

Agenda Item #26 for the Meeting of Tuesday, October 11, 2022

GENERAL BUSINESS:

26. Status Report on Best Management Practices for Lake Munson
(County Administrator/ County Administration/ Public Works)

This document distributed October 5, 2022.

**Leon County
Board of County Commissioners**

Notes for Agenda Item #26

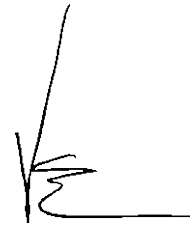
Leon County Board of County Commissioners

Agenda Item #26

October 11, 2022

To: Honorable Chairman and Members of the Board

From: Vincent S. Long, County Administrator



Title: Status Report on Best Management Practices for Lake Munson

Review and Approval:	Vincent S. Long, County Administrator
Department/ Division Review:	Alan Rosenzweig, Deputy County Administrator Ken Morris, Assistant County Administrator Brent Pell, Director, Public Works Charles Wu, Director, Engineering Services
Lead Staff/ Project Team:	Anna Padilla, Stormwater Management Coordinator

Statement of Issue:

This item provides a status update on the natural conditions and past contamination of Lake Munson, the progress made in water quality as a result of cooperative actions, strategic investments and prioritization in capital improvements, present day challenges, and best management practices for the ongoing and planned enhancements to Lake Munson. For the mitigation of recent algal blooms and rapid growth of an invasive aquatic plant (hydrilla), the item seeks Board approval to implement an Action Plan for Lake Munson which includes an immediate and temporary drawdown of the water level to coincide with enhanced water quality monitoring, and an aerial topographic survey of the lake bottom. The Action Plan includes long-term strategies to supplement the State's in-lake restoration activities and provides a higher level of service to County residents including the use of hydrogen peroxide to treat algal blooms, implementing an invasive vegetation management program, ongoing engagement over the next two years to evaluate the Lake's response to the drawdown, and regular status updates to the Board every six months.

As requested at the Board's September 13, 2022 meeting, this item also includes an analysis of the requests brought forward by the Lake Munson citizen group.

Fiscal Impact:

This item has a fiscal impact. The drawdown plan and treatments for Lake Munson are estimated to cost \$130,000 in FY 2023. Funding is included in a separate agenda item as a carry-forward for these purposes.

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Staff Recommendation:

Option #1: Accept the Status Report on Best Management Practices for Lake Munson.

Option #2: Approve the Lake Munson Action Plan, presented herein, including the immediate drawdown plan.

Report and Discussion

Background:

This item provides a status update on the natural conditions and past contamination of Lake Munson, the progress made in water quality as a result of cooperative actions, strategic investments and prioritization in capital improvements, present day challenges, and best management practices for the ongoing and planned enhancements to Lake Munson. For the mitigation of recent algal blooms and rapid growth of an invasive aquatic plant (hydrilla), the item seeks Board approval to implement an Action Plan for Lake Munson which includes an immediate and temporary drawdown of the water level to coincide with enhanced water quality monitoring and an aerial topographic survey of the lake bottom. The Action Plan also presents long-term initiatives based on best management practices for Lake restoration.

On September 13, 2022, the County Administrator advised the Board that staff was preparing an agenda item for the October 11th meeting that would seek Board approval to proceed with a temporary drawdown of Lake Munson and provide recommendations for any additional short- and long-term best management practices that may be advisable for the Lake. At that time, the Board directed staff to meet with a Lake Munson citizens group (Workgroup) to address their concerns about the Lake, and to bring back an analysis of the Workgroup's ten requests submitted to the County in writing as part of this agenda item.

The Workgroup is made up of residents who live near Lake Munson and other stakeholders. Based on the Board's direction, staff immediately contacted the Workgroup to schedule meetings and coordinate with the appropriate subject matter experts across County departments, Blueprint, State agencies, and the County's Science Advisory Committee (SAC). While the proposed Lake Munson Action Plan addresses some of the issues raised by the Workgroup as described throughout this agenda item, specific responses for each of the ten requests begin on page 23 of the Analysis section.

This status report advances the following FY2022-FY2026 Strategic Initiative:

- *Ensure County's water quality and stormwater regulations, programs and projects are evaluated and implemented holistically to advance the County's adopted strategic priority: to protect the quality and supply of our water. (2022-16)*

This particular Strategic Initiative aligns with the Board's Environment Strategic Priorities:

- *(EN1) Protect the quality and supply of our water.*
- *(EN2) Conserve and protect environmentally sensitive lands and our natural ecosystems.*

This item provides a background on Lake Munson including the millions of dollars the County has made and continues to make in investments in watershed planning, major project implementation, and follow-up studies throughout the basin since the 1990s. Despite the better water quality, in-lake mitigation, and the magnitude of investments in upstream infrastructure, Lake Munson continues to experience occurrences of fish kills, algal blooms, invasive vegetation and snails, low game fish productivity, and depressed oxygen levels. This item presents ongoing and additional best practices to these challenges with the County has been performing or will be implementing,

including a planned drawdown with more frequent water quality testing, an aerial topographic survey of Lake Munson to measure elevations of compacted sediment to evaluate for future in-lake mitigation strategies, a new vegetation management program for treating invasive plants, and implementing periodic drawdowns in consultation with FWC to reduce the need to mechanically remove organic-rich sediment. And finally, this item provides information on the County's cooperative efforts with a group of local residents to address their concerns surrounding present day lake challenges.

Lake Munson is an approximately 288-acre, cypress-rimmed lake located south of the City of Tallahassee. It is a state-managed waterbody with a history of chronic water quality and ecological problems including fish kills, algal blooms, exotic vegetation and snails, high nutrient levels, low game fish productivity, sediment contamination, and depressed oxygen levels. The Lake is believed to have originally been a cypress swamp but has since been impounded and now functions as a shallow man-made lake. This description of the Lake is not a value statement, rather the origin and mode of formation of the Lake is important to understand how it functions ecologically. Today, Lake Munson is designated by the Florida Department of Environmental Protection (FDEP) as a Class III waterbody suitable for fish consumption and recreational activities. However, the shallow and stagnant nature of the waterbody makes it susceptible to the growth of algal in the Lake resulting in a bloom.

Lake Munson has historically been subjected to drainage with high nutrient loads and wastewater discharges to the tributary system, which has resulted in the embedding of legacy nutrients in the lake-bottom soil. The Lake receives surface water flow from a 32,000-acre basin, much of which is located in the City of Tallahassee (Attachment #1). All flow enters Lake Munson through Munson Slough, from Lake Henrietta which receives upstream flow from the east and from the north (Attachment #2). In the early 1980s the effluent from the City of Tallahassee T.P. Smith Water Reclamation Facility was redirected from Munson Slough to the Tram Road Sprayfields and since then, effluent from T.P. Smith does not discharge into Lake Munson (neither directly nor indirectly). Decades of development in the Tallahassee red-clay hills, wastewater treatment facilities discharging to the tributary system, and drainage activities focused on flood reduction contributed high nutrient loads entering Lake Munson resulting in poor water quality. Efforts to improve the water quality and reduce the nutrient loading in Lake Munson have been ongoing since the 1990s, including hundreds of millions of dollars of capital investment by the County, City, and Blueprint, and requires the continuous coordination among governmental partners with respect to each's responsibilities to protect natural resources.

1991 Stormwater Management Plan

In 1991, the Northwest Florida Water Management District (NFWFMD), under a joint contract through the County and City of Tallahassee (City), completed a Stormwater Management Plan (SMP) for Lake Munson. The SMP included structural (capital improvements) and non-structural (preservation, land use, and regulatory) recommendations. The 1991 Lake Munson SMP identified stormwater management improvements designed to provide flood control and water quality enhancements in the Lake Munson basin and along major drainage branches. The non-structural recommendations were primarily preservation and restoration initiatives through regulatory and land management programs.

The structural improvements recommended in the 1991 SMP included the creation of seven regional wet detention stormwater management facilities along the major tributaries to the Lake to address flooding as well as capture a significant portion of nutrients, suspended solids, and other contaminants. Importantly, over the next three decades, the regional stormwater management facilities were constructed throughout the basin including the Carter Howell Strong Park in Frenchtown at the headwaters of the FSU Branch, the FSU stormwater facility (known as Lake Elberta) along the Central Drainage Ditch, the Jim Lee Road and East Branch facilities along the East Drainage Ditch. Also constructed were the Vega Drive and Eisenhower Avenue facilities on the West Drainage Ditch and the Orange Avenue facility on the East Drainage Ditch (Attachment #3).

All non-structural recommendations in the 1991 Lake Munson SMP were prioritized and completed over this time. Major restoration efforts included the Gum Swamp wetland restoration, the North Ridge Road wetland and Silver Lake restoration, and the Lake Munson Restoration project including the construction of the Lake Henrietta stormwater facility, Munson Slough restoration, sediment removal from the Lake Munson delta, Lake Henrietta wetlands restoration, and Lake Munson wetlands restoration. The Gum Creek Watershed Management Program and the Hopkins Crossing wetland preservation have also been completed. Additionally, regulatory measures have been implemented to preserve wetlands and floodplains.

The 1991 SMP examined the entirety of the Lake Munson Basin for deficiencies and developed basin-wide recommendations. Based on a desire to improve the Water Quality of Lake Munson, an action team was assembled to develop a management plan specific to Lake Munson with recommendations that would directly benefit the Lake.

1994 Lake Munson Action Plan

The 1994 Lake Munson Action Plan was written by the Lake Munson Action Team, a twelve-member group created by the County Commission in the early 1990s. The Action Team included a technical staff representative from County departments, state agencies, and private citizens with an interest and concern for Lake Munson.

Over the course of 18 months, the Action Team reviewed the problems of the Lake and possible solutions before developing an overall strategy for restoration. The 1994 Lake Munson Action Plan incorporated three major strategies to restore Lake Munson: watershed management, in-lake restoration, and community action. The Action Team recommended commencing the watershed management and community action strategies immediately. The in-lake restoration was recommended to follow the watershed management so that resources would be directed toward upstream improvements to ensure that clean water was entering the Lake. Much like a leaky pipe, it is important to first stop what is coming out of the pipe before cleaning up what spilled. The plan also recommended specific projects in each of these categories.

Watershed Management

The watershed management component of the 1994 Action Plan consisted of upstream improvements to reduce the nutrients and sediment entering the Lake. Facilities farthest upstream were prioritized since the design and performance of downstream alternatives would be adversely affected by a lack of upstream control. The Action Team determined that implementation of the

1991 SMP was the top priority and was crucial for the Lake's restoration. In addition to the 1991 SMP stormwater and restoration projects, the Action Team recommended trash racks be installed upstream of Lake Munson and the creation of a water quality monitoring program. Since the 1994 Action Plan, the County, City, and Blueprint Intergovernmental Agency (Blueprint) prioritized and completed these upstream improvements and infrastructure projects.

In-Lake Restoration

The 1994 Action Plan recommended in-lake restoration including sediment removal, drawdowns, dam refurbishment, and invasive exotic plant control with herbicide treatment. The Plan identified dredging as a cost-effective method but cited turbidity problems (e.g., disturbing sediment and resuspending it in the water) and the proximity of disposal sites as prohibitive challenges, so exploring additional alternatives was recommended. The Plan also recommended fall and winter drawdowns as part of a well-coordinated restoration plan. To control the invasive exotic vegetation, which at the time was hyacinth and hydrilla, the Action Team recommended the continued, judicious use of herbicides to suppress water hyacinth, and for control alternatives to be implemented for hydrilla. Since the Plan was adopted, the County conducted a drawdown in 2000 and again in 2010, reconstructed the Lake Munson dam, and continues to coordinate with the Florida Fish and Wildlife Conservation Commissioner (FWC) for herbicide treatment of the exotic vegetation.

Community Action

The final component of the 1994 Action Plan involved community and political action on a broad range of issues. The Plan recommended a strategy that built on the attributes of the area and promoted a positive image, one based on environmental education and natural area-based recreation. It called for the creation of lakefront parks with boat ramps, picnic areas, and adequate parking and further recommended the parks be part of a greenway system of public land along watercourses. The Action Team also emphasized the importance of educating the public about the proper design and maintenance of septic systems, best management practices for construction and lawn care, and the need for individuals to take personal responsibility for reducing soil erosion, nutrients, and other types of pollution. This strategy resulted in the opening of Gil Waters Park Preserve at Lake Munson which was constructed in 2000 and includes a boat ramp and landing, picnic areas, a scenic overlook, trails, and paved parking. Additional parks created in the basin include Anita Davis Preserve at Lake Henrietta Park, Broadmoor Pond Park, Martha Wellman Park, Orange Avenue – Meridian Street Park, and Blueprint's Debbie Lightsey Nature Park. Still in design, Blueprint's Capital Circle SW Greenway will connect neighborhoods in south and southwest Tallahassee, will connect users to several parks and greenways and the Apalachicola National Forest. Fulfilling the call for better septic systems and personal responsibility for reducing nutrient pollution, later sections of this item highlight the County's focus on eliminating conventional septic tanks and regulatory actions to protect our natural resources including restrictions on the use fertilizer.

The 1994 Lake Munson Action Plan provided a comprehensive approach to lake and watershed restoration and preservation. It prioritized the implementation of the 1991 SMP structural (capital improvement) projects and non-structural recommendations (land use and regulatory actions) within the basin, which represent the early efforts to restore Lake Munson, and identified additional upstream improvements. Structural projects included repairing the Lake Munson Dam,

implementation of the 1991 SMP, installing trash racks, land acquisition projects to preserve wetlands and waterbodies, aquatic plan control, and a water quality monitoring program. The non-structural recommendations included regulations changes for land use and density limits, surface water quality protection, trash and sediment reduction requirements for new development, and special protection zone regulations. The recommendations also included community outreach initiatives and education programs, lake clean up events, information on septic tank maintenance, and periodic drawdowns of the Lake.

From the Lake Munson SMP crafted in 1991 to the 1994 Lake Munson Action Plan, the implementation of both plans demonstrates the County's and City's ongoing support of projects that enhance water quality in Lake Munson. These plans guided the community strategy, efforts, and investments to enhance water quality by recognizing and prioritizing the need for upstream improvements to ensure that clean water was going into the Lake before undertaking an in-Lake dredging project that would disturb the existing sediment.

Continuous Investment in the Lake Munson Basin

Since the 1990s, the County, City, and Blueprint have dedicated hundreds of millions of dollars and completed numerous projects upstream of Lake Munson to provide water quality treatment, reduce sediment transport, and collect trash. Trash racks have been installed east of Jake Gaither Golf Course on the East Drainage Ditch, west of Lake Bradford Road on the Central Drainage Ditch, and upstream of Lake Henrietta. The City's Erosion Control and South City/Country Club Creek Drainage projects, both with the Lake Munson basin, reduce the amount of sediment flowing to Lake Munson by protecting the channel banks. Notable water quality improvement projects include Gum Swamp Restoration and Cascades Park as well as the San Luis Park, Broadmoor, Martha Wellman, Bond, Carter-Howell-Strong, Bond, Tallahassee Junction, and Coal Chute stormwater management facilities (SWMFs). Many of these projects were water quality enhancements to larger projects such as the addition of Broadmoor SWMF with the widening of Capital Circle NW/SW and the creation of Coal Chute Pond and Tallahassee Junction SWMF expansion with the FAMU Way project. Blueprint has completed a substantial number of stormwater improvements along the Capital Cascades Trail corridor improving both water quality and reducing area flooding. In all, these stormwater improvements represent a total investment of more than \$130 million and stretch approximately 2.5 miles. Another major upstream restoration project designed to enhance water was the Lake Munson Restoration Project which constructed the Lake Henrietta stormwater facility, made improvements to Munson Slough, removed trash and the sediment delta from Lake Munson, and restored wetlands around Lake Henrietta and Lake Munson.

The strategies from the 1994 Lake Munson Action Plan have facilitated the continuous investment in the Lake Munson basin and have been broadened over the years to include new technologies and methods in lake management and restoration best practices which are explored further in the Analysis section. For the mitigation of current conditions on the Lake including recent algal blooms and rapid growth of hydrilla, this item seeks Board approval to implement an Action Plan for Lake Munson which includes an immediate and temporary drawdown of the water level to coincide with enhanced water quality monitoring and an aerial topographic survey of the lake bottom. The Action Plan also presents long-term actions to enhance the Lake based on best management practices.

Analysis:

Leon County Government, the City of Tallahassee, and the Blueprint Intergovernmental Agency have dedicated hundreds of millions of dollars for projects in the Lake Munson basin and prioritized upstream improvements which reduce the transport of sediment and benefit the Lake water quality. While the Lake continues to improve, undoing decades of damage will take continuous commitment. The 1994 Lake Munson Action Plan has been used as the basis to guide watershed and stormwater improvements, regular testing and monitoring of water quality, and regulatory actions to limit pollutants and protect natural resources. Since 2019, two studies have been completed on sediment contamination in Lake Munson which will guide the evaluation and analyses of future restoration projects. As a result of these studies, in-lake sediment removal is no longer a viable mitigation option to reduce nutrient levels in Lake Munson at this time; however, as new technologies and information become available, dredging may become a viable option in the future.

In preparing this item, staff sought input from the Leon County Science Advisory Committee on the current water conditions, quality and ecology of Lake Munson. The SAC has a great deal of institutional knowledge on Lake Munson and has provided input to the Board over the years on lake management best practices. On September 2, 2022, SAC reviewed the County's water quality data and concurred with staff that over the past several decades, the water quality in the Lake has been improving; Munson Slough and Lake Munson are exceeding their State-mandated nutrient levels for nitrogen while phosphorus levels have declined significantly over the last ten years and are now approaching the target levels. The SAC finds that the upstream improvements since the 1990s have resulted in lower concentrations of nitrogen and phosphorus flowing into the Lake meaning that the quality of incoming water is better than the water in Lake Munson.

