

New Hi-Tech Equipment Measures Ballston Lake

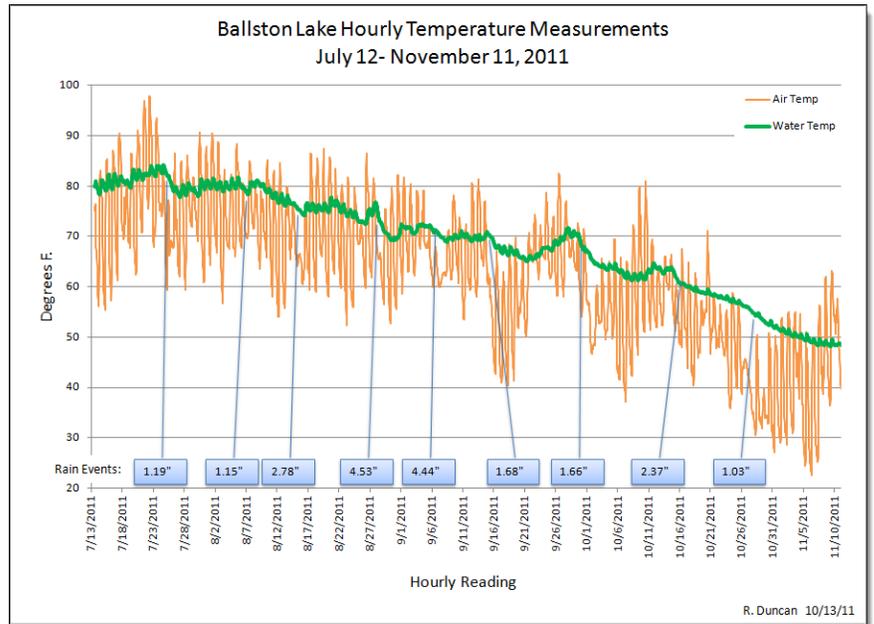
Bob Duncan, 11/30/2011

Last Spring the town of Ballston purchased an electronic water depth gauge for the Ballston Lake Improvement Association. It will help us measure the impact of rainfall on Ballston Lake. A year earlier the BLIA purchased an electronic rain gauge to continuously measure the rainfall. Lake Association members took manual lake level readings using steel measuring sticks fixed to docks. But it was difficult to measure the lake height during waves or wind, volunteers traveled, and measurements were rarely taken when it was dark or raining.

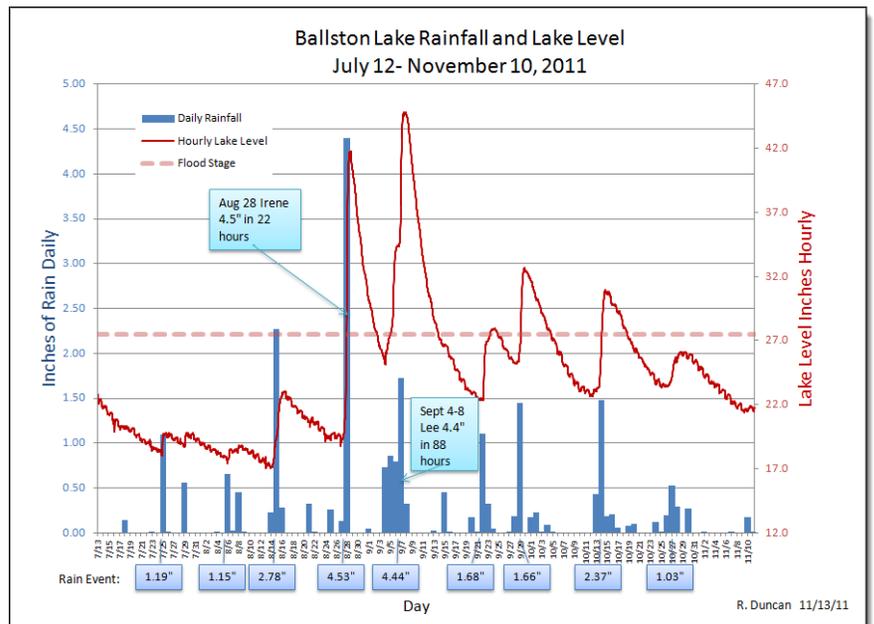
Our new equipment overcomes all of this. Every hour it records the pressures and temperatures of the lake and the air. The device has two pressure gauges. One gauge is fastened to a resident's dock about 3 feet below the surface and will be bubbled during the winter. It measures the pressure of the water and of the atmosphere above. A second gauge, above the water, measures the atmospheric pressure. Periodically we download the data into Excel. Combined with the data from our electronic rain gauge, we can analyze how the rain and lake interact.

It is obvious that the air temperature cycles up and down about 20 degrees every 24 hour period. But did you know that the lake water varies about 3 degrees from day to night? The new equipment shows us that the water temperature typically lags the air temperature by about four hours.

The first graph shows the hourly temperature measurements from July to November. You can see the large air variation in grey and the smaller water variation in black. Rain brings down the water temperature in the summer. On the graph, the significant rain events point out where the water temperatures quickly dropped.

