A Scenario Analysis of the Potential Costs of Implementing the Phosphorus Management Tool on the Eastern Shore of Maryland

November 7, 2014

Easton, MD

Purpose

- The Maryland Department of Agriculture (MDA) is proposing the use of a Phosphorus Management Tool (PMT) to better determine where Phosphorus saturated soils are and whether additional Phosphorus can be applied.
- Many of the stakeholders from the agriculture sector are concerned that the rapid implementation of the PMT will create a significant economic burden that could put some of them out of business.
- This study was commissioned to estimate the potential impacts of the proposed implementation of the PMT using three possible scenarios.

Process

- The Stakeholders
- The Macro Panel
- The Micro Panel
- Additional Input
- Additional Resources
- The Three Scenarios
- Scenario Analysis
- Peer Review

The Macro Level Framework

MARYLAND BENEFITS	MARYLAND COSTS
• Inorganic Versus Litter in Receiving Areas • P Reduction • Innovation Benefits • Sectorial Benefits (Seafood, Recreation, etc.) • Land Values • Alternative Technologies • Blueprint Compliance Cost Savings	• Infrastructure Cost Subsidies • Transportation Cost Subsidies • Incentives • Alternative Technology Investments
EASTERN SHORE BENEFITS	**EASTERN SHORE COSTS**
• Reduced Cost of Inorganic Fertilizer for Some • Free Organic Fertilizer for Some • P Reduction • Alternative Uses for Litter	• Community Impacts • Infrastructure Costs • Transportation Costs • Inorganic Fertilizer Costs • Yield Changes • Land Values • Employment Impacts • Noise Pollution • Emissions and Air Pollution • Traffic

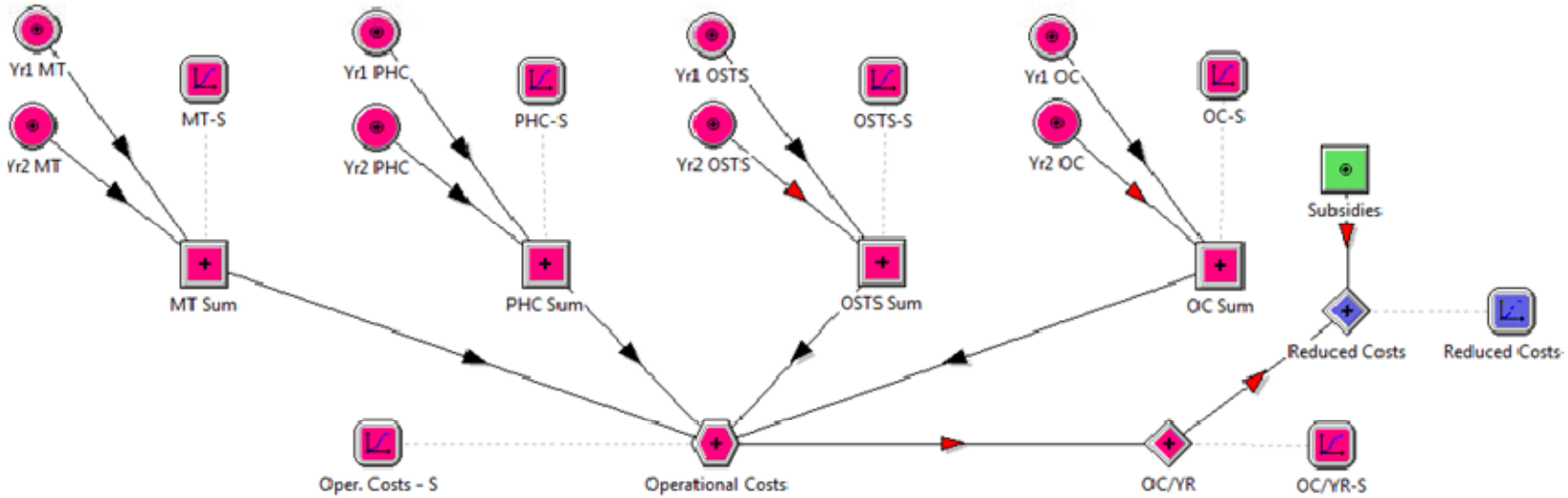
The Micro Level Framework

HIGH P FARMS	LOW P FARMS
• Storage Costs • Transportation Costs • Cost of Infrastructure • Added Cost of Inorganic Fertilizer • Yield Changes (Animal, Grain, Other) • Change in Margins • Change in Market Share • Change to Land Value • Compliance Costs • Miscellaneous Costs	• Changes to Land Value • Reduced Cost of Inorganic Fertilizer • Free Organic Fertilizer • Yield Changes (Animal, Grain, Other)

Scenario 1

- Uses a two-year implementation schedule;
- In year 1 (2016), Nutrient Management Plans will be developed using both the existing PSI and the proposed PMT;
- Starting with Year 2 (2017), no P will be applied to lands with a PMT Risk Score of 100 or greater;
- Provides a total of $1,464,000 a year in subsidies for manure transportation;
- Makes available $1,465,000 a year in additional subsidies once implementation begins (Year 2) for Nutrient Management Plan Revisions.

