

## MEMORANDUM

Date: December 13, 2023

From: Jeffrey N. King, PhD PE CFM  
Principal Engineer, Geosyntec Consultants, Inc.

Subject: Lake Prevatt Minimum Levels Peer Review  
Task A: Kick-Off Meeting and Site-Visit Summary

This memorandum summarizes the December 11, 2023, kick-off meeting and lake and watershed visit for engineering and environmental services contract 39104, work order 1: an independent scientific peer review of St. Johns River Water Management District's (SJRWMD) Hydrologic Simulation Program FORTRAN (HSPF) numerical simulation of water levels in Lake Prevatt, in Orange County, Florida (fig. 1). This meeting was public and part of a Central Florida Water Initiative peer review. The kick-off meeting and site visit are task A of work order 1.

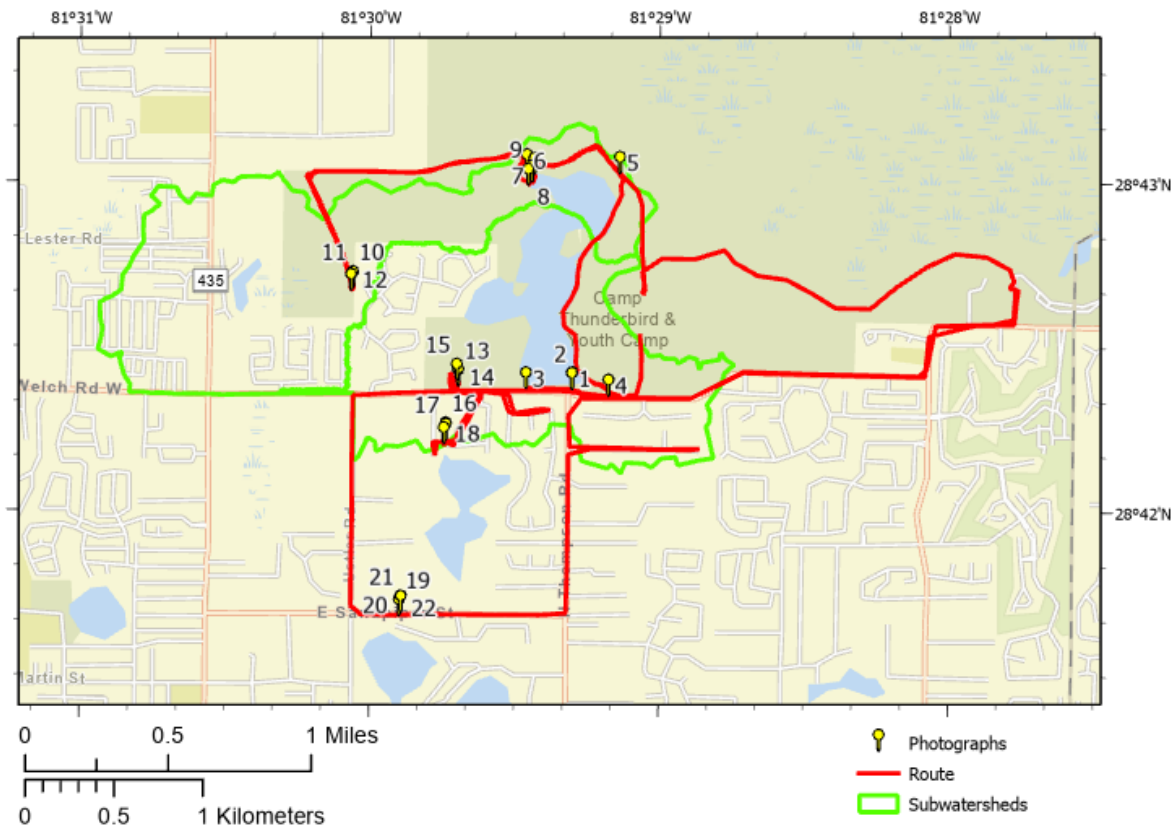


Figure 1. Lake Prevatt sub-watersheds (green polygons); route for the December 11, 2023 (red polyline) lake and watershed field visit; and photograph locations (yellow pins) over the ESRI World Street Map basemap.

