Current Activities

- Finalized and posted the Data Management Plan and Description of the Modeling Process to the UNRBA website: https://www.unrba.org/reexamination

- Continuing to receive data from organizations in the watershed

- Drafting the first data summary memorandum

- Preparing for the October 24th stakeholder meeting

  - Present sources of data

  - Summarize data

  - Discuss assumptions

  - Receive feedback

Topics for Fall Stakeholder Meeting

History of the UNRBA and Project Background

- Members of the Association
- Use of the lake
- Falls Lake Nutrient Management Strategy developed by DWR
  - Uncertainties and questions
  - Incorporation of the Consensus Principles developed by the UNRBA
  - Allowance for re-examination
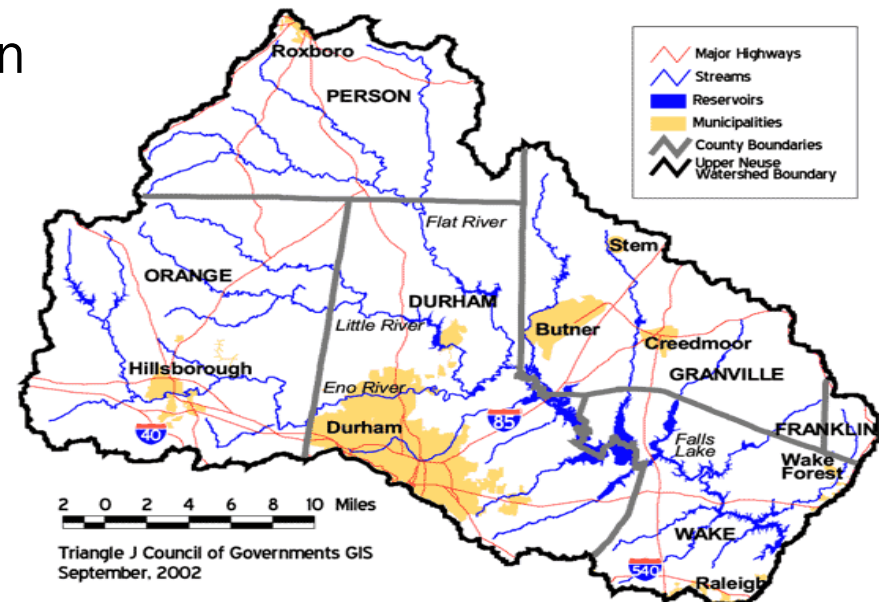
UNRBA Re-examination Progress

Planning phase

Monitoring program

**Modeling and regulatory support project**

- Review existing data and models
- Designed the monitoring program
- Described the modeling framework

- Monitoring Plan and Quality Assurance Project Plan (QAPP)
- Routine monitoring
- Special studies

- Model selection
- Conceptual Modeling Plan and Modeling QAPP
- **Data collection**
- **Modeling**

Watershed Modeling Units

- Watershed model is divided into small units called catchments

  - Present preliminary delineations (over 100 catchments)

