Hydrogeological Investigation of the Lower Floridan Aquifer in Polk County (P280)

Crooked Lake, Frostproof and Lake Wales Sites

Presentation to the Well Drillers Advisory Committee
July 11, 2018

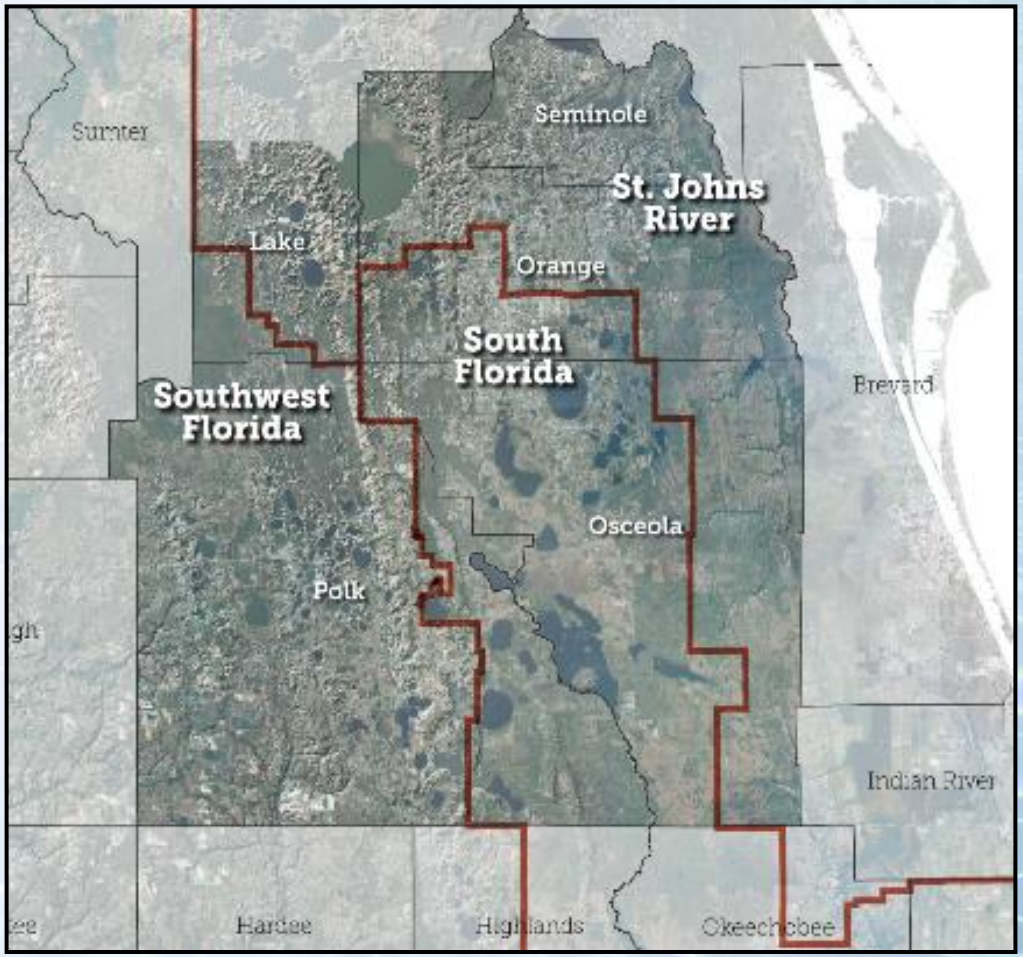
Southwest Florida
Water Management District

