WHY TRADE? SEARCHING FOR THE ELUSIVE COST SAVINGS FROM WATER QUALITY TRADING

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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

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Today's Presentation

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

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

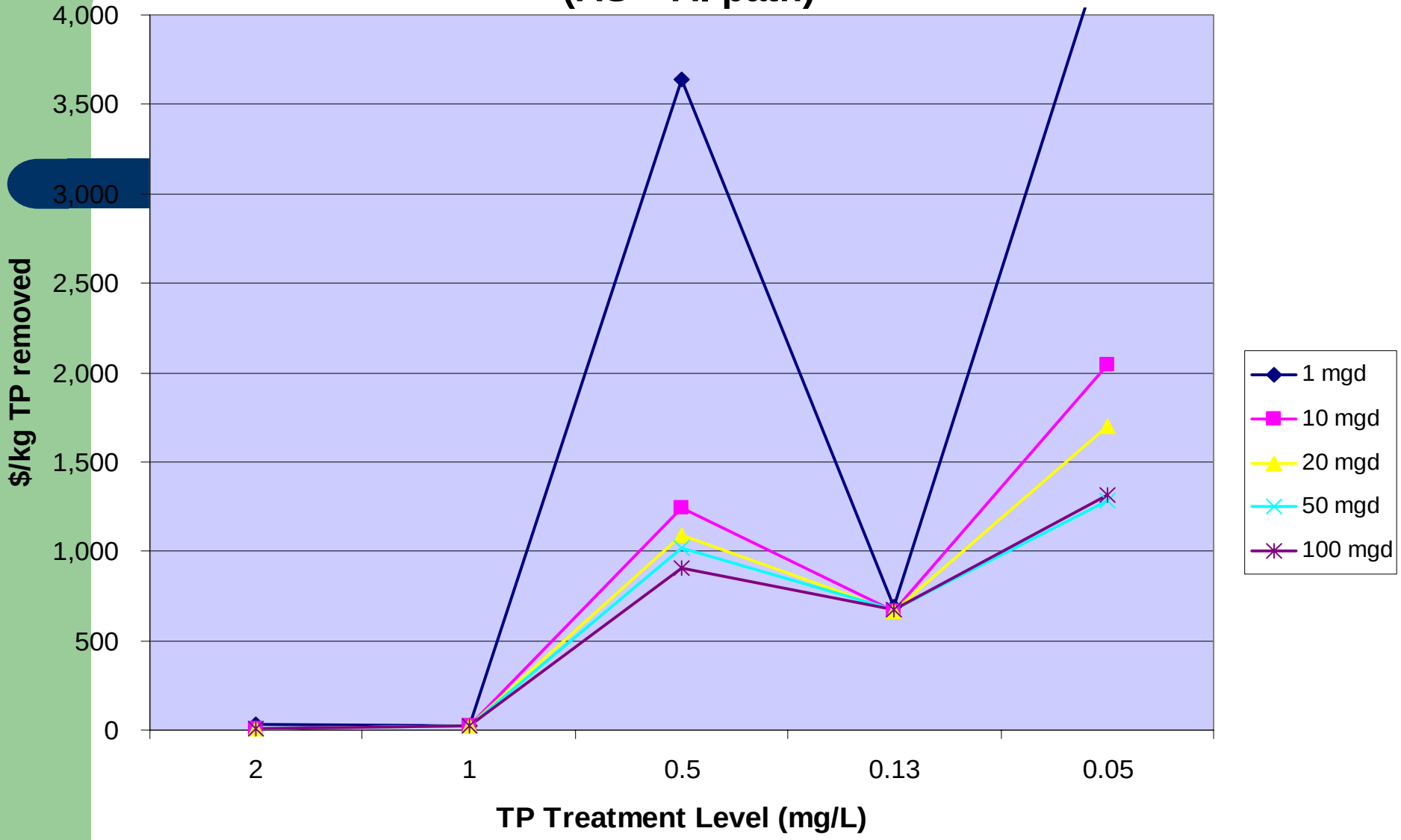
- Phosphorus treatment
- Estimate costs of point source treatment at increasing levels of regulation
- Examine demand for water quality credits
- Question: Why is trading activity minimal in existing trading programs?

