

# Monitoring Program Status Update and Annual Report

Path Forward Committee  
Meeting  
June 2017





# Annual Report

## > Data through December 2016

- includes prior years' data
- data from 2016 are set apart in the figures with different colored symbols

## > Lake data from several sources

- DWR Falls Lake data
- City of Durham (growing seasons)
- CAAE (only photic zone composite data)
- City of Raleigh will be included in next report (photic zone collection began October 2016)



## > Format follows last year's Annual Report

A hand wearing a white glove holds a white plastic bottle with a white cap. The bottle has a white label with text. The background shows a body of water and a metal structure, possibly a bridge or pier, with trees in the distance. The overall image is in grayscale.

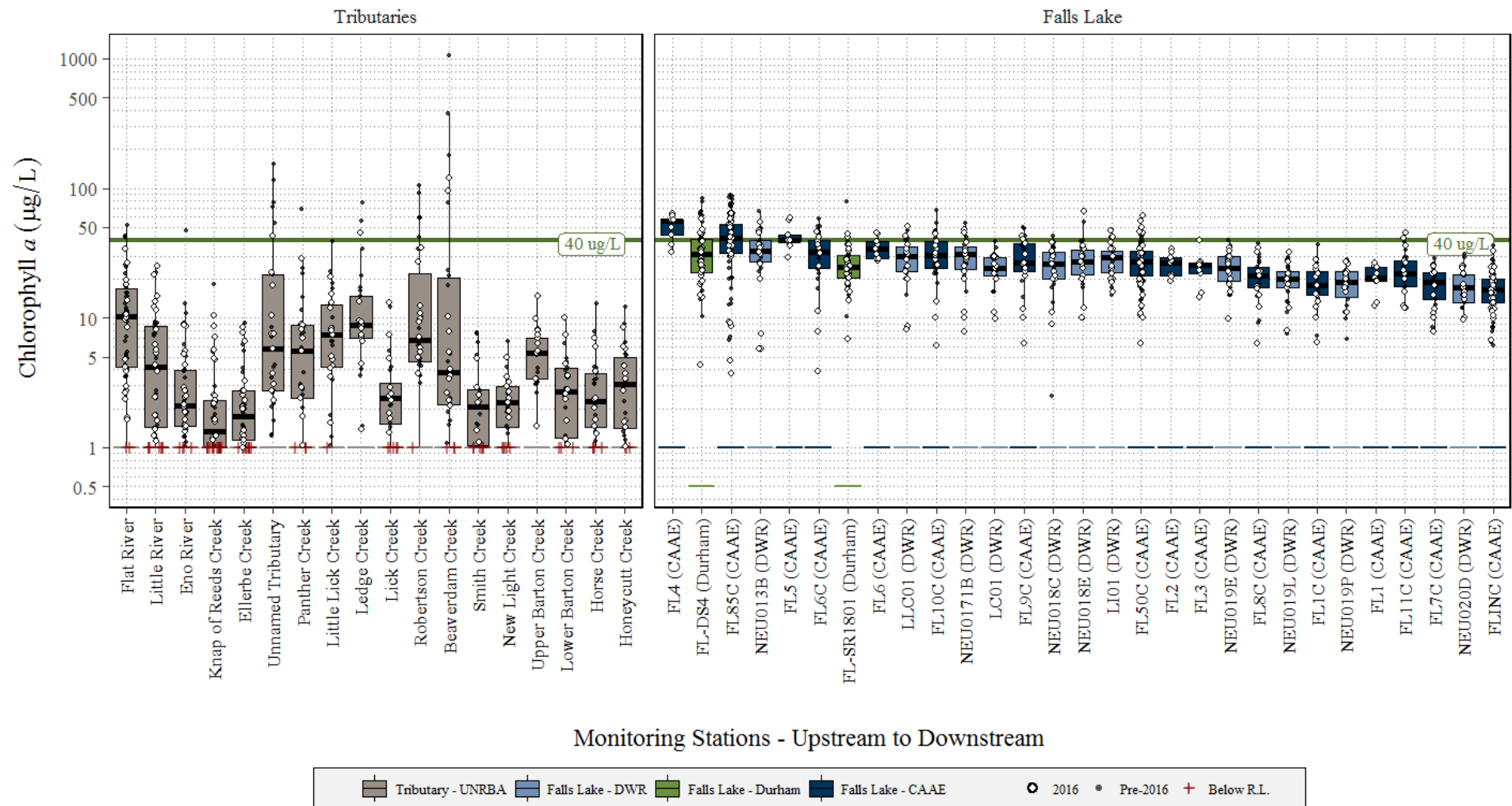
# Routine Monitoring Results

Sample  
#11  
NH3U TKNU P 4

CAUTION: CORROSIVE  
SULFURIC ACID



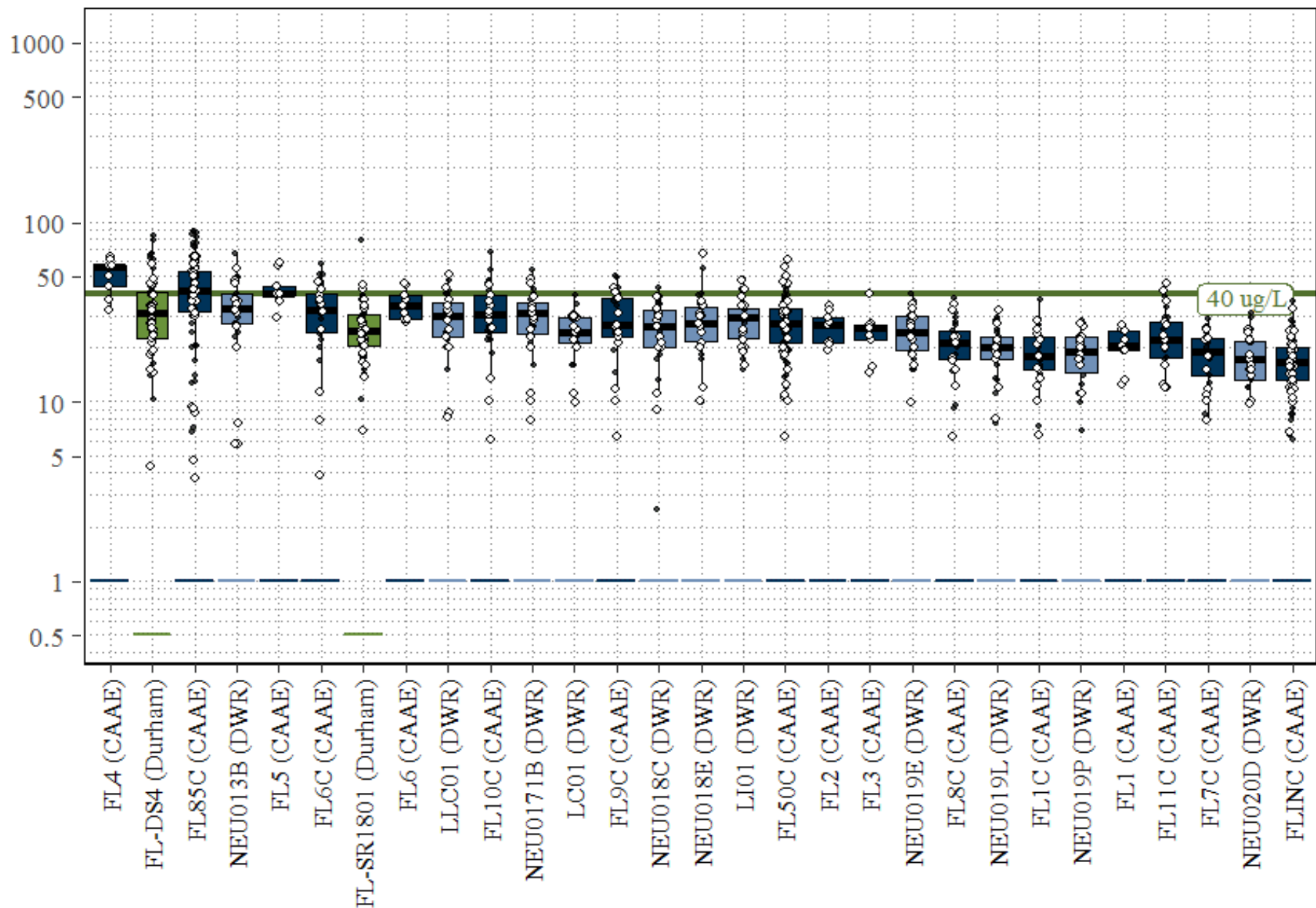
## Chlorophyll *a* (2014-2016)



