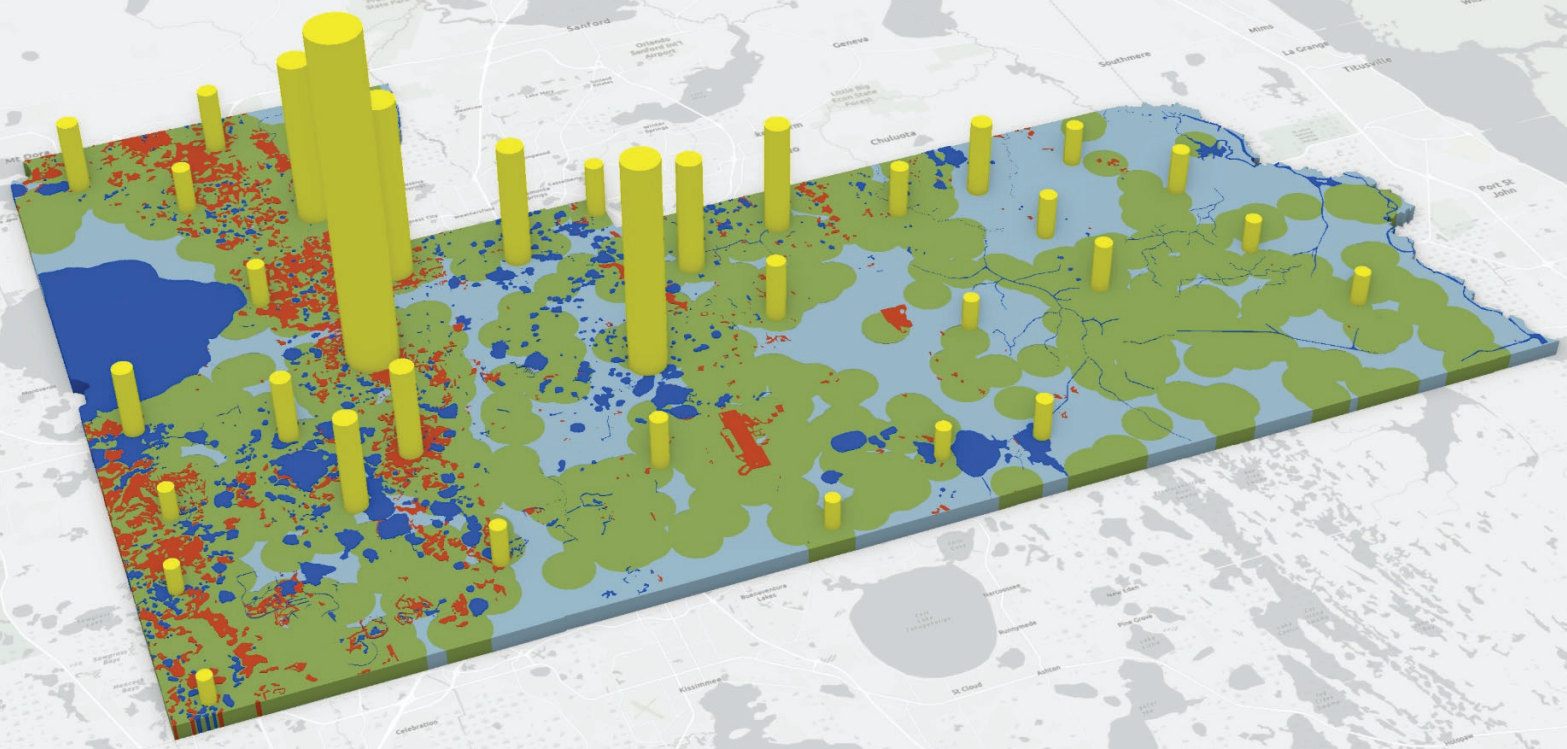
ORANGE COUNTY GROUNDWATER VULNERABILITY ASSESSMENT

ADDENDUM: Phase II Priority Vulnerability Areas (PVAs)



December 21, 2023

Less Vulnerable
Vulnerable
More Vulnerable
Waterbodies
Septic Density

ORANGE COUNTY GOVERNMENT FLORIDA

DRUMMOND CARPENTER
engineering + research

ORANGE COUNTY GROUNDWATER VULNERABILITY ASSESSMENT

Report Addendum: Phase II Priority Vulnerability Areas (PVAs)

Prepared for:

Orange County Environmental Protection Division
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Orange County EPD Contract # Y20-906A PO #C20906A001

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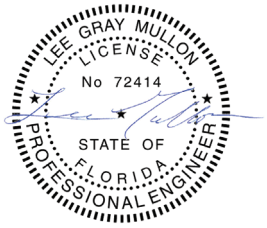
21 December 2023

The material and data contained within the enclosed report was prepared by Drummond Carpenter, PLLC, for sole use by Orange County Environmental Protection Division. This report was prepared under the supervision and direction of the respective undersigned, whose seal as a registered professional engineer is affixed below.



