



Where is all this water coming from?

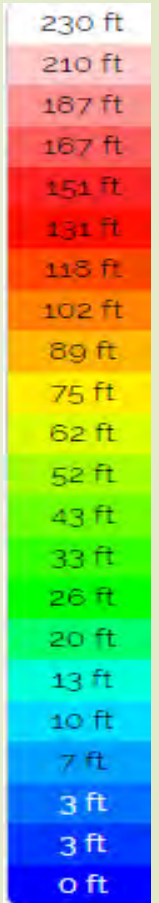
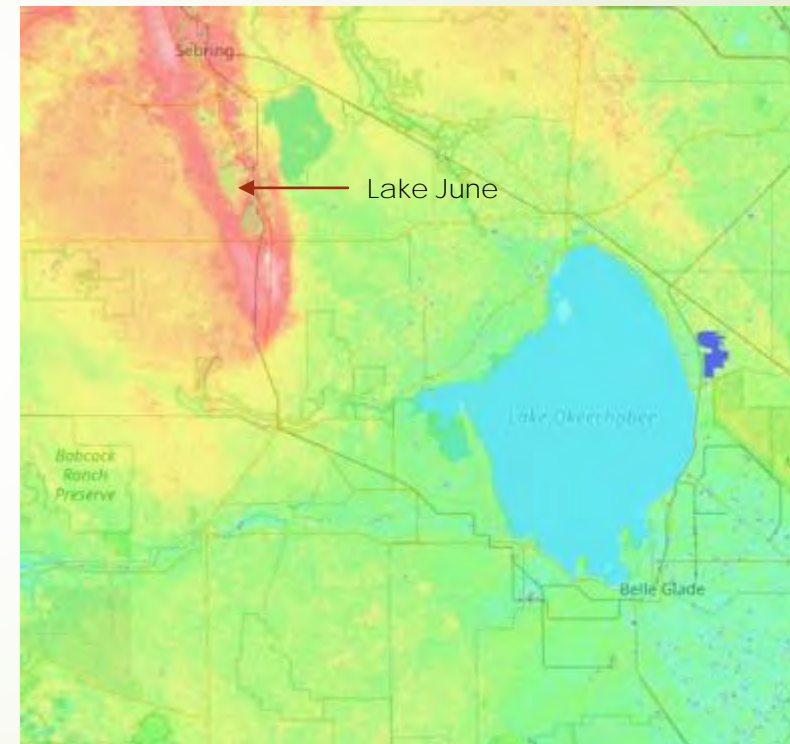
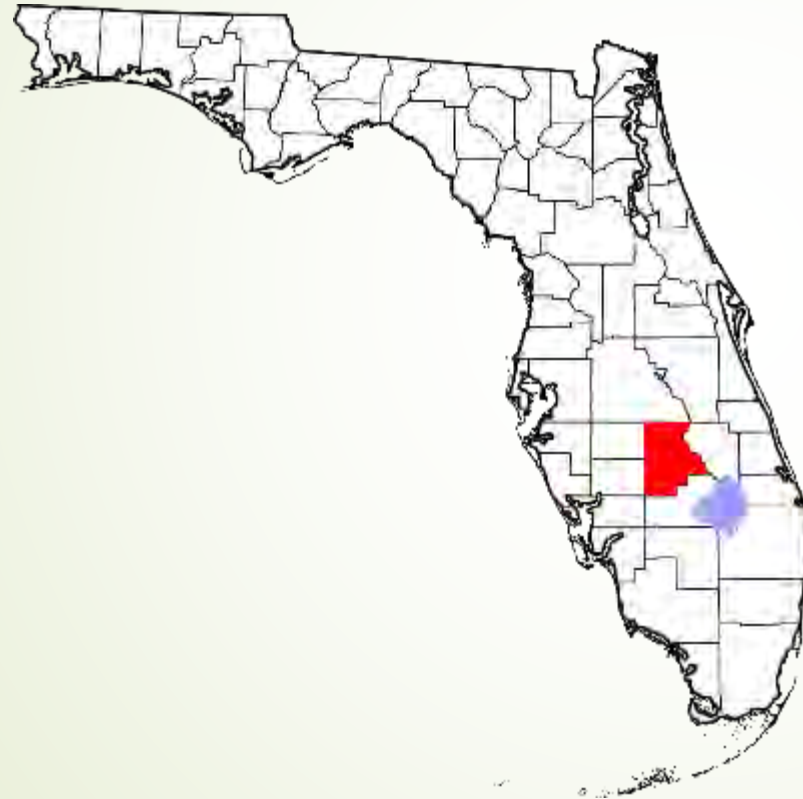
Tim Denison, Environmental Scientist
Johnson Engineering



