

**DWQ Credit Yield Subcommittee Meeting**  
**May 4, 2009**  
**EEP Headquarters, Raleigh, NC**

**Attendance**

Jim Stanfill, NC Ecosystem Enhancement Program  
Barrett Jenkins, Restoration Systems, Inc  
Lin Xu, NC Ecosystem Enhancement Program  
Kelly Williams, NC Ecosystem Enhancement Program  
Mike Schlegel, Triangle J Council of Governments  
Haywood Phthisic, LNBA  
Sandi Wilbur, City of Durham  
Erik Kulz, NC Division of Water Quality  
Joe Rudek, Environmental Defense Fund  
Rich Gannon, NC Division of Water Quality  
John Huisman, NC Division of Water Quality  
Larry Baldwin, Neuse Riverkeeper Foundation  
Jamie Guerrero, Johnston County

**I. MEETING PURPOSE AND AGENDA**

**A. Purpose of the Meeting**

1. Understand how nutrient credit yield is currently calculated, and the deficiencies inherent in the current method.
2. Provide feedback and suggestions about whether/how to modify the credit yield calculation and whether/how to establish new policy guidelines for implementing the method.
3. Stakeholders make recommendations to bring back to the full NOPP stakeholder group.

**B. Meeting Agenda**

- 1:00 Purpose of meeting and discussion agenda (Smutko)
- 1:15 Description of current credit yield calculation and policy guidelines, and DWQ identification of deficiencies in the method (Huisman)
- 2:00 Discussion and Feedback on:
- Yield calculation
  - Policy guidelines
- 4:00 Recommendations to bring back to the full committee
- 4:30 Adjourn

### C. Options for Stakeholders to Consider:

1. Maintain the status quo, use the existing credit yield calculations and policy guidelines
2. Keep the same credit yield calculations but alter the policy guidelines
3. Change the credit yield calculations and the policy guidelines

## II. CREDIT YIELD CALCULATIONS

- A. John Huisman described the way credit yield for nitrogen and phosphorous are currently calculated, and the problems inherent in the current method.

Credit yield is based on three water quality benefits:

- (1) Land use change
- (2) Nutrient removal from NPS runoff
- (3) Nutrient removal from overbank flooding

Nitrogen credit = Benefit 1+2+3

Phosphorous credit = Benefit 1+2

- B. Benefits derived from land use change

Current method assumes the following export coefficients:

- Ag/Urban (N) composite export coefficient = 11.57 lbs/ac
- Wetlands (N) export coefficient = 1.76 lbs/ac
- Agriculture (P) export coefficient = 2.15 lb/ac
- Riparian buffer (P) export coefficient = 0.42 lb/ac

- C. Benefits derived by removing nutrients from runoff flowing into the buffer

Current method:

1. Inflow loading = drainage area x composite export coefficient
2. Nutrient removal is the product of (Inflow loading) x (% removal efficiency)
3. Assumptions
  - Drainage area = 10.8 ha
  - Ag/urban composite export coefficient = 11.57 lbs/ac
  - Removal efficiency = 50% (N)
  - Riparian buffer restorations only occur on agricultural lands.
  - Width of restored riparian buffer is 50 feet, and with mixture of grass and forest.

- D. Benefit of removing nutrients (nitrogen only) from periodic flooding

1. Current method:
2. Nutrient removal = (Flow concentration) x (area) x (overboard height) x (% removal)
3. Assumptions
  - Flow concentration = 2.5 mg/L nitrogen
  - Area = 1 ha

- Overboard height = 1 foot
- Removal efficiency = 50%
- Periodic flooding = once a year

**E. Formula for Calculating Nitrogen Offset Reductions on Riparian Buffer Restoration Sites:**

*Size (Acres) \* 75.77(lbs/Acre/Year) \* 30 Years = Total Pounds of Nitrogen Removed from Riparian Buffer Project*

**F. Formula for Calculating Phosphorus Offset Reductions on Riparian Buffer Restoration Sites:**

*Size (Acres) \* 4.88(lbs/Acre/Year) \* 30 Years = Total Pounds of Total Phosphorus Removed from Riparian Buffer Project*