# Chlorophyll *a* (2014-2016)

Falls Lake

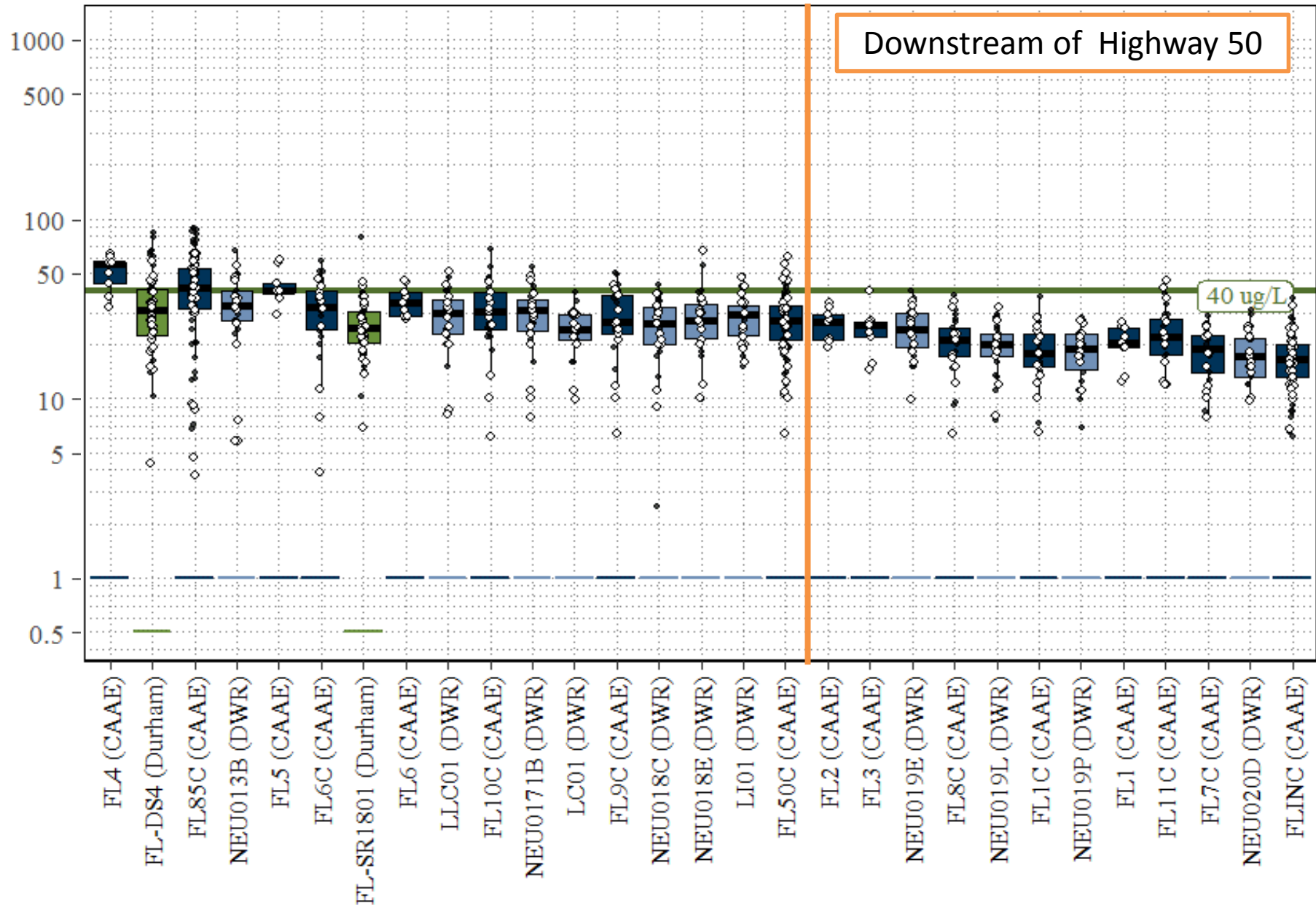
Chlorophyll *a* ( $\mu\text{g/L}$ )



# Chlorophyll *a* (2014-2016)

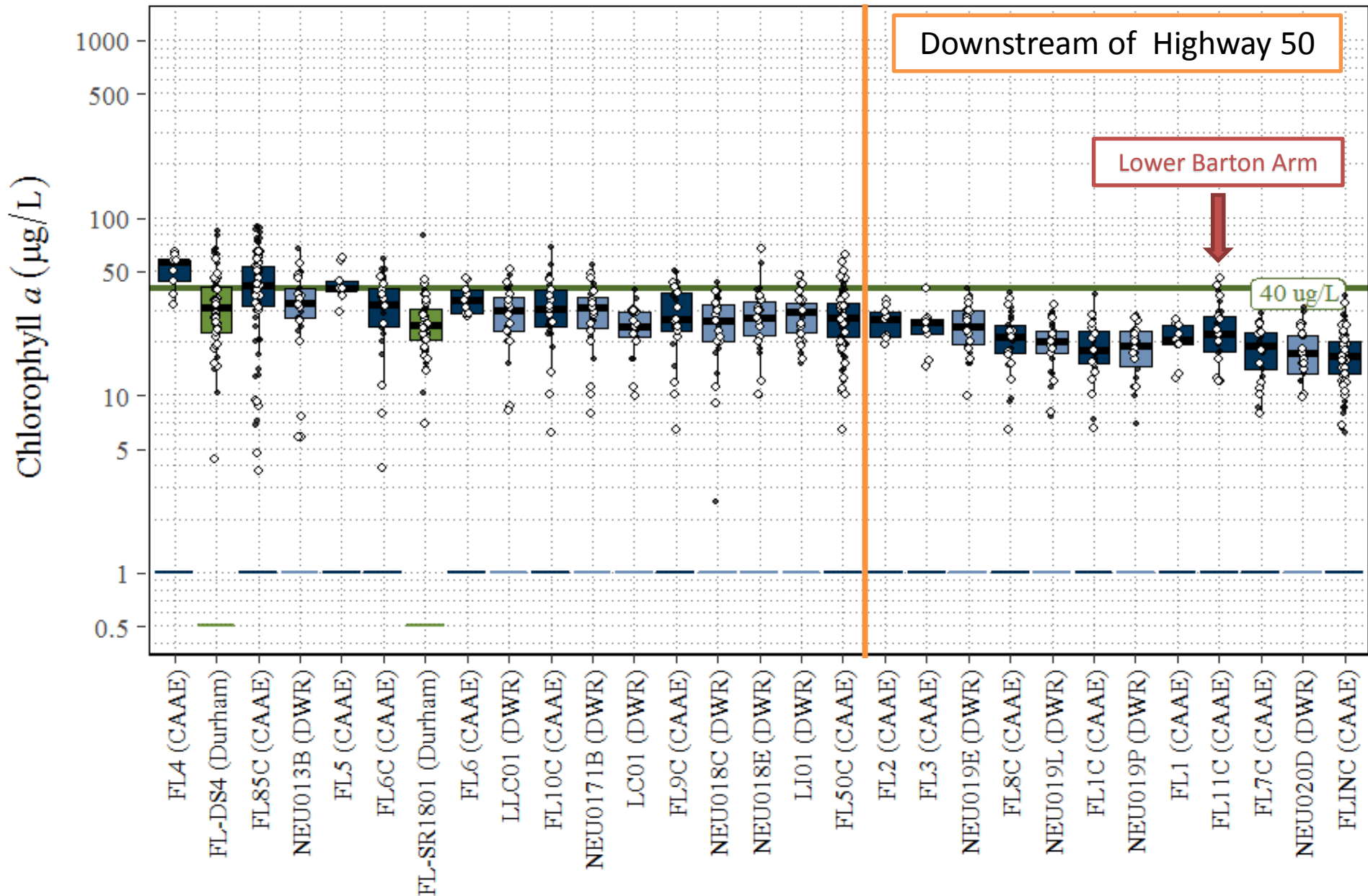
Falls Lake

Chlorophyll *a* ( $\mu\text{g/L}$ )

