



# Trickle-Down Theory: *A Gorge Story*

*How  
our water  
gets from  
mountaintop  
to faucet, and  
what the future may hold*



Eliot Creek drains Mount Hood's Eliot Glacier.

## Story & photos by DAVID HANSON

**J**ust before the turn off Highway 35 to Cooper Spur Resort, a small creek, no more than four feet wide, flows out of the dark forest. It's clear and cold and, aside from heavy rain or snowmelt, runs at roughly the same flow year-round.

A few hundred yards up from where the creek meets the highway, behind a locked gate, there is a slab of concrete as wide as a city block and half as long. It ramps up the natural slope, covering the place where that creek emerges from its channel deep below Mount Hood. Beneath the concrete, a pipe diverts less than half of the creek — 1,500-1,700 gallons per minute — and carries it to 5,800 residents, businesses, and fruit packers from Parkdale to China Gorge Restaurant.



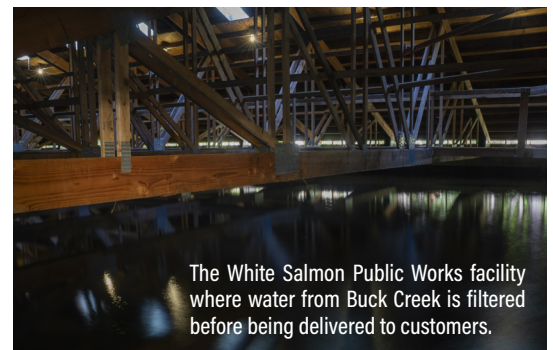
Fred Schatz, Crystal Springs Water District superintendent, at the main source of Crystal Springs water on Mount Hood.

“The first time this water sees daylight is when it leaves someone’s faucet,” Fred Schatz, superintendent of Crystal Springs Water District, tells me as we stand atop the concrete. “The only thing we add is chlorine, and mostly just for liability. We’re lucky. It’s really clean water coming from deep.”

This past summer, with water always on the mind — keeping plants alive, finding swimming holes, worrying about wildfires and heat domes — I went on a mission to answer a few questions about the plumbing of the Columbia River Gorge. Why in the summer does the Hood River run gray and shallow while the White Salmon River is crystal clear and carries enough water for rafting? How does the snow and rain that fall onto Mount Hood and Mount Adams move underground, above ground, and into our homes? And, most pressingly, what’s our outlook for water in the future?

Mirroring the Crystal Springs operation on the Mount Hood side of the Columbia is the City of White Salmon’s water source, Buck Creek. As opposed to the untouched Crystal Springs source, Buck Creek flows on the surface, down from its headwaters near Monte Cristo Mountain.

I meet Andrew Dirks, White Salmon Public Works director, at the base of Buck Creek where it enters the White Salmon River. We drive a few miles upstream to the city’s water treatment center, a squat building about ten feet tall. Inside is a small room with pipes and gauges, but most of the building is made up of two rooms full of water with sand at



The White Salmon Public Works facility where water from Buck Creek is filtered before being delivered to customers.

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The mouth of the White Salmon River.

the base. The facility draws water (600 gallons per minute) from nearby Buck Creek that settles through the sand. Then chlorine is added and gravity pulls it to White Salmon consumers.

“The slow sand filter operation is really basic,” Dirks tells me. “But the rest of the system is complicated, with two wells drawing from the Grande Ronde Aquifer and a system designed to pump excess water in low-use months back into the ground for aquifer recharge.”

Dirks, like Schatz, isn’t too worried about water quantity (assuming development growth remains moderate), but both are concerned

about upgrading aging infrastructure and the risk of wildfire and floods to the conveyance systems.

“We’re due for another major flood like the ones in ’64, ’81 and ’96,” Schatz tells me. “That makes me nervous. I also worry that too hot of a wildfire in the upper basin could allow nitrates to get into the water and those are hard to remove. Thankfully we only saw a minor uptick in nitrates from the Gnarl Ridge Fire in 2008.”

