# TENNESSEE NUTRIENT REDUCTION FRAMEWORK

Department of Environment & Conservation

Jenny Dodd
Deputy Director, TDEC Division of Water Resources

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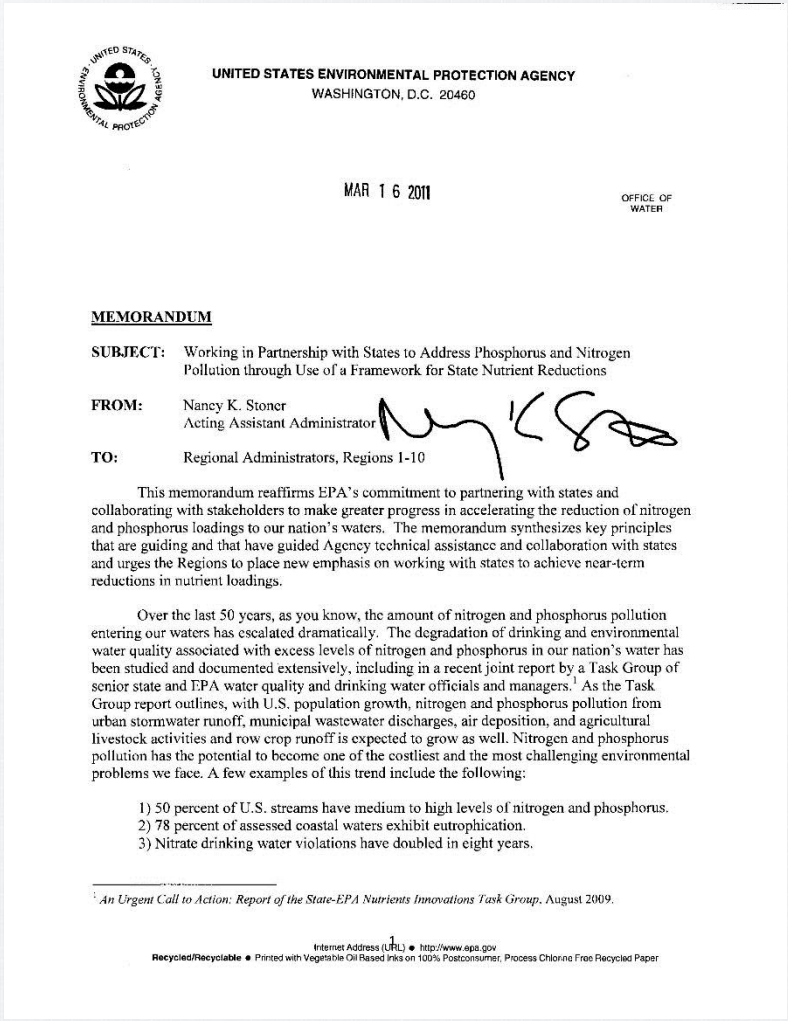
# NUTRIENT POLLUTION IN TN

- Many sources of nutrients: Agriculture, MS4s and municipal discharges (including sanitary sewer overflows) are all significant sources.
- History of using voluntary nutrient reduction for nonpoint sources (319 program in Dept. of Ag)
- Tennessee's nutrient criteria are narrative

# Nutrient Reduction Frameworks

- "Working in Partnership with States to Address Phosphorus and Nitrogen Pollution through Use of a Framework for State Nutrient Reductions"(EPA 2011).
- Strategies to achieve "near-term reductions in nutrient loadings."



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

MAR 16 2011

OFFICE OF WATER

**MEMORANDUM**

**SUBJECT:** Working in Partnership with States to Address Phosphorus and Nitrogen Pollution through Use of a Framework for State Nutrient Reductions

**FROM:** Nancy K. Stoner
Acting Assistant Administrator

**TO:** Regional Administrators, Regions 1-10

This memorandum reaffirms EPA's commitment to partnering with states and collaborating with stakeholders to make greater progress in accelerating the reduction of nitrogen and phosphorus loadings to our nation's waters. The memorandum synthesizes key principles that are guiding and that have guided Agency technical assistance and collaboration with states and urges the Regions to place new emphasis on working with states to achieve near-term reductions in nutrient loadings.

