

Sanitary District 1 – Cedar Lake

7/22/21

Hello all,

This is a more detailed informational notice of the Sanitary District's recent decision to enforce the Town Ordinance 2009-02 regarding Slow No Wake restrictions. It is always a tough decision to restrict the lake to slow no wake. The Slow No Wake restriction has only been needed for a few days at a time only twice since the Ordinance was established in 2009. During my 19 years as a Sanitary District Commissioner and 16 years as a Citizen Lake Monitor for the WDNR, I have seen many challenges and changes, and I will share some of my experiences, both oral and written history and facts.

The recent 24-hour rain on July 15-16 put 6 inches in my rain gage and 7 inches in one other on the lake. Piers were submerged and many others were close to being submerged. The potential for significant damage to piers, docks and immovable structures alone was enough for the three Sanitary Commissioners to confer and place the Slow No Wake notice.

Important environmental concerns need additional consideration. High lake levels encroach on fertilized lawns and tree roots. Wave action by boats tend to wash away soil containing Nitrogen and Phosphorus which contributes to algae blooms. Eroded soil cannot be replaced.

I looked at my Hydrology course book to see how often we statistically can expect a rain event like that. The Department of Commerce Technical Paper No. 40 Rainfall Frequency Atlas of the United States showed that the probability of only a 5.5-inch rainfall in our area should only occur once every 100 years. We had 6 or more inches. At the time of the rainfall, we already had 2 inches of water running out of the outlet culvert. Extreme events often require prompt and often dramatic response not appreciated by all to protect our resource.

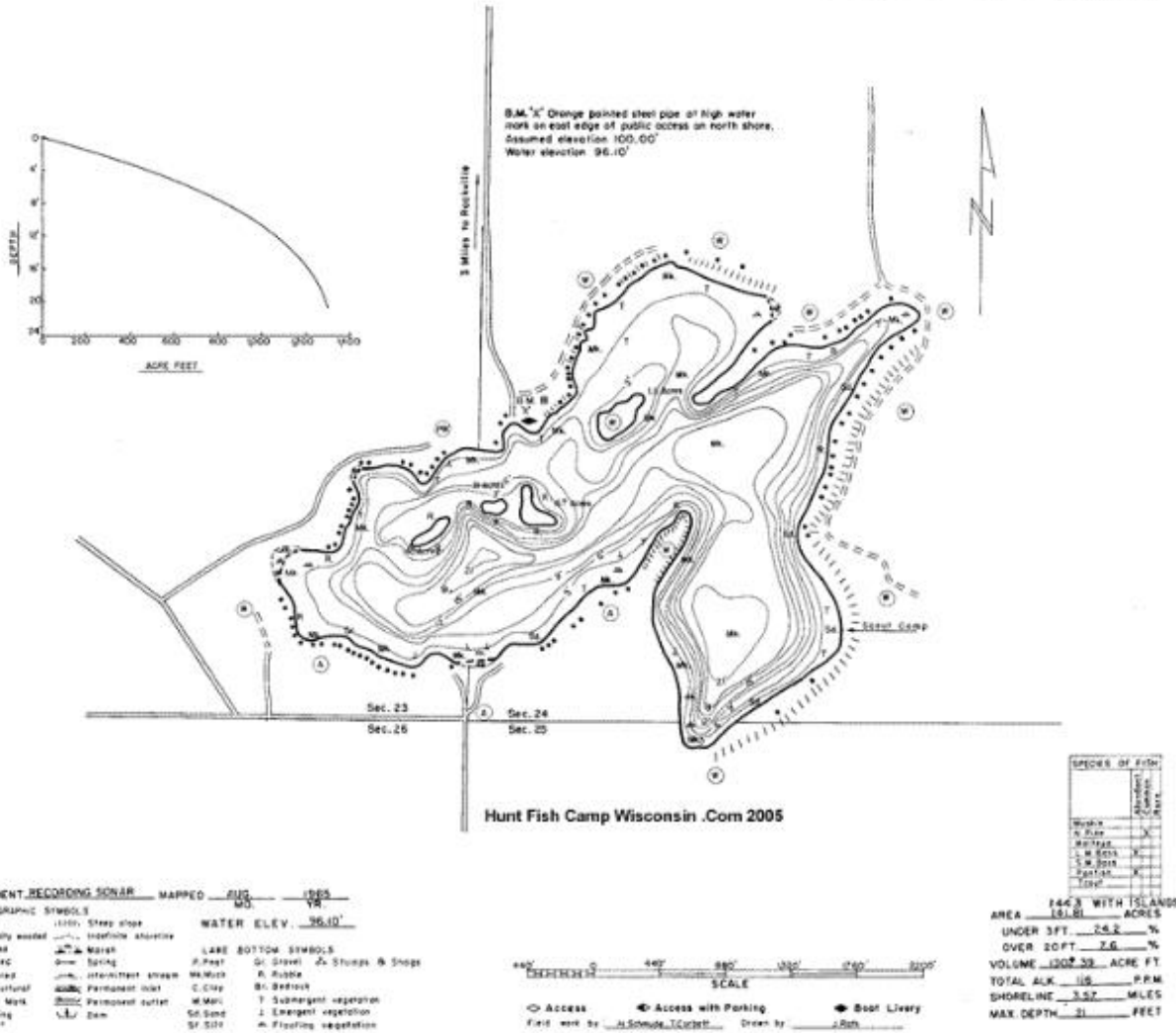
100-YEAR 24-HOUR RAINFALL (INCHES)