Lake June in Winter Water Quality Assessment



Lake June is in Highlands County along a ridge northwest of Lake Okeechobee





About Lake June

- ▶ Lake elevation averages about 73 feet (NAVD)
- ▶ Surface area of about 6 square miles
- ▶ Drainage area of about 44 square miles
- ▶ Downstream from Lake Placid, connected by Catfish Creek (both are impaired water bodies)
- ▶ Water quality has declined over past 2 decades
- ▶ Not impaired yet, but nutrients and chlorophyll-a increasing

Popular for Boating and Fishing



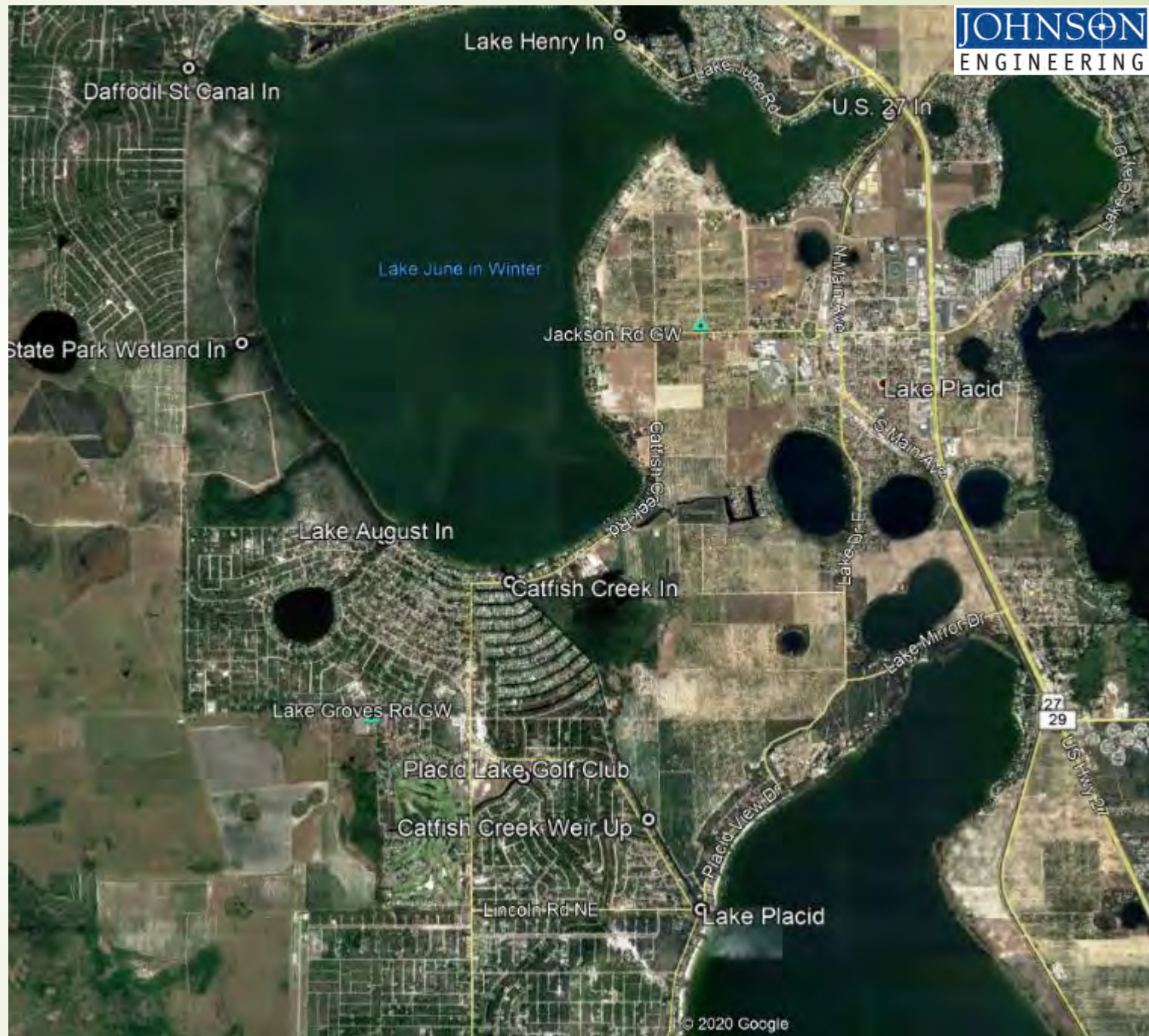


