Central District • Middle St. Johns River Basin

Draft Report

Nutrient TMDLs for Kasey Lake (WBID 3002Q), Lake Fairhope (WBID 3004R), and Lake Lotta (WBID 3002G)

Eric Tano, Casey Luzius
Division of Environmental Assessment and Restoration
Florida Department of Environmental Protection

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2600 Blair Stone Road
Mail Station 3000
Tallahassee, FL 32399-2400
https://floridadep.gov

Executive Summary

This analysis presents the total maximum daily loads (TMDLs) as in-lake nutrient targets and required reductions developed to address nutrient impairment in Lake Lotta, Lake Fairhope, and Kasey Lake, located in the Middle St. Johns Basin in Orange County. All three waterbodies were identified as impaired for nutrients based on elevated chlorophyll *a* concentrations and, in Kasey Lake and Lake Fairhope, total nitrogen (TN) and total phosphorus (TP) concentrations exceeding numeric nutrient criteria. These lakes were added to the 303(d) list by Secretarial Order in April 2020 as the segments with waterbody identification (WBID) numbers 3002G, 3002Q, and 3004R, respectively.

TMDLs for TN and TP have been developed, and **Table EX-1** lists supporting information for the TMDLs. These were developed in accordance with Section 303(d) of the federal Clean Water Act and guidance developed by the U.S. Environmental Protection Agency.

Table EX-1. Summary of TMDL supporting information for Lake Lotta

Type of Information	Description
Waterbody name/ WBID number	Lake Lotta (WBID 3002G), Kasey Lake (WBID 3002Q), and Lake Fairhope (WBID 3004R)
Hydrologic Unit Code (HUC) 8	03080101
Use classification/ Waterbody designation	Class III/Fresh
Targeted beneficial uses	Fish consumption; recreation, and propagation and maintenance of a healthy, well-balanced population of fish and wildlife
303(d) listing status	Verified List of Impaired Waters for the Middle St. Johns Group 2 Basin adopted via Secretarial Order in 2020
TMDL pollutants	TN and TP
TMDLs and the narrative nutrient criterion	**Lake Lotta (WBID 3002G):** **TN**: 1.27 milligrams per liter (mg/L), expressed as an annual geometric mean (AGM) **TP**: 0.05 mg/L, expressed as an AGM **Kasey Lake (WBID 3002Q):** **TN**: 1.05 mg/L **TP**: 0.03 mg/L **Lake Fairhope (WBID 3004R):** **TN**: 1.05 mg/L **TP**: 0.03 mg/L
Concentration reductions required to meet the TMDLs	**Lake Lotta (WBID 3002G):** A 0 % TN reduction and 20 % TP reduction to achieve the chlorophyll *a* criterion of 20 micrograms per liter (µg/L) for high-color lakes. **Kasey Lake (WBID 3002Q): A** 29 % TN reduction and 62 % TP reduction to achieve the chlorophyll *a* criterion of 20 µg/L for low-color, high-alkalinity lakes. **Lake Fairhope (WBID 3004R): A** 56 % TN reduction and 84 % TP reduction to achieve the chlorophyll *a* criterion of 20 µg/L for low-color, high-alkalinity lakes.

Acknowledgments

This analysis was accomplished thanks to significant contributions from staff in the Florida Department of Environmental Protection (DEP) Division of Environmental Assessment and Restoration (DEAR), specifically, the Office of Watershed Services, Watershed Assessment Section, Standards Development Section, Water Quality Restoration Program, Central Regional Operations Center, and Watershed Evaluation and TMDL Section. DEP also recognizes Orange County for its contributions towards understanding the issues, history, and processes at work in the Kasey Lake and Lake Fairhope Watersheds.

For additional information regarding the development of this report, contact the DEAR office at:

2600 Blair Stone Road
Mail Station 3000
Tallahassee, FL 32399-2400
Phone: (850) 245–8668

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Acronyms and Abbreviations

µg/L	Micrograms Per Liter
AGM	Annual Geometric Mean
BMAP	Basin Management Action Plan
BMP	Best Management Practice
$CaCO_3$	Calcium Carbonate
CFR	Code of Federal Regulations
CWA	Clean Water Act
DEAR	Division of Environmental Assessment and Restoration
dem	Digital Elevation Model
DEP	Florida Department of Environmental Protection
DO	Dissolved Oxygen
EPA	U.S. Environmental Protection Agency
°F	Degrees Fahrenheit
F.A.C.	Florida Administrative Code
FDOT	Florida Department of Transportation
F.S.	Florida Statutes
FWRA	Florida Watershed Restoration Act
HUC	Hydrologic Unit Code
IWR	Impaired Surface Waters Rule
kg	Kilograms
LA	Load Allocation
mg/L	Milligrams Per Liter
MOS	Margin of Safety
MS4	Municipal Separate Storm Sewer System
NA	Not Applicable or Not Available
NNC	Numeric Nutrient Criteria
NPDES	National Pollutant Discharge Elimination System
OFS	Outstanding Florida Springs
OSTDS	Onsite Sewage Treatment and Disposal System
PCU	Platinum Cobalt Unit
PLRG	Pollutant Load Reduction Goal
SJRWMD	St. Johns River Water Management District
SWIM	Surface Water Improvement and Management
TMDL	Total Maximum Daily Load
TN	Total Nitrogen
TP	Total Phosphorus
U.S.	United States
USGS	U.S. Geological Survey

WBID	Waterbody Identification (number)
WLA	Wasteload Allocation
WWTF	Wastewater Treatment Facility

Chapter 1: Introduction

1.1 Purpose of Report

This report presents the total maximum daily loads (TMDLs) developed to address the nutrient impairment of Kasey Lake, Lake Fairhope, and Lake Lotta, located in the Middle St. Johns River Basin in Orange County. The TMDLs are based on the generally applicable numeric nutrient criteria (NNC) for high-color lakes; low-color; and, low-color, high-alkalinity lakes in subsection 62-302.531(2), Florida Administrative Code (F.A.C.).

These waterbodies were verified as impaired for nutrients using the methodology in the Identification of Impaired Surface Waters Rule (IWR) (Chapter 62-303, F.A.C.), and were included on the Verified List of Impaired Waters for the Middle St. Johns River Basin adopted by Secretarial Order in April 2020.

The TMDL process quantifies the amount of a pollutant that can be assimilated in a waterbody, identifies the sources of the pollutant, and provides water quality targets needed to achieve compliance with applicable water quality criteria based on the relationship between pollutant sources and water quality in the receiving waterbody. The TMDLs establish the allowable nutrient concentrations for Kasey Lake, Lake Fairhope, and Lake Lotta and associated nutrient reductions that would restore the waterbodies so that they meet their applicable water quality criteria for nutrients.

1.2 Identification of Waterbody

For assessment purposes, the Florida Department of Environmental Protection (DEP) divided the Middle St. Johns River Basin (Hydrologic Unit Code [HUC] 8 – 03080101) into watershed assessment polygons with a unique **w**ater**b**ody **id**entification (WBID) number for each watershed or surface water segment. Lake Kasey is WBID 3002Q, Lake Fairhope is WBID 3004R, and Lake Lotta is WBID 3002G. **Figures 1.1, 1.2,** and **1.3** show the location of the lake WBIDs in the basin and major geopolitical and hydrologic features in the region.

Kasey Lake (WBID 3002Q) is a small lake located in northwest Orlando in central Orange County. The lake does not receive water from any waterbodies and discharges into Kristy Lake through a 15-inch pipe overflow control structure with a ditch bottom inlet gate weir (48 inches by 60 inches). The Kasey Lake Watershed boundary was provided by the City of Orlando.

Lake Fairhope (WBID 3004R) is a small lake located in north Orlando in central Orange County. The lake does not discharge into any waterbodies and does not receive water from any waterbodies; it is also a closed basin. The Lake Fairhope Watershed boundary was provided by the City of Orlando.

Lake Lotta (WBID 3002G) is a small lake located in west Orlando in Orange County. The lake discharges into Lake Rose but does not receive drainage from another waterbody. The Lake Lotta Watershed boundary was delineated using a 10-meter digital elevation model (dem).

Table 1.1 summarizes the lakes' general hydrologic characteristics.

Table 1.1. Characteristics of Kasey Lake, Lake Fairhope, and Lake Lotta

[1] Data from City of Orlando Public Works Department 2016.
NA = Not available.

Lake Name	Lake Surface Area (acres)	Lake Volume (acre-feet)	Mean Depth (feet)	Maximum Depth (feet)	Watershed Area (acres)
Kasey[1]	4	33	9	13	74
Fairhope[1]	1	3	2	4	15
Lotta[1]	40	~486	12	14	908

1.3 Watershed Information

1.3.1 Population and Geopolitical Setting

According to data available from the U.S. Census Bureau (2019), the population of Orange County is 1,393,452, with a density of 1,268.5 people per square mile. The county occupies an area of 903.43 square miles and contains 556,896 housing units, with a housing density of 616 houses per square mile. Kasey Lake and Lake Fairhope are situated in the City of Orlando, which has a population of 287,442. Lake Lotta is situated in Orange County, near the City of Ocoee.

1.3.2 Topography

Lake regions in Florida have been defined by the U.S. Environmental Protection Agency (EPA) and are based on regions of similarity in physical, chemical, and biological characteristics along with their associations with landscape features (Griffith et al. 1997). Kasey Lake and Lake Lotta are both located in the Apopka Upland region (75-16), which is characterized by many small lakes and sinkholes with elevations ranging from 70 to 150 feet. The physical and chemical characteristics of the lakes in this region are varied, and lake water levels can decrease significantly through drought periods. There are some acidic, clear, soft water lakes of low mineral content, some clear lakes with moderate nutrients (some may lack macrophytes), and some darker water lakes that still have circumneutral pH values. The current land cover consists of citrus, pasture, and urban and residential development. Candler-Apopka-Astatula and Tavares-Zolfo-Millhopper are the most common soil associations, developed over more silt and clay than the coarser clastics of the Mount Dora Ridge (Brooks 1981; 1982).

Lake Fairhope is located in the Orlando Ridge region (75-21), which is characterized by an urbanized karst area of low relief, with elevations from 75 to 120 feet. In the area, longleaf pine and xerophytic oaks were the dominant trees of the natural vegetation. Soils comprise primarily

the Tavares, Smyrna, and Pomello series. Lakes in this region are characterized as clear, alkaline, hardwater lakes of moderate mineral content. Additionally, Orlando Ridge region lakes are more phosphatic and green than in the Crescent City/DeLand Ridges (75-11) region and only slightly more so than in the Apopka Upland region (75-16).

1.3.3 Hydrogeological Setting

The hydrology of the lakes is determined in part by the topography and their similar soil geology, aquifer/groundwater interactions, and climate.

The climate of the region is humid subtropical in the Köppen classification system. It is characterized by warm, relatively wet summers and mild, relatively dry winters. Annual average temperatures in the region are 23° Celsius. Annual rainfall averages 129 centimeters, and the majority of the rainfall occurs from June through September (U.S. Geological Survey [USGS] 1996).

The Kasey Lake Watershed is located in the Undifferentiated Sediment and Cypresshead Formation geological regions. The Undifferentiated Sediment is characterized by siliciclastics comprising gray, tan, brown to black, unconsolidated to poorly consolidated, clean to clayey, silty, unfossiliferous, variably organic-bearing sands ranging from blue-green to olive green in color, and poorly to moderately consolidated, sandy, silty clays.

Kasey Lake, Lake Fairhope, and Lake Lotta Watersheds are all located in the Cypresshead Formation (Pliocene), characterized by reddish-brown to reddish-orange, unconsolidated to poorly consolidated, fine to very coarse-grained, clean to clayey sands (Scott 2001). The Cypresshead Formation is at or near the surface, and because of the permeable sands, this region encompasses a part of the surficial aquifer found in Florida and eastern Georgia.

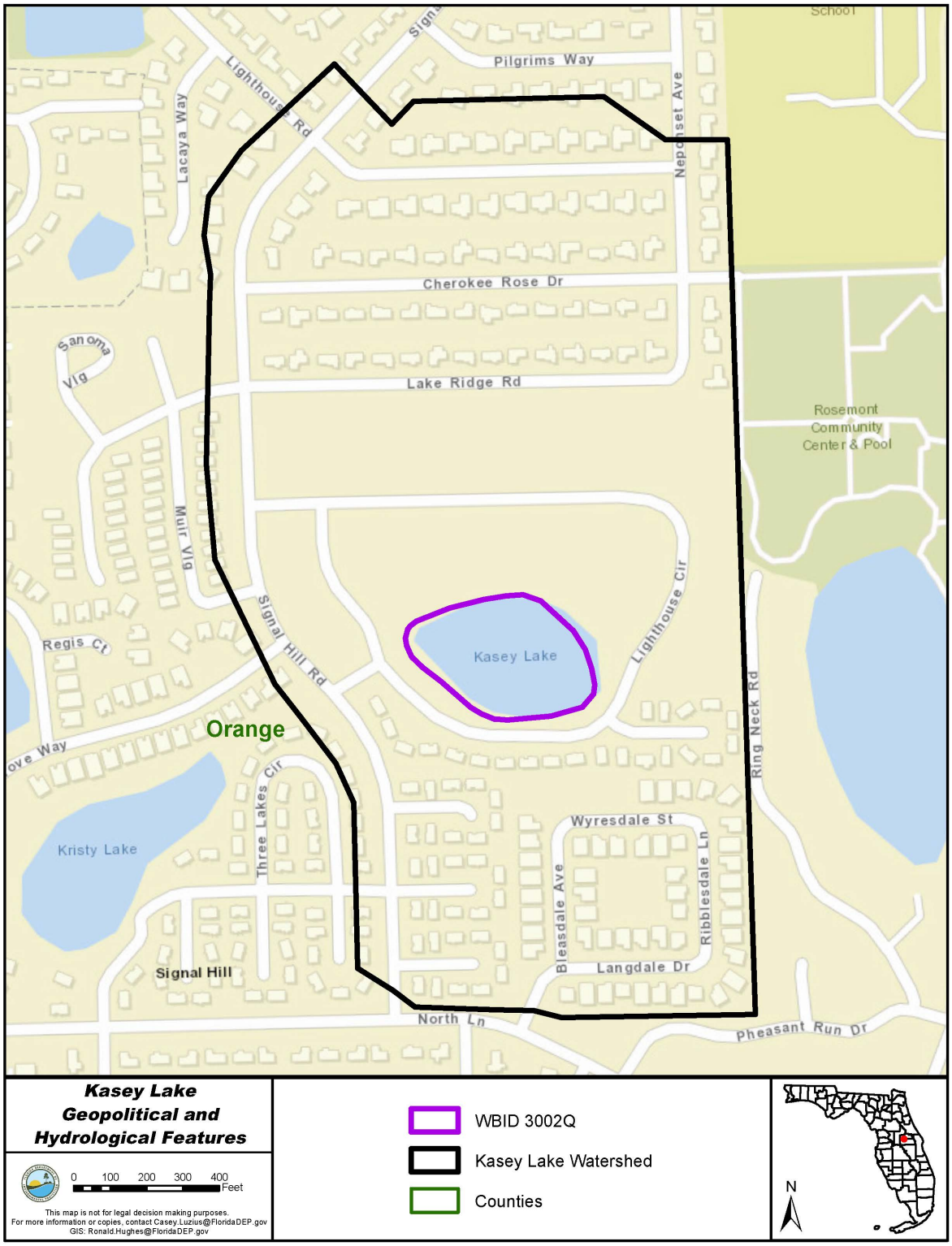

Figure 1.1. Location of Kasey Lake (WBID 3002Q) in the Middle St. Johns River Basin and major geopolitical and hydrologic features in the region