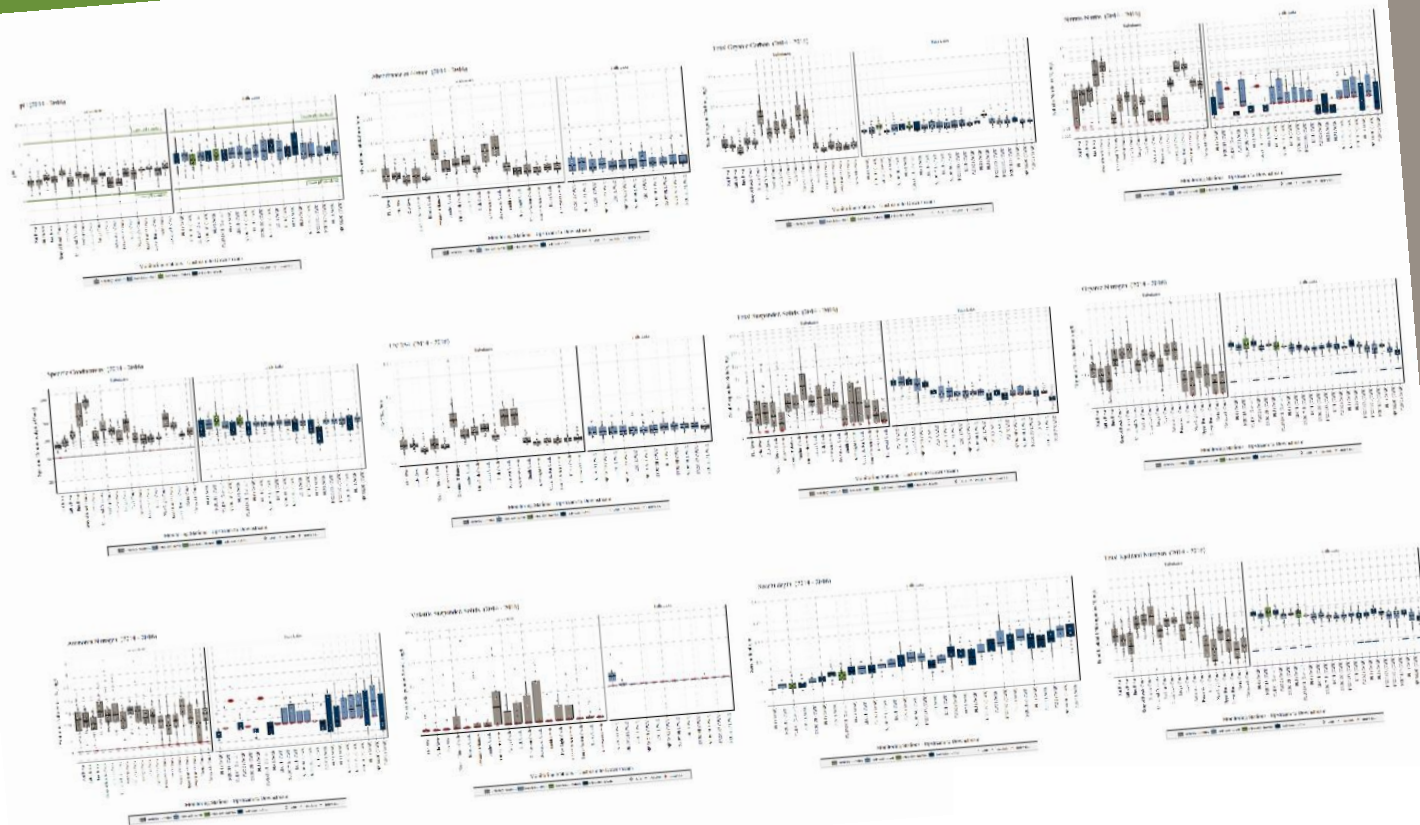


# Chlorophyll *a* (2014-2016)

Falls Lake



Many more...



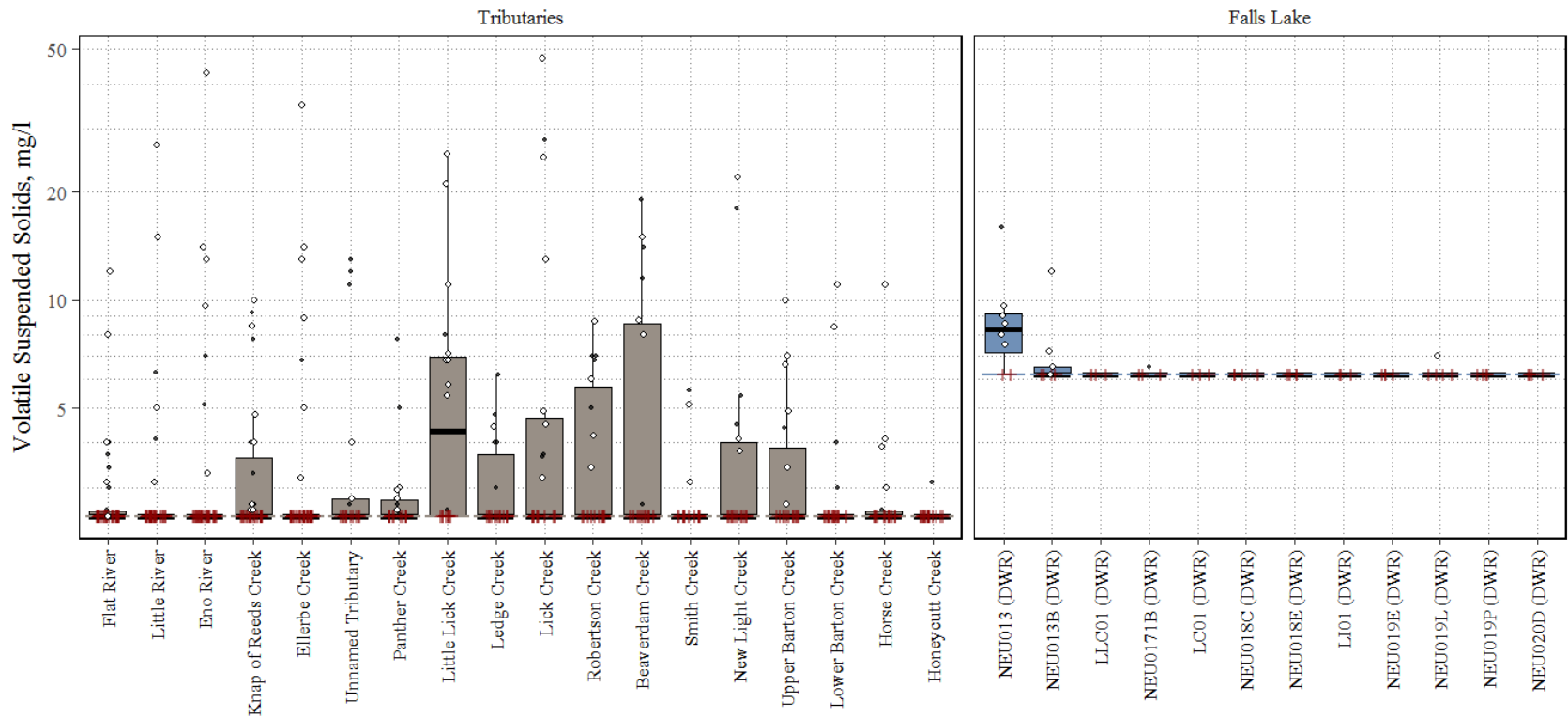




## > Volatile Suspended Solids

- Organic material suspended in the water
- Often below reporting levels

Volatile Suspended Solids (2014 - 2016)



