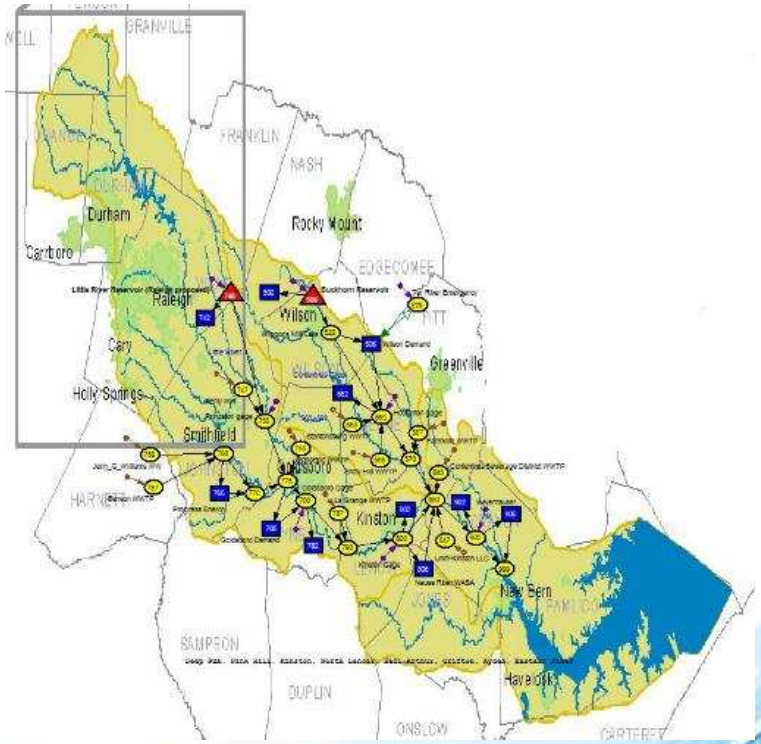
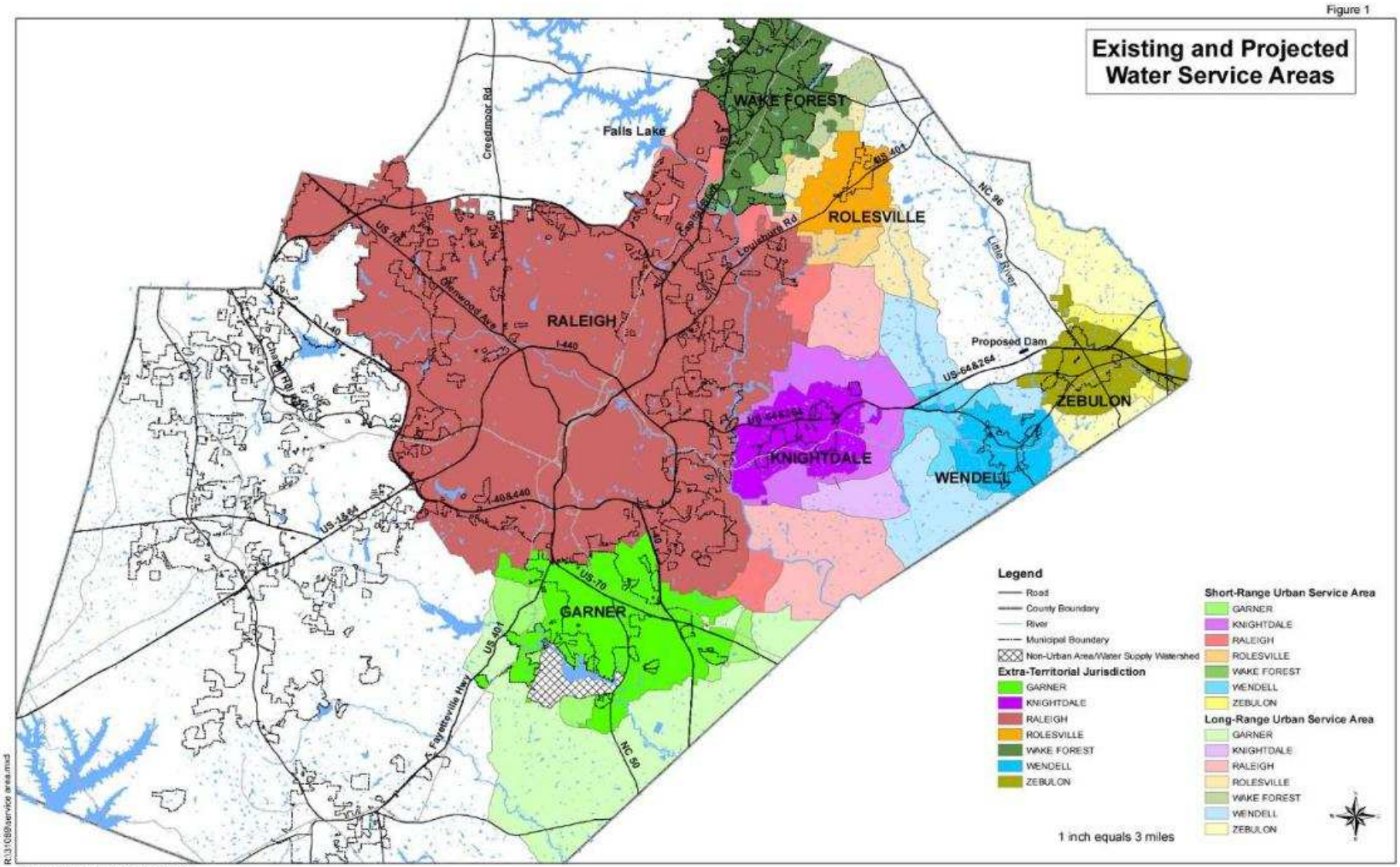
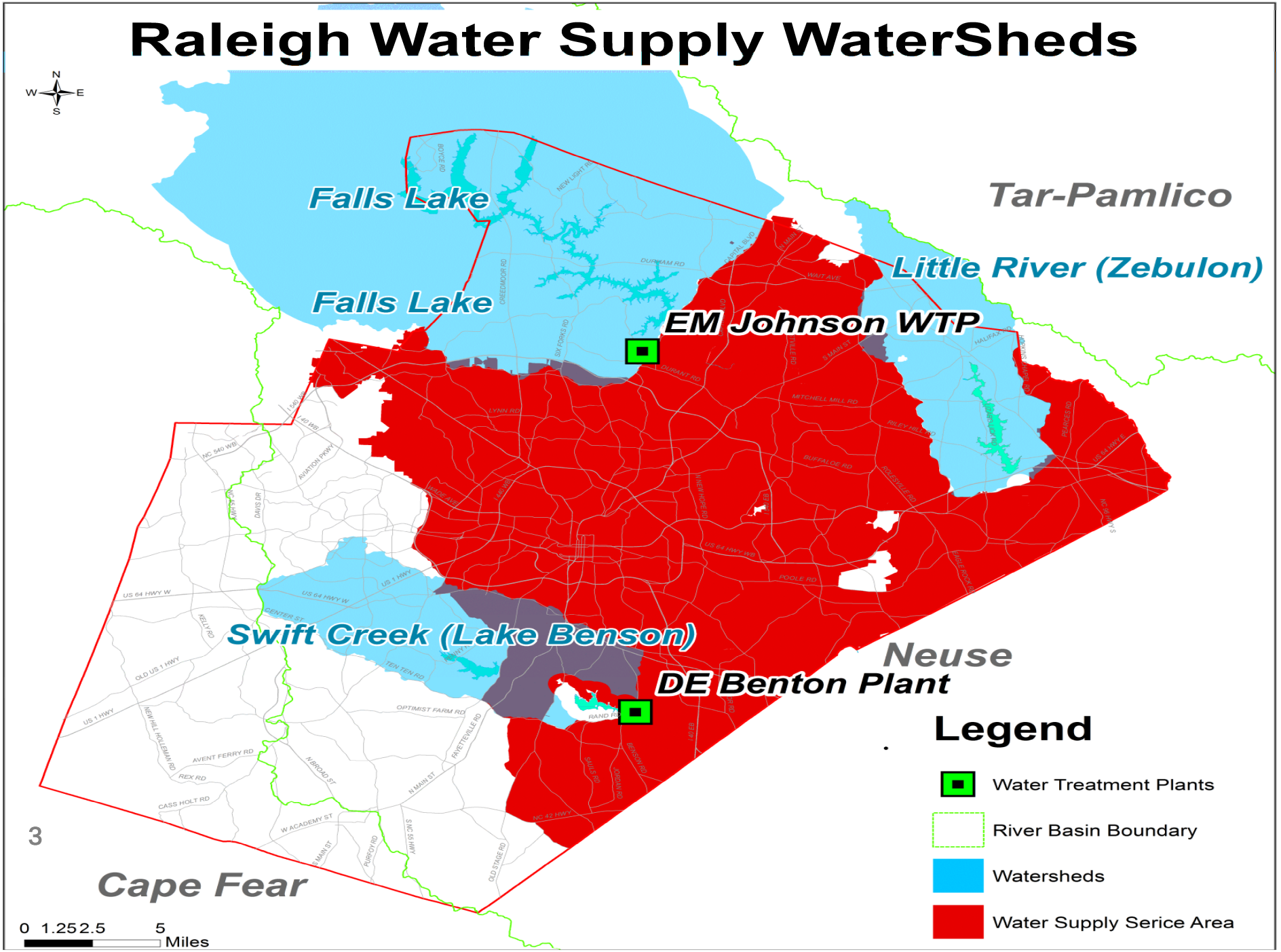
City of Raleigh Water Supply Planning Update

Upper Neuse River Basin Association
June 17, 2015

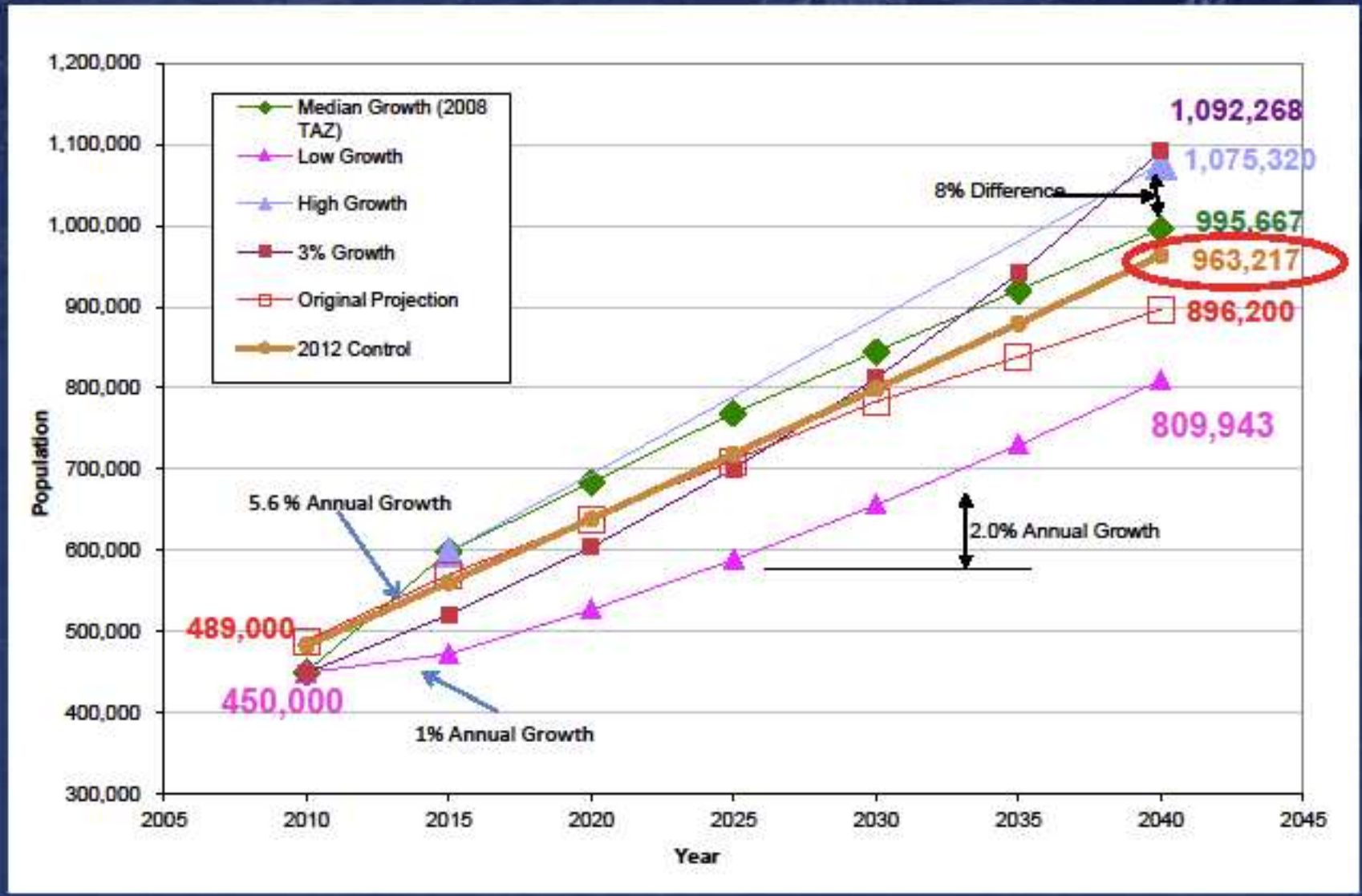


Water Supply Planning Area

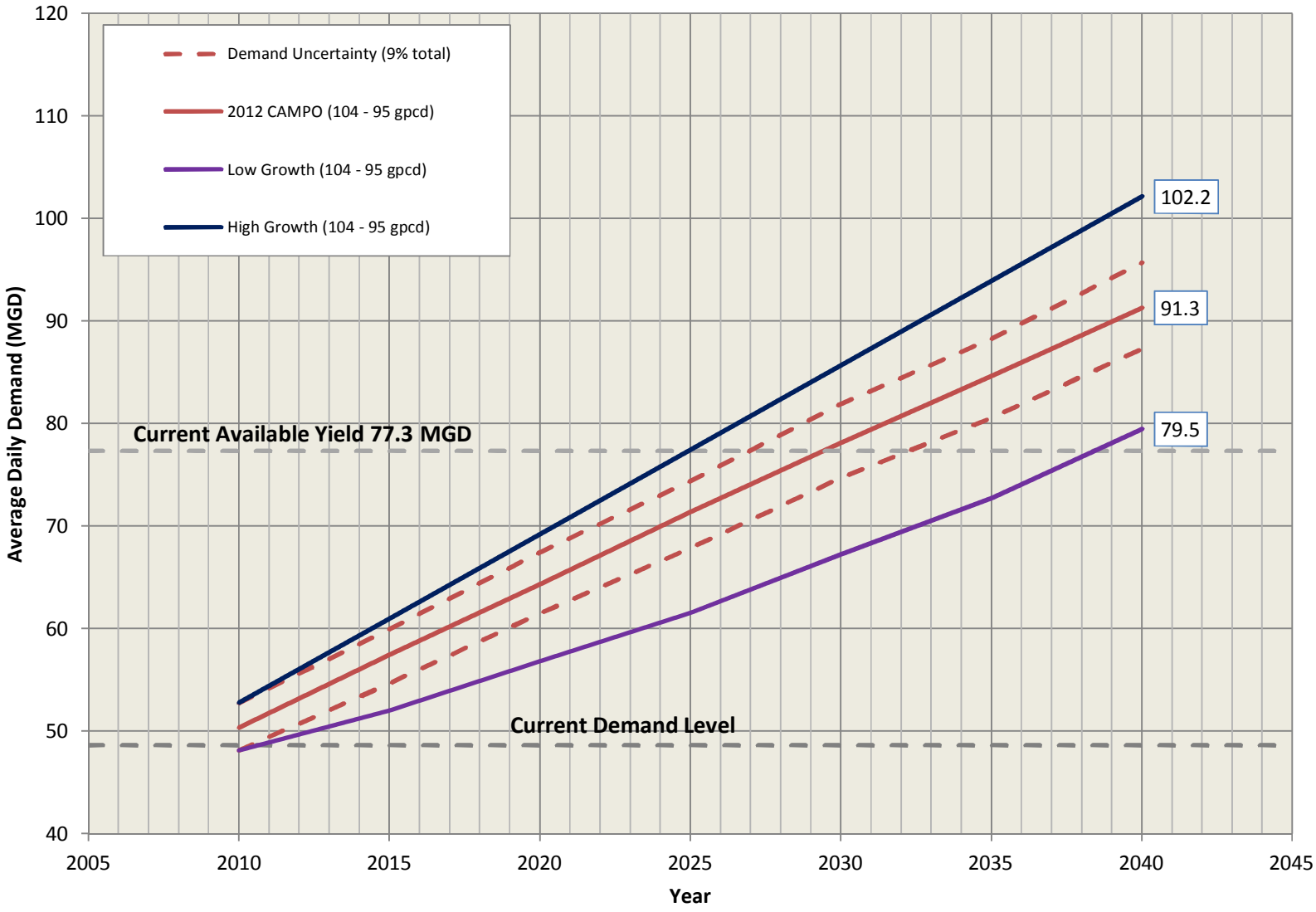



Raleigh Water Supply WaterSheds
N
W
E
S
Falls Lake
Falls Lake
Tar-Pamlico
Little River (Zebulon)
EM Johnson WTP
Swift Creek (Lake Benson)
Neuse
DE Benton Plant
Cape Fear
3
0 1.252.5 5
Miles
Legend
Water Treatment Plants
River Basin Boundary
Watersheds
Water Supply Serice Area