Methodology

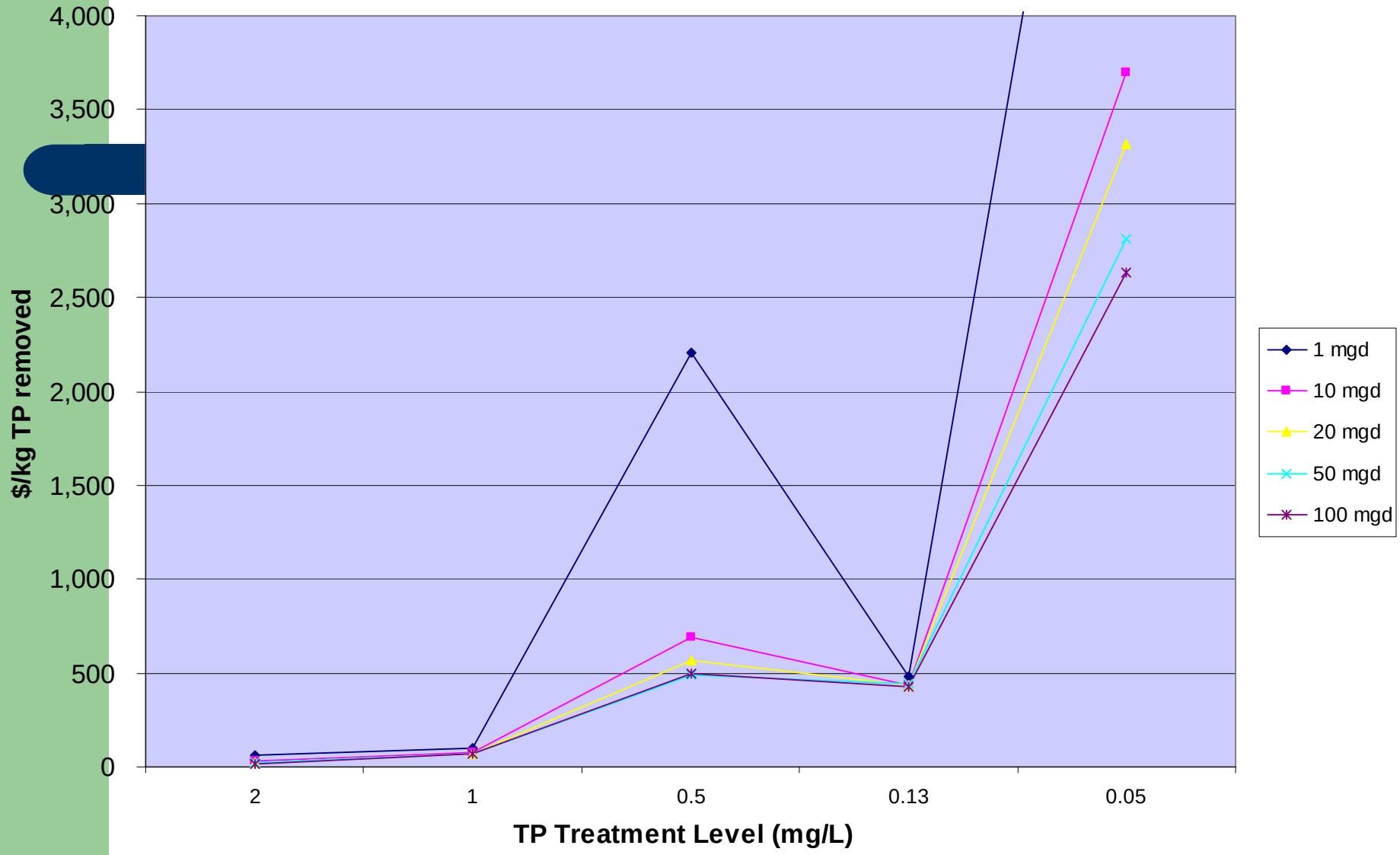
- Simulation of phosphorus removal configurations
  - WEST, Activated Sludge Model No.2d (ASM 2d)
  - TP treatment levels: 4, 2, 1, 0.5, 0.13, 0.05 mg/l
  - Plant capacity: 1, 10, 20, 50,100 MGD
- Cost estimation
  - Capital costs
  - Operation and maintenance costs (energy, chemicals, waste activated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