# Special Studies





## > Falls Lake Constriction Study

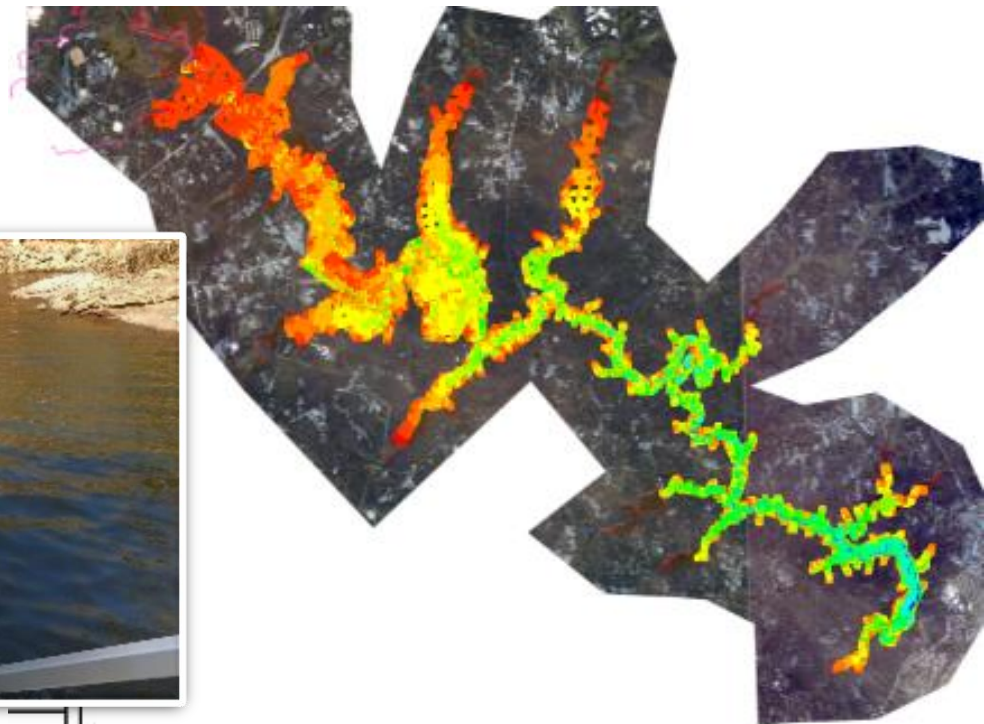
- Funded in FY2016
- The second of two planned events was completed in October following Hurricane Matthew
- Flow measurements through the I-85 and Hwy 50 constrictions were made using Acoustic Doppler Current Profiler technology
- Measured chlorophyll *a*, nutrients, TOC, and TSS at both locations over 3-4 day intervals
- Data will be used in the modeling effort (e.g. hydrodynamic modeling)





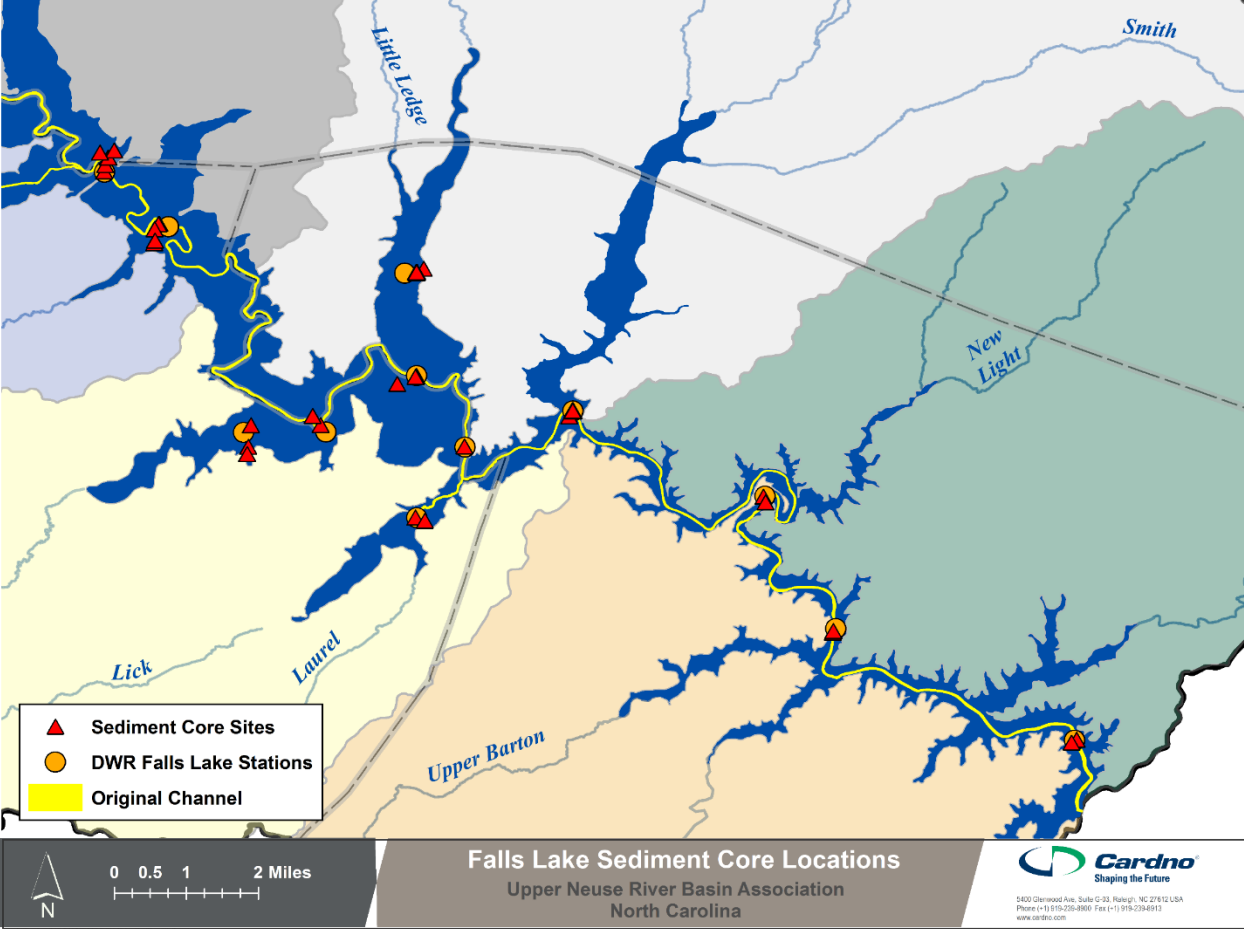
## Bathymetry and Sediment Mapping: Field Work Completed

- > Improve physical representation of the lake in the modeling
- > Started on March 6 & completed April 14.
- > Digitization and mapping are now underway
- > Target completion by June 30