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Phase II Priority Vulnerability Areas

Drummond Carpenter, PLLC (DC) conducted a limited analysis of 51 waterbodies that were not included as part of the Phase I Priority Focus Areas (PFAs) documented in the "Orange County Groundwater Vulnerability Assessment" report dated April 12, 2023. Note the PFAs were renamed to PVAs since issuance of the April 2023 report to avoid confusion with existing PFAs, such as the Wekiva PFA.

While the focus of Phase I PVAs was to define areas around identified waterbodies to prioritize septic interventions of existing septic systems that would likely take the form of capital improvements projects (i.e., septic-to-sewer or advanced treatment retrofits), the goal of Phase II PVA development is to proactively protect waterbodies from impairment due to future septic systems and is meant to prioritize policy changes that should be implemented to responsibly regulate existing and future septic system construction and operation.

The first step in development of Phase II PVAs was to evaluate waterbodies not included in Phase I PVAs. As part of our analysis, DC evaluated recent levels and trends for the following surface water quality analytes that can be indicators of lake health: total nitrogen (TN), total phosphorus (TP), nitrate plus nitrite, color, alkalinity, and chlorophyll-a. Our evaluation also considered where waterbodies were located in relation to existing land use (e.g., septic, sewer, vacant land) as well as planned future uses surrounding the waterbodies based on Vision 2050 sectors[1].

Waterbodies recommended for Phase II PVAs generally fell in unincorporated Orange County. Waterbodies falling within other jurisdictions were generally not considered for Phase II PVA development. Waterbodies falling in Wekiva Priority Focus Area were also excluded from consideration for Phase II PVAs. If the Wekiva PFA is removed in the future, waterbodies falling within the existing Wekiva PFA should be evaluated for PVA development.

Table 1 provides a list of the waterbodies evaluated, those recommended for Phase II PVAs, and relevant information related to why waterbodies were or were not recommended. A total of **24 waterbodies** of the 51 evaluated were selected and **23 Phase II PVAs** were developed. **Table 2** provides recent surface water quality concentrations and trend results. **Figure 1** shows Phase I and Phase II PVAs with corresponding waterbodies throughout Orange County. **Table 3** lists the Phase II PVAs.

Methodology

Phase II PVAs and their boundaries were generally developed following the methodology described below. Note the Phase II PVA boundaries were determined in a methodology similar to the development of the Phase I PVA boundaries.

1. The 51 waterbodies in Table 1 not in Phase I PVAs or in the Wekiva PFA within Orange County were evaluated for current impairment status, location, current and potential future land use, and water quality indicates levels and trends. Trends for total TN, TP, nitrate plus nitrite, color, alkalinity, and chlorophyll-a from 2013-2023 were determined using a Mann Kendall Trend Test for each waterbody with available water quality data (Table 2). Of the 51 waterbodies evaluated, 24 waterbodies were selected for Phase II PVAs.
2. For each selected waterbody for inclusion in Phase II PVAs, 5-year groundwater influence zones were developed using the same groundwater model simulations and methodology used to define the Phase I PVAs, as described in the "Orange County Groundwater Vulnerability Assessment"

[1] Vision 2050 (arcgis.com)

report dated April 12, 2023. The 5-year influence zones represent areas where a particle of water released in the SAS would be predicted to reach the waterbody in less than five years.
3. A 150-ft buffer was then applied to these 5-year influence zone boundaries to better capture the seasonality, fluctuation, and potential deviations in groundwater flow conditions from dry to wet years. A 150-ft setback is also the current Orange County septic setback requirement from waterbodies.
4. Buffered 5-year influence zones that overlapped were consolidated (e.g., nearby lakes). Any consolidated buffered 5-year influence zones that overlapped with Phase I PVAs were then adjusted along the Phase I PVA boundaries creating the final areas for the Phase II PVAs. The Phase I and Phase II PVAs do not overlap.
5. Subdivisions where at least a portion of the subdivisions falls within the delineated PVA boundaries would be considered to qualify as part of the PVA. If a subdivision lies within both a Phase I and Phase II PVA, the subdivision would be considered to fall within the Phase I PVA.

