UNRBA Monitoring Program Development and Implementation

BOD Meeting
Jan 15, 2014

January 15, 2014

Monitoring objectives

- Falls Lake EFDC Model improvement
- Demonstrate response of Falls Lake chlorophyll a and TOC to changes in nitrogen and phosphorus concentrations and loading
- Determine Jurisdictional Loading
- Regulatory compliance
- Link water quality and designated uses
- Prioritize BMP implementation
- Support regulatory options

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Updates

- Main focus of current analyses is to use and create models that can predict water quality or flow
  - Develop adaptive monitoring plan
  - Reduce future monitoring effort where possible
  - Optimize the level of monitoring effort and cost

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Updates

- Monitoring plan development and optimization:
  - How sensitive is DWR's Falls Lake model to changes in inputs?
  - How does monitoring frequency or flow data time step influence loading calculations?
  - ID the "best" existing or new model/method to estimate flow in areas without flow gages.
  - Can existing models/methods estimate water quality at locations or dates without data?
  - Are there redundancies in existing monitoring programs?
  - Update on UNRBA database status.

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Path Forward for Remainder of Fiscal Year 2014

- Recommended flow estimation approach to PFC at end of January
- Falls Lake model sensitivity analysis to PFC at end of January
- Water quality estimation approaches to PFC at end of February
- Draft Monitoring Plan to PFC in March
- Complete contracts with monitoring contractors in March/early April
- Begin monitoring in May

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Monitoring plan components reviewed and approved by DWR

- UNRBA Quality Assurance Project Plan (monthly submittals to DWR)
  - Describes entire UNRBA monitoring program
  - Identifies acceptable field and laboratory methods and procedures
  - Documents data accuracy requirements
  - Includes methods for verifying data quality
- Modeling Framework to DWR in early February
  - Identifies proposed model revisions
  - Describes how the monitoring program will provide the data to support Falls Lake model updates

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Falls Lake EFDC Model Sensitivity Analyses

