

2022 Falls Lake Nutrient Management Study Research Symposium

# The Upper Neuse River Basin Association Pathway to a Re-examination of the Falls Lake Nutrient Management Strategy

April 7, 2022



# The History of Falls Lake

- Initial primary focus on flood control
- Authorized in 1965
- Water Quality Agency Predicts eutrophic conditions and violations of water quality standards
- Began to fill in 1981 (filled during a drought)
- Reached full pool by 1983
- Water Quality better than predicted



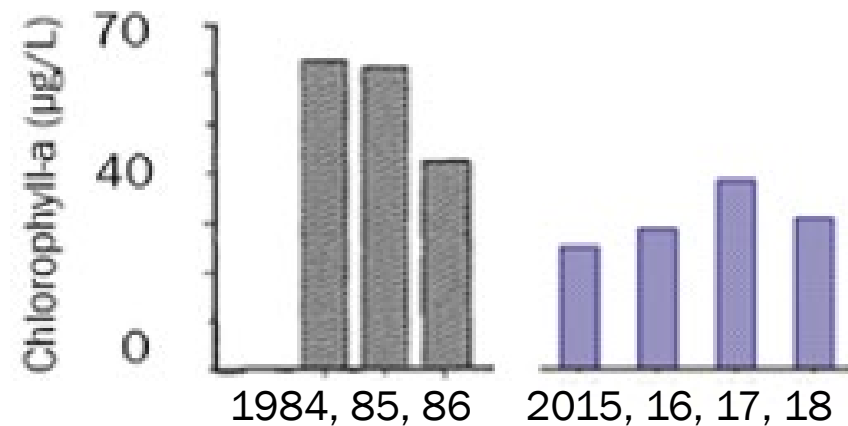
Photograph of workers on an old wooden dam uncovered during construction of Falls Lake Dam in the late-1970s. When this photo was taken, the wooden dam was over 150 years old and covered by silt, mud, and water. *Photograph courtesy of the US Army Corps of Engineers.*

Photograph courtesy of the US Army Corps of Engineers as cited by the Wake Forest Historical Museum.

# Controversy and Concern Follows Falls Lake

- Environmental concerns about removal of a free-flowing river and resulting quality of the lake
- Environmental studies indicated it would be over-enriched with nutrients
- Listed on NC's 303(d) list for chlorophyll-a in 2008
- Falls Lake Rules adopted in 2010
- Data and analysis indicates water quality is better than predicted and has improved over time

Growing Season Average Chlorophyll-a



The predicted lake-wide average based on models developed in 1983 by NCDDEM was 75 µg/L.

# UNRBA Members and Perspectives

## Members

- Six counties
- Six municipalities
- One water utility
- Soil and water conservation districts

## Perspectives

- Urban and rural areas
- Point and non-point sources
- Local governments
- Agriculture
- Institutions
- State and federal entities



# Falls Lake Reservoir Provides Multiple Purposes

- Provides drinking water for 550,000 customers
- Minimizes flooding
- Regional recreational facility
- Provides habitat to aquatic and terrestrial wildlife
- Protects water quality downstream



# Regulatory Context

- In 2005, the NC legislature directed the NC Environmental Management Commission to
  - Study water quality in drinking water supply reservoirs serving more than 300,000 persons
  - Adopt nutrient control criteria for impaired reservoirs or those that may become impaired within 5 years (Falls Lake listed in 2008)
  - Complete studies, modeling, and management strategy development within 3 years
  - Timeline was extended to January 2011 in later bills
- In 2010, the legislature created the Falls Lake Watershed Association (FLWA) (the UNRBA also does business as the FLWA)
- In 2011, the Falls Lake Nutrient Management Strategy (Falls Lake Rules) were passed with the goal of attaining the chlorophyll-a standard everywhere in the lake