SJRWMD, as mandated by state water policy, is engaged in a district-wide effort to establish Minimum Flows and Levels (MFLs) for priority lakes, streams and rivers, wetlands, springs, and groundwater aquifers. MFLs designate the minimum hydrologic conditions that must be maintained in these water resources to prevent significant harm resulting from permitted water withdrawals.

Lake Prevatt is an MFLs priority waterbody in the Wekiva Springs State Park, about two miles northeast of the City of Apopka, in Orange County, Florida. The State of Florida adopted minimum levels for Lake Prevatt in 1998. This peer review supports reevaluation of minimum levels for Lake Prevatt, based on updated methods and measurements.

I identified no specific action items during the meeting, for model review or model documentation.

SJRWMD convened the kickoff meeting on December 11, 2023, at 10 AM Eastern Standard Time in the Youth Camp Recreation Hall of Wekiva Springs State Park, and as a Microsoft Teams virtual meeting (table 1).

**Table 1.** Conference call attendees, attendee affiliation, and lake and watershed visit attendees.

Name	Affiliation	Attendance at	
		Meeting	Lake and Watershed Visit
Andrew Sutherland	SJRWMD	✓	✓
Fatih Gordu	SJRWMD	✓	✓
Tom Jobs	SJRWMD	✓	✓
Nathaniel Mouzon	SJRWMD	✓	✓
Courtney Shadik	SJRWMD	✓	✓
SJRWMD staff	SJRWMD	✓	✓
Dan Schmutz	Greenman-Pederson, Inc.	✓	✓
Rob Denis	Liquid Solutions, Inc.	✓	✓
Jeffrey King	Geosyntec Consultants, Inc.	✓	✓
Sarah Malone		✓	
Carolin Ciarlariello	Florida Department of Environmental Protection	✓	
Yessenia Escibano	Florida Department of Agriculture and Consumer Affairs	✓	
SJRWMD staff	SJRWMD	✓	
TJ Venning	Southwest Florida Water Management District	✓	
Brady Evans	Southwest Florida Water Management District	✓	
Chris Russell	Orlando Utilities Commission	✓	
Jordan Miller	Mills Law Group	✓	
Robert Brooks	Wekiva Springs State Park		✓ (partial)

Note: SJRWMD is St. Johns River Water Management District

During the virtual meeting, Dr. Andrew Sutherland, PhD, MFLs Program Lead, Division of Water Supply Planning and Assessment, SJRWMD, briefly described MFLs. He stated the following:

- State of Florida Water Resource Implementation Rule 62.40 details ten water-resource values.
- SRWMD does not weigh all values equally, in all MFL investigations, because some values may not be relevant or significant, in some water bodies.
- MFLs define limits at which further water withdrawals will be significantly harmful to the water resources or ecology of an area or water body.
- Lake Prevatt is an important recreation resource.
- Wetlands exist along lake margins.
- In parts of the Lake Prevatt watershed, land use transitioned over several decades from a more rural use to residential and urban uses.

- Lake Prevat is an Outstand Florida Water.
- Lake Prevat connects to the Upper Floridan aquifer.
- Lake Prevat is an important sentinel site for SJRWMD.
- Simulation files and other MFL documents available on SJRWMD MFL web page at <https://www.sjrwmd.com/minimumflowsandlevels/lake-prevatt/>.

Dr. Fatih Gordu, Chief Water Resources Engineer, Water Supply Planning and Assessment, SJRWMD, presented a technical overview of MFLs.

