



When The Snow Melts

Mountain snowpack is key to the Harney Basin water year

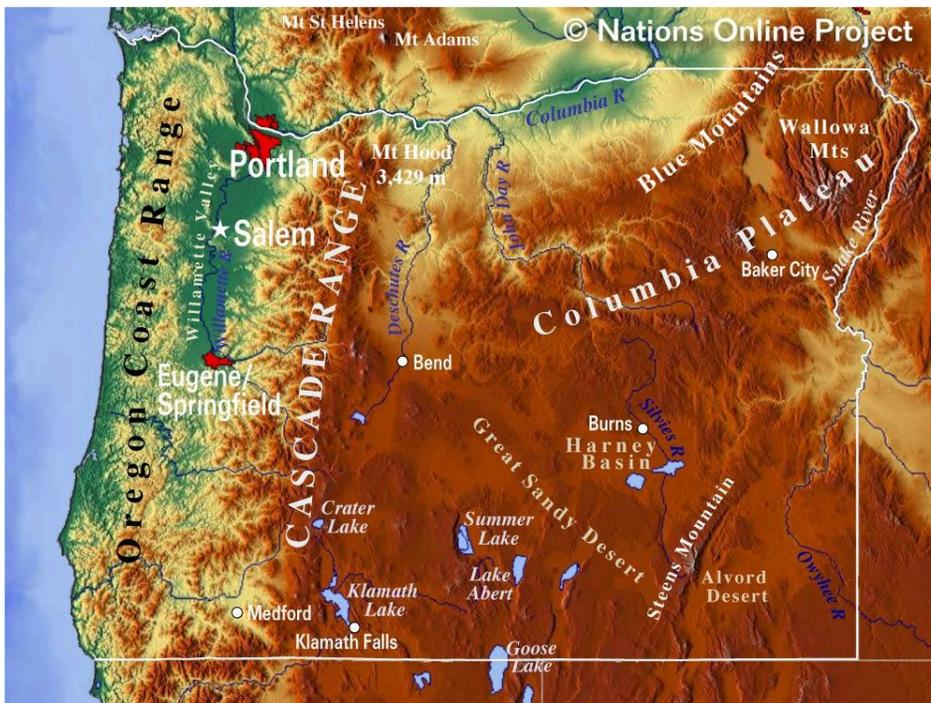
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by Lauren Brown

A healthy snowpack in the Harney Basin benefits not only ranchers and farmers who rely on it to grow hay, but also migrating birds who depend on the flood irrigated wet meadows in the spring as they travel to their northern breeding grounds. Current snowpack numbers put the Harney Basin at a snow water equivalent of 122 percent of normal as of March 3, according to the U.S.

Department of Agriculture's Natural Resources Conservation Service.

The Harney Basin Wetlands Collaborative, a collaborative of High Desert Partnership, formed in 2011 to improve the aquatic health and sustainability of Malheur Lake, and the flood irrigated wet meadows across the Harney Basin. The snowpack plays a key role in determining how much water flows into Malheur Lake and the wet meadows.



How does this water journey from the higher mountain elevations surrounding the Harney Basin (uplands) end up in the wet meadows (lowlands) where birds and ranchers benefit? It starts in the Blue Mountains to the north and Steens Mountain to the south.

Amanda Garcia, a hydrologist for the United States Geological Survey (USGS), said that while snow accumulates in the mountains all around the Harney Basin, the most notable accumulations of snow occur in the Blue Mountains and Steens Mountain. The semi-arid climate in the basin means that there are mild summers and cool winters with most of the precipitation occurring in the upland areas from November to May.

At the highest elevation in the basin, the Blue Mountains receive an annual total of about 25 to 30 inches of snow whereas the ridgeline of Steens Mountain receives an annual total of more than 50 inches.

According to the Hydrologic Budget of the Harney Basin Groundwater System prepared by the USGS and the Oregon Water Resources Department, water flowing from these areas is measured in gages at the Silvies River near Burns, the Donner und Blitzen River near Frenchglen and at Silver Creek near Riley on the west side of the basin.

The Silvies River flows southward from the Blue Mountains and represents about 80% of roughly 170,000 acre feet per year of surface water that drains the Blue Mountains within and east of the Silvies River watershed.

