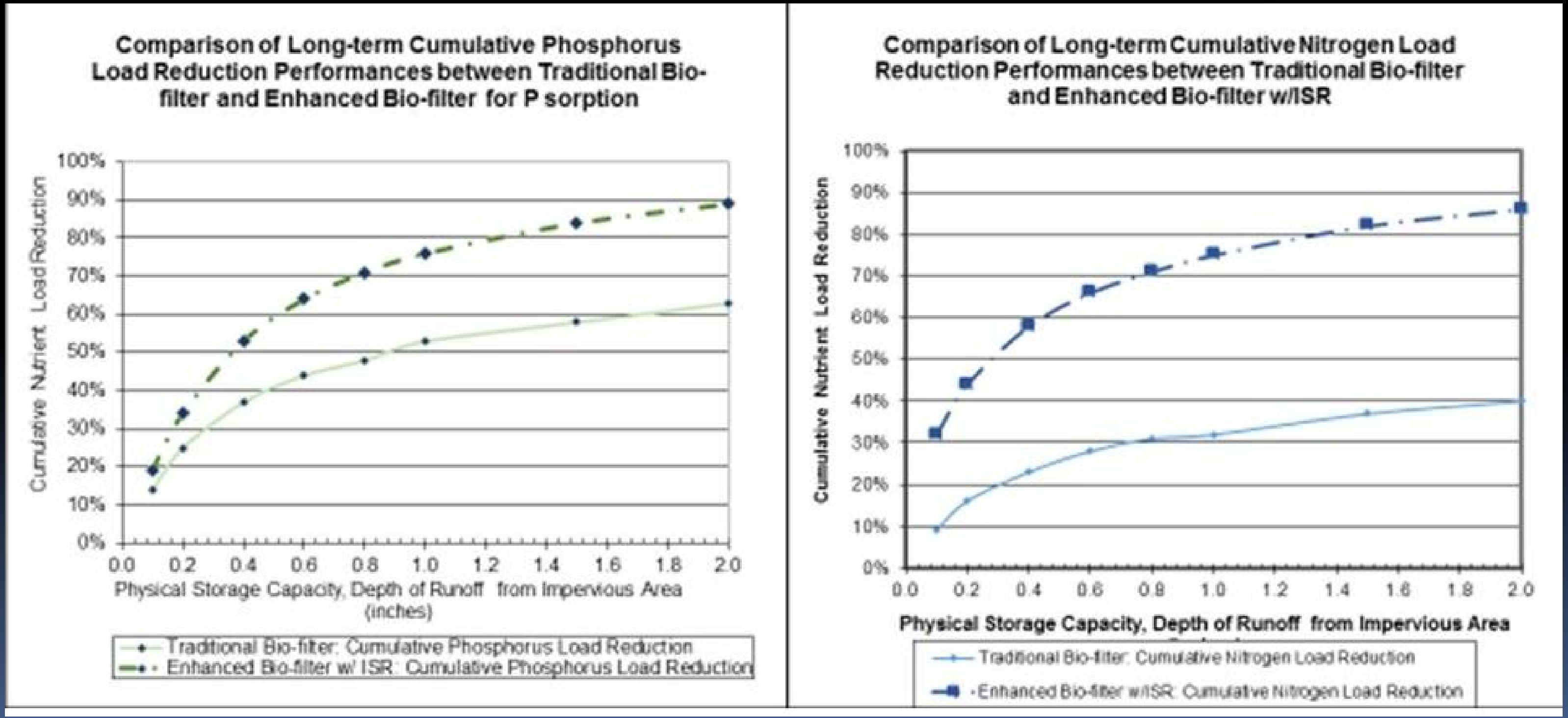
Rhode Island DOT Consent Decree: Quantitative Targets for Stormwater Control

Andrew Spejewski,
Water Enforcement
EPA Region I

February 20, 2018

National Stormwater Roundtable,
Atlanta GA

Or,
How I Learned to Stop Worrying and Love the "Curves"