  - Discuss further delineation
    - Jurisdictional boundaries

  - Receive feedback on best year and source of data to represent jurisdictional boundaries
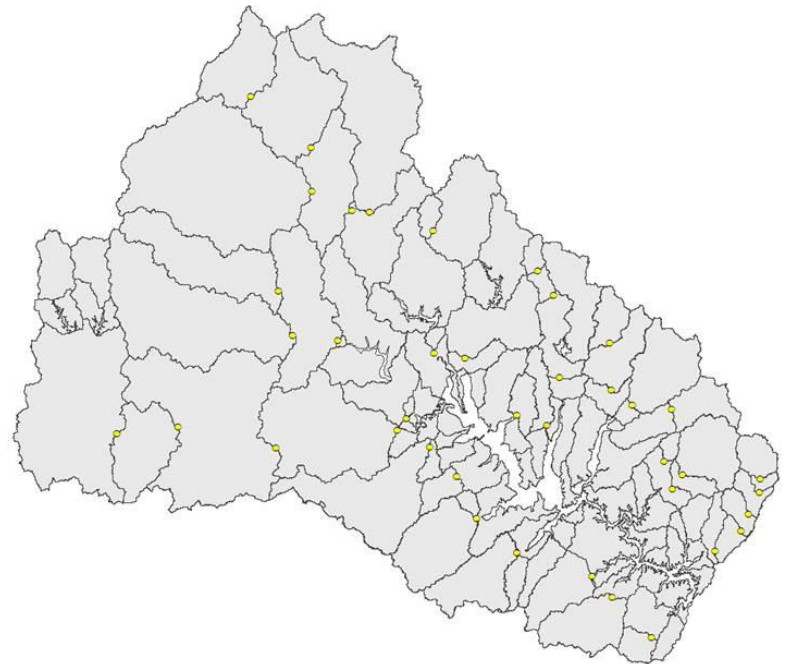
Lake Modeling Units

- Lake model is divided into small units called grid cells
  - Present modeling grid (804 cells)
  - Relied on the UNRBA bathymetric survey of Falls Lake
  - Provide opportunity for stakeholder input
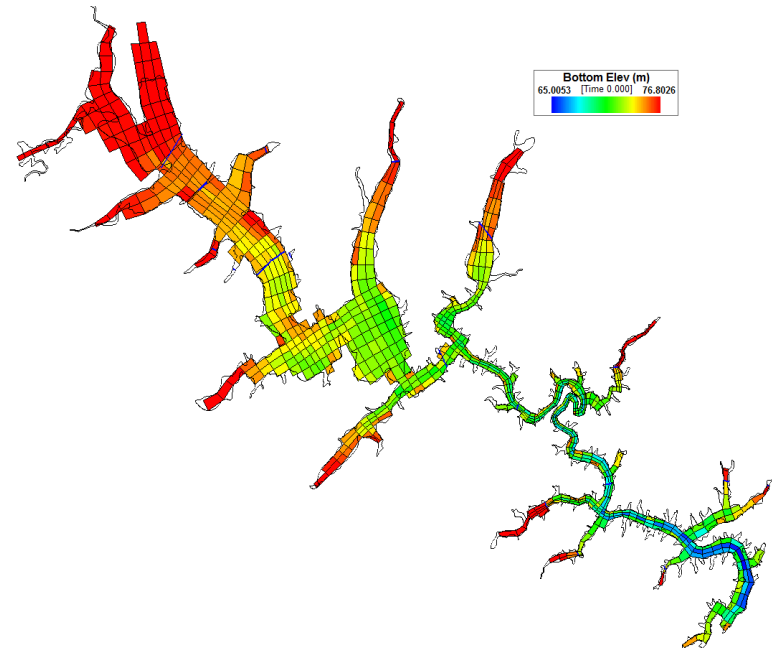
Stream Flow and Water Elevation Data

- Primary source of data is the US Geological Survey
- Multiple gages with data in the two modeling periods
  - 2005 to 2007: 10 gages
  - 2014 to 2018: 14 gages
- Measurements are taken at least daily
- Applications in the modeling
  - Develop time series of observations
  - Compare simulated stream flows and water levels to observations
  - Calibrate the models to improve predictions
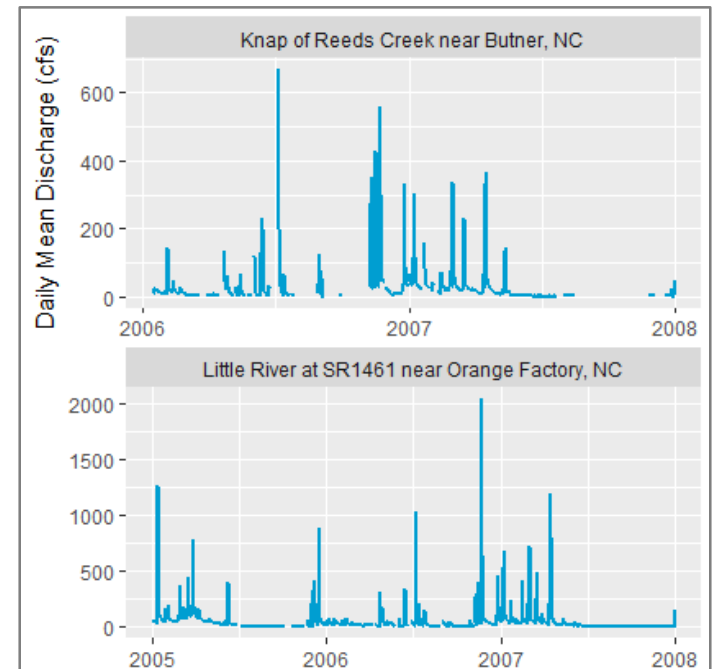
Impoundments