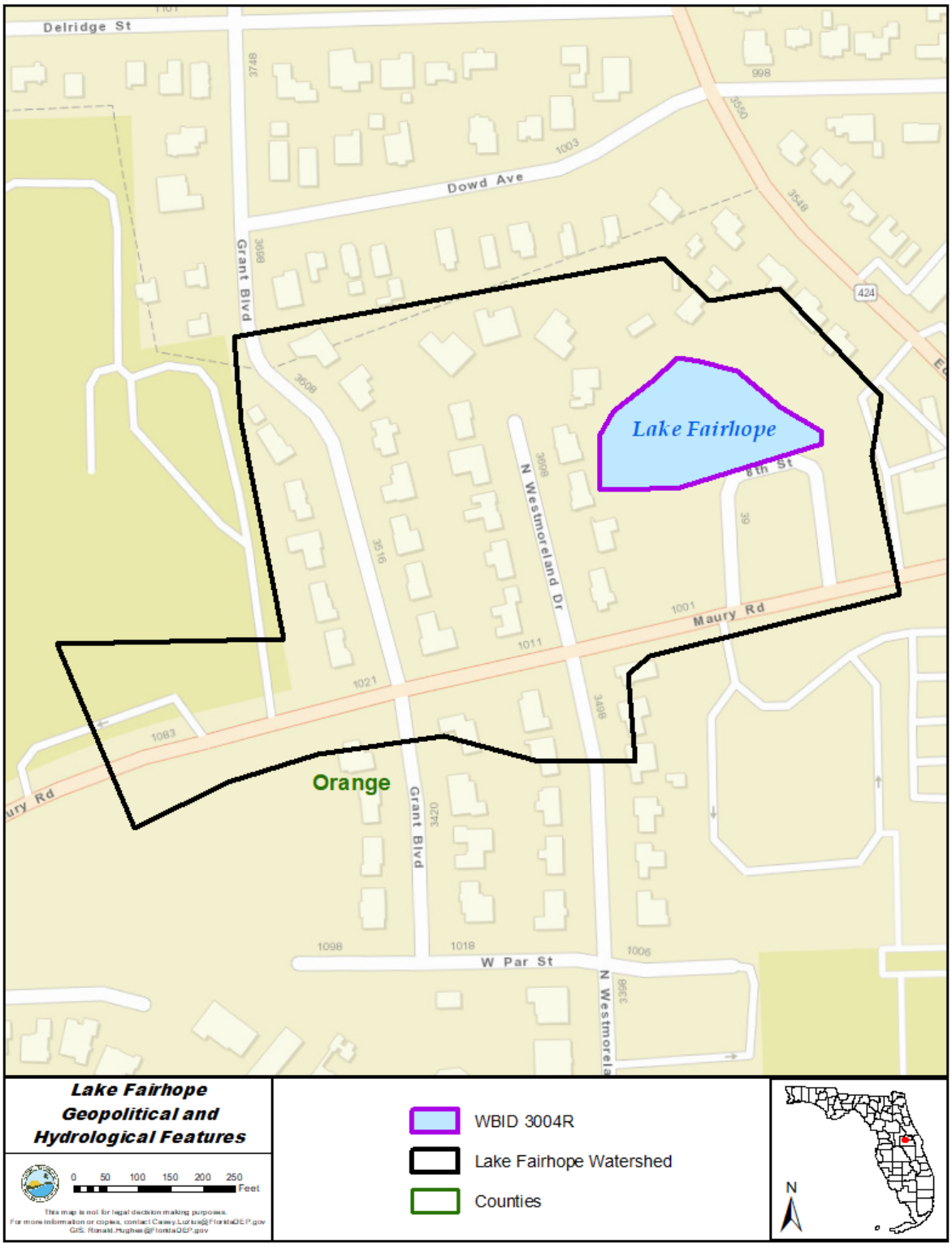

Figure 1.2. Location of Lake Fairhope (WBID 3004R) in the Middle St. Johns River Basin and major geopolitical and hydrologic features in the region

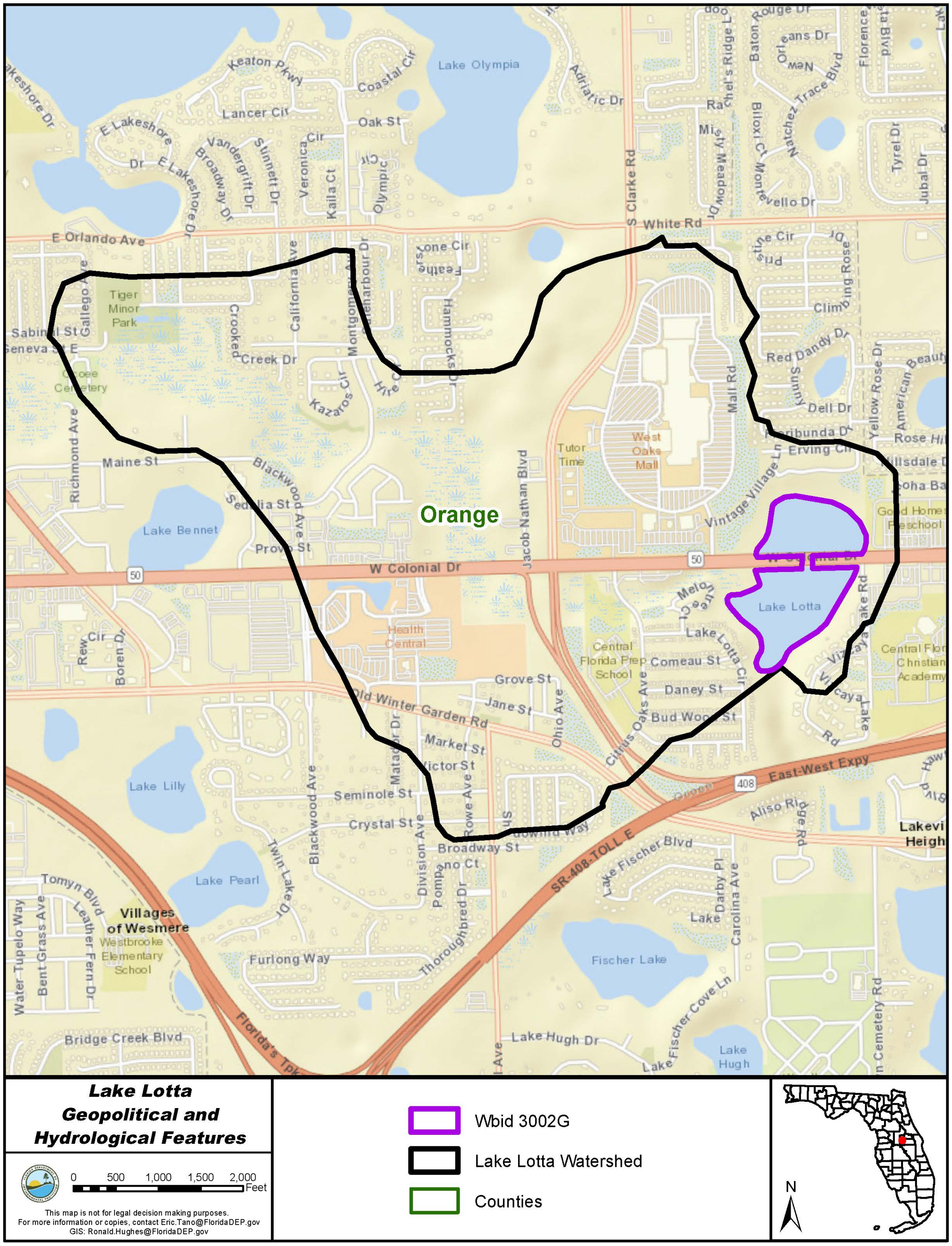

Figure 1.3. Location of Lake Lotta (WBID 3002G) in the Middle St. Johns Basin and major hydrologic and geopolitical features in the region

The soils in the Kasey Lake, and Lake Fairhope watersheds comprise Hydrologic Soil Groups A and A/D, based on the National Cooperative Soil Survey. Group A type soils are typically well-drained, have deep water tables, and consist of sandy, textured soils with a relatively low runoff potential. Group D type soils are variable in texture but generally have a greater clay component and are often found at lower topography with higher water tables that generate a higher hydrologic runoff response. When Group A/D is unsaturated, it behaves like Groups A and when unsaturated like Group D soil. The soils in the Lake Lotta watershed are also composed of Hydrologic Soil Groups A, and A/D. In addition to A and A/D, the Hydrologic Soil Group B/D is in the Lake Lotta watershed. Soil Groups A/D and B/D are similar in that when they are unsaturated they behave like Group A.

Figures 1.4, **1.5,** and **1.6** display the distribution of soil types in the Kasey Lake, Lake Fairhope, and Lake Lotta Watersheds, respectively. These lake watershed areas consist mostly of a mix of well-drained, sandy, textured soils ("A" soils). **Tables 1.2, 1.3**, and **1.4** list the percentage of soil types in the Kasey, Fairhope, and Lotta Watersheds, respectively.

Table 1.2. Soil type acreage and percent in the Kasey Lake Watershed

Note: Hybrid soil type is A/D.

Hydrologic Group	Acres	% of Watershed
No Data	2.8	3.8
A	60.2	80.8
A/D	11.5	15.4
Total	**74.5**	**100.0**

Table 1.3. Soil type acreage and percent in the Lake Fairhope Watershed

Note: Hybrid soil type is A/D.

Hydrologic Group	Acres	% of Watershed
A	2.3	15
A/D	13	85
Total	**15.3**	**100.0**

Table 1.4. Soil type acreage and percent in the Lake Lotta Watershed

Note: Hybrid soil types are A/D and B/D.

Hydrologic Group	Acres	% of Watershed
A	760	83
A/D	87	10
B/D	7	1
No Data	54	6
Total	**908**	**100.0**