Policy Recommendations

Phase II PVAs are meant to define areas where septic has a greater potential to negatively impact the 24 identified waterbodies. These areas can be prioritized for implementation of policy changes to help responsibly regulate existing and future septic system construction and operation. Policy recommendations for new and existing septic systems falling within Phase II PVAs are consistent with those suggested for Phase I PVAs. These recommendations include a specific focus on the protection of waterbodies from future impairment due to septic impacts associated with existing systems or septic systems installed with future growth across Orange County:

1. Require new developments that cannot be connected to central sewer to install advanced septic treatment systems and maintain a waterbody setback distance of at least 150 feet.
2. Require existing conventional septic systems within 300 feet of a waterbody or on lot sizes of less than 1 acre to be upgraded to advanced treatment systems if they are not planned for connection to central sewer within a 20-year period.
3. Require existing failing conventional septic systems that require a permit from FDOH/FDEP for repair be upgraded to advanced treatment systems if not planned to be connected to central sewer within a 5-year period. Failing conventional septic systems could be considered those where the system is not operating as intended by the manufacturer due to one or more failing components, which could include but are not limited to the septic drain field(s), plumbing, or the septic tank(s).
4. Consider increasing the distance for which connection to the existing central sewer is required for new developments.
5. Consider offering septic upgrade incentive programs like the pilot program currently being offered within the Wekiwa PFA for subdivisions that are not considered feasible for connection to the sanitary sewer. Within nutrient BMAP areas, such programs could be part of the County's annual stakeholder contribution to reduce nutrient loads.

Table 1. Recommended Waterbodies for Phase II PVA Development

Lakes Evaluated for Phase II PVAs	Waterbody ID (WBID)*	Recommended for Phase II PVA?	Relevant Information
BAY LAKE	RCID1	No	• Not enough data to determine trends or impairment. • Within Incorporated Vision 2050 sector. • Entirely within Bay Lake jurisdiction.
BEARHEAD LAKE	3168W	Yes	• Not impaired. • Showing increasing trends for NOx-N, Alkalinity. • Within Targeted Vision 2050 sector.
BLACK LAKE	2875A	Yes	• Not impaired. • Select events have exceeded the TP NNC threshold since 2018. • Variable lake water quality from "Good" to "Poor" since 2000 per Orange County Water Atlas. • Within Incorporated Vision 2050 sector in western part of County. • Partially within City of Winter Garden jurisdiction.
BOO BOO LAKE	3169C1	No	• Falls within Big Sand Lake Phase I PVA.
CORNER LAKE	3033C	Yes	• Not impaired. • Increasing NOx-N trend. • Within Intended and Rural Vision 2050 sectors. • Surrounded by vacant parcels where future development could occur and sewer not currently present within area.
LAKE BALDWIN	3023B	No	• Not impaired. • Within Incorporated Vision 2050 sector. • Within City of Orlando and City of Winter Park jurisdiction.
LAKE BARTHO	2965B	No	• Not Impaired. • Not enough data for trends. • Within Preserved Vision 2050 sector.
LAKE BRITT	3170FE	Yes	• Not impaired. • Not enough data for trends. • Within Targeted Vision 20250 sector. • In area of growth in southwest Orange County. • Surrounded by land without existing sewer.
LAKE BRYAN	3169N	Yes	• Not impaired. • Increasing NOx-N trend. • Within Targeted Vision 2050 sector. • In area of growth in southwest Orange County. • Partially surrounded by vacant land without existing sewer.
LAKE BUCHANAN	3169A3	Yes	• Impaired. • Within Targeted Vision 2050 sector.
LAKE BUCK	3171G	No	• Not impaired. • Within Incorporated Vision 2050 sector. • Entirely within City of Orlando jurisdiction.
LAKE CATHERINE	3169P	Yes	• Not impaired. • Select events have exceeded the TP NNC threshold since 2018. • Variable lake water quality from "Good" to "Poor" since 2001 per Orange County Water Atlas. • Within Targeted Vision 2050 sector.
LAKE CHRISTIE	3169S	Yes	• Not impaired. • Decreasing trends for TN and TP. • Good water quality. • Within Established and Targeted Vision 2050 sectors. • Surrounded by septic tanks.
LAKE CLAIRE	3001C	No	• Not impaired. • Good water quality. • Within Special Vision 2050 sector.
LAKE CONE	28932	No	• Impaired for mercury. • Within Preserved Vision 2050 sector in eastern part of County. • Not surrounded by septic tanks or planned development.
LAKE EBBY	3001C	No	• Not Impaired but within Targeted Vision 2050 sector. • Not many existing septic tanks within area.
LAKE ELLENOR	3169A1	No	• Not Impaired but within Targeted Vision 2050 sector. • Not many existing septic tanks within area. • Within established area in eastern Orange County with existing sewer.
LAKE FREDRICA	3036	Yes	• Impaired. • Within Targeted Vision 2050 sector. • Partially surrounded by vacant land where septic could go during growth.
LAKE GEORGE	3036A1	No	• Not impaired. • In Established Vision 2050 sector suggesting limited future growth. • Partially within City of Orlando jurisdiction.
LAKE GIBSON	3036B	No	• Not impaired. • In Established Vision 2050 sector suggesting limited future growth. • Surrounded by existing septic. • Could be an option for Phase II PVA if Rio Pinar parcels get subdivided.
LAKE GIFFORD	3170FB	Yes	• Not impaired. • Good water quality. • Within Intended Vision 2050 sector. • Within expected growth area in the southwestern portion of Orange County.

