A Study of the Costs Associated with Providing Nutrient Controls that Are Adequate to Offset Point Source and Nonpoint Source Discharges of Nitrogen and Other Nutrients

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Study Overview

- Study is being prepared for:
  - Environmental Review Commission with the approval of the Legislative Services Commission

- Project reporting schedule:
  - Presentation of draft final results: April 30, 2007
  - Final report: May 15, 2007

Project Team

- RTI International
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  - Randy Dodd
  - Kim Matthews
  - Dallas Wood
- Center for Watershed Protection
  - Tom Scheuler
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Brief Background

- Nutrient Offset Fee Payment Program (NOFPP): The NOFPP is administered by the Ecosystem Enhancement Program (EEP).
- Funds paid by excess dischargers are used to construct nutrient controls within the river basin that offset the excess nutrients they discharge.
- Current NOFPP projects are primarily riparian buffer restoration projects in the Neuse River Basin.
- During the last year, EEP began accepting mitigation payments to reduce nitrogen and phosphorous in the Tar-Pamlico River Basin.

Brief Background

- In 2006, several changes to the original 1998 payment rules were proposed to better reflect the true costs of mitigation and to expand the program to new river systems. These changes included the following:
  - Raising the nitrogen offset fee from $11 to $57 per pound per year,
  - Expanding the NOFPP to the Tar-Pamlico River Basin, and
  - Creating a nutrient offset program for phosphorous in the Tar-Pamlico River Basin.

Project Objectives

- The objectives of this study include the following:
  - Objective 1: Evaluate the sustainability of the program at the current fee of $11 per pound of nitrogen
  - Objective 2: Develop a proposed fee based on the cost-effectiveness analysis
  - Objective 3: Develop a formula for calculating the offset payment fee
  - Objective 4: Assess the advantages and disadvantages of expanding the nutrient offset payments to other nutrients and additional areas of the state
  - Objective 5: Evaluate the ability of public (other than the EEP) and private entities to provide nutrient offsets
  - Objective 6: Develop a comprehensive review of potential nutrient mitigation efforts available

Overview of Methodology

- To Sustain the Program:

Offset Payments per pound = Restoration Expenditures per pound

Time period: 30 years (maintenance)

Offset Payment Formula

$$Nitrogen\ Payment = [(\$ / lb)(\#\ of\ lbs / year)(30\ years) + (Land\ Cost\ \$ / Ac)(1\ Ac / 35\ Ac)(Devel.\ In\ Ac)] \times (1.1\ Ad\ Costs)$$

- $/lb = the cost of mitigation in dollars per pound of nitrogen mitigation
- # of lbs/year = the number of pounds of nitrogen discharged each year
- Land cost $/ac = the current property value of the property being developed
- 1 ac / 35 ac = an adjustment factor indicating that 1 acre of mitigation is required for every 35 acres of development
- Devel. in ac = the overall size of the development
- 1.1 ad costs = an adjustment factor used to reflect the administrative costs

NOFPP Restoration Expenditures

Restoration Expenditures = Land costs +

Installation costs +

Maintenance costs

Restoration Expenditures = One time costs +

$\sum$ (annual costs)

Restoration Expenditures = Present Value (costs)

Overview of Methodology

- Given the existing offset payment formula, we can "back solve" for ($/lb) offset payment that allows the program to break even.

- $/lb fee = Function (restoration costs)

Key Issues to be Addressed

- Offset payment formula has two main components:
  - $ per pound (currently $11 for nitrogen)
  - Value of land being developed scaled by (1/35)
- Thus, need information on value of land being developed (current and projected) to assess total payments into program
- Also need to assess appropriateness of (1/35) scaling factor—both directly affect $/lb needed to keep program solvent

Land Use and Cost

- Will use RTI's Geographic Information System (GIS) capabilities to investigate:
  - Land use (agriculture, forest, developed)
  - Property values
  - Soil characteristics

Key Issues to be Addressed

- Restoration costs vary significantly by type of project:
  - To date, most NOFPP projects have been riparian buffers because of funding constraints
- We will need restoration cost information for a variety of potential projects in potential areas

Examples of Restoration Project Costs

BMP	Riparian Buffer	Wetland	Wet Pond
	Fecue & bahia grassbuffer on the edge of a 1 acre agricultural field in the Piedmont area [a]	**5 acre wetland in an urban area of North Carolina** [d]	**5 acre wet pond in an urban area of North Carolina** [d]
		Costs	
Instillation Costs	$207	$22,000	$26,000
Maintenance Costs per Year	$50	$750	$750
Land Costs per Year	$113 [b]	$0	$0
Total 30 Year Cost	$5,082	$44,500	$48,500
Present Value (5% discount rate)	$1,335	$27,206	$31,206
		Emissions	
Nitrogen Released per Year (lbs)	20[c]	80	80
Nitrogen Removal Efficiency	65%	40%	25%
Nitrogen Removed per Year (lbs)	13	32	20
Total 30 year Removal (lbs)	390	960	600
Efficiency ($PV/Total Removal lb)	$3.42	$28.34	$52.01

[a] Wossink, Ada. 2000. “The Economics of BMPs to Control Nitrogen in the Neuse River Basin.” NCSU CALS Publ. AGW-2. Available at http://www2.ncsu.edu/unity/ lockers/users/g/gawossin/Papers/bmpecon.pdf. As obtained on February 22, 2007.

[b] Wossink reports land costs ranging from $53 to $172. For this example, we use the average of the two.

[c] Evans, R.O., J.P. Lilly, R.W. Skaggs, J.W. Gilliam. 2000. "Rural land use, water movement, and coastal water quality." N.C. Cooperative Extension AG-605. Available at http://www.bae.ncsu.edu/programs/extension/evans/wtm/ag-605.pdf. As obtained on February 28, 2007.

[d] N.C. Department of Environment and Natural Resources (NCDENR). 2005. “Report of Proceedings on the Proposed Changes to 15A NCAC 2B. 0240, The Nutrient Offset Payments Rule.”

Key Issues to be Addressed

- Because of the cost differences across different projects, we will need to forecast the **distribution** of project types to be used in the analysis
- Two example scenarios could be:
  - Most future projects will continue to be riparian buffers (i.e., always select lowest cost option)
  - X% of restoration projects will occur in **rural** areas and Y% of projects will be achieved in **urban** areas

Key Issues to be Addressed

- Restoration costs are going to vary over time. For example:
  - Installation costs may be relatively constant over time
  - Engineering design costs may decrease with experience
  - Restoration land costs may increase as low-cost land becomes depleted and/or growth encroaches on rural areas
- Current offset payment formula allows payments to increase as value of developed land increases
- Escalation factors (indexes) could be developed to automatically adjust for cost changes over time

Key Issues to be Addressed

- Restoration costs may vary across geographic areas:
  - Differences between river basins (Neuse vs. Tar-Pamlico)
  - Differences within a single river basin

Summary

- Objective of this project is NOT to make recommendations on the type of restoration projects that should be implemented.
- Objective is to provide policy makers with the restoration cost information and potential offset payment fee scenarios/formulas to help them evaluate different alternatives that will keep the NOFPP solvent over the next 30 years.

Summary

- Any information on restoration project costs would be greatly appreciated.

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