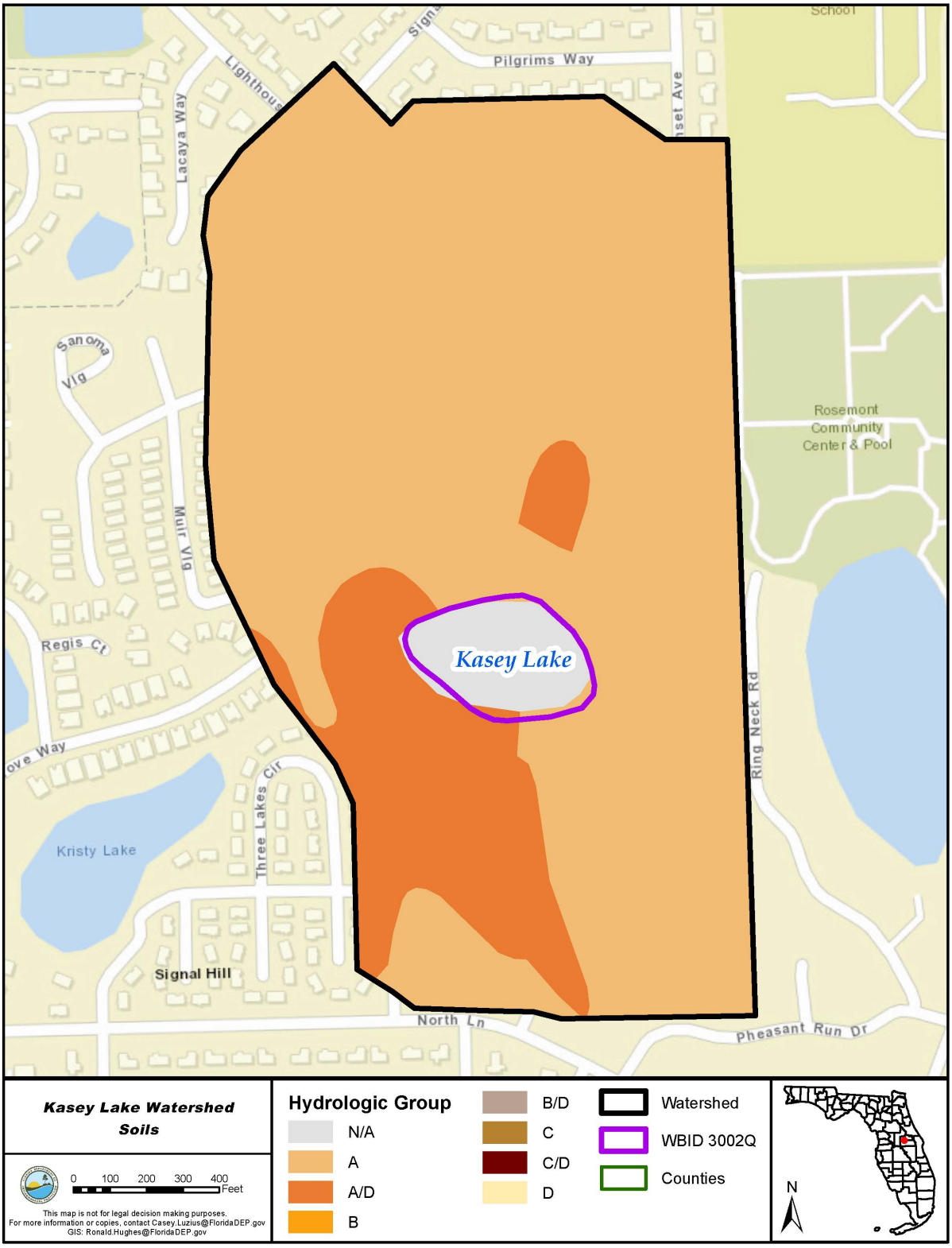

Figure 1.4. Hydrologic soil groups in the Kasey Lake Watershed

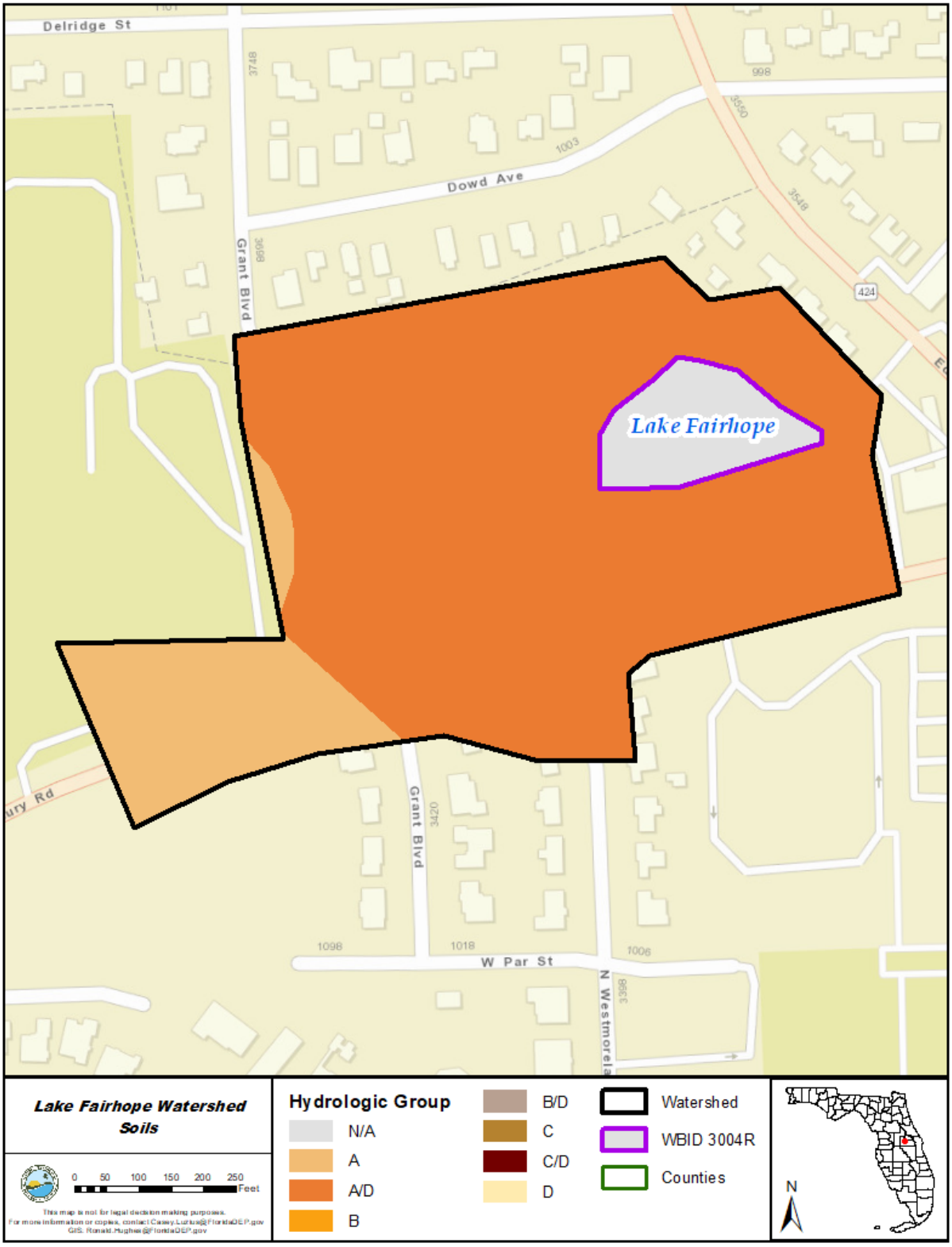

Figure 1.5. Hydrologic soil groups in the Lake Fairhope Watershed

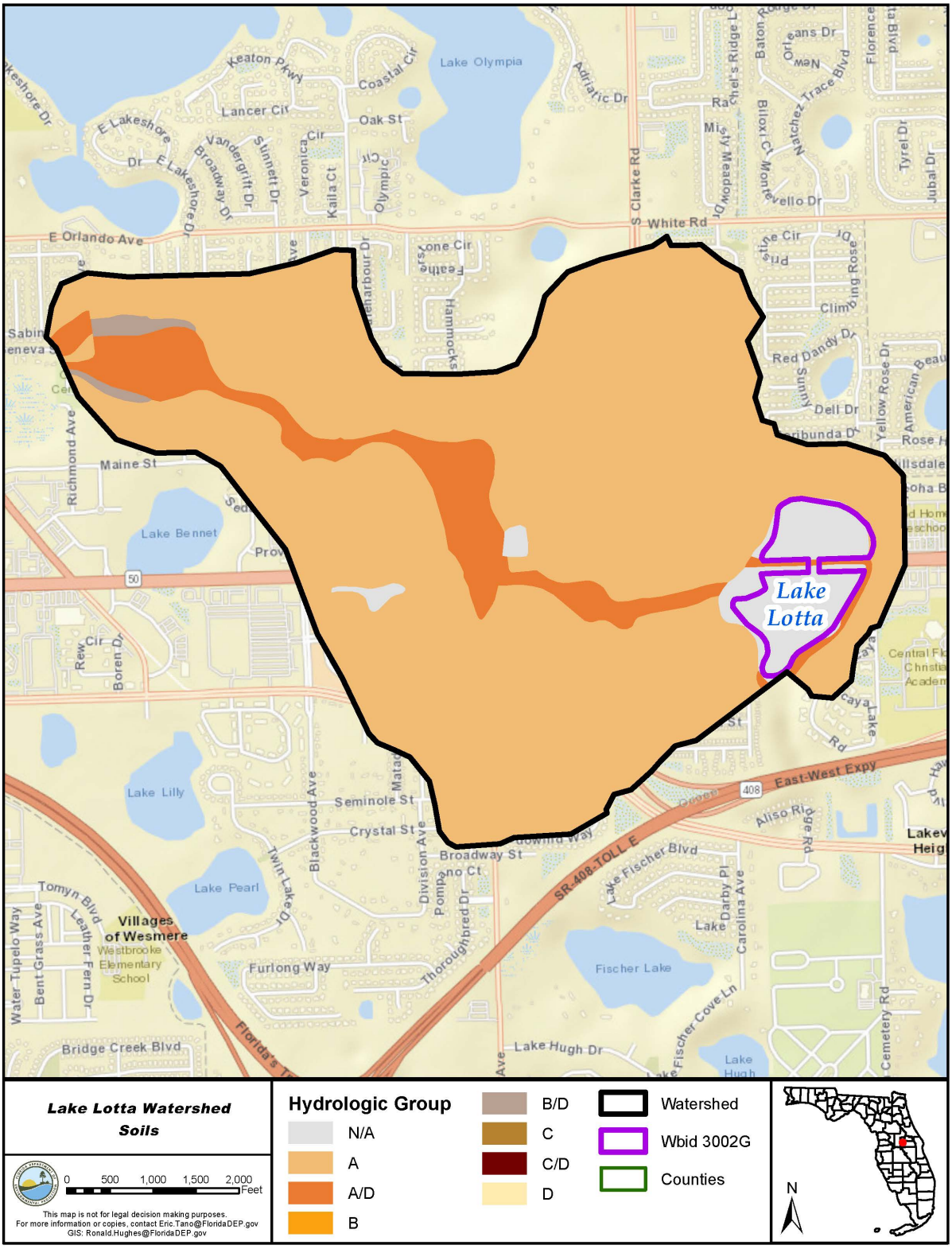

Figure 1.6. Hydrologic soil groups in the Lake Lotta Watershed

Chapter 2: Water Quality Assessment and Identification of Pollutants of Concern

2.1 Statutory Requirements and Rulemaking History

Section 303(d) of the federal Clean Water Act (CWA) requires states to submit to the U.S. Environmental Protection Agency (EPA) lists of surface waters that do not meet applicable water quality standards (impaired waters) and establish a TMDL for each pollutant causing the impairment of listed waters on a schedule. DEP has developed such lists, commonly referred to as 303(d) lists, since 1992.

The Florida Watershed Restoration Act (FWRA) (Section 403.067, Florida Statutes (F.S.)) directed DEP to develop, and adopt by rule, a science-based methodology to identify impaired waters. The Environmental Regulation Commission adopted the methodology as Chapter 62-303, F.A.C. (the IWR), in 2001. The rule was amended in 2006, 2007, 2012, 2013, and 2016.

The list of impaired waters in each basin, referred to as the Verified List, is also required by the FWRA (Subsection 403.067(4), F.S.). The state's 303(d) list is amended annually to include basin updates.

2.2 Classification of the Waterbody and Applicable Water Quality Standards

Kasey Lake, Lake Fairhope, and Lake Lotta are Class III (fresh) waterbodies, with a designated use of fish consumption; recreation, and propagation and maintenance of a healthy, well-balanced population of fish and wildlife. The Class III water quality criterion applicable to the verified impairment (nutrients) for these waterbodies is Florida's nutrient criterion in paragraph 62-302.530(48)(b), F.A.C. Florida adopted NNC for lakes, spring vents, and streams in 2011. These were approved by the EPA in 2012 and became effective in 2014.

The applicable lake NNC are dependent on alkalinity, measured in milligrams per liter (mg/L) as calcium carbonate ($CaCO_3$) and true color (color), measured in platinum cobalt units (PCU), based on long-term period-of-record geometric means (**Table 2.1**). The long-term averages of geometric means for alkalinity in Kasey Lake, Lake Fairhope, and Lake Lotta are 28, 85, and 58 mg/L $CaCO_3$, respectively. The long-term averages of geometric means for color in Kasey Lake, Lake Fairhope, and Lake Lotta are 32, 37, and 45 PCU, respectively. The geometric means were calculated based on the results in the IWR Run 60 Database. Using this methodology, Lake Kasey and Lake Fairhope are both classified as low color, high alkalinity (≤40 PCU and >20 mg/L $CaCO_3$), while Lake Lotta is classified as high color (> 40 PCU).

The chlorophyll *a* NNC for low-color, high-alkalinity lakes is an annual geometric mean (AGM) value of 20 micrograms per liter (µg/L), not to be exceeded more than once in any consecutive 3-

year period. The associated total nitrogen (TN) and total phosphorus (TP) criteria for a lake can vary annually, depending on the availability of data for chlorophyll *a* and the concentrations of chlorophyll *a* in the lake.

If there are sufficient data to calculate an AGM for chlorophyll *a* and the AGM does not exceed the chlorophyll *a* criterion for the lake type in **Table 2.1**, then the TN and TP numeric interpretations for the calendar year are the AGMs for lake TN and TP samples, subject to minimum and maximum limits.

If there are insufficient data to calculate the AGM for chlorophyll *a* for a given year, or the AGM for chlorophyll *a* exceeds the values in the table for the lake type, then the applicable nutrient interpretations for TN and TP are the minimum values. These values are listed in **Table 2.1**, as specified in subparagraph 62-302.531(2)(b)1., F.A.C.

Table 2.1. Chlorophyll *a*, TN, and TP criteria for Florida lakes (Subparagraph 62-302.531(2)(b)1., F.A.C.)

* For lakes with color > 40 PCU in the West Central Nutrient Watershed Region, the maximum TP limit is the 0.49 mg/L TP streams threshold for the region.

Long-Term Geometric Mean Lake Color and Alkalinity	AGM Chlorophyll *a* (µg/L)	Minimum Calculated AGM TP NNC (mg/L)	Minimum Calculated AGM TN NNC (mg/L)	Maximum Calculated AGM TP NNC (mg/L)	Maximum Calculated AGM TN NNC (mg/L)
>40 PCU	20	0.05	1.27	0.16*	2.23
≤ 40 PCU and > 20 mg/L $CaCO_3$	20	0.03	1.05	0.09	1.91
≤ 40 PCU and ≤ 20 mg/L $CaCO_3$	6	0.01	0.51	0.03	0.93

2.3 Determination of the Pollutant of Concern

2.3.1 Data Providers

The lake nutrient data used in the most recent assessment period for Kasey Lake and Lake Fairhope came from stations sampled and monitored by the DEP Central District (21FLCEN…) and the City of Orlando (21FLORL…). **Figures 2.1** and **2.2** show the lake sampling locations in the two watersheds, respectively. **Table 2.2** lists the monitoring stations for collecting chlorophyll *a*, TN, and TP data from 2005 to 2019 for Kasey Lake and from 2008 to 2019 for Lake Fairhope.

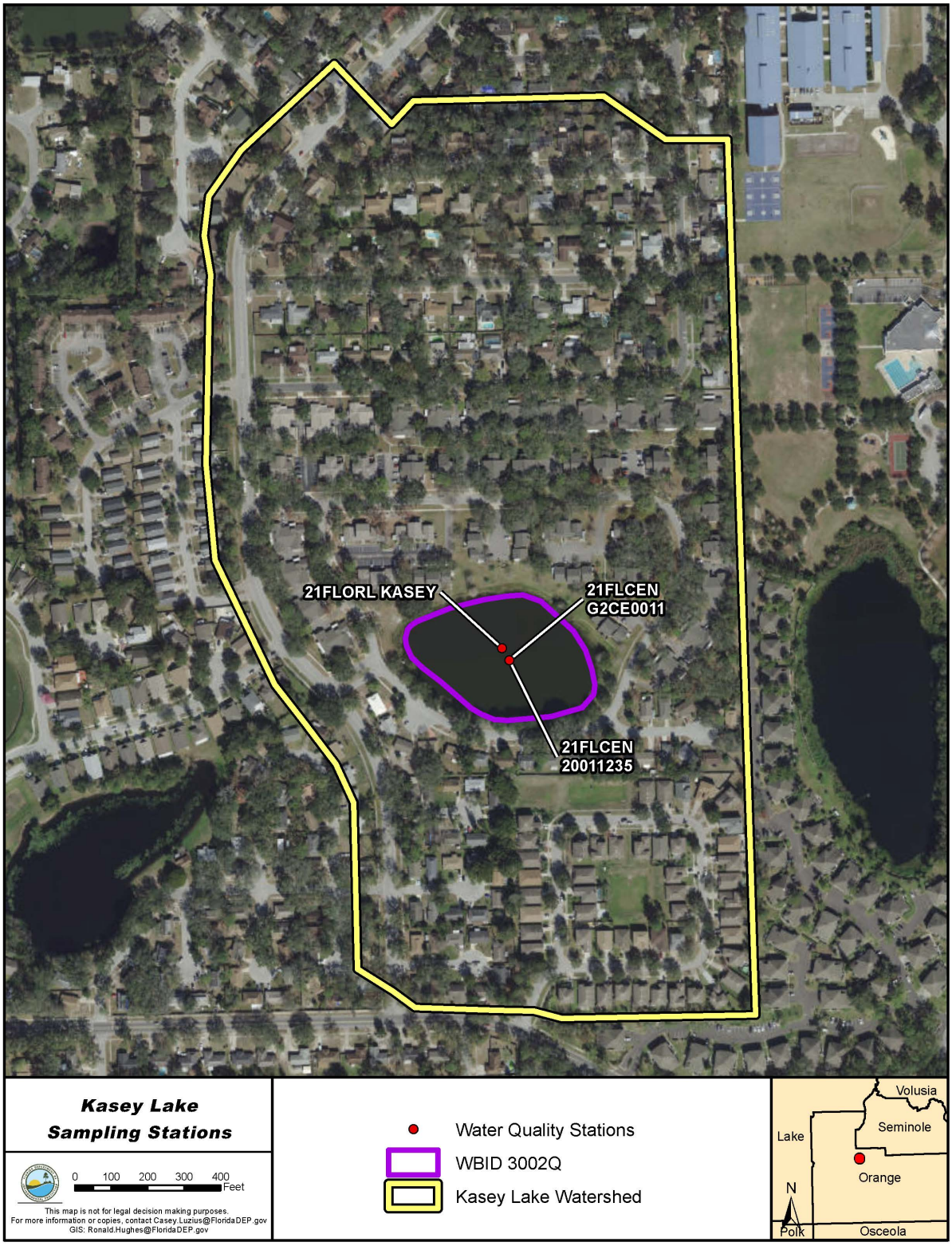

Figure 2.1. Monitoring stations in the Kasey Lake Watershed

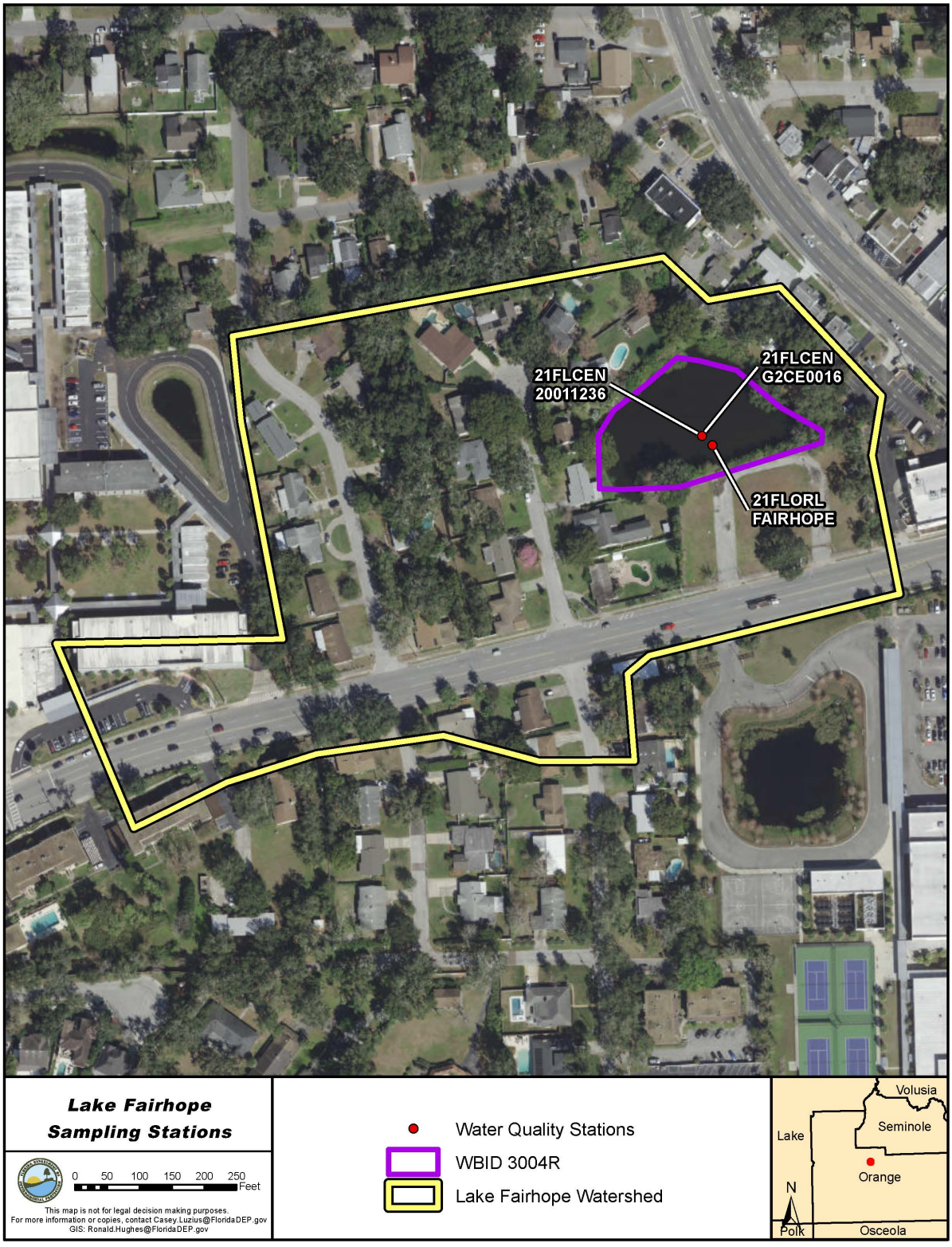

Figure 2.2. Monitoring stations in the Lake Fairhope Watershed

Table 2.2. Monitoring stations for Kasey Lake, Lake Fairhope, and Lake Lotta in the Middle St. Johns River Basin

Lake	WBID	Station Identification
Kasey	3002Q	21FLCEN20011235 21FLORL KASEY
Fairhope	3004R	21FLCEN20011236 21FLORL FAIRHOPE
Lotta	3002G	21FLORANBW38 21FLORANBW38N 21FLORANBW38S 21FLCEN G2CE0093

For Lake Lotta, the majority of the lake nutrient data used in the most recent assessment period came from stations sampled and monitored primarily by the DEP Central District (21FLCEN...) and Orange County Environmental Protection Division (21FLORAN…). Additional sampling and monitoring were also conducted at DEP stations (21FLGW…). Data from 2005 to 2019 collected by these providers were used for TMDL development and model calibration. **Figure 2.3** shows the locations of the water quality sampling stations in the WBID, and **Table 2.2** summarizes the sampling stations and associated data providers.

