

UNRBA Path Forward Committee

Monitoring Program Status Update

March 28, 2018



Routine Monitoring Update

March 2018

Routine Monitoring Status

| Date | Sample Collection | Sample Analysis | Data Review | Posted to Database |
|----------------|-------------------|-----------------|-------------|--------------------|
| Aug - Dec 2014 | ✓ | ✓ | ✓ | ✓ |
| Jan - Dec 2015 | ✓ | ✓ | ✓ | ✓ |
| Jan - Dec 2016 | ✓ | ✓ | ✓ | ✓ |
| Jan - Dec 2017 | ✓ | ✓ | ✓ | ✓ |
| January 2018 | ✓ | ✓ | | |
| February 2018 | ✓ | | | |
| March 2018 | ✓ | | | |
| April 2018 | | | | |
| May 2018 | | | | |
| June 2018 | | | | |

The UNRBA has now generated 43 months, 3 full growing seasons, and 3 full calendar years of water quality data.

Only 8 months remaining in the planned data collection window for the modeling effort of the re-examination.

Special Studies Update

March 2018

High Flow Sampling

- Three events so far in FY2018
 - January 23
 - January 29
 - March 21



Sediment Study

- Dr. Marc Alperin (UNC) is completing his report this week on sediment sampling and analysis
- To be summarized in the Annual Report
 - Full report may not be finalized by then, but will be provided when completed
- Results to be provided to the modeling team
- Recommendations to be made by Dr. Alperin on sediment chamber study locations for EPA



Monitoring Program Activities Ahead

- Annual Report in preparation
 - Due to PFC in April 2018
 - Working with SME's and modeling team on content
 - More extensive analysis than in prior reports

Exploring Relationships Among Parameters

NEU013B

| | Outflow, cfs | Avg. Residence Time, 90 Days | Avg. Residence Time, 30 Days | Blue-green Algae | Chryomonads | Cryptomonads | Diatoms | Dinoflagellates | Euglenoids | Green Algae | Prymnesiophytes | |
|------------------------------|--------------|------------------------------|------------------------------|------------------|-------------|--------------|---------|-----------------|------------|-------------|-----------------|------------------------------|
| Outflow, cfs | 0.56 | -0.51 | -0.59 | -0.21 | -0.02 | 0.15 | -0.29 | 0.04 | -0.24 | -0.05 | 0.22 | Stage, ft |
| Avg. Residence Time, 90 Days | -0.36 | -0.47 | -0.19 | -0.09 | 0.22 | -0.25 | -0.02 | -0.10 | -0.27 | 0.10 | 0.10 | Outflow, cfs |
| Avg. Residence Time, 30 Days | 0.87 | 0.01 | 0.11 | 0.00 | 0.52 | -0.16 | 0.13 | 0.28 | -0.01 | -0.01 | -0.01 | Avg. Residence Time, 90 Days |
| Ammonia Nitrogen, mg/l | 0.13 | 0.19 | -0.13 | 0.40 | -0.10 | 0.03 | 0.03 | 0.30 | 0.04 | 0.04 | 0.04 | Avg. Residence Time, 30 Days |
| Chlorophyll-a, ug/l | -0.58 | -0.25 | 0.03 | 0.00 | -0.12 | -0.04 | 0.44 | 0.32 | -0.02 | -0.02 | -0.02 | Blue-green Algae |
| Dissolved oxygen, mg/l | -0.62 | -0.35 | 0.83 | 0.20 | 0.10 | 0.16 | -0.04 | 0.15 | 0.02 | 0.02 | 0.02 | Chryomonads |
| Kjeldahl Nitrogen, mg/l | 0.26 | 0.17 | -0.23 | -0.16 | -0.01 | 0.06 | 0.11 | -0.03 | 0.18 | 0.18 | 0.18 | Cryptomonads |
| Nitrate/Nitrite, mg/l | -0.32 | -0.28 | 0.36 | 0.17 | -0.32 | -0.17 | 0.03 | 0.33 | 0.04 | 0.04 | 0.04 | Diatoms |
| Total Organic Carbon, mg/l | -0.02 | 0.12 | 0.12 | 0.14 | 0.04 | -0.30 | -0.01 | 0.02 | 0.08 | 0.08 | 0.08 | Dinoflagellates |
| Turbidity | -0.73 | -0.31 | 0.56 | 0.49 | -0.41 | 0.56 | -0.32 | 0.28 | -0.02 | -0.02 | -0.02 | Euglenoids |
| | 0.01 | 0.34 | -0.13 | -0.18 | 0.27 | -0.31 | 0.47 | -0.08 | 0.13 | 0.13 | 0.13 | Green Algae |
| | 0.29 | 0.48 | -0.06 | -0.31 | -0.01 | -0.02 | 0.19 | -0.01 | 0.28 | 0.28 | 0.28 | |
| | -0.64 | -0.25 | 0.45 | 0.28 | -0.21 | 0.50 | -0.32 | 0.82 | 0.17 | 0.17 | 0.17 | |
| | -0.40 | -0.06 | 0.09 | -0.05 | 0.18 | 0.18 | -0.22 | 0.49 | 0.45 | 0.07 | 0.07 | |
| Stage, ft | | | | | | | | | | | | |
| Outflow, cfs | | | | | | | | | | | | |
| Avg. Residence Time, 90 Days | | | | | | | | | | | | |
| Avg. Residence Time, 30 Days | | | | | | | | | | | | |
| Ammonia Nitrogen, mg/l | | | | | | | | | | | | |
| Chlorophyll-a, ug/l | | | | | | | | | | | | |
| Dissolved oxygen, mg/l | | | | | | | | | | | | |
| Kjeldahl Nitrogen, mg/l | | | | | | | | | | | | |
| Nitrate/Nitrite, mg/l | | | | | | | | | | | | |
| Total Organic Carbon, mg/l | | | | | | | | | | | | |
| Total Phosphorous, mg/l | | | | | | | | | | | | |