My inspiration for joining the Sanitary District was prompted by my concern that the loudest voices on the lake would prompt the Sanitary District Commissioners to turn the well pump on when the ice came off of the lake. After two years of observing the well pumping water into the lake while water was running out of the outlet culvert, I figured that they needed some technical help.

LAKE LEVEL HISTORY

The lake level reached its lowest point in recent history during the summer of 1959. Corn was planted where the Harvester is docked. Skiers were towed by cars running on the exposed gravel shoreline lake bed. That level was approximately 6.5 feet lower than current lake elevations. These low levels raised somewhat. However the DNR lake map of 1986 shows two islands that are submerged.



Variations in the lake level prompted the challenging permitting of one of a handful of wells in Wisconsin specifically for controlling those major lake fluctuations. In 1972, a well was drilled to a depth of 600 feet. A pump was installed to produce 500 gallons of water from the Niagara limestone formation often used for major cities water source.



500 gallon per minute well installed in 1972

The well was turned on and precipitation helped raise the lakes level. Unfortunately, the precipitation and resulting increase in lake level required the permitting and installation of a new culvert to help control excessive lake levels.

In 1986 a determination of an Ordinary High Water Mark (OHWM) was made by the WDNR and the permit was issued to construct the 18-inch diameter PVC culvert with its lowest point (invert) to match the OHWM.

With both the well pumping as needed and the culvert helping maintain a high lake level, the lake level was successfully maintained with an annual fluctuation of around one- and one-half feet. A fluctuation is a necessary to maintain certain emergent plants and support an ecosystem that dries up and is submerged annually.



18-inch diameter culvert installed in 1986 (currently screened by cattails)

During June of 2008, Cedar Lake experienced 16 inches of rainfall in the month. About 14 inches occurred in two weeks prompting a two week long Slow No Wake to be in effect.

Prompt action was taken to permit and place a second culvert adjacent to the existing culvert to aid in quickly lowering the lake level should a similar event occur. A permit application was submitted to have the second culvert be 3.5 inches lower to allow for a 2x4 to be installed and removed should the lake need to be lowered quickly. Unfortunately, the WDNR ruled that the 2x4 would be considered to be a dam and an Army Corps of Engineer permit along with public hearings would be needed or we could place it at the same elevation as the first culvert. It was permitted to place it at the same elevation as the first culvert (invert or lowest point of the culvert and at the OHWM of the original culvert) and use an elliptical culvert that had a higher flow capacity.