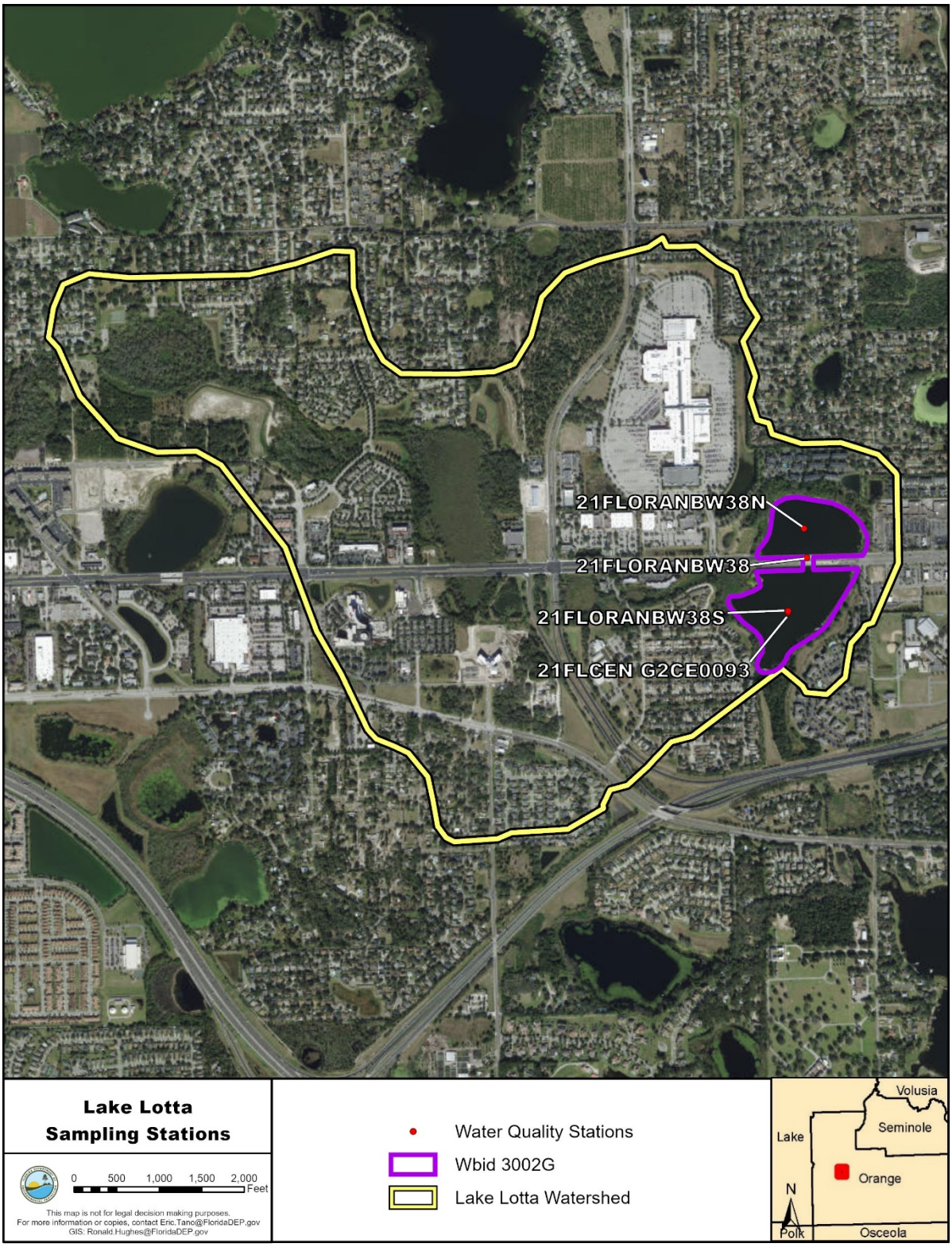

Figure 2.3. Monitoring stations in the Lake Lotta Watershed

2.3.2 Information on Verified Impairment

For the Cycle 4 basin assessment completed in 2020, the NNC were used to assess the lakes for the verified period (January 1, 2012–June 30, 2019) during the Group 2, Cycle 4 assessment based on data from the IWR Run 58 Database. Kasey Lake and Lake Fairhope were assessed as impaired (Category 5) for chlorophyll *a*, TN, and TP, and the lakes were added to the Verified List. Lake Lotta was assessed as impaired (Category 5) for chlorophyll *a* and was added to the Verified List.

Tables 2.3, **2.4**, and **2.5** list the chlorophyll *a*, TN, and TP AGMs, respectively, for Kasey Lake, Lake Fairhope, and Lake Lotta calculated using the data from 2012 to 2019 in the IWR Run 58 Database.

Table 2.3. Kasey Lake, Lake Fairhope, and Lake Lotta chlorophyll *a* AGM values (µg/L), 2012–18

Note: Values shown in boldface type and shaded are greater than the NNC of 20 µg/L chlorophyll *a* for Kasey Lake,Lake Fairhope, and Lake Lotta. Rule 62-302.531, F.A.C., states that the applicable numeric interpretations for TN, TP, and chlorophyll *a* shall not be exceeded more than once in any consecutive 3-year period.
NA = Not available

Year	Kasey Lake	Lake Fairhope	Lake Lotta
2012	**57**	**67**	**32**
2013	NA	NA	NA
2014	**29**	**60**	NA
2015	**55**	**68**	NA
2016	**33**	**26**	15
2017	NA	NA	NA
2018	**31**	NA	**29**

Table 2.4. Kasey Lake, Lake Fairhope, and Lake Lotta TN AGM values (mg/L), 2012–18

Note: Values shown in boldface type and shaded are greater than the NNC of 1.05 mg/L TN for Kasey Lake and Lake Fairhope. For Lake Lotta, values shown in boldface type and shaded are greater than the NNC of 1.27 mg/L. Rule 62-302.531, F.A.C., states that the applicable numeric interpretations for TN, TP, and chlorophyll *a* shall not be exceeded more than once in any consecutive 3-year period.
NA = Not available

Year	Kasey Lake	Lake Fairhope	Lake Lotta
2012	**1.41**	**1.77**	NA
2013	**1.17**	**2.37**	NA
2014	1.02	**1.42**	NA
2015	**1.17**	**1.94**	0.75
2016	**1.09**	**0.97**	0.93
2017	NA	NA	NA
2018	1.04	NA	0.84

Table 2.5. Kasey Lake, Lake Fairhope, and Lake Lotta TP AGM values (mg/L), 2012–18

Note: Values shown in boldface type and shaded are greater than the NNC of 0.03 mg/L TP for Kasey Lake and Lake Fairhope. For Lake Lotta, values shown in boldface type and shaded are greater than the NNC of s0.05 mg/L. Rule 62-302.531, F.A.C., states that the applicable numeric interpretations for TN, TP, and chlorophyll *a* shall not be exceeded more than once in any consecutive 3-year period.
NA = Not available

Year	Kasey Lake	Lake Fairhope	Lake Lotta
2012	**0.08**	**0.15**	NA
2013	**0.07**	**0.18**	NA
2014	**0.07**	**0.17**	NA
2015	**0.07**	**0.16**	0.04
2016	**0.05**	**0.09**	0.03
2017	NA	NA	NA
2018	**0.06**	NA	0.05

Chapter 3: Assessment of Sources

3.1 Types of Sources

An important part of the TMDL analysis is the identification of pollutant source categories, source subcategories, or individual sources of the pollutant of concern in the target watershed and the amount of pollutant loading contributed by each of these sources. Sources are broadly classified as either point sources or nonpoint sources. Historically, the term "point sources" has meant discharges to surface waters that typically have a continuous flow via a discernable, confined, and discrete conveyance, such as a pipe. Domestic and industrial wastewater treatment facilities (WWTFs) are examples of traditional point sources. Point sources also include certain urban stormwater discharges, such as those from local government master drainage systems, construction sites over five acres, and a wide variety of industries (see **Appendix A** for background information on the federal and state stormwater programs). In contrast, the term "nonpoint sources" was used to describe intermittent, rainfall-driven, diffuse sources of pollution associated with everyday human activities, including runoff from urban land uses, agriculture, silviculture, and mining; discharges from septic systems; and atmospheric deposition.

To be consistent with CWA definitions, the term "point source" is used to describe traditional point sources (such as domestic and industrial wastewater discharges) and stormwater systems requiring an NPDES stormwater permit when allocating pollutant load reductions required by a TMDL (see **Section 5.1** on **Expression and Allocation of the TMDL**). However, the methodologies used to estimate nonpoint source loads do not distinguish between NPDES and non-NPDES stormwater discharges, and as such, this source assessment section does not make any distinction between the two types of stormwater.

3.2 Point Sources

3.2.1 Wastewater Point Sources

There are no NPDES-permitted wastewater facilities that discharge to Kasey Lake, Lake Fairhope, or Lake Lotta, or that discharge to surface waters in the three watersheds.

3.2.2 Municipal Separate Storm Sewer System (MS4) Permittees

The Kasey Lake and Lake Fairhope Watersheds are covered by the City of Orlando's NPDES MS4 Phase I permit (FLS000014). The Lake Fairhope and Lake Lotta Watersheds are covered by Orange County's NPDES MS4 Phase I permit (FLS000011). The Lake Lotta Watershed is also covered by the Florida Department of Transportation (FDOT) District 5 Phase I copermit (FLS000011) and the City of Ocoee's Phase I copermit (FLS000011) on Orange County's permit. For more information on MS4 facilities in both watersheds, send an email to: npdes-stormwater@dep.state.fl.us. **Table 3.1** lists the MS4 permittees/copermittees and their MS4 permit numbers.

Table 3.1. NPDES MS4 permits with jurisdiction in the Kasey Lake and Lake Fairhope Watersheds

Permit Number	Permittee/ Copermittee	Phase
FLS000014	City of Orlando	I
FLS000011	Orange County	I
FLS000011	City of Ocoee	I
FLS000011	FDOT	I

3.3 Nonpoint Sources

Pollutant sources that are not NPDES wastewater or stormwater dischargers are generally considered to be nonpoint sources. Nonpoint sources addressed in this analysis primarily include loadings from surface runoff and precipitation directly onto the lake surface (atmospheric deposition).

3.3.1 Land Use

Land use is one of the most important factors in determining nutrient loadings from a watershed. Nutrients can be flushed into a receiving water through surface runoff and stormwater conveyance systems during stormwater events. Both human land use areas and natural land areas generate nutrients. However, human land uses typically generate more nutrient loads per unit of land surface area than natural lands produce. **Tables 3.2**, **3.3,** and **3.4** list 2016 land use for the Kasey Lake, Lake Fairhope, and Lake Lotta Watersheds, respectively, based on data from the St. Johns River Water Management District (SJRWMD). **Figures 3.1, 3.2,** and **3.3**, respectively, show the land use information graphically for each watershed. These data were applied in the development of watershed loadings to the lakes, described in **Section 3.4**. The watershed loadings were then used in the methodology documented in **Chapter 4**.

The Kasey Lake Watershed covers an area of 74.45 acres (0.12 square miles). High-density residential represents 32.65 % of the watershed, low-density residential 32.57 %, and medium-residential 29.93 %. The Lake Fairhope Watershed covers an area of 15.31 acres (0.02 square miles). Medium-density residential comprises 66.1 % of the watershed, institutional 9.54 %, and water 8.62 %. The Lake Lotta Watershed covers an area of 908.25 acres (1.43 square miles). Commercial represents 17.83 % of the watershed, medium-density residential 16.79 %, and communication and transportation 13.31 %.

Table 3.2. SJRWMD land use in the Kasey Lake Watershed, 2016

Land Use Code	Land Use	Acres	% of Watershed
1100	Low-Density Residential	24.25	32.57

Land Use Code	Land Use	Acres	% of Watershed
1200	Medium-Density Residential	22.28	29.93
1300	High-Density Residential	24.31	32.65
5000	Water	3.61	4.85
	Total	**74.45**	**100.00**

Table 3.3. SJRWMD land use in the Lake Fairhope Watershed, 2016

Land Use Code	Land Use	Acres	% of Watershed
1200	Medium-Density Residential	10.12	66.10
1300	High-Density Residential	0.45	2.94
1400	Commercial	0.72	4.70
1700	Institutional	1.46	9.54
1900	Open Land	1.24	8.10
5000	Water	1.32	8.62
	Total	**15.31**	**100.00**

Table 3.4. SJRWMD land use in the Lake Lotta Watershed, 2013–16

Land Use Code	Land Use Classification	Acres	% of Watershed
1100	Low-Density Residential	17.52	1.93
1200	Medium-Density Residential	152.46	16.79
1300	High-Density Residential	81.32	8.95
1400	Commercial	161.97	17.83
1700	Institutional	70.93	7.81
1800	Recreational	8.14	0.90
1900	Open Land	17.97	1.98
2000	Agriculture	20.90	2.30
3000	Rangeland	7.39	0.81
4000	Forest/Rural Open	87.20	9.60
5000	Water	45.52	5.01
6000	Wetlands	112.29	12.36
7000	Rangeland	3.76	0.41
8000	Communication and Transportation	120.88	13.31
Total		**908.25**	**100**