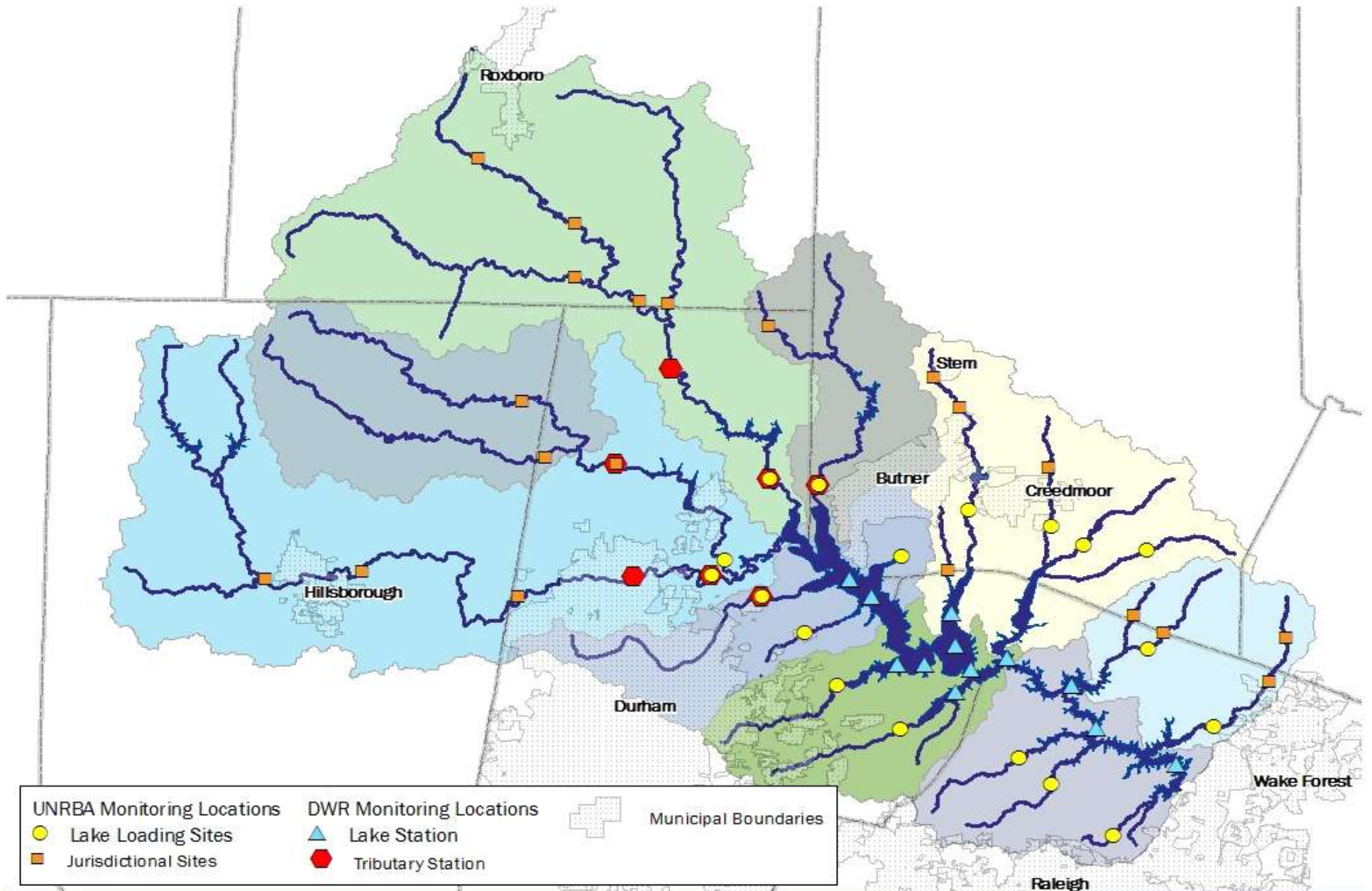
- Also looking at combinations of parameters that may influence Chl a or algae
- Dovetails into the Empirical Modeling efforts