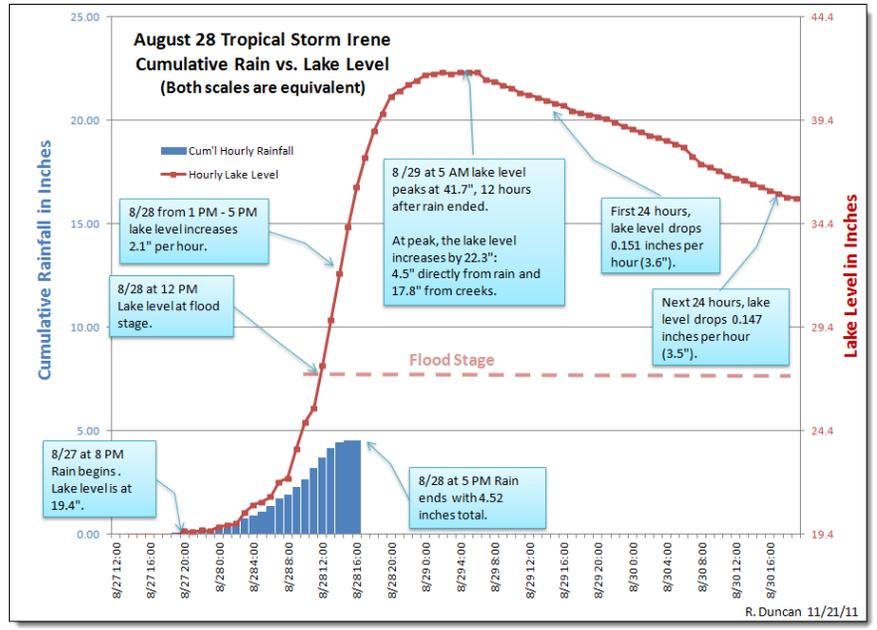


The second graph shows the lake level as the line and rain measurements as the bars. You can see the lake level climbs quickly with rain and falls slowly when dry. The flood stage is set at the level where water overflows the bank into our yards. It was a warm and dry July and the lake levels were low and our yards were dry. Even the 2.7 inch rainfall in early August barely impacted the lake level. But on August 28, Tropical Storm Irene passed through. In our area hydrologists define a 15-year rainstorm as 4.5 inches in 24 hours. On Ballston Lake we measured 4.53 inches of rain in 22 hours. The lake level quickly climbed above flood stage. A week later Tropical Storm Lee



rained 4.4 inches in 88 hours. The lake climbed higher this time. In the three weeks from the end of September to mid October, there were three rain events between 1.6” and 2.3” that caused the lake to flood three times more times.

The third graph zooms in on the hourly measurements during Tropical Storm Irene. The bars on the graph show the accumulated rainfall hour by hour until it ended at 4PM on August 28 with 4.5 inches total. On the right side is the scale for the lake level. It is the same scale as the rain axis before the rain began. As the rain accumulates, the lake level climbs quickly. Obviously, the water falling directly on the lake will cause it to rise at the same rate as the rainfall. But almost immediately, the lake level increases much faster. The difference comes from water flowing into Ballston Lake from the creeks faster than it is flowing out Outlet Creek. About 18 inches of the 22 inch increase in the lake level came from the



creeks. Since the Ballston Lake watershed is about 30 times larger than the lake, over 13% of the watershed’s rainfall flowed into the lake within the first 24 hours of the storm. In the future as the watershed area develops, the soil will become less permeable and storms will bring more water into our lake causing lake shore flooding. We are collecting valuable baseline data to better understand our lake and the watershed.

BLIA Wins Grant to Study Phosphorus in Ballston Lake

In July we won a scientific grant from the Bender Scientific Fund to study our lake. The \$6,000 grant covers the cost of lab analysis of the many samples we plan to take next year to measure the phosphorus in our lake. Below is the abstract:

For over the last 20 years the Ballston Lake (Saratoga County) Improvement Association (BLIA) has participated with the Citizens Statewide Lake Assessment Program (CSLAP) in measuring Ballston Lake’s water quality. These studies have shown that, over the last 10 years, phosphorus levels have been increasing significantly. High phosphorus levels contribute to eutrophication, a condition in which accumulated nutrients support a dense abnormally high growth of algae, which then die and decay. The process of decay, by bacteria, depletes the dissolved oxygen content of the water. This impacts the entire aquatic ecosystem. As the dissolved oxygen levels fall the impact to more sensitive species increases. If left unaddressed these species die off or must move to more favorable environments.

The BLIA, under the guidance of the Cornell Cooperative Extension of Saratoga County, will expand the monitoring program to measure phosphorus levels in the lake tributaries during rain events over the next 12 months. By measuring the volume of creek flow during rain events and by taking frequent periodic samples during events, phosphorus-loading of the lake can be calculated and source area/s determined. This study will also provide a baseline to determine the impact of future development of the Ballston Lake watershed. BLIA members, local college interns, and local high school students will participate in the data collection and analysis of the results. Results and recommendations will be shared with residents in the Ballston Lake watershed, County and Local Governments and with other local, regional, and State-wide water quality organizations and Programs. The grant is to cover the cost of lab analysis of phosphorus measurements in samples taken over a year.

If you know any high school or local college student who would like to participate in the study, email me at RDuncan@nycap.rr.com.