

Cost of Reducing Nitrogen from Forest Riparian Buffers

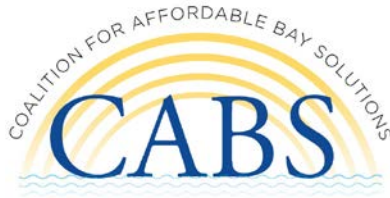
At the most recent Pennsylvania Department of Environmental Protection (PA DEP) Watershed Implementation Plan (WIP) meeting on [September 27](#), a presentation by Chesapeake Bay Program on cost effective solutions using average costs for the Chesapeake Bay watershed stated that 4.9 million pounds of annual nitrogen Bay reductions could be achieved at \$1.62 per pound of nitrogen by installing forest buffers on 80,000 acres in areas with maximum potential for reductions (see slide below). The total aggregate annual cost was projected to be \$7,938,000.

An alternative calculation based upon a methodology from the Chesapeake Bay Program Office using Pennsylvania specific costs projected a cost of \$4.62 per lb of annual nitrogen Bay reductions using the following assumptions:

- The present 3 to 1 “uncertainty” factor required to qualify modeled nitrogen reductions for use as verified Bay reductions was not included.
- A capital cost of \$2,930 per acre with an interest rate of 5% over a 75-year amortization period.
- No short or long term maintenance costs.
- An annual land rental cost of \$140 per care of farmland converted into a forest riparian buffer.
- The forecast assumes the availability of 80,000 acres of farmland that would participate in the program.

Based upon those additional assumptions, the total annual aggregate cost would increase to \$22,656,800. Using the projected 4.9 million pounds of annual nitrogen reduction assumed, the cost per pound of nitrogen reduction would be \$4.62.

Our analysis indicates that the cost per pound of Chesapeake Bay qualified nitrogen reductions is significantly higher than the projected estimates once the

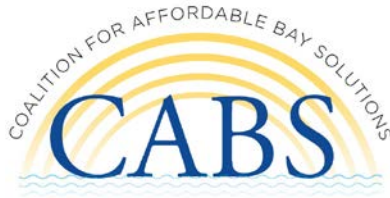


cost of the omitted assumption costs are incorporated. The key cost drivers not incorporated in the Chesapeake Bay Program Office's Pennsylvania-specific model are:

1. The 3:1 uncertainty factor that is applied to modeled credits based upon the EPA Technical Memorandum conclusion that their actual reductions in nutrients were overstated by 50% and greater. Presently, the PA DEP uses a 3:1 "uncertainty factor" to determine the number of verified credits that would qualify for use as Bay offsets for modeled credits such as forest buffers. As a result, the 4.9 million pounds of projected nitrogen reductions would be reduced to 1.633 million pounds of Chesapeake Bay credits that would meet the *verified* standard required by EPA for use as a qualified offset.
2. The land rental factor of \$140 per acre for the farmland being removed from production (opportunity cost) is assumed for the 75-year lifecycle since no increases are part of the cost projection. Assuming farmers are not going to agree to a fixed cost rental for crop acreage for 75 years going forward, either the buffer capital cost needs to be amortized over a shorter time frame (10-15 years) or the "opportunity cost" payment to farmers beyond the 10-15 year period needs to be increased as part of the projection. In either case, it will significantly increase the buffer cost projection per pound of nitrogen reduced.

In Lancaster County our estimate of the present cost of renting farmland is \$200 to \$400 per acre annually. That additional rental cost of between \$60 to \$260 per acre would add between \$4.8-\$20.8 million to the annual buffer cost.

If we assume a \$300 per acre land rental / opportunity cost, the total aggregate cost would increase by \$11,200,000. As a result, the cost per verified pound of nitrogen would increase by \$6.85 to an annual verified nitrogen pound cost of \$11.47. Applying the 3 to 1 uncertainty factor to the \$11.47 would increase the cost per pound to \$34.41.



The 2012 Chesapeake Bay Commission report “[Nutrient Credit Trading for Chesapeake Bay –an Economic Study](#)” projected an annual cost per pound of nitrogen reduction from forest buffers of \$35 per lb.

In summary, the specific assumptions listed below will be extraordinarily difficult to achieve and will add to the cost per pound of nitrogen reduction for forest riparian buffers:

- The amortization over 75 years assumes a fixed land rental or opportunity cost. It is difficult to believe that farmers would agree to such a fixed cost over such a long period of time.
- The assumption that 80,000 acres are available for long term forest buffers.
- The assumption that no short or long term maintenance is needed to maintain 80,000 acres of buffers over a 75-year period, especially in light of the interim report results recently released by a multi-stakeholder group called an “[Assessment of Riparian Forest Buffers within the Susquehanna-Chesapeake Watershed](#)” which has been [summarized](#) on the CABS website.

Next Page – Slide from the September 27, 2017 PA DEP
Watershed Implementation Plan Meeting

Targeting Forest Buffers

- Assume PA chose to implement 80,000 acres of forest buffers.
- Option 1: Each county converts an equal percent of available acres into buffers.
 - 3.9 M lbs in reductions.
 - \$2.04/ lb N reduced
- Option 2: Implement buffers in areas with more potential for reductions.
 - 4.9 M lbs in reductions.
 - **\$1.62/ lb N reduced**
 - 25% more reductions and 21% savings
- Leaves 32 M lbs to achieve. Keep going! Look at more initiatives.