Other Activities

- Considering additional efforts to address Designated Use support
 - Addressing the Biological Integrity facet of the standard, for example
 - Working with ED and SMEs, the MRSW and the PFC
 - Assessing available information and data
 - Considering whether supplemental data acquisition or analysis may be warranted
- Evaluating UNRBA Monitoring Program findings relative to analyses and reporting by others.
 - CAAE
 - UNC Collaboratory

Monitoring Program: FY2019 and Beyond

- Looking at several options for Routine Monitoring in FY2019
 - PFC and BOD decided to continue current program through October 2018 to capture the full growing season
- Working to shift budget to Modeling and Regulatory Support efforts, while continuing to acquire and manage beneficial data for future needs
 - Shifting more money means modeling can proceed faster, and/or can include more scenarios and considerations
- Discussing options with ED and SMEs since January
- Weighing Pros and Cons
- Thinking about how each option would affect funding for the modeling schedule
- Seeking PFC input and recommendations
 - Today, or via email to Forrest



0 2.25 4.5 9 Miles

Current Monitoring Locations
 Upper Neuse River Basin Association
 North Carolina

Brown AND Caldwell

Monitoring Program Options (see Handout)

1. Maintain program throughout FY2019 as-is; no changes
2. Reduce tributary monitoring to bi-monthly after October
3. Reduce tributary monitoring to quarterly after October
4. Suspend monitoring at all Jurisdictional Boundary stations after October
5. Monitor only the “Big Five” Lake Loading stations after October
6. “Surgical” option to maintain monthly monitoring, with elimination of selected stations and parameters

Other options (including hybrids of those above) can also be explored

Characteristics of Options 2 - 6

- Assumes suspension of VSS and light absorbance measurements by the UNRBA on lake samples
- Assumes DWR will continue its monthly monitoring of the in-lake and large tributary stations
- Includes no budget for Special Studies or substantive “out-of-scope” efforts
- Scales the amount of program elements based on the revised program
 - Laboratory oversight
 - Data management
 - QAPP and Monitoring Plan management
 - Analysis and reporting
 - Communication and meeting time