# Sediment Cores & Benthic Nutrient Flux



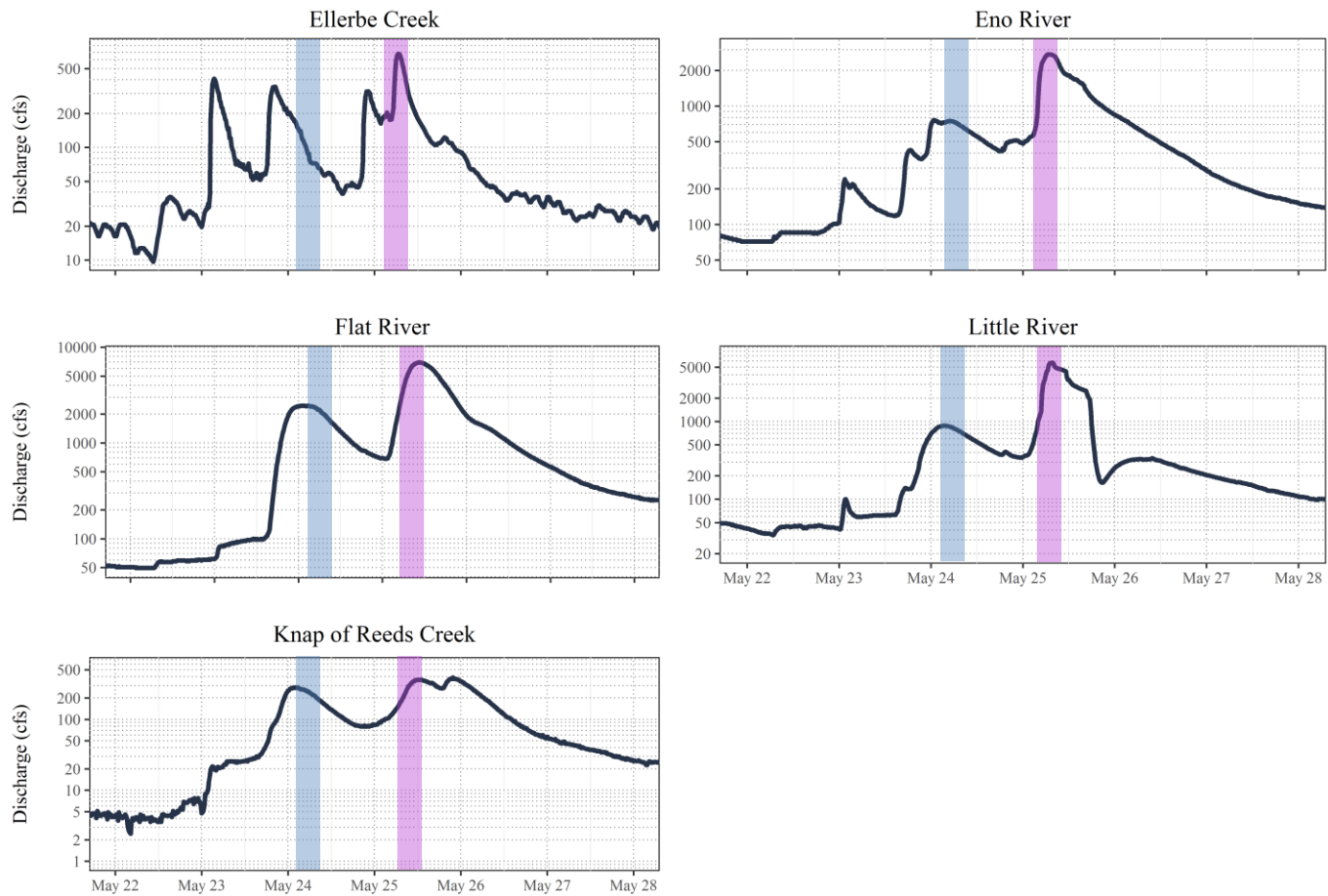


## High Flow Tributary Sampling

- Routine Monitoring often misses large loading events
- UNRBA approved expanded sampling to fill this gap for FY2017
  - Aims for monthly sampling if conditions are present
  - Targets the largest five tributaries
  - Other locations when timing and conditions allow
- Between July and December 2016:
  - No samples were collected in July, November, or December
  - Samples were collected in August, September, and October
- So far in 2017:
  - No samples collected in February or March
  - Samples were collected in January, April, and May
- For FY2017, 5 out of 12 months did not have sample collection and thus some of the budget allocation for this study will not be used.



## Samples collected May 24-25 relative to flow





# Recommendations





## Recommended Adjustments to Monitoring Program

### **Routine Monitoring**

- > UNRBA previously committed to a minimum of four years of routine monitoring
- > Third year of monitoring will be complete in July
- > Monitoring of the third full growing season will be complete in October
- > Recommend continuing Routine Monitoring as is, but consider suspending VSS measurements



## Recommended Adjustments to Monitoring Program

### **Special Studies**

- > Focus ongoing High Flow Sampling on largest five tributaries and aim for monthly sampling (when flows are sufficient)
- > No new Special Studies for FY2018
  - Re-allocate budget from FY2017 Bathymetry and Sediment Mapping to other uses



## Recommended Adjustments to Monitoring Program

### Reporting and Documentation

- > Eliminate formal Interim Report
- > Expand analysis and discussion of findings in Annual Report
  - Seasonal and inter-annual comparisons
  - Relationships among key parameters
  - Benefits/drawbacks of continuing monitoring for 5<sup>th</sup> year
  - Observed variability in data and ramifications
  - Update Monitoring Plan with an addendum rather than full revision



## Recommended Adjustments to Monitoring Program

### **Residual Funding from Prior Years**

- > Close out contracts from FY2015, 2016 and 2017 and make unspent budget available to supplement FY2018 budget (\$800,000)
  - \$10,300 from FY2015
  - \$12,500 from FY2016
  - At least \$60,000 from FY2017
    - (to be finalized following end of contract term)



## Recommended Budget Allocation for FY2018

Reexamination Component	Source of Funding				Total Proposed Budget
	FY2018	FY2015	FY2016	FY2017	
Routine Monitoring	\$ 475,000	-	-	\$ 10,000	\$ 485,000
High Flow Sampling	\$ 25,000	\$ 10,300	\$ 12,500	\$ 20,000	\$ 67,800
Modeling and Reg. Support	\$ 260,000	-	-	\$ 20,000	\$ 280,000
Subject Matter Experts	<u>\$ 40,000</u>	-	-	<u>\$ 10,000</u>	<u>\$ 50,000</u>
<b>Totals</b>	<b>\$ 800,000</b>	<b>\$ 10,300</b>	<b>\$ 12,500</b>	<b>\$ 60,000</b>	<b>\$ 882,800</b>

Relative to FY2017, this allocation provides:

- \$137,727 **less** for Monitoring Program
- \$195,000 **more** for Modeling and Regulatory Support
- \$10,000 **more** for Subject Matter Experts



# Recommended Monitoring Program Distribution for FY2018

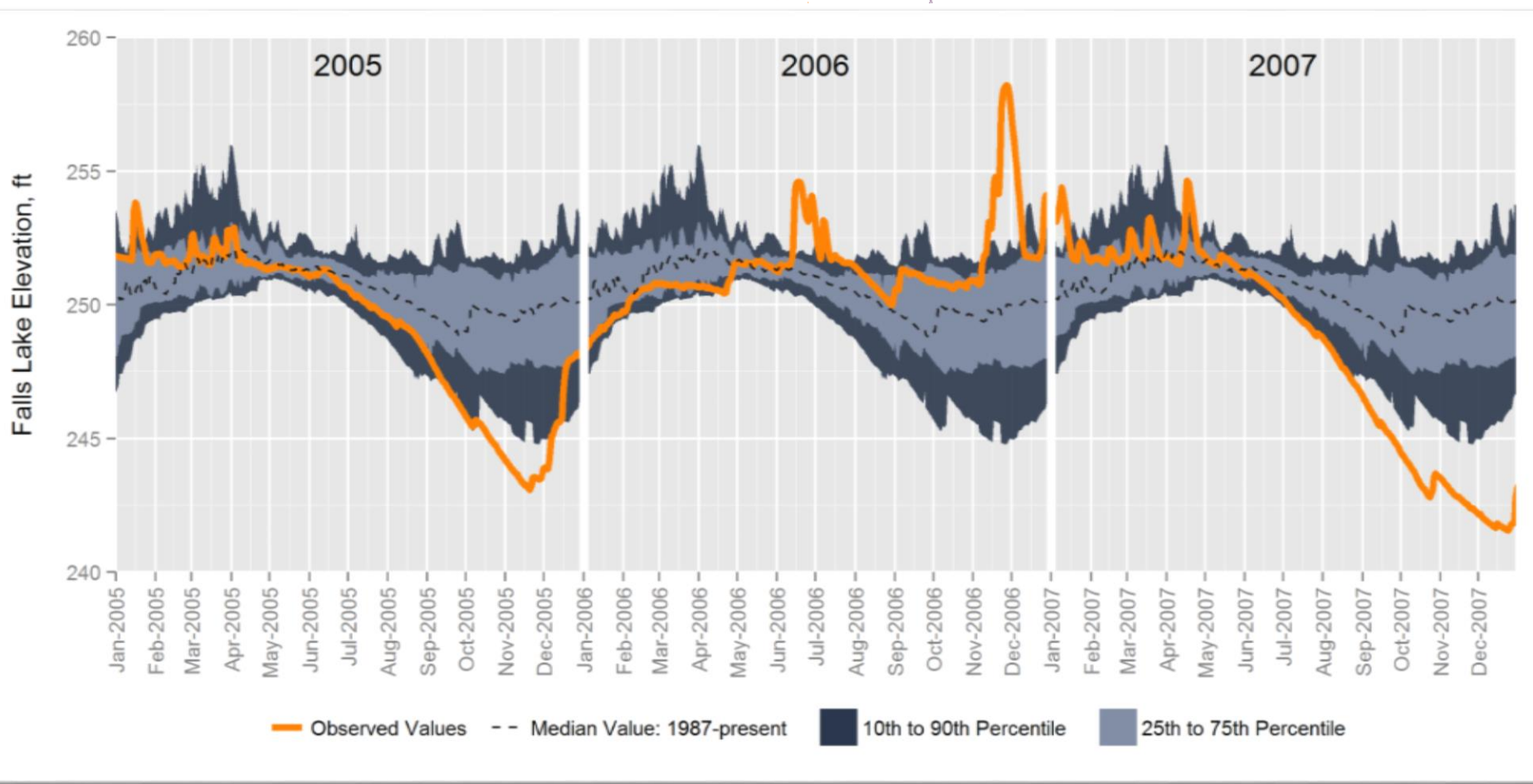
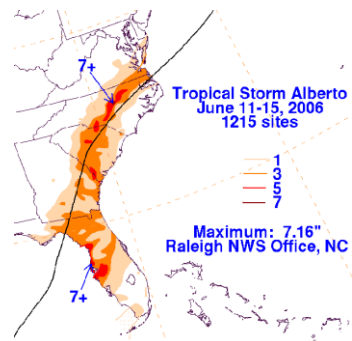
Phase and Task	Consultant Labor	Subcontractor Invoices	Miscellaneous Expenses	Total
<b>Routine Tributary Monitoring</b>				
Lake Loading Stations	\$23,300	\$124,400	\$-	<b>\$147,700</b>
Jurisdictional Stations	\$11,200	\$49,800	\$-	<b>\$61,000</b>
<b>Routine Lake Monitoring</b>				
Routine Lake Monitoring	\$4,800	\$8,400	\$-	<b>\$13,200</b>
<b>Data Management</b>				
Data Management	\$30,900	\$-	\$-	<b>\$30,900</b>
<b>Analysis, Reporting, Communication, Meetings</b>				
Data Analysis	\$57,600	\$-	\$-	<b>\$57,600</b>
Annual Report and Presentations	\$49,900	\$-	\$-	<b>\$49,900</b>
Client Communication, Management, ad hoc	\$42,600	\$-	\$2,700	<b>\$45,300</b>
Meeting Attendance. PFC, BOD, etc.	\$25,300	\$-	\$600	<b>\$25,900</b>
<b>Monitoring Plan Management and QA/QC</b>				
QA/QC of contract lab activities	\$19,200	\$-	\$900	<b>\$20,100</b>
QAPP Updates and Internal QA/QC Review	\$10,200	\$-	\$-	<b>\$10,200</b>
Plan updates; correspondence with PFC, DWR, etc.	\$23,200	\$-	\$-	<b>\$23,200</b>
<b>Special Studies</b>				
High Flow Sampling	<u>\$38,000</u>	<u>\$27,000</u>	<u>\$2,800</u>	<b><u>\$67,800</u></b>
<b>Total for the FY2018 Monitoring Program</b>	<b>\$336,200</b>	<b>\$209,600</b>	<b>\$7,000</b>	<b>\$552,800</b>



