State Fiscal Year 2019
Grants to Prevent, Mitigate and/or Control Harmful Algal Blooms (HABs)
Project Descriptions

1. **The Evaluation of Innovative Measures to Prevent, Mitigate and/or Control HABs in Lake Hopatcong**
   Grantee: Lake Hopatcong Commission
   Funding Amount: $500,000

Lake Hopatcong experienced unprecedented cyanobacteria HABs over most of the summer season from mid-June well into October in 2019. These HABs resulted in the posting of advisories over large sections of the lake and the closing of all beaches. These conditions resulted in substantial impacts on the ecological, recreational, and economic resources of the lake and region.

The Lake Hopatcong Commission is implementing a variety of innovative HAB management measures, including habitat modifications, nutrient reduction, and/or direct HAB treatment. Projects have been identified within two counties and four municipalities throughout the Lake Hopatcong Watershed. The overall project goal is to implement these projects and objectively evaluate the relative effectiveness through water quality monitoring. Project objectives include evaluating various filtering media in two Aqua-Filter stormwater basins, three types of aeration, the nutrient inactivator PhosLock, the non-copper algaecide GreenClean, the use of Biochar to remove phosphorus from nearshore waters, and the consideration/installation of rain gardens.

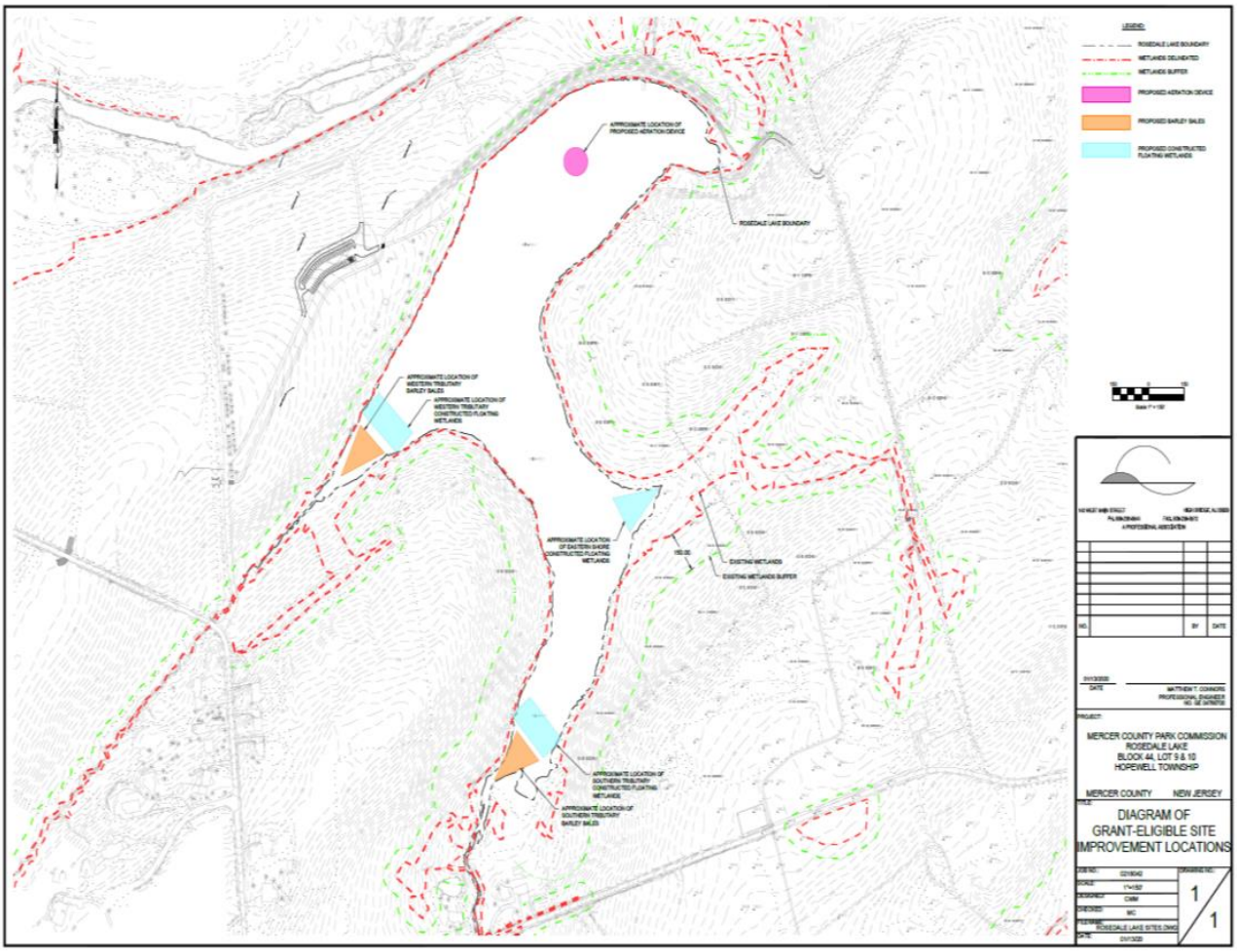
2. **Implementation and Evaluation of Several Innovative In-Lake Management Techniques to Prevent, Mitigate and Control HABs in Lake Mohawk, Sussex County**
   Grantee: Lake Mohawk Preservation Foundation
   Funding Amount: $160,920