| Monitoring Option | FY2019 Estimated Cost | FY2020 Estimated Cost | Benefits | Drawbacks |
|---|-----------------------------|-----------------------------|--|---|
| <p>1 Maintain Current Program As-Is</p> | <p>\$550,000</p> | <p>\$550,000</p> | <p>Maintains same level of data acquisition, management and reporting.</p> | <p>No ability to increase budget for Modeling and Regulatory Support</p> |
| <p>2 Current Program through October, then Bi-Monthly Sampling</p> | <p>\$ 320,000</p> | <p>\$ 205,000</p> | <p>Maintains sampling at all current stations. Less than ½ the cost of current program (in FY2020).</p> | <p>Reduces ability to identify shorter-term changes or analyze trends. Continues sampling at stations that provide little information relevant to overall lake behavior. Cost may not allow for anticipated Modeling efforts.</p> |
| <p>3 Current Program through October, then Quarterly Sampling</p> | <p>\$ 265,000</p> | <p>\$ 145,000</p> | <p>Maintains sampling at all current stations. About ¼ the cost of current program (in FY2020).</p> | <p>Greatly reduces ability to identify shorter-term changes or analyze trends. Continues sampling at stations that provide little information relevant to overall lake behavior.</p> |

| Monitoring Option | FY2019 Estimated Cost | FY2020 Estimated Cost | Benefits | Drawbacks |
|---|-----------------------------|-----------------------------|--|---|
| <p>4 Current Program through October, then Only LL Stations Monthly</p> | <p>\$ 350,000</p> | <p>\$ 235,000</p> | <p>Maintain sampling at all Lake Loading stations. Maintain monthly schedule for continued ability to see shorter-term changes and analyze trends. About ½ the cost of current program (in FY2020)</p> | <p>Suspends data acquisition at Jurisdictional Boundary stations - which may be of interest as jurisdictional loadings are developed and reductions are tracked. Cost may not allow for anticipated Modeling efforts.</p> |
| <p>5 Current Program through October, then "Big 5" LL Stations Monthly</p> | <p>\$ 250,000</p> | <p>\$ 90,000</p> | <p>>80% cost reduction (in FY2020) while still obtaining monthly data from tributaries providing 70+% of inflow to lake.</p> | <p>Suspends monitoring at all Jurisdictional Boundary stations. Suspends monitoring at 13 of 18 Lake Loading stations. All tributary monitoring would be at the top of the lake.</p> |
| <p>6 "Surgical" Plan - Reduce stations, parameters, & ancillary efforts</p> | <p>\$ 275,000</p> | <p>\$ 180,000</p> | <p>Maintains monthly sampling Maintains sampling at all stations above Hwy 50 About 1/3 the cost of current program (in FY2020)</p> | <p>Suspends monitoring below Hwy 50 All tributary monitoring would be in the upper lake Relies on DWR to continue monitoring the Big Five tribs.</p> |