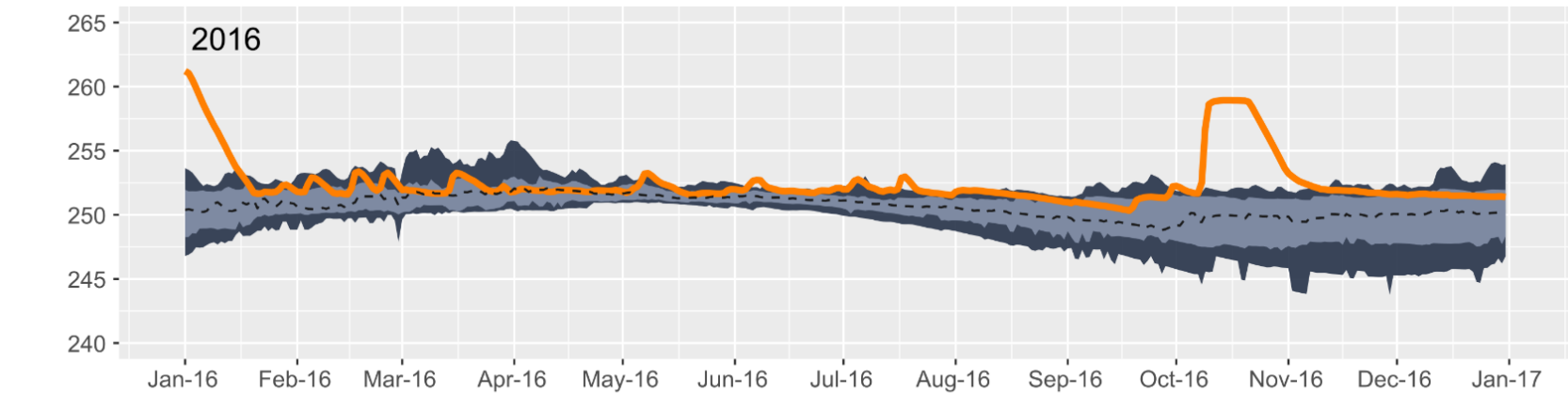
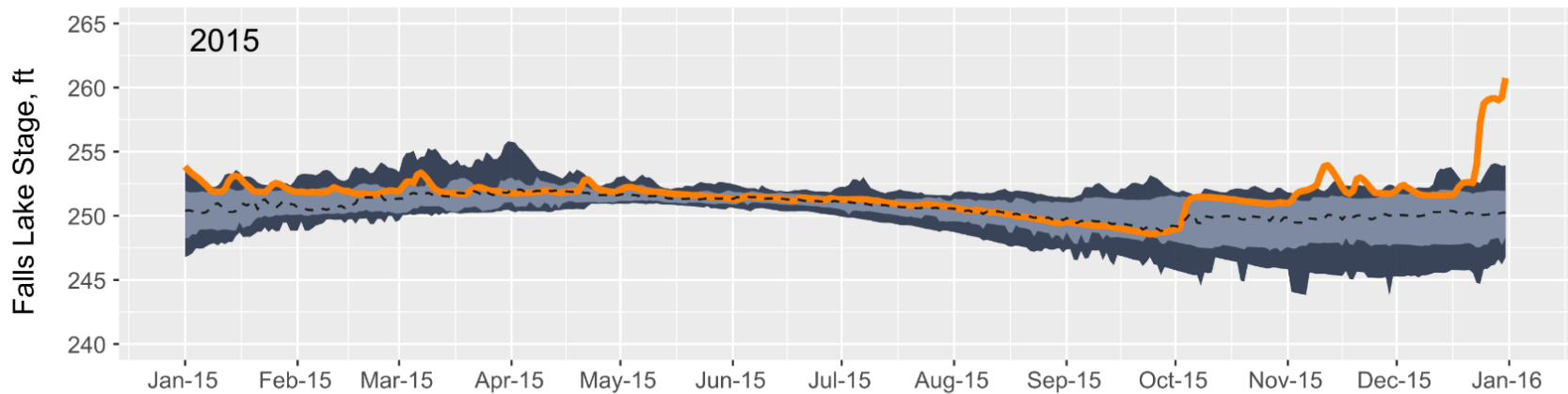
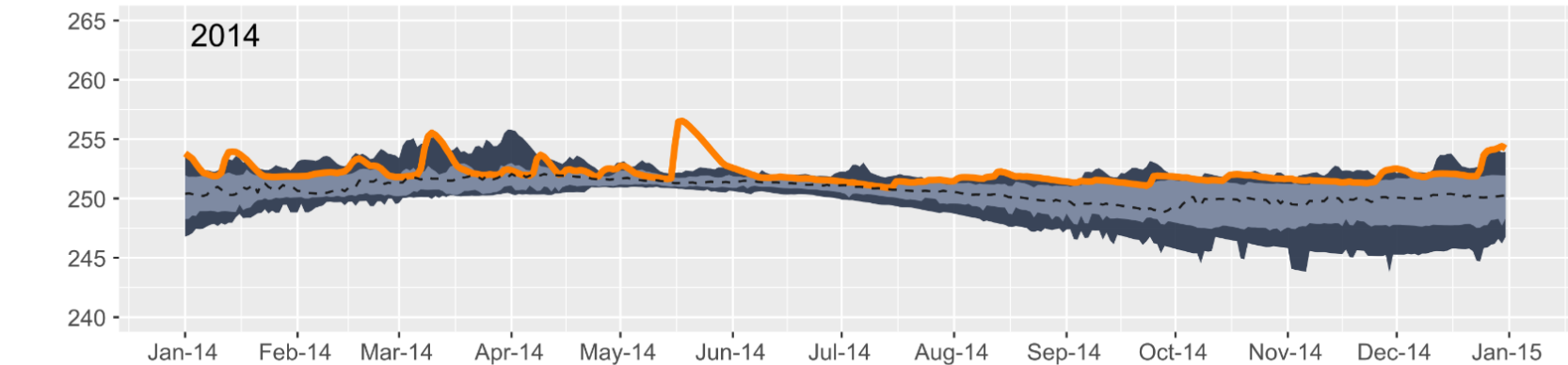