Over the last 50 years, as you know, the amount of nitrogen and phosphorus pollution entering our waters has escalated dramatically. The degradation of drinking and environmental water quality associated with excess levels of nitrogen and phosphorus in our nation's water has been studied and documented extensively, including in a recent joint report by a Task Group of senior state and EPA water quality and drinking water officials and managers.[1] As the Task Group report outlines, with U.S. population growth, nitrogen and phosphorus pollution from urban stormwater runoff, municipal wastewater discharges, air deposition, and agricultural livestock activities and row crop runoff is expected to grow as well. Nitrogen and phosphorus pollution has the potential to become one of the costliest and the most challenging environmental problems we face. A few examples of this trend include the following:

1) 50 percent of U.S. streams have medium to high levels of nitrogen and phosphorus.
2) 78 percent of assessed coastal waters exhibit eutrophication.
3) Nitrate drinking water violations have doubled in eight years.

[1] *An Urgent Call to Action: Report of the State-EPA Nutrients Innovations Task Group*, August 2009.

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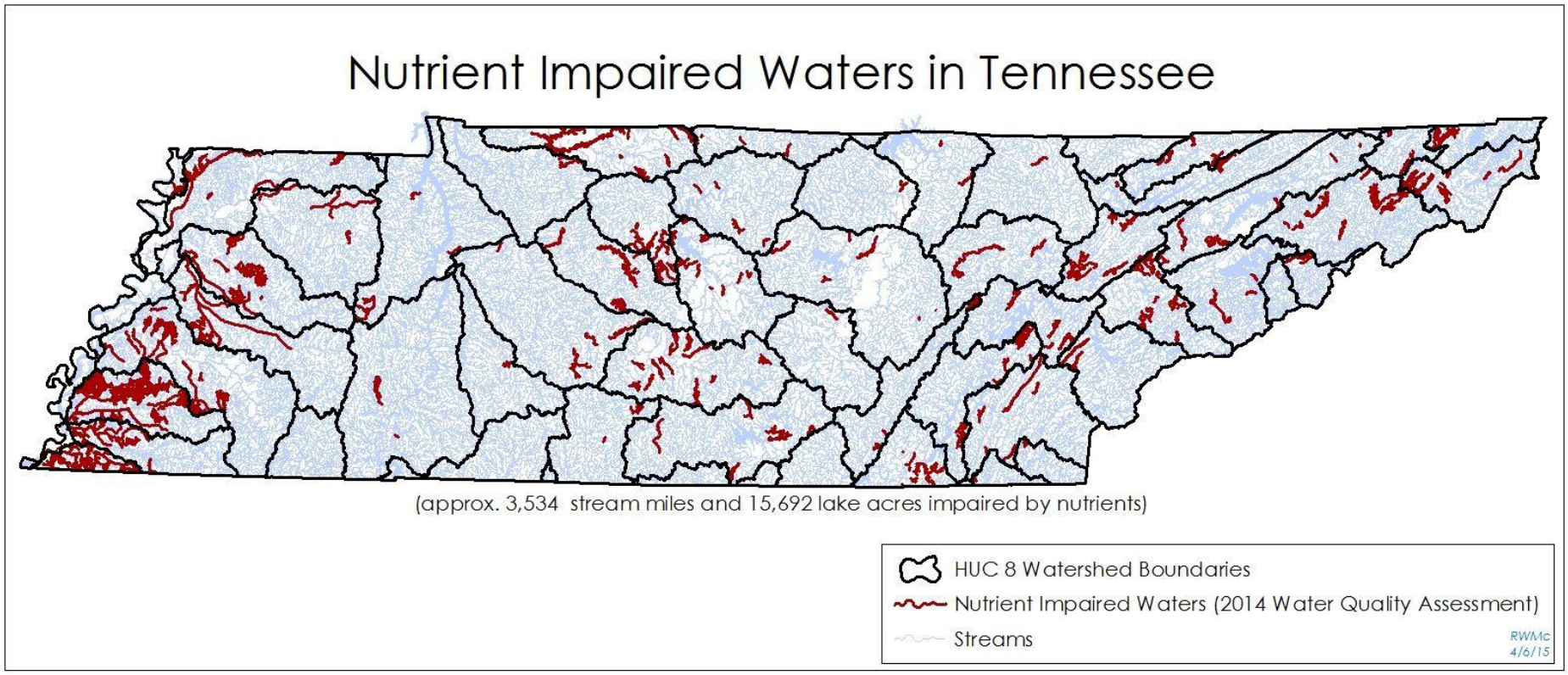
# Nutrient Impaired Waters