**G. Deficiencies of Current Method**

1. Composite export coefficient
  - a. Ag/Urban used instead of Ag/pasture
  - b. Export coefficient not adjusted by basin
2. Drainage Area
  - a. 10 acre assumption does not account for variables
  - b. Drainage area varies by buffer width (50' vs. 200')
  - c. Varies by region (Piedmont vs. Coastal Plain)
3. Removal efficiency
  - a. Only 50' buffers
  - b. All buffer widths do not achieve same % removal
4. Instream concentration: 2.5 mg/l N seems high.
5. General assumptions: All buffer projects do not achieve all three benefit categories. DWQ review of all buffer projects showed that only 50% achieve overbank flooding.

**H. Discussion**

1. Question: Why use a wetlands coefficient for buffers?  
Response: This is one reason we are reviewing this.
2. Discussion about drainage area assumption (10.8 ha):  
The ag/urban export coefficient currently in use is 12.8. Many buffer catchment areas are more urbanized now than ten years ago. The current coefficient may not be as accurate.
3. Discussion about removal efficiency:

Should it be 50%? 65%?

NCSU's latest studies support the 50% figure.

4. Question: Is the per-acre export rate actually delivered to the stream from all acres or is there transport loss over upland distance? (Does 10 acres of ag land deliver 62.8 lbs to a stream?)

Response: DWQ will query Deanna Osmond (NCSU), Kurt Richardson (Duke U), and Emily Burnhardt (Duke U).

5. The group discussed the effect of the reduction in size of drainage area (catchment area) as buffer width increases. Since the inflow nitrogen loading used to calculate benefit #2 (the benefit derived by removing nutrients from runoff flowing into the buffer) is highly sensitive to the size of the drainage area draining to the buffer, increases in buffer width, and subsequent decreases in drainage area, result in a decrease in inflow nitrogen loading which decreases the nutrient reduction achieved through benefit #2. This issue requires further research by DWQ.

### **III. CREDIT YIELD UPDATE**

#### **A. DWQ Recommendations for Credit Yield Calculation Update**

1. Updated variables (formula remains the same)
  - a. Removal efficiency
    - % reduction for 50' and 200' buffers
  - b. Drainage area
    - Calculated for 50' & 200' buffers in Piedmont & Coastal
  - c. Composite Export Coefficient
    - Basin specific based on acre weighted average of Ag/pasture
  - d. Instream concentration
    - Updated based on recent water quality data

#### **B. Options discussed for the credit yield calculation**

1. A refined simplified method
2. Project-specific method (varies by drainage area)

#### **C. Policy Guidelines**

There are currently no written guidelines for nutrient credit. Buffer nutrient credit is based on past project approval. DWQ suggested four policy guidelines:

1. *Locate buffers only on intermittent or perennial streams.* The group agreed that this guideline was unnecessary because it is already policy (where?)

2. *In the Piedmont, projects cannot be located on unstable or modified natural streams.* This guideline as reworded by the group to read: Streams with buffers that are non-functioning cannot be used for nutrient credit. In the Piedmont, projects must address instability if present.
3. *Land use in the drainage area shall be agricultural.* Because the guidelines do not address land uses in the drainage area, Ag-urban export coefficients (rather than strictly agricultural) will be used in calculating yield.
4. *Buffer width shall be 50 feet.* It as agreed to hold this guideline for future consideration by the subcommittee.

#### **IV. RECOMMENDATIONS TO FULL STAKEHOLDER COMMITTEE**

1. The subcommittee discussed the potential impact on nutrient offset payment price. They agreed that data data from past projects are needed to determine the cost impact of estimating yield using catchment area as a variable. **EEP will calculate catchment area of past projects, apply credit yield calculations and estimate the payment price using the actual cost method. This information will be brought back to the subcommittee at its next meeting.**

#### **Topics remaining in “Parking Lot”**

1. Value of a square foot of mitigation is different than the value of a square foot of nutrient mitigation.
2. How to address the issue of pricing for buffer maintenance and stewardship beyond 30 years
  - A. This is required for nutrient offset buffer projects
  - B. How does this affect cost calculations?