BACKCOUNTRY

THE UNTRACKED EXPERIENCE

THE LOST ARC

HIDDEN ROUTES, EXTINCT LINES AND THE FUTURE OF SKIING IN A MELTING WORLD

+

THE GREAT RECESSION

FINDING FLOW ON WANING GLACIERS

+

KAZAKHSTAN

900 MILES OF HORSES TRAINS & SKINTRACKS

MAINLINE – BACKCOUNTRY
03>
0 71435 02160 1
$14.95 US/CAN DISPLAY UNTIL JUNE 16, 2026

Measuring Ice

The Oregon Glaciers Institute is using citizen science to document the retreating ice sheets before they disappear.

by Tom Hallberg

Mountains call to Steve Boyer.

Across his globe-spanning career, the medical doctor and glaciologist was a member of the seminal 1981 American Medical Research Expedition to Everest, attempted to re-create and understand prehistoric ice on Baffin Island, and published scientific literature on glacial retreat in eastern Antarctica. Despite the lure of faraway, remote expanses, he's most drawn to one closer to home: Oregon's Mount Hood.

"I've climbed it 169 times," he says.

In summer 2003, blue ice shining through the melting toes of the mountain's 12 glaciers, Boyer cataloged each one. Climate change and glacial retreat had already entered the public psyche, and Boyer's photos would provide a snapshot before the melting worsened. "I just wanted to do it because these glaciers are living organisms," he says. "They're like us. We breathe in oxygen and make it into carbon dioxide. They breathe in snow and make it into ice."

Would anyone ever use the photos? Boyer didn't know, but as the years passed, he held onto the collection, a single data point waiting for a comparison.

Then, fellow glaciologist Anders Carlson formed the nonprofit Oregon Glaciers Institute in 2020 to assess the health of the state's glaciers. Local climbing club The Mazamas had tracked the state's glaciers through the 1980s, and the federal government last measured glacial mass on Mount Hood that same decade.

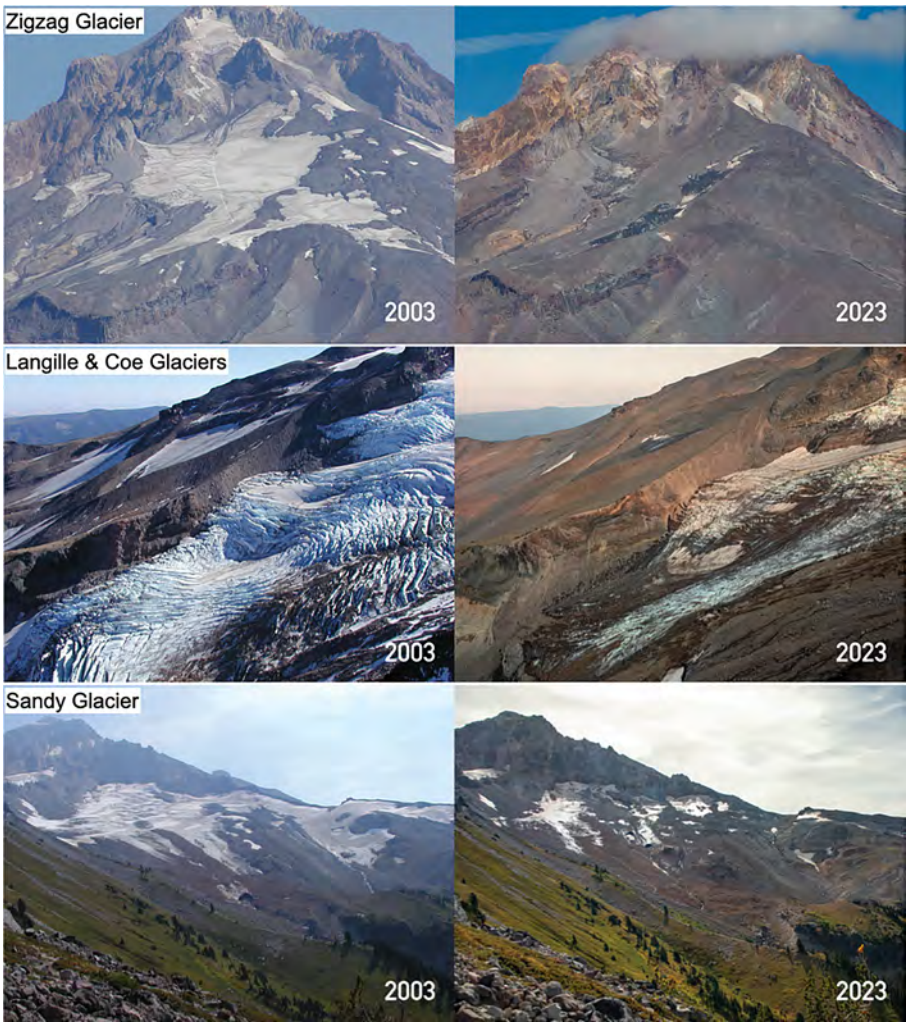
However, the Oregon Water Resources Department doesn't track glaciers, the United States Geological Survey (USGS) has no reference glaciers there, and the National Park Service's one property in the Beaver State—Crater Lake National Park—has no glaciers. To make matters worse, the last time USGS topographic maps for the state had been updated was the 1950s. "Holy cow, we've got 65 years or so of time where glaciers clearly have changed, and the federal government never updated the maps," Carlson says. Simply put, no one knew the glaciers' current state nor rate of decline.

