4.5 Carr Lake

This section presents the results from Tasks 1 through 3 for Carr Lake. This includes an overview and history of the lake and basin, present impairment status, an overview of available data, a qualitative assessment of potential pollutant sources, and calculation of potential pollutant loads.

4.5.1 Overview and History

Carr Lake is a very shallow, approximately 692-acre lake located north of Lake Jackson. The lake itself is located entirely within Leon County. The lake is surrounded by two primary property owners, Ayavalla Land Company and Orchard Pond LLC. Orchard Pond LLC is a farming cooperative that produces organic produce and other products. Carr Lake is a valued biological, aesthetic, and recreational resource of Leon County. It was designated an Aquatic Preserve in 1973 (Leon County, 2018).

The drainage basin for Carr Lake covers an area of 5,964 acres **(Figure 4-40**). Meridian Road runs in a north-south direction through the basin, with the area to the west of Meridian Road almost entirely within Leon County and the area to the east primarily within the City's incorporated area. **Figure 4-40** shows a split of the Carr Lake drainage basin into two subbasins. The eastern (up-stream) subbasin drains into Summerbrook Creek, which flows through the northern end of Holley Pond into the northeastern side of Carr Lake. The Summerbrook Creek subbasin includes a small portion of the Killearn Lakes neighborhood north of Bannerman Road, most of the Summerbrooke neighborhood, and a northern portion of Ox Bottom Manor. This subbasin is discussed in more detail within **Section 4.6**. The western subbasin is the immediate area that drains directly to Carr Lake, including a subbasin that drains to Holley Pond. This area has very limited development, with only a few single-family homes, farms, limited rural roadways, and the newly constructed Orchard Pond Parkway to the north. Mallard Pond, which is interconnected with Carr Lake, is also located within this subbasin and receives some of the drainage from the northern portion of the subbasin. Outflow from Carr Lake flows into the northern lobe of Lake Jackson.

Carr Lake presently supports a number of recreational activities including kayaking, air boating, fishing, and duck hunting and can support some motorboat activities in the open water area along the northern side where the public boat ramp is located. Due to vegetative cover, much of the lake is only accessible using airboats and through pathways cut through the vegetation that interconnect other smaller open water areas. **Photo 4-18** and **Photo 4-19** show the open water areas and nearshore vegetation from the boat ramp along the northern end.

Similar to Lake Jackson, the hydrologic cycle for the lake is such that the levels decline due to evaporation and transpiration by aquatic vegetation, and outflow to Lake Jackson. The lake rises due to stormwater, and baseflow inflows from the tributaries and direct rainfall. When one exceeds the other, the lake will either drain or fill. Unlike Lake Jackson, Carr Lake does not have the direct connection to groundwater through sinkholes and, therefore, during historical drought periods, the lake has retained water while Lake Jackson has been dry.

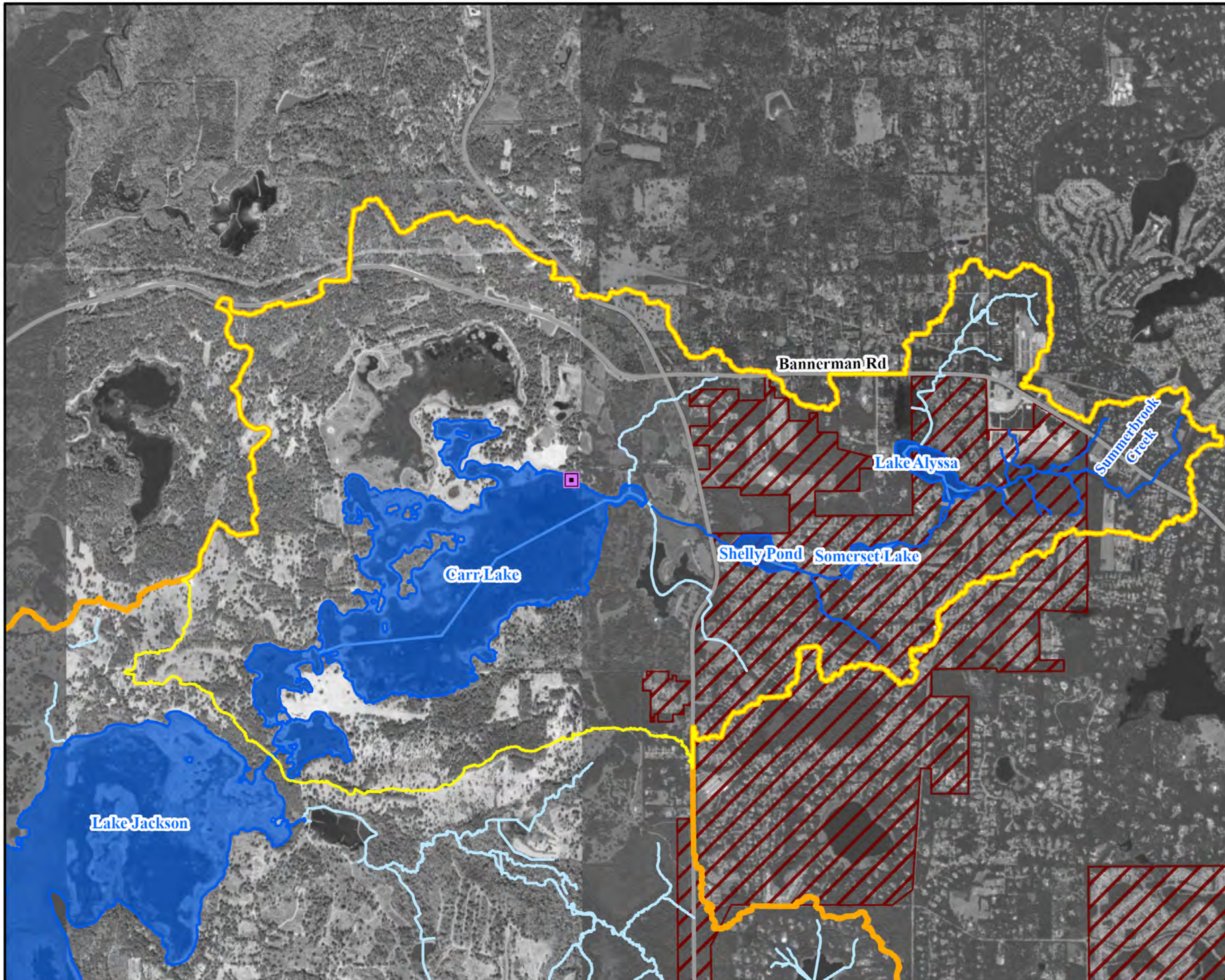

Figure 4-40:
Carr Lake Drainage Basin Overview

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Photo 4-18: Carr Lake from Boat Ramp (February 2021)

Photo 4-19: Carr Lake from Boat Ramp (February 2021)

Photo 4-20 through **Photo 4-27** present aerial views of the lake from 1937 through the present. Examination of the aerial photos shows that the areas of open water have expanded and contracted through time. In the 1937 aerial photo (**Photo 4-20**), the open water areas are of a similar size and nature to those seen in the 2020 aerial (**Photo 4-27**). Through the remaining aerials, the open water areas appear to expand in size, with the largest appearing to be in the 1970 aerial (**Photo 4-23**) and then, subsequently, decreasing in size up to the present.

4.5.2 Regulatory Status

As stated previously, Carr Lake (WBID 582C) was designated an Aquatic Preserve in 1973 and maintains that special protected status. **Exhibit 4-2** presented the verified impaired waters within the overall Lake Jackson basin. Presently, no verified impaired waters are within the Carr Lake drainage basin.

4.5.3 Waterbody Data Review and Summary

This section presents an overview of available data and data sources for Carr Lake and the Carr Lake basin, including bathymetry, land use, soils, septic systems, hydrologic measurements, surface water quality, groundwater quality, biological, stormwater treatment facilities, and atmospheric deposition.

4.5.3.1 Bathymetry

No bathymetric data for Carr Lake is available currently. Based upon general descriptions of the lake found in various references, depths within the lake range from shallow areas of 2 to 3 ft supporting extensive vegetation, up to some deeper, open water areas, such as is seen in the northern area **(Figure 4-40)**. Depths in the deeper areas are not much more than 5 ft.

4.5.3.2 Land Use

Figure 4-41 presents a map of the Level 2 land uses within the Carr Lake basin. A table is provided to show the overall acreages and percent cover for the various levels. Tables are provided for both the Level 2 and grouped Level 1 land uses. The largest land use types within the Carr Lake drainage basin per the grouped Level 1 categories are Upland Forrest (32 percent), Wetlands (23 percent), and Urban and Built Up (22 percent). Nearly all of the Urban and Built Up land uses are located in the basin area east of Meridian Road. Within the Urban Built Up category, Low to Medium Density Residential takes up the largest portion. A large area of the eastern basin currently identified as Upland Forrest is now under development. This is the area upstream of Lake Alyssa. West of Meridian Road, the primary land use is Upland Forrest, with some areas presently in Agricultural use. This use would be associated in part with the Orchard Pond LLC.

4.5.3.3 Soils

The most prevalent soil groups in the Carr Lake drainage basin are Group C (**Figure 4-42**) and Group B, accounting for 36 percent and 25 percent of the area, respectively. Group B soils are considered to have a moderate rate of infiltration, whereas Group C soils are considered to have slow rates of infiltration. Small clusters of Group A/D soils are found along the primary tributary pathways. These are considered to have high infiltration potential, but due to elevated water table conditions, will act more similarly to soils with low infiltration potential.

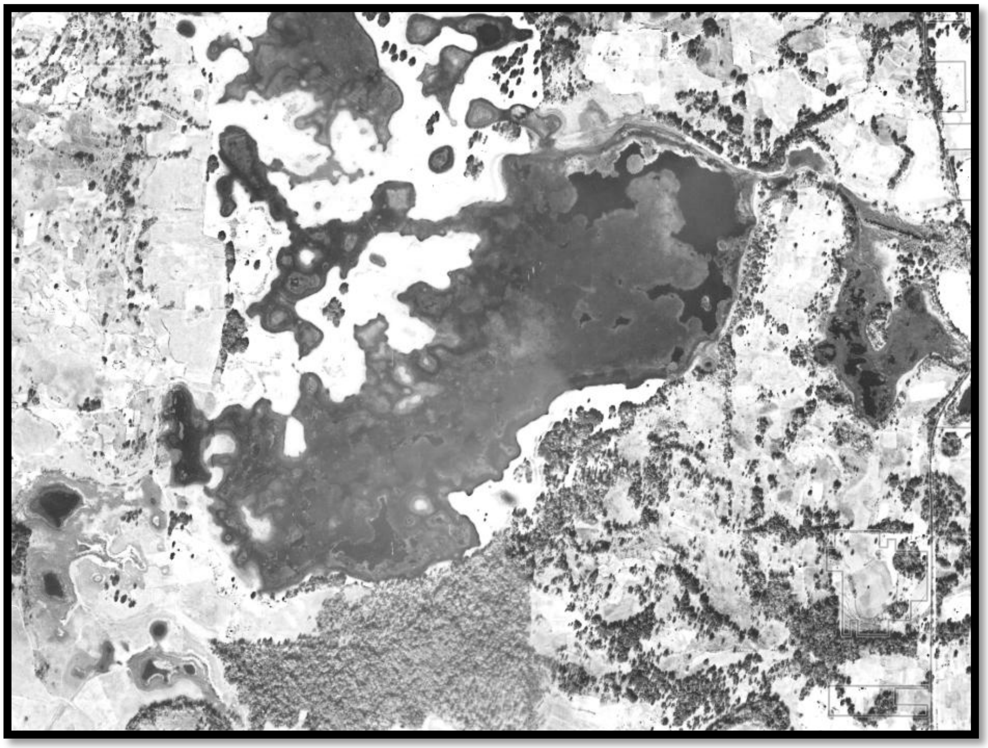


Photo 4-20: Carr Lake Basin Area Aerial (1937)

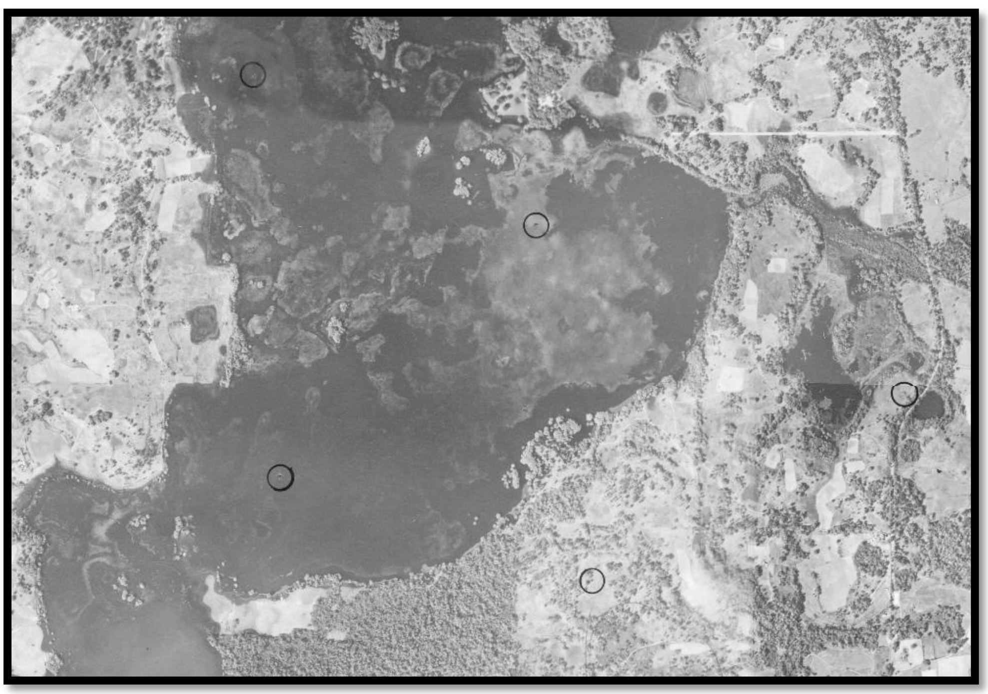


Photo 4-21: Carr Lake Basin Area Aerial (1949)

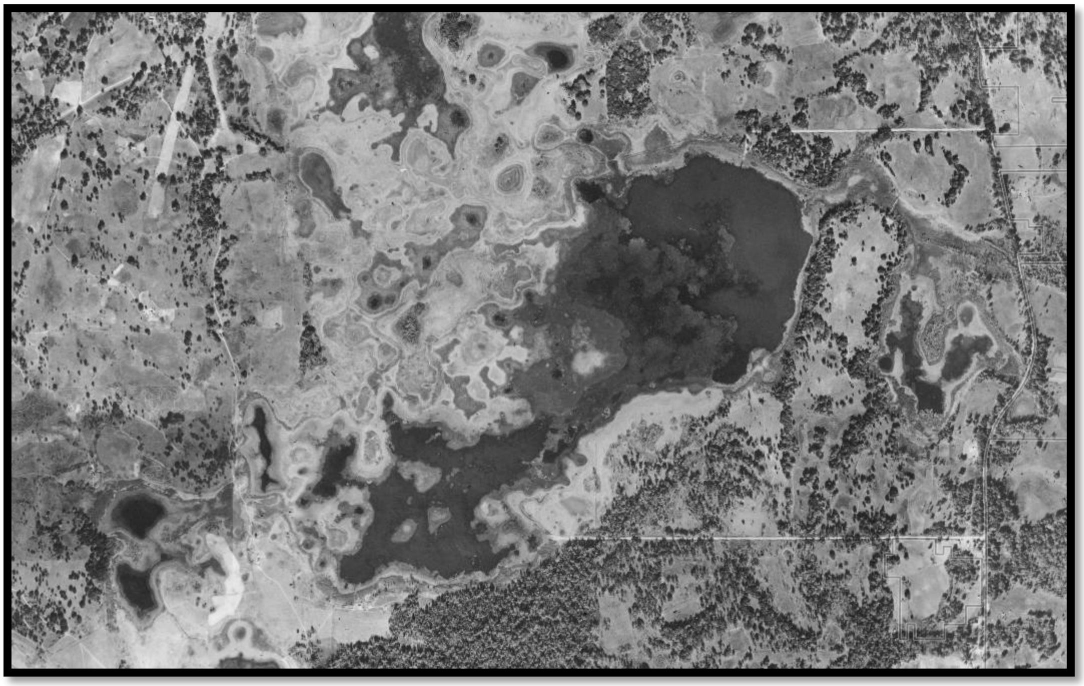


Photo 4-22: Carr Lake Basin Area Aerial (1954)

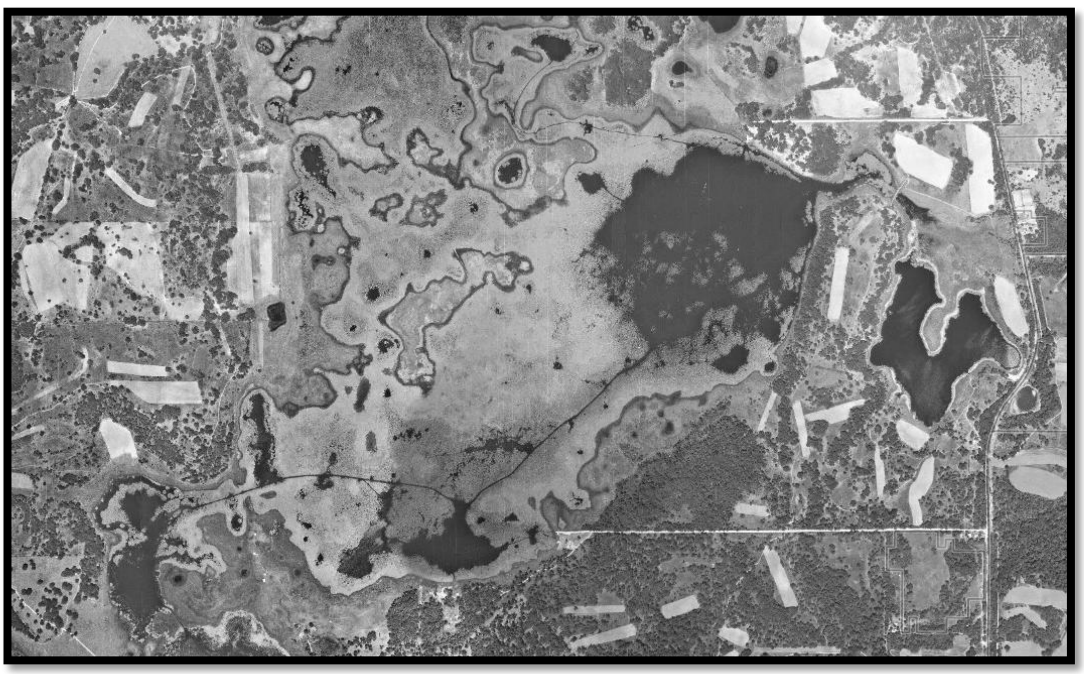


Photo 4-23: Carr Lake Basin Area Aerial (1970)

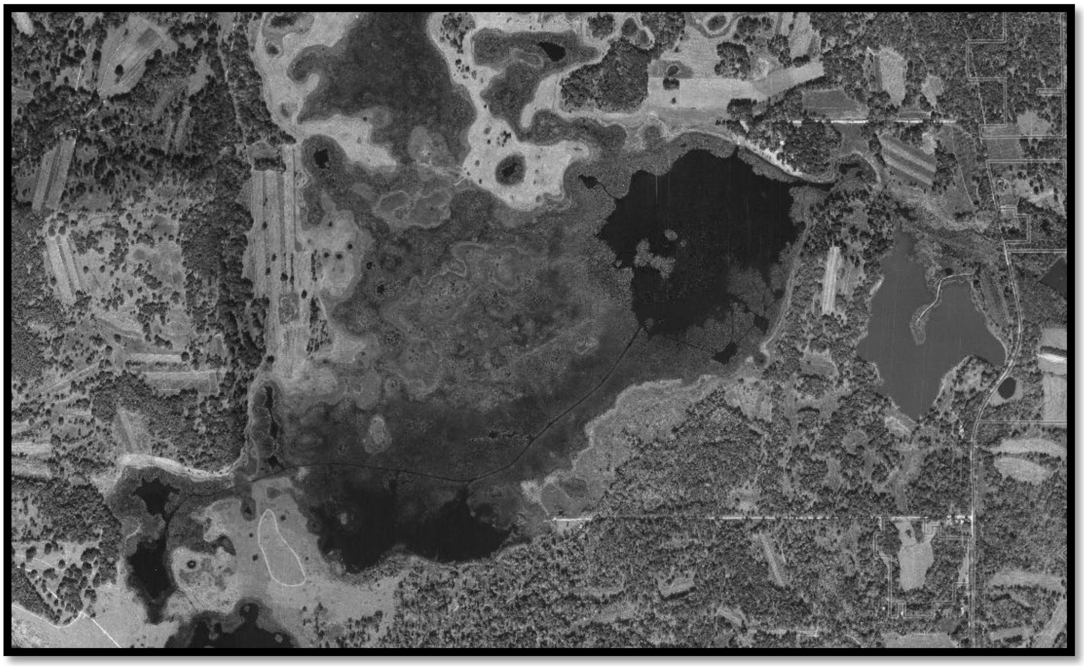


Photo 4-24: Carr Lake Basin Area Aerial (1983)

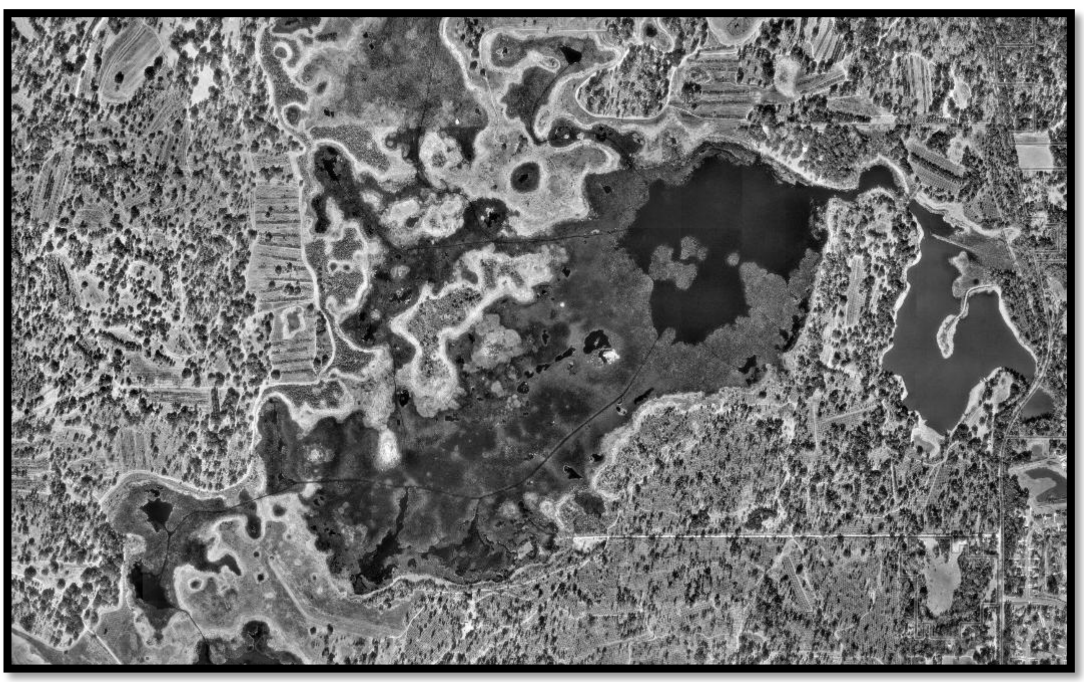
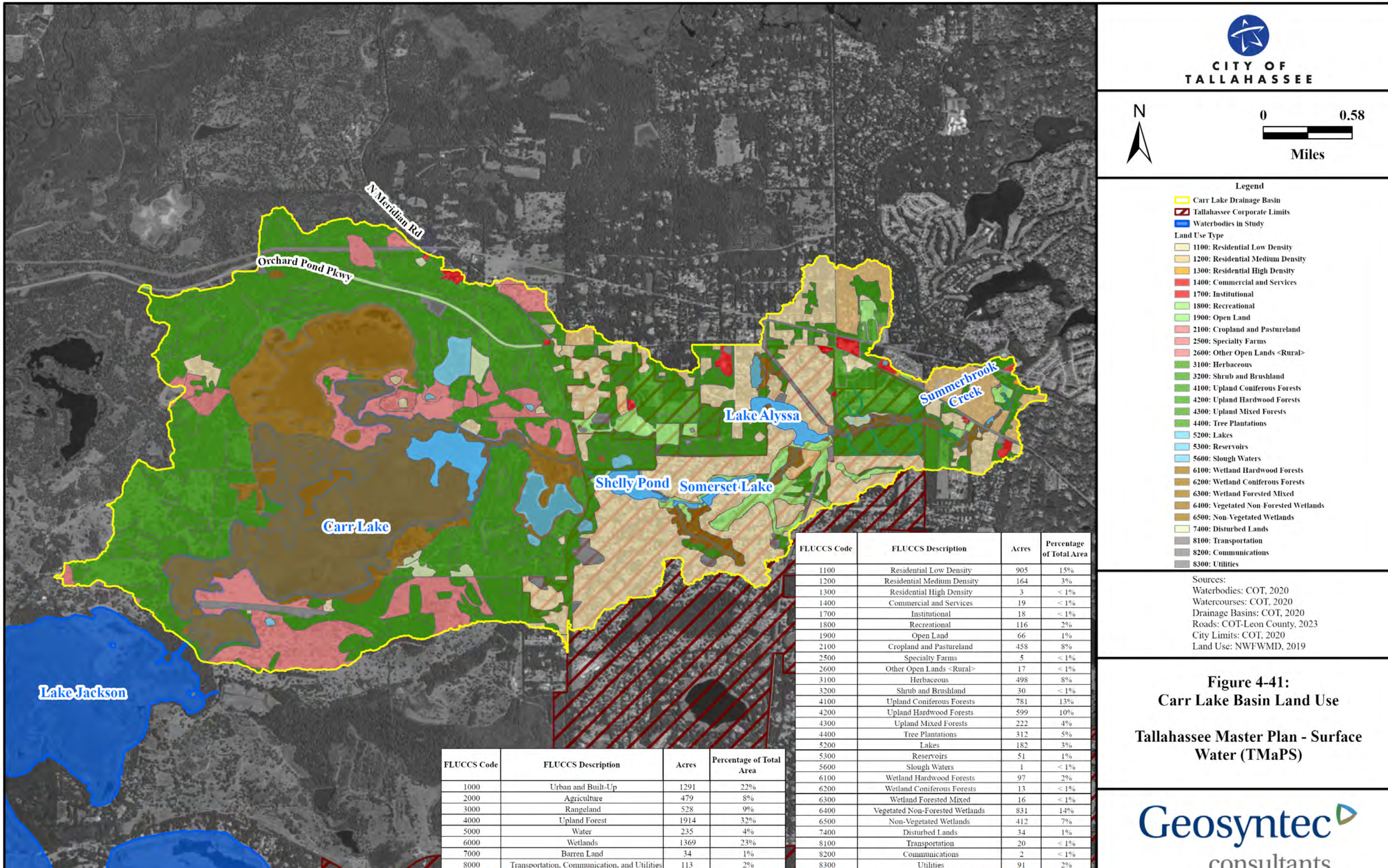


Photo 4-25: Carr Lake Basin Area Aerial (1996)

Photo 4-26: Carr Lake Basin Area Aerial (2007)

Photo 4-27: Carr Lake Basin Area Aerial (2020)



FLUCCS Code	FLUCCS Description	Acres	Percentage of Total Area
1000	Urban and Built-Up	1291	22%
2000	Agriculture	479	8%
3000	Rangeland	528	9%
4000	Upland Forest	1914	32%
5000	Water	235	4%
6000	Wetlands	1369	23%
7000	Barren Land	34	1%
8000	Transportation, Communication, and Utilities	113	2%

FLUCCS Code	FLUCCS Description	Acres	Percentage of Total Area
1100	Residential Low Density	905	15%
1200	Residential Medium Density	164	3%
1300	Residential High Density	3	< 1%
1400	Commercial and Services	19	< 1%
1700	Institutional	18	< 1%
1800	Recreational	116	2%
1900	Open Land	66	1%
2100	Cropland and Pastureland	458	8%
2500	Specialty Farms	5	< 1%
2600	Other Open Lands <Rural>	17	< 1%
3100	Herbaceous	498	8%
3200	Shrub and Brushland	30	< 1%
4100	Upland Coniferous Forests	781	13%
4200	Upland Hardwood Forests	599	10%
4300	Upland Mixed Forests	222	4%
4400	Tree Plantations	312	5%
5200	Lakes	182	3%
5300	Reservoirs	51	1%
5600	Slough Waters	1	< 1%
6100	Wetland Hardwood Forests	97	2%
6200	Wetland Coniferous Forests	13	< 1%
6300	Wetland Forested Mixed	16	< 1%
6400	Vegetated Non-Forested Wetlands	831	14%
6500	Non-Vegetated Wetlands	412	7%
7400	Disturbed Lands	34	1%
8100	Transportation	20	< 1%
8200	Communications	2	< 1%
8300	Utilities	91	2%

Sources:
Waterbodies: COT, 2020
Watercourses: COT, 2020
Drainage Basins: COT, 2020
Roads: COT-Leon County, 2023
City Limits: COT, 2020
Land Use: NWFWMD, 2019

Figure 4-41:
Carr Lake Basin Land Use

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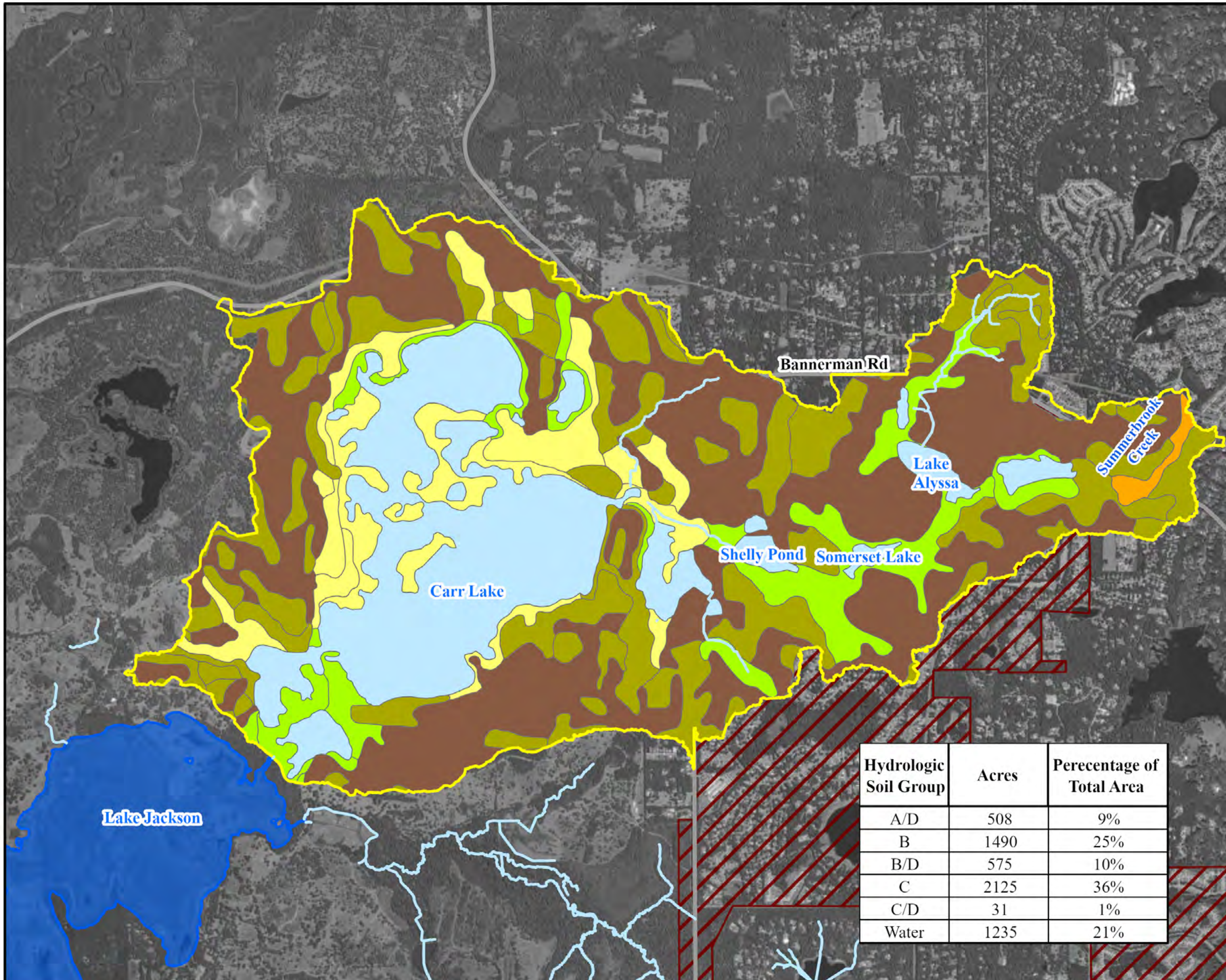

Hydrologic Soil Group	Acres	Perecentage of Total Area
A/D	508	9%
B	1490	25%
B/D	575	10%
C	2125	36%
C/D	31	1%
Water	1235	21%

Sources:
Waterbodies: COT, 2020
Watercourses: COT, 2020
Drainage Basins: COT, 2020
Roads: COT-Leon County, 2023
City Limits: COT, 2020

Figure 4-42:
Carr Lake Basin Soils

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4.5.3.4 Septic Systems

An estimated 455 septic tank units are within the boundaries of the Carr Lake drainage basin, based on the FDOH septic tank layer (**Figure 4-43**). The bulk of the septic tanks are located in specific clusters, including the Killearn Lakes neighborhood north of Bannerman Road, residences off Greystone Drive and Reynolds Drive, an unsewered portion of Summerbrooke, and other smaller neighborhoods.

Effluent from septic tanks that are in good condition should be comparable to secondarily treated wastewater effluent from sewage treatment plants. However, septic systems can be a source of pollutants, pathogens, and nutrients and are identified by FDEP as a potential source of FIB and nutrients to waterbodies in its assessment processes.

4.5.3.5 Hydrologic Data

There are no current or recent historical hydrologic monitoring stations specific to Carr Lake or the Carr Lake drainage basin. All rainfall, water level, and flow monitoring stations were presented and discussed in **Section 4.4.3** for the entire Lake Jackson basin.

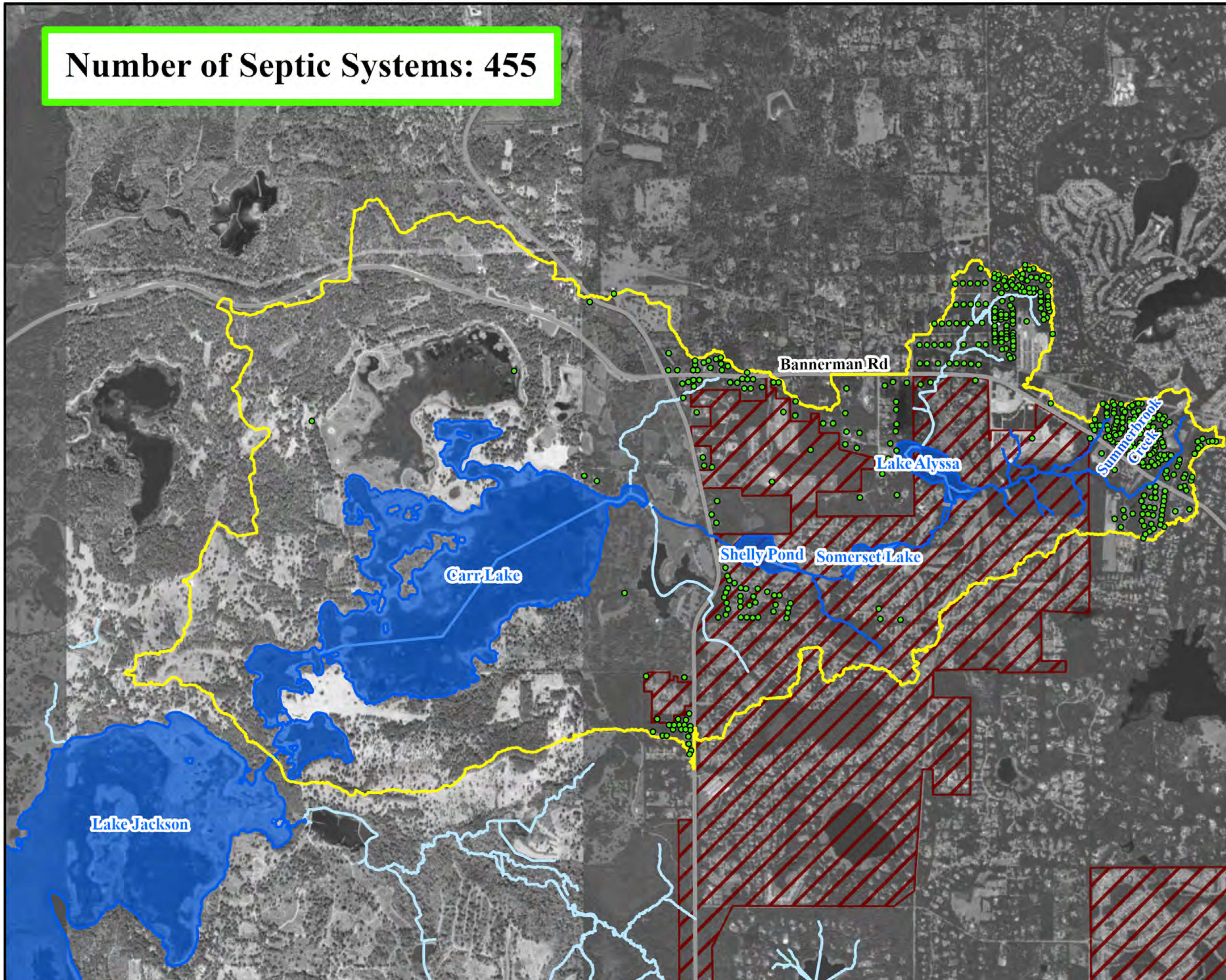
4.5.3.6 Surface Water Quality Data

The IWR dataset for Carr Lake (WBID 582) spans from 2000 to 2020 and includes contributions from local and state agencies (Leon County, FDEP, and Florida LAKEWATCH) as well as private sector firms (BRA, and McGlynn Lab).

Figure 4-44 presents the locations of in-lake water quality monitoring stations for Carr Lake (yellow) along with stations that provide water quality data along tributaries that flow directly into Carr Lake (red). A table is provided in **Figure 4-44** that shows the station identification (ID), station name, period of record, sample count, data source, and if the station represents in-lake or inflowing tributary data. Based on the number of stations and the length of the station IDs, station IDs were not included on the figure, rather each of the stations is given a number and the numbers correspond to stations in the table.

Figure 4-44 shows that most of the stations are located in the northern section of Carr Lake, within the open water area. There are stations located further south but the data are all prior to 2010. The only stations that have data past 2010 are maintained by Leon County and are numbers 6 and 9 on the map. For the upstream tributary inflow stations (15 through 17 on the map), data are all on or before 2011.

Some initial plots of the available data in the lake are provided in this section. This includes plots of the raw data along with AGM. As nutrients are the primary constituent of interest relative to water quality conditions in Carr Lake, plots are provided for the key parameters related to potential nutrient impairment. These include TN, TP, Chl-a, and TSI. Additionally, based on interest in the area relative to septic systems and other sources, FIB, specifically *E. coli* are included. Additional data plots and analyses are provided as part of the qualitative assessment of sources in **Section 4.5.4**.



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Legend

- Carr Lake Drainage Basin
- Waterbodies in Study
- Watercourses
- Tallahassee Corporate Limits
- Septic Systems

Sources:
Waterbodies: COT, 2020
Watercourses: COT, 2020
Drainage Basins: COT, 2020
Roads: COT-Leon County, 2023
City Limits: COT, 2020

Figure 4-43:
Carr Lake Drainage Basin Septic Systems

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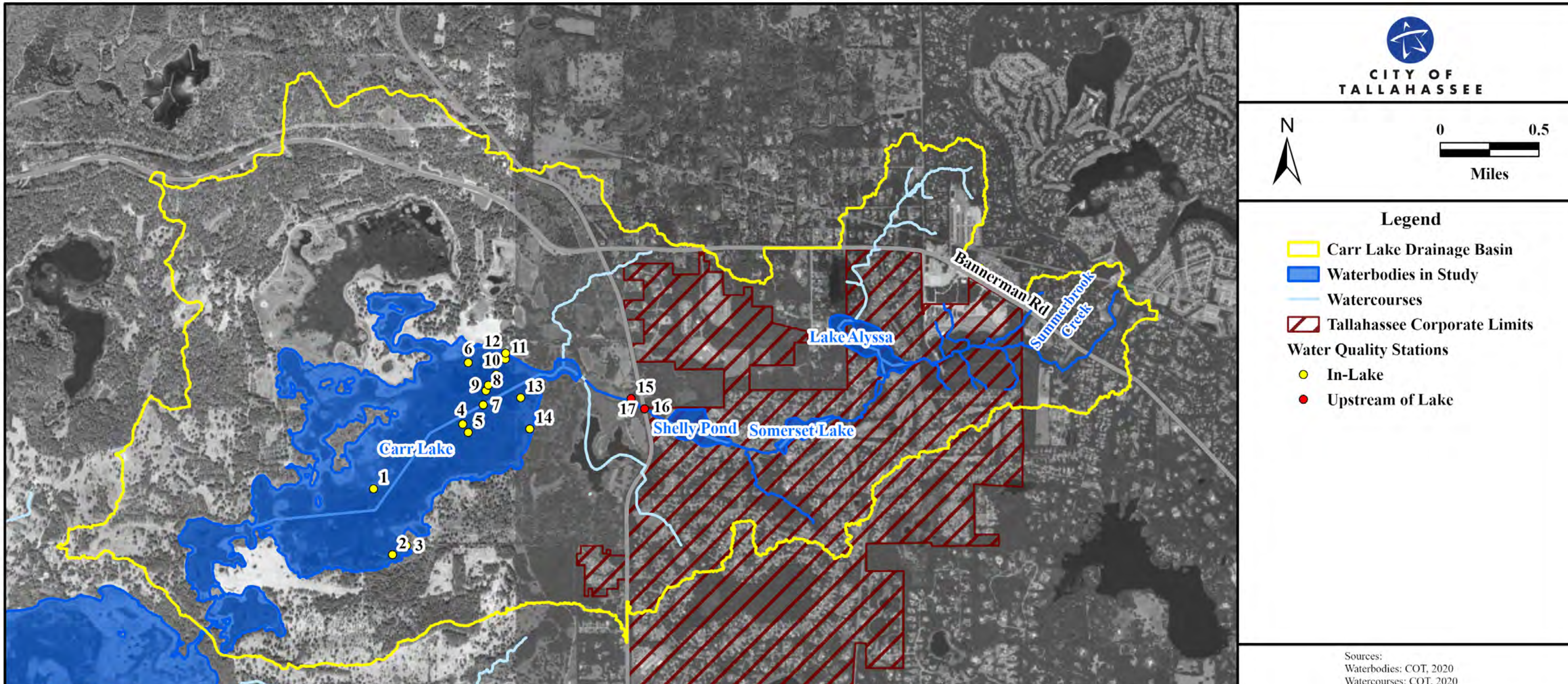

Number	StationID	StationName	Start of Record	End of Record	Source	Location
1	21FLKWATLEO-CARR-3	LEO-CARR-3	2005	2005	FL LAKEWATCH	In-Lake
2	21FLGW 9235	NWA-LL-1006 CARR LAKE	2000	2000	FDEP	In-Lake
3	21FLWQA 303355708417470	Carr Lake at Gardner Rd boat landing	2001	2001	FDEP	In-Lake
4	21FLGW 22100	NW1-LL-2007 CARR LAKE	2004	2004	FDEP	In-Lake
5	21FLKWATLEO-CARR-2	LEO-CARR-2	2005	2005	FL LAKEWATCH	In-Lake
6	21FLLEONLCCA13057984291	Carr Lake	2006	2017	Leon County	In-Lake
7	21FLWQSP22100	Lake Carr	2007	2008	FDEP	In-Lake
8	21FLKWATLEO-CARR-1	LEO-CARR-1	2005	2005	FL LAKEWATCH	In-Lake
9	21FLLEONLCCA23057784289	Carr Lake, middle of Lake	2011	2019	Leon County	In-Lake
10	21FLMCGLCA1	Lake Carr, middle of lake	2000	2006	McGlynn Lab	In-Lake
11	21FLBRA 582B-A	582B - Lake Jackson Outlet - 30m S of Cedar Hill boat ramp	2006	2007	Biological Research Associates	In-Lake
12	21FLWQA 303446708417165	Carr Lake at Cedar Hill Rd boat landing	2001	2006	FDEP	In-Lake
13	21FLBRA 582B-C	582B - Lake Jackson Outlet - 400m S of dock	2006	2007	Biological Research Associates	In-Lake
14	21FLWQSPLEO116NL	Carr Lake (WBID 582)	2005	2006	FDEP	In-Lake
15	21FLBRA 582B-B	582B - Lake Jackson Outlet - at Orchard plantation	2006	2006	Biological Research Associates	Upstream
16	21FLPNS 303431908416340	Summer Creek At Meridian Rd (SR 155)	2011	2011	FDEP	Upstream
17	21FLWQA 303431908416340	Summer Creek at Meridian Rd (SR 155)	2001	2006	FDEP	Upstream

Sources:
Waterbodies: COT, 2020
Watercourses: COT, 2020
Drainage Basins: COT, 2020
Roads: COT-Leon County, 2023
City Limits: COT, 2020
WQ Stations: FDEP, 2022

Figure 4-44:
Carr Lake Water Quality Station Locations

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Figure 4-45 through **Figure 4-47** present plots of the measured TN, TP, and Chl-a data from 2010 to 2020. All three parameters show similar slight downward trends from 2010 to 2020. Additionally, the concentrations of all three parameters are low indicating a relatively pristine lake. Qualitative evaluation of historical nutrient data shows that the lake has not changed significantly over the period of record.

Under FDEP's NNC, Carr Lake is defined as a low color, low alkalinity system. Based on this designation, the AGM threshold for Chl-a is 6 µg/L. For TN and TP, a range of concentrations are allowable, based on maintaining Chl-a levels in the lake below 6 µg/L. For TN, the range is 0.51 mg/L to 0.93 mg/L. For TP, the range is 0.01 mg/L to 0.03 mg/L. For *E. coli*, the criteria are monthly geometric means below 126 colonies per 100 mL of water and less than 10 percent of samples above 410 colonies per 100 mL of water in any 30-day period.

TN, TP, and Chl-a AGMs are plotted in **Figure 4-48** through **Figure 4-50,** as these define the status of the lake relative to nutrient impairments. Where sufficient data are available to assess the AGMs, the levels are provided from 2010 through 2020. For Chl-a, only data with corrected Chl-a are provided. The Chl-a threshold and the minimum and maximum thresholds for TN and TP relative to the NNC are provided on each of the graphs as pink dashed lines. **Figure 4-51** presents a plot of calculated TSI values in the lake. While TSI is no longer utilized for the determination of impairment, it does serve as an indicator of lake health. Based on TSI definitions, levels below 60 are deemed good condition, levels between 60 and 70 indicate fair condition while levels above 70 indicate poor condition. **Figure 4-52** presents plots of *E. coli* data for the available period of record.

Examination of the TN plot (**Figure 4-48)** shows that between 2010 and 2020, the TN AGMs were all below the minimum threshold. TP AGM levels (**Figure 4-49**) have fallen between the minimum and maximum threshold values in a number of years and below the minimum threshold for other years. **Figure 4-50** presents the Chl-a AGMs from 2010 through 2020. At no time during this period of record did the Chl-a AGM go above the threshold 6 µg/L. Based on the rainfall record shown in **Section 4.4.3.6**, 2011 was a low rainfall year, as was 2015, which also had higher Chl-a levels. These patterns may reflect the effects of residence time on Chl-a levels. Examination of the TSI plot **(Figure 4-51**) shows that the lake is well below the threshold, with a general downward trend as was seen for the TN, TP, and Chl-a. This further supports the findings from the Chl-a measurements that the lake is not presently exhibiting nutrient enrichment.

Figure 4-52 present a plot of measured *E. coli* levels in the lake from 2014 through 2020. The data all show very low values, with most at below detection limits and well below the 410 MPN/100 mL threshold.

4.5.3.7 Groundwater Data

Figure 4-53 presents the surficial aquifer groundwater sampling wells within and adjacent to the Carr Lake basin. Station AAA0282 is located along the shoreline of Carr Lake and serves as a source of data on surficial groundwater quality in the immediate shoreline area. Data for this station is only available from 1993 to 1997, but given the limited development in the area, may be representative of surficial aquifer water quality conditions today.

