

To: The Honorable Philip Rodgers, Jr.
Leelanau County Circuit Court
328 South Washington Street
Traverse City, Michigan 49684

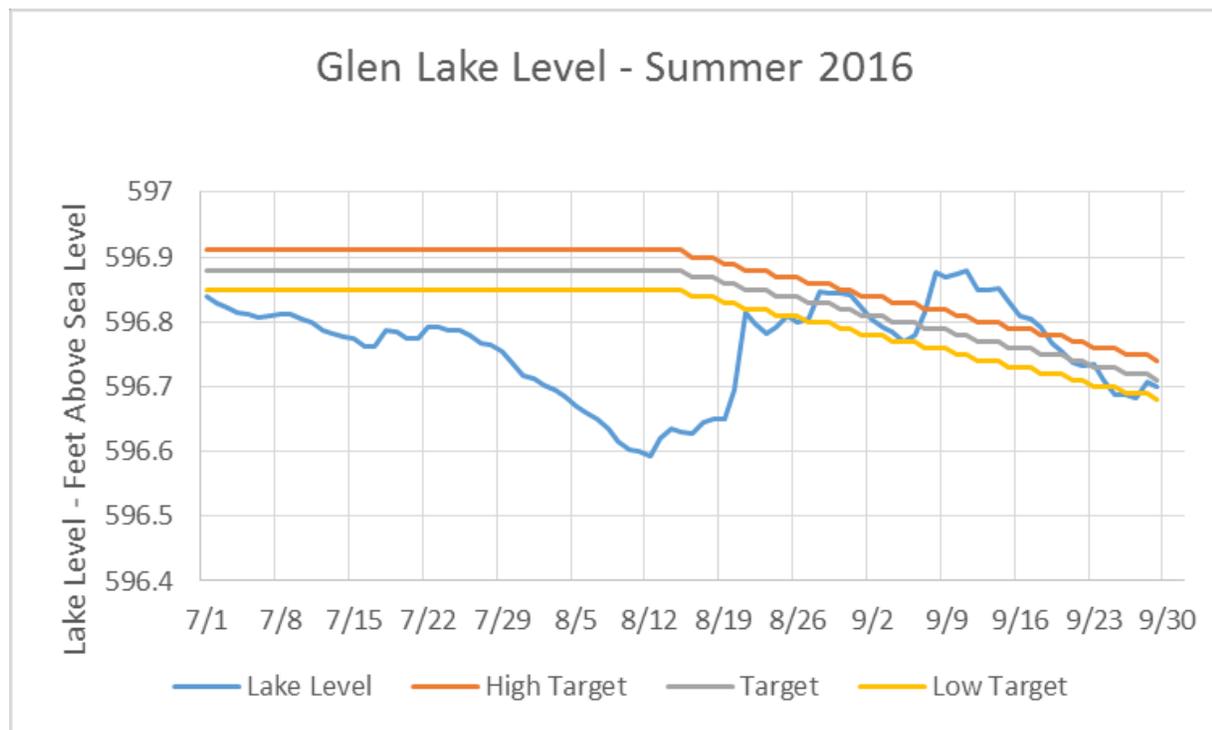
From: Bill Meserve-Glen Lake Association/Water Level Committee

