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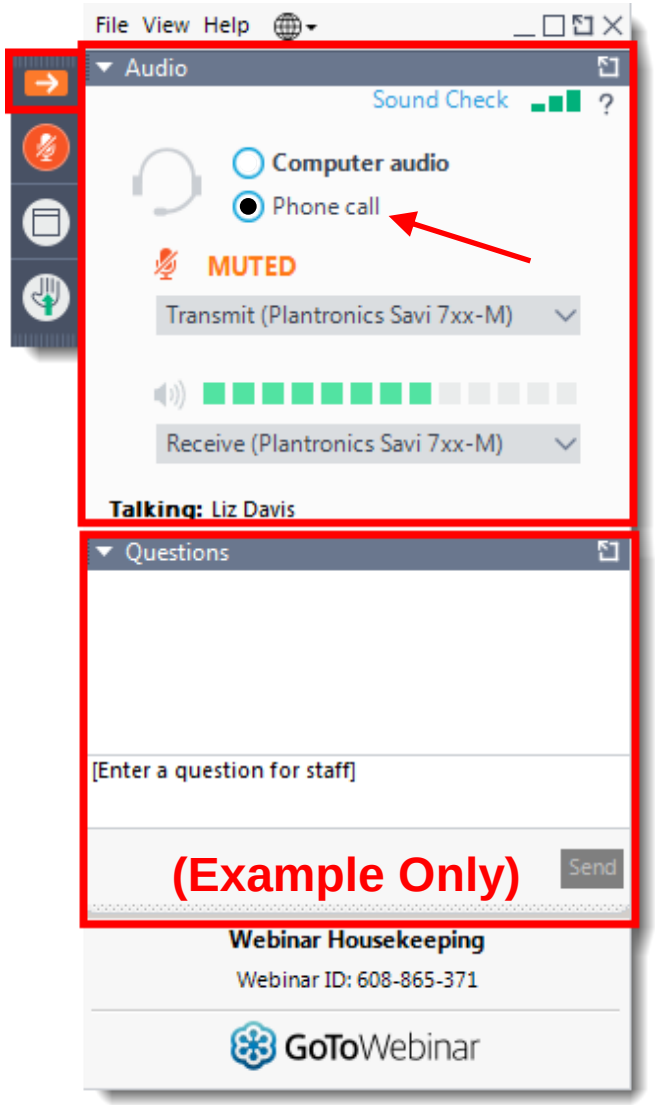


TOTAL MAXIMUM DAILY LOADS (TMDLS) FOR SELECT LAKES IN THE MIDDLE ST. JOHNS RIVER AND KISSIMMEE RIVER BASINS

Eric Simpson
Division of Environmental Assessment and Restoration
Florida Department of Environmental Protection

GoToWebinar | Mar. 4, 2025

LAKES TMDLS

Basin	Lake	WBID
Middle St. Johns River	Lake Terrace	3168X3
	Lake Lawsona	3168Z9
	Lake Lancaster	3168Y
	Lake Davis*	3168Y4
	Lake Wade*	3168W3
	Lake Weldona*	3168Y8
	Kasey Lake*	3002Q
	Kelly Lake	3002S
	Lake Lotta*	3002G
Kissimmee River	Lake Fran*	3169G3
	Lake Kozart*	3169G4
	Lake Richmond*	3169G6
	Lake Walker*	3169G5
	Lake Beardall	3169G8

*Denotes previously proposed TMDLs that are being updated.

PRESENTATION OUTLINE

- Introduction and overview of Florida's TMDL program.
- Presentation of nutrient TMDLs for lakes in the Orlando area:
  - Water Body Identification Number (WBID) overview.
  - Assessment and Verified Impairments.
  - TMDL approach.
- Next steps.
- Public questions and comments.

FEDERAL AND STATE REQUIRMENTS

- The Federal Clean Water Act (CWA) established requirements for states in Section 303(d).
  - Assess and provide lists of their impaired waters to the U.S. Environmental Protection Agency (EPA).
  - Develop TMDLs for impaired waters.
  - Identify pollutant reductions and reductions needed to achieve water quality standards.
- The Florida Watershed Restoration Act (FWRA, section 403.067, Florida Statutes) established a framework for identifying impaired waters, developing TMDLs, and developing and implementing restoration plans.

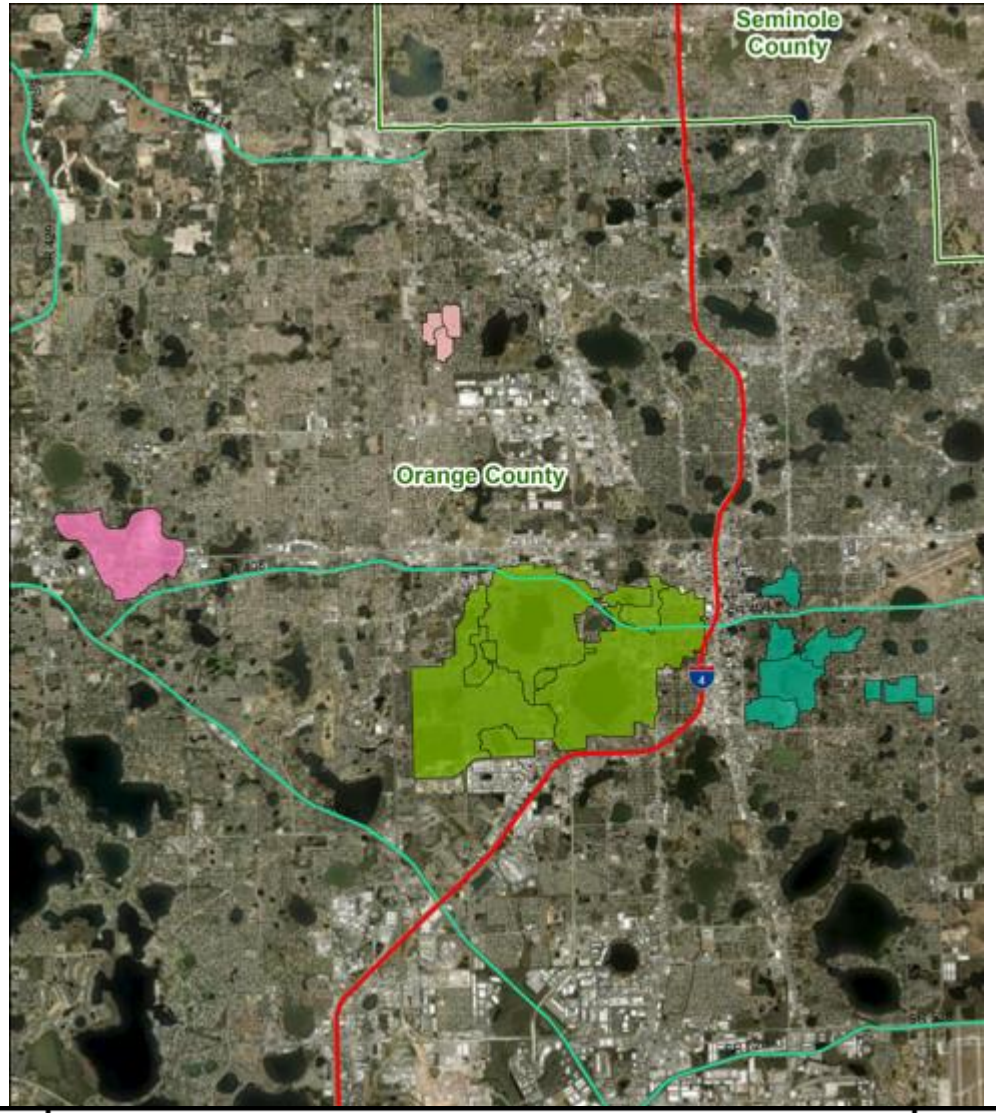
SITE-SPECIFIC RESTORATION TARGETS

- Typically referred to as TMDLs.
- TMDLs include water quality restoration thresholds developed for waterbodies that are “impaired.”
  - “Impaired” means that the waterbody does not meet applicable water quality standards.
  - Essentially the maximum amount of a pollutant that a waterbody can receive and still maintain its designated uses (e.g., drinking water, fishing, swimming and shellfish harvesting).
- TMDLs serve as the legal basis for future restoration action as directed by the federal CWA and FWRA, particularly for permitted entities.

TMDLs

- TMDLs may provide the basis for site-specific numeric nutrient criteria (NNC).
  - Termed Hierarchy 1 or “H1” criteria.
  - Non-H1 criteria are the generally applicable NNC provided in Rule 62-302.531, Florida Administrative Code (F.A.C.), for streams, springs and lakes.

ORLANDO AREA LAKE GROUP WATERSHEDS



Orlando Area Lakes Group Overview Geopolitical Features

0 1 2 Miles

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- Lake Fran Watershed
- East Orlando TMDL Watersheds
- Kasey Kelly Kristy Lake Group
- Lake Lotta Watershed
- FDOT Interstates
- FDOT Toll Roads

LAKE GROUPS AND LAKE NUTRIENT ASSESSMENT STATUS

Watershed	Impaired Lakes	Not Impaired Lakes
Lake Fran Watershed	Fran, Kozart, Richmond, Walker and Beardall	Clear, Lorna Doone and Mann
East Orlando Lakes	Davis, Wade, Weldona, Terrace, Lawsona and Lancaster	Dot, Frederica, Gear, Park, Druid, Cherokee, Copeland and Lurna
Lakes Kasey and Kelly, and Kristy Watershed	Kasey, Kelly	Kristy

TMDL DEVELOPMENT APPROACH

- Lakes were grouped together based on similar characteristics and drainage areas.
- Used the generally applicable lake chlorophyll *a* target of 20 micrograms per liter (µg/L) as the restoration target.
- Evaluated the relationships between chlorophyll *a* and in-lake total nitrogen (TN) and total phosphorus (TP) annual geometric mean (AGM) concentrations by selecting range of years with the most complete dataset for each lake group.
- Strong relationships were found between chlorophyll *a* and nutrient concentrations in all lake groups applying both simple and multiple linear regression analyses.

TMDL DEVELOPMENT APPROACH

- The TN and TP targets were derived by applying the simple linear regression equations to determine the nutrient concentrations needed to achieve the chlorophyll *a* restoration target of 20 µg/L.
- The lake group nutrient target values were then applied in the multiple regression equation for the individual lake group to determine whether the chlorophyll *a* value is achieved.
- The TMDLs are expressed as in-lake nutrient concentration targets and percent reductions necessary to meet the targets.
- If approved, the TMDL concentration targets will be adopted in Chapter 62-304, F.A.C., as Hierarchy 1 NNC.

NNC FOR FLORIDA LAKES

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

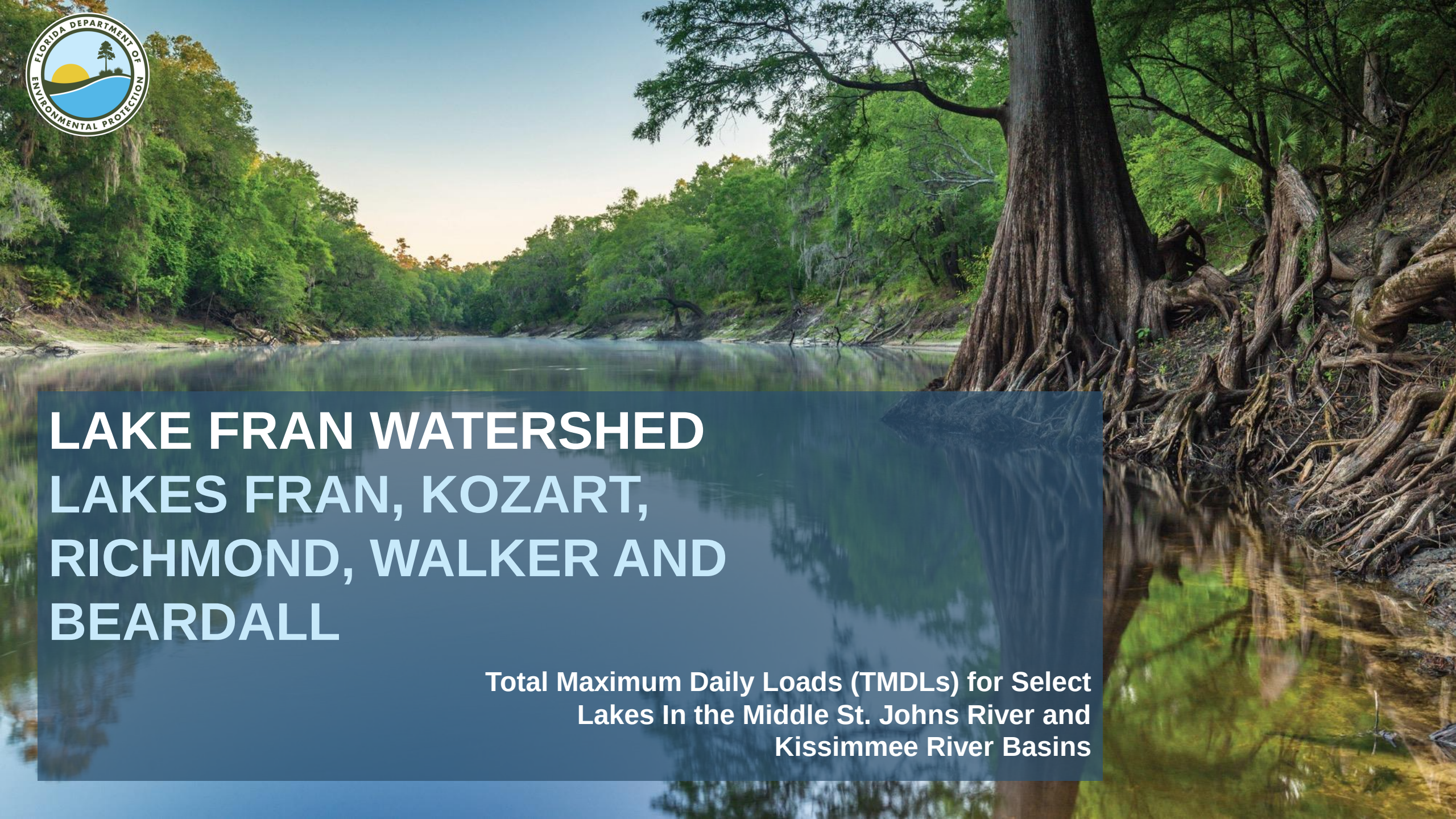
- Impaired if AGM is greater than the NNC more than once in a 3-year period.
- Minimum TN or TP NNC is applied when chlorophyll *a* ≥ 20 µg/L for high color or low color, high alkalinity lakes.
- Maximum TN or TP NNC is applied when chlorophyll *a* < 20 µg/L for high color or low color, high alkalinity lakes.

* Lake Lotta is categorized as a high color lake (>40 PCU).

‡ All other lakes under review are categorized as low color (≤40 PCU) and high alkalinity (>20 mg/L $CaCO_3$) lakes.

PROPOSED SITE-SPECIFIC NNC

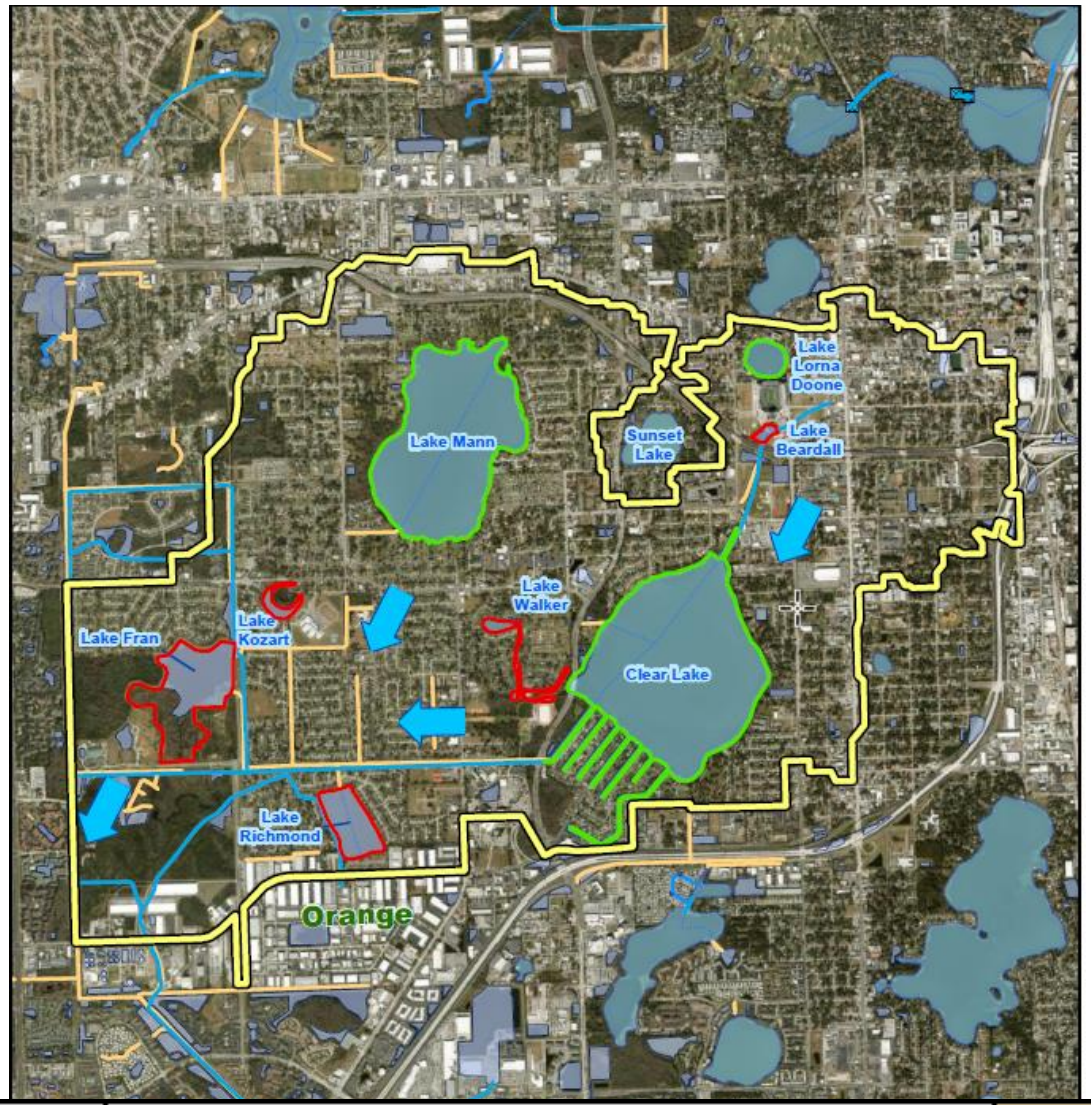
		Applicable NNC		Site-Specific Interpretations			
Lake Group	**Lakes**	**AGM Chlorophyll *a* (µg/L)**	**Chlorophyll *a* Frequency**	**AGM TN (mg/L)**	**TN Frequency**	**AGM TP (mg/L)**	**TP Frequency**
Lake Fran Watershed	Lakes Fran, Kozart, Richmond, Walker and Beardall	20	No more than one exceedance in a three-year period	1.10	No exceedance	0.05	No exceedance
East Orlando Lakes	Lakes Davis, Wade, Weldona, Terrace, Lawsona and Lancaster	20	No more than one exceedance in a three-year period	0.80	No exceedance	0.05	No exceedance
Kasey-Kelly-Kristy Lakes	Lakes Kasey and Kelly	20	No more than one exceedance in a three-year period	0.91	No exceedance	0.05	No exceedance
Lake Lotta	Lake Lotta	20	No more than one exceedance in a three-year period	1.27	No exceedance	0.03	No exceedance



LAKE FRAN WATERSHED
LAKES FRAN, KOZART, RICHMOND, WALKER AND BEARDALL

Total Maximum Daily Loads (TMDLs) for Select Lakes In the Middle St. Johns River and Kissimmee River Basins