Despite the better water quality, in-lake mitigation, and investments in upstream infrastructure, Lake Munson continues to experience occurrences of fish kills, algal blooms, invasive vegetation and snails, low game fish productivity, and depressed oxygen levels. Several of these conditions were experienced by Lake Munson residents this summer, providing an opportunity to hear directly from residents and other stakeholders. This item articulates not only all that Leon County has done to enhance water quality in the Lake Munson basin, but also describes the three decades of strategies which informed and prioritized the infrastructure investments by cooperative local governments. And finally, the item details the County's next steps to address these recent conditions including those that were planned and, in some cases, those which came out of the meetings with the Workgroup. These next steps are hereafter referred to as the Lake Munson Action Plan (Action Plan) throughout the agenda materials.

For the continued improvement of Lake Munson and consideration of future in-Lake restoration projects, the County will continue to utilize the SAC and engage State agency partners for their resources and expertise. State agencies, water management districts, and local governments each have a unique role in watershed, stormwater, and lake management. The continuous coordination between local governments and State agencies is necessary to address water quality in Lake Munson as described throughout this item. However, it is important to clearly understand the roles and responsibilities of each jurisdiction with regard to planning improvements to a State waterbody.

Roles and Responsibilities

The management of waterbodies is governed by the Federal Clean Water Act which establishes the basic structure for regulating discharges of pollutants into the waters of the United States, establishes quality standards for surface waters, and delegates much of the regulatory enforcement to the states. At the state level, the FDEP is responsible for the administration of water resources along with the enforcement of federal and state laws and programs. This includes monitoring and responding to red tide on the coast, algal blooms in freshwater, and fish kill investigations conducted by FWC. According to FDEP's website:

It is a policy of the Legislature that the State's water resources be managed at a state and regional level.

The FDEP is responsible for the administration of the water resources at the state level and exercises general supervisory authority over the state's five water management districts which are responsible for the administration of the water resources at the regional level. The state's five water management districts include the Northwest Florida Water Management District, the Suwannee River Water Management District, the St. Johns River Water Management District, the Southwest Florida Water Management District, and the South Florida Water Management District. The core mission of Florida's five water management districts is water supply, water quality, flood protection and floodplain management, and natural systems management. For waterbodies within their regions, the water management districts construct or help fund the construction of water quality projects to benefit our state's waterbodies. In addition, the districts administer regulatory programs designed to achieve the protection of the state's water quality.

The FWC is the lead State agency for managing fish and wildlife, and their habitats on Florida's aquatic resources. The agency develops comprehensive Lake Management Plans detailing its management activities which can include, but are not limited to, habitat protection, restoration and enhancement, fish management, and invasive plant management such as herbicide treatments, biological controls, and mechanical removal. The FWC supports Lake Munson through its Aquatic Plan Management Program which chemically treats invasive exotic aquatic vegetation. FWC's program is currently the only aquatic plant management strategy for lakes in Leon County and is subject to available State funding.

FWC also has a history of lake restoration projects on state-managed waterbodies in Leon County. This includes sediment removal projects on Lakes Iamonia and Miccosukee and, in 2001, State funds were programmed for an in-Lake and upstream restoration project to benefit Lake Munson. Following delays to begin the project, in 2003 the Board adopted a Resolution urging FWC to begin the in-Lake removal of sediment. The project never commenced and FWC notified the County in 2007 that it was no longer a priority project.

The County is responsible for regularly collecting and reporting water quality data, administering the stormwater management program, and developing policies or regulatory measures to protect water resources in the unincorporated areas of our community. County staff monitors the quality of our water resources through field sampling to analyze the chemical makeup and assess the biological health of our waterbodies to ensure that waterbodies are within acceptable nutrient levels. Should a waterbody exceed the water quality thresholds established by the State, FDEP and the County would prepare a restoration plan to identify programs and improvements designed

to reduce nutrient levels to meet the state standards. The following section describes this exact scenario from 2013 related to Lake Munson.

FDEP Environmental Assessment and Restoration

Lake Munson has a long history of poor water quality and not meeting the State minimum water quality standards. In 2010, a Total Maximum Daily Load (TMDL) was in development for Wakulla Springs and because Lake Munson contributes to Wakulla Springs, it was necessary to reduce nutrient levels at Lake Munson. Through the FDEP environmental assessment program, individual parameters within a waterbody are analyzed to determine if the waterbody is meeting its designated uses. Lake Munson was impaired for nitrogen and phosphorus. FDEP adopted a TMDL for Lake Munson and Munson Slough in 2013. The TMDL set limits for nutrients that must be achieved by the County and City for Lake Munson.

As part of the Water Quality Monitoring Program, Leon County samples Lake Munson quarterly. This data is summarized in the Annual Water Quality Report that presents the previous calendar year's data. Leon County has water quality data dating back to 2001 when the program began. County staff reviews and analyzes the data for trends in the system. The water quality in Lake Munson has been below the TMDL limit for nitrogen since 2017 and has been steadily declining in phosphorus (24% reduction since 2013) that it is now approaching the TMDL limit. Graphs of Lake Munson's nitrogen and phosphorus concentrations are included in Attachment #4.

The lack of stability in the nitrogen and phosphorus levels through time reflects the changing nature of Lake Munson. For example, the explosion of apple snails in 2004-2005 and the resultant elimination of aquatic plants caused an extensive algal bloom and the Lake to change. The crash of the apple snail population further perturbed the system.

The ups and downs in the nutrient values also represent the Lake trying to reach some sort of stability. A lake dominated by algae takes a very long time to stabilize, if ever. The algae will take up the nutrients and prevent other higher-level plants from establishing or reestablishing. The quarterly samples in recent years show much greater stability of nutrient levels which means the Lake appears to have stabilized.

After the drawdown in 2010, the nutrient level dramatically fluctuated. This was in part caused by the plants in the lake bottom dying off, and in part due to FWC's aggressive chemical treatment for the water hyacinth that emerged at that time. Some variability in the nutrient values after the Lake is refilled and tries to restabilize can be expected. The proposed Action Plan described later in this analysis includes more frequent chemical treatment of the invasive exotic species in an effort to reduce this instability.

The changes to nitrogen and phosphorus levels over the last seven years are most certainly a result of the ongoing upstream improvements. The submersed aquatic plants in the Lake decrease the nitrogen and phosphorus levels in the water column; however, aquatic vegetation alone would not result in such a drastic drop in concentrations.

2019 FGS Sediment Study

While the upstream improvements significantly reduced the nutrient levels in the lake, in-lake restoration was part of the recommended improvement strategies from the 1994 Action Plan. In order to dredge the lake, information on how much material needed to be removed and determine if there were any contaminants in the material. In order to determine this, a sediment study was needed. This study would remove material from the lake, test the material for contaminants, and determine how dangerous the levels of any detected contaminants are. The report prepared though this study would be used to guide future decisions on in-lake restoration strategies. As a State-managed waterbody, staff consulted with FDEP for guidance and the agency offered to conduct a sediment study.

The Florida Geological Survey (FGS), a division of FDEP, together with the Bureau of Laboratories under the Florida Department of Health, had the staff, expertise, knowledge, and equipment to investigate the Lake Munson sediments. The purpose of the Sediment Study was to determine the depth to and thickness of organic muck, native sand, and clay beneath the waterbodies; determine if hazardous wastes occur and their location and depth within the sediment muck layer; determine the nutrient concentrations in the sediment muck layer; and investigate two known karst features and attempt to identify unknown karst features within Lake Munson.

Between September and November 2018, FGS collected vibracore sediment samples from 37 sample sites, 32 in Lake Munson, 2 in Lake Henrietta, and 3 in Munson Slough. The sediment samples were analyzed for a suite of heavy metals and other containments. The final report was completed in February 2019 (2019 FGS Sediment Study). In short, the study found polychlorinated biphenyls (PCBs) and heavy metals in the sediment samples.

The samples with the highest concentrations of contaminants were further analyzed. This analysis indicated that the contaminants are tightly bound to the sediment and do not leach under simulated rainfall, so they are not soluble in overlying water. These types of contaminants are attracted to sediment particles and when they find a particle they latch on; the chemicals are then moved around through sediment transport or movement. The FGS testing indicates that when the exposed particles are rained on, they remain stuck to the sediment and does not run-off. This suggests that contaminants were transported at some point to Lake Henrietta and Lake Munson attached to the sediment particles, from somewhere upstream and not flowing downstream in the water from a leak or other source. The FGS testing also suggests that once the sediment particles settle to the bottom within the Lake, the contaminants are not releasing off the sediment into the water; therefore, the sediment on the bottom is stable and not releasing toxins. The SAC accepted the findings but shortly thereafter, the City of Tallahassee hired a consultant to review the results of the 2019 FGS Sediment Study.

The City of Tallahassee hired Terracon, a national engineering consulting firm specializing in environmental, geotechnical and materials services, to provide recommendations in response to the FGS Sediment Study. Completed in 2021, the Terracon Report found that the use of PCBs has been banned since 1979 and the use of heavy metals are regulated such that they are only allowed in small concentrations. The Terracon Report determined that the contaminated sediment accumulated from activities prior to the mid-1990s and are still detectable due to how slowly they

break down. The report also determined that upstream source sampling for historical sources is unnecessary because they are unlikely to be contributing new contamination to Lake Munson.

The PCBs found in the sediment are likely relic contaminants prior to current regulations or may have been transported downstream or downwind during development activity decades ago. Significant development and construction activity have occurred upstream of Lake Munson which provided ample opportunities for potentially contaminated soil to be exposed, rained upon, and carried downstream. Based on these recent reports and findings from experts in the public and private sectors, it is unlikely the sediment contributes to water column contamination to which people, pets, and fish would be exposed. After consultation with the FDEP on the results of the analysis and the known conditions of the basin, no upstream source sampling for PCBs and/or heavy metals had been pursued.

The purpose of the 2019 FGS Sediment Study was to obtain new information that could be used to guide future lake management strategies. The Sediment Study provided new information on the extent of contaminated sediments in the Lake. Analysis by staff, the SAC, and leading environmental firms the County has on contract of these studies have concluded that dredging is not a preferred mitigation method at this time. The PCBs are not causing harm to the water, fish, or Wakulla Springs because they are bound to the sediment so dredging the Lake at this time would disturb the sediment resulting in greater harm to the Lake and downstream.

Present Day Challenges

In May 2022, Lake Munson experienced an algal bloom which are a common and natural occurrence in Florida's fresh waters, including Lake Munson, and are attributed to environmental factors such as sunny days, warm water temperatures, low rainfall amounts, still water conditions, and a plentiful supply of nutrients in the water which cause blue-green algae (cyanobacteria) to rapidly accumulate and result in an algal bloom. At that time, staff was working closely with State agency partners FDEP, FWC, and the FDOH to ensure the health of our water bodies and residents. For context as to the prevalence of these blooms, FDEP is currently monitoring nearly 200 active algal blooms across the state. While algal blooms can occur with or without toxins, FDOH determined that Lake Munson's algal bloom earlier this summer produced a microcystin toxin and issued a health alert for residents to avoid contact with the water.

On May 23rd, FDOH issued a health alert specifically advising residents to not drink, swim, wade, use a personal watercraft, or boat in Lake Munson and warned residents to keep pets away from the area. At the urging of FDOH, the County closed the boat ramps due to the anticipated Memorial Day Weekend traffic and shared FDOH's alerts across the County's digital platforms. At that time, the Board received an email with a comprehensive summary of the issue and a status report was placed on the Board's July 12th meeting agenda detailing the progression of the algal bloom and toxicity. The next week, on July 21st, FDOH lifted the health alert for blue-green algal toxins at Lake Munson based on water samples collected by FDEP. FDOH advised the public may resume water-related activities and to continue to exercise caution on the lake as algae blooms can move around, subside, and reappear when conditions are favorable. At that time, the County reopened the Lake Munson boat ramps for recreational use.

In late August 2022, residents living near Lake Munson brought forward additional concerns related to a fish kill, people experiencing adverse health conditions, and a call-to-action for the County to address these issues. In addition, staff had observed the rapid growth of aquatic vegetation (hydrilla) which requires mitigation. As these issues arose, staff consulted with the appropriate State agencies and sought input from the County's SAC to assess mitigation options, where appropriate, for Lake Munson.

There is a consensus among staff, State agency partners, and the SAC that immediate mitigation is needed, and a drawdown of Lake Munson will help address the algal, nutrient, and aquatic vegetation challenges in the Lake. In consultation with State agency partners and the SAC, staff began developing the drawdown plan as well as short- and long-term best management practices. On September 13, 2022, the County Administrator advised the Board that an agenda item would be brought back at the October 11th meeting seeking Board approval to proceed with the drawdown.

Lake Munson Action Plan

The proposed Lake Munson Action Plan provides an opportunity to better articulate ongoing and long-term infrastructure projects to benefit the basin, the planned drawdown with more frequent water quality testing, an aerial topographic survey of Lake Munson to measure elevations of compacted sediment to evaluate for future in-lake mitigation strategies, a new vegetation management program for treating invasive plants, and implementing periodic drawdowns in consultation with FWC to reduce the need to mechanically remove organic-rich sediment. The Action Plan captures recommendations sought by the Workgroup including the deployment of hydrogen peroxide to treat algal blooms, point-source testing for PCBs, ongoing engagement over the next two years to evaluate the Lake's response to the drawdown, and regular status updates to the Board every six months. This holistic approach will allow the immediate strategies to quickly mitigate the rapid growth of hydrilla and eliminate the algal bloom while the long-term actions will supplement the State's in-lake activities and provide a higher level of service to County residents. Consistent with the management strategies adopted by the 1994 Lake Munson Action Team, this Action Plan was developed with input from State agency partners, citizen stakeholders on the SAC and with the Workgroup, and industry best practices for lake management to include the following components:

- Lake Munson Drawdown & Enhanced Monitoring
 - Water Quality Study
 - Aerial Topographic Survey
 - Point-Source Testing for PCBs
- Ongoing and Planned Infrastructure Projects
- Long-Term Lake Management Actions
 - Invasive Exotic Vegetation Management Program
 - Hydrogen Peroxide to Treat Algal Blooms
 - Reoccurring Drawdown Schedule
 - Innovative Technology Exploration

Drawdown and Enhanced Monitoring

This summer Lake Munson experienced algal blooms, a fish kill, and most recently an abundance of aquatic vegetation. While the nutrient levels in the Lake have been steadily declining, these issues pose a need for immediate mitigation. A drawdown will help address the algal, nutrient, and aquatic vegetation challenges in the Lake. The drawdown will kill off the hydrilla and algae and will form a “cap” on the sediment to reduce the nutrients leaving the sediment. In addition to the immediate benefit, drawdowns provide long-term benefits to the nutrient-rich sediment. A drawdown is most efficient during the “dry” season, which in Leon County is starting now. An optimal start of the drawdown in October, coupled with a minimum length of time the Lake is down during the dry season create an urgency to start the drawdown right away. If a drawdown were to be deferred to next fall/winter, it is possible many of the current issues in the Lake will continue through the fall or will return next summer.

Drawdowns are a proven technique in lake management and are beneficial to the Lake by allowing the sediments to de-water, oxidize, and form a hardened crust over the lake bottom. A drawdown would serve to “cap” the underlying sediment which would provide habitat for fish spawning and reduce nutrient recycling once the Lake is reflooded. A complete drawdown is planned to provide the maximum benefit.

The Lake drawdown is anticipated to start at the beginning of November, or sooner if possible, and would last for 3-5 months, depending on the weather through the winter. A warm and wet winter would require a longer drawdown to allow the lake bottom to dry out; whereas, a cool and dry winter could allow for a shorter drawdown period.

The drawdown starts by opening the gate on the Lake Munson dam to allow more water out than is flowing into the Lake, slowly lowering the water level of the Lake until most of the lake bottom is exposed and the amount of water flowing into the Lake is the same as the amount of water flowing out. The amount of water released through the gate is a balance. Enough water should be let out to lower the lake level in a reasonable amount of time, but not so much water that the increased flow causes erosion or flooding problems downstream. Like the drawdown in 2010, the increased discharge of the Lake downstream is not anticipated to cause adverse impacts.

A majority of the bottom of the Lake will be exposed when the drawdown is complete, but several areas such as the north lobe (bunny ear) and the southwest portion (back foot) are anticipated to still have water in them, although at a lower depth. This is due to the differences in the elevation of the lake bottom, as it relates to the elevation of the dam gate. These two areas have a lower lake bottom elevation creating pools of water that cannot drain. Also, these areas are located off the main flow through channel line, making it more difficult for the water to flow out of them to the dam. Once the water has drained from the Lake, the gate at the dam will remain open so that any water that comes into the Lake passes directly through. If the Lake Munson drainage basin were to receive a large rain event, the Lake could fill up for a short period of time.

A complete drawdown exposes the most sediments and would force fish and other biota into the sinkhole in the southwest corner of the Lake. Many fish and other organisms would not survive a complete drawdown; however, the Lake biota would recover quickly upon refill. The fish populations could be re-established from those that survived in the sinkhole, from upstream, and

from re-stocking by FWC. Staff will coordinate with FWC to minimize the death of fish and other creatures during the complete drawdown. It is important to remember that the primary goal of the drawdown is to improve sediment quality, and thereby water quality, improving the long-term health of the entire lake ecosystem. Creatures that live naturally in Lake Munson have recovered from past drawdowns. The current condition of the Lake, including an abundance of hydrilla and warm temperatures, threaten the entire fish population and can cause fish kills like the one experienced in August 2022.