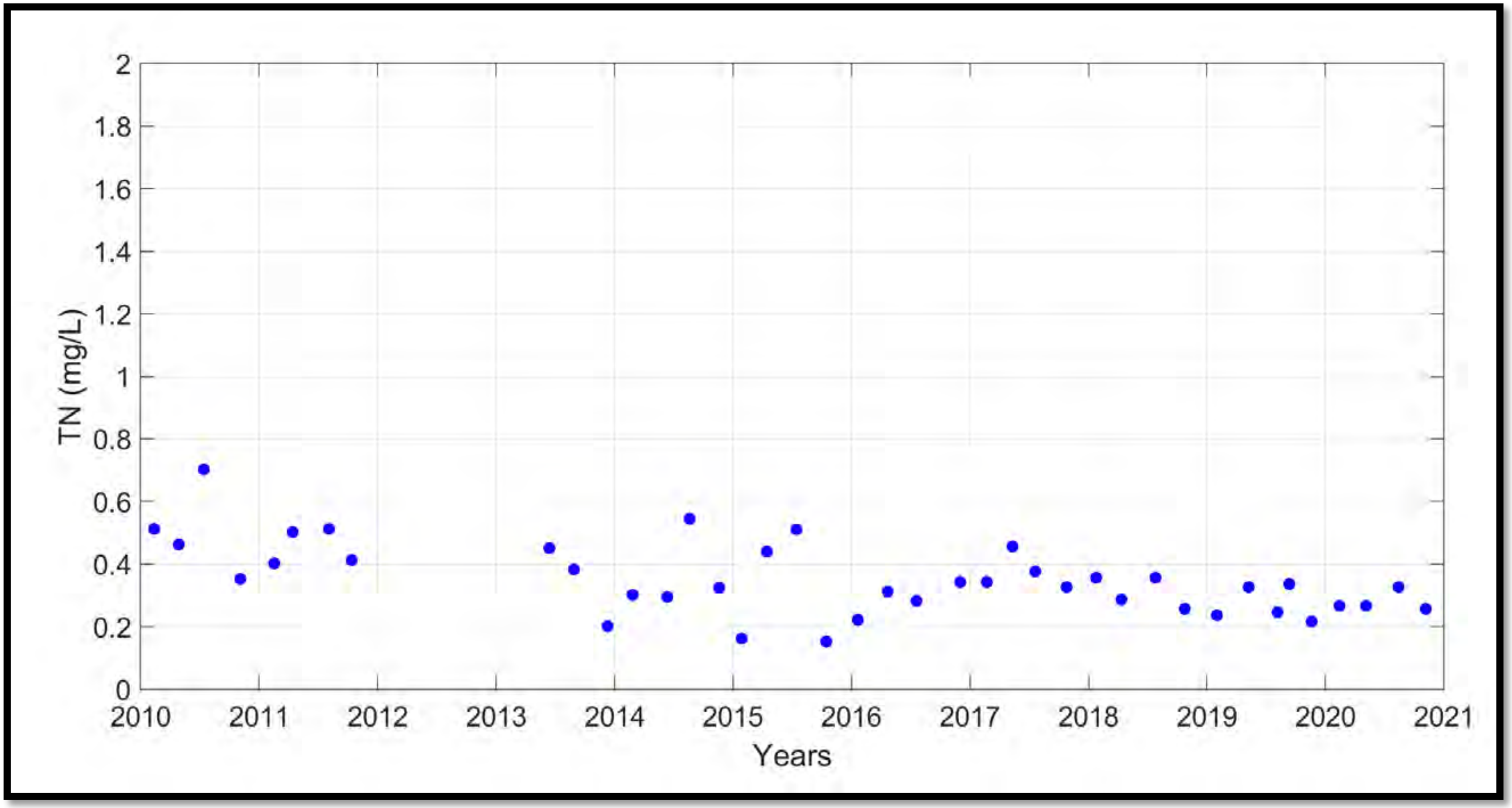


Figure 4-45: Plot of Measured TN

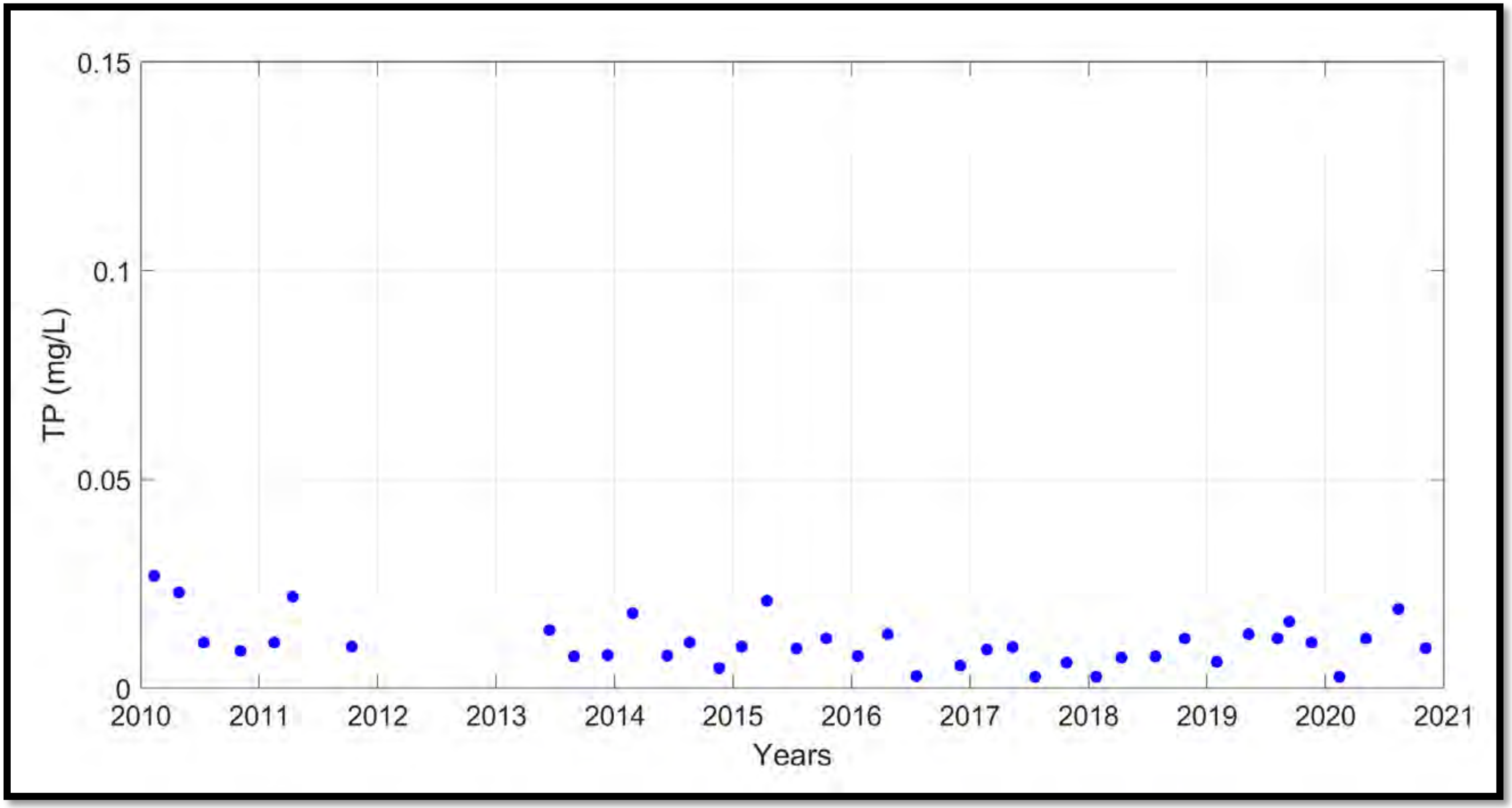


Figure 4-46: Plot of Measured TP

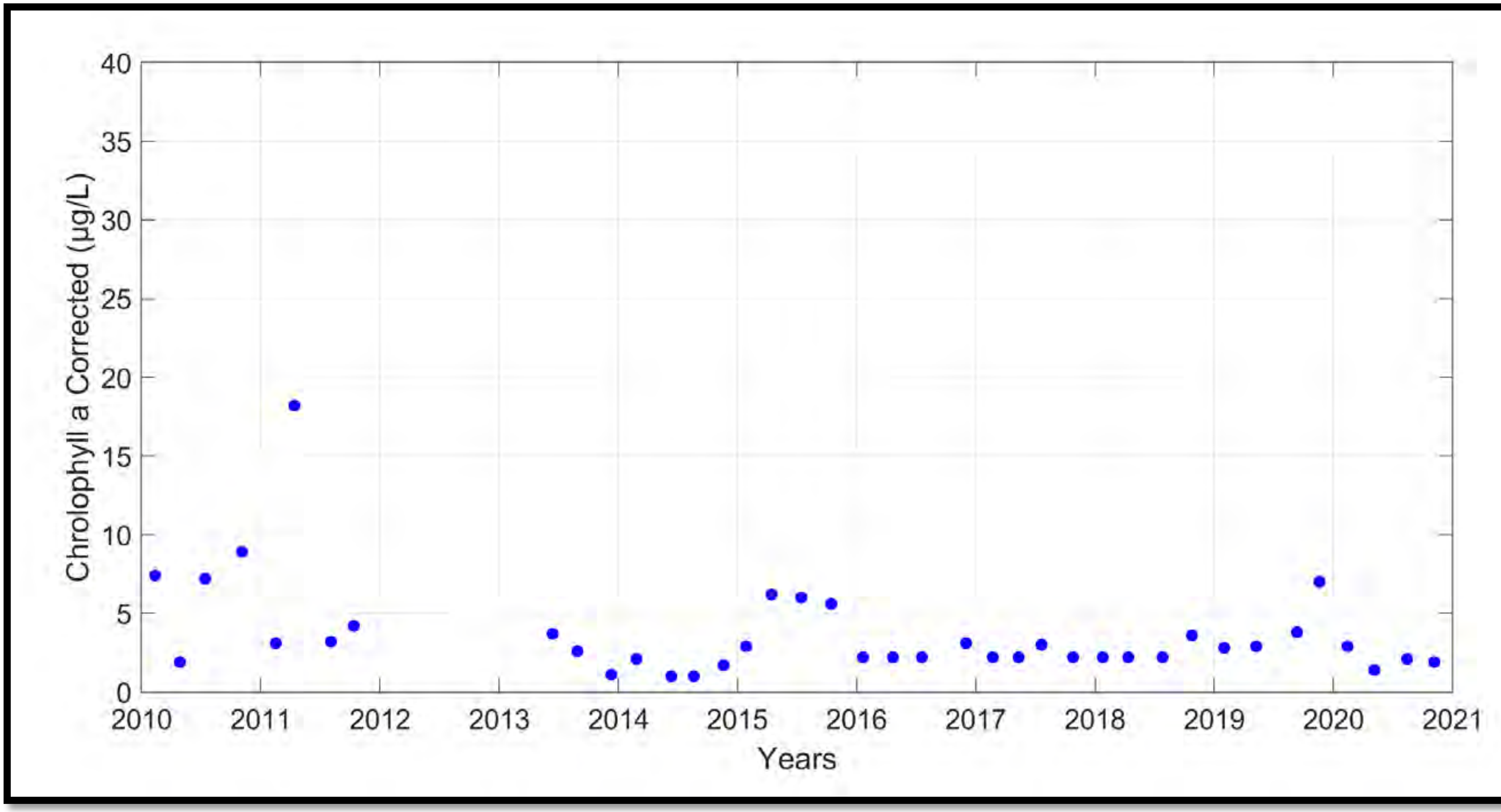


Figure 4-47: Plot of Measured Chl-a

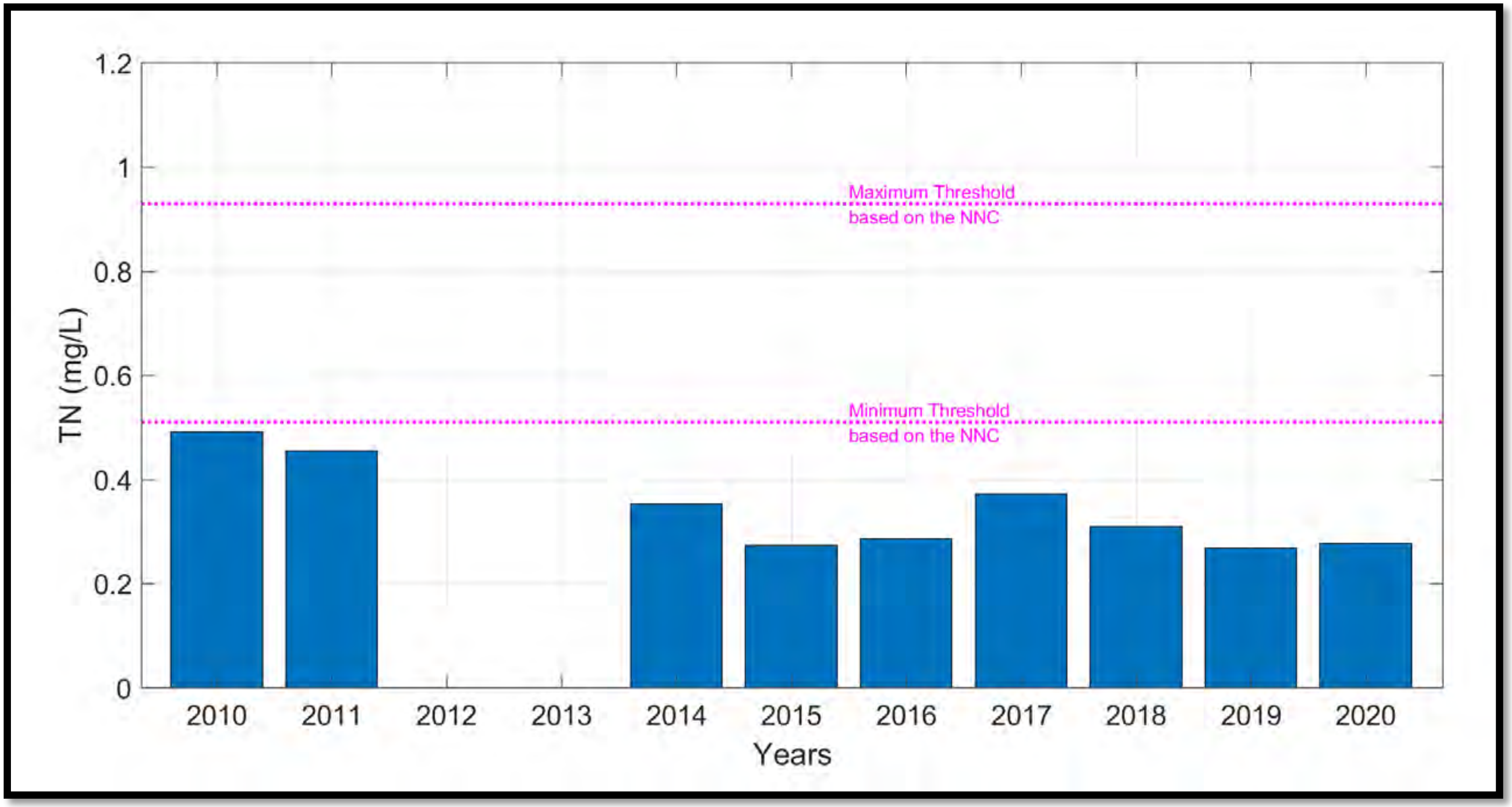


Figure 4-48: Plot of Annual Geometric Means for TN with NNC Criteria for Carr Lake

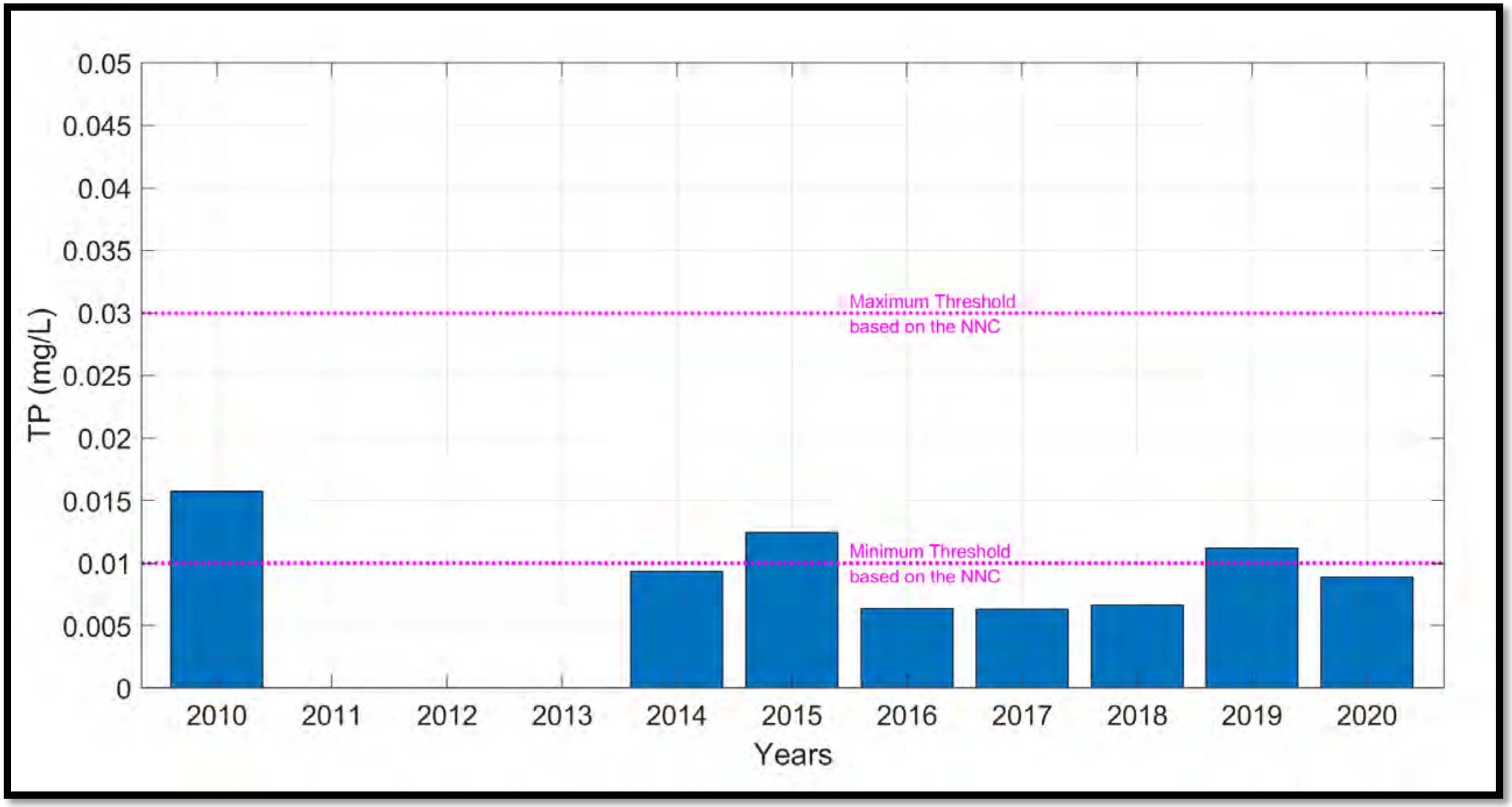


Figure 4-49: Plot of Annual Geometric Means for TP with NNC Criteria for Carr Lake

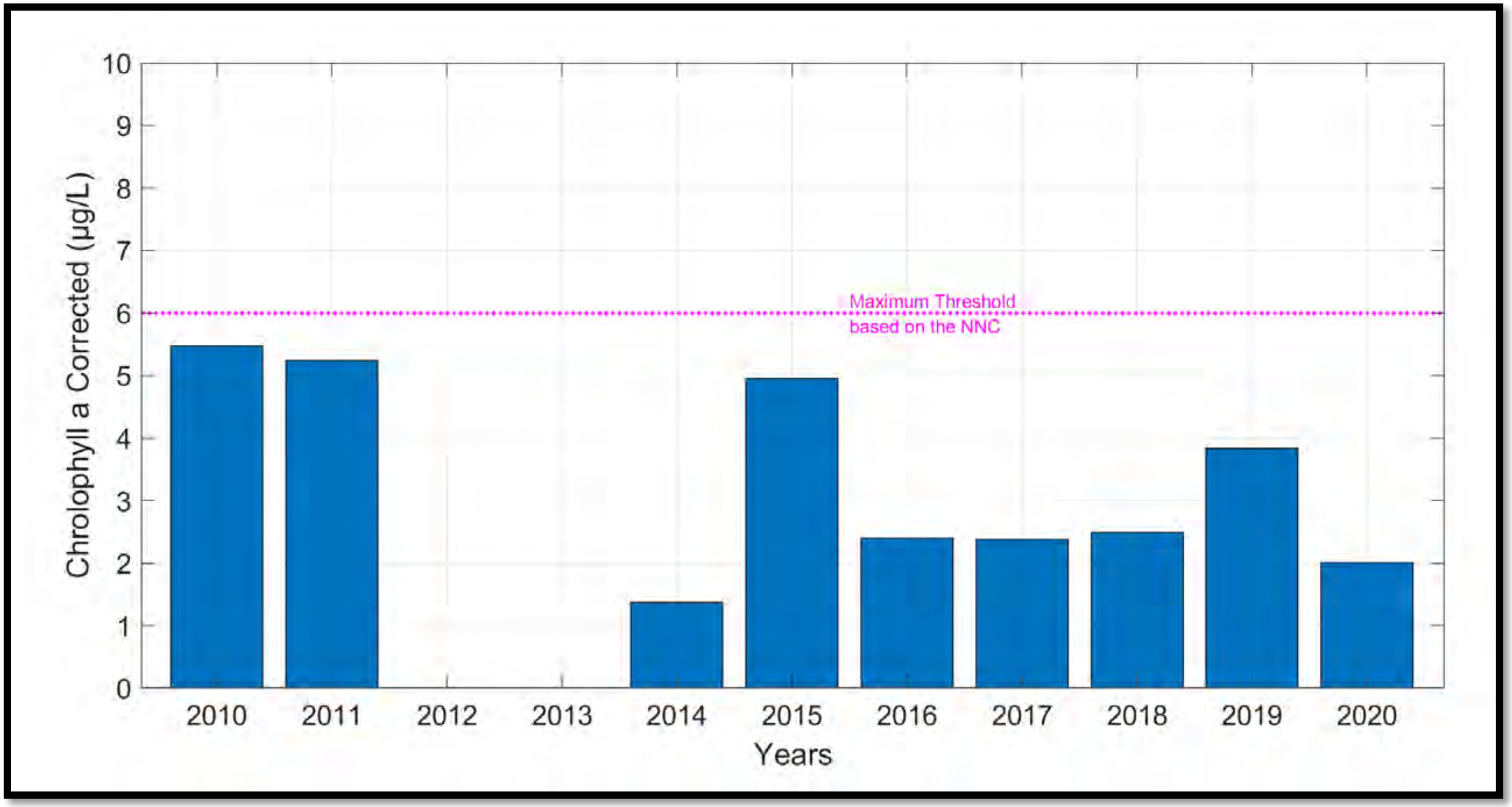


Figure 4-50: Plot of Annual Geometric Means for Chl-a with NNC Criteria for Carr Lake

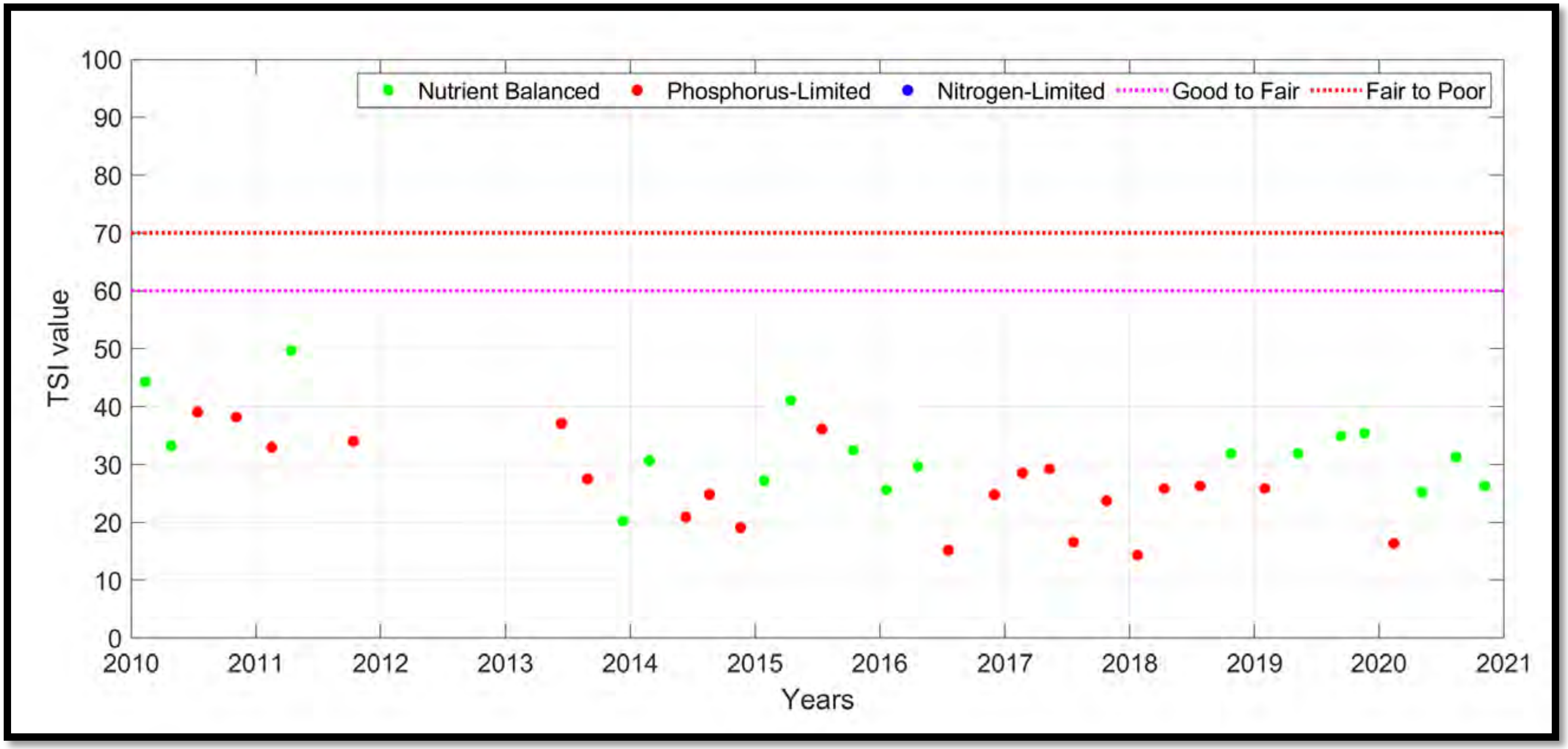


Figure 4-51: Trophic State Index for Carr Lake

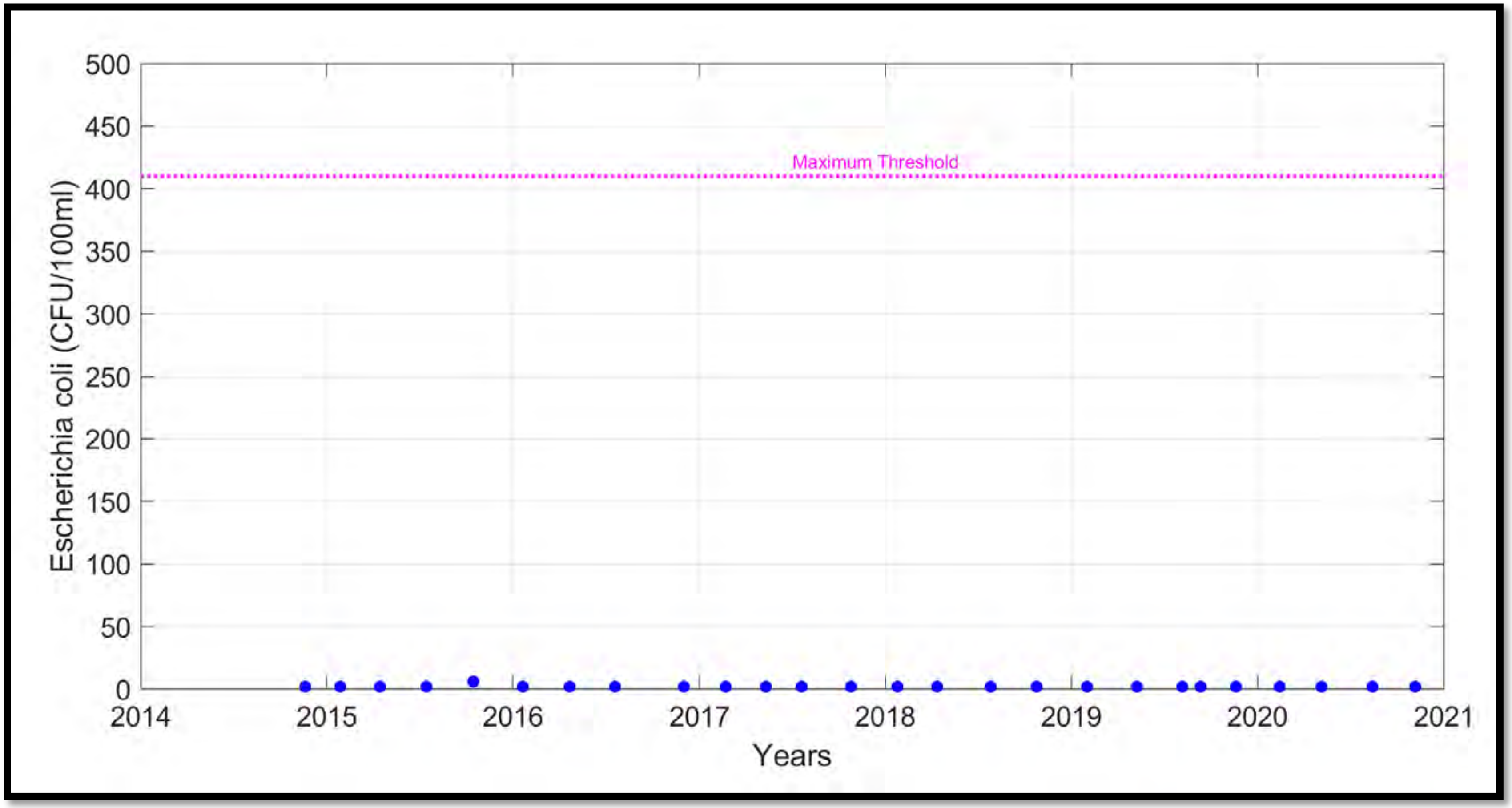
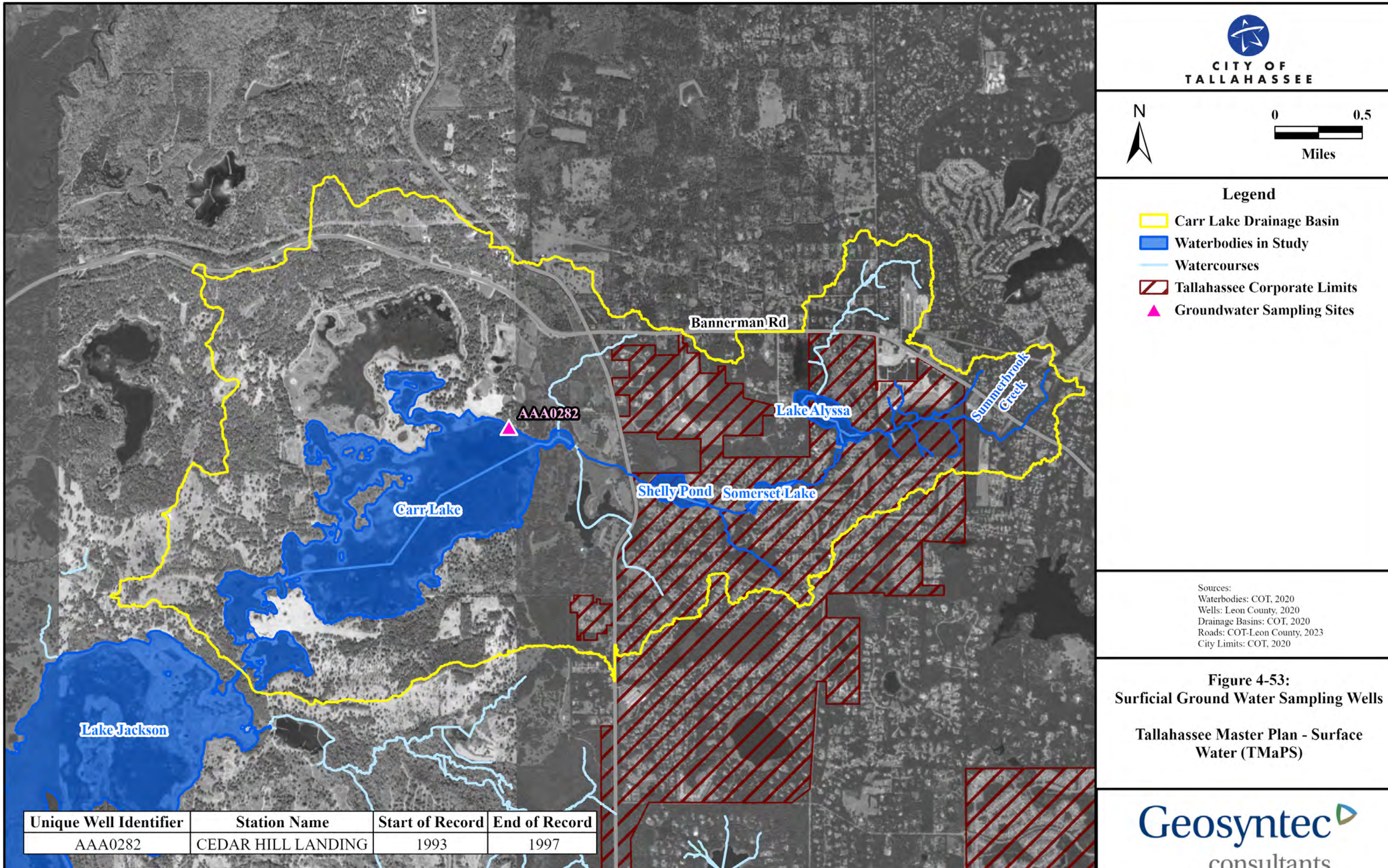


Figure 4-52: Plot of *E. coli* Measurements (2014 to 2020)



Unique Well Identifier	Station Name	Start of Record	End of Record
AAA0282	CEDAR HILL LANDING	1993	1997

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Sources:
Waterbodies: COT, 2020
Wells: Leon County, 2020
Drainage Basins: COT, 2020
Roads: COT-Leon County, 2023
City Limits: COT, 2020

Figure 4-53:
Surficial Ground Water Sampling Wells

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4.5.3.8 Biological Data

Table 4-14 presents LVI data collected by Leon County and FDEP between 20107 and 2019. The data show a range of from 53 up to 71, reflecting healthy conditions in the lake. Overall, the LVI values have improved, with some values below 60 prior to 2011 and all scores above 65 after 2016.

Table 4-14: Summary of LVI Data for Carr Lake

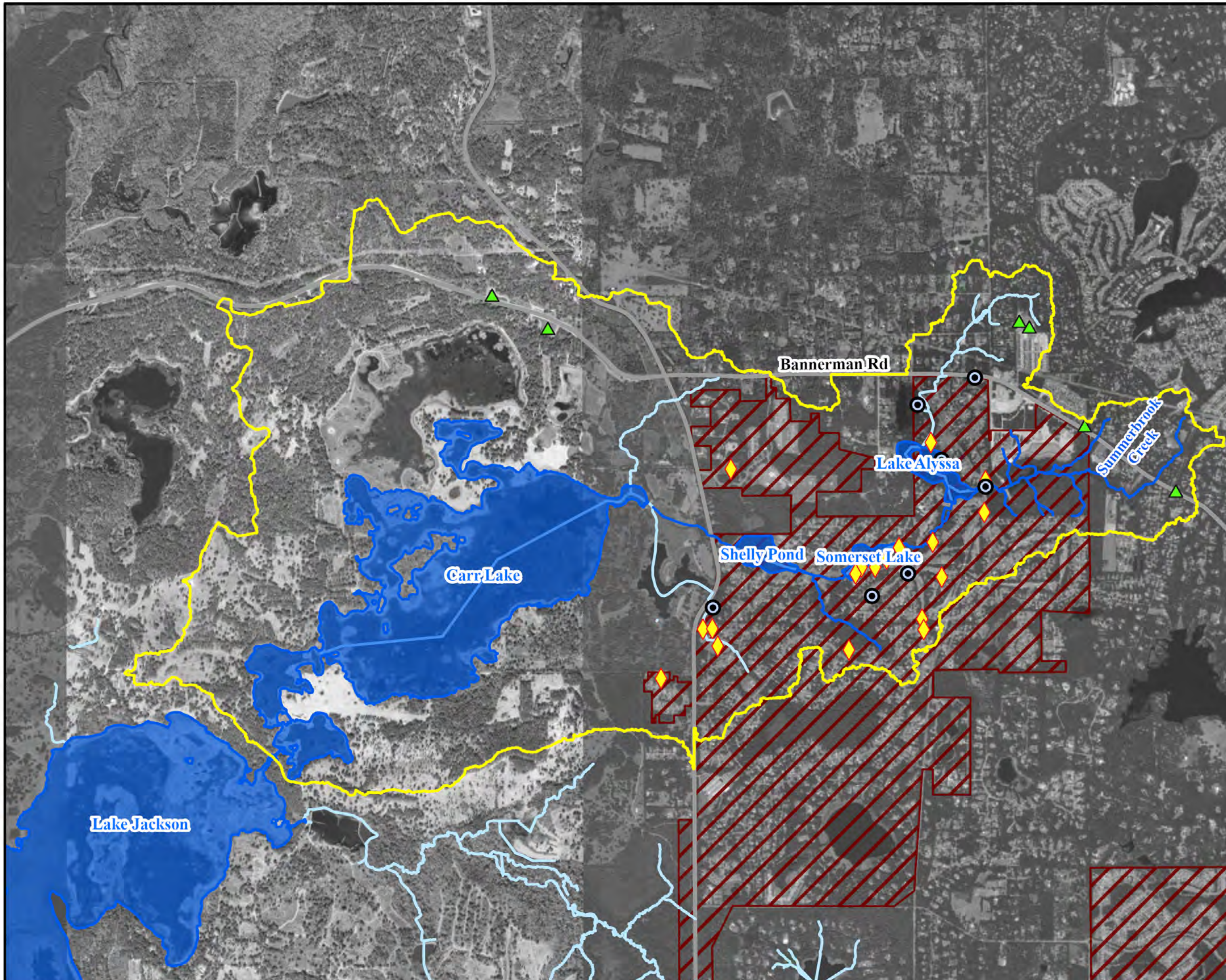
Date	Station ID	LVI	Aquatic Life Use Category
9/3/2010	21FLLEONLEONLVI0	59	Healthy
8/30/2013	21FLLEONLEONLVI0	69	Healthy
9/30/2014	21FLLEONLEONLVI0	70	Healthy
10/12/2015	21FLLEONLEONLVI0	68	Healthy
8/4/2016	21FLLEONLEONLVI0	64	Healthy
6/1/2017	21FLGW22100	68	Healthy
6/15/2017	21FLGW22100	66	Healthy
6/15/2017	21FLGW22100	71	Healthy
6/26/2014	21FLGW22100	65	Healthy
7/23/2018	21FLLEONLEONLVI0	68	Healthy
7/25/2019	21FLLEONLEONLVI0	65	Healthy

4.5.3.9 Stormwater Treatment Facilities

In assessing potential sources of pollutants to Carr Lake, and ultimately for targeting loads and reductions, it is important to identify treatment facilities adjacent to and along tributaries flowing into the lake. **Figure 4-54** presents a map showing the locations of stormwater treatment facilities throughout the Carr Lake subbasin. These are maintained by Leon County, the City, and private neighborhoods. Only three facilities are located west of Meridian Road. These include two along the newly constructed Orchard Pond Parkway maintained by Leon County and one serving the Cortona Hills neighborhood maintained by the City. A total of 23 facilities are located east of Meridian Road, with the largest number within the Ox Bottom and Summerbrooke neighborhoods. These are maintained by the City or the local neighborhood Homeowner Associations (HOAs). Four facilities are located along and north of Bannerman Road, which are maintained by Leon County or the local neighborhood HOAs.

4.5.3.10 Atmospheric Deposition Data

Section 4.4.3.11 presented the location of the nearest atmospheric deposition station to Carr Lake. This is the same station that was utilized in the Lake Jackson calculations.



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Legend

- Carr Lake Drainage Basin
- Waterbodies in Study
- Watercourses
- Tallahassee Corporate Limits
- Stormwater Ponds (Other)
- City of Tallahassee Stormwater Ponds
- Leon County Stormwater Ponds

Sources:
Waterbodies: COT, 2020
Watersheds: COT, 2020
Roads: COT-Leon County, 2023
BMPs: Geosyntec, 2022
City Limits: COT, 2020

Figure 4-54:
BMPs in Carr Lake Drainage Basin

Tallahassee Master Plan - Surface Water (TMaPS)

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4.5.3.11 Data Summary

For the purposes of the qualitative analysis of sources of pollutants to Carr Lake (**Section 4.5.4**), the available data are reasonable. There are sufficient active surface water quality stations within the lake to support the qualitative assessment. The water quality conditions in the lake limit the need for additional data. Based on the relatively pristine water quality, it is assumed anthropogenic loads are minimal. The following outlines some limitations in the available data. Specific recommendations on additional data collection efforts are provided in **Section 4.11**.

- Data are not available for the flow in the primary tributary entering the northern end of Carr Lake which drains the Summerbrook basin.
- Water quality data in the primary tributary from the Summerbrook basin is old (pre-2010).

4.5.4 Qualitative Assessment of Sources

As outlined in **Section 4.4.4** for Lake Jackson, prior to performing loading calculations and other analyses to quantify existing pollutant sources to Carr Lake, it is important to analyze available data and summarize findings from historical studies to support identification of likely sources and quantification of the magnitude of impact.

For Carr Lake, the sources to be evaluated include the following:

- Stormwater runoff
- Septic systems
- Interconnected flows
- Internal recycling and seepage
- Wastewater
- Atmospheric deposition

An overview of analyses and findings for each source listed above is provided in the following sections. Prior to the discussions of each of the potential sources, an in-lake analysis is provided to build on the information presented in **Section 4.5.3.6.** Following the discussions for each source type, a summary of findings for the qualitative assessment is provided.

4.5.4.1 In-Lake Water Quality

Following the methodology utilized for Lake Jackson in **Section 4.4.4.1**, analyses were conducted on the available in-lake data from 2010 to the present. This provides an evaluation of the baseline water quality conditions. The parameters analyzed for Carr Lake include color, alkalinity, TP, TN, Chl-a, TSI, and *E. coli*.

As was done for Lake Jackson (**Section 4.4.4.1**), stations were clustered where they represent conditions within a specific area, and all stations with data after 2010 were assigned to a specific cluster. The clustered data from 2010 to the present were analyzed to provide the average of the annual geomeans or the 90th percentile, depending upon the parameter. The results are presented on a map, with colors representing the results. The levels associated with the colors are reflective of water quality thresholds as outlined in 62-302 F.A.C. and are discussed and presented in **Section 4.4.4.1**. The Carr Lake analyses use the same ranges as the Lake Jackson analyses.

Figure 4-55 presents the data clustering used for the analyses and associated stations. For Carr Lake, data since 2010 were only available in one general location, which is at the northern end of the lake near the boat ramp. Therefore, a single cluster was analyzed. As such, the spatial comparisons discussed for Lake Jackson are not provided, rather the results from the single cluster are discussed against the thresholds.

Figure 4-56 and **Figure 4-57** present the color and alkalinity. Both are low, indicating the lake is a clear, low alkaline system with the associated criteria.

Figure 4-58 and **Figure 4-59** present the TN and TP. For all of the parameters, the nutrient levels in the northern portion of the lake are low. TN levels are below the minimum lake threshold while TP levels are just above the minimum threshold. It should be noted that the upper portion of the lake contains the discharge from the Summerbrook Creek Drainage Basin. The Summerbrook Creek Drainage Basin has higher levels of development and septic systems than the immediate drainage basin of Carr Lake, west of Meridian Road. The Summerbrook Creek Drainage Basin is discussed in greater detail in **Section 4.6.**

Figure 4-60 and **Figure 4-61** present maps of the Chl-a and TSI. The Chl-a levels on average are low, between 3 and 4 µg/L. The TSI values are within the lowest segment between 0 and 15, identifying the system as Oligotrophic, with very low nutrient levels.

Figure 4-62 presents a map of the *E. coli* levels. The data analyzed are from 2014 through 2020 and the data were analyzed to provide the 90th percentile to compare against the 410 MPN/100 mL criteria per the FDEP approach in the IWR analyses. The results show that the 90th percentile for the data are well within the criteria in the lowest blue range (less than 100 MPN/100 mL).

4.5.4.2 Stormwater Runoff

To assess stormwater runoff as a potential source of pollutant loads to Carr Lake, the first step was to evaluate the LDI levels within the subbasins draining to the lake. In **Section 4.4.4.2**, LDI values were presented by subbasin in **Figure 4-24**. The map showed that in the immediate watershed area surrounding Carr Lake (west of Meridian Road), LDI levels were excellent. This would indicate that this area has limited potential for anthropogenic pollutant loads from stormwater runoff. Within the Summerbrook Creek Drainage Basin (east of Meridian Road), the levels were moderate, indicating higher potential for anthropogenic pollutant loads from stormwater runoff. The next section (**Section 4.6**) provides a detailed evaluation of the Summerbrook Creek subbasin and its potential for stormwater pollutant loading. This includes analyses of data along Summerbrook Creek upstream of the discharge into Carr Lake.

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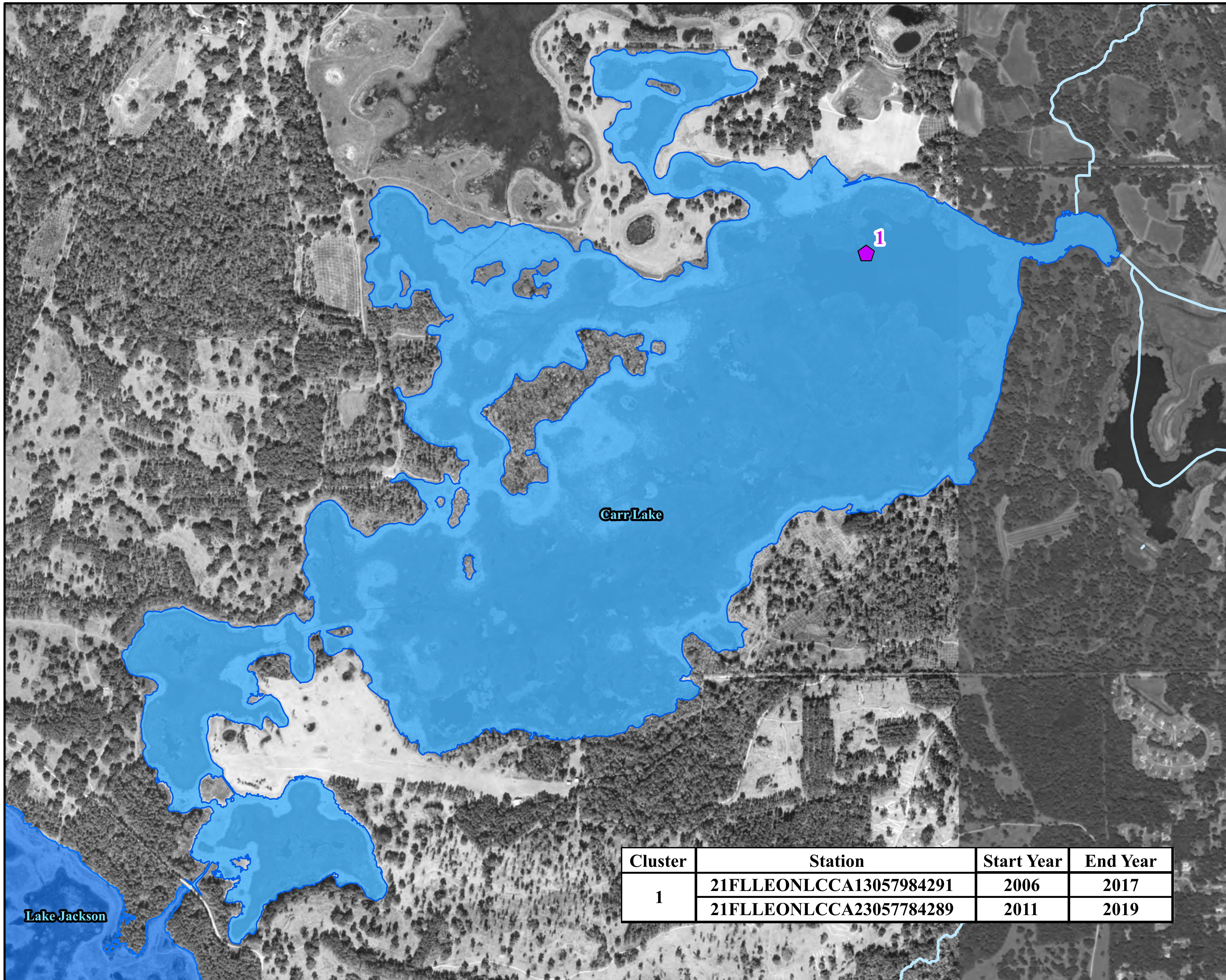

Cluster	Station	Start Year	End Year
1	21FLLEONLCCA13057984291	2006	2017
	21FLLEONLCCA23057784289	2011	2019

Legend

- Carr Lake
- Waterbodies in Study
- Watercourses
- In-Lake Station Cluster

Sources:
Waterbodies: COT, 2020
Watercourses: COT, 2020
Roads: COT-Leon County, 2023
Station Data: FDEP, 2021

Figure 4-55:
Station Clustering for In-Lake Spatial Analyses for Carr Lake

Tallahassee Master Plan - Surface Water (TMaPS)

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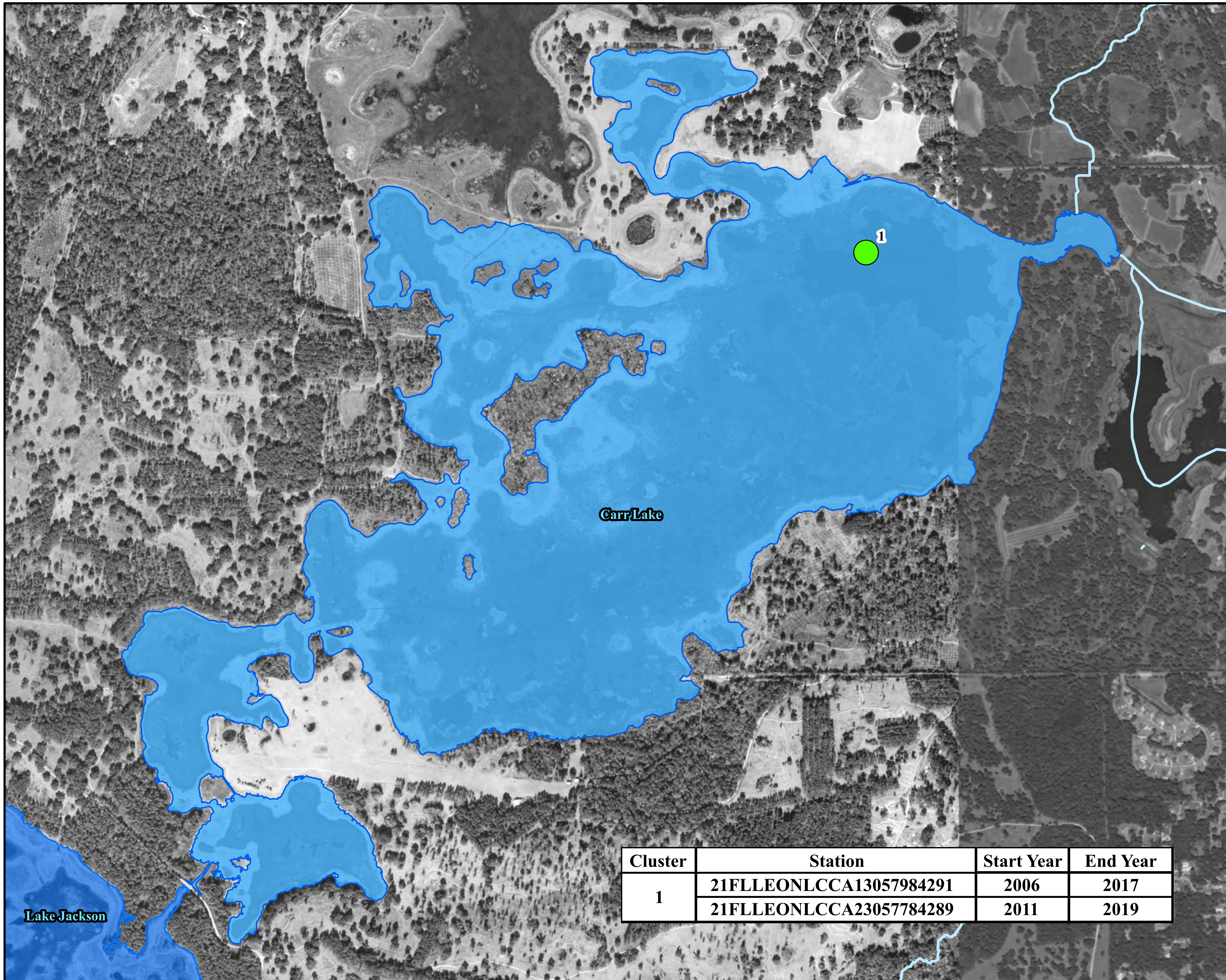


Cluster	Station	Start Year	End Year
1	21FLLEONLCCA13057984291	2006	2017
	21FLLEONLCCA23057784289	2011	2019

CITY OF TALLAHASSEE

N

0 0.2
Miles

Legend

- Carr Lake
- Waterbodies in Study
- Watercourses

Color Average 2010-2020

PCU

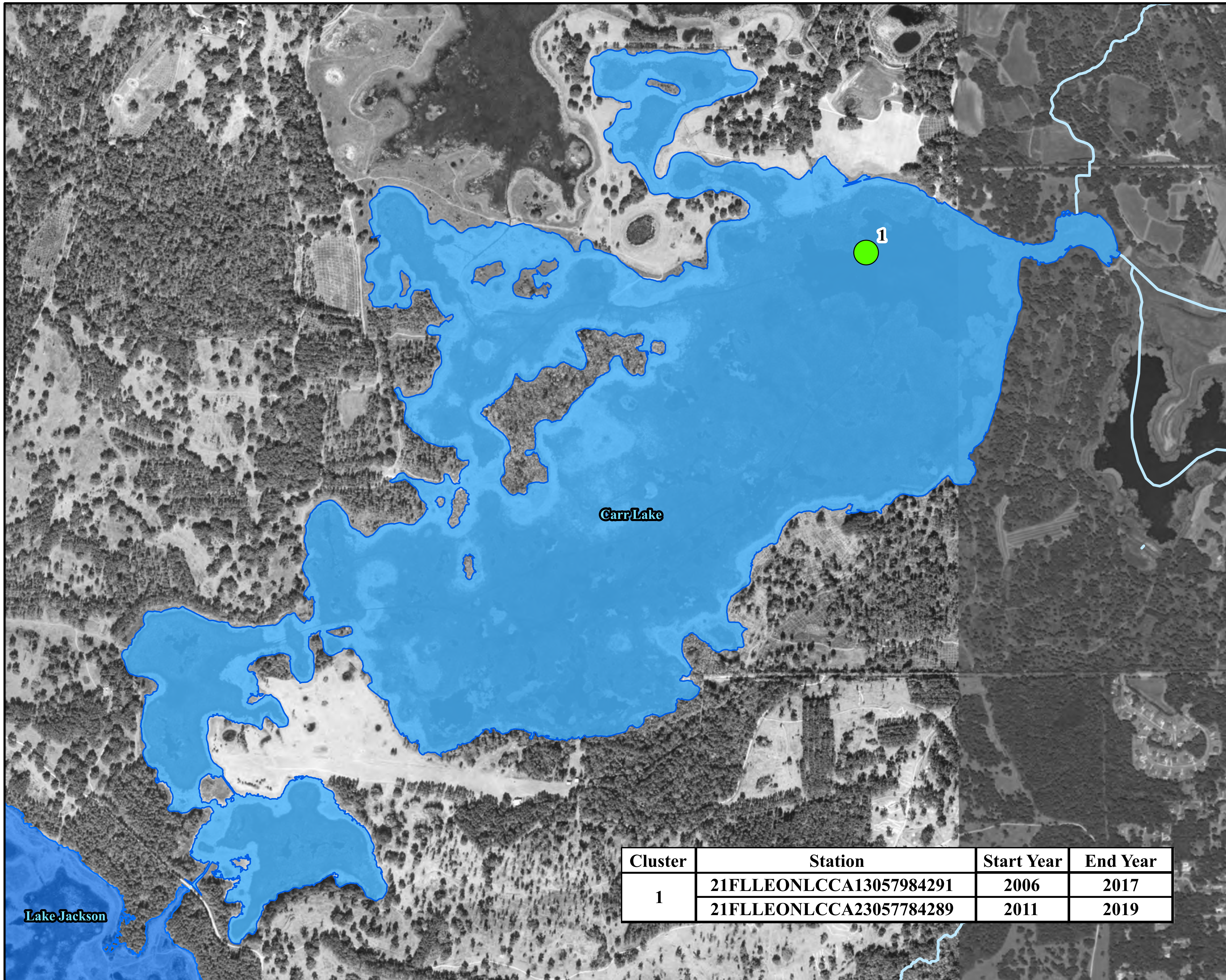
- 0 - 10
- 10 - 20
- 20 - 30
- 30 - 40
- > 40

