



TREMBLINGS

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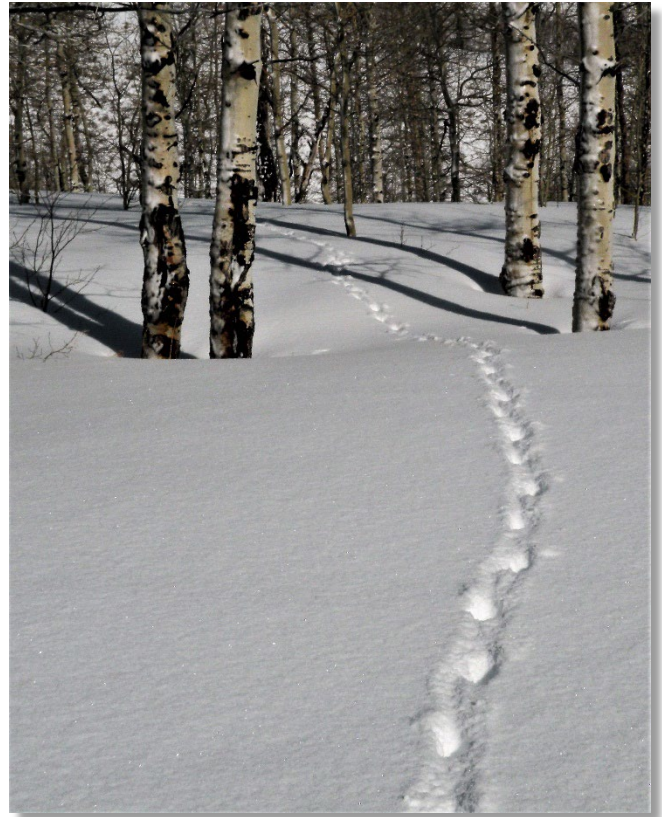
Partnering to preserve and restore healthy aspen ecosystems

MEMBER PARTICIPATION: The WAA is a virtual science-based community. Send us aspen-related publications, management plans, and media mentions and we'll help spread the word. Contact Paul Rogers, Director: p.rogers@usu.edu.

Share *Tremblings* with your friends and colleagues.

New members welcome! [Sign up here](#)

know has contact with potential philanthropic partners please reach out to [Director Paul Rogers](#). Thank you!



Signs of winter life permeate the aspen forests of the West. This image of coyote tracks in Logan Canyon, northern Utah, depicts a journey, perhaps a daily commute, through fresh snowfall in pursuit of a meal or warm place to shelter. (Photo: Paul Rogers).

WAA HAPPENINGS

A New Website in the Offing: The WAA will be implementing a new website in the coming months. Please forgive our disorganization as we make this transition. In the end, support provided by Utah State University's [Quinney College of Natural Resources](#) will ensure a higher caliber and more responsive online presence for the WAA.

WAA in Central Asia in 2023—Western Aspen Alliance Director Paul Rogers will be traveling to Mongolia to survey forest conditions, programs, and biodiversity conservation. SusTainable Resilient Ecosystem and Agriculture Management (STREAM) is a consortium of European Union, GIZ (German natural resource development cooperative), Mendel University (Czechia), National University of Mongolia, and numerous European higher education institutes. (Utah State University is the only North American University participating in STREAM.) Among numerous forest objectives, biodiversity and the role of Eurasian aspen (*Populus tremula*) in supporting global diversity is key to the WAA's participation.

WAA Looking for Sponsors—The Western Aspen Alliance is in need of corporate or individual philanthropic supporters. Due to the recent unanticipated ending of our agency funding, we are seeking private donors to fill this gap. The WAA is a non-profit natural resource research and education entity based at Utah State University. If you or someone you

UPCOMING EVENTS

Creative Tensions: Living With Fire—Author Alison Turner's new fiction titled "[Defensible Spaces](#)" will be featured alongside the expertise of forest ecologist Paul Rogers in a [public forum](#) at the Salt Lake City main library Feb. 22, 2023. [Creative Tensions](#) is a format for collective conversation expressed in movement, wherein participants reveal where they stand on an issue by where

they stand in the room. Guided by a moderator and provoked by experts who approach a given topic from different perspectives, *Creative Tensions* is an eye-opening, reflective, and inspiring live experience. The event is co-sponsored by Torrey House Press, The King's English bookstore, and Salt Lake City Public Library.