LAKES NUTRIENT ASSESSMENT STATUS



Lake Fran Watershed Lakes Nutrient Assessment Status

0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 Miles

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Lake Fran Watersheds

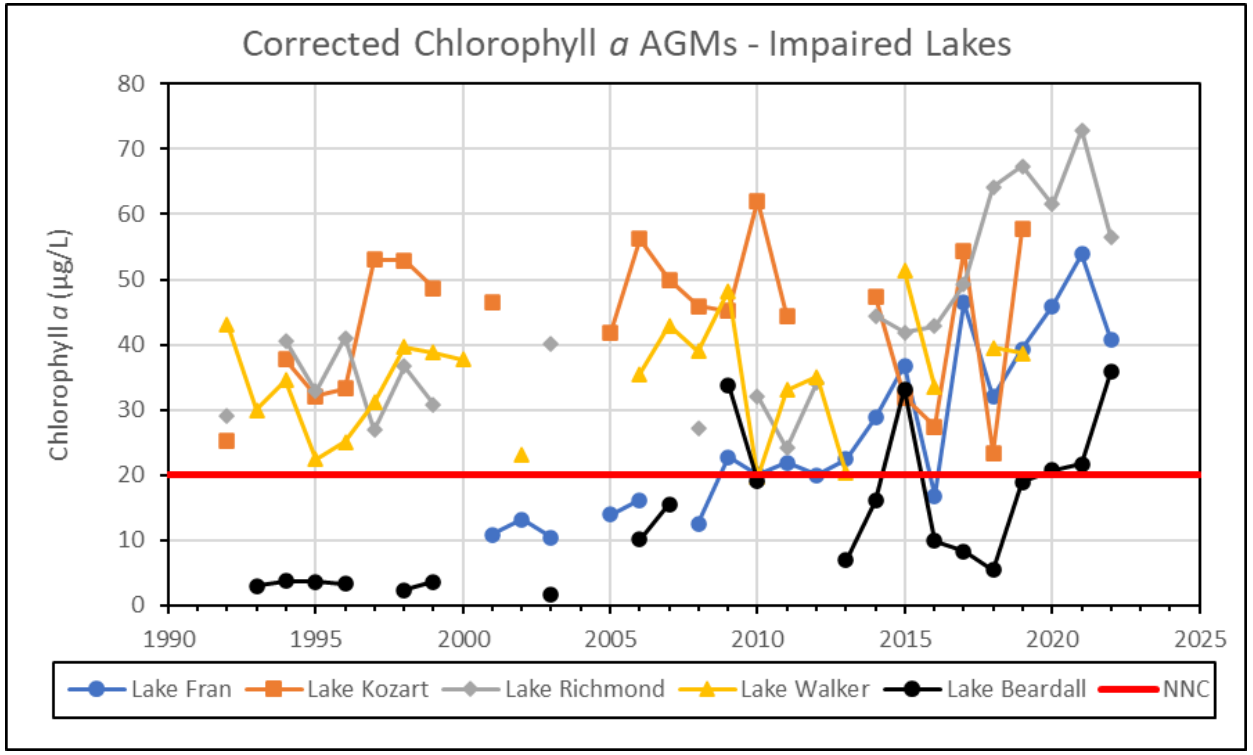
Impaired for Nutrients

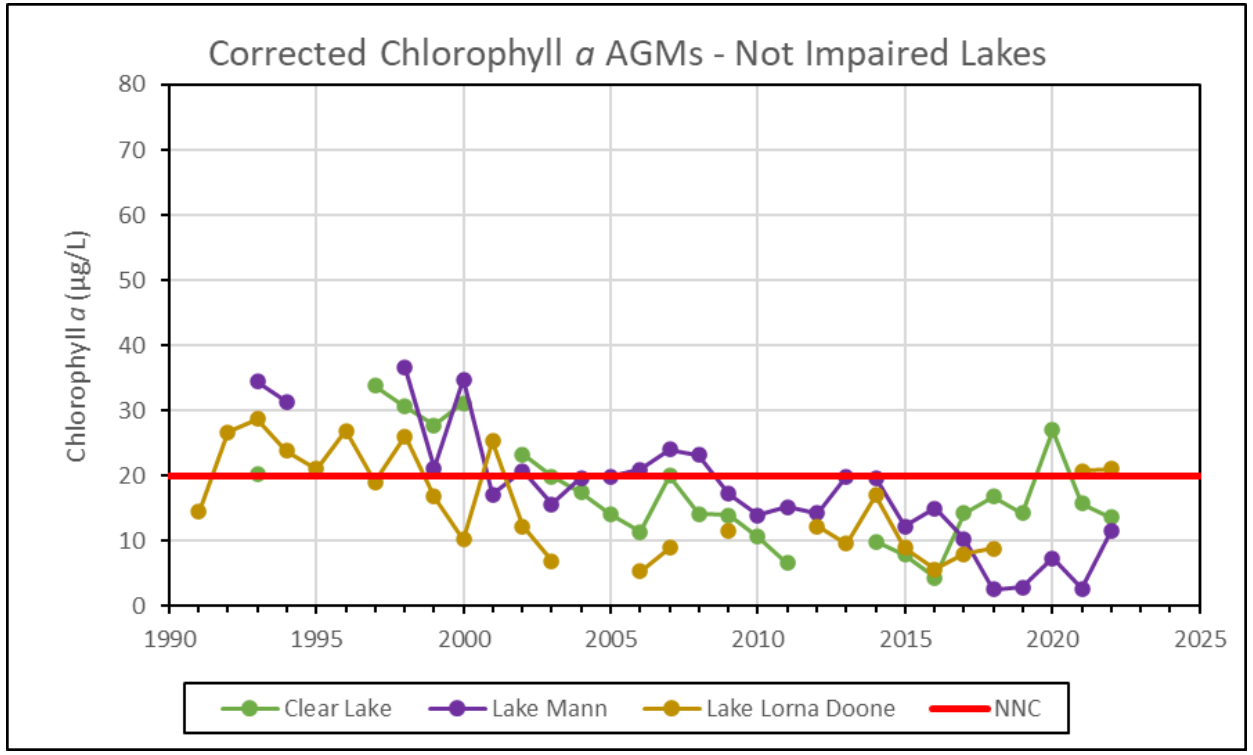
Not Impaired for Nutrients

NUTRIENT ASSESSMENT STATUS

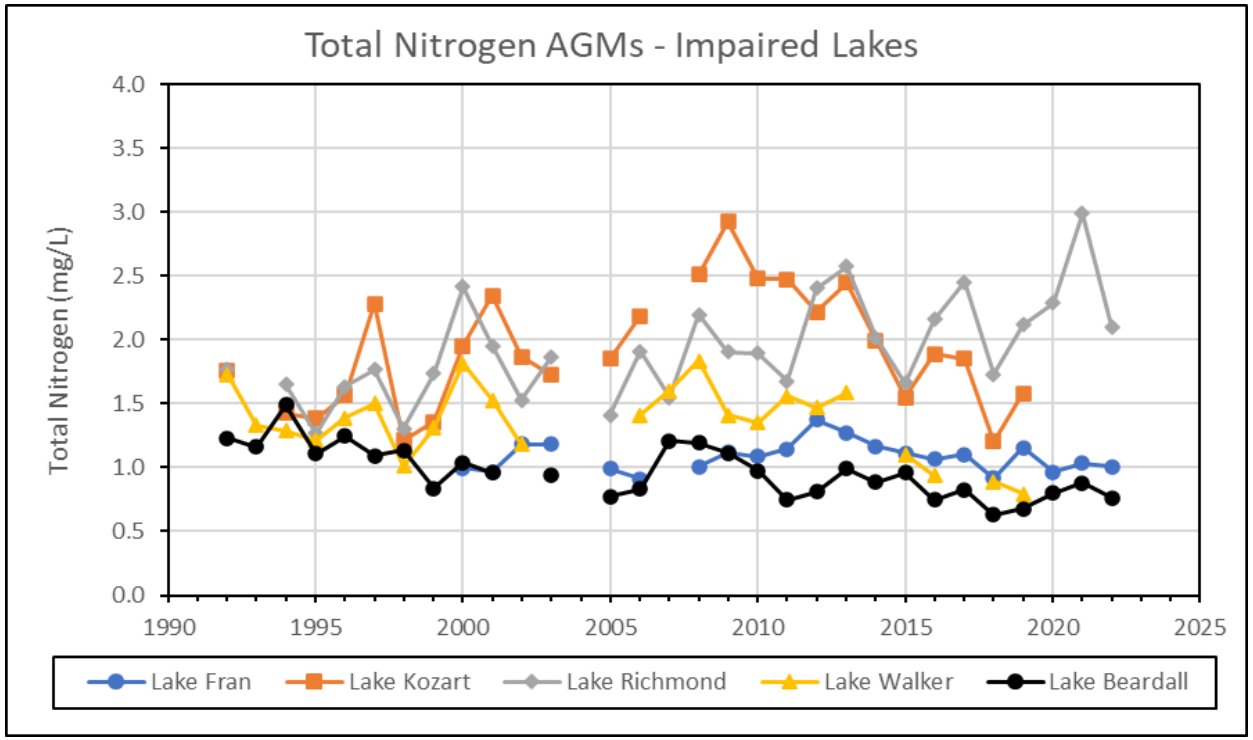
- Lakes Fran, Kozart, Richmond, Walker and Beardall were assessed for nutrients during the verified period of Jan. 1, 2009, to June 30, 2016.
  - Lakes Fran, Kozart, Richmond and Walker were assessed as impaired for nutrients (chlorophyll *a,* TN and TP).
  - Lake Beardall was assessed as impaired for nutrients (TP).
  - The five lakes were included on the Verified List of Impaired Waters that was adopted by Secretarial Order in June 2017.
- During the Biennial Assessment 2022-24, Lake Beardall was assessed as impaired for nutrients (chlorophyll *a*) in the verified period of Jan. 1, 2015, to June 30, 2022.

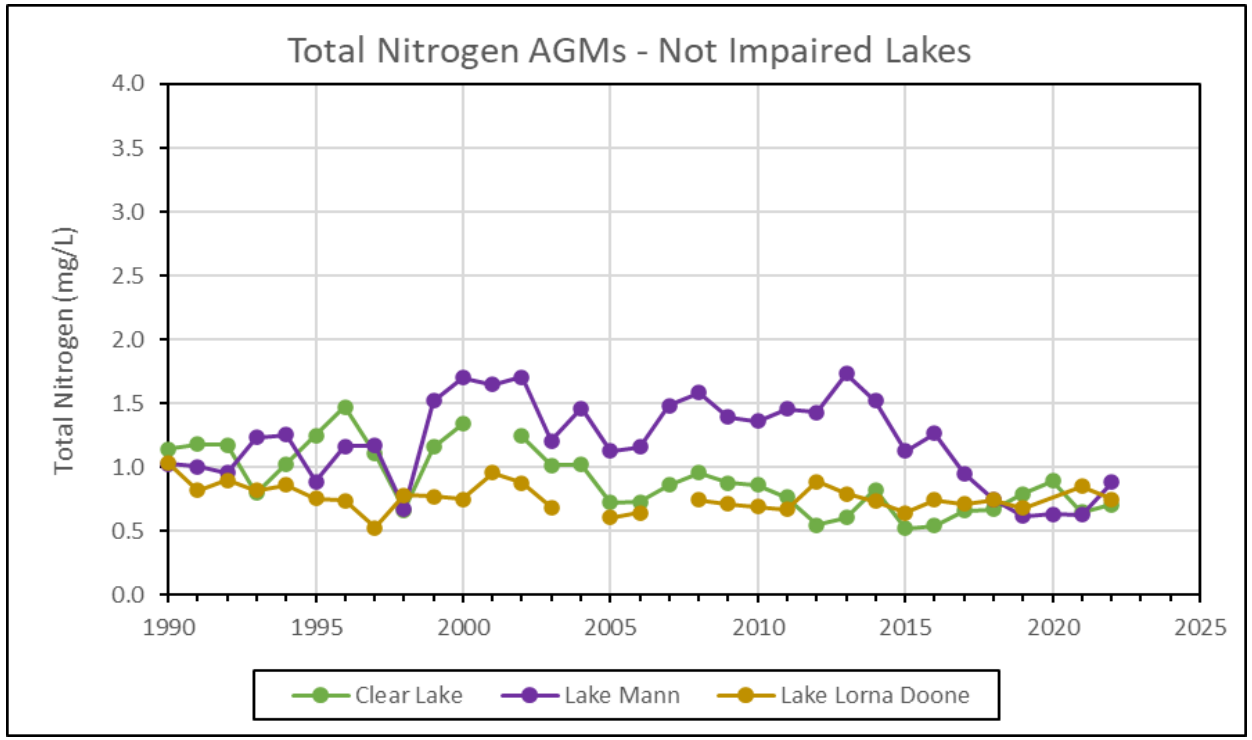
LAKE FRAN WATERSHED CHLOROPHYLL *a*



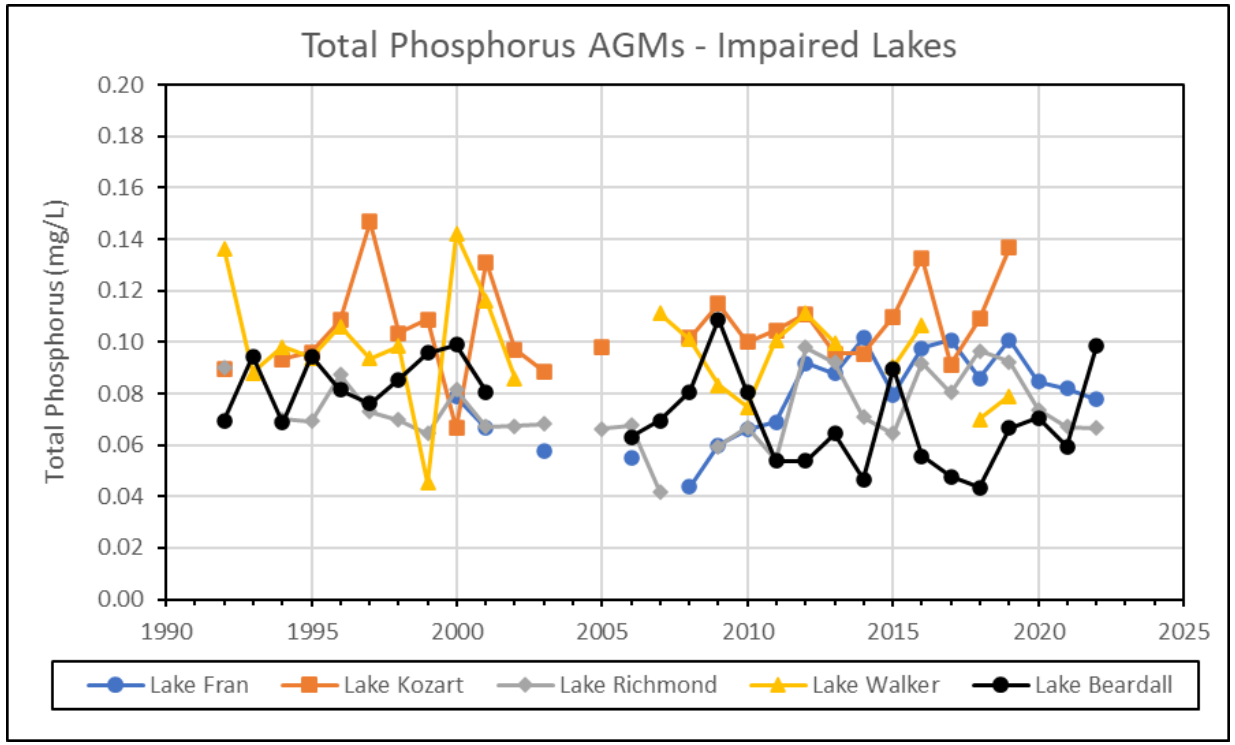


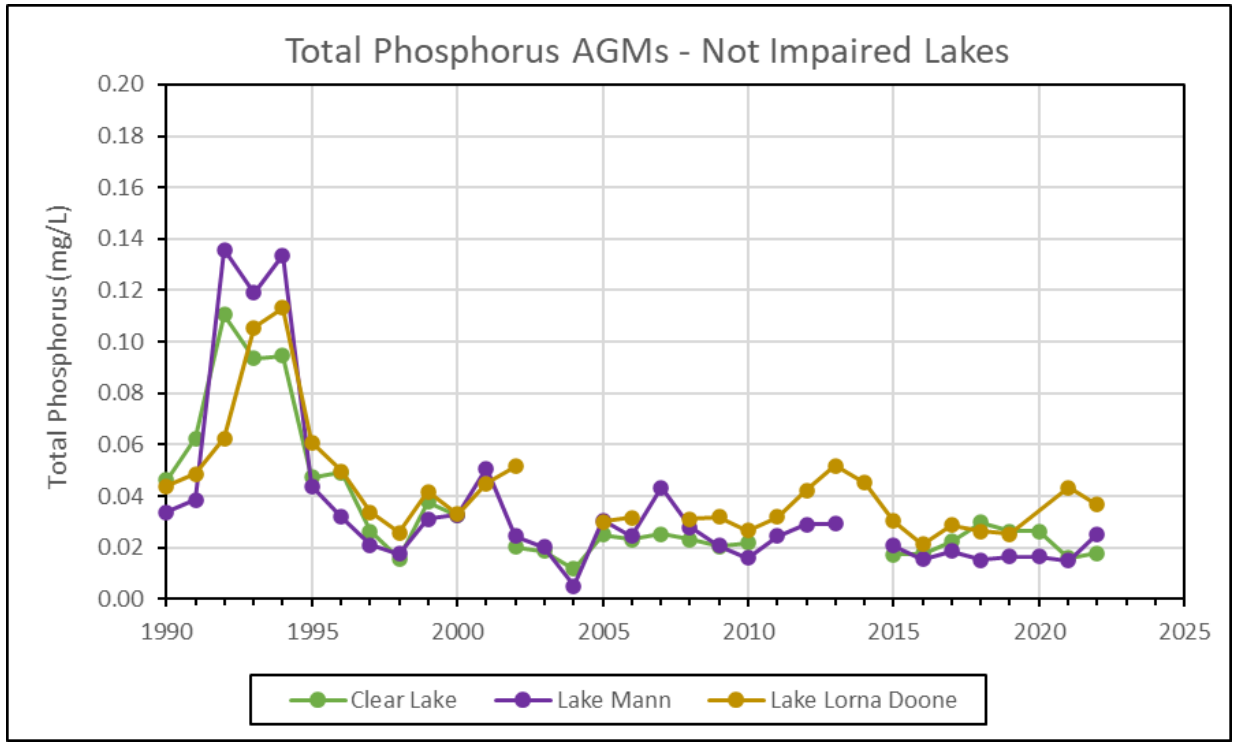
LAKE FRAN WATERSHED TN





LAKE FRAN WATERSHED TP



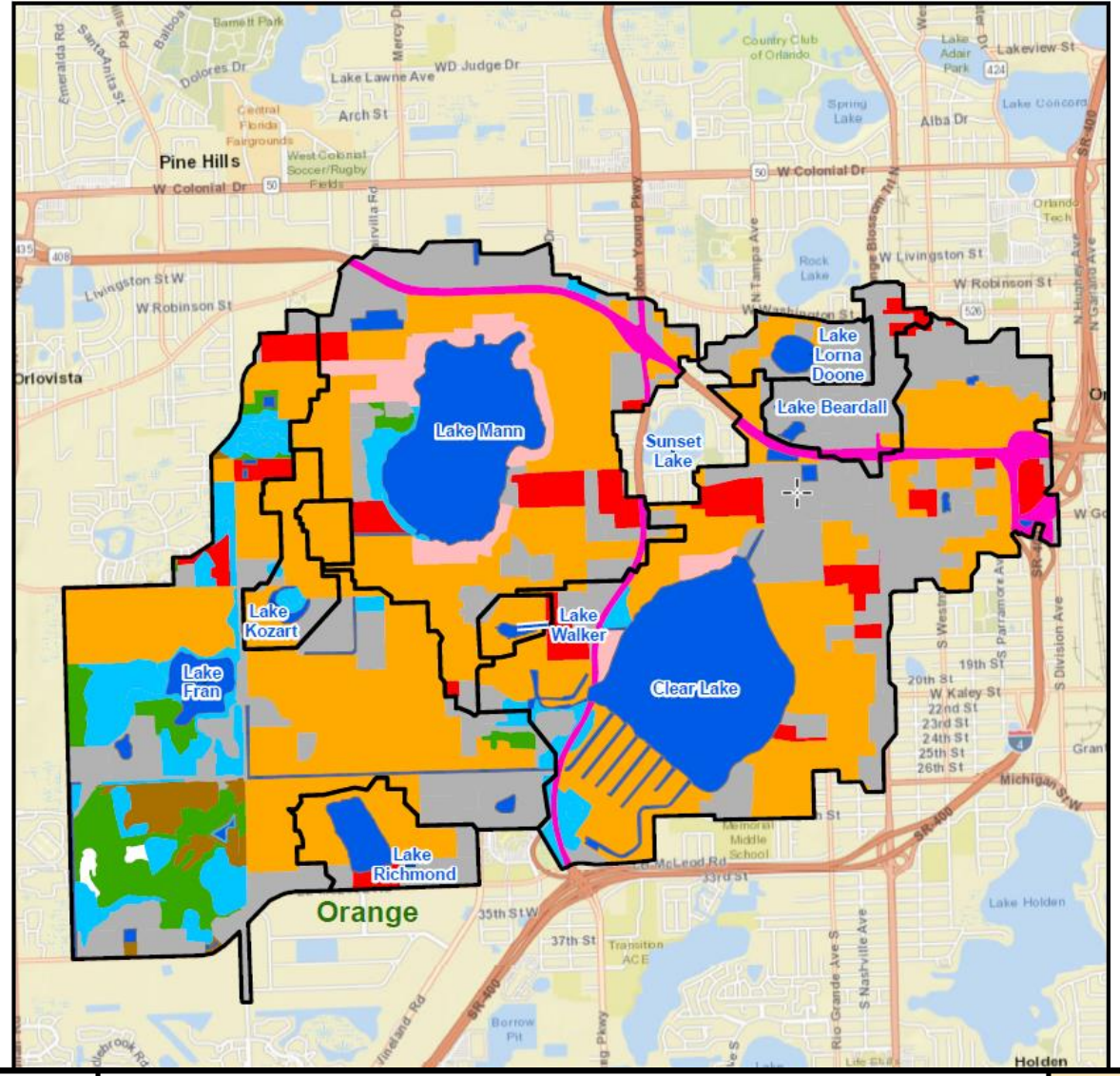


LAKE CHARACTERISTICS

Lake	Mean Depth (feet)	Maximum Depth (feet)	Surface Area (acres)	Lake Watershed Area (acres)	Watershed to Lake Area Ratio	Origin
Beardall	6.2	10.6	3	157	52:1	Excavation
Clear	12.9	25.0	358	1,458	4:1	Natural
Fran	9.0	10.2	70	1,604	23:1	Excavation
Kozart	4.3	5.9	7	111	16:1	Excavation
Lorna Doone	14.2	29.0	15	96	6:1	Natural
Mann	10.5	26.1	267	1,041	4:1	Natural
Richmond	5.3	13.2	35	137	4:1	Excavation
Walker	7.7	13.5	4	37	9:1	Natural

Source: City of Orlando

LAKE FRAN WATERSHED LAND USE



Lake Fran Watershed and Contributing Lake Basins Land Use

0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 Miles

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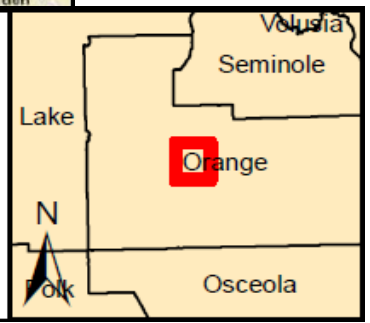
- Low Density Residential
- Medium Density Residential
- High Density Residential
- Urban and Built Up
- Agriculture
- Rangeland
- Upland Forest
- Water
- Wetlands
- Barren Land
- Trans, Comm, Util
- Lake Drainage Basins



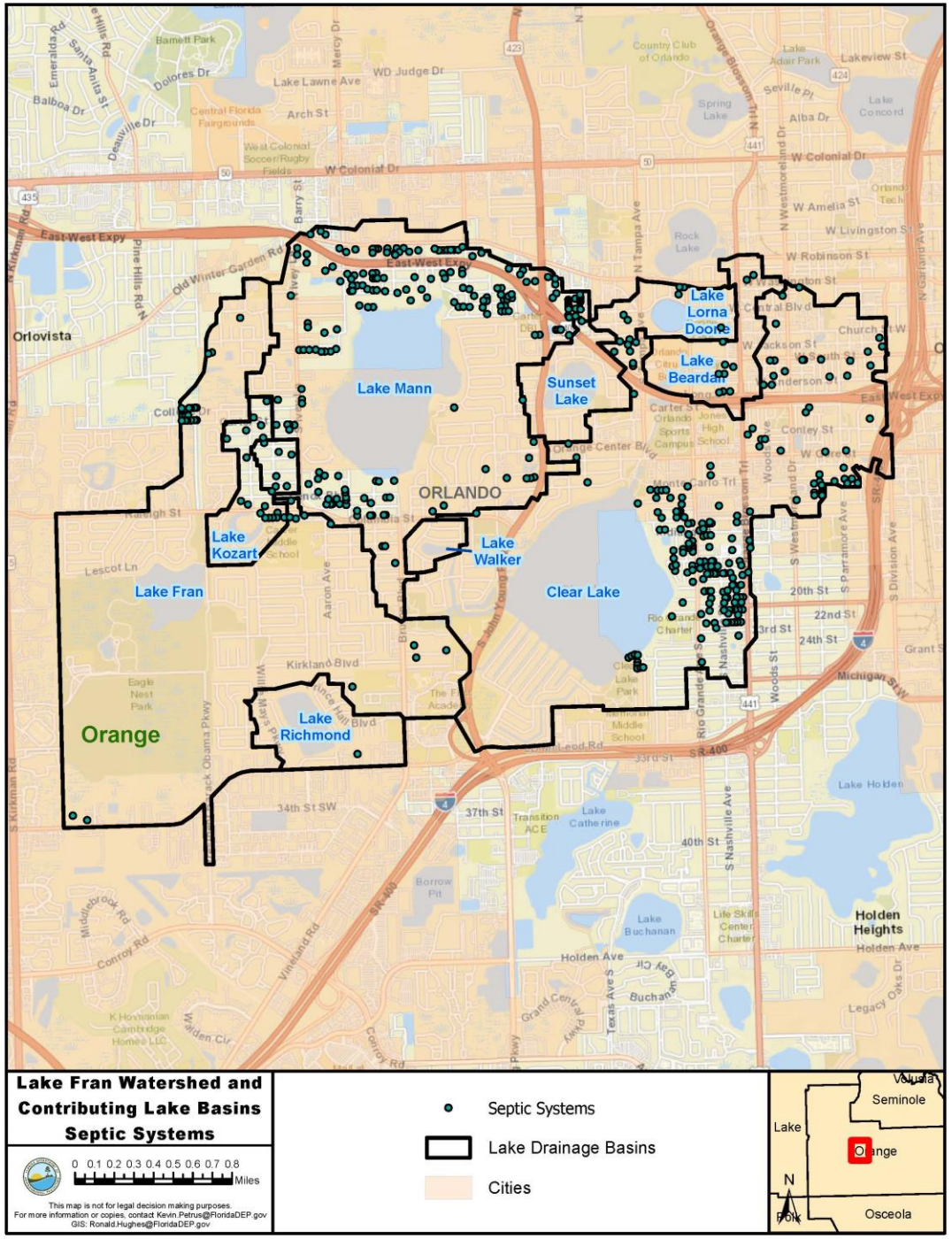
LAKE FRAN WATERSHED LAND USE

Land Use Classification	Lake Drainage Basins (Acres)*								Total Acres	% of Watershed
	Fran	Kozart	Richmond	Walker	Beardall	Clear	Lorna Doone	Mann		
Residential Medium Density	667	89	83	32	4	691	28	492	2,086	38.6
Urban and Built-Up	378	15	43	2	133	492	67	258	1,387	25.7
Water	71	7	34	4	3	378	15	275	788	14.6
Wetlands	247	7	--	--	--	46	--	27	328	6.1
Residential High Density	48	0	11	2	11	106	--	80	258	4.8
Upland Forest	182	0	--	--	--	--	--	7	190	3.5
Transportation, Communication, and Utilities	0	--	--	--	10	81	--	53	144	2.7
Residential Low Density	0	--	--	--	--	22	--	116	139	2.6
Rangeland	71	--	--	--	--	--	--	--	71	1.3
Barren Land	9	--	--	--	--	--	--	--	9	0.2
Total	**1,674**	**118**	**172**	**41**	**160**	**1,816**	**111**	**1,308**	**5,400**	**100**

* 0 values indicate presence of land use that is negligible.

