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Where Few Trees Have Gone Before

As the climate warms, forests encroach on meadowland

By Carrie Madren | Tuesday, February 12, 2013 | 2 comments

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In perhaps the slowest invasion in history, mountain meadows in the Pacific Northwest—where hikers and backpackers revel in breath-taking scenery—are gradually giving way to hemlocks, Pacific silver firs and other conifers. In these high-elevation, subalpine meadows of Jefferson Park in the central Cascade Range in Oregon, snow typically covers the meadows until July or August and returns again in November or December—too short a growing season for most trees to take root. But with a warming climate, snow has begun melting earlier and growing seasons have lengthened; that extra time with little or no snow cover has given trees a boost. As a result, tree occupation rose from 8 percent in 1950 to 35 percent in 2008, reports a U.S. Department of Agriculture Forest Service–funded study published last October in *Landscape Ecology*.



Jefferson Park, Oregon

Image: COURTESY OF HAROLD S. J. ZALD Oregon State University

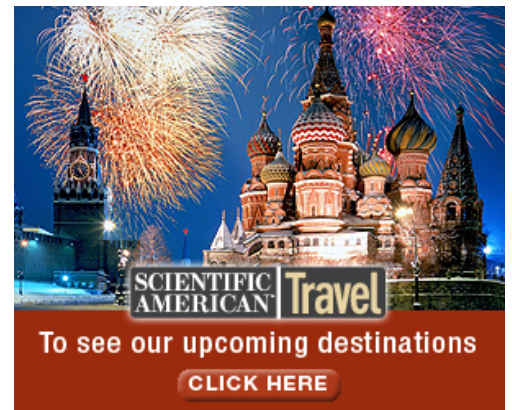
At a time when so many forests are threatened, aren't more trees something to celebrate? Not necessarily, say the authors of the new study. These tall trees block light that meadow grasses, shrubs and wildflowers need to survive. Once trees become established, the surrounding seed banks of native grasses tend to fade away. The meadows' "biodiversity value is much larger than the amount of area they occupy," explains lead author Harold S. J. Zald, postdoctoral research associate at Oregon State University, who hatched the idea for the study while backpacking in the Cascade Range. The researchers do not yet know which plant or animal species would be endangered.

The scientists did find one bright spot: depressions in the landscape carved out by glaciers held deeper snow that lasted longer through the summer. Such indentations might hold important reservoirs of meadow species even as global temperatures rise, Zald says.

To gather data, the researchers pinpointed study plots with GPS, counted trees by species, measured snow depth in late July, and sleuthed back through time by taking tree core samples to determine their age. Using LiDAR data—"basically laser beams sent down from an airplane," Zald explains—the team created a precise, three-dimensional map of vegetation, rock and soil, helping the researchers understand where trees became established and how deep the snow was over the rugged landscape.

Although there is still much to learn, the study highlights yet another impact of climate change. "Over the past 20 years in the Pacific Northwest, we've been focused on conservation of old-growth forests as well as conservation of species such as the spotted owl and salmon," Zald says. "But in the process, we haven't really paid attention to meadow decline. Moving forward, this may be an emerging

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