NEW JERSEY AGRICULTURAL EXPERIMENT STATION
RUTGERS COOPERATIVE RESEARCH & EXTENSION

# Water Quality Trading in the Non-Tidal Passaic River Watershed


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# Project Goal

- Develop, implement, and evaluate a Water Quality Trading program for Non-tidal Passaic River Watershed that:
  - *Adheres to USEPA policy on Water Quality Trading*
  - *Meets NJDEP requirements*
  - *Implements TMDL*
  - *Reduces cost of compliance with Clean Water Act*
  - *Establishes incentives for voluntary reductions that could also achieve ancillary environmental benefits such as expedited load reductions*

# Background

- NJDEP Phosphorus Criteria = 0.1 mg/l for streams and 0.05 mg/l for lakes
  - Solution requires lower total discharge of phosphorus from all sources
  - 24 Major WWTPs and 84 Municipal Separate Storm Sewer Systems (MS4s) in Upper Passaic Basin
  - A Total Maximum Daily Load (TMDL) is near completion to address the impairments in the Upper Passaic River Basin
  - Possibility of site-specific criteria as alternative

# Water Quality Trading

- High cost to upgrade each wastewater treatment plant to achieve TMDL reductions
- Team led by Rutgers proposed water quality trading program as solution
- Alignment with USEPA Trading Policy (January 2003)
- USEPA Office of Water FY 2007 goal of 33% increase of permits that allow trading

# Project Partners

- Multidisciplinary team
  - Rutgers Univ. (science, engineering, policy)
  - Cornell Univ. (economics)
  - NJ Dept of Environmental Protection (NJDEP)
  - Passaic River Basin Alliance (WWTP association)
  - NJ Association of Environmental Authorities
  - NJ League of Municipalities
  - EPA (funding source)
- University presence acts as neutral party and provides research based approach

# Plan for Passaic Trading Program

- Three year plan
- Primary focus on point source/point source trades but will investigate point to nonpoint source trading
- Plan has three phases
  - Characterization and assessment
  - Trading Program Development
  - Implementation and Evaluation

# Project Status

- Phase 1 (Characterization and Assessment) near complete
- Phase 2 (Trading Program Development) already in progress; tasks completed:
  - ✓ Trading ratios derived from water quality model
  - ✓ 2 proposals for trading framework
  - ✓ Preliminary economic model
  - ✓ Feasibility analysis of trades with MS4s

# Trading Framework

- What are the restrictions on trading necessary to protect and improve water quality?
- Two possible approaches
  - Same tributary framework
    - Most conservative approach
  - Cross tributary framework
    - More flexible approach

