Modeling and Regulatory Support Workgroup Meeting

Remote Access, May 4, 2021

Remote Access Options

Equipment Type	Access Information	Notes
Computers with microphones and speakers	Join Microsoft Teams Meeting **Please mute your microphone** unless you want to provide input.	Press control and click on this link to bring up Microsoft Teams through the internet. You can view the screen share and communicate through your computer's speakers and microphone
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Remote Access Guidelines

- This meeting will open 30 minutes prior to the official meeting start time to allow users to test equipment and ensure communication methods are working
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Agenda (Reordered)

- Opening Comments, Agenda Review/Revisions
- MRSW Workgroup Reports
- Draft Scope of Work and Budget for FY22
- Plan for Statistical Model Development and Regulatory Options for the Chlorophyll-a Water Quality Standard
- Modeling and Regulatory Support Status

MRSW Workgroup Reports

Model Scenario Output Workgroup

- Sixth meeting held on April 12th
- Preliminary form was developed to summarize the types of model output needed for each scenario
  - Spatial data (catchments, tributaries, lake segments)
  - Temporal data (annual 2015 to 2018, average)
  - Parameters
    - Watershed loads: total nitrogen, phosphorus, and organic carbon
    - Lake water quality: nutrients, carbon, chlorophyll-a
      - Growing season averages by segment
      - Percent of chlorophyll-a values over 40 µg/L
- Modeling team to initially build an online data sharing tool to provide output rather than formal reports
    - User can “zoom in on” areas of interest
    - Modelers will have more time to run scenarios

Scenario Screening Workgroup

- Fourth meeting held on April 13th
- Prioritized 9 scenarios to evaluate from a list of 30
- Breakout teams are drafting documentation about the selection process and description of scenario
- Group will meet again toward the end of May
- MRSW to discuss today the recommendation to evaluate the “all forest” scenario

Model Scenario Output Form – Part A

Scenario (short) name/ Scenario ID number: 01_All Forest Scenario

Scenario description: Would the lake meet water quality standards if all of the land were forested or wetlands, all wastewater and nutrient application were ceased, etc.? Convert all land uses that are not forest or wetlands to mixed use forest; remove point sources and nutrient application (except atmospheric deposition?); bypass upstream impoundments. Run the scenario for the 2015-2018 time period. Evaluate the change in nutrient load loading by year. Evaluate changes to lake water quality (nutrients and chlorophyll) by year.

Scenario type: Infeasible maximum limit; regulatory consideration

Count(ies) affected: All counties

Municipality(ies) affected: All municipalities

Sectors affected: Removes all sectors

Water Quality Models used: Watershed model (WARMF), Simple Lake Model (WARMF)

Consultants involved: Systech Water Resources

Simulation considerations: Tbc by modeling team.

Preliminary cost to run scenario: Medium

PFC approved for evaluation: TBD

PFC recommended scenario priority: High

Draft Scope of Work and Budget for FY2022

Summary of Scope for FY2022

- Calibration of the EFDC and WARMF Lake models for water quality and evaluation of loading scenarios
- Application of calibrated watershed and lake models
  - Understand sources of nutrient loading to Falls Lake
  - Evaluate management scenarios and their impact on nutrient loading and lake water quality
- Development of the Statistical Model to link nutrient loading, lake water quality, and designated uses in Falls Lake
- Continued communications support including the development of new materials, keeping existing materials up to date, and developing communications strategies for stakeholders interested in or impacted by the UNRBA's Reexamination of Stage II of the Falls Lake Rules

Task 340: Compile and Format Lake Water Quality Data

- Continued compilation and formatting of lake water quality data to support development and calibration of the WARMF and EFDC lake models
- **Deliverables:**
  - Documentation of the source data, compilation methods, and assumptions associated with water quality modeling that will be described in presentations to the MRSW and PFC and project reporting

Brown and Caldwell Labor	Systech Water Resources, LLC.	Dynamic Solutions, Inc.	KDV Analytics, Brindle Creek, and Miscellaneous Expenses	Total
$4,965	$5,250	$5,250	$0	$15,465

Task 341: Water Quality Calibration and Validation of WARMF Lake and EFDC

- Calibration of WARMF Lake and EFDC water quality for 2015 to 2018 based on the performance criteria described in the UNRBA Modeling QAPP
- **Deliverables:**
  - Calibration of lake models for 2015-2016 for mainstem segments
  - Validation of lake models for 2017-2018 for mainstem segments
  - Documentation of the source data, compilation methods, and assumptions associated with WARMF Lake and EFDC hydrologic and water quality modeling will be described in status presentations
  - Project documentation will be drafted for the formal modeling report

Brown and Caldwell Labor	Systech Water Resources, LLC.	Dynamic Solutions, Inc.	KDV Analytics, Brindle Creek, and Miscellaneous Expenses	Total
$4,326	$96,621	$112,631	$0	**$213,578**

Task 342: Sensitivity Analyses and Scenario Evaluation

- Sensitivity analyses - a subset of global model parameters to evaluate the impact of variability/uncertainty in model inputs
- Scenarios to evaluate how changes in management actions impact loading and lake water quality
- **Deliverables:**
  - Sensitivity analyses for the WARMF and EFDC models following consultation with the MRSW and DWR
  - Scenario analyses for WARMF and EFDC models; one of the scenarios is the baseline period (2005 to 2007)
  - Summary presentations to the MRSW and PFC
  - Project documentation will be drafted for the formal modeling report.