Potential Range of Population Projections



Demand Projections



Historic Water Resource Planning

- **1971 Identified as a possible site for water supply reservoir by Moore/Gardner, Edwards, Piatt and Wooten Engineers Task Force;**
- **1986 Evaluated for drinking water in "East Wake County Water Supply Alternatives and Analysis" by Peirson and Whitman, Inc.;**
- **1987 Watershed zoned for water supply purposes;**
- **1988 EMC reclassified watershed to today's WS-II classification**
- **1989 *Phase I Preliminary Engineering Services Report for the Proposed Little River Reservoir;***
- **1990 *Environmental Assessment Phase 1 Report;***
- **1993 *Draft Environmental Assessment* prepared to evaluate project feasibility;**
- **1995 Wake County began reservoir property acquisition;**
- **2000-2006 Raleigh and other Wake County Municipalities merge utilities;**
- **2006-2015 Raleigh undertakes new water resource development though Federal and State permitting processes.**

Processes, Challenges and Hurdles

- **Federal**
  - **Clean Water Act**
  - **The National Environmental Policy Act**
  - **The Endangered Species Act**
  - **EPA Region 4 Guidelines on Water Efficiency Measures for Water Supply Projects**
  - **National Case Law**
  - **Well Established Opposition or Guidance Groups**

- **State**
  - **State Delegation of Components of the Clean Water Act**
  - **Interbasin Transfer Law & Rule**
  - **L&S Water Power v. Piedmont Triad Rural Water Authority decision**
  - **Ecological Flows and the EFSAB Recommendations**
  - **Well Established Opposition or Guidance Groups**

Most Difficult Challenge and Hurdle?

- **Complexity!**
  - **Complexity brings grid lock, accidental or intentional;**
  - **Complexity brings confusion for decision makers and the public;**
  - **Complexity brings "Analysis Paralysis";**
  - **Complexity brings opportunity for opponents to derail projects that society would otherwise consider reasonable;**
  - **It brings <u>uncertainly</u>…**

Projected Water Resource Needs

	2011	2020	2030	2040	2050	2060
Surface Water Supply, mgd	77.3	77.3	77.3	77.3	77.3	77.3
Reduced Demand, mgd	--	1.9	4.5	8.7	14.4	15.2
Service Area Demand, mgd	51.9	64.4	78.2	91.3	102.7	115.00
Future Need, mgd	--	0.0	13.8	14	25.4	37.7

[1] Demand reductions acquired from water efficiency and reclaimed water utilization off setting new demand.

Water, Water Everywhere….?

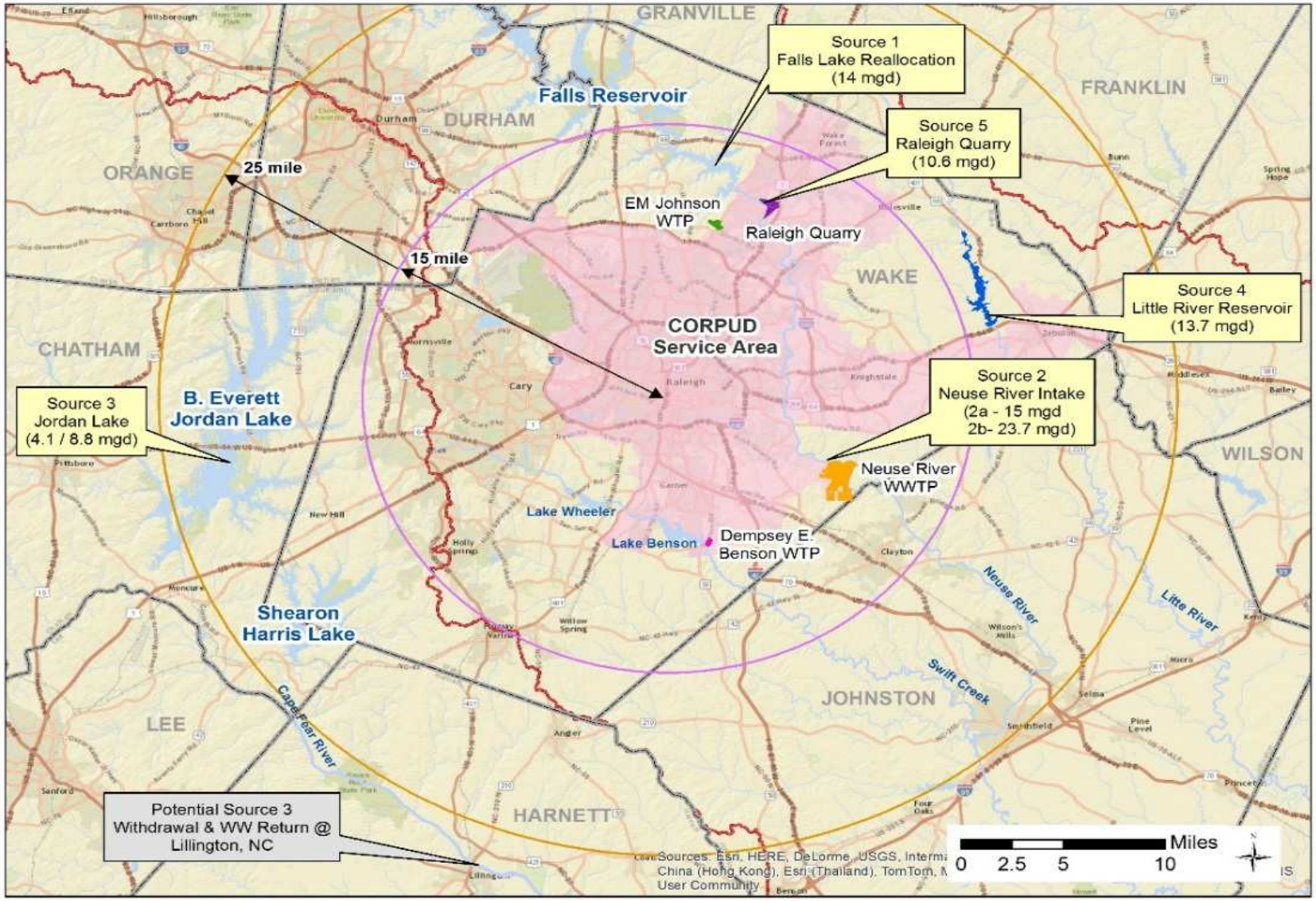
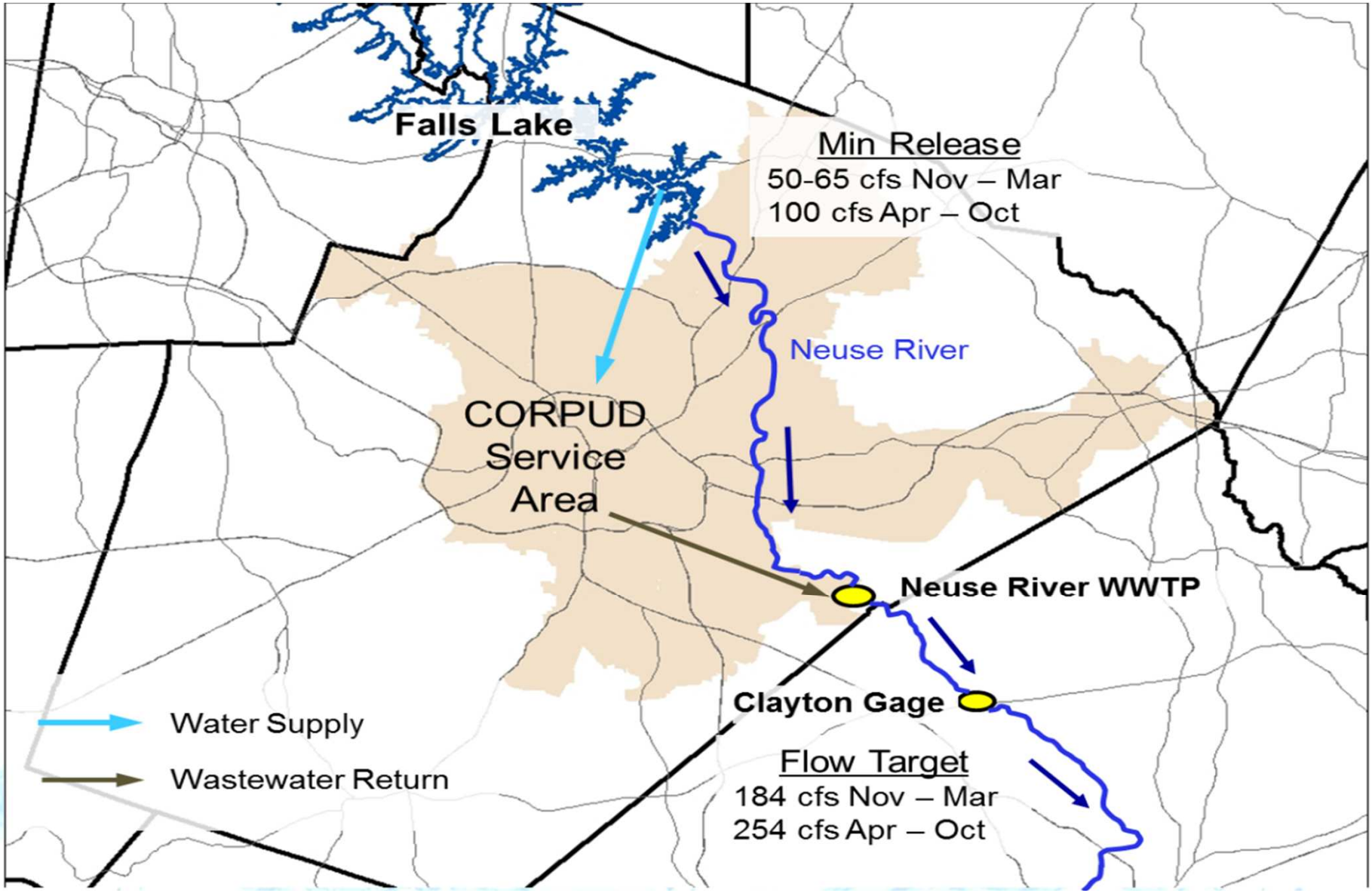
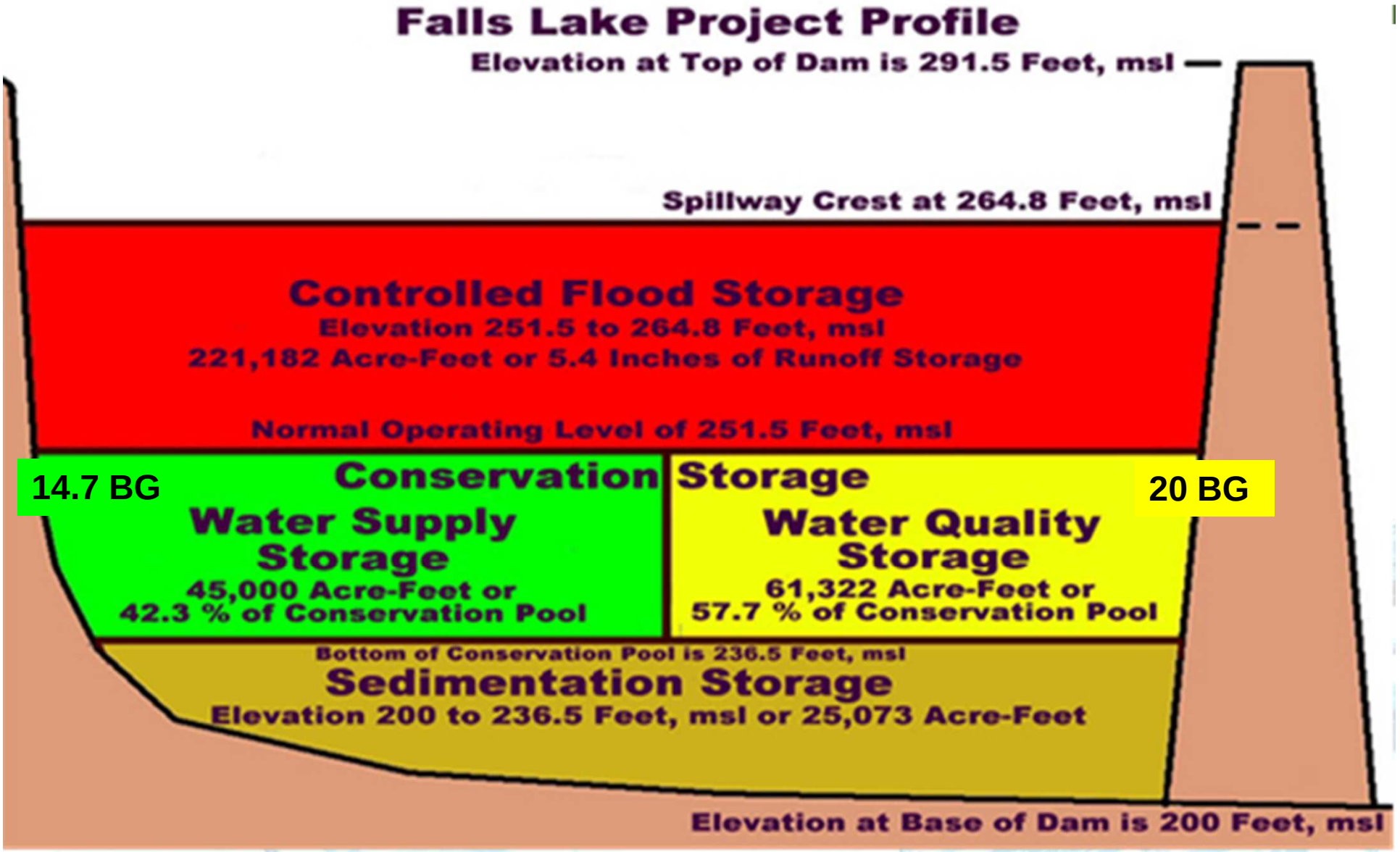