Sources:
Waterbodies: COT, 2020
Watercourses: COT, 2020
Roads: COT-Leon County, 2023
Station Data: FDEP, 2021

Figure 4-56:
Spatial Assessment of Color in Carr Lake

Tallahassee Master Plan - Surface Water (TMaPS)

Geosyntec consultants

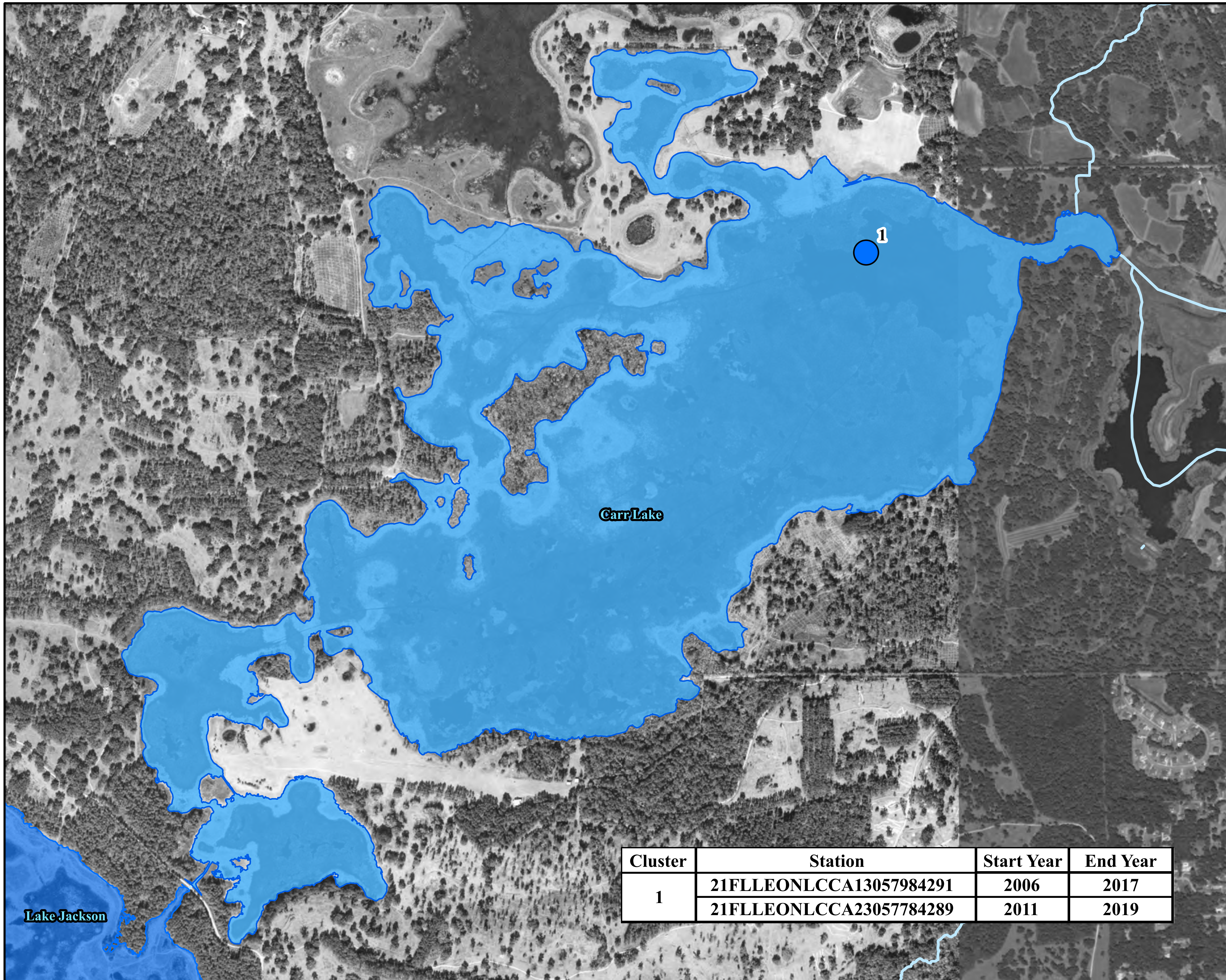


Cluster	Station	Start Year	End Year
1	21FLLEONLCCA13057984291	2006	2017
	21FLLEONLCCA23057784289	2011	2019

Figure 4-57:
Spatial Assessment of Alkalinity in Carr Lake

Tallahassee Master Plan - Surface Water (TMaPS)

Geosyntec consultants



Cluster	Station	Start Year	End Year
1	21FLLEONLCCA13057984291	2006	2017
	21FLLEONLCCA23057784289	2011	2019

CITY OF TALLAHASSEE

N

0 0.2

Miles

Legend

Carr Lake

Waterbodies in Study

Watercourses

TN Average 2010-2020

mg/L

0 - 0.53

0.53 - 0.66

0.66 - 0.79

0.79 - 0.93

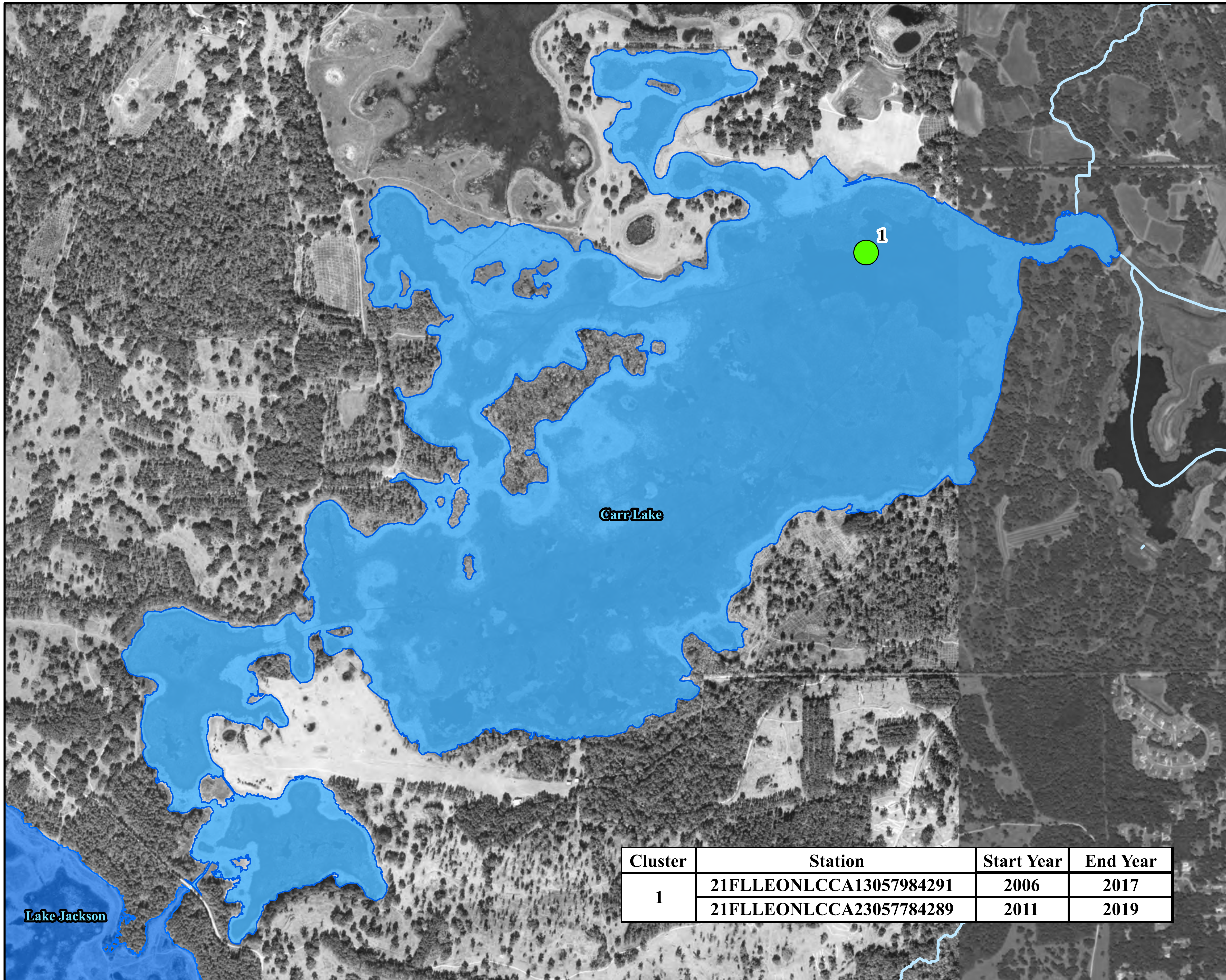
> 0.93

Sources:
Waterbodies: COT, 2020
Watercourses: COT, 2020
Roads: COT-Leon County, 2023
Station Data: FDEP, 2021

Figure 4-58:
Spatial Assessment of TN in Carr Lake

Tallahassee Master Plan - Surface Water (TMaPS)

Geosyntec consultants



CITY OF TALLAHASSEE

Legend

- Carr Lake
- Waterbodies in Study
- Watercourses

TP Average 2010-2020

mg/L

- 0- 0.010
- 0.010 - 0.017
- 0.017 - 0.024
- 0.024 - 0.030
- > 0.03

Cluster	Station	Start Year	End Year
1	21FLLEONLCCA13057984291	2006	2017
	21FLLEONLCCA23057784289	2011	2019

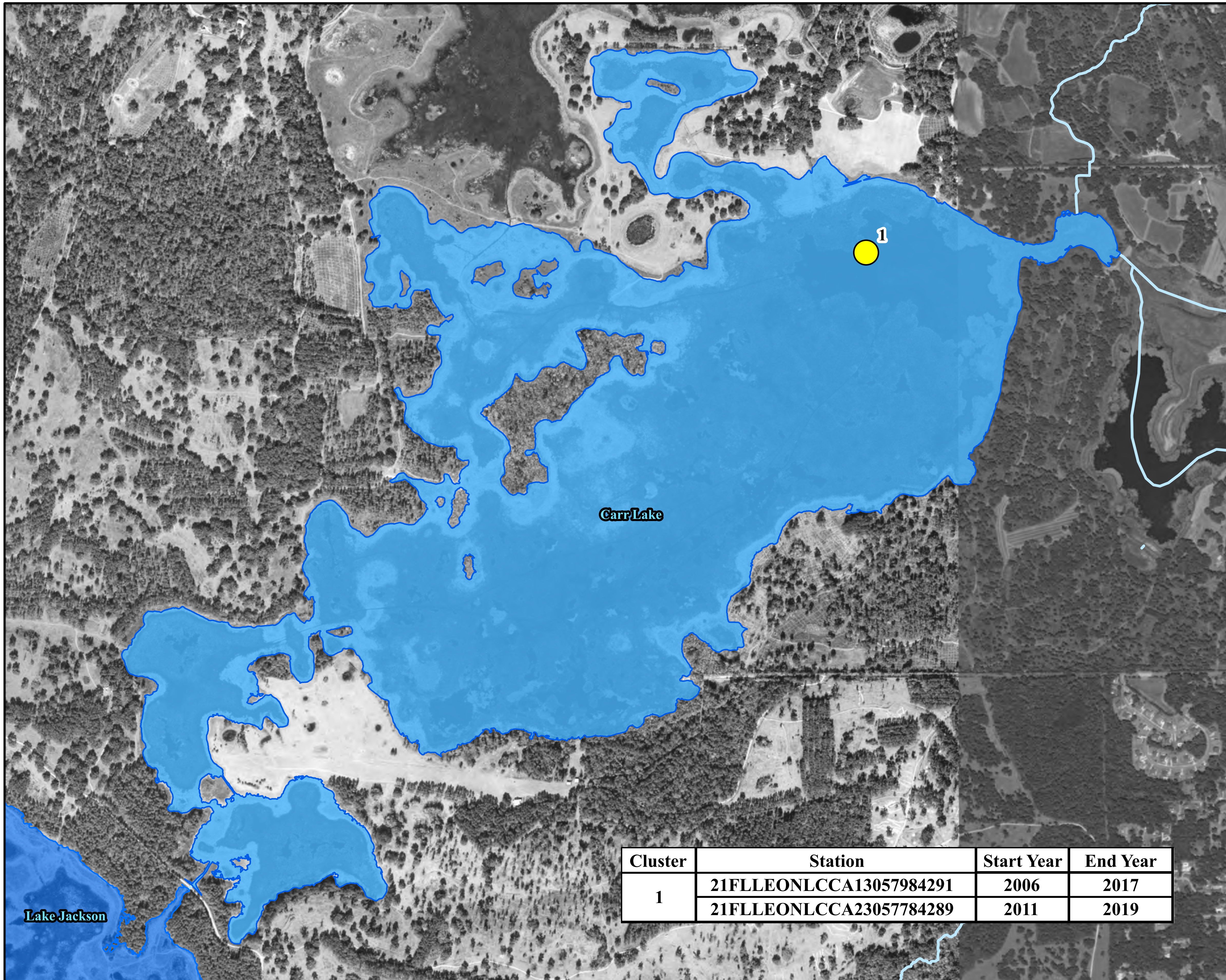
Sources:
Waterbodies: COT, 2020
Watercourses: COT, 2020
Roads: COT-Leon County, 2023
Station Data: FDEP, 2021

Figure 4-59:
Spatial Assessment of TP in Carr Lake

Tallahassee Master Plan - Surface Water (TMaPS)

Geosyntec consultants

CITY OF TALLAHASSEE



Cluster	Station	Start Year	End Year
1	21FLLEONLCCA13057984291	2006	2017
	21FLLEONLCCA23057784289	2011	2019

N

0 0.2

Miles

Legend

- Carr Lake
- Waterbodies in Study
- Watercourses

Chl a Average 2010-2020

µg/L

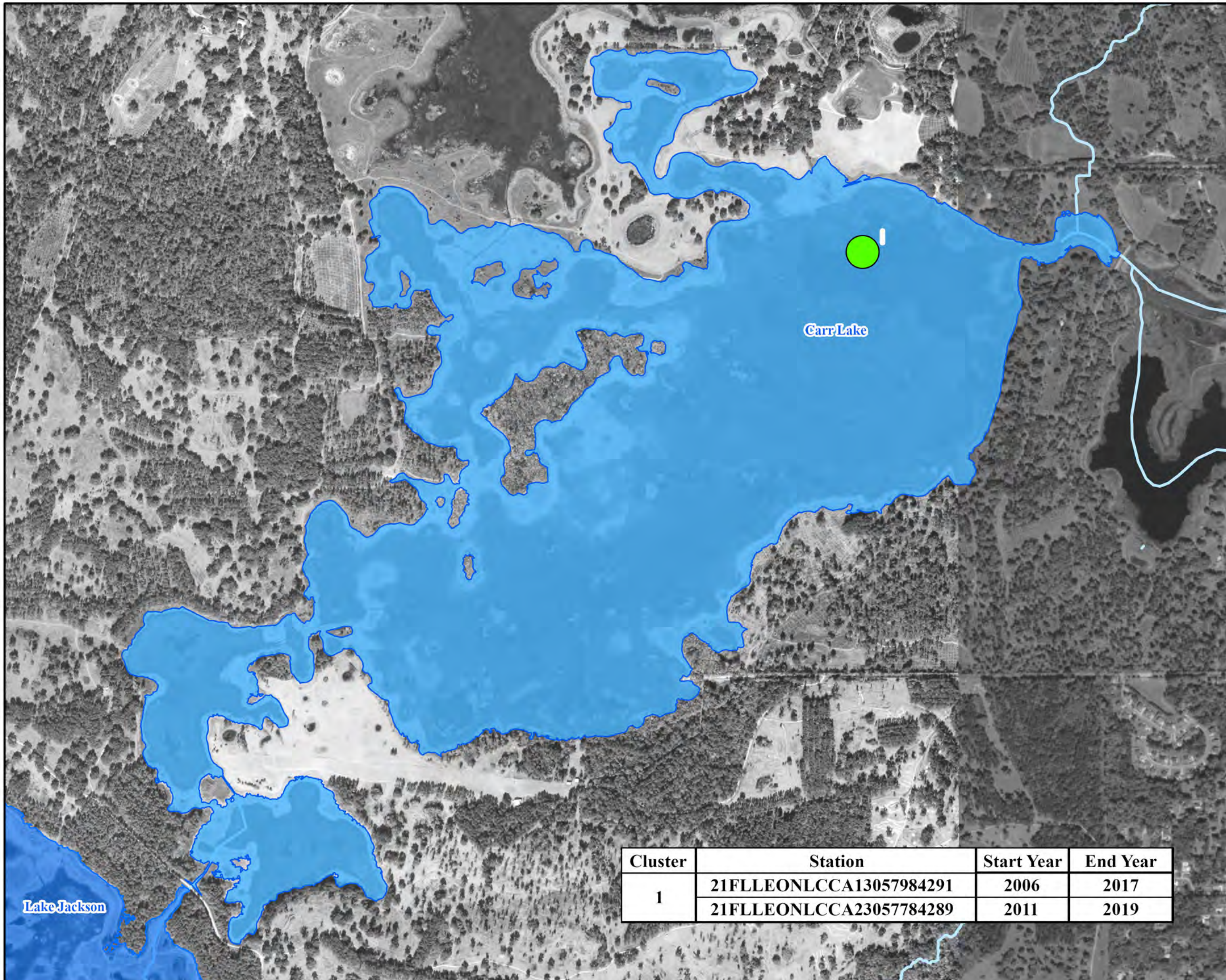
- 0.0 - 1.5
- 1.5 - 3.0
- 3.0 - 4.5
- 4.5- 6.0
- > 6

Sources:
Waterbodies: COT, 2020
Watercourses: COT, 2020
Roads: COT-Leon County, 2023
Station Data: FDEP, 2021

Figure 4-60:
Spatial Assessment of Chl a in Carr Lake

Tallahassee Master Plan - Surface Water (TMaPS)

Geosyntec consultants



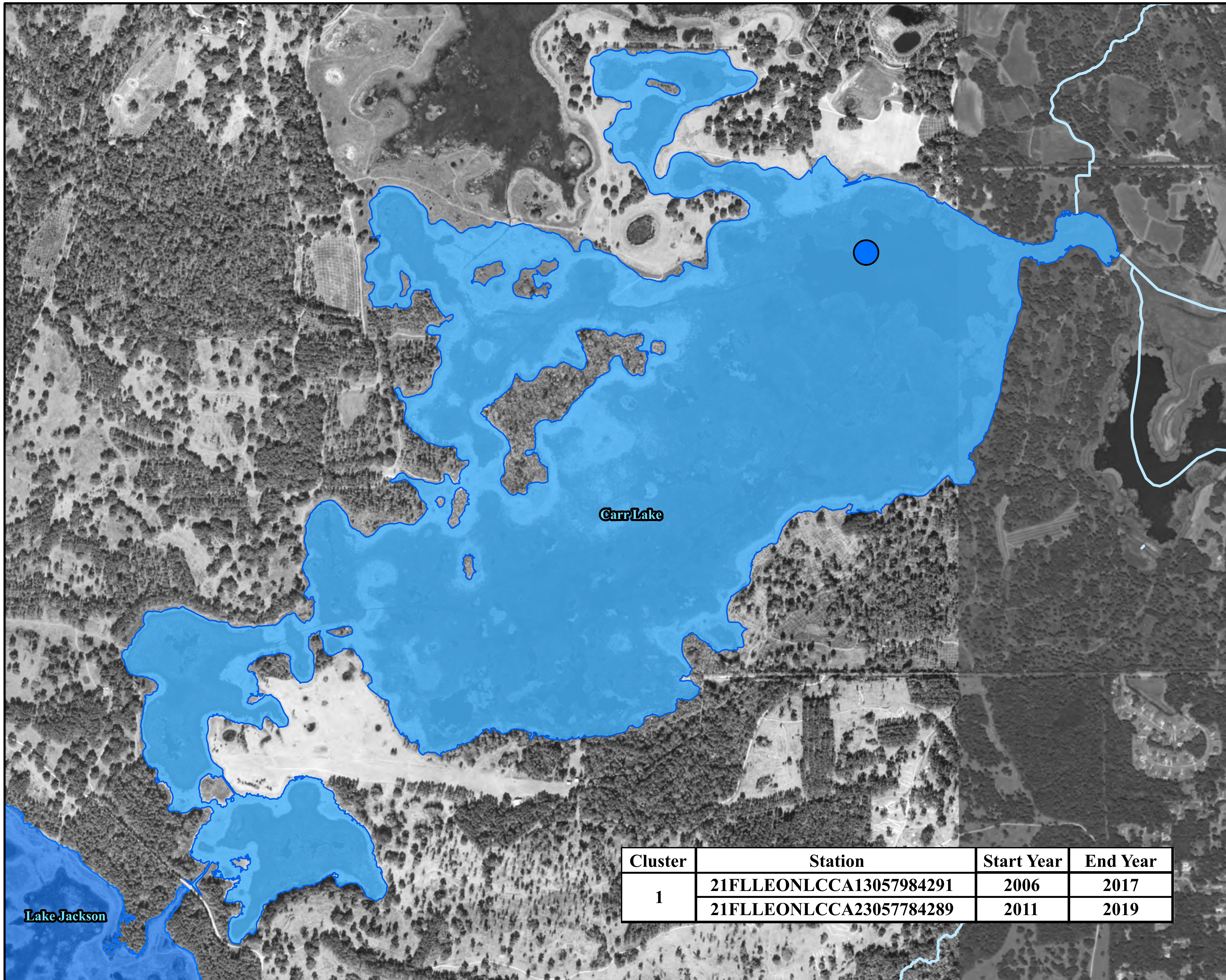
Cluster	Station	Start Year	End Year
1	21FLLEONLCCA13057984291	2006	2017
	21FLLEONLCCA23057784289	2011	2019

Sources:
Waterbodies: COT, 2020
Watercourses: COT, 2020
Roads: COT-Leon County, 2023
Station Data: FDEP, 2021

Figure 4-61:
Spatial Assessment of TSI in Carr Lake

Tallahassee Master Plan - Surface Water (TMaPS)

Geosyntec consultants



Cluster	Station	Start Year	End Year
1	21FLLEONLCCA13057984291	2006	2017
	21FLLEONLCCA23057784289	2011	2019

CITY OF TALLAHASSEE

N

0 0.2 Miles

Legend

Carr Lake
Waterbodies in Study
Watercourses

E. coli 90th Percentile 2010-2020

MPN/100mL

< 100
100 - 200
200 - 300
300 - 410
> 410

Sources:
Waterbodies: COT, 2020
Watercourses: COT, 2020
Roads: COT-Leon County, 2023
Station Data: FDEP, 2021

Figure 4-62:
Spatial Assessment of E. coli in Carr Lake

Tallahassee Master Plan - Surface Water (TMaPS)

Geosyntec consultants

4.5.4.3 Septic Systems

Figure 4-43 presented the locations of septic systems within the Carr Lake basin. **Figure 4-31** presented a map showing the septic tank densities by subbasin for the full Lake Jackson basin. As with the LDI values, the septic tank densities in the immediate Carr Lake basin are low. A total of five septic systems are within the immediate drainage area of the lake. There is a small cluster located in the southeast corner of the drainage area west of Meridian Road, which is part of the subbasin that drains to Holley Pond and not Carr Lake. Based on these analyses, the potential for septic loads from the areas west of Meridian Road would be deemed low. East of Meridian Road (within the Summerbrook Creek basin) is where the bulk of the septic systems are located. The septic density within this subbasin is higher, indicating a greater potential for load from this area. The septic loading in the Summerbrook Creek basin is addressed in more detail in **Section 4.6**.

4.5.4.4 Internal Recycling and Seepage

Internal Recycling

To date, no studies or data collection efforts have been undertaken to assess the potential for nutrient loading/recycling from sediments in Carr Lake. Given the good water quality, healthy biological conditions, and general pristine nature of the direct drainage areas to the lake, internal loading is not identified as a significant source of loading to the lake.

Seepage

As outlined in **Section 4.5.3.10** and presented in **Figure 4-53**, there was a single surficial aquifer sampling site within the Carr Lake basin. This station was located at the Cedar Hill Landing boat ramp park immediately adjacent to the northern end of Carr Lake. The data gathered at this location was from 1993 to 1997, with a total of three samples. The data did show some higher levels of ammonia (0.8 to 1.3 mg/L). Given the limited sample set, age, and location of the data, they were not considered representative of present conditions for seepage to Carr Lake.

4.5.4.5 Wastewater

No direct wastewater discharges are currently within the Carr Lake basin. Additionally, no areas in the Lake Jackson basin presently have reuse discharges. **Figure 4-32** presented a map of the Lake Jackson basin boundaries in relation to sewer service areas. There is no sewer infrastructure located in the immediate drainage basin for Carr Lake (west of Meridian Road). There is a small area in the southeast corner of the drainage area west of Meridian Road, but this infrastructure is within the subbasin for Holley Pond. East of Meridian Road, within the Summerbrook Creek basin, there is extensive sewer infrastructure. The potential for this infrastructure to contribute pollutant loads to Summerbrook Creek and, ultimately Carr Lake, is addressed in the discussion of the Summerbrook Creek basin (**Section 4.6.4.5**).

4.5.4.6 Atmospheric Deposition

For Carr Lake, the ratio of the watershed area to lake area is around 10:1. With this ratio, and the potential attenuation of rainfall runoff, direct atmospheric deposition to the lake can play a role in overall loading to the lake, especially for nitrogen. Atmospheric deposition will be accounted for both indirectly within stormwater runoff and directly as a load to the lake surface as part of this study. **Section 4.5.3.10** identified the nearest atmospheric deposition station as the Quincy station (FL14) **(Figure 4-15**).

4.5.4.7 Interconnected Flows

There are three waterbodies that have surface connections and the potential to flow into Carr Lake. These are Mallard Pond, Holley Pond, and Shelly Pond. The individual waterbodies, the connections, and their potential to contribute load to the lake are discussed in further detail below.

Mallard Pond has a surface area of roughly 257 acres and is amidst a collection of dry and wet prairies, forests, and marshes. Mallard Pond buttresses Carr Lake to the northeast and appears to be isolated under dry conditions. There is no current water quality data within Mallard Pond so nutrient loads out of the lake cannot be calculated. The dynamics of the connection between the two waterbodies and whether it is unidirectional are also not known. Based on land uses around Mallard Pond, it is unlikely as a potential anthropogenic source of nutrients to Carr Lake.

Shelly Pond discharges out of its western side into a stream that connects under Meridian Road with a total flow length of about 3,400 ft. Shelly Pond’s surface area is approximately 23 acres and is mostly surrounded by residential land use on the southern side and hardwood forest on its northern side. As Shelly Pond has been discharging to Carr Lake for many years, and the water quality within the lake has not degraded, this load is not a likely significant anthropogenic source of nutrients to Carr Lake.

Holley Pond discharges out of its northernmost point to the western portion of the waterbody and flows north approximately 650 ft before converging with the flowpath coming from Shelly Pond and traveling an additional 1,000 ft before inflowing to Carr Lake. Holley Pond has a surface area of about 48 acres and is mostly surrounded by woodlands/forested area land use. Based on land uses around Holley Pond, it is not identified as a potential anthropogenic source to Carr Lake.

4.5.4.8 Summary of Findings

At present, water quality and biological conditions in Carr Lake are very good and are not exhibiting declining trends. The immediate drainage basin to the lake (west of Meridian Road) is mostly undeveloped and is not expected to be a potential source of pollutant loads. The area to the east of Meridian Road, while developed, has been discharging under the same conditions for many years without any declining water quality in Carr Lake, suggesting pollutant loads from these areas are also minimal.

Though these sources do not appear significant, stormwater runoff contributing to tributary inflow, septic, and atmospheric deposition are quantified for comparative purposes as part of this study based on available data. Interconnected flow, internal recycling, seepage, and wastewater also do not appear to be significant sources and were not quantified as part of this study based on limited data. Interconnected flow from Shelly Pond is identified for future evaluation outside of this study to better assess potential contributions from the City's municipal separate storm sewer system (MS4) to Carr Lake.

4.5.5 Calculation of Potential Nutrient Loads

This section presents calculations of potential nutrient (TN and TP) loads to Carr Lake for the sources identified for calculation in **Section 4.5.4.8**. These include stormwater runoff, septic systems, and atmospheric deposition. Where loads were not calculated, the sections below provide brief discussions. The load calculations are for the purpose of comparing the potential magnitudes of each source relative to one another to support determination of sources to target for load reduction.

4.5.5.1 Stormwater Pollutant Load

In order to calculate the stormwater TN and TP loads to Carr Lake, average annual pollutant load modeling was performed. The goal was to identify outfalls that are contributing higher TN and TP loads relative to one another and to quantify the total TN and TP loads to Carr Lake. TN and TP loads were calculated using the SIMPLE-Seasonal model. The model methodology was described in detail in **Section 4.4.5.1** for the stormwater loads to Lake Jackson.

Figure 4-63 presents the subbasins and the DEM utilized in the SIMPLE model calculations for Carr Lake. **Figure 4-64** presents the aggregated land use. Finally, **Figure 4-65** presents the CDAs for the Carr Lake stormwater loading to define total and per acre TN and TP loads, as well as the ranking of CDAs around the Lake.

<u>Stormwater Nutrient Loads to Carr Lake</u>

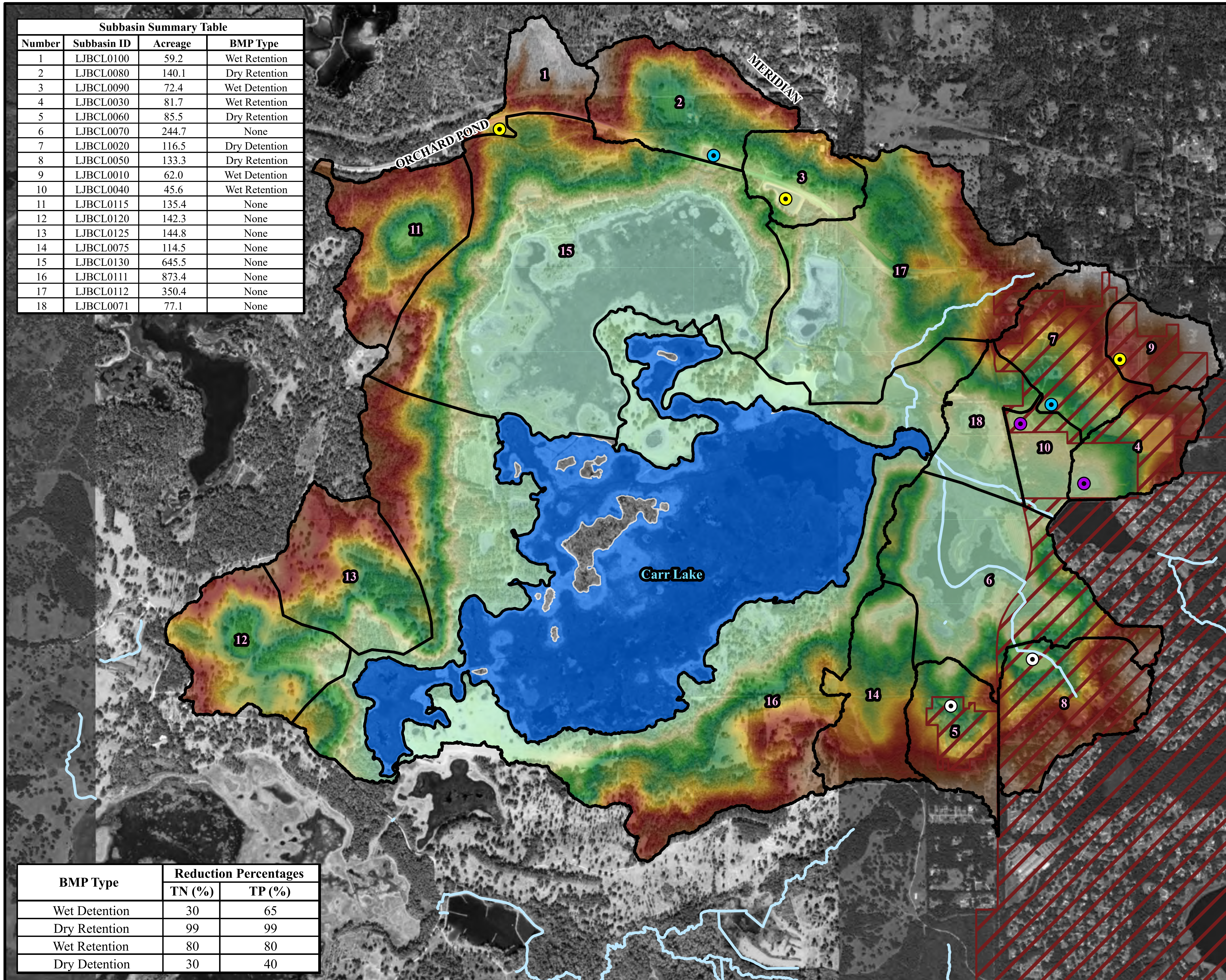
Figure 4-66 presents the distribution of the ranking of the CDAs for TN along with the total load and per acre loads (see the table on **Figure 4-66**). The rankings are color coded with the highest ranked CDAs in green moving down to the lowest ranked in pale yellow. The calculated total stormwater TN loads from the CDAs ranged from as low as 128 lb/yr up to 754 lb/yr. The per acre loads ranged from 0.7 lb/acre/yr up to 1.0 lb/acre/yr. Evaluation of per acre loads only shows a small difference between the various CDAs. Additionally, compared to the numbers for Lake Jackson, the per acre loading is small and more representative of natural conditions throughout. While the ranking highlights CDAs north and south of the lake, all of the areas have relatively low per acre loads and would not generally be deemed areas of focus for projects. The total potential stormwater runoff load for TN is 2,805 lb/yr.

Figure 4-67 presents the distribution of the ranking of the CDAs for TP along with the total load and per acre loads (see the table on **Figure 4-67**). The calculated total stormwater TP loads from the CDAs ranged from as low as 18 lb/yr up to 106 lb/yr. The per acre loads ranged from 0.09 lb/acre/yr up to 0.17 lb/acre/yr. Similar to what was seen for TN, while the ranking would point to the CDA on the southeast side, overall, the low per acre loads would not indicate any as targets for load reduction. The total potential stormwater runoff load for TP is 432 lb/yr.

4.5.5.2 Septic Load

In order to analyze the potential impacts from septic tank units to Carr Lake, the SPIL method adopted by FDEP was utilized to quantify the potential septic load. The approach and calculations were described earlier in **Section 4.4.5.2**, which presented the septic loading to Lake Jackson. As outlined earlier, the calculations were only done for nitrogen (TN), and based on literature on transport and assimilation, may represent a conservative potential load.

Subbasin Summary Table			
Number	Subbasin ID	Acreage	BMP Type
1	LJBCL0100	59.2	Wet Retention
2	LJBCL0080	140.1	Dry Retention
3	LJBCL0090	72.4	Wet Detention
4	LJBCL0030	81.7	Wet Retention
5	LJBCL0060	85.5	Dry Retention
6	LJBCL0070	244.7	None
7	LJBCL0020	116.5	Dry Detention
8	LJBCL0050	133.3	Dry Retention
9	LJBCL0010	62.0	Wet Detention
10	LJBCL0040	45.6	Wet Retention
11	LJBCL0115	135.4	None
12	LJBCL0120	142.3	None
13	LJBCL0125	144.8	None
14	LJBCL0075	114.5	None
15	LJBCL0130	645.5	None
16	LJBCL0111	873.4	None
17	LJBCL0112	350.4	None
18	LJBCL0071	77.1	None



BMP Type	Reduction Percentages	
	TN (%)	TP (%)
Wet Detention	30	65
Dry Retention	99	99
Wet Retention	80	80
Dry Detention	30	40

CITY OF TALLAHASSEE

N

0 0.4
Miles

Legend

- Carr Lake
- Subbasins
- Watercourses
- Tallahassee Corporate Limits

BMP Type

- Dry Detention
- Dry Retention
- Wet Detention
- Wet Retention

Topographic Elevations
ft NAVD88

278

80

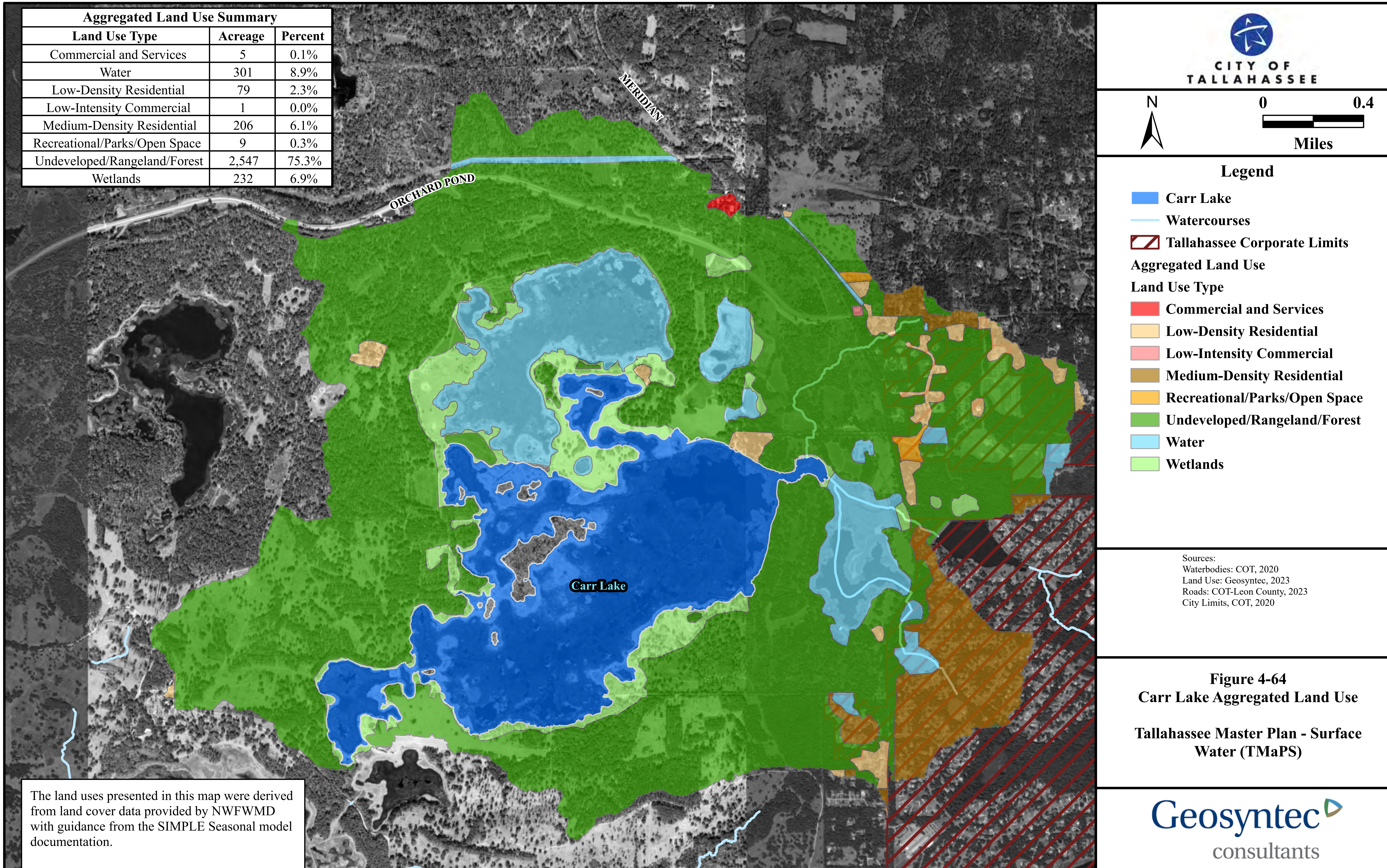
Sources:
Waterbodies: COT, 2020
Watercourses: COT, 2020
Subbasins: Geosyntec, 2023
Roads: COT-Leon County, 2023
BMPs: Geosyntec, 2023
Elevation: COT-Leon County, 2018
City Limits, COT, 202

**Figure 4-63:
Carr Lake Subbasin Delineation
and BMPs**

Tallahassee Master Plan - Surface Water (TMaPS)

Geosyntec consultants

Aggregated Land Use Summary		
Land Use Type	Acreage	Percent
Commercial and Services	5	0.1%
Water	301	8.9%
Low-Density Residential	79	2.3%
Low-Intensity Commercial	1	0.0%
Medium-Density Residential	206	6.1%
Recreational/Parks/Open Space	9	0.3%
Undeveloped/Rangeland/Forest	2,547	75.3%
Wetlands	232	6.9%



The land uses presented in this map were derived from land cover data provided by NWFWMD with guidance from the SIMPLE Seasonal model documentation.

CITY OF TALLAHASSEE

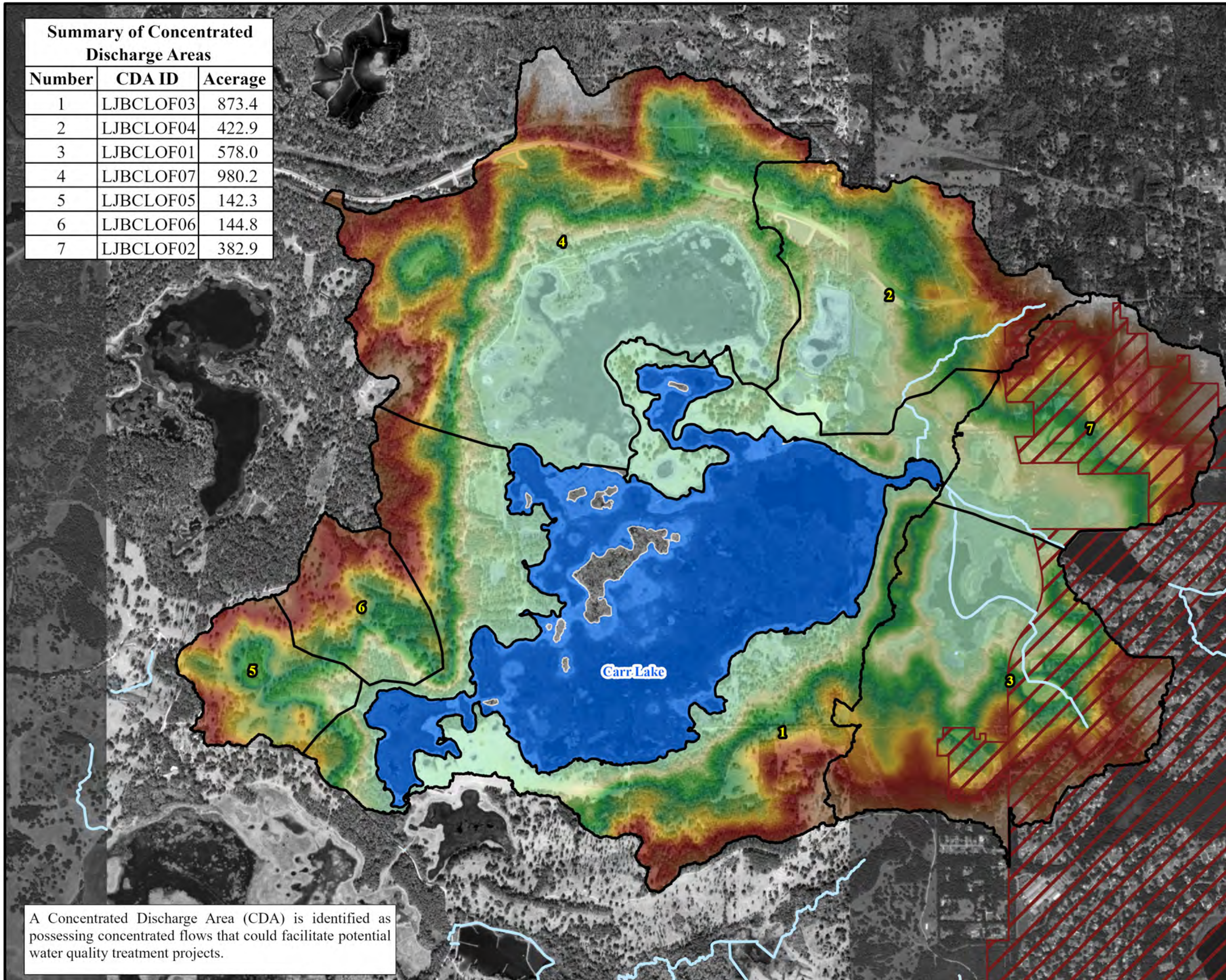
Sources:
Waterbodies: COT, 2020
Land Use: Geosyntec, 2023
Roads: COT-Leon County, 2023
City Limits, COT, 2020

Figure 4-64
Carr Lake Aggregated Land Use

Tallahassee Master Plan - Surface Water (TMaPS)

Geosyntec consultants

Summary of Concentrated Discharge Areas		
Number	CDA ID	Acerage
1	LJBCLOF03	873.4
2	LJBCLOF04	422.9
3	LJBCLOF01	578.0
4	LJBCLOF07	980.2
5	LJBCLOF05	142.3
6	LJBCLOF06	144.8
7	LJBCLOF02	382.9



A Concentrated Discharge Area (CDA) is identified as possessing concentrated flows that could facilitate potential water quality treatment projects.

CITY OF TALLAHASSEE

N

0 0.4

Miles

Legend

- Carr Lake
- Concentrated Discharge Area
- Tallahassee Corporate Limits
- Watercourses

Topographic Elevations ft NAVD88

278

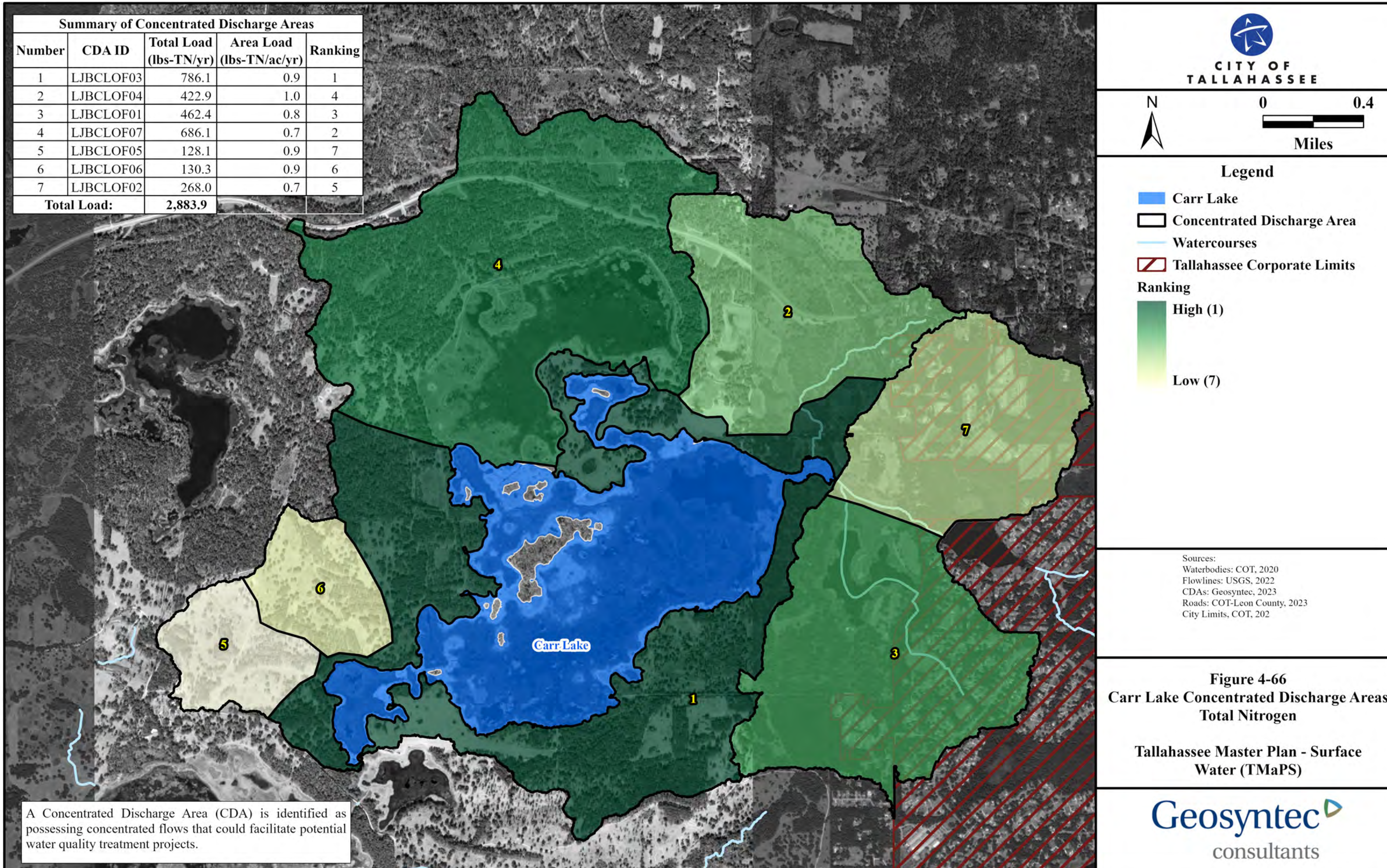
80

Sources:
Waterbodies: COT, 2020
Flowlines: USGS, 2022
CDAs: Geosyntec, 2023
Roads: COT-Leon County, 2023
Elevation: COT-Leon County, 2018
City Limits, COT, 202

Figure 4-65:
Carr Lake Concentrated Discharge Areas

Tallahassee Master Plan - Surface Water (TMaPS)

Geosyntec consultants



Summary of Concentrated Discharge Areas

Number	CDA ID	Total Load (lbs-TN/yr)	Area Load (lbs-TN/ac/yr)	Ranking
1	LJBCLOF03	786.1	0.9	1
2	LJBCLOF04	422.9	1.0	4
3	LJBCLOF01	462.4	0.8	3
4	LJBCLOF07	686.1	0.7	2
5	LJBCLOF05	128.1	0.9	7
6	LJBCLOF06	130.3	0.9	6
7	LJBCLOF02	268.0	0.7	5
Total Load:		2,883.9		

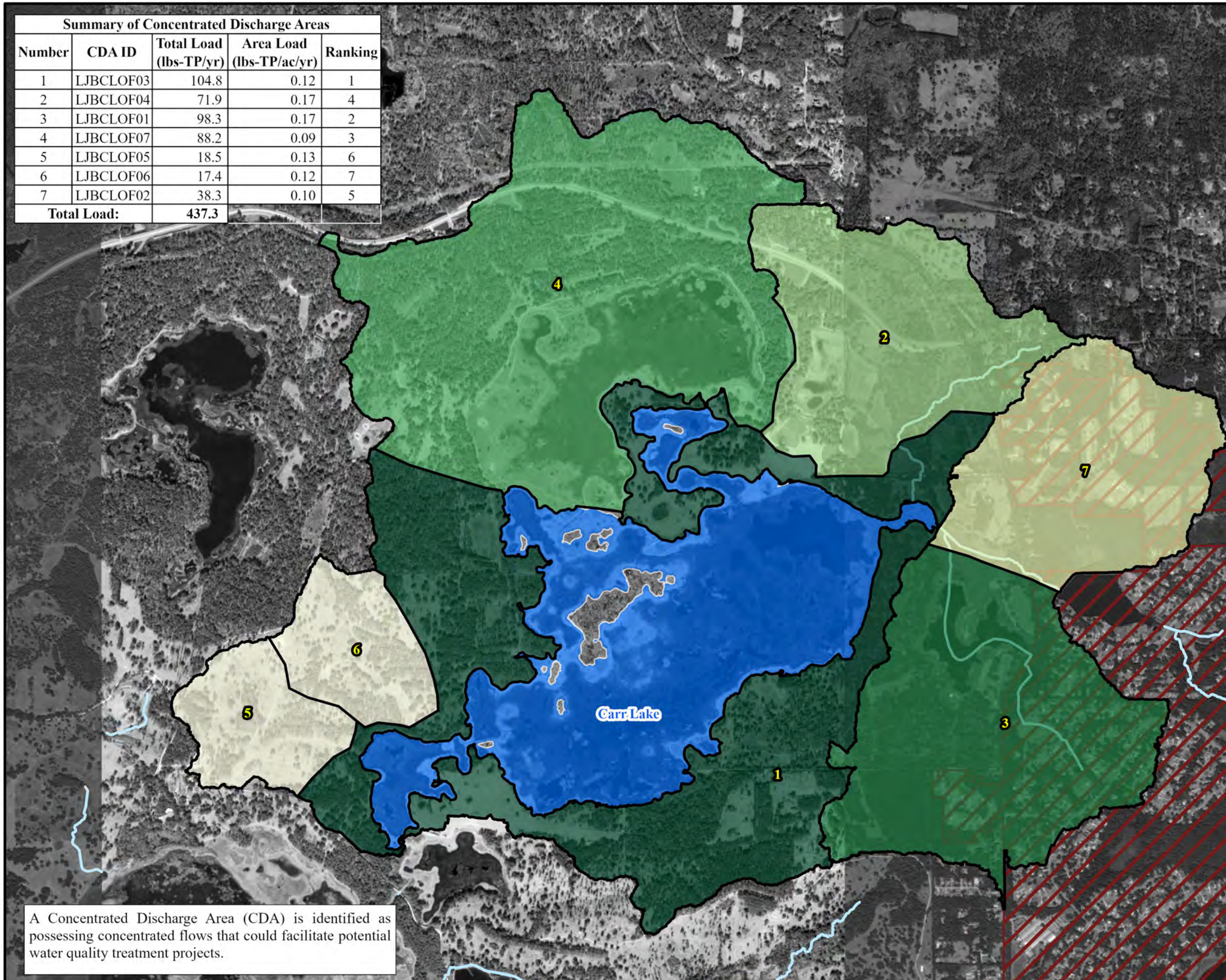
A Concentrated Discharge Area (CDA) is identified as possessing concentrated flows that could facilitate potential water quality treatment projects.