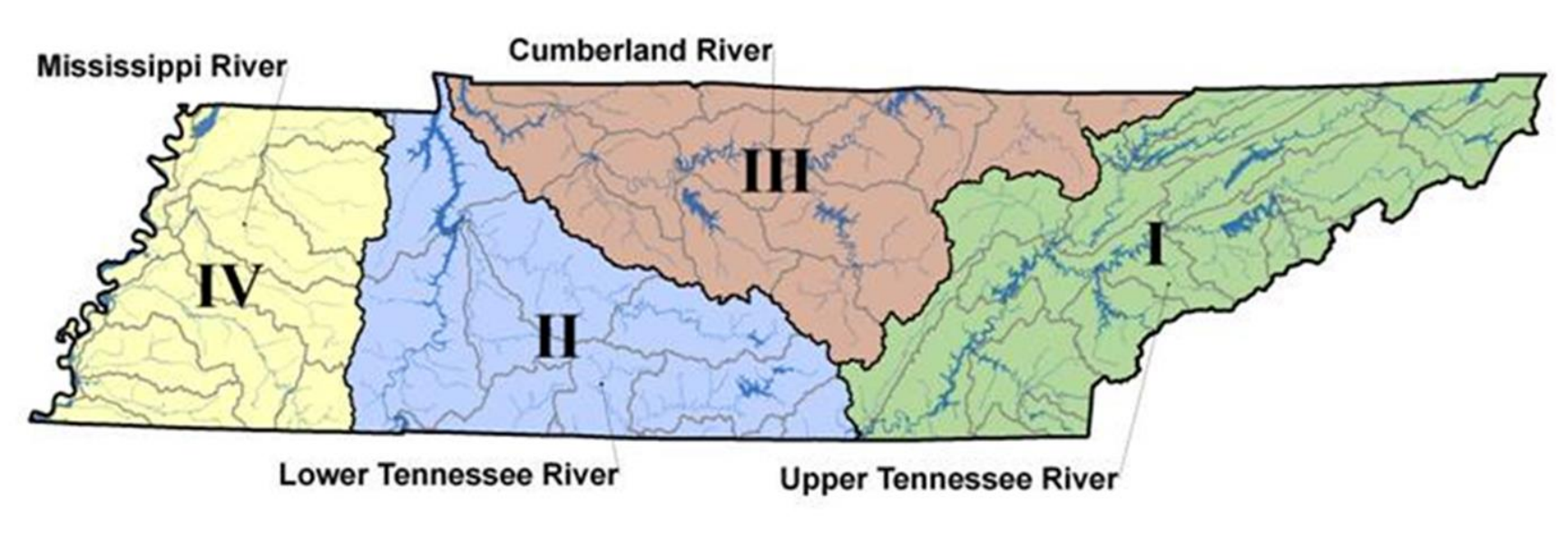
# Regulating Nutrients

- Complex – not the same as metals and other toxics
- States with numeric nutrient criteria still struggling:
  - Implementation in permits
  - Waivers or long compliance schedules
  - Magnitude, frequency, and duration
- TN Nutrient Reduction Framework
  - Not a replacement for TMDL development or NNCs
  - Adaptive
  - Iterative approach