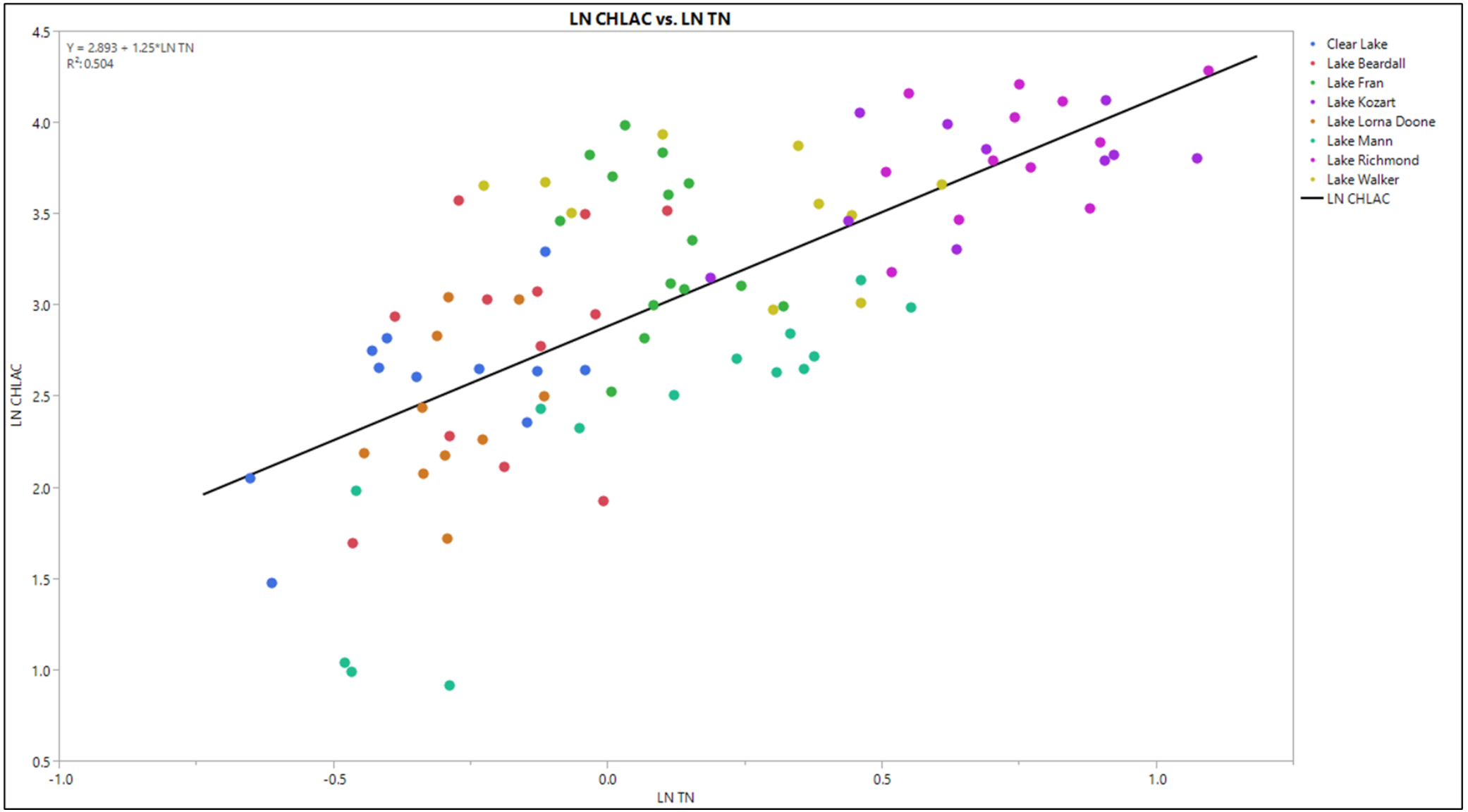
LAKE FRAN WATERSHED ONSITE TREATMENT AND DISPOSAL SYSTEMS (OSTDS)

Lake Drainage Basins	Number of OSTDS
Beardall	10
Clear	201
Fran	34
Kozart	18
Lorna Doone	8
Mann	196
Richmond	1
Walker	0
Total	**468**



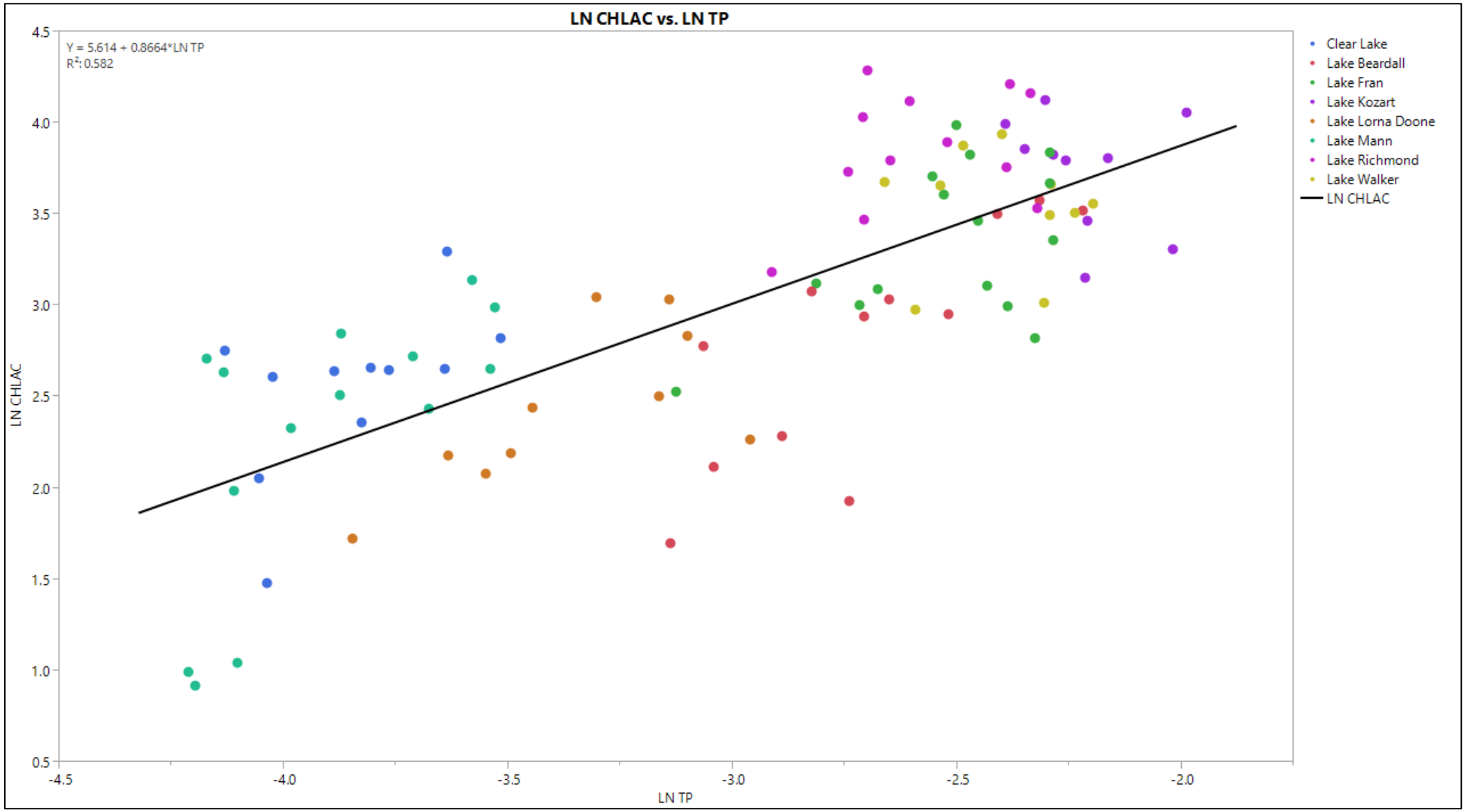
LAKE FRAN WATERSHED

CHLOROPHYLL *a* VS. TN



LAKE FRAN WATERSHED

CHLOROPHYLL *a* VS. TP



LAKE FRAN WATERSHED

REGRESSION RESULTS SUMMARY

	CHLAC vs. TN*	CHLAC vs. TP*	CHLAC vs. TN and TP*
R^2 Adjusted	0.50	0.58	0.69
p value - Nutrient Term	<0.0001	<0.0001	<0.0001 (TN), <0.0001 (TP)
Data Period	2008-22	2008-22	2008-22
Number of Observations	94	94	94

* Regression analyses performed using natural log transformed AGMs.

LAKE FRAN WATERSHED
REGRESSION ANALYSES RESULTS

Simple Linear Regression Equations

- Ln (Chlorophyll *a* AGM) = 2.89307 + 1.25044 * Ln (TN AGM).
- Ln (Corrected Chlorophyll *a* AGM) = 5.61427 + 0.86638 * Ln (TP AGM).
- Application of the simple linear regression equations indicate that the TN and TP AGM concentrations necessary to meet the chlorophyll *a* criterion are 1.10 mg/L and 0.05 mg/L, respectively.

Multiple Linear Regression (MLR) Equation

- Ln (Chlorophyll *a* AGM) = 4.74670 + 0.72289 * Ln (TN AGM) + 0.60388 * Ln (TP AGM).
- Applying the nutrient concentrations, derived using the simple linear regression models, in the MLR equation results in a chlorophyll *a* AGM of 20 µg/L.

* Ln is the natural log of the parameter within the parentheses.

LAKE FRAN WATERSHED

PERCENT REDUCTIONS TO MEET TARGETS

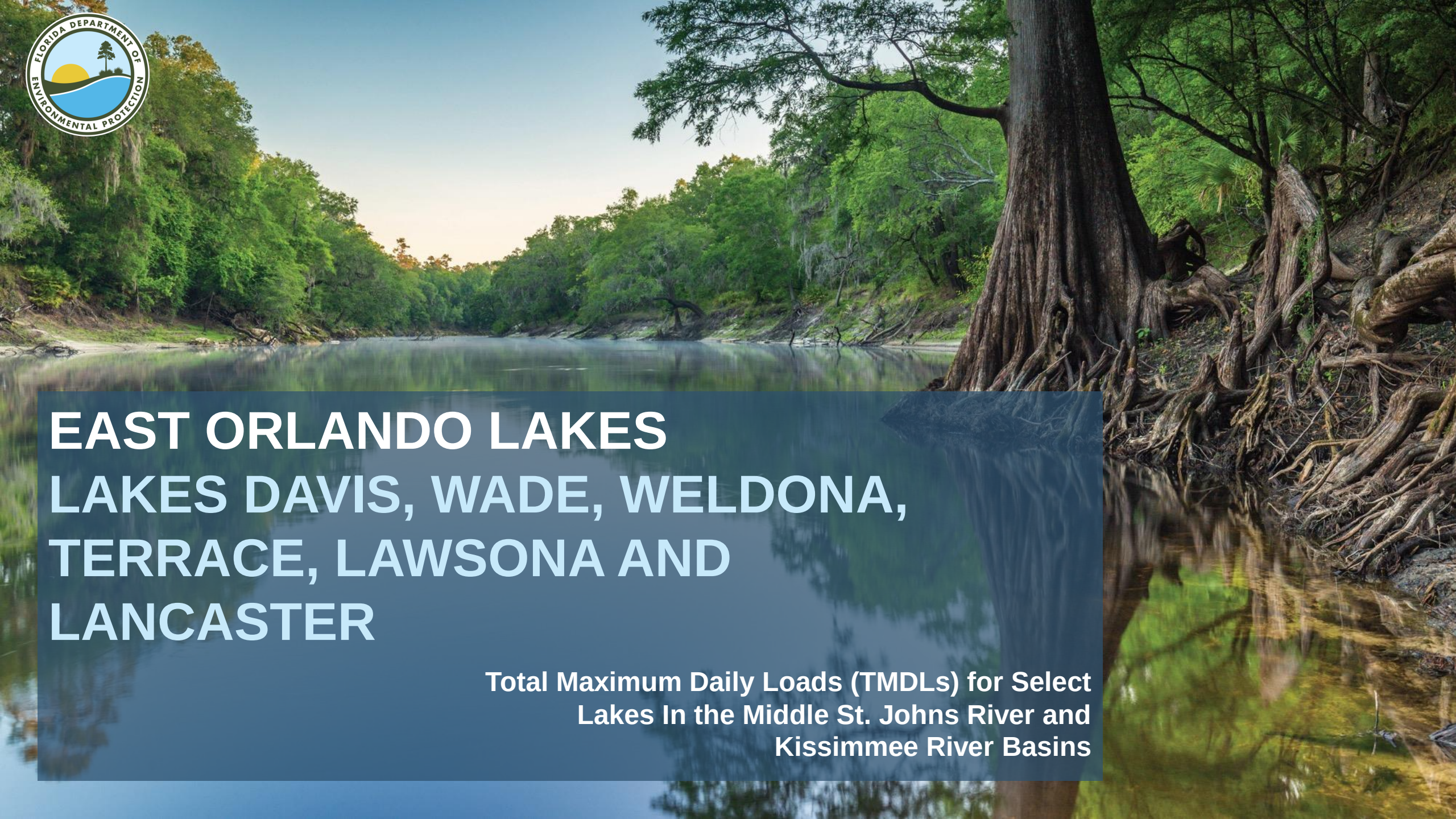
	Lake Fran TN AGM (mg/L)	Lake Fran TP AGM (mg/L)	Lake Kozart TN AGM (mg/L)	Lake Kozart TP AGM (mg/L)	Lake Richmond TN AGM (mg/L)	Lake Richmond TP AGM (mg/L)	Lake Walker TN AGM (mg/L)	Lake Walker TP AGM (mg/L)	Lake Beardall TP AGM (mg/L)
Maximum AGM (2013-22)	1.28	0.10	2.45	0.14	2.99	0.10	1.58	0.11	0.10
TMDL Target	1.10	0.05	1.10	0.05	1.10	0.05	1.10	0.05	0.05
% Reduction to Meet Target	14	50	55	64	63	50	30	55	50

$$\% \text{ Reduction} = \frac{[\text{measured exceedance (maximum AGM)} - \text{target}]}{\text{measured exceedance (maximum AGM)}} \times 100$$

TMDL COMPONENTS

Waterbody Name (WBID)	Parameter	TMDL (mg/L)[1]	WLA Wastewater (% reduction)	WLA NPDES Stormwater (% reduction)[2]	LA (% reduction)[2]
Lake Fran (3169G3)	TN	1.10	NA	14	14
Lake Fran (3169G3)	TP	0.05	NA	50	50
Lake Kozart (3169G4)	TN	1.10	NA	55	55
Lake Kozart (3169G4)	TP	0.05	NA	64	64
Lake Richmond (3169G6)	TN	1.10	NA	63	63
Lake Richmond (3169G6)	TP	0.05	NA	50	50
Lake Walker (3169G5)	TN	1.10	NA	30	30
Lake Walker (3169G5)	TP	0.05	NA	55	55
Lake Beardall (3169G8)	TN	1.10	NA	0	0
Lake Beardall (3169G8)	TP	0.05	NA	50	50

[1] The TMDLs represent the AGM lake concentrations (mg/L) not to be exceeded.
[2] The required percent reductions listed in this table represent the reductions of in-lake concentrations and do not directly reflect reductions in source loadings.



EAST ORLANDO LAKES
LAKES DAVIS, WADE, WELDONA, TERRACE, LAWSONA AND LANCASTER

Total Maximum Daily Loads (TMDLs) for Select Lakes In the Middle St. Johns River and Kissimmee River Basins

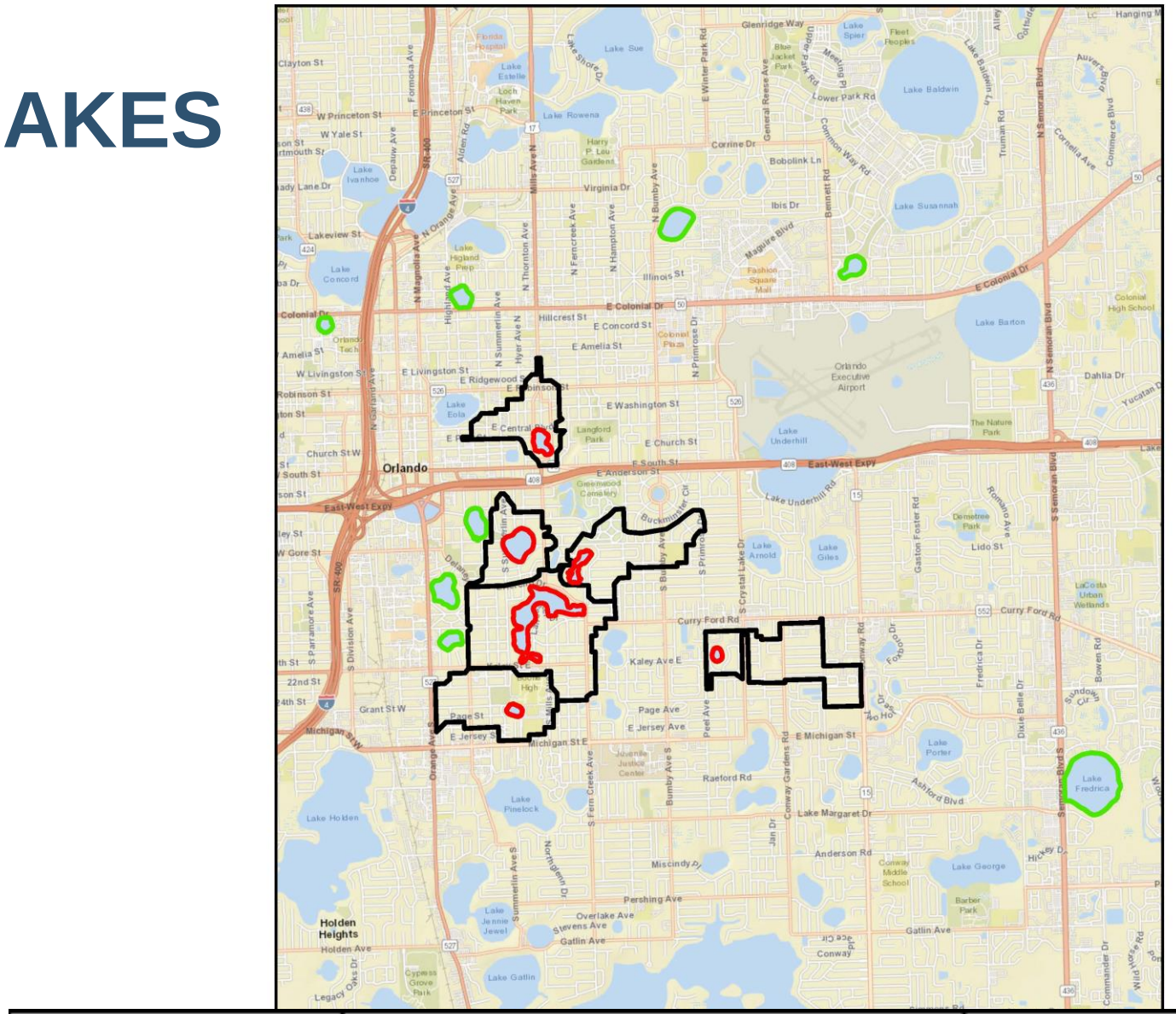
EAST ORLANDO LAKES

Impaired Lakes:

- Lake Terrace.
- Lake Lawsona.
- Lake Lancaster.
- Lake Davis.
- Lake Wade.
- Lake Weldona.