Table 1. Recommended Waterbodies for Phase II PVA Development

Lakes Evaluated for Phase II PVAs	Waterbody ID (WBID)*	Recommended for Phase II PVA?	Relevant Information
LAKE GLORIA	3168K	No	• Not impaired. • Increasing TP and Chlorophyll-a but both at lower levels. • Within Established and Targeted Vision 2050 sectors. • Surrounded by sewer.
LAKE HALL	3009G	No	• Not impaired. • In Established Vision 2050 sector suggesting limited future growth. • Directly surrounded by septic subdivisions.
LAKE HART	3171	Yes	• Impaired for lead. • Generally improving water quality trends. • Within Rural Vision 2050 sector. • In a growing area within southern Orange County.
LAKE JENNIFER	2991	No	• Not impaired. • Within Rural Vision 2050 sector. • Surrounded by septic with sewer not within the area.
LAKE JESSAMINE	3168C	Yes	• Not impaired. • Increasing TN and TP trends. • In Established Vision 2050 sector.
LAKE LEE	3001C	No	• Not impaired. • Decreasing TN water quality trends. • Within Special Vision 2050 sector.
LAKE LOUISE	3170W	Yes	• Not impaired. • Within Intended and Rural Vision 2050 sectors. • Surrounded by vacant parcels where future development could occur and sewer not currently present within area.
LAKE LOVELY	3011D	No	• Impaired. • Within Targeted Vision 2050 sector. • Already within Wekiva PFA.
LAKE MABEL	3170O	Yes	• Not impaired. • Stable trends. • Within Rural Vision 2050 sector. • Surrounded by septic and vacant parcels where potential development could include septic.
LAKE MAITLAND	2997C	No	• Not impaired. • Within Incorporated Vision 2050 sector. • Existing sewer surrounds lake. • Within the City of Winter Park and City of Maitland jurisdictions.
LAKE NONA	3171D	No	• Not impaired. • Within Incorporated Vision 2050 sector. • No septic systems around lake. • Entirely within the City of Orlando jurisdiction.
LAKE OLIVER	3170FA	Yes	• Not impaired. • Within Intended Vision 2050 sector. • Surrounded by area where potential development could include septic.
LAKE PAXTON	3019A	Yes	• Not impaired. • Within Intended Vision 2050 sector. • Surrounded by area where potential development could include septic.
LAKE REAMS	3170G6	Yes	• Not impaired. • Showing increasing trends for TP, Alkalinity, and Chlorophyll-a. • Within Intended Vision 2050 sector.
LAKE RUBY	3169A4	Yes	• Not impaired. • Showing increasing trends for TN, NOx-N, and Color. • Within Established Vision 2050 sector but surrounded by the Targeted sector. • Generally surrounded by existing sewer.
LAKE SERENE	3169C1	Yes	• Not impaired. • Within Established and Targeted Vision 2050 sector. • Partially falls within Big Sand Lake PFA. • Near septic subdivision to northwest. • Groundwater influence zone would be incorporated into Big Sand Lake PVA.
LAKE SHERWOOD	3002H	No	• Not impaired. • Within Targeted Vision 2050 sector. • Most of lake falls within Wekiva PFA.
LAKE SPIER	3023A	No	• Not Impaired. • Within urban, established area but surrounded by a septic subdivision. • Entirely within City of Winter Park jurisdiction.
LAKE SUZANNE	2991	No	• Not Impaired. • Not enough data for trends. • Within Rural Vision 2050 sector. • Surrounded by septic with sewer not within the area.

