



The Jordan Lake Controversy: Toxigenic Cyanobacteria, Nutrients, Quiescent Water & a Systems Approach to Restoration

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Abstract

The NC General Assembly recently passed bill S515, the Jordan Lake Water Quality Act, which suspends the Lake's unimplemented nutrient management rules and laws. The bill calls for a new plan that includes treating the impaired lake directly, as opposed to only reducing new nutrient input. Upstream Piedmont Triad bill proponents believe the current point- and nonpoint-source watershed management (WSM) plan will not restore the lake, and cost them too much at \$1-2 billion. Jordan Lake-area bill opponents prefer the current plan and cost structure. The almost 14,000 acre Jordan Lake in the Research Triangle has been impaired since the reservoir was completed in 1982 by the US Army Corps to provide flood control and designated uses such as drinking source water, wildlife habitat, and recreation. Prior to Jordan's construction, scientists and the US Environmental Protection Agency (EPA) predicted impairment by excessive algal growth due to high inlet nutrient content and low flow rates. Cyanobacteria (aka blue-green algae) increasingly predominate beneficial freshwater algae as nutrient concentrations and temperatures increase and water circulation decreases. Highly potent cyanotoxins pose human and animal health risks, and decay of the huge biomasses formed during cyanobacterial "harmful algal blooms" (HABs) depletes dissolved oxygen, killing fish. HABs increase Chlorophyll-a, pH, and turbidity, the Jordan Lake impairments identified by the NC Department of the Environment and Natural Resources (DENR). DENR developed total maximum daily loads for phosphorus and nitrogen, and nutrient management rules in accordance with current EPA policy. The EPA estimates that similar WSM implementations in about 15,000 of 55,000 impaired freshwaters have restored <8%, most of which had dominant point-source inputs. Point-source inputs now account for only about 5-10% of total input in the US, and 11% in Jordan Lake, although a \$100 million Greensboro utility upgrade will reduce input. Current EPA policy implements only the point- and nonpoint-source WSM pillars of freshwater protection and restoration mandated in the Clean Water Act. The 3rd pillar, waterbody management (WBM; Clean Lakes program), calls for treatments within impaired waterbodies. WBM treatments could suppress cyanobacteria, reduce nutrient internal loads and inlet inputs, and increase water circulation. A project is planned to demonstrate cyanobacteria suppression in Jordan Lake using solar-powered, long-distance circulation, and a more comprehensive plan will be developed. A plan that combines the most cost effective WSM and WBM tools and practices forms a systems approach to freshwater management. A systems approach is needed to restore Jordan Lake and protect downstream waters in the near term at a lower overall cost.