Watershed Evaluation

- In 2018, SWFWMD & Highlands County funded a water quality assessment of Lake June
 1. Evaluate water quality impacts to the lake
 2. Identify stormwater improvement BMPs and natural system restoration projects

Lake June inflow

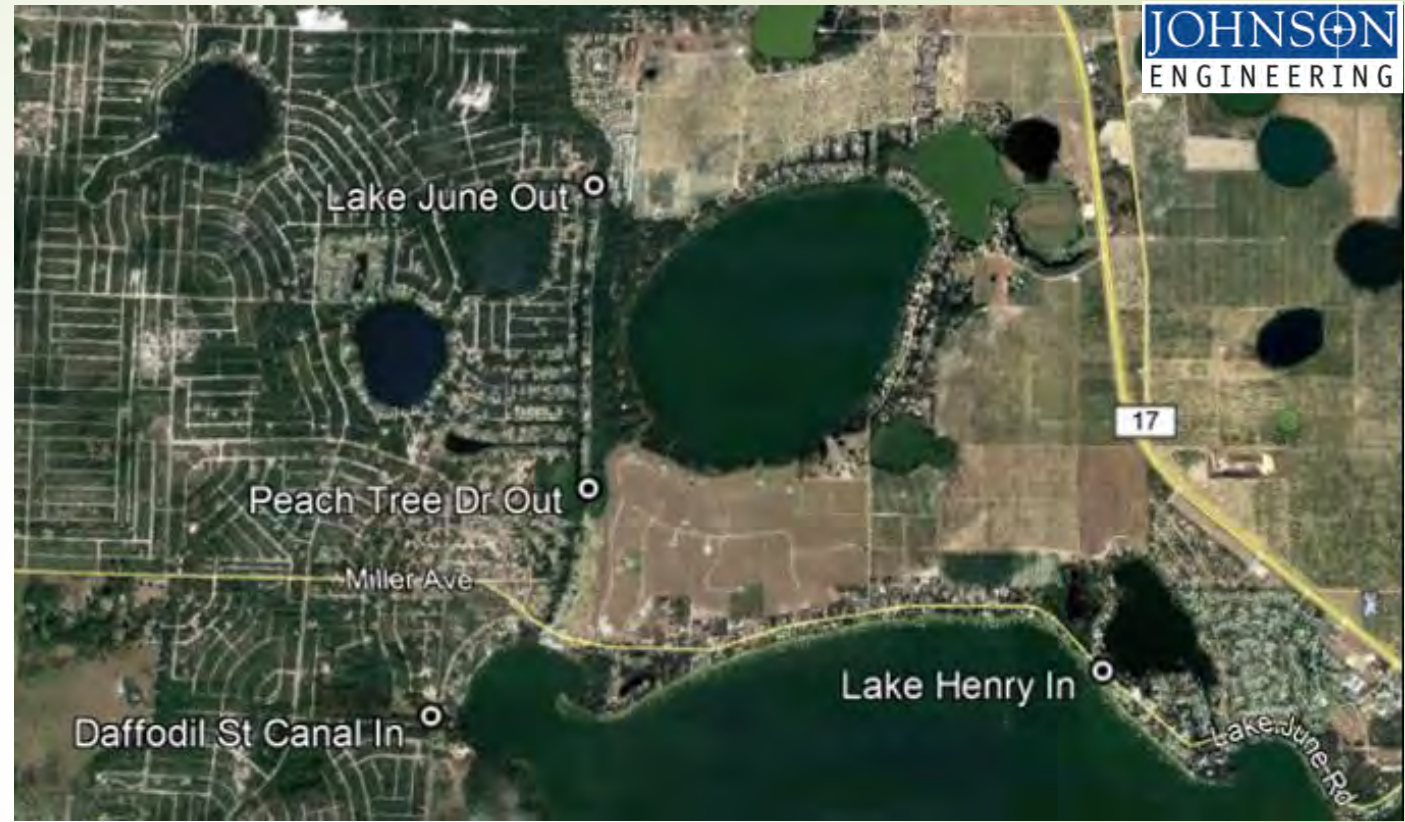
- Lake Henry and US27 to the Northeast
- Agricultural crops to the East
- Lake Placid to the Southeast
- Catfish Creek and residential areas to the South
- Lake August to the Southwest
- Scrub State Park to the West
- Daffodil Canal and residential areas to the Northwest