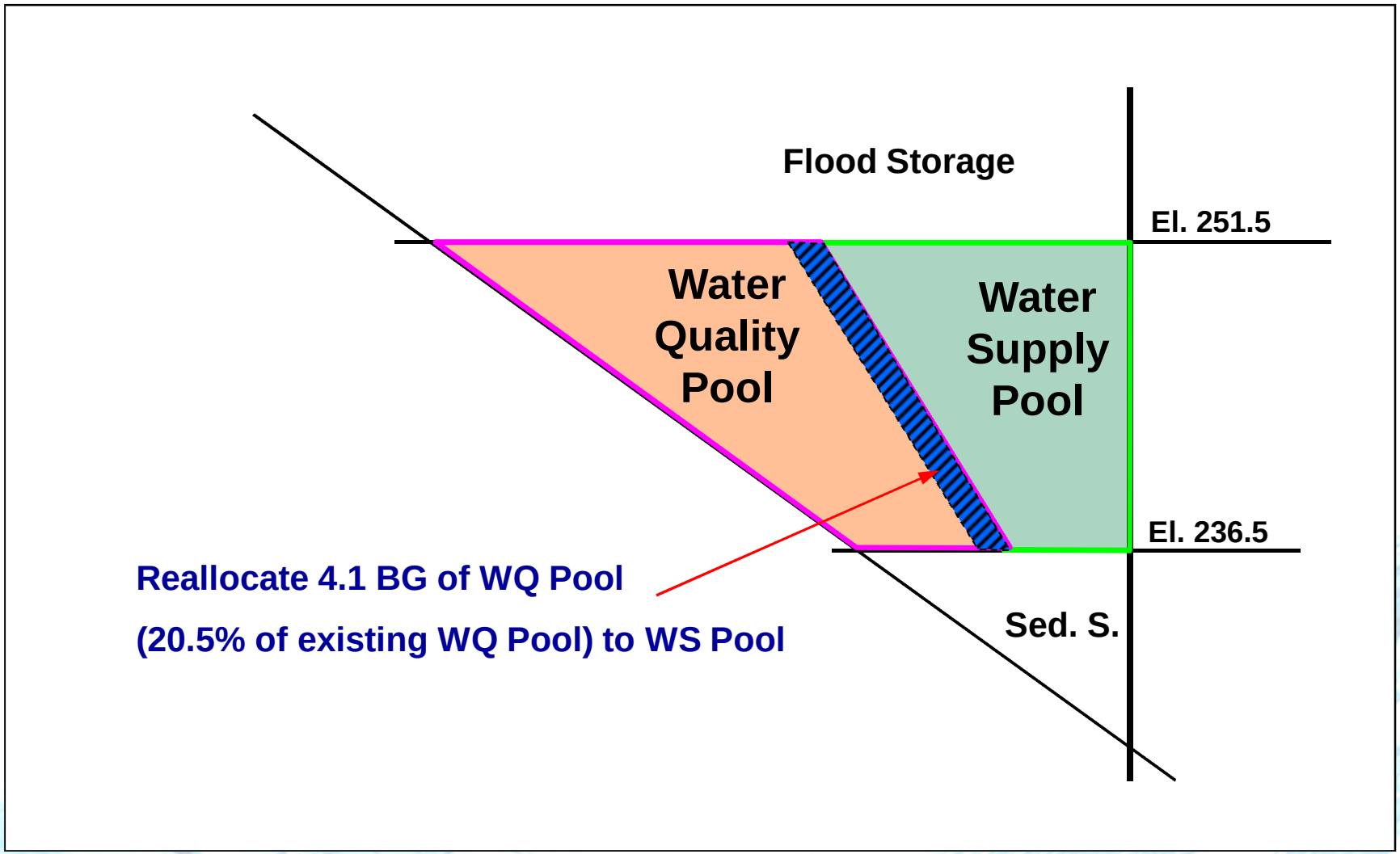
Illustration of Water Supply Usage Impact on Clayton Flow Target



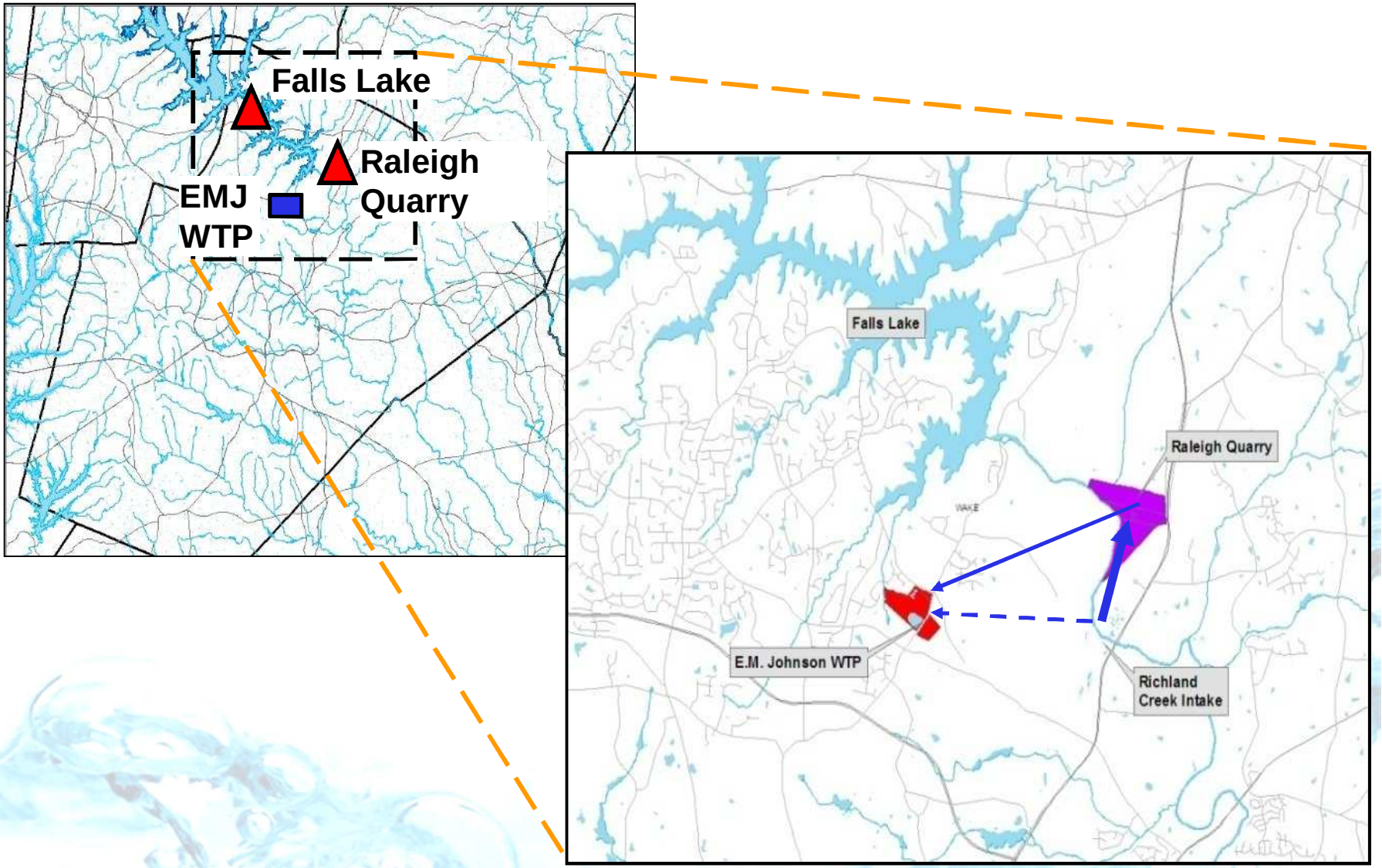
Source: Falls Lake Storage



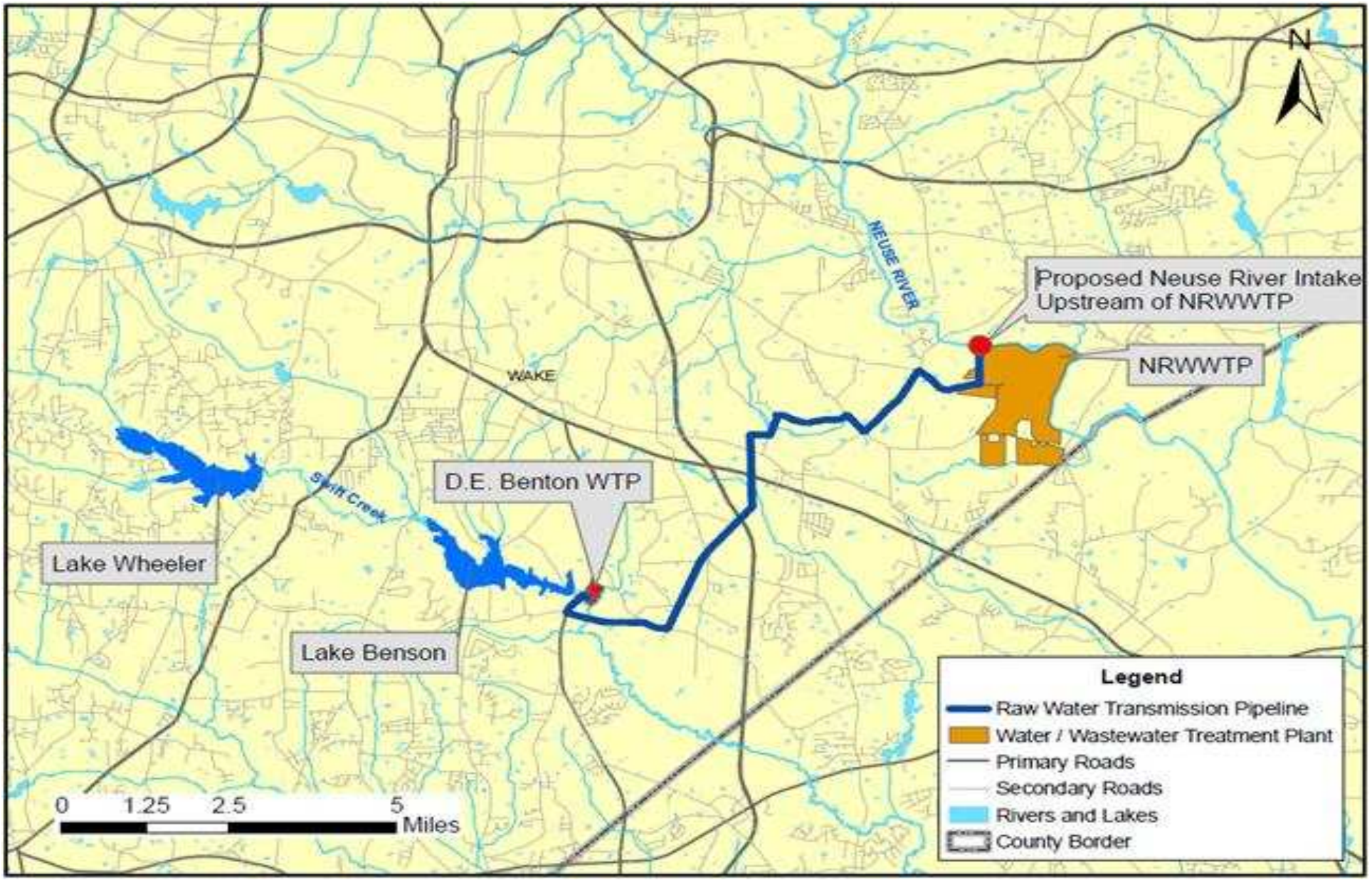
Reallocation Alternative



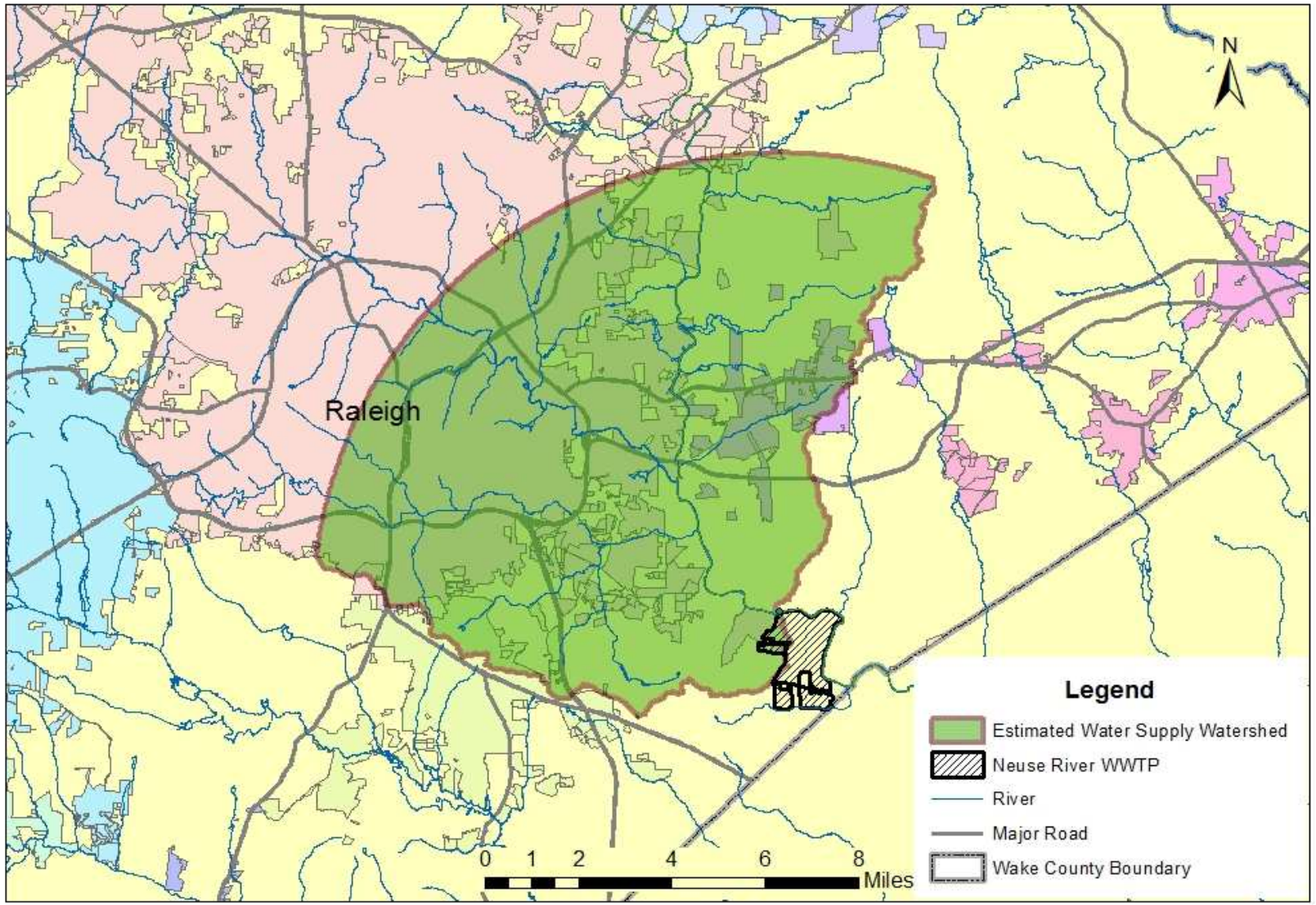
Source: Raleigh Quarry Storage with Neuse River Intake below Richland Creek



