

Yellow-cedar are dying in Alaska: Scientists now know why

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Yellow-cedar in West Chichagof-Yakobi Wilderness Area, a pristine area of coastal Alaska, faces intensive mortality. Credit: Paul Hennon

Yellow-cedar, a culturally and economically valuable tree in southeastern Alaska and adjacent parts of British Columbia, has been dying off across large expanses of these areas for the past 100 years. But no one could say why -- until now.

"The cause of tree death, called yellow-cedar decline, is now known to be a form of root freezing that occurs during cold weather in late winter and early spring, but only when [snow](#) is not present on the ground,"

explains [Pacific Northwest Research Station](#) scientist Paul Hennon, co-lead of a synthesis paper recently published in the February issue of the journal *BioScience*. "When present, snow protects the fine, shallow roots from extreme soil temperatures. The shallow rooting of yellow-cedar, early spring growth, and its unique vulnerability to freezing injury also contribute to this problem."

Yellow-cedar decline affects about 60 to 70 percent of trees in forests covering 600,000 acres in Alaska and British Columbia. The paper, "Shifting Climate, Altered Niche, and a Dynamic Conservation Strategy for Yellow-Cedar in the North Pacific Coastal Rainforest," summarizes 30 years of research and offers a framework for a conservation strategy for yellow-cedar in Alaska.

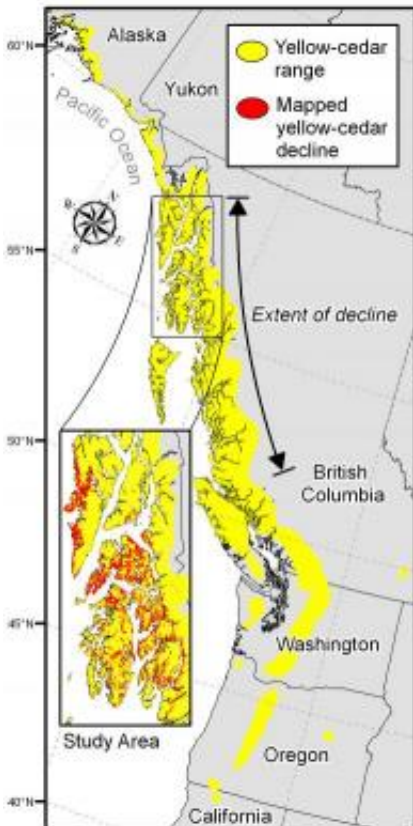


This photo shows the dying crown in a yellow-cedar tree that has freezing injury to its fine roots. Credit: Paul Hennon

Some key findings include:

- The complex cause of yellow-cedar decline is related to reduced snow, site and stand characteristics, shallow rooting, and the unique vulnerability of the roots to freezing in low temperatures.
- Low snow levels and poor soil drainage lead to impact root injury and the eventual death of yellow-cedar trees. The tree thrives in [wet soils](#), but its tendency to produce shallow roots to access nitrogen on these sites made it more vulnerable when spring snow levels were reduced by climate warming.
- Yellow-cedar health depends on changing snow patterns, thus locations for appropriate conservation and management activities need to follow the shifting snow patterns on the landscape.
- Some responses to shifting climate are expected to be complex and difficult to anticipate. Long-term multidisciplinary research was needed to determine the true role of climate in the health of yellow-cedar and untangle it from other processes and natural cycles in forests.

The yellow-cedar is a slow-growing tree; many are 700 to 1,200 years old. The tree has long been culturally significant to Native Alaskans who use it to make paddles, masks, dishes, and woven items. The wood is also very valuable commercially (for home and boat building) because of its straight grain, durability, and resistance to insects.



Yellow-cedar can be found growing from California to Prince William Sound in Alaska. The yellow-cedar decline occurs along a 600-mile zone from British Columbia to southeast Alaska. The extensive tree death has been mapped on about one-half million acres in southeast Alaska. Credit: Colin Shanley, The Nature Conservancy

Attention is now directed toward a solution to protect and manage yellow-cedar, as coastal Alaska is expected to experience less snow but a persistence of periodic [cold weather](#) events in the future.

Scientists are working with partners in the Alaska Region of the Forest Service to use this new information as the framework for a comprehensive conservation strategy for yellow-cedar in Alaska in the context of a changing climate.

"We also have ongoing projects with colleagues in the Tongass National Forest in Alaska on planting and thinning to favor yellow-cedar on suitable habitat," adds co-lead author and station scientist Dave D'Amore, "especially on well-drained productive soils where most of the commercial forestry exits. Silvicultural techniques can be used to nudge the ecological niche of yellow-cedar, making it more competitive on these favorable sites."

Provided by USDA Forest Service

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