Unimpaired Lakes:

- Lake Dot.
- Lake Frederica.
- Lake Gear.
- Park Lake.
- Druid Lake.
- Lake Cherokee.
- Lake Copeland.
- Lake Lurna.

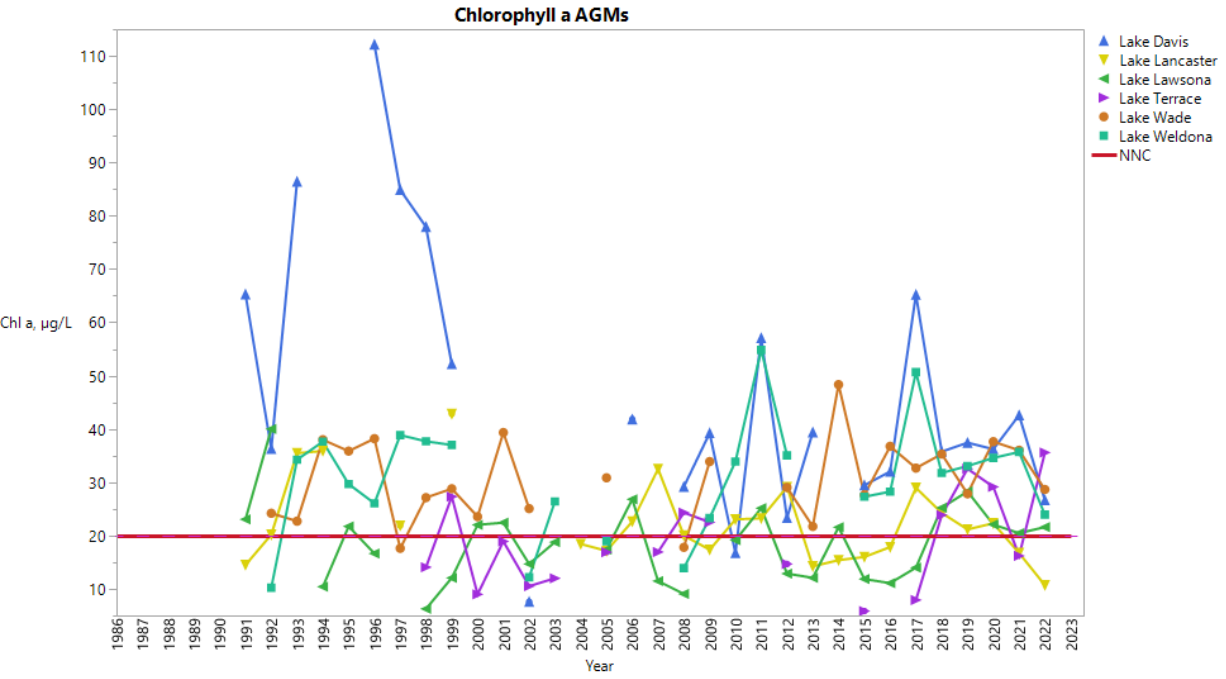


NUTRIENT ASSESSMENT STATUS

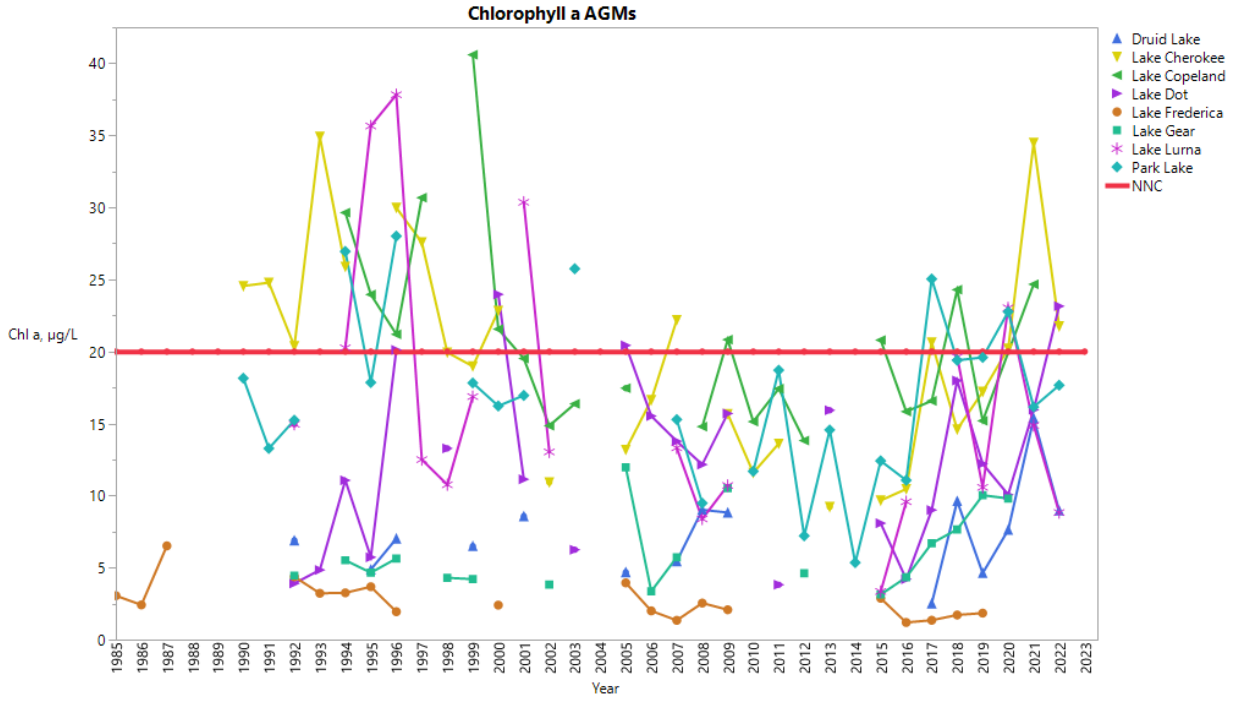
- Lakes Terrace, Lawsona and Lancaster were assessed for lake NNC as part of the statewide Biennial Assessment 2020-22.
  - The verified period was Jan. 1, 2013, to June 30, 2020.
- Lake Davis, Lake Wade and Lake Weldona were assessed by applying the lake NNC.
  - The verified period was Jan. 1, 2009, to June 30, 2016.

EAST ORLANDO LAKES CHLOROPHYLL *a*

Impaired Lakes

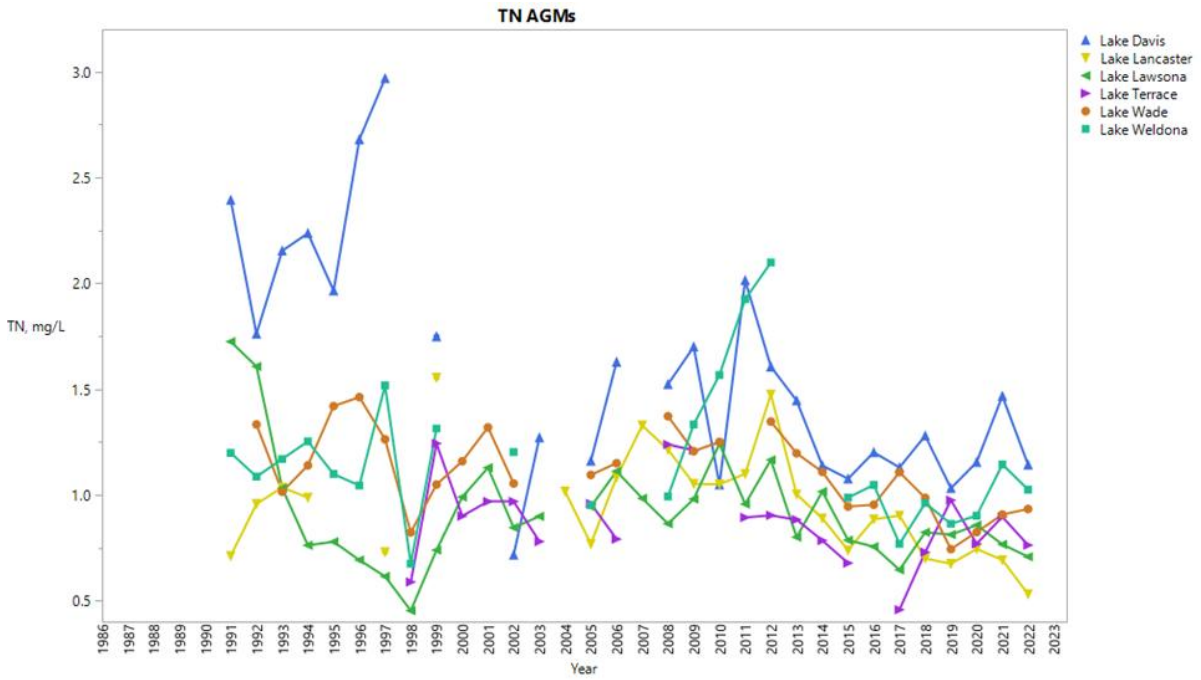


Unimpaired Lakes

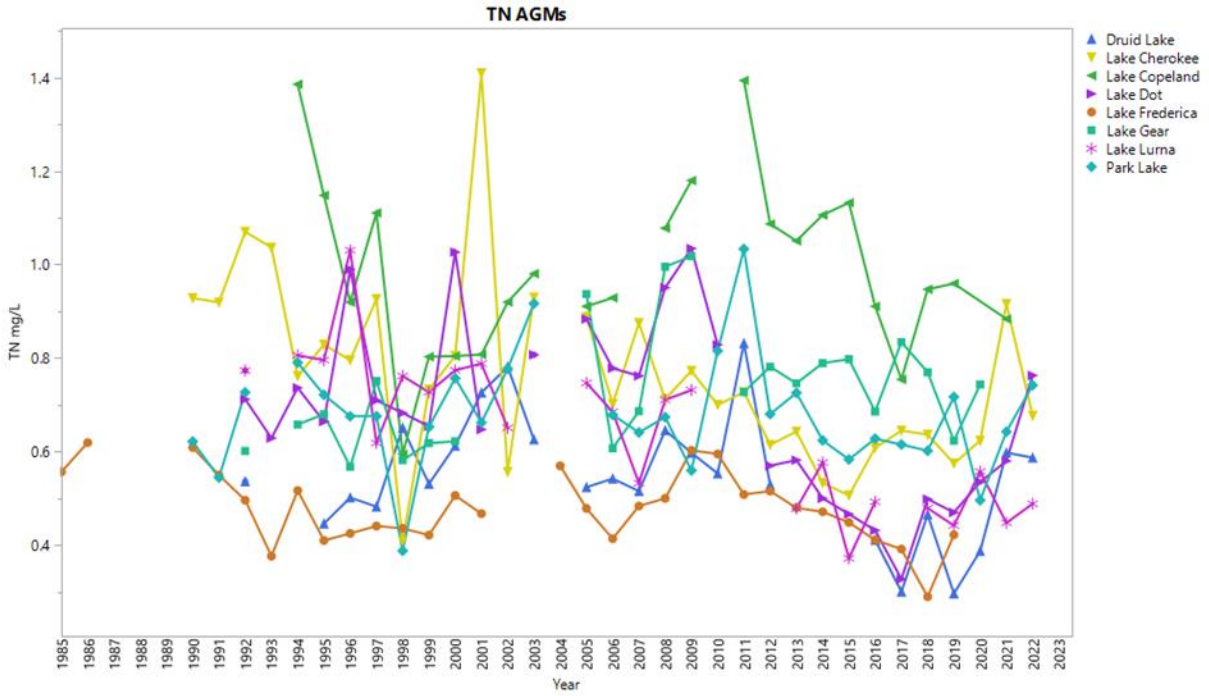


EAST ORLANDO LAKES TN

Impaired Lakes

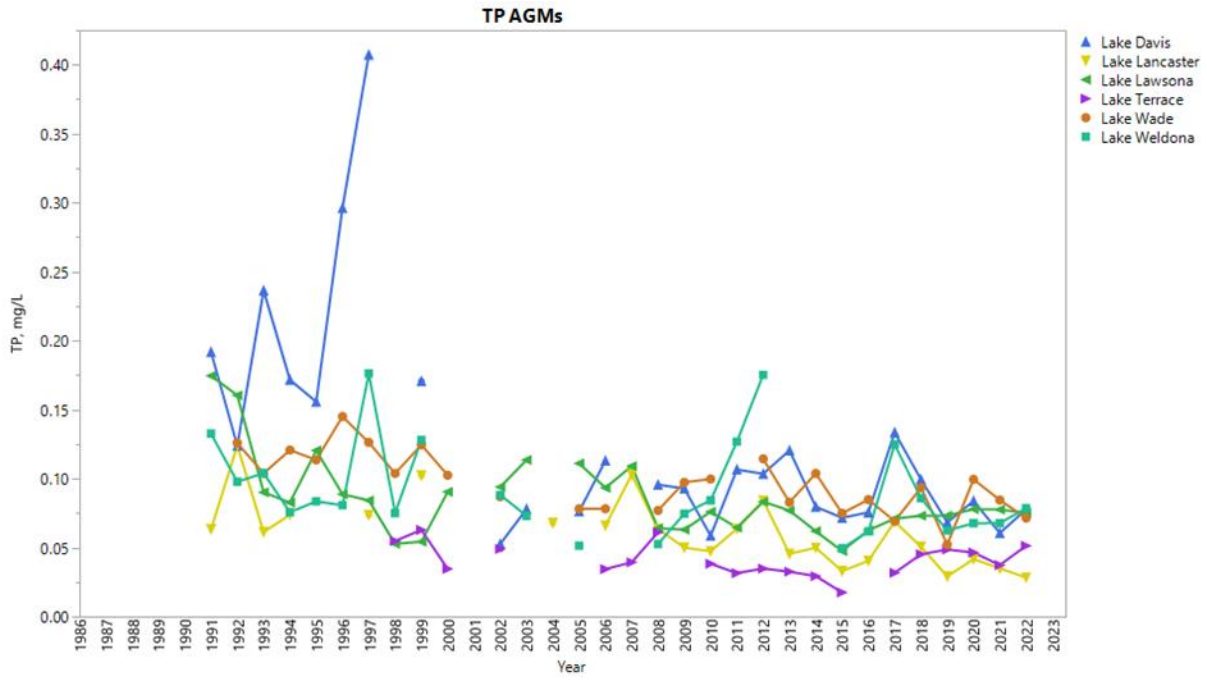


Unimpaired Lakes

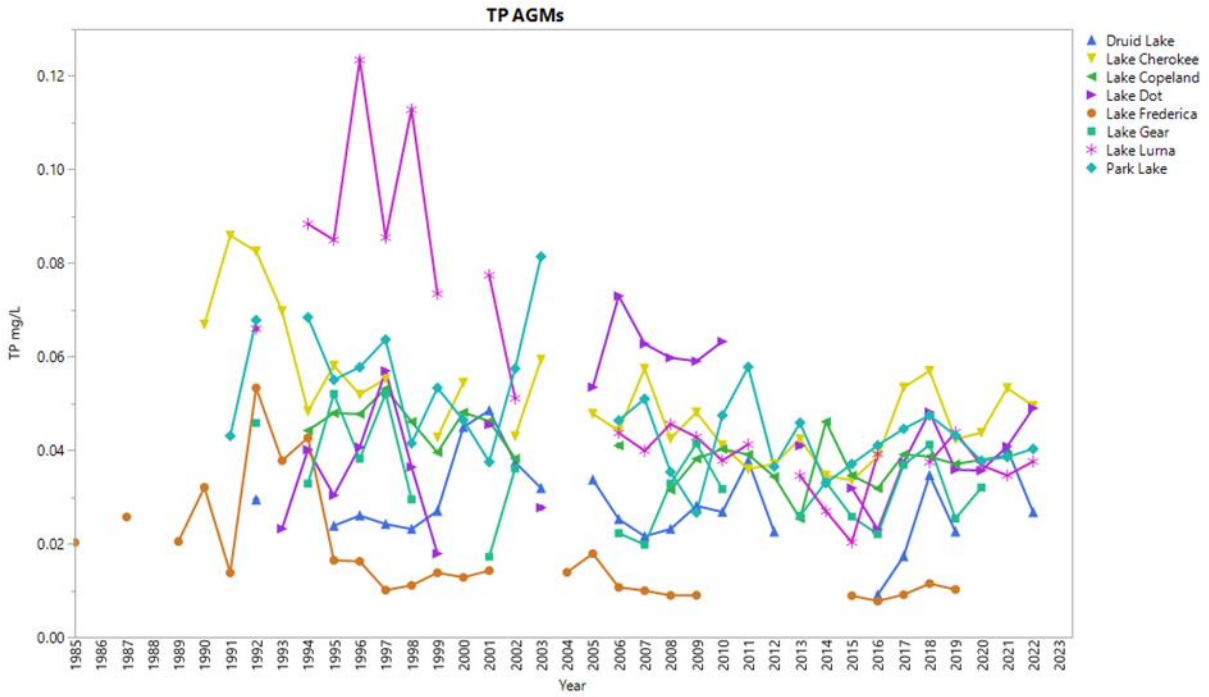


EAST ORLANDO LAKES TP

Impaired Lakes



Unimpaired Lakes

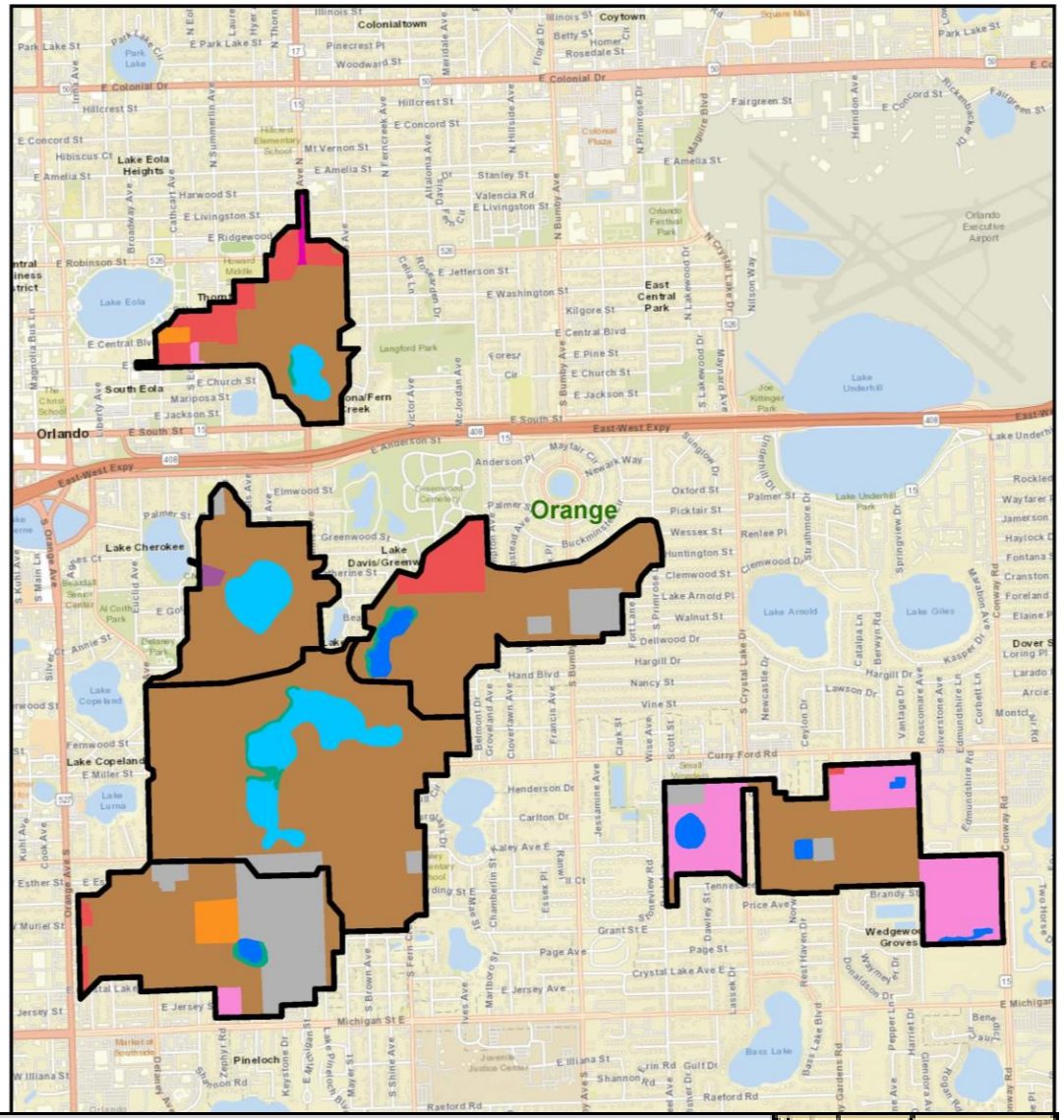


LAKE CHARACTERISTICS

Lake	Average Depth, feet	Maximum Depth, feet	Watershed Area, acres	Lake Area, acres	Watershed to Lake area ratio	Origin
Lake Terrace	3.9	5.3	183	4	45.75	Natural
Lake Lawsona	2.2	4.2	118	8	14.75	Natural
Lake Lancaster	1.6	7	333	43	77.5	Natural
Lake Davis	1.9	Not Reported	117	18	6.5	Natural
Lake Wade	1.8	2.4	179	4	44.75	Natural
Lake Weldona	2.3	4.5	171	7	24.4	Natural

Source: City of Orlando

EAST ORLANDO LAKES WATERSHED LAND USE



Orlando Area Lakes Land Use

0 1,000 2,000 3,000 Feet

This map is not for legal decision making purposes.
For more information or copies, contact Eric.Simpson@FloridaDEP.gov
GIS: Ronald.Hughes@FloridaDEP.gov

- Watersheds
- Commercial and Services
- Institutional
- Lakes
- Open Land
- Recreational
- Reservoirs
- Residential High Density
- Residential Medium Density
- Transportation
- Vegetated Non-Forested Wetlands

