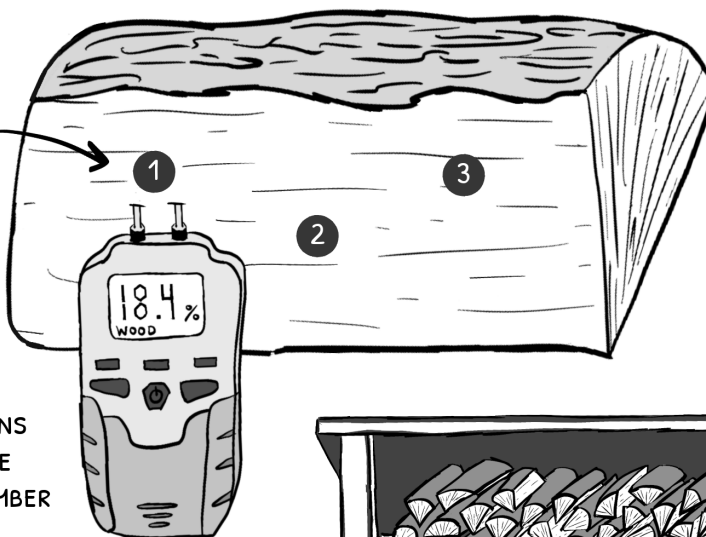
- 1 PIN CAP: PROTECTS MOISTURE READING PINS WHEN NOT IN USE
- 2 PINS ARE INSERTED INTO WOOD TO DETERMINE MOISTURE CONTENT
- 3 MOISTURE CONTENT IS DISPLAYED HERE AS A PERCENTAGE
- 4 CONSULT THE MANUAL OF YOUR DEVICE FOR SPECIFIC CONTROLS. IF THERE ARE MULTIPLE MODES, USE THE FIREWOOD MODE



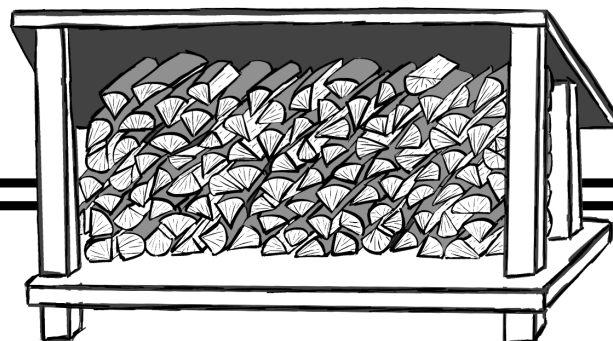
SPLIT THE WOOD AGAIN BEFORE TAKING READINGS

TAKE THREE READINGS FROM THE MIDDLE OF THE LOG AND WITH THE GRAIN OF THE WOOD

INSERT THE PINS WITH PRESSURE UNTIL THE NUMBER STABILIZES



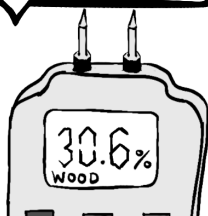
FROZEN WOOD? THE ACCURACY OF THE MOISTURE READING WILL BE OFF SO THAW THE WOOD BEFORE TESTING IT



TO DETERMINE IF YOUR WOOD STACK IS SUFFICIENTLY DRY, CHOOSE MULTIPLE PIECES OF WOOD FROM DIFFERENT AREAS WITHIN THE STACK

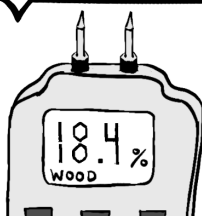
IF ANY OF THE THREE READINGS IS ABOVE 20%, THE WOOD NEEDS TO DRY FOR MORE TIME BEFORE IT SHOULD BE BURNED

TOO WET

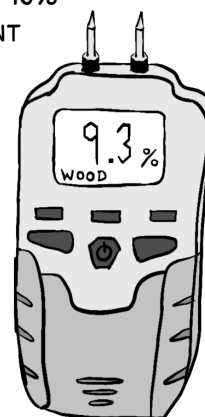


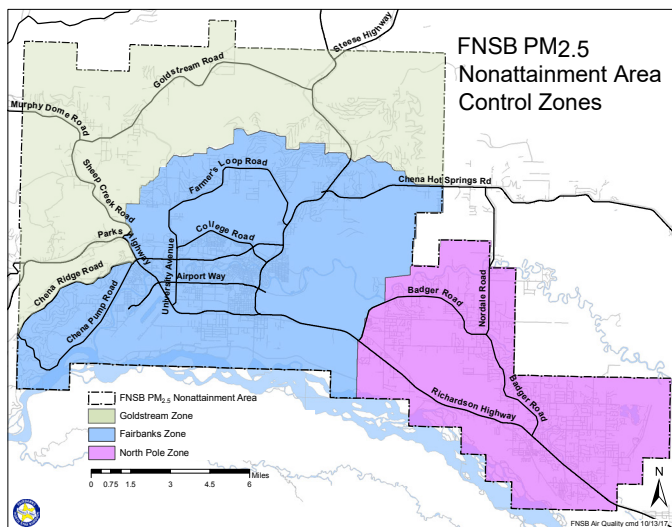
IF ALL THREE READINGS ARE BELOW 20%, THE WOOD IS READY FOR THE FIRE!

JUST RIGHT



WHILE FINE TO BURN, WOOD THAT IS BELOW 10% WATER CONTENT BURNS FAST AND HOT, LEADING TO HEAT DAMAGE TO WOOD STOVES AND INCREASED WOOD USE





The PM_{2.5} nonattainment area was established by the Environmental Protection Agency to improve air quality by regulating wood burning for heat in this area.

20%

Any firewood advertised, marketed or sold in the Fairbanks North Star Borough's nonattainment area must have a moisture content of 20% or less.



For more information about firewood, visit the RREA website <https://www.uaf.edu/ces/sustainable-resources/rrea/>

Reference:

Young-Robertson, J. M., Robertson, M. A., & Little, J. (2025). Identifying the Optimal Season to Harvest Firewood in Interior Alaska to Significantly Reduce Drying Time. *Forest Products Journal*, 75(3), 275–283. <https://doi.org/10.13073/fpj-d-25-00021>

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