Table 1. Recommended Waterbodies for Phase II PVA Development

Lakes Evaluated for Phase II PVAs	Waterbody ID (WBID)*	Recommended for Phase II PVA?	Relevant Information
LAKE TANNER	3019	Yes	• Not impaired. • Increasing trends for TN, NOx-N, and Color. • Within Intended Vision 2050 sector. • Surrounded by septic parcels and vacant land where potential development could include septic. • Sewer connection not currently in area. • Near Econlockhatchee River PVA and groundwater influence zone may be incorporated into it.
LAKE TILDEN	2875B	Yes	• Not Impaired. • Increasing trend for chlorophyll-a. • Select events have approached the TN NNC threshold and exceeded the TP NNC threshold since 2018. • Variable lake water quality from "Good" to "Fair" since 2003 per Orange County Water Atlas. • Within the Incorporated and Rural Vision 2050 sectors. • Septic in area.
LAKE VIRGINIA	2997G	No	• Not Impaired. • Within Incorporated Vision 2050 sector. • Existing sewer around lake. • Entirely within City of Winter Park jurisdiction.
LAKE WHIPPOORWILL	3171B	No	• Not impaired. • Within Rural Vision 2050 sector. • Surrounded by septic systems and in area of County where growth is occuring.
LITTLE BRYAN LAKE	3169A5	Yes	• Not Impaired. • Not monitored since 2018. • Variable lake water quality from "Good" to "Fair" since 1991 per Orange County Water Atlas. • Within Targeted Vision 2050 sector. • Surrounded by vacant land with the potential for septic systems if developed.
LITTLE SAND LAKE	3169L	No	• Not impaired. • Within Targeted Vision 2050 sector. • Generally surrounded by existing sewer connection. • Partially within Big Sand Lake PVA.
RACCOON LAKE	3170FD	Yes	• Not impaired. • Variable lake water quality from "Good" to "Fair" since 2007 per Orange County Water Atlas. • Within Intended and Targeted Vision 2050 sectors.
REEDY LAKE	3170F4	Yes	• Not impaired. • No recent water quality data. • Within Intended Vision 2050 sector. • Surrounded by vacant land where septic systems could be added if developed.
SOUTH LAKE	3170O2	No	• Not impaired. • Generally good water quality with stable trends. • Within Targeted, Established, and Incorporated Vision 2050 sectors. • Not surrounded by existing septic but a good amount of vacant land.
SPRING LAKE	2997S	No	• Not impaired. • Variable lake water quality from "Good" to "Poor" since 2007 per Orange County Water Atlas. • Incorporated Vision 2050 sector. • Surrounded by existing sewer.
WHISPERWOOD LAKE	3169A	No	• Not impaired. • Within Established Vision 2050 sector. • Surrounded by existing sewer.

*A lake without an individual WBID assigned WBID of water system encompassing the lake.

