

Million dollar question: What does USGS study show?

BY DEBRA NEUTKENS
WHITE BEAR EDITOR

ST. PAUL — The long-awaited U.S. Geological Survey (USGS) report on lake levels in the Northeast Metro was released Oct. 19 by lead hydrologist Perry Jones; at least the first half of the study. Part two is expected late January.

A day prior to the official release, Jones presented his findings at the Minnesota Water Resources Conference at St. Paul's River Centre. In the room were representatives of both sides of the lake level lawsuit between the White Bear Lake Restoration Association (WBLRA) and the Department of Natural Resources (DNR). Both parties have been patiently waiting for the USGS findings, which looked at groundwater and surface water exchanges in Northeastern lakes between 2002 and 2015.

It has been the contention of the WBLRA that municipal pumping is impacting lake level and changing the ecology of White Bear Lake. The non-profit group, along with the lake homeowners association, sued the DNR, the agency responsible for appropriating water permits to municipalities. The case goes to trial in March with both sides hoping to use the USGS report to sway the judge.

What their expert witnesses will glean from the research remains to be seen. For now, Jones and his team concluded the following:

- The physical setting of lakes, including elevation, underlying geology and surrounding land use, is the most significant driver of lake level changes.
- Of 96 lakes analyzed, not all responded similarly to weather and groundwater pumping.

White Bear Lake is especially sensitive to lake level changes because of its unique deep-water outlets.

These deep water outflows are uncommon in Minnesota lakes, Jones said, and make the lake uniquely sensitive to water level declines.

Jones doesn't know how fast water is flowing out into the aquifer below.

"What is happening is we're seeing a large contribution of surface water in wells down-gradient or south of White Bear Lake," he said. "It indicated water coming from the lake is going downward, into the well stream and is taken up."

Jones and his co-workers sampled 40 wells in October of 2014 to determine the percentage contribution of surface water. What they found was a variety. Some wells are totally groundwater with little interaction with surface water and some were almost all surface water (see map).

Researchers also could distinguish sites that had trapped gases present.

"Areas with trapped gases had much thicker organic sediments. We did not find much groundwater-surface water interaction in those areas," Jones said. "Sections that had little (trapped) gas and more permeable sediments were places we found interactions and potential for downward flow. We could use these seismic signals to look for potential for groundwater and surface water to be exchanged."

Water level changes in White Bear Lake have been the largest of the northeast metro lakes monitored since 1925, Jones-told conference attendees. "Our study showed that water is flowing out of the lake at deeper depths, and this may be contributing to larger water-level changes."

- Closed basin lakes like White Bear Lake had more significant lake level declines than flow-through lakes with an outlet.
- When closed basin lake levels increased or decreased, groundwater levels reflected those changes.
- Lake level declines were larger in higher-elevation areas. The higher the elevation, the more variability. White Bear Lake is on the top of a hill so it has less (storm) water flowing into it.

None of those conclusions were particularly earth shattering to White Bear Lake City Engineer Mark Burch.

"Many of the conclusions were things we already know," he said. "Perry just proves them in the research."

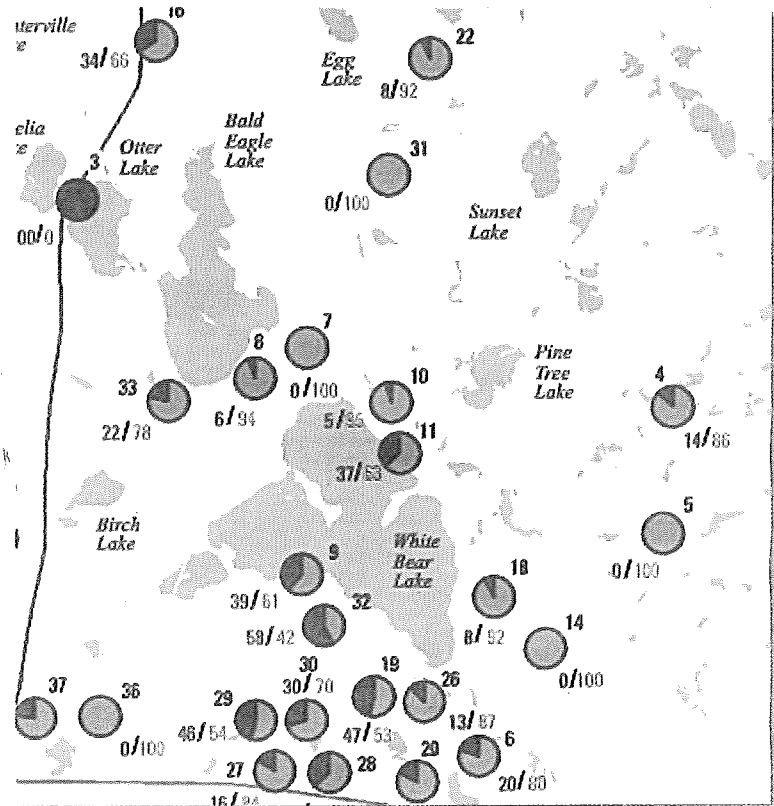
Burch emphasized that he is still perusing the 100-page report, but at this point, has not learned much.

When asked if the well samples showing a high percentage of surface water means people are drinking lake water, Burch stressed that it was important not to jump to conclusions.

"I've given this a lot of thought," he said. "Yes, surface water appears to be in certain wells, but when did the water enter the ground? Every drop of water in the ground was on the surface at one time."

"In the report, Perry says water entered the ground from the '40s to the mid '70s. That's at least 45 years ago. What effect did that water have on lake level? The lake has gone up and down many times since then. People need to understand that before they conclude that 50 percent of the water in our wells is coming out of the lake."

"We may be drinking lake water but it has been there at least since



EXPLANATION

Sampled well—Percentage of contribution from groundwater and surface water. Black number is same as in table 7. Blue number is the percentage of surface-water contribution to well. Orange number is the percentage of groundwater contribution to well.

Surface water
Groundwater

WELL No. 29 on the map is the city of White Bear Lake's well No. 4; No. 30 is well No. 1 and No. 28 is well No. 3. Wells No. 3 and 4 are high-capacity wells drilled in 1959 and 1962 that pump 2,500 gallons per minute from the Prairie du Chien and Jordan aquifers.

the '70s," Burch noted. "That was the most current water Perry saw coming up from our wells. What does that mean? I don't know. I can't explain how pumping has an impact on lake level if water entered the ground in the '70s."

Does the study answer the million dollar question: Are the wells drawing down the lake?

"There is no evidence that I can see," Burch replied. "The report provides information, but it doesn't answer the pumping question. I called Perry and told him I was having a hard time drawing conclusions for the lawsuit. He told me the modeling phase will have more."

Part 2 of the USGS study provides results of the groundwater flow model. The model is a tool to assess surface water and groundwater interactions, including the effects of groundwater withdrawals on lake levels.

"We will use the model to look at potential future pumping condi-

tions," Jones said. "Scenarios include the impact of increasing pumping 30 percent in existing high-capacity wells in the Northeast Metro and decreasing pumping by 30 percent."

White Bear Lake has bounced back, Jones noted at the conference. "It is about to the mean water level. With the increased rainfall the last few years, a lot of these lakes have bounced back."

Funding for the three-year study came from the Clean Water Legacy Act after approval by the state Legislature. USGS partnered with the Metropolitan Council and state Department of Health on the study.

A copy of the report can be viewed online at <http://pubs.usgs.gov/sir/2016/5139/a/sir20165139A.pdf>