Unit Cost for Adapting TP Treatment

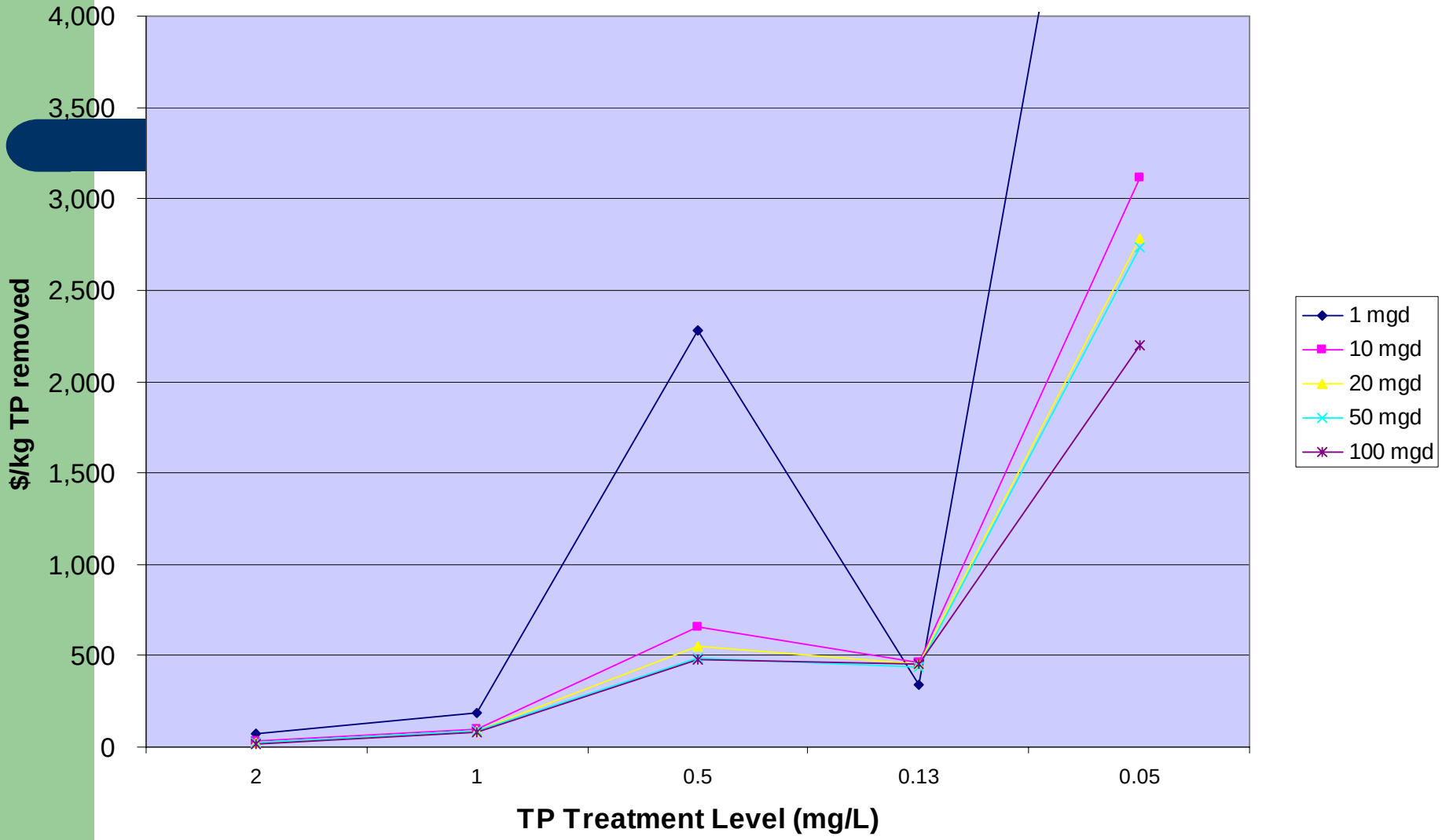
(AS + Al path)



Unit Cost for Adapting TP Treatment
(AO path)



Unit Cost for Adapting TP Treatment
(AAO path)



Results

- Results demonstrate a substantial increase in treatment costs (per kg of TP removed) below 1.0 mg/l TP effluent limits
  - >1mg/l: <$100/kg
  - <1mg/l:>$450/kg
- 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

Lack of Economic Driver for WQT

- Gains from trade may not always be as big as expected
- Difference between actual and expected costs
  - Over-estimates of point source costs (ex., Tar-Pamlico)
  - Under-estimates of nonpoint source costs
  - Decreasing costs of point source control technology
  - Most TP effluent limits >1mg/L

Demand for WQT Credits

- Inadequate regulatory pressure in most watersheds at this time (TP)
- Offsets for new/expanding sources (e.g., VA)
- EPA nutrient criteria
- New 303d listings/TMDLs (GA)

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"
- Offsets and increased regulation of nutrient loading will increase demand for WQT credits
- 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

A Tangent: WQT and Compliance Incentives

- Measurement of compliance shifts from concentration to loading
- Will WWTPs to “sail closer to the wind”?
  - Design of WWTP could differ based on how compliance is measured and whether WQT is an option
    - Concentration: design to perform below standard at all times
    - Loading: design based on average performance at standard (with option to trade if exceed)

Any questions?

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