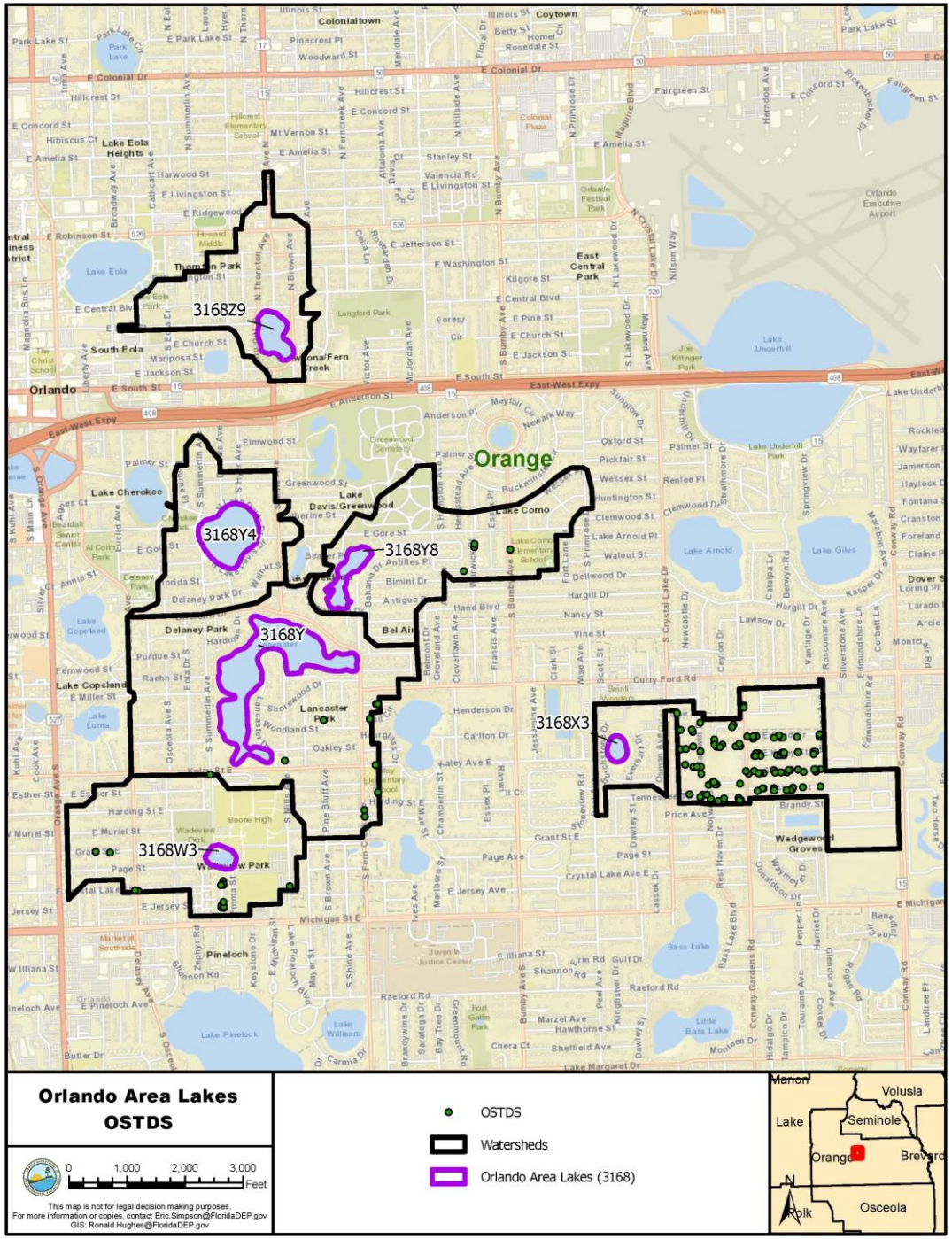
EAST ORLANDO LAKES WATERSHED LAND USE

Land Use Classification	Lake Drainage Basins (Acres)*					
	Terrace	Lawsona	Lancaster	Davis	Wade	Weldona
Residential Medium Density	78	72	279	95	99	125
Residential High Density	90	2	--	0	4	--
Commercial and Services	1	31	--	--	4	23
Institutional	7	--	11	2	58	14
Recreational	--	3	--	0	10	--
Lakes	--	8	40	18	3	8
Vegetated Non-forested Wetlands	--	--	3	--	1	1
Transportation	--	2	--	--	--	--
Utilities	--	--	--	--	--	--
Reservoirs	8	--	--	--	--	--
Herbaceous Dry Prairie/Open Land	--	--	--	2	--	--
Total	**184**	**118**	**333**	**117**	**179**	**171**

* 0 values indicate presence of land use that is negligible

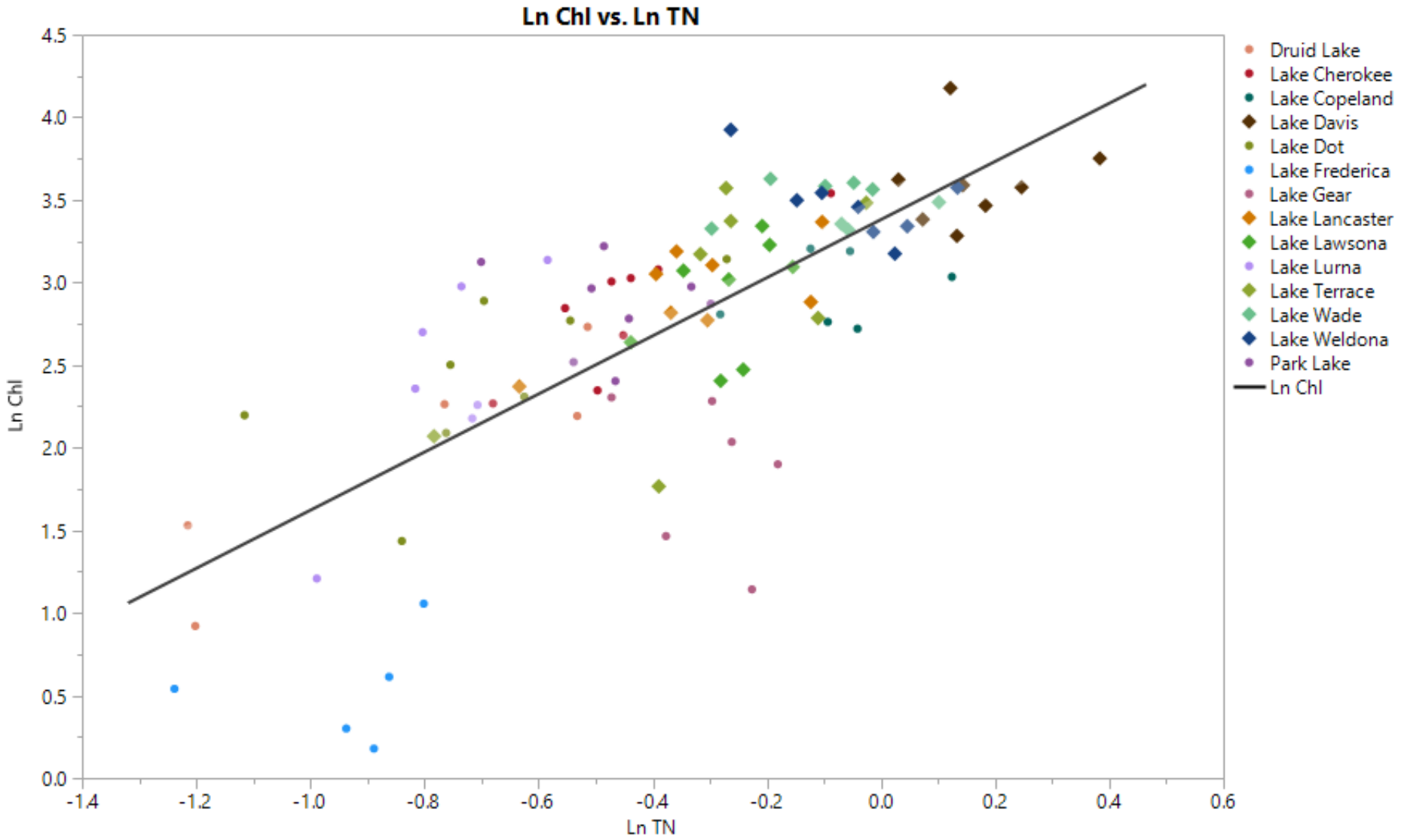
EAST ORLANDO LAKES WATERSHED OSTDS

Watershed	Number of OSTDS
Terrace	104
Lawsona	0
Lancaster	11
Davis	0
Wade	16
Weldona	4



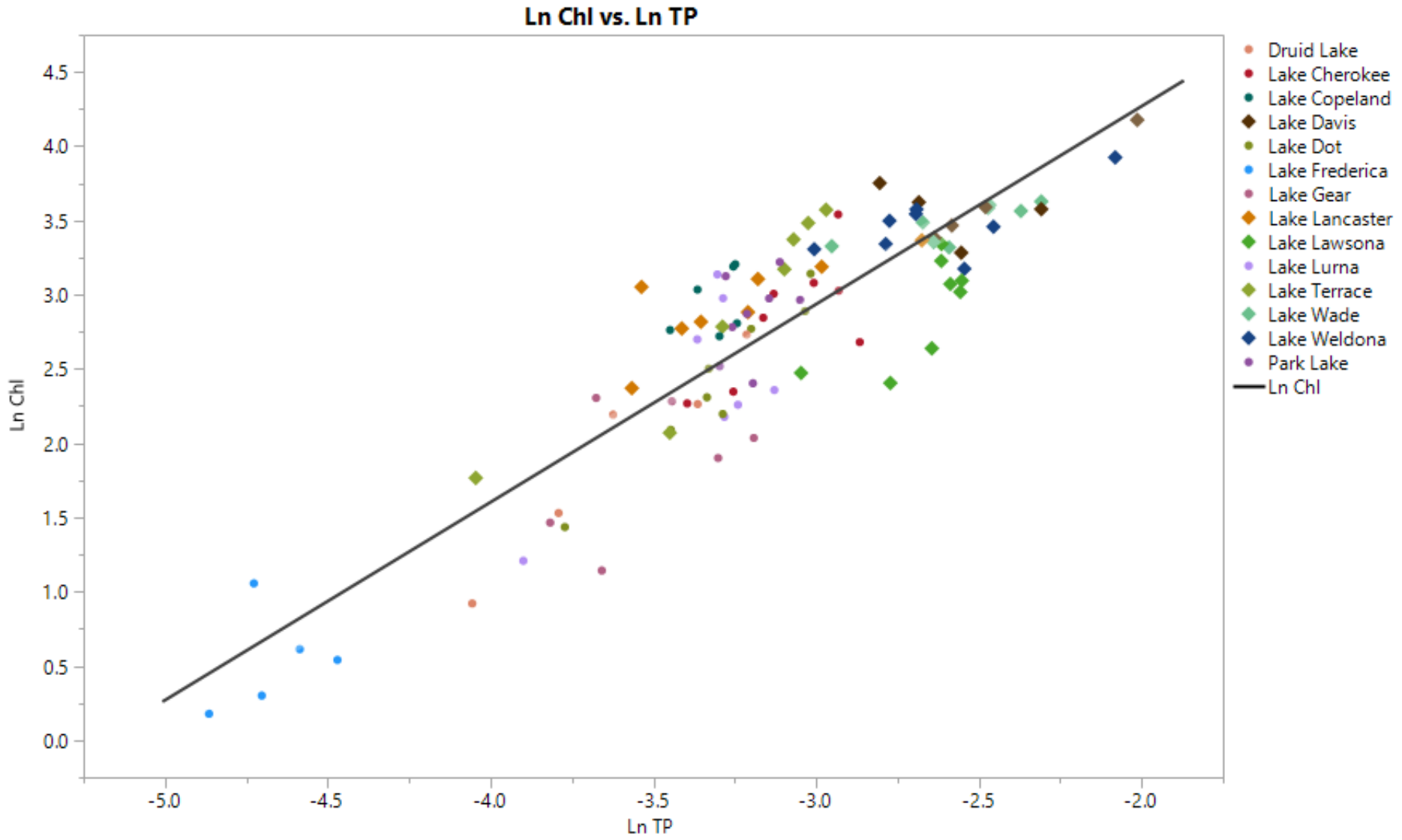
EAST ORLANDO LAKES

CHLOROPHYLL *a* VS. TN



EAST ORLANDO LAKES

CHLOROPHYLL *a* VS. TP



EAST ORLANDO LAKES

REGRESSION RESULTS SUMMARY

	CHLAC vs. TN*	CHLAC vs. TP*	CHLAC vs. TN and TP*
R^2 Adjusted	0.55	0.82	0.85
p value - Nutrient Term	<0.0001	<0.0001	<0.0001 (TN), <0.0001 (TP)
Data Period	2015-2022	2015-2022	2015-2022
Number of Observations	108	108	108

* Regression analyses performed using natural log transformed AGMs.

EAST ORLANDO LAKES
REGRESSION ANALYSES RESULTS

Simple Linear Regression Equations

- Ln (Corrected Chlorophyll *a* AGM) = 3.38173 + 1.75955 * Ln(TN AGM).
- Ln (Corrected Chlorophyll *a* AGM) = 6.93641 + 1.33332 * Ln (TP AGM).
- Application of the simple linear regression equations indicate the TN and TP AGM concentrations necessary to meet the chlorophyll *a* criterion are 0.80 mg/L and 0.05 mg/L, respectively.

Multiple Linear Regression (MLR) Equation

- Ln (Corrected Chlorophyll *a* AGM) = 6.34927 + 0.56644 * Ln (TN AGM) + 1.08138 * Ln (TP AGM).
- Applying the nutrient concentrations, derived using the simple linear regression models, in the MLR equation results in a chlorophyll *a* AGM of 20 µg/L.

* Ln is the natural log of the parameter within the parentheses.

EAST ORLANDO LAKES

PERCENT REDUCTIONS TO MEET TARGETS

	Lake Terrace TP (mg/L)	Lake Lawsona TP (mg/L)	Lake Lancaster TP (mg/L)	Lake Davis TP (mg/L)	Lake Wade TP (mg/L)	Lake Weldona TP (mg/L)
Maximum AGM (2015-22)	0.05	0.08	0.08	0.13	0.11	0.18
TMDL Target	0.05	0.05	0.05	0.05	0.05	0.05
Percent Reduction	0	38	38	62	55	72

	Lake Terrace TN (mg/L)	Lake Lawsona TN (mg/L)	Lake Lancaster TN (mg/L)	Lake Davis TN (mg/L)	Lake Wade TN (mg/L)	Lake Weldona TN (mg/L)
Maximum AGM (2015-22)	0.97	1.17	1.47	1.61	1.35	2.1
TMDL Target	0.80	0.80	0.80	0.80	0.80	0.80
Percent Reduction	18	32	46	50	41	62

$$\% \text{ Reduction} = \frac{[\text{measured exceedance (maximum AGM)} - \text{target}] \times 100}{\text{measured exceedance (maximum AGM)}}$$

TMDL COMPONENTS

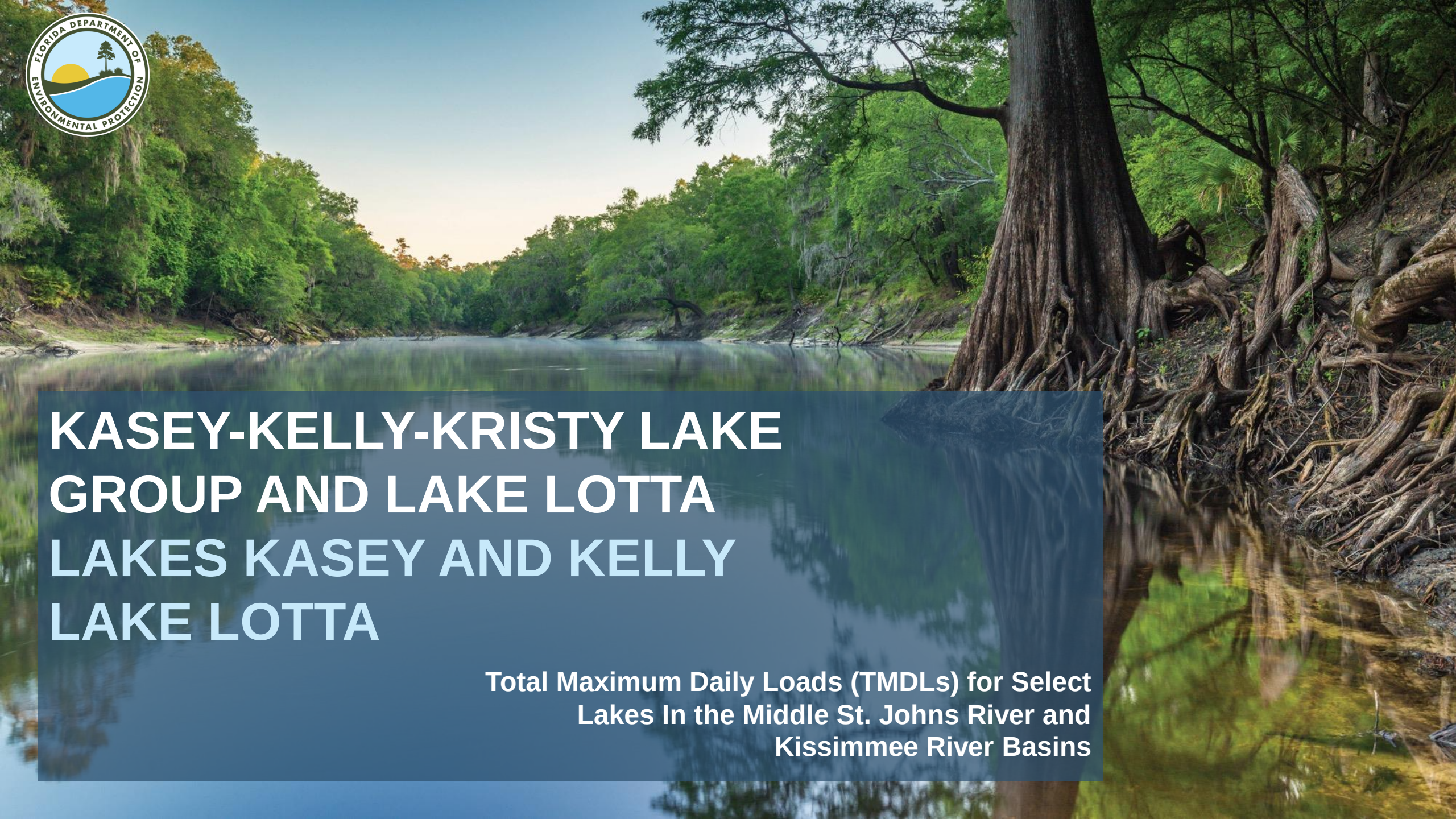
Waterbody Name (WBID)	Parameter	TMDL (mg/L)[1]	WLA Wastewater (% reduction)	WLA NPDES Stormwater (% reduction)[2]	LA (% reduction)[2]
Lake Terrace (3168X3)	TN	0.80	NA	18	18
	TP	0.05	NA	0	0
Lake Lawsona (3168Z9)	TN	0.80	NA	32	32
	TP	0.05	NA	38	38
Lake Lancaster (3168Y)	TN	0.80	NA	46	46
	TP	0.05	NA	38	38
Lake Davis (3168Y4)	TN	0.80	NA	50	50
	TP	0.05	NA	62	62
Lake Wade (3168W3)	TN	0.80	NA	41	41
	TP	0.05	NA	55	55
Lake Weldona (3168Y8)	TN	0.80	NA	62	62
	TP	0.05	NA	72	72

[1] Represents the AGM lake value not to be exceeded.
[2] The required percent reductions listed in this table represent the reductions of in-lake concentrations and do not directly reflect reductions in source loadings.

Kasey-Kelly-Kristy Lake Group and Lake Lotta

Lakes Kasey and Kelly

Lake Lotta



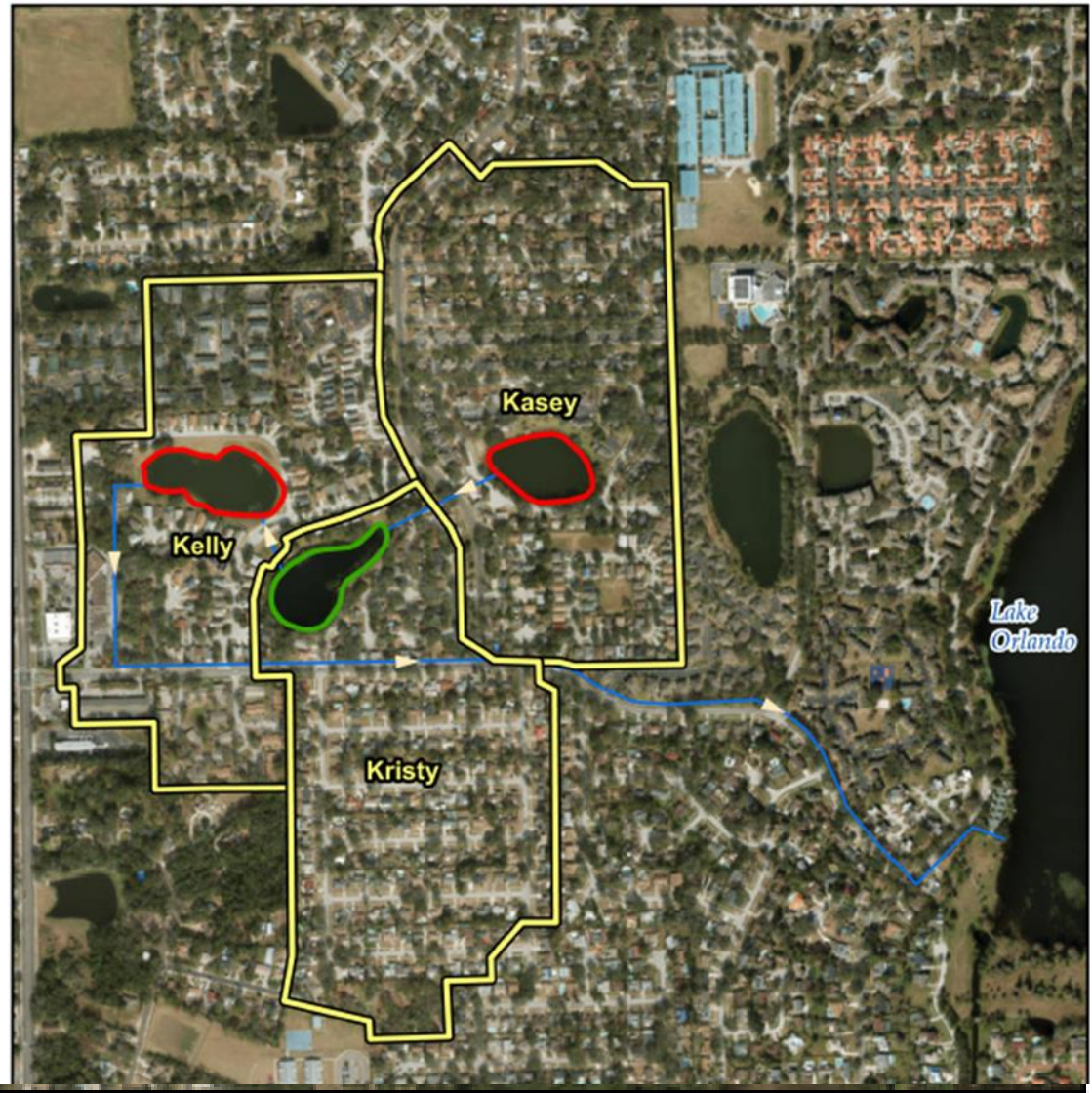
KASEY-KELLY-KRISTY LAKE GROUP AND LAKE LOTTA