Table 2. Surface Water Quality Concentrations and Trends

Lake	Lake Water Quality and Impairment Status							Trends					
	Average Concentration Since 2018							Surface Water Quality Parameters					
	Parameter	TN	TP	Nitrate + Nitrite	Color	Alkalinity	Chlorophyll-a	TN	TP	Nitrate + Nitrite	Color	Alkalinity	Chlorophyll-a
	Units	µg/L	µg/L	µg/L	PCU	mg/L	µg/L	µg/L	µg/L	µg/L	PCU	mg/L	µg/L
BAY LAKE (WBID: RCID1)	Not Impaired	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
BEARHEAD LAKE	Not Impaired	717.6	21.7	14.4	22.3	35.4	5.5	No Trend	Stable	Increasing	Prob. Decreasing	Increasing	Stable
BLACK LAKE	Not Impaired	893.5	105.2	20.8	136.5	43.6	15.3	Decreasing	Decreasing	Decreasing	Decreasing	No Trend	Increasing
BOO BOO LAKE	Not Impaired	559.0	10.5	4.0	11.0	81.0	6.1	Stable	Stable	No Trend	Stable	No Trend	Stable
CORNER LAKE	Not Impaired	595.0	10.0	11.0	68.0	5.0	5.6	Stable	Stable	Increasing	Prob. Increasing	Decreasing	Stable
LAKE BALDWIN	Not Impaired	554.1	12.4	10.3	12.6	61.3	5.9	Decreasing	No Trend	No Trend	No Trend	Prob. Decreasing	Decreasing
LAKE BARTHO	Not Impaired	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
LAKE BRYAN	Not Impaired	446.0	8.0	9.0	26.0	30.0	3.9	Decreasing	Stable	Increasing	No Trend	Decreasing	No Trend
LAKE BUCHANAN	Impaired (Biology, Chlorophyll-a, TN, TP)	1381.0	116.0	45.0	30.0	42.0	35.8	No Trend	Prob. Increasing	Prob. Increasing	Stable	Prob. Decreasing	Stable
LAKE BRITT	Not Impaired	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
LAKE BUCK	Not Impaired	584.4	22.8	15.6	71.9	15.9	4.5	Decreasing	Stable	No Trend	Decreasing	No Trend	Stable
LAKE CATHERINE	Not Impaired	777.5	41.1	10.0	48.8	76.8	20.0	No Trend	Increasing	Stable	Decreasing	Increasing	Increasing
LAKE CHRISTIE	Not Impaired	627.0	14.0	10.0	20.0	26.0	5.8	Decreasing	Prob. Decreasing	Increasing	Stable	No Trend	Decreasing
LAKE CLAIRE	Not Impaired	469.0	11.0		67.0		1.3	Stable	Increasing	No Trend	Increasing	No Trend	Decreasing
LAKE CONE	Not Impaired	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
LAKE EBBY	Not Impaired	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
LAKE ELLENOR	Not Impaired	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
LAKE FREDRICA	Not Impaired	415.0	10.9	10.0	9.4	17.9	2.2	Decreasing	No Trend	Stable	Stable	Decreasing	Stable
LAKE GEORGE	Not Impaired	506.0	12.0		11.8			Stable	No Trend		Stable		
LAKE GIBSON	Not Impaired	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
LAKE GIFFORD	Not Impaired	758.0	10.0	11.0	65.0	11.0	3.8	Decreasing	Stable	Increasing	No Trend	Stable	Decreasing
LAKE GLORIA	Not Impaired	555.7	13.3	9.0	24.0	41.4	4.6	Prob. Decreasing	Prob. Increasing	Increasing	No Trend	Stable	Increasing
LAKE HALL	Not Impaired	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
LAKE HART	Not Impaired	1069.0	21.0	60.0	239.6	7.0	4.3	Stable	Stable	Decreasing	Decreasing	Increasing	Stable
LAKE JENNIFER	Not Impaired	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
LAKE JESSAMINE	Not Impaired	863.9	16.0	12.6	9.5	45.6	12.8	Increasing	Increasing	No Trend	No Trend	Decreasing	No Trend
LAKE LEE	Not Impaired	422.0	11.0	4.0	32.6	27.0	1.7	Decreasing	Stable	No Trend	Increasing	No Trend	Decreasing
LAKE LOUISE	Not Impaired	665.0	13.0	12.0	79.0	17.0	8.0	No Trend	No Trend	Prob. Increasing	No Trend	No Trend	Increasing
LAKE LOVELY	Impaired (Nutrients, Chlorophyll-a)	815.8	39.2	8.9	37.1	45.7	21.7	Decreasing	Decreasing	Increasing	Decreasing	No Trend	Prob. Decreasing
LAKE MABEL	Not Impaired	743.0	13.8	16.4	137.2	5.8	5.6	Decreasing	Prob. Decreasing	Decreasing	No Trend	Increasing	Increasing
LAKE MAITLAND	Not Impaired	505.9	10.9	9.1	6.0	50.0	6.1	Stable	Decreasing	Stable	Prob. Decreasing	Prob. Increasing	Decreasing
LAKE NONA	Not Impaired	394.5	7.5	10.2	14.2	7.8	1.6	Stable	Decreasing	No Trend	Decreasing	Increasing	Decreasing