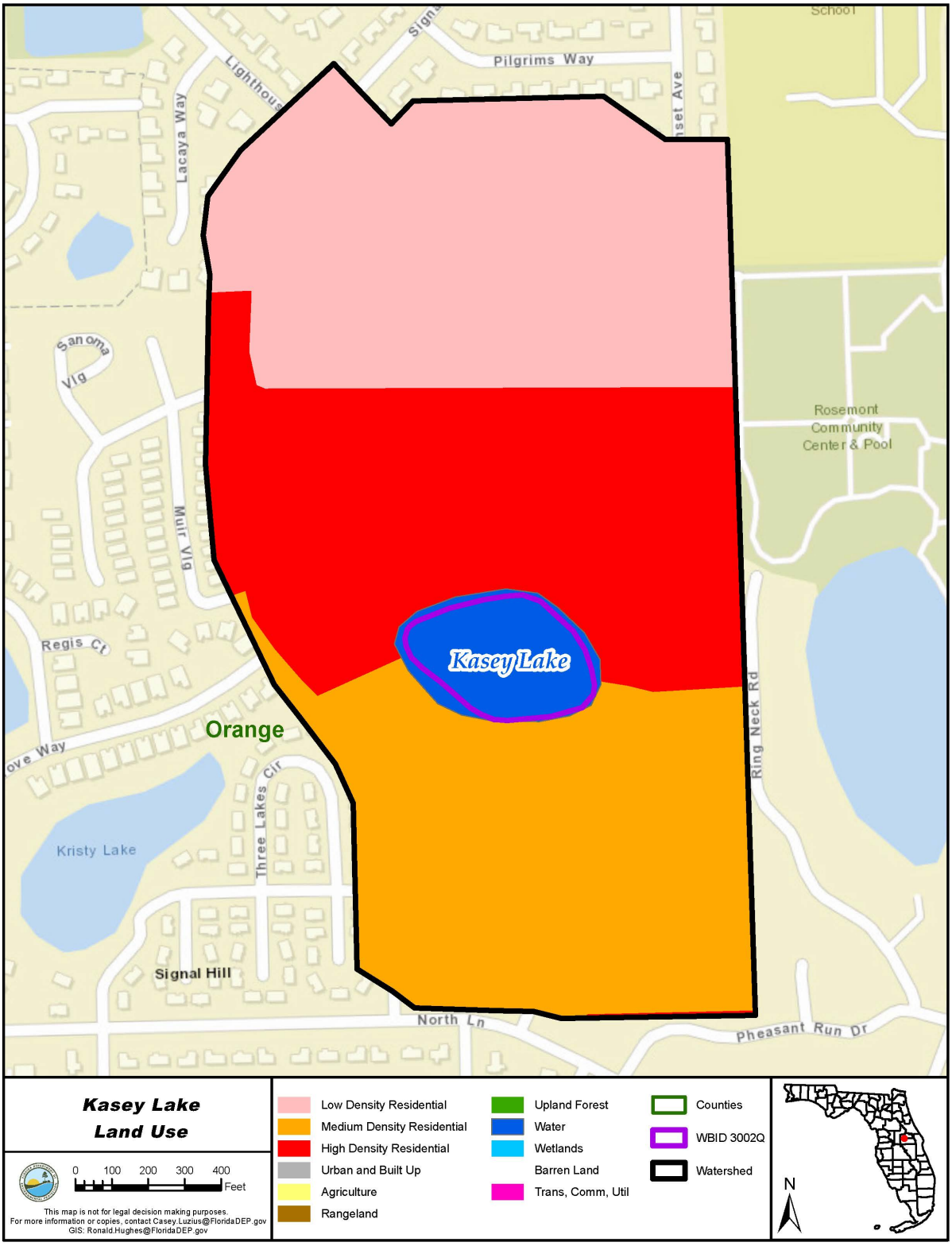

Figure 3.1. Land use in the Kasey Lake Watershed, 2016

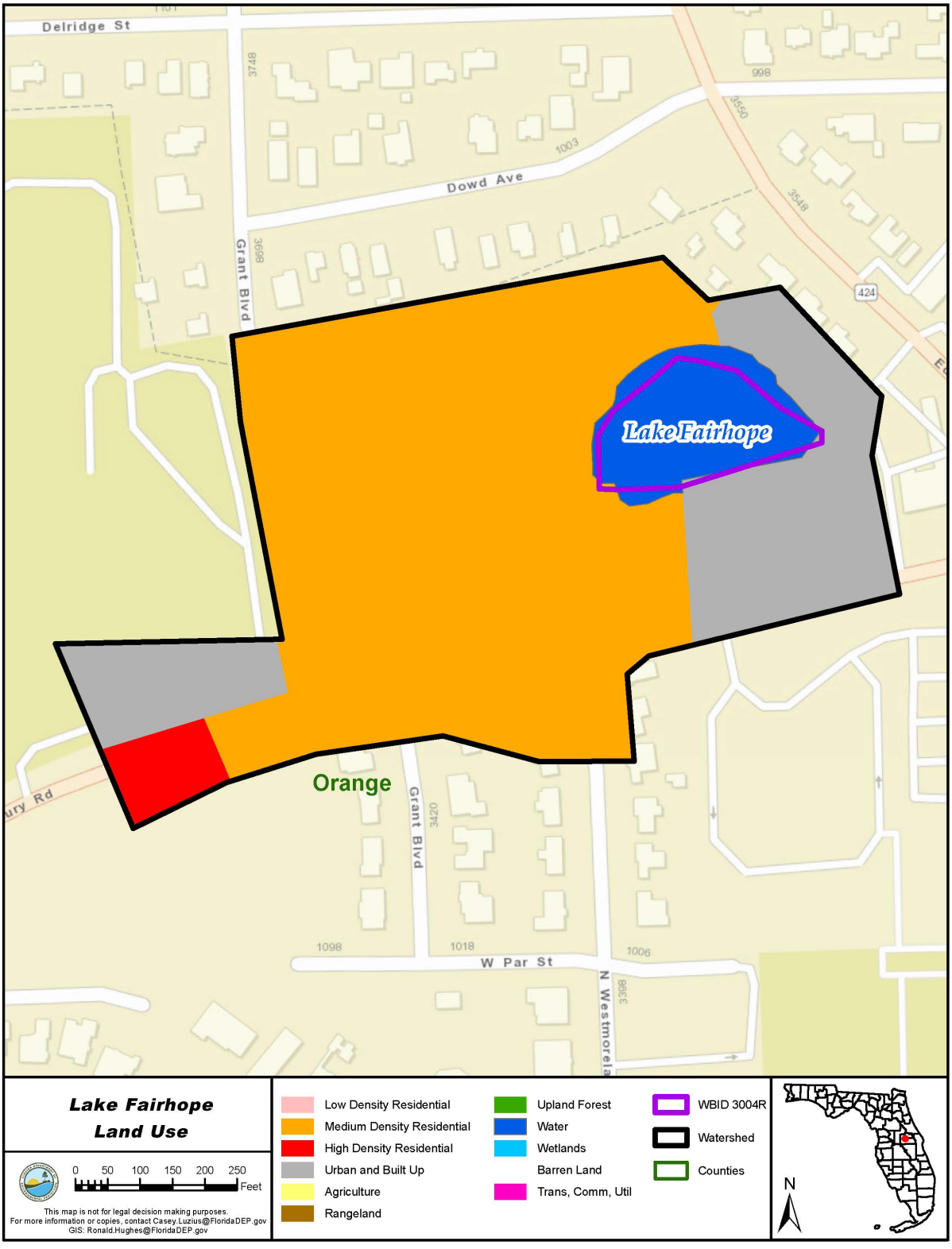

Figure 3.2. Land use in the Lake Fairhope Watershed, 2016

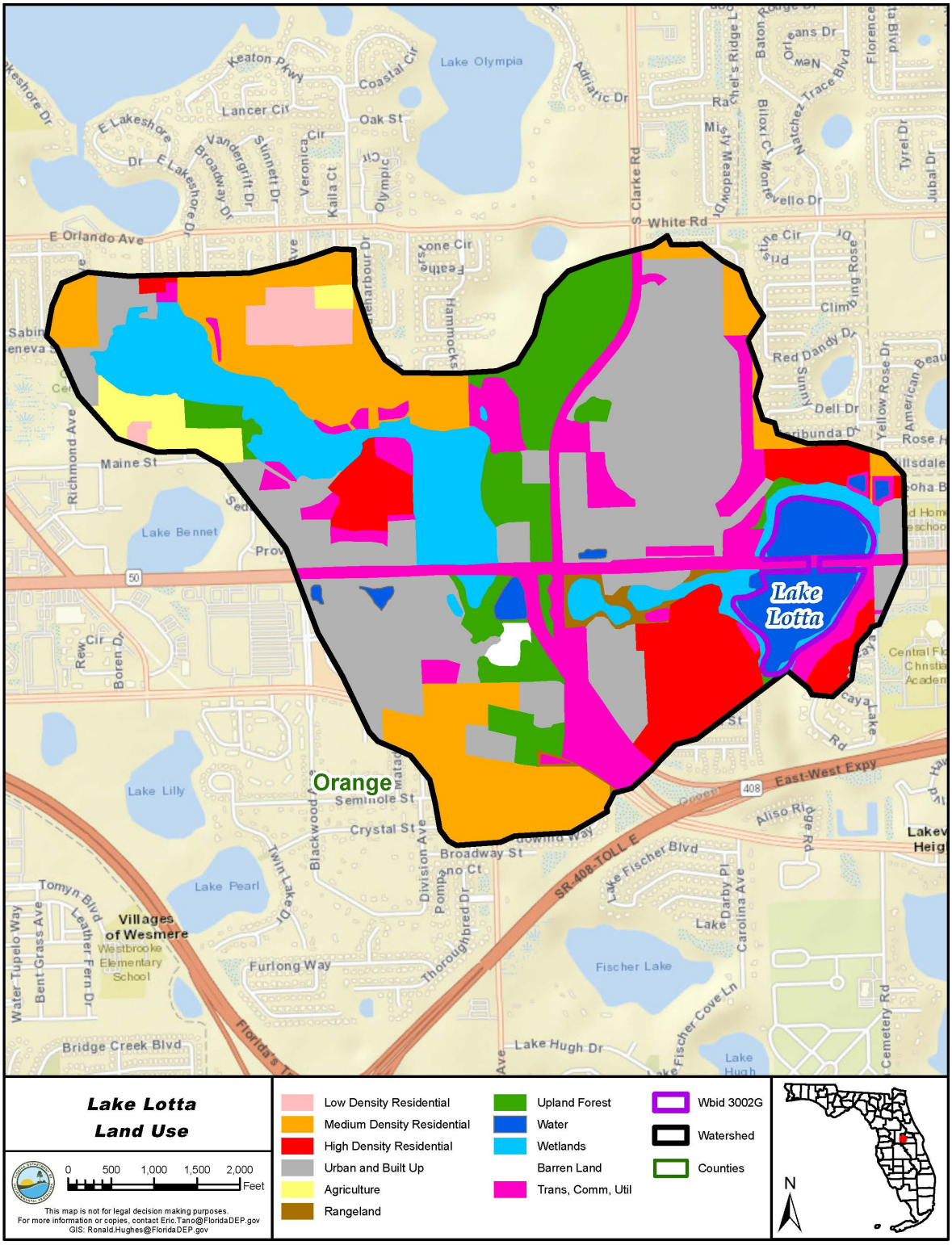

Figure 3.3. Land use in the Lake Lotta Watershed, 2013–16

3.3.2 Onsite Sewage Treatment and Disposal Systems (OSTDS)

OSTDS, including septic systems, are commonly used in rural areas where providing central sewer service is not cost-effective or practical. When properly sited, designed, constructed, maintained, and operated, OSTDS are a safe means of disposing of domestic waste. The effluent from a well-functioning OSTDS is comparable to secondarily treated wastewater from a sewage treatment plant. However, OSTDS can be a source of nutrients (nitrogen and phosphorus), pathogens, and other pollutants to both groundwater and surface water.

The Florida Department of Health maintains a list of septic systems by county, and the Orange County 2018 Database was used to determine the number of known, likely, and somewhat likely septic systems in the watersheds. Currently, there are 3 septic systems in the Lake Fairhope Watershed, 138 septic systems in the Lake Lotta Watershed, and 0 septic systems in the Kasey Lake Watershed, **Figures 3.4** and **3.5** show the OSTDS locations in the Lake Fairhope and Lake Lotta Watersheds, respectively.