Brown and Caldwell Labor	Systech Water Resources, LLC.	Dynamic Solutions, Inc.	KDV Analytics, Brindle Creek, and Miscellaneous Expenses	Total
$12,175	$47,250	$47,250	$0	$106,675

Task 343: Modeling Support and Statistical Modeling

- Evaluation of the calibration and validation of the lake and watershed models relative to the performance criteria listed in the QAPP
- Development of an online portal for sharing scenario results
- Development of the statistical lake model for Falls Lake and scenario evaluation
- **Deliverables:**
  - Documentation of the progress of statistical modeling will be described in presentations to the MRSW and PFC.
  - Project documentation will be drafted for the formal modeling report.
  - Online portal to distribute scenario results

Brown and Caldwell Labor	Systech Water Resources, LLC.	Dynamic Solutions, Inc.	KDV Analytics	Total
$84,831	$0	$0	$67,146	$151,977

Task 344: Iterative Reporting

- Deliverables:
  - Meeting materials describing the development of the input data sets and calibration of the lake models and status of the re-examination will be developed in preparation for MRSW, PFC, and Board meetings as well as a technical stakeholder workshop and a 2nd symposium with the UNC Collaboratory.
  - Internal UNRBA meetings and workshops to discuss key questions and scenarios to evaluate with the models (integrate into PFC and MRSW meetings)
  - Continued drafting of a technical report(s) describing the data used to develop WARMF watershed, WARMF lake, and EFDC lake models as well as model performance.

Brown and Caldwell Labor	Systech Water Resources, LLC.	Dynamic Solutions, Inc.	KDV Analytics, Brindle Creek, and Miscellaneous Expenses	Total
$64,508	$15,960	$54,600	$0	$135,068

Task 345: Update the Multi-Year Work Plan and Develop Scope for FY2023

- Update the work plan for future work under MRS Phases 4 and 5
- Incorporate the latest information on legislative changes affecting either the UNRBA reexamination process and/or the UNC Nutrient Study of Falls Lake
- **Deliverables:**
  - Updated work plan for the MRS project as needed
  - FY2023 scope of work

Brown and Caldwell Labor	Systech Water Resources, LLC.	Dynamic Solutions, Inc.	KDV Analytics, Brindle Creek, and Miscellaneous Expenses	Total
$7,210	$1,050	$1,050	$0	$9,310

Task 346: Regulatory Support Including IAIA Program Support

- Support of the UNRBA in their preparation and planning for meetings with agency staff, watershed stakeholders, or interested parties regarding discussions that may affect the reexamination
- Provide implementation support for the IAIA program
- **Deliverables:**
  - Development of meeting materials, attendance at meetings, and presentation at meetings associated with the re-examination
  - Support IAIA Program implementation, reporting, and meetings
  - Provide review and input on materials generated by the UNRBA or external parties at the request of the Executive Director

Brown and Caldwell Labor	Systech Water Resources, LLC.	Dynamic Solutions, Inc.	KDV Analytics, Brindle Creek, and Miscellaneous Expenses	Total
$15,019	$0	$0	$0	$15,019

Task 347: Communications Support

- Coordination and management of the consulting support for the UNRBA Communications Team
- **Deliverables:**
  - Planning to address internal and external stakeholders identifying goals, formats, schedule, and distribution plan for communication activities and materials
  - Development of materials pending discussion on priority with the PFC and consideration of budget for FY2022
  - Planning and support of the second Spring Symposium and a UNRBA Technical Stakeholder Workshop anticipated for FY2022
  - Response to request from the Executive Director to address communication needs associated with internal UNRBA and external stakeholders including preparation of slides, fact sheets, etc.
  - Preparation of meeting materials for discussions with agencies and commissions regarding the work of the UNRBA

Brown and Caldwell Labor	Systech Water Resources, LLC.	Dynamic Solutions, Inc.	KDV Analytics, Brindle Creek, and Miscellaneous Expenses	Total
$35,000	$0	$0	$0	$35,000

Task 400: Preliminary Assessment of Cost and Benefits

- Engage the Subject Matter Expert Economist to support the cost benefit analyses associated with evaluation of nutrient management scenarios
- **Deliverables:**
  - Participation in select internal or external stakeholder meetings
  - Coordination with the statistical modeling team to integrate the preliminary cost benefit analysis into the statistical model framework.