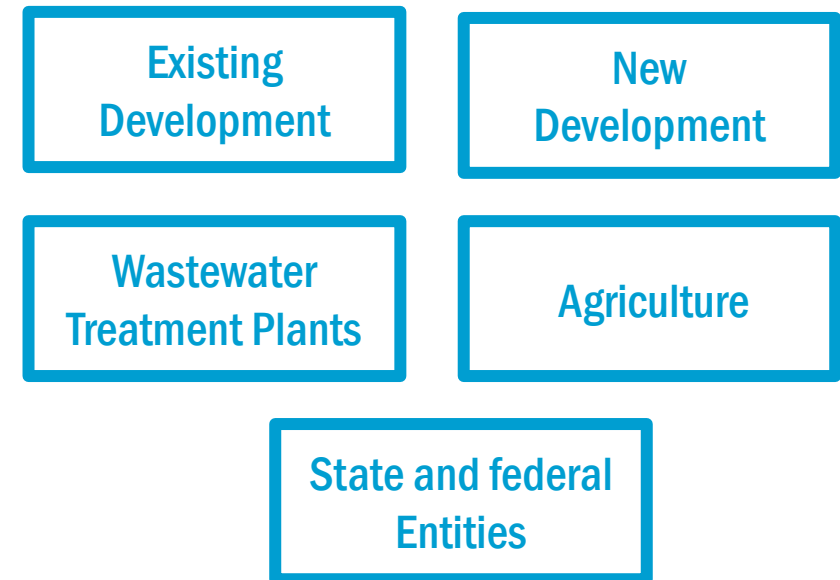
# The Consensus Principles

- Initially there was friction among the UNRBA members with two different perspectives
  - This is our water supply, and its quality is critical to our service area and economy
  - These rules are a burden on the upper jurisdictions
- Consensus Principles were established by UNRBA members during development of the Falls Lake Nutrient Management Strategy
- All parties agreed to the protection of Falls Lake as a drinking water supply
- Resulted in language in the Rules that allowed for re-examination if certain steps were taken
- Provided the framework for the UNRBA re-examination process and a funding mechanism



# DWR 2011 Falls Lake Nutrient Management Strategy

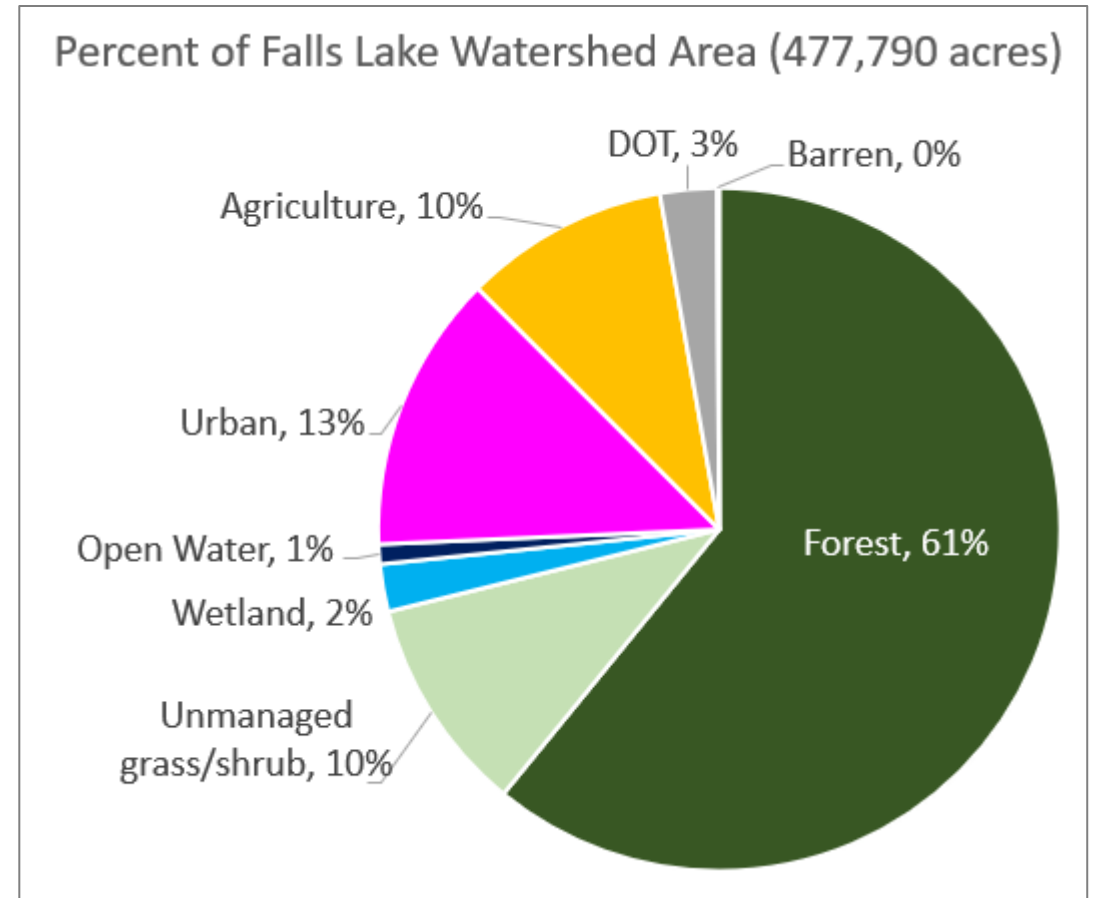
- DWR models were finalized in 2009 using data from 2005 to 2007 (with limited time and resources)
- Establishes two stages of actions and assigns load reduction targets for individual sectors
  - Includes the highest nutrient reductions ever passed in NC (77% Phosphorus, 40% Nitrogen)
  - Required reductions exceed limits of technology
  - Uncertain that chlorophyll-a standard could be achieved everywhere in the lake
  - The total strategy is estimated to cost over \$1.5 billion
- Strategy allows for a re-examination of Stage II based on the Consensus Principles