Mr. Thomas Jobes, Senior Engineer Scientist, Basin Management and Project Development, SJRWMD, described a hydrologic simulation of water levels in Lake Prevat. He stated the following:

- In the southern lobe of Lake Prevat, the simulated probability of exceedance for a given lake level is greater than the measured probability of exceedance, for lake levels less than 52 feet. For example, a time series of measured lake stage shows that a stage of 50 feet in Lake Prevat has about an 80 percent chance of being exceeded; and a time series of simulated lake stage shows stage 50 feet has about a 90 percent chance of being exceeded.
- Northern and southern Lake Prevat lobes disconnect at relatively lower lake elevations.
- SJRWMD extended a time series for water levels in the northern lobe of Lake Prevat using measured water levels in the southern lobe.
- SJRWMD measured groundwater levels in Upper Floridan aquifer, and in the surficial aquifer below the southern lobe of Lake Prevat
- Lake Prevat persistently recharges the aquifer, such that Lake Prevat always loses water to the aquifer and never gains water from the aquifer.
- SJRWMD simulated water levels in Lake Prevat, forced by groundwater pumping; and not forced by groundwater pumping, during which aquifer pumping is removed from the simulation.
- 2014-2018 is the current condition.
- One objective of the MFL is to understand the state of the lake, forced by long-duration pumping.
- SJRWMD consider the simulation calibration reasonable.
- SJRWMD simulated lake level sensitivity to 15% change in select parameters.
- SJRWMD simulated lake level sensitivity to 2x, 3x, 1/2x, 1/3x.
- Leakance between Lake Prevat and the Floridan aquifer system is a sensitive and dominant parameter.

Mr. Jobes presented several model performance statistics.

I asked:

- Is Lake Prevatt meteorological forcing statistically stationary?

In response Dr. Gordu stated:

- The historic record reflects relatively wet periods and relatively dry periods; and that acceptable simulation during these relatively dryer and relatively wetter periods justifies the performance of the simulation.
  - Downscaling global climate models is challenging and difficult to deploy at the Lake Prevatt scale.
  - SJRWMD does not know whether the future climate in central Florida will be wetter or dryer.
  - SJRWMD uses adaptive management to periodically revisit water management decisions relative to non-stationarity in meteorological forcing, such that the District may adjust management in the future, based on future changes in meteorology.
- Does the aquifer system discharge to Lake Prevatt in very, very dry conditions?

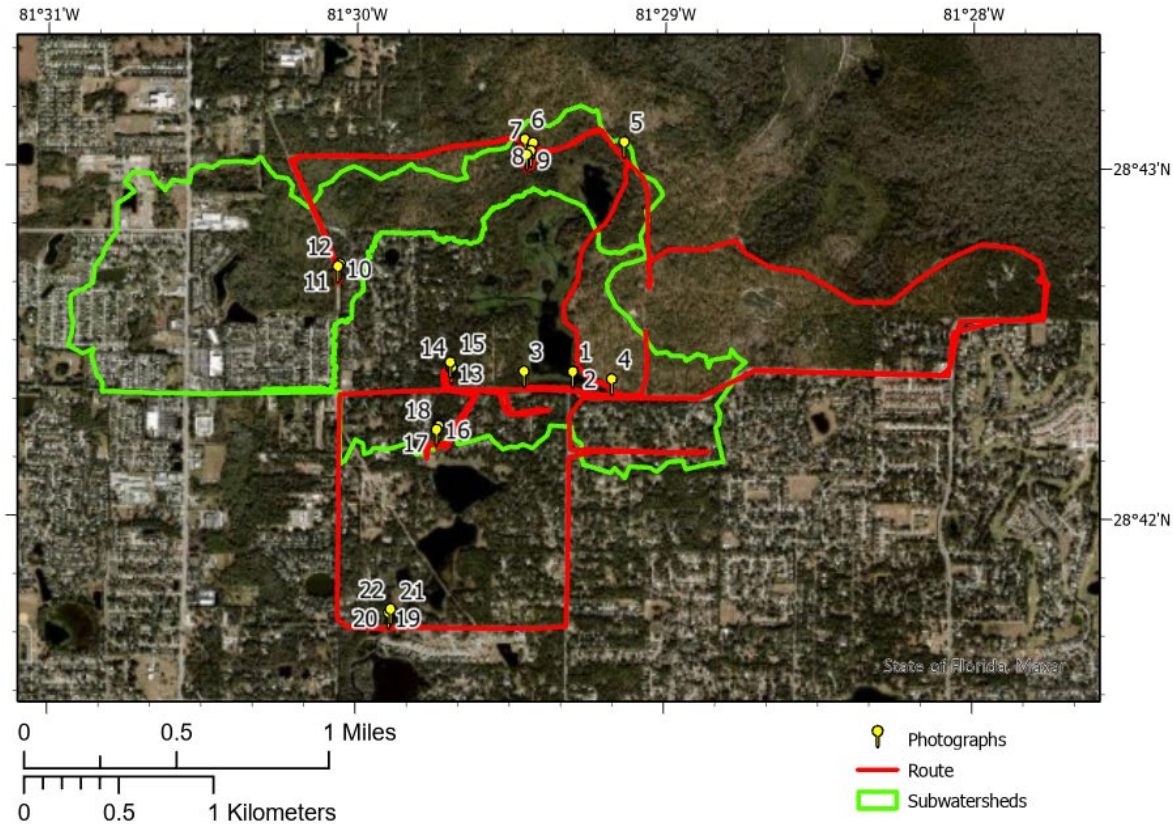
In response, Dr. Gordu stated that the aquifer system does not drain to Lake Prevatt in very, very dry conditions, and that discharge from Lake Prevatt to the aquifer system is persistent.