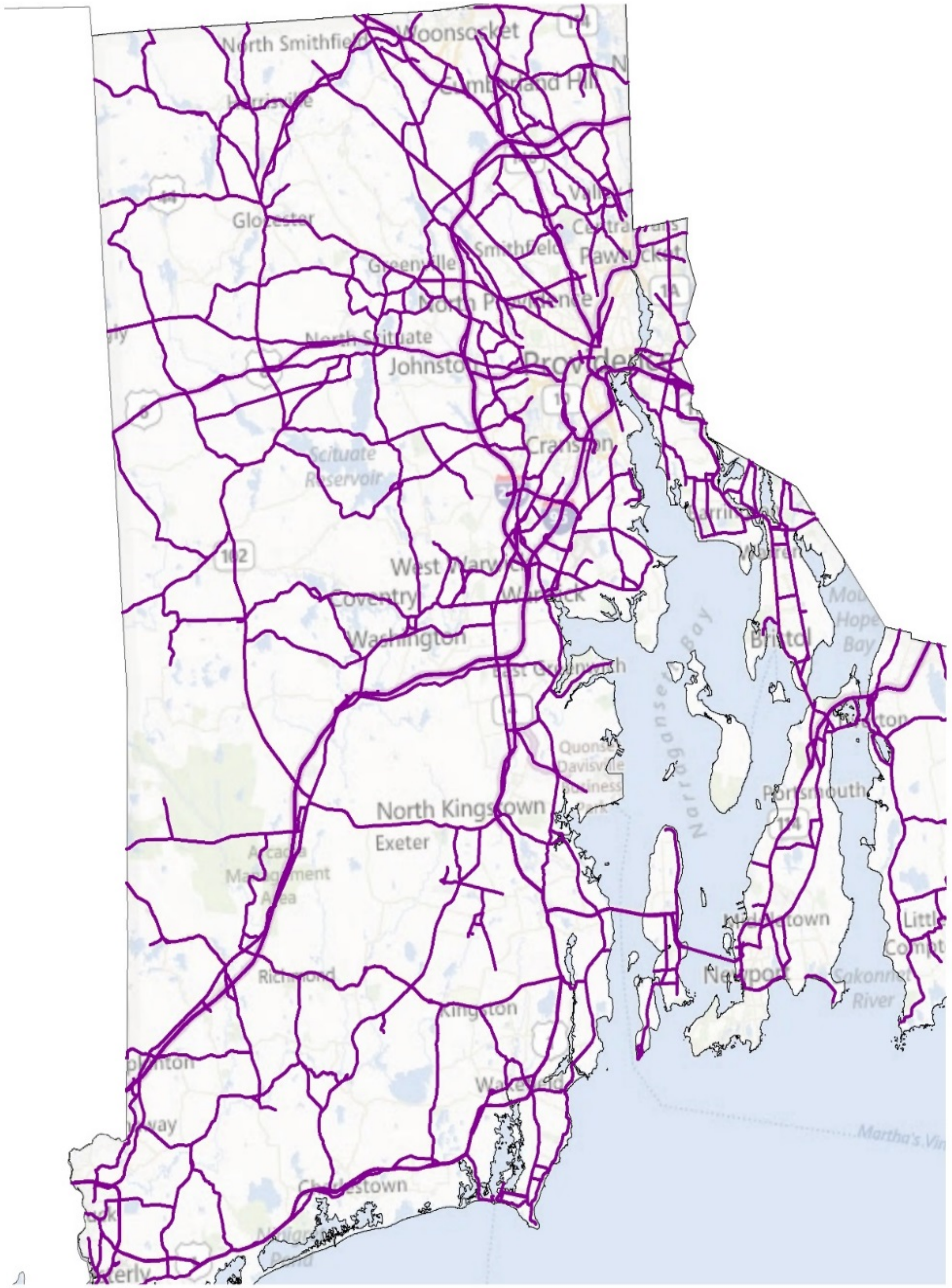


Rhode Island Department of Transportation

Significant urban presence

3,300 Lane-Miles
About 1/3 divided highway
2/3 within permit area

Roughly same MS4 permit area as Maine, Vermont, and New Hampshire combined

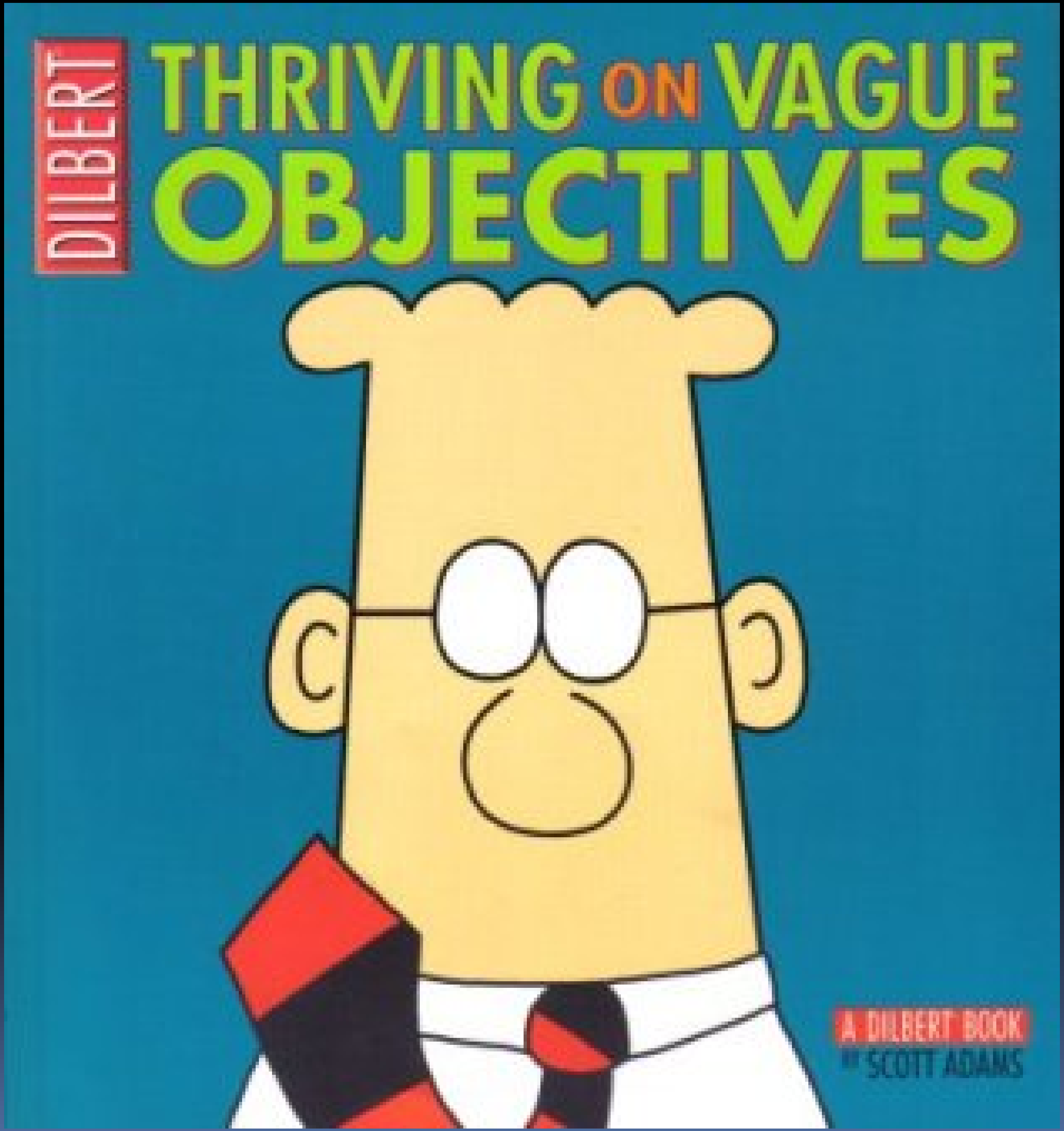


EPA Case against RI DOT

- Original inspection in early 2011, looking at municipal stormwater (MS4) permit. Information requests in 2012 and 2013.
- Violations in street sweeping/cleaning, outfall investigations, and impaired waters/TMDLs.
- Referred to DOJ for Civil Enforcement in 2013.
- Initial negotiation letter sent May 2014. Negotiations included DOJ, EPA, RI DEM, RI DOT.
- Consent Decree signed and lodged in late 2015
- First Stormwater Control Plans submitted in Dec 2016 – will be resubmitted in 2018;
- Second Stormwater Control Plans submitted in Dec 2017 – EPA reviewing

RIDOT Consent Decree

- Consent Decree is the first in the country to require a DOT to implement stormwater controls to comply with pollutant load reductions required by TMDLs.
- Penalty for past violations of $315,000
- Remedial measures in the Decree will cost RIDOT approximately $200 million over 20 years – about $100 million in stormwater retrofits
- Decree serving as template for RIDEM MS4 enforcement.


DILBERT
THRIVING ON VAGUE
OBJECTIVES
A DILBERT BOOK
BY SCOTT ADAMS

RI DOT stormwater permit

- [for discharges to impaired waters] "If a TMDL has not been approved, the [Stormwater Plan] must include a description of the BMPs that will be used to <u>control the pollutant(s) of concern</u>, to the maximum extent practicable."