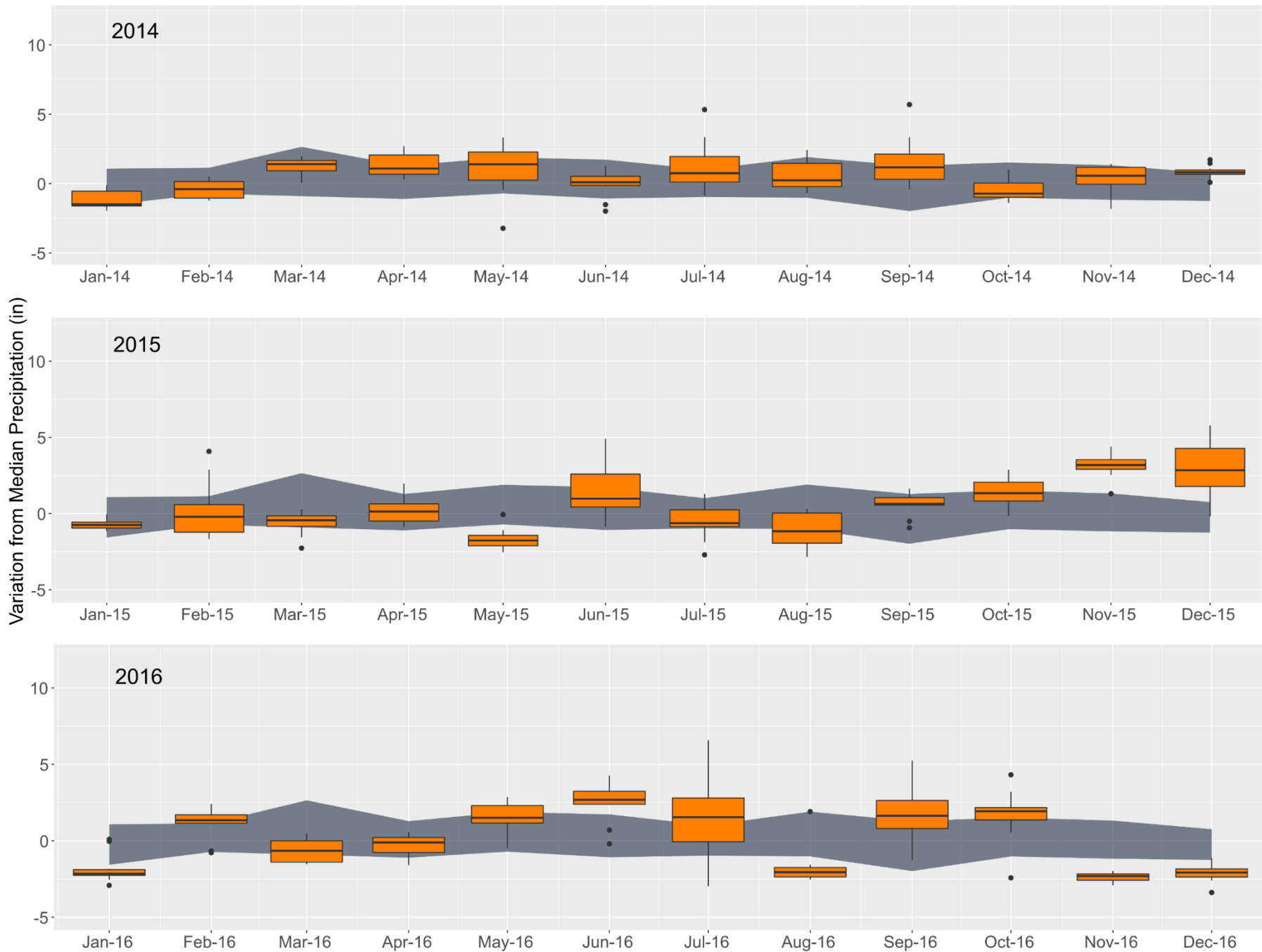
# Falls Lake Water Level (2005-2007)