Future weather projections indicate hotter temperatures and increased wildfire risk, but also more precipitation. My chief question

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The mouth of the Hood River.

remained: more rain and snow sounds good, but where does it go? The water districts have water storage tanks and irrigation districts maintain reservoirs like Laurance and Kingsley, but what's happening underground?

If you could produce the perfect person to answer these questions, it might be Nate Klema. Before beginning his doctoral dissertation on volcanic landscape evolution in the Columbia River Gorge, Klema was an international expedition kayaker. His kayaking connected him intimately to surface flows for more than two decades. Lately, he's been diving deep into the science of how rock and water interact below the surface. I spoke to him while he took a break from research in Eugene.

"The Columbia River is the largest river on earth that crosses an active volcanic arc," Klema tells me. "Massive mountains are growing with the Columbia cutting through the middle of it."

But the ancient story isn't as simple as two enormous stratovolcanoes depositing lava. Rather, the timing and source of rock deposition in the Gorge is much more nuanced and explains the differences we see between Mount Hood rivers and Mount Adams rivers.

"One key difference between the Hood and Adams side is the amount of basalt," Klema says. "Mount Hood tends to erupt fine-grained ash, as recently as when Lewis and Clark passed through the Gorge. On the Washington side, several smaller volcanos have erupted young lava flows that cooled into basalt rock."

Most of the Adams-side material closest to the surface originated from a volcanic



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The Davis Spring, a recently acquired water source for the Crystal Springs Water District in the upper Hood River Valley.

eruption in the Indian Heaven Wilderness that sent slow, low-viscosity lava material flowing toward the Columbia in a manner similar to modern-day Hawaii. The lava follows existing topography and river channels downhill, cooling quickly and, you could say, sloppily. Gas bubbles harden into holes, and cracks traverse throughout. It basically becomes a solid black block of Swiss cheese with cracks on top and gaps at the base.

The underlying, relatively fresh, geology on the White Salmon side explains why the Little White Salmon and White Salmon Rivers flow clear and consistent throughout the dry summer.

“You can think of young basalt as trying to dam a spring with a sponge,” Nate says. “There’s not a hard boundary. Water’s going to seep into the rock layers and slowly move through the gaps and cracks until the water is forced to the surface at lower elevations. The Little White Salmon River has a perfect sponge dam on the top and that’s why you get long flows even after the rain has stopped.”

The Mount Hood side, by contrast, has a different and older volcanic story. The Columbia River basalt flows originating in eastern Oregon about 15 to 17 million years ago account for most of the base layers on the Hood River side, forming the walls of the Gorge. Over such a long time, water can slowly weather the basalt into fine material that effectively “clogs” the sponge so water tends to flow on the surface versus slowly seeping into the ground. Horizontal layers at the base of massive basalt flows still exist and account for the aquifers that hold and move water, such as the one that carries Crystal Springs water to the surface near Highway 35. But in general, the gaps have been filled around Mount Hood, so the Hood River carries surface and glacial sediments, resulting in less clear water. Flows spike and drop rapidly without the slow basaltic infiltration seen in White Salmon river drainages.

The final stop on my local plumbing project is to a spring outside Trout Lake. A trail above the White Salmon River leads a few miles into a towering forest. Soon the trail drops into a small valley with a flow no wider than

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10 feet of rushing water. I follow the trail upstream for a short time until I notice the silence. The topography hasn't changed — I'm still walking in a narrow valley bottom. But there's no stream. I backtrack on the trail. When I hear water again, I head toward it. There, at the base of a short, steep hill, the creek emerges from the ground. Knowing the hulking mass of Mount Adams is above me, I try to imagine the snow and rain soaking downward into the basalt cracks and air-bubble holes to reach this outlet.

Maybe it's just a primitive reaction to clean, available water, but there's an intimacy to being so close to the source, to this hidden fracture where the most valuable, vital substance on earth rushes forth, free of charge, with no guardrails, labels, or on-off switch. I kneel, put my face down to where the mountain becomes water, and drink.

*David Hanson is a writer, photographer and video producer based in Hood River. Find his editorial and commercial work at [ModocStories.com](http://ModocStories.com) and weddings at [CascadiaStudios.com](http://CascadiaStudios.com).*

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