# Falls Lake Challenges

- Dam construction on the river resulted in flooded topography and shallow areas difficult for attaining the 40 µg/L chlorophyll-a standard
- Exceedances of the chlorophyll-a standard resulted in the lake being 303(d) listed
- The watershed is approximately 74% unmanaged (forest, wetlands, unmanaged grassland/shrubland, open water)
- Watershed and lake sediments are an ongoing source of nutrients

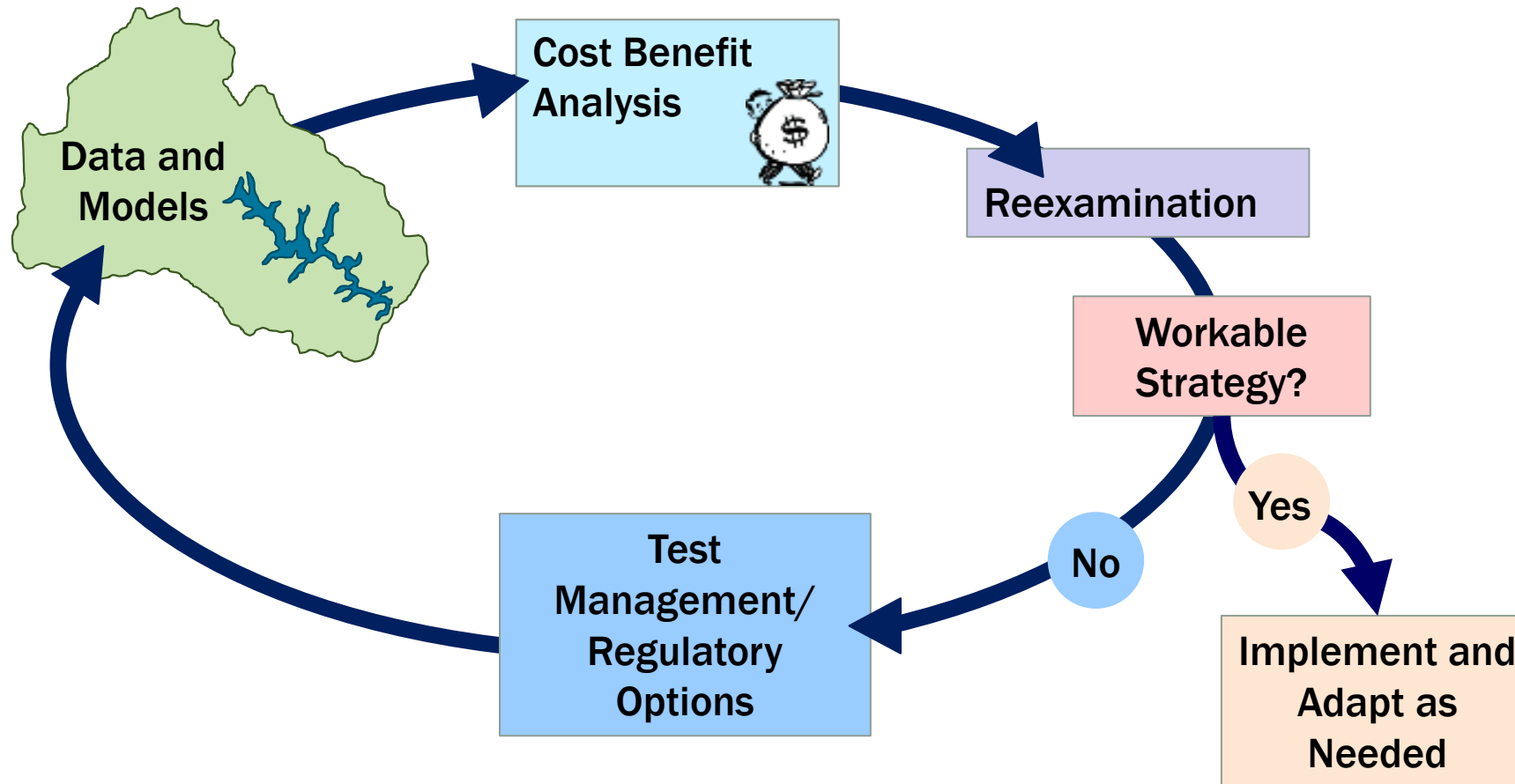


# Components of the Re-examination

- Use a science-based approach to nutrient management
- Protect water quality in Falls Lake and continue to meet designated uses
- Use local resources effectively
- Balance science, policy, and water quality goals develop a revised nutrient management strategy that is technologically feasible and economically viable