With the water drained from the Lake, the bottom can begin to dry out. The submerged aquatic vegetation in the Lake will slowly die. The sun will begin to dry out the sediments and muck on the bottom of the Lake will begin compressing. The aquatic vegetation will be replaced with terrestrial plants, which are plants that live on land, and the sediments will continue to dry out. During the drawdown there can be some unpleasant smells as the vegetations die off and the wet lake bottom begins to dry.

The length of time needed to dry out the sediments is dependent on nature and the weather. Staff will work closely with FWC and FDEP to determine the optimal time to begin refilling the Lake. When it is time to complete the drawdown, Leon County will slowly begin closing the gates to allow water to remain in the Lake. Much like lowering the Lake level, refilling the Lake is a balancing act. The goal is to hold enough water back in the Lake, without adversely impacting downstream wetlands and waterbodies by not sending enough water downstream. The time it takes to refill the Lake is also weather dependent. If it is a wet spring the Lake will refill quickly, but a drier spring would mean a longer refill period. The sediments in the bottom of the Lake serve as a seed bank. When the Lake refills, the terrestrial plants will be drowned, providing fish habitat, and will be replaced with the aquatic vegetation that grows from the seed bank.

The drawdown of the Lake will necessitate a large public information component, including coordination with various divisions within FWC, FDEP, and NFWMD as well as the SAC and the Water Resources Committee. Staff will also communicate with the Wakulla Springs Alliance, the Friends of Wakulla Springs State Park, and other concerned citizen and/or citizen groups in advance of, and during the drawdown.

The drawdown also provides an excellent opportunity for citizen engagement through lake clean-up events. These events have multiple benefits including actively engaging citizens with our natural resources, providing educational opportunities alongside nature, and improving the water quality and ecology of the Lake by removing garbage and debris from the lakebed. The County has held numerous successful lake clean-up events including for past drawdowns of Lake Munson. Staff from Public Works is coordinating with Community & Media Relations to explore dates for early next year to host a clean-up event on Lake Munson during the dry season.

The planned drawdown also does not include any vegetation removal from the lake bottom. Immediately after drawdown, the lake bottom will be too wet to support the equipment necessary to remove the vegetation that remains. After the sediments begin to harden, the vegetation will be left in place so as not to disturb the sediment, potentially allowing the sediment to resuspend and mix into the water column when the Lake refills. Cutting or mowing down the vegetation is a management strategy but the vegetation could not be harvested without sediment disturbance so

the cut vegetation would be left to flow downstream. In some cases, vegetation can be burned during a drawdown; however, this method was previously discussed by the County during a natural drawdown on Upper Lake Lafayette and it was determined the associated liability far outweighed the benefit.

In recent meetings with the Lake Munson Workgroup on the proposed Action Plan, the Workgroup was supportive of the planned drawdown but felt very strongly about the need to pair it with sediment removal efforts while the Lake was dry. Lake drawdowns often present an opportunity to dredge a waterbody or, at times, remove the top layer of sediment from the lakebed. However, the planned drawdown for Lake Munson does not include any dredging or removal of muck and sediments due to the known contaminants identified in the 2019 Florida Geological Survey (FGS) Sediment Study. While dredging and the removal of sediments have been advised in the historically accepted mitigation strategies for the Lake and advised in the 1994 Lake Munson Action Plan, these methods are not recommended at this time as recent studies and data analyses indicate that removing the sediments may cause more harm to the Lake. If the Lake were to be dredged these contaminants could be released into the water column and be transported downstream to Wakulla Springs. However, future technologies could make dredging a viable option.

Lake Munson is also believed to contain sinkholes. Data collected as part of the 2019 FGS Sediment Study indicates several areas of high karst potential. A major concern with dredging the Lake is the potential for inadvertently opening a sinkhole. Heavy equipment, digging too deep or removing too much material could create a sinkhole. If a sinkhole were to open on the Lake, it could completely change the hydrology and ecosystem. Much like Lake Jackson, the Lake could drain and stay down until the sinkhole naturally filled.

During conversations with the Workgroup, the removal of sediment in Lake Munson was improperly compared to other dredging projects in the community and around the State. For example, Lake Munson is a natural lake system upstream of a first-magnitude spring so dredging of the lakebed poses the risk of the releasing relict contaminants. Directly upstream, Lake Henrietta is a constructed stormwater facility designed to collect sediment for periodic removal, to redirect or bypass the water flow during construction to minimize impacts downstream, and is fully accessible to construction equipment. For these reasons, Lake Henrietta has an upcoming sediment removal project that will benefit Lake Munson.

Over the summer months, a member of the Workgroup shared information on water quality and sediment removal projects in other parts of the State including Lake Apopka, bordering Orange and Lake Counties, and a project just north of Lake Okeechobee which straddles several counties along the Kissimmee River. In addition to all the aforementioned risks of dredging Lake Munson directly upstream of Wakulla Springs following the findings of the 2019 FGS Sediment Study, there are additional factors which distinguish these projects.

One of the primary differences between Lake Munson and Lakes Apopka and Okeechobee is the sheer size of these waterbodies. Lake Munson is 288 acres (0.45 square miles) with an average depth of 5 feet; whereas Lake Apopka is 48 square miles with an average depth of approximately 15 feet and Lake Okeechobee is 730 square miles with an average depth of approximately 9 feet.

Removal of aquatic vegetation in the larger lakes has less of an impact because it is less of a shock to the system as within a smaller lake such as Lake Munson. On Lake Munson, all of the vegetation in the lake could be removed in a matter of days, which would be a drastic change in a short period of time. Conversely, on a lake like Okeechobee, the amount of vegetation that could be removed in the same period of time is very small compared to the total size of the lake, making the change much less noticeable. Lakes Apopka and Okeechobee do not have the widespread sediment contamination as Lake Munson which would require disposal far away from the basin or at a managed site like a landfill so it does not return to the ground or water. The muck that is dredged from Lakes Apopka and Okeechobee can be land applied nearby the project based on the known types of contaminants in those waterbodies.

A common thread between the Lakes Apopka and Okeechobee projects which happen to impact multiple jurisdictions is that these complex water quality projects in State-managed waterbodies are, in fact, led by the State. Being responsible for the management of these waterbodies, the State determined, often through the regional water management districts, to initiate the improvements to these waterbodies.

Water Quality Study

Water quality sampling pre- and post-drawdown is an excellent opportunity to monitor and quantify the effects of the drawdown on water and quality in Lake Munson. As part of the drawdown, a water quality study will be conducted using samples collected both upstream and downstream of the Lake, at up to four locations, and will be analyzed for the County's standard water quality parameters. An initial sample event will be collected prior to drawdown to provide pre- and post-drawdown comparison. After the Lake has started to refill, samples will be collected monthly for a period of two years. Between the County and City, samples are collected upstream and downstream of the Lake on a quarterly basis; however, this sampling frequency does not provide the level of detail needed to follow the evolution of the Lake as it re-stabilizes after refill. The sampling plan was developed incorporating suggestions from the SAC.

The Action Plan calls for the SAC to receive an update on the drawdown and monthly water quality data on a quarterly basis, to include the Workgroup for participate in the quarterly SAC updates to discuss the available sampling data and drawdown progress, and for staff to prepare six-month status reports to the Board on the progress at Lake Munson throughout the drawdown phase.

Aerial Topographic Survey

Additional data collection includes an aerial topographic survey of the lake bottom. The survey will be conducted immediately after the lake bottom has been fully exposed and again immediately prior to refilling the Lake. This information will provide data on how much the sediment compacted, as well as information on the elevations of the current lake bottom. Data quantifying the amount of compaction is useful in evaluating the effectiveness of the drawdown. It also provides information on the responsiveness of the Lake during a drawdown which is beneficial in determining future drawdown timing. A current lake bottom survey is useful for evaluating future in-lake mitigation strategies. Topographic survey of the lake bottom was not collected during the drawdown in 2010 but staff noted this would have been valuable information to have acquired at that time.

Point-Source Testing for PCBs

At its September meeting, the SAC discussed sampling the water flowing into Lake Munson for dissolved concentrations of contaminants. Point-source testing would validate the 2019 FGS Sediment Study and the Terracon Report to show that the sediment contaminants are not resulting in water column contamination. Based on the SAC discussion, County staff have developed an event sampling plan for point-source testing. Samples will be collected from four sites, including upstream of the Lake, in Lake Munson, and downstream of the Lake. The samples will be collected during a high flow event and tested for the suite of contaminants in 2019 FGS Sediment Study. In the unlikely event that elevated dissolved concentrations are found, additional sampling or an investigation into the upstream sources may be warranted.

The Lake Munson Workgroup welcomed the point-source testing for PCBs but sought for the County to conduct ongoing tests. The reason the County seeks to conduct the point-source testing for PCBs is to validate the findings from the recent studies by FGS and Terracon. The 2019 FGS Sediment Study, which the Workgroup relies upon as the basis to perform testing, states that, “Upstream sampling may help to identify the source(s) of those contaminations” (emphasis added). Should the testing at the four locations confirm that the sediment contaminants are not resulting in water column contamination, ongoing testing would be unnecessary. Future tests may be warranted and performed by the County based on new information or the conditions of the Lake.

Ongoing and Planned Infrastructure Improvements

Earlier sections of this item documented the hundreds of millions of dollars invested by the County, City, and Blueprint to enhance the water quality in Lake Munson dating back to the 1990s. At present, there are several ongoing and planned infrastructure projects within the Lake Munson Basin which are described in this section (Attachment #5).

The County’s Lake Henrietta Sediment Removal project is anticipated to commence in 2023 and will reduce the amount of sediments transported into Lake Munson, thereby improving water quality. Managed by Blueprint, the first two segments of the Capital Cascades Trail and network of stormwater facility projects have already been completed and Segment 3, which includes a regional stormwater facility (3D-B Stormwater Facility) along the FAMU Way Corridor, is currently under construction. Capital Cascades Trail Segment 4 will remove sediment and trash and improve downstream water quality in the Lake Munson basin. The Segment 4 improvements will begin at the convergence of two stormwater conveyance systems (Central Drainage Ditch and St. Augustine Branch) near FAMU Way and extend south to Lake Henrietta at Springhill Road. Blueprint staff anticipates bringing an agenda item back to the Intergovernmental Agency Board in March 2023 seeking acceptance of the design concepts so that the project can proceed to the final design and permitting phase. Capital Cascades Trail Segment 4 will complete the 4.25-mile stormwater treatment and recreational improvements, stretching from Leon High School south to the Lake Henrietta stormwater facility, as provided in the Capital Cascades Master Plan approved by the Blueprint Intergovernmental Agency Board (IA Board) on January 31, 2005.

As our community has continued to make so many investments on these upstream improvements to ensure that clean water is flowing downstream, the priority has shifted to include millions of dollars in resources allocated to address water quality in the basin through the reduction of household septic systems. Consistent with the third strategy in the 1994 Lake Munson Action Plan

calling for community actions such as emphasizing the importance of educating the public on the proper design and maintenance of septic systems so that individuals can take personal responsibility in reducing pollution, the County and the State have prioritized the proliferation of advanced septic systems and septic to sewer projects in recent years.

Based on the shared desire to enhance water quality in our region through nitrogen reduction projects, Leon County and FDEP jointly adopted the Leon County Water Quality and Springs Protection Infrastructure Improvement Plan (Springs Improvement Plan) in FY 2018. This first of its kind multi-year agreement between the State and a county was the result of Leon County's strong commitment to reducing nitrogen levels in the primary springs protection zone and FDEP's willingness to provide a dollar-for-dollar match toward projects in Leon County. Lake Munson, and portions of the Munson basin, are within the primary springs protection zone which allows residents to be eligible for the voluntary wastewater projects. Both parties committed over \$32 million through FY 2024 for water quality and springs protection infrastructure projects, subject to annual appropriation by the Board and Florida Legislature.

The Springs Improvement Plan includes funding for the County's Northeast Lake Munson Septic to Sewer project and two programs that financially support homeowners who wish to voluntarily upgrade their septic systems to advanced nitrogen-reducing systems. As the County has done upstream of the Lake, the County is also actively addressing over \$12 million dollars in bringing sewer to the neighborhoods immediately adjacent to the Lake and removing up to 220 septic tanks. Downstream of the Lake Munson basin, millions of dollars have been committed to bring sewer to Woodville which will be vital to Wakulla Springs. The plan also includes future commitments to broadening the Comprehensive Wastewater Treatment Facilities Plan by funding future studies on the best methods of wastewater treatment for reducing nitrogen County-wide.

Based the City of Tallahassee's shared commitment to improving the water quality in Lake Munson, the City and County entered a Water and Sewer agreement in 1993 and revised in 2005, whereby the City commits to maintain or improve its sewer system so it can provide capacity to jointly identified target areas. This agreement helped make the NE Lake Munson Septic to Sewer Project possible.

Long-Term Lake Management Actions

The Action Plan calls for an expanded role for the County in managing Lake Munson as it continues to coordinate with State agencies on long-term restoration opportunities. As upstream contributors to the Lake, the County and City have focused on stormwater improvements to reduce the nutrient loading and sediment entering the system and monitoring the water quality for system trends. At the State's request, the County provided assistance in managing previous drawdowns on Lake Munson. As a State-managed waterbody, the County relies on the State for in-lake management such as the treatment of aquatic vegetation and sediment removal projects. The Action Plan proposes supplementing the State's lake-management efforts and responsibilities related to Lake Munson by implementing an enhanced vegetation management program, periodic drawdowns in consultation with FWC to reduce the need to mechanically remove organic-rich sediment, algal bloom treatments, and exploring new and innovative methods for in-lake management including potential opportunities through FDEP's Innovative Technologies Grant. The cost for these supplemental lake-management services is estimated to be \$60,000 in FY 2023.

Invasive Exotic Vegetation Management Program

The Action Plan calls for the County to implement an Invasive Exotic Vegetation Management Program to supplement the State's treatment efforts on Lake Munson. Invasive exotic plants adversely impact native plant communities and, if left untreated, will rapidly colonize and take over a waterbody. Native species create a healthier ecosystem; they allow a variety of plants to grow and serve as food and nesting habitat for fish and wildlife. As a State-managed waterbody, the County relies on FWC's Aquatic Plant Management Program for treatment of exotic vegetation for area lakes.

FWC's service area covers the entire Florida panhandle, from Escambia to Jefferson County, so County Water Resources staff often identifies areas of exotic vegetation growth and notifies the State. FWC spot treats the areas of concern with a chemical herbicide subject to the availability of personnel and funding.

Leon County has a small vegetation management program that is limited to treating stormwater facilities. This item proposes enhancing the Invasive Exotic Vegetation Management Program to better manage the aquatic vegetation in area waterbodies by supplementing the State's plant management services to prevent the rapid growth of invasive exotic species and facilitate the growth of native aquatic vegetation. When an area is identified for treatment, staff will coordinate with FWC to determine its availability to respond before reaching out to the private contractor. This supplemental program is anticipated to provide a quicker response time and more frequent mitigation of the aquatic vegetation. More frequent treatment in smaller areas is better for lake ecology because less product is generally needed.

The Invasive Exotic Vegetation Management Program will be an in-lake mitigation tool the County can utilize as a long-term strategy to manage area lakes. This program will be implemented for Lake Munson later this year following the drawdown and anticipates county-wide expansion in FY 2024.

Algal Blooms Management Program

One of the requests by the Workgroup was a peroxide treatment of the algal blooms. Peroxide treatment methods on algal blooms are very new to Florida. As more information becomes available, staff will continue to review the results peroxide treatment on algal blooms state-wide and will evaluate the use on future blooms on Lake Munson, as well as continuing to explore the best treatment method for Lake Munson. The proposed long-term initiatives include an algal bloom management program.

A peroxide treatment immediately in advance of the drawdown would not provide significant benefits to the lake. The algae need water to grow, so when the lake is drawn down, the algae are removed with the water leaving the lake. Therefore, peroxide treatment this fall has not been included in the proposed action plan.

The peroxide treatment recommended by the Workgroup was Lake Guard, which was developed by BlueGreen Water Technologies (BlueGreen), that can be used to treat algal blooms. This method of treatment has been used in other areas of the world but is very new to the United States and Florida; prior to 2020, peroxide treatments had never been applied to Florida waterbodies.

The Lake Guard is a granular chemical product that floats on the surface of the water and can be transported by current or wind to the location of the algal blooms. The Lake Guard can be applied by hand or by boat or airplane. When the Lake Guard mixes with water it changes into a hydrogen peroxide chemical. The hydrogen peroxide mixture stresses the blue-green algae, breaking down their cells, and causing them to die. The product is intended to be applied (and is most effective) in the early stages of a bloom. According to BlueGreen, there needs to be an active bloom for the product to be effective.

Lake Guard is designed to treat the cyanobacteria in the waterbody; the cyanobacteria in Lake Munson have been limited and the predominant algae type is the filamentous algae (the stringy stuff on top of the water). There is little information on the effectiveness of the product on the filamentous algae and the BlueGreen has not utilized it in this manner. There is also little information available on any adverse impacts to the waterbody after treatment with Lake Guard. Staff asked BlueGreen for this information but have not received the requested information.