Figure 4-66
Carr Lake Concentrated Discharge Areas
Total Nitrogen

Tallahassee Master Plan - Surface Water (TMaPS)

CITY OF TALLAHASSEE

Summary of Concentrated Discharge Areas				
Number	CDA ID	Total Load (lbs-TP/yr)	Area Load (lbs-TP/ac/yr)	Ranking
1	LJBCLOF03	104.8	0.12	1
2	LJBCLOF04	71.9	0.17	4
3	LJBCLOF01	98.3	0.17	2
4	LJBCLOF07	88.2	0.09	3
5	LJBCLOF05	18.5	0.13	6
6	LJBCLOF06	17.4	0.12	7
7	LJBCLOF02	38.3	0.10	5
Total Load:		437.3		



A Concentrated Discharge Area (CDA) is identified as possessing concentrated flows that could facilitate potential water quality treatment projects.

N

0 0.4

Miles

Legend

- Carr Lake
- Concentrated Discharge Area
- Watercourses
- Tallahassee Corporate Limits

Ranking

High (1)

Low (7)

Sources:
Waterbodies: COT, 2020
Flowlines: USGS, 2022
CDAs: Geosyntec, 2023
Roads: COT-Leon County, 2023
City Limits, COT, 202

Figure 4-67:
Carr Lake Concentrated Discharge Areas
Total Phosphorus

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An estimated 37 septic tank units were identified within 200 meters of Carr Lake and associated upstream tributaries. **Figure 4-68** shows the septic systems utilized in this analysis, with green representing those associated with direct loading to the waterbody and pink representing those associated with loading to tributaries. A table provided on the figure summarizes the calculated TN load from septic units. The loads are split between tributary inputs (379 lb/yr) and direct inputs (22 lb/yr).

4.5.5.3 Point Source Load

No active point sources were identified within the Lake Jackson basin. Therefore, the point source loads for TN and TP are set to 0 lb/yr for Carr Lake.

4.5.5.4 Lake Inflow Load

The approach utilized in the calculation of the inter-lake loading was described in **Section 4.4.5.4** for Lake Jackson. The lakes and connections are shown in **Figure 4-69**, along with a table summarizing available water quality data, flow, load calculations (where available), and impairment status. None of the lakes identified in **Figure 4-69** (Mallard Pond, Shelly Pond, Holley Pond) have recent water quality data to allow for calculation of the loading into Carr Lake. As such, no lake inflow load was calculated.

4.5.5.5 Internal Lake Load

Based on the qualitative assessment of potential pollutant loads to Carr Lake (see **Section 4.5.4.4**), internal loading is not likely to have a high potential for loading to the lake. Additionally, no data are available that quantifies the internal loads. Therefore, this load was not calculated.

4.5.5.6 Atmospheric Deposition

As presented and discussed in **Section 4.4.5.6** the annual average atmospheric TN load per acre was calculated from the Quincy NADP station (F14) at 2.56 lb/acre/yr. Multiplying this by the acreage of Carr Lake (692 acres) gives a total TN load of 1,772 lb/yr. No data are available for TP, therefore only the nitrogen load is provided.

4.5.5.7 Summary of Calculated Loads

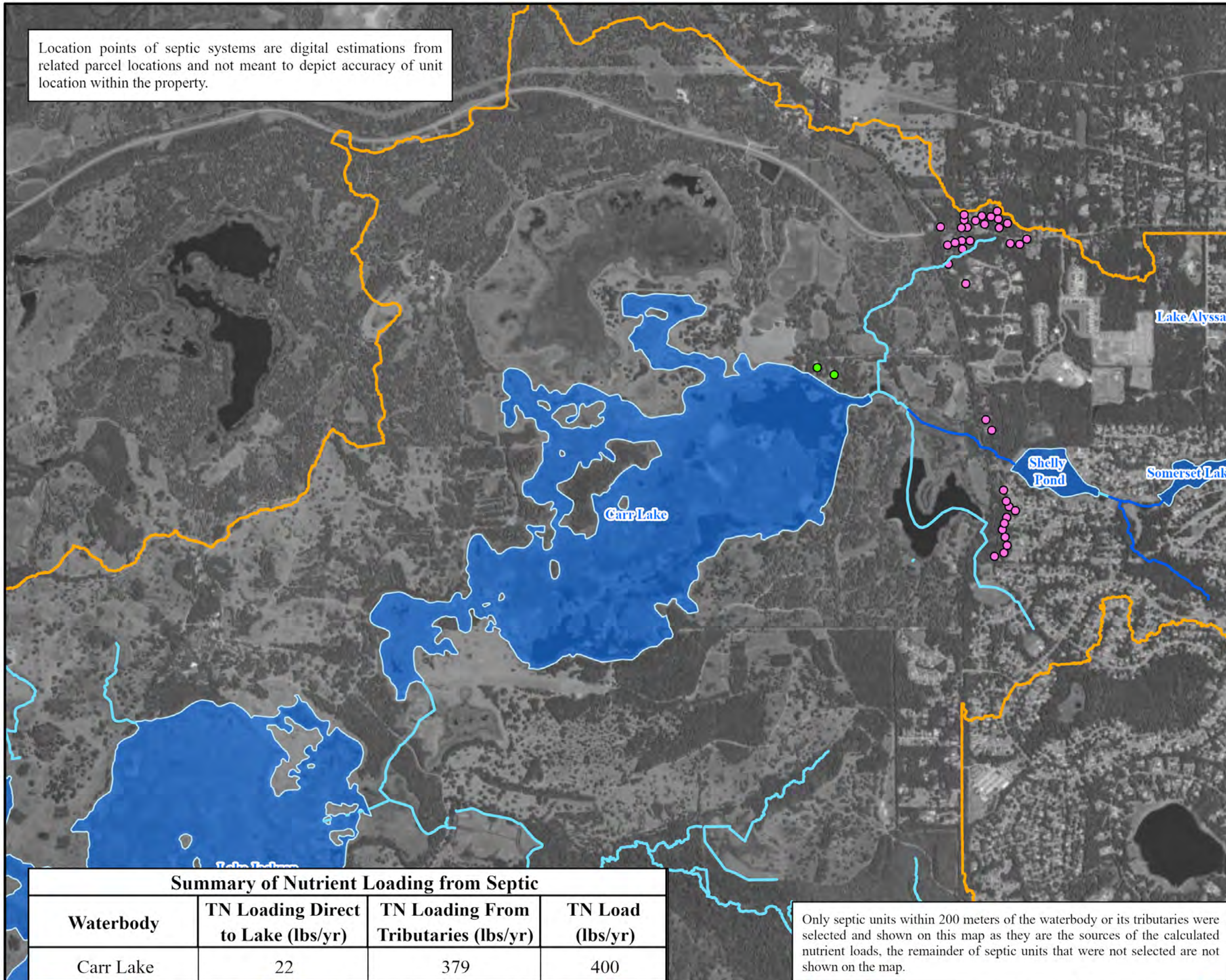
Nutrient loads to Carr Lake were calculated for stormwater runoff, septic systems, and atmospheric deposition. **Table 4-15** presents the calculated total loads to the lake for TN and TP. For septic systems and atmospheric deposition, only TN loads were calculated (see **Section 4.5.5.2** and **Section 4.5.5.6**, respectively, for explanation).

Table 4-15: Summary of Calculated Loads to Carr Lake

Source	TN (lb/year)	TP (lb/year)
Stormwater Runoff	2,805	432
Septic Systems	400	NC
Atmospheric Deposition	1,772	NC

NC – Not calculated.

Location points of septic systems are digital estimations from related parcel locations and not meant to depict accuracy of unit location within the property.



CITY OF TALLAHASSEE

N

0 0.4

Miles

Legend

- Lake Jackson Drainage Basin
- Waterbodies in Study
- Watercourses

Relevant Septic Sites

- Lake
- Tributaries

Sources:
Waterbodies: COT, 2020
Watercourses: COT, 2020
Septic Systems: COT, 2020
Watershed: COT, 2020
Roads: COT-Leon County, 2023

Figure 4-68:
Septic Loading to Carr Lake

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Summary of Nutrient Loading from Septic

Waterbody	TN Loading Direct to Lake (lbs/yr)	TN Loading From Tributaries (lbs/yr)	TN Load (lbs/yr)
Carr Lake	22	379	400

Only septic units within 200 meters of the waterbody or its tributaries were selected and shown on this map as they are the sources of the calculated nutrient loads, the remainder of septic units that were not selected are not shown on the map.

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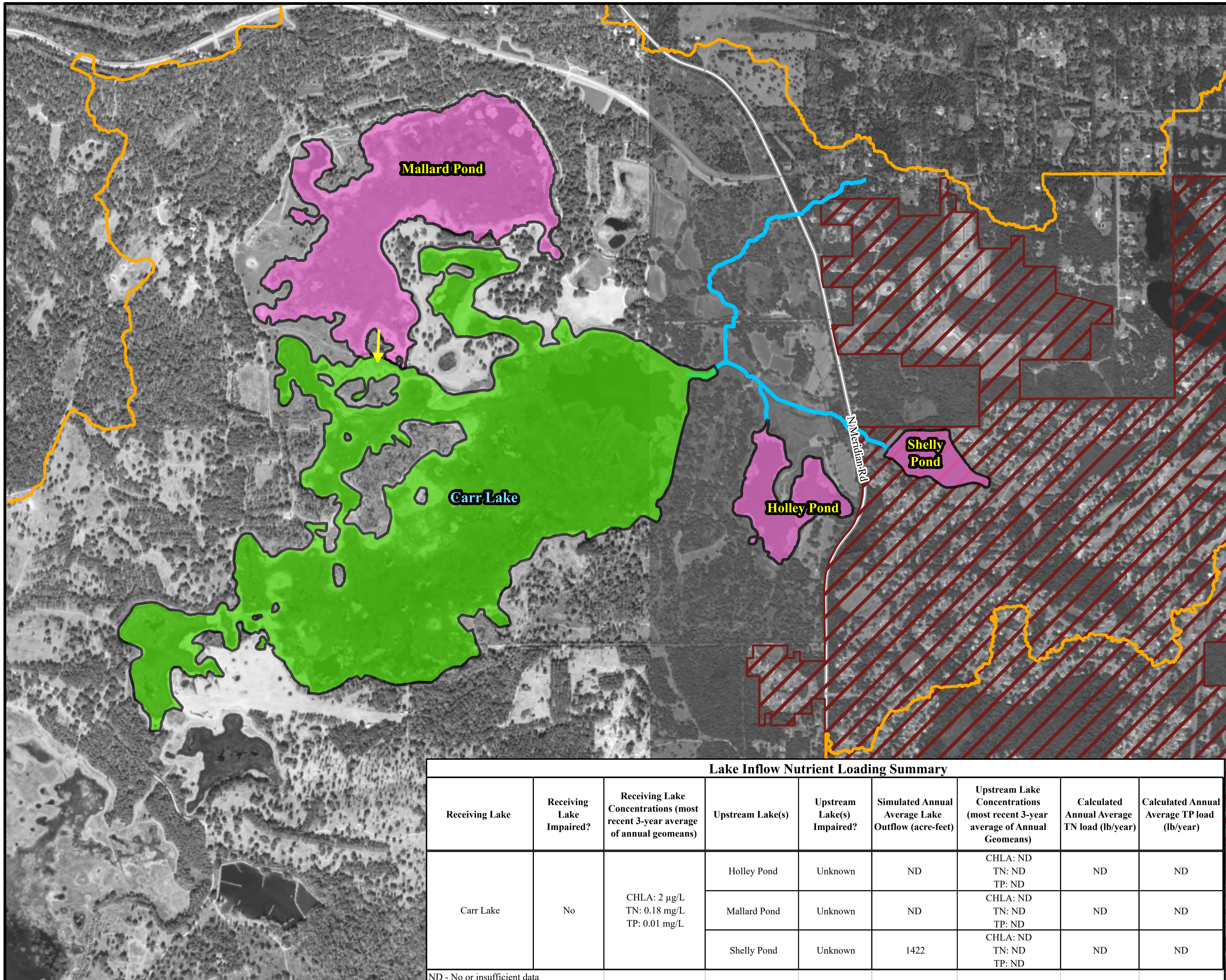

Lake Inflow Nutrient Loading Summary

Receiving Lake	Receiving Lake Impaired?	Receiving Lake Concentrations (most recent 3-year average of annual geomeans)	Upstream Lake(s)	Upstream Lake(s) Impaired?	Simulated Annual Average Lake Outflow (acre-feet)	Upstream Lake Concentrations (most recent 3-year average of Annual Geomeans)	Calculated Annual Average TN load (lb/year)	Calculated Annual Average TP load (lb/year)
Carr Lake	No	CHLA: 2 µg/L TN: 0.18 mg/L TP: 0.01 mg/L	Holley Pond	Unknown	ND	CHLA: ND TN: ND TP: ND	ND	ND
			Mallard Pond	Unknown	ND	CHLA: ND TN: ND TP: ND	ND	ND
			Shelly Pond	Unknown	1422	CHLA: ND TN: ND TP: ND	ND	ND

ND - No or insufficient data

CITY OF TALLAHASSEE

N

0 0.4 Miles

Legend

- Lake Jackson Drainage Basin
- Carr Lake
- Inflowing Lakes
- Flows Into Carr
- Tallahassee Corporate Limits

Sources:
Waterbodies: COT, 2020
Flowlines: USGS, 2020
Watershed: COT, 2020
Roads: COT-Leon County, 2023
City Limits, COT, 202

Figure 4-69:
Inflow Loading to Carr Lake

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4.6 Summerbrook Chain of Lakes and Summerbrook Creek

This section presents the results from Tasks 1 through 3 for Summerbrook Creek and the Summerbrook Chain of Lakes (Lake Alyssa, Somerset Lake, and Shelly Pond). This includes an overview and history of the lakes and basin, present impairment status, an overview of available data, a qualitative assessment of potential pollutant sources, and calculation of potential pollutant loads.

4.6.1 Overview and History

Summerbrook Creek is a slightly tannic stream in northwestern Leon County that flows from near Bradfordville Road, through the Summerbrooke neighborhood, and into Carr Lake (Leon County, 2020). The Summerbrook Creek basin (**Figure 4-70**) covers an area of 2,062 acres and is located in the Bradfordville Urban Service Area (Leon County, 2004). While the Summerbrook Creek basin includes a small area west of Meridian Road, for this section, only those areas east of Meridian Road are presented and discussed since the area west does not contain any waterbodies in the study nor any other items of analysis such as water quality stations or BMPs.

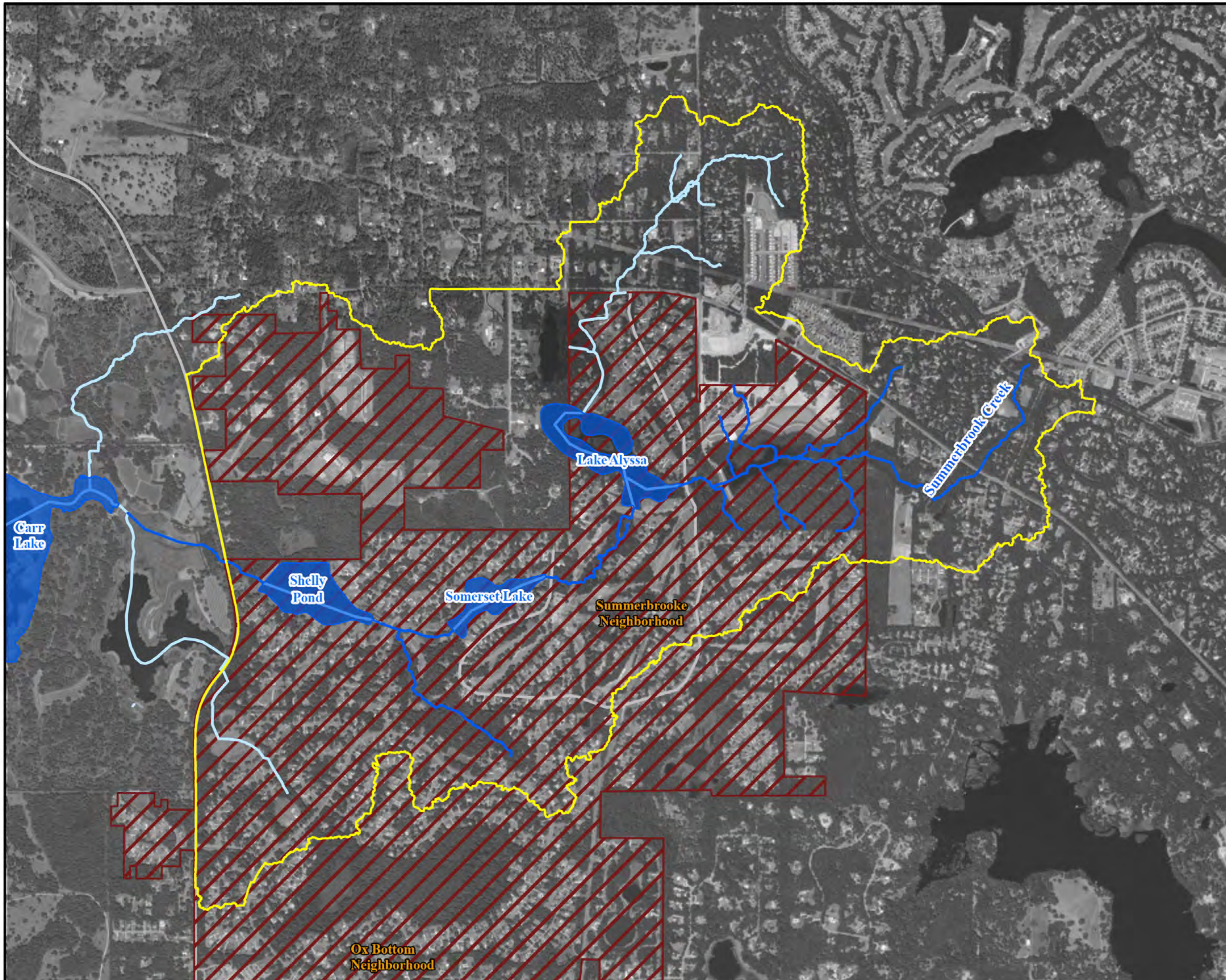
Bradfordville is a small community that originated in the 1820s serving numerous plantations throughout the area. These plantations primarily grew cotton. Following the Civil War, much of the land in Bradfordville was purchased by wealthy industrialists and used as hunting plantations and winter homes. In the 1980s and 1990s, the areas in Bradfordville around Thomasville Road and Bannerman Road were developed into medium to low density housing. The Summerbrooke neighborhood was established in 1989.

Summerbrook Creek flows through the Summerbrook Chain of Lakes located within the Summerbrooke subdivision. From upstream to downstream, these are Lake Alyssa, Somerset Lake, and Shelly Pond (**Figure 4-70**). The three lakes are managed by the Summerbrooke Property Owners Association, Inc. (SPOA) as community lakes. **Photo 4-28** through **Photo 4-30** presents views of each of the lakes, Alyssa, Somerset, and Shelly Pond, respectively.

Photo 4-31 through **Photo 4-38** present aerial views of the Summerbrook Creek basin area from 1937 through the present. In the early aerial views (prior to 1970), the three lakes were not there, but rather, there were small depressional wetland areas that can be seen throughout the basin. Some of the depressional areas line up with the future lake locations. In the 1970 aerial, the footprints of the three lakes can be seen, with Shelly Pond in the process of excavation. In the 1996 aerial, the Summerbrooke subdivision can be seen, along with the footprints of the three lakes.

4.6.2 Regulatory Status

Exhibit 4-2 presented the verified impaired waters within the overall Lake Jackson basin. Presently there are no verified impaired waterbodies within the Summerbrook Creek basin.



CITY OF TALLAHASSEE

N

0 0.3 Miles

Legend

- Summerbrook Creek Drainage Basin
- Waterbodies in Study
- Watercourses
- Tallahassee Corporate Limits

Sources:
Waterbodies: COT, 2020
Watercourses: COT, 2020
Drainage Basins: COT, 2022
Roads: COT-Leon County, 2023
City Limits: COT, 2020

Figure 4-70: Summerbrook Creek Drainage Basin Overview

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a

b

Photo 4-28a and b: Lake Alyssa

Photo 4-29: Lake Somerset

Photo 4-30: Shelly Pond

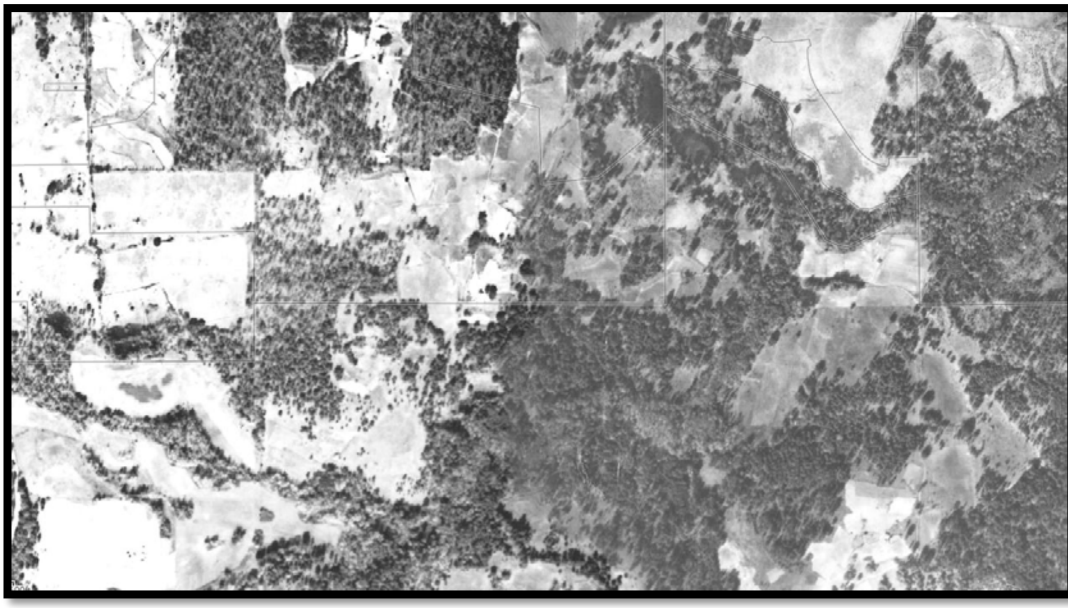


Photo 4-31: Summerbrook Creek Basin Area Aerial (1937)

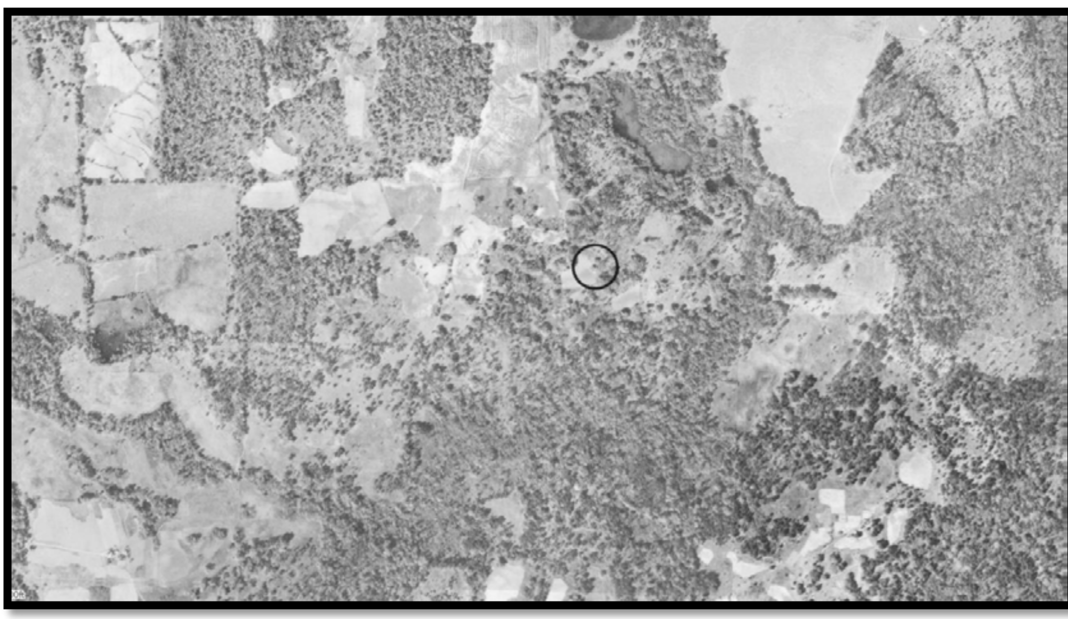


Photo 4-32: Summerbrook Creek Basin Area Aerial (1949)

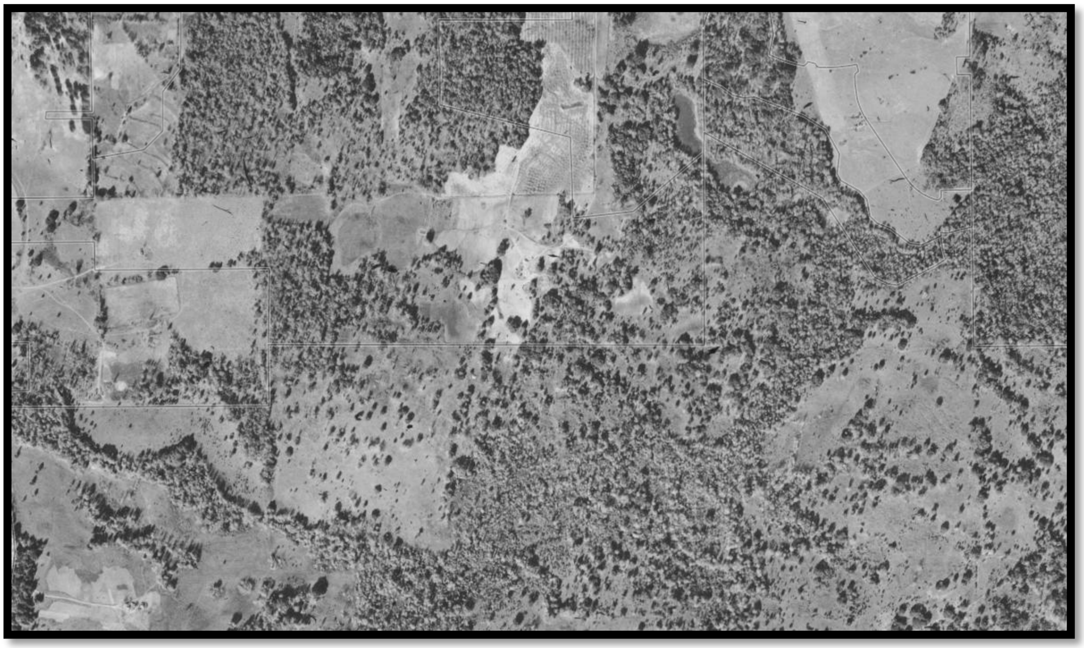


Photo 4-33: Summerbrook Creek Basin Area Aerial (1954)

Photo 4-34: Summerbrook Creek Basin Area Aerial (1970)

Photo 4-35: Summerbrook Creek Basin Area Aerial (1983)

Photo 4-36: Summerbrook Creek Basin Area Aerial (1996)

Photo 4-37: Summerbrook Creek Basin Area Aerial (2007)

Photo 4-38: Summerbrook Creek Basin Area Aerial (2020)

4.6.3 Waterbody Data Review and Summary

This section presents an overview of available data and data sources for Summerbrook Creek and the Summerbrook Chain of Lakes, including bathymetry, land use, soils, septic systems, hydrologic measurements, surface water quality, groundwater quality, biological, stormwater treatment facilities, and atmospheric deposition.

4.6.3.1 Bathymetry

No bathymetric data within any of the lakes has been provided to date. Based on discussions with personnel familiar with the lakes, in general, they are relatively shallow, with depths less than 5 to 6 ft.

4.6.3.2 Land Use

Figure 4-71 presents a map of the Level 2 land uses within the Summerbrook Creek basin. A table is provided to show the overall acreages and percent cover. Tables are provided for both the Level 2 and grouped Level 1 land uses. The largest land use within the Summerbrook Creek basin, per the grouped Level 1 categories, is Urban and Built Up (57 percent). This is made up primarily of Low Density Residential, with some Medium Density Residential and some Recreational. The Recreational use is primarily associated with the Summerbrooke Golf Course. Per the land use map, which was based on 2019 data, a large area of Upland Forest is in the upper portion of the basin, just south of Bannerman Road. That area is presently undergoing development. **Photo 4-39** presents this area in a recent (2021) aerial image showing cleared areas. This area drains into Lake Alyssa across Preservation Road. In **Photo 4-28a,** the silt curtains presently deployed to reduce sediment load from this project can be seen where the discharge enters Lake Alyssa. The source of the silt was not identified in the review.

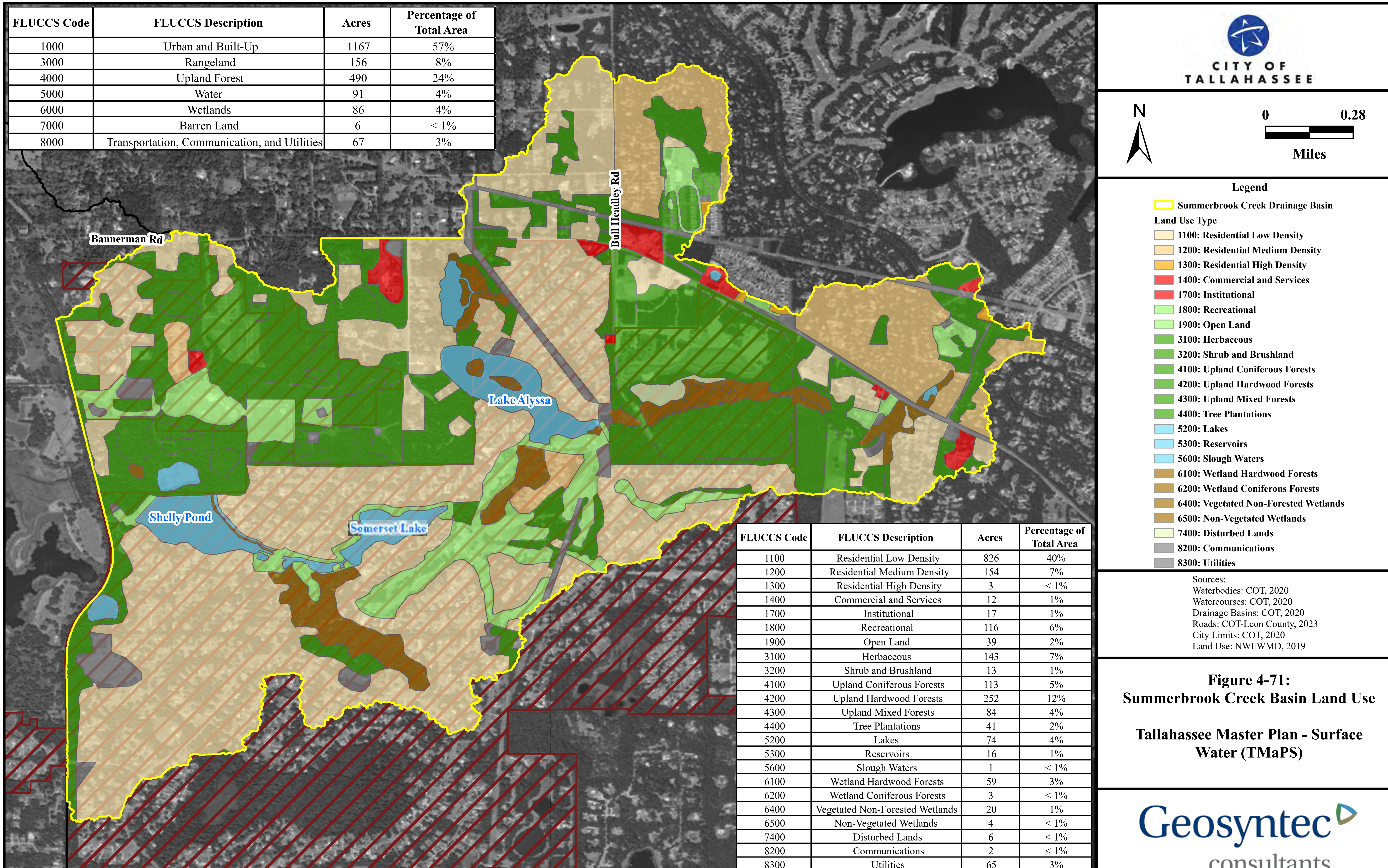
4.6.3.3 Soils

The most prevalent soil group in the Summerbrook Creek basin is Group C (47 percent) (**Figure 4-72**). Group C soils are considered to have slow rates of infiltration and a high runoff potential. This is consistent with the overall nature of the area, with high clay content throughout. The second highest soil group coverage is Group B (30 percent), which has moderate rates of infiltration. The remaining soil groups throughout the basin are generally in areas with high water tables so they also would not drain well and have large runoff potentials.

4.6.3.4 Septic Systems

An estimated 402 septic systems are within the boundaries of the Summerbrook Creek Drainage Basin. The bulk of the systems are located in specific clusters, including the Killearn Lakes neighborhood north of Bannerman Road, other residences south of Bannerman Road, an un-sewered portion of Summerbrooke, and other smaller neighborhoods off Bannerman Road and Meridian Road (**Figure 4-73**).

FLUCCS Code	FLUCCS Description	Acres	Percentage of Total Area
1000	Urban and Built-Up	1167	57%
3000	Rangeland	156	8%
4000	Upland Forest	490	24%
5000	Water	91	4%
6000	Wetlands	86	4%
7000	Barren Land	6	< 1%
8000	Transportation, Communication, and Utilities	67	3%



FLUCCS Code	FLUCCS Description	Acres	Percentage of Total Area
1100	Residential Low Density	826	40%
1200	Residential Medium Density	154	7%
1300	Residential High Density	3	< 1%
1400	Commercial and Services	12	1%
1700	Institutional	17	1%
1800	Recreational	116	6%
1900	Open Land	39	2%
3100	Herbaceous	143	7%
3200	Shrub and Brushland	13	1%
4100	Upland Coniferous Forests	113	5%
4200	Upland Hardwood Forests	252	12%
4300	Upland Mixed Forests	84	4%
4400	Tree Plantations	41	2%
5200	Lakes	74	4%
5300	Reservoirs	16	1%
5600	Slough Waters	1	< 1%
6100	Wetland Hardwood Forests	59	3%
6200	Wetland Coniferous Forests	3	< 1%
6400	Vegetated Non-Forested Wetlands	20	1%
6500	Non-Vegetated Wetlands	4	< 1%
7400	Disturbed Lands	6	< 1%
8200	Communications	2	< 1%
8300	Utilities	65	3%

Sources:
Waterbodies: COT, 2020
Watercourses: COT, 2020
Drainage Basins: COT, 2020
Roads: COT-Leon County, 2023
City Limits: COT, 2020
Land Use: NWFWMD, 2019

Figure 4-71:
Summerbrook Creek Basin Land Use

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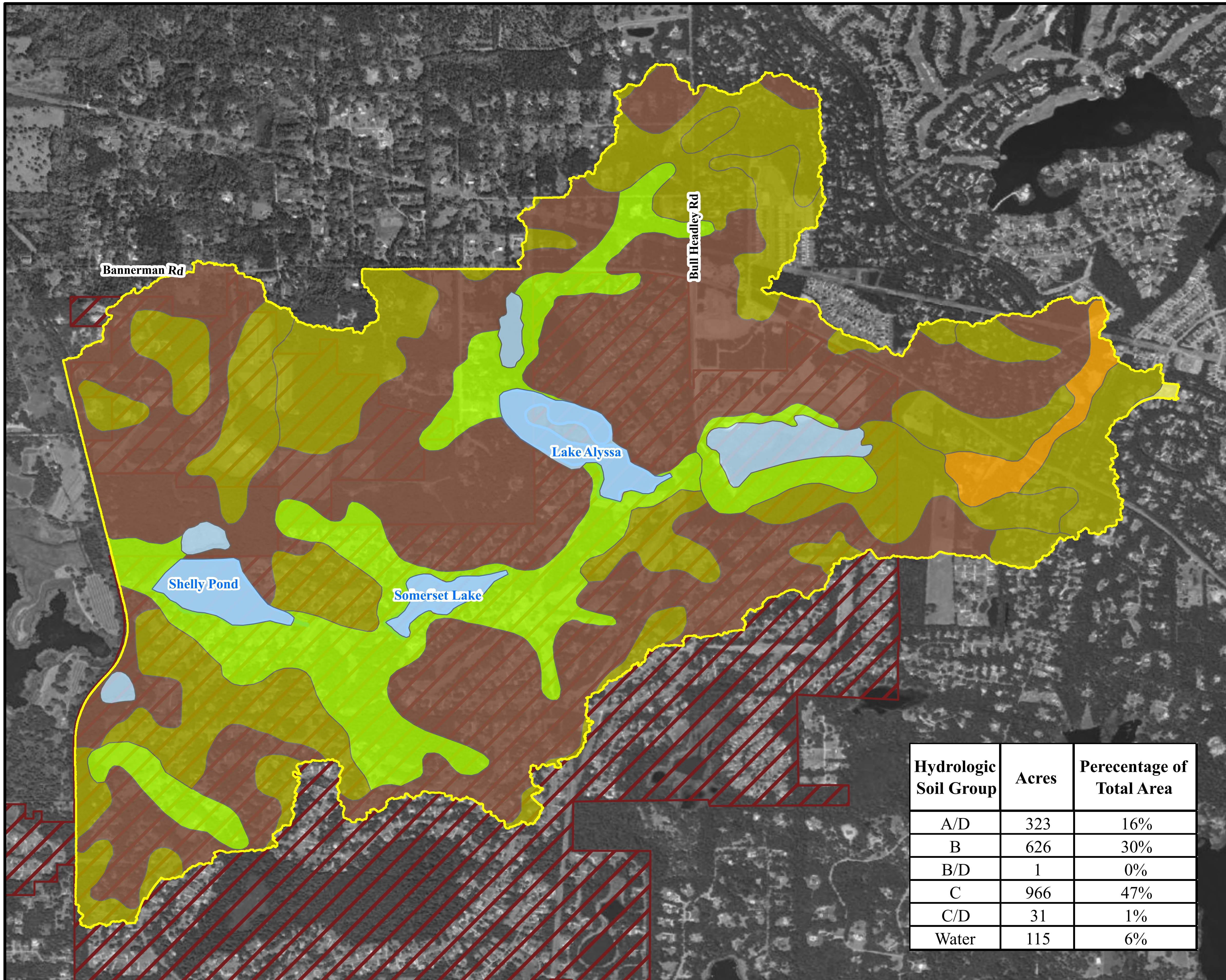
Photo 4-39: Aerial Image of Recent Development within Summerbrook Creek Basin



Hydrologic Soil Group	Acres	Perecentage of Total Area
A/D	323	16%
B	626	30%
B/D	1	0%
C	966	47%
C/D	31	1%
Water	115	6%

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N

0 0.28

Miles

Legend

- Summerbrook Creek Drainage Basin
- Tallahassee Corporate Limits

Hydrologic Soil Group

- A/D
- B
- B/D
- C
- C/D
- Water

Sources:
Waterbodies: COT, 2020
Drainage Basins: COT, 2020
Roads: COT-Leon County, 2023
City Limits: COT, 2020
Soils: NRCS, 2020

Figure 4-72:
Summerbrook Creek Basin Soils

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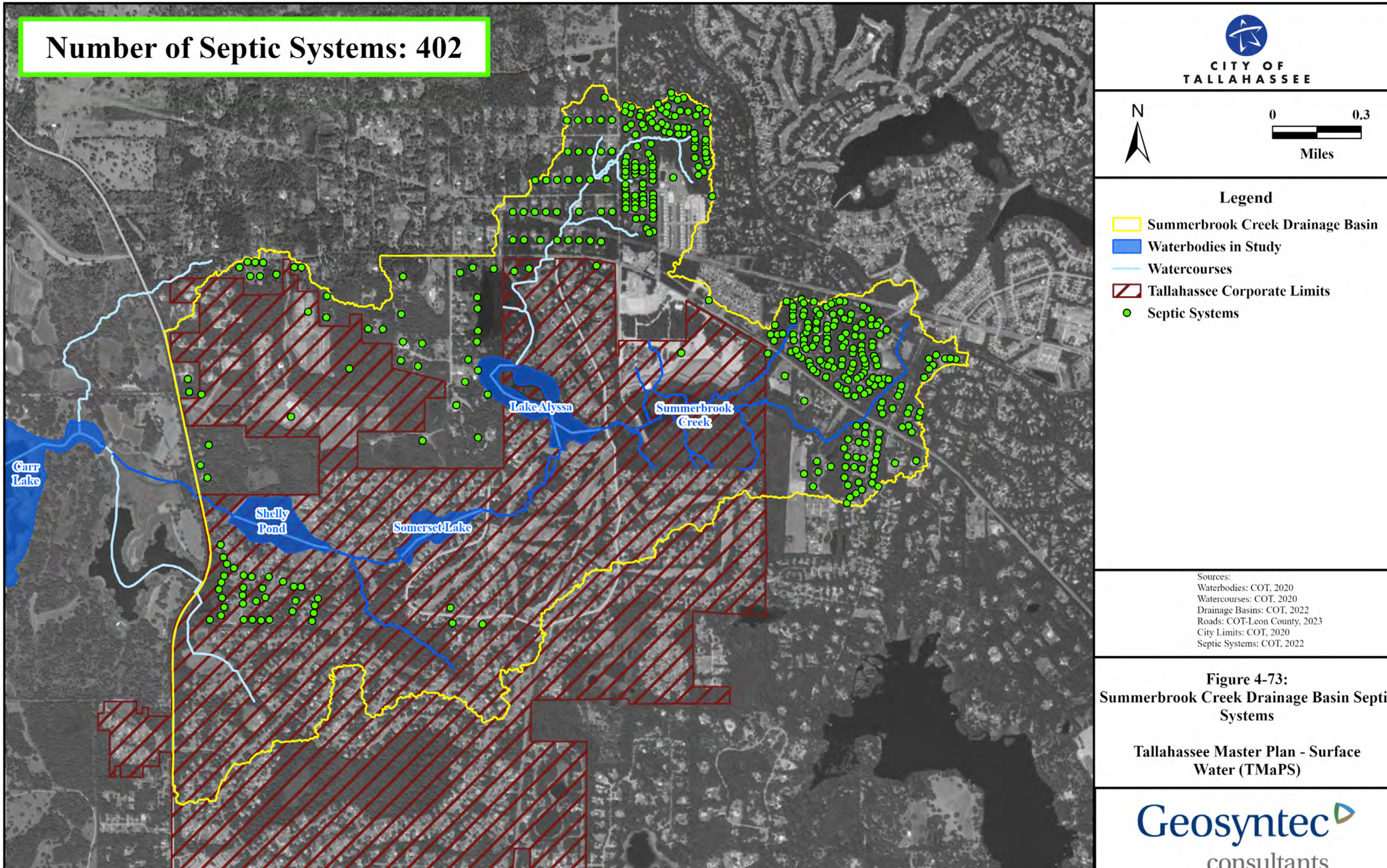

Figure 4-73: Summerbrook Creek Drainage Basin Septic Systems

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4.6.3.5 Hydrologic Data

No recent historical or current hydrologic monitoring stations are located within the Summerbrook Creek basin.

4.6.3.6 Surface Water Quality Data

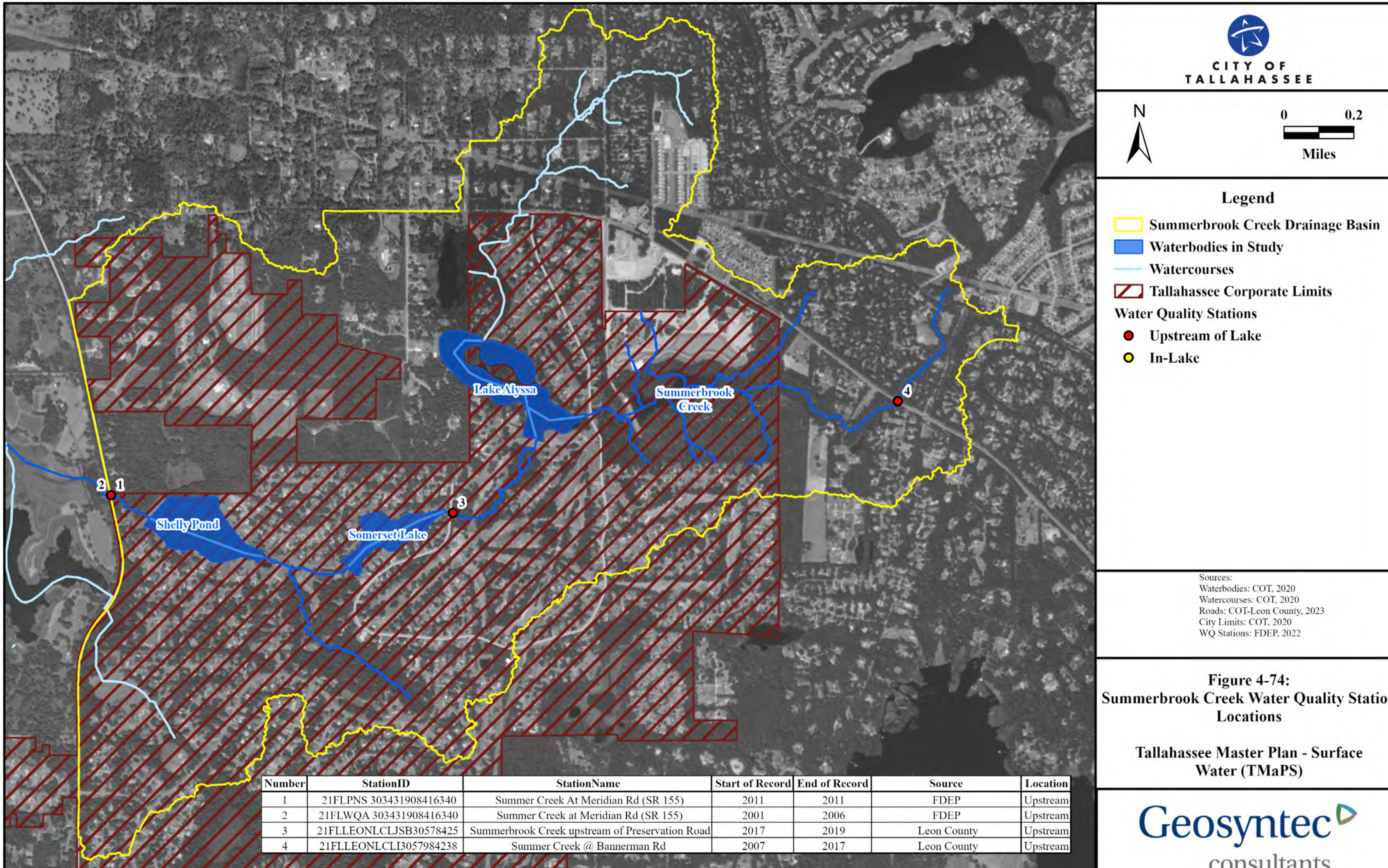
The IWR dataset for the Summerbrook Creek drainage basin spans from 2001 to 2020 and includes data collected by FDEP and Leon County. No direct water quality data are available from the lakes, but rather data are available at three locations along Summerbrook Creek, upstream and downstream of the lakes. **Figure 4-74** presents the locations where data have been collected. A table is provided in **Figure 4-74** that shows the station ID, station name, period of record, sample count, and data source. Based on the number of stations and the length of the station IDs, station IDs were not included on the figure, rather each of the stations is given a number and the numbers correspond to stations in the table. The most upstream station (#4, where the creek crosses Bannerman Road) was sampled by Leon County from 2007 to 2017. Due to intermittent flows, there were multiple years where insufficient samples were collected to assess compliance. In 2017, the station was moved further downstream (#3) (Leon County, 2020). The most downstream stations (#1 and #2) were sampled by FDEP between 2001 to 2006 and then again in 2011, but with very limited data. No recent data are available for that location.

Figure 4-75 and **Figure 4-76** present plots of the TN and TP data, respectively, from 2010 to 2020. Examination of the data shows TN levels decreasing during that period. For TP a slight increasing trend can be seen in the data with higher values in recent years.

Under FDEP's NNC, the freshwater stream nutrient thresholds are 0.18 mg/L for TP and 1.03 mg/L for TN as annual geometric means. For *E. coli*, the freshwater stream criteria are monthly geometric means below 126 colonies per 100 mL of water and less than 10 percent of samples above 410 colonies per 100 mL of water in any 30-day period. For the purpose of determining FIB impairments where data are collected monthly, per 62-303 F.A.C., FDEP assesses all of the samples collected through the verified period to determine the number of samples that are above the threshold. If the number of samples (based on the sample size) is greater than or equal to numbers provided in the tables within 62-303, the waterbody is deemed impaired. The FDEP threshold for this analysis is 410 MPN/100 mL.

Figure 4-77 and **Figure 4-78** present plots of the TN and TP annual geomeans from 2010 to 2020 along the creek for years with sufficient samples. In addition to the geomeans, the NNC criteria are plotted as dashed lines on the graphs. The data show that while data were limited for AGM calculation, the years with sufficient data showed TN and TP geometric means well below the NNC stream thresholds.

Figure 4-79 presents a plot of the measured *E. coli* from all of the stations from 2010 through 2020. The data are plotted with the 410 MPN/100 mL threshold (described previously) as a dashed line. The data show elevated concentrations with one point above the threshold.