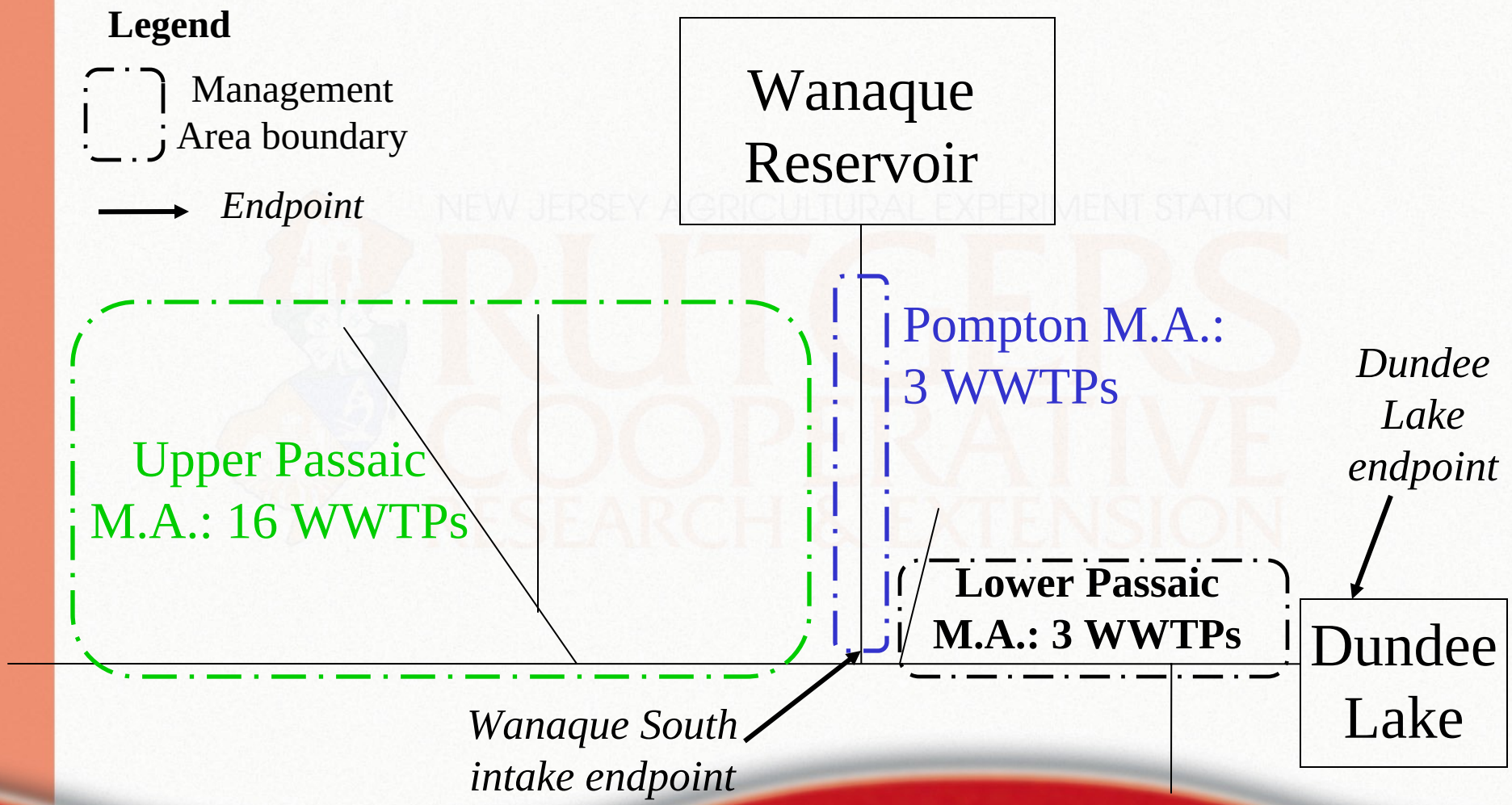
# Same tributary framework

- Aims to protect all reaches; assumes excessive P anywhere is a water quality concern
- Seller must be upstream of buyer, and must be "physically connected" to buyer
  - Apply trading ratio

# Cross tributary framework

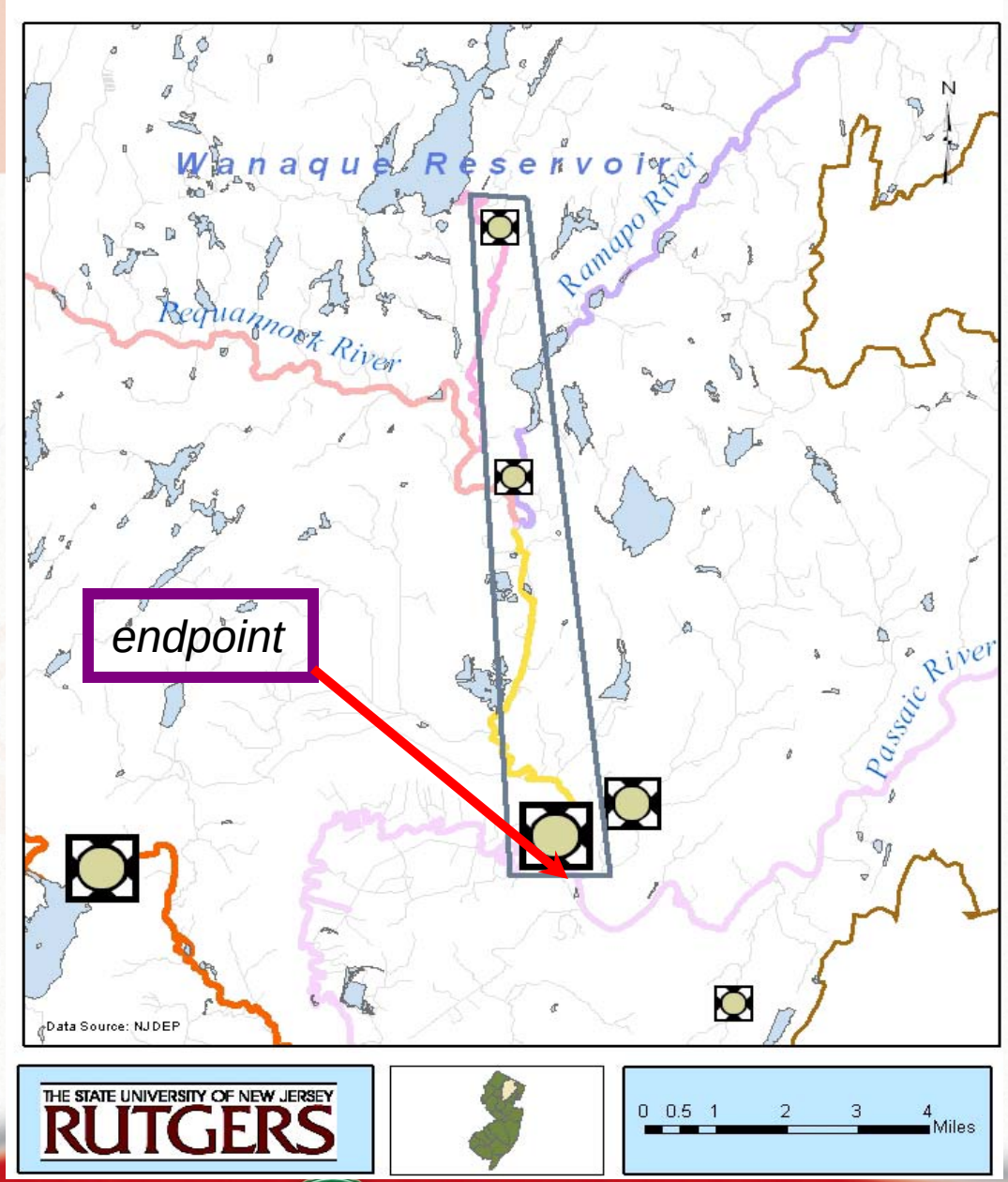
- Aims to protect TMDL endpoints; assumes excessive P is only a water quality concern at the TMDL endpoints
- Group WWTPs into "management areas". A management area is bounded by a TMDL endpoint. **Purpose of management area concept is to protect TMDL endpoints**.
  - *Within the management area, buyers and sellers can trade bidirectionally. For trades between management areas, seller must be upstream.*
  - Apply trading ratio