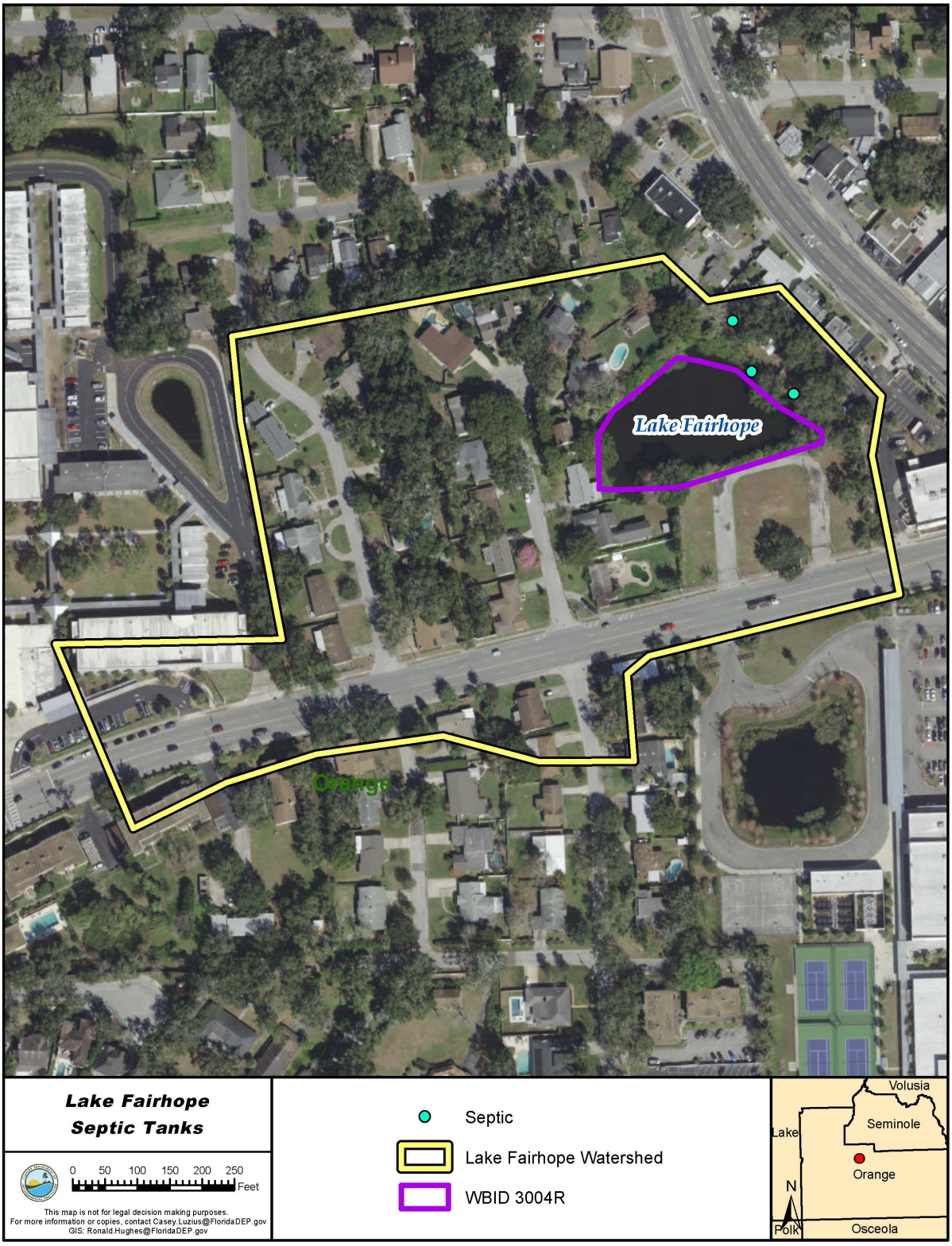

Figure 3.4. OSTDS in the Lake Fairhope Watershed

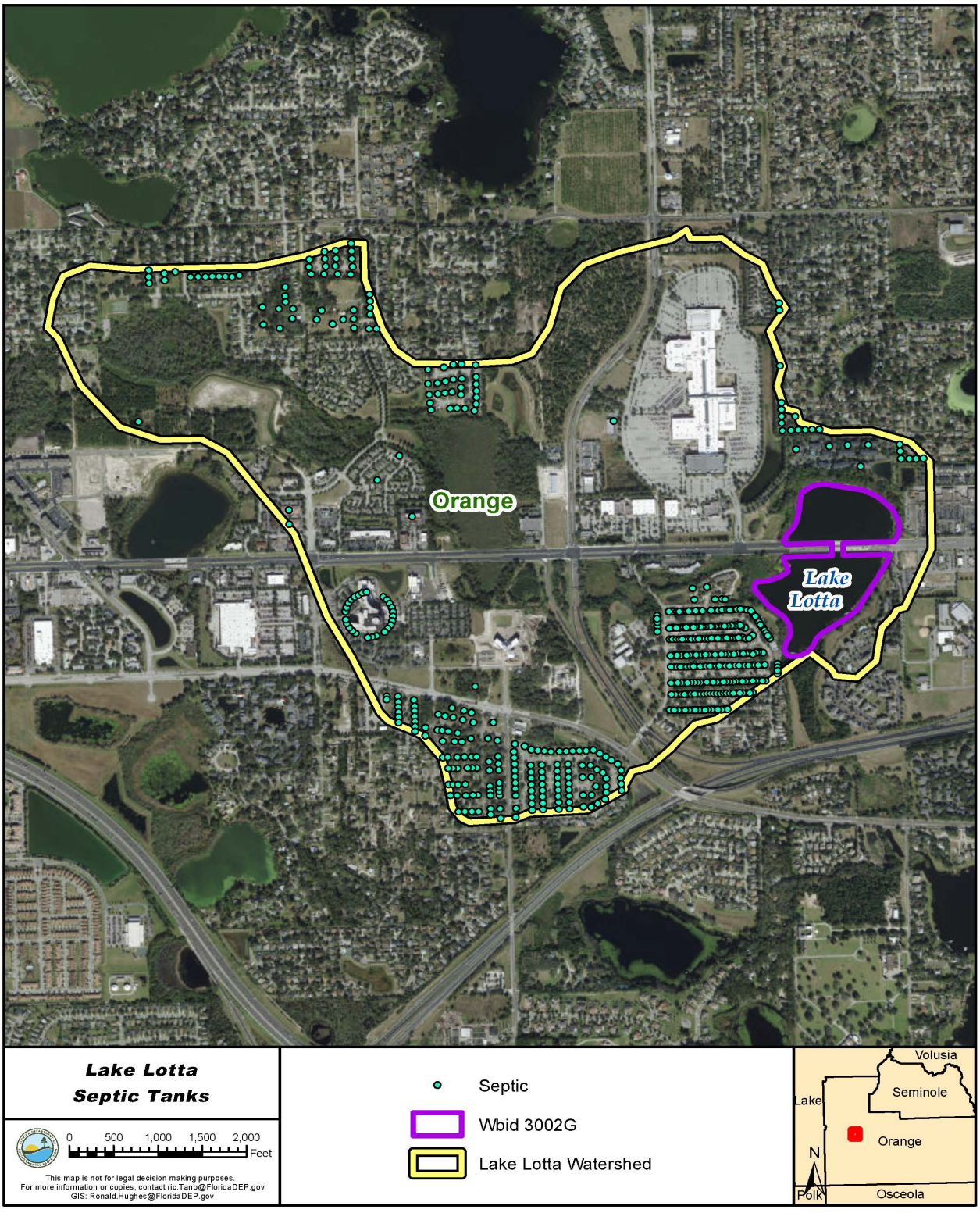

Figure 3.5. OSTDS in the Lake Lotta Watershed

Chapter 4: Determination of Assimilative Capacity

4.1 Determination of Loading Capacity

Nutrient enrichment and the resulting problems related to eutrophication tend to be widespread and are frequently manifested far (in both time and space) from their sources. Addressing eutrophication involves relating water quality and biological effects such as photosynthesis, decomposition, and nutrient recycling as acted on by environmental factors (rainfall, point source discharge, etc.) to the timing and magnitude of constituent loads supplied from various categories of pollution sources. Assimilative capacity should be related to some specific hydrometeorological condition during a selected period or to some range of expected variation in these conditions.

The goal of this TMDL analysis is to identify the maximum allowable lake TN and TP concentrations and the associated nutrient source reductions, so that the lakes will meet the TMDL targets and thus maintain their function and designated use as Class III freshwaters.

4.2 Evaluation of Water Quality Conditions

Figures 4.1, **4.2,** and **4.3** show the chlorophyll *a* AGM values and annual rainfall for Kasey Lake, Lake Fairhope, and Lake Lotta, respectively. Relationships between rainfall and chlorophyll *a* were R^2=0.002 for Kasey Lake, R^2=0.06 for Lake Fairhope, and R^2 = 0.02 for Lake Lotta. The lack of strong relationships between nutrients and rainfall suggests seasonality and rainfall adjustments are unlikely to affect the TMDL determination.

For the water quality analysis conducted for TMDL development, AGMs were used to be consistent with the expression of the adopted NNC for lakes. They were calculated using a minimum of four sample results per year, with at least one of the samples collected in the May-to-September period and at least one sample collected from other months. Values with an "I" qualifier code were used as reported. Values with "U" or "T" qualifier codes were changed to the minimum detection limit divided by the square root of two. Values with "G" or "V" qualifier codes were removed from the analysis for quality control reasons. Negative values and zero values were also removed. Multiple sample results collected on the same day were averaged.

The AGM calculation method for this purpose is somewhat different than the one used to calculate AGMs for performing water quality assessments, following the methodology in Chapter 62-303, F.A.C. Therefore, the AGMs listed in **Chapter 2** may not exactly match the AGMs used for TMDL development.

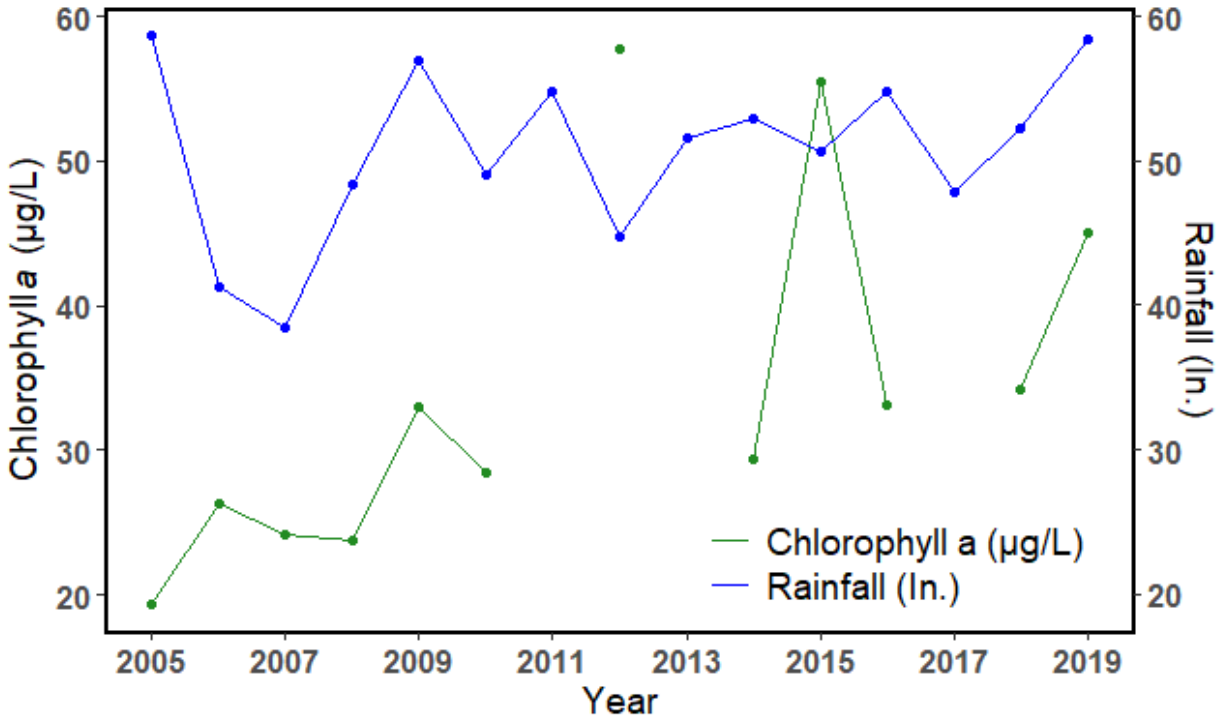

Figure 4.1. Chlorophyll *a* AGM values vs. annual rainfall in Kasey Lake, 2005–19

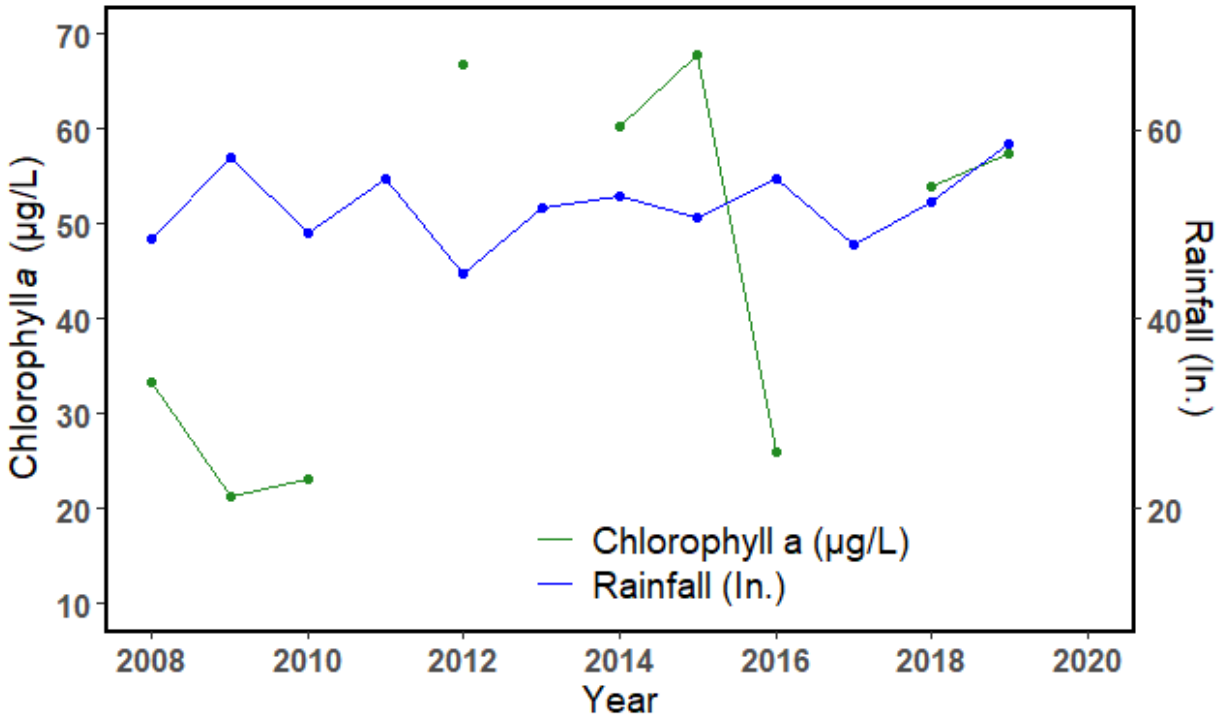

Figure 4.2. Chlorophyll *a* AGM values vs. annual rainfall in Lake Fairhope, 2008–19

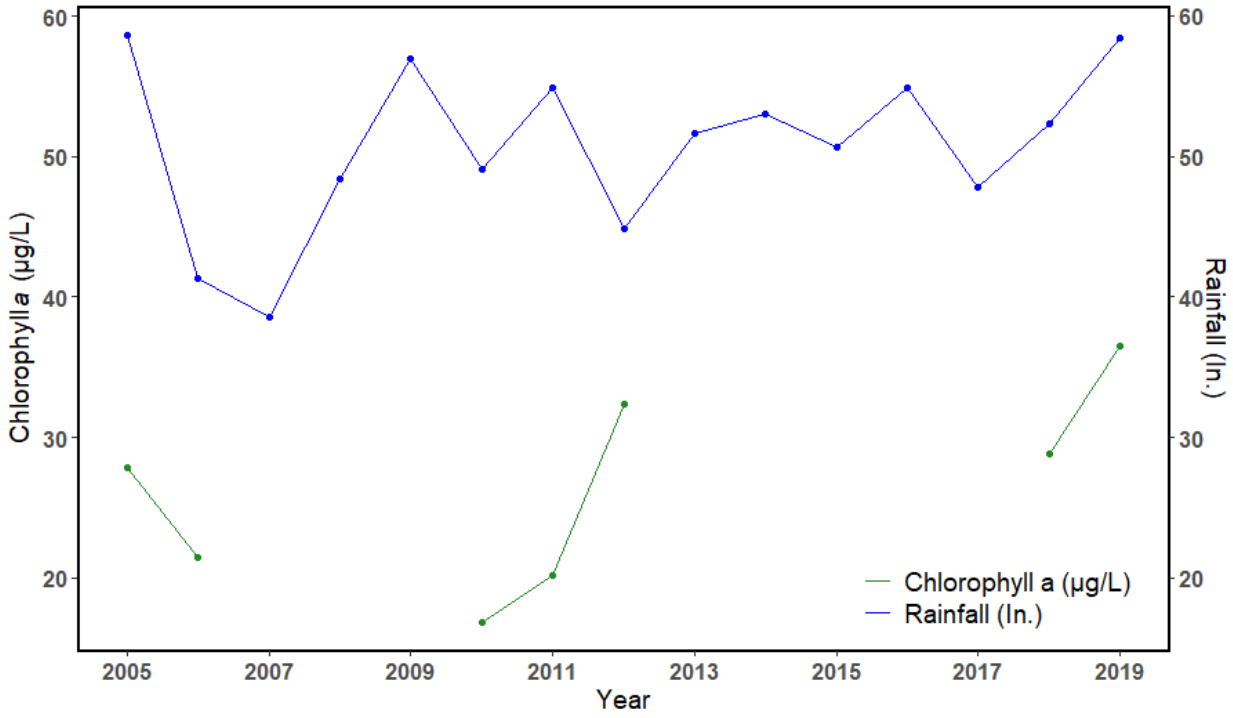

Figure 4.3. Chlorophyll *a* AGM values vs. annual rainfall in Lake Lotta, 2005–19

4.3 Critical Conditions and Seasonal Variation

The estimated assimilative capacity is based on annual conditions, rather than critical/seasonal conditions, because (1) the methodology used to determine assimilative capacity does not lend itself very well to short-term assessments, (2) DEP is generally more concerned with the net change in overall primary productivity in the segment, which is better addressed on an annual basis, (3) the methodology used to determine impairment is based on annual conditions, and (4) the chlorophyll *a* criterion used as the TMDL target is expressed as an AGM.

4.4 Basis of the TMDLs

The data collected by Orange County and DEP were used in evaluating the relationships between nutrient and chlorophyll *a* concentrations. The period from 2005 to 2015 had the most complete long-term set of AGM values for evaluating surface water quality for Kasey Lake and Lake Fairhope. This analysis used nutrient and corrected chlorophyll *a* AGMs to be consistent with the expression of the adopted NNC for lakes.

The state of Florida established the generally applicable statewide NNC based on robust empirical relationships between nutrients and chlorophyll *a* derived from a large dataset of lakes statewide. For Kasey Lake and Lake Fairhope, the criteria range for TN is 1.05–1.91 mg/L, and 0.03–0.09 mg/L for TP, with an exceedance frequency of no more than once in any three-year

period. For Lake Lotta, the criteria range for TN is 1.27–2.23 mg/L, and 0.05-0.16 mg/L for TP. The individual nutrient data for Kasey Lake, Lake Fairhope, and Lake Lotta were compared with the larger statewide nutrient dataset to see if they fell within the range of the data used to establish the generally applicable NNC. This was done to verify that these lakes are operating like the NNC lakes and are exhibiting the same nutrient responses to determine if site-specific criteria would be needed. **Figures 4.4** and **4.5** show the TN and TP data, respectively, for Kasey Lake plotted against the statewide population of clear lakes, **Figures 4.6** and **4.7** show the TN and TP data, respectively, for Lake Fairhope, and **Figures 4.8** and **4.9** show the TN and TP data, respectively, for Lake Lotta. The AGM values for all lakes are indicated with red circles, and the NNC derivation data are indicated with gray 'X' markers. The dashed line boundaries shown on these graphs are at the 90 % prediction intervals.

Based on the available information, there is nothing unique about Kasey Lake, Lake Fairhope, and Lake Lotta that would either make the use of the chlorophyll *a* threshold of 20 µg/L unprotective or suggest that the lakes respond differently from statewide generally applicable relationships depicted in **Figures 4.4** through **4.9**. Therefore for Kasey Lake and Lake Fairhope, it can be concluded that basing the TMDL targets on the low-end TN (1.05 mg/L) and TP (0.03 mg/L) generally applicable NNC will fully protect designated uses within these lakes, and will attain the chlorophyll *a* threshold of 20 µg/L. For Lake Lotta, it can be concluded that basing the TMDL targets on the low-end TN (1.27 mg/L) and TP (0.05mg/L) generally applicable NNC will fully protect designated uses within these lakes, and will attain the chlorophyll a threshold of 20 µg/L. Additionally, the TMDL targets do not need to be adopted as Hierarchy 1 site-specific interpretations of the NNC because the generally applicable NNC fully protect designated uses.