LAKES KASEY AND KELLY

LAKE LOTTA

Total Maximum Daily Loads (TMDLs) for Select Lakes In the Middle St. Johns River and Kissimmee River Basins

KASEY-KELLY-KRISTY LAKE GROUP

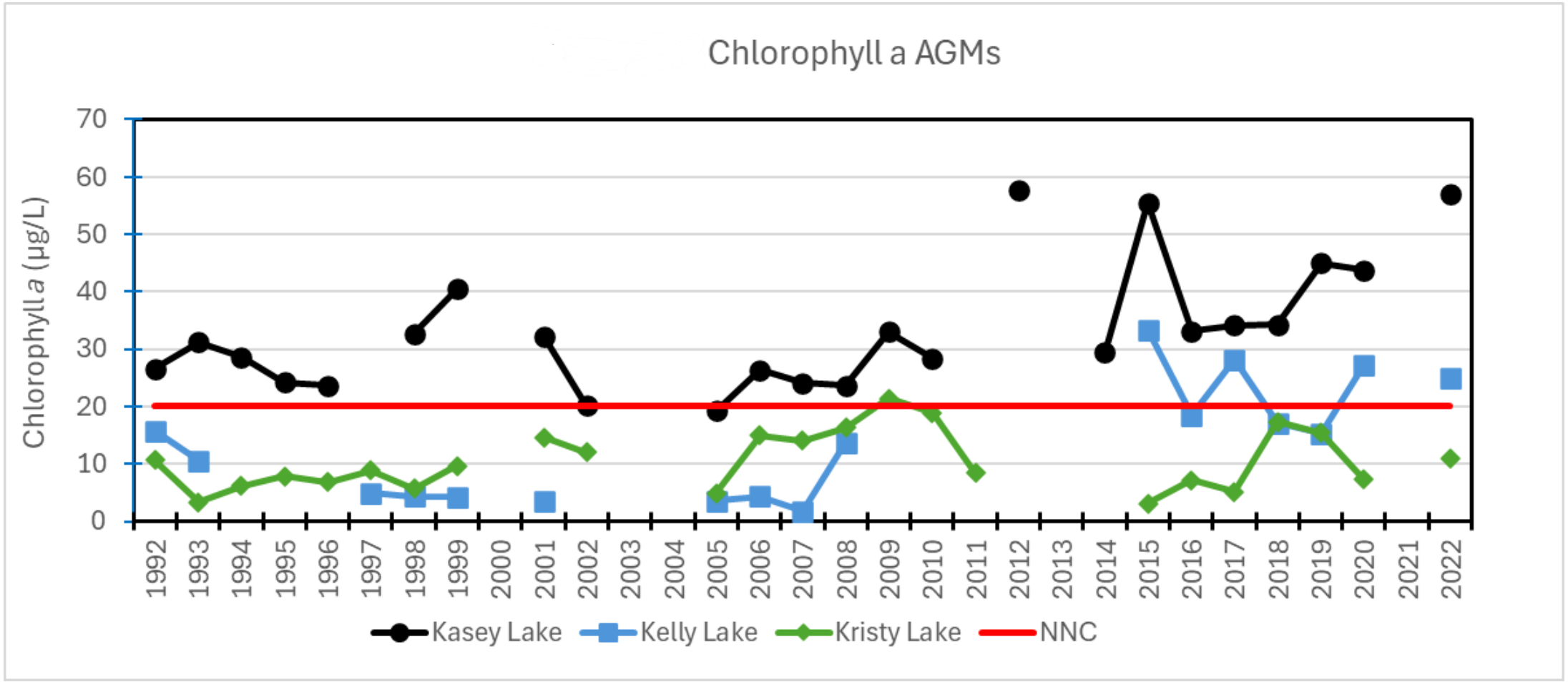


NUTRIENT ASSESSMENT STATUS

- Kasey Lake was assessed for nutrients during the verified period of Jan. 1, 2012, to June 30, 2019.
  - The lake was assessed as impaired for chlorophyll *a,* TN and TP.
- During the Biennial Assessment 2020-22, Lake Kelly was assessed as impaired for chlorophyll *a* and TP in the verified period of Jan. 1, 2013, to June 30, 2020.
- Kasey Lake was included on the Verified List of Impaired Waters that was adopted by Secretarial Order in April 2020 and Kelly Lake in July 2022.

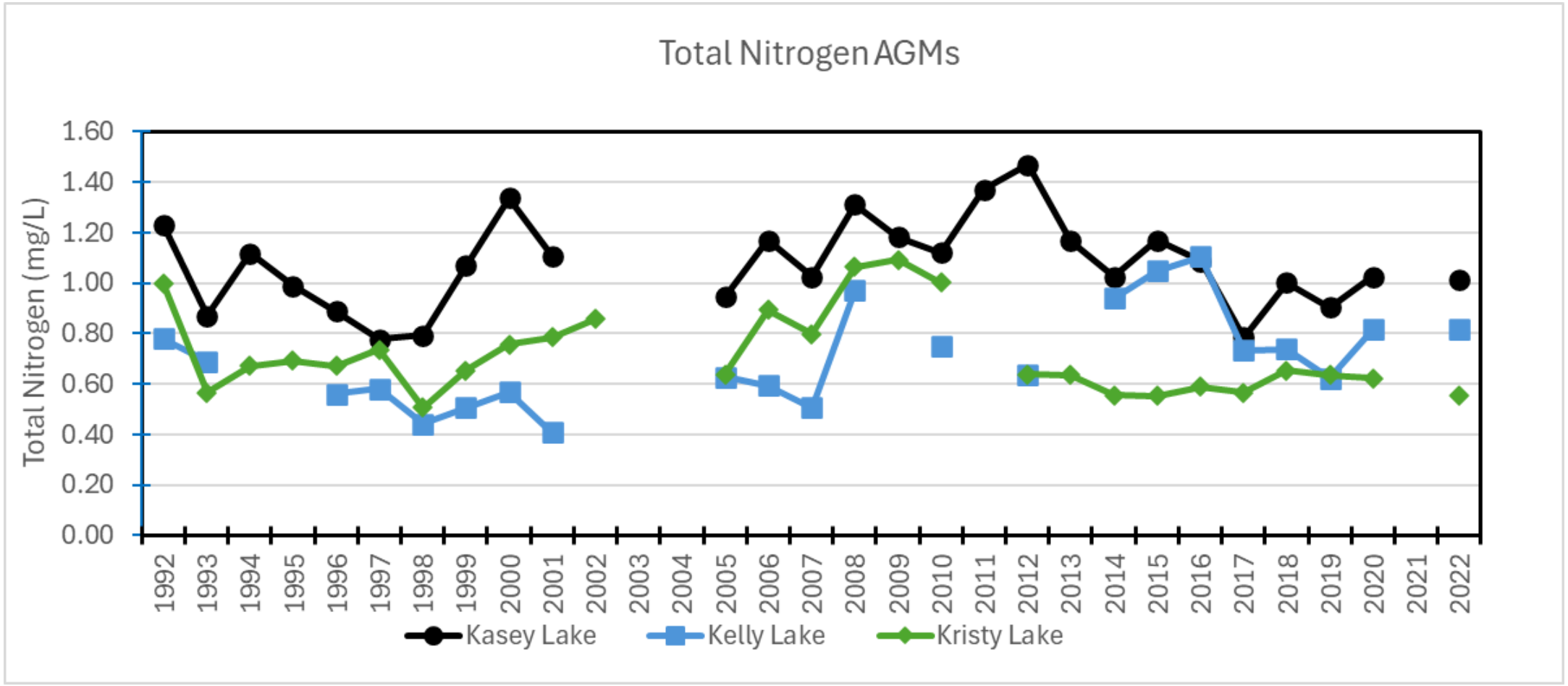
KASEY-KELLY-KRISTY LAKE GROUP

CHLOROPHYLL *a*



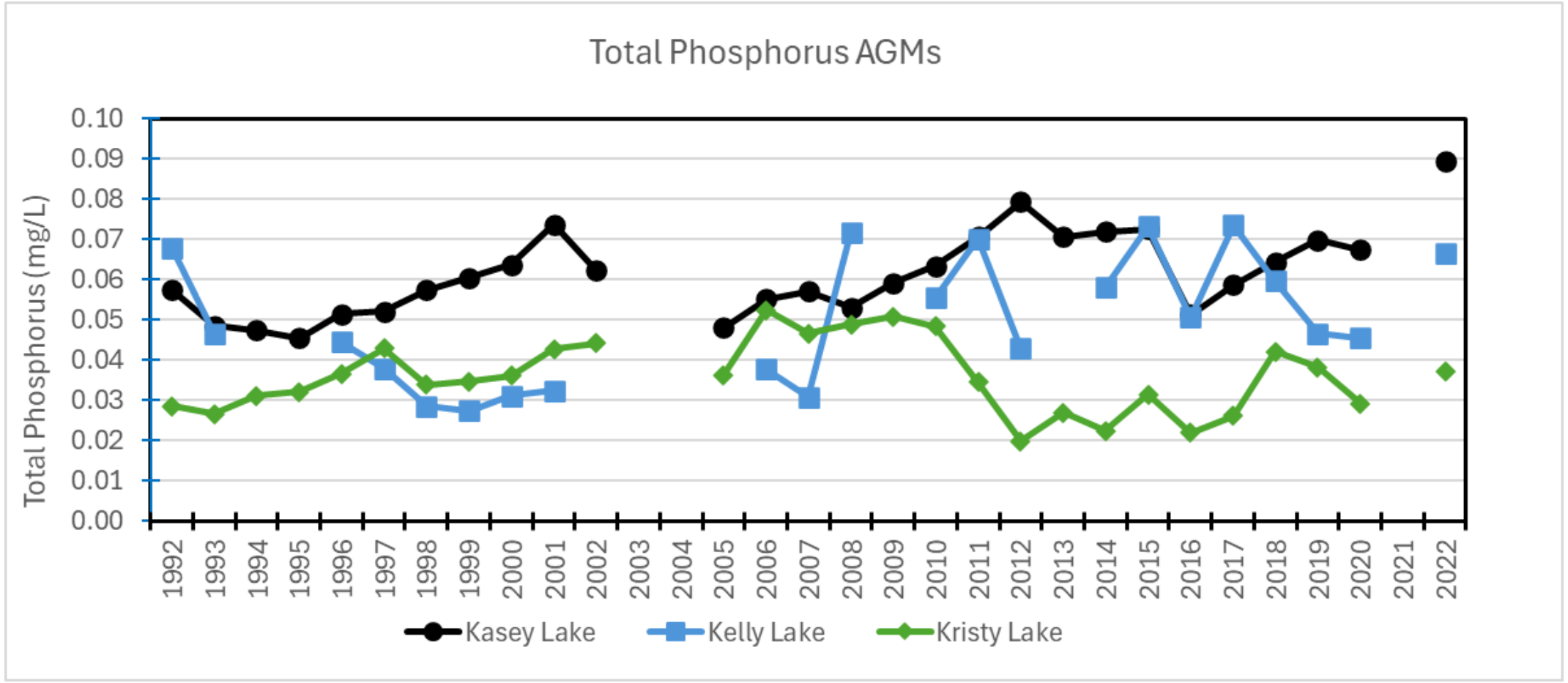
KASEY-KELLY-KRISTY LAKE GROUP

TN



KASEY-KELLY-KRISTY LAKE GROUP

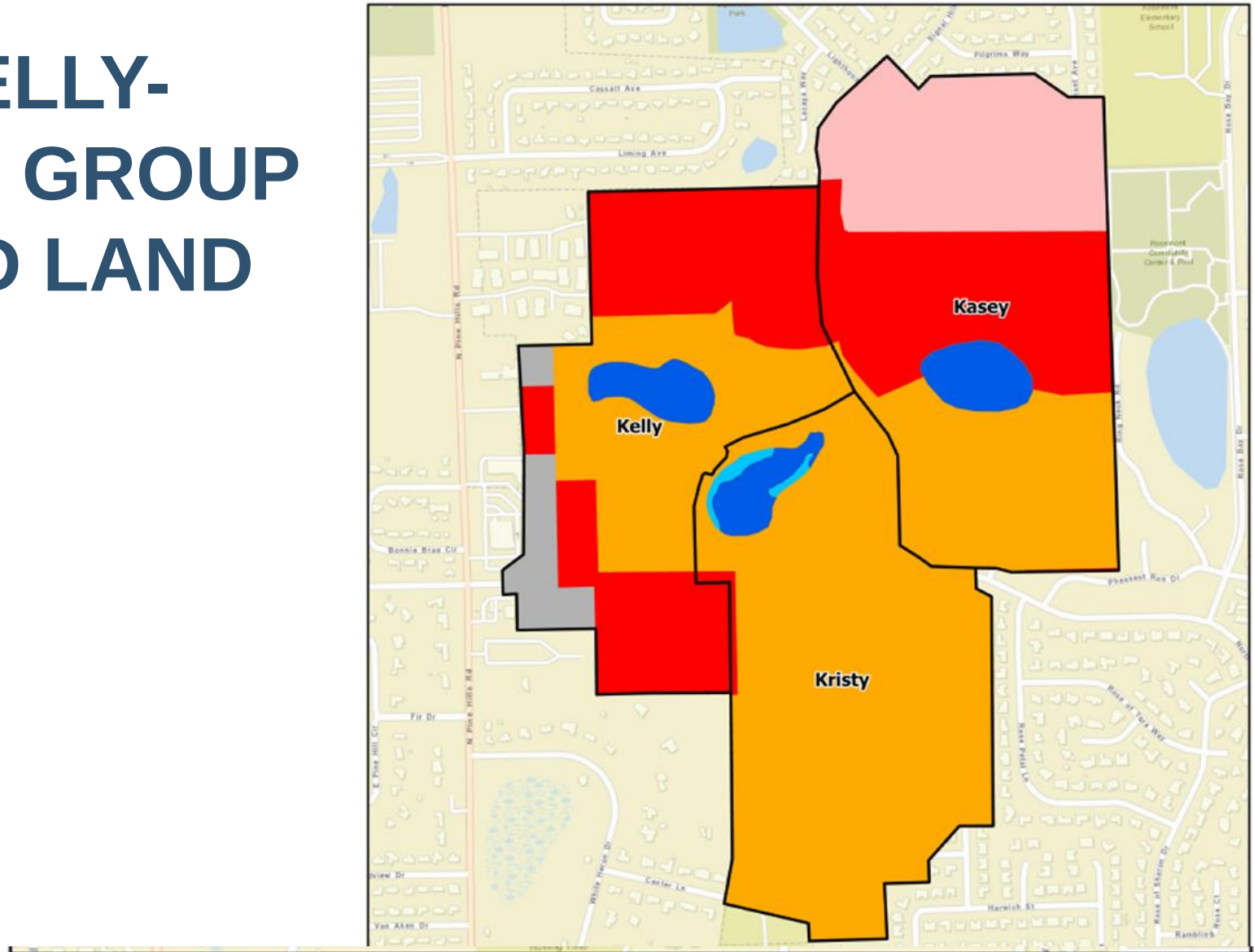
TP



LAKE CHARACTERISTICS

Lake	Mean Depth (feet)	Maximum Depth (feet)	Surface Area (acres)	Lake Watershed Area (acres)	Watershed to Lake Area Ratio	Origin
Kasey	9	13	4	74	19	Excavation
Kelly	-	-	4	64	16	Excavation
Kristy	10	41	4	67	17	Excavation

KASEY-KELLY-KRISTY LAKE GROUP WATERSHED LAND USE



Lakes Kasey, Kelly, and Kristy Land Use

0 0.05 0.1 0.15 Miles

This map is not for legal decision making purposes.
For more information or copies, contact Kyeongsik.Rhew@dep.state.fl.us
GIS: Ronald.Hughes@FloridaDEP.gov

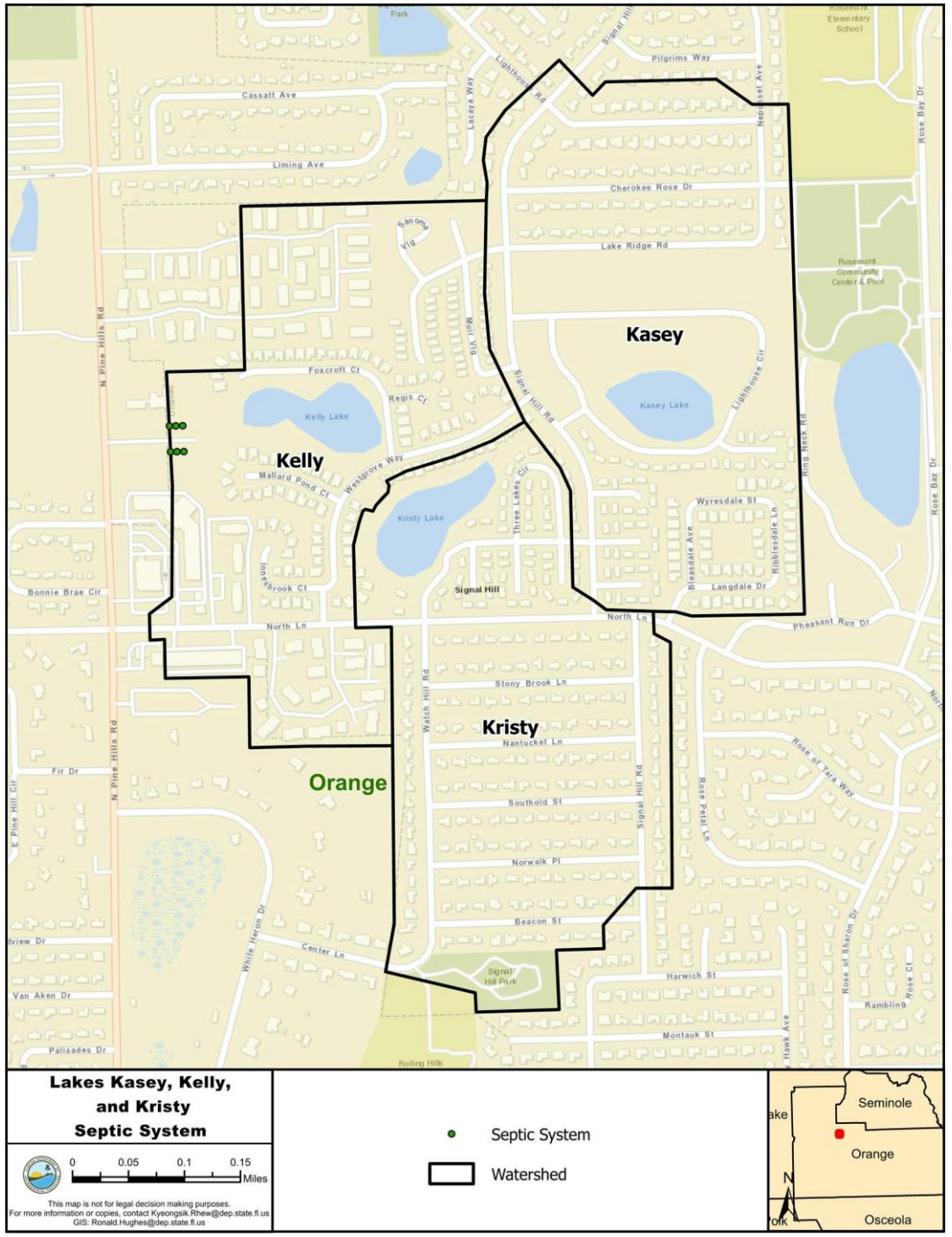
- Low Density Residential
- Medium Density Residential
- High Density Residential
- Urban and Built Up
- Agriculture
- Rangeland
- Upland Forest
- Water
- Wetlands
- Barren Land
- Trans, Comm, Util
- Watershed

KASEY-KELLY-KRISTY LAKE GROUP WATERSHED LAND USE

Land Use Classification	Kasey Lake (Acres)	Kelly Lake (Acres)	Kristy Lake (Acres)	Total Acres	% of Watershed
Low-Density Residential	24	-	-	24	11.9
Medium-Density Residential	22	23	63	109	52.9
High-Density Residential	24	32	1	57	27.6
Commercial	-	5	-	5	2.4
Institutional	-	1	-	1	0.4
Water	4	3	3	10	4.8
Wetlands	-	-	1	1	0.4
Total	**75**	**64**	**67**	**206**	**100**