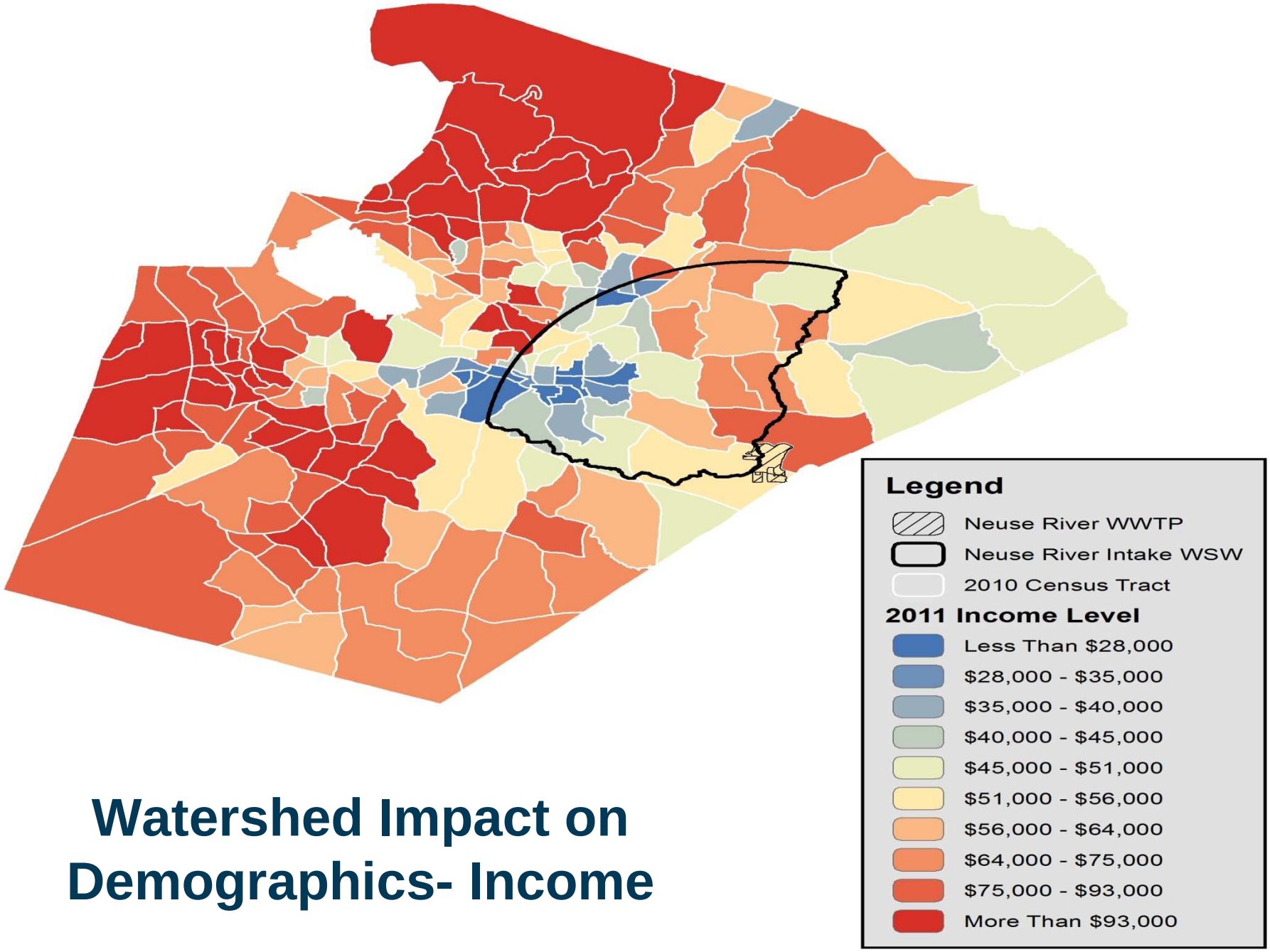
Source: River Intake Above Neuse River WWTP