Subject: Third Quarter Report 2016, re Glen Lake and Crystal River Operations

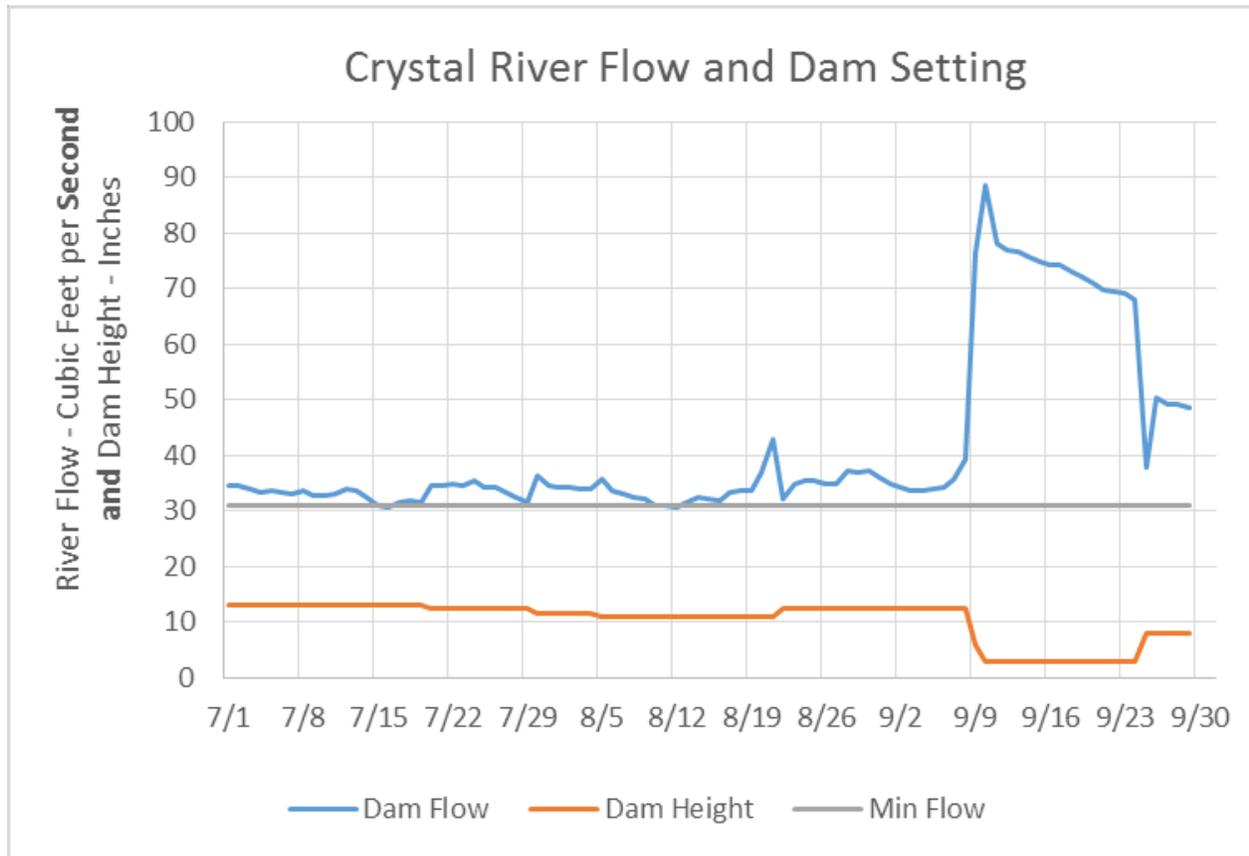
Glen Lake level has been below our target most of the summer due to the normal summer drought. Evaporation and lack of rain again proved to be a bigger factor in lake level than the dam. The lake level drop-off is typical of most years. (See historical level curves in Appendix A.) The lake did not drop below 596.60, the trigger level for the water sharing plan which forces us to drop river flow below 31 cubic feet per second.

Usually in September or October we get lots of rain. This year, in late August we had a nice storm which brought the lake up. Currently, Glen Lake is finally within targets.

The following chart shows the lake level this summer compared to our Court agreed target. Notice that the target is dropping now as we approach the winter level, which is about 3.5 inches lower than the summer level.



The next chart shows Crystal River flow, the dam setting, and the acceptable minimum flow. The blue line is flow at the dam in cubic feet per second. During the third quarter, until September, river flow was kept close to the minimum to conserve lake level as the dam was kept as high as possible. We made 7 dam changes in the quarter. For instance, on the Sept 9 and 10 we changed the dam from 12.5 inches down to 3 inches in two steps, to increase to flow as the lake level shot above the target due to a good rain storm.



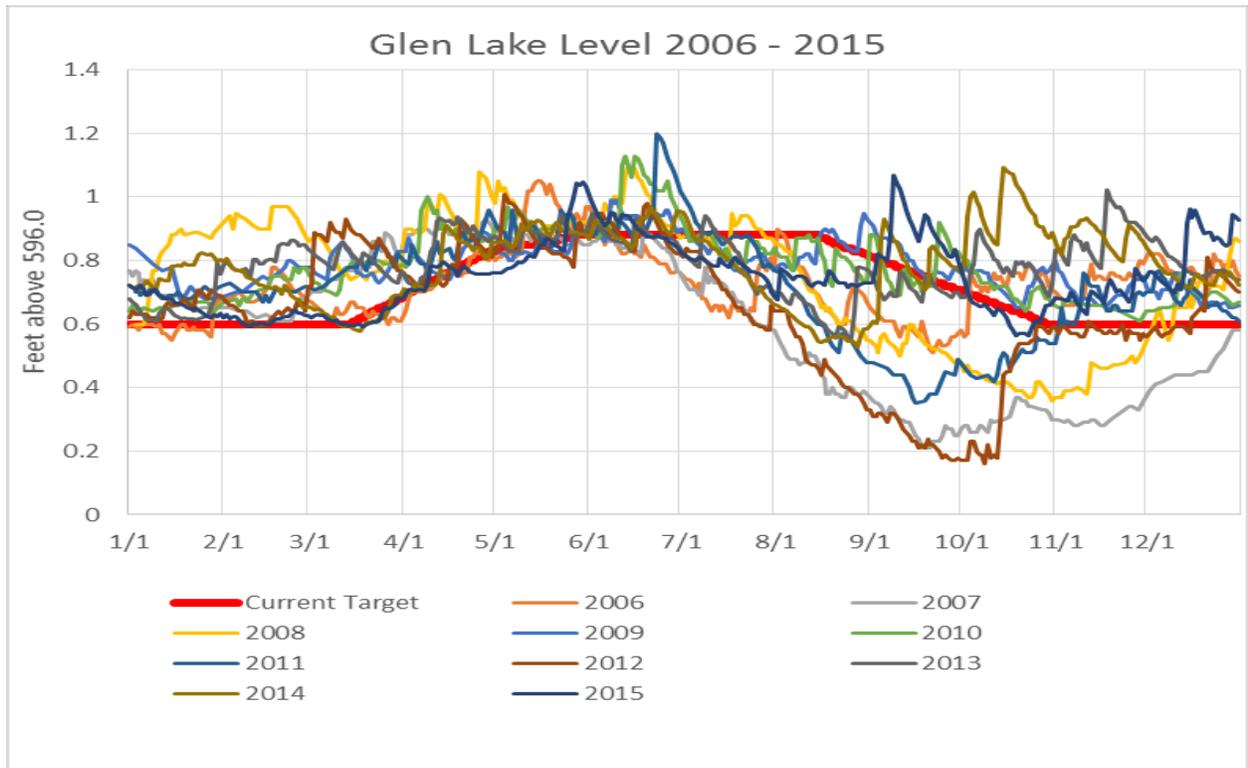
We continue to make twice weekly visits to the dam, in reasonable weather, to make manual readings, clean the solar panel, and do a visual inspection.