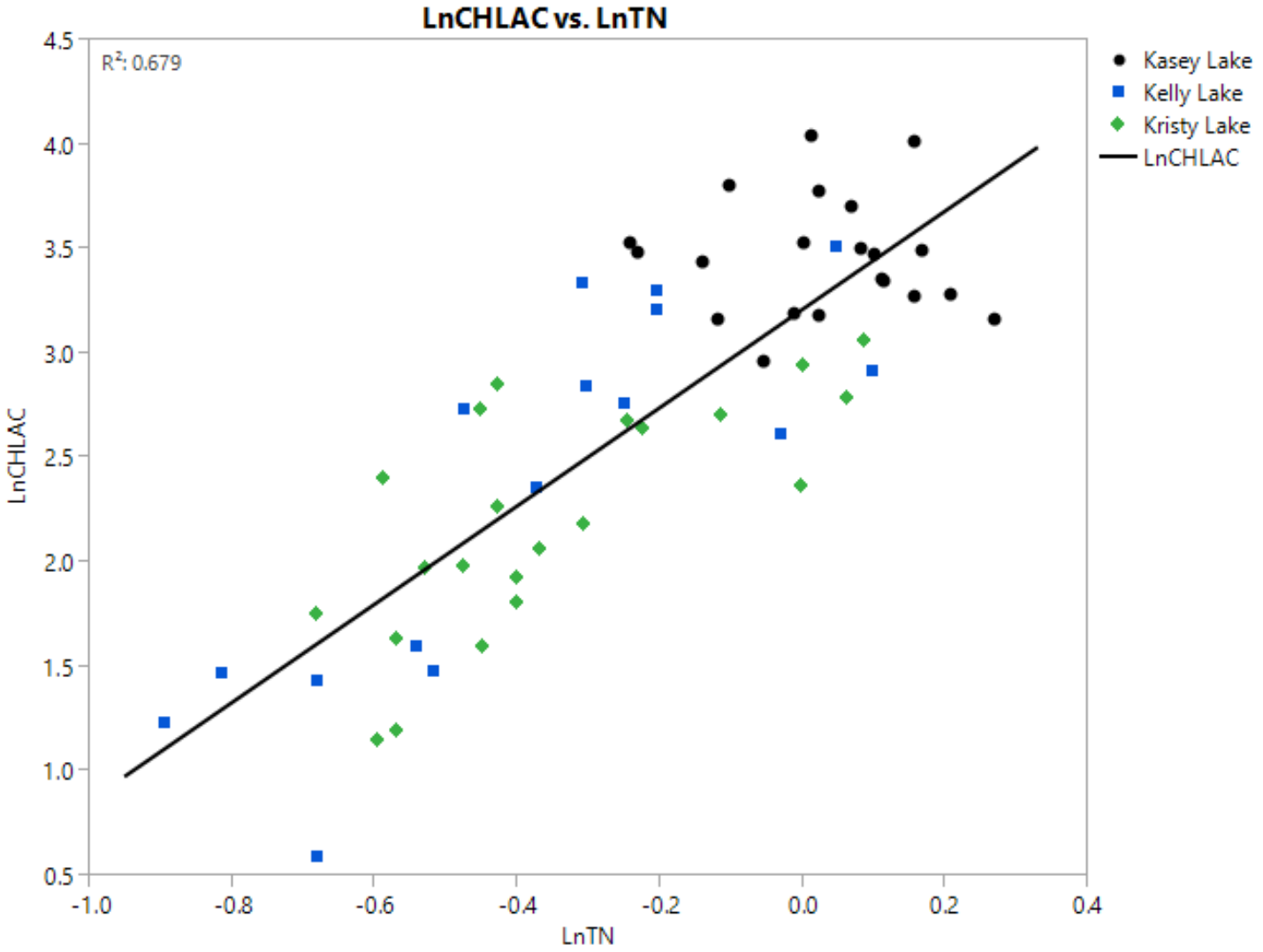
KASEY-KELLY-KRISTY WATERSHED OSTDS

Lake Drainage Basins	Number of OSTDS
Kasey	0
Kelly	6
Kristy	0



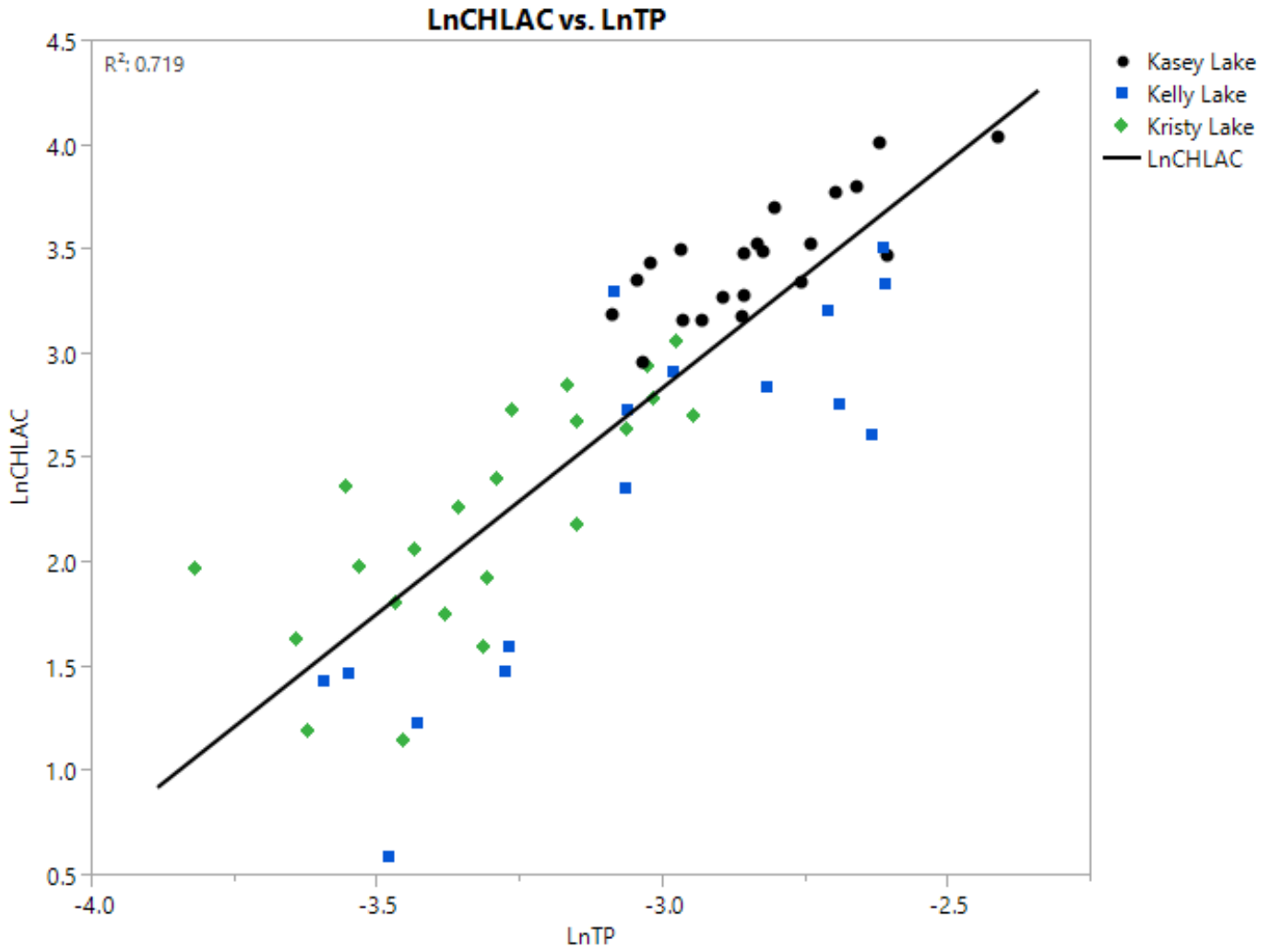
KASEY-KELLY-KRISTY

CHLOROPHYLL *a* VS. TN



KASEY-KELLY-KRISTY

CHLOROPHYLL *a* VS. TP



KASEY-KELLY-KRISTY

REGRESSION RESULTS SUMMARY

	CHLAC vs. TN*	CHLAC vs. TP*	CHLAC vs. TN and TP*
R^2 Adjusted	0.68	0.72	0.81
p value - Nutrient Term	<0.0001	<0.0001	<0.0001 (TN) <0.0001 (TP)
Data Period	1992-22	1992-22	1992-22
No. of Observations	59	59	59

* Regression analysis performed using natural log transformed AGMs.

KASEY-KELLY-KRISTY

REGRESSION ANALYSES RESULTS

Simple Linear Regression Equations

- Ln(Corrected Chlorophyll *a* AGM) = 3.21911 + 2.35161 * Ln (TN AGM).
- Ln (Corrected Chlorophyll *a* AGM) = 9.34702 + 2.16530 * Ln (TP AGM).

Multiple Linear Regression (MLR) Equation

- Ln (Corrected Chlorophyll *a* AGM) = 7.12136 + 1.25988 * Ln (TN AGM) + 1.34928 * Ln (TP AGM).
- Application of the simple linear regression equations indicate the TN and TP AGM concentrations necessary to meet the chlorophyll *a* criterion are 0.91 mg/L and 0.05 mg/L, respectively.
- Applying the nutrient concentrations, derived using the simple linear regression models, in the MLR equation results in a chlorophyll *a* AGM of 19 µg/L

* Ln is the natural log of the parameter within the parentheses.

KASEY-KELLY-KRISTY

PERCENT REDUCTIONS TO MEET TARGETS

	Kasey Lake TN AGM (mg/L)	Kasey Lake TP AGM (mg/L)	Kelly Lake TN AGM (mg/L)	Kelly Lake TP AGM (mg/L)
Maximum AGM (2013-22)	1.17	0.09	1.10	0.07
TMDL Target	0.91	0.05	0.91	0.05
% Reduction to Meet Target	22	44	17	29

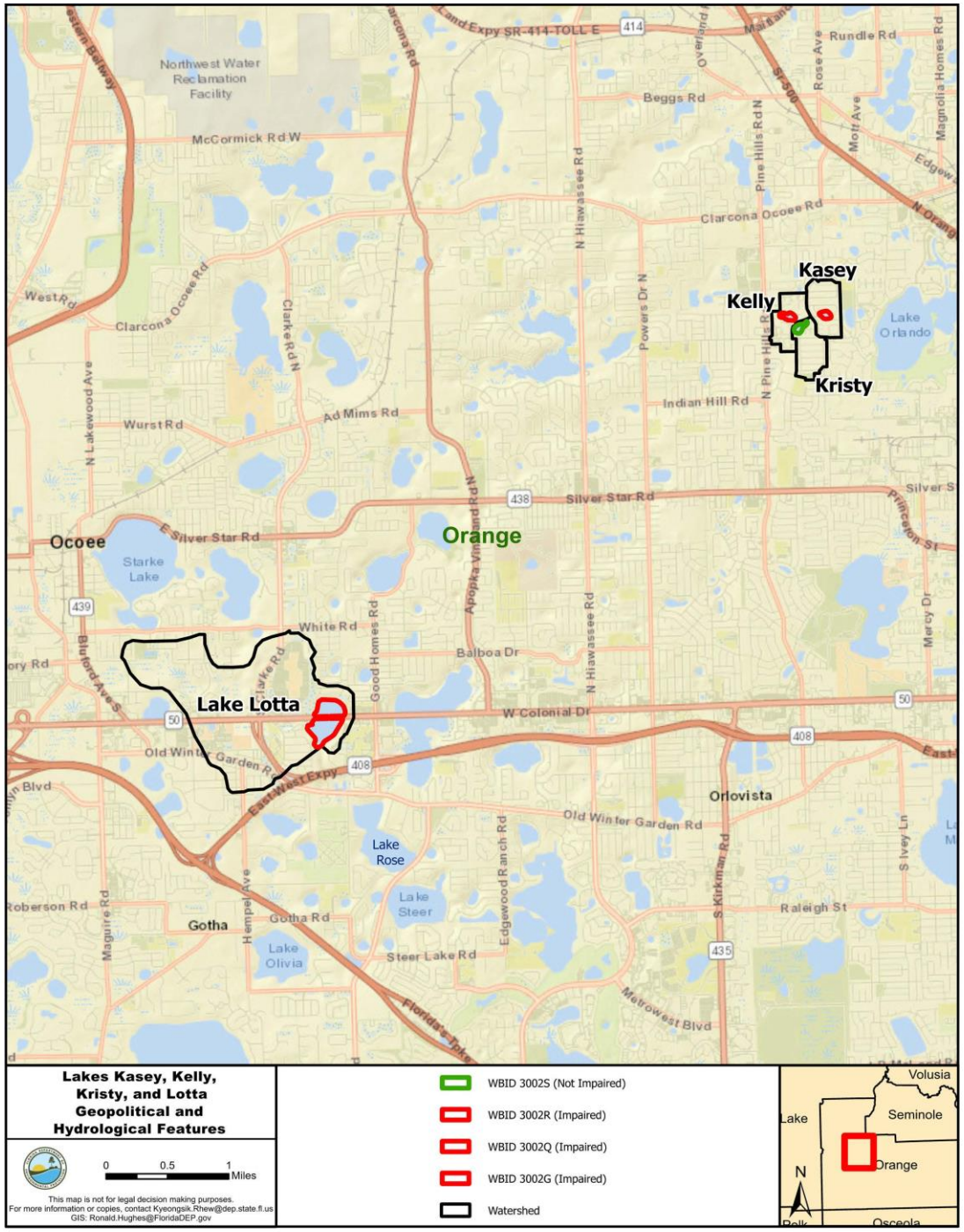
$$\% \text{ Reduction} = \frac{[\text{measured exceedance (maximum AGM)} - \text{target}]}{\text{measured exceedance (maximum AGM)}} \times 100$$

TMDL COMPONENTS

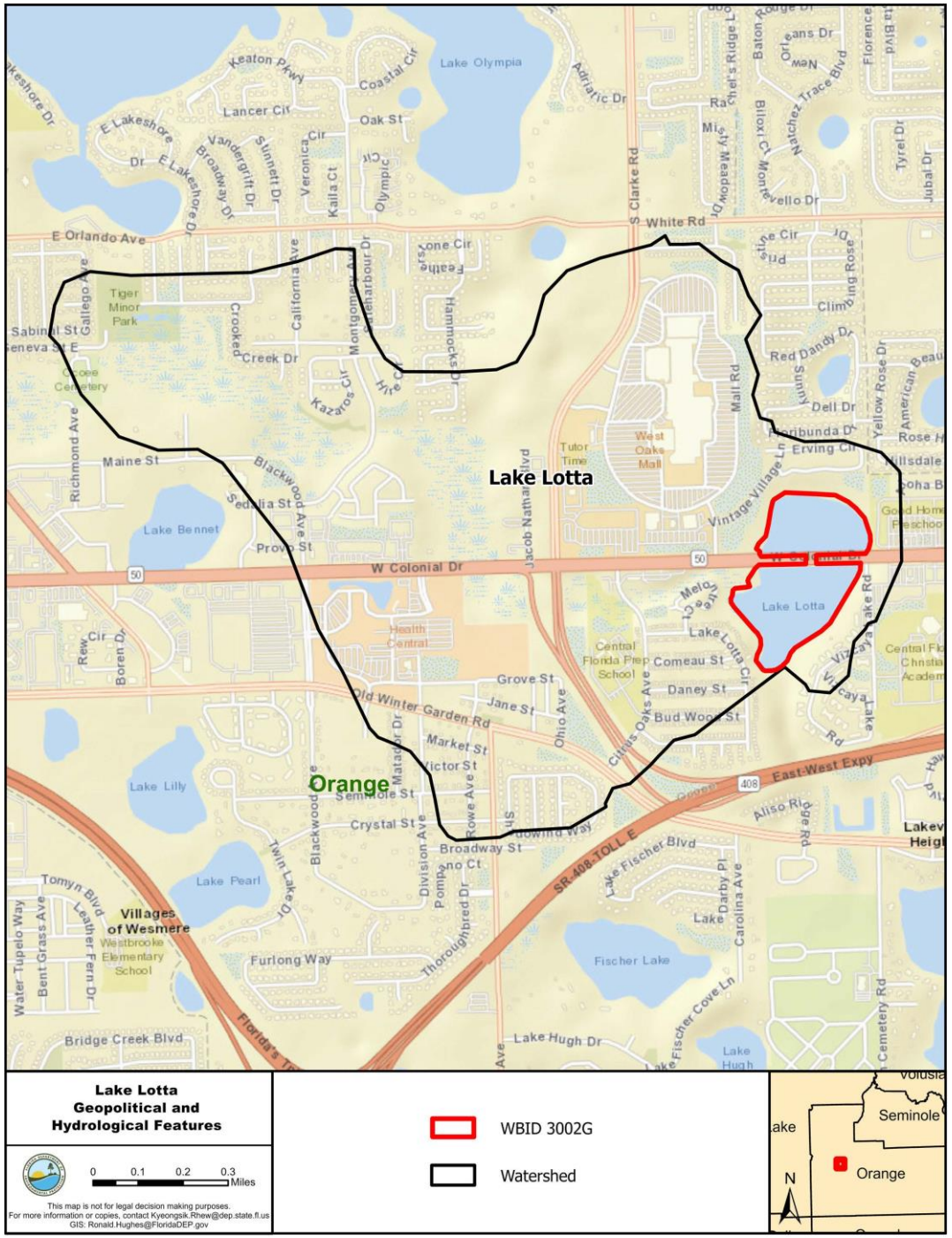
Waterbody Name (WBID)	Parameter	TMDL (mg/L)[1]	WLA Wastewater (% reduction)	WLA NPDES Stormwater (% reduction)[2]	LA (% reduction)[2]
Kasey Lake (3002Q)	TN	0.91	NA	22	22
Kasey Lake (3002Q)	TP	0.05	NA	44	44
Kelly Lake (3002R)	TN	0.91	NA	17	17
Kelly Lake (3002R)	TP	0.05	NA	29	29

[1] The TMDLs represent the AGM lake concentrations (mg/L) not to be exceeded.
[2] The required percent reductions listed in this table represent the reductions of in-lake concentrations and do not directly reflect reductions in source loadings.

LAKE LOTTA (HIGH COLOR LAKE)



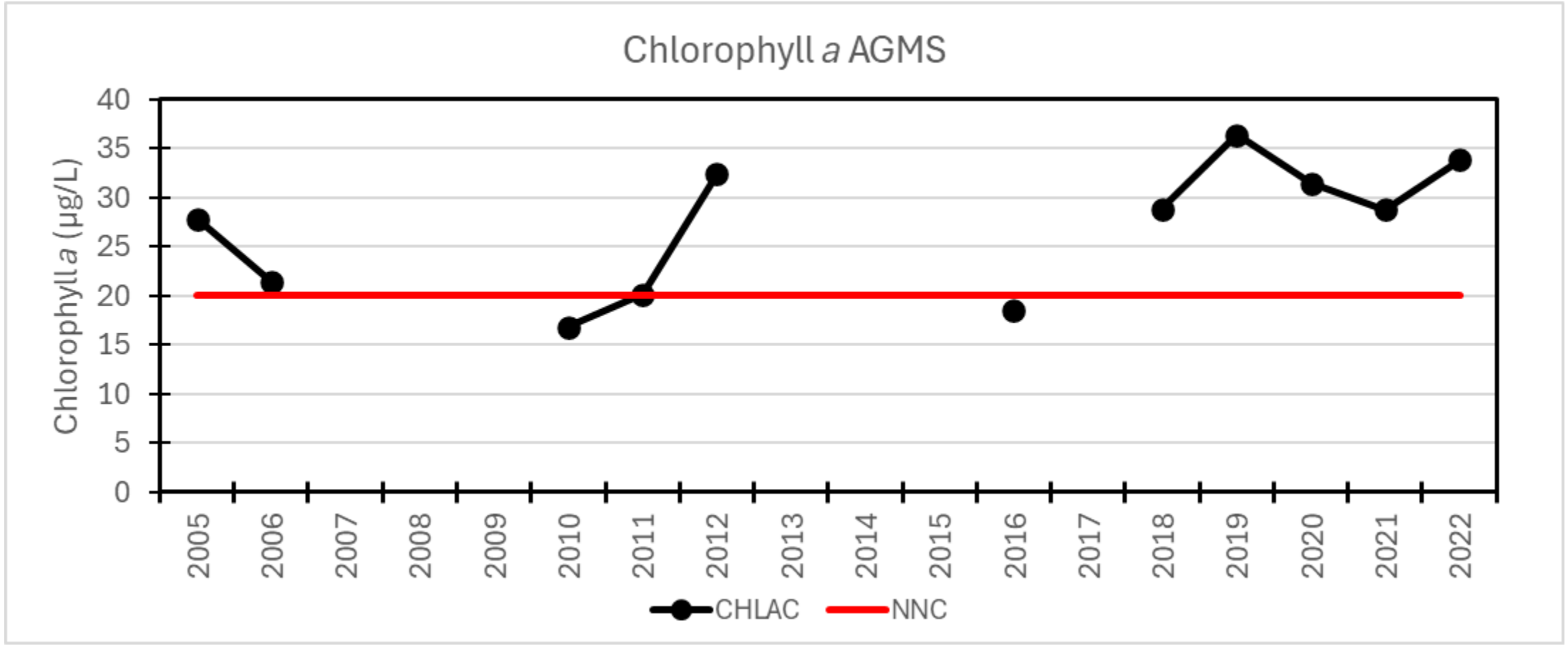
LAKE LOTTA AND WATERSHED



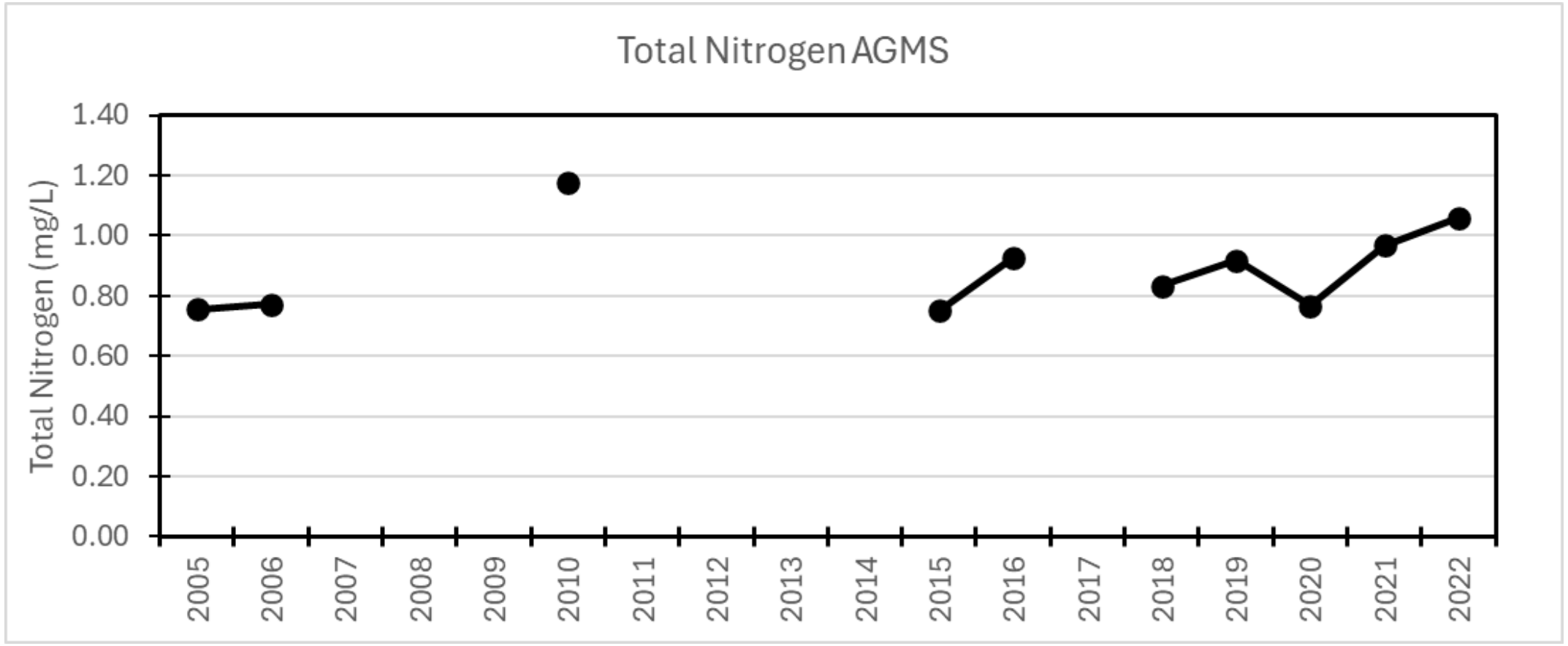
NUTRIENT ASSESSMENT STATUS

- Lake Lotta was assessed for nutrients for the verified period: Jan. 1, 2012, to June 30, 2019.
  - The lake was assessed as impaired for chlorophyll *a*.
- Lake Lotta was included on the Verified List of Impaired Waters that was adopted by Secretarial Order in April 2020 for chlorophyll *a.*
- During the Biennial Assessment 2022-24 .
  - Verified Period: Jan. 1, 2015, to June 30, 2022.
  - Lake Lotta was assessed as impaired for TP.