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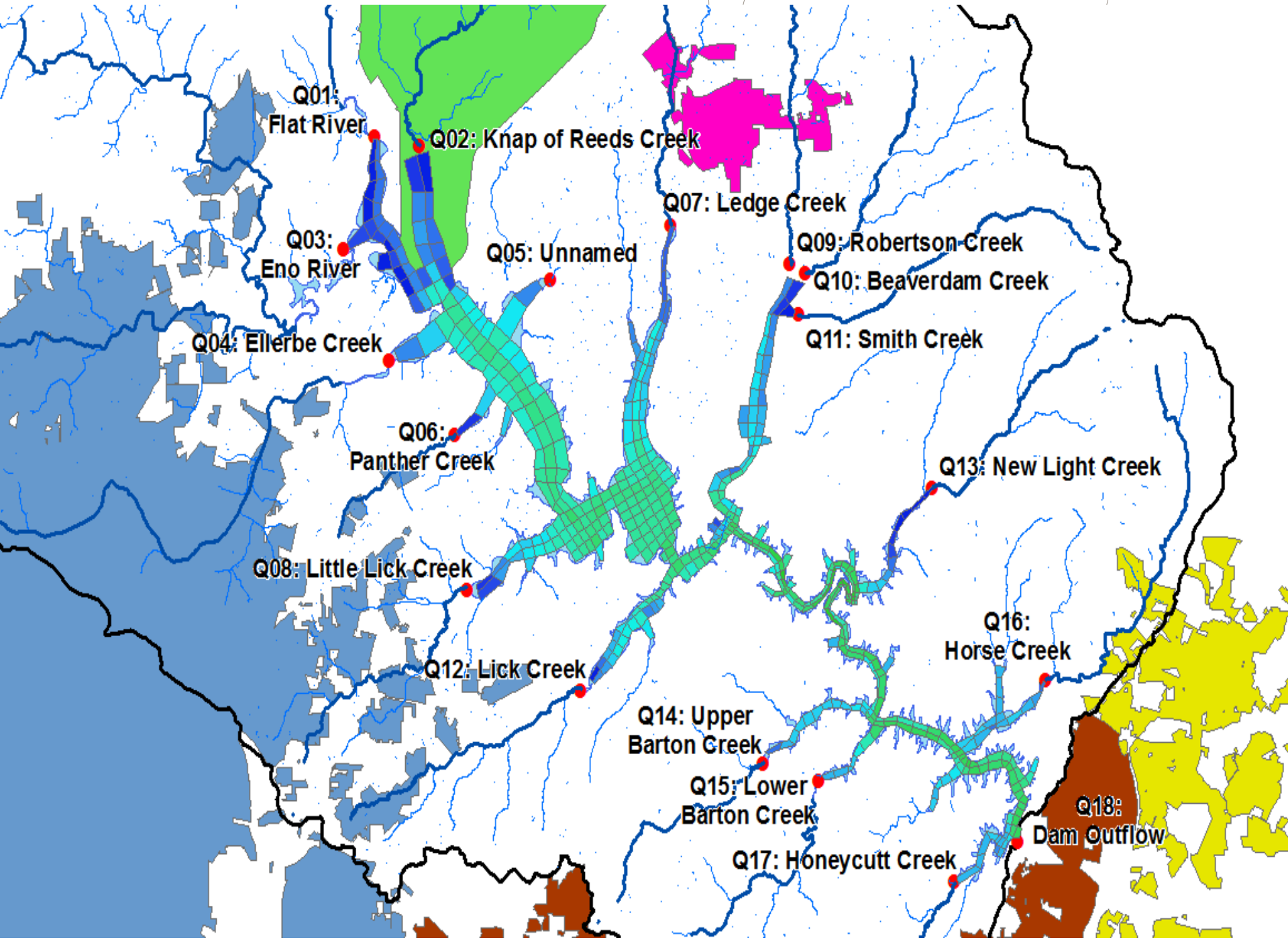
Q01: Flat River
Q02: Knap of Reeds Creek
Q03: Eno River
Q04: Ellerbe Creek
Q05: Unnamed
Q06: Panther Creek
Q07: Ledge Creek
Q08: Little Lick Creek
Q09: Robertson Creek
Q10: Beaverdam Creek
Q11: Smith Creek
Q12: Lick Creek
Q13: New Light Creek
Q14: Upper Barton Creek
Q15: Lower Barton Creek
Q16: Horse Creek
Q17: Honeycutt Creek
Q18: Dam Outflow

How sensitive is the Falls Lake EFDC model to changes in inputs?

- Model is currently calibrated with large inputs of chl a coming from the tributaries.
  - Even if we reduce the chl a inputs and rerun the model, its calibration affects how the model will respond
  - The sensitivity of an improved and recalibrated model is unknown at this time, but is unlikely to show the same sensitivity to nutrient inputs as the existing model
  - The upper portions of Falls Lake are most sensitive to changes in nutrient inputs