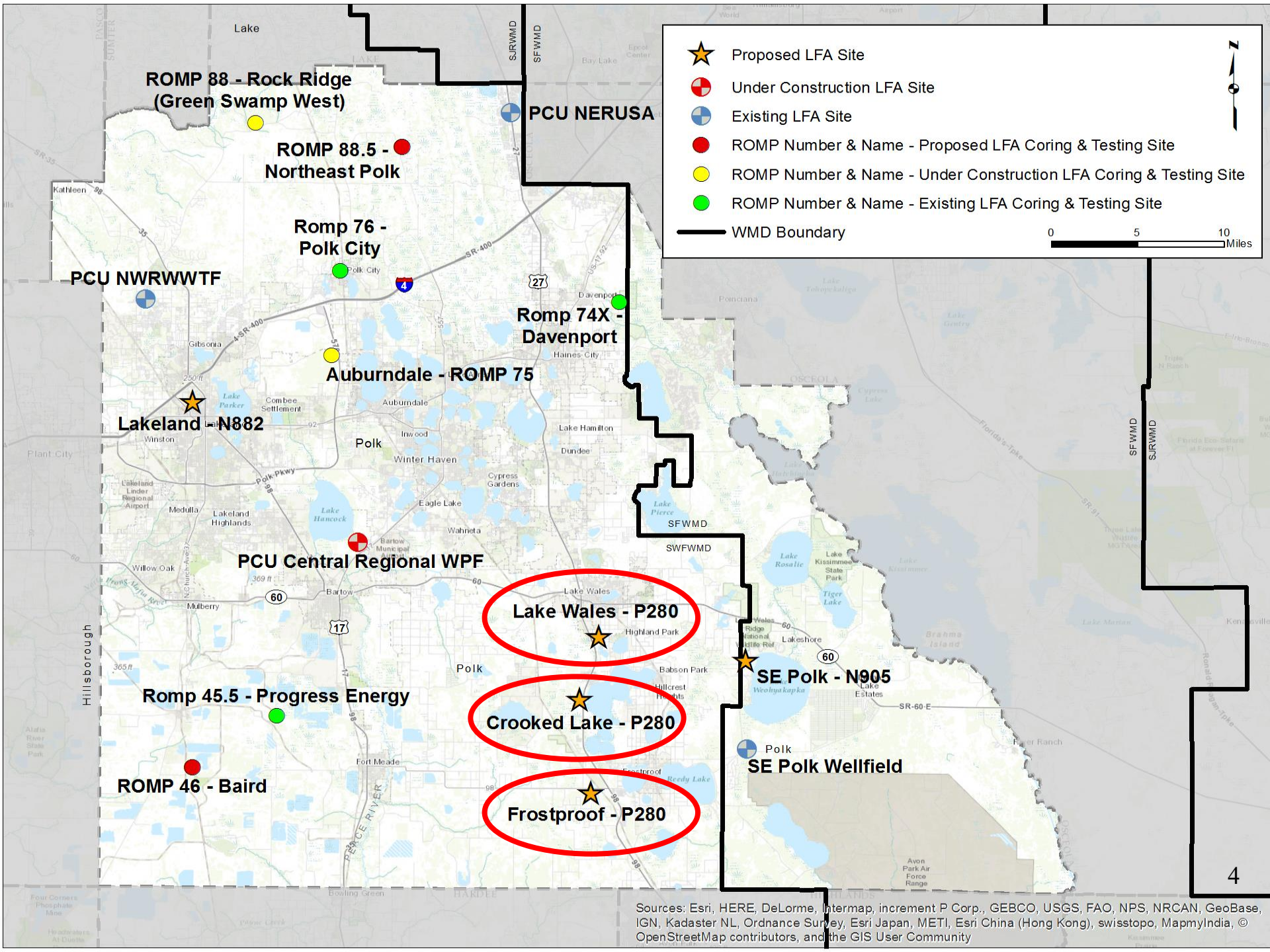
Agenda

- Project Location
- Project Overview
- Crooked Lake Status
- Frostproof Status
- Lake Wales Status
- Communications