- Affect the storage and release of water to streams
- May be used as a source of drinking water
- Can affect the hydrology in the watershed
- Must be accounted for in order to calibrate downstream flows
- Ten impoundments are upstream of Falls Lake
- Utilities, local governments, and DEQ are provided data
  - Information about the storage capacity
  - Amount of water released from impoundment
  - Amount of water withdrawn from the impoundment

Source: City of Durham Teer Quarry

Meteorology Data

- Primary driver of the watershed model is meteorology data
  - Rainfall -> Runoff or Infiltration -> Pollutant Loading
- Complete time series are required for several parameters
  - Preferably hourly
  - Many locations across the watershed
- Sources of data include observations and model simulations
- Modelers are compiling this data now
- Evaluating use of precipitation radar data to provide better spatial coverage
  - Used to generate time series at locations with no direct observations
  - Help from NC Department of Transportation and the State Climate Office

Components of a watershed model:

Inputs: Precipitation, Solar Radiation

Processes: Evapotranspiration, Overland Runoff, Infiltration

Layers: Land Cover, Vegetation, Topography, Soils, Geology

Streamflow

Outputs: Streamflow, Water quality
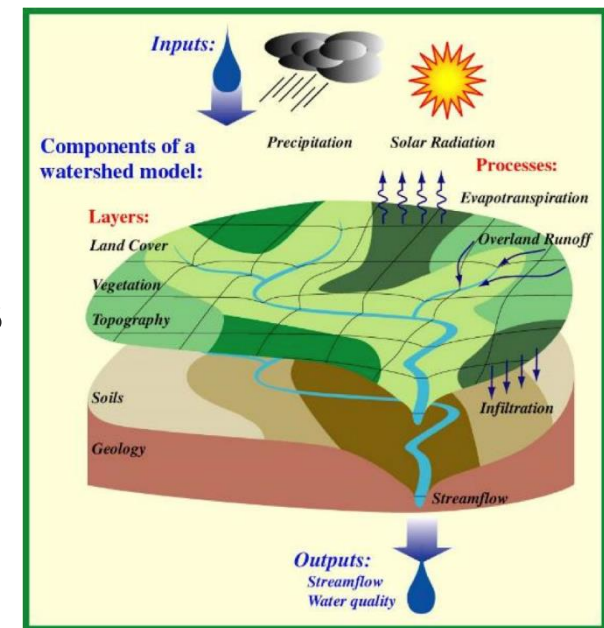
Wastewater Treatment Facilities

- Wastewater facilities can alter in-stream water quality and stream flows
- Accurate accounting of discharges is essential for accurate model development and calibration to observations
  - In stream flows (USGS)
  - Water quality measurements (UNRBA and its members, DEQ, etc.)
- There are three major and several minor facilities to develop time series of daily discharges
- All data from these facilities has been received