- Do other studies justify key assumptions, such as persistent Lake Prevatt recharge of the aquifer?

In response Dr. Gordu stated SJRWMD may research other studies to justify key assumptions.

The site visit at Lake Prevatt and in the Lake Prevatt watershed began at 11:30 AM Eastern Standard Time (table 1 and fig. 2). I observed hydrologic features (fig. 2 through figs. 8, photo. 1 to photo. 22). These observations provided insight that will aid in my review.





**Figure 2.** Lake Prevatt subwatersheds (green polygons); route for the December 11, 2023 (red polyline) lake and watershed field visit; and photograph locations (yellow pins) over a January 28, 2021 aerial photograph attributed to Orange County, Florida in the ESRI World Imagery basemap.

During the lake and watershed field visit, I participated in conversations with various lake and watershed field visit attendees. Various sub-sets of the field group and I made the following observations:

- Wekiva Springs State Park Manager Robert Brooks asserted discharge from Lake Coroni inundates from the south, the pond near the park manager's residence (fig. 6, photo. 15), one-to-three days after relatively large episodic rainfall events, such as rainfall events associated with 2010s and 2020s era hurricanes and tropical depressions. Manager Brooks stated that the maximum pond stage in response to this episodic discharge inundates the pond adjacent to the park manager's residence (photo. 15) to a point that is equidistant between the normal pond shoreline and the park manager's residence. Manager Brooks asserted that a governmental entity controlled and managed this discharge, with water management actions such as the opening of a water control gate.
- SJRWMD staff and I inspected two locations south of the ranger's residence (figs. 7 and 8) and found that Lake Coroni was dry on December 11. The group agreed that this volume is likely sufficient to contain relatively lesser events, and that this volume is likely sufficient to significantly lag a storm of relatively larger magnitude. We inspected and photographed a 60-inch diameter round concrete pipe that controls flows to the south, toward the ranger's residence. If Lake Coroni is dry during an episodic event, lake water may eventually pop off during the

episodic event, through the culvert (photo. 16). We made a similar conclusion relative to a rectangular weir (photo. 19) that controls outflow from Lake McCoy.

- Manager Brooks stated that during extreme events, the water surface exceeds the northeastern banks of the small pond in front of his residence, and that this lake pops off across an overland flow path toward Lake Prevatt.
- Manager Brooks stated that Lake Prevatt has dried during relatively dry periods.
- A natural channel from the west (photos. 9, 10, 11, and 12) conveys water from the western basin into the northern lobe of Lake Prevatt.
- Lake Prevatt pops off to Carpenter Branch, and discharges to the north, to wetlands south of Rock Springs Run.
- Culverts under the county road likely convey water, periodically, into Lake Prevatt. This water management may result in disconnected basins during relatively lesser magnitude storms, such that the watershed is effectively smaller during these events.