Foresters Host Aspen Tour—The Intermountain West Society of American Foresters and Utah State University Forestry Club will be hosting a half-day aspen tour in Logan Canyon, northern Utah, April 22, 2023 (Earth Day!) with WAA Director Paul Rogers. You may learn more about their annual meeting and this aspen tour by contacting USU Forestry Club at: usuforestry@usu.edu.

Summer 2023 Aspen Workshops:

- The WAA will co-host its first Washington summer workshop in July 2023 (date TBD). The location will be northeast Washington, near Cusick. Contact [Katherine Napier-Janz](#) (Alpine Forestry) for more information.
- The Colorado Aspen Summit is revving their engines for a repeat 2023 workshop to be held in southwest Colorado (date/place TBD). This state, having the largest coverage of aspen in the 'lower 48,' also maintains a sizable contingent of professionals working in these communities; hence, the keen interest in a reprise workshop. Contact [Gloria Edwards](#) (Southern Rockies Fire Science Network) if you want to learn more.
- A repeat Sierra Nevada Aspen Workshop is also being planned. Last year's Markleeville, California, event drew a healthy roster, but folks there wanted to see more discussion of west slope issues in the Sierra Nevadas. If you have an interest in organizing, attending, or contributing to this event please contact [Becky Estes](#) (USFS R5 Regional Ecologist).

We're open to future proposals for aspen workshops in your area. Please contact [WAA Director](#) Paul Rogers.

COMMENTARY

It's cold out there! Frost: An overlooked aspen disturbance

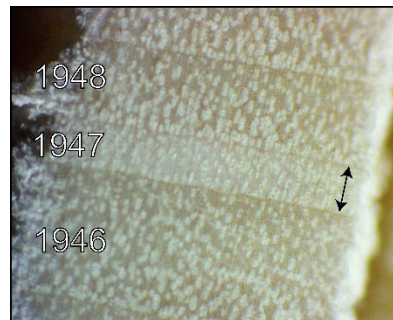
Joseph D. Birch, Department of Wildland Resources, Utah State University, Logan, Utah



If you have ever decried the arrival of a frost in May or June, you are not alone. As it turns out, late-spring frost is also a problem for aspen. Our [recent research](#) details the damaging history of defoliating frost on aspen over nearly two centuries. Early in

the growing season aspen are undergoing budburst and are particularly vulnerable to frost. When a frost arrives shortly after budburst, the buds and leaves may be so seriously damaged that the aspen is partially or fully defoliated. This disturbance disproportionately impacts aspen while largely sparing frost-tolerant conifers. The immense resource expenditure to re-flush leaves after defoliation may lead to elevated mortality rates. For example, a severe frost in May 1919 caused a temperature drop of 107 °F (41 °C) over four days resulting in widespread defoliation and mortality across Utah.

If aspen stems survive such defoliation, frost episodes can leave an indelible mark in the wood anatomy with a 'white ring' (photo, 1947) These white rings result from



carbon being used to re-flush leaves rather than contribute to thick structural cell walls. We used white rings identified in tree cores from aspen stands across Utah to determine frequency and damage of frost

over the last 185 years. Our oldest aspen had defoliating frost events as early as 1785 and as recently as 2020. Widespread frost events occurred in 1870, 1902, 1919, 1947, 1954, 2007, and 2020 in Utah and neighboring states. These frosts usually see aspen radial growth decline by 40% and occur in about one of every twenty years. Frosts seem to favor conifers and likely hasten

their dominance. Because these incidents impact entire regions, multiple stands may be impacted simultaneously, and in combination with drought, cause aspen decline. While we can't prevent frosts, minimizing competition with co-occurring conifers may help aspen recover.

While defoliating frost has only been quantified in Utah (so far!), certainly this disturbance impacts aspen elsewhere. In Canada's aspen parkland and southern boreal forest, the presence of widespread defoliating insect outbreaks complicates the identification of frost defoliation. It may be that these aspen populations are better adapted to growing season frost. Aspen in other portions of its range may have physical adaptations that help populations or individual trees avoid the risks of a mistimed budburst. Variations in budburst timing between adjacent clones can result in [dramatic differences](#) when frost does occur and these differences between and within aspen clones will provide fertile ground for future work.