Town of Hillsborough
TN lb/year
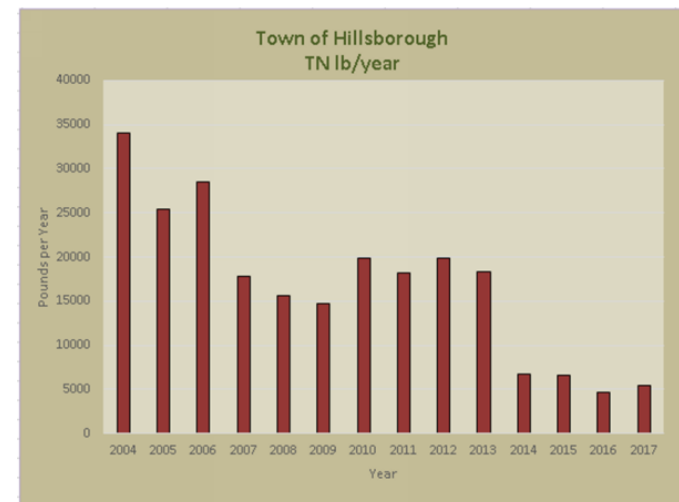
Precipitation Chemistry and Air Quality Data

- Wet and dry deposition can be significant contributions to total nutrient load in the watershed (~15-30% of total in some east coast watersheds)

  - Wet deposition carries pollutants in rain and snow

  - Dry deposition carries pollutants as particles settle

- Several parameters require development of time series inputs for deposition

- Four sources of data

  - Clean Air Status and Trends Network (CASTNET)

  - National Atmospheric Deposition Program Trends Network (NADP-NTN)

  - City of Durham Atmospheric Deposition Monitoring Study

  - NC DEQ Division of Air Quality NO2 Concentration Data

Total deposition of nitrogen 2015
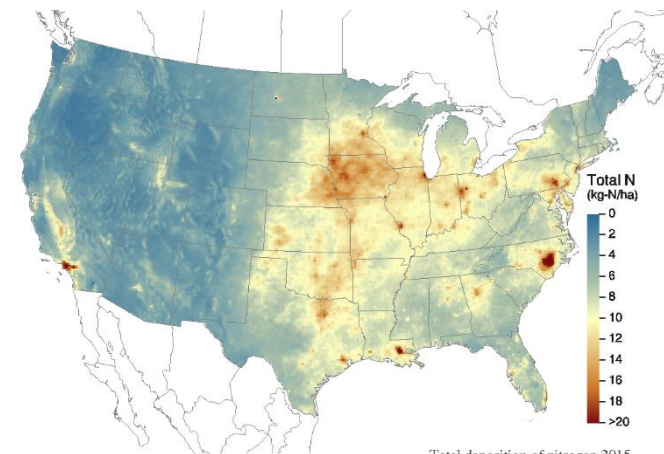
Source: CASTNET/CMAQ/NTN/AMON/SEARCH   USEPA 09/14/16

Planned Topics for Spring Meeting

- Land Use data

  - USGS National Land Cover Data

    - Year 2016 release

    - Years 2001, 2006, 2011 - reharmonized

  - Data from local governments

  - Acreages provided by NC Department of Agriculture

- Nutrient application rates and time

  - Urban fertilizer studies

  - Rates provided by NC Department of Agriculture

- Soils data from the Natural Resources Conservation Service
- Best management practices and structural control measures

Multi-Year Schedule

ACTIVITY	2017	2018	2019	2020	2021	2022	2023	2024
Stakeholder engagement and coordination with DWR, EPA, UNC	██	██	██	██	██	██	██	██
UNRBA Full Monitoring Program	██	██						
Develop Modeling QAPP	██							
Preliminary data compilation		██	██					
Model setup / interim reporting			██					
Hydrologic and hydrodynamic calibration / interim reporting				██				
Water quality calibration / interim reporting					██			
Cost benefit analyses, sensitivity analyses, load reduction scenarios					██	██		
Final technical report (modeling)						██		
Agency review and input		██	██	██	██	██		
UNRBA Reexamination package UNRBA proposal to begin EMC Rules Readoption by Dec. 2024							██	▨

FY2019 (spanning 2018–2019)

Questions ?