Lake June outflow

Two structures along Stearns Creek to the North

- G-90 (huge control gates)
- G-91 (small fixed weir)



Water Quality Impact Evaluation

➤ Phased approach

1. Review historic water quality data
2. Identify existing monitoring locations
3. Develop a monitoring plan



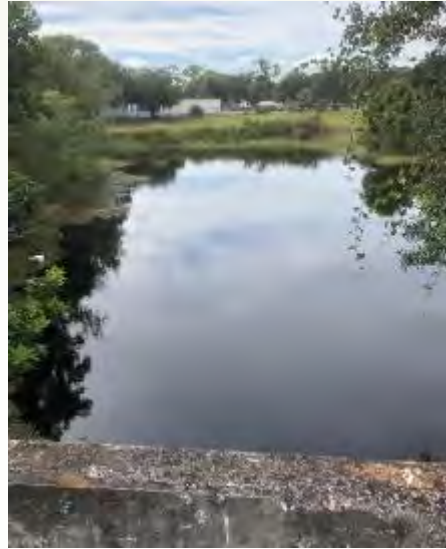
Water Monitoring Plan

- Surface Water Sampling
 - Along Catfish Creek
 - Surrounding Lake June
 - At the outfalls
- Groundwater Sampling
- Water Elevations
- Flow
- Rainfall



Surface Water Inflow Sampling

- Along Catfish Creek
- Around Lake June



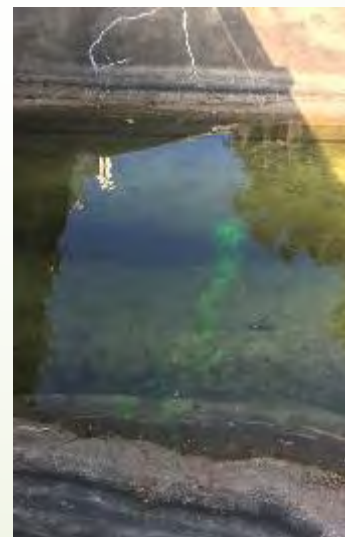
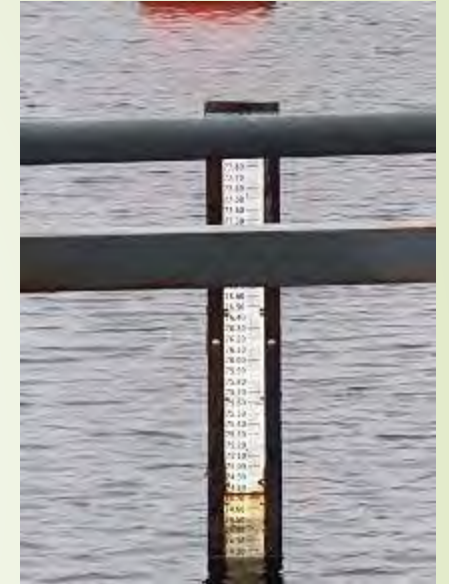
Surface Water Outflow & Groundwater Sampling