Lake Guard can provide real relief from the side effects of toxic algae because the cyanobacterial toxins produced by the active bloom in the treatment area will die off and sink. Because Lake Munson is not the normal conditions Lake Guard is designed for (open water with cyanobacteria actively blooming) it is unknown what level of relief may be achieved on Lake Munson.

Normally, Lake Guard is used in open water where the chemical can be added to the water, and the current moves the product to the location of the algal bloom. This would not work in Lake Munson due to the large amounts of hydrilla. In the case of Lake Munson, because of the large amounts of hydrilla and the lack of flowing water, the product would need to be applied evenly throughout the application zone. During the meeting with the Workgroup on Monday, BlueGreen stated they would need to develop an alternative application plan, which staff have not received. BlueGreen did state the application may require the use of a helicopter.

BlueGreen stated they can deploy to treat an area within approximately 72 hours of receiving a contract and a purchase order. Under normal conditions (open water), an application can be completed relatively quick. Because the alternative application plan has not been developed it is unclear how long application on Lake Munson would take. After application, under normal conditions the algae die off within 24 to 48 hours; a second application is suggested after 48 to 72 hours. Since the Lake is topped out with aquatic vegetation, it is not clear if the product will treat the algae in the same length of time. BlueGreen also recommended the County stockpile a supply of Lake Guard to spot treat the algae in the future.

BlueGreen was contracted by the St. John's River Water Management District (SJRWMD) for a pilot project on Lake Minneola and by the South Florida Water Management District (SFWMD) to conduct a test project on the C-43 Canal/ Caloosahatchee River, both using Lake Guard. Because they are state-managed waterbodies, the FDEP and Water Management Districts paid for and oversaw the projects. The Lake Minneola has been plagued with cyanobacteria, so this pilot project was developed to test Lake Guard's ability to prevent algal blooms. Water samples were tested to determine algal bloom prone areas, which were then treated with Lake Guard. The Pilot Project lasted a year and a half. From this project, the SJRWMD is developing a rapid response plan to take on algal blooms before they overwhelm lakes and rivers. The C-43 Canal/

Caloosahatchee River is a mixture of natural and manmade canal networks that have a history of heavy cyanobacteria issues. The project was intended to mitigate the effects of the blooms through treatment and test the products ability to in treating heavy blooms and maintaining the system in a bloom-free condition. Both scenarios are different than Lake Munson. In both cases, the Lake Guard was applied in an open water situation, and where the product could flow to and with the cyanobacteria. Also, both waterbodies have long histories of significant cyanobacteria issues, whereas, Lake Munson has primarily had issues with filamentous algae this summer. It's also important to note that like Lake Munson, both waterbodies are state-managed and hence the Water Management Districts sponsored the projects.

Lake Guard is a very new method of treatment in Florida. Little information is available on how the peroxide mixes and disperses in the water. During the meeting with the Workgroup, a question was raised on if Lake Guard left enough vegetation in the system to allow the fish and other wildlife to survive. More research is needed to determine optimal levels needed to suppress blooms, while not affecting fish or other wildlife.

The use of Lake Guard is a management and mitigation strategy. The product can treat active blooms and may be able to prevent future blooms. In both cases, the use of Lake Guard would be an on-going treatment method and would require continual use to achieve the algal management.

Reoccurring Drawdown Schedule

Periodic and reoccurring drawdowns are not a new concept and have previously been used on lakes in Leon County. Drawdowns are beneficial to the health of the Lake, especially on lakes that do not experience natural drawdowns. Episodic drawdowns reduce the need to remove nutrient and organic-rich sediment. Drawdowns should be reasonably frequent with timing that mimics the natural draining and refill cycle that keeps lakes in a healthy state. Based on recommendations from the SAC and FWC, Leon County Public Works will implement a planned drawdown cycle of every 5-10 years which allows flexibility of more frequent drawdowns if needed. The exact period of time between drawdowns will be determined by the conditions and health of the Lake, and in consultation with FWC and the SAC. On average, the driest months in Tallahassee are October through January. Drawdowns beginning in October and lasting through the winter are ideal. Complete lake drawdowns will be utilized to provide the maximum benefit to the Lake, unless the health of the Lake dictates otherwise, as determined by FWC and the SAC. Staff will prepare an agenda item seeking Board approval of future drawdowns and will provide ample notice to the public through Community and Media Relations.

Innovative Technology Exploration

And finally, staff will continue to explore new and innovative methods for lake management and any potential strategies and technologies will be presented to the SAC and State agency partners for discussion and analysis. On August 15th, the County applied for an FDEP Innovative Technologies Grant for a pilot project on Lake Munson utilizing Biochar, a charcoal-like substance capable of removing the dissolved nutrients that facilitate algal blooms. This grant will explore the effectiveness of the Biochar and determine scalability if implemented in a larger setting. The successful outcome from this and other Innovative Technologies Grants could be used on Lake Munson in the future. As more FDEP Innovated Technology grants are awarded, the best practices

in lake management and restoration will continue to evolve as these projects are completed and new strategies are proven to be effective.

Lake Munson Workgroup

This summer, residents living near Lake Munson joined with local environmental advocates and brought forward concerns related to algal blooms, people experiencing adverse health conditions, a fish kill, aquatic vegetation, and a proposal for an FDEP grant. Through phone calls, emails, news advisories, as well as large public and small neighborhood meetings, the County was responsive to the concerns brought forward about the Lake which often required coordination with State agency partners at FDEP, FWC, and FDOH.

County employees strive to always be receptive to new ideas and innovative solutions to complex problems such as the continuous efforts to enhance water quality in Lake Munson, an examination of the County's role versus the State in lake management, or the County's response to algal blooms in state-managed waterbodies. As these issues arose, staff consulted with the appropriate state agencies and sought input from the County's Science Advisory Committee, where appropriate, for additional guidance and expertise. Unsatisfied with the information provided by the County, the Lake Munson Workgroup provided ten specific requests in writing for the Board's consideration. On September 13, 2022, the Board directed staff to meet with the Workgroup to address their concerns about the Lake and to bring back an analysis of the Workgroup's ten requests as part of this agenda item.

Based on the Board's direction, staff immediately contacted the Workgroup to schedule meetings and coordinate with the appropriate subject matter experts across County departments, Blueprint, state agencies, and the County's Science Advisory Committee. Over the course of a week, the Workgroup convened twice for a total of approximately five hours to discuss the ten requests, listen to residents' experiences and concerns, and engage subject matter experts on issues related to water quality conditions, marine life, prudent health precautions related to algal blooms, and the projects and programs designed to enhance Lake Munson. The proposed Action Plan for Lake Munson presented in this agenda item addresses the issues raised by the Workgroup, and identifies where there is agreement on certain mitigation techniques and best practices for Lake Munson.

As submitted by the Workgroup, several of the requests touch on multiple subject areas which require extensive responses. Other requests refer back to previous sections of this agenda item for a greater level of detail on an issue. It is important to note that a few of the requests and issues raised in the Workgroup meetings will be familiar to the Board as these County-wide policy matters have been considered in recent agenda items but continue to be pursued by the environmental advocate members of the Workgroup whom do not live near Lake Munson. Specifically, the Lake Munson Workgroup requested the following:

- 1. We want a 2 year plan to clean the lake and remove sediments. This includes short, intermediate, and long term objectives, as well as identifying funding sources, disposal sites, etc. That means starting work in 2 years.*

Response: Leon County has made continuous efforts to enhance the water quality in the Lake since the 1990s through upstream capital improvements and, in recent years, nitrogen reduction wastewater projects including a sewer project in NE Lake Munson and providing

residents of the basin financial incentives to upgrade their conventional septic systems. In addition to the ongoing and long-term infrastructure projects that benefit the basin, the Action Plan describes the planned drawdown with more frequent water quality testing, an aerial topographic survey of Lake Munson to measure elevations of compacted sediment to evaluate for future in-Lake mitigation strategies, a new vegetation management program for treating invasive plants, and implementing periodic drawdowns in consultation with FWC to reduce the need to mechanically remove organic-rich sediment. This holistic approach will allow the immediate strategies to quickly mitigate the rapid growth of hydrilla and eliminate the algal bloom while the long-term actions will supplement the State's in-lake activities and provide a higher level of service to County residents.

As described on page 13 of this analysis, in-lake sediment removal is not included in the plan.

The purpose of the 2019 FGS Sediment Study was to obtain new information that could be used to guide future lake management strategies. The Sediment Study provided new information on the extent of contaminated sediments in the Lake. Analysis by staff, the SAC, and leading environmental firms the County has on contract of these studies have concluded that dredging is not a preferred mitigation method at this time. The PCBs are not causing harm to the water, fish, or Wakulla Springs because they are bound to the sediment so dredging the Lake would disturb the sediment resulting in greater harm to the Lake and downstream. In the future as more information is known and technologies change and become safer or more cost-effective, dredging may become a viable option.

The Lake continues to improve; however, Lake Munson's water quality issues date back decades and undoing this damage will take continuous commitment. The County will continue to explore new and innovative methods for lake management and any potential strategies and technologies. As more FDEP Innovated Technology grants are awarded, the best practices in lake management and restoration will continue to evolve as these projects are completed and new strategies are proven to be effective.

2. *We want our group involved in this plan and decisions that affect our health and property, along with scientists from our group on any committee formed by the county to consult on remedies, similar to how the 1994 Munson Management Plan was devised.*

Response: The Action Plan captures recommendations sought by the Workgroup including the deployment of hydrogen peroxide to treat algal blooms, point-source testing for PCBs, ongoing engagement over the next two years to evaluate the Lake's response to the drawdown, and regular status updates to the Board every six months.

During the first Workgroup meeting, Mr. Terry Ryan proposed convening the Workgroup and County staff on a quarterly basis through the end of the drawdown. Staff concurred with the frequency of meetings but insisted that the SAC host the future meetings to evaluate the progress of the drawdown and enhanced water quality sampling. The Action Plan calls for the SAC to receive an update on the drawdown and monthly water quality

data on a quarterly basis, to include the Workgroup for participate in the quarterly SAC updates to discuss the available sampling data and drawdown progress, and for staff to prepare six-month status reports to the Board on the progress at Lake Munson throughout the drawdown phase.

3. *Short Term: We want a drawdown ASAP and if taking too long -- peroxide treatments to kill the cyanobacteria. Staff is indicating the drawdown will occur this fall after hurricane season.*

Response: A drawdown is proposed for November 1st, or sooner if possible, following adequate public notice. A drawdown will mitigate the current algae and hydrilla challenges as well as form a “cap” over the sediments to prevent nutrients from leaving the sediment in the future. Refer to Page 9 for additional details.

A peroxide treatment immediately in advance of the drawdown would not provide a drastic benefit to the lake. The algae need water to grow, so when the lake is drawdown, the algae go away. During the September 26th meeting with the Workgroup, FWC staff stated that peroxide algae treatment prior to the drawdown was not likely worth the investment. Staff consulted with BlueGreen Water Technologies (BlueGreen), the developer of the peroxide treatment the Workgroup referenced, and requested a scope to spray in an area around the homes but have not received a response.

As more information becomes available, peroxide treatments may become a worthwhile management strategy to mitigate and manage algal blooms. Staff will continue to review the results of the Pilot Studies and will seek funding opportunities to use Lake Guard in the future. Peroxide treatment for algal blooms has also been incorporated into the long-term initiatives for the lake.

4. *Short Term: We want an emergency declaration regarding the condition of the lake and acknowledgment of the potential human health impacts to city and county residents.*

Response: As has been said, Lake Munson presents significant challenges with past contamination but will continue to receive attention and resources as evidenced by all of the previous, planned, and ongoing water quality infrastructure projects within the basin and all the ongoing and planned best management practices addressed herein, including, the planned drawdown of the Lake in a few weeks. The current conditions at Lake Munson do not meet the definition of an emergency as defined in the County’s Emergency Management Ordinance nor do the proposed courses of action to remediate the current conditions support the issuance of a local state of emergency. Local states of emergency enable the County to take emergency measures pursuant to the disaster recovery plans of the County. They can be a mechanism for the County to qualify for funding that would not otherwise available absent an emergency. Local states of emergency may also be issued to enable the County to take emergency measures on an expedited basis in circumstances where the County would otherwise be limited or without authority to act, such as establishing curfews, directing persons to shelter-in-place during incidents involving the release of hazardous waste, suspending otherwise applicable state and local

procurement and contracting requirements, and in some instances directing and compelling the evacuation of all or some portion of the County population.

It is undisputed that the Lake has a history of chronic water quality and ecological problems. However, according to surface water quality testing conducted by the County and the City of Tallahassee, the water quality of the Lake currently meets the Total Maximum Daily Load levels set by the FDEP for nutrients. Moreover, algal blooms are a common and natural occurrence in Florida's fresh waters, including the Lake, and are attributed to environmental factors such as sunny days, warm water temperatures, low rainfall amounts, still water conditions, and nutrients in the water which cause blue-green algae to accumulate. Additionally, FDOH has a process and procedures in place for assessing public health conditions related to algal blooms, with a dedicated web page providing information on the natural occurrence of algal blooms in Florida and precautions residents should take for themselves and their pets. While exposure to such blooms may result in temporary respiratory issues and irritations of the eyes, nose, and skin, the FDOH has taken the position that such occurrences are a nuisance, and do not pose a serious health risk to most people.

For the Board to issue a local state of emergency, the purpose and requirements of the Emergency Management Ordinance, codified in Chapter 2, Article VIII of the Code of Laws of Leon County, Florida (Leon County Code), must be met. An "emergency" is defined in Sec. 2-305. of the Leon County Code to mean:

"any occurrence, or threat thereof . . . which results or may result in substantial injury or harm to the population or substantial damage to or loss of property."

As a threshold matter, an occurrence or event that cannot objectively and scientifically meet this definition fails to constitute an emergency. Accordingly, a local state of emergency is not necessary or appropriate at this time for a state-managed waterbody, based upon current objective and scientific data gathered by state and local governments.

5. *We oppose the county's tea bag grant proposal. This is a giant, missed funding opportunity.*

Response: On July 12, 2022 the Board provided direction for staff to evaluate opportunities to enhance Lake Munson through the FDEP Innovative Technologies Grant. Mr. Max Epstein presented staff with a proposal that included dredging the lake bottom by relocating and harvesting the organic matter. As detailed in the response to Request #1 by the Workgroup, professional engineers at Public Works explained the risks associated with sediment removal but continued to work with Mr. Epstein to evaluate his proposal, troubleshoot operational challenges, and gather information from state and federal agencies as well as the private sector to evaluate new innovative technologies that could benefit Lake Munson.

In addition to the sediment and aquatic vegetation removal, there were several other prohibitive obstacles with Mr. Epstein's proposal for the County to endorse the application to FDEP for grant funding including:

- Securing a location destination to land apply the organic materials.
- Determining the costs associated with transporting said materials, often the most expensive component of sediment removal projects, without knowing the final destination to calculate roundtrip distances and needing to anticipate those costs during a period of high inflation with rising gasoline prices.
- Reliability of the cost estimates to ensure the County secures funding for the full project costs.
- Supposition that FDEP would award a \$2.5 million grant, despite concerns about the reliability of the cost estimates, given the allocation of grant awards last cycle. In FY 2022, most of the 16 grants awarded were between \$200k - \$300k. The two highest grants were slightly less than \$1 million. While there is a larger pool of funding available to consider grant awards this year, FDEP is seeking to provide a greater volume of awards to water management districts and local governments across the state.

After working with Mr. Epstein for several weeks on his proposal, staff presented a new innovative technology for the County to seek funding. Since that time, the County has been accused of “failing to apply for a \$2.5 million grant,” being unwilling to invest in Lake Munson, and “pulling a “bait and switch” on its grant application. This undermines the many hours of collective work put forth by both Mr. Epstein and County staff throughout this process, which requires the County to endorse the grant application and take on the responsibility of managing/implementing the project.

The County submitted an Innovative Technologies Grant application to FDEP on August 15th. Awards are anticipated to be announced by spring 2023. The grant application was developed after consultation with AECOM, a leading engineering consulting firm with an extensive portfolio in lake management and algae technologies, for a pilot project using Biochar, a charcoal like substance, evaluating its effectiveness at taking up dissolved nutrients to prevent harmful algal blooms. The Biochar will be suspended in mesh-bags and placed at specific areas around the Lake at different heights within the water column, within the first 12 inches below the surface and approximately 12 inches above the bottom. If successful, the pilot project results will provide valuable information on how to scale-up the technology for future use. This approach will not disturb the sediment in Lake Munson, is non-invasive, and does not affect the submerged aquatic vegetation. Biochar is an established product; however, it has not been used in a small lake setting and there are no robust studies demonstrating its ability to remove nutrients in a lake such as Lake Munson. The use of Biochar in Lake Munson is a prime candidate for the grant since it is applying a known technology in a new way.

6. *Short/Intermediate Term: We want an agenda item back for increased water testing, including point-source testing as recommended by the county's own 2019 report for contaminants suspected to be actively entering the lake.*

Response: The Action Plan calls for point-source testing to validate the 2019 FGS Sediment Study and the Terracon Report and show that the sediment contaminants are not resulting in water column contamination. An event sampling plan for point-source testing was provided during the meetings with the Workgroup. Samples will be collected from four sites, including upstream of the Lake, in Lake Munson, and downstream of the Lake. The samples will be collected during a high flow event and tested for the suite of contaminants in 2019 FGS Sediment Study. In the unlikely event that elevated dissolved concentrations are found, additional sampling or an investigation into the upstream sources may be warranted.