# Observed Falls Lake Stage Compared to Values from 1987 to the Present

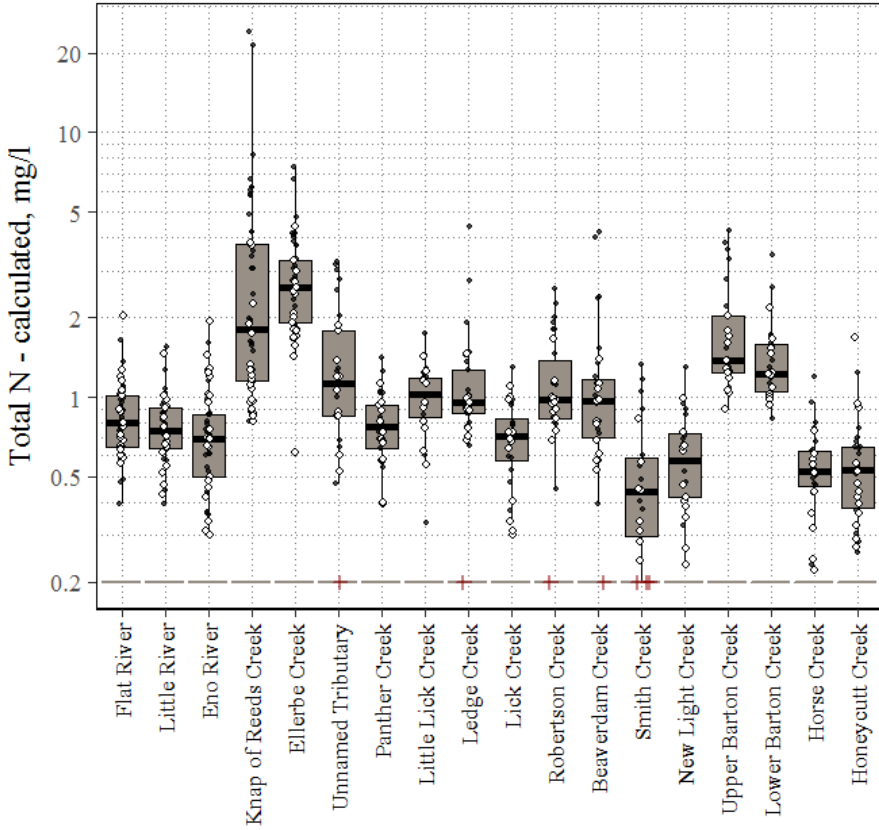


# Precipitation across the Upper Neuse Watershed Compared to Previous 30 Years

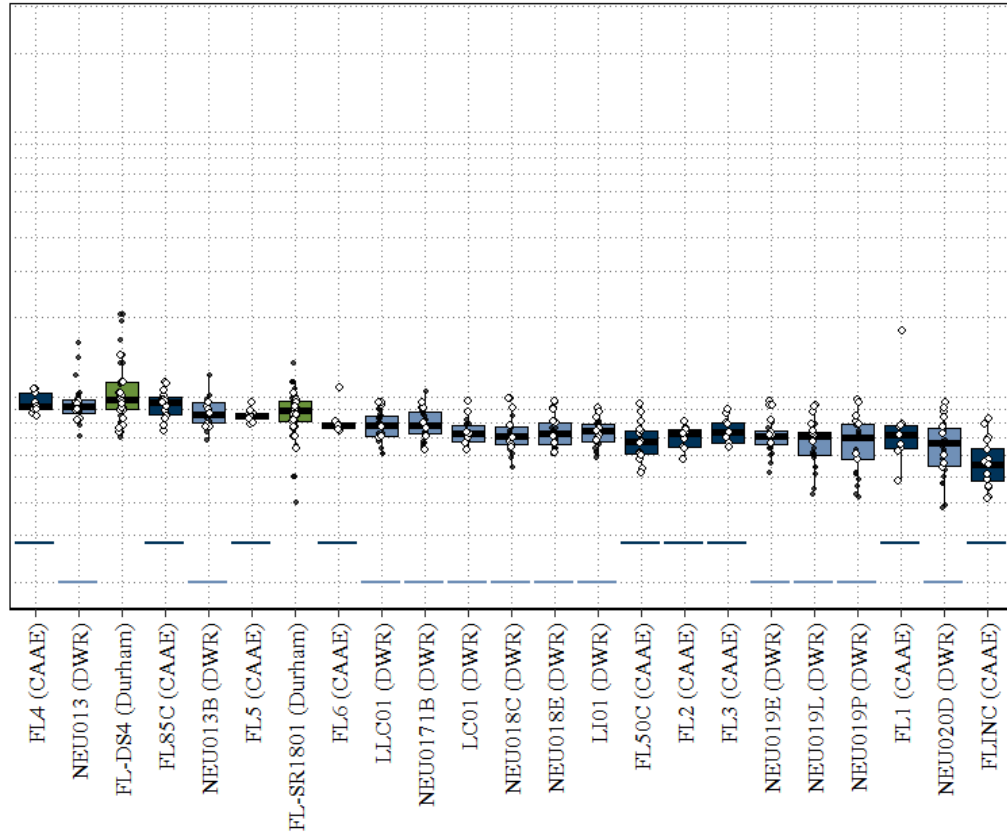


# Total Nitrogen (2014 - 2016)

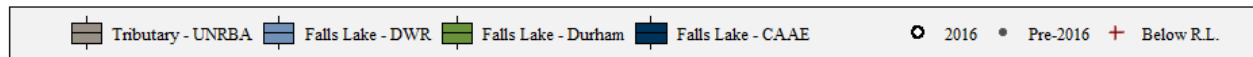
Tributaries



Falls Lake

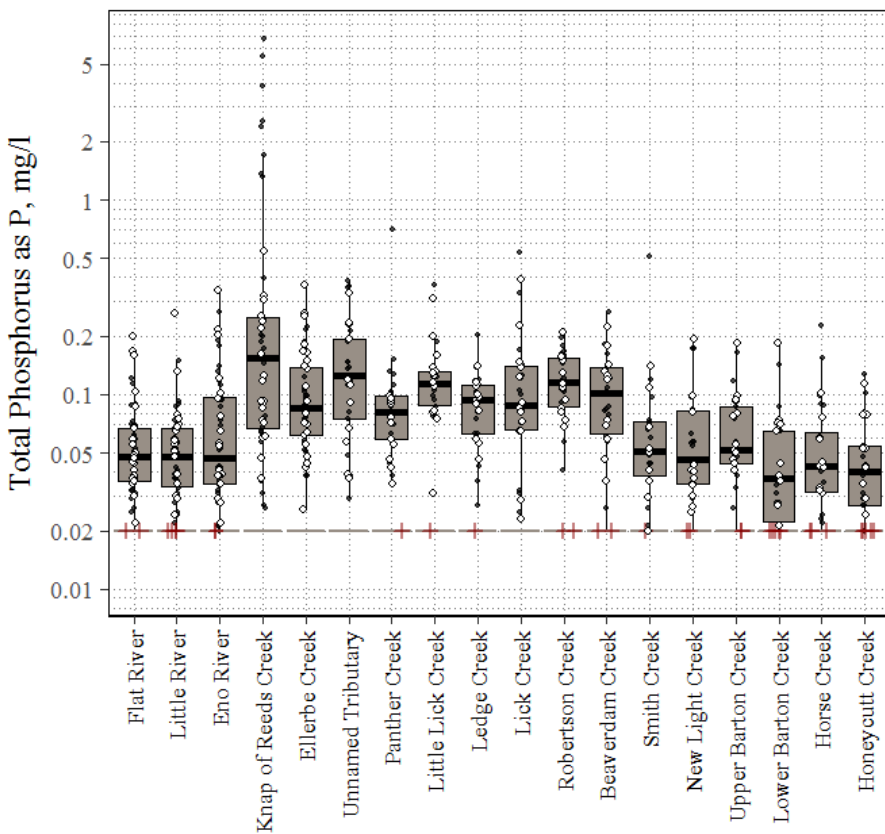


Monitoring Stations - Upstream to Downstream

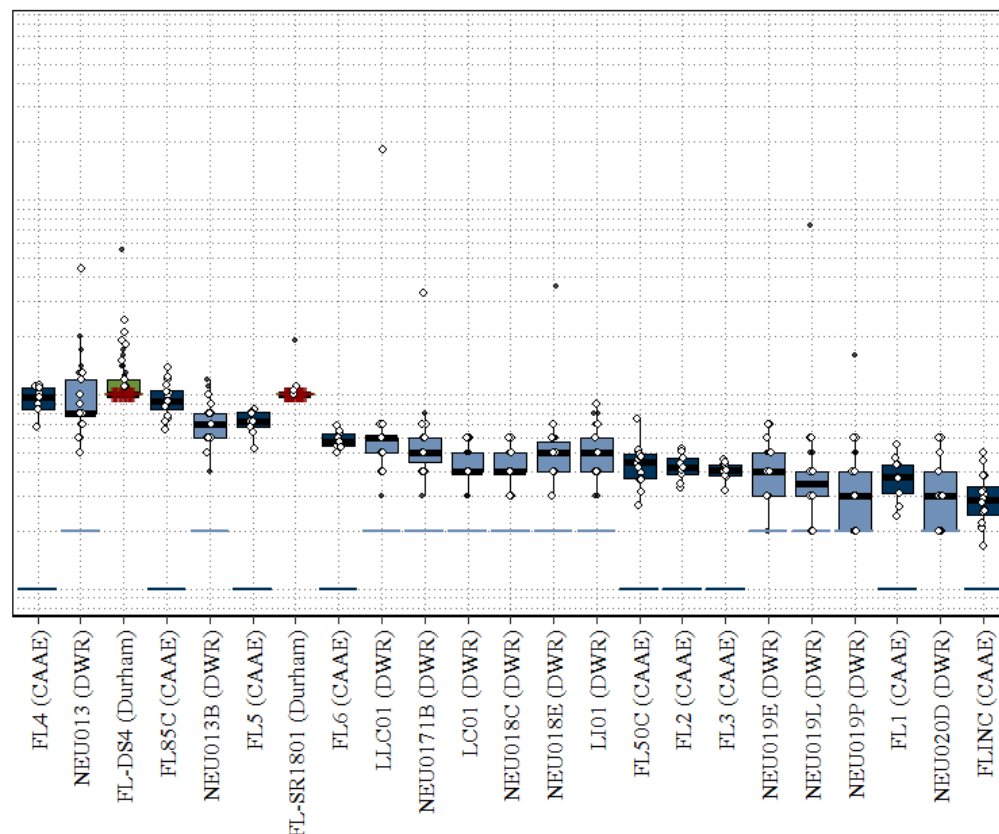


# Total Phosphorus (2014 - 2016)

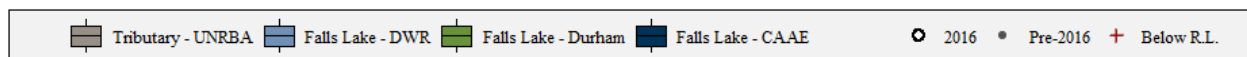
Tributaries



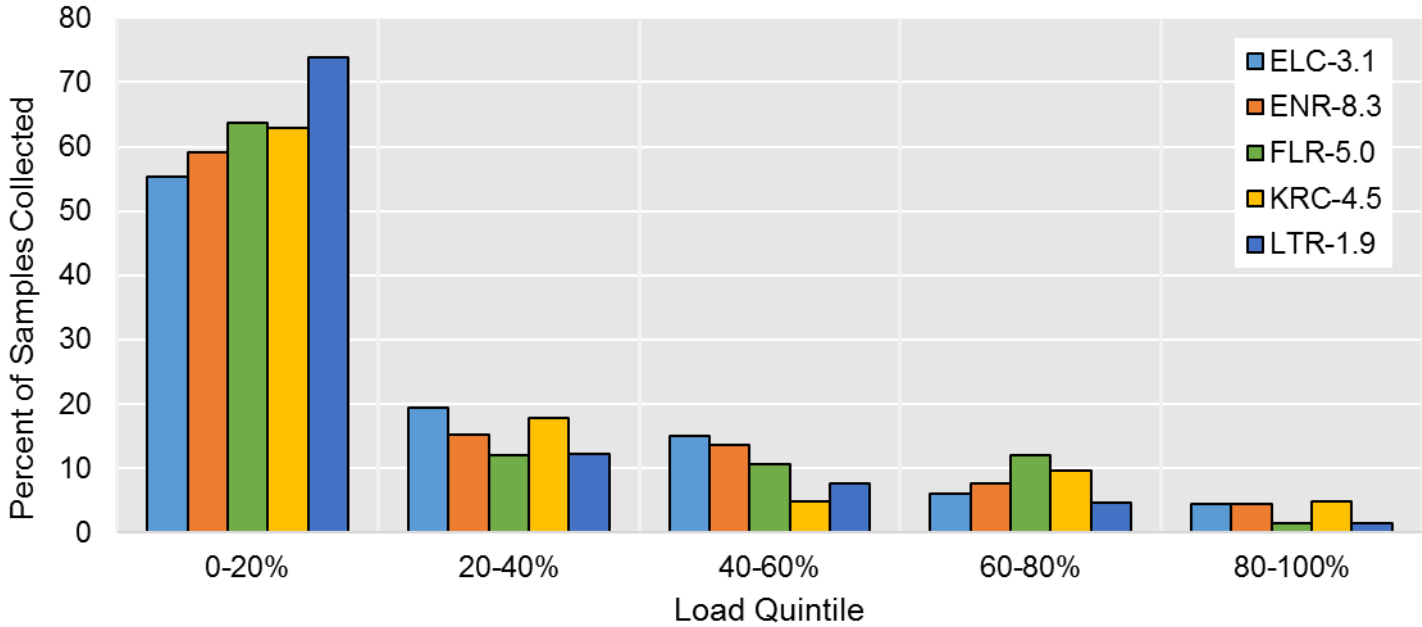
Falls Lake



Monitoring Stations - Upstream to Downstream



August 2014 - December 2016



July 2016 - May 2017

