

Proposal to Experiment with a Passive Control Structure at the Carlson Road Dam

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Premise

There has been a great deal of discussion and debate over the past 5 years related to the management of water levels on the Round Lake Watershed (Round Lake, Little Round Lake, Osprey Lake and Osprey Creek.)

Work done by SEH, the results of which were published in a report dated December 27, 2010, concludes that the current Carlson Road dam is inconsequential in all situations except when all stop logs are in place at elevation 1345.0 feet, due to the fact that the downstream obstructions become the low water control.

As part of their work, SEH analyzed a passive control structure as a possible replacement for the Carlson Road Dam and published the following in their report dated December 27, 2010:

The Passive Control structure analyzed as a possible replacement for the existing Carlson Road Dam consists of a 12-foot wide by 7-foot high precast concrete box culvert with a fixed-crest concrete weir wall (overtop elevation of 1345.0') at the upstream face of the culvert. To allow drawdown of Round Lake to elevation 1343.8', a trapezoidal notch would be included in the weir. The notch in the weir has a trapezoidal shape with a 6-inch long base at elevation 1343.8' and a 45-degree angle up to the crest elevation of 1345.0'. A trapezoidal shape notch is used in lieu of a v-notch to aid in the passage of debris at low flows.

Evaluating the performance of the proposed system without the limitations imposed by the hydraulic capacity of the downstream system reveals that during high flows the proposed configuration reduces the drawdown time from that of the existing structure with stop logs. During times of low flow, this configuration increases the drawdown time compared to the existing structure without stop logs. Therefore, the proposed configuration optimizes the hydraulics of the outlet structure by limiting low flow discharge and maximizing the amount of water passed during high flows.

However, taking the downstream hydraulic controls into account reveals that the proposed structure does little to improve the overall hydraulic efficiency of the system over that of the existing outlet system. Since the normal WSE for the proposed structure is lower than that of the existing structure with stop logs, the downstream structures (the beaver dams and NN culverts) control the water surface elevations and reduce the peak outflow during high flow events. During low flow events, the

drawdown is again controlled by the downstream controls and the results compared to that of the existing structure without stop logs show minimal improvement with the proposed configuration. The main advantage of the proposed structure is that the peak elevation in Round Lake and Little Round Lake is lower than for the existing structure with stop logs and the necessity for human intervention is reduced. Some maintenance would still be required to remove any accumulated debris at the structure, primarily at the flow notch.

It must be recognized that the hydraulic capacity associated with the proposed structure will remain limited by the downstream structures that limit capacity, namely the beaver dams.

The Round Lake Property Owners Association has concerns regarding the county's recommendation to replace the Carlson Road Dam with a 12-foot by 7-foot box culvert set at the elevation of the stream bed because we believe that the beaver dams and other obstructions downstream of the dam are not reliable and could wash out over time resulting in a significant lowering of the normal water surface elevation (WSE) of Round Lake.

Based on our understanding of SEH's engineering analysis, the passive structure described above would be of no consequence as long as the beaver dams and downstream obstructions remain intact at their current elevation or higher. Should the beaver dams and downstream obstructions erode or wash out, the passive structure would provide a low water control that would help maintain the normal WSE of Round Lake near the desired level of 1344.75' during times when precipitation patterns are in the range of historic averages. At the same time, the structure provides for a base flow through the system to ensure that Osprey Lake is supplied with water at all times when the WSE of Round Lake exceeds the streambed level upstream of Carlson Road.

With the current WSE of Round Lake near the desired level of 1344.75', we are in an excellent position to test the concept of the passive structure as described above.

The Plan

We propose that we first contract with a local surveyor to install accurate gauges to measure water levels on Round Lake, Little Round Lake and Osprey Lake. The existing Gauges have been shown to vary from one to another and there is currently no gauge on Osprey Lake. We will also clearly identify and survey the beaver dams on Osprey Creek.

With new gauges in place, we will be able to collect data regarding water levels on all the lakes and monitor their relationship to the passive structure as well the beaver dams.

With the survey work complete, we will simulate the passive structure described by SEH by installing the standard wooden stop logs in one bay of the Carlson Road Dam. In the other bay, we will install a weir fabricated from wood that will mimic the weir described in SEH's report:

a fixed-crest concrete weir wall (overtop elevation of 1345.0'). To allow drawdown of Round Lake to elevation 1348.8' (the sill level of the dam), a trapezoidal notch would be included in the weir. The notch in the weir has a trapezoidal shape with a 6-inch long base at elevation 1343.8' and a 45-degree angle up to the crest elevation of 1345.0'.

Expected Results

Because we believe that the beaver dams and other downstream obstructions are controlling the water level on all three lakes, we expect the water levels on all three lakes to be approximately the same (Osprey Lake is expected to be slightly lower reflecting the slight hydraulic gradient between the Carlson Road dam and Osprey Lake).

We also expect the passive structure to have no effect on water levels as long as the beaver dams and other obstructions remain intact. It is possible that, if we have a significant rain event, the water level on Round Lake may rise to a level higher than the level of Osprey Lake, before draining over time to a situation where the levels are again approximately the same.

The primary benefit of the experiment will be the ability to monitor and document the results over a long period of time and hopefully a wide range of precipitation patterns.

Timing

We will start the project as soon as the ice is out. Once the survey work is complete, we will set the structure at Carlson Road.

The test will continue through the entire open water season of 2012.

The test can be stopped at any time at the request of any of the stakeholders, should the results become problematic for any reason.