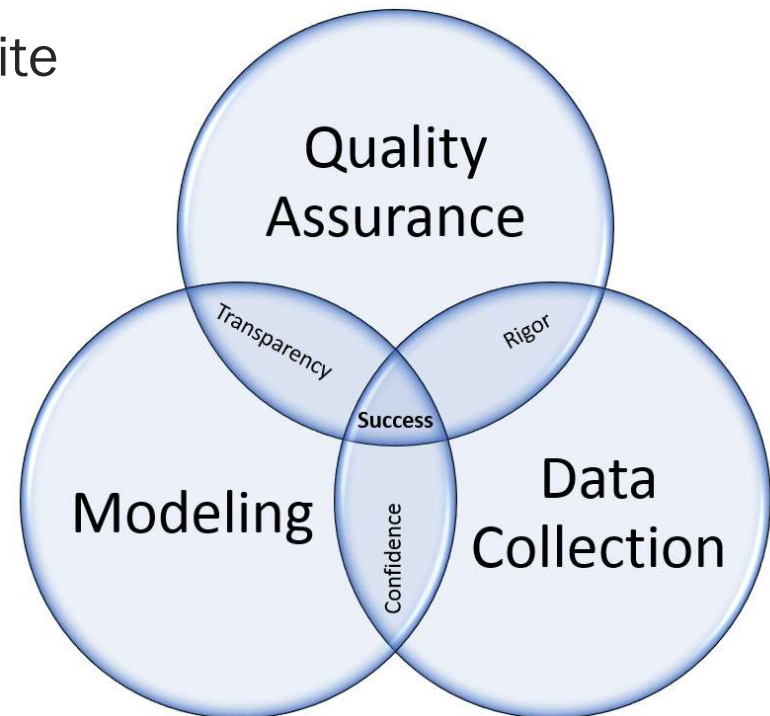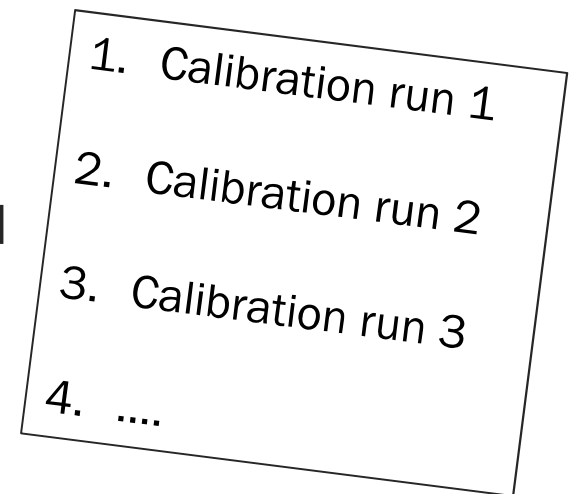# MRS Project
Status Update

March 28, 2018

Status of the Modeling Quality Assurance Project Plan (QAPP)

- DWR approved the final revisions to the QAPP via email
- All signatures have been obtained
- Distribute the approved QAPP as noted on the distribution page
- Upload a copy to the UNRBA website

Data Management Plan

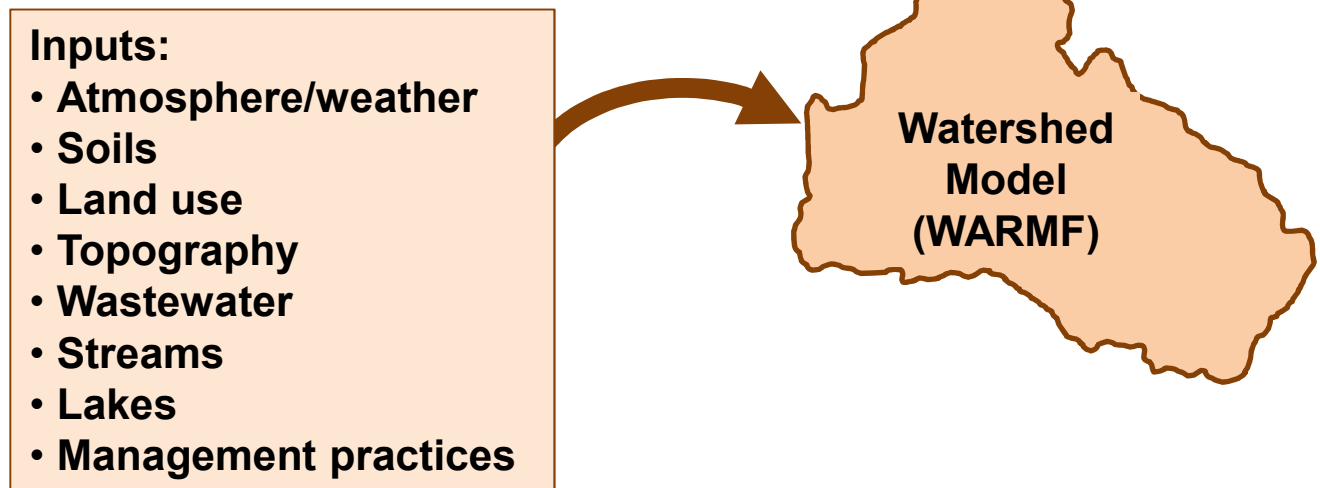- Modeling Team is drafting a Data Management Plan for review by the MRSW and PFC to describe