Lake Mohawk is a large, eutrophic water body located in Sparta Township, Sussex County that frequently experiences nuisance densities of cyanobacterial Harmful Algal Blooms (HABs). Approximately 2,700 families live in the Lake Mohawk community. The Lake Mohawk Preservation Foundation (the Foundation) and the Lake Mohawk Country Club (LMCC) have been very proactive over the last three decades in improving and protecting the water resources of Lake Mohawk, which is an important and substantial headwater system for the Wallkill River. The Foundation and the LMCC are seeking funds to implement and evaluate alternative and innovative management measures to control and prevent the development of HABs without the use of copper-based algaecides.

The project will be implementing innovative, in-lake measures to address HABs and move away from the use of copper-based algaecides over a 2-year period. These measures include the use of the non-copper algaecide GreenClean and the application of the phosphorus inactivator PhosLock to control HABs. Each measure will be objectively evaluated through detailed water quality monitoring to determine its cost effectiveness.

3. **HAB Prevention at Rosedale Lake**
   Grantee: Mercer County Park Commission
   Funding Amount: $185,000

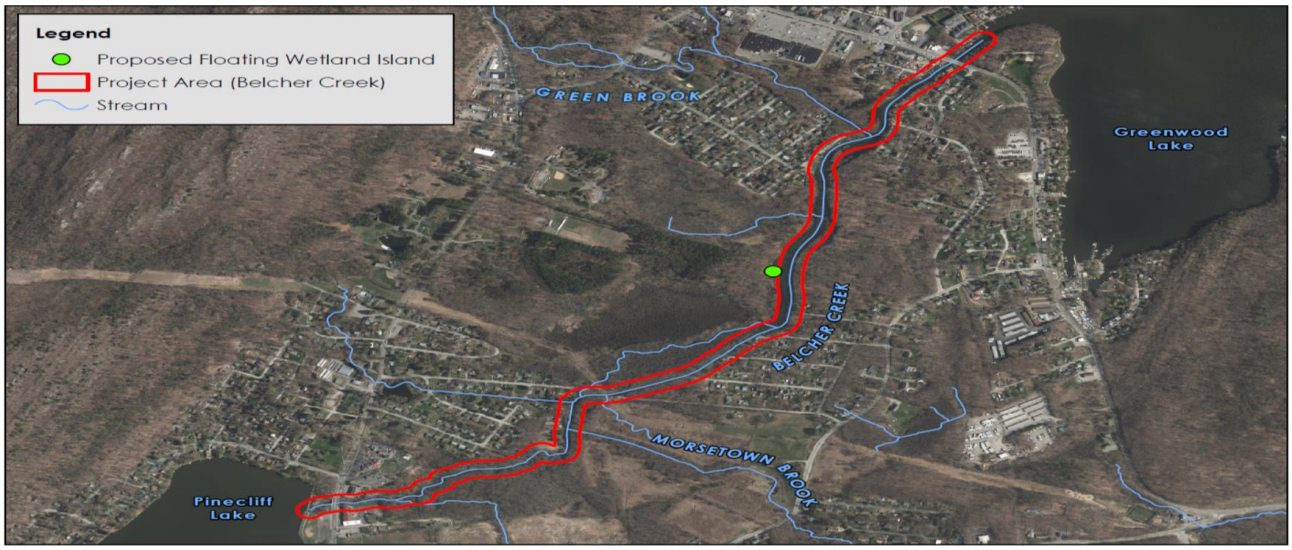
Rosedale Lake in Hopewell Township, Mercer County is owned and managed by Mercer County Park Commission and is located within Mercer Meadows. The lake has an extensive drainage area of currently unfiltered runoff and has experienced some of the highest HAB cell counts in New Jersey over the past few years. The goal of the funded project is to manage water quality conditions via structural practices to decrease the nutrient concentrations within the lake. This will be accomplished via the installation of an aerator device, barley bales and constructed floating wetlands. These various practices are designed to prevent the introduction of additional nutrients into Rosedale Lake and to reduce internal nutrient loading.