This request pre-dates the summer algal bloom on Lake Munson as Mr. Terry Ryan, a member of the Workgroup, has been advocating for point-source contaminate testing based on the 2019 FGS Sediment Study. Since the algal bloom this summer, some members of the Workgroup have conflated the contaminated sediment in the lakebed with the toxicity of the algae and the algal blooms. However, the 2019 Sediment Study contradicts this assertion. Algae grows when there is an abundance of nitrogen in the system and blooms occur when the algae grow rapidly. Environmental factors such as sunny days, warm water temperatures, low rainfall amounts, still water conditions can also cause algae to rapidly grow and accumulate, resulting in an algal bloom. While the sediments may release nutrients into the water column, this is not the case for the contaminants in the sediment. The contaminants are tightly bound to sediment and are not releasing into the water column.

The Lake Munson Workgroup welcomed the point-source testing for PCBs but sought for the County to conduct ongoing tests. The 2019 FGS Sediment Study, which the Workgroup relies upon as the basis to perform testing, states that, “Upstream sampling may help to identify the source(s) of those contaminations” (emphasis added). Should the testing at the four locations confirm that the sediment contaminants are not resulting in water column contamination, it would confirm the recent studies and ongoing testing would be unnecessary. Future tests may be warranted and performed by the County based on new information or changes to the conditions of the Lake.

Upstream sampling generally refers to the stormwater conveyance systems owned and maintained primarily by the City of Tallahassee. The East Drainage Ditch and Munson Slough enter City limits just east and just north of Lake Henrietta. The point-source testing requested by the Workgroup include water column or sediment testing starting at Lake Henrietta and continuing upstream in every direction until the contaminants are no longer detected, indicating the location the contaminants entered the system.

The Workgroup continues to reference one paragraph in the summary of the Sediment Study which states, “Lake Henrietta was constructed in 2000 and is periodically dredged, thus its sediments were recently deposited. The contaminants detected in Lake Henrietta’s sediments are therefore from continuing sources. Upstream sampling may help to identify the source(s) of those contaminants.”

There are issues with not interpreting the Sediment Study and the Terracon Report holistically. This paragraph contains an error that was inadvertently not corrected prior to final publication. Lake Henrietta has not been dredged since construction in 2000; therefore, deposited sediments are unlikely to be recent. The Workgroup is neglecting to look at the prior two paragraphs of the Sediment Study which provides data that suggests the contaminants are tightly attached to the sediment and will not leach off into the water column. While upstream sampling *may* help to identify the source, the necessity for upstream sampling was challenged in the Terracon Report. The Terracon report states, “This information indicates that upstream sampling is unwarranted as the data suggests the system is working as intended and serving as a filter for Lake Munson.”

The use of PCBs has been banned since 1979 and the use of heavy metals are regulated such that they are only allowed in small concentrations. The Terracon Report determined that the contaminated sediment accumulated from activities prior to the mid-1990s and are still detectable due to how slowly they break down. The PCBs found in the sediment are likely relic contaminants prior to current regulations or may have been transported from upstream and upwind during development activity in the last few decades. Significant development and construction activity have occurred upstream of Lake Munson, which provided ample opportunities for potentially contaminated soil to be exposed, rained upon, and carried downstream. The 2019 FGS report was provided to, and discussed with FDEP, and no recommendations for further sampling were made.

During the September SAC meeting, the environmental advocates’ request for upstream point-source sampling was discussed. The SAC suggested sampling the water flowing into Lake Munson for dissolved concentrations of contaminants. This testing would validate the 2019 FGS Sediment Study and the Terracon Report to prove the contaminants are not contributing to water column contamination. County staff have developed a single event sampling plan. Samples will be collected from four sites, including upstream of the Lake, in Lake Munson, and downstream of the Lake. The samples will be collected during a high flow event and tested for the suite of contaminants in 2019 FGS Sediment Study. In the unlikely event that elevated dissolved concentrations are found, additional sampling or an investigation into the upstream sources may be warranted. This sampling plan is not in conjunction with the drawdown or any lake management plans, because the contaminants are a different issue than the current lake concerns.

The County plan includes water column testing instead of sediment testing. The sediment in Lake Munson and Lake Henrietta has been sampled and is known to contain PCBs and other contaminants. Additional sampling in these areas provides no worthwhile information. While sediment samples could be tested upstream of Lake Henrietta, only one sample could be taken before entering the city limits. One sample would also not provide useful information and does not accomplish the upstream point-source tracing desired by the environmental advocates.

Based on conversations with the Workgroup and the environmental advocates, it appears the root of the issue in the requests for the upstream sampling is the concern that the contaminants are producing the toxic algae. By testing the water column, worthwhile

information can be provided demonstrating contaminants are staying bound to the sediment and do not pose a threat to people, pets, or wildlife.

This contaminant sampling plan was discussed with the Workgroup during the meetings. The Workgroup does not approve of the County's plan. They would like year-round testing, similar to the County's water quality monitoring program. The Workgroup is also adamant about the upstream point-source tracing of the contaminants, despite being provided information suggesting it is not necessary.

Although at this time only a single sampling event is planned, the County is receptive to one or more follow-up sampling events after the lake refills, and under different lake and flow conditions.

7. *Intermediate Term: We would like a workshop on cyanobacteria, its health effects, and how to combat this problem going forward, and create policies for blooms county-wide.*

Response: As described throughout the agenda materials, FDOH is the lead agency to address the health effects of cyanobacteria algal blooms throughout the state. FDOH has procedures in place for assessing public health conditions related to algal blooms and a dedicated web page providing information their natural occurrence in Florida, precautions residents should take for themselves and their pets, and FAQs. FDOH-Leon was able to participate in one of the meetings with the Lake Munson Workgroup and respond to specific questions about the health effects of algal blooms and the agency's procedures. At that time, FDOH-Leon had only been made aware of two residents experiencing exposure-related symptoms and agreed to mail out educational materials to residents living near the Lake. Since the algal bloom is no longer toxic, FDOH-Leon did not find the requests for door-to-door outreach or a town hall meeting to be warranted at this time.

Lake Munson Workgroup members specifically requested both FDOH-Leon and Leon County Government provide financial assistance to residents having incurred medical expenses and/or experiencing physical ailments associated with the algal blooms. Both FDOH-Leon and Leon County Government denied consideration of the request for financial compensation and reiterated that algal blooms are naturally occurring events which tend to formulate in warm and stagnant waters. Further, the County maintains that Lake Munson, as a waterbody of the State, is the legal responsibility of the State of Florida under the administrative and regulatory auspices of the FDEP. The County is responsible for its conveyance systems to the Lake and, at times, has coordinated the State's in-Lake mitigation efforts (drawdowns, etc.).

While FDOH's position at this time is that exposure to algal blooms may result in nuisance health effects including temporary respiratory issues and irritations of the eyes, nose, and skin, it is important to note that additional research is underway at the federal and state levels to better understand this issue. The U.S. Centers for Disease Control is conducting surveillance studies on human and animal illnesses that are associated with exposures to cyanobacteria algal blooms and the State of Florida is utilizing four universities to improve the understanding of potential human health impacts of algal blooms and red tide. Through

FDOH, the State provided \$650,000 to four universities in 2019 for ongoing studies on the prevention of toxic algal blooms, treatment for exposed individuals, health disparities related to the exposure of toxins, and better screening to quickly detect toxic blooms.

Based on FDOH's role as the lead agency to address the health effects of cyanobacteria algal blooms throughout the state and the ongoing academic research in environmental and human health, this analysis finds that a Board workshop would not be a productive venue to address the health effects of cyanobacteria.

The Workgroup also requested the County explore the creation of policies and response protocols for algal blooms including the closure of Gil Waters Preserve at Lake Munson. The County closed the boat ramps at Gil Waters Preserve to prevent access to Lake Munson, however, the park remained open to the public with signage advising patrons about the algal bloom. Since the algal bloom toxins can be aerosolized and blow onshore, the Workgroup is seeking the closure of County parks which may be adjacent to future toxic blooms.

Red tide is a saltwater algal bloom that can also be aerosolized and blown onshore resulting in the same temporary symptoms freshwater algal blooms. Both are generally considered seasonal and people with preexisting respiratory conditions are advised to avoid proximity with both types of algal blooms. However, the beaches remain fully open during a red tide and there is no prohibition for swimming.

The best course of action related to County parks is to rely on the subject matter experts at FDEP and FDOH to determine the necessary precautions associated with an algal bloom and respond as needed on a case-by-case basis. The State agencies responsible for testing and interpreting the lab data are charged with identifying the level of toxicity and issuing caution advisories or alerts based on their findings. As with any potential danger in a County facility, including parks, the County facilities would be closed to the public.

8. *Intermediate Term: We want the county to bring back another fertilizer ordinance agenda item to consider wet-season bans as instituted by other counties on the forefront of water quality issues.*

Response: On May 11, 2021, the Board adopted an amendment to the County's Fertilizer Ordinance modeled after the State Model Fertilizer Ordinance. The County's Fertilizer Ordinance includes a provision that goes beyond the Model Ordinance and imposes a "fertilizer time-out" in advance of storms forecasted to produce a certain amount of rain. The Workgroup's request seeks the Board's reconsideration of the County's Fertilizer Ordinance which was adopted less than 18 months ago at a Public Hearing.

By prohibiting the use of fertilizer in advance of a storm, the Ordinance prevents fertilizer from washing off lawns and into waterbodies when it rains. The Workgroup is seeking a months-long wet-season ban to use fertilizer. This alternative was included in the agenda materials and discussed by the Board prior to the adoption of the existing Ordinance. The Board preferred the targeted approach of the "fertilizer time-out" before a rainfall event

instead of the full wet-season ban during the summer months. Of the 67 counties in Florida, only 17 counties have a fertilizer ordinance that includes the requested wet season ban. The Workgroup did not provide any new information to support the need to revisit the Ordinance. Revision of the fertilizer ordinance is not recommended.

9. *Intermediate Term: We want public education about cyanobacteria, including involving the health department, mailers, and/or door to door outreach, and to catalogue human health effects. Tackling this problem is multifaceted and will include strengthening testing and changing development regulations.*

Response: Staff has been working in close coordination with FDOH-Leon since the presence of algal blooms (without toxins) was discovered in Lake Munson in early May. While algal blooms can occur with or without toxins, a laboratory analysis from a subsequent water sample found “low level toxins present” in Lake Munson. The state determined that the algal bloom produced a microcystin toxin and FDOH-Leon issued a health alert for residents to avoid contact with the water. The health alert specifically advised residents to not drink, swim, wade, use a personal watercraft, or boat in Lake Munson. It also warned residents to keep pets away from the area and offered FAQs including, “Is blue-green algae harmful?” The FAQs provided links to state agency websites for additional information. For broader dissemination of this important alert, Leon County Community and Media Relations disseminated the FDOH-Leon alert across the County’s digital platforms.

Algae blooms including red tide and blue green algae are generally considered health nuisances. The smell can cause temporary respiratory issues and irritations of the eyes, nose, and skin. The World Health Organization considers the presence of low-level toxins (under 10 micrograms/liter) to represent a low-level risk for adverse health outcomes from short-term recreational exposure; however, certain sensitive populations (e.g., children, the elderly and immunocompromised populations) may still be at risk even at low concentrations and should avoid any exposure. During the algal blooms this summer that with microcystin toxins detected, most of the samples collected had levels less than 0.5 micrograms/liter. One sample in mid-May detected toxin at 1.1 micrograms/liter. The State has processes and procedures for assessing public health conditions related to algal blooms. Physicians and medical laboratories in Florida are required to report conditions of public health importance to FDOH. Should physicians observe and report dangerous medical conditions, epidemiologists at FDOH will determine the appropriate public health response (public educational outreach, further medical assessment, isolation, etc.).

During the summer months while the toxins were still present, members of the Lake Munson Workgroup requested FDOH-Leon to mail educational materials to residents about cyanobacteria, conduct door-to-door outreach, and gather information from residents on their symptoms related to the algal blooms. FDOH-Leon was not responsive to the Workgroup’s initial requests until the newly appointed FDOH-Leon Health Officer, Ms. Brandi Knight, was contacted by the Workgroup in mid-July. Upon looking into the matter further, Ms. Knight found that FDOH-Leon had only been made aware of two residents reporting exposure-related symptoms which, by definition, are not generally considered

harmful to a person's health. Further, FDOH-Leon lifted the health alert for blue-green algal toxins a few days later which negated any consideration of door-to-door efforts since Lake Munson no longer had an active toxic bloom.

Ms. Knight participated in a Workgroup meeting hosted by the County and agreed to mail out educational materials this month to residents living near Lake Munson. Ms. Knight also informed the Workshop that FDOH-Leon would consider door-to-door outreach in the future if there were enough reports of adverse health impacts and the toxic bloom was still ongoing. The purpose of the outreach would be to educate residents, perform epidemiologic investigations, and provide general medical guidance to avoid the water, wear long sleeves for sensitive skin, and remain indoors if necessary.

FDOH and FDEP have dedicated web pages and educational materials providing information on the natural occurrence of algal blooms in Florida and the precautions residents should take for themselves and their pets. Attachment #6 provides a sample of the online educational materials available through multiple state agencies. At the time of this writing, the toxins have not been present in Lake Munson for 2.5 months. On July 21st, FDOH-Leon lifted the health alert for blue-green algal toxins at Lake Munson based on water samples collected by FDEP. FDOH-Leon advised the public may resume water-related activities and to continue to exercise caution on the lake as algae blooms can move around, subside, and reappear when conditions are favorable.

With regard to the Workgroup's request to change development regulations, no specific suggestions were immediately offered to enhance water quality, so a brief overview of the County's Land Development Code (LDC) was provided at the subsequent meeting. The County can enact regulatory measures which help reduce the amount of nutrients entering waterbodies. The County's Environmental Services Director provided an overview of the County's LDC which provides for the regulations, procedures, and standards for the review and approval of all development and use of land in the unincorporated portions of the County.

Staff addressed concerns from the Workgroup regarding perceptions that the LDC and Environmental Management Act (EMA) are not as stringent as other Florida counties with regard to stormwater protection standards. Specifically, the question arose about whether the EMA should be amended to require preservation of 40% of the vegetation on-site for proposed developments within the County. The County's Environmental Services Director informed the Workgroup that the LDC already contains open space/landscape area standards with some requiring as much as 60% set-aside open space for certain development in Lake Protection, and 50% of set-aside in perpetual conservation easement for conservation subdivisions. Staff provided additional information on the County's EMA requirements related to landscape and natural minimum areas which can be mitigated if projects are designed in a manner that account for the natural features on-site.

Members of the Workgroup were pleasantly surprised upon learning of the existing land development regulations in place and moved on to discuss other issues.

10. Intermediate/Long Term: We want to involve Blueprint's Capital Cascades 4 as a solution to fixing the lake going forward. There needs to be an active, ongoing discussion about these environmental issues and how to address Munson at the BPIA. This includes the board requesting an agenda item for discussion.

Response: The Capital Cascades Trail is a multi-faceted network of stormwater and recreation facility projects separated into physically distinct segments stretching from Leon High School south to the Lake Henrietta stormwater facility. Managed by Blueprint, the first two segments have already been completed and Segment 3, which includes Coal Chute Pond along the FAMU Way Corridor, is currently under construction. Capital Cascades Trail Segment 4 will remove sediment and trash and improve downstream water quality in the Lake Munson water basin. The improvements will begin at the convergence of two stormwater conveyance systems (Central Drainage Ditch and St. Augustine Branch) near FAMU Way and extend south to Lake Henrietta at Springhill Road. Blueprint staff anticipates bringing an agenda item back to the Intergovernmental Agency Board in March 2023 seeking acceptance of the design concepts so that the project can proceed to the final design and permitting phase. Capital Cascades Trail Segment 4 is funded at approximately \$19 million and will complete the 4.25-mile stormwater treatment and amenity improvements as contemplated in the Capital Cascades Master Plan approved by the Blueprint Intergovernmental Agency Board (IA Board) on January 31, 2005.

As noted previously in this item, staff met with Mr. Epstein over the summer to evaluate opportunities for an FDEP Innovative Technologies Grant to support water quality projects for Lake Munson. In addition to dredging the Lake bottom, Mr. Epstein has advocated for the acquisition of 125 acres of U.S. Forest Service property for the construction of a wetland on the western bank of the Lake to filter stormwater, similar to the Sweetwater Branch Sheetflow Restoration Project in Alachua County. As presented, neither of these two concepts are viable water quality projects for Lake Munson. For reasons explained throughout this item related to the FGS Sediment Study, in-lake sediment removal is no longer considered a mitigation option to reduce nutrient levels in Lake Munson. Disturbance of the existing sediment poses a contamination risk to the water and aquatic life. The concept to construct a 125-acre wetland was based on a project in Alachua County serving a smaller stormwater basin. The Lake Munson basin is about twenty times larger so a constructed wetland similar to the Sweetwater Branch system would have to be several times the size of the proposed 125-acre facility.

During the Lake Munson Workgroup meetings in recent weeks, Mr. Epstein suggested expanding the scope of the upcoming Capital Cascades Trail Segment 4 project to include additional downstream improvements to benefit Lake Munson. Mr. Epstein was advised that the Segment 4 project area was established along the Central Drainage Ditch nearly 20 years ago, the improvements extend as far south as Lake Henrietta, and that his proposed improvements along the western bank of Lake Munson are more than two miles from the project terminus. The Capital Cascades Trail stormwater improvements were intended to address water quality and flood concerns in the heavily urbanized drainage system comprised of the St Augustine Branch and the southern end of the Central Drainage Ditch,

both of which are in the Lake Munson basin. All the modeling, analysis, designed and built projects to date have focused on these two stormwater conveyance systems.