River Intake Above Neuse River WWTP

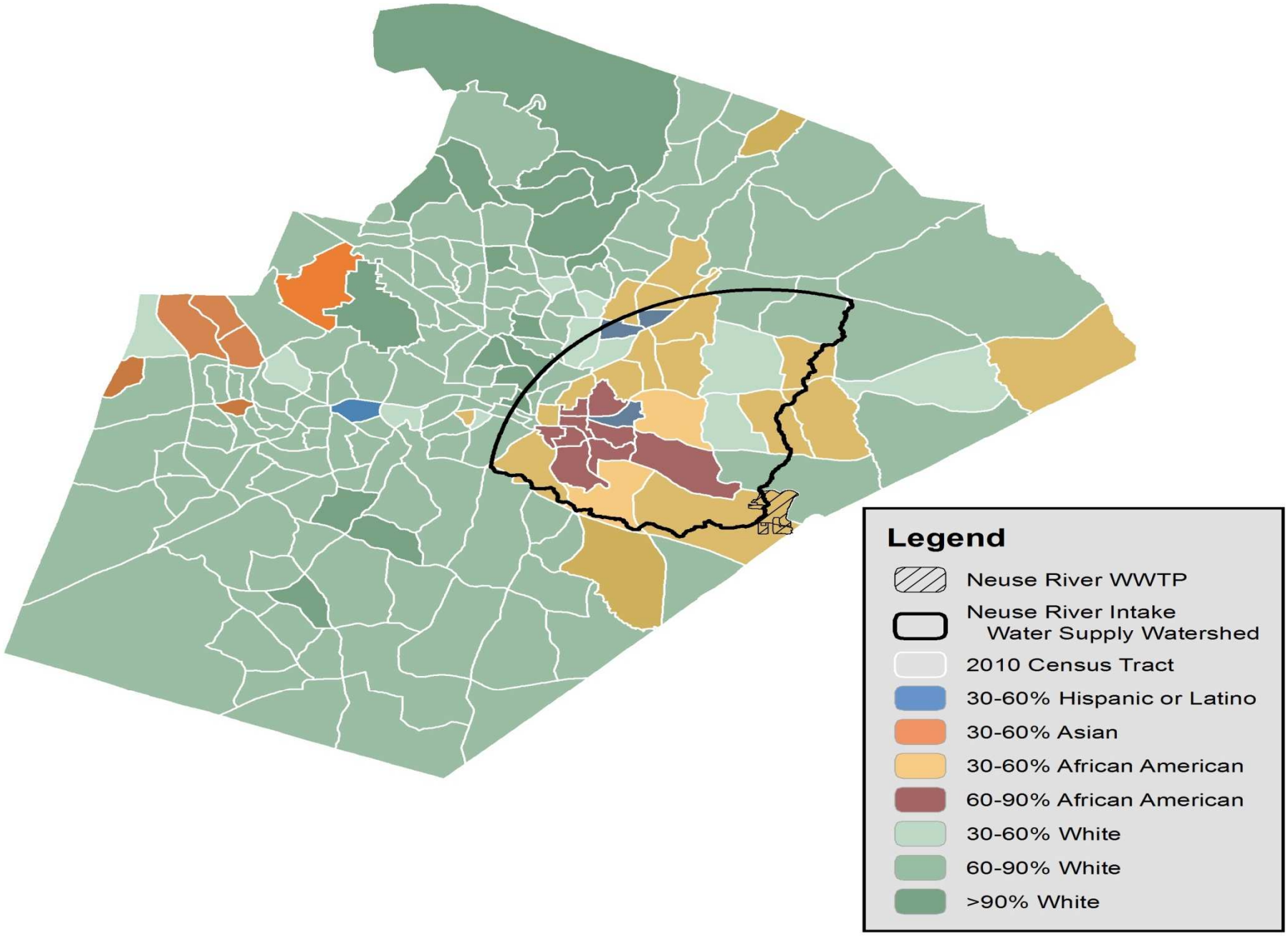


Area shaded in green shows potential extent of water supply watershed overlay

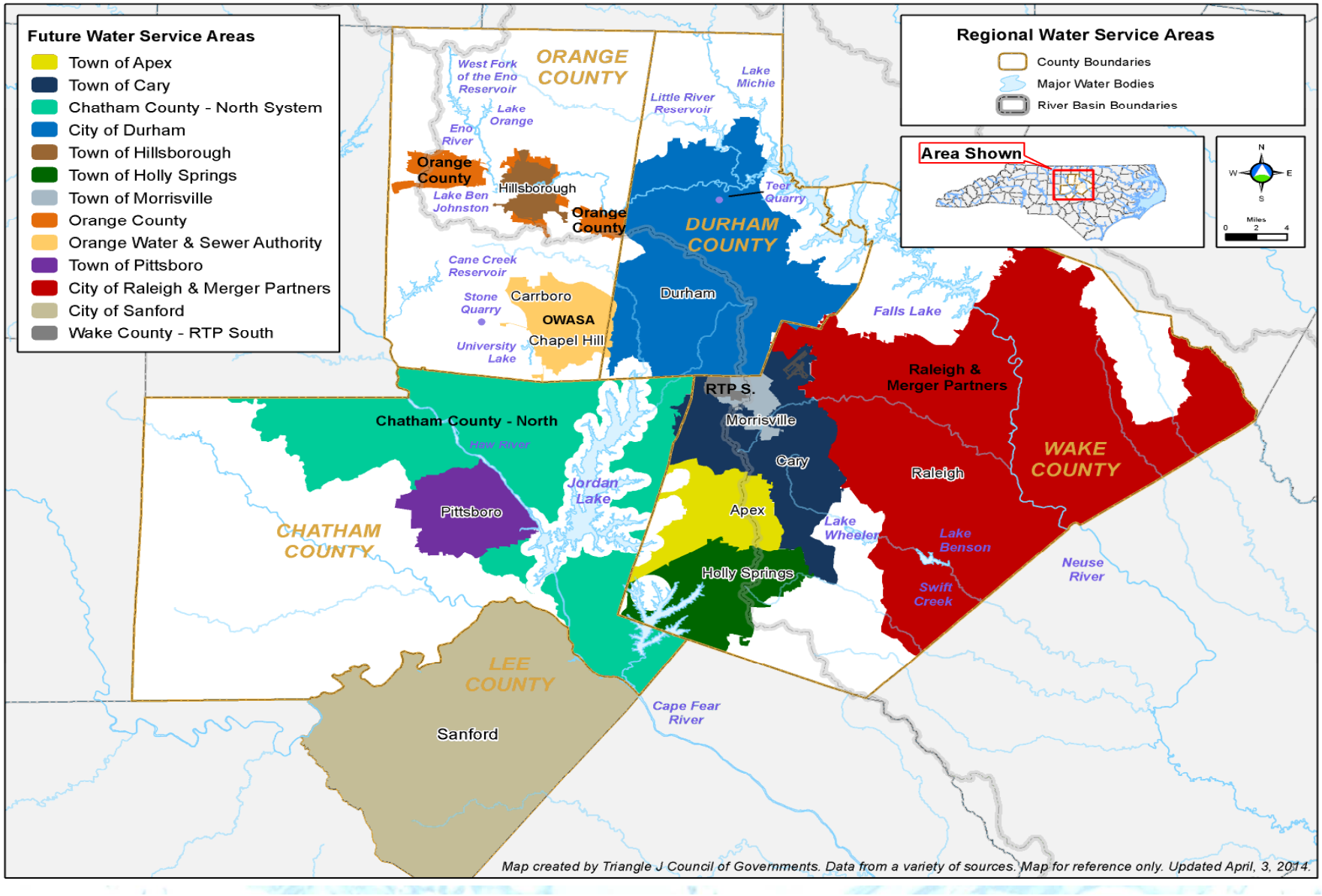


Watershed Impact on Demographics- Income

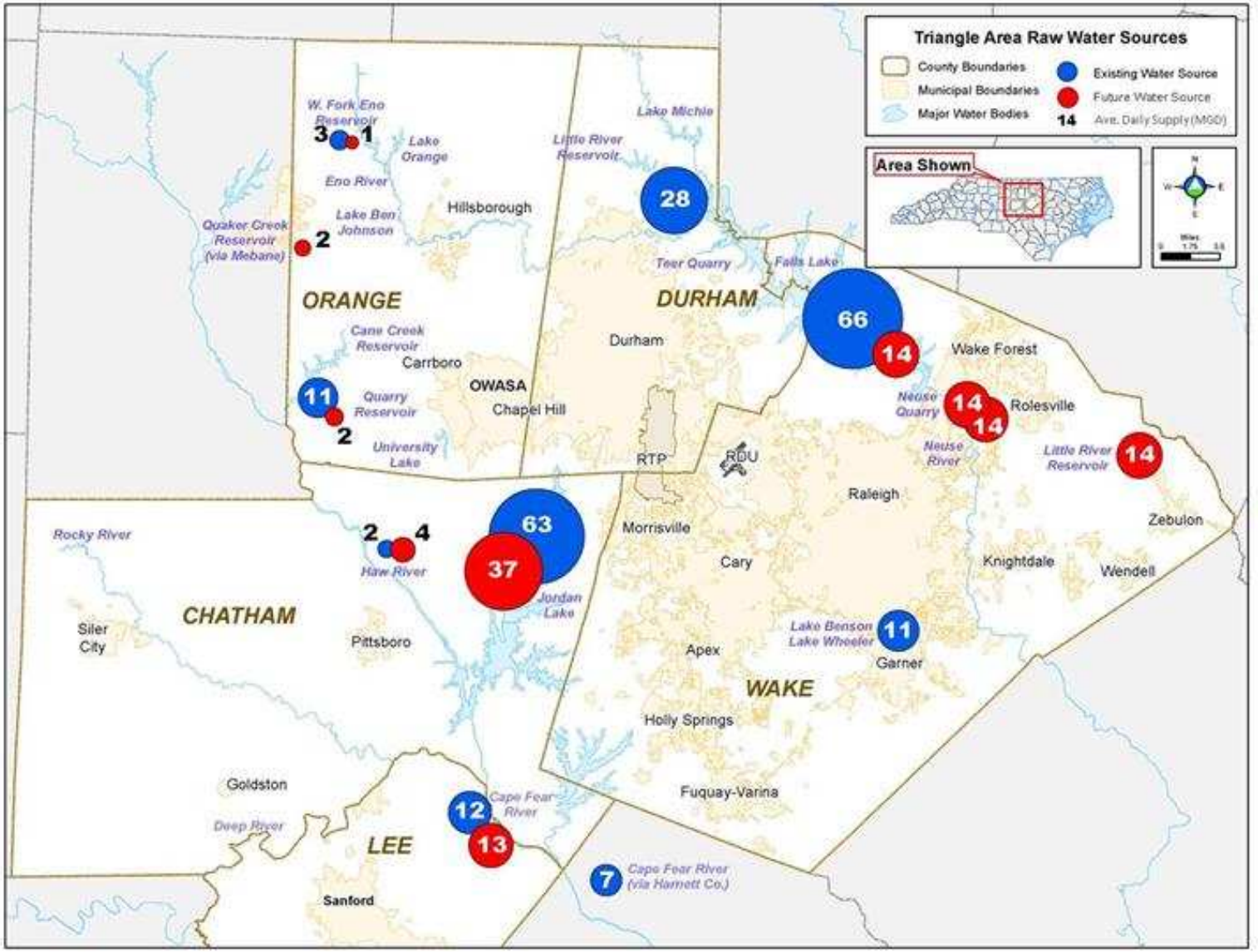
Watershed Impact on Demographics- Race



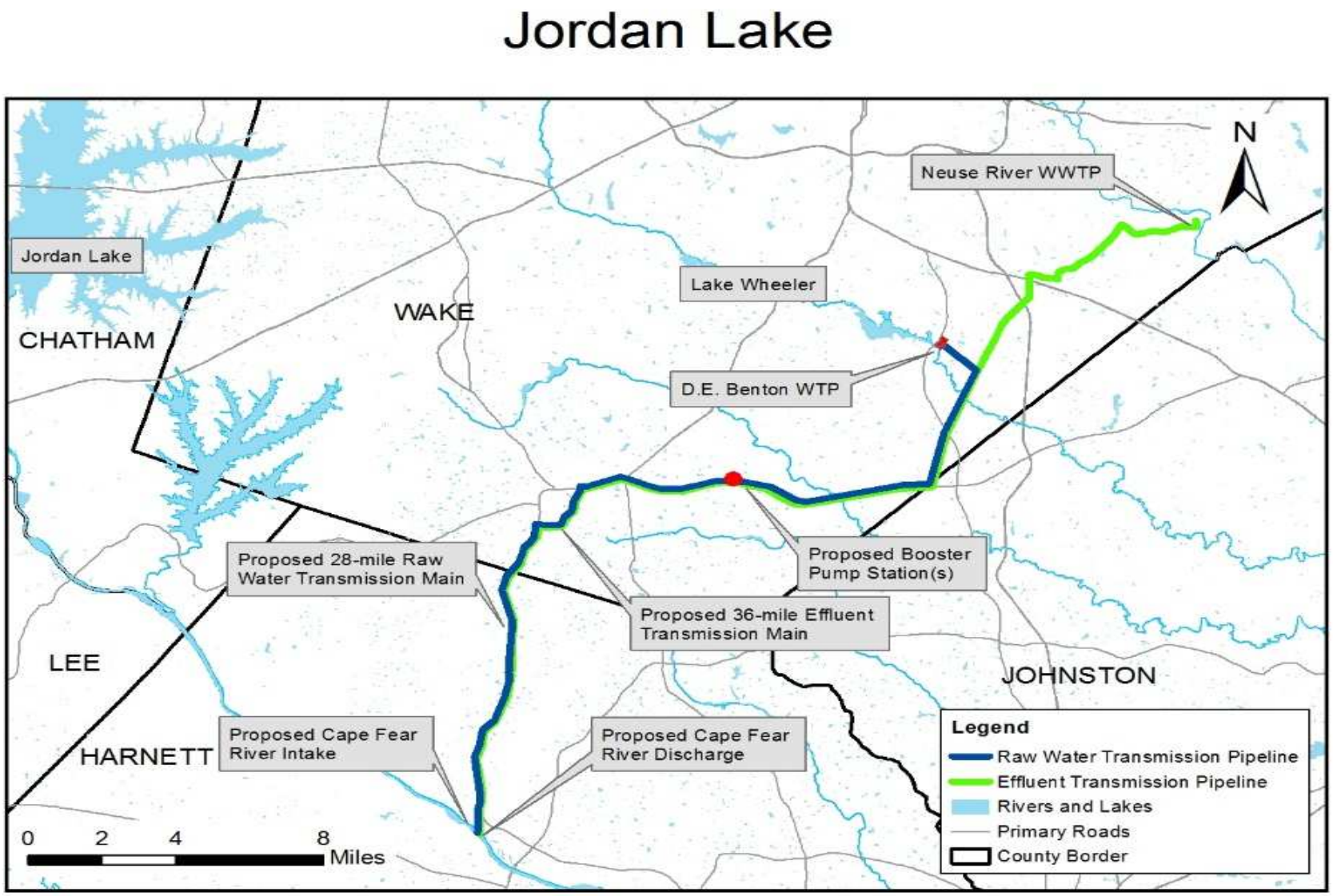
Jordan Lake Partnership and TRWSP



Triangle Regional Water Supply



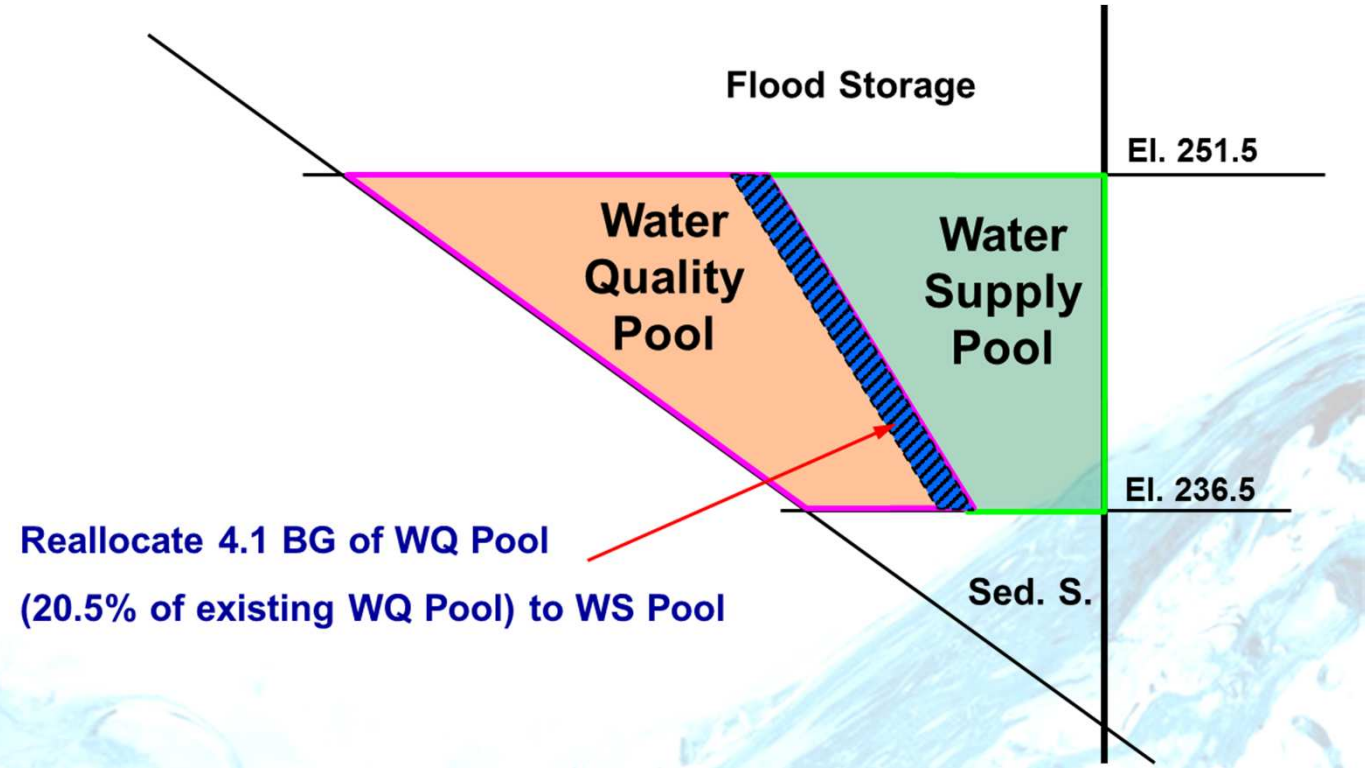
One means to acquire water from Jordan Lake



Falls Lake Reallocation Impacts