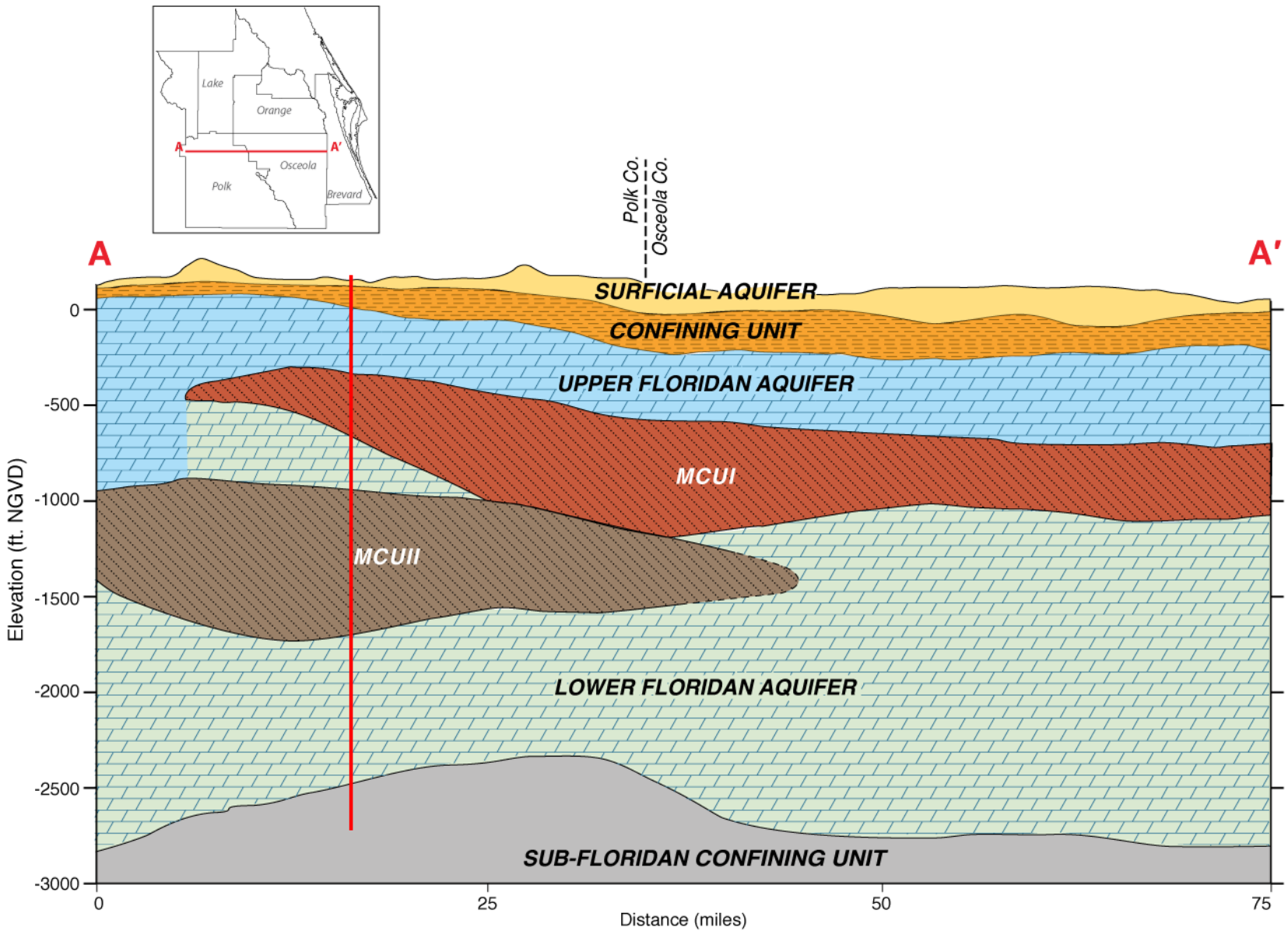
Central Florida Water Initiative (CFWI)

A collaborative regional water supply planning effort to protect, develop, conserve and restore central Florida's water resources




Proposed LFA Site
Under Construction LFA Site
Existing LFA Site
ROMP Number & Name - Proposed LFA Coring & Testing Site
ROMP Number & Name - Under Construction LFA Coring & Testing Site
ROMP Number & Name - Existing LFA Coring & Testing Site
WMD Boundary
0 5 10 Miles
ROMP 88 - Rock Ridge (Green Swamp West)
PCU NERUSA
ROMP 88.5 - Northeast Polk
Romp 76 - Polk City
PCU NWRWWTF
Romp 74X - Davenport
Auburndale - ROMP 75
Lakeland - N882
PCU Central Regional WPF
Lake Wales - P280
SE Polk - N905
Romp 45.5 - Progress Energy
Crooked Lake - P280
SE Polk Wellfield
ROMP 46 - Baird
Frostproof - P280
SFWMD
SJRWMD
SWFWMD
Polk
Hillsborough
Lake
Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