Number	StationID	StationName	Start of Record	End of Record	Source	Location
1	21FLPNS 303431908416340	Summer Creek At Meridian Rd (SR 155)	2011	2011	FDEP	Upstream
2	21FLWQA 303431908416340	Summer Creek at Meridian Rd (SR 155)	2001	2006	FDEP	Upstream
3	21FLLEONLCLJSB30578425	Summerbrook Creek upstream of Preservation Road	2017	2019	Leon County	Upstream
4	21FLLEONLCLI3057984238	Summer Creek @ Bannerman Rd	2007	2017	Leon County	Upstream

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Sources:
Waterbodies: COT, 2020
Watercourses: COT, 2020
Roads: COT-Leon County, 2023
City Limits: COT, 2020
WQ Stations: FDEP, 2022

Figure 4-74: Summerbrook Creek Water Quality Station Locations

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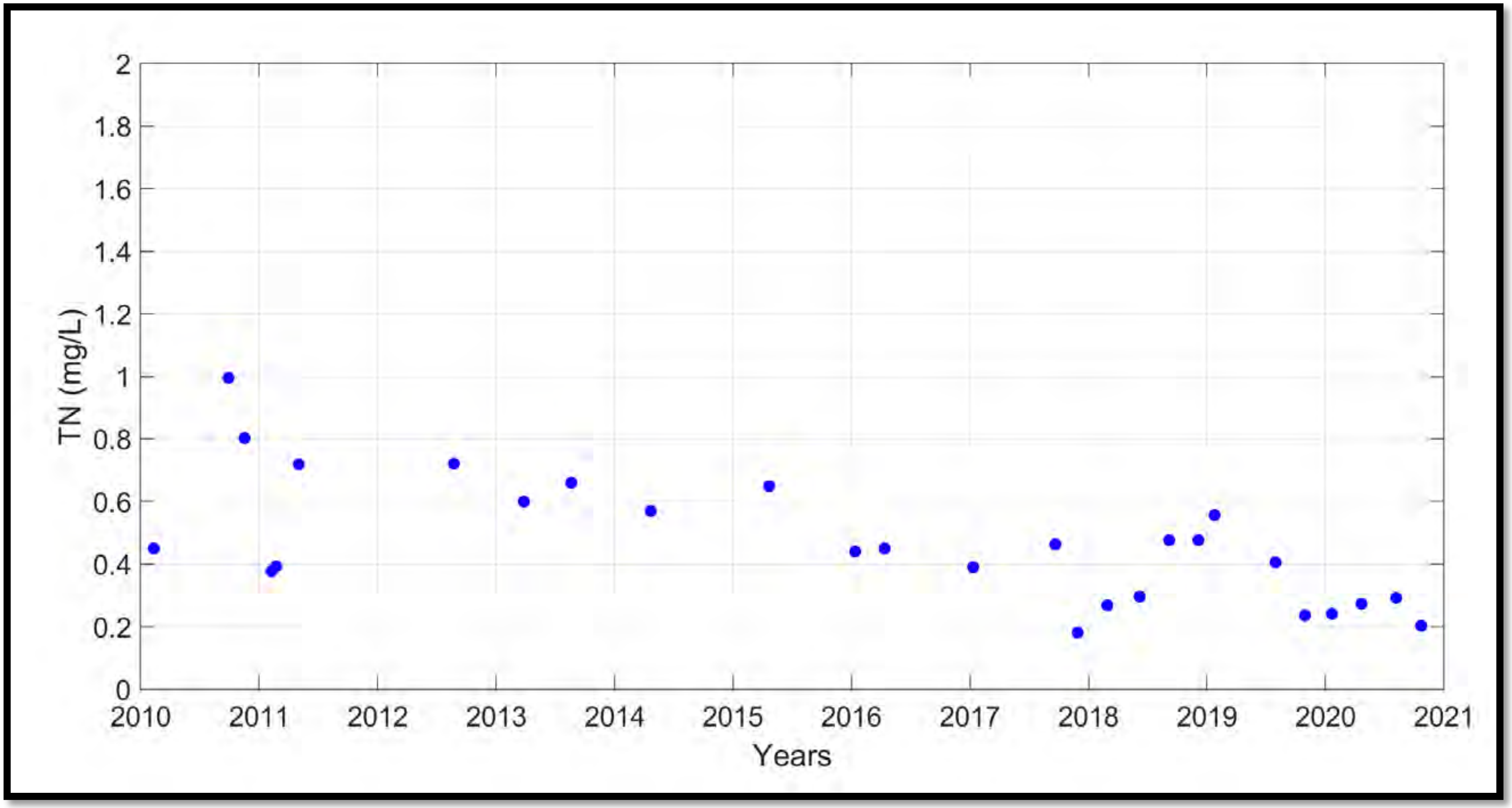


Figure 4-75: Plot of Measured TN in Summerbrook Creek

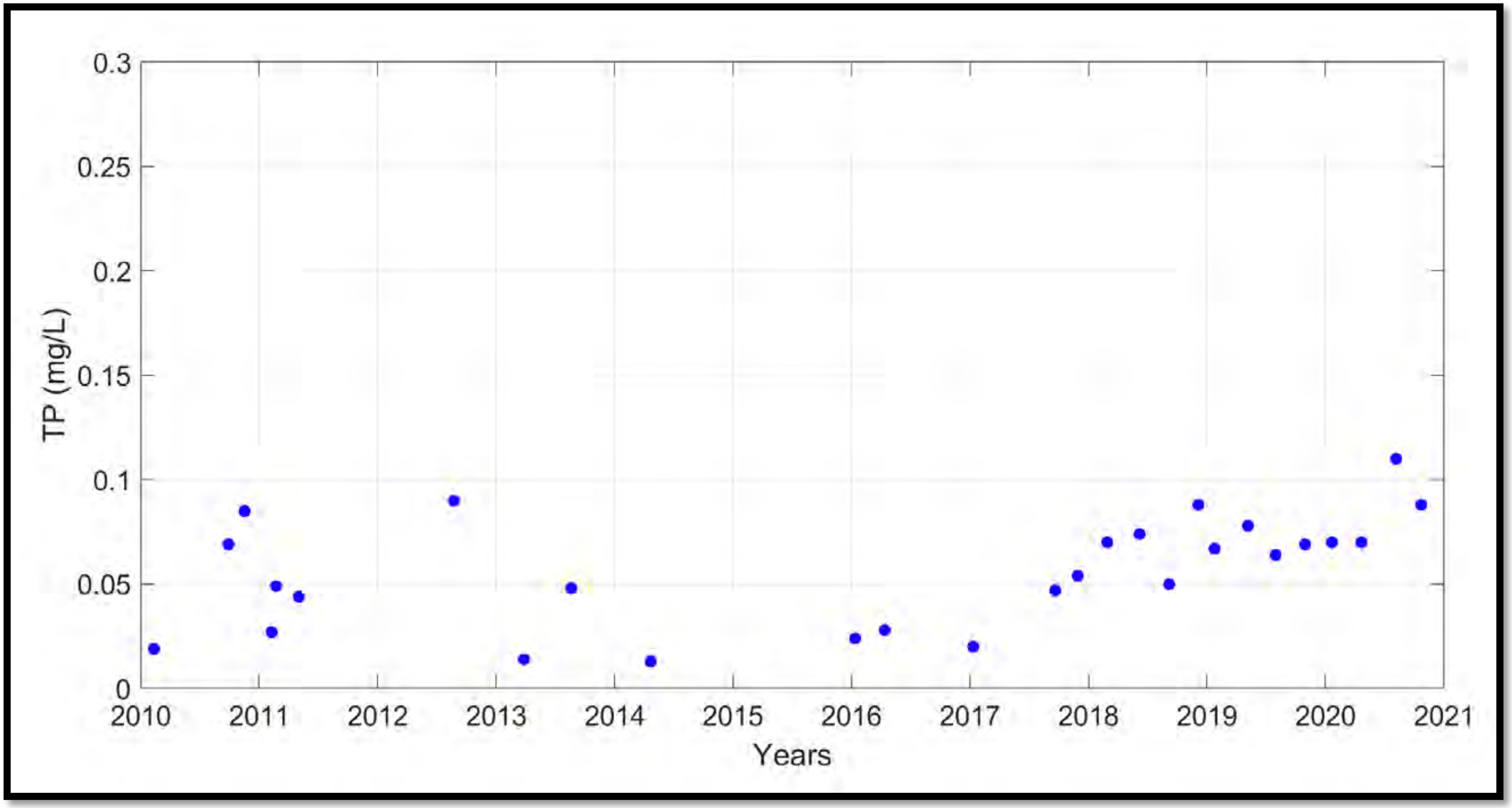


Figure 4-76: Plot of Measured TP in Summerbrook Creek

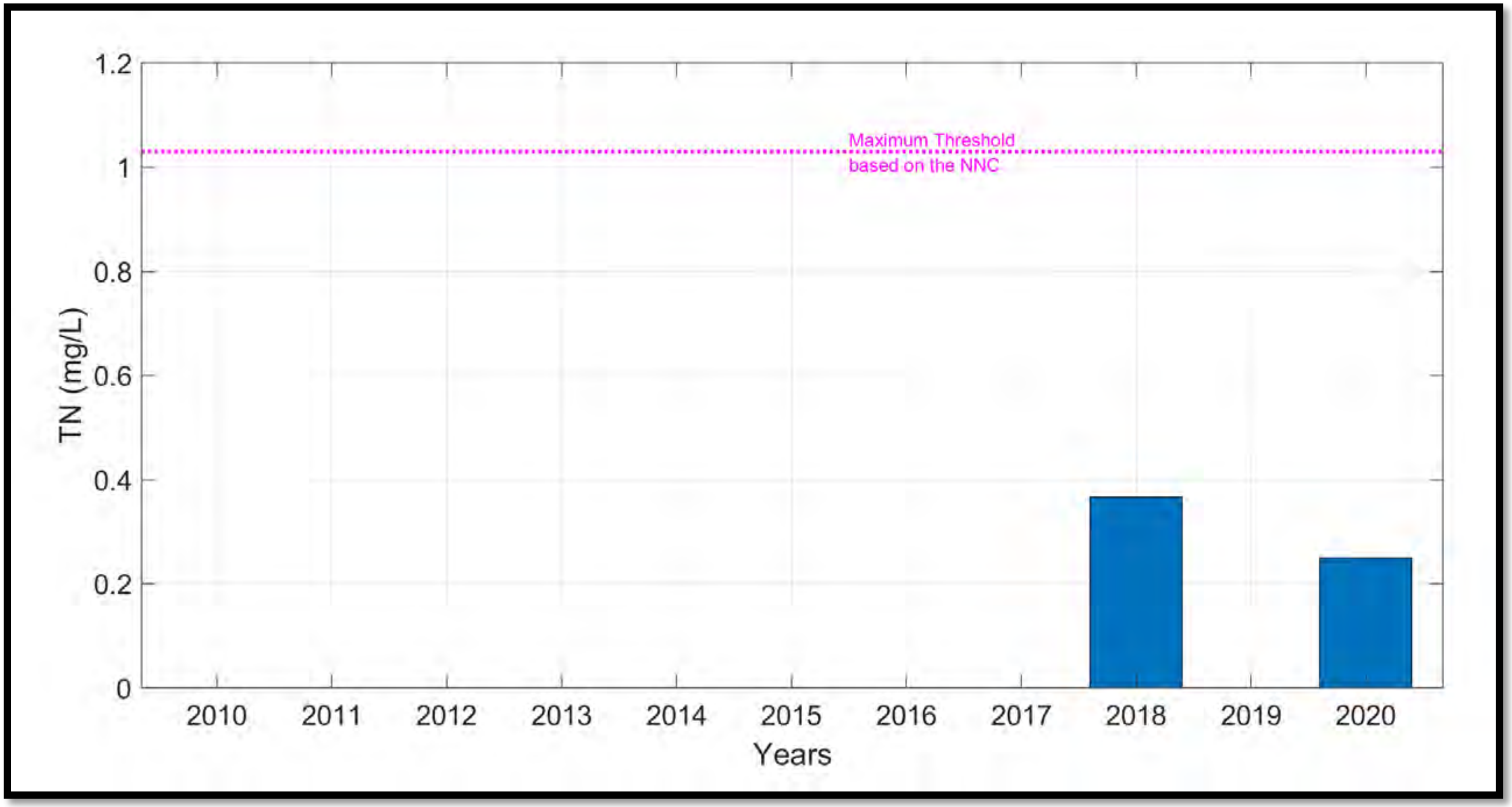


Figure 4-77: Plot of Annual Geometric Means for TN with NNC Criteria for Summerbrook Creek

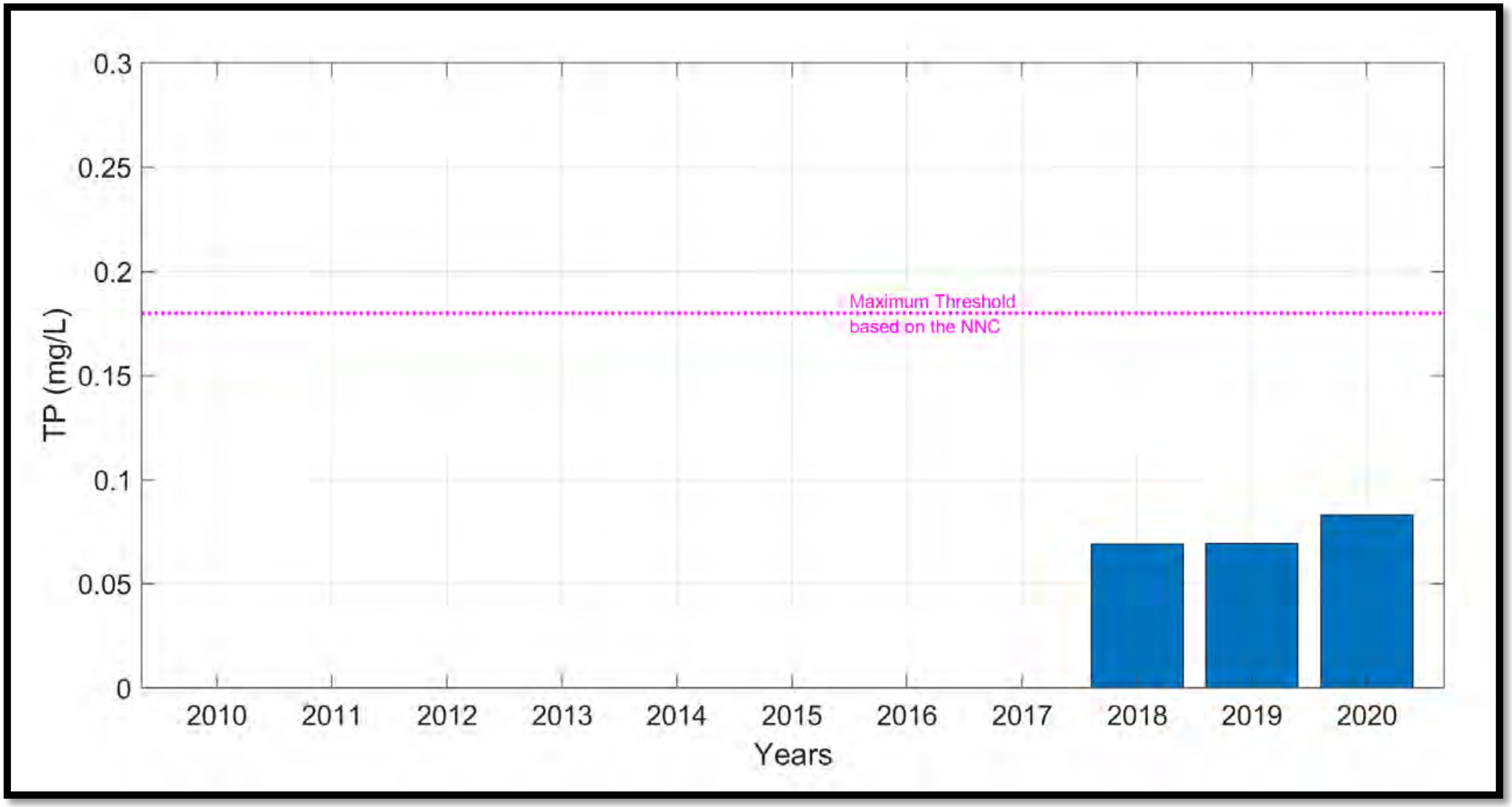


Figure 4-78: Plot of Annual Geometric Means for TP with NNC Criteria for Summerbrook Creek

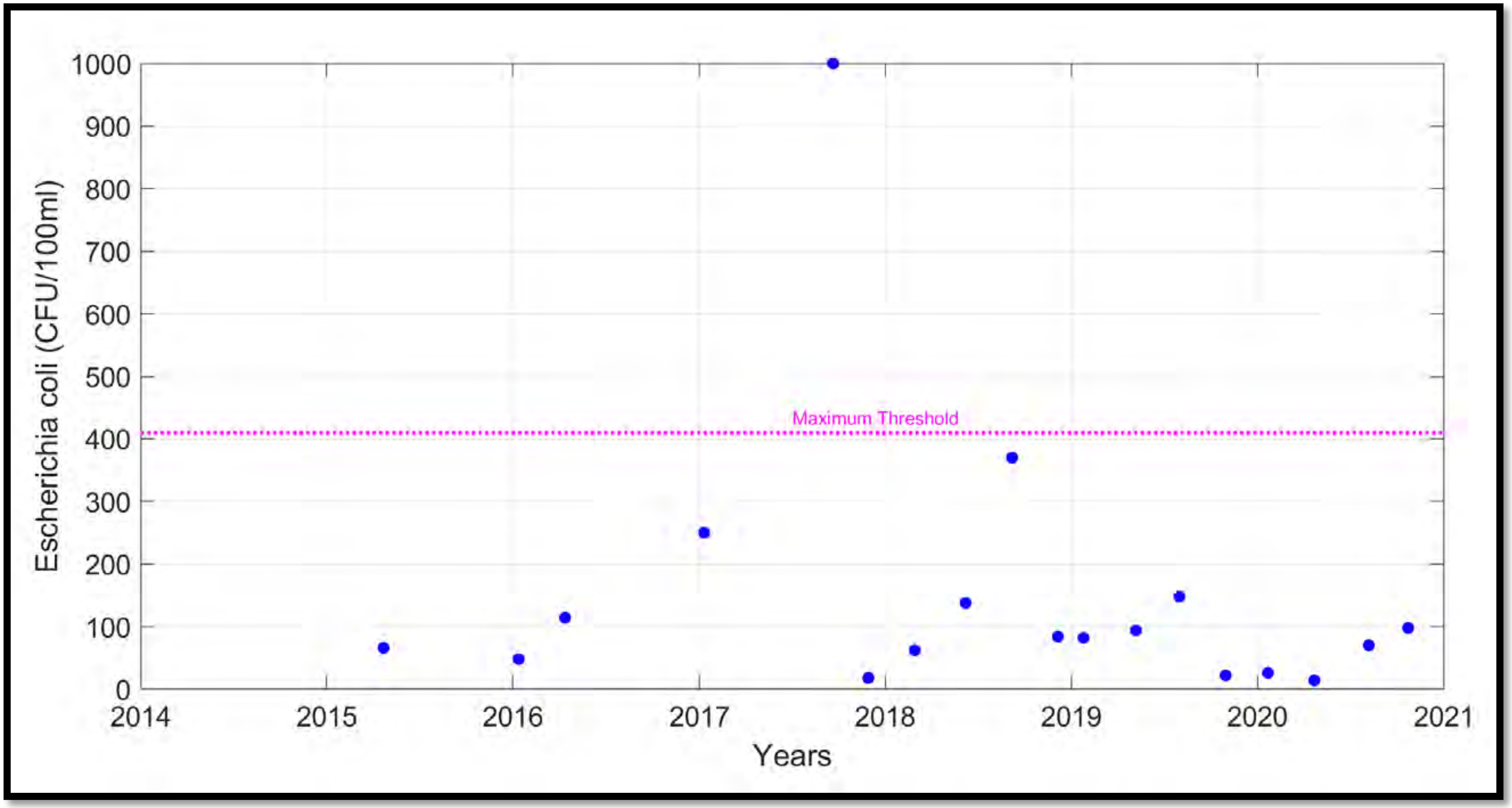


Figure 4-79: Plot of *E. coli* Measurements (2015 to 2020) in Summerbrook Creek

4.6.3.7 Groundwater Data

Presently, there are no identified surficial groundwater monitoring wells within the Summerbrook Creek basin.

4.6.3.8 Biological Data

Presently, no LVI or Stream Condition Index (SCI) data has been identified for the lakes and streams within the Summerbrook Creek basin.

4.6.3.9 Stormwater Treatment Facilities

Figure 4-80 presents a map showing the locations of stormwater treatment facilities throughout the Summerbrook Creek basin. Four Leon County stormwater ponds are located in the upper reaches of the basin along Bannerman Road and within a neighborhood off Glenn Oak Trail. South of Bannerman Road, there are multiple stormwater ponds scattered throughout the basin. These facilities are maintained by the City and private entities. Many of the City facilities are located around Lake Alyssa and Somerset Lake, providing treatment of stormwater prior to discharge into the lakes. The Summerbrooke neighborhood has an extensive swale system that provides conveyance and treatment of stormwater prior to discharge to Summerbrook Creek or the Summerbrook Chain of Lakes.

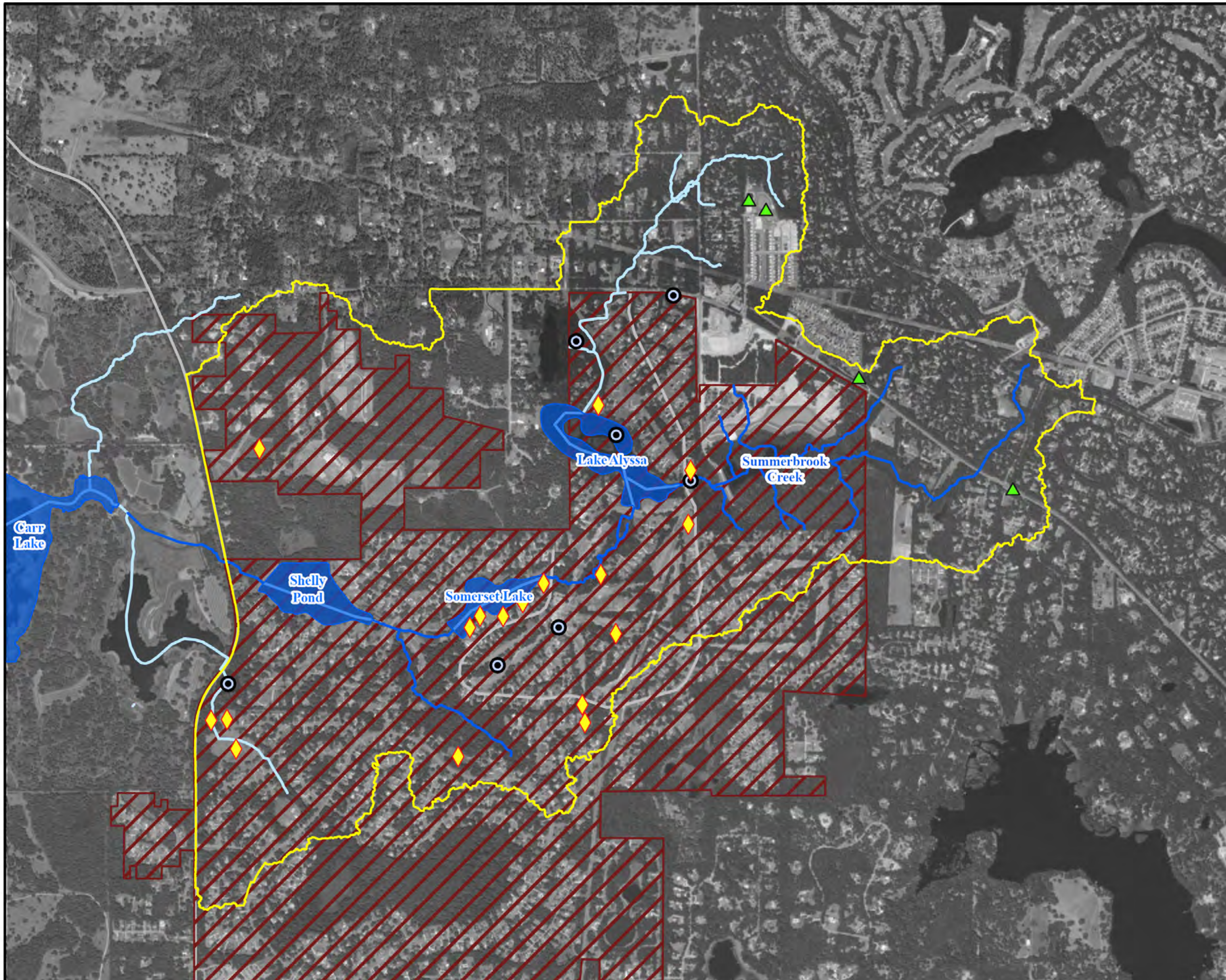
4.6.3.10 Atmospheric Deposition Data

Section 4.4.3.11 presented the location of the nearest atmospheric deposition station to the Lake Jackson basin. The data from this station will be utilized to calculate atmospheric deposition to the Summerbrook Chain of Lakes.

4.6.3.11 Data Summary

For the purposes of the qualitative analysis of sources of pollutants to Summerbrook Creek and the Summerbrook Chain of Lakes **(Section 4.6.4**), the available data are somewhat limited. No direct water quality measurements were provided for any of the lakes. The only available data were from Summerbrook Creek upstream, between, and downstream of the lakes, and at certain locations, these data were limited. The following outlines some specific data limitations. Specific recommendations on additional data collection efforts are provided in **Section 4.11**.

- No available in-lake water quality data for any of the three lakes.
- Data are not available for the flow in Summerbrook Creek or other hydrologic parameters (water levels).
- No data on potential internal recycling as a potential load to the lakes.
- No surficial aquifer measurements around the lake to assess potential seepage.



Sources:
Waterbodies: COT, 2020
Watercourses: COT, 2020
Drainage Basins: COT, 2022
Roads: COT-Leon County, 2023
City Limits: COT, 2020

Figure 4-80:
Summerbrook Creek Basin BMPs

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4.6.4 Qualitative Assessment of Sources

As outlined in previous sections, prior to performing loading calculations and other analyses to quantify existing pollutant sources to Summerbrook Creek and the Summerbrook Chain of Lakes (Lake Alyssa, Somerset Lake, and Shelly Pond), it is important to analyze available data and summarize findings from historical studies to support identification and magnitude of likely sources.

For Summerbrook Creek and the Summerbrook Chain of Lakes, the sources to be evaluated include the following:

- Stormwater runoff
- Septic systems
- Interconnected flows
- Internal recycling and seepage
- Wastewater
- Atmospheric deposition

An overview of analyses and findings for each source listed above is provided in the following sections. Prior to the discussions of each of the potential sources, additional analyses of the data collected along Summerbrook Creek are provided to build on the information presented in **Section 4.6.3.** Following the discussions for each source type, a summary of findings for the qualitative assessment is provided.

4.6.4.1 In-Stream Water Quality

Following the methodology utilized for the lakes, analyses were conducted on the available stream data from 2010 to the present. This provides an evaluation of the baseline water quality conditions and the spatial differences along the creek. The parameters analyzed include TP, TN, TSS, and *E. coli*.

As was done for the lakes, stations were clustered where they represent conditions within a specific area. The clustered data from 2010 to 2020 were then analyzed to provide the average of the annual geomeans or the 90th percentile, depending upon the parameter. The results are presented on a map, with colors representing the results. The levels associated with the colors are reflective of water quality thresholds as outlined in 62-302 F.A.C. for the freshwater stream criteria. For the parameters with freshwater stream criteria (TN, TP, and *E. coli*), the transition between orange and red was set at the criteria. The remaining transition levels are set at even increments from the criteria down to zero. For TSS, where there is no freshwater stream criteria, the ranges were set at levels that allow evaluation of the spatial differences between the clusters.

Figure 4-81 presents the data clustering used for the analyses and associated stations. For Summerbrook Creek, data since 2010 were available at three locations along the stream. Since each location had only one sampling station identified for data from 2010 forward, these three stations became the clusters. The locations include where the creek crosses Meridian Road just upstream of the discharge to Carr Lake (W), upstream of Lake Somerset (C), and in the upper portions of the watershed where the creek crosses Bannerman Road (E). Each station had data over different periods, with limited overlap between clusters, so the discussion of spatial differences must be evaluated with this understanding. The available data for the W station only had 1 year of data in 2011.

Figure 4-82 and **Figure 4-83** present the TN and TP results. First and foremost, it should be noted that the analyses for both TP and TN show that all stations are below the stream criteria. This is in line with the AGM plots presented in **Section 4.6.3.6**. Some potential spatial variation can be seen in the data that can be noted, such as higher TP levels further downstream.

Figure 4-84 presents a map of the TSS levels. The measured TSS levels were somewhat higher than those seen in the lake data as expected, but are generally low, i.e., below 10 mg/L.

Figure 4-85 presents a map of the *E. coli* levels. The data analyzed are from 2015 through 2020, and the data were analyzed to provide the 90th percentile to compare against the 410 MPN/100 mL criteria per the FDEP approach in the IWR analyses. The results show that the 90th percentile for the data at the upstream station (E) and just upstream of Lake Somerset are between 200 and 300 MPN/100 mL.

4.6.4.2 Stormwater Runoff

No data are available for the smaller tributaries flowing into Summerbrook Creek or into the Summerbrook Chain of Lakes, only data along Summerbrook Creek. To assess stormwater runoff as a potential source of pollutant loads to Summerbrook Creek, the Summerbrook Chain of Lakes, and ultimately to Carr Lake, the LDI levels within the Summerbrook Creek basin were evaluated. In **Section 4.4.4.2**, LDI values were presented by subbasin in **Figure 4-24**. The map showed that the LDI level in the Summerbrook Creek basin is moderate, indicating potential for pollutant loading from stormwater runoff. The data at present are well within the stream criteria, but TP concentrations were trending upward somewhat, which raises some concerns relative to future conditions. Additionally, the analyses of *E. coli* showed some elevated values. Presently, there is significant new development occurring in the upstream reaches of the basin that is not represented in the LDI calculations.

4.6.4.3 Septic Systems

Figure 4-73 resented the locations of septic systems within the Summerbrook Creek basin. **Figure 4-31** presented a map showing the septic tank densities by subbasin for the full Lake Jackson basin, including the Summerbrook Creek basin. The septic tank densities are elevated relative to downstream watersheds and, while the nutrient levels are low, *E. coli* levels are somewhat elevated based on the data presented in **Section 4.6.3.6.** This indicates that septic systems may be a potential source of pollutant loading to the system.

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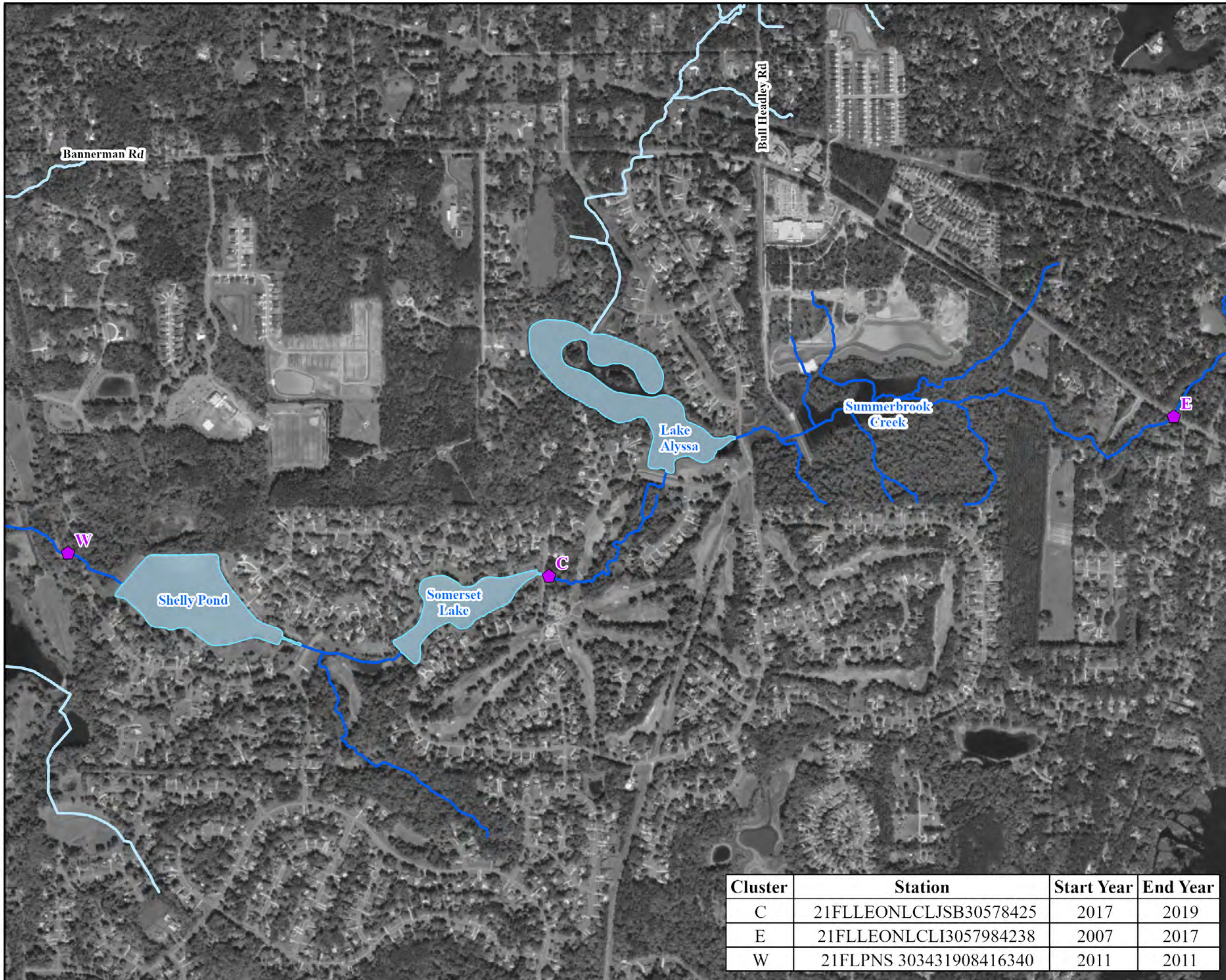


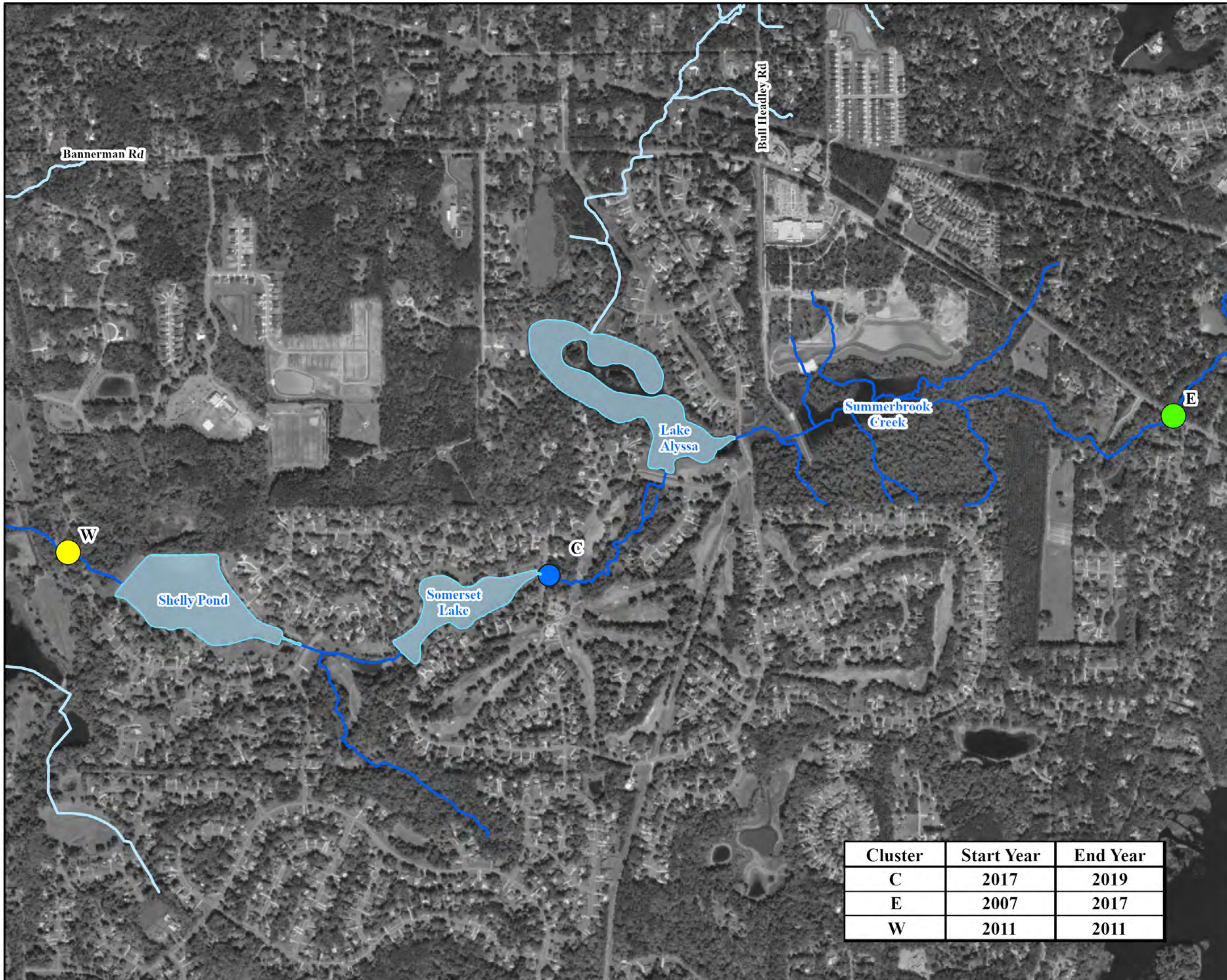
Cluster	Station	Start Year	End Year
C	21FLLEONLCLJSB30578425	2017	2019
E	21FLLEONLCLI3057984238	2007	2017
W	21FLPNS 303431908416340	2011	2011

Sources:
Waterbodies: COT, 2020
Watercourses: COT, 2020
Roads: COT-Leon County, 2023
Station Data: FDEP, 2021

Figure 4-81:
Station Clustering for Spatial Analyses of Summerbrook Creek

Tallahassee Master Plan - Surface Water (TMaPS)

Geosyntec consultants



Cluster	Start Year	End Year
C	2017	2019
E	2007	2017
W	2011	2011

CITY OF TALLAHASSEE

N

0 0.2

Miles

Legend

- Summerbrook Creek
- Summerbrook Chain of Lakes
- Watercourses

TN Average 2010-2020

mg/L

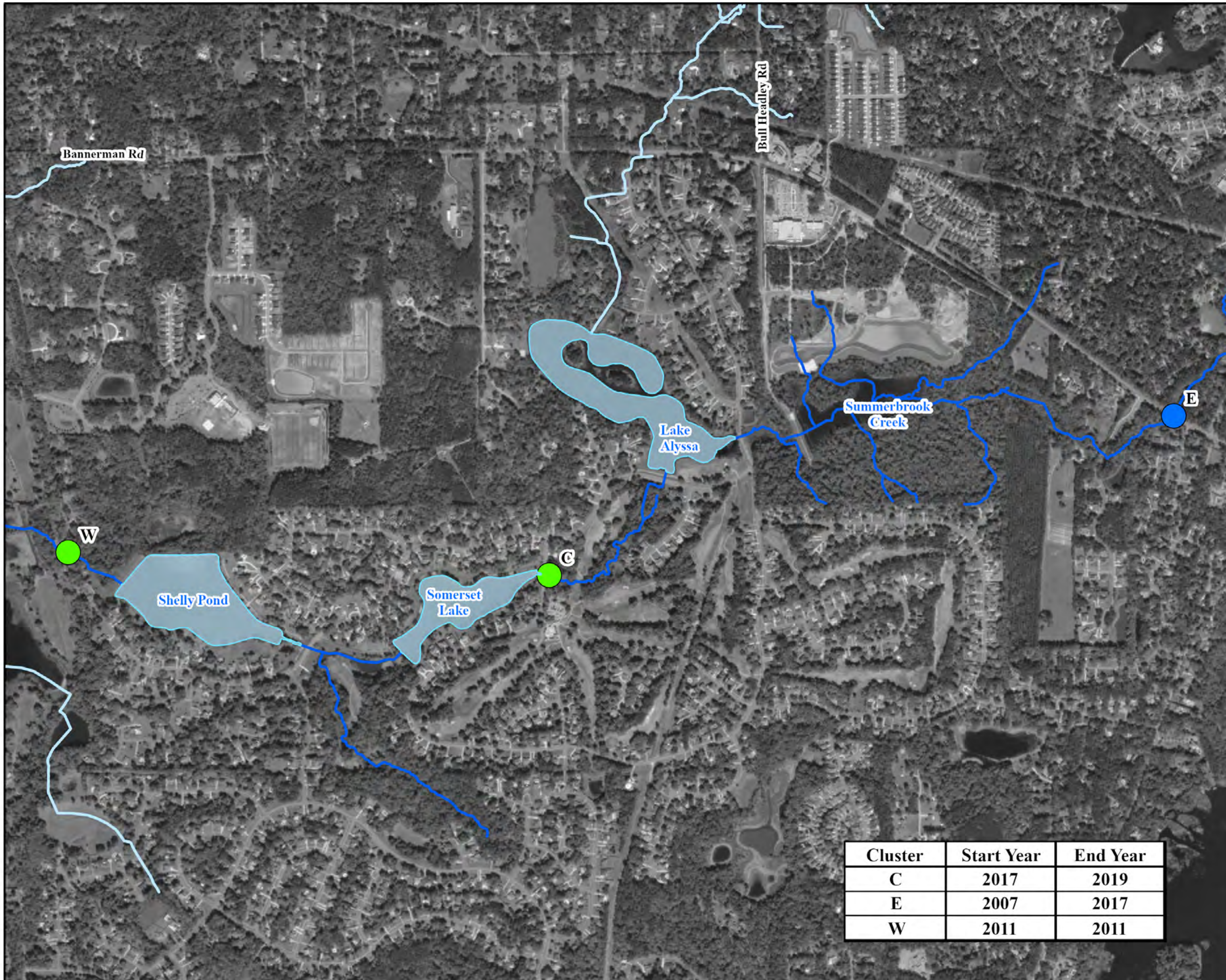
- 0- 0.2
- 0.25 - 0.50
- 0.50 - 0.75
- 0.75 - 1.03
- > 1.03

Sources:
Waterbodies: COT, 2020
Watercourses: COT, 2020
Roads: COT-Leon County, 2023
Station Data: FDEP, 2021

Figure 4-82:
Spatial Assessment of TN in Summerbrook Creek

Tallahassee Master Plan - Surface Water (TMaPS)

Geosyntec consultants



CITY OF TALLAHASSEE

N

0 0.2

Miles

Legend

- Summerbrook Creek
- Summerbrook Chain of Lakes
- Watercourses

TP Average 2010-2020

mg/L

- 0 - 0.045
- 0.045 - 0.090
- 0.090 - 0.135
- 0.135 - 0.180
- > .18

Sources:
Waterbodies: COT, 2020
Watercourses: COT, 2020
Roads: COT-Leon County, 2023
Station Data: FDEP, 2021

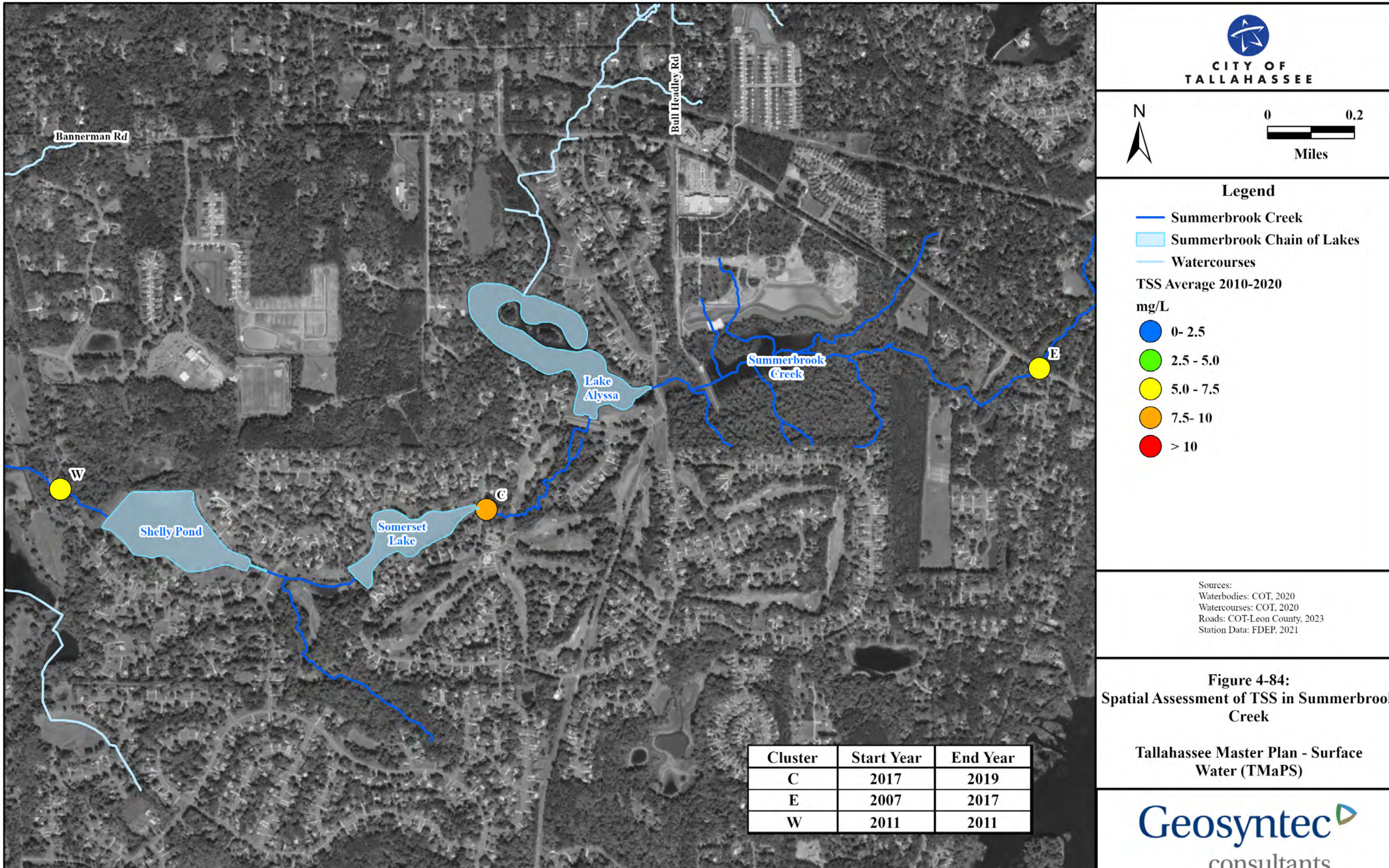
Cluster	Start Year	End Year
C	2017	2019
E	2007	2017
W	2011	2011

Figure 4-83:
Spatial Assessment of TP in Summerbrook Creek

Tallahassee Master Plan - Surface Water (TMaPS)

Geosyntec consultants

CITY OF TALLAHASSEE



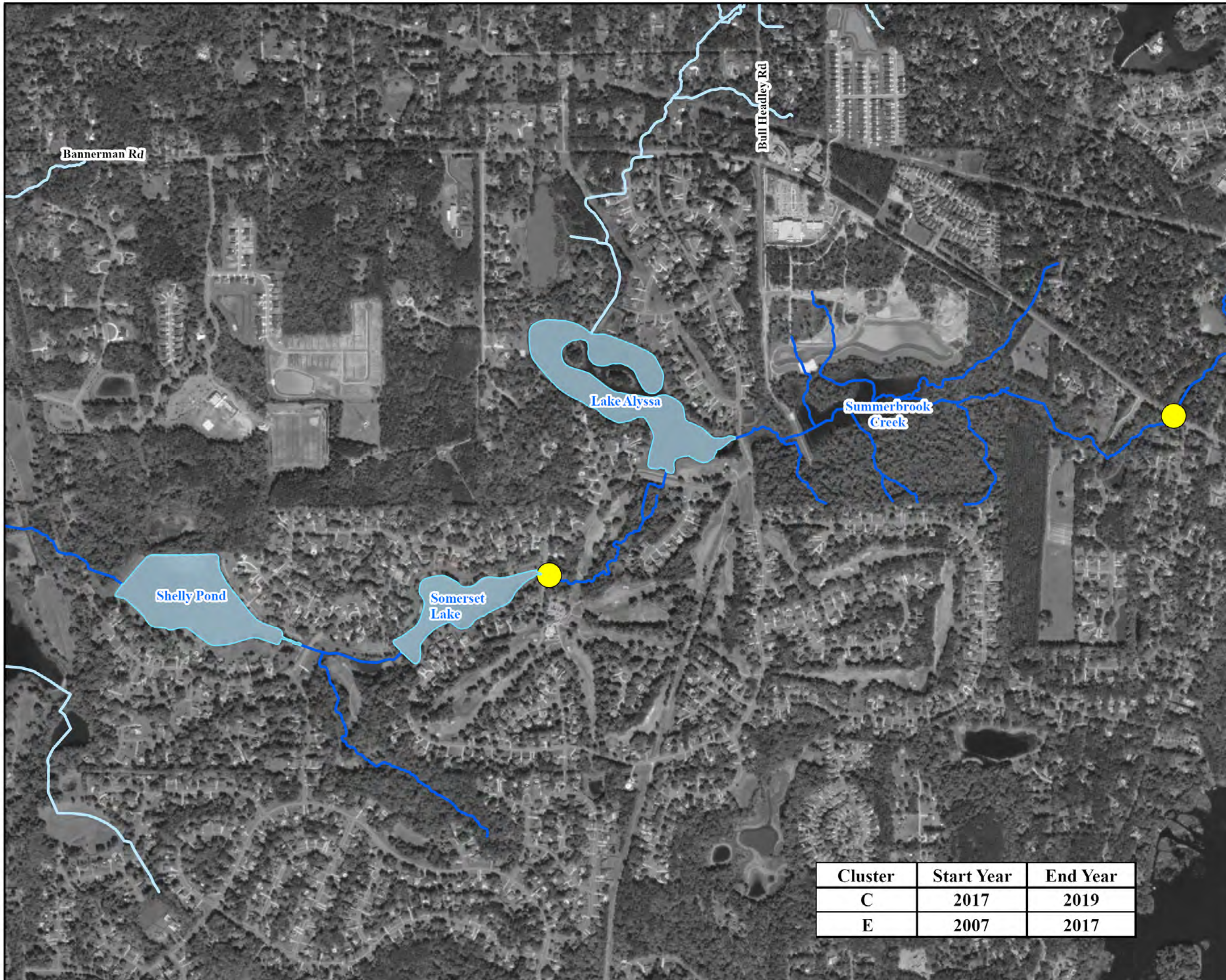
Cluster	Start Year	End Year
C	2017	2019
E	2007	2017
W	2011	2011

Sources:
Waterbodies: COT, 2020
Watercourses: COT, 2020
Roads: COT-Leon County, 2023
Station Data: FDEP, 2021

Figure 4-84:
Spatial Assessment of TSS in Summerbrook Creek

Tallahassee Master Plan - Surface Water (TMaPS)

Geosyntec consultants



Cluster	Start Year	End Year
C	2017	2019
E	2007	2017

CITY OF TALLAHASSEE

N

0 0.2 Miles

Legend

- Summerbrook Creek
- Summerbrook Chain of Lakes
- Watercourses

E. coli 90th Percentile 2010-2020 MPN/100mL

- 0 - 100
- 100 - 200
- 200 - 300
- 300 - 410
- > 410

Sources:
Waterbodies: COT, 2020
Watercourses: COT, 2020
Roads: COT-Leon County, 2023
Station Data: FDEP, 2021

Figure 4-85: Spatial Assessment of E. coli in Summerbrook Creek

Tallahassee Master Plan - Surface Water (TMaPS)

Geosyntec consultants

4.6.4.4 Internal Recycling and Seepage

Internal Recycling

To date, no studies or data collection efforts have been undertaken to assess the potential for benthic fluxes as a source of nutrients to the lakes. Generally, low nutrient levels in the available stream measurements would indicate that internal loading is not significant. But based on the lack of measured data in the lakes, increasing trends in the TP data in the creek, and the uses of the lakes for stormwater retention, this loading should be considered a potential source for further evaluation.

Seepage

As outlined in **Section 4.6.3.7**, there are no surficial aquifer sampling sites identified within the Summerbrook Creek basin to provide potential for seepage to contribute to the loading to the creek and lakes. It should be noted that based on the soil types in this basin, sub-surface transmissivity levels are expected to be low, impeding transport of pollutants through seepage. Thus, seepage is not likely a significant source of nutrients to Summerbrook Creek and the Summerbrook Chain of Lakes.

4.6.4.5 Wastewater

Within the Summerbrook Creek basin, there currently are no direct wastewater discharges. Additionally, no areas in the Lake Jackson basin currently have reuse discharges. **Figure 4-32** presented a map of the Lake Jackson basin boundaries and subbasins in relation to sewer service areas and sewer infrastructure. Presently, 63 percent of the Summerbrook Creek basin has sewer infrastructure. As was noted for the septic systems, while nutrient levels in the stream are low, *E. coli* levels are somewhat elevated, identifying the potential for wastewater infrastructure as a source of pollutant loads.

4.6.4.6 Atmospheric Deposition

For the Summerbrook Chain of Lakes, the ratio of the watershed area to lake area is around 33:1. With this ratio and the potential attenuation of rainfall runoff due to upstream BMPs, direct atmospheric deposition to the lakes can play a role in overall loading, especially for nitrogen. Atmospheric deposition will be accounted for both indirectly within stormwater runoff and directly as loads to the lake surfaces. **Section 4.6.3.10** identified the nearest atmospheric deposition station as the Quincy station (FL14) (**Figure 4-15**).

4.6.4.7 Interconnected Flows

Within the Summerbrook Chain of Lakes, Lake Alyssa is the most upstream waterbody and discharges directly into Somerset Lake. Somerset Lake then flows into Shelly Pond. The upstream lakes have the potential to contribute to nutrient loading and be a source to consider for the downstream lakes.

Lake Alyssa has a surface area of about 36 acres and is located within an area that is an even mix of residential land use and upland hardwood forest. Lake Alyssa discharges from its southern end into a stream that flows over 2,500 ft and into the easternmost point of Somerset Lake. Currently there is no in-lake water quality data for Lake Alyssa to make a determination on its potential as a source of pollutants to Somerset Lake. However, while there are no data in Lake Alyssa, there is a water quality station for Summerbrook Creek upstream of Somerset Lake and downstream of Lake Alyssa. In **Section 4.6.3.6**, the data at the station between the two lakes was analyzed and the data did not indicate high nutrient concentrations but did show an increasing trend in TP. The data also showed elevated *E. coli* levels. Based on the surrounding land uses, increasing TP levels and the presence of elevated FIB levels, this connection is identified as a potential source for loading to Somerset Lake.

Somerset Lake has a surface area of about 12.5 acres and is located within an area that is predominantly surrounded by residential land use. Water discharges from the western portion of the lake and flows through over 1,200 ft of stream before inflowing to the eastern side of Shelly Pond. There is currently no in-lake water quality data in Somerset Lake. Furthermore, historical water quality stations along Summerbrook Creek do not include the segment connection between Shelly Pond and Somerset Lake. Based on the lack of water quality data, surrounding land uses, and determinations made based on upstream data, this connection is identified as a potential source of pollutant loads to Shelly Pond.

4.6.4.8 Summary of Findings

Based on the discussions above and data and information presented in **Section 4.6.3**, there are various potential sources of pollutant loads to the Summerbrook Chain of Lakes. The primary constituent of concern is FIB given elevated *E. coli* levels, but TP data is also showing a somewhat concerning increasing trend.

Stormwater runoff contributing to tributary inflow and septic appear significant and are quantified as part of this study. Interconnected flow, internal recycling, seepage, and wastewater are not quantified due to data limitations, but may warrant further evaluation as part of future studies. Direct atmospheric load to the lakes is identified as a potential source and the loads calculated as part of this study.