# Framework for the Re-examination



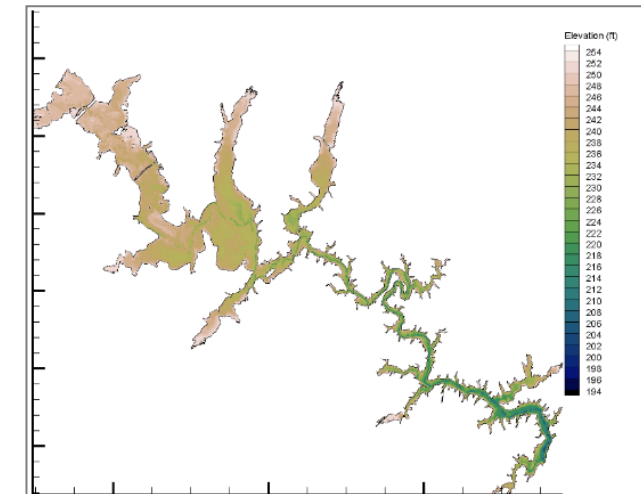
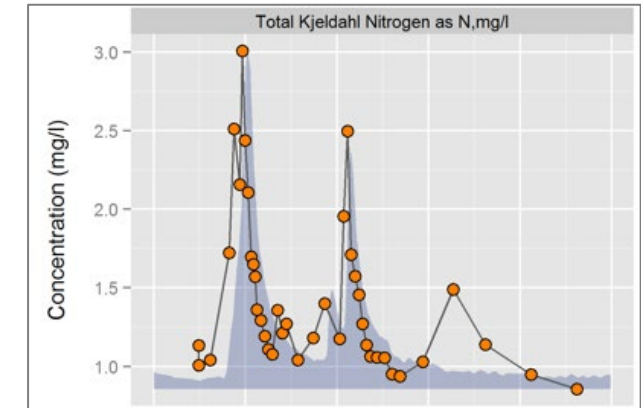
# UNRBA Knowledge Base for the Re-examination

- [UNRBA Description of the Modeling Framework, 2014](#) \*
- [UNRBA Monitoring Plan, 2014](#) \*
- [UNRBA Monitoring Quality Assurance Project Plan \(QAPP\), 2014](#) \*
- [Evaluation and Selection of Model Packages for the UNRBA Modeling and Regulatory Support Project, 2017](#)
- [Conceptual Modeling Plan, 2017](#)
- [Data Management Plan, 2018](#)
- [Four-year monitoring program \(August 2014 through October 2018\)](#) \*
- [UNRBA Modeling QAPP, 2018](#) \*
- [Comprehensive UNRBA Monitoring Report, 2019](#)
- [UNRBA Decision Framework, 2020](#)