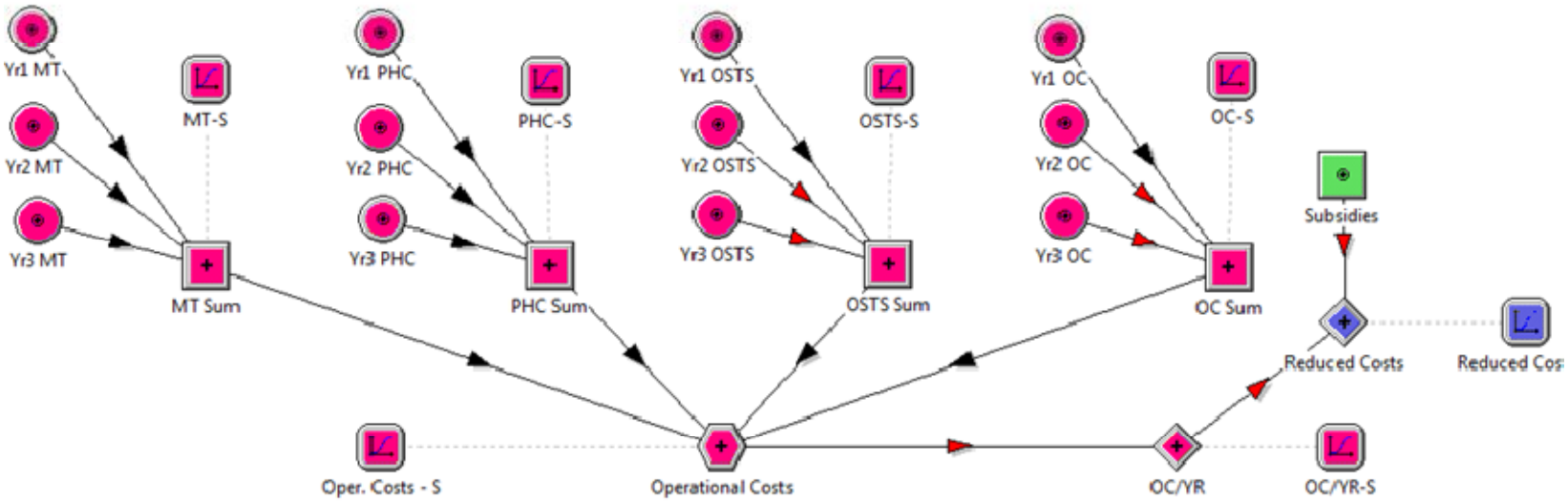
The Influence Diagram for Scenario 1



Scenario 2

- This scenario is a variant of Scenario 1;
- The only difference is the replacement of the activities of Year 2 in Scenario 1 with a two-year phase-in;
- Under this scenario, more time is available for the development of the storage and transportation infrastructure;
- Some P application is still allowed in the first of the two years of phase-in;
- The annual subsidy amounts used for scenario 1 remain unchanged.