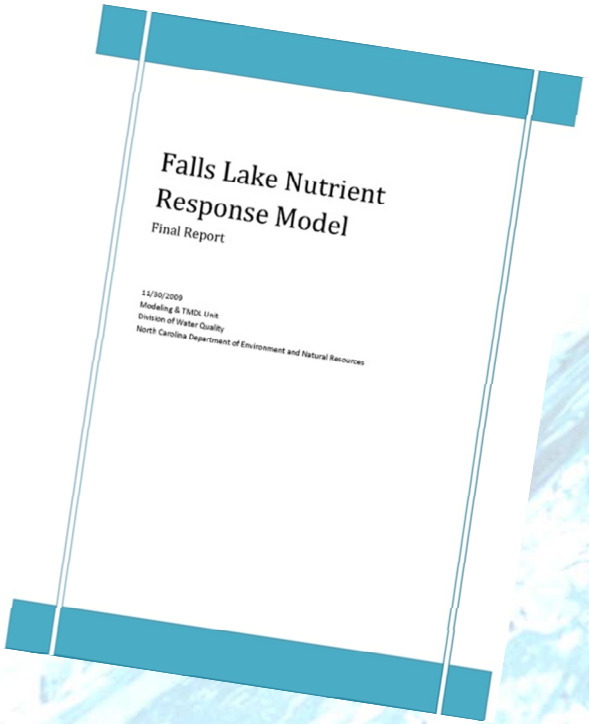
- **Limited negative impacts anticipated for reallocation**

- **Does reallocation pose evident water quality impacts?**

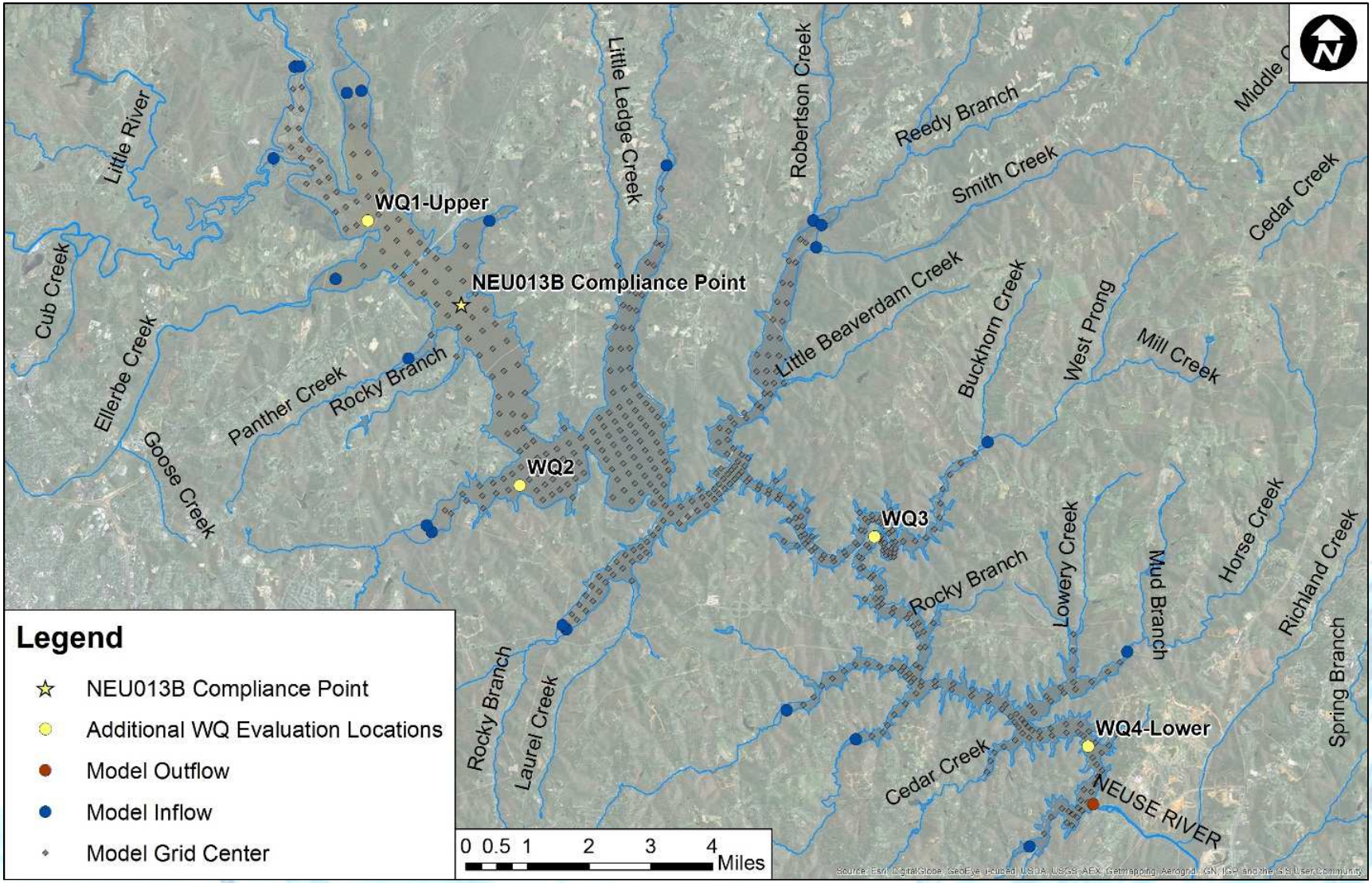


Falls Lake EFDC Model

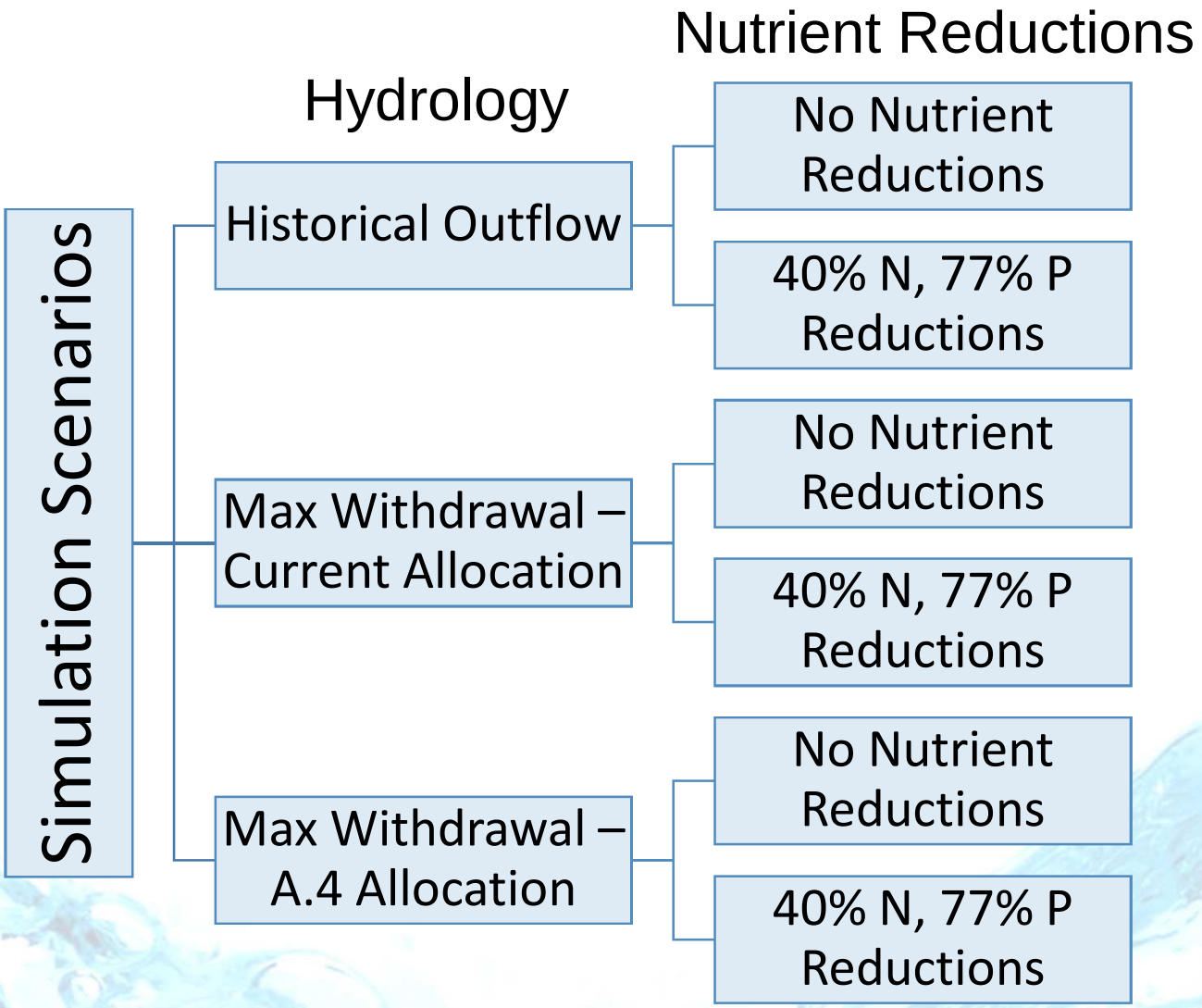
- Developed by NCDENR DWR to aid in developing nutrient management strategy
- Completed in 2009 under guidance of Falls Lake Technical Advisory Committee
- Simulating Chl-a concentrations was key purpose
- Chl-a goal:
  - Less than 40 µg/L 90% of the time
- Focused primarily on nutrient inputs from tributaries



