# Credit for Going Green

## Pollutant Removal Credits for Buffers in MS4 Permits

# Partners & Advisors

## Partners

- University of New Hampshire Stormwater Center
- Great Bay National Estuarine Research Reserve
- Roca Communications
- Narragansett Bay National Estuarine Research Reserve
- Waquoit Bay National Estuarine Research Reserve

## Advisors

- New Hampshire Department of Environmental Services
- United States Environmental Protection Agency Region 1

# We Are Grateful to Our Sponsor

National Estuarine Research Reserve System Science Collaborative, which advances collaborative research to address coastal management problems important to reserves and their communities.

The Science Collaborative is funded by the National Oceanic and Atmospheric Administration and managed by the Universi Michigan Water Center.

# Our Goal

Help New Hampshire communities use buffers to help meet pollution reduction targets for stormwater permits

# Our Process

Weight of evidence approach that engaged experts in recommending pollutant load reduction performance curves for restored or constructed buffers in projects involving land use change


**Get the guide!**

# Frame Your Question

- Review Previous Work
- Check in with Stakeholders
- Look for case studies
- Find a mentor
- Secure the resources you need

# Assemble the team

- Form the Core
- Convene Your Advisors
- Recruit the Panel

| Table 1: Going Green Expert Panel Members | |
|---|---|
| **Panelist** | **Position & Affiliation** |
| Dr. James Houle (Chair) | Program Director, University of New Hampshire Stormwater Center |
| Dr. Thomas Ballestero | Director, University of New Hampshire Stormwater Center<br>Associate Professor, Civil Engineering |
| Dr. Michael Dietz | Director, Connecticut Nonpoint Education for Municipal Officials (NEMO)<br>Associate Extension Educator, University of Connecticut |
| Mr. Mark Voorhees | Environmental Engineer, U.S. Environmental Protection Agency, Region 1 |
| Mr. Ted Diers | Administrator, NHDES, Watershed Management Bureau |
| Ms. Karen Dudley | Resource Soil Scientist, Natural Resources Conservation Service |
| Dr. Nigel Pickering | Research Associate Professor, State of Washington Water Research Center and the Washington Stormwater Center. (Formerly of Horsely Whitten) |
| Mr. Pete Steckler | GIS & Conservation Project Manager, NH Certified Wetland Scientists, The Nature Conservancy, NH |
| Mr. John Magee | Certified Fisheries Professional & Fish Habitat Biologist,<br>New Hampshire Fish and Game Department |
| The panel retained a consultant who had run an expert panel process to develop credits for non structural BMPs in the Chesapeake Bay Region: Thomas Scheuler, Executive Director of the Chesapeake Stormwater Network | |

# Sustain Momentum

- Get Organized
- Compile the Science
- Keep Moving forward

CENTER FOR LEADERSHIP & ORGANIZATIONAL CHANGE
PARTNERING FOR RESULTS

# Consensus Continuum

| Stop | Hold | Stand Aside | Agreement with Reservations | Endorsement |
|---|---|---|---|---|
| "I do not agree and feel the need to stand in the way of this decision" | "I believe more work is needed before we make a decision" | "I trust the group and will not block this decision but need to register my disagreement" | "I can live with it" | "I like it" |

# Take It On the Road

- Develop recommendations
- Advisory committee check in
- Wrap it up and roll it out

# About the Panel Recommendations

# Key Terms

**Removal Efficiency (RE):** Buffer capacity to remove total nitrogen (TN), total suspended solids (TSS), & total phosphorus (TP)

**Performance:** Buffer's ability to remove TN, TSS, and/or TP.

**Credit:** Estimated pollutant load reduction given for the use of buffers in regulatory permits issued for redevelopment projects under the NPDES Stormwater Permit Program and other efforts to manage stormwater

**Penalty:** Reduction in credit (from the total possible) that a buffer can receive. It reflects the impact of different conditions on the buffer's ability to remove TN, TSS, and/or TP.