# Ongoing Efforts

- Plant optimization efforts
  - Workshops
  - Pilot studies at WWTPs
- Stakeholder outreach
- Nutrient Reduction Framework
  - Concept paper
  - Online
- Implementation Report (annual)

# Four Major Hydrologic River Basins



# Nutrient Reduction Framework

- Point and non-point sources
- Prioritization and action plans developed for each HUC 10 watershed
- SPARROW (SPAtially Referenced Regression On Watershed attributes)
  - evaluate existing nutrient loading and relative source contributions
- Separate models for TN and TP
- Enrichment Factor (EF)
  - Phosphate rich soil and rock for TP
  - Atmospheric deposition for TN

# Framework continued

- WWTP and Industrial sources (loading)
- Stormwater
- Agriculture (voluntary incentives)
  - TDA
  - NRCS
  - UT –Institute of Ag
- Process repeated until stream meets narrative nutrient criterion

TN:

$$EF = \frac{Load_{WWTP} + Load_{AtmDep} + Load_{Fertilizer} + Load_{Manure} + Load_{Urban}}{Load_{AtmDep}}$$

TP:

$$EF = \frac{Load_{WWTP} + Load_{S\text{-}PR} + Load_{Fertilized\ Land} + Load_{Manure} + Load_{Urban} + Load_{Mines}}{Load_{S\text{-}PR}}$$

# Total Nitrogen Evaluation Matrix in Upper Tennessee River

| % WWTP Contribution | EF<1.5 | 1.5≤EF<2 | EF≥2 |
|---|---|---|---|
| WWTP≥14.1% | Low | Medium | High |
| 4.2%≤ WWTP<14.1% | Low | Medium | Medium |
| WWTP<4.2% | Low | Low | Low |

# Total Phosphorus Evaluation Matrix in Upper Tennessee River

| % WWTP Contribution | 2.8>EF | 2.8<EF<4.1 | EF≥4.1 |
|---|---|---|---|
| WWTP ≥21.7% | Low | Medium | High |
| 8.8%≤ WWTP<21.7% | Low | Medium | Medium |
| WWTP<8.8% | Low | Low | Low |

| | Low Impact | Medium Impact | High Impact |
|---|---|---|---|
| Total Nitrogen | Cap @ current level | 8 mg/l | 5 mg/l |
| Total Phosphorus | Cap @ current level | 1 mg/l | 0.3 mg/l |

# Nutrient Optimization Trial: 2015/2016

**Project Description**

$85,000, 1-year contract to provide training , including 4 visits to 3 POTWs

**Project Goals**

In-plant O&M technical guidance to achieve …

- 50% Nitrogen Removal
- 75% Phosphorus Removal

**Project Results**

1 of 3 plants realized N&P goals

$4.4 M reduction in N&P capital improvement requirements

> $250,000$^{+}$ annual O&M savings

TDEC priority to optimization efforts

# Lessons Learned

1. Significant Optimization opportunities exist in most all wastewater plants regardless of design (nutrient, energy, sludge, O&M, chemical costs, capital costs, etc.)

2. Support and enforcement discretion

3. Without commitment from the facility operators and the department manager unlikely to see results

# Current Round
# October 2015 – September 2016

- Hands-on training of TDEC DWR staff at 10 +/- facilities across the state
- Training volunteer operators to be peer "go to" experts along with our inspectors
- Providing educational resources on the web
- Equipping our central office staff for better …
    - plans review
    - SRF application evaluation
    - permitting
    - planning

Department of Environment & Conservation

# QUESTIONS

JENNIFER.DODD@TN.GOV