On September 29, 2022, Mr. Epstein provided written and verbal comments to the IA Board seeking to extend the study area for Capital Cascades Trail Segment 4 to include a wetland treatment area along Lake Munson. The IA Board directed Blueprint staff to bring back an agenda item to develop a scope and estimated fee for a study that would consider a treatment facility on the west side of Lake Munson. The IA Board made it clear that it does not intend to slow down the conceptual design process for the Segment 4 project. The Lake Munson analysis agenda item will be brought back to the IA Board at its next meeting on December 8, 2022.

Conclusion

Lake Munson is a state-managed waterbody with a history of chronic water quality and ecological problems including fish kills, algal blooms, exotic vegetation and snails, high nutrient levels, low game fish productivity, sediment contamination, and depressed oxygen levels. The shallow and stagnant nature of the waterbody makes it susceptible to the growth of algal in the Lake resulting in this summer's bloom. The Lake receives surface water flow from a 32,000-acre basin, much of which is located in the City of Tallahassee, and has historically been subjected to drainage with high nutrient loads and wastewater discharges to the tributary system which has resulted in the embedding of legacy nutrients in the lake-bottom soil.

Significant efforts to improve the water quality and reduce the nutrient loading in Lake Munson have been ongoing since the 1990s and requires the continuous coordination among governmental partners with respect to our respective responsibilities to protect natural resources. The 1994 Lake Munson Action Plan has been used as the basis to guide watershed and stormwater improvements, regular testing and monitoring of water quality, and regulatory actions to limit pollutants and protect natural resources. Leon County Government, the City of Tallahassee, and the Blueprint Intergovernmental Agency have dedicated hundreds of millions of dollars for projects in the Lake Munson basin and prioritized upstream improvements which reduce the transport of sediment and benefit the Lake water quality. The County's SAC finds that the upstream improvements have resulted in lower concentrations of nitrogen and phosphorus flowing into the Lake meaning that the quality of incoming water is better than the water in Lake Munson. Munson Slough and Lake Munson are exceeding their State-mandated nutrient levels for nitrogen while phosphorus levels have declined significantly over the last ten years and are now approaching the target levels.

In recent years, the County, City and FDEP have invested millions of dollars and allocated future resources to address water quality through the reduction of household septic systems. In 2018, Leon County and FDEP jointly adopted a Springs Improvement Plan with both parties committing \$32 million through FY 2024 for water quality and springs protection infrastructure projects. Lake Munson, and portions of the Munson basin, are within the primary springs protection zone which allows residents to be eligible for these voluntary wastewater projects which remove or upgrade conventional septic systems.

Despite the better water quality, in-lake mitigation, and investments in upstream infrastructure, Lake Munson continues to experience occurrences of fish kills, algal blooms, invasive vegetation

and snails, low game fish productivity, and depressed oxygen levels. Several of these conditions were experienced by Lake Munson residents this summer, resulting in concerns expressed by from residents and other stakeholders. On September 13, 2022, the Board directed staff to meet with a Workgroup made up of residents who live next to Lake Munson and other stakeholders to address their concerns about the Lake and to bring back an analysis of the Workgroup's ten requests posed to the County in writing. This information on the County's next steps to address the recent Lake conditions including those that were planned and, in some cases, those which came out of the meetings with the Workgroup are presented as the Lake Munson Action Plan.

This item and the proposed Action Plan provides an opportunity to better articulate the magnitude and duration of the past, ongoing, and long-term infrastructure projects to benefit the basin, the planned drawdown with more frequent water quality testing, an aerial topographic survey of Lake Munson to the measure elevations of compacted sediment to evaluate for future in-Lake mitigation strategies, a new vegetation management program for treating invasive plants, and implementing periodic drawdowns in consultation with FWC to reduce the need to mechanically remove organic-rich sediment. The Action Plan captures recommendations sought by the Workgroup including the deployment of hydrogen peroxide to treat algal blooms, point-source testing for PCBs, ongoing engagement over the next two years to evaluate the Lake's response to the drawdown, and regular status updates to the Board every six months. This holistic approach will allow the County to quickly mitigate the rapid growth of hydrilla and eliminate the algal bloom while the long-term lake management actions will supplement the State's chemical treatment services and provide a higher level of service to County residents.

The drawdown plan and treatments for Lake Munson are estimated to cost \$130,000 in FY 2023. Funding is included in a separate agenda item as a carry-forward for these purposes. The annual recurring costs for FY 2024 will be included in the Public Works Operating Budget.

While the Lake continues to improve, undoing decades of damage will take continuous commitment. Over the next two years, the Action Plan calls for the SAC to receive an update on the drawdown and review the available enhanced sampling data on a quarterly basis, invite the Workgroup to participate in the quarterly SAC meetings to discuss the available sampling data and drawdown progress, and for staff to prepare six-month status reports to the Board on the progress at Lake Munson throughout the drawdown phase. The drawdown is proposed for November 1st, or sooner if possible, following adequate notice to the public.

Options:

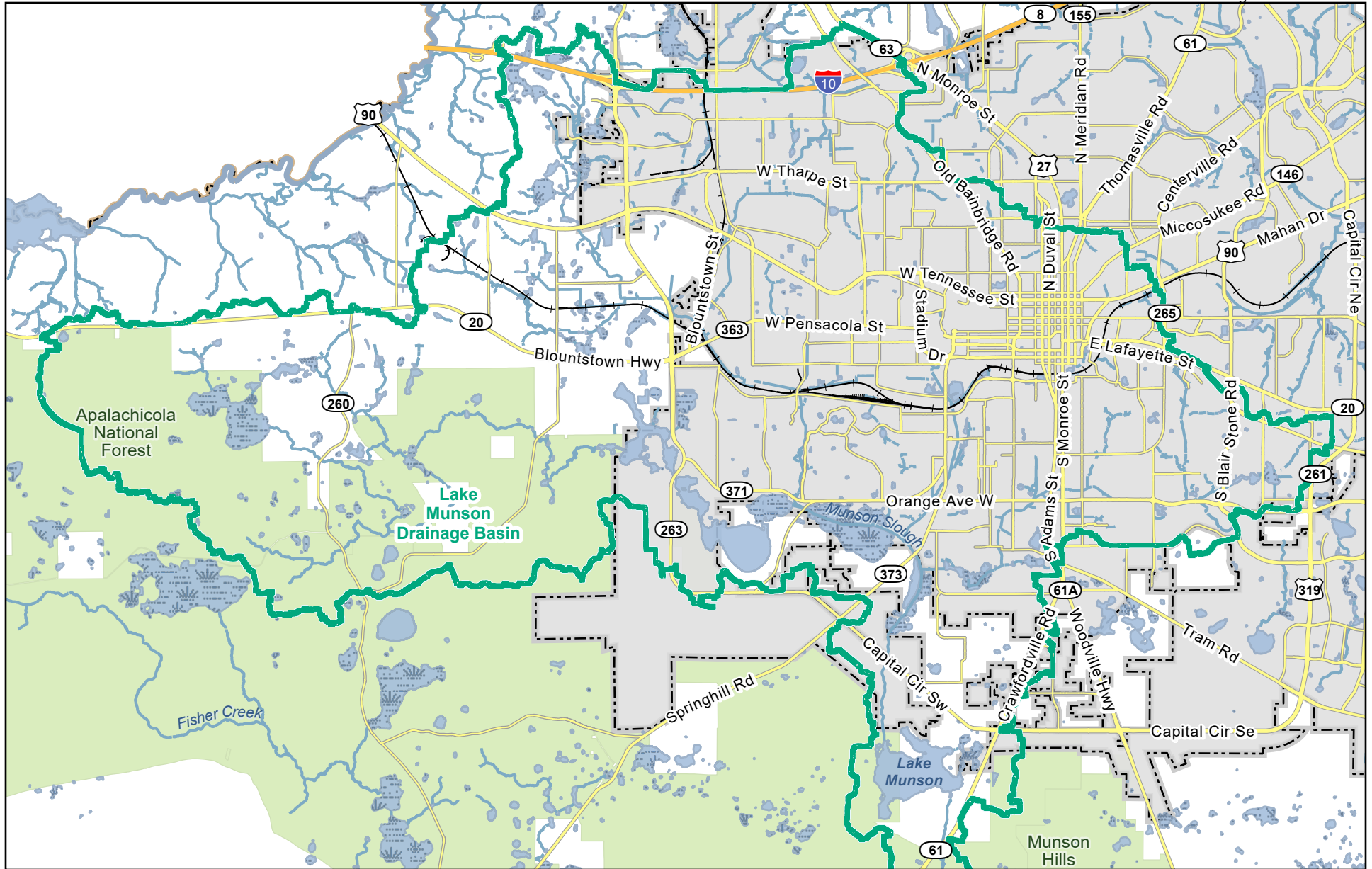
1. Accept the Status Report on Best Management Practices for Lake Munson.
2. Approve the Lake Munson Action Plan, presented herein, including the immediate drawdown plan.
3. Board direction.

Recommendation:





Options #1 and #2

Attachments:

1. Lake Munson Drainage Basin Map
2. Lake Munson Map
3. Projects List and map
4. Graphs of Nitrogen and Phosphorous concentrations
5. Ongoing and planned infrastructure projects within the Lake Munson Basin
6. FDOH and FDEP educational material



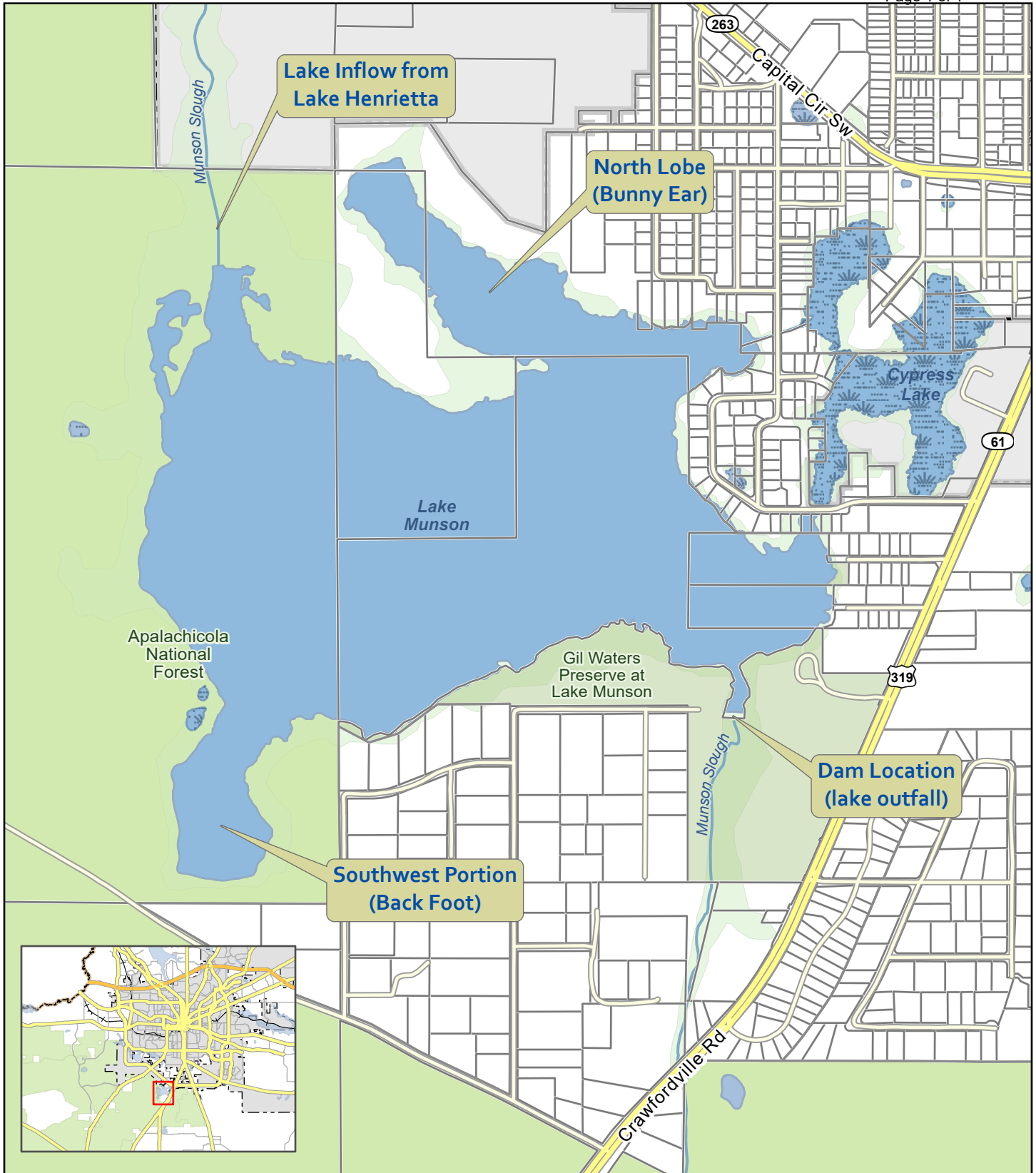
This product has been compiled from the most accurate source data from Leon County, the City of Tallahassee, and the Leon County Property Appraiser's Office. However, this product is for reference purposes only and is not to be construed as a legal document or survey instrument. Any reliance on the information contained herein is at the user's own risk. Leon County, the City of Tallahassee, and the Leon County Property Appraiser's Office assume no responsibility for any use of the information contained herein or any loss resulting therefrom.

-  Lake Munson Basin
-  Wetland
-  Lake
-  Tallahassee City Limit



Lake Munson Drainage Basin

Date Drawn: 9/20/2022



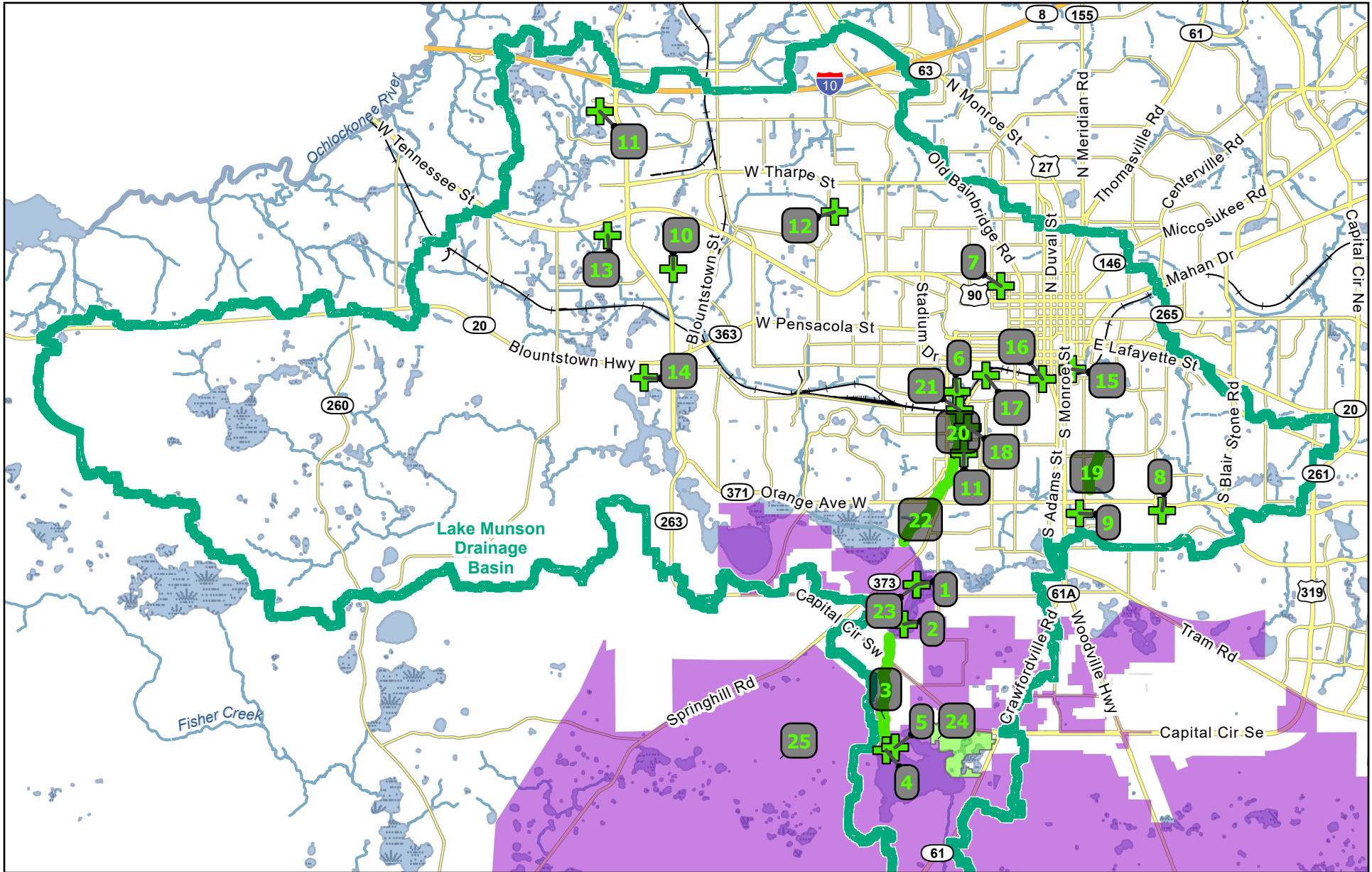
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Lake Munson