# Key Decisions

## What Gets Credit

Restored or constructed buffers in development, redevelopment, restoration & other projects involving land use change.

## Optimal Buffer Condition for Credit

Forested buffer with a width of 100 feet can achieve maximum removal efficiency values. Deviations from this condition result in penalties that reflect lower performance expectations.

## Minimally Acceptable Buffer Width for Credit

20 feet—Narrower buffers, while valuable, will not receive credit.

# Key Decisions

## Grassed Buffers

Receive a 20% reduction (penalty) in performance based on the Chesapeake values for nitrogen for grassed buffers (Lowrance 1998, Mayer et al. 2005).

## HSGs and Sediment and Phosphorus Removal

As hydrologic soil groups (HSGs) assist in pollutant reduction through infiltration, HSG A soils receive the maximum credit for total suspended solids and phosphorus removals.

## HSGs and Nitrogen Removal

As total nitrogen performance is enhanced by depth to ground water, removal efficiencies for nitrogen are *inversely* proportional to those for TSS and TP, i.e,, HSGs that are best for TN removal (HSG D) are the opposite of those that are optimal for TSS and TP removal (HSG A).

# Chesapeake Bay Pollutant Removal Efficiencies for Buffers By Geology (source)

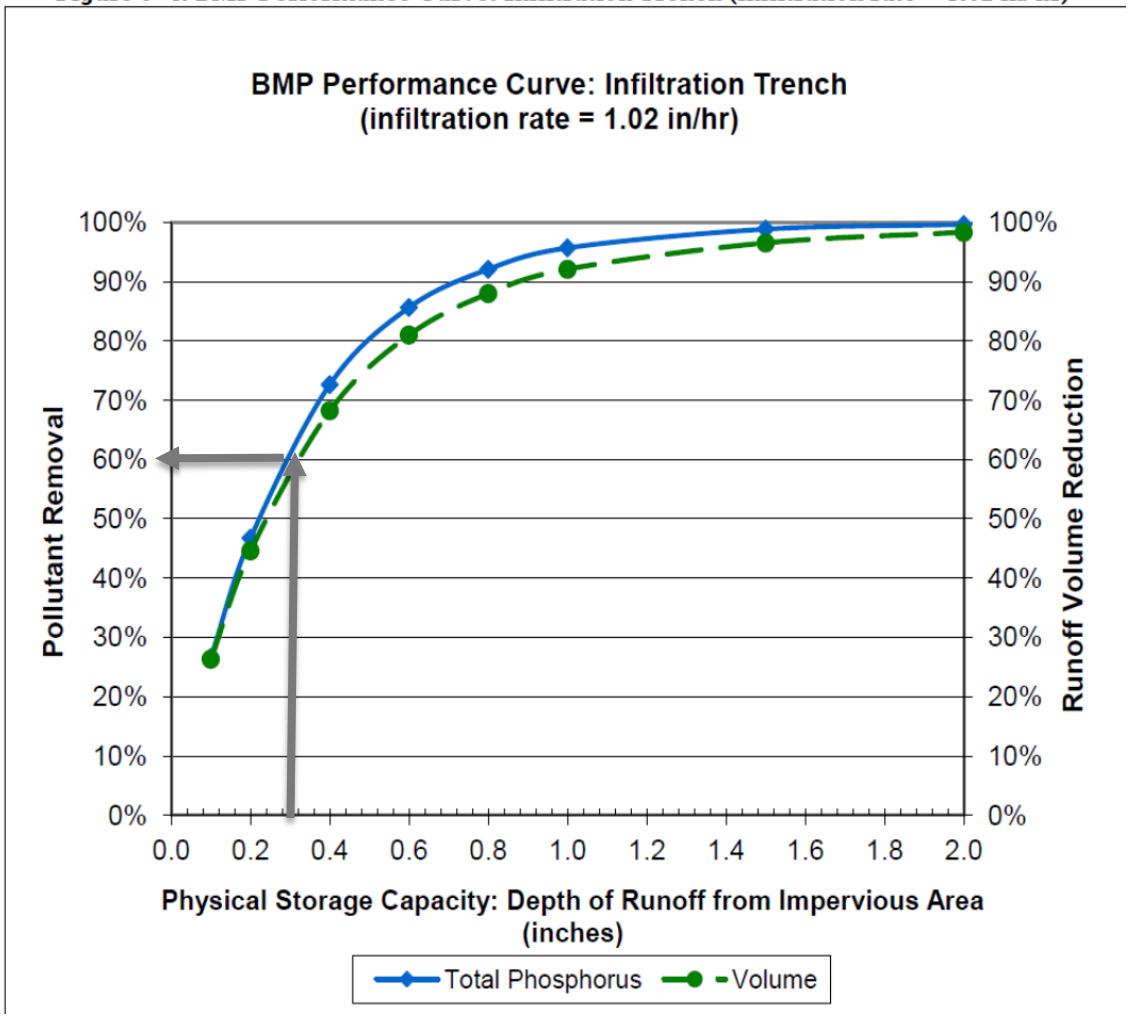
| | Forest on one side of the stream (same as 2008) | | | Grass on one or both sides of the stream (same as 2008) | | |
|---|---|---|---|---|---|---|
| | TN | TP | TSS | TN | TP | TSS |
| Inner Coastal Plain | 65 | 42 | 56 | 46 | 42 | 56 |
| Outer Coastal Plain (well drained) | 31 | 45 | 60 | 21 | 45 | 60 |
| Outer Coastal Plain (poorly drained) | 56 | 39 | 52 | 39 | 39 | 52 |
| Tidally Influenced | 19 | 45 | 60 | 13 | 45 | 60 |
| Piedmont (schist/gneiss) | 46 | 36 | 48 | 32 | 36 | 48 |
| Piedmont (sandstone) | 56 | 42 | 56 | 39 | 42 | 56 |
| Valley and Ridge (karst) | 34 | 30 | 40 | 24 | 30 | 40 |
| Valley and Ridge (sandstone/shale) | 46 | 39 | 52 | 32 | 39 | 52 |
| Appalachian Plateau | 54 | 42 | 56 | 38 | 42 | 56 |