**Figure 3.** Photograph locations (yellow pins) north of Welch Road West, over a January 28, 2021 aerial photograph attributed to Orange County, Florida in the ESRI World Imagery basemap.





**Photograph 1.** North side of Welch Road West, looking south on December 11, 2023 at 11:42 EST from 28° 42' 22.3 " N 81° 29' 17.8 " W.



**Photograph 2.** North side of Welch Road West, looking north toward Lake Prevatt on December 11, 2023 at 11:43 EST from 28° 42' 22.3 " N 81° 29' 17.8 " W.



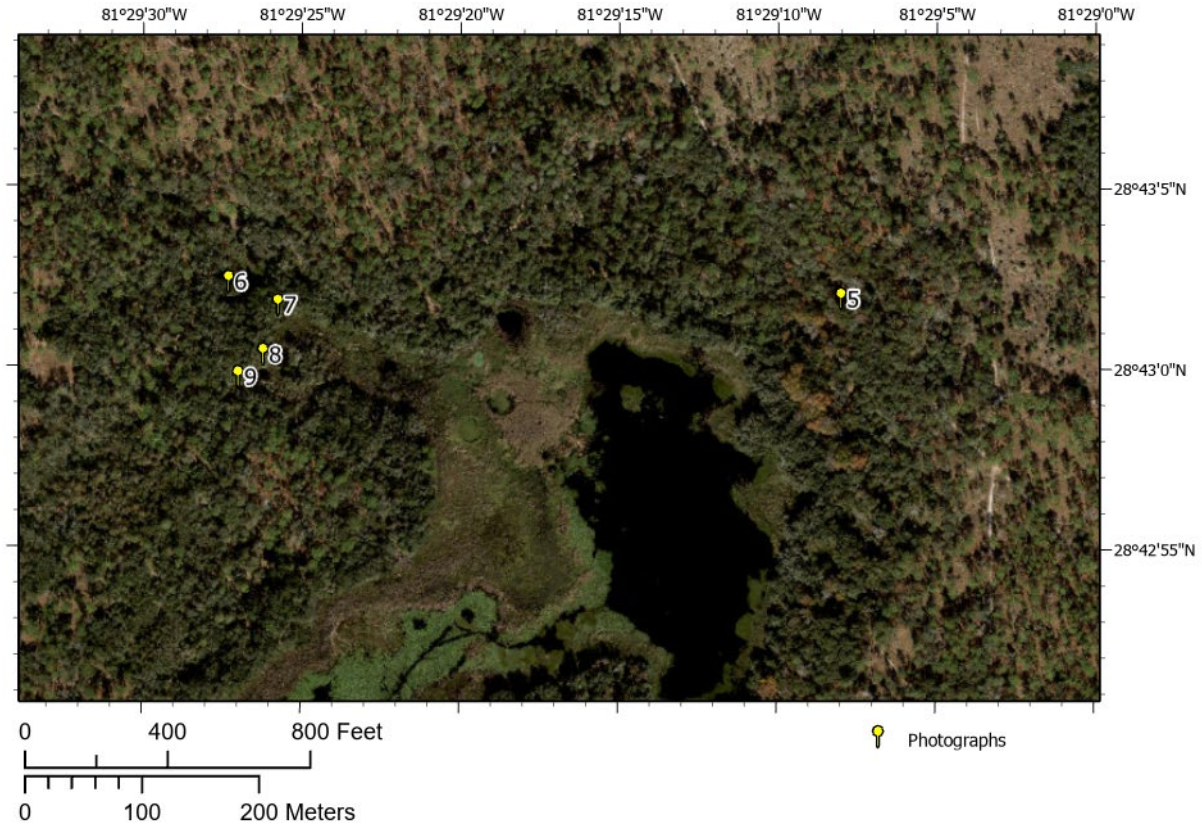


**Photograph 3.** North side of Welch Road West, looking south on December 11, 2023 at 11:47 EST from 28° 42' 22.3 " N 81° 29' 27.3 " W.