- [If TMDL] "The BMPs must be tailored to <u>address the pollutant(s) of concern and findings of the TMDL</u> or other water quality determination by Department."


Can You Stay For Dinner

Questions to answer:

- What pollutant reduction is required?
- How much reduction do existing/proposed controls provide?

Goals for Impaired Waters Program in CD

- Meet TMDL targets, and take concrete steps to improve impaired waters
- Quantitative, enforceable targets
- Simple models for evaluating compliance, easy to understand and evaluate – saving RIDOT and EPA resources
- Flexibility in choosing controls, allow efficient smaller controls – again best use of RIDOT resources
- Encourage infiltration, “Green Infrastructure” as much as possible

TMDLs

TMDLs provide a percentage reduction, either overall or more specific

Table 5.3 Loading Capacity and Allocation of Allowable Loading.

Current Load (kg/yr)	TMDL (kg/yr)	10% MOS (kg/yr)	TMDL * (kg/yr)	Required Load Reduction (kg/yr)	Required Loading Reduction (% Present Value)
1374	217	22	195	1179	86

Percentage reduction required as a total over entire sub-watershed; any combination of controls

Impervious Cover Standard for areas without TMDL limits (and bacteria TMDL areas)

- Sets overall sub-watershed target of 10% impervious cover
- RIDOT must ‘mitigate’ part of its roads, depending on percentage IC in sub-watershed as a whole
- ‘Mitigating’ measured with pollutants (using phosphorous as surrogate for all pollutants), runoff volume (infiltration) and peak flow– curves used for modeling
- Treatment totaled over entire sub-watershed – treating lots of area slightly is equivalent to treating small area completely