# Performance Curves

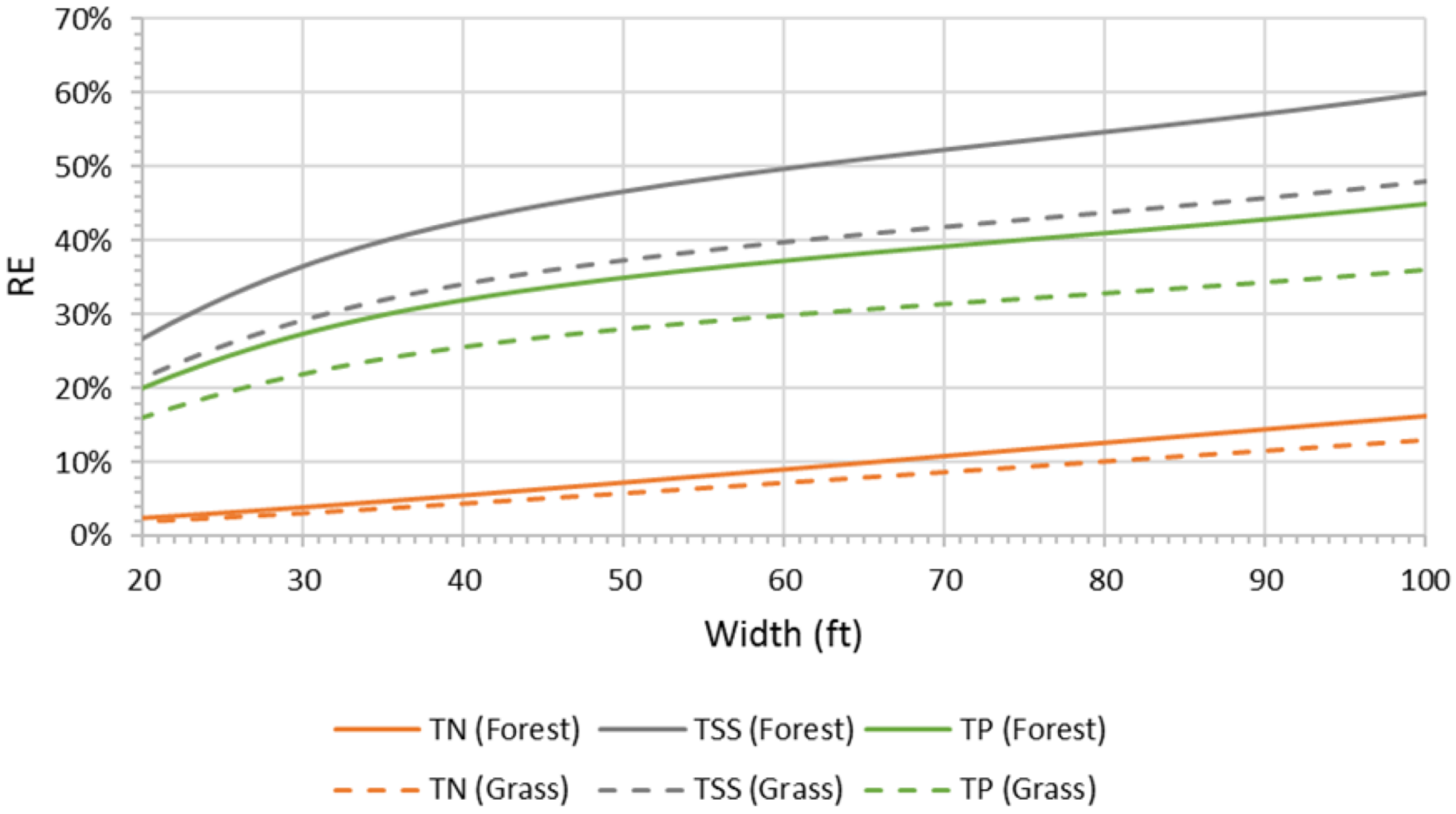
# Design Guidance

| Infiltration Trench (IR = 1.02 in/hr) BMP Performance Table: Long-Term Phosphorus Load Reduction | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **BMP Capacity: Depth of Runoff Treated from Impervious Area (inches)** | 0.1 | 0.2 | 0.4 | 0.6 | 0.8 | 1.0 | 1.5 | 2 |
| **Runoff Volume Reduction** | 26.3% | 44.6% | 68.2% | 81.0% | 88.0% | 92.1% | 96.5% | 98. |
| **Cumulative Phosphorus Load Reduction** | 27% | 47% | 73% | 86% | 92% | 96% | 99% | 10 |