4. **Nutrient Reduction Measures in Belcher Creek to Reduce HABs in Greenwood Lake**
   Grantee: Greenwood Lake Commission
   Funding Amount: $52,800

Greenwood Lake is a 1,920-acre waterbody located in both Passaic County, New Jersey and Orange County, New York. The watershed encompasses approximately 16,036 acres and most of the development within the watershed occurs on the northern (New York) and southern (New Jersey) ends of the lake. Belcher Creek is the main tributary of the lake and empties into the southern end of Greenwood Lake in New Jersey. The lake is a highly valued ecological and recreational resource for both states and has a substantial impact on the local economies. In addition, the lake serves as a headwater supply of potable water that flows to the Monksville Reservoir and eventually into the Wanaque Reservoir, where it supplies over 3 million people and thousands of businesses with drinking water.

This project will follow the progress made to date on decreasing factors that contribute to HABs in Greenwood Lake, including data collection to establish the proper location for an innovative ferric sulfate injection system on Belcher Creek and the installation of Floating Wetland Islands to further decrease TP loading.



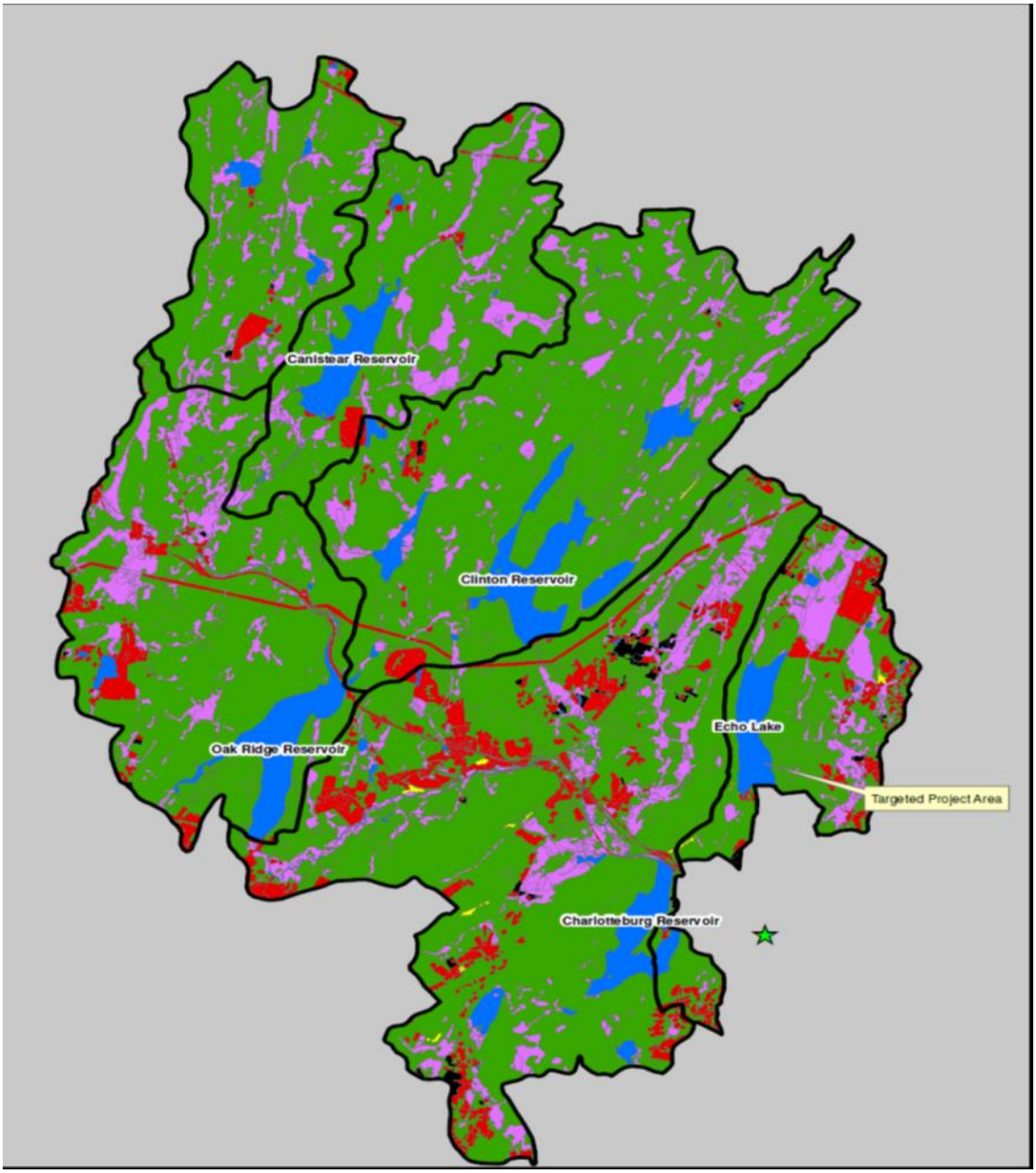
5. **Ultrasonic Algae Control Treatment – Water Supply Reservoirs Serving the Pequannock Water Treatment Plant (WTP)**
   Grantee: City of Newark Department of Water and Sewer Utilities
   Funding Amount: $475,000