Culverts #3 (which is the most frequent spot for flow blockage) has not been a problem this quarter. And with river levels low there has been no breaching upstream. But we are mindful of last winter, when flow was high. We had several minor breaching events at lower river levels (as measured at the culverts) than in the past. We keep an eye on the problem, since a small breach from one part of the river to another could erode into a large flow, cutting off flow to that part of the river which goes into Glen Arbor and back. In the past we have put out the idea of hardening this breach with cement so it would be a permanent flood relief if any of culverts #3 plug. This idea was rejected by the Park Service. The breach area is located on private property.

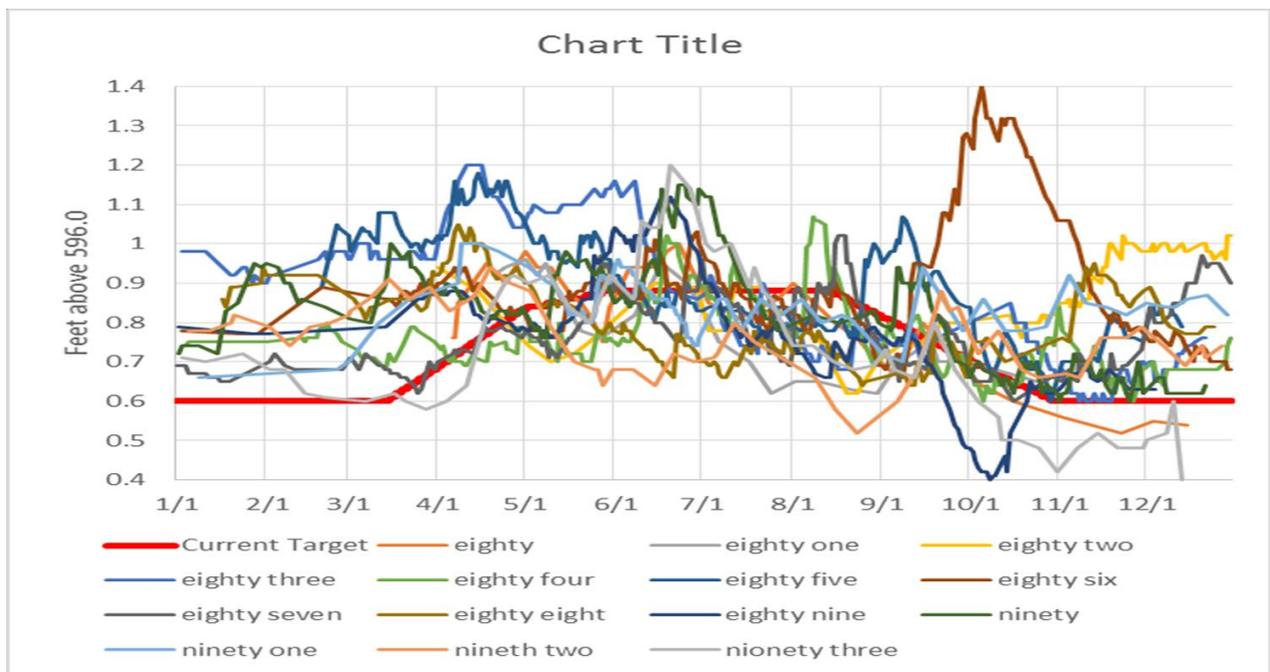
We have not determined if there are certain trees laying in the river that are causing a flow obstruction downstream of the breach point. Water Level Committee members made several kayak trips on the river from the breach to culverts #3 looking for flow obstructions at the numerous trees laying into the river. Nothing was obvious at the low flows we have been experiencing all summer. We recently make a few trips when the water flow was near 70 cfs. Still no obvious blockage, but we will keep looking. If we find a culprit, we may have to work with the Park Service before we can remove the problem tree/brush. The following map shows the problem area.

Appendix A

The following chart shows the last 10 years of lake level data. It can be seen that from July through August and sometimes September, the level is usually low with none of the sharp upshifts indicating rain events:



Compare the above with the following years from 80s and 90s. The same pattern occurred then, Lake level falling in summer, high in winter. Data is also available going back into the 1950s.



The area which has experienced beach erosion is the deep sand beach in the lower center of this Google map.