**Photograph 4.** North side of Welch Road West, looking south on December 11, 2023 at 11:54 EST from 28° 42' 21 " N 81° 29' 10.3 " W.





**Figure 4.** Photograph locations (yellow pins) north of the north lobe of Lake Prevatt, over a January 28, 2021 aerial photograph attributed to Orange County, Florida in the ESRI World Imagery basemap.



**Photograph 5.** Wekiva Springs State Park looking northeast over the sub-watershed divide, on December 11, 2023 at 12:05 EST from 28° 43' 1.6 " N 81° 29' 8 " W.





**Photograph 6.** Wekiva Springs State Park near Carpenter Branch, looking south-southeast on December 11, 2023 at 12:14 EST from 28° 43' 2.1 " N 81° 29' 27.3 " W.



**Photograph 7.** Wekiva Springs State Park near Carpenter Branch, looking south-southeast on December 11, 2023 at 12:18 EST from 28° 43' 1.4 " N 81° 29' 25.7 " W.





**Photograph 8.** Wekiva Springs State Park near the north lobe of Lake Prevatt, looking southeast on December 11, 2023 at 12:21 EST from 28° 43' 0 " N 81° 29' 26.2 " W.



**Photograph 9.** Wekiva Springs State Park near the outfall of an unnamed creek that drains the northern and western sub-watershed into Lake Prevatt, looking southeast on December 11, 2023 at 12:23 EST from 28° 42' 59.4 " N 81° 29' 27 " W. Creek water flowed to the southeast on December 11.





**Figure 5.** Photograph locations (yellow pins) near a Wekiva Springs State Park boundary, west of Oak Leaf Court, over a January 28, 2021 aerial photograph attributed to Orange County, Florida in the ESRI World Imagery basemap.



**Photograph 10.** Western side of the unnamed creek in photograph 8, looking northeast on December 11, 2023 at 12:39 EST from 28° 42' 40.6 " N 81° 30' 3.2 " W.