The City of Newark owns and operates the Pequannock Water Treatment Plant (WTP), located in West Milford, which provides more than half of the City of Newark's water supply and serves over 500,000 residents. The WTP draws water from the Pequannock Watershed, which is approximately 35,000 acres and situated within portions of six separate municipalities in Morris, Passaic, and Sussex counties. The City of Newark owns approximately 86% of the Watershed. Raw water is drawn from the Charlotteburg Reservoir, which is the downstream terminus for runoff within the Watershed. Four other reservoirs present within the Pequannock Watershed include the Canistear Reservoir, Oak Ridge Reservoir, Clinton Reservoir, and Echo Lake.

Echo Lake is impacted by water quality issues and is rarely used as a supplemental potable water supply. Currently, Echo Lake is primarily used for recreation including swimming, fishing, boating, and camping for local youths. A cyanobacteria bloom was observed and quantified by the NJDEP in October 2019;

Due to water quality and recreational usage considerations, this project will be focused on addressing HABs specifically within Echo Lake, with the flexibility to implement solutions in the other four reservoirs throughout the course of the project if deemed necessary.

The project proposes the use of ultrasonic technology deployed in clusters across the surface of the target reservoir, forming a "sound barrier" on the water's surface to block cyanobacteria from photosynthesizing. This method is intended to reduce the intensity and duration of (or potentially eliminate) the cyanobacteria bloom, minimize potential impacts on human and animal health and aquatic resources, and control the harmful bloom itself within the water body. The primary focus will be to address HABs first within Echo Lake, with the ability to deploy additional units to other reservoirs over the course of the project. In addition to ultrasonic treatment, a monitoring plan will be employed each year in order to ensure the effectiveness of the ultrasound solution and to assess potential impacts on animal health and aquatic resources.