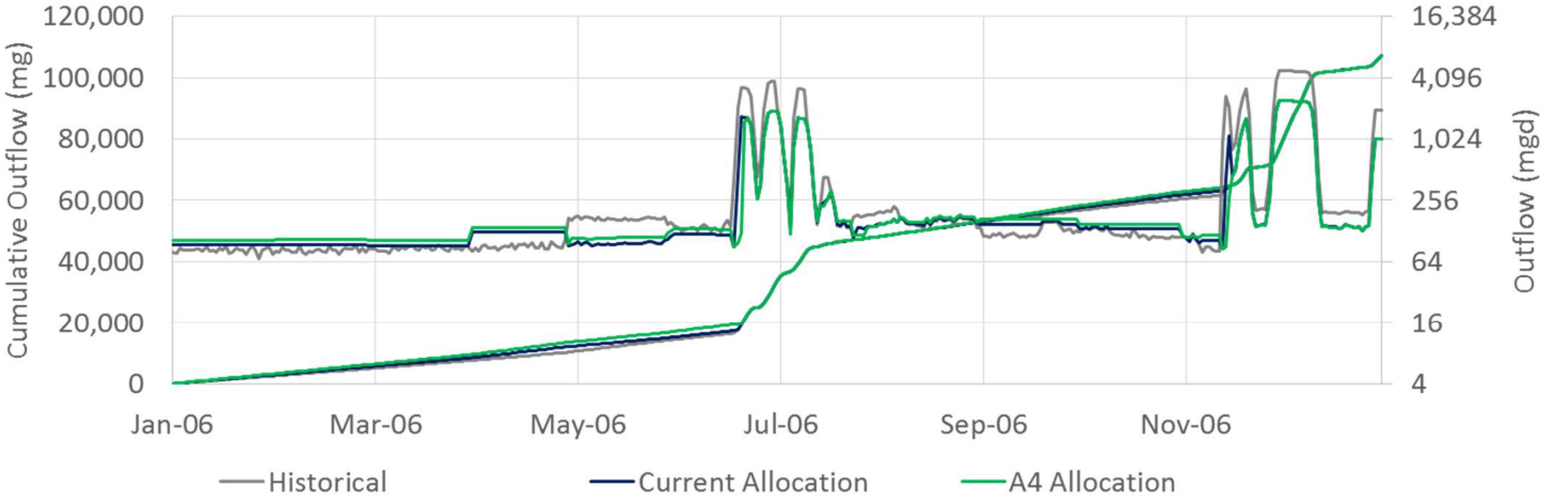
Falls Lake EFDC Model

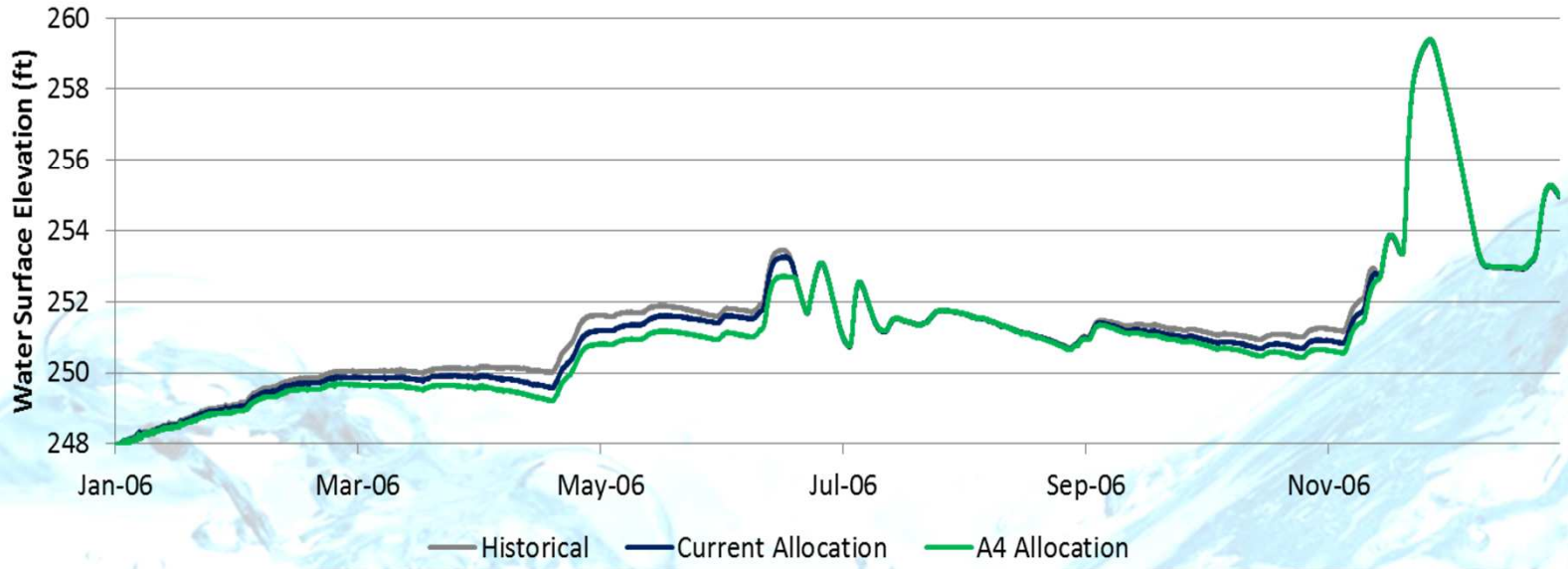


Simulation Scenarios

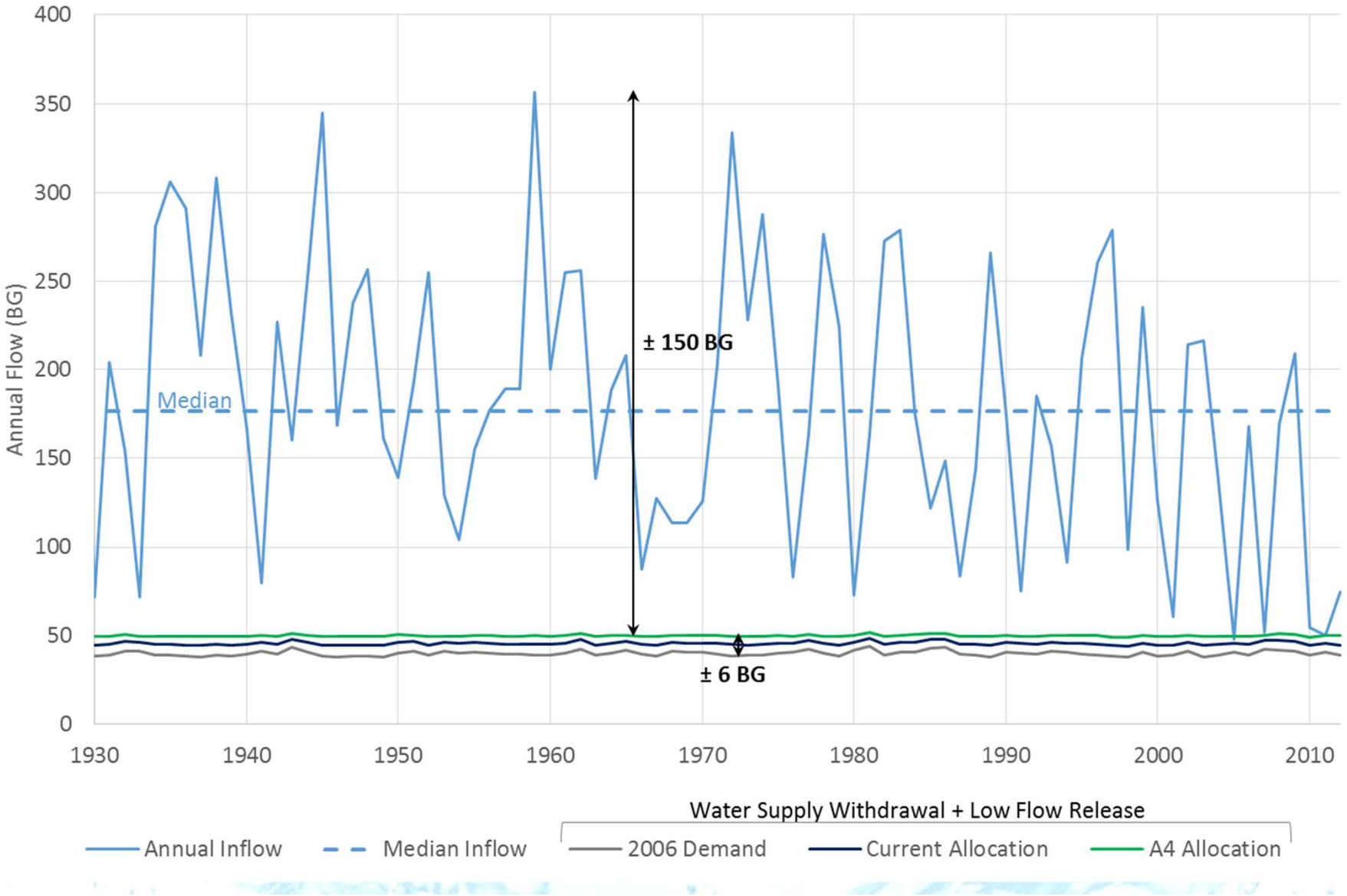


Reservoir Hydrology Impacts

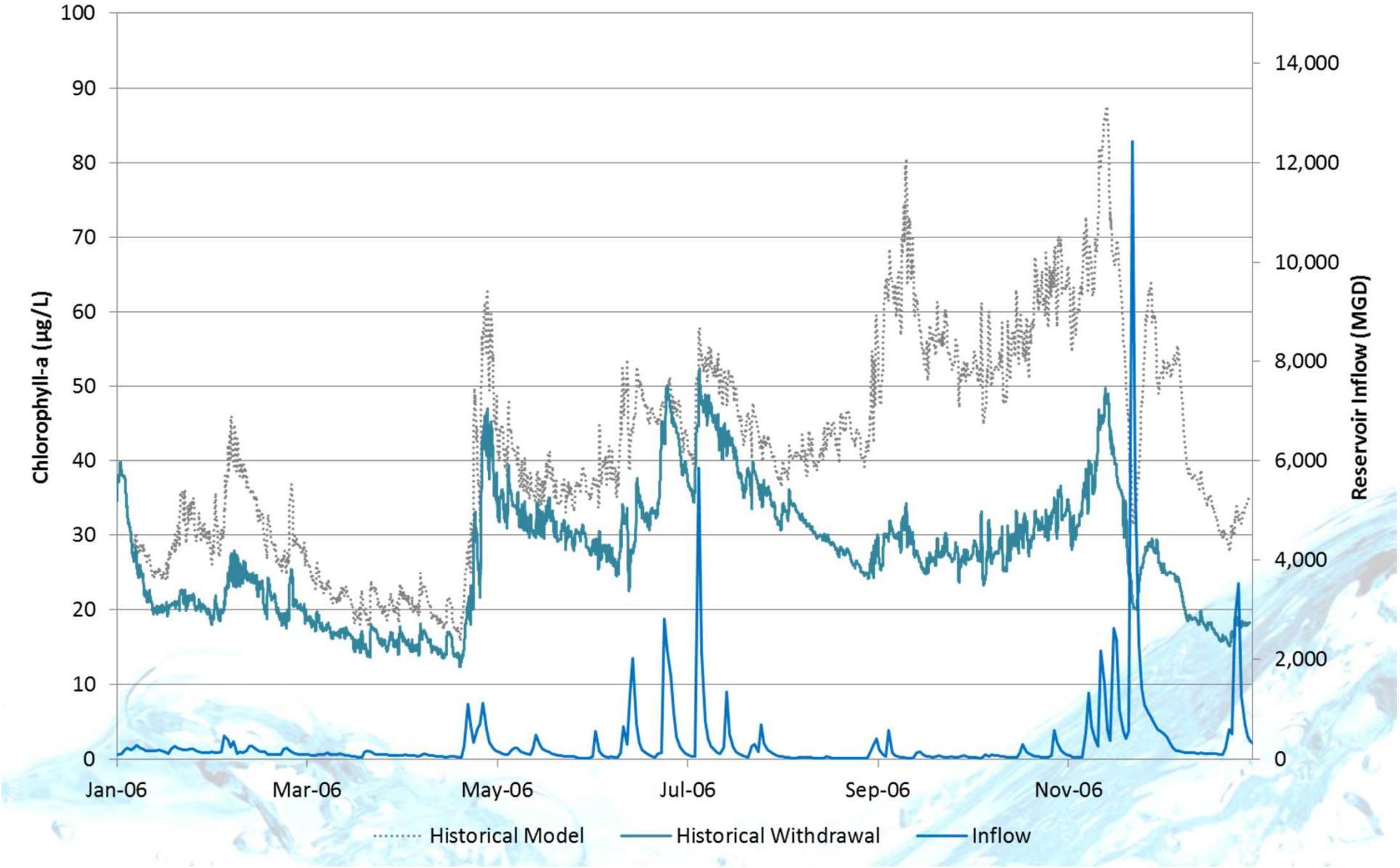




Inflow Variability vs. Withdrawal Variability



40/77% Nutrient Reductions at NEU013B



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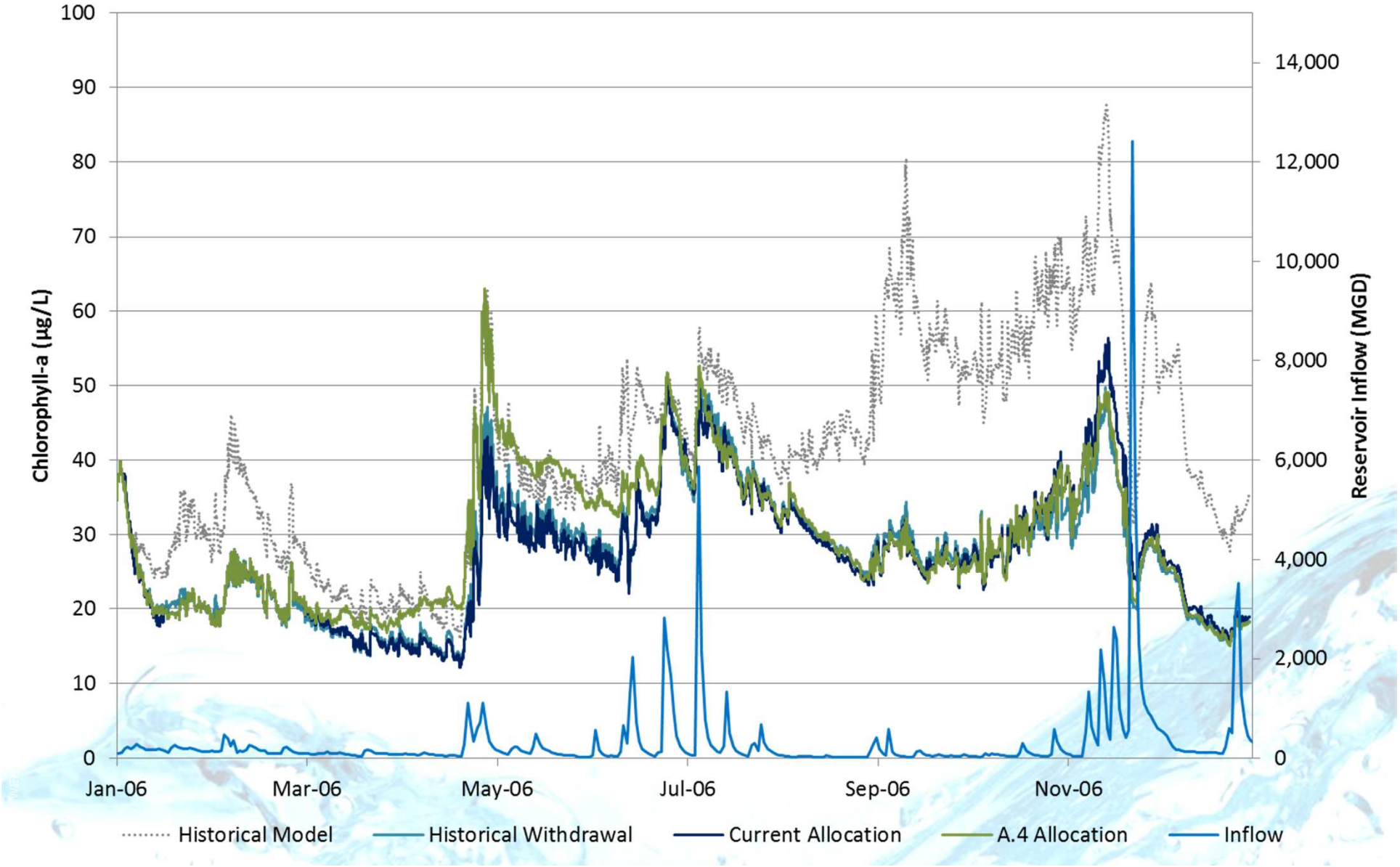
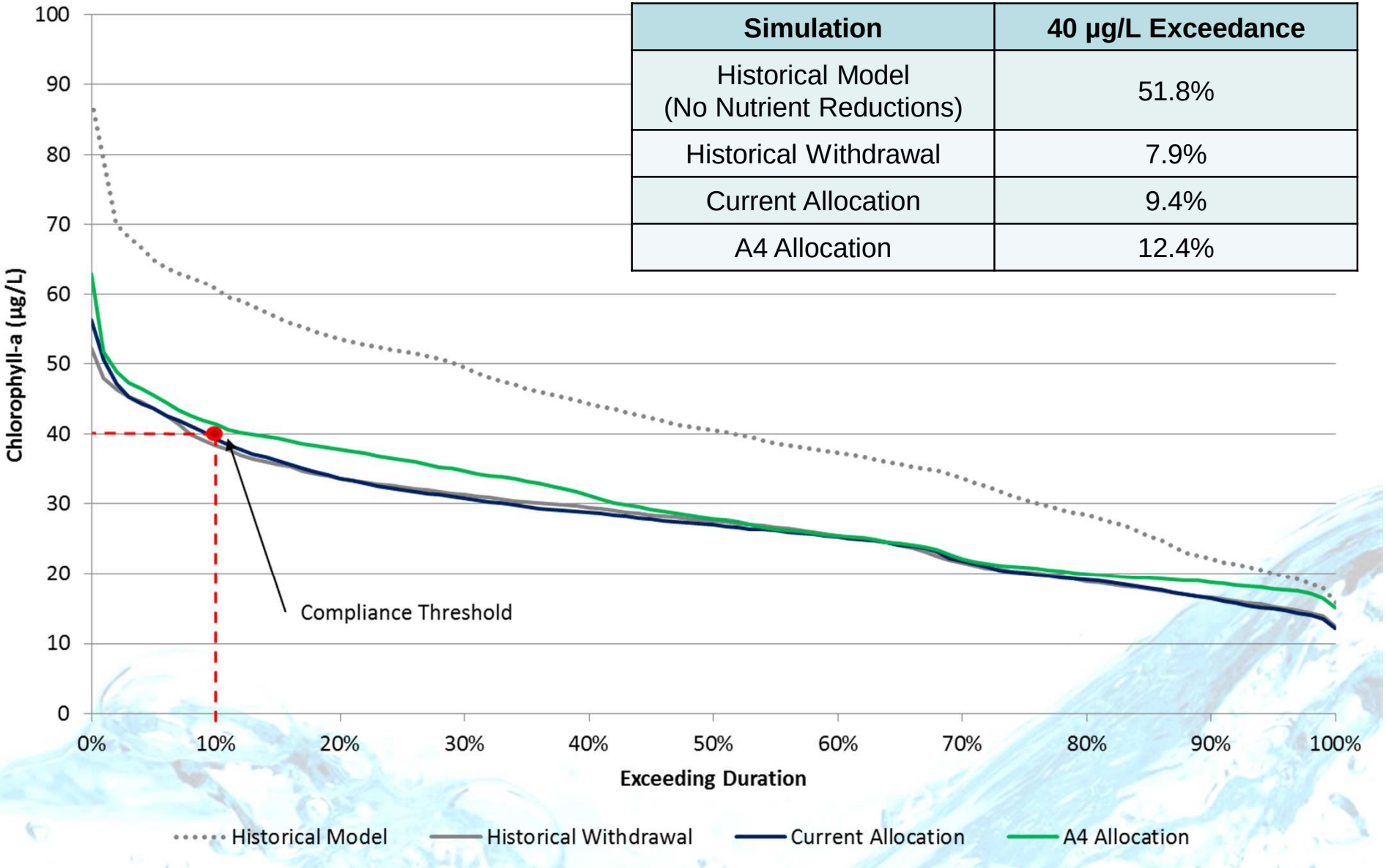
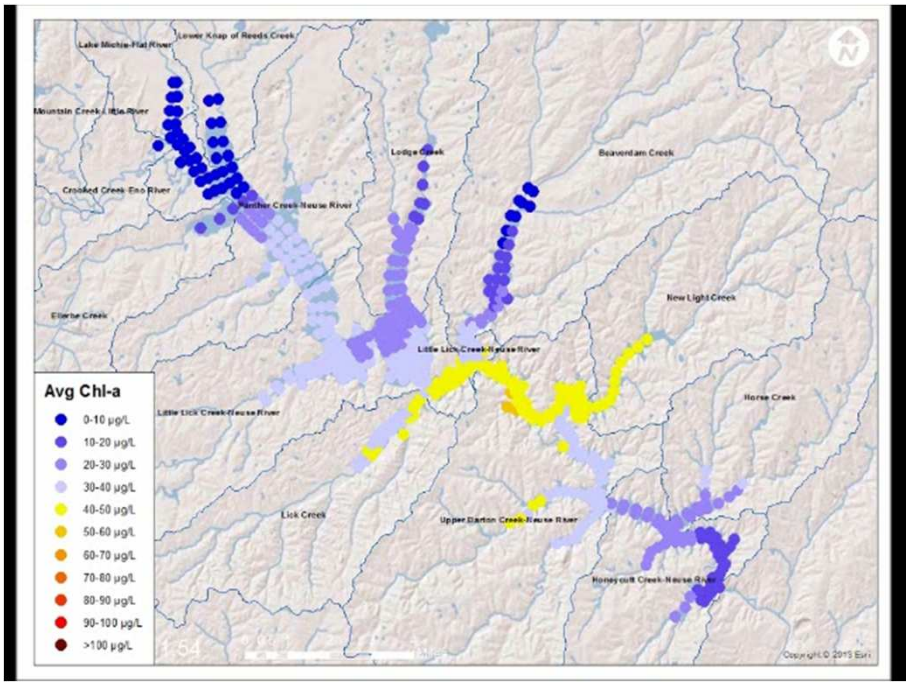


Chl-a Exceedance Probability

Simulation	40 µg/L Exceedance
Historical Model (No Nutrient Reductions)	51.8%
Historical Withdrawal	7.9%
Current Allocation	9.4%
A4 Allocation	12.4%