Table 2. Surface Water Quality Concentrations and Trends

Lake	Lake Water Quality and Impairment Status							Trends					
	Average Concentration Since 2018							Surface Water Quality Parameters					
	Parameter	TN	TP	Nitrate + Nitrite	Color	Alkalinity	Chlorophyll-a	TN	TP	Nitrate + Nitrite	Color	Alkalinity	Chlorophyll-a
	Units	µg/L	µg/L	µg/L	PCU	mg/L	µg/L	µg/L	µg/L	µg/L	PCU	mg/L	µg/L
LAKE OLIVER	Not Impaired	746.7	9.0	9.0	203.3	2.0	4.4	No Trend	No Trend	No Trend	No Trend	No Trend	No Trend
LAKE PAXTON	Not Impaired	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
LAKE REAMS	Impaired (Silver)	817.0	25.0	10.0	177.0	13.0	8.7	Stable	Increasing	Stable	Decreasing	Increasing	Increasing
REEDY LAKE	Not Impaired	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
LAKE RUBY	Not Impaired	641.0	9.0	45.0	89.0	2.0	4.7	Increasing	No Trend	Increasing	Increasing	Stable	Stable
LAKE SERENE (only 2018 data)	Not Impaired	438.9	10.7				4.0	No Trend	No Trend	No Trend	No Trend	No Trend	No Trend
LAKE SHERWOOD	Not Impaired	780.0	29.9	28.4	32.0	47.4	12.7	No Trend	No Trend	Increasing	No Trend	No Trend	Prob. Increasing
LAKE SPIER	Not Impaired	- -	- -	- -	- -	- -	- -	- -	No Trend	- -	- -	- -	- -
LAKE SUZANNE	Not Impaired	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
LAKE TANNER	Not Impaired	641.0	9.0	45.0	89.0	2.0	4.9	Increasing	No Trend	Increasing	Increasing	Stable	Stable
LAKE TILDEN	Not Impaired	1124.6	86.9	37.7	249.1	34.8	15.9	Stable	Decreasing	Decreasing	Decreasing	No Trend	Increasing
LAKE VIRGINIA	Not Impaired	500.5	14.4	9.4	6.9	54.5	7.7	No Trend	Stable	Stable	Stable	No Trend	Prob. Decreasing
LAKE WHIPPOORWILL	Not Impaired	567.0	13.8	17.6	40.7	19.2	3.6	Stable	No Trend	Increasing	No Trend	Increasing	Decreasing
LITTLE BRYAN LAKE	Not Impaired	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
LITTLE SAND LAKE	Not Impaired	429.0	6.9	15.5	7.9	48.7	3.1	Stable	No Trend	Increasing	No Trend	Increasing	No Trend
RACCOON LAKE	Not Impaired	649.0	21.0	19.0	63.0	32.0	9.2	Prob. Decreasing	Stable	Prob. Increasing	Stable	Decreasing	Stable
SOUTH LAKE	Not Impaired	789.4	17.5	43.5	150.3	6.9	4.6	No Trend	Stable	No Trend	No Trend	Increasing	Stable
SPRING LAKE	Not Impaired	799.1	42.1	15.6	19.8	47.6	22.2	Prob. Increasing	Increasing	Decreasing	Decreasing	Stable	Increasing
WHISPERWOOD LAKE	Not Impaired	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
	Impairment status per Orange County Water Atlas. Blank values represent lakes with insufficient water quality data to develop averages or trends. Lakes were not considered for mercury impairment.							Trends in Orange County Lakes from 2013-2023. Trends used no more than 40 data points. If more than 40 data points for an analyte were available, lake data was truncated to the year for which 40 or less points would be used in the trend analysis. Multiple measurements on a given waterbody within a day were averaged for the trend analysis. Trends evaluated using the GIS Mann-Kendall Toolkit (https://www.gsienv.com/product/gsi-mann-kendall-toolkit/).					

Table 3. Phase II PVAs

Phase II PVA	Associated Waterbodies in Phase II PVA
Bearhead Lake PVA	Bearhead Lake
Black Tilden PVA	Black Lake and Lake Tilden
Corner Lake PVA	Corner Lake
Lake Britt PVA	Lake Britt
Lake Bryan PVA	Lake Bryan
Lake Buchanan PVA	Lake Buchanan
Lake Catherine PVA	Lake Catherine
Lake Christie PVA	Lake Christie
Lake Fredrica PVA	Lake Fredrica
Lake Gifford PVA	Lake Gifford
Lake Hart PVA	Lake Hart
Lake Jessamine PVA	Lake Jessamine
Lake Louise PVA	Lake Louise
Lake Mabel PVA	Lake Mabel
Lake Oliver PVA	Lake Oliver
Lake Paxton PVA	Lake Paxton
Lake Reams PVA	Lake Reams
Lake Ruby PVA	Lake Ruby
Lake Serene PVA	Lake Serene
Lake Tanner PVA	Lake Tanner
Little Bryan Lake PVA	Little Bryan Lake
Raccoon Lake PVA	Raccoon Lake
Reedy Lake PVA	Reedy Lake