Summary of “Surgical” Option

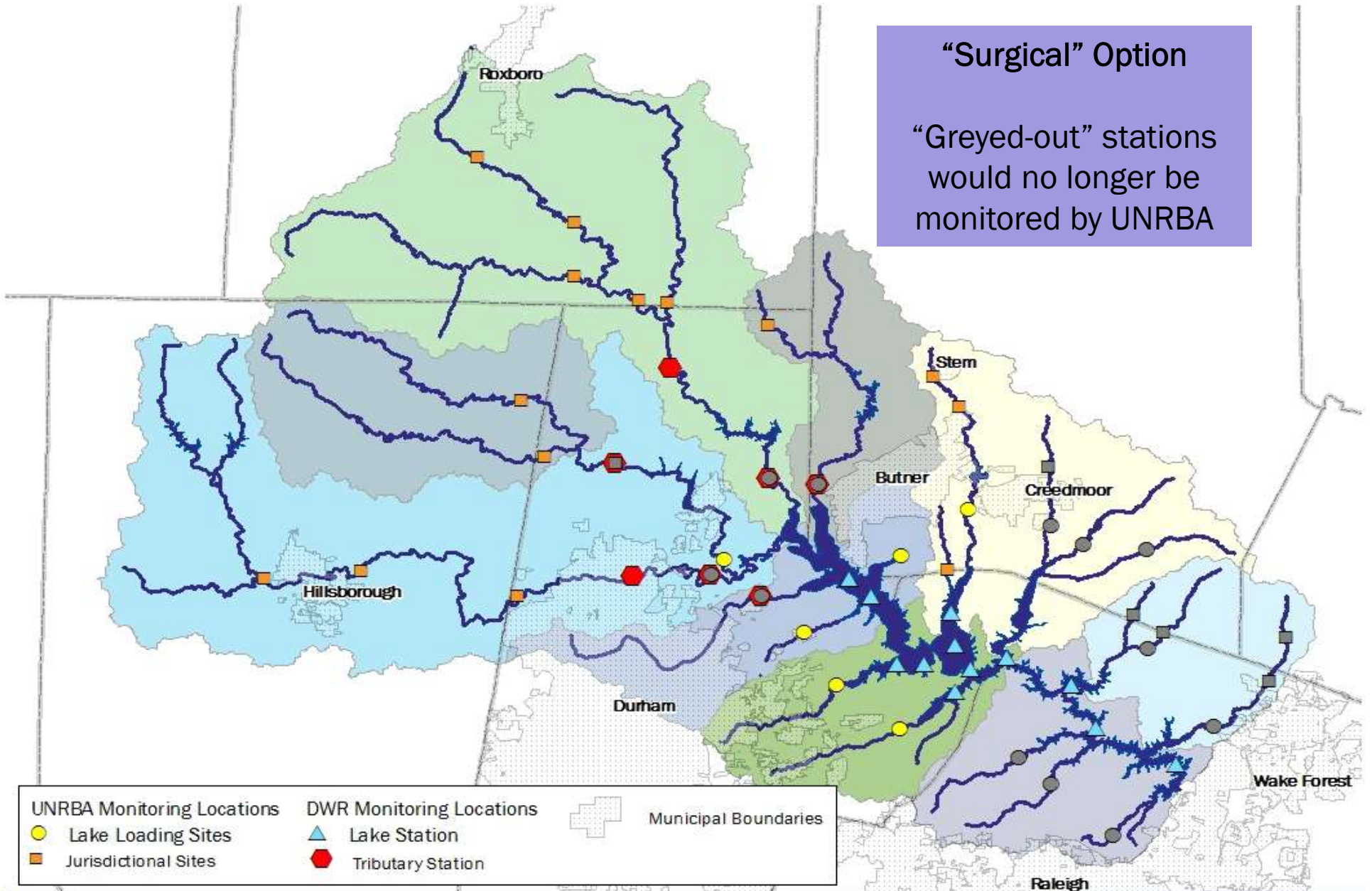
- Maintain current program through October 2018
- Prepare a “Final” report with data through October 2018
- Beginning in November 2018:
 - Reduce Annual Report effort to a more concise technical memorandum
 - Present monitoring status, interesting findings and recommendations
 - Below Highway 50
 - Suspend tributary sampling (Jurisdictional and Lake Loading stations)
 - Area constitutes a very small proportion of the watershed with small tributaries
 - Stage 2 does not apply below Hwy 50

Summary of “Surgical” Option (continued)

- Above Highway 50 (beginning in November 2018)
 - Continue monthly monitoring at 14 of the 15 Jurisdictional stations
 - DWR monitors 1 of them monthly (and also monitors 2 other locations not monitored by the UNRBA)
 - Maintains data acquisition for jurisdictional loading evaluations in the watershed area subject to Stage 2
 - Continue monthly monitoring at the smaller 5 Lake Loading stations above Hwy 50
 - Suspend monitoring at 4 of the “Big 5” Lake Loading stations
 - DWR monitors the same 4 stations monthly
 - Suspend analysis for VSS, absorbances, dissolved nutrient fractions, TOC and Chl a
 - Reduces per-sample analysis cost substantially
 - Aligns parameter list with what DWR monitors at the Big 5 stations
 - Does not eliminate any parameter of interest for future jurisdictional loading evaluations

“Surgical” Option

“Greyed-out” stations would no longer be monitored by UNRBA



Schedule for Finalizing FY2019 Monitoring

- March 28 - Introduction of Potential Options
- Through April 6 – Receive input from PFC
- April 20 - 2018 Annual Report provided to PFC, with recommended FY2019 Monitoring
- April 25 – (PFC meeting) Formal recommendation sought on FY2019 Monitoring to send to BOD
- May 16 – (BOD meeting) Presentation of Recommended 2019 Monitoring at BOD meeting
- June 20 – (BOD meeting) Vote to approve FY2019 contracts for Monitoring and Modeling and Regulatory Support



Monitoring Program Options

PFC Discussion.....

Questions?

Thoughts?

Recommendations?