# Schematic


Legend
Management Area boundary
Endpoint
Wanaque Reservoir
Pompton M.A.: 3 WWTPs
Upper Passaic M.A.: 16 WWTPs
Lower Passaic M.A.: 3 WWTPs
Dundee Lake endpoint
Dundee Lake
Wanaque South intake endpoint

## Pompton Management Area

- Endpoint is Wanaque South Intake
- Endpoint is only hot spot concern in the Pompton Management Area
- 3 WWTPs with total 12.5 MGD capacity
- WWTP discharge is attenuated as it flows toward endpoint



# Economic Model

- Cornell Univ. team developed economic model to identify trading scheme that can best minimize treatment costs
- Model design is adapted from landmark Hung and Shaw (2005) paper
- Model uniquely includes marginal abatement costs *and* incremental capital costs
- Watershed-specific cost data not yet available, so data from other studies was applied
- Considered multiple scenarios based on potential TMDL allocations and trading zones

# Economic Model Findings

- Sufficient incentives for limited but important multi-year bilateral or trilateral deals
- A phased in TMDL cap will reduce costs of TMDL implementation
  - Allows flexibility in the timing of capital investments (e.g. Long Island Sound)

# NPS and MS4 Trade Opportunities

- Peckman River as MS4 trade opportunity
- Ancillary benefits to TP from NPS trades that reduce fecal coliform
- Feasibility analysis of MS4 trading
  - Trade opportunities exist between small WWTPs discharging less than 1 MGD at high phosphorus effluent and proximate MS4s.

# Next steps

- Incorporate final TMDL allocations into economic model
- Conduct trading scenario simulations
- Develop best permitting system for this program

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# For more information

http://www.water.rutgers.edu/Projects/trading/WQTrading.htm

Water Resources Program - Microsoft Internet Explorer

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Address http://www.water.rutgers.edu/Projects/trading/WQTrading.htm

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### Water Quality Trading Program

- Passaic Trading Project
- Stakeholders
- Forum
- Water Quality Trading
- Point to Point
- Point to Nonpoint
- Nonpoint to Nonpoint
- Science
- Economics
- Policy
- Case Studies
- FAQ's
- References

***What is water quality trading?***
Water quality trading represents a market based approach to achieving better water quality at lower cost. It is an alternative to traditional command and control regulation. Not only does it hold the potential of reduced costs for point sources (factories, wastewater treatment plants, etc.) to comply with water quality standards, it may be the best way to encourage reduction of rampant non point source pollution such as agriculture and urban land use, which are not regulated by the Clean Water Act. Water quality trading is multi-disciplinary and integrates science, engineering, policy, and economics. Stakeholders in a trading program can include industries, wastewater treatment plants, local businesses, farmers, municipalities, environmental NGOs, government officials, and citizen groups.

Trading is based on the fact that sources in a watershed can face very different costs to control the same pollutant. A trading program allots a certain number of pollution credits to sources collocated in the same watershed. The sources can choose to pollute under their limit and sell their credits, or pollute over their limit and purchase credits. If the limits and credits are properly allocated, such as with a TMDL, the net effect will improve water quality in the watershed, at lower cost than making each individual pollutant source upgrade their equipment to comply. Trading can occur among point sources and nonpoint sources. Depending on the structure of the program, sources can trade directly or indirectly with each other. Several water quality trading programs are underway nationwide, and some have been very successful, including nitrogen trading in Long Island Sound, and nutrient trading in the North Carolina Tar-Pamlico River Basin. These programs are saving hundreds of millions of dollars while significantly reducing water pollution.

These are just some of the key issues which are important to making a successful trading program:

- Presence of a regulatory driver, such as a TMDL
- Presence of market drivers that make trading financially attractive
- Establishing a framework that reduces transaction costs and simplifies the trading process, while still being transparent and compliant with the Clean Water Act and state/local laws
- Avoiding hot spots of higher pollutant concentration and ensuring equity for lower income residents

***Source:*** US EPA Water Quality Trading Assessment Handbook (2004), available at http://www.epa.gov/owow/watershed/trading/handbook/