The Donner und Blitzen River flows northward from Steens Mountain. About 50% of the streamflow that comes from Steens Mountain flows through the Donner Falls und Blitzen upgradient of Frenchglen while the other 50 percent comes from other creeks including Kiger Creek, Bridge Creek, McCoy Creek, Krumbo Creek, Mud Creek, Cucamonga Creek, and Riddle Creek. The total flow on average draining Steens Mountain and flowing onto the lowlands to the north is just over 200,000 acre feet per year.

Tony Svejcar, a partner with the Harney Basin Wetlands Collaborative and a retired rangeland scientist and research leader with the U.S. Department of Agriculture, said the notable difference between the Silvies River and Donner und Blitzen River gages is the timing of the peak water flows. "It's pretty much a whole month's difference in peak flow," he said. Peak flows for the Silvies River tend to happen in March and April whereas the peak flows in the Donner und Blitzen occur in April and May. "Part of that is that the Silvies River watershed is lower in elevation, and it's not as snow dominated as the Donner und Blitzen River," Svejcar said.



Spring freshet

As temperatures gradually warm up in the spring, most people are familiar with the spring freshet, or the annual high-water river event that results from melting mountain snow. Gravity pulls snowmelt down through streams and springs and while some of it is consumed through evapotranspiration (loss of water both by evaporation from the soil surface and by transpiration from the leaves of the plants), the rest travels down to the lowlands and Malheur and Harney lakes.

Part of the Silvies River flowing through the Baker Ranch March 2021. Photo by Nick Wagner, Foresight Drones.

Garcia said that when there is a higher snowpack, the resulting runoff in the Silvies River is greater than in the Donner und Blitzen River. "There's a larger difference in the spring freshet between years with higher snowpack and years with lower snowpack because the Blue Mountain watersheds are dominated by runoff of precipitation or snowmelt rather than groundwater," Garcia said. During the winter and spring months, Blue Mountain streams are primarily fed by runoff and then in the late summer/low flow season, streamflow is mostly from groundwater.

This is in comparison to the southern part of the basin where the Donner und Blitzen River flows. In this area, there is more groundwater that contributes to the water flow throughout the year. In the southern part of the basin, "we do see a lot of change within the hydrograph (a way to display water level information over time) where the streams flow over the year from a wet year to a dry year, but it's not quite as acute of a change as we see in the Silvies River Basin because it's buffered by the groundwater component and groundwater moves slower," Garcia said.

She said that notably in Harney Basin, in both the northern and southern regions, most of the water that percolates downward and recharges the groundwater system in the mountains, discharges to streams and springs within the mountains as well. It doesn't reach the valley lowlands through the groundwater system. "That is mostly because the underlying geology within the mountains is not very permeable, so a lot of the water that percolates downward into the groundwater system eventually flows laterally and discharges to local springs and as base flow to nearby mountain streams," she said.

When the snowpack is healthy, runoff will reach the wet meadows in time for the spring migration when birds traveling along the Pacific Flyway stop in the Harney Basin to rest and feed on their way north.

Once the spring freshet eases, the Silvies River often doesn't reach Malheur Lake past July each year whether it is a wet year or a dry year because the portion remaining in the channel percolates downward, recharging the shallow groundwater system. Even in years with higher snowpacks, Garcia said floodwater in the lowland areas within the Silvies floodplain is consumed by evapotranspiration or percolates downward into the groundwater system. "The increase in soil water storage is not enough to maintain these wet meadows into drier years thereafter," she said.

This is in comparison to the Donner und Blitzen River area where most of the meadows and wet marsh areas are within the Malheur National Wildlife Refuge. “Many are irrigated each year, and within those areas we don’t really see a correlation between evapotranspiration from those fields and surface water at the gage,” Garcia said. This indicates that either the same amount of water is applied regardless of whether it is a wet year or a dry year or that enough water remains in the soil to supply the vegetation during drier years. A third option may be that groundwater is shallow enough to supply vegetation during dry years.

A healthy snowpack, which ultimately feeds the flood irrigated wet meadows in the Harney Basin, is important for both ranchers and wildlife. The Harney Basin Wetlands Collaborative is dedicated to the conservation and maintenance of flood irrigated wet meadows through improved infrastructure and management that lends to the most efficient use of what snow melt reaches the basin each year.

This article is provided by High Desert Partnership; a Harney County nonprofit convening and supporting six collaboratives including the Harney Basin Wetlands Collaborative.

