

Report to Town of White Lake October, 2020

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LIMNOSCIENCES

It was in September of 2017 that conditions in the lake crossed a threshold: nutrient levels (both Nitrogen and Phosphorus) were high, pH levels were high, and a cyanobacterial bloom dominated the lake, resulting in a bright green appearance of the water, as documented in a drone shot taken along the southern lakeshore.

September of 2018 was memorable for the high rainfall associated with Hurricane Florence, and a lot of water moved through the lake system in a short period of time. Conditions in the lake—nutrient levels, algae, pH and clarity—were similar before and after the hurricane, although lake levels and water table levels were substantially higher afterwards.

In September of 2019, lake levels were 8 inches below what they were in September 2020, while nutrient levels, algae, and pH levels were similar. Water clarity was better compared to September 2019, and better compared to summer conditions this year:



September 15, 2020 White Lake Marina, northern shore of lake



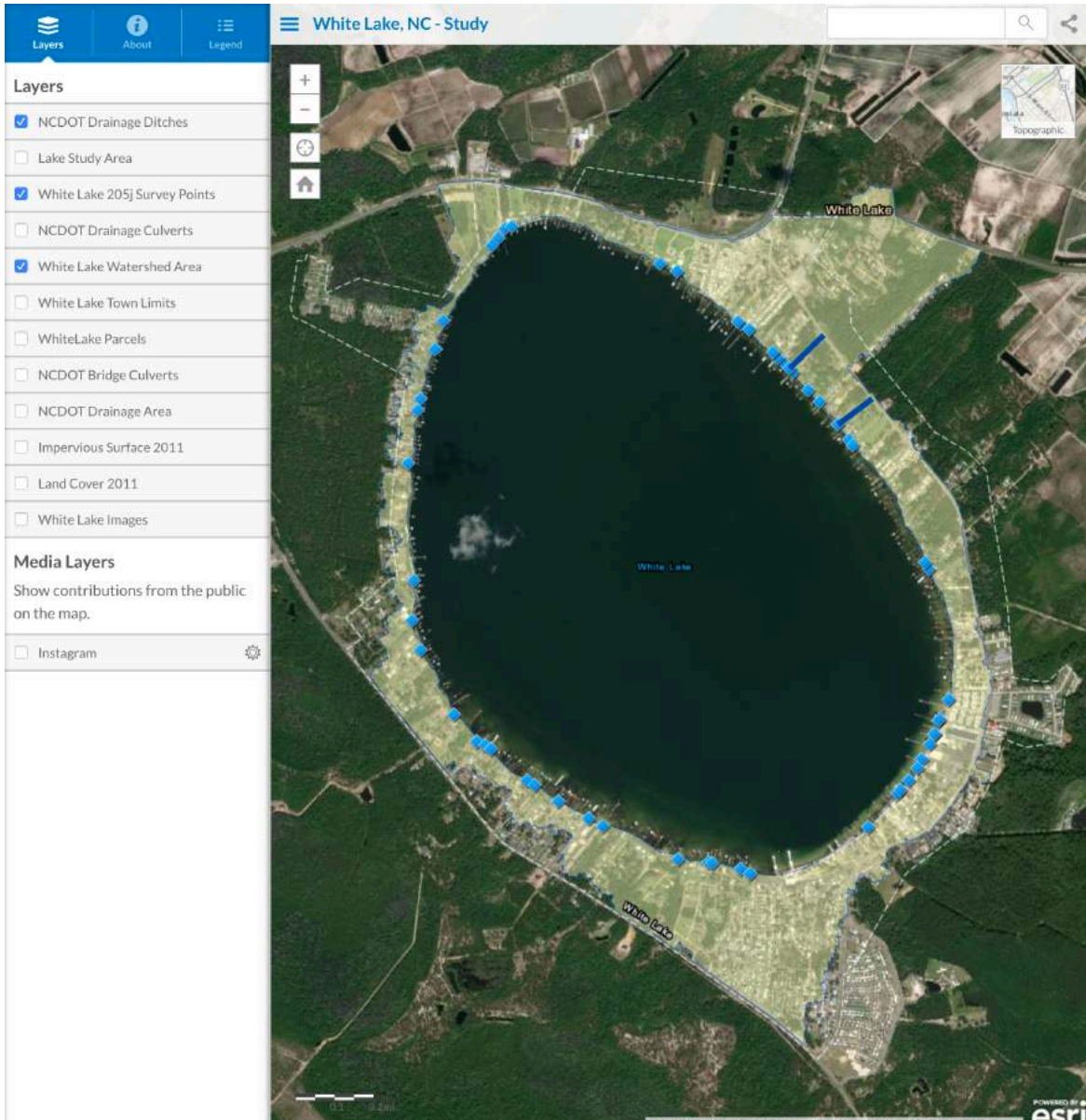
July 15, 2020 White Lake Marina, northern shore of lake