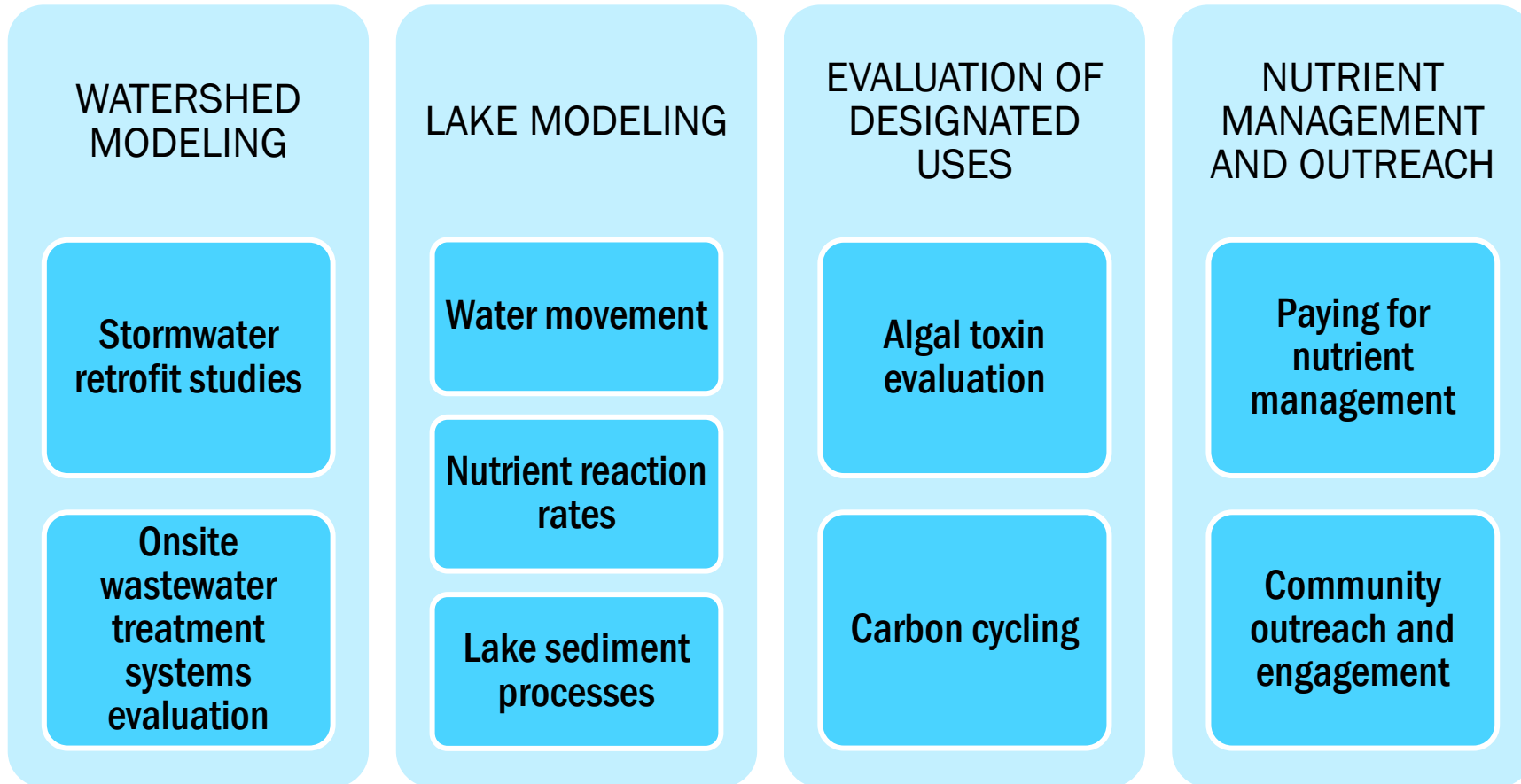
\* *State Requirements for the Re-examination as described in the Rules*

# UNRBA Watershed and Lake Data Collection and Studies

- UNRBA monitoring program  
<https://www.unrba.org/monitoring-program>
- Four-year program
- At least monthly sampling
- 38 stations in the watershed
- Supplemental data collected at 12 DWR lake monitoring stations
- Designed to fill data gaps and support modeling efforts
  - Routine monitoring
  - Special studies
- [UNRBA Data Summary Report](#)



# Integration of NC Policy Collaboratory Research into UNRBA Re-examination



*In addition to the studies, the NC Collaboratory is also providing third-party review of the UNRBA models as an additional quality assurance measure.*