ARE WE THERE YET !?!
MATT GROENING

Option 1: Specified sized controls

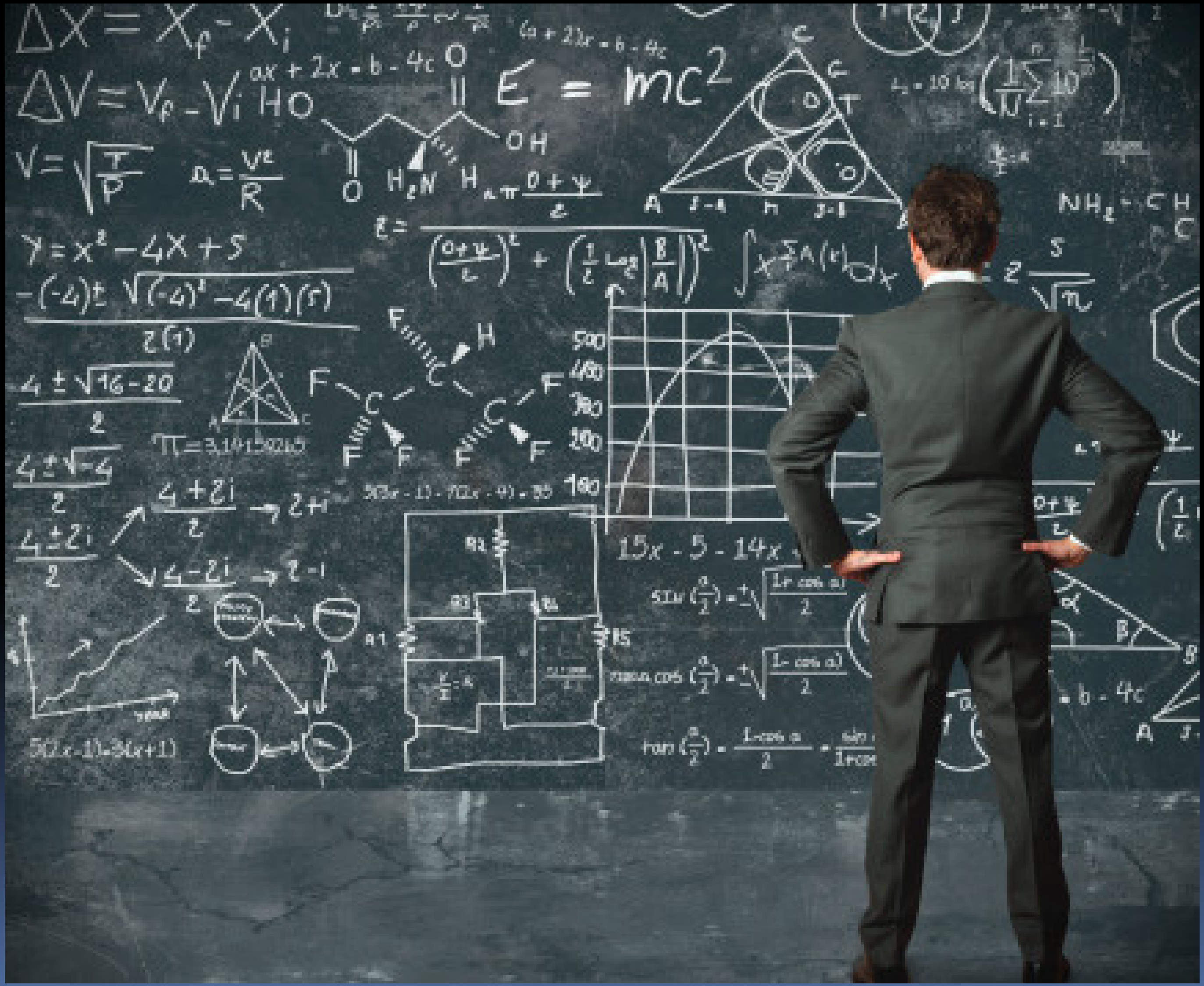
E.g. “Treat 1” of runoff from ½ of impervious cover”

Often found in state Stormwater Manuals/requirements

No relation to actual pollutant reduction – may spend $ unnecessarily

Inefficient (forces fewer, larger, controls)

Option 2: Hydrologic Models (SWMM, etc.)