Date Drawn: 9/19/2022

Past Projects in Lake Munson Drainage Basin		
Map Number	Project Name	Agency
1	Lake Henrietta Restoration	Leon County
2	Lake Henrietta Wetlands Restoration	Leon County
3	Munson Slough Restoration	Leon County
4	Lake Munson Delta Sediment Removal	Leon County
5	Lake Munson Wetlands Restoation	Leon County
6	Lake Elberta	Tallahassee
7	Carter-Howell-Strong Park	Tallahassee
8	Jim Lee Road Facility	Tallahassee
9	Orange Avenue Facility	Leon County
10	Gum Creek Watershed Management Program	Leon County
11	Hopkins Crossing Wetland Preservation	Leon County
11	Bond Stormwater Facility	Blueprint
12	San Luis Park	Tallahassee
13	Martha Wellman Facility	Leon County
14	Broadmoor Stormwater Facility	Blueprint
15	Cascades Park	Blueprint
16	Lake Anita	Blueprint
17	Coal Chute Stormwater Facility	Blueprint
18	Tallahassee Junction Facility	Blueprint
19	Country Club Creek Drainage Improvements	Tallahassee
20	Lower CDD Erosion Control	Tallahassee
Ongoing and Future Projects in Lake Munson Drainage Basin		
Map Number	Project Name	Agency
21	3D-B Regional Stormwater Facility	Blueprint
22	Capital Cascades Segment 4	Blueprint
23	Lake Henrietta Sediment Removal	Leon County
24	NE Lake Munson Sewer	Leon County
25	Advanced Septic Incentive Program	Leon County



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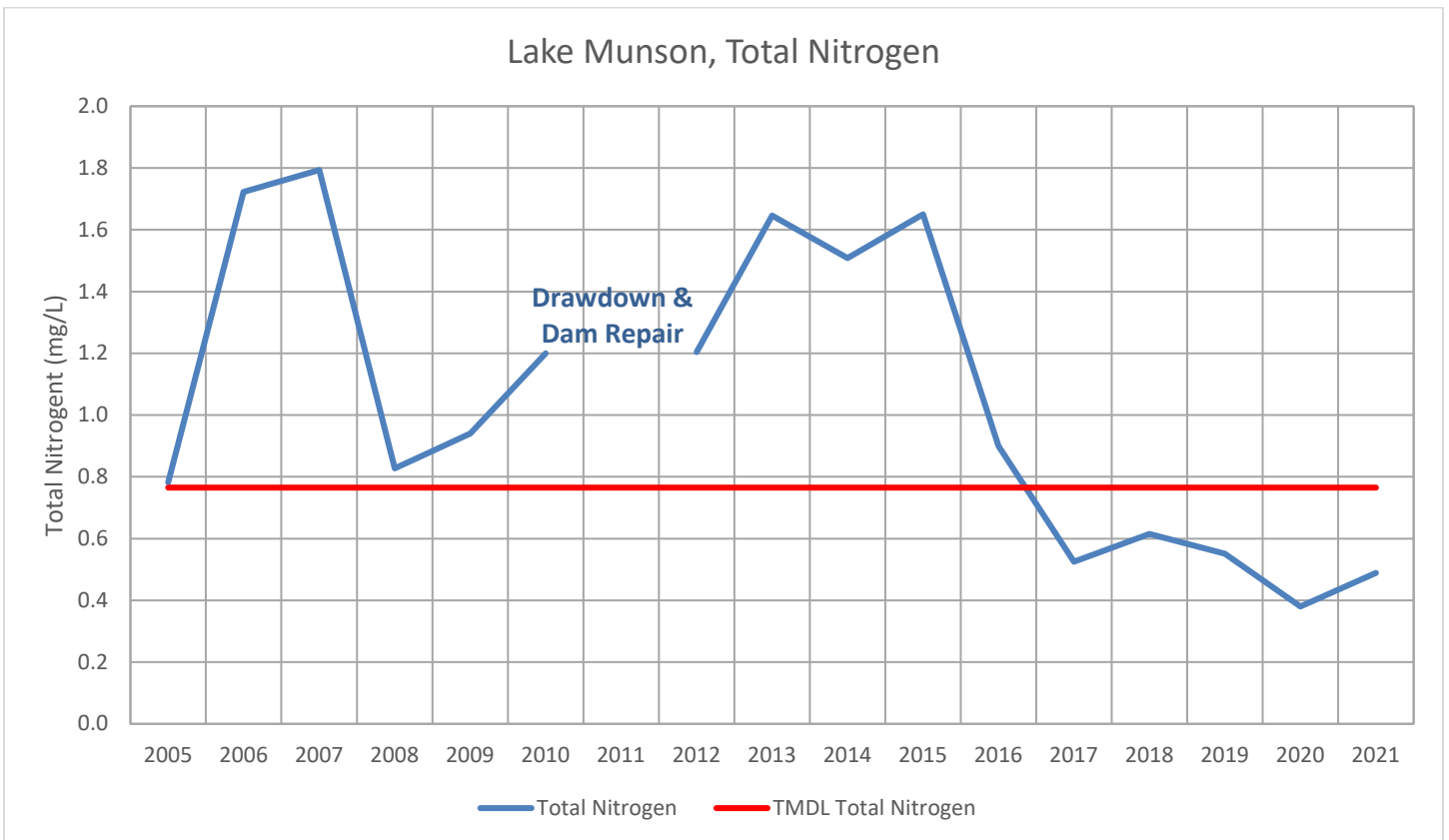
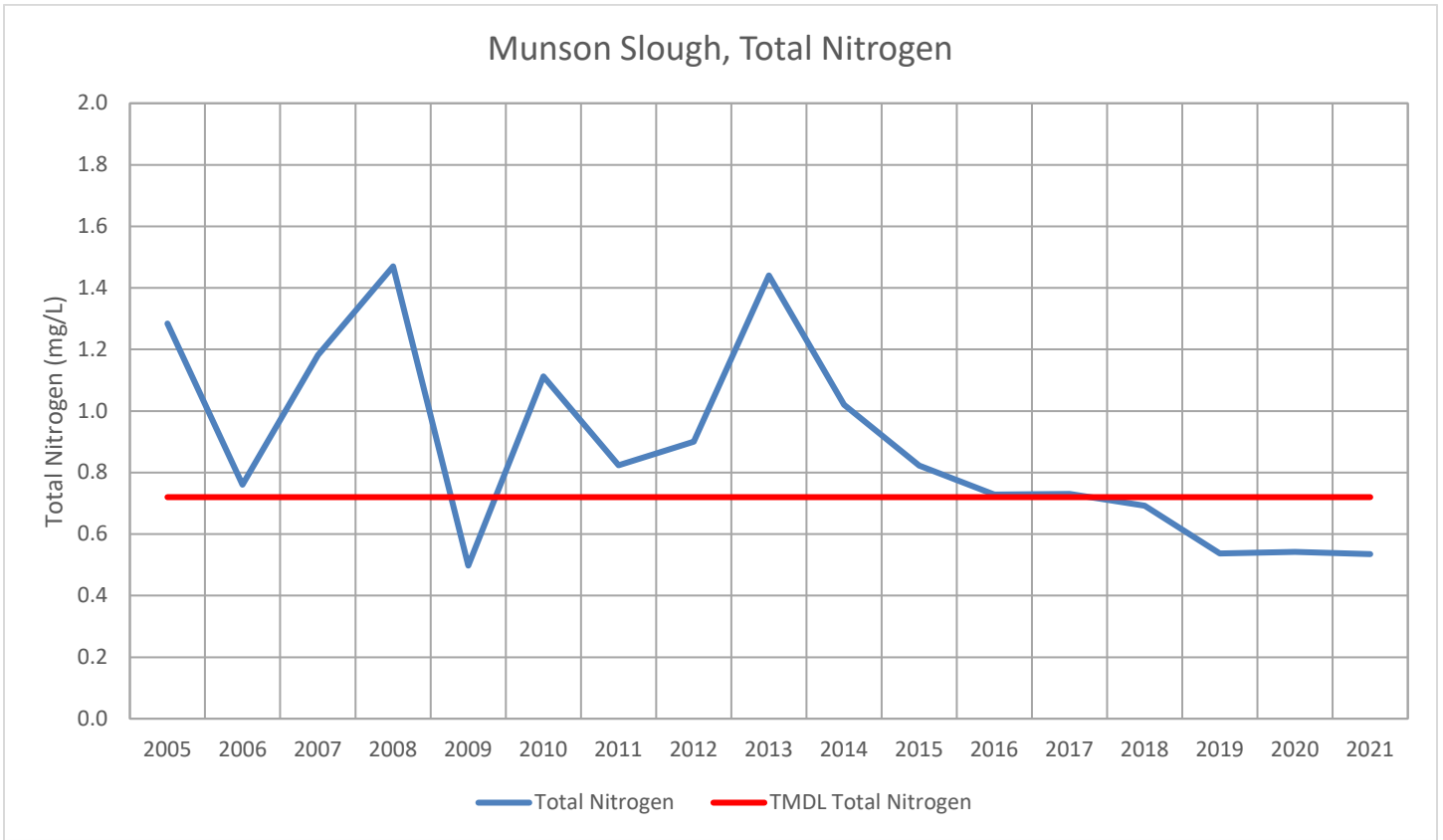
-  NE Lake Munson Sewer Project (24)
-  Septic Upgrade Projects (25)
-  Munson Projects (Line)



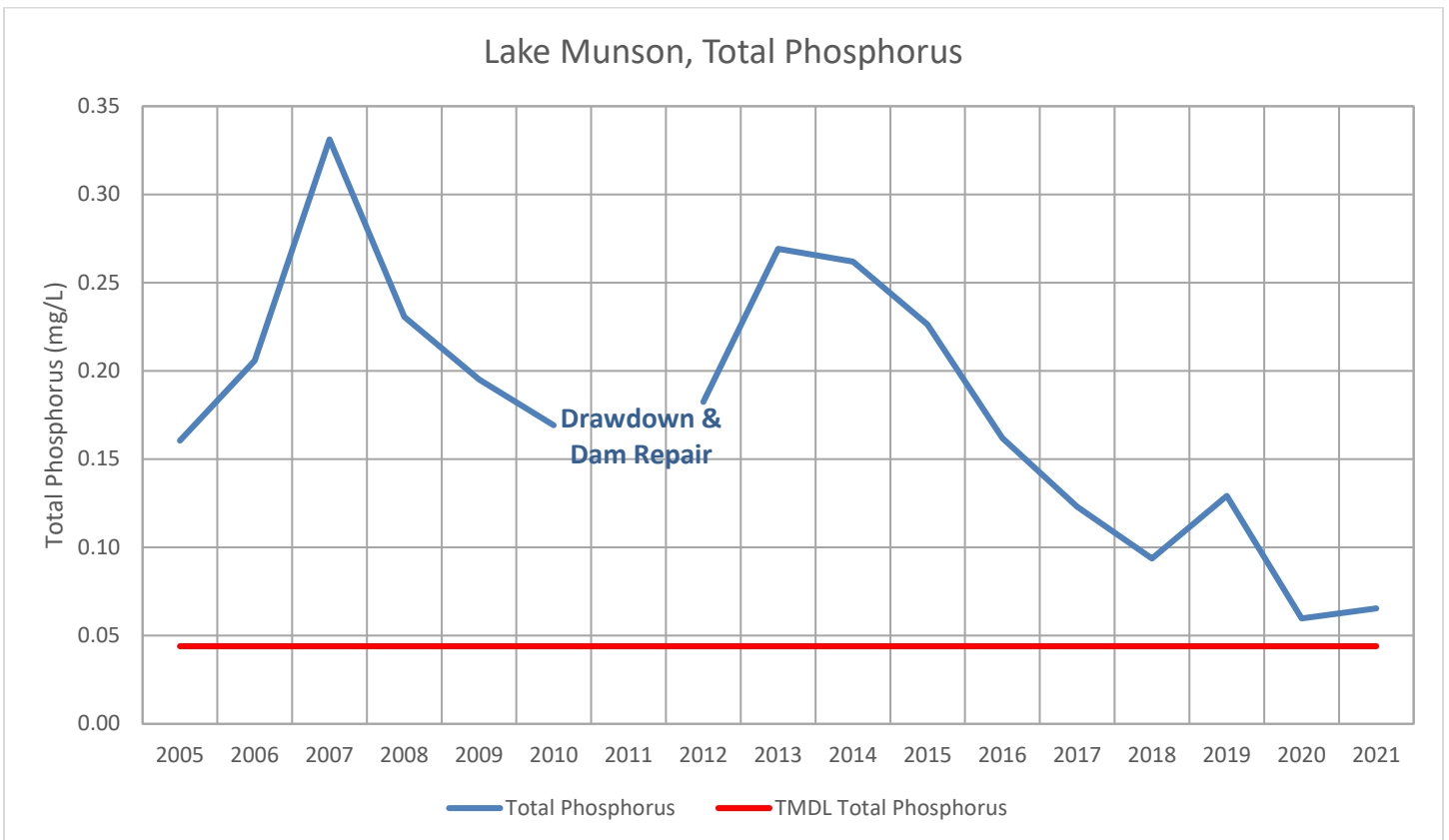
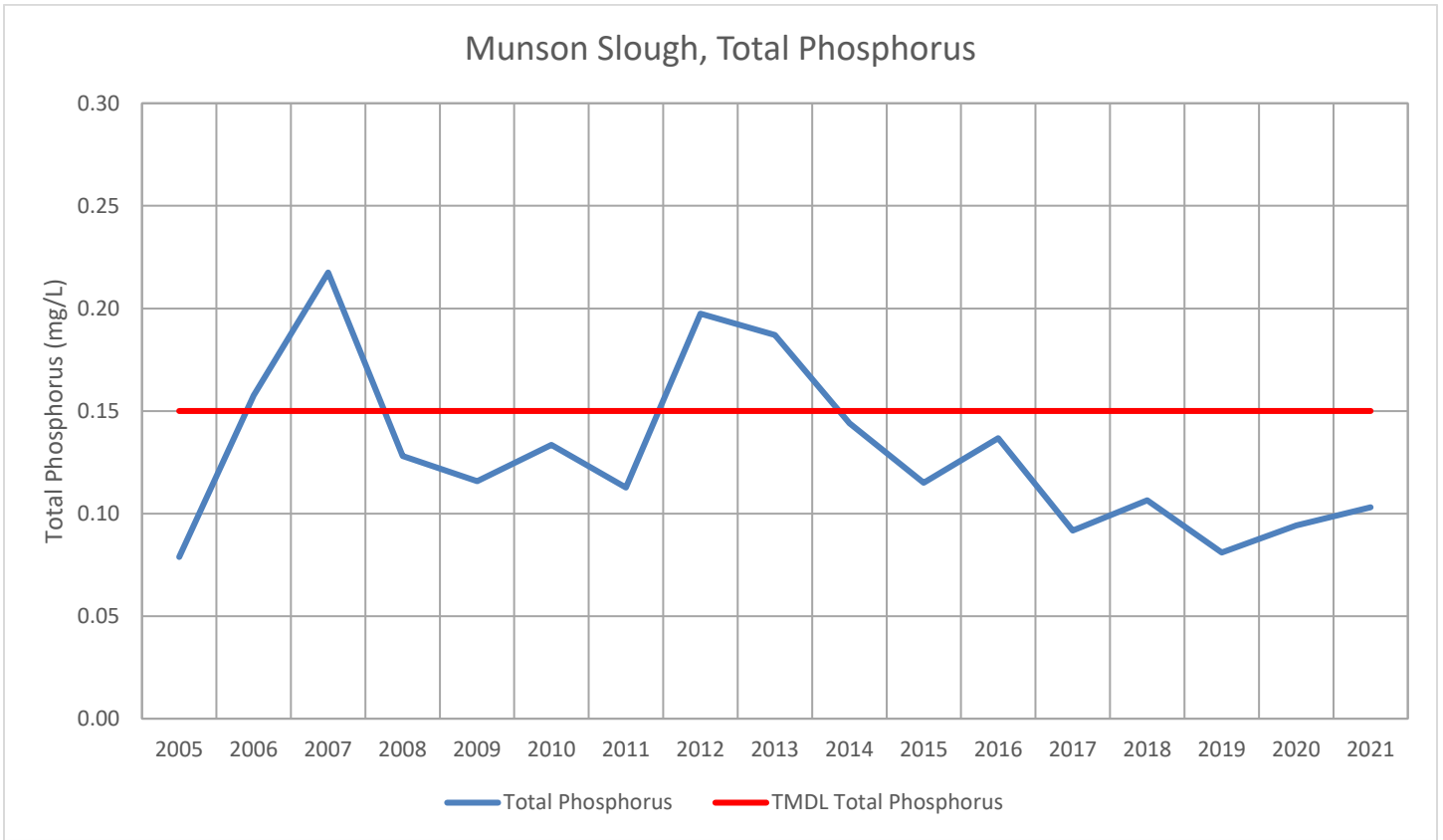
Lake Munson Drainage Basin Past, Ongoing, and Future Projects

Date Drawn: 10/5/2022

Annual Average Nitrogen Concentrations



Annual Average Phosphorus Concentrations



ONGOING AND PLANNED LEON COUNTY INFRASTRUCTURE PROJECTS



ADVANCED SEPTIC PILOT PROJECT

- \$1.5 million FDEP grant
- Design and construction
- Wakulla Springs PFA
- Upgrade existing septic systems to INRB systems
- 49 sites complete – Anticipate 35 more



LOWER CENTRAL DRAINAGE DITCH EROSION CONTROL

- Over \$9.1 million
- Springhill Road upstream to the FAMU Way extension
- Armors channel banks and protects adjacent properties from erosion
- Eliminates ditch erosion
- Reduces phosphorus in Lake Munson
- Completed Spring 2020