Generalized Hydrogeologic Cross Section A–A′



Project Overview

- Three-year testing program in two phases
- Phase 1
  - Initial drilling and testing
  - Installation of multiple monitor wells
- Phase 2
  - Drilling and testing of test/production wells
  - Aquifer performance tests:
    - Aquifer characteristics
    - Water quality

Versa-Drill coring rig

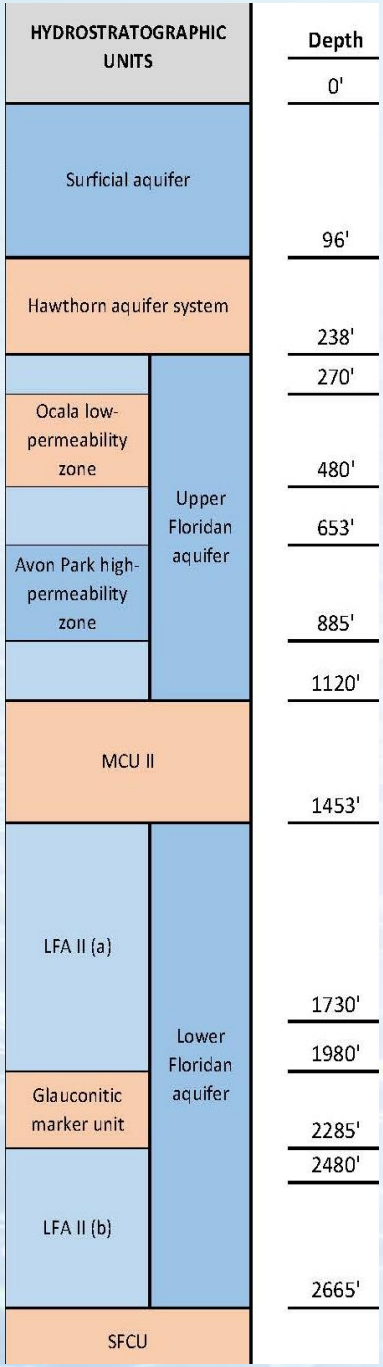
Crooked Lake LFA Site Update

- Project duration January 2017 – January 2018
- Monitoring well constructed
  - Lower Floridan aquifer (LFA) within Middle Confining Unit II (MCU II)
  - Upper Floridan aquifer (UFA)
  - Surficial aquifer (SA)

LFA monitoring well

Crooked Lake Update

- Testing completed
  - Coring
  - Packer tests
  - Water quality testing
  - Geophysical logging
- United States Geological Survey (USGS) Optical Borehole Imaging completed
- USGS Age Dating – Fall 2018