  - How data is processed and quality assured to develop model inputs

    - Time series

    - Spatial

  - How model runs are catalogued and stored

    - Calibration

    - Validation

    - Sensitivity analyses

    - Scenario runs

1. Calibration run 1

2. Calibration run 2

3. Calibration run 3

4. ....

Data Acquisition to Support Modeling

- Set up a Dropbox file sharing system to obtain data from local governments and watershed stakeholders
- Continue to receive data sets
- Begun to summarize data and information received for review by UNRBA and stakeholders
- Include 3rd party reviewers as available
- Please submit available data as soon as possible

Inputs:
- **Atmosphere/weather**
- **Soils**
- **Land use**
- **Topography**
- **Wastewater**
- **Streams**
- **Lakes**
- **Management practices**

Watershed Model (WARMF)

Land Conservation Credit

- Several UNRBA members have inquired about the practice
  - Status and applicability
  - Amount of the credit
  - Cost effectiveness compared to other practices
- As of yet, no credit has been approved
- DWR is still reviewing the credit
- Today we will summarize progress to date
- Compare to other practices

Original Proposal for Land Conservation

- Based on monitoring study conducted by the NC Forest Service
- Compared allowable loads from new development to those measured from forested areas
- Proposed credits varied based on geology

Table 1. Initially Proposed Credits by the UNRBA in October 2016

Geologic Province	Annual Nitrogen Credit (lb/ac/yr)	Annual Phosphorus Credit (lb/ac/yr)
Carolina Slate Belt	1.2	0.19
Triassic Basin	0.4	0.16
Raleigh Belt	1.1	0.17

Subsequent Discussions with DEQ

- The UNRBA had several discussions with DEQ staff following the original proposal
- Simplified credit values were discussed as the starting point
- Varies levels of caps on the credit were discussed

Table 2. Comparison of Initial Proposed Credits to Various Credit Caps

Scale	Nitrogen Credit (lb-N/ac/yr)	Phosphorus Credit (lb-P/ac/yr)
100 Percent	1.0	0.2
50 Percent	0.5	0.1
25 Percent	0.25	0.05
10 Percent	0.1	0.02

Alternate Land Conservation Credit

- The UNRBA and DWR Planning staff discussed an alternative method to account for shifting development away from forested areas
- UNRBA submitted this proposal in August 2017
- DWR did not agree with all of the assumptions made

Table 3. Range of Credits Associated with Varying Acreages of Land Conservation

Total Acreage Assumed Conserved	Nitrogen Credit (lb-N/ac/yr)	Phosphorus Credit (lb-P/ac/yr)
32,000	0.35	0.035
40,000	0.45	0.043
48,000	0.54	0.052
56,000	0.62	0.061

Initial DWR Response to Alternate Credit

- DWR reworked the alternative credit
- Varying nitrogen credits each year as more land is conserved
  - From 0.01 lb-N/ac/yr in 2008
  - Up to 0.07 lb-N/ac/yr in 2025
- Set phosphorus credit to zero due to calculations resulting in negative credit
  - Stage II P loading from forest is higher than pasture
- UNRBA suggested that the methodology was too complex and the credit too small
- DWR is currently re-evaluating the credit

Assumptions for Calculating Cost Effectiveness of Land Conservation

- Upper Neuse Clean Water Initiative reports that since the baseline period

  - 9,330 acres of land have been conserved

  - The total investment has been $78 million

  - $68.7 million in cash investment

- Cost effectiveness ($/lb) can be calculated from dividing the costs by the estimated nutrient credits