THE UNITED STATES OF AMERICA
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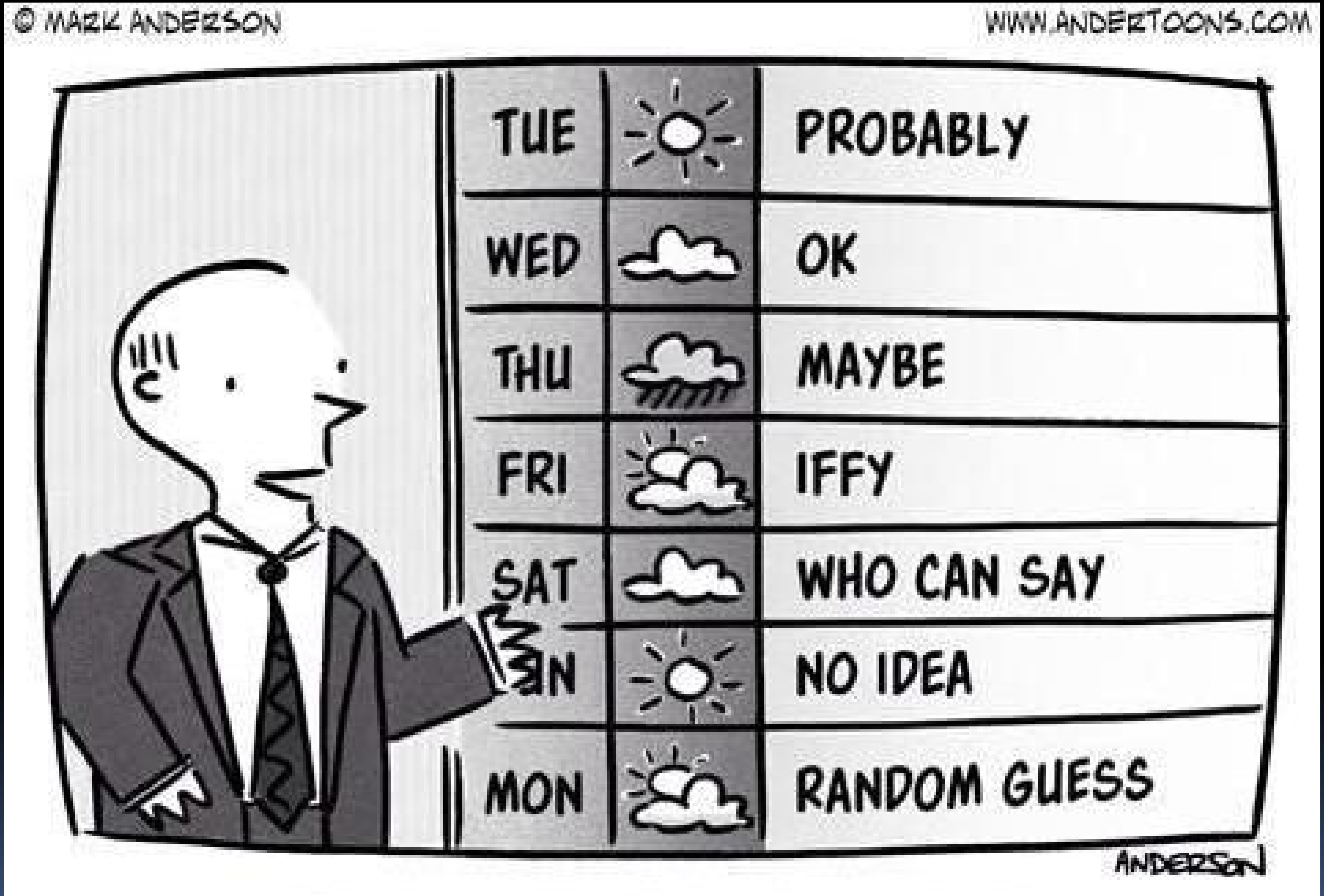
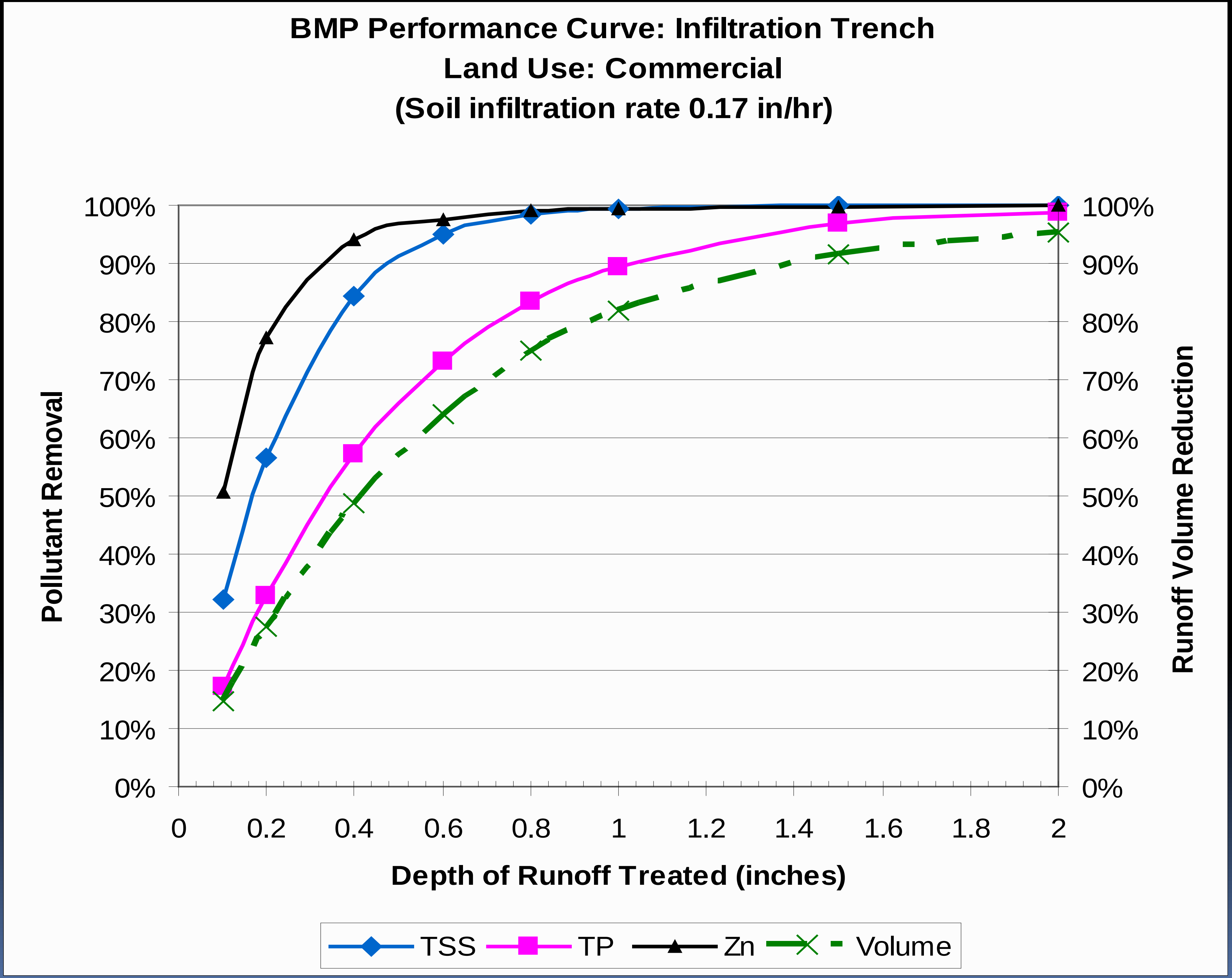
WASHINGTON, D.C.
STATES OF AMERICA
D 68203056 K
TWENTY DOLLARS