4.6.5 Calculation of Potential Nutrient Loads

This section presents calculations of potential nutrient (TN and TP) loads to Summerbrook Creek and the Summerbrook Chain of Lakes for the sources identified for calculation in **Section 4.6.4.8** These include stormwater runoff, septic systems, and atmospheric deposition. Where loads were not calculated the sections below provide brief discussions. The load calculations are for the purpose of comparing the potential magnitudes of each source relative to one another to support determination of sources to target for load reduction.

4.6.5.1 Stormwater Pollutant Load

To calculate the stormwater TN and TP loads to the Summerbrook Chain of Lakes, average annual pollutant load modeling was performed. The goal was to identify outfalls that are contributing higher TN and TP loads relative to one another and to quantify the total TN and TP loads to each of the lakes (Lake Alyssa, Somerset Lake, and Shelly Pond). TN and TP loads were calculated using the SIMPLE-Seasonal model. The model methodology was described in detail in **Section 4.4.5.1** for the stormwater loads to Lake Jackson.

Figure 4-86 presents the subbasins and the DEM utilized in the SIMPLE model calculations for the Summerbrook Chain of Lakes. **Figure 4-87** presents the aggregated land use. Finally, **Figure 4-88** presents the CDAs for the Chain of Lakes stormwater loading to define total and per acre TN and TP loads, as well as the ranking of CDAs around the lakes.

<u>Stormwater Nutrient Loads to Summerbrook Chain of Lakes</u>

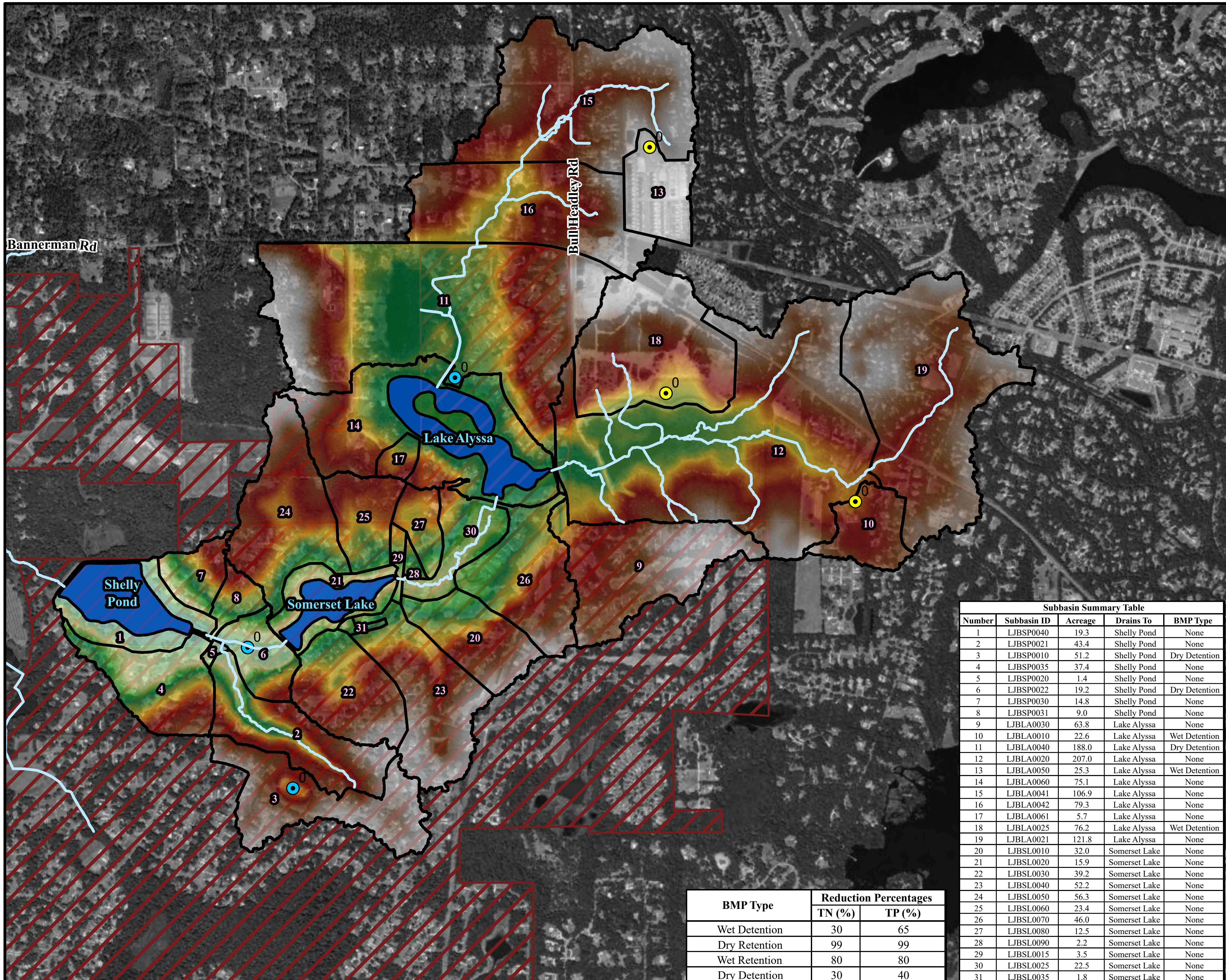
Figure 4-89 presents the distribution of the ranking of the CDAs for TN along with the total load and per acre loads for each waterbody (see the tables on **Figure 4-89**). The rankings are color coded with the highest ranked CDAs (by waterbody) in dark green moving down to the lowest ranked in pale yellow. The calculated total stormwater TN loads from the CDAs ranged from as low as 7.5 lb/yr up to 1,059.0 lb/yr. The per acre loads ranged from 2.0 lb/acre/yr up to 5.8 lb/acre/yr. The highest ranked CDAs were located along the southeastern side of the chain of lakes. This is likely a function of the size of the CDAs in that area along with the presence of recreational land use (associated with a golf course) in the more southern ones. The per acre loads are higher than more natural areas such as those surrounding Carr Lake. The total potential stormwater runoff loads for TN for Lake Alyssa, Somerset Lake and Shelly Pond are 2,482 lb/yr, 1,365 lb/yr, and 560 lb/yr, respectively.

Figure 4-90 presents the distribution of the ranking of the CDAs for TP along with the total load and per acre loads for each waterbody (see the tables on **Figure 4-90**). The calculated total stormwater TP loads from the CDAs ranged from as low as 2.1 lb/yr up to 210.0 lb/yr. The per acre loads ranged from 0.4 lb/acre/yr up to 2.0 lb/acre/yr. As was seen for the TN, the highest ranked CDAs were located primarily in the areas southeast of the lakes in the area of the recreational land use. TP per acre loads were higher throughout the CDAs draining to the chain of lakes in comparison to those seen in more natural areas. The total potential stormwater runoff loads for TP for Lake Alyssa, Somerset Lake and Shelly Pond are 541 lb/yr, 450 lb/yr, and 149 lb/yr, respectively.

4.6.5.2 Septic Load

In order to analyze the potential impacts from septic tank units to Summerbrook Creek and the Summerbrook Chain of Lakes, the SPIL method adopted by FDEP was utilized to quantify the potential septic load. The calculations were done for each of the three waterbodies in this area (Lake Alyssa, Somerset Lake, and Shelly Pond). The approach and calculations were described earlier in **Section 4.4.5.2,** which presented the septic loading to Lake Jackson. As outlined earlier, the calculations were only done for nitrogen (TN), and based on literature on transport and assimilation, may represent a conservative potential load.

An estimated 272 septic tank units were identified within 200 meters of Summerbrook Creek, Summerbrook Chain of Lakes, and associated tributaries. **Figure 4-91** shows the septic systems utilized in the analyses with those associated with direct loading to the waterbody green and those associated with loading to tributaries pink. Tables provided on the figure summarize the calculated nutrient load from septic units to each of the three waterbodies (Lake Alyssa, Somerset Lake, and Shelly Pond). The total TN load to Lake Alyssa is 2801 lb/yr with 2,725 lb/yr of that total load coming from tributaries. The total TN load to Somerset Lake is 0 lb/yr. The TN load to Shelly Pond is 141 lb/yr with 108 lb/yr from direct loading to the lake.



Subbasin Summary Table				
Number	Subbasin ID	Acreage	Drains To	BMP Type
1	LJBSP0040	19.3	Shelly Pond	None
2	LJBSP0021	43.4	Shelly Pond	None
3	LJBSP0010	51.2	Shelly Pond	Dry Detention
4	LJBSP0035	37.4	Shelly Pond	None
5	LJBSP0020	1.4	Shelly Pond	None
6	LJBSP0022	19.2	Shelly Pond	Dry Detention
7	LJBSP0030	14.8	Shelly Pond	None
8	LJBSP0031	9.0	Shelly Pond	None
9	LJBLA0030	63.8	Lake Alyssa	None
10	LJBLA0010	22.6	Lake Alyssa	Wet Detention
11	LJBLA0040	188.0	Lake Alyssa	Dry Detention
12	LJBLA0020	207.0	Lake Alyssa	None
13	LJBLA0050	25.3	Lake Alyssa	Wet Detention
14	LJBLA0060	75.1	Lake Alyssa	None
15	LJBLA0041	106.9	Lake Alyssa	None
16	LJBLA0042	79.3	Lake Alyssa	None
17	LJBLA0061	5.7	Lake Alyssa	None
18	LJBLA0025	76.2	Lake Alyssa	Wet Detention
19	LJBLA0021	121.8	Lake Alyssa	None
20	LJBSL0010	32.0	Somerset Lake	None
21	LJBSL0020	15.9	Somerset Lake	None
22	LJBSL0030	39.2	Somerset Lake	None
23	LJBSL0040	52.2	Somerset Lake	None
24	LJBSL0050	56.3	Somerset Lake	None
25	LJBSL0060	23.4	Somerset Lake	None
26	LJBSL0070	46.0	Somerset Lake	None
27	LJBSL0080	12.5	Somerset Lake	None
28	LJBSL0090	2.2	Somerset Lake	None
29	LJBSL0015	3.5	Somerset Lake	None
30	LJBSL0025	22.5	Somerset Lake	None
31	LJBSL0035	1.8	Somerset Lake	None

BMP Type	Reduction Percentages	
	TN (%)	TP (%)
Wet Detention	30	65
Dry Retention	99	99
Wet Retention	80	80
Dry Detention	30	40

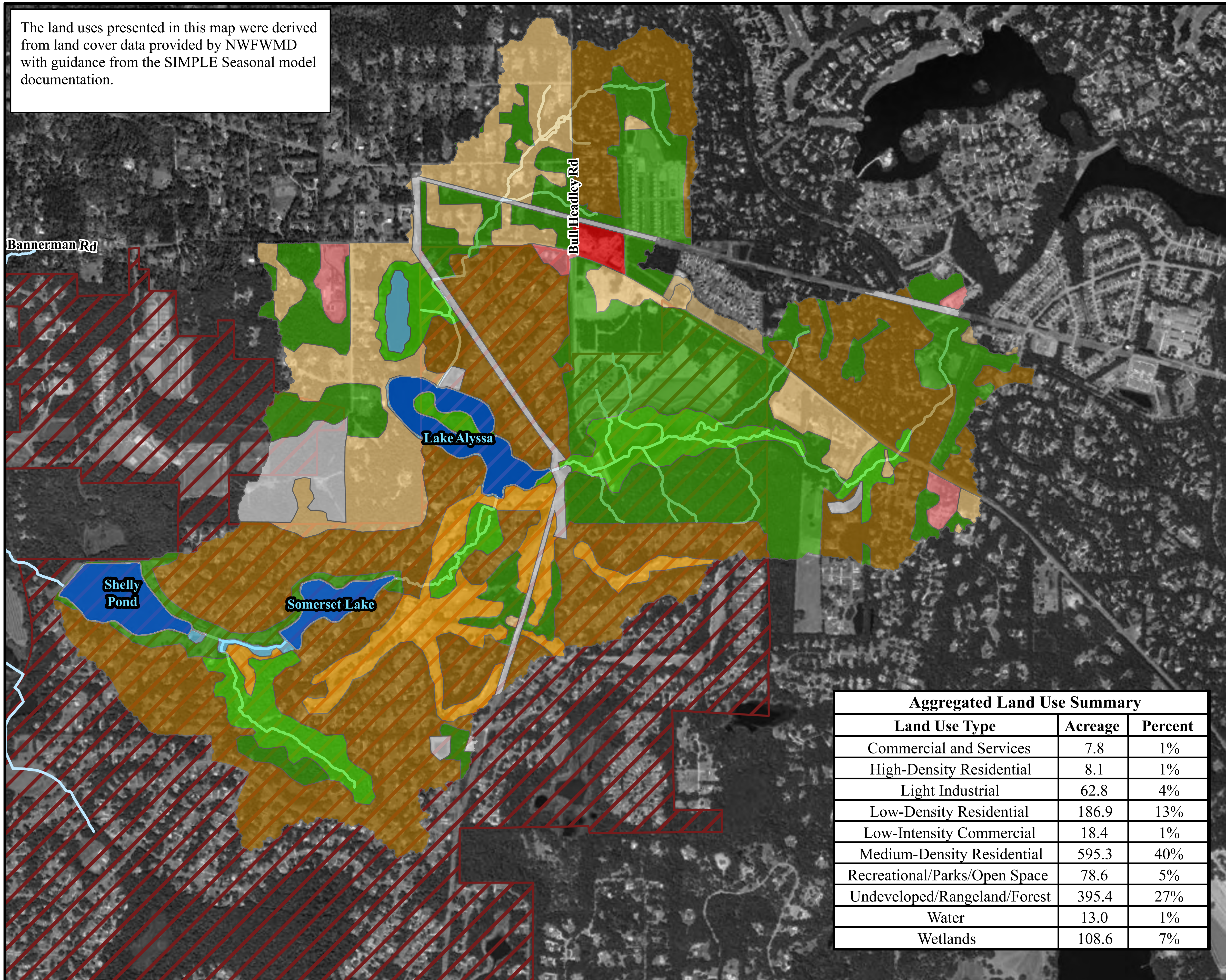
Sources:
Waterbodies: COT, 2020
Watercourses: COT, 2020
Subbasins: Geosyntec, 2023
Roads: COT-Leon County, 2023
BMPs: Geosyntec, 2023
Elevation: COT-Leon County, 2018
City Limits, COT, 2020

Figure 4-86: Summerbrook Chain of Lakes Subbasin Delineation and BMPs

Tallahassee Master Plan - Surface Water (TMaPS)

Geosyntec consultants

The land uses presented in this map were derived from land cover data provided by NWFWMD with guidance from the SIMPLE Seasonal model documentation.



Aggregated Land Use Summary

Land Use Type	Acreage	Percent
Commercial and Services	7.8	1%
High-Density Residential	8.1	1%
Light Industrial	62.8	4%
Low-Density Residential	186.9	13%
Low-Intensity Commercial	18.4	1%
Medium-Density Residential	595.3	40%
Recreational/Parks/Open Space	78.6	5%
Undeveloped/Rangeland/Forest	395.4	27%
Water	13.0	1%
Wetlands	108.6	7%

CITY OF TALLAHASSEE

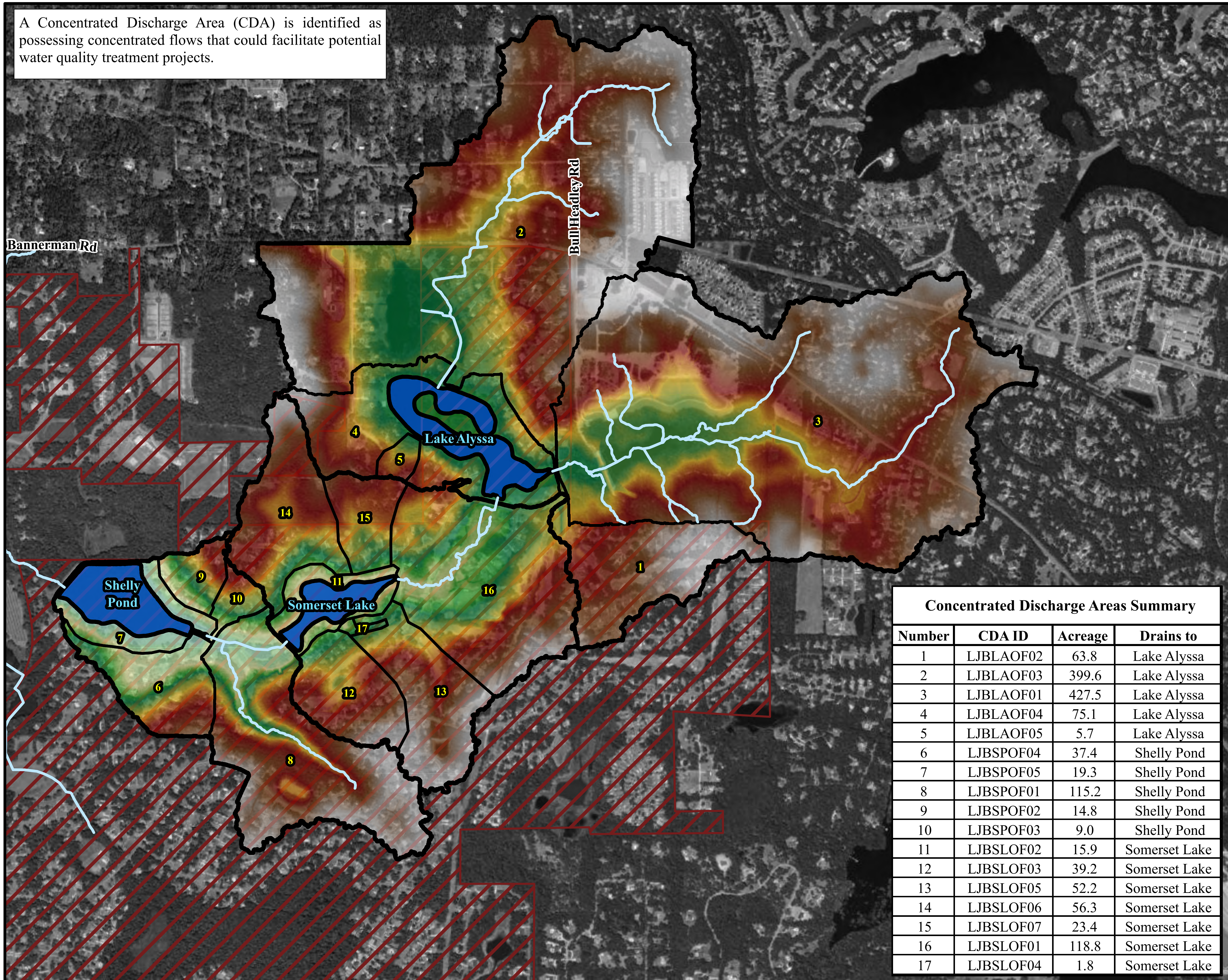
Sources:
Waterbodies: COT, 2020
Land Use: Geosyntec, 2023
Roads: COT-Leon County, 2023
City Limits, COT, 2020

Figure 4-87:
Summerbrook Chain of Lakes Aggregated Land Use

Tallahassee Master Plan - Surface Water (TMaPS)

Geosyntec consultants

A Concentrated Discharge Area (CDA) is identified as possessing concentrated flows that could facilitate potential water quality treatment projects.



CITY OF TALLAHASSEE

N

0 0.2

Miles

Legend

- Summerbrook Chain of Lakes
- Concentrated Discharge Area
- Watercourses
- Tallahassee Corporate Limits

Topographic Elevations

ft NAVD88

252

108

Concentrated Discharge Areas Summary

Number	CDA ID	Acreage	Drains to
1	LJBLAOF02	63.8	Lake Alyssa
2	LJBLAOF03	399.6	Lake Alyssa
3	LJBLAOF01	427.5	Lake Alyssa
4	LJBLAOF04	75.1	Lake Alyssa
5	LJBLAOF05	5.7	Lake Alyssa
6	LJBSPOF04	37.4	Shelly Pond
7	LJBSPOF05	19.3	Shelly Pond
8	LJBSPOF01	115.2	Shelly Pond
9	LJBSPOF02	14.8	Shelly Pond
10	LJBSPOF03	9.0	Shelly Pond
11	LJBSLOF02	15.9	Somerset Lake
12	LJBSLOF03	39.2	Somerset Lake
13	LJBSLOF05	52.2	Somerset Lake
14	LJBSLOF06	56.3	Somerset Lake
15	LJBSLOF07	23.4	Somerset Lake
16	LJBSLOF01	118.8	Somerset Lake
17	LJBSLOF04	1.8	Somerset Lake

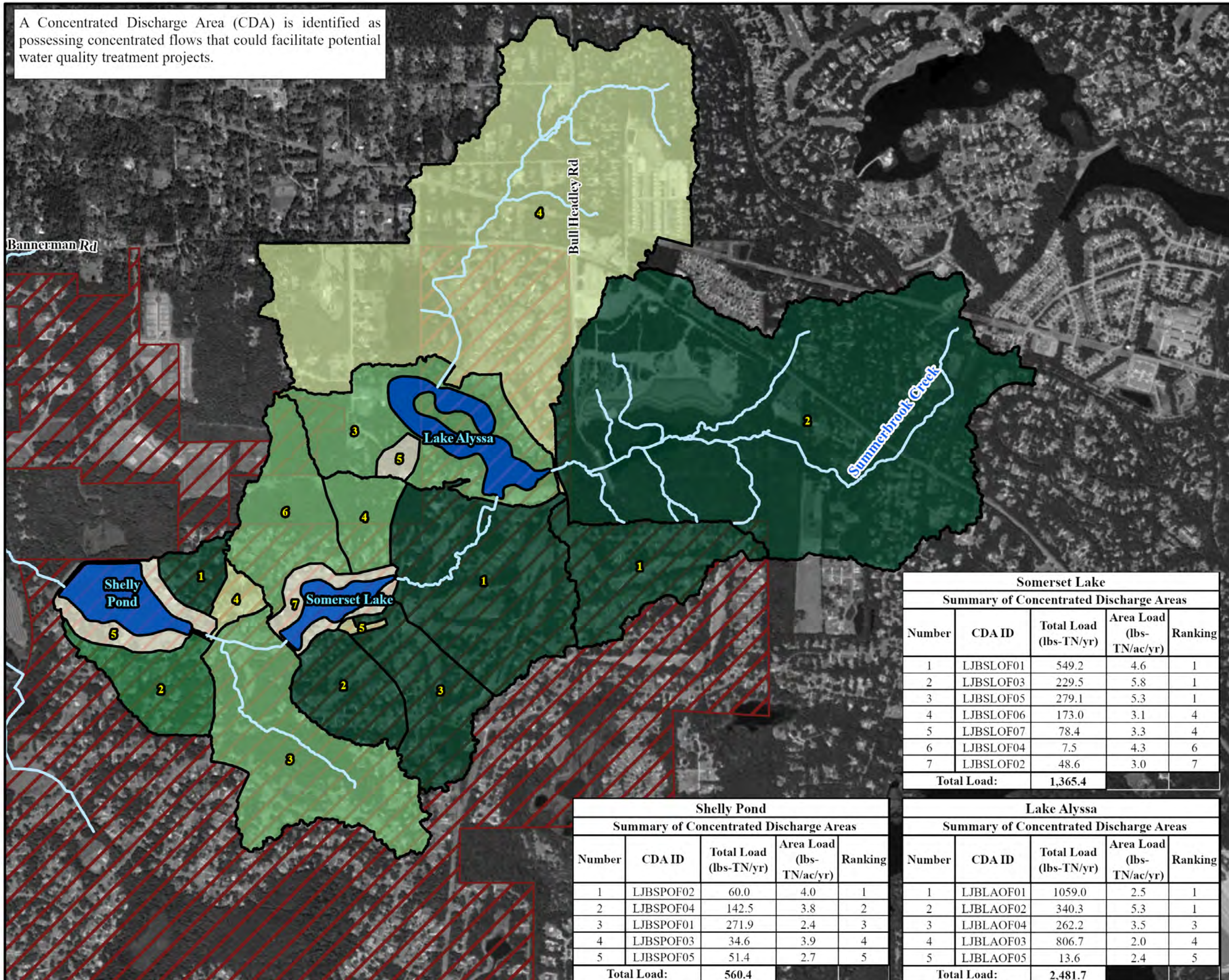
Sources:
Waterbodies: COT, 2020
Flowlines: USGS, 2020
CDAs: Geosyntec, 2023
Roads: COT-Leon County, 2023
Elevation: COT-Leon County, 2018
City Limits, COT, 202

Figure 4-88:
Summerbrook Chain of Lakes
Concentrated Discharge Areas

Tallahassee Master Plan - Surface Water (TMaPS)

Geosyntec consultants

A Concentrated Discharge Area (CDA) is identified as possessing concentrated flows that could facilitate potential water quality treatment projects.



Somerset Lake				
Summary of Concentrated Discharge Areas				
Number	CDA ID	Total Load (lbs-TN/yr)	Area Load (lbs-TN/ac/yr)	Ranking
1	LJBSLOF01	549.2	4.6	1
2	LJBSLOF03	229.5	5.8	1
3	LJBSLOF05	279.1	5.3	1
4	LJBSLOF06	173.0	3.1	4
5	LJBSLOF07	78.4	3.3	4
6	LJBSLOF04	7.5	4.3	6
7	LJBSLOF02	48.6	3.0	7
Total Load:		1,365.4		

Shelly Pond				
Summary of Concentrated Discharge Areas				
Number	CDA ID	Total Load (lbs-TN/yr)	Area Load (lbs-TN/ac/yr)	Ranking
1	LJBSPOF02	60.0	4.0	1
2	LJBSPOF04	142.5	3.8	2
3	LJBSPOF01	271.9	2.4	3
4	LJBSPOF03	34.6	3.9	4
5	LJBSPOF05	51.4	2.7	5
Total Load:		560.4		

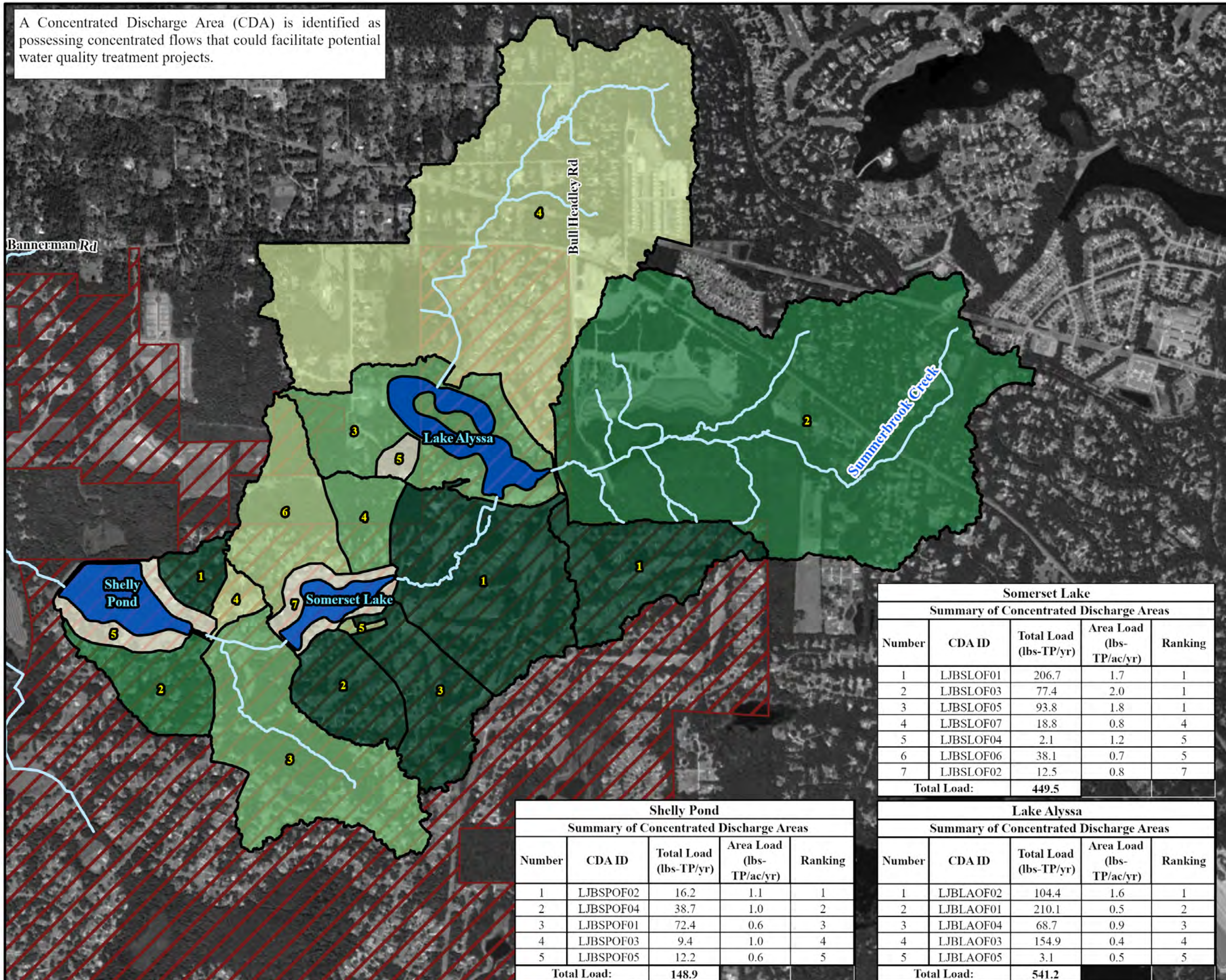
Lake Alyssa				
Summary of Concentrated Discharge Areas				
Number	CDA ID	Total Load (lbs-TN/yr)	Area Load (lbs-TN/ac/yr)	Ranking
1	LJBLAOF01	1059.0	2.5	1
2	LJBLAOF02	340.3	5.3	1
3	LJBLAOF04	262.2	3.5	3
4	LJBLAOF03	806.7	2.0	4
5	LJBLAOF05	13.6	2.4	5
Total Load:		2,481.7		

Sources:
Waterbodies: COT, 2020
Flowlines: USGS, 2022
CDAs: Geosyntec, 2023
Roads: COT-Leon County, 2023
City Limits, COT, 202

Figure 4-89: Summerbrook Chain of Lakes Concentrated Discharge Areas Total Nitrogen

Tallahassee Master Plan - Surface Water (TMaPS)

Geosyntec consultants



Somerset Lake				
Summary of Concentrated Discharge Areas				
Number	CDA ID	Total Load (lbs-TP/yr)	Area Load (lbs-TP/ac/yr)	Ranking
1	LJBSLOF01	206.7	1.7	1
2	LJBSLOF03	77.4	2.0	1
3	LJBSLOF05	93.8	1.8	1
4	LJBSLOF07	18.8	0.8	4
5	LJBSLOF04	2.1	1.2	5
6	LJBSLOF06	38.1	0.7	5
7	LJBSLOF02	12.5	0.8	7
Total Load:		449.5		

Shelly Pond				
Summary of Concentrated Discharge Areas				
Number	CDA ID	Total Load (lbs-TP/yr)	Area Load (lbs-TP/ac/yr)	Ranking
1	LJBSPOF02	16.2	1.1	1
2	LJBSPOF04	38.7	1.0	2
3	LJBSPOF01	72.4	0.6	3
4	LJBSPOF03	9.4	1.0	4
5	LJBSPOF05	12.2	0.6	5
Total Load:		148.9		

Lake Alyssa				
Summary of Concentrated Discharge Areas				
Number	CDA ID	Total Load (lbs-TP/yr)	Area Load (lbs-TP/ac/yr)	Ranking
1	LJBLAOF02	104.4	1.6	1
2	LJBLAOF01	210.1	0.5	2
3	LJBLAOF04	68.7	0.9	3
4	LJBLAOF03	154.9	0.4	4
5	LJBLAOF05	3.1	0.5	5
Total Load:		541.2		

CITY OF TALLAHASSEE

N

0 0.2

Miles

Legend

- Summerbrook Chain of Lakes
- Concentrated Discharge Area
- Watercourses
- Tallahassee Corporate Limits

Ranking

High (1)

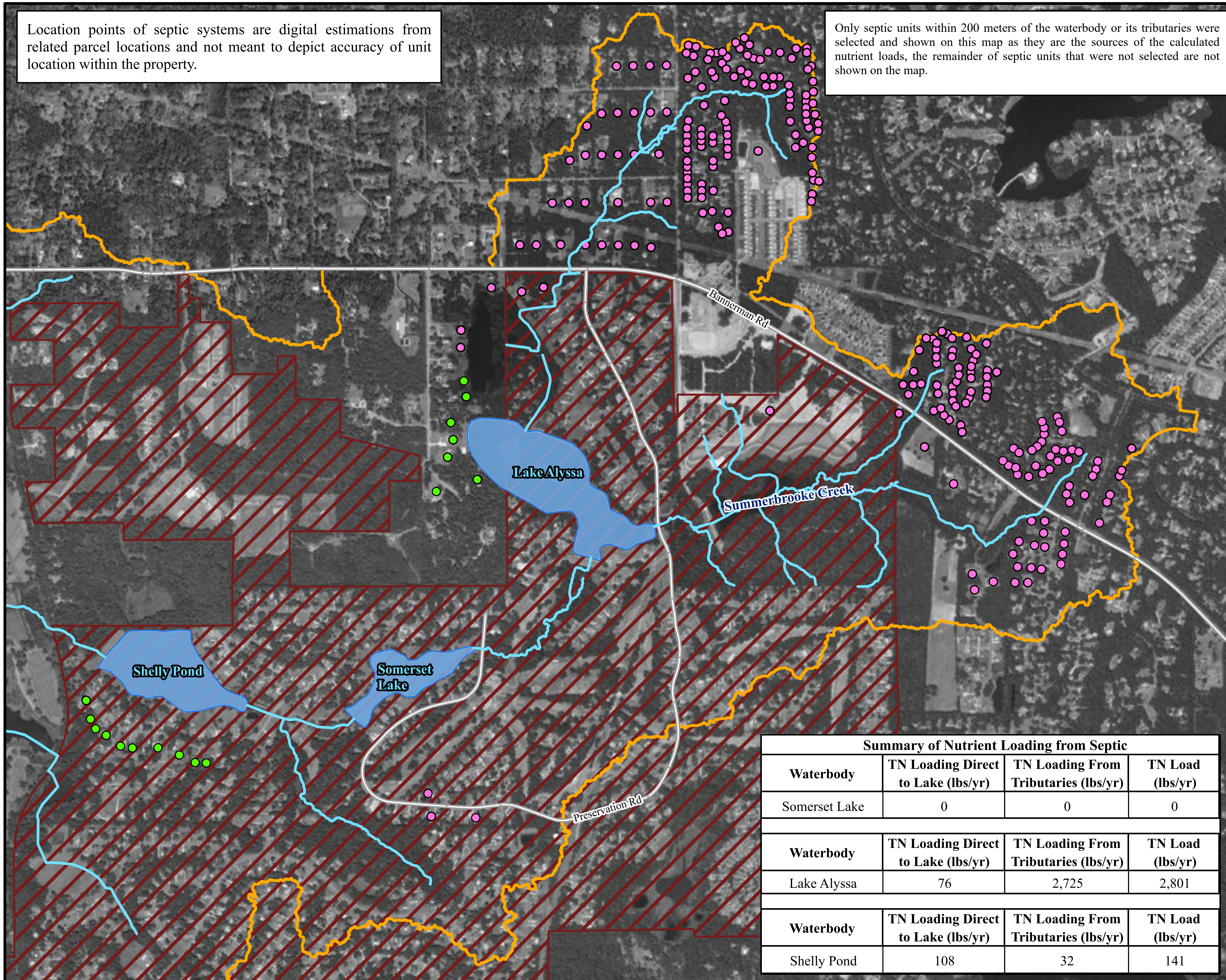
Low (7)

Sources:
Waterbodies: COT, 2020
CDAs: Geosyntec, 2023
Roads: COT-Leon County, 2023
City Limits, COT, 202

Figure 4-90: Summerbrook Chain of Lakes Concentrated Discharge Areas Total Phosphorus

Tallahassee Master Plan - Surface Water (TMaPS)

Geosyntec consultants



Location points of septic systems are digital estimations from related parcel locations and not meant to depict accuracy of unit location within the property.

Only septic units within 200 meters of the waterbody or its tributaries were selected and shown on this map as they are the sources of the calculated nutrient loads, the remainder of septic units that were not selected are not shown on the map.

Summary of Nutrient Loading from Septic

Waterbody	TN Loading Direct to Lake (lbs/yr)	TN Loading From Tributaries (lbs/yr)	TN Load (lbs/yr)
Somerset Lake	0	0	0
Waterbody	**TN Loading Direct to Lake (lbs/yr)**	**TN Loading From Tributaries (lbs/yr)**	**TN Load (lbs/yr)**
Lake Alyssa	76	2,725	2,801
Waterbody	**TN Loading Direct to Lake (lbs/yr)**	**TN Loading From Tributaries (lbs/yr)**	**TN Load (lbs/yr)**
Shelly Pond	108	32	141

CITY OF TALLAHASSEE

Legend

- Lake Jackson Drainage Basin
- Summerbrook Chain of Lakes
- Watercourses
- Tallahassee Corporate Limits

Relevant Septic Sites

- Lake
- Tributaries

Sources:
Waterbodies: COT, 2020
Watercourses: COT, 2020
Septic Systems: COT, 2020
Watershed: COT, 2020
Roads: COT-Leon County, 2023

Figure 4-91: Septic Loading to Summerbrook Chain of Lakes

Tallahassee Master Plan - Surface Water (TMaPS)

Geosyntec consultants

4.6.5.3 Point Source Load

No active point sources were identified within the Summerbrook Creek basin. Therefore, the point source loads for TN and TP are set to 0 lb/yr for Lake Alyssa, Somerset Lake, and Shelly Pond.

4.6.5.4 Lake Inflow Load

The approach utilized in the calculation of the inter-lake loading was described in **Section 4.4.5.4** for Lake Jackson. The lakes and connections are shown in **Figure 4-92** along with a table summarizing available data, calculated flows, and if inter-lake loads could be calculated. It should be noted that Somerset Lake represents both a receiving lake and an inflowing lake for these analyses. This is reflected on **Figure 4-92**. As no water quality data are available within either of the two upstream lakes, the loading cannot be calculated either from Lake Alyssa to Somerset Lake, or from Somerset Lake to Shelly Pond.

4.6.5.5 Internal Lake Load

While internal lake load was identified as a potentially significant source, no direct data/studies were identified to quantify the present benthic flux conditions in the Summerbrook Chain of Lakes. Additionally, no in-lake field parameter data are available for assessment of vertical profiles for parameters such as DO, temperature, ORP, and specific conductance as described for Lake Jackson. Therefore, internal lake load was not estimated.

4.6.5.6 Atmospheric Deposition

As presented and discussed in **Section 4.4.5.6** the annual average atmospheric TN load per acre was calculated from the Quincy NADP station (F14) at 2.56 lb/acre/yr. Multiplying this by the acreage of Lake Alyssa (36 acres), Somerset Lake (12.5 acres), and Shelly Pond (23 acres) gives total TN loads of 92 lb/yr, 32 lb/yr, and 59 lb/yr, respectively. No data are available for TP therefore only the nitrogen load is provided.

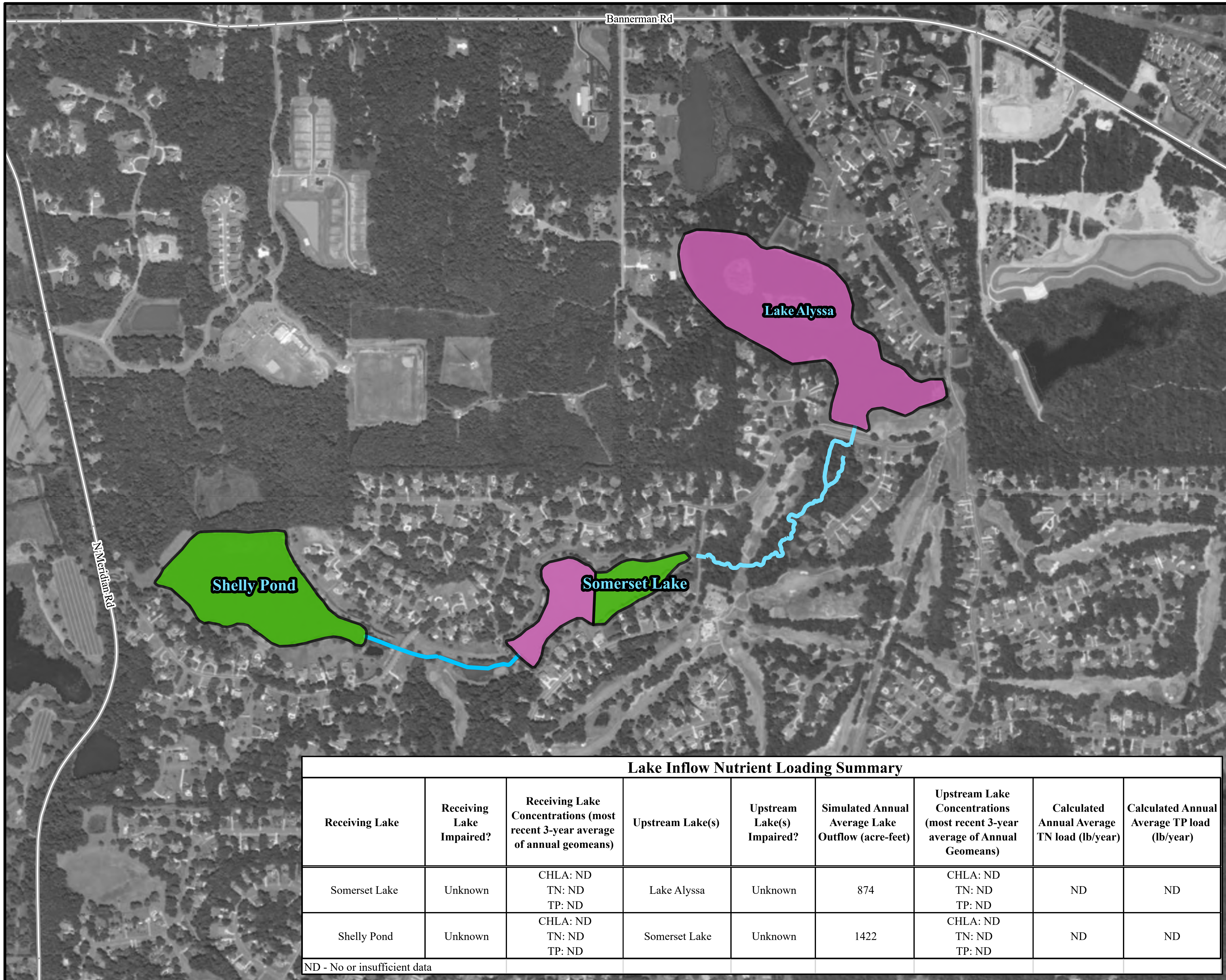
4.6.5.7 Summary of Calculated Loads

Nutrient loads to Lake Alyssa, Somerset Lake, and Shelly Pond were calculated for stormwater runoff, septic systems, and atmospheric deposition. **Table 4-16** through **Table 4-18** present the calculated total loads to the lake for TN and TP. For septic systems and atmospheric deposition, only TN loads were calculated (see **Section 4.6.5.2** and **Section 4.6.5.6,** respectively, for explanation).

Table 4-16: Summary of Calculated Loads to Lake Alyssa

Source	TN (lb/year)	TP (lb/year)
Stormwater Runoff	2,482	541
Septic Systems	2,801	NC
Atmospheric Deposition	92	NC

NC – Not calculated.



Lake Inflow Nutrient Loading Summary

Receiving Lake	Receiving Lake Impaired?	Receiving Lake Concentrations (most recent 3-year average of annual geomeans)	Upstream Lake(s)	Upstream Lake(s) Impaired?	Simulated Annual Average Lake Outflow (acre-feet)	Upstream Lake Concentrations (most recent 3-year average of Annual Geomeans)	Calculated Annual Average TN load (lb/year)	Calculated Annual Average TP load (lb/year)
Somerset Lake	Unknown	CHLA: ND TN: ND TP: ND	Lake Alyssa	Unknown	874	CHLA: ND TN: ND TP: ND	ND	ND
Shelly Pond	Unknown	CHLA: ND TN: ND TP: ND	Somerset Lake	Unknown	1422	CHLA: ND TN: ND TP: ND	ND	ND

ND - No or insufficient data

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- Shelly Pond
- Somerset Lake
- Inflowing Lakes
- Flowlines

Sources:
Waterbodies: COT, 2020
Flowlines: USGS, 2020
Watershed: COT, 2020
Roads: COT-Leon County, 2023
City Limits, COT, 202

Figure 4-92:
Inflow Loading to Summerbrook Chain of Lakes

Tallahassee Master Plan - Surface Water (TMaPS)

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Table 4-17: Summary of Calculated Loads to Somerset Lake

Source	TN (lb/year)	TP (lb/year)
Stormwater Runoff	1,365	449
Septic Systems	0	NC
Atmospheric Deposition	32	NC

NC – Not calculated.

Table 4-18: Summary of Calculated Loads to Shelly Pond

Source	TN (lb/year)	TP (lb/year)
Stormwater Runoff	560	149
Septic Systems	141	NC
Atmospheric Deposition	59	NC

NC – Not calculated.

4.7 Lake Overstreet

This section presents the results from Tasks 1 through 3 for Lake Overstreet. This includes an overview and history of the lake and basin; present impairment status; an overview of available data; a qualitative assessment of potential pollutant sources; and calculation of potential pollutant loads.

4.7.1 Overview and History

Lake Overstreet is a 144-acre pristine natural lake located on the property of Alfred B Maclay Gardens State Park. The lake maintains its natural condition primarily due to limited access and prohibitions on boating and fishing. The lake is only accessible by hiking trails that start within Maclay Gardens State Park and off Meridian Road. **Photo 4-40** and **Photo 4-41** were taken in 2011 and 2012, respectively.

Historically the lake and surrounding properties were part of the Lafayette Land Grant in the early 1800s. The Land Grant was a gift from the United States government to the Marquis de Lafayette, who lent money to the government during the American Revolution. Fertile land around the lake was good for crops, and much of the area was cleared for cotton production. In 1994, the FDEP Division of Recreation and Parks, with assistance from the City, purchased 887 acres of property, including Lake Overstreet. This property was made part of Maclay Gardens State Park.

The drainage basin for Lake Overstreet covers an area of 1,670 acres **(Figure 4-93**). The upper portion of the basin, which drains into Lake Overstreet (815 acres), is primarily undeveloped, with a portion containing the High Grove neighborhood. The outflow of the lake flows into the Lake Overstreet Drain, which flows through the Bobbin Brook and Woodbrook neighborhoods prior to crossing Meridian Road and ultimately discharging into Fords Arm.

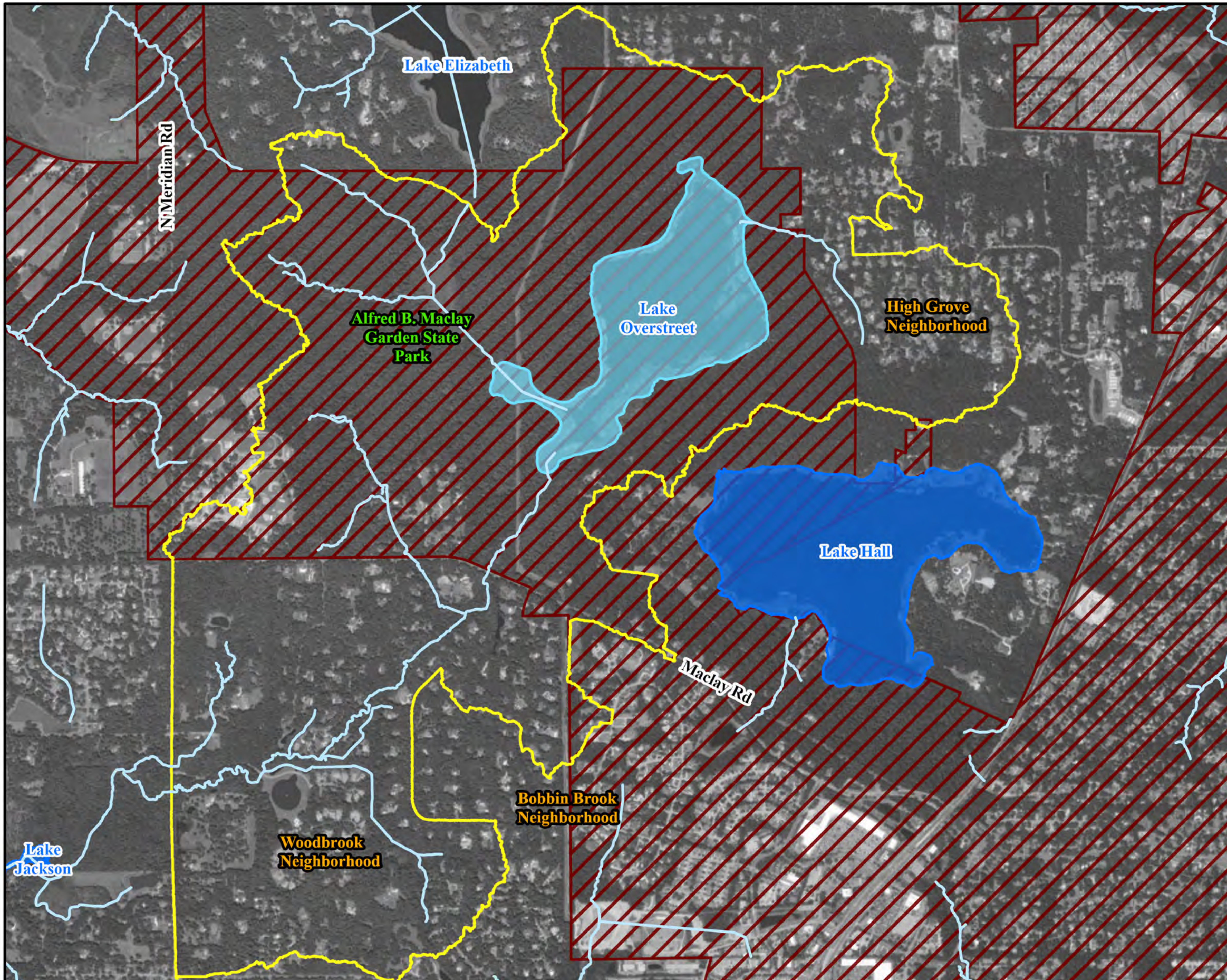
Lake Overstreet is a relatively deep lake for the area, with depths throughout much of the lake greater than 20 ft. **Photo 4-42** through **Photo 4-49** present aerial views of the lake from 1937 through the present. Examination of the aerial photos shows that the lake has generally remained the same over this period of time and, due to the depths, maintains open water throughout much of its area. The only variations seen are in the degree of vegetative cover in the southern portion and the degree of clearing in the land surrounding the lake. Prior to 1970, much of the land surrounding the lake was cleared, especially along the eastern side. After 1970, the surrounding land was reforested, and presently the entire shoreline and a significant buffer around the lake are natural.

4.7.2 Regulatory Status

Exhibit 4-2 presented the verified impaired waters within the overall Lake Jackson basin. The Overstreet Drain (WBID 689) was placed on the verified list in 2008 for fecal coliform. As outlined in **Section 4.4.2**, fecal coliform is no longer the applicable FIB parameter for the waterbody classification. *E. coli* will be included in the upcoming Strategic Monitoring Plan to collect the new applicable FIB parameter data while the WBID remains on the Verified List for fecal coliform impairment. It is noted that analyses of the *E. coli* data on the Overstreet Drain to Lake Jackson (**Section 4.4.4.2**) did not show levels above the *E. coli* threshold of 410 MPN/100 mL.

Photo 4-40: Lake Overstreet (2011)

Photo 4-41: Lake Overstreet (2012)



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- Lake Overstreet Drainage Basin
- Lake Overstreet
- Waterbodies in Study
- Watercourses
- Tallahassee Corporate Limits

Sources:
Waterbodies: COT, 2020
Watercourses: COT, 2020
Drainage Basins: COT, 2022
Roads: COT-Leon County, 2023
City Limits: COT, 2020

Figure 4-93:
Lake Overstreet Drainage Basin Overview

Tallahassee Master Plan - Surface Water (TMaPS)

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Photo 4-42: Lake Overstreet Basin Area Aerial (1937)

Photo 4-43: Lake Overstreet Basin Area Aerial (1949)

Photo 4-44: Lake Overstreet Basin Area Aerial (1954)

Photo 4-45: Lake Overstreet Basin Area Aerial (1970)

Photo 4-46: Lake Overstreet Basin Area Aerial (1983)

Photo 4-47: Lake Overstreet Basin Area Aerial (1996)

Photo 4-48: Lake Overstreet Basin Area Aerial (2007)

Photo 4-49: Lake Overstreet Basin Area Aerial (2020)

4.7.3 Waterbody Data Review and Summary

This section presents an overview of available data and data sources for Lake Overstreet and the Lake Overstreet basin including bathymetry, land use, soils, septic systems, hydrologic measurements, surface water quality, groundwater quality, biological, stormwater treatment facilities, and atmospheric deposition.