typical production zone

confinement between UFA and LFA

1st production zone from the LFA

confinement between upper LFA production zone and lower potential injection zone

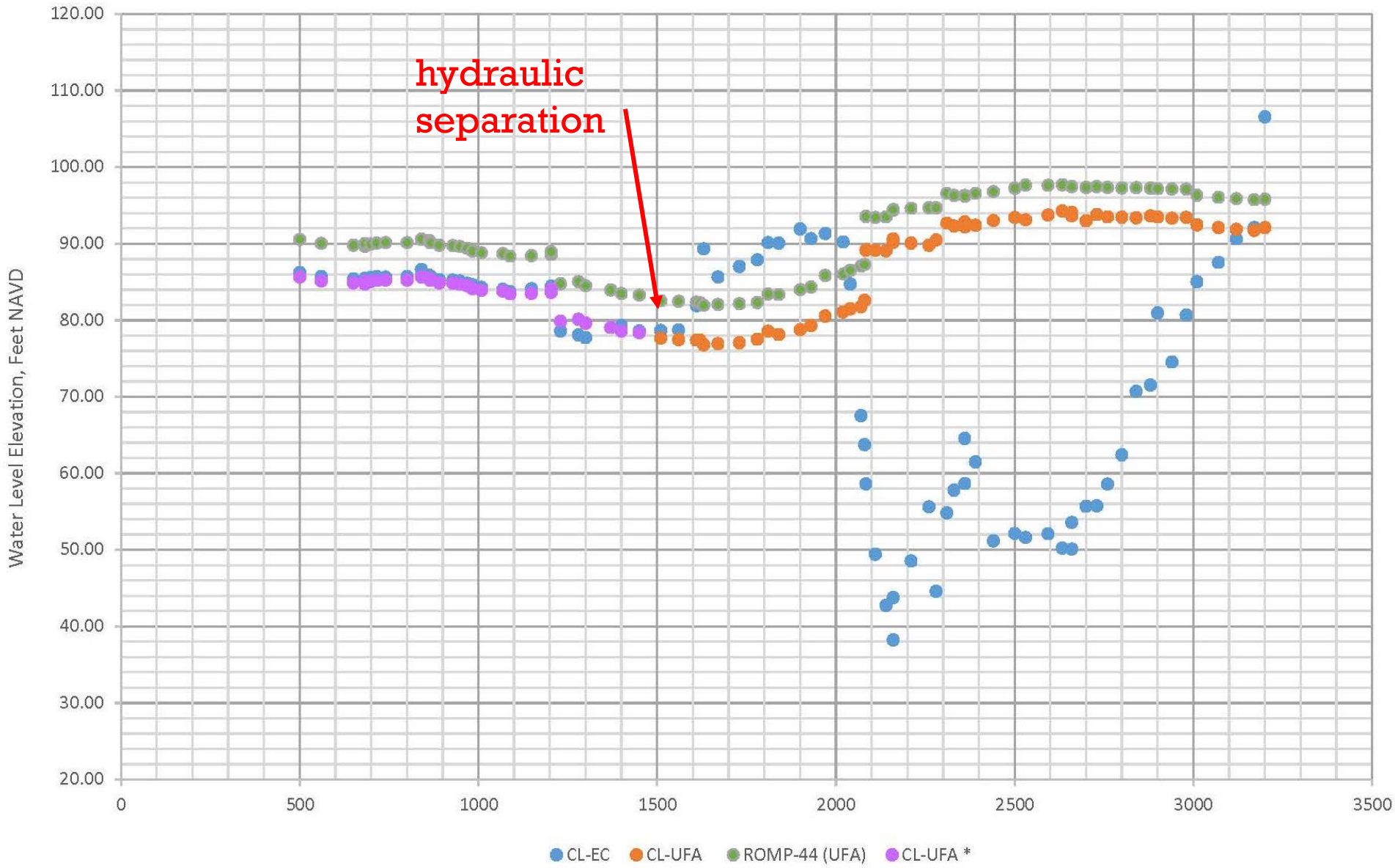
Upper Depth (ft bls)	Lower Depth (ft bls)	Temp (°C)	Specific Cond. (µS/cm)	pH	TDS (mg/L)
30	50	20.7	75	6.0	-
270	400	20.2	390	7.9	180
-	872	26.0	324	7.9	170
-	968	27.5	295	8.3	140
1,270	1,300	29.5	2,567	7.7	1,667
1,450	1,480	24.0	1,480	7.8	1,300
1,590	1,620	29.6	3,624	7.5	2,360
-	1,930	26.7	2,698	7.5	2,600
2,010	2,040	29.9	3,905	7.7	2,539
-	2,070	25.5	4,004	6.3	2,603
2,130	2,160	31.8	18,060	7.8	11,739
-	2,250	26.4	18,561	7.3	12,065
2,310	2,360	29.7	4,179	8.1	2,728
2,430	2,460	31.9	2,710	7.8	1,762
2,530	2,560	33.3	10,878	7.0	7,070
2,630	2,660	23.2	11,052	7.3	7,186
2,900	3,000	25.6	25,784	6.9	16,758
-	2,800	23.5	103,504	6.9	67,315
2,400	2,490	28.1	9,134	7.9	5,934
2,050	2,630	30.3	4,482	9.3	2,911
1,450	1,835	27.8	3,802	7.8	2,468