- Surface water at the outfall(s)
- Groundwater
 1. Lake Groves (near Catfish Creek)
 2. Jackson Rd (west of the lake)



Water Elevations, Flow, and Rainfall

- Staff gauges
- Water level datalogger
- Flow probes
- Dye velocities
- Weir equations
- Doppler flowmeter
- Tipping bucket



Water Quality Sampling Results

Total Nitrogen (mg/L)					
SAMPLE LOCATIONS	10/11/18	11/5/18	11/27/18	1/24/19	Geometric Mean
Catfish Creek In	1.43	2.93	NS	3.15	2.36
Catfish Creek Weir Up	2.25	0.58	0.58	NS	0.91
Daffodil St. Canal In	0.82	1.17	1.14	1.23	1.08
<i>Lake August In</i>	<i>0.88</i>	<i>0.84</i>	<i>0.89</i>	<i>1.57</i>	<i>1.01</i>
<i>Lake Henry In</i>	<i>NS</i>	<i>NS</i>	<i>NS</i>	<i>1.27</i>	<i>1.27</i>
<i>Lake Placid</i>	<i>0.93</i>	<i>NS</i>	<i>NS</i>	<i>NS</i>	<i>0.93</i>
Peach Tree Dr. Out	0.65	0.59	0.67	1.09	0.72
Placid Lake Golf Club	1.00	NS	0.96	1.63	1.16
Scrub State Park Wetland In	1.02	1.10	1.08	1.99	1.25
U.S. 27 In	0.81	NS	NS	NS	0.81
Lake Groves Rd.	0.85	1.63	0.85	1.34	1.12
Jackson Rd.	7.32	1.73	1.74	2.72	2.78
Fresh Streams Water Quality Criteria					≤1.54
Clear Hard Lakes Water Quality Criteria					≤1.05

Total Phosphorus (mg/L)					
SAMPLE LOCATIONS	10/11/18	11/5/18	11/27/18	1/24/19	Geometric Mean
Catfish Creek In	0.04	0.02	NS	0.07	0.04
Catfish Creek Weir Up	0.18	0.03	0.02	NS	0.05
Daffodil St. Canal In	0.08	0.05	0.05	0.09	0.06
<i>Lake August In</i>	<i>0.11</i>	<i>0.09</i>	<i>0.08</i>	<i>0.14</i>	<i>0.10</i>
<i>Lake Henry In</i>	<i>NS</i>	<i>NS</i>	<i>NS</i>	<i>0.02</i>	<i>0.02</i>
<i>Lake Placid</i>	<i>0.03</i>	<i>NS</i>	<i>NS</i>	<i>NS</i>	<i>0.03</i>
Peach Tree Dr. Out	0.02	0.008 *	0.02	0.03	0.02
Placid Lake Golf Club	0.34	NS	0.30	0.33	0.32
Scrub State Park Wetland In	0.75	0.64	0.50	0.47	0.58
U.S. 27 In	0.19	NS	NS	NS	0.19
Lake Groves Rd.	0.10	0.11	0.07	0.13	0.10
Jackson Rd.	0.18	0.19	0.16	0.17	0.17
Fresh Streams Water Quality Criteria					≤0.12
Clear Hard Lakes Water Quality Criteria					≤0.03