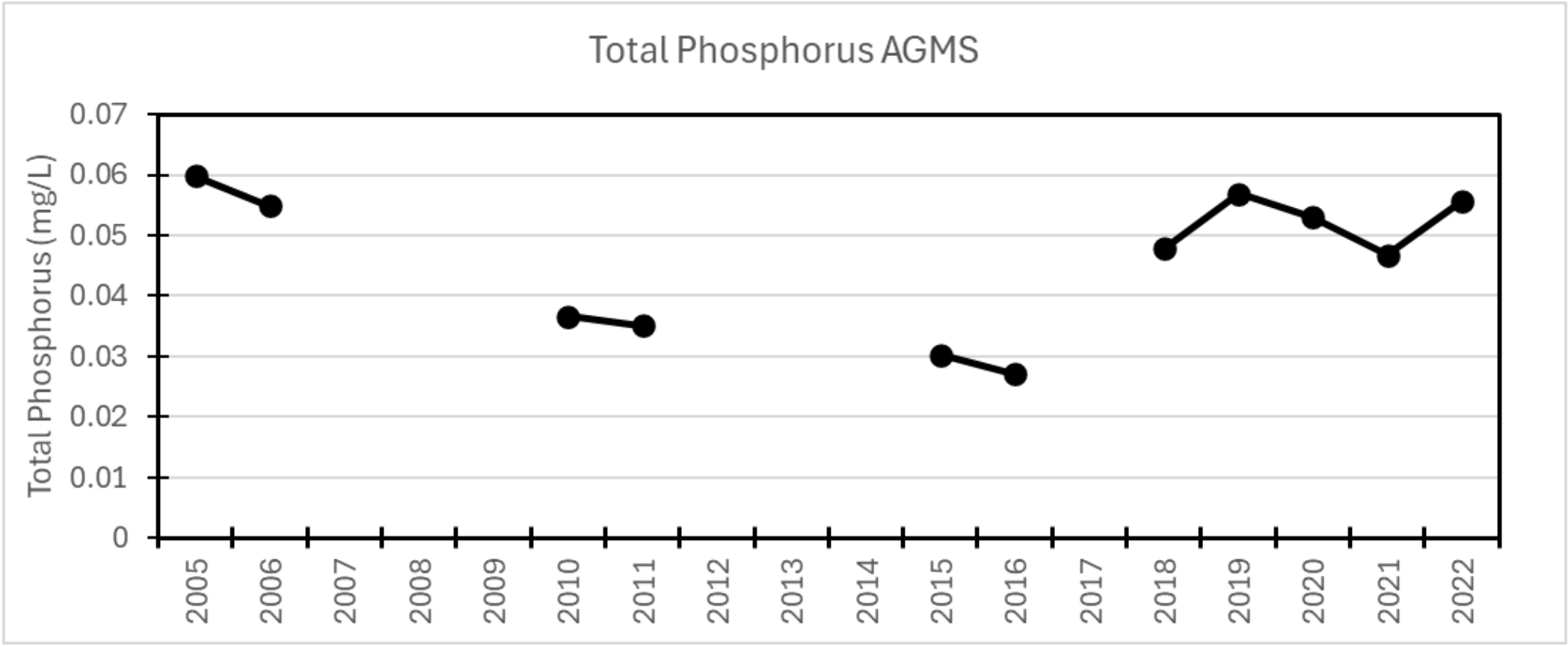
LAKE LOTTA CHLOROPHYLL *a*



LAKE LOTTA TN



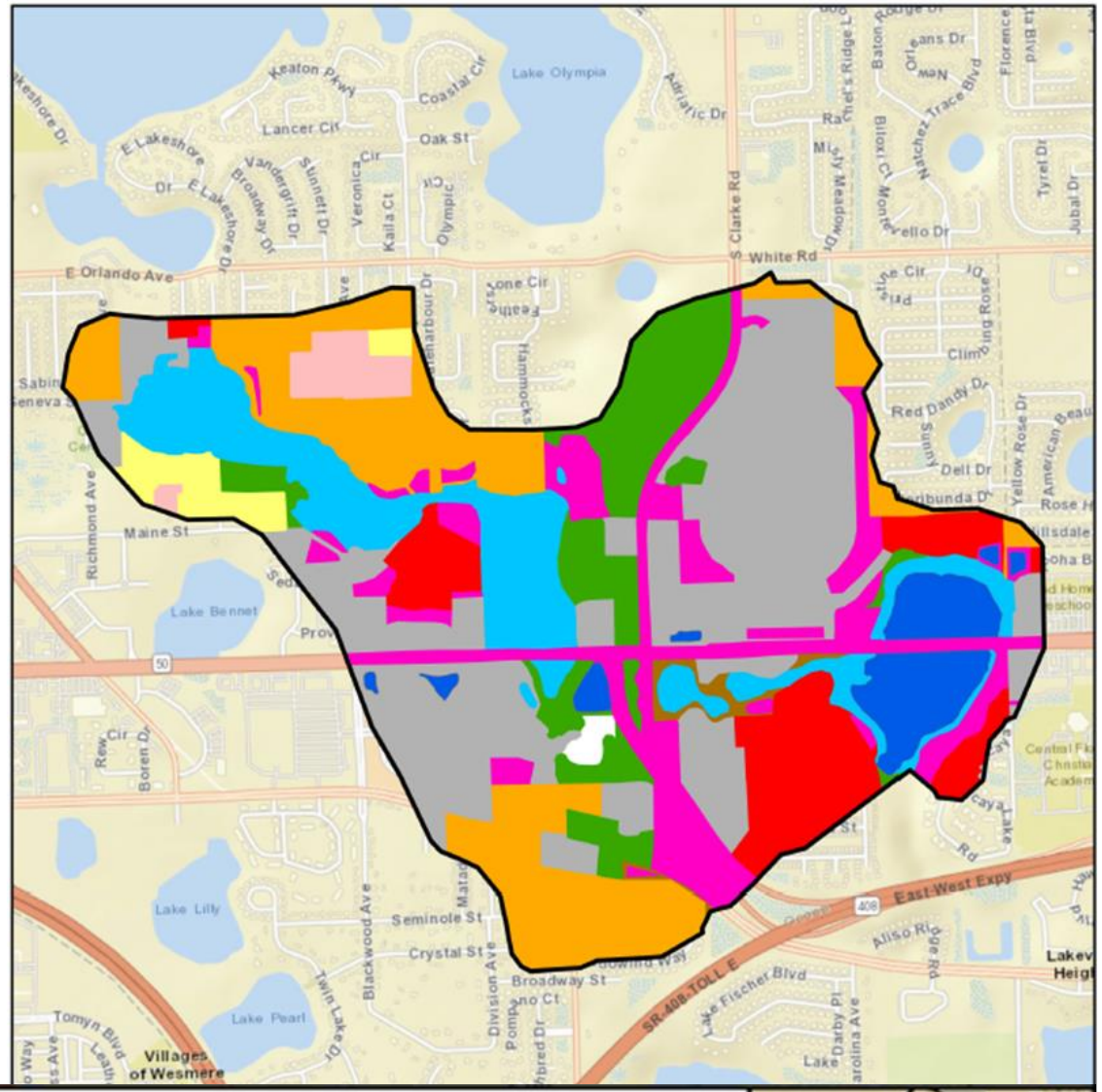
LAKE LOTTA TP



LAKE LOTTA CHARACTERISTICS

Lake	Mean Depth (feet)	Maximum Depth (feet)	Surface Area (acres)	Lake Watershed Area (acres)	Watershed to Lake Area Ratio	Origin
Lotta	12	14	40	908	23	Natural

LAKE LOTTA LAND USE



Lake Lotta Land Use

0 0.1 0.2 0.3 Miles

This map is not for legal decision making purposes.
For more information or copies, contact Kyeongsik.Rhew@dep.state.fl.us
GIS: Ronald.Hughes@FloridaDEP.gov

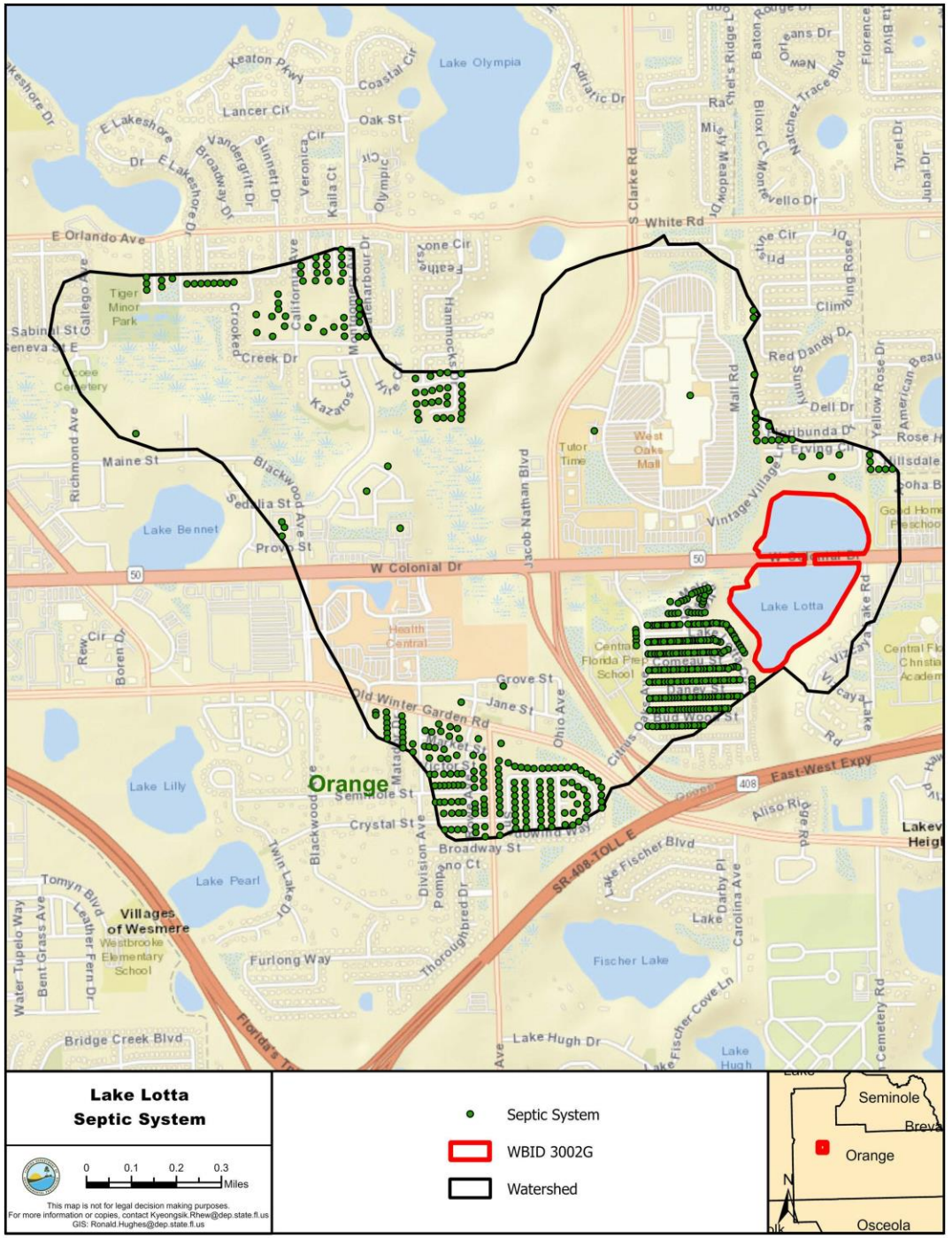
- Low Density Residential
- Medium Density Residential
- High Density Residential
- Urban and Built Up
- Agriculture
- Rangeland
- Upland Forest
- Water
- Wetlands
- Barren Land
- Trans, Comm, Util
- Watershed

LAKE LOTTA WATERSHED LAND USE

Land Use Classification	Lake Lotta (Acres)	% of Watershed
Low-Density Residential	18	1.9
Medium-Density Residential	153	16.8
High-Density Residential	81	9.0
Commercial	162	17.8
Institutional	71	7.8
Recreational	8	0.9
Open Land	18	2.0
Agriculture	21	2.3
Rangeland	7	0.8
Forest/Rural Open	87	9.6
Water	46	5.0
Wetlands	112	12.4
Rangeland	4	0.4
Communication and Transportation	121	13.3
Total	**908**	**100**

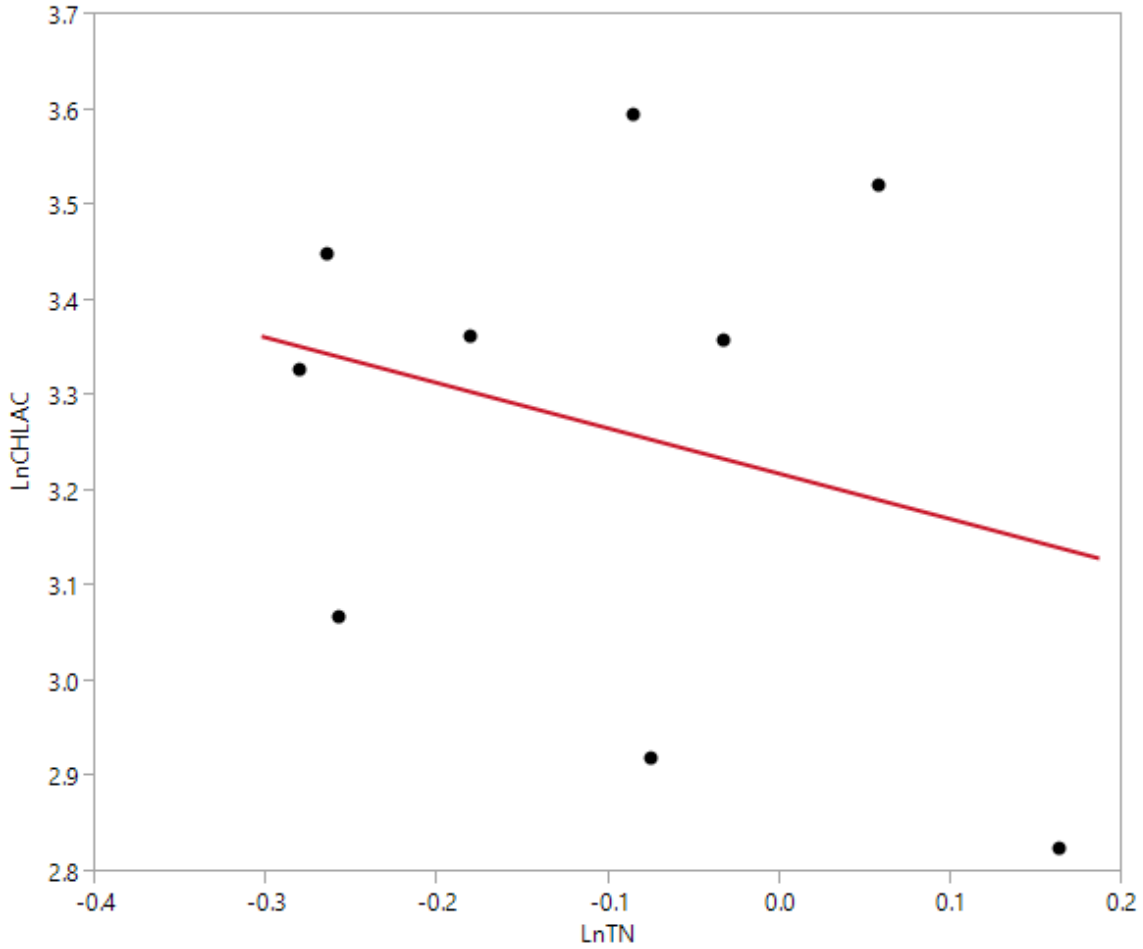
LAKE LOTTA OSTDS

Lake Drainage Basins	Number of OSTDS
Lotta	583



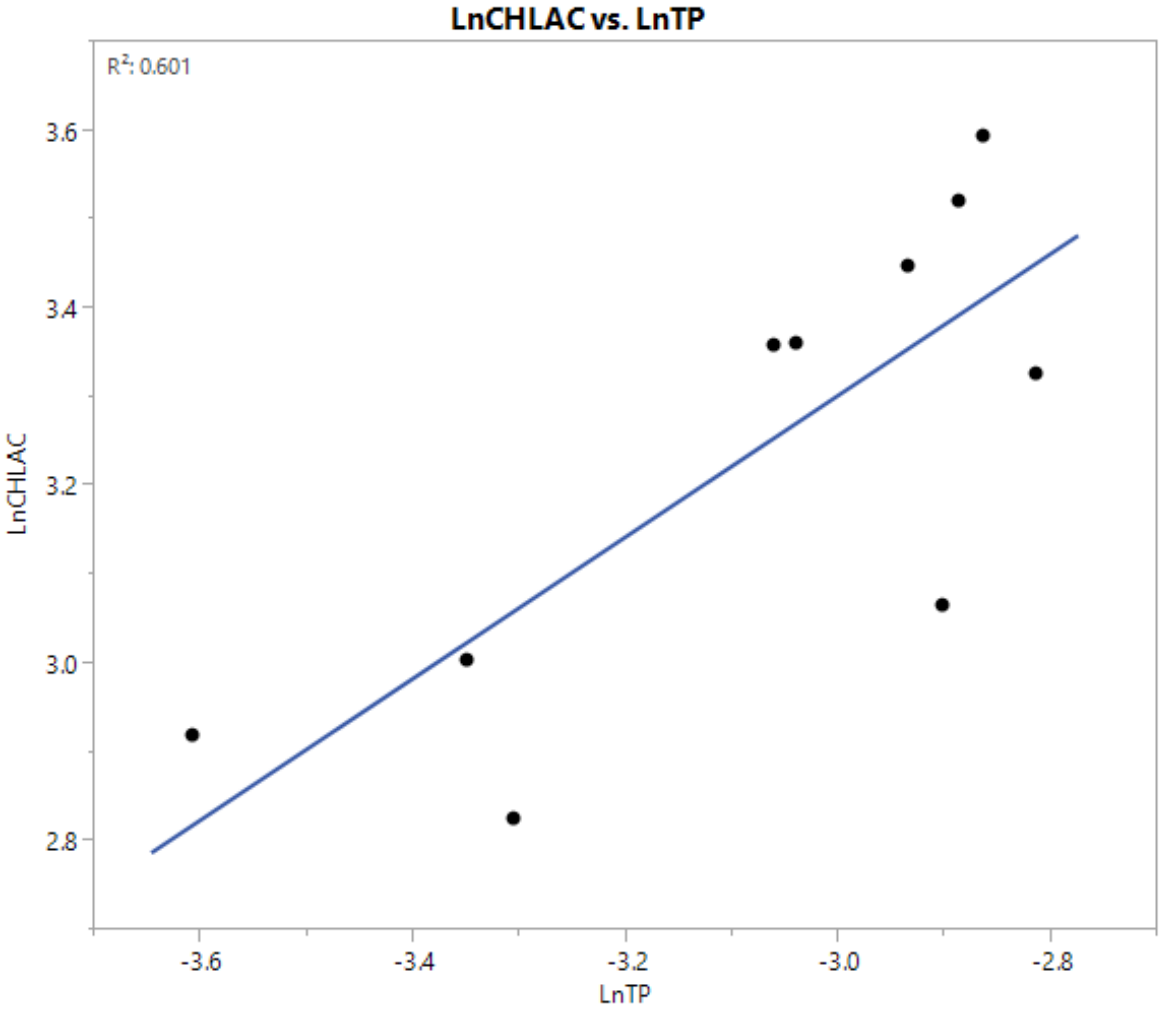
LAKE LOTTA

CHLOROPHYLL *a* VS. TN



LAKE LOTTA

CHLOROPHYLL *a* VS. TP



LAKE LOTTA

REGRESSION RESULTS SUMMARY

	CHLAC vs. TN*	CHLAC vs. TP*
R^2 Adjusted	0.07	0.60
p value - Nutrient Term	0.4778	0.0084
Data Period	2005-2022	2005-2022
Number of Observations	9	10

* Regression analysis performed using natural log transformed AGMs.

LAKE LOTTA

REGRESSION ANALYSIS RESULTS

Simple Linear Regression Equation

- Ln (Corrected Chlorophyll *a* AGM) = 5.69609 + 0.79726 * Ln (TP AGM).
- Application of the simple linear regression equations indicate the TP AGM concentrations necessary to meet the chlorophyll *a* criterion are 0.03 mg/L.

* Ln is the natural log of the parameter within the parentheses.

LAKE LOTTA

PERCENT REDUCTIONS TO MEET TARGET

	Lake Lotta TN AGM (mg/L)	Lake Lotta TP AGM (mg/L)
Maximum AGM (2013-22)	1.18	0.06
TMDL Target	1.27	0.03
Percent Reduction to Meet Target	0	50

$$\% \text{ Reduction} = \frac{[\text{measured exceedance (maximum AGM)} - \text{target}]}{\text{measured exceedance (maximum AGM)}} \times 100$$

TMDL COMPONENTS

Waterbody Name (WBID)	Parameter	TMDL (mg/L)[1]	WLA Wastewater (% reduction)	WLA NPDES Stormwater (% reduction)[2]	LA (% reduction)[2]
Lake Lotta (3004G)	TN	1.27	NA	0	0
Lake Lotta (3004G)	TP	0.03	NA	50	50

[1] The TMDLs represent the AGM lake concentrations (mg/L) not to be exceeded.
[2] The required percent reductions listed in this table represent the reductions of in-lake concentrations and do not directly reflect reductions in source loadings.

FORMAL PUBLIC COMMENTS

Please state:

- Full Name.
- Affiliation.
- Comment or Question.

STAKEHOLDER INVOLVEMENT

Draft Report:

- https://floridadep.gov/dear/water-quality-evaluation-tmdl/content/draft-tmdls
- Reports posted on Jan. 29, 2025

Requesting Comments on the Report:

- Requesting comments by April 4, 2025.
- Requesting information on local water quality issues and projects that might influence the TMDLs.
  - Assuring that pertinent local information is used in TMDL development.
  - Establishing contact with key stakeholders who will help us during the restoration process.

Submit Comments to Eric Simpson, Environmental Administrator

- Eric.Simpson@FloridaDEP.gov
- 850-245-8466

NEXT STEPS

- Review comments provided by stakeholders.
- Revise reports and produce a rule package that will be submitted to DEP leadership for consideration.
- Adopt TMDLs into state rule in spring 2025, assuming no major revisions. This includes holding a rule making hearing with at least a 45-day public notice.
- Submit to EPA for approval as site-specific water quality standards and TMDLs.

THANK YOU

Eric Simpson
Division of Environmental Assessment and Restoration/
Water Quality Evaluation and TMDL Program
Florida Department of Environmental Protection

Contact Information:
850-245-8466
Eric.Simpson@FloridaDEP.gov