Brown and Caldwell Labor	Systech Water Resources, LLC.	Dynamic Solutions, Inc.	Brindle Creek	Total
$7,210	$0	$0	$18,900	$26,110

Task 600: Project Management and Meeting Attendance

- Provide status updates to the UNRBA during PFC, BOD, and MRSW meetings
- Invoice processing and supporting documentation
- **Deliverables:**
  - Attendance at PFC, BOD, and MRSW meetings (in person or virtual)
  - Attendance at stakeholder meetings as described in Task 345
  - Routine calls with the Executive Director for project status updates and meeting preparation not to exceed 4 hours per month
  - Participation in other meetings as directed by the Executive Director
  - Submittal of invoices and supporting documentation

Brown and Caldwell Labor	Systech Water Resources, LLC.	Dynamic Solutions, Inc.	Miscellaneous Expenses	Total
$40,055	$15,750	$15,750	$5,244	**$76,799**

Proposed MRS Meeting Plan for July to Dec. 2021

Jul-21	MRSW: Review watershed loading summaries; Scenario Screening Workgroup to recommend preliminary scenarios for consideration
Aug-21	PFC: Review loading summaries; MRSW to recommend preliminary scenarios for consideration; DWR: UNRBA 2019 Monitoring Report
Sep-21	MRSW: Review lake water quality calibration (preliminary); BOD: Review loading summaries and list of scenarios under evaluation
Oct-21	PFC: Review lake water quality calibration and preliminary statistical modelling framework
Nov-21	BOD: Status; Technical Workshop: loading summaries and scenario discussion
Dec-21	PFC: Statistical model development (preliminary)

Proposed MRS Meeting Plan for Jan. to June 2022

Jan-22	PFC: Statistical model development; BOD: status
Feb-22	MRSW: Preliminary scenario analyses
Mar-22	PFC: Preliminary scenario analyses; BOD: status; WRRI: annual conference
Apr-22	MRSW: Additional scenario analyses
May-22	MRSW: Draft scope of work for FY2023; additional scenario analyses; BOD: status; Second joint symposium
Jun-22	PFC: Draft scope of work and contract for FY2023; additional scenario analyses; BOD: Final scope of work and contract for FY2023; select scenario results

Preliminary Budget for FY2022

Abbreviated Task Names	Brown and Caldwell Labor	Systech Water Resources, LLC.	Dynamic Solutions, Inc.	KDV Analytics, Brindle Creek, and Misc. Expenses	Total
340: Format lake water quality data	$4,965	$5,250	$5,250	$0	**$15,465**
341: Lake model calibration and validation (WARMF, EFDC)	$4,326	$96,621	$112,631	$0	**$213,578**
342: Sensitivity analyses and scenario evaluation	$12,175	$47,250	$47,250	$0	**$106,675**
343: Statistical model development	$84,831	$0	$0	$67,146	**$151,977**
344: Interim reporting	$64,508	$15,960	$54,600	$0	**$135,068**
345: Update the work plan	$7,210	$1,050	$1,050	$0	**$9,310**
346: Regulatory support and IAIA implementation support	$15,019	$0	$0	$0	**$15,019**
347: Communications support	$35,000	$0	$0	$0	**$35,000**
400: Preliminary cost benefit analysis	$7,210	$0	$0	$18,900	**$26,110**
600: Project management and meetings	$40,055	$15,750	$15,750	$5,244	**$76,799**
Total	**$275,298**	**$181,881**	**$236,531**	**$91,290**	**$785,000**

Plan for Statistical Model Development and Regulatory Options for the Chlorophyll-a Water Quality Standard

Planning for Development of a Statistical Model Development and Regulatory Options for the Chlorophyll-a Water Quality Standard

- The primary task for the legal team in FY2021 is to begin consideration of a petition for site specific criteria for Falls Lake
- This work will rely partially on the UNRBA Statistical Model of Falls Lake
- Evaluation of the State's Nutrient Criteria Development Plan process
- The legal team and the statistical modeling team are coordinating on this effort
- The Technical Advisors Workgroup was formed at the January 2021 PFC meeting and will meet in May
- This workgroup will report back to the MRSW and PFC

Modeling and Regulatory Support Status

WARMF Watershed and EFDC Lake Modeling Status

Reporting

- Interim draft report for the hydrologic model development and calibration for the Watershed Analysis Risk Management Framework (WARMF) watershed model
  - Addressing Executive Director's comments on draft hydrologic sections
  - Adding text to describe water quality model development
  - Including the model calibration output formats requested by the MRSW
- Developing draft report for the EFDC model

EFDC Hydrodynamic Lake Modeling

- Modeling team is refining hydrodynamic calibration to apportion flow balances based on tributary area and use a statistical smoothing technique
- Setting up the water quality components of the EFDC lake model (inputs, calibration data, etc.)

WARMF Watershed Modeling

- Model has been calibrated for stream flow and water quality across the watershed
- As described in the QAPP, calibration and performance criteria focus on the upper five tributaries that deliver more than 70 percent of the flow to the lake
- Performance criteria will be provided for both concentrations and loads
- Checks for “reasonableness” were conducted for the other tributaries using the UNRBA monitoring data despite lack of gaged stream flows
- Overall, the model performs well when streams are flowing and delivering load to the lake; simulated concentrations are not accurate during very low flows

WARMF Demonstration of Results

Closing Comments
Additional Discussion