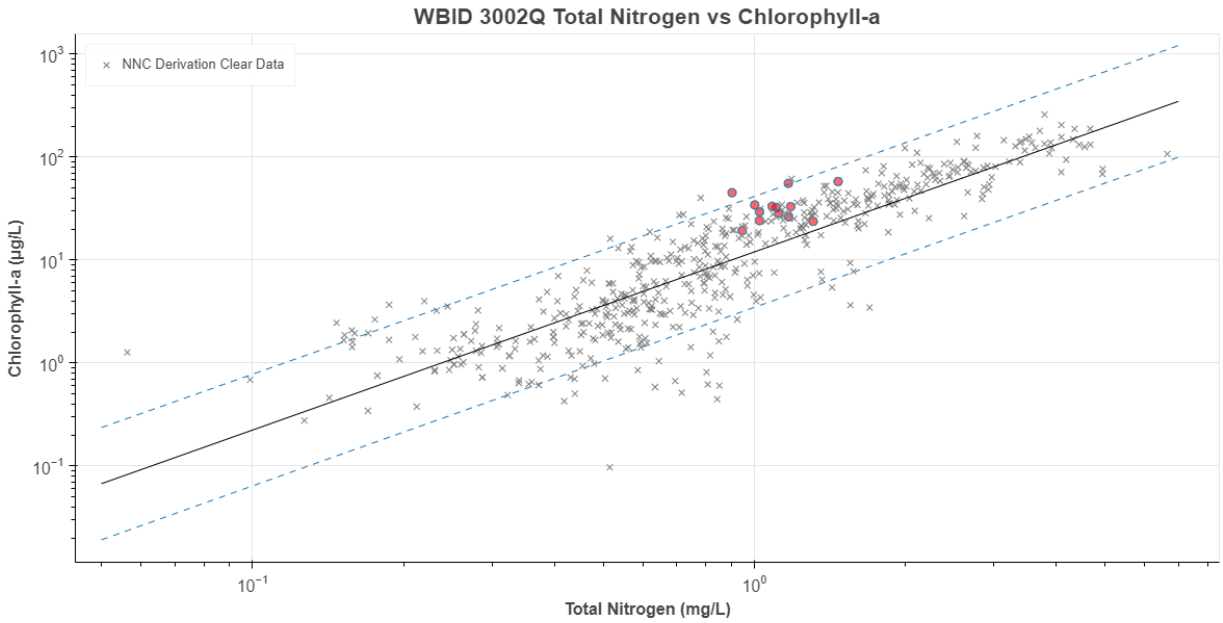

Figure 4.4. Kasey Lake TN vs. chlorophyll *a* against statewide population of clear (low color) lake data

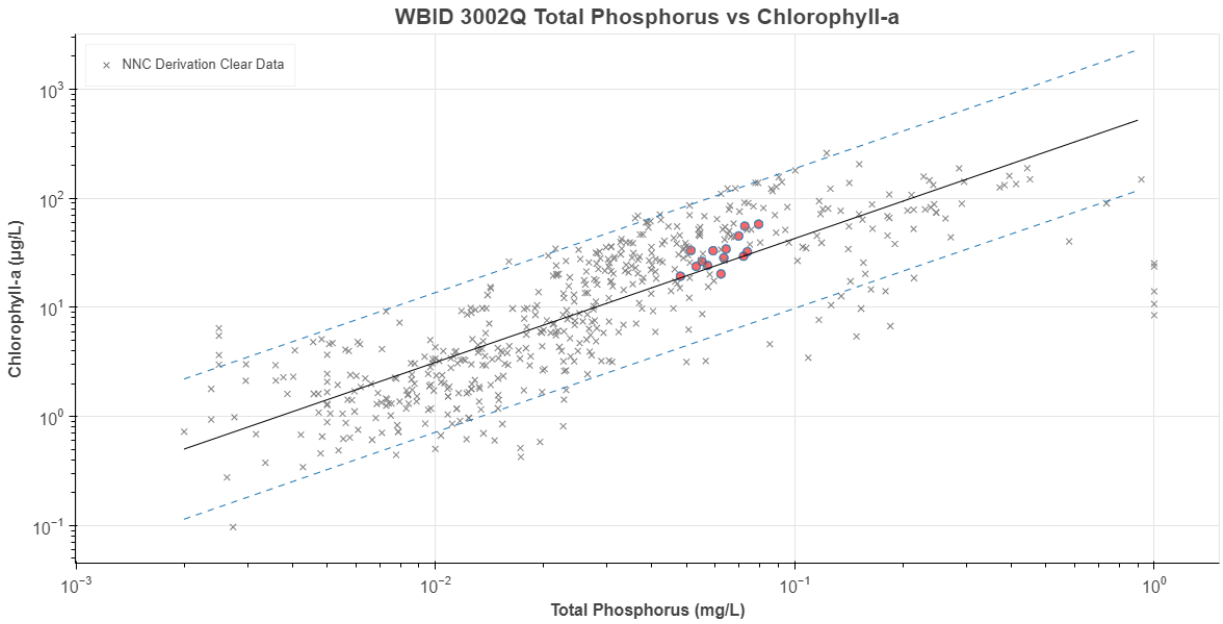

Figure 4.5. Kasey Lake TP vs. chlorophyll *a* against statewide population of clear (low color) lake data

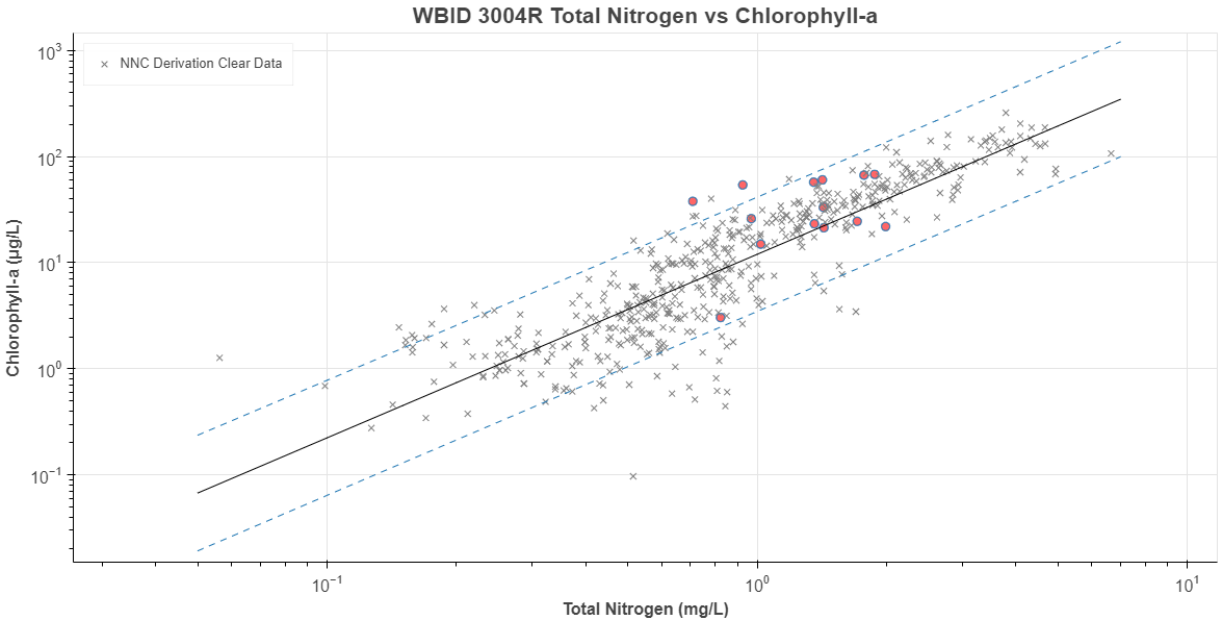

Figure 4.6. Lake Fairhope TN vs. chlorophyll *a* against statewide population of clear (low color) lake data

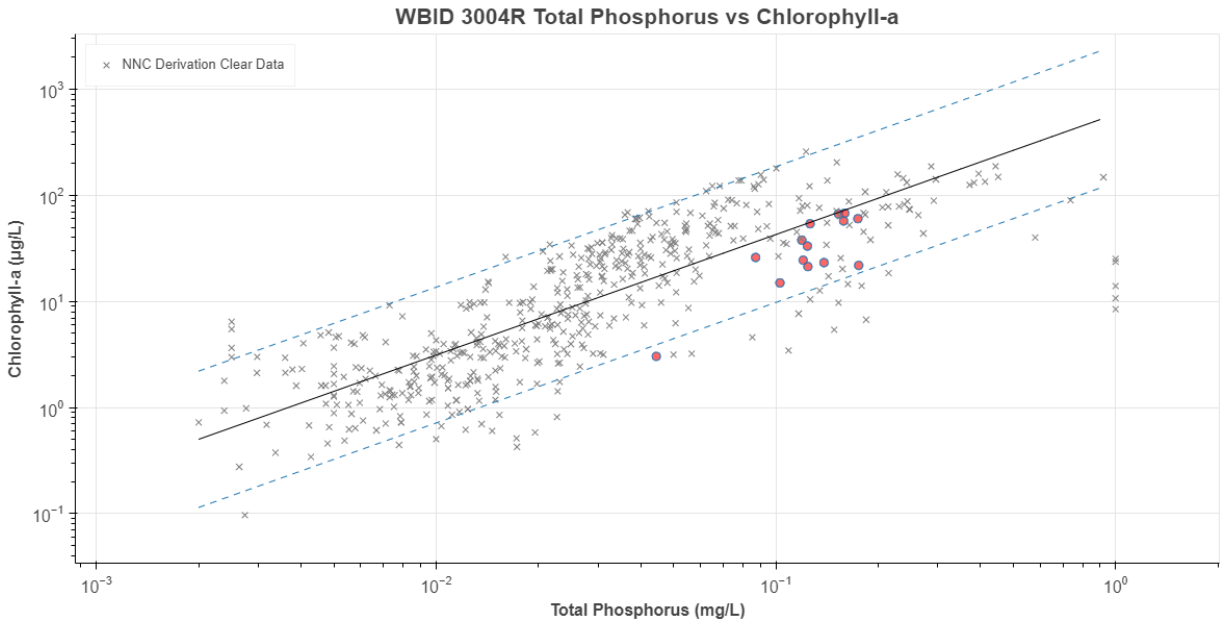

Figure 4.7. Lake Fairhope TP vs. chlorophyll *a* against statewide population of clear (low color) lake data

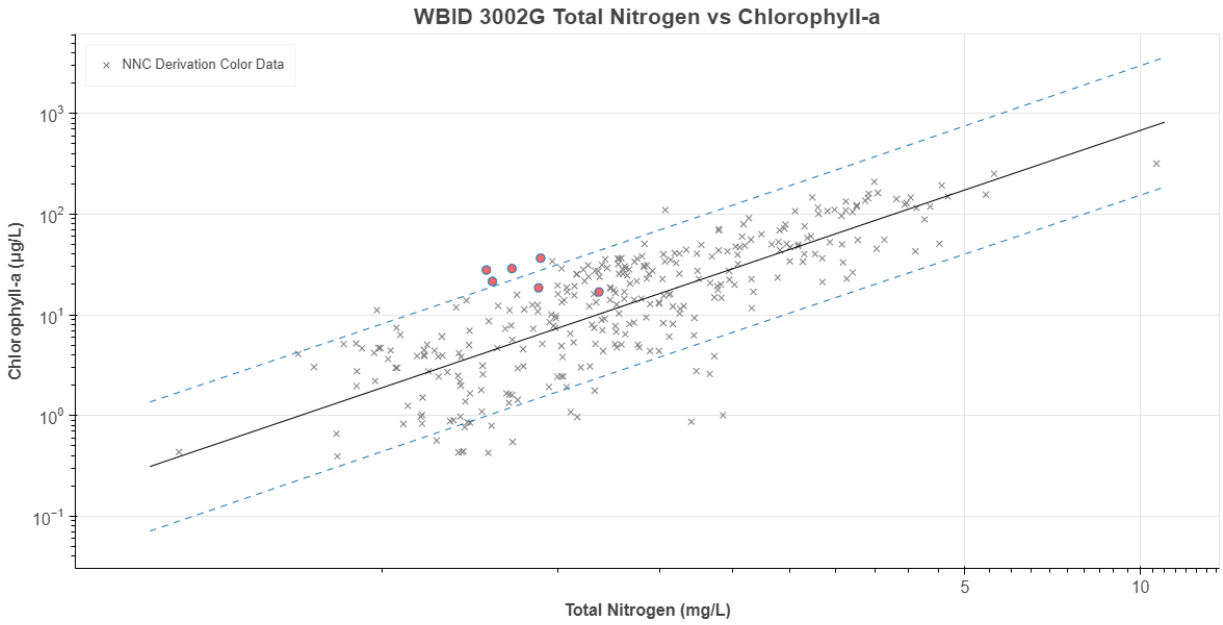

Figure 4.8. Lake Lotta TN vs. chlorophyll *a* against statewide population of high color lake data

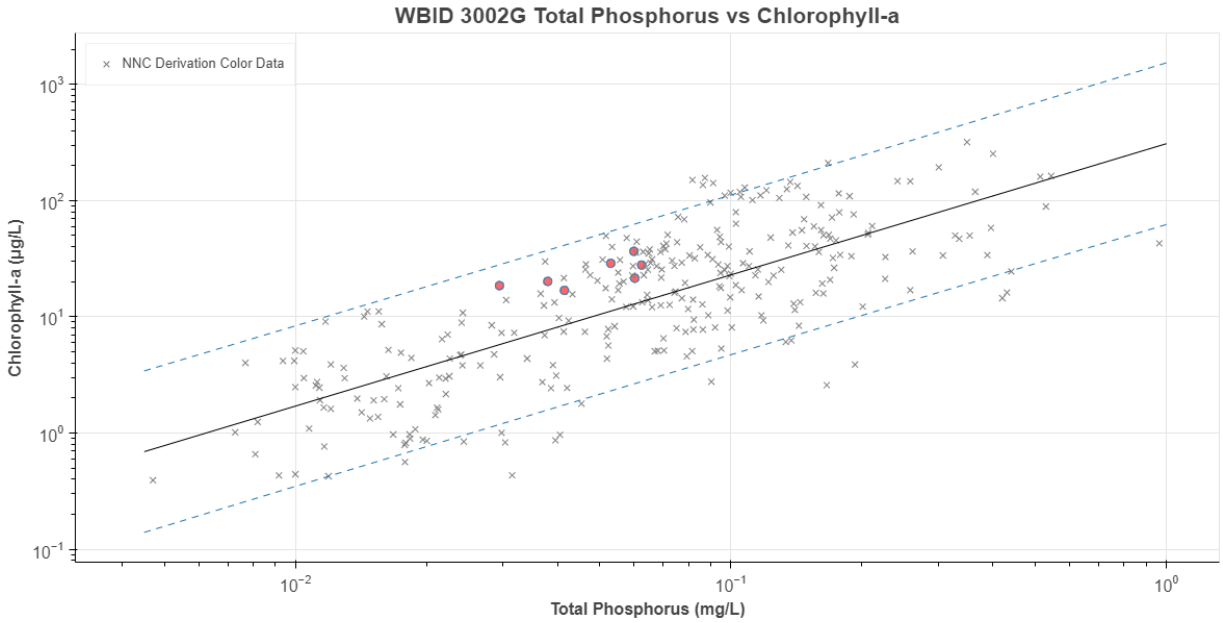

Figure 4.9. Lake Lotta TP vs. chlorophyll *a* against statewide population of high color lake data

The lakes are expected to meet the applicable nutrient criteria and maintain their function and designated use as Class III freshwater lakes when surface water nutrient concentrations are reduced to the target concentrations, addressing the anthropogenic contributions to the water quality impairments.