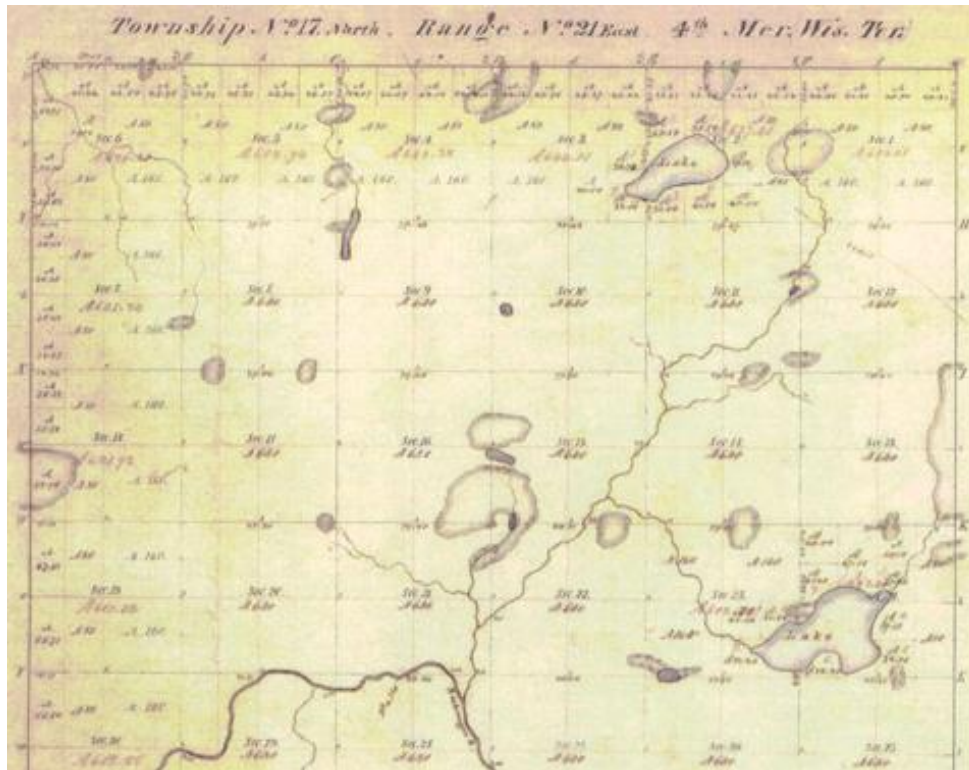
18-inch elliptical culvert installed in 2010

Concern that there may be a need to require a Slow No Wake period prompted the Town to enact the Slow No Wake Ordinance 2009-02 to allow for the limiting of wakes when the lake level exceeded the OHWM which is the culvert invert/lowest point. Fortunately, the Town has only had to enforce the ordinance a few days since 2009.

It should be noted that my research of documents in the Wisconsin State Historical Society Building in Madison produced a surveyor's map dated 1834 with a symbol showing a flowing stream from Cedar Lake. Over the years the stream was dammed up by Woodside Lane with culverts placed and replaced over the years. This has caused approximately 3 feet of difference from the current lake level on Woodside Lane to the ground level on the other side of the lane.

The surveyor's notes laid out the first North-South East-West gridlines allowing for the Government to sell and populate the Wisconsin Territory. These notes were important to provide Section Lines to identify property deeds. They were also important to identify resources such as minerals, water for power and mills, lumber and farmable land. This made the land more valuable at the sale.

The surveyor noted an Indian encampment where they were making Maple syrup. That was a key flavor enhancer for the Indians. The surveyor's notes indicated an Indian encampment just East of the boat landing. Joe Leitner said he found an Indian arrowhead near there as he was digging a trench.