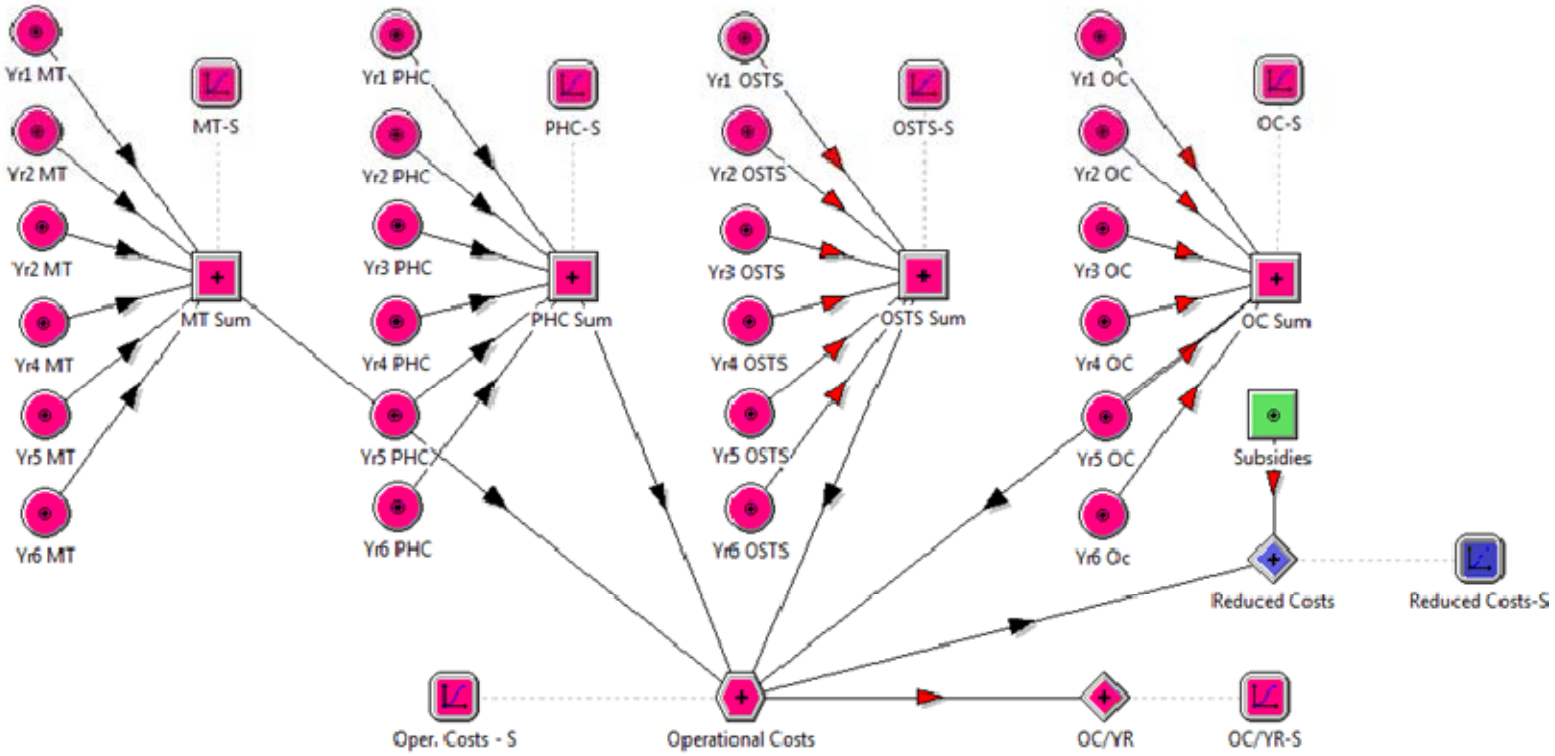
The Influence Diagram for Scenario 2



Scenario 3

- This scenario uses a six-year implementation schedule;
- Additional subsidies, incentives, and investments, including some capital expenditures for infrastructure development are foreseen;
- Some flexibility in implementation is built-in to the scenario;
- Allows for changes as implementation data is analyzed.