Chlorophyll-a (µg/L)					
SAMPLE LOCATIONS	10/11/18	11/5/18	11/27/18	1/24/19	Geometric Mean
Catfish Creek In	31.2	27.7	NS	28.2	29.0
Catfish Creek Weir Up	143	1.5	19.3	NS	15.9
Daffodil St. Canal In	1.2	0.7	1.1	0.9	0.9
<i>Lake August In</i>	<i>0.4</i>	<i>0.4</i>	<i>1.9</i>	<i>0.4</i>	<i>0.6</i>
<i>Lake Henry In</i>	<i>NS</i>	<i>NS</i>	<i>NS</i>	<i>10.5</i>	<i>10.5</i>
<i>Lake Placid</i>	<i>20.1</i>	<i>NS</i>	<i>NS</i>	<i>NS</i>	<i>20.1</i>
Peach Tree Dr. Out	7.2	4.9	5.7	9.2	6.6
Placid Lake Golf Club	19.7	NS	12.0	6.2	11.4
Scrub State Park Wetland In	0.25 *	0.25 *	0.25 *	0.4	0.3
U.S. 27 In	14.4	NS	NS	NS	14.4
Fresh Streams Water Quality Criteria					≤20
Clear Hard Lakes Water Quality Criteria					≤20

Water Quality – Total Nitrogen (mg/L)



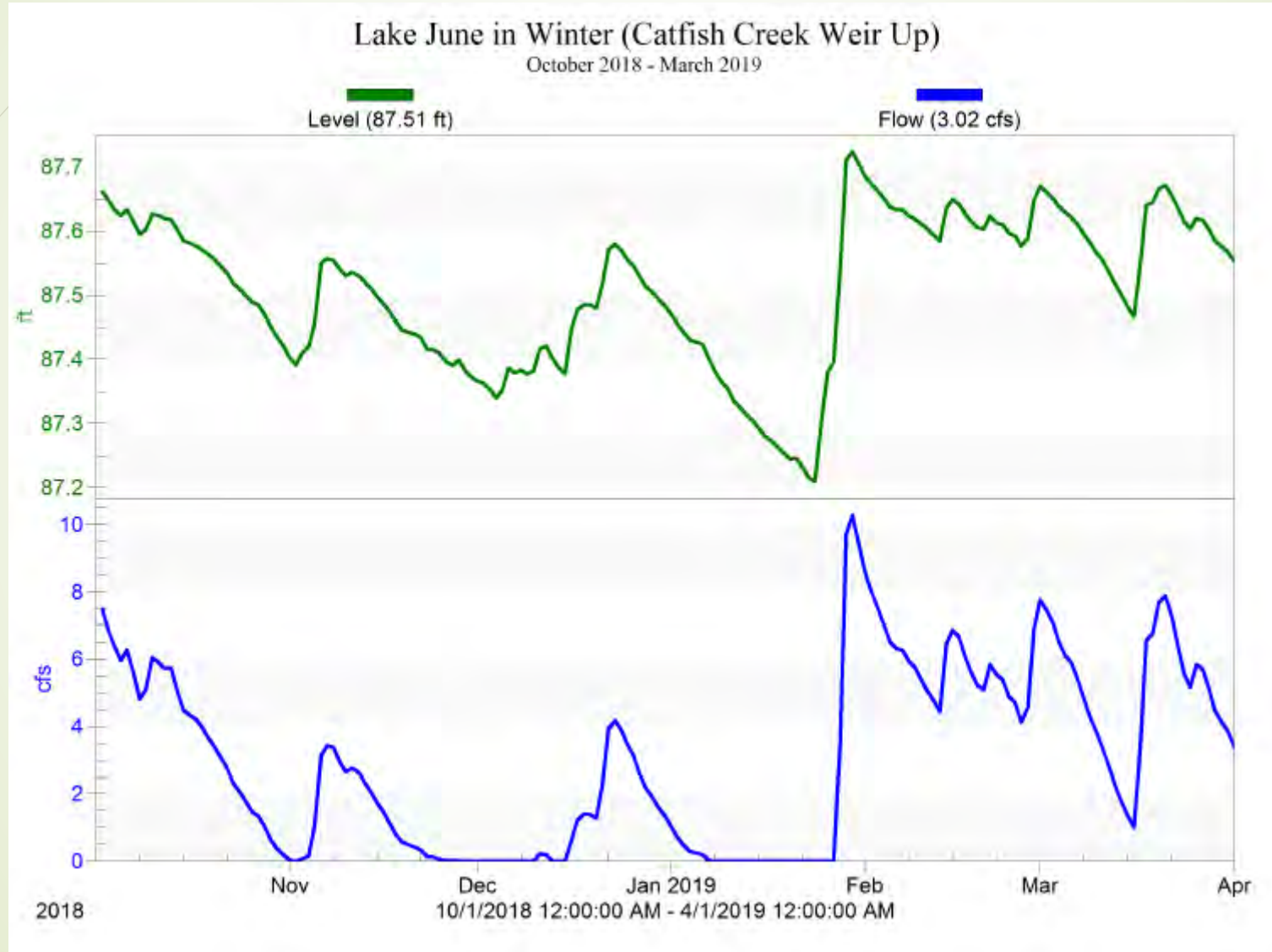
Water Quality – Total Phosphorus (mg/L)