With increasing climate variability and warmer temperatures, what does the future hold for seasonal frost and aspen? Unfortunately, the picture isn't clear. Warming may promote earlier budburst and actually *increase* the exposure to [defoliating frost](#) if the frequency of frosts does not decrease. There remain many questions about how these frosts may particularly disadvantage aspen. It is likely that the impacts from these frosts will shift with climate change and more research is needed to identify how these changes will impact aspen across its range.

WAA Creates

"WAA Creates" requests geographically diverse artistic aspen-related contributions. We encourage fiction, folklore, poetry, drawings, paintings, photography, and other artistic expressions. [Send your stuff](#) to share with WAA readers.

Van Gogh on Aspen (DALL-E 2, AI software composed)



Nathan Gill
Lubbock, Texas

From the artist: *This image was created by me and DALL-E 2, an Artificial Intelligence system designed to combine concepts, attributes, and styles from a text description to create original art. The text description that led to the creation of this image was "A quaking aspen clone on a mountain ridge with autumn colors in the style of Van Gogh".* Nathan can be found at the Texas Tech [LEAF Lab](#).

RECENT ASPEN PUBLICATIONS

A word on Open Access: The Western Aspen Alliance strongly supports open access publishing (CC-BY). Articles with hyperlinks below are available for download and sharing following [Creative Commons](#) rules for attribution.

Asadulaev, Z.M., and P.K. Omarova. 2022. Postfire Recovery of a Broad-Leaved Forest in Submountain Dagestan. *Contemporary Problems of Ecology* 15:659-670.

- Bennett, J.A., J. Franklin, and J. Karst. 2022. Plant-soil feedbacks persist following tree death, reducing survival and growth of *Populus tremuloides* seedlings. [Plant and Soil](#).
- Birch, J. D., Y. Chikamoto, R. J. DeRose, V. Manvailor, E. H. Hogg, J. Karst, D. M. Love, and J. A. Lutz. 2022. Frost-Associated Defoliation in *Populus tremuloides* Causes Repeated Growth Reductions Over 185 years. [Ecosystems](#).
- Ding, C., and J.S. Brouard. 2022. Assisted migration is plausible for a boreal tree species under climate change: A quantitative and population genetics study of trembling aspen (*Populus tremuloides* Michx.) in western Canada. *Ecology and Evolution* 12:[e9384](#).
- Eisenring, M., R.L. Lindroth, A. Flansburg, N. Giezendanner, K. E. Mock, and E. L. Kruger. 2022. Genotypic variation rather than ploidy level determines functional trait expression in a foundation tree species in the presence and absence of environmental stress. *Annals of Botany* [mcac071](#).
- Gustafson, E.J., C.C. Kern, and J.M. Kabrick. 2023. Can assisted tree migration today sustain forest ecosystem goods and services for the future? *Forest Ecology and Management* 529:120723.
- Kēniņa, L., D. Elferts, I. Jaunslaviete, E. Bāders, G. Šņepsts, and Ā. Jansons. 2022. Tree biomass—a fragile carbon storage in old-growth birch and aspen stands in hemiboreal Latvia. *Baltic Forestry* 28:654.
- Nesbit, K.A., L.L. Yocom, A.M. Trudgeon, R.J. DeRose, and P.C. Rogers. 2023. Tamm Review: Quaking aspen's influence on fire occurrence, behavior, and severity. *Forest Ecology and Management* 531:120752.
- Steen, K., V. Bailey, G. Boodhoo, and B. McLaughlin. 2022. Yellowstone Ecological Forecasting: Assessing Change in Aspen Extent in Northern Yellowstone National Park. NASA Develop National Program, Athens, Georgia. https://ntrs.nasa.gov/api/citations/20220015305/downloads/2022Sum_GA_YellowstoneEco_TechPaper_FD_v2.docx
- Witzell, J., V. H.G. Decker, M. Agostinelli, C. R. Tapia, M. Cleary, and B. R. Albrechtsen. 2020. Aspen leaves as a “chemical landscape” for fungal endophyte diversity—Can nitrogen and herbivory shape the community composition in controlled conditions? *Frontiers in Microbiology* 13. [846208](#).

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Website: <http://www.western-aspen-alliance.org/>



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