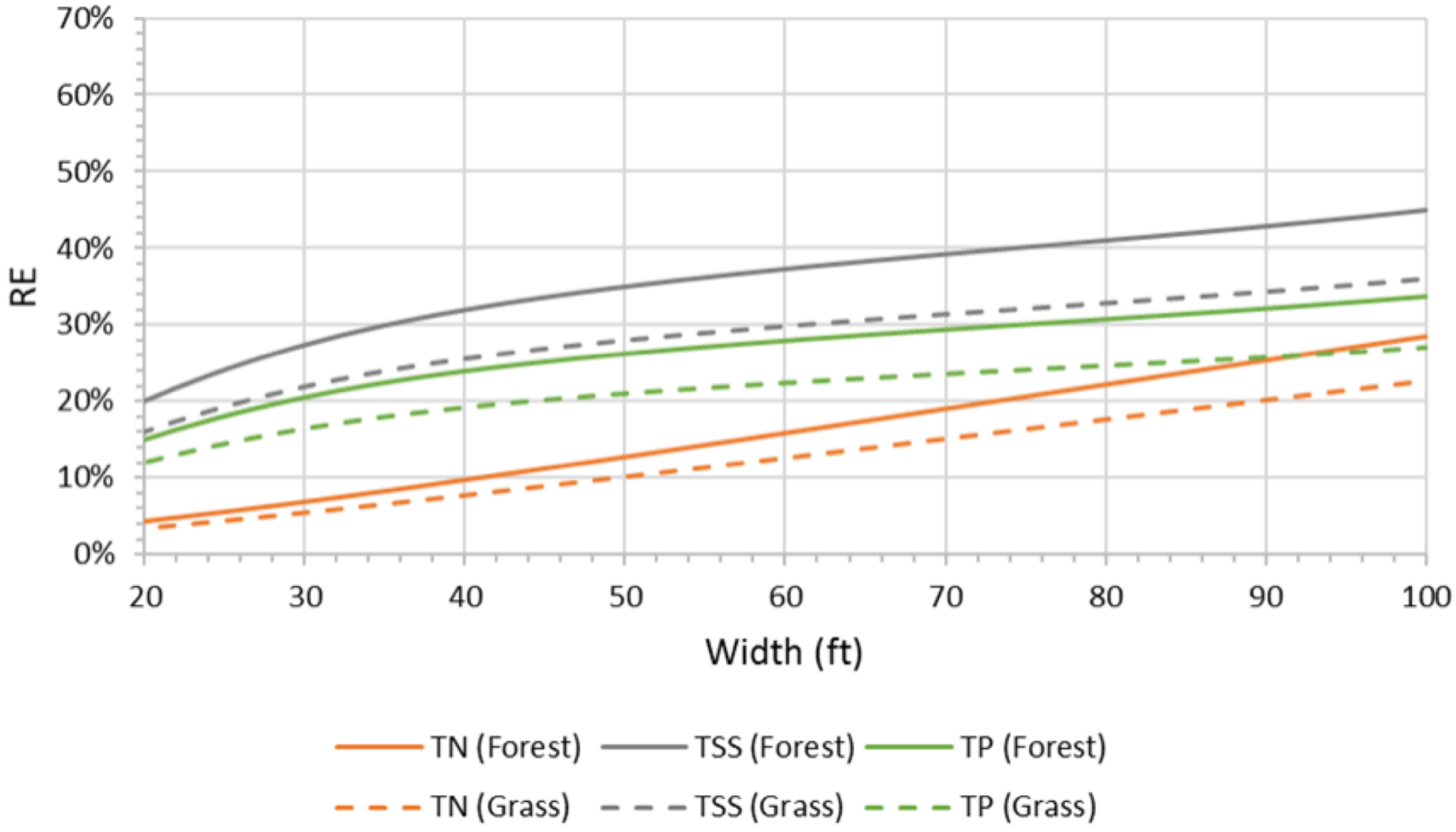
**Figure 3- 4: BMP Performance Curve: Infiltration Trench (infiltration rate = 1.02 in/hr)**