"And now the 7-day forecast..."

Region 1 “curves” modeling

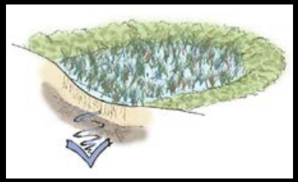
- Based on insight that very simple model is accurate enough for stormwater; typical year’s climate can be incorporated into model
- Requires only on type of control and volume of control divided by area treated (depth of treatment)
- Gives pollutant removal, infiltration (for typical year)
- Models calibrated at UNH, with actual NE rainfall data

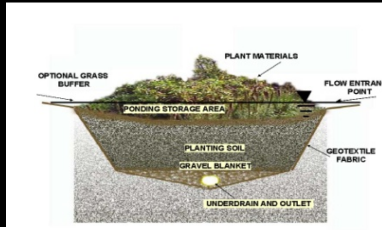


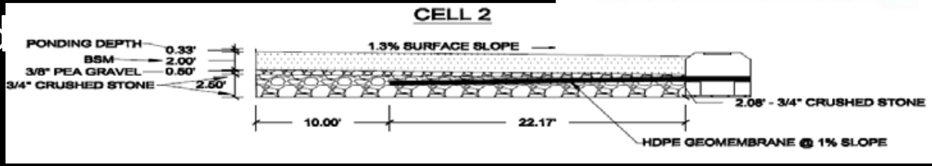
BMP Performance Curve: Infiltration Trench
Land Use: Commercial
(Soil infiltration rate 0.17 in/hr)
Pollutant Removal
Runoff Volume Reduction
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
0
0.2
0.4
0.6
0.8
1
1.2
1.4
1.6
1.8
2
Depth of Runoff Treated (inches)
TSS
TP
Zn
Volume

SW Control Types with Performance Curves

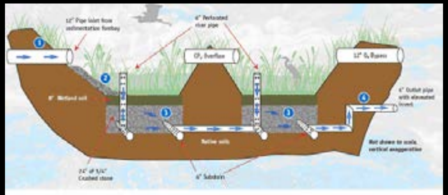
Pollutants: TP, TN, TSS, Zn



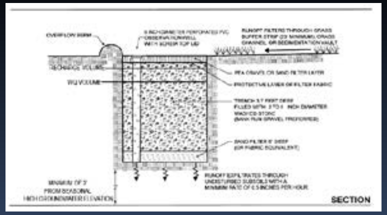




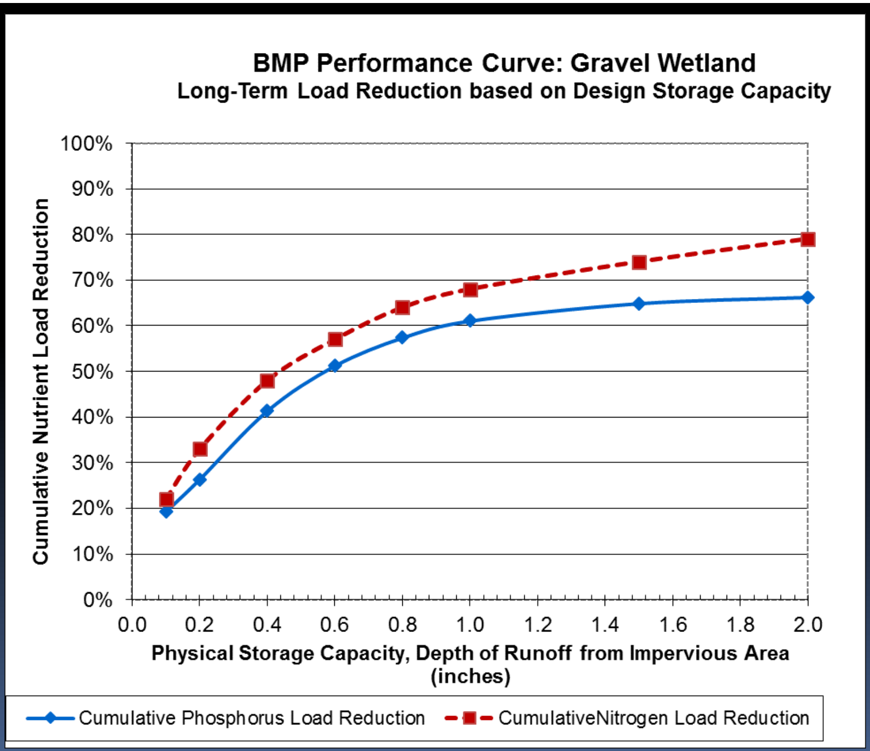
1. Bio-filtration(currently using Chesapeake Bay curves for P and N)
2. Enhanced Bio-filtration w/ Internal Storage Reservoir (ISR) (enhanced for P sorption and N control)*
3. Dry Pond(currently using Chesapeake Bay curves for N)
4. Grass Swale w/detention (currently using Chesapeake Bay curves for N)