low brackish water quality

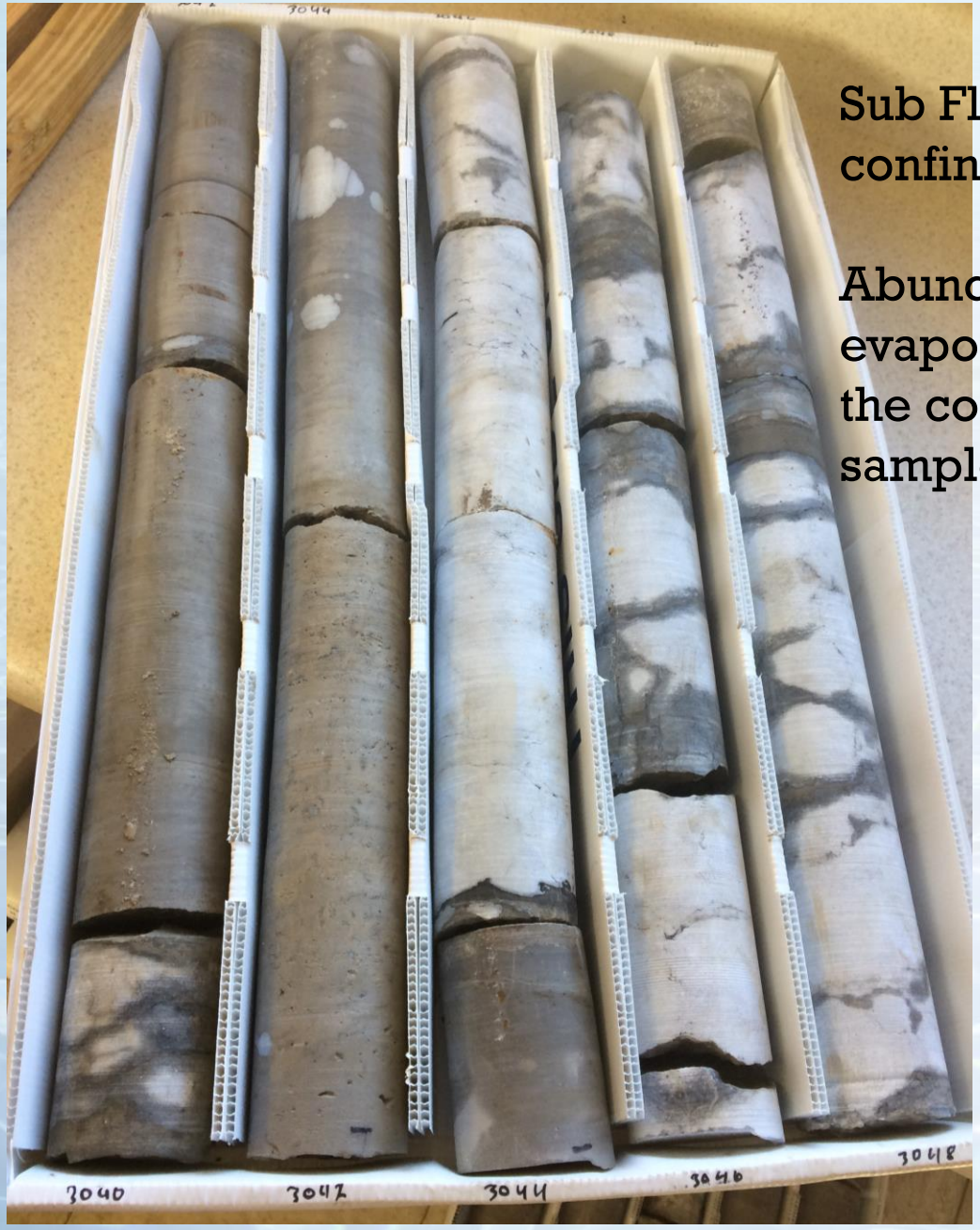
Upper Depth (ft bls)	Lower Depth (ft bls)	Chloride (mg/L)	Sulfate (mg/L)
30	50	6.4	3.2
270	400	7.9	0.75
-	870	7.5	3.2
-	968	7.1	8.5
1,270	1,300	13	1,600
1,450	1,480	9.8	740
1,590	1,620	47	2,300
-	1,930	35	1,700
2,010	2,040	213	2,250
-	2,070	77	2,200
2,130	2,160	4,700	3,700
-	2,250	5,800	2,400
2,310	2,360	220	2,700
2,430	2,460	2,300	2,500
2,530	2,560	2,500	2,600
2,630	2,660	2,700	2,700
2,900	3,000	11,000	2,200
-	2,800	49,000	3,300
2,400	2,490	1,900	2,300
2,050	2,630	490	2,100
1,450	1,835	81	2,600

