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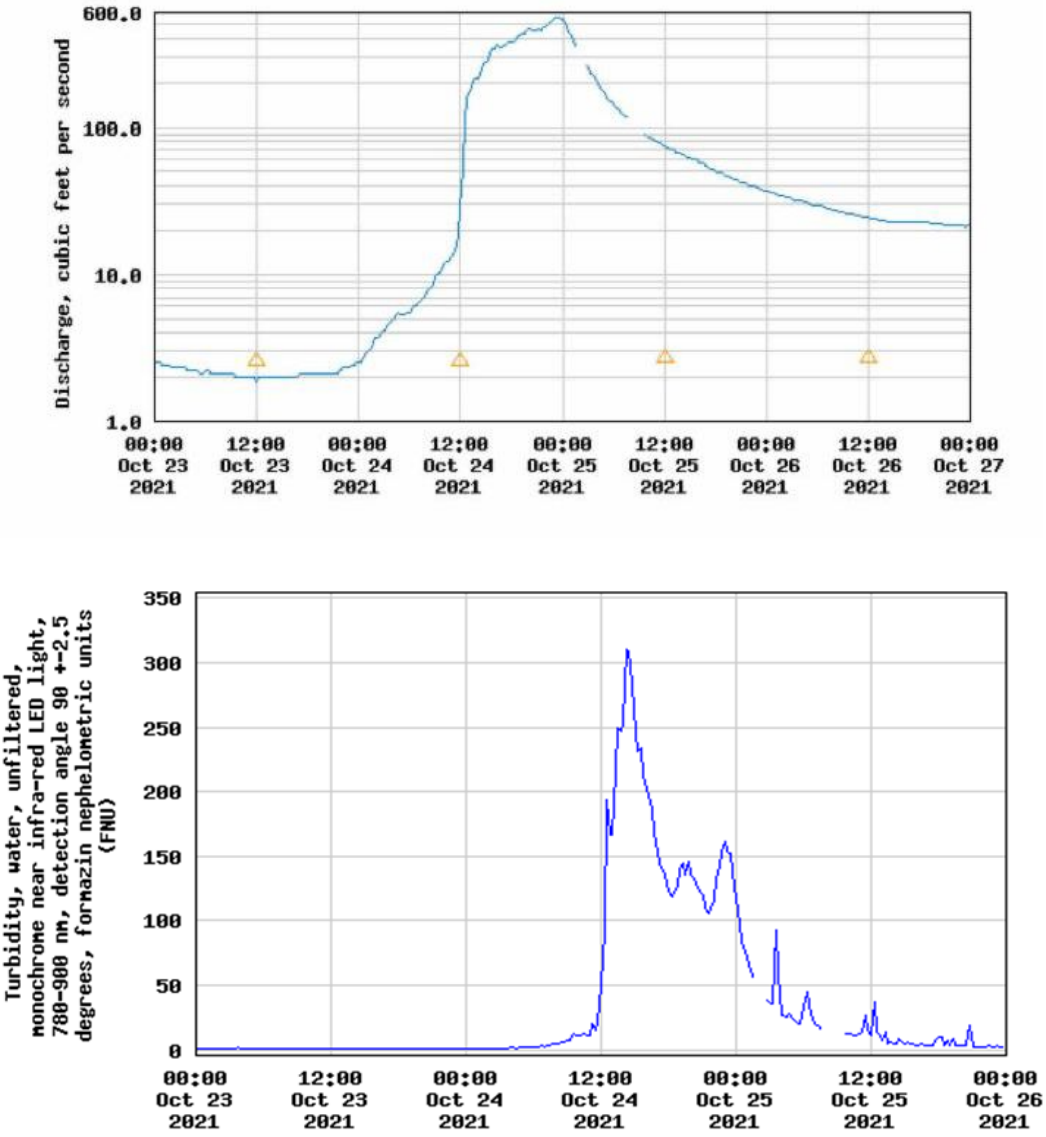
The use of water to remove human waste dates to Neolithic times (3000 BC). The flushing toilets, that we are accustomed to, were invented by Sir **John** Harrington, godson of Elizabeth I, who presented her majesty with one in 1592 and in doing so also bequeathed his first name to his invention. It took a further 200 years for their broader adoption and for many of the features we see today to be invented.

The term “first flush” refers to something altogether different from toilets. It is the principle under which the first minutes to hours of a storm, often the first storm of the season, discharges a disproportionately high fraction of pollution into a lake. The large amount of rain we received two weeks ago caused virtually all streams at Lake Tahoe to experience a “first flush.”

Measuring the concentration of pollutants is very important as it often represents most of the accumulated pollution within the watershed. However, recording these measurements is often easier said than done. Storms occur at inconvenient times (nights, weekends), and because each stream and its watershed have different sizes, the actual timing of each stream’s first flush is different and difficult to predict.



Blackwood Creek, on the west shore of Lake Tahoe is one of seven streams monitored by the U.S. Geological Survey. The graphs above show provisional data for the first flush. The upper figure shows the flowrate during the October 24 rainstorm. In a matter of hours, the flowrate increased from 10 cubic feet per second (cfs) to 540 cfs, with the peak occurring close to midnight. The lower figure shows the turbidity over the same time interval. Turbidity measures the muddiness of the water. The turbidity increases from 0.5 (clear water) to 315 units at 2:15 am on October 24, almost 10 hours sooner than the peak in the flow. By the time the peak streamflow occurred, the turbidity had decreased by over 50%.

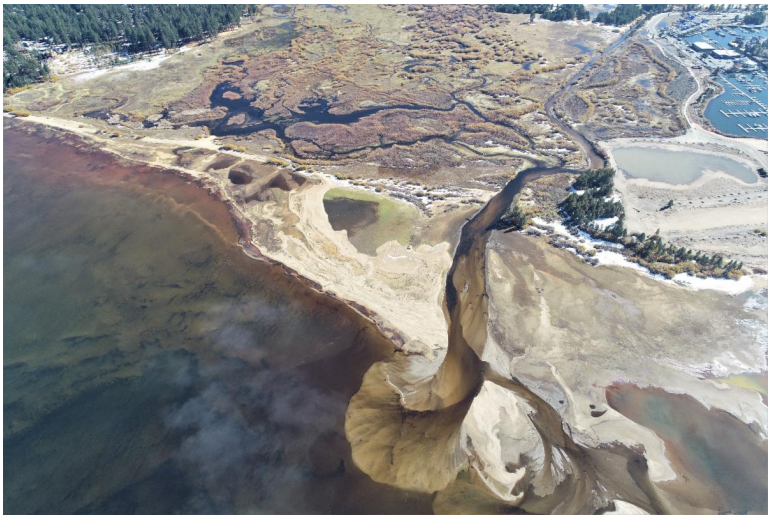


Photo: Brandon Berry, UC Davis TERC

A drone image of the Upper Truckee River discharging high turbidity water into Lake Tahoe is shown above. While this image was taken days after the first flush, it still illustrates the connection between the river and the lake. Can you see the brown, fan-shaped discharge at the mouth of the stream? What is happening to the brown turbid water that gives it such a sharp edge? As the turbid water is colder (more dense) than the lake water, the fan is sinking below the lake surface and taking its muddy water and nutrients to deeper parts of the lake.

How deep does it go? That is a story for another day.

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