PREDICTING WATER QUALITY TRADING SUCCESS

USDA-CSREES National Water Conference
San Antonio, TX
February 8, 2006

Kristin Rowles

Georgia Water Planning & Policy Center
Georgia State University
Andrew Young School of Policy Studies

Georgia Water Planning and Policy Center Research

- Evaluate water quality trading for application in Georgia watersheds
- Components of current research:
  - Watersheds evaluation
  - Legal analysis
  - **Economic analysis**
  - Monitoring
  - Modeling
  - Stakeholder dialogue
- Conducted in partnership with the **Warnell School of Forest Resources** at the University of Georgia

GEORGIA Water PLANNING & POLICY CENTER

Today's Presentation

- Based on research by:
  - Feng Jiang and M. Bruce Beck from the Warnell School of Forest Resources at the University of Georgia
  - Ron Cummings and Kristin Rowles from the Georgia Water Planning and Policy Center and Georgia State University
- Interdisciplinary effort: economists and engineers
- Cost estimation for phosphorus removal by wastewater treatment facilities (De novo, Adaptation)
- Evaluate demand for water quality trading credits

What is Water Quality Trading?

One pollutant source with high treatment costs pays another source to meet regulatory objectives or water quality goals at a lower cost.

In other words…

- Buyers pay someone else to meet their water quality obligations.
- Sellers receive payment for providing environmental services, in excess of their own environmental obligations.

Water Quality Trading in the U.S.

- Pioneered in Dillon Lake, Colorado and Tar-Pamlico River in North Carolina
- 75 or more water quality trading initiatives in watersheds across the U.S.
- EPA Water Quality Trading Policy (2003)
- Interest and enthusiasm is high, but so far trading activity is minimal

Rationale for Water Quality Trading

- Traditional water quality regulation is not efficient
  - Diminishing returns
  - Investing in high cost solutions before exhausting lower cost options
- The case for water quality trading is often built on the belief that unregulated nonpoint source pollution controls are less costly than point source pollution controls