low brackish water quality

Upper Floridan and Lower Floridan Water Level Elevation vs. Corehole Depth - Crooked Lake Wellsite



** CL-UFA water level elevation extrapolated from ROMP-44 water level elevation for same POR*



Sub Floridan confining unit

Abundant evaporites in the core sample

Sample storage

Frostproof LFA Well Site

ROWE DRILLING COMPANY WATER SUPPLY CONTRACTORS

JACOBS®

Frostproof LFA Site Status

- Phase 1 project started January 2018
- Monitoring well constructed
  - Upper Floridan aquifer (UFA)
  - Surficial aquifer (SA)
- Dual zone LFA monitoring well under construction

Frostproof Status

- Testing ongoing
  - Coring
  - Packer tests
  - Water quality testing
  - Geophysical logging
- USGS Optical Borehole Imaging ongoing

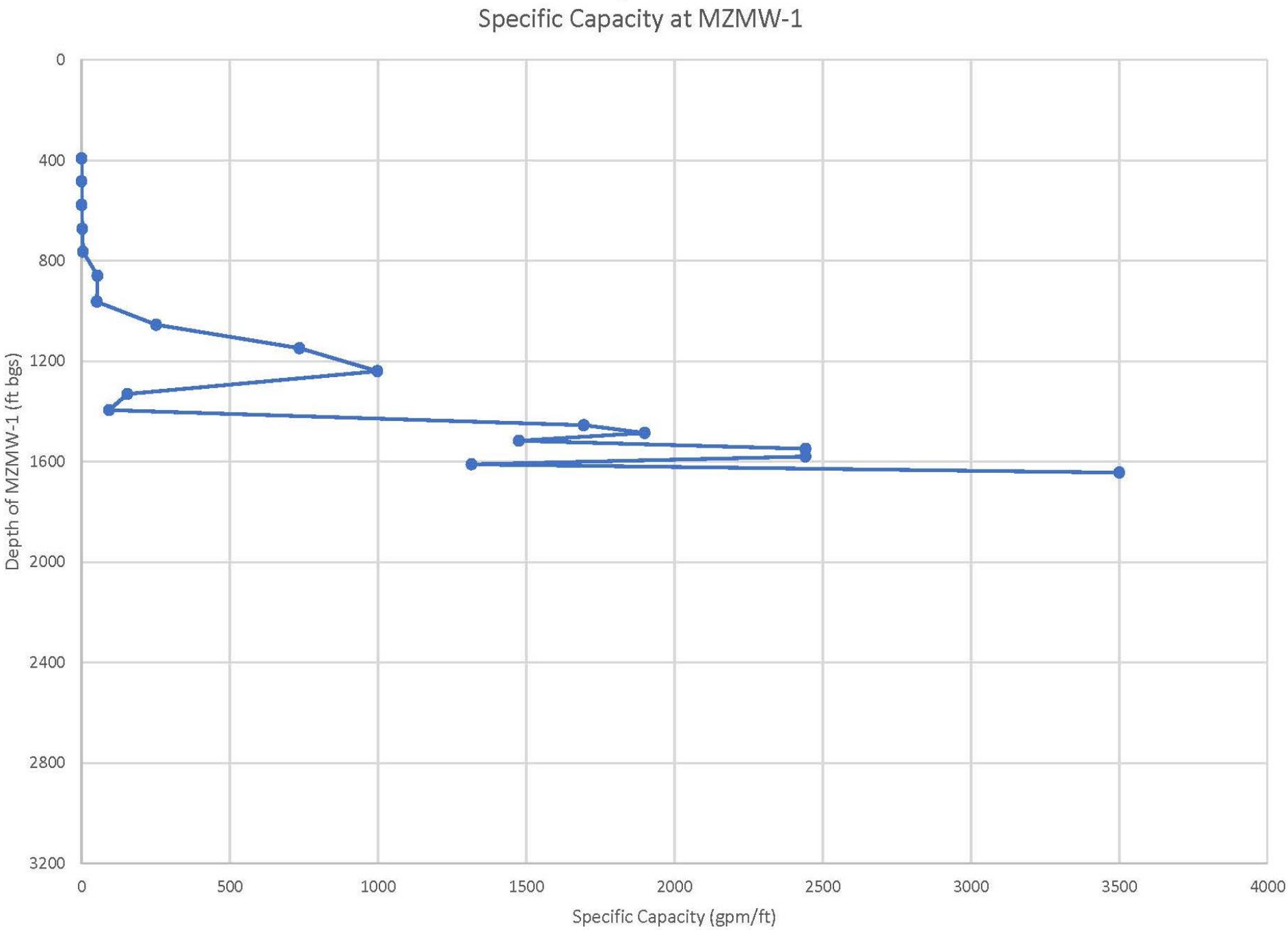
Depth (ft bgs)	Static WL (ft btoc)	Drawdown (ft)	Discharge (gpm)	Specific Capacity (gpm/ft)
392	94	110.4	31	0.3
484	89.3	117.7	38	0.3
578	90.2	95.8	58	0.6
673	92.66	37.99	103	2.7
764	90.2	27.13	129	5.0
860	90.2	2.89	156	54.0
963	88.61	3.24	167	51.4
1055	90.62	0.53	133	251.8
1149	98.6	0.19	140	735.3
1240	91.46	0.14	140	997.9
1331	90.94	0.86	133	154.7
1395	90.7	1.59	148	93.1
1455	94.12	0.08	136	1694
1486	95.54	0.09	171	1900
1517	94	0.12	177	1475
1549	92.68	0.07	175	2442
1580	92.56	0.07	171	2442
1611	92.47	0.13	171	1315
1644	92.75	0.05	175	3500