The Influence Diagram for Scenario 3



Scenario Analysis Findings

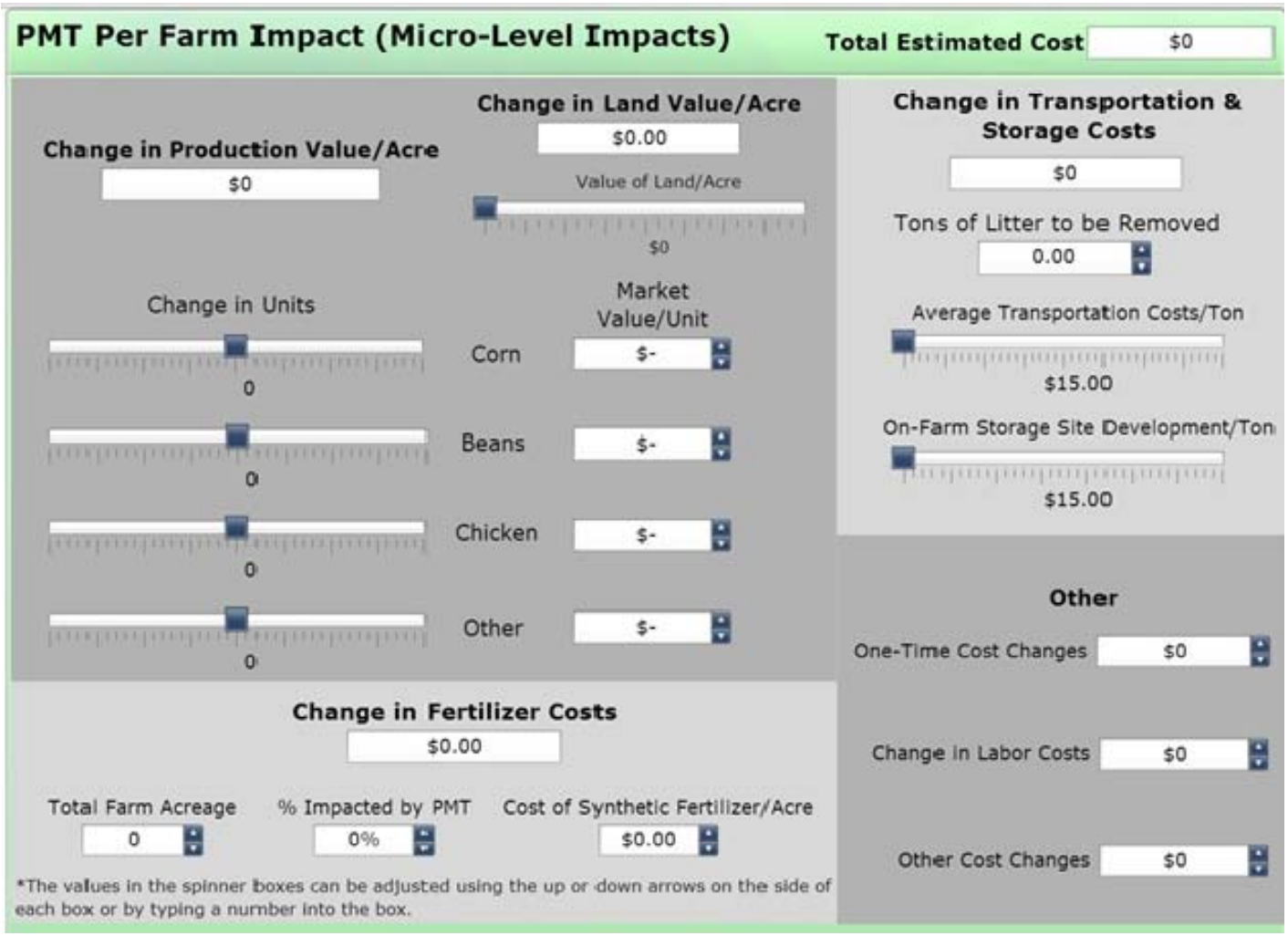
	25th Percentile	50th Percentile	75th Percentile
Scenario 1	$50.6 million	$51.5 million	$52.5 million
Scenario 2	$29.7 million	$30.2 million	$30.7 million
Scenario 3	$21.3 million	$22.5 million	$23.7 million

Six-year Subsidized Costs of PMT Implementation

Benefits of PMT Implementation

- The costs of other sectors meeting the TDML Goals;
- The October 2014 CBF report estimating the “Clean Bay Value;”
- Estimating the share of “Clean Bay Value” attributable to PMT implementation;
- The problem with contrasting the share of the “Clean Bay Value” attributable to PMT implementation with the costs of PMT implementation.

A MICRO-Level Dashboard Template



Limitations

- The final chosen scenario might not be one of the three scenarios analyzed;
- Differences in opinions and assumptions between some of the stakeholders;
- Lack of trust in each other among some of the stakeholders;
- The three scenarios used in this study, by design, do not address other systemic issues where different stakeholders have differing opinions;
- Difficulty in estimating the incremental benefits of PMT implementation at the MACRO-Level;
- In a watershed that spans many states, the PMT will apply only to Maryland.

Next Steps

- Well-designed PMT implementation cost data collection protocols should be established;
- With three to five years of actual implementation cost data, a panel of agriculture and environmental economists should conduct a comprehensive economic impact study to:
  - Measure both direct and secondary cost/benefit impacts of PMT implementation over time;
  - Incorporate findings from current and future research on the costs of further reducing P deliveries to the Bay by other means (e.g. buffers, reduced tillage, etc.);
  - Examine the actual impact of alternative uses for manure, the calibration of the PMT, and the resolution over time of other current uncertainties;
  - Include the costs and benefits of innovation and new technologies with a higher degree of accuracy.