4.7.3.1 Bathymetry

Presently, no bathymetric data are available for Lake Overstreet. Depths are based upon general descriptions of the lake. As stated earlier, Lake Overstreet is a deeper lake, with maximum depths on the order of 26 ft, with much of the area of the lake greater than 20 ft deep.

4.7.3.2 Land Use

Figure 4-94 presents a map of the Level 2 land uses within the Lake Overstreet and Overstreet Drain basin. A table is provided to show the overall acreages and percent cover for the various levels. Tables are provided for both the Level 2 and grouped Level 1 land uses. The largest land use within the Lake Overstreet and Overstreet Drain drainage basin per the grouped Level 1 categories is Upland Forrest (50 percent). The bulk of the Upland Forrest land use is located within the upper portions of the basin surrounding Lake Overstreet. The second largest land use in the overall basin is Residential (Low Density). A portion of the Low Density Residential is located in the upper reaches of the basin (High Grove neighborhood). The remaining Low Density with some High Density Residential areas drain into Overstreet Drain and ultimately to Lake Jackson.

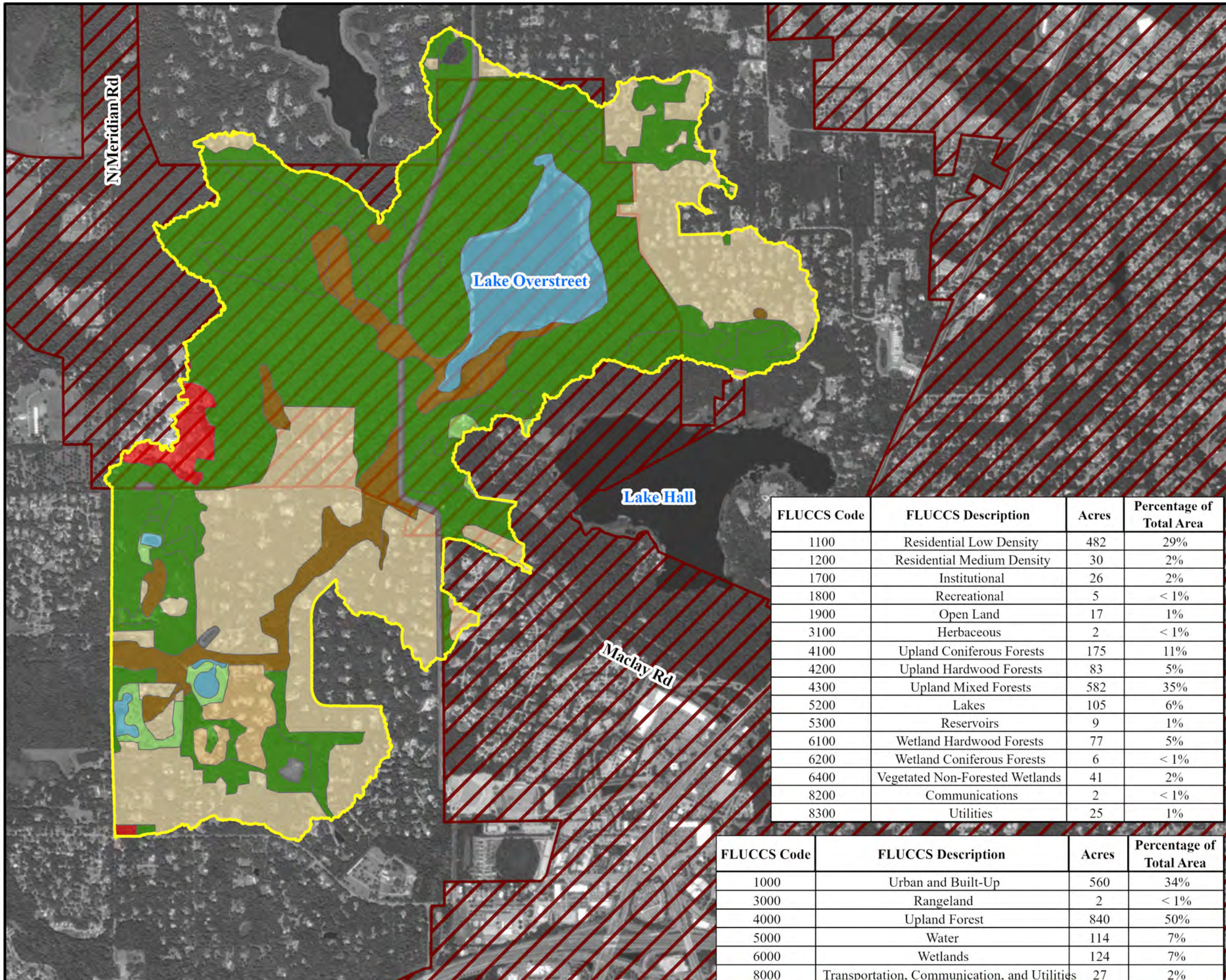
4.7.3.3 Soils

The most prevalent soil groups in the Lake Overstreet and Overstreet Drain basin are Group B **(Figure 4-95**) and Group C, accounting for 37 percent and 31 percent of the area, respectively. Group B soils are considered to have a moderate rate of infiltration, whereas Group C soils are considered to have slow rates of infiltration. Group A/D soils (18 percent) are found along the primary tributary pathways. These are considered to have high infiltration potential, but due to elevated water table conditions, will act more similarly to soils with low infiltration potential.

4.7.3.4 Septic Systems

An estimated 254 septic systems are within the boundaries of the Lake Overstreet and Overstreet Drain basin based on the FDOH septic tank layer (**Figure 4-96**). The septic tanks are located in two clusters. The first cluster is located at the upper end of the basin, primarily in the High Grove neighborhood. The second cluster is primarily within the Bobbin Brook and Woodbrook neighborhoods, downstream of Lake Overstreet.

For recent TMDL analyses, FDEP used a radius of 200 meters to analyze direct contribution of nutrient loads from septic systems to a waterbody. There are presently no identified septic systems within 200 meters of the shoreline of Lake Overstreet. A total of 105 septic systems are within the High Grove neighborhood and within a half-mile radius of Lake Overstreet. While some of the septic systems downstream of the lake are within a half-mile radius, any loading from these would go to Overstreet Drain and downstream toward Lake Jackson.



FLUCCS Code	FLUCCS Description	Acres	Percentage of Total Area
1100	Residential Low Density	482	29%
1200	Residential Medium Density	30	2%
1700	Institutional	26	2%
1800	Recreational	5	< 1%
1900	Open Land	17	1%
3100	Herbaceous	2	< 1%
4100	Upland Coniferous Forests	175	11%
4200	Upland Hardwood Forests	83	5%
4300	Upland Mixed Forests	582	35%
5200	Lakes	105	6%
5300	Reservoirs	9	1%
6100	Wetland Hardwood Forests	77	5%
6200	Wetland Coniferous Forests	6	< 1%
6400	Vegetated Non-Forested Wetlands	41	2%
8200	Communications	2	< 1%
8300	Utilities	25	1%

FLUCCS Code	FLUCCS Description	Acres	Percentage of Total Area
1000	Urban and Built-Up	560	34%
3000	Rangeland	2	< 1%
4000	Upland Forest	840	50%
5000	Water	114	7%
6000	Wetlands	124	7%
8000	Transportation, Communication, and Utilities	27	2%

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Lake Overstreet Drainage Basin

Tallahassee Corporate Limits

Land Use Type

1100: Residential Low Density
1200: Residential Medium Density
1700: Institutional
1800: Recreational
1900: Open Land
3100: Herbaceous
4100: Upland Coniferous Forests
4200: Upland Hardwood Forests
4300: Upland Mixed Forests
5200: Lakes
5300: Reservoirs
6100: Wetland Hardwood Forests
6200: Wetland Coniferous Forests
6400: Vegetated Non-Forested Wetlands
8200: Communications
8300: Utilities

Sources:
Waterbodies: COT, 2020
Watercourses: COT, 2020
Drainage Basins: COT, 2022
Roads: COT-Leon County, 2023
City Limits: COT, 2020
Land Use: NWFWMD, 2019

Figure 4-94:
Lake Overstreet Basin Land Use

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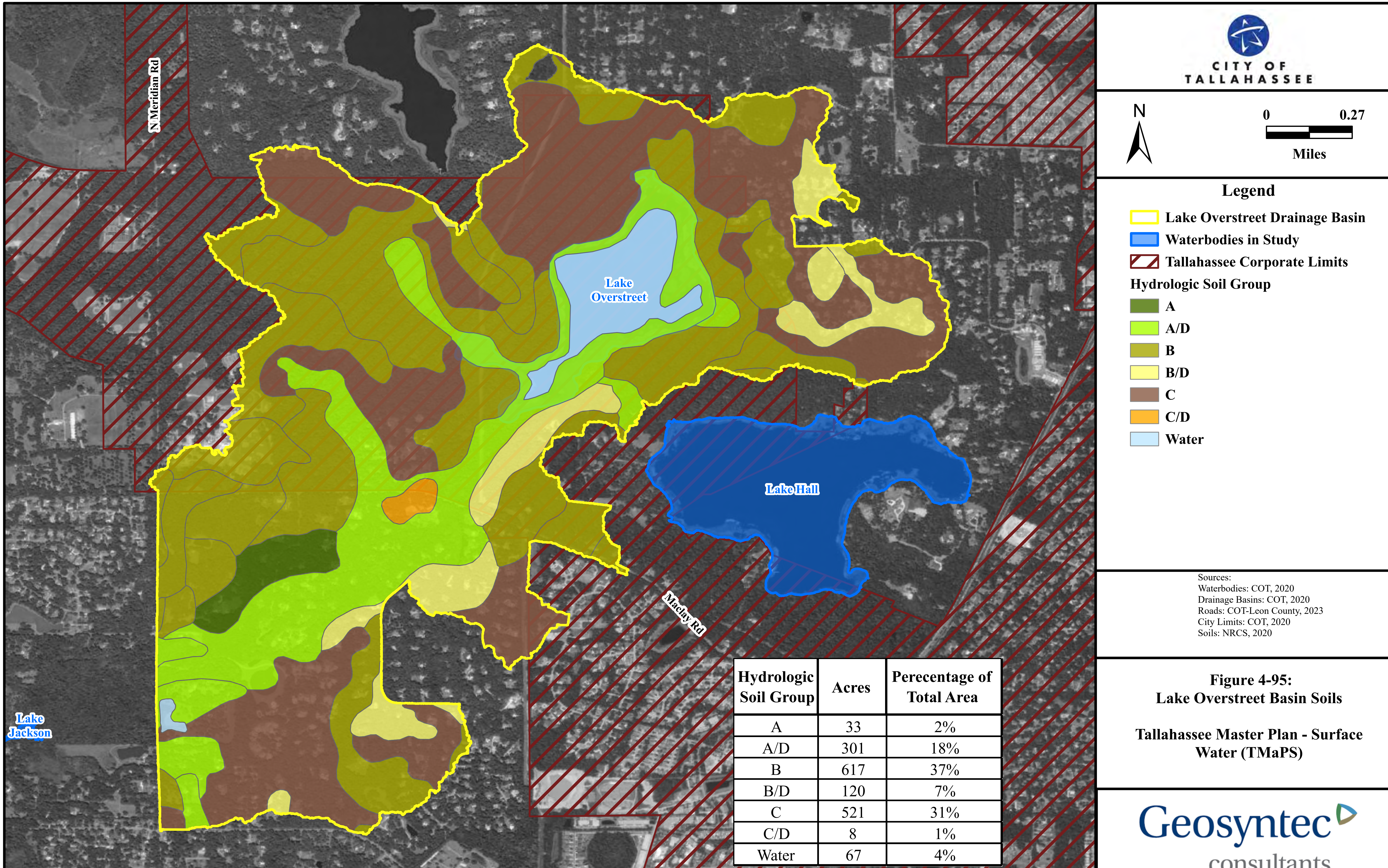

Hydrologic Soil Group	Acres	Perecentage of Total Area
A	33	2%
A/D	301	18%
B	617	37%
B/D	120	7%
C	521	31%
C/D	8	1%
Water	67	4%

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Figure 4-95: Lake Overstreet Basin Soils

Tallahassee Master Plan - Surface Water (TMaPS)

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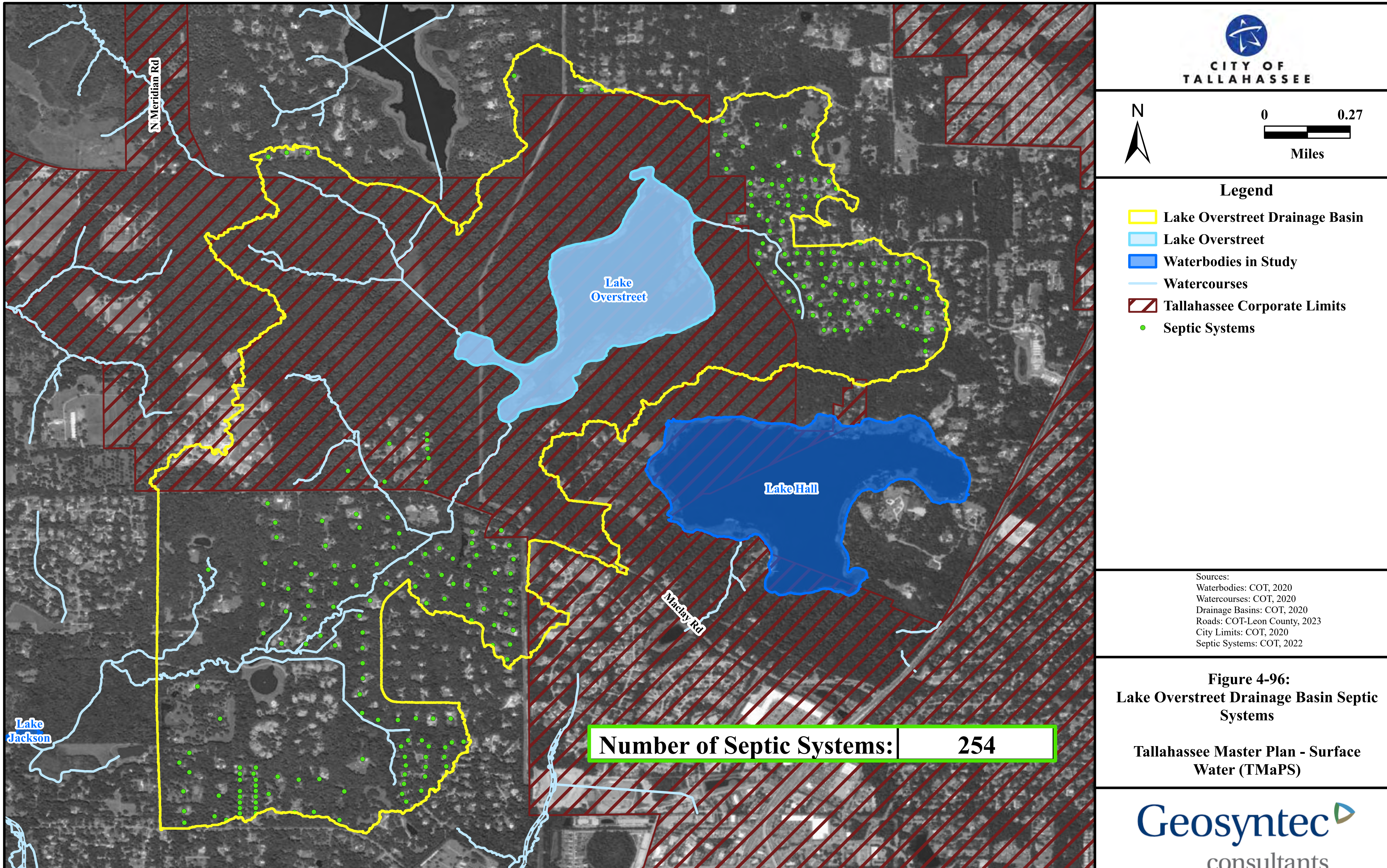


Figure 4-96:
Lake Overstreet Drainage Basin Septic Systems

Tallahassee Master Plan - Surface Water (TMaPS)

4.7.3.5 Hydrologic Data

No recent historical or present hydrologic monitoring stations are located within the Lake Overstreet or the Overstreet Drain basin.

4.7.3.6 Surface Water Quality Data

The IWR dataset for Lake Overstreet (WBID 689A) and Overstreet Drain (WBID 689) spans from 1991 to 2020 and includes contributions from local and state agencies (the City, FDEP, and Florida LAKEWATCH), as well as a private sector firm (BRA).

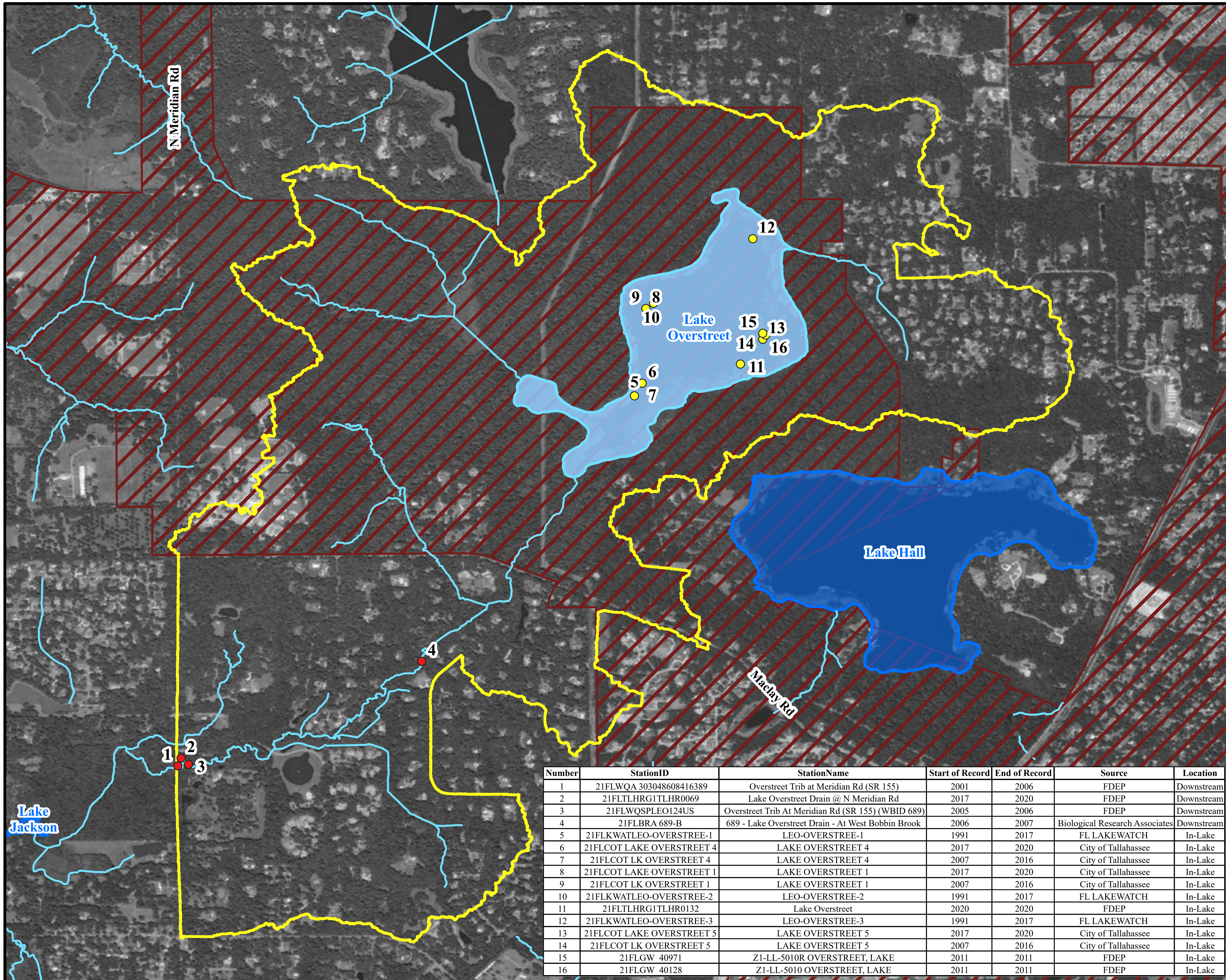
Figure 4-97 presents the locations of in-lake water quality monitoring stations for Lake Overstreet (yellow), along with stations that provide water quality data along Overstreet Drain (red), which is downstream of the lake. A table is provided in **Figure 4-97** that shows the station ID, station name, period of record, sample count, data source, and if the station represents in-lake or tributary data. Based on the number of stations and the length of the station IDs, station IDs were not included on the figure, rather each of the stations is given a number and the numbers correspond to stations in the table.

Figure 4-97 shows that in-lake water quality monitoring is grouped around four locations. These are north of the lake (Station 12), the western side (Stations 8, 9, and 10), the eastern side (Stations 11, 13, 14, 15, and 16) and the southern arm (Stations 5, 6, and 7). All four groups have good periods of record and relatively continuous monitoring.

Some initial plots of the available data in the lake are provided in this section. This includes plots of the raw data along with AGM. Nutrients are the primary constituent of interest relative to water quality conditions in Lake Overstreet, therefore, plots are provided for the key parameters related to potential nutrient impairment. These include TN, TP, Chl-a, and TSI. As discussed earlier, data are plotted from 2010 to 2020 to represent present conditions. Additionally, based on interest in the area relative to septic systems and other sources, FIB, specifically *E. coli* are included. Additional data plots and analyses are provided as part of the qualitative assessment of sources in **Section 4.7.4.1**.

Figure 4-98 through **Figure 4-100** present plots of the measured TN, TP and Chl-a from 2010 to 2020. Overall, the TN, TP and Chl-a concentrations are not elevated, with slight decreasing trends for TN and Chl-a and for the most part level TP concentration. There was a period between 2012 to 2014 where Chl-a and to some extent TN and TP levels were elevated in relation to other years after 2010. Qualitative comparison of the present TN and TP levels with historical measurements (pre-2000) showed somewhat elevated levels today in relation to historical measurements but the levels today are still relatively low.

Under FDEP's NNC, Lake Overstreet is defined as a low color, low alkalinity system. Based on this designation, the AGM threshold for Chl-a is 6 μg/L. For TN and TP, a range of concentrations are allowable, based on maintaining Chl-a levels in the lake below 6 μg/L. For TN, the range is 0.51 mg/L to 0.93 mg/L. For TP, the range is 0.01 mg/L to 0.03 mg/L. For *E. coli*, the criteria are monthly geometric means below 126 colonies per 100 mL of water and less than 10 percent of samples above 410 colonies per 100 mL of water in any 30-day period.



Number	StationID	StationName	Start of Record	End of Record	Source	Location
1	21FLWQA 303048608416389	Overstreet Trib at Meridian Rd (SR 155)	2001	2006	FDEP	Downstream
2	21FLTLHRG1TLHR0069	Lake Overstreet Drain @ N Meridian Rd	2017	2020	FDEP	Downstream
3	21FLWQSPLEO124US	Overstreet Trib At Meridian Rd (SR 155) (WBID 689)	2005	2006	FDEP	Downstream
4	21FLBRA 689-B	689 - Lake Overstreet Drain - At West Bobbin Brook	2006	2007	Biological Research Associates	Downstream
5	21FLKWATLEO-OVERSTREE-1	LEO-OVERSTREE-1	1991	2017	FL LAKEWATCH	In-Lake
6	21FLCOT LAKE OVERSTREET 4	LAKE OVERSTREET 4	2017	2020	City of Tallahassee	In-Lake
7	21FLCOT LK OVERSTREET 4	LAKE OVERSTREET 4	2007	2016	City of Tallahassee	In-Lake
8	21FLCOT LAKE OVERSTREET 1	LAKE OVERSTREET 1	2017	2020	City of Tallahassee	In-Lake
9	21FLCOT LK OVERSTREET 1	LAKE OVERSTREET 1	2007	2016	City of Tallahassee	In-Lake
10	21FLKWATLEO-OVERSTREE-2	LEO-OVERSTREE-2	1991	2017	FL LAKEWATCH	In-Lake
11	21FLTLHRG1TLHR0132	Lake Overstreet	2020	2020	FDEP	In-Lake
12	21FLKWATLEO-OVERSTREE-3	LEO-OVERSTREE-3	1991	2017	FL LAKEWATCH	In-Lake
13	21FLCOT LAKE OVERSTREET 5	LAKE OVERSTREET 5	2017	2020	City of Tallahassee	In-Lake
14	21FLCOT LK OVERSTREET 5	LAKE OVERSTREET 5	2007	2016	City of Tallahassee	In-Lake
15	21FLGW 40971	Z1-LL-5010R OVERSTREET, LAKE	2011	2011	FDEP	In-Lake
16	21FLGW 40128	Z1-LL-5010 OVERSTREET, LAKE	2011	2011	FDEP	In-Lake

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- Lake Overstreet Drainage Basin
- Lake Overstreet
- Waterbodies in Study
- Watercourses
- Tallahassee Corporate Limits

Water Quality Stations

- Downstream of Lake Water Quality Sampling Stations
- In-Lake Water Quality Sampling Stations

Sources:
Waterbodies: COT, 2020
Watercourses: COT, 2020
Drainage Basins: COT, 2020
Roads: COT-Leon County, 2023
City Limits: COT, 2020
WQ Stations: FDEP, 2022

Figure 4-97: Lake Overstreet Water Quality Station Locations

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TN, TP, and Chl-a, AGMs are plotted in **Figure 4-101** through **Figure 4-103** as these define the status of the lake relative to nutrient impairments. Where sufficient data are available to assess the AGMs, the levels are provided from 2010 through 2020. The Chl-a threshold and the minimum and maximum thresholds for TN and TP relative to the NNC are on each of the graphs as pink dashed lines. **Figure 4-104** presents a plot of calculated TSI values in the lake. While TSI is no longer utilized for the determination of impairment, it does serve as an indicator of lake health. Based on TSI definitions, levels below 60 are deemed good condition, levels between 60 and 70 indicate fair condition, while levels above 70 indicate poor condition. **Figure 4-105** presents plots of *E. coli* data for the available period of record.

Examination of the TN plot **(Figure 4-101**) shows that from 2010 to 2020 TN AGM levels have been at or below the minimum threshold. The AGMs show a similar rise between 2012 and 2014 that was noted for the raw data.

TP AGM levels **(Figure 4-102)** have fallen between the minimum and maximum threshold values for most of the years, with general downward trend. In 2018 and 2019, the levels fall below the minimum threshold. In 2020, the value pops back up above the minimum.

Figure 4-103 presents the Chl-a AGMs from 2010 through 2020. The Chl-a AGM was above the threshold in 2012 by a significant amount and then right at the threshold in 2020. Other times showed the Chl-a AGMs below the threshold. The general rise between 2012 and 2014/2015 can be seen.

Examination of the TSI plot **(Figure 4-104**) shows similar patterns as seen in TN, TP, and Chl-a, with higher levels between 2012 to 2015 and again in 2020. No values went above the 60 threshold during the period of record.

Figure 4-105 present a plot of measured *E. coli* levels in the lake from 2015 through 2020. The data all show very low values, with most at below detection limits. Some higher concentrations were measured in 2020.

4.7.3.7 Groundwater Data

Presently, there are no identified surficial groundwater monitoring wells within the Lake Overstreet and Overstreet Drain basin.

4.7.3.8 Biological Data

Table 4-19 presents LVI data collected by the City and FDEP between 2010 and 2013. The data show a range of from 61 up to 71, reflecting healthy conditions in the lake.

Table 4-19: Summary of LVI Results from Lake Overstreet

Date	Station ID	LVI	Aquatic Life Use Category
6/24/2010	21FLCOTCOTLVI006	67	Healthy
7/20/2011	32FLGW40128	61	Healthy
10/1/2012	21FLCOTCOTLVI006	71	Healthy
10/29/2013	21FLCOTCOTLVI006	70	Healthy

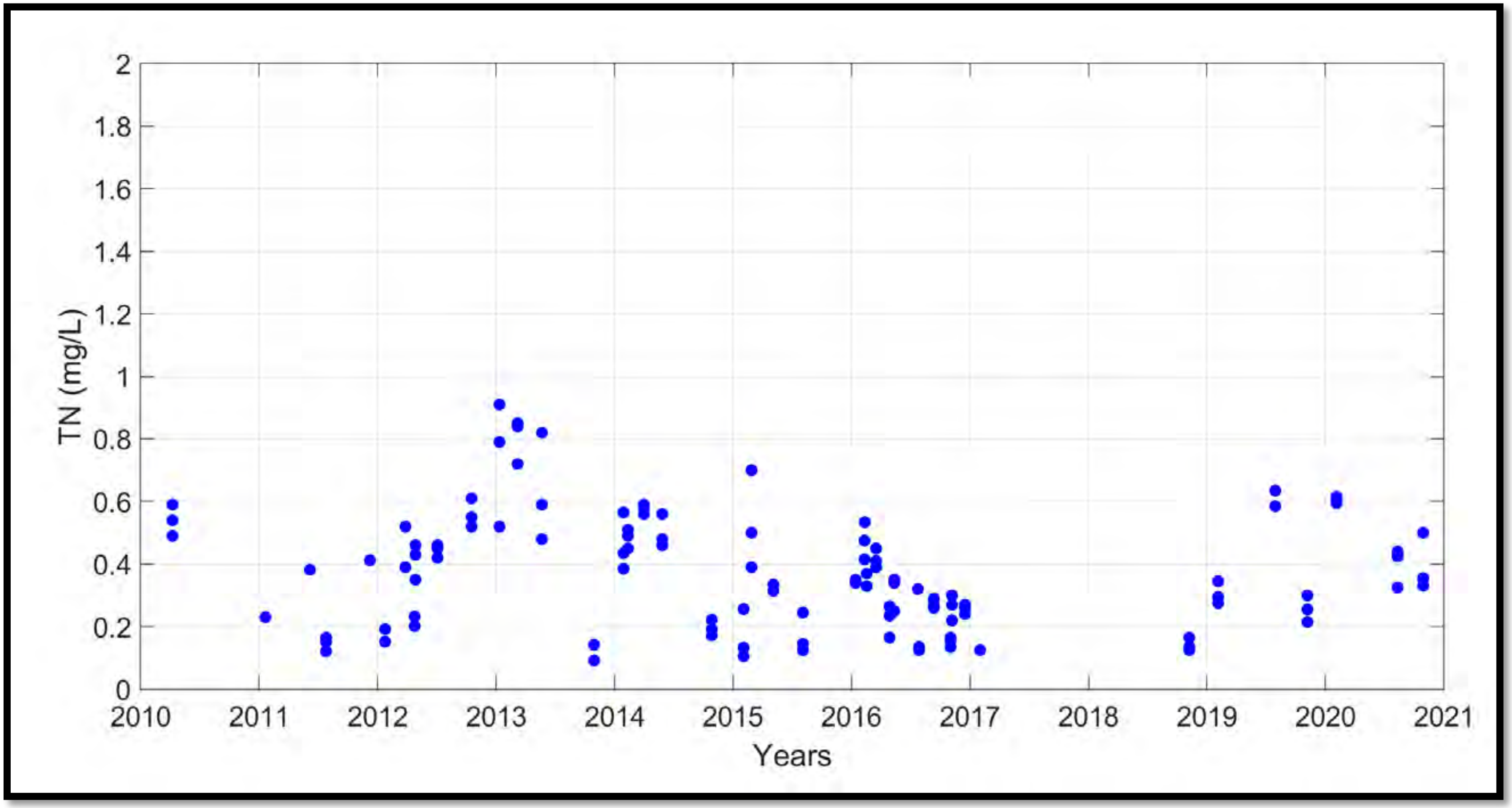


Figure 4-98: Plot of Measured TN

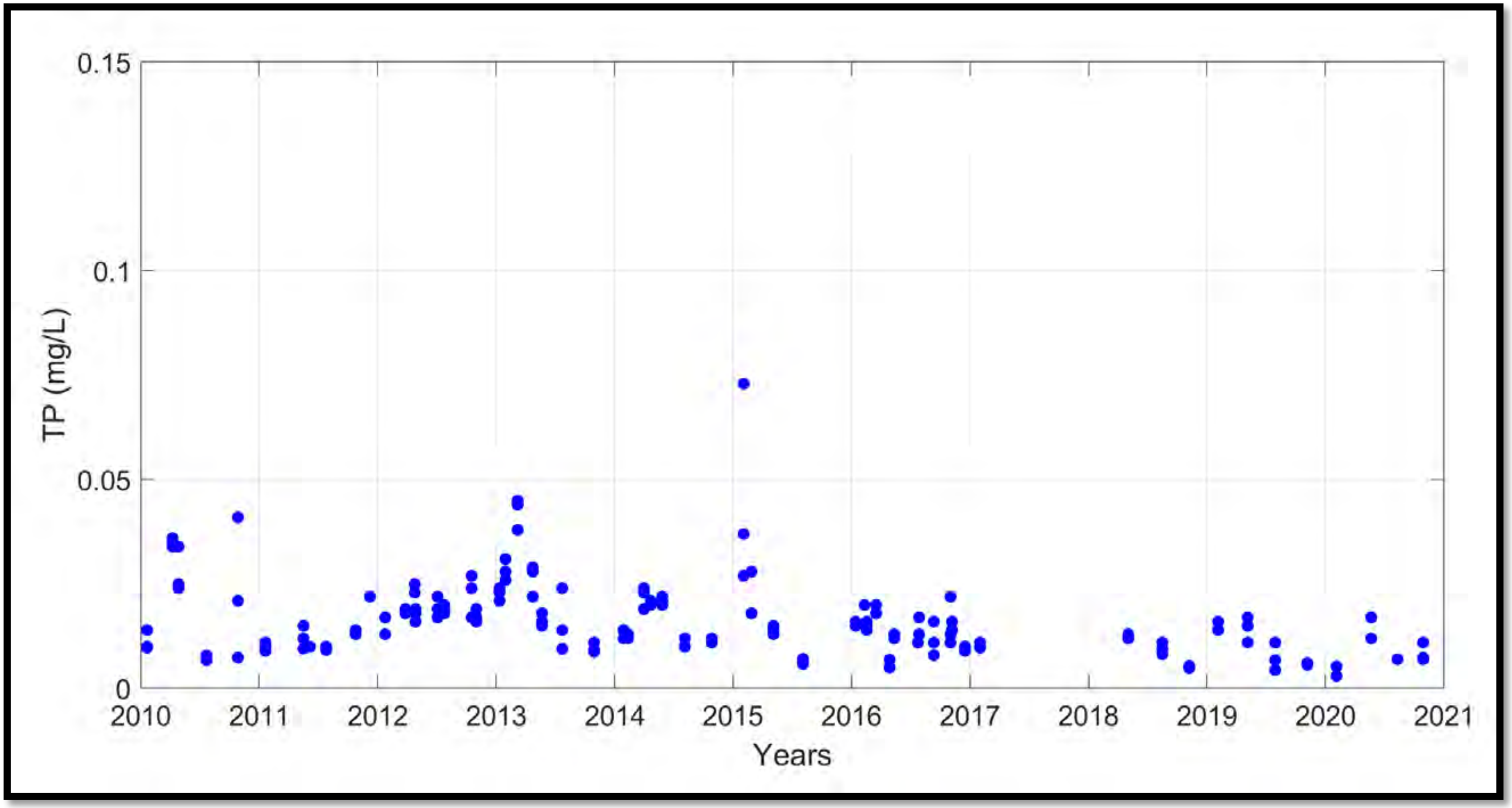


Figure 4-99: Plot of Measured TP

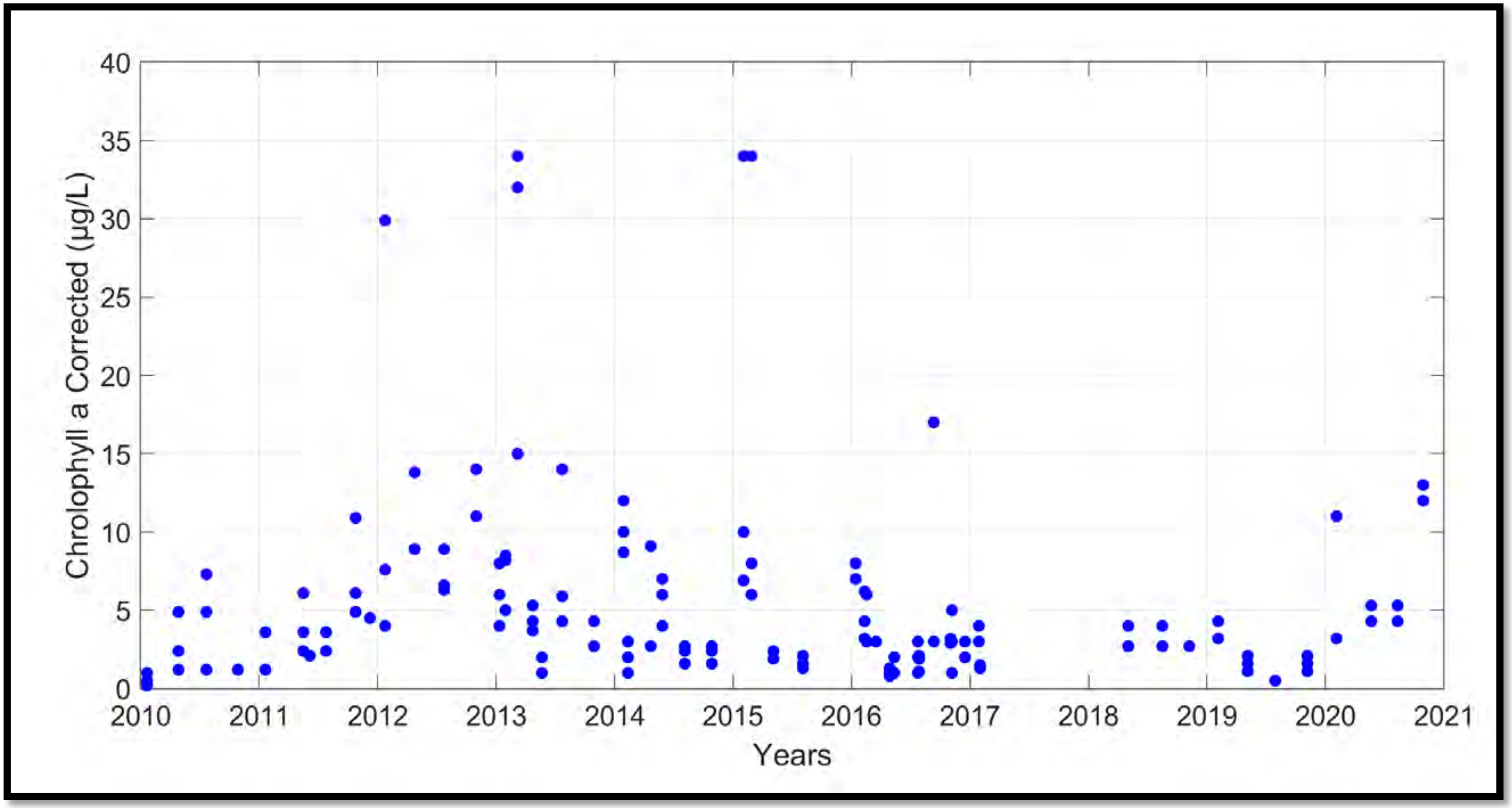


Figure 4-100: Plot of Measured Chl-a

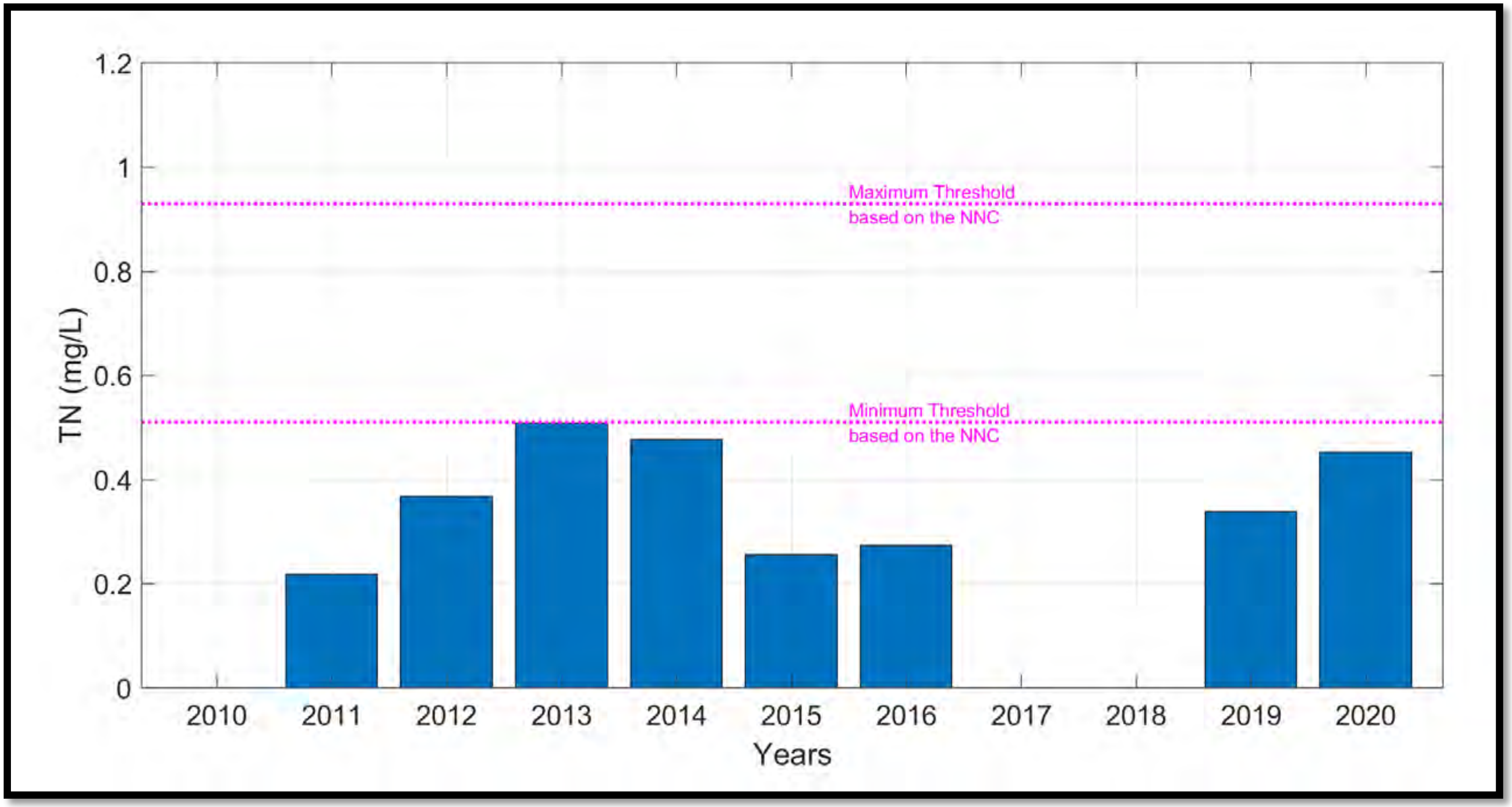


Figure 4-101: Plot of Annual Geometric Means for TN with NNC Criteria for Lake Overstreet

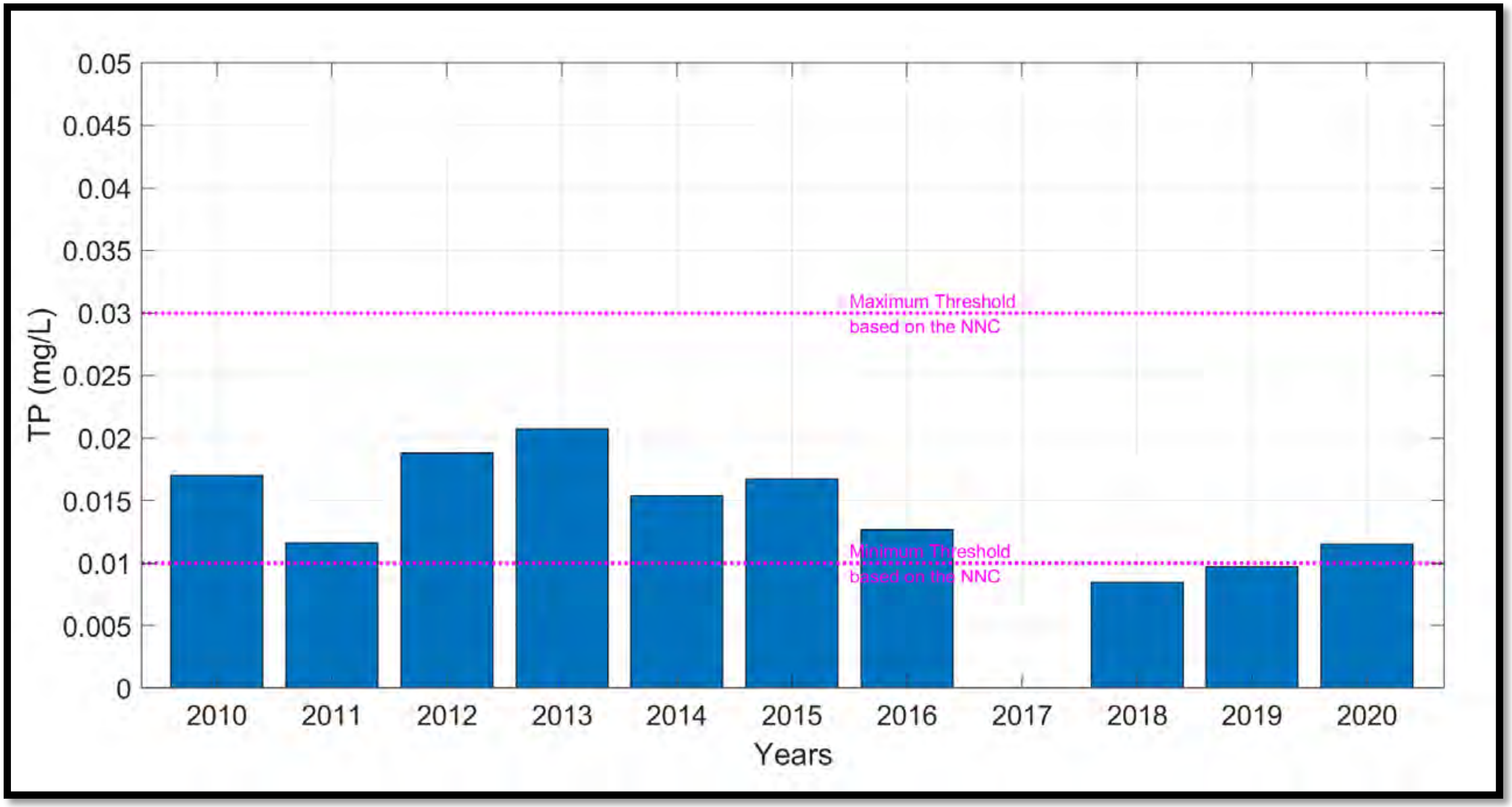


Figure 4-102: Plot of Annual Geometric Means for TP with NNC Criteria for Lake Overstreet

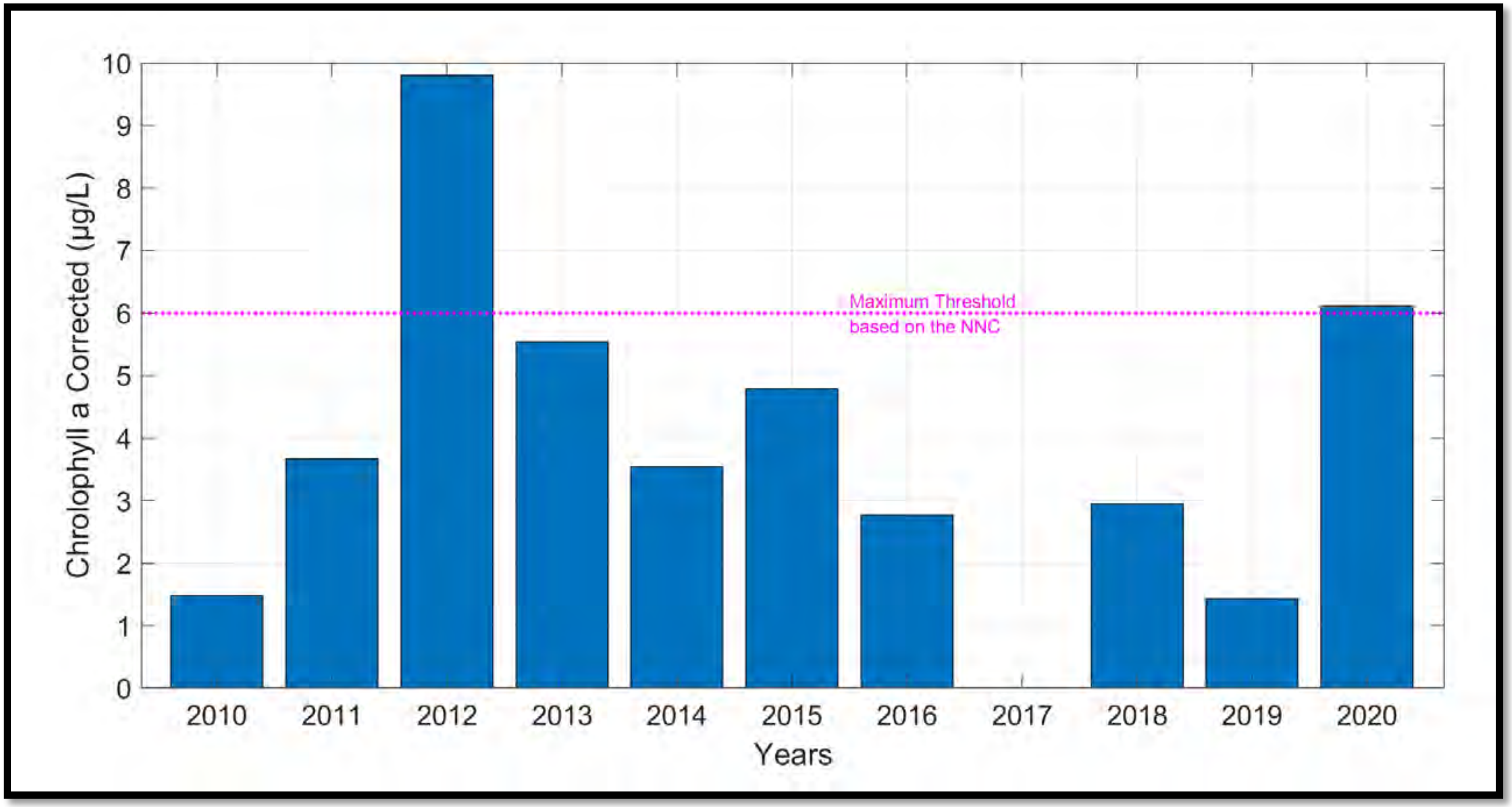


Figure 4-103: Plot of Annual Geometric Means for Chl-a with NNC Criteria for Lake Overstreet

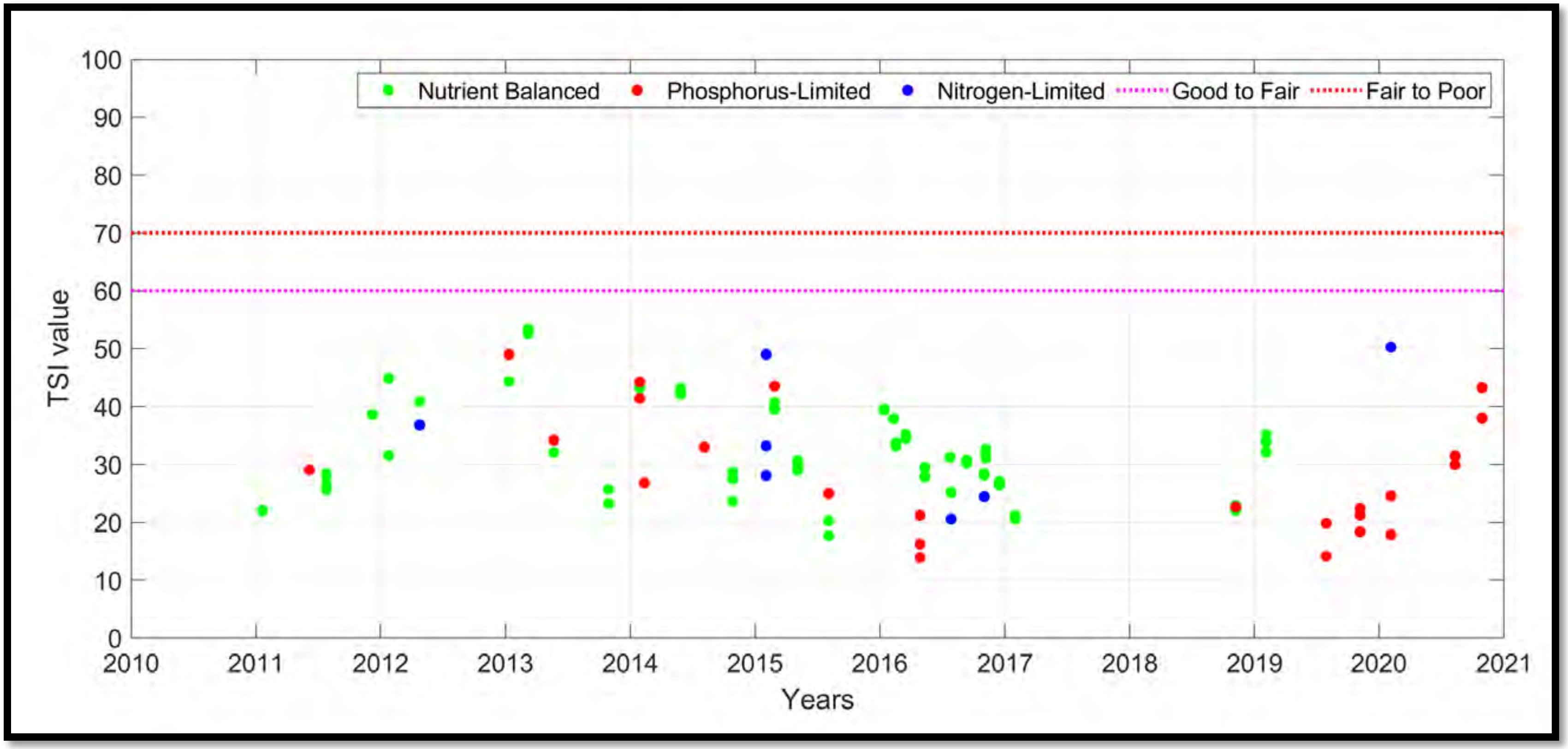


Figure 4-104: Trophic State Index for Lake Overstreet

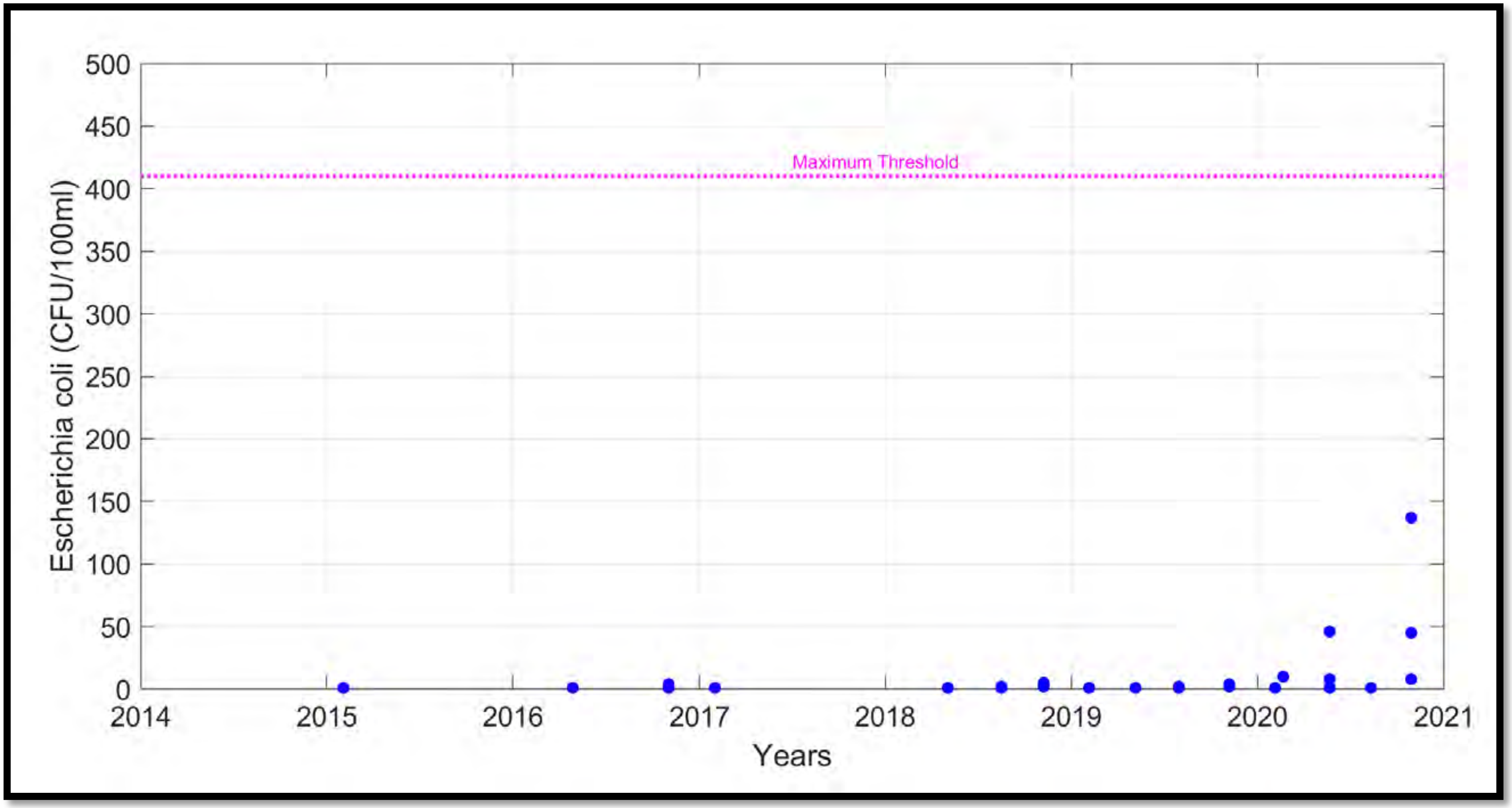


Figure 4-105: Plot of *E. coli* Measurements (2015 to 2019)

4.7.3.9 Stormwater Treatment Facilities

Figure 4-106 presents a map showing the locations of stormwater treatment facilities throughout the Lake Overstreet and Overstreet Drain drainage basin. The figure shows only one stormwater pond within the basin. The pond (Maclay Road Pond) is located along Maclay Road on the western boundary of the basin. It is maintained by Leon County and is downstream of Lake Overstreet.