Carlson and the institute's volunteer team took a novel approach: They queried citizen scientists and mountain enthusiasts for historical pictures, then used those to estimate glacial retreat from the last official measurements. To confirm, they groundtruthed the estimates with in-field measurements and research.

Two decades after lugging film equipment up the slopes of Oregon's tallest peak, Boyer found a home for his work. The institute used the images to set up a before-and-after comparison with analogues from 2023. "It was sort of a gift in two ways," he says. "It was a gift for the institute to use my information, and I was giving them a gift of these photographs."

Glaciers in Oregon are not solely the domain of climbers and skiers. Mountain sports pale in comparison to the icefields' economic and ecological functions. Streams and rivers in the state's western half are dependent on glacial meltwater for late-season flow. Salmon, trout and critical

Mount Hood's glaciers sleep well insulated beneath winter snow. **Jon Ellinger / TLT Photography**



If humans reverse the warming of the planet, Oregon's glaciers could gain mass again, undoing decades of loss.

[This Page] Repeat photographs show the rapid recession of Mount Hood's glaciers between 2003 and 2023. **Courtesy Oregon Glaciers Institute**

[Facing Page] Doug Ward airs into a turn on an early descent of Alberta's Skyladder line. **Ian Tomlinson**

aquatic invertebrates need that cold water to survive, and the state's $8 billion agricultural sector draws from those flows to last until harvest season. Oregonians who've never set foot on a glacier are inextricably tied to them.

"It's not purely academic, it's not purely environmentalistic," Carlson says of the institute's research. "It's got a real economic reason, too."

The results show the threat of glacial loss is increasing. Ten glaciers on Mount Hood have consistent data that spans from 1981 to 2023. From 1981 to 2015, they retreated at a rate of 0.81% per year, a concerning but, perhaps, not alarming trend. According to a paper by institute scientists published in *The Cryosphere*, a scientific journal dedicated to frozen water and landscapes, that rate increased to 2.1% from 2015 to 2023. The rate of loss on Hood's seven largest glaciers was 3.5 times faster from 2000 to 2023 than in the 20th century.

Perhaps the biggest takeaway from the institute's research beyond the increased rate of loss is that anthropogenic climate change is to blame. Winter precipitation from 2013 to 2023 was relatively the same as from 1895 to 1924, according to their paper, but temperatures during the summer melt season were 1.7 to 1.8 degrees Celsius higher. And that's just on Mount Hood. Oregon's southern glaciers on the Three Sisters are likely to disappear completely in coming decades, according to an institute report in the *Mazama Bulletin*.

Surprisingly, Carlson is still hopeful. He must be to continue in this work. If humans reverse the warming of the planet, Oregon's glaciers could gain mass again, undoing decades of loss. He finds solace knowing carbon-neutral energy is now cheaper than fossil fuels. "We can do this if we want to," he says. "The solution is well within our grasp if we just want to reach out and take it."

Societal change requires people to care about and feel connected to the issue. To that end, the institute has released its newest citizen science initiative, the Glacier Tracker app. Anyone traveling in Oregon's mountains can download the app and be geolocated to the same spots Boyer and the researchers have taken reference photos from. They can then add to the growing compendium of images used to monitor the glaciers, which will be available to the public on the institute's website.

Boyer's photos created the possibility of a comparative, before-and-after study. With the Glacier Tracker app, his images become the start of a body of work, point A in a lineage of data that will inform the understanding of policymakers, water users and recreators across the state. Like with its previous citizen science initiatives, the Oregon Glacier Institute isn't doing research for the sake of information or data. According to Megan Thayne, a geographer who developed the Glacier Tracker app, the aim is to galvanize users: "Step one is to pay attention. But step two is what are we going to do about it?" ❄