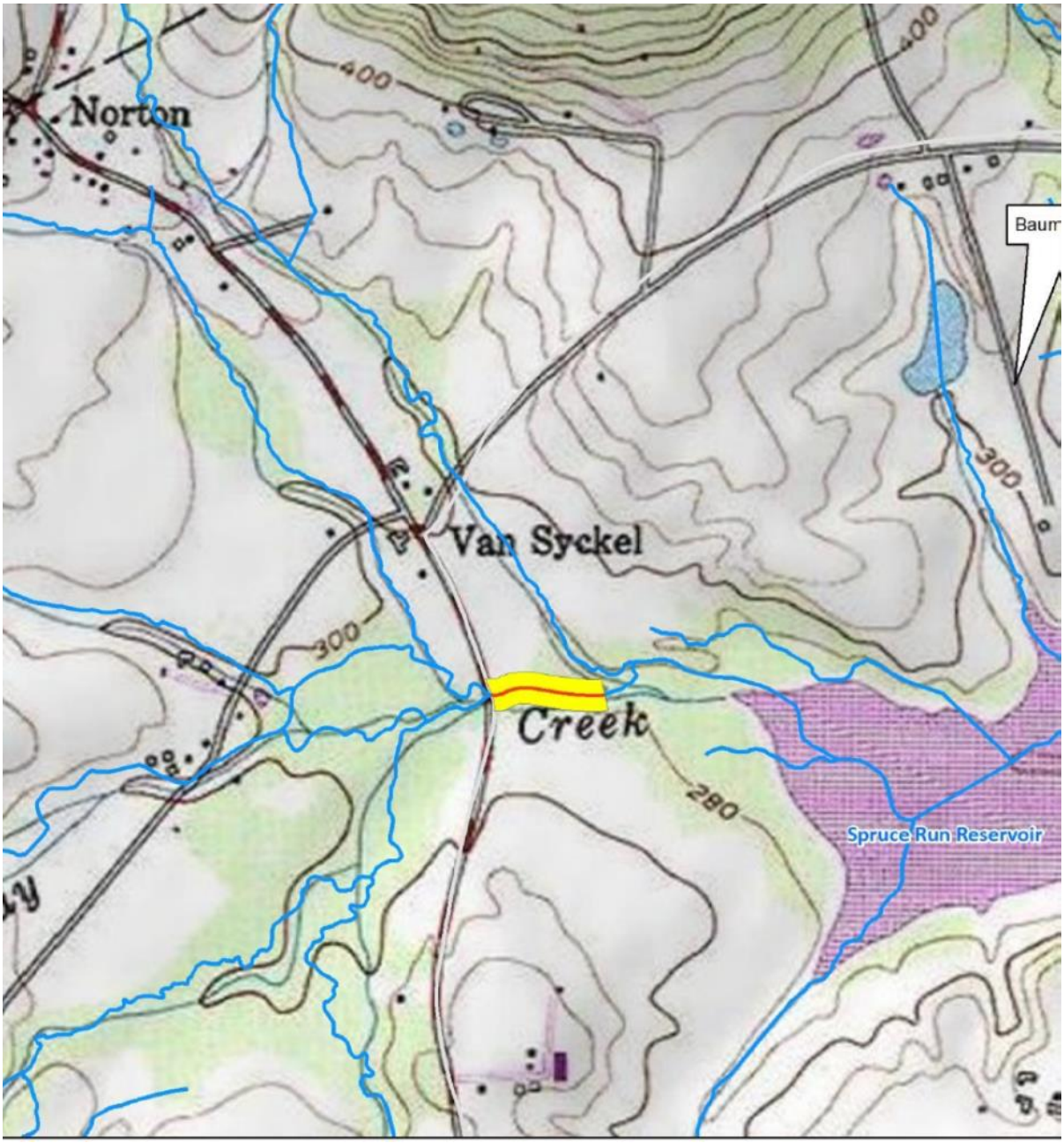

Canistear Reservoir
Clinton Reservoir
Oak Ridge Reservoir
Echo Lake
Targeted Project Area
Charlotteburg Reservoir

6. **Spruce Run Reservoir Innovative Biochar Installation to Mitigate HABs**
   Grantee: New Jersey Water Supply Authority
   Funding Amount: $115,600

Spruce Run Reservoir, located in Clinton Township and Union Township, Hunterdon County, is owned by the State of New Jersey, and operated by the New Jersey Water Supply Authority (NJWSA) as part of the Raritan Basin Water Supply Complex. The Raritan Basin Water Supply Complex provides the basic source of water supply to several public and private water utilities serving more than 1,500,000 people in central New Jersey. The land surrounding the reservoir is owned by the State of New Jersey and managed by one of three entities: NJWSA, NJ State Park Service (Spruce Run Recreation Area), or NJ Division of Fish and Wildlife (Clinton Wildlife Management Area). The 1,290-acre reservoir has 15 miles of shoreline, and stores 11 billion gallons of water as the third largest reservoir in the state, after Round Valley and Wanaque Reservoirs. The reservoir with a maximum depth of 70 feet is fed by two primary sources: the Mulhockaway Creek and the Spruce Run Creek. Spruce Run Recreation Area is a multiuse recreational facility offering swimming, fishing, boating, camping, hunting and other outdoor activities.