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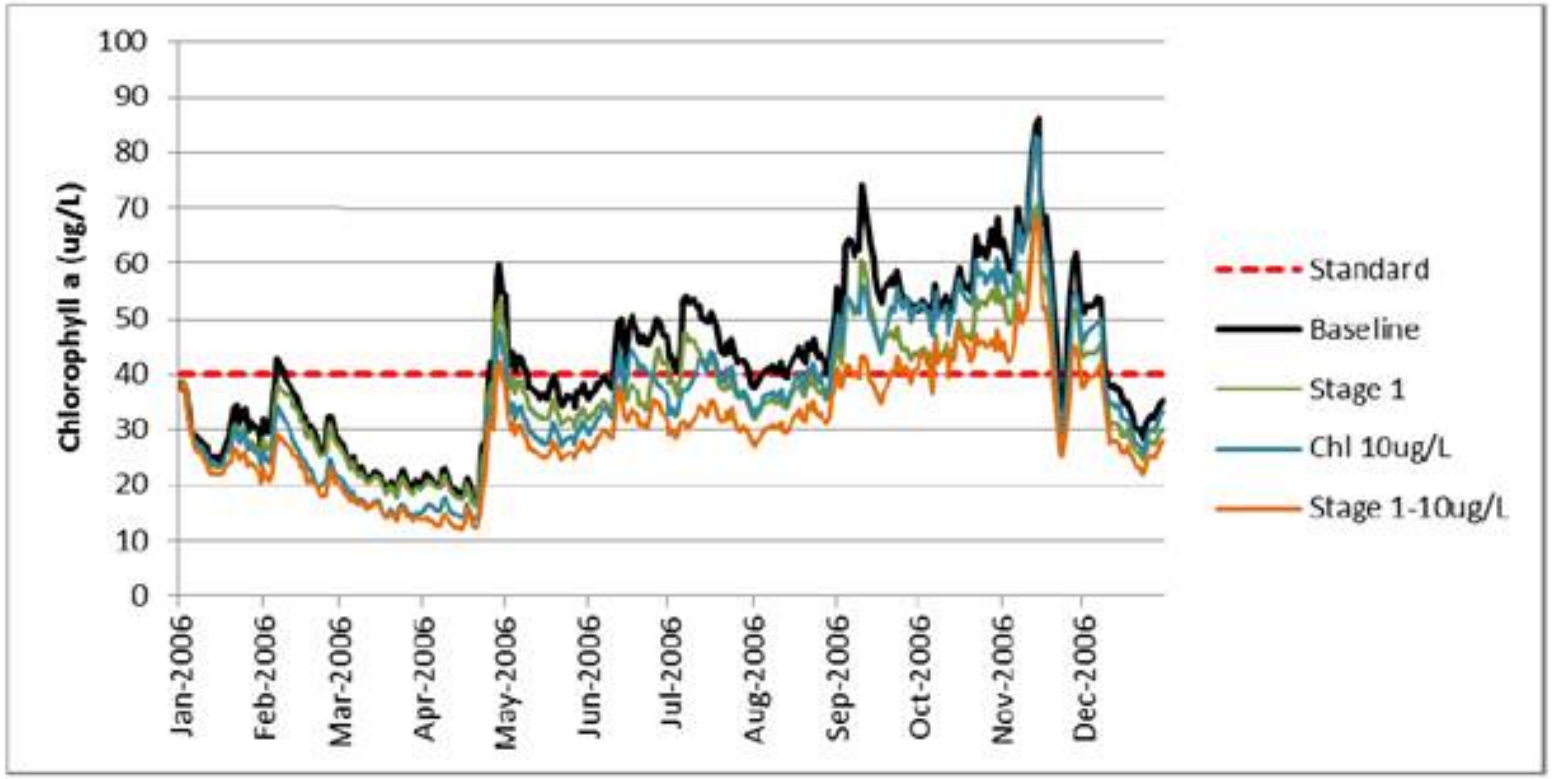
EFDC Sensitivity – Predicted Chl a at I-85 with Chl a inputs reduced to 10 ug/l, with and without Stage I reductions in TN and TP (20%↓ TN, 40%↓ TP)



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How sensitive is the Falls Lake EFDC model to increased nutrient loading?

- Several scenarios were run that increased individual tributary loads and groups of tributaries by 50 percent
- Compared model output with increased loads to baseline predictions at I-85, Highway 50, and the Dam.

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Flow Monitoring Optimization

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Is there a cost effective tool available to predict flows in areas where we do not have flow gages?

- Methods/Models under evaluation
  - OASIS,WARMF, Basin proration, RTI Waterfall
  - USGS Archfield method
- Identifying model strengths and limitations
- Comparing flow predictions from several methods at gaged locations
- Compare basin proration method to selected method at 1-2 ungaged locations

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Water Quality Monitoring Optimization

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How can we use existing data and available supporting information to predict water quality or reduce level of monitoring effort?

- Statistical Models Under Development
  - Similar Stations Model –
    - Can be used to determine relationships within and across subbasins
  - Upper Neuse WQ Model –
    - Offers significant prediction flexibility and can be used for monitoring optimization
    - Identifies locations that behave differently than expected
  - Sampling Optimization Model -
    - Prioritize sampling frequency

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