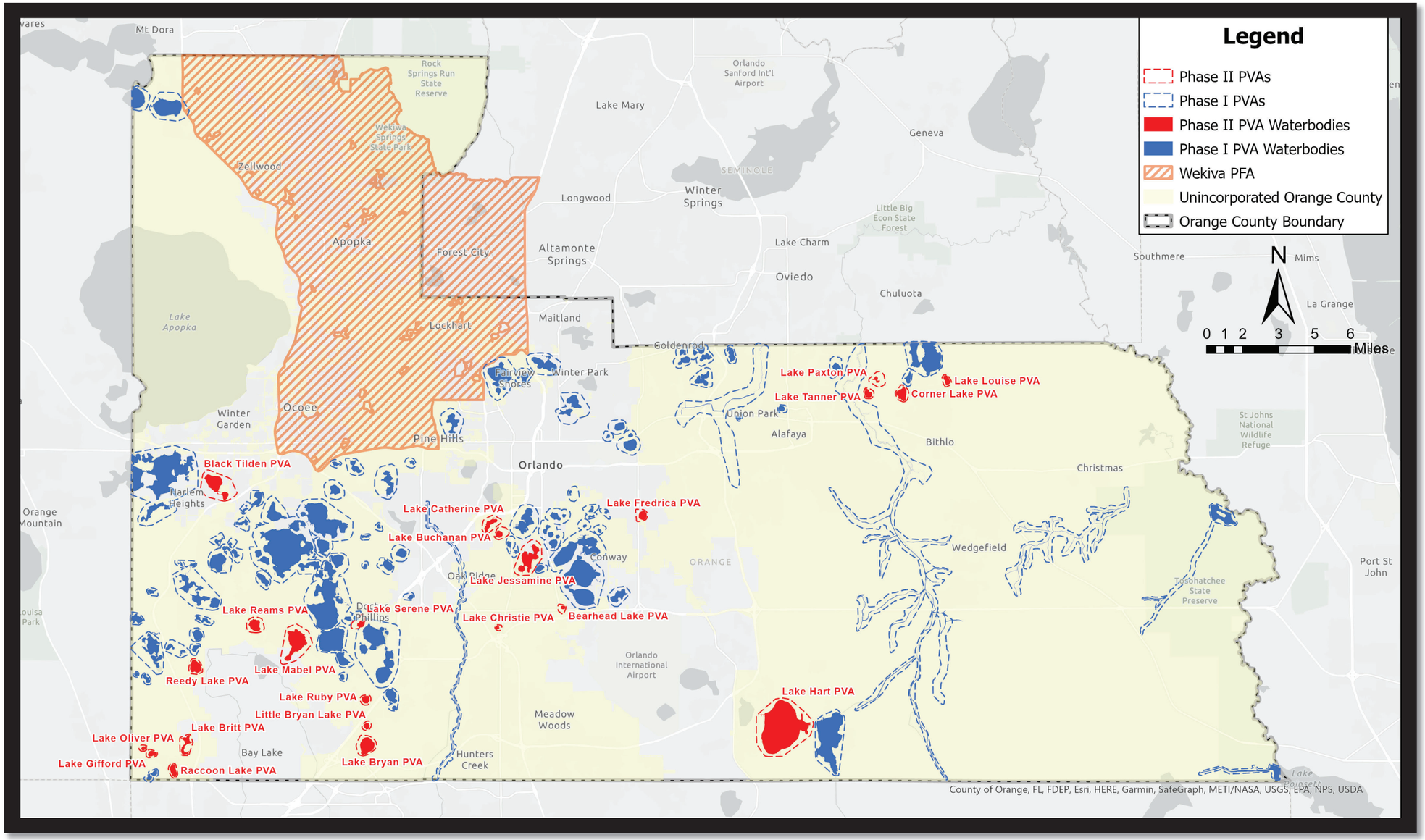

Figure 1. Phase I and II Priority Vulnerability Areas (PVAs)