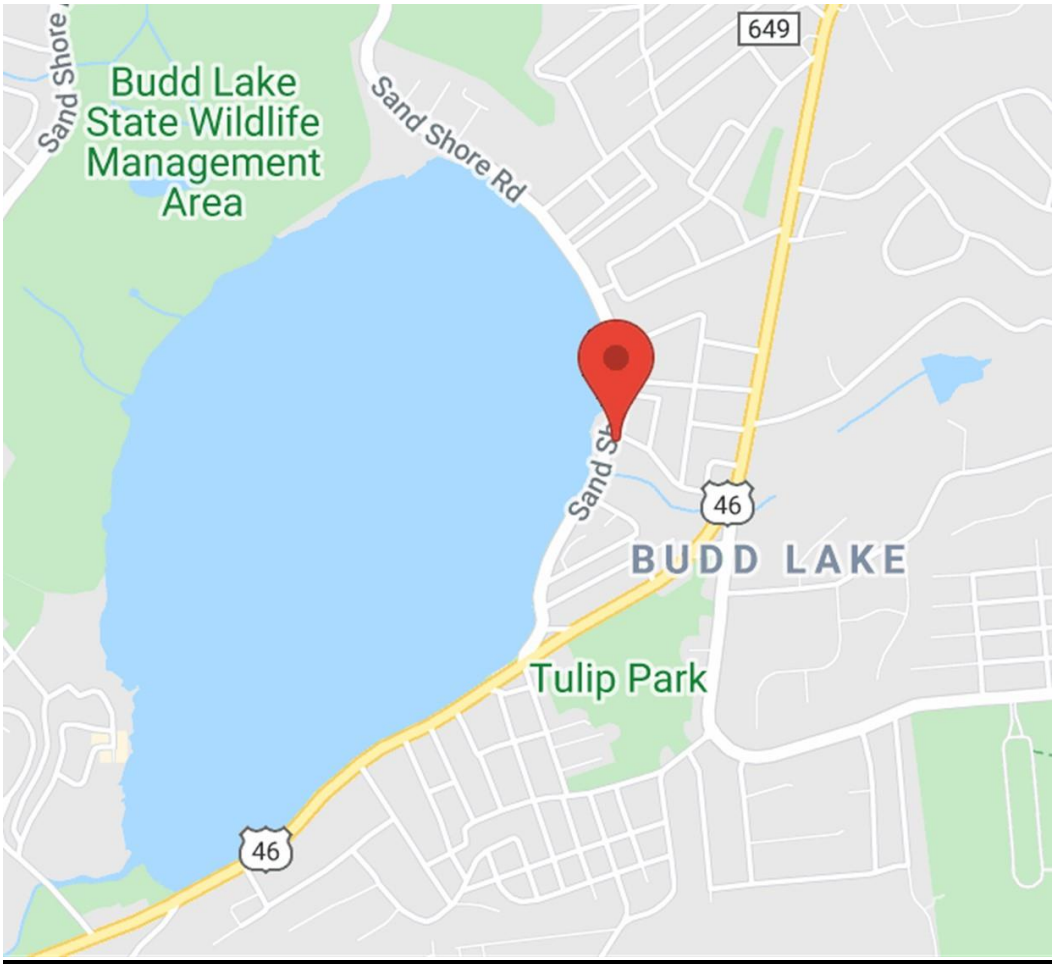
Spruce Run Reservoir has been increasingly plagued by cyanobacteria blooms in recent years, including fall of 2018 and an extensive bloom from June 2019 through January 2020. Due to the length and scope of the 2019 bloom, it is likely that both internal and external nutrient loads are providing a consistent nutrient source for the cyanobacteria.

In order to address some of the known external phosphorus load, a biochar filter system will be installed on the Mulhockaway Creek approximately 0.3 miles upstream of the inlet to Spruce Run Reservoir. Biochar is electronegatively charged burnt plant material that grabs nutrients as water flows over and through it. This demonstration project has the potential for significant nutrient and metal removals, and may provide a scalable, low-cost option for in-stream and/or stormwater system applications in order to address nutrient loading that may contribute to HABs throughout the Spruce Run watershed and other watersheds in New Jersey. NJWSA will evaluate the effectiveness of the biochar installation through a comprehensive stream monitoring program, which includes baseflow and stormwater sampling.