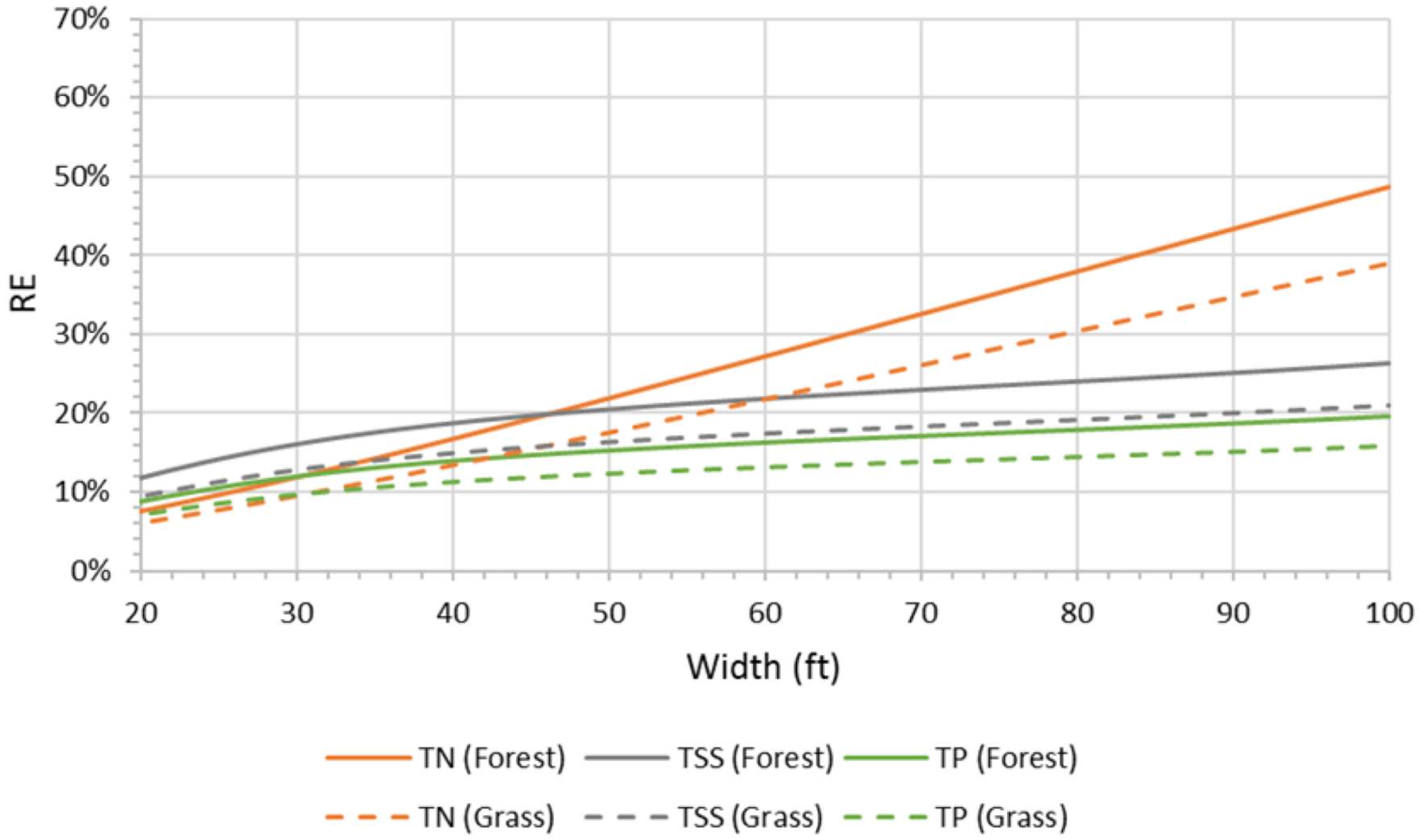
# Removal Curves: Hydrologic Soil Group A