Cost Effectiveness for Nitrogen

Nitrogen Credit (lb-N/ac/yr)	Total Credit for All 9,330 Acres Conserved (lb-N/yr)	Cost Effectiveness ($/lb-N) assuming total costs of $78 million	Cost Effectiveness ($/lb-N) assuming cash investments of $68.66 million
1.2	11,196	$ 6,967	$ 6,133
1	9,330	$ 8,360	$ 7,359
0.62	5,785	$ 13,484	$ 11,869
0.54	5,038	$ 15,482	$ 13,628
0.5	4,665	$ 16,720	$ 14,718
0.45	4,199	$ 18,578	$ 16,353
0.35	3,266	$ 23,886	$ 21,026
0.25	2,333	$ 33,441	$ 29,436
0.1	933	$ 83,601	$ 73,591
0.07	653	$ 119,430	$ 105,129
0.01	93	$ 836,013	$ 735,906

Cost Effectiveness for Nitrogen

- Land conservation
  - $6,000/lb-N to over $800,000/lb-N
- Algal turf scrubber*
  - $19/lb-N to $648/lb-N
- Stormwater control measures*
  - $2,450/lb-N to over $39,000/lb-N

*From City of Durham presentation on the cost effectiveness of the algal turf scrubber.

Cost Effectiveness for Phosphorus

Phosphorus Credit (lb-P/ac/yr)	Total Credit for All 9,330 Acres Conserved (lb-P/yr)	Cost Effectiveness ($/lb-P) assuming total costs of $78 million	Cost Effectiveness ($/lb-P) assuming cash investments of $68.66 million
0.2	1,866	$ 41,801	$ 36,795
0.1	933	$ 83,601	$ 73,591
0.061	569	$ 137,051	$ 120,640
0.052	485	$ 160,772	$ 141,520
0.05	467	$ 167,203	$ 147,181
0.043	401	$ 194,422	$ 171,141
0.035	327	$ 238,861	$ 210,259
0.02	187	$ 418,006	$ 367,953
0	0	Not applicable	Not applicable

Cost Effectiveness for Phosphorus

- Land conservation
  - $36,000/lb-P to over $400,000/lb-P

- Algal turf scrubber*
  - $68/lb-P to over $1,534/lb-P

- Stormwater control measures*
  - $11,000/lb-P to approximately $200,000/lb-P

*From City of Durham presentation on the cost effectiveness of the algal turf scrubber.

Summary

- Land conservation provides long term protection of water quality

- It mitigates uncertainties associated with
  - Predicted loading from pollutant sources (e.g., new development, lake sediments)
  - Variations in new development loading across soil types and historic land uses
  - Impact from large storm events that overwhelm structural practices

- It could not be the only practice that would satisfy load reduction requirements
  - Other practices are more cost effective
  - Land conservation would only be credited in critical areas

Questions ?

ACTIVITY	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
Sign Contract (Sep 20)	█									
Development and Distribution of the Data Acquisition Form to Stakeholders	█									
Stakeholder kickoff meeting (Oct 25)		█								
Draft Data Management Plan		█	█	█						
Targeted calls/meetings regarding data collection (ag, DOT, etc.)			█	█	█	█				
Compile and summarize publically available and discreet data sets		█	█	█	█	█	█	█		
Develop EFDC model grid		█	█	█						
Begin WARMF configuration			█	█	█	█				
Exploratory statistical analyses		█	█	█	█	█				
Draft memo summarizing preliminary model configuration and analyses (EFDC, WARMF, Stats)					█	█	█			
Stakeholder meeting to data acquired, issues identified, additional data gaps; preliminary model configuration								█		
Update the Multi-year work plan and develop Year 3 scope of work								█	█	█
Review and comment on FY2018 MP Annual Report; develop recommendations for long-term monitoring								█	█	

ACTIVITY	2017	2018	2019	2020	2021	2022	2023	2024
Stakeholder engagement including coordination with DWR, EPA, and UNC								
UNRBA Monitoring Program								
Develop Modeling QAPP								
Preliminary data compilation and model setup								
Model development and interim reporting								
Cost benefit analyses and load reduction alternative scenarios								
Final technical report (modeling)								
Agency review and input								
UNRBA Reexamination package								
SL 2016-94: interim (*) and final results of the UNC study on Falls Lake				*	*			
UNRBA proposed changes dates of UNC interim (*) and final reports						*	*	
UNRBA proposed changes to begin Rules Readoption by the EMC no later than Dec. 2024.								

Legend: ▪ UNRBA Activities ▪ UNC Activities Required by SL 2016-94 * Interim Reports ▪ Changes proposed by the UNRBA regarding UNC and EMC Activities