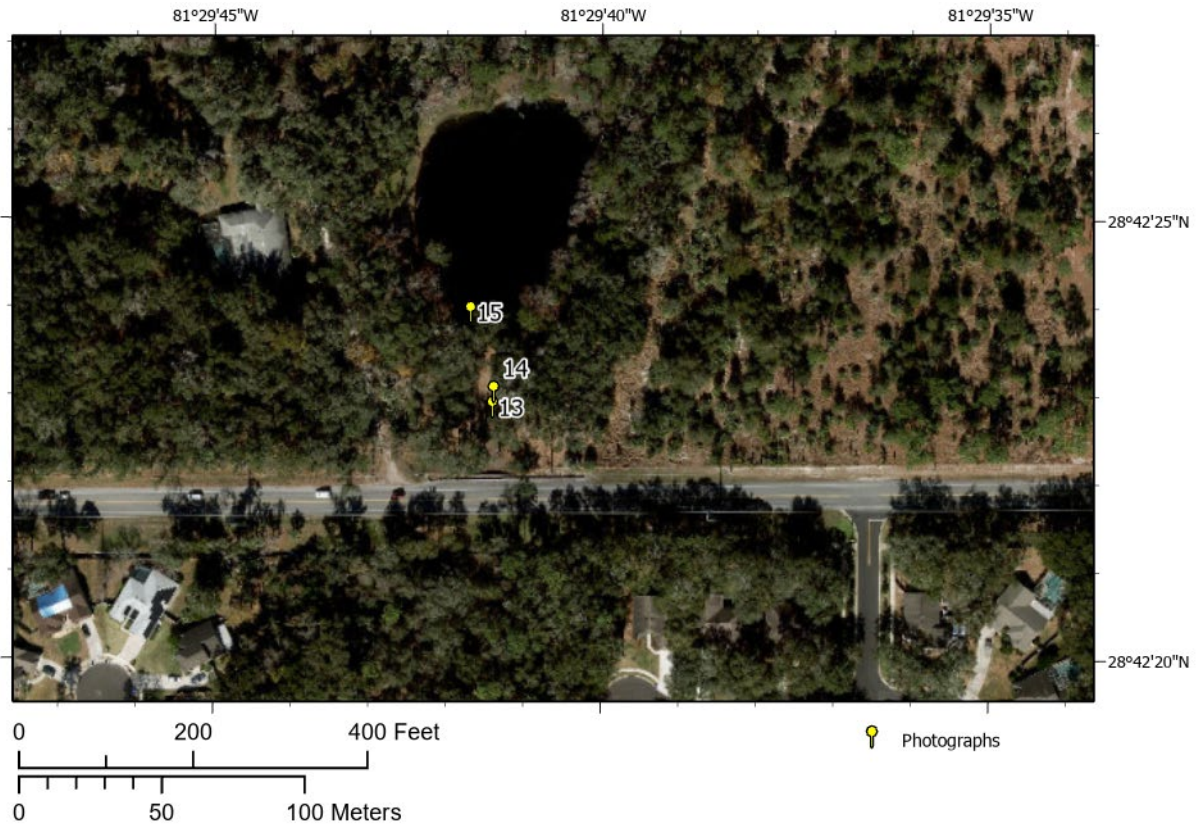


**Photograph 11.** Northern side of unnamed creek in photographs 8 and 10, looking southwest on December 11, 2023 at 12:40 EST from 28° 42' 40.6 " N 81° 30' 3.3 " W.



**Photograph 12.** Bridge over unnamed creek in photographs 8, 10, and 11, looking southwest on December 11, 2023 at 12:41 EST from 28° 42' 40.2 " N 81° 30' 3.6 " W.





**Figure 6.** Photograph locations (yellow pins) north of Welch Road West near the Wekiva Springs State Park ranger's residence (north-northwest of photograph 15), over a January 28, 2021 aerial photograph attributed to Orange County, Florida in the ESRI World Imagery basemap.



**Photograph 13.** Wekiva Springs State Park ranger's residence, looking south on December 11, 2023 at 13:18 EST from 28° 42' 22.7 " N 81° 29' 41.4 " W.





**Photograph 14.** Wekiva Springs State Park ranger's residence, looking north on December 11, 2023 at 13:19 EST from 28° 42' 22.9 " N 81° 29' 41.4 " W.



**Photograph 15.** Southern side of pond east of Wekiva Springs State Park ranger's residence, looking northeast on December 11, 2023 at 13:29 EST from 28° 42' 23.8 " N 81° 29' 41.7 " W.





**Figure 7.** Photograph locations (yellow pins), north and south of Paradise Isle Drive, over a January 28, 2021 aerial photograph attributed to Orange County, Florida in the ESRI World Imagery basemap. Lake Coroni is south of Paradise Isle Drive.



**Photograph 16.** North of Paradise Isle Drive looking southwest on December 11, 2023 at 13:38 EST from 28° 42' 13.1 " N 81° 29' 43.9 " W. The diameter of this round concrete pipe culvert is about 60 inches.