4.7.3.10 Atmospheric Deposition Data

Section 4.4.3.11 presented the location of the nearest atmospheric deposition station to the Lake Jackson basin. The data from this station will be utilized to calculate atmospheric deposition to Lake Overstreet.

4.7.3.11 Data Summary

For the purposes of the qualitative analysis of sources of pollutants to Lake Overstreet (**Section 4.7.4**), the available data are reasonable. There are sufficient active surface water quality stations within the lake to support the qualitative assessment. The water quality conditions in the lake limit the need for additional data. Based on the relatively pristine water quality, it is assumed anthropogenic loads are minimal. No noteworthy limitations were identified.

4.7.4 Qualitative Assessment of Sources

As outlined in previous sections, prior to performing loading calculations and other analyses to quantify existing pollutant sources to Lake Overstreet, it is important to analyze available data and summarize findings from historical studies to support identification of likely sources.

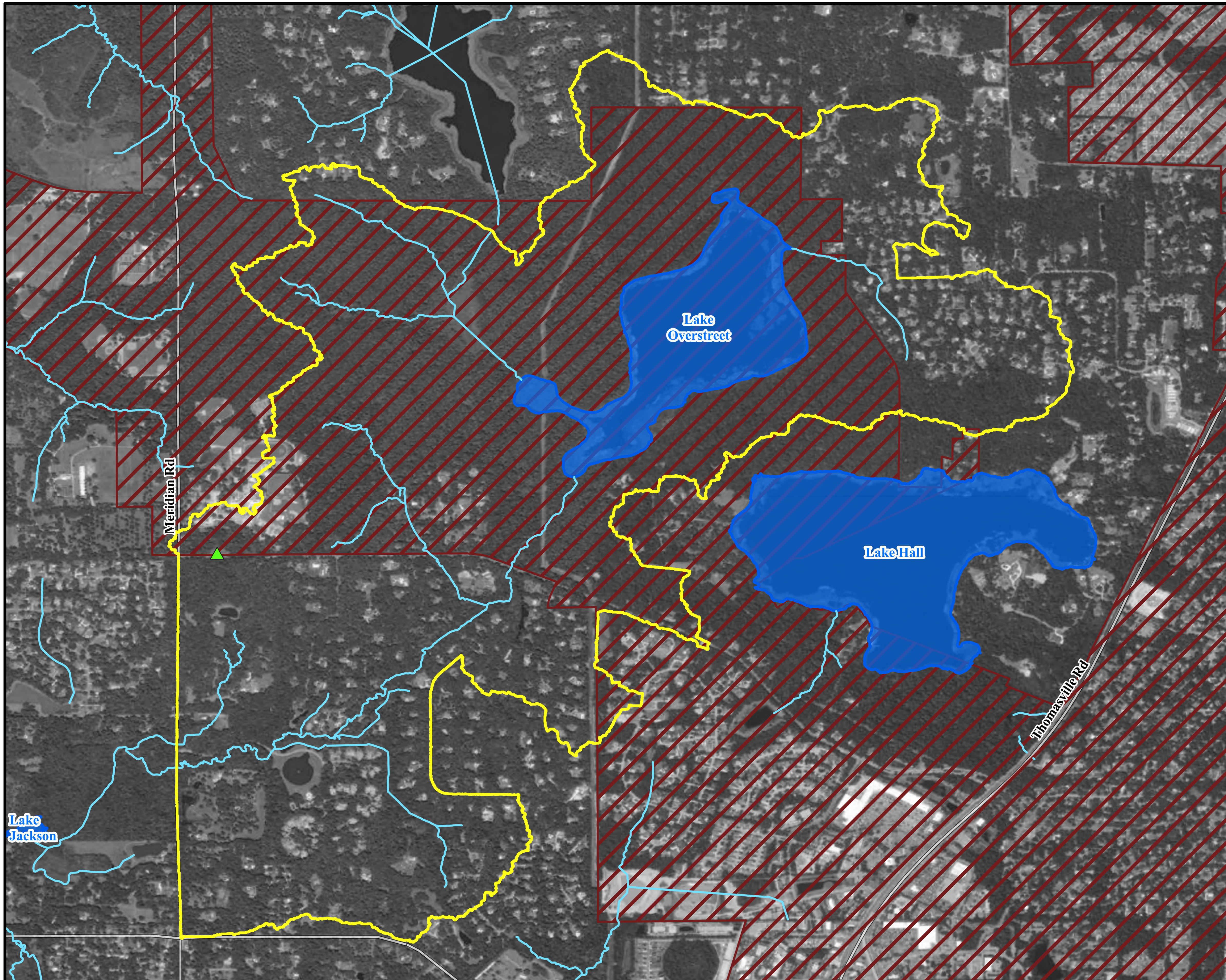
For Lake Overstreet, the sources to be evaluated include the following:

- Stormwater runoff
- Septic systems
- Internal recycling and seepage
- Wastewater
- Atmospheric deposition
- Interconnected flows

An overview of analyses and findings for each source listed above is provided in the following sections. Prior to the discussions of each of the potential sources, an in-lake analysis is provided to build on the information presented in **Section 4.7.3.6.** Following the discussions for each source type, a summary of findings for the qualitative assessment is provided.

4.7.4.1 In-Lake Water Quality

Following the methodology utilized for other lakes, analyses were conducted on the available in-lake data from 2010 to the present. This provides an evaluation of the baseline water quality conditions and the spatial differences within the lake. The parameters analyzed for Lake Overstreet include color, alkalinity, TP, TN, Chl-a, TSI, and *E. coli*.



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N

0 0.25

Miles

Legend

- Lake Overstreet Drainage Basin
- Waterbodies in Study
- Watercourses
- Tallahassee Corporate Limits
- Leon County Stormwater Ponds

Sources:
Waterbodies: COT, 2020
Watersheds: COT, 2020
Roads: FDOT, 2020
BMPs: Geosyntec, 2022
City Limits: COT, 2022

Figure 4-106:
Lake Overstreet Drainage Basin BMPs

Tallahassee Master Plan - Surface Water (TMaPS)

Geosyntec consultants

As was done for the other lakes, stations were clustered where they represent conditions within a specific area. The clustered data from 2010 to the present were analyzed to provide the average of the annual geomeans or the 90th percentile, depending upon the parameter. The results are presented on a map, with colors representing the results. The levels associated with the colors are reflective of water quality thresholds as outlined in 62-302 F.A.C. and were discussed and presented in **Section 4.4.4.1**. The Lake Overstreet analyses use the same ranges as the Lake Jackson analyses.

Figure 4-107 presents the data clustering used for the analyses and associated stations. For Lake Overstreet, data since 2010 were available within four clusters around the lake. These are in the northern end of the lake (N), the western and eastern sides (W and E), and the south-central side where the lake necks down prior to its discharge to the south (SC). Clusters W, E, and SC had complete data sets and were analyzed for all parameters. Cluster N was LAKEWATCH data, which has a more limited parameter list.

Figure 4-108 and **Figure 4-109** present the color and alkalinity. Both parameters show low values with no discernible spatial variation in the data. This supports the lake as a clear, low alkaline system with the associated criteria.

Figure 4-110 and **Figure 4-111** present the TN and TP results. TN levels are below the minimum lake threshold at all the clusters. The results do not show any significant spatial variation in the data. TP levels are between the minimum and maximum values, toward the lower end. There is some spatial variation seen in the results, with values at the north (N) and western (W) sides slightly higher.

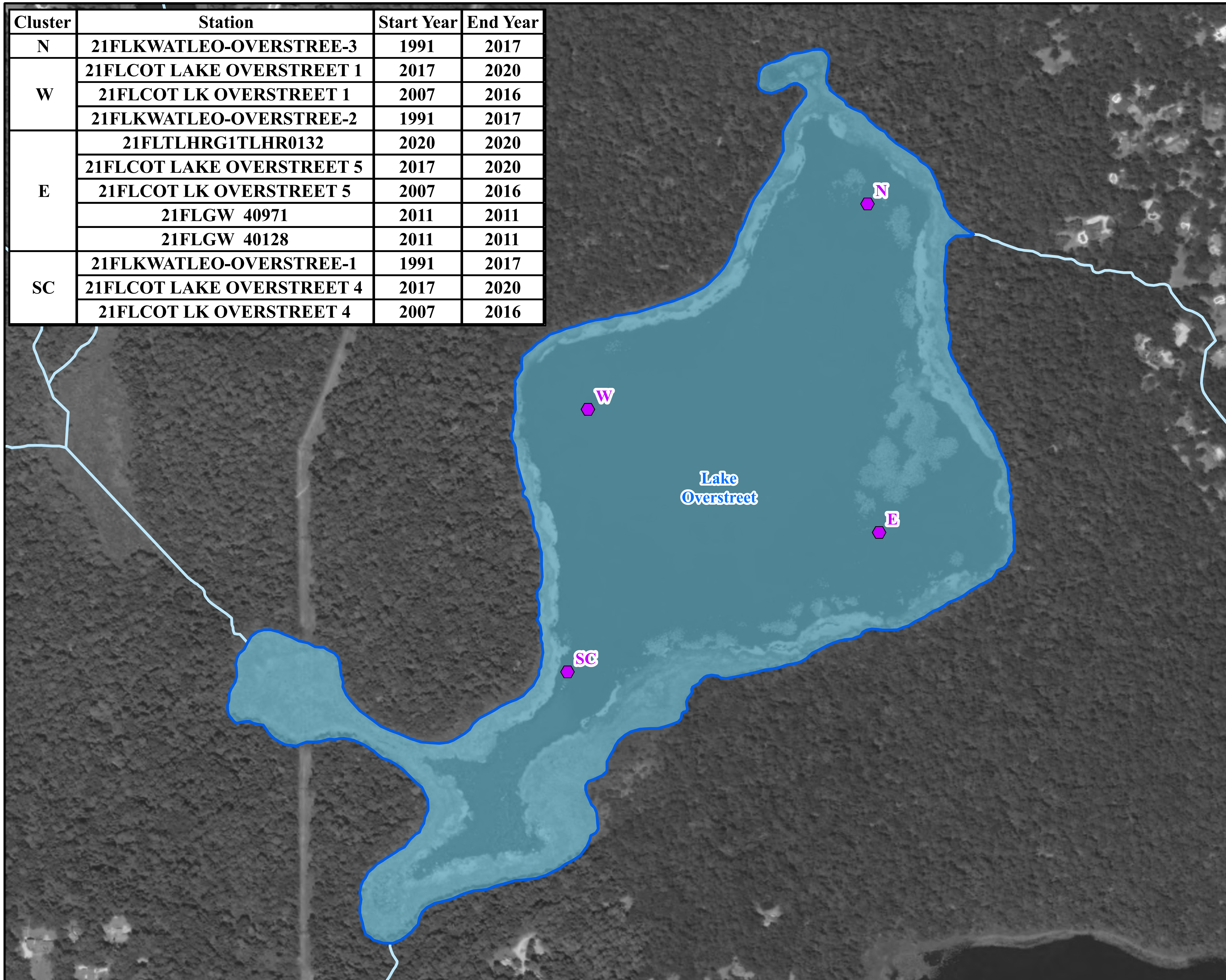
Figure 4-112 and **Figure 4-113** present maps of the Chl-a and TSI. The Chl-a levels, on average, are low, between 3.0 and 4.5 µg/L, with the northern station (N) showing slightly elevated average values (4.5 to 6.0 µg/L). This difference may be a function of the timeframe of the available data, with the northern station having data only from 2013 to 2017. Additionally, it could be a function of the isolated nature of the northern lobe and distance from the outflow. The TSI values are in the 15 to 45 range.

Figure 4-114 presents a map of the *E. coli* levels. The data analyzed were from 2015 through 2020, and the data were analyzed to provide the 90th percentile to compare against the 410 MPN/100 mL criteria per the FDEP approach in the IWR analyses. The results show that the 90th percentile for the data are well within the criteria in the lowest blue range (less than 100 MPN/100 mL).

4.7.4.2 Stormwater Runoff

To assess stormwater runoff as a potential source of pollutant loads to Lake Overstreet, the first step was to evaluate the LDI levels within the subbasin draining to the Lake. In **Section 4.4.4.2**, LDI values were presented by subbasin in **Figure 4-24**. The map shows that in the immediate watershed area draining to Lake Overstreet, LDI levels were good. This would indicate that this area has limited potential for anthropogenic pollutant loads from stormwater runoff. Additionally, the LDI levels in the downstream watershed area (Overstreet Drain down to Lake Jackson) go from good to excellent, indicating limited potential for anthropogenic pollutant loads from stormwater runoff in the Lake Overstreet basin to Lake Jackson. No data are available for any of the tributaries flowing into Lake Overstreet.

Cluster	Station	Start Year	End Year
N	21FLKWATLEO-OVERSTREE-3	1991	2017
W	21FLCOT LAKE OVERSTREET 1	2017	2020
	21FLCOT LK OVERSTREET 1	2007	2016
	21FLKWATLEO-OVERSTREE-2	1991	2017
E	21FLTLHRG1TLHR0132	2020	2020
	21FLCOT LAKE OVERSTREET 5	2017	2020
	21FLCOT LK OVERSTREET 5	2007	2016
	21FLGW 40971	2011	2011
	21FLGW 40128	2011	2011
SC	21FLKWATLEO-OVERSTREE-1	1991	2017
	21FLCOT LAKE OVERSTREET 4	2017	2020
	21FLCOT LK OVERSTREET 4	2007	2016



CITY OF TALLAHASSEE

N

0 0.08

Miles

Legend

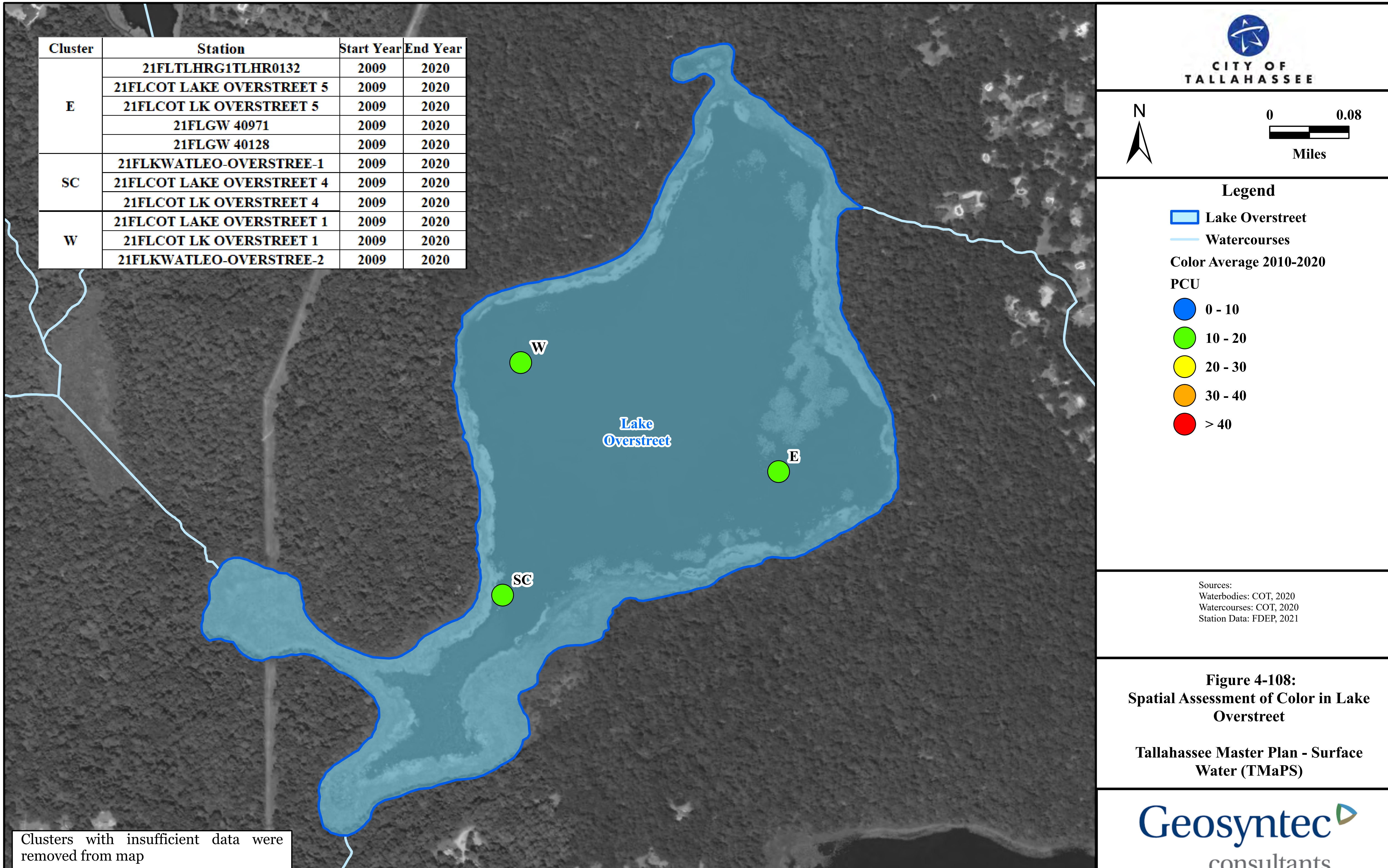
- Lake Overstreet
- Watercourses
- In-Lake Station Clusters

Sources:
Waterbodies: COT, 2020
Watercourses: COT, 2020
Station Data: FDEP, 2021

Figure 4-107:
Station Clustering for In-Lake Analyses for Lake Overstreet

Tallahassee Master Plan - Surface Water (TMaPS)

Geosyntec consultants

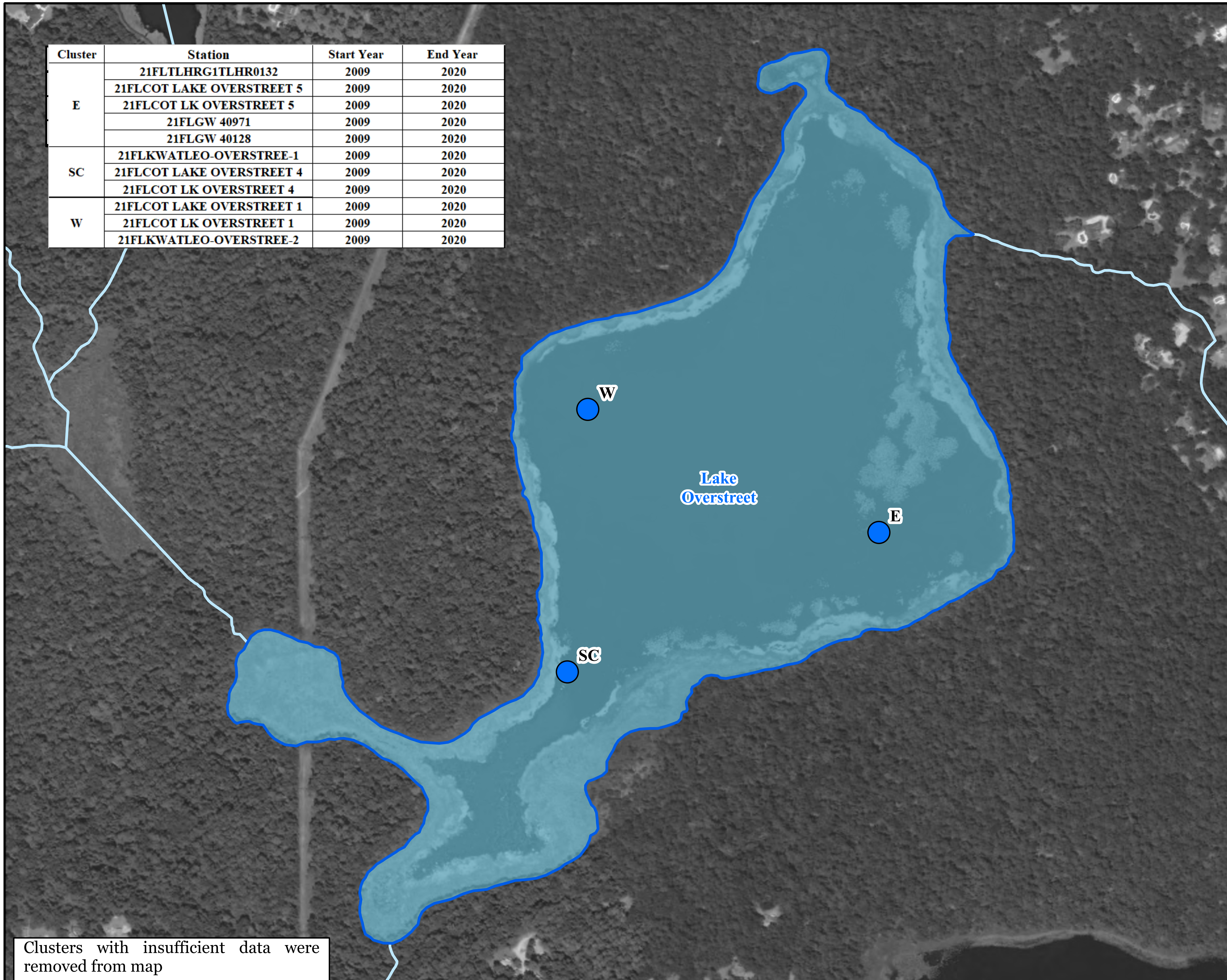


Cluster	Station	Start Year	End Year
E	21FLTLHRG1TLHR0132	2009	2020
	21FLCOT LAKE OVERSTREET 5	2009	2020
	21FLCOT LK OVERSTREET 5	2009	2020
	21FLGW 40971	2009	2020
	21FLGW 40128	2009	2020
SC	21FLKWATLEO-OVERSTREE-1	2009	2020
	21FLCOT LAKE OVERSTREET 4	2009	2020
	21FLCOT LK OVERSTREET 4	2009	2020
W	21FLCOT LAKE OVERSTREET 1	2009	2020
	21FLCOT LK OVERSTREET 1	2009	2020
	21FLKWATLEO-OVERSTREE-2	2009	2020

Figure 4-108: Spatial Assessment of Color in Lake Overstreet

Tallahassee Master Plan - Surface Water (TMaPS)

Cluster	Station	Start Year	End Year
E	21FLTLHRG1TLHR0132	2009	2020
	21FLCOT LAKE OVERSTREET 5	2009	2020
	21FLCOT LK OVERSTREET 5	2009	2020
	21FLGW 40971	2009	2020
	21FLGW 40128	2009	2020
SC	21FLKWATLEO-OVERSTREE-1	2009	2020
	21FLCOT LAKE OVERSTREET 4	2009	2020
	21FLCOT LK OVERSTREET 4	2009	2020
W	21FLCOT LAKE OVERSTREET 1	2009	2020
	21FLCOT LK OVERSTREET 1	2009	2020
	21FLKWATLEO-OVERSTREE-2	2009	2020



Clusters with insufficient data were removed from map

CITY OF TALLAHASSEE

N

0 0.08

Miles

Legend

- Lake Overstreet
- Watercourses

Alkalinity Average 2010-2020

mg/L

- 0 - 5
- 5 - 10
- 10 - 15
- 15 - 20
- > 20

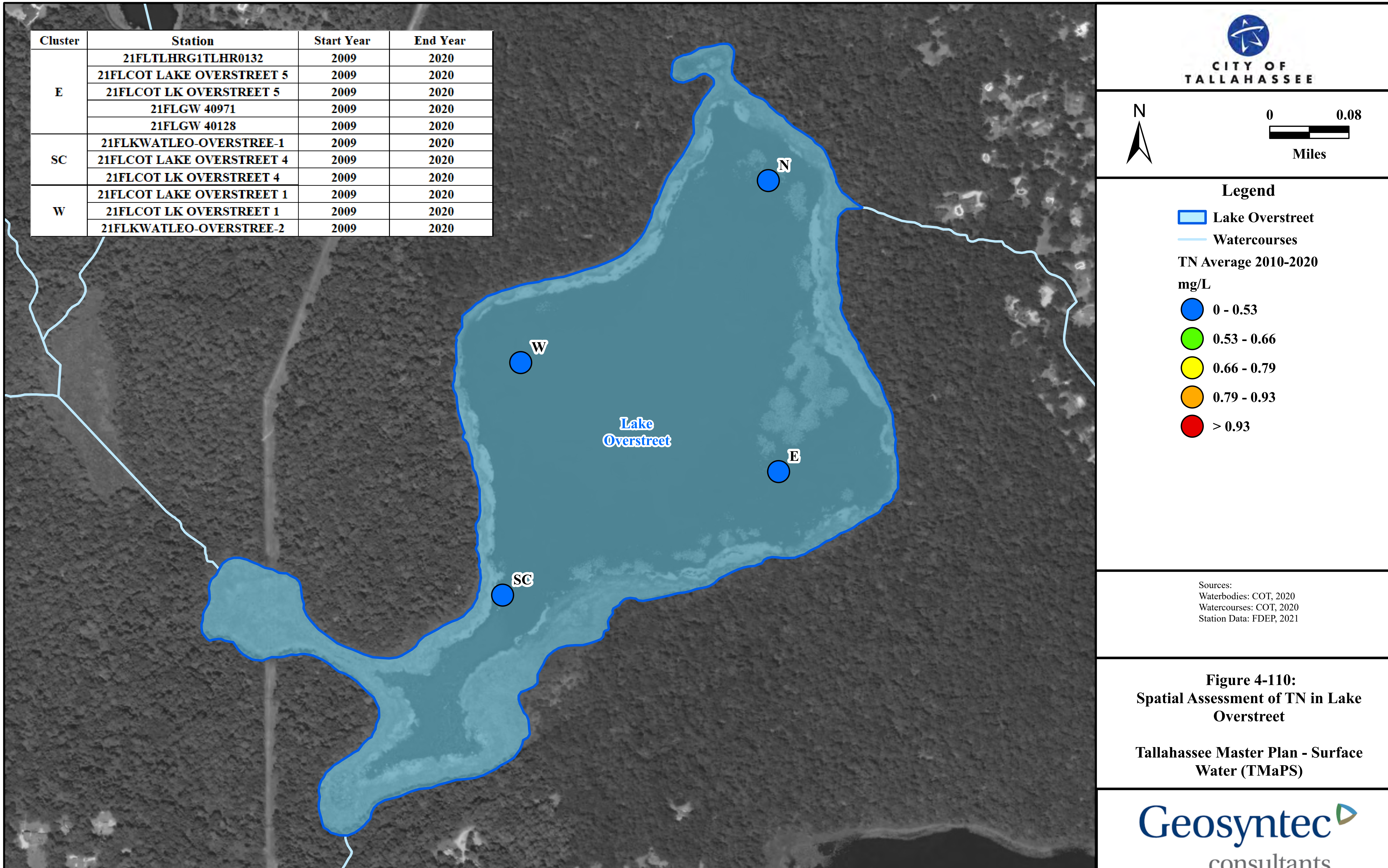
Sources:
Waterbodies: COT, 2020
Watercourses: COT, 2020
Station Data: FDEP, 2021

Figure 4-109:
Spatial Assessment of Alkalinity in Lake Overstreet

Tallahassee Master Plan - Surface Water (TMaPS)

Geosyntec consultants

Cluster	Station	Start Year	End Year
E	21FLTLHRG1TLHR0132	2009	2020
	21FLCOT LAKE OVERSTREET 5	2009	2020
	21FLCOT LK OVERSTREET 5	2009	2020
	21FLGW 40971	2009	2020
	21FLGW 40128	2009	2020
SC	21FLKWATLEO-OVERSTREE-1	2009	2020
	21FLCOT LAKE OVERSTREET 4	2009	2020
	21FLCOT LK OVERSTREET 4	2009	2020
W	21FLCOT LAKE OVERSTREET 1	2009	2020
	21FLCOT LK OVERSTREET 1	2009	2020
	21FLKWATLEO-OVERSTREE-2	2009	2020



CITY OF TALLAHASSEE

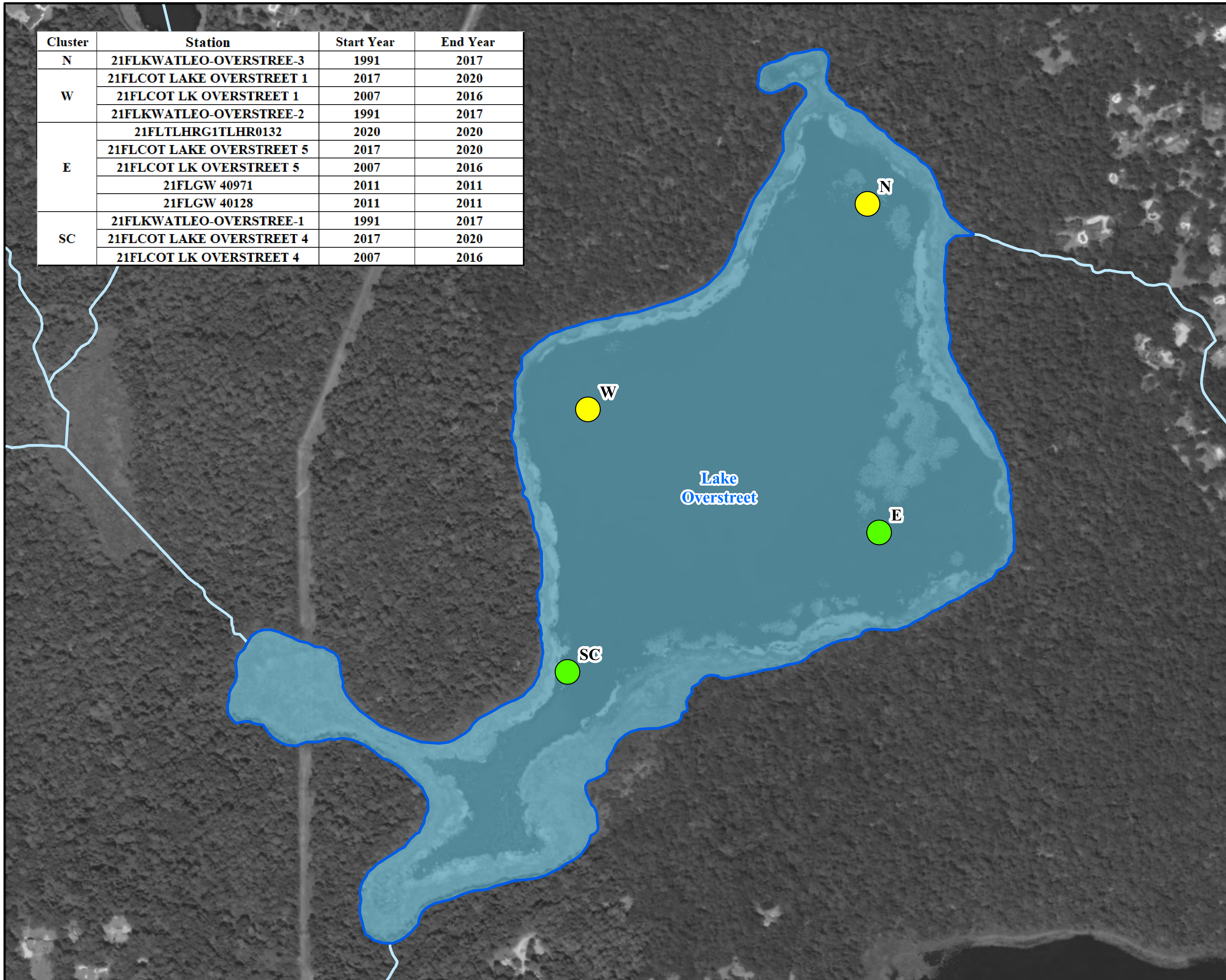
Sources:
Waterbodies: COT, 2020
Watercourses: COT, 2020
Station Data: FDEP, 2021

Figure 4-110:
Spatial Assessment of TN in Lake Overstreet

Tallahassee Master Plan - Surface Water (TMaPS)

Geosyntec consultants

Cluster	Station	Start Year	End Year
N	21FLKWATLEO-OVERSTREE-3	1991	2017
W	21FLCOT LAKE OVERSTREET 1	2017	2020
	21FLCOT LK OVERSTREET 1	2007	2016
	21FLKWATLEO-OVERSTREE-2	1991	2017
E	21FLTLHRG1TLHR0132	2020	2020
	21FLCOT LAKE OVERSTREET 5	2017	2020
	21FLCOT LK OVERSTREET 5	2007	2016
	21FLGW 40971	2011	2011
	21FLGW 40128	2011	2011
SC	21FLKWATLEO-OVERSTREE-1	1991	2017
	21FLCOT LAKE OVERSTREET 4	2017	2020
	21FLCOT LK OVERSTREET 4	2007	2016



CITY OF TALLAHASSEE

N

0 0.08

Miles

Legend

Lake Overstreet

Watercourses

TP Average 2010-2020

mg/L

0- 0.010

0.010 - 0.017

0.017 - 0.024

0.024 - 0.030

> 0.03

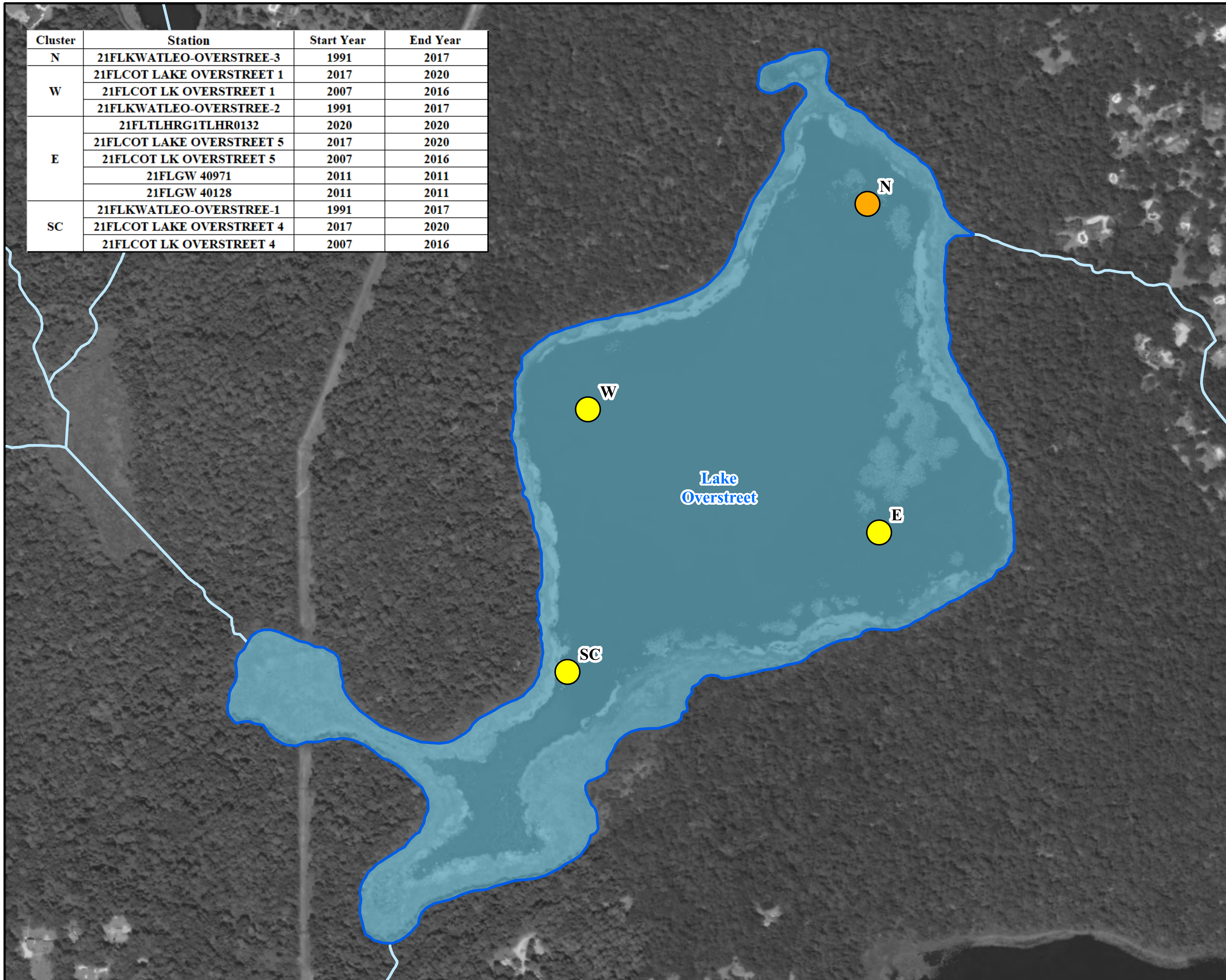
Sources:
Waterbodies: COT, 2020
Watercourses: COT, 2020
Station Data: FDEP, 2021

Figure 4-111: Spatial Assessment of TP in Lake Overstreet

Tallahassee Master Plan - Surface Water (TMaPS)

Geosyntec consultants

Cluster	Station	Start Year	End Year
N	21FLKWATLEO-OVERSTREE-3	1991	2017
W	21FLCOT LAKE OVERSTREET 1	2017	2020
	21FLCOT LK OVERSTREET 1	2007	2016
	21FLKWATLEO-OVERSTREE-2	1991	2017
E	21FLTLHRG1TLHR0132	2020	2020
	21FLCOT LAKE OVERSTREET 5	2017	2020
	21FLCOT LK OVERSTREET 5	2007	2016
	21FLGW 40971	2011	2011
	21FLGW 40128	2011	2011
SC	21FLKWATLEO-OVERSTREE-1	1991	2017
	21FLCOT LAKE OVERSTREET 4	2017	2020
	21FLCOT LK OVERSTREET 4	2007	2016



CITY OF TALLAHASSEE

N

0 0.08

Miles

Legend

Lake Overstreet

Watercourses

Chl a Average 2010-2020

µg/L

- 0.0 - 1.5
- 1.5 - 3.0
- 3.0 - 4.5
- 4.5 - 6.0
- > 6

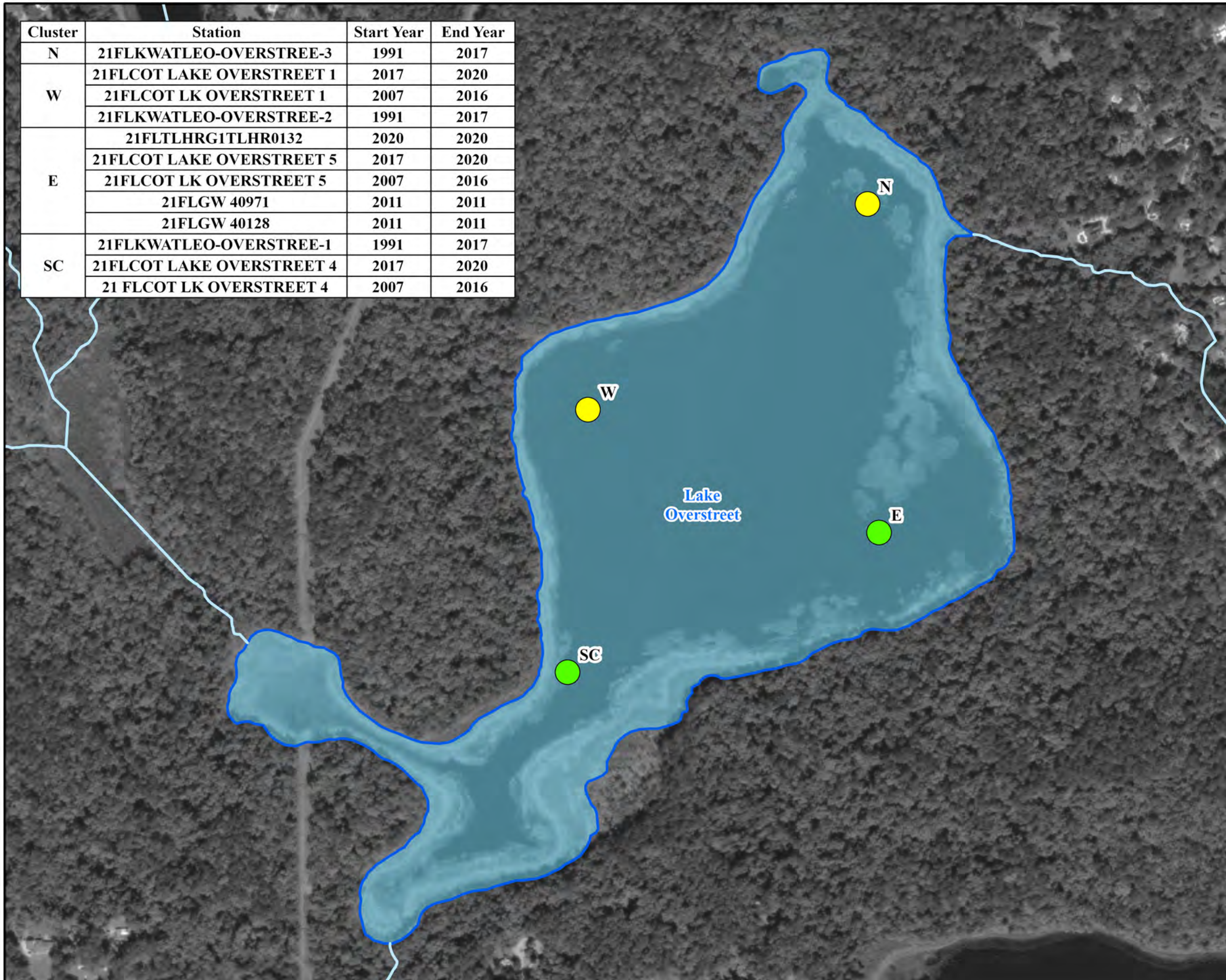
Sources:
Waterbodies: COT, 2020
Watercourses: COT, 2020
Station Data: FDEP, 2021

Figure 4-112:
Spatial Assessment of Chl a in Lake Overstreet

Tallahassee Master Plan - Surface Water (TMaPS)

Geosyntec consultants

Cluster	Station	Start Year	End Year
N	21FLKWATLEO-OVERSTREE-3	1991	2017
W	21FLCOT LAKE OVERSTREET 1	2017	2020
	21FLCOT LK OVERSTREET 1	2007	2016
	21FLKWATLEO-OVERSTREE-2	1991	2017
E	21FLTLHRG1TLHR0132	2020	2020
	21FLCOT LAKE OVERSTREET 5	2017	2020
	21FLCOT LK OVERSTREET 5	2007	2016
	21FLGW 40971	2011	2011
	21FLGW 40128	2011	2011
SC	21FLKWATLEO-OVERSTREE-1	1991	2017
	21FLCOT LAKE OVERSTREET 4	2017	2020
	21 FLCOT LK OVERSTREET 4	2007	2016



CITY OF TALLAHASSEE

N

0 0.08

Miles

Legend

Lake Overstreet

Watercourses

TSI Average 2010-2020

TSI Score

- 0 - 15
- 15 - 30
- 30 - 45
- 45 - 60
- > 60

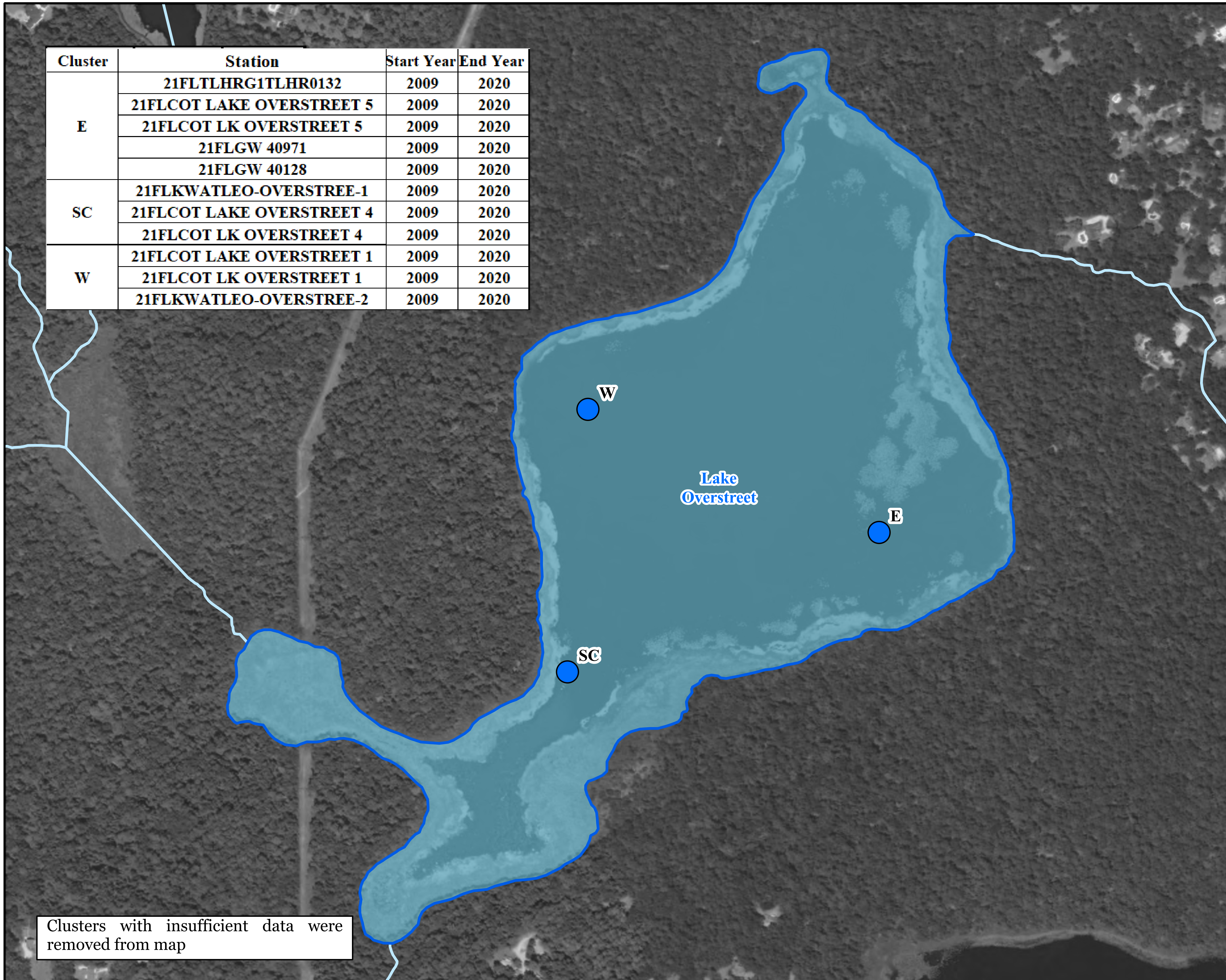
Sources:
Waterbodies: COT, 2020
Watercourses: COT, 2020
Station Data: FDEP, 2021

Figure 4-113: Spatial Assessment of TSI in Lake Overstreet

Tallahassee Master Plan - Surface Water (TMaPS)

Geosyntec consultants

Cluster	Station	Start Year	End Year
E	21FLTLHRG1TLHR0132	2009	2020
	21FLCOT LAKE OVERSTREET 5	2009	2020
	21FLCOT LK OVERSTREET 5	2009	2020
	21FLGW 40971	2009	2020
	21FLGW 40128	2009	2020
SC	21FLKWATLEO-OVERSTREE-1	2009	2020
	21FLCOT LAKE OVERSTREET 4	2009	2020
	21FLCOT LK OVERSTREET 4	2009	2020
W	21FLCOT LAKE OVERSTREET 1	2009	2020
	21FLCOT LK OVERSTREET 1	2009	2020
	21FLKWATLEO-OVERSTREE-2	2009	2020



Clusters with insufficient data were removed from map

CITY OF TALLAHASSEE

N

0 0.08

Miles

Legend

Lake Overstreet

Watercourses

E. coli 90th Percentile 2010-2020 MPN/100mL

- < 100
- 100 - 200
- 200 - 300
- 300 - 410
- > 410

Sources:
Waterbodies: COT, 2020
Watercourses: COT, 2020
Station Data: FDEP, 2021

Figure 4-114: Spatial Assessment of E. coli in Lake Overstreet

Tallahassee Master Plan - Surface Water (TMaPS)

Geosyntec consultants