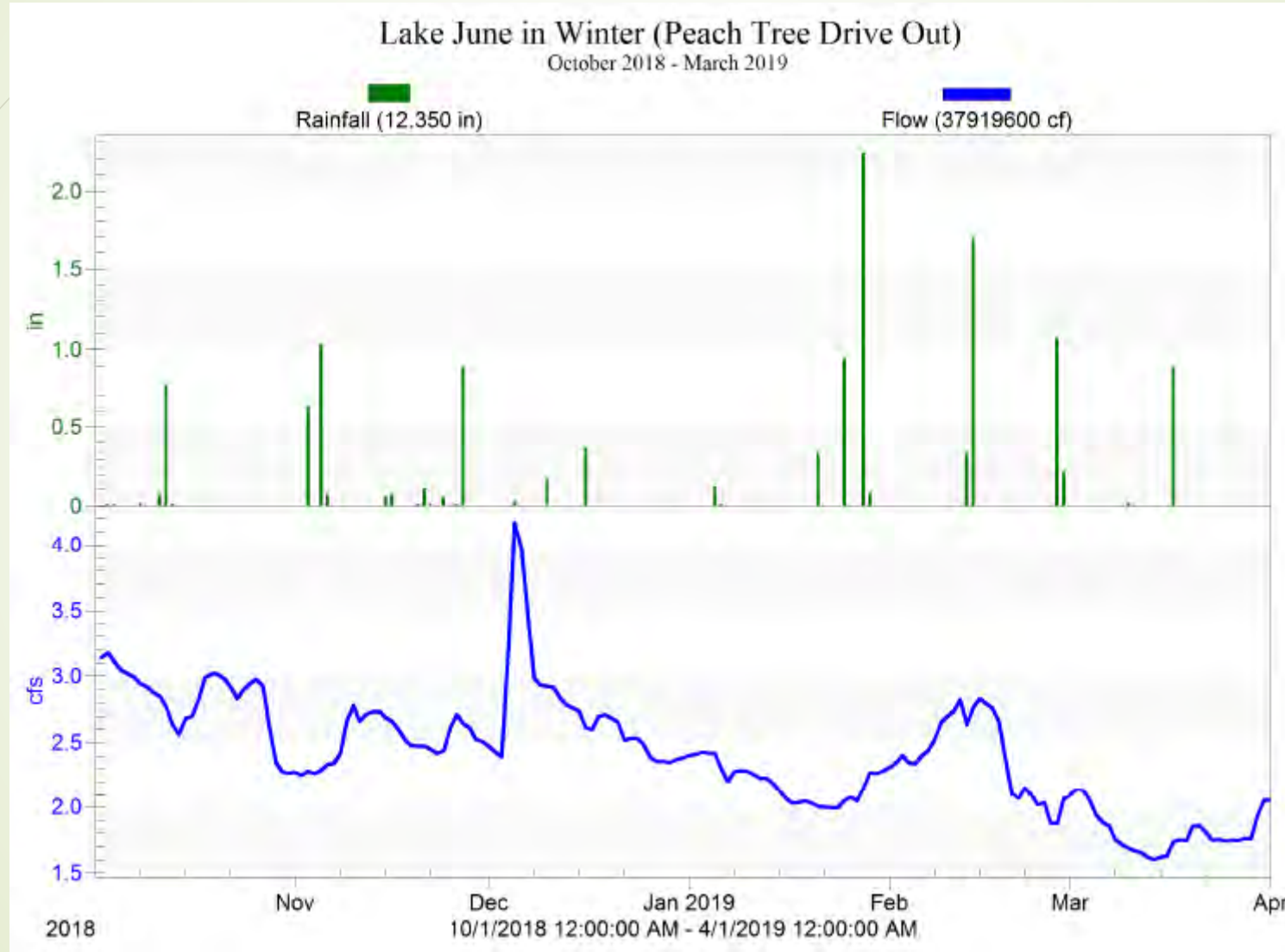
Water Quality – Chlorophyll-a ($\mu\text{g/L}$)