Production well capacity

Depth (ft bgs)	Chloride (mg/L)	Sulfate (mg/L)	TDS (mg/L)
673	26	1.61	<10
764	103	1.42	194
860	6.61	1.32	222
963	12	1.21	74
1055	8.32	1.35	172
1148	11.3	3.71	186
1240	8.75	7.66	198
1331	8.89	25.8	232
1395	9.37	41.2	230
1455	8.87	45.5	236
1486	8.97	56.9	258
1517	9.59	44.8	270
1549	10.1	37.5	256
1580	11.0	45.1	266
1611	18.7	155	422
1644	17.4	97.6	334

Lower Floridan aquifer (upper production zone) yields:

- low chlorides
- increasing sulfates
- increasing TDS


Specific Capacity at MZMW-1
Depth of MZMW-1 (ft bgs)
0
400
800
1200
1600
2000
2400
2800
3200
0
500
1000
1500
2000
2500
3000
3500
4000
Specific Capacity (gpm/ft)

Core Sample #1
1st appearance of evaporites

Sample inspection

Gypsum

Lake Wales LFA Site Status

- Phase 1 project start November 2018 proposed
- Phase 1 monitoring well construction
  - Upper Floridan aquifer (UFA)
  - Surficial aquifer (SA)
  - Dual zone LFA

Next Steps at Crooked Lake/Frostproof/Lake Wales

Crooked Lake

- Select contractor for LFA dual zone monitor well
  - Start Fall 2018

Frostproof

- Complete Phase 1
  - Spring 2019
- Initiate Phase 2?
  - Summer 2019

Lake Wales

- Select contractor for Phase 1
  - Start Fall 2018

Upcoming Bids

Release both Sept 7

Mandatory Pre-bid Sept 19th

Communications

- LFA webpage launched July 25, 2017
  - WaterMatters.org/LFA
  - Regular updates
- LFA video
  - Create video #2 FY2018
- Future workshops/Input

QUESTIONS and COMMENTS