COMPREHENSIVE WASTEWATER TREATMENT FACILITIES PLAN

- \$500,000 FDEP grant
- Study on best type of advanced nitrogen-reducing treatment
- County-wide
- Identifies target areas for future projects
- Provides treatment recommendations on a parcel by parcel basis



SOUTH CITY/COUNTRY CLUB DRAINAGE IMPROVEMENTS

- Country Club Creek upstream of the East Drainage Ditch
- Improve conveyance and reduce sediment
- Decreased flooding
- Completed in Spring 2020
- Over \$2.5 million

SEPTIC UPGRADE INCENTIVE PROGRAM

- \$1.11 million FDEP grant
- Design and construction
- Wakulla Spring PFA
- Upgrade existing septic systems to advanced nitrogen removing technology
- Nearly 150 sites

NE LAKE MUNSON SEPTIC TO SEWER

- \$12.1 million (\$4.6 FDEP grant / \$7.5 local match)
- Design and construction
- Central sewer in neighborhoods adjacent to Lake Munson
- 220 properties
- Construction to start this Fall

LAKE HENRIETTA SEDIMENT REMOVAL

- \$2 million (\$1.6 million Federal grant / \$400,000 local match)
- Design and construction
- Remove approximately 20,000 cubic yards of sediment
- Restore to original design
- Design to start this fall
- Construction anticipated in 2023

BLUEPRINT CAPITAL CASCADES SEGMENT 4

- Includes water quality and stormwater improvements
- Currently in design
- Construction anticipated in Spring 20224
- Estimated \$20 million total project cost

BLUEPRINT 3D-B REGIONAL STORMWATER MANAGEMENT FACILITY

- Regional stormwater management facility
- Water quality treatment
- Trash capture
- Estimated completion end of 2022

FDEP INNOVATIVE TECHNOLOGIES GRANT (If Awarded)

- \$186,000 FDEP grant
- Design, implementation, after-action report
- Pilot project to test capability of BioChar at removing dissolved nitrogen
- Anticipate grant agreement spring 2023
- Implementation anticipated summer 2023

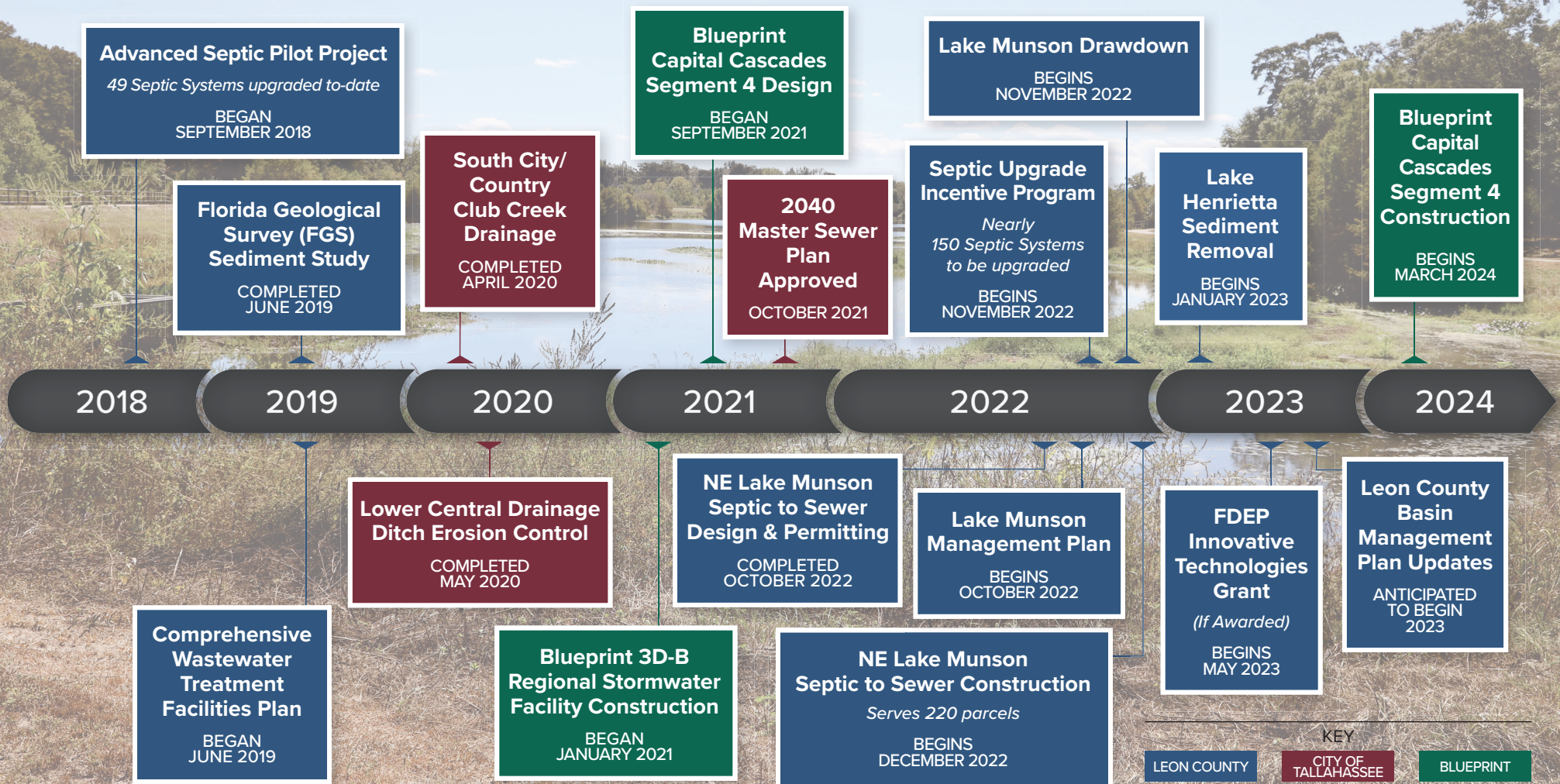
KEY

LEON COUNTY

CITY OF TALLAHASSEE

BLUEPRINT

LAKE MUNSON BASIN PROJECTS 2018-2024



Keep Your Pet Safe From Harmful Algal Blooms in Florida

What are algal blooms?

Algal blooms occur when algae, which are usually found in water, multiply very quickly. In Florida, algal blooms can be found in our fresh water, salt water and brackish water bodies. Algal blooms are temporary and can occur at any time but tend to occur most commonly in Florida in late summer and early fall.

An algal bloom may have the following features:

- Discoloration of the water such as green, blue, brown or red
- Look like foam, scum, mats or paint on the surface of the water
- Smell bad
- Have dead fish in or around the water

What are harmful algal blooms?

Harmful algal blooms occur when there is rapid growth of certain types of algae which can cause harm to people, animals or the local environment. The harmful algal blooms of most concern to human and animal health are those that produce toxins. It is not possible to tell if there are toxins associated with the bloom just by looking at it.

In fresh water such as lakes and rivers, the most common harmful algal blooms are caused by cyanobacteria, sometimes called blue-green algae. In salt water, an example of a harmful algal bloom is red tide that may be found in the Gulf of Mexico.

Why are harmful algal blooms important to my pet's health?

Toxins can be produced by harmful algal blooms which can cause serious illness and death in animals. Illness and death in Florida dogs have been linked to exposure to harmful algal blooms.

How can my pet get sick from harmful algal blooms?

Dogs can be exposed by swimming in or drinking water that contains harmful algal bloom toxins. Some dogs may also be attracted to the smell and taste of algae. They may eat scum, foam or dead fish in or around the water that contains toxins. In addition, dogs may also lick algae off their fur after swimming.

What symptoms might my pet have?

Symptoms in dogs normally occur within a few minutes to days of exposure to toxins from harmful algal blooms. Symptoms in dogs can include:

- Lack of energy
- Not eating
- Vomiting
- Diarrhea
- Yellow eyes or gums
- Bruising
- Dark urine
- Weakness, stumbling
- Tremors, seizures
- Difficulty breathing
- Excessive drooling

What should I do if I suspect my pet has been exposed to harmful algal blooms?

If your dog swam in an algal bloom, wash your dog off with clean water immediately. If your dog drank any water with an algal bloom or has eaten any material near the algal bloom, please call a veterinarian immediately, especially if they are showing any signs of illness. You may also call the ASPCA Animal Poison Control Center at 1-888-426-4435 or the Pet Poison Helpline at 1-855-764-7661 if you have questions about your pet (there is a fee for these calls).

How should I prevent my pet from getting sick from harmful algal blooms?

If you see signs of an algal bloom as described above:

- Keep your dog on a leash and away from the water.
- Do not let your dog wade or swim in the water.
- Do not let your dog drink the water or eat any material (e.g. dead fish, scum) nearby.
- Do not let your dog lick their fur until they have been bathed if they have been in contact with an algal bloom.

If there is health signage present, follow the signs to keep your dog safe.

Remember, you cannot tell if a bloom is toxic just by looking at it. If in doubt, keep out!

Learn more about harmful algal blooms at [FloridaHealth.gov/environmental-health/aquatic-toxins](https://www.floridahealth.gov/environmental-health/aquatic-toxins)



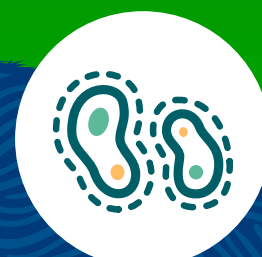
UNDERSTANDING BLUE-GREEN ALGAE

WHAT ARE BLUE-GREEN ALGAE?

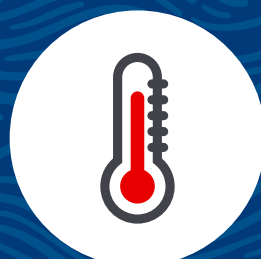
Blue-green algae are a type of bacteria that occur frequently in Florida's freshwater environments.



Blue-green algae, like plants, use light energy from the sun and nutrients acquired from the environment to help them grow.



A bloom occurs when rapid growth of algae leads to an accumulation of individual cells that discolor water and often produce floating mats that emit unpleasant odors. Blooms may negatively impact fish and other aquatic animals.



Some environmental factors that contribute to blue-green algae blooms are sunny days, warm water temperatures, still water conditions and a plentiful supply of nutrients.



Reducing the supply of nutrients, particularly nitrogen and phosphorus, can help decrease the intensity and duration of blue-green algal blooms.

ARE BLUE-GREEN ALGAE HARMFUL?

Many types of blue-green algae can produce toxins. Algal blooms can result in high toxin concentrations. Unfortunately, there are no visual signs that might indicate definitively when blue-green algae are producing toxins.



Ingestion of water with high concentrations of algal toxins can result in serious health effects.



Direct contact or breathing airborne droplets containing high levels of algal toxins can cause irritation of the skin, eyes, nose and throat.



In addition to health effects on people, blue-green algae blooms can cause health impacts in animals.



People and pets should not drink or swim in water where blue-green algae blooms are present. Children, the elderly, and those who are immunocompromised may be at risk even at low concentrations and should avoid any exposure.



DEP tests water samples regularly to determine the type of blue-green algae present. If the algae identified are known to produce toxins, additional testing is carried out to determine if toxins are present and how concentrated they are.



The presence and level of toxins produced by a bloom can vary. Therefore, recurring and persistent blooms are routinely monitored and retested.

WHERE CAN I REPORT A BLUE-GREEN ALGAL BLOOM?

Report algal blooms through:

ReportAlgalBloom.com

or 1-855-305-3903

PROTECTING  TOGETHER

ProtectingFloridaTogether.gov



FRESHWATER ALGAL BLOOMS FREQUENTLY ASKED QUESTIONS

What is blue-green algae?

Blue-green algae, or cyanobacteria, is a type of algae found naturally in freshwater environments. This algae is a microorganism that functions like a plant in that it feeds through photosynthesis and derives its energy from the sun.

Blue-green algae can be found all over the world, and occur in Florida's freshwater and brackish habitats, such as lakes, rivers and estuaries.

What causes an algal bloom?

Although blue-green algae are found naturally, increases in nutrients can exacerbate the extent, duration and intensity of blooms. Other factors that contribute to blooms include warm temperatures, reduced water flow, and lack of animals that eat algae. Although they can occur at any time, blue-green algae are most common in Florida during the summer and early fall, with high temperatures and abundant sunlight. The summer also brings storms that have the potential to deliver nutrients into waterways through stormwater runoff.

Are all types of blue-green algae harmful?

Some – not all – blue-green algae can produce toxins that can contribute to environmental problems and affect public health. Little is known about exactly what environmental conditions trigger toxin production. Over time, these toxins are diluted and eventually break down and disappear.

Non-toxic blooms can also harm the environment by depleting oxygen levels in the water column and reducing the amount of light that reaches submerged plants.

Are algal blooms predictable?

The nature of most freshwater algal bloom events makes it difficult to predict where and when a bloom will occur or how long it will last. However, lessening the negative effects of algal blooms is possible through restoration work to improve water quality by reducing nutrients. Reducing nitrogen and phosphorous levels can help decrease the intensity and duration of algal blooms.

Can you identify algal type or if it is producing toxins by looking at it?

No, this is why the Florida Department of Environmental Protection (DEP) coordinates with the water management districts and the Florida Fish and Wildlife Conservation Commission to routinely sample observed and reported algal blooms and test for algal identification and toxicity.

What are the health risks associated with algal blooms?

The Florida Department of Health (DOH) takes the lead in determining if a harmful algal bloom presents a risk to human health. DOH issues health advisories for recreational waters where there is a risk of the public coming into contact with an existing algal bloom as it deems appropriate.

The World Health Organization considers toxin levels under 10 micrograms/liter to represent a low-level risk for adverse health outcomes from short-term recreational exposure; however, certain sensitive populations (e.g., children, the elderly and immunocompromised populations) may still be at risk even at low concentrations and should avoid any exposure.

continued

What should I do if I see an algal bloom in a freshwater system?

The state's bloom response team encourages everyone to be on the lookout for blooms and report them.

Residents statewide can now easily report algal blooms to the department 24 hours a day, 7 days a week. Information can be reported online through at www.reportalgalbloom.com, as well as through a new toll-free number at 1-855-305-3903.

To report fish that are either dead or in poor physical condition, residents should contact the Fish Kill Hotline 1-800-636-0511.

People experiencing symptoms or illnesses should contact the Florida Poison Control Center at 1-800-222-1222.

What happens when an algal bloom is reported?

The department collects detailed information such as location, description and size of the bloom. The reports are then evaluated and prioritized for inclusion in near-term sampling plans based on severity of the bloom and potential for human exposure.

How can I stay updated on algal blooms in my area?

To ensure the health and safety of our state's residents and visitors, DEP is committed to keeping Floridians updated on current algal blooms and how the state is responding to protect human health, water quality and the environment.

DEP is placing sampling results, monitoring and testing information and latest actions by DEP, the water management districts and other local, state and federal response team partners on our [website](#).

Where are algal bloom samples tested?

Most algal bloom samples are processed in DEP's nationally recognized lab in Tallahassee.

What does DEP's lab test for?

Algal samples are tested to identify the type of algae present. If the algae is a type that is capable of producing toxins, it is then tested to determine if it is producing toxin and if so, at what level. The toxins typically tested for include microcystin, cylindrospermospin and anatoxin-a.

How long does it take to test samples?

All samples will still be shipped to DEP's laboratory in Tallahassee for formal algal identification and toxin analysis, which can take approximately three to five days.

Who collects samples?

DEP and Florida's water management districts collect samples when algal blooms are observed during their routine water quality monitoring as well as when blooms are reported. FWC samples nearshore marine waters.

How often are samples collected?

DEP and Florida's water management districts frequently monitor Florida's water quality, and routinely collect algal bloom samples as soon as they are observed as part of this effort. In addition, staff can be deployed to take additional samples in response to reported blooms – whether from a citizen, other response team agencies or other sources.

If a specific site or bloom is tested, is there a need for retesting?

Yes, because whether a bloom is producing toxins and the levels of toxins produced can vary, recurring and persistent blooms are routinely monitored and retested.

Who should I contact about beach closures?

For the most up-to-date information regarding public beach closures, residents and visitors are encouraged to contact the counties directly as they have information on the latest actions.

- » Martin County: 772-320-3112
- » St. Lucie County: 772-229-2850
- » Palm Beach County
 - North Palm Beach County (Juno Beach and north): 561-624-0065
 - South Palm Beach County (Riviera Beach and south): 561-629-8775
- » Visit www.floridastateparks.org for state park beach closure alerts

PROTECTING TOGETHER

JOIN US IN PROTECTING AND RESTORING FLORIDA'S WATERS

BE MINDFUL OF BLUE-GREEN ALGAE

Blue-green algae can produce toxins, which can be harmful to humans and pets.



Blooms are often green in color.



Blooms may appear on the surface of the water as scum or a floating mat.



Blooms may produce unpleasant odors.

CHECK RECENT BLOOM ACTIVITY



ProtectingFloridaTogether.gov/StayInformed

- Sign up for alerts.
- Find volunteer opportunities.
- Learn what the state is doing to protect and restore our waters.

IF YOU SEE A BLUE-GREEN ALGAL BLOOM

People and pets should stay out of the water.



Do not swim, wade or walk in the water.



Do not let pets swim or go near the water.



Rinse fish with tap water. Throw out guts.



Do not use water from this site for drinking or cooking.



Do not eat shellfish.

Report blooms at ReportAlgalBloom.com or 1-855-305-3903