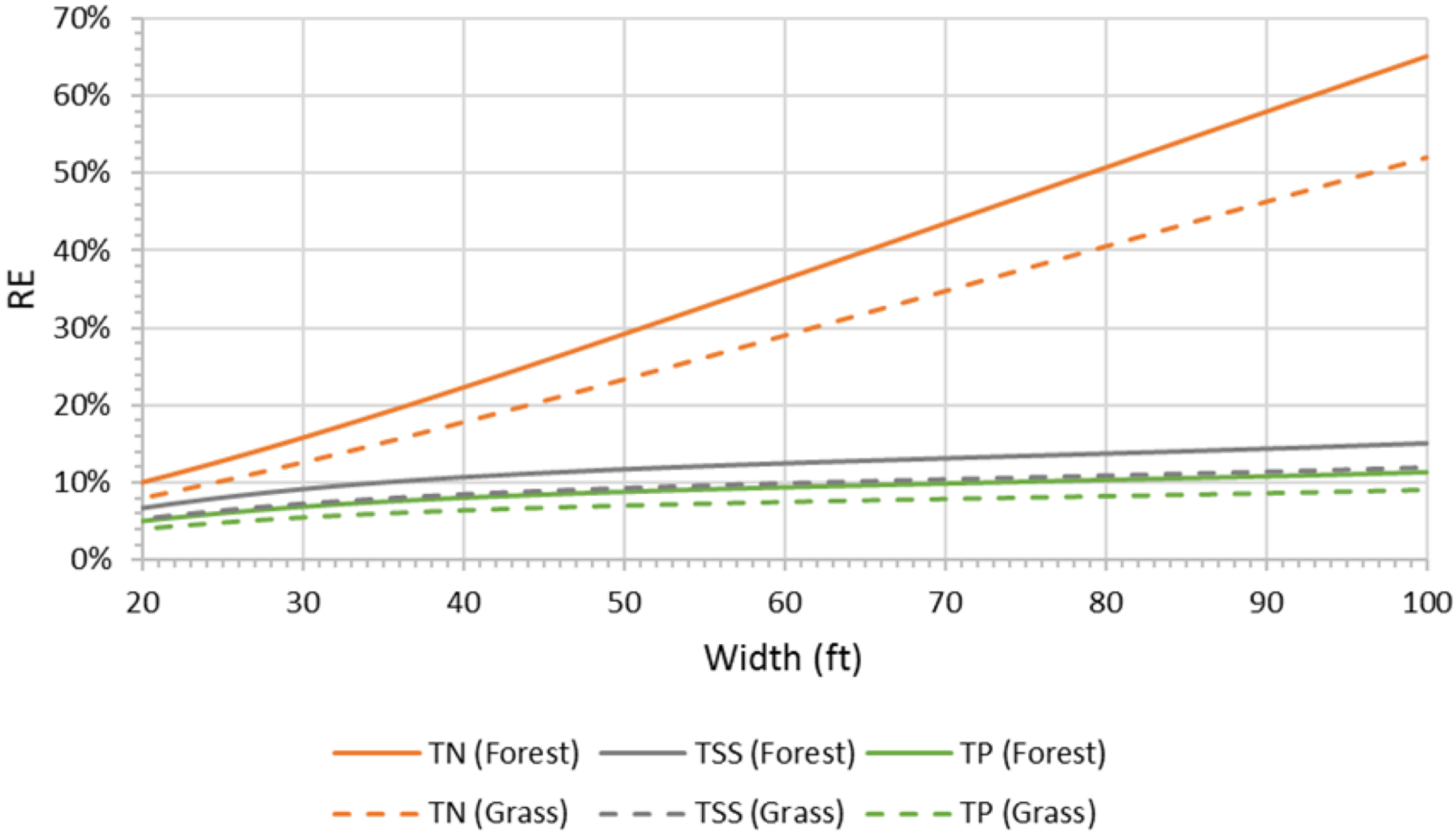
# Removal Curves: Hydrologic Soil Group B



# Removal Curves: Hydrologic Soil Group C



# Removal Curves: Hydrologic Soil Group D



# Land Use Categories & Pollutant Load Export Rates

| Loading Ration by land use | | | PLER lb/ac/yr | | |
|---|---|---|---|---|---|
| Buffer Curves | DCIA % | Max Contributing Area (ft) | TSS | TN | TP |
| Low Residential | <36 | 400 | 108 | 3.8 | 0.55 |
| Residential | 36-60 | 300 | 186 | 6.2 | 1.07 |
| Commercial/Trans | >60 | 100 | 234 | 9.3 | 1.16 |

# • Performance Multiplier Based on Slopes up to 15%

| Health and Longevity: consensus reached on 10-year lifespan of credit | | | |
|---|---|---|---|
| Slope | 0-5% | 5-10% | 10-15% |
| Buffer Multiplier | 1 | 0.75 | 0.5 |

# When to Use the Curves

- Development, redevelopment, & restoration
- Ordinances related to buffers
- Watershed management planning
- Nitrogen management budget

# What the Curves Can't Address

- Buffers Wider Than 100 Feet
  (Although these have great value!)
- Buffers Narrower Than 20 Feet
- Slopes Steeper Than 15%

# Questions?