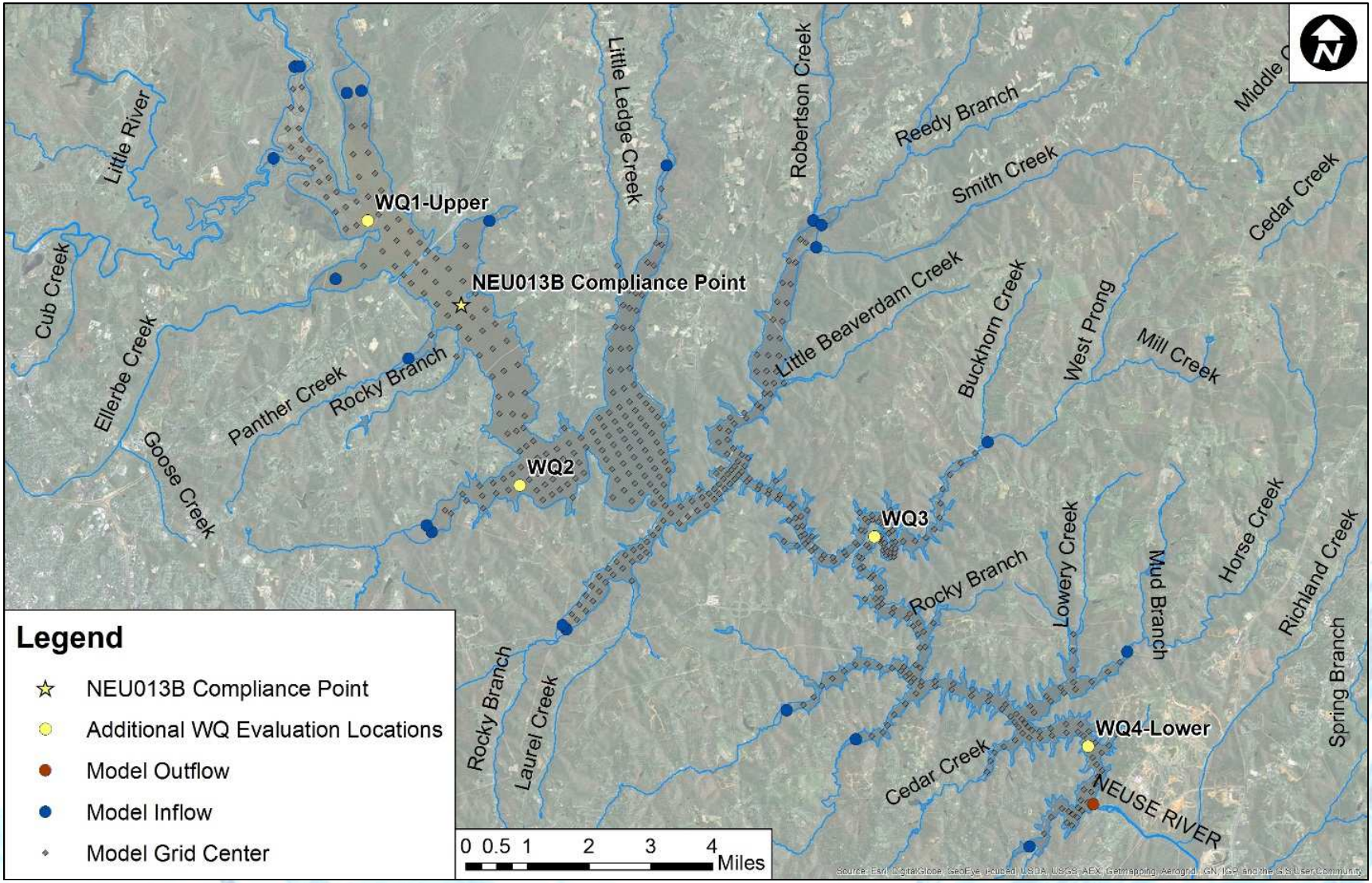


A4 with Nutrient Reductions

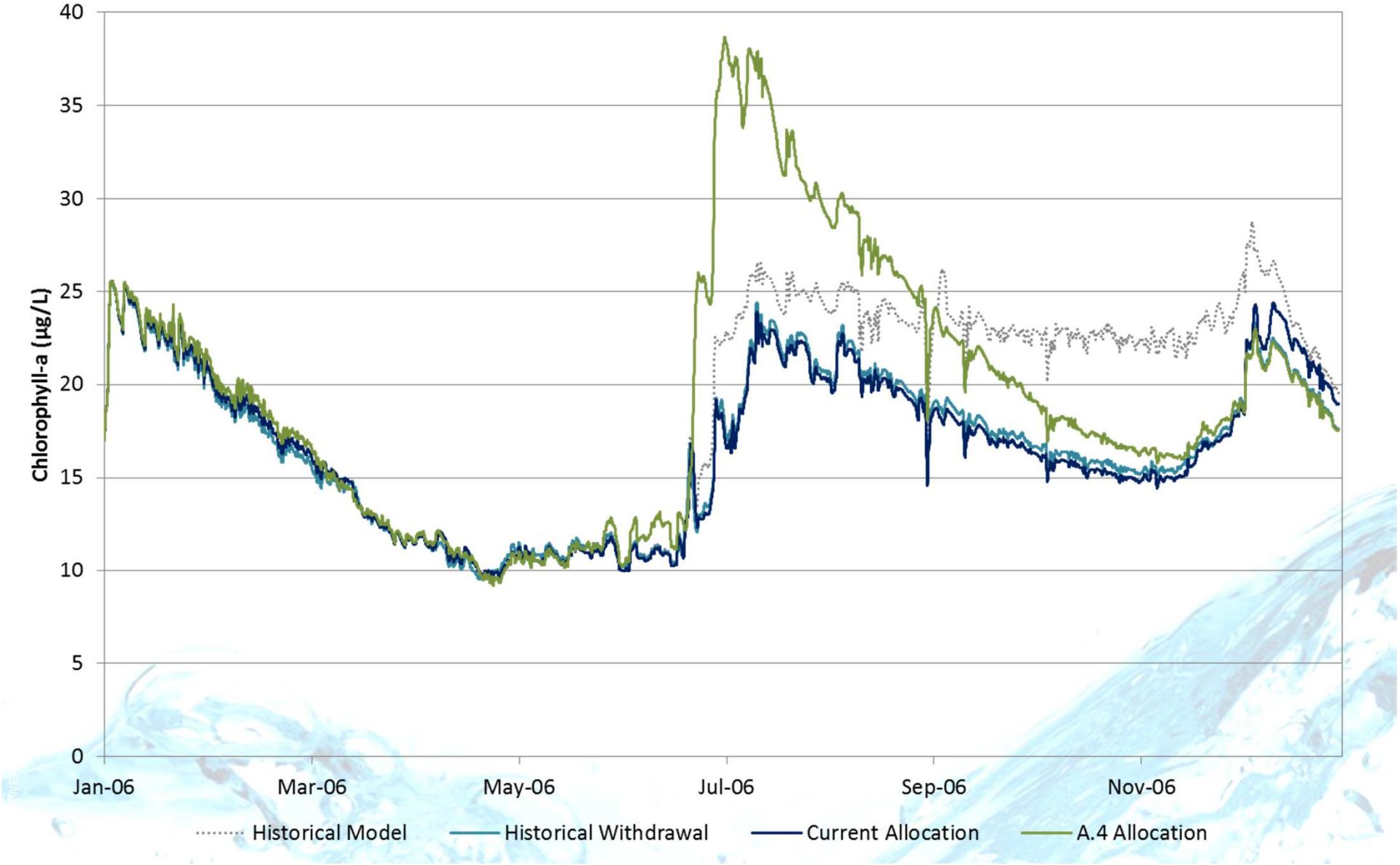


Base A.4 Simulation

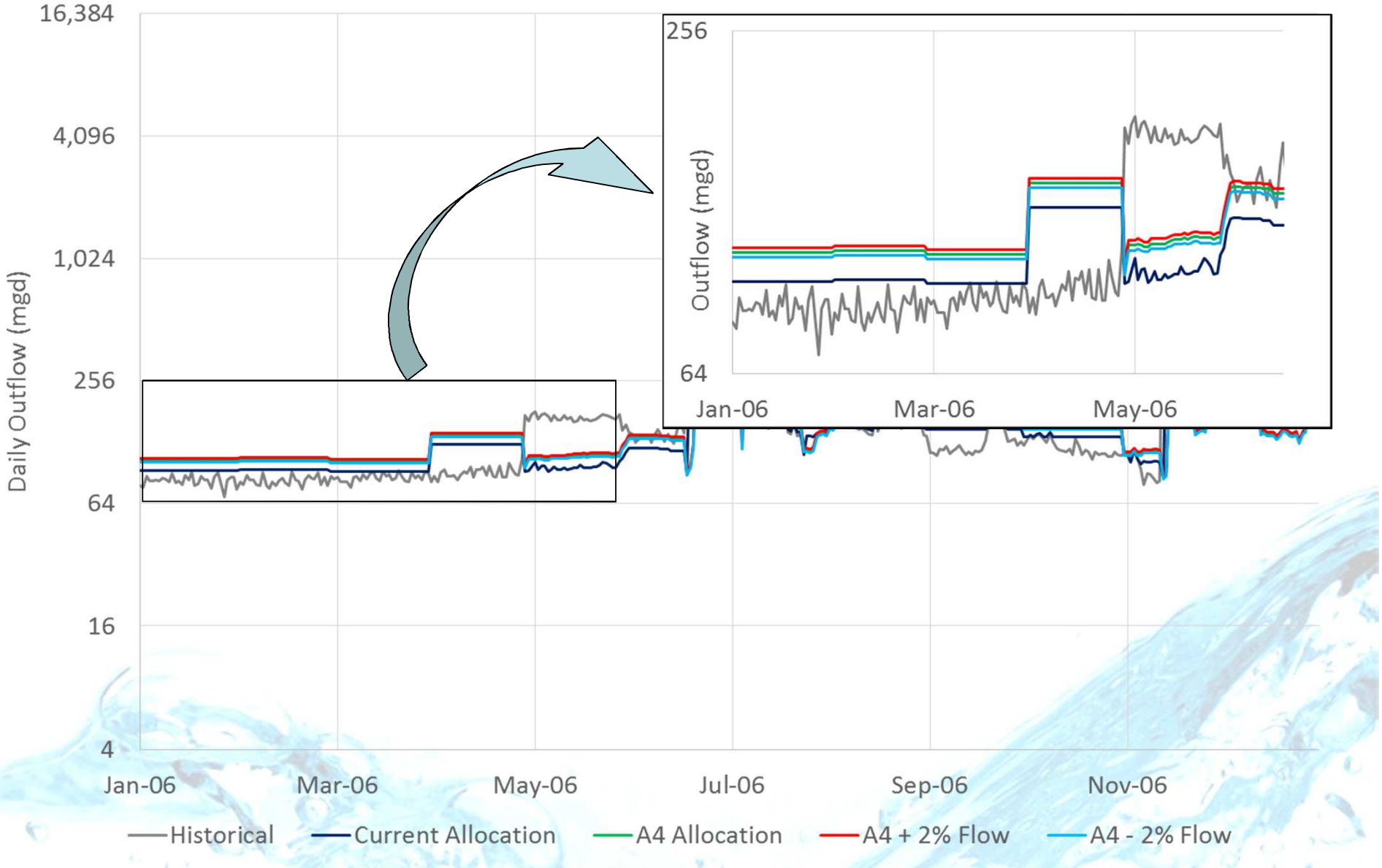
Falls Lake EFDC Model



40/77% Nutrient Reductions at WQ4-Lower Lake



A.4 Allocation +/- 2% Outflow



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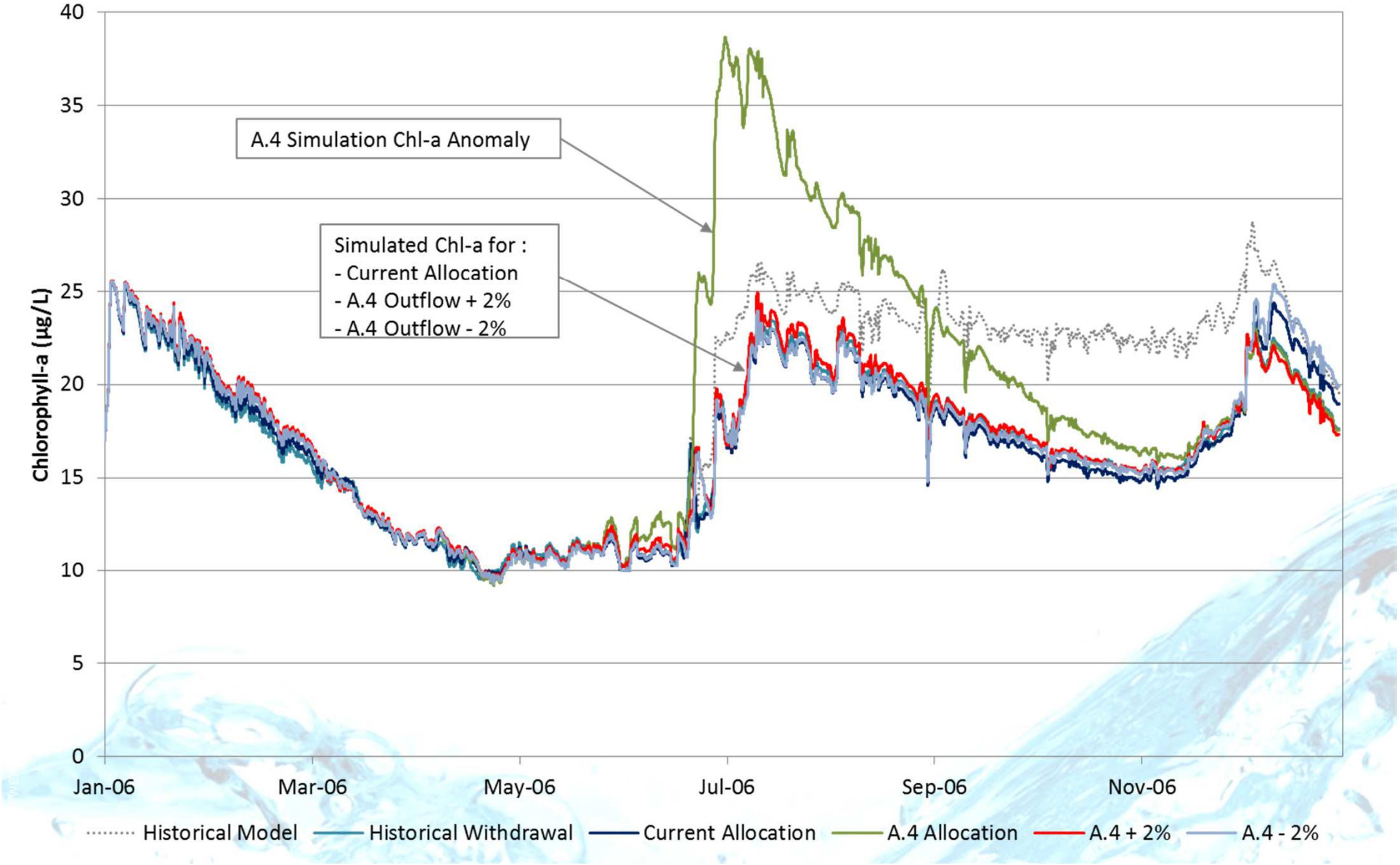
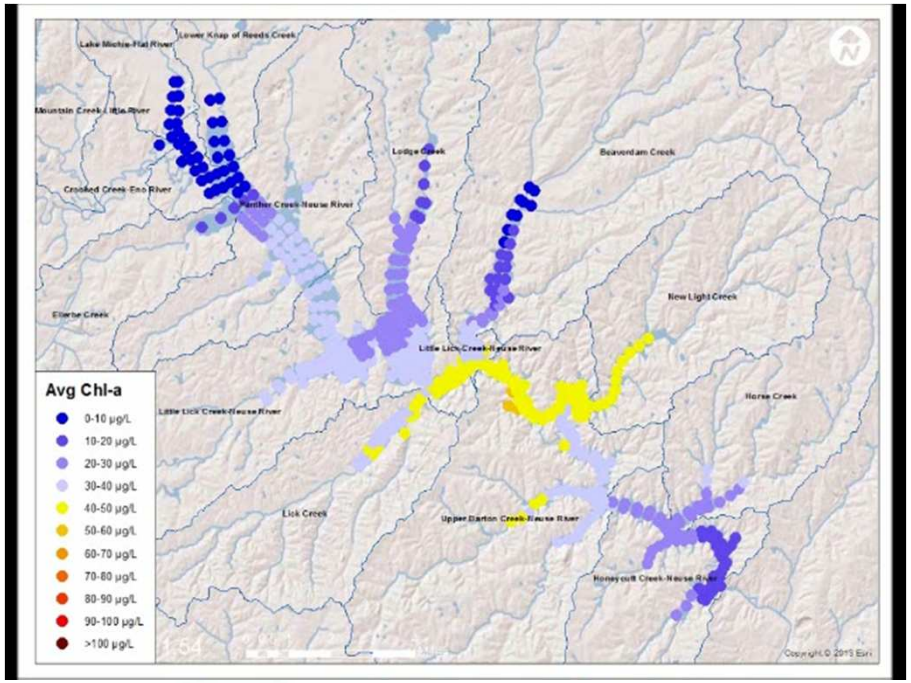
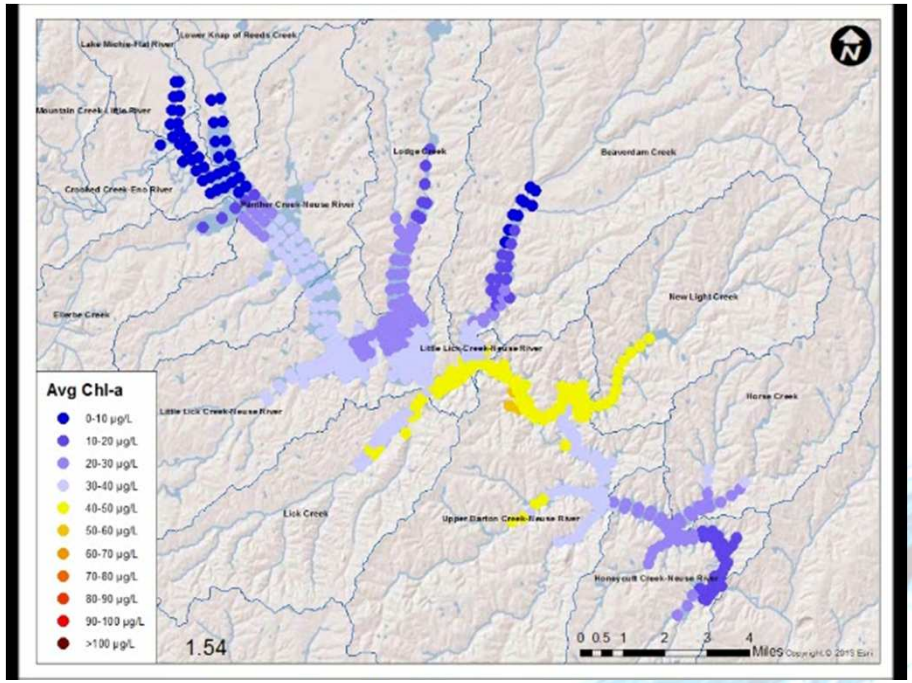


Base A4 vs A4 with 2% Outflow Increase

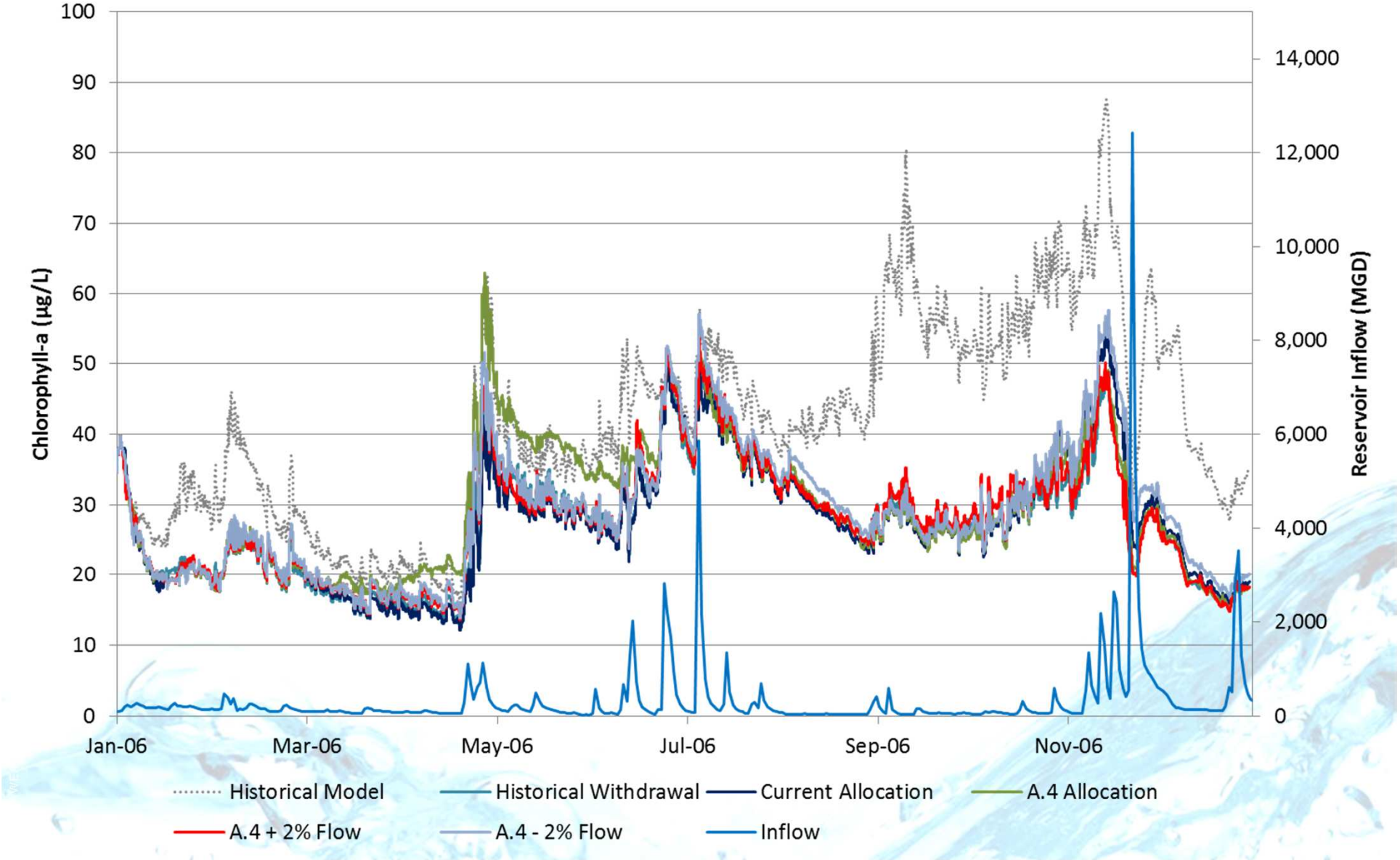




Base A.4 Simulation

A.4 + 2% Outflow

40/77% Nutrient Reductions at NEU013B



40/77% Nutrient Reductions at NEU013B

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Historical Model (No Nutrient Reductions)	51.8%
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Current Allocation	9.4%
A4 Allocation	12.4%
A4 Allocation + 2% Outflow	8.9%
A4 Allocation – 2% Outflow	11.6%