Are conditions in the lake anywhere near what they were in September of 2017? No. Are conditions worse than they were after the 2018 alum treatment? No, they are better—recall that the alum treatment was designed to inactivate nutrients, particularly Phosphorus, but the treatment added turbidity to the water, which settled out very slowly. It did work to quickly remove the cyanobacteria that had dominated the lake and had caused the pH of the lake water to spike. At the time, there was concern that these cyanobacterial blooms would become regular occurrences, and fortunately, that has not proved to be the case.

Are the changes in water clarity a result of more algae in the water? Sometimes, but there is more non-living particulate matter in the lake now, which becomes suspended and can remain suspended, particularly during the summer season. This is very notable near shoreline regions with seawalls. The amount of algae in the water is not varying as much as it did in the past (2013 and 2017, for example), and as a result the pH of the lake water is not increasing during summer as it had when algae levels were higher.

What is washing into the lake? Nutrients (both Nitrogen and Phosphorus), bacteria, chemicals from paved surfaces, sediment, plant matter and debris—anything on the land can wind up in the lake, particularly with high rainfall events and flooding. The stormwater

assessment project with the Lumber River COG mapped all of the stormwater pipes and ditches that drain directly into the lake:



If the primary concerns of the community are public health and safety and lake aesthetics, then it would seem that there would also be consensus for taking meaningful actions to significantly reduce what goes into the lake. We look forward to engaging with this issue next month as part of the comprehensive plan review process.

As there seems to be a continuing interest in managing the pH of the lake as a means to return to the conditions of the past, and a belief that pumping low pH groundwater into the lake is a means to accomplish this, Town staff have provided information on the chemistry of the drinking water wells used by the Town of White Lake (memo attached):

pH range from the three wells: 6.5 to 7.1

These deep, confined aquifers do not contain low pH water, in other words, and the pH of the deep groundwater is higher than rainfall pH. The pH of the lake water is presently around 6.8, and as indicated earlier, is not varying much over time.

An additional point of reference: a drinking water well could pump a volume of water in a month that is equivalent to what falls on the lake surface in a 3" rainfall. This is one of the reasons why pumping groundwater as a means to regulate lake level—which was looked at in the past—was not deemed feasible. This was confirmed by Jim Perry with the Lumber River COG in his workshop presentation on groundwater hydrology last year.

Other monthly monitoring at White Lake includes sampling for bacterial levels by the Bladen County Health Department (and this summer's levels have been within the range considered safe for swimming waters) and monitoring of aquatic vegetation, to look for the aquatic weed Hydrilla (which has not been found). One note which underscores the need to do routine vegetation monitoring: a particularly aggressive floating aquatic weed called Giant Salvinia has been found in a pond in Columbus County. It can be transported to other water bodies by boats/trailers, and by wildlife, so routine inspections of boats and trailers before launching them in the lake can reduce the potential for this or other aquatic weeds to be introduced.

MEMO

Subject: White Lake Drinking Water Wells pH Testing

From: Steve Bunn

Date: October 6, 2020

Memo to the Lake Water Quality file

On June 17, 2020, Steve Bunn, Lake Stewardship Officer and Bill Stafford, White Lake Water System Operator conducted pH testing of the town water system wells. The results were as follows:

Well #1 7.1 pH

Well #2 6.7 pH

Well #3 6.5 pH

Well #1 is located at the old airport, across from the Scotchman on US Hwy. 701; Well # 2 is located at Louise St. and NC Hwy. 53; Well #3 is located on US Hwy. 701 at the old prison camp. The wells vary in depth from 200-300 feet and they each draw water from the Pee Dee aquifer, the Black Creek aquifer and the Upper Cape Fear aquifer.