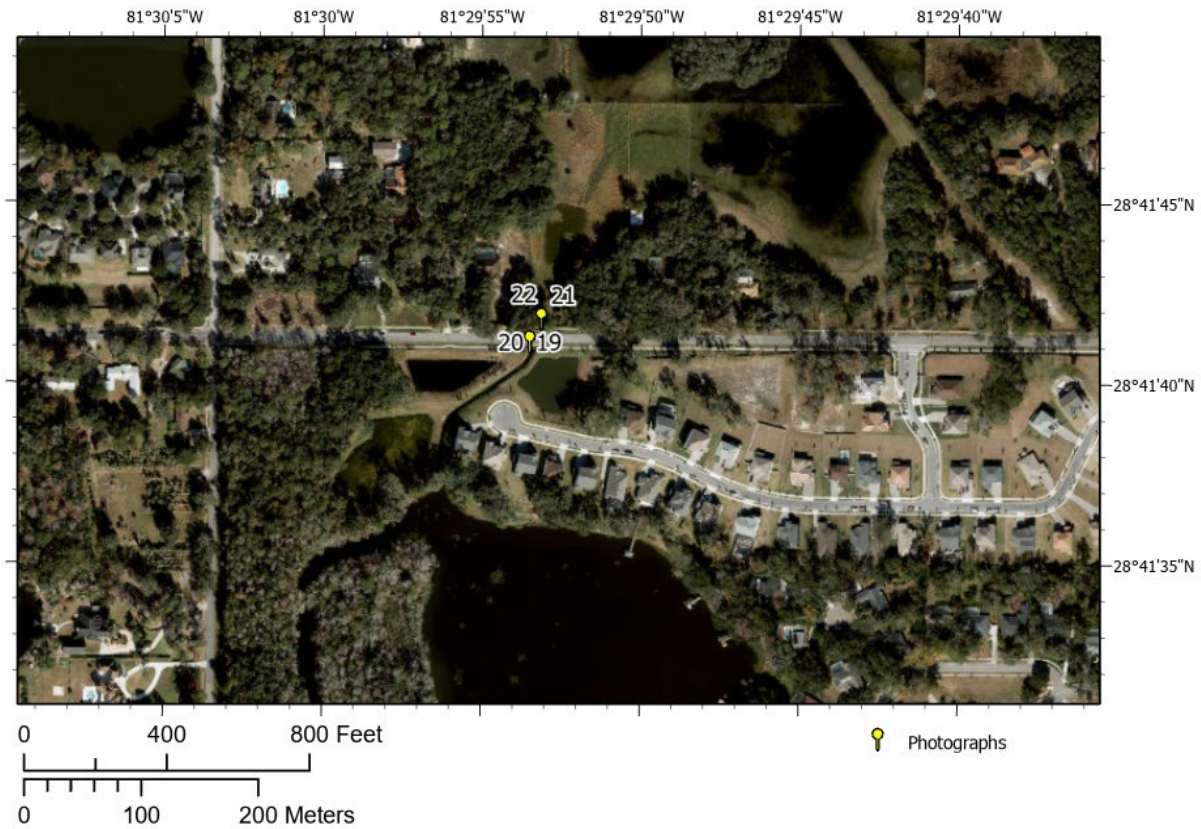


**Photograph 17.** North of Paradise Isle Drive looking north on December 11, 2023 at 13:38 EST from 28° 42' 12.9 " N 81° 29' 43.9 " W.



**Photograph 18.** South of Paradise Isle Drive looking south toward Lake Coroni on December 11, 2023 at 13:39 EST from 28° 42' 12.2 " N 81° 29' 44.3 " W. Lake Coroni was dry on December 11, with no apparent standing water in the bottom of the lake, visible from Paradise Isle Drive.





**Figure 8.** Photograph locations (yellow pins) north and south of East Sandpiper Street, over a January 28, 2021 aerial photograph attributed to Orange County, Florida in the ESRI World Imagery basemap. Lake Coroni is north of East Sandpiper Street; Lake McCoy is south of East Sandpiper Street.



**Photograph 19.** South of East Sandpiper Street looking north on December 11, 2023 at 13:53 EST from 28° 41' 40.8 " N 81° 29' 53.5 " W.





**Photograph 20.** South of East Sandpiper Street looking south on December 11, 2023 at 13:53 EST from 28° 41' 40.8 " N 81° 29' 53.5 " W.



**Photograph 21.** North of East Sandpiper Street looking north on December 11, 2023 at 13:54 EST from 28° 41' 41.5 " N 81° 29' 53.1 " W.





**Photograph 22.** North of East Sandpiper Street looking down on December 11, 2023 at 13:55 EST from 28° 41' 41.5 " N 81° 29' 53.1 " W.