Norton
400
400
Baum
300
Van Syckel
300
Creek
280
Spruce Run Reservoir

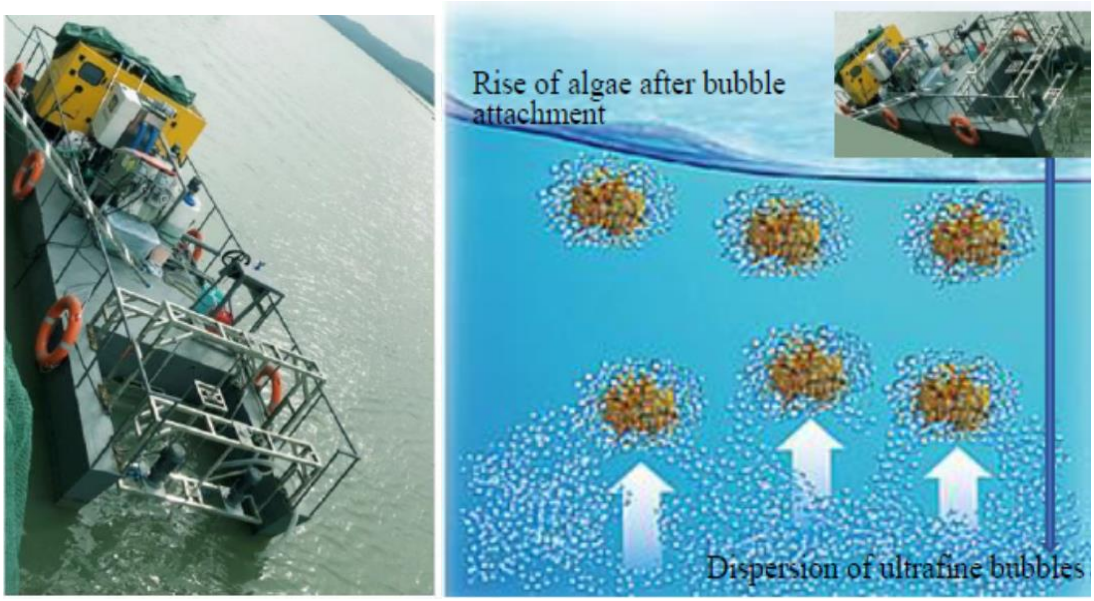
7. **Budd Lake Aquatic Herbicide and Weed Harvesting**
   Grantee: Township of Mount Olive
   Funding Amount: $365,000

Budd Lake in Mount Olive Township is the headwater of the South Branch of the Raritan River and is the largest natural spring fed glacial lake in New Jersey. The lake encompasses 0.6 square miles, has an average depth of 7 to 12 feet and is surrounded by a bog and the Budd Lake State Wildlife Management Area. Over the past few years Budd Lake has experienced HABs despite an aggressive aquatic weed harvesting and treatment program. The funded project will be implementing a 3-year program to focus on reducing internal nutrient loading in Budd Lake and to conduct chemical treatment of HABs. Nutrient load reductions will be accomplished through intensification of the existing aquatic weed harvesting and aquatic herbicide application program, and through lake wide treatments of aluminum sulfate. The applicant also proposes to monitor water quality for early signs of HABs and treat them through lake wide application of appropriate additional chemical measures.



8. **Mechanical removal of HABs in lakes using air micro nano bubbles from a specialized floating platform**
Grantee: New Jersey Institute of Technology
Funding Amount: $500,000

This proposal will implement a mobile floating platform to mechanically remove HABs by air flotation using air micro-nano bubble generators. This project aims to deploy a customized multifunctional floating platform in Branch Brook Lake and Deal Lake, two of the HABs-affected lakes in New Jersey in 2019. The New Jersey Institute of Technology (NJIT) will implement a 3-year project to install and study a mobile floating platform to mechanically remove HABs by air flotation using air micro-nano bubble generators. This project will deploy a customized multifunctional floating platform in Branch Brook Lake and Deal Lake, two of the lakes affected by HABs in the summer of 2019. This in-situ algal removal technology aims to clarify HAB-affected waterbodies, including the surface and water columns as deep as 4-6 ft. Additional objectives include a long-term HAB strategy for Branch Brook Park Lake and evaluation of additional water quality improvements achieved by the platforms for parameters such as dissolved oxygen and turbidly.



9. **Lake Hopatcong Crescent Cove Aeration**
   Grantee: Borough of Hopatcong
   Funding Amount: $145,680

Lake Hopatcong experienced excessive HAB in Crescent Cove during the 2019 summer season. The core objective of this project is to prevent, control and minimize HABs within Crescent Cove using aeration. The funded project will demonstrate the effectiveness of bottom-diffused aeration targeting the entirety of Lake Hopatcong's Crescent Cove. The project consists of the design and installation of a lake-bottom Diffused Aeration System starting at the River Styx Bridge and covering the entire 60 acre area known as Crescent Cove.