5. Gravel Wetland
6. Infiltration Basin, Rain Gardens, Bioretention*
7. Infiltration Chambers

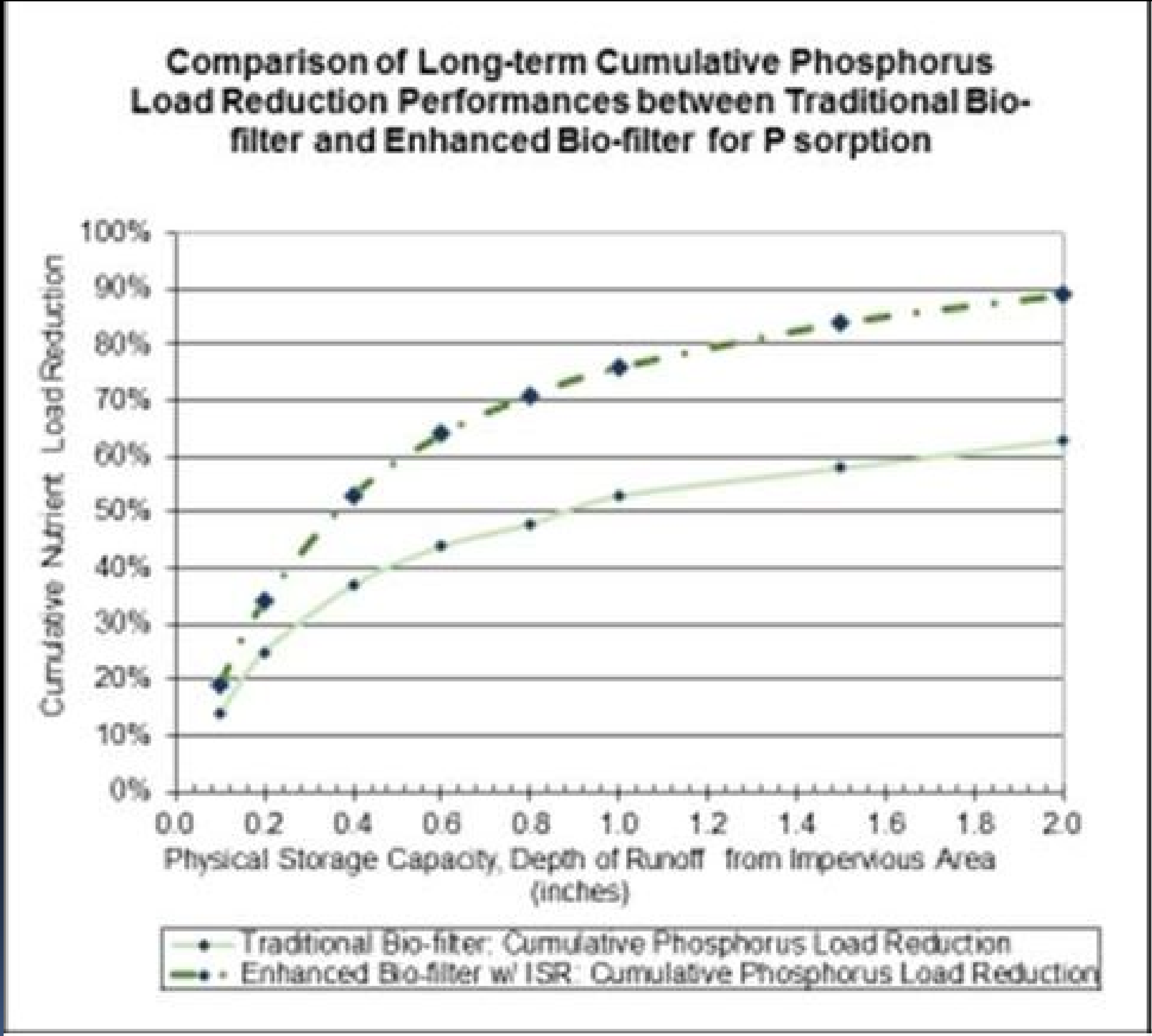


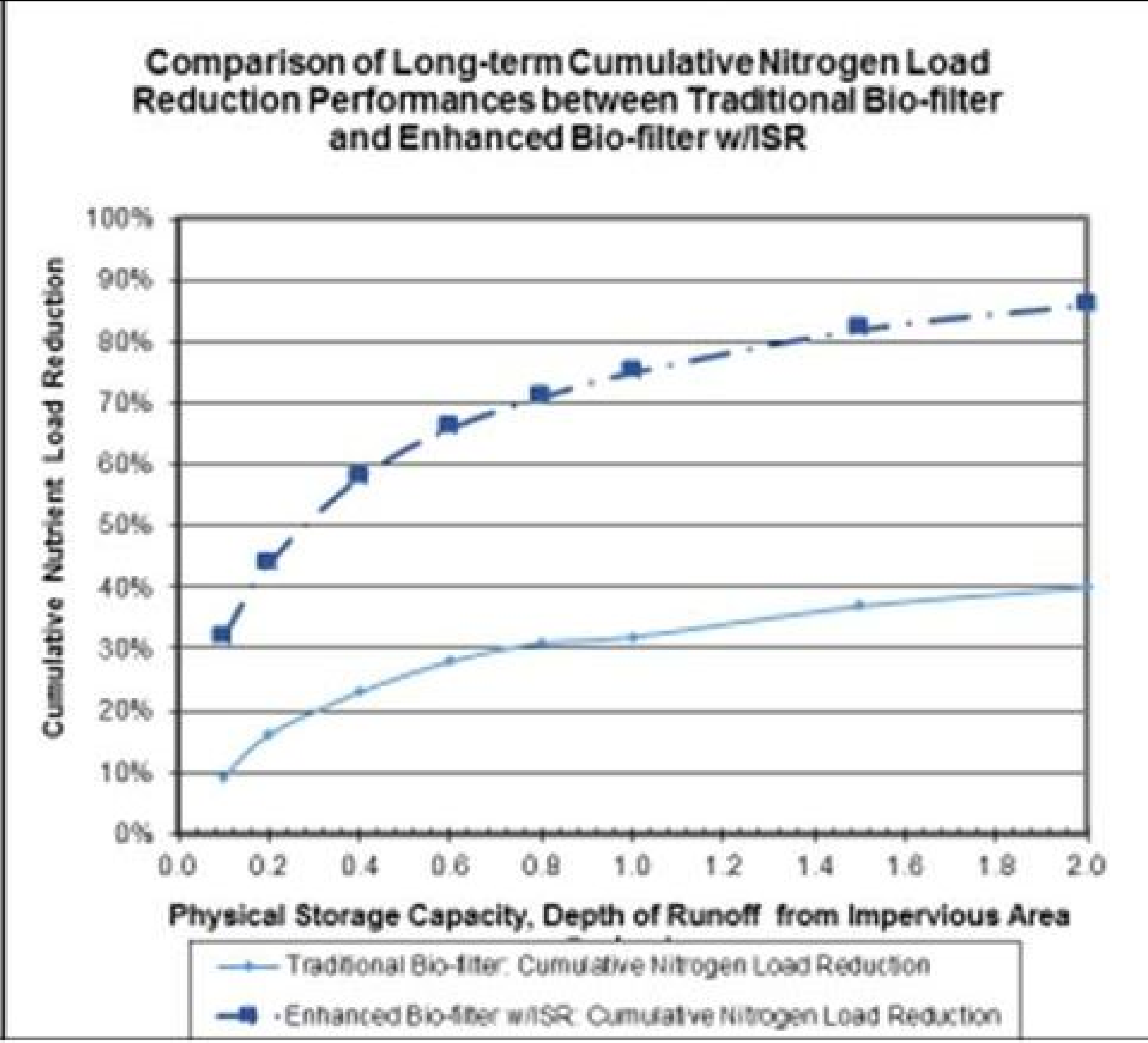
8. Infiltration Trench
9. Porous Pavement
10. Sand Filter (currently using Chesapeake Bay curves for P and N)
11. Wet Pond (currently using Chesapeake Bay curves for P and N)



Benefits of "curves"

- Easy to calculate and understand – no deep expertise needed.
  - Allows consistency across organizations and consultants
- Doesn't need lots of data (no hydraulic model)
- Flexible – goals can be met anywhere in watershed
- Quick – allows many comparisons, 'what if's
- Can be easily updated/modified
  - For different climates
  - To add new types of controls


Comparison of Long-term Cumulative Phosphorus Load Reduction Performances between Traditional Bio-filter and Enhanced Bio-filter for P sorption
Cumulative Nutrient Load Reduction
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
1.6
1.8
2.0
Physical Storage Capacity, Depth of Runoff from Impervious Area (inches)
Traditional Bio-filter: Cumulative Phosphorus Load Reduction
Enhanced Bio-filter w/ ISR: Cumulative Phosphorus Load Reduction


Comparison of Long-term Cumulative Nitrogen Load Reduction Performances between Traditional Bio-filter and Enhanced Bio-filter w/ISR
Cumulative Nutrient Load Reduction
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
1.6
1.8
2.0
Physical Storage Capacity, Depth of Runoff from Impervious Area
Traditional Bio-filter: Cumulative Nitrogen Load Reduction
Enhanced Bio-filter w/ISR: Cumulative Nitrogen Load Reduction


Maryland State Highway Administration

Maryland State Highway Administration


Maryland State Highway Administration

Lessons learned (so far)

- CAN put quantitative requirements for SW controls
- Using common framework pays off
- Beware of interactions with state SW manuals, other regs
- If possible, start in simplest/easiest areas
- Still to see how maintenance works

Credits:

- Mark Voorhees, EPA Region I, water permits
- Kevin Pechulis, EPA Region I Attorney
- Eric Beck, Elizabeth Scott, Rhode Island Department of Environmental Management

Questions?