Catfish Creek Water Level and Inflow



Lake June Rainfall and Outflow

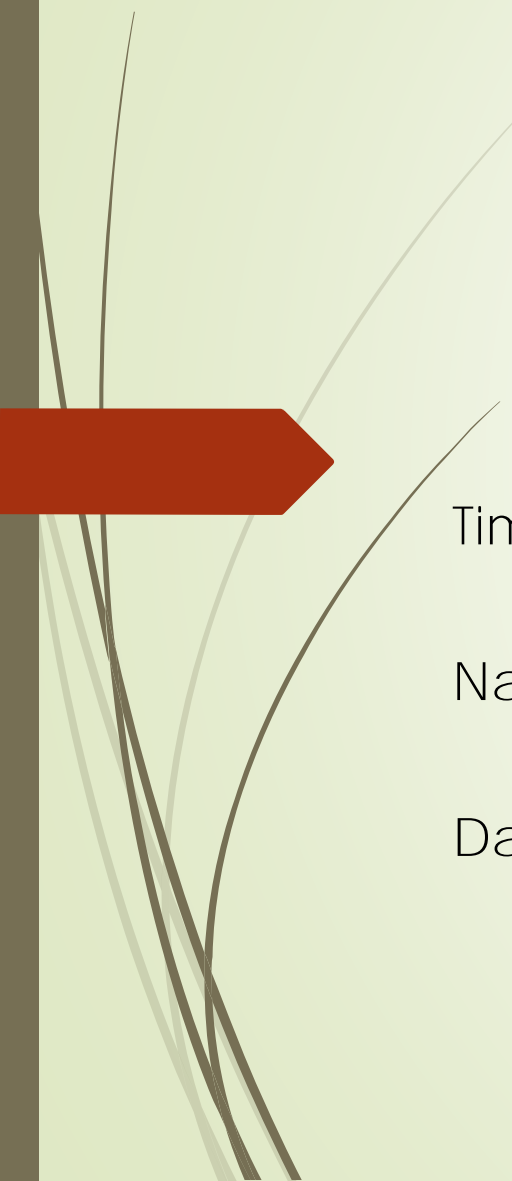




Next Steps...

- Determine surface water vs. groundwater contributions
- Determine nutrient impairment loads
 - Fertilizer runoff?
 - Septic tank leachate?
- Identify stormwater improvement BMPs
- Identify natural system restoration projects

Questions?



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