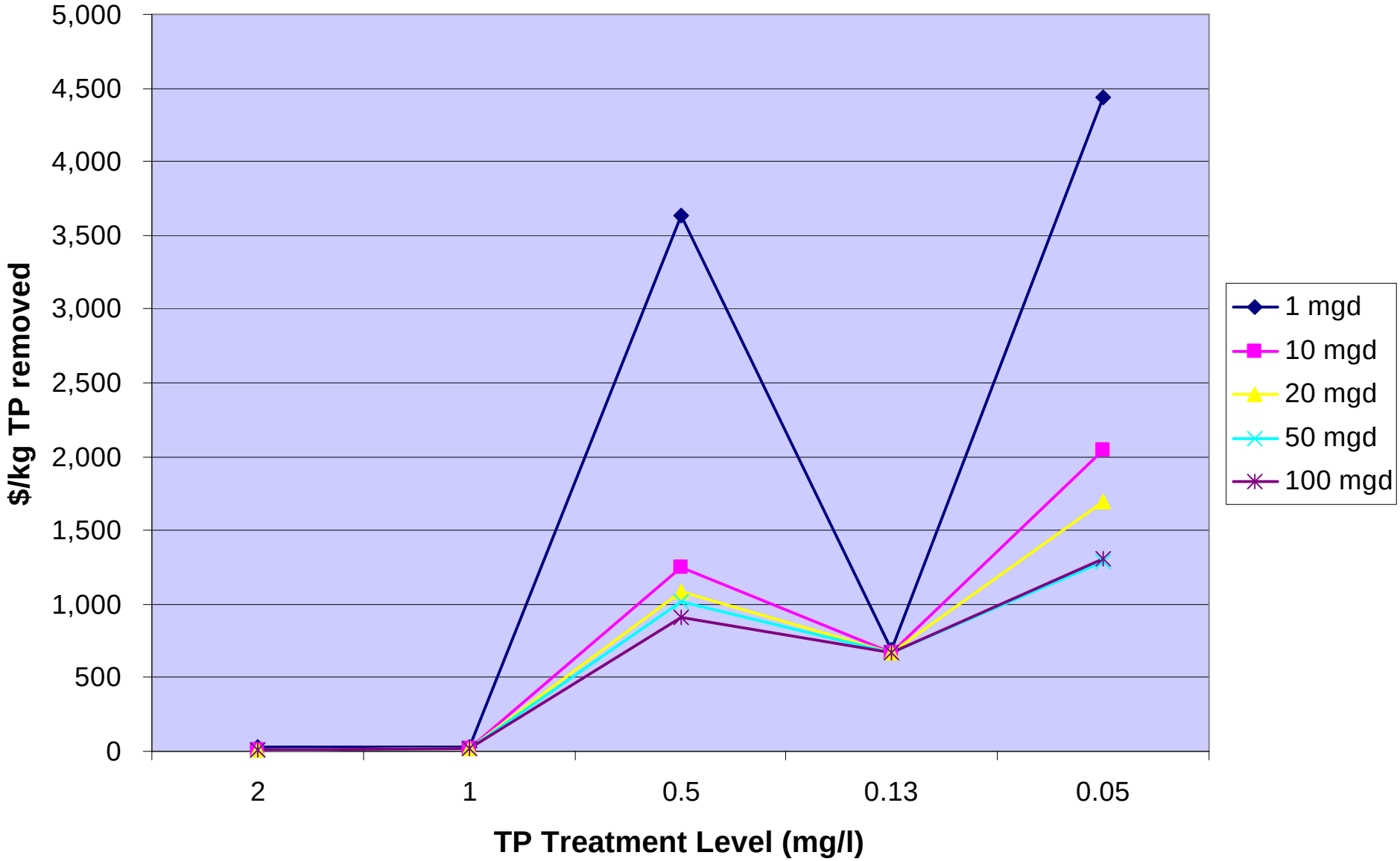
Economic Analysis

- Estimate costs of point source treatment (phosphorus) at increasing levels of regulation
- Examine demand for water quality credits
- Question: Why is trading activity minimal in existing trading programs?

Methodology

- Simulation of phosphorus removal configurations
  - WEST, Activated Sludge Model No.2d (ASM 2d)
  - TP treatment levels: 4, 2, 1, 0.5, 0.13, 0.05 mg/l
  - Plant capacity: 1, 10, 20, 50,100 MGD
- Cost estimation
  - Capital costs
  - Operation and maintenance costs (energy, chemicals, waste activated sludge disposal, labor, maintenance, and insurance)

Unit Cost for Adapting TP Treatment



Results

- Results demonstrate that a substantial increase in treatment costs when moving below 1.0 mg/l TP effluent limits
- Above 1mg/l, point source costs are often competitive with nonpoint source costs
- Explanation for lack of trading elsewhere?

Sources of Uncertainty

- Model uncertainty
- Sensitivity to price of alum and cost of sludge treatment
- Optimization of treatment process
- Variation in weather and operating conditions over the annual cycle

Water Quality Trading Implications

- Demand for water quality trading credits could be limited by a number of factors
  - Transaction costs
  - Trading ratios
  - “Gaming” to avoid regulation
  - “Thin” markets
  - Lack of economic driver for trading
    - Gains from trade may not always be as big as expected
    - Difference between actual and expected costs
      - Over-estimates of point source costs (Tar-Pamlico)
      - Under-estimates of nonpoint source costs
      - Decreasing costs of point source control technology

Conclusions

- Sharp increase in willingness to pay for WQT credits as the regulatory standard gets below of <1.0mg/l
- Few watersheds are currently regulated this "aggressively"
- Implementation of new EPA nutrient criteria might lead to increased demand
- When considering a new trading initiative, need:
  - Better methods for assessing supply and demand
  - Identification of *relevant* costs

Further Study

- More complete assessment of uncertainty
  - Including a wider range of weather and operating conditions
- Evaluation of effects of treatment process optimization
- Regulation of nutrient load vs. concentration; effects on economic incentives under trading

Any questions?

Kristin Rowles
krowles@gsu.edu

GEORGIA Water PLANNING & POLICY CENTER

Georgia State University
ANDREW YOUNG SCHOOL OF POLICY STUDIES