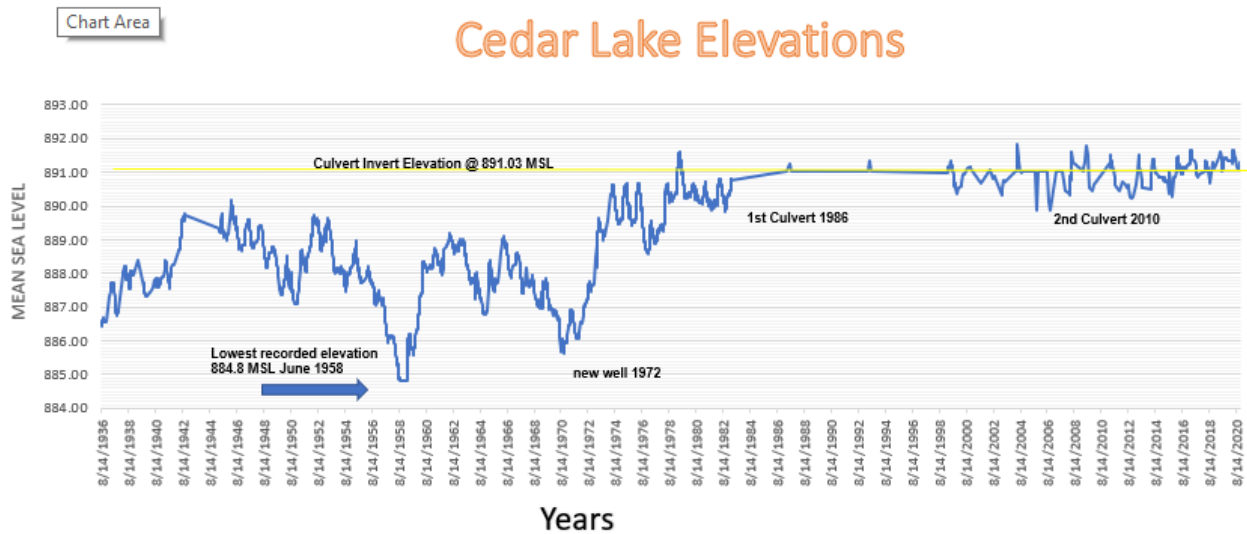
Original Surveyor's map of Cedar Lake Sections 1834

LAKE LEVEL MONITORING

The United States Geological Survey studied the lake from 1936 to 1983. They set up a small corrugated metal shed on the Resort beach where a lake elevation reading was taken once per week during this 47-year period. This was a rare case where we are able to see accurate and weekly natural fluctuations of the lake.

The readings were based on an assumed elevation of a railroad spike in an oak tree on the beach. It was needed to tie the old data into the current survey system (USGS Mean Sea Level) which would allow for the continued current lake level monitoring match and comparison to Ordinary High Water Marks. Fortunately, my daughters and I surveyed the railroad spike for an elevation to correlate the assumed tree/lake elevation data with USGS Mean Sea Level elevations. The following week I went back and the tree and spike were gone. Lightning had struck the tree and the tree was cutdown for removal.

The following plot shows the fluctuations and the ability of the well and culverts to minimize the sever fluctuations.



There were minimal management guidelines for turning on and off the well pump when I joined the District. Mostly it was unnecessary due to the fact that the lake level was generally low during those years and turning the pump on when the ice left the lake was needed.

However, there were times when the pump was left on and the water came close to running out of the culvert. When it was at that level, often there were rains that caused the lake to flow out of the culvert. Guidelines needed to be established to not waste the pumped water when a rain would raise it to discharge level. It was determined that a guideline would be established that during the summer months if the lake level dropped to six inches below the culvert the well pump would be turned on to maintain a minimum of no more than six inches below the culvert invert. During the fall, the lake level has been allowed to drop as much as 10 inches below the culvert invert as past practice has shown that spring rains quickly bring the lake up and the well can quickly raise the lake during this period if it is needed. *Historical data shows June to be the highest month for precipitation.*

A Slow No Wake Guideline of six inches above the culvert invert and the Sanitary District Slow No Wake Ordinance. This was established before the advent of Wave Surfing and some of the wave enhancing boat equipment. Since that time there has been competing and new recreational activities. Kayaking, paddleboarding, have increased along with the number and size of the boats. Current efforts by lake residents to minimize safety issues by Wave surfing near the middle of the lake have been followed by the lake residents but sometimes ignored by offsite boaters. Eroded shoreline can't be replaced.

I hope that this sheds some light on the lake level as it relates to the need for Slow No Wake, safe recreating and long-term environmental protection of our lake. Goals shared by all.

Sincerely,

Scott Otterson, PE