Table 4.1 lists the percent reductions in the maximum AGMs needed to achieve the TN AGM target of 1.05 mg/L and the TP AGM target of 0.03 mg/L for Kasey Lake and Lake Fairhope, and the TN AGM target of 1.27 mg/L and TP AGM target of 0.05 mg/L for Lake Lotta. The TN percent reductions are 29 % in Kasey Lake, 56 % in Lake Fairhope, and 0 % in Lake Lotta. The TP percent reductions are 62 % in Kasey Lake, 84 % in Lake Fairhope, and 20 % in Lake Lotta. The nutrient AGM TMDL values and the associated percent reductions address the anthropogenic nutrient inputs contributing to the exceedances of the chlorophyll *a* criterion.

The method used to determine the reductions needed to attain the nutrient TMDLs is the percent reduction approach. Existing lake nutrient condition calculations were selected by considering the nutrient concentrations measured in the 2000 to 2019 period, which includes most Cycle 4 verified period (2012–19). The existing nutrient conditions used to calculate the required reductions were the maximum values of the TN and TP AGMs in each lake that exceeded the water quality targets. The geometric means were calculated from nutrient results available in the IWR Run 60 Database.

The equation used to calculate the percent reduction is as follows:

[measured exceedance – target] X 100

measured exceedance

Table 4.1 lists the percent reductions in the maximum AGMs needed to achieve the TN AGM target of 1.05 mg/L and the TP AGM target of 0.03 mg/L for Kasey Lake and Lake Fairhope, and the TN AGM target of 1.27 mg/L and TP AGM target of 0.05 mg/L for Lake Lotta. The nutrient AGM TMDL values and the associated percent reductions address the anthropogenic nutrient inputs contributing to the exceedances of the chlorophyll *a* criterion.

Table 4.1. Reductions required in existing TN and TP concentrations to meet water quality targets in Kasey Lake, Lake Fairhope, and Lake Lotta

Year	Kasey Lake TN AGMs (mg/L)	Kasey Lake TP AGMs (mg/L)	Lake Fairhope TN AGMs (mg/L)	Lake Fairhope TP AGMs (mg/L)	Lake Lotta TN AGMs (mg/L)	Lake Lotta TP AGMs (mg/L)
2000	1.34	0.06	1.02	0.1	NA	NA
2001	1.11	0.07	0.71	0.12	NA	NA
2002	NA	0.06	1.99	0.18	NA	NA
2003	NA	NA	1.71	0.12	NA	NA
2004	NA	NA	NA	NA	NA	NA
2005	0.95	0.05	1.13	0.09	0.75	0.06
2006	1.17	0.06	0.82	0.04	0.77	0.06
2007	1.02	0.06	NA	NA	NA	NA
2008	1.31	0.05	1.43	0.12	NA	NA
2009	1.18	0.06	1.43	0.12	NA	NA
2010	1.12	0.06	1.36	0.14	1.18	0.04
2011	1.37	0.07	NA	0.13	NA	0.04
2012	1.47	0.08	1.77	0.15	NA	NA
2013	1.17	0.07	2.37	0.18	NA	NA
2014	1.02	0.07	1.42	0.17	NA	NA
2015	1.17	0.07	1.88	0.16	0.75	0.04
2016	1.09	0.05	0.97	0.09	0.93	0.03
2017	0.78	0.06	NA	NA	NA	NA
2018	1.00	0.06	0.93	0.13	0.84	0.05
2019	0.90	0.07	1.35	0.16	0.94	0.06
Maximum	**1.47**	**0.08**	**2.37**	**0.18**	**1.18**	**0.06**
TMDL Target	**1.05**	**0.03**	**1.05**	**0.03**	**1.27**	**0.05**
% Reduction	**29**	**62**	**56**	**84**	**0**	**20**

Chapter 5: Determination of Loading Allocations

5.1 Expression and Allocation of the TMDLs

The objective of a TMDL is to provide a basis for allocating loads to all the known pollutant sources in a watershed so that appropriate control measures can be implemented and water quality standards achieved. A TMDL is expressed as the sum of all point source loads (wasteload allocations, or WLAs), nonpoint source loads (load allocations, or LAs), and an appropriate margin of safety (MOS), which accounts for uncertainty in the relationship between effluent limitations and water quality:

$$\mathbf{TMDL = \sum WLAs + \sum LAs + MOS}$$

As discussed earlier, the WLA is broken out into separate subcategories for wastewater discharges and stormwater discharges regulated under the NPDES Program:

$$\mathbf{TMDL \cong \sum WLAs_{wastewater} + \sum WLAs_{NPDES\ Stormwater} + \sum LAs + MOS}$$

It should be noted that the various components of the revised TMDL equation may not sum up to the value of the TMDL because (1) the WLA for NPDES stormwater is typically based on the percent reduction needed for nonpoint sources and is also accounted for within the LA, and (2) TMDL components can be expressed in different terms (for example, the WLA for stormwater is typically expressed as a percent reduction, and the WLA for wastewater is typically expressed as mass per day).

WLAs for stormwater discharges are typically expressed as "percent reduction" because it is very difficult to quantify the loads from MS4s (given the numerous discharge points) and to distinguish loads from MS4s from other nonpoint sources (given the nature of stormwater transport). The permitting of stormwater discharges also differs from the permitting of most wastewater point sources. Because stormwater discharges cannot be centrally collected, monitored, and treated, they are not subject to the same types of effluent limitations as wastewater facilities, and instead are required to meet a performance standard of providing treatment to the "maximum extent practical" through the implementation of best management practices (BMPs).

This approach is consistent with federal regulations (40 Code of Federal Regulations [CFR] § 130.2(I)), which state that TMDLs can be expressed in terms of mass per time (e.g., pounds per day), toxicity, or other appropriate measure. The TMDLs for Kasey Lake, Lake Fairhope, and Lake Lotta are expressed in terms of nutrient concentration targets and the percent reductions necessary to meet the target, and represent the lake nutrient concentrations the waterbodies can assimilate while maintain a balanced aquatic flora and fauna (see **Table 5.1**). These TMDLs are expressed as maximum AGM values for TN and TP not to be exceeded. The restoration goal is

to achieve the generally applicable chlorophyll *a* criterion of 20 µg/L, which is expressed as an AGM not to be exceeded more than once in any consecutive 3-year period. This goal protects each lake's designated use.

Table 5.1 lists the TMDLs for Kasey Lake, Lake Fairhope, and Lake Lotta.

Table 5.1. TMDL components for nutrients in Kasey Lake, Lake Fairhope, and Lake Lotta

NA = Not applicable
Note: The LA and TMDL daily load for TN is 0.22 kilograms per day (kg/day), and for TP 0.01 kg/day.
*The required percent reductions listed in this table represent the reductions from all sources.

Waterbody Name/WBID	Parameter	TMDL (mg/L)	WLA Wastewater (% reduction)	WLA NPDES Stormwater (% reduction)*	LA (% reduction)*
Kasey Lake/ 3002Q	TN	1.05	NA	29	29
Kasey Lake/ 3002Q	TP	0.03	NA	62	62
Lake Fairhope/ 3004R	TN	1.05	NA	56	56
Lake Fairhope/ 3004R	TP	0.03	NA	84	84
Lake Lotta/ 3004G	TN	1.27	NA	0	0
Lake Lotta/ 3004G	TP	0.05	NA	20	20

5.2 Load Allocation

To achieve the LA in Kasey Lake, a 29 % and 62 % reduction in current TN and TP concentrations, respectively, will be required. In Lake Fairhope, a 56 % and 84 % reduction in current TN and TP loads, respectively, will be required. In Lake Lotta, a 0 % and 20 % reduction in current TN and TP loads, respectively, will be required.

The TMDLs are based on the percent reduction in total watershed loading; however, it is not DEP's intent to abate natural conditions. The needed reduction from anthropogenic inputs will be calculated based on more detailed source information when a restoration plan is developed. The reductions in nonpoint source nutrient loads are expected to result in reduced sediment nutrient flux, which is commonly a factor in lake eutrophication.

It should be noted that the LA includes loading from stormwater discharges regulated by DEP and the water management districts that are not part of the NPDES stormwater program (see **Appendix A**).

5.3 Wasteload Allocation

5.3.1 NPDES Wastewater Discharges

As noted in **Chapter 4**, no active NPDES-permitted facilities in the Kasey Lake, Lake Fairhope, or Lake Lotta Watersheds discharge either into the waterbodies or their watersheds. Therefore, a WLA for wastewater discharges is not applicable.

5.3.2 NPDES Stormwater Discharges

Orange County, the City of Orlando, and the City of Ocoee have a Phase I NPDES MS4 permit (FLS000011 and FLS000014). Any MS4 permittee is only responsible for reducing the anthropogenic loads associated with stormwater outfalls that it owns or otherwise has responsible control over, and it is not responsible for reducing other nonpoint source loads in its jurisdiction.

Stormwater reductions are included in both the MS4 WLA and LA. In determining the overall stormwater reductions needed, however, the TMDLs do not differentiate between the MS4 WLA and the LA, and instead, apply the same overall percent reductions to both as if these were a single category source. The stormwater reductions for the TMDLs are a 29 % reduction in TN and a 62 % reduction in TP from the current anthropogenic loading to Kasey Lake, a 56 % reduction in TN, and an 84 % reduction in TP from the current anthropogenic loading to Lake Fairhope, and a 0 % reduction in TN and a 20 % reduction in TP from the current anthropogenic loading to Lake Lotta. Aggregated allocations for a category of sources are not intended to be applied uniformly to individual sources in that category. Pollutant reductions to attain a TMDL can come from many sources, and these percent reductions do not directly apply to any individual MS4 outfall.

5.4 Margin of Safety

The MOS can either be implicitly accounted for by choosing conservative assumptions about loading or water quality response, or explicitly accounted for during the allocation of loadings. Consistent with the recommendations of the Allocation Technical Advisory Committee (DEP 2001), an implicit MOS was used in the development of these TMDLs. The MOS is a required component of a TMDL and accounts for the uncertainty about the relationship between pollutant loads and the quality of the receiving waterbody (CWA, Section 303(d)(1)(c)). Considerable uncertainty is usually inherent in estimating nutrient loading from nonpoint sources, as well as in predicting water quality response. The effectiveness of management activities (e.g., stormwater management plans) in reducing loading is also subject to uncertainty.

Consistent with the recommendations of the Allocation Technical Advisory Committee (DEP 2001), an implicit MOS was used in the development of the TMDLs because of the conservative assumptions that were applied. The highest TN and TP AGM values were used to calculate the percent reductions, and the TMDL targets must not be exceeded in any one year.

Chapter 6: Implementation Plan Development and Beyond

6.1 Implementation Mechanisms

Following the adoption of a TMDL, implementation takes place through various measures. The implementation of TMDLs may occur through specific requirements in NPDES wastewater and MS4 permits, and, as appropriate, through local or regional water quality initiatives or basin management action plans (BMAPs).

Facilities with NPDES permits that discharge to the TMDL waterbody must implement the permit conditions that reflect target concentrations, reductions, or wasteload allocations identified in the TMDL. NPDES permits are required for Phase I and Phase II MS4s and domestic and industrial wastewater facilities. MS4 Phase I permits require a permit holder to prioritize and act to address a TMDL unless management actions to achieve that particular TMDL are already defined in a BMAP. MS4 Phase II permit holders must also implement the responsibilities defined in a BMAP or other form of restoration plan (e.g., a reasonable assurance plan).

6.2 BMAPs

Information on the development and implementation of BMAPs can be found in Section 403.067, F.S. (the FWRA). DEP or a local entity may initiate and develop a BMAP that addresses some or all of the contributing areas to the TMDL waterbody. BMAPs are adopted by the DEP Secretary and are legally enforceable.

BMAPs describe the fair and equitable allocations of pollution reduction responsibilities to the sources in the watershed, as well as the management strategies that will be implemented to meet those responsibilities, funding strategies, mechanisms to track progress, and water quality monitoring. Local entities—such as wastewater facilities, industrial sources, agricultural producers, county and city stormwater systems, military bases, water control districts, state agencies, and individual property owners—usually implement these strategies. BMAPs can also identify mechanisms to address potential pollutant loading from future growth and development.

The Kasey Lake and Lake Lotta Watersheds are located in the Wekiwa Spring and Rock Springs BMAP area. The BMAP was adopted in June 2018 to implement protections for Outstanding Florida Springs (OFS) as provided by the 2016 Florida Springs and Aquifer Protection Act. This BMAP will be implemented in addition to the Wekiva River, Rock Springs, and Little Wekiva Canal surface water BMAP (adopted in 2015).

The Lake Fairhope Watershed is located in the Wekiva Spring, Rock Springs Run, and Little Wekiva Canal BMAP area. The BMAP was adopted in October 2015 to implement the TP and nitrate-nitrogen TMDLs in Wekiva River, Wekiwa Springs, and Rock Springs Run, as well as

nutrient and dissolved oxygen (DO) TMDLs for the Little Wekiva Canal, and activities are ongoing throughout the larger basin to reduce nutrient loads to these waterbodies.

Management strategies in the Kasey Lake and Lake Fairhope Watersheds will also address nutrient impairments for these lakes and will likely benefit the lakes at a different level than reported in the Wekiva River, Rock Springs Run, and Little Wekiva Canal BMAP. Additional information about BMAPs is available on DEP's website.

6.3 Implementation Considerations for the Waterbodies

In addition to addressing reductions in watershed pollutant contributions to impaired waters during the implementation phase, it is also necessary to consider the impacts of internal sources (e.g., sediment nutrient fluxes or the presence of nitrogen-fixing cyanobacteria) and the results of any associated remediation projects on surface water quality. Approaches for addressing these other factors should be included in comprehensive management plans for the waterbodies. Additionally, the current water quality and water level monitoring of Kasey Lake and Lake Fairhope should continue and be expanded, as necessary, during the implementation phase to ensure that adequate information is available for tracking restoration progress.

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Appendices

Appendix A: Background Information on Federal and State Stormwater Programs

In 1982, Florida became the first state in the country to implement statewide regulations to address the issue of nonpoint source pollution by requiring new development and redevelopment to treat stormwater before it is discharged. The Stormwater Rule, as authorized in Chapter 403, F.S., was established as a technology-based program that relies on the implementation of BMPs designed to achieve a specific level of treatment (i.e., performance standards) as set forth in Chapter 62-40, F.A.C. In 1994, DEP stormwater treatment requirements were integrated with the stormwater flood control requirements of the water management districts, along with wetland protection requirements, into the Environmental Resource Permit regulations, as authorized under Part IV of Chapter 373, F.S.

Chapter 62-40, F.A.C., also requires the state's water management districts to establish stormwater pollutant load reduction goals (PLRGs) and adopt them as part of a Surface Water Improvement and Management (SWIM) Program plan, other watershed plan, or rule. Stormwater PLRGs are a major component of the load allocation part of a TMDL. To date, they have been established for Tampa Bay, Lake Thonotosassa, the Winter Haven Chain of Lakes, the Everglades, Lake Okeechobee, and Lake Apopka.

In 1987, the U.S. Congress established Section 402(p) as part of the federal CWA Reauthorization. This section of the law amended the scope of the federal NPDES permitting program to designate certain stormwater discharges as "point sources" of pollution. The EPA promulgated regulations and began implementing the Phase I NPDES stormwater program in 1990 to address stormwater discharges associated with industrial activity, including 11 categories of industrial activity, construction activities disturbing 5 or more acres of land, and large and medium MS4s located in incorporated places and counties with populations of 100,000 or more.

However, because the master drainage systems of most local governments in Florida are physically interconnected, the EPA implemented Phase I of the MS4 permitting program on a countywide basis, which brought in all cities (incorporated areas), Chapter 298 special districts; community development districts, water control districts, and FDPT throughout the 15 counties meeting the population criteria. DEP received authorization to implement the NPDES stormwater program in 2000. The authority to administer the program is set forth in Section 403.0885, F.S.

The Phase II NPDES stormwater program, promulgated in 1999, addresses additional sources, including small MS4s and small construction activities disturbing between 1 and 5 acres, and urbanized areas serving a minimum resident population of at least 1,000 individuals. While these urban stormwater discharges are technically referred to as "point sources" for the purpose of

regulation, they are still diffuse sources of pollution that cannot be easily collected and treated by a central treatment facility, as are other point sources of pollution such as domestic and industrial wastewater discharges. It should be noted that Phase I MS4 permits issued in Florida include a reopener clause that allows permit revisions to implement TMDLs when the implementation plan is formally adopted.