



Stormwater – the science and regulatory background

How Does Development Affect Water Resources?



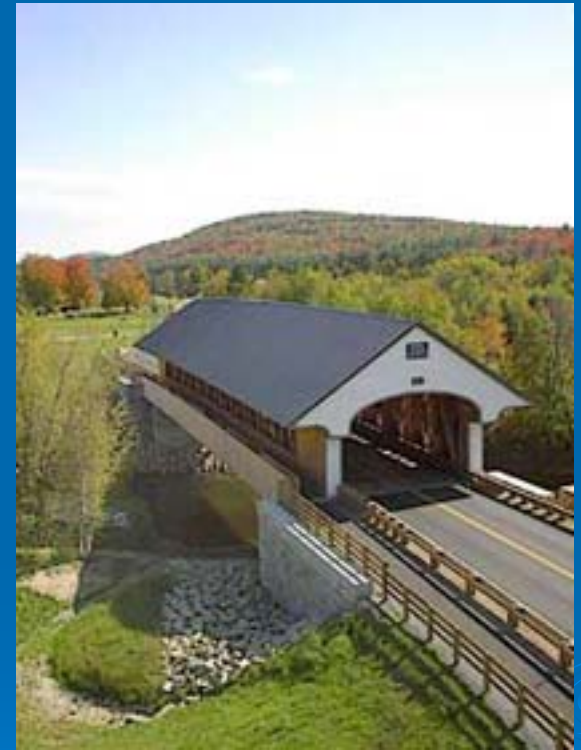
Disturbs natural cover

Replaces natural cover with grass and manmade surfaces

Disturbance of Natural Cover

During construction, removal of vegetation, root systems, and topsoil **compromises the ability of vegetation to:**

- **stabilize soil**
- **reduce velocity of runoff,**
- **shield the surface from rain, and**
- **maintain the soil's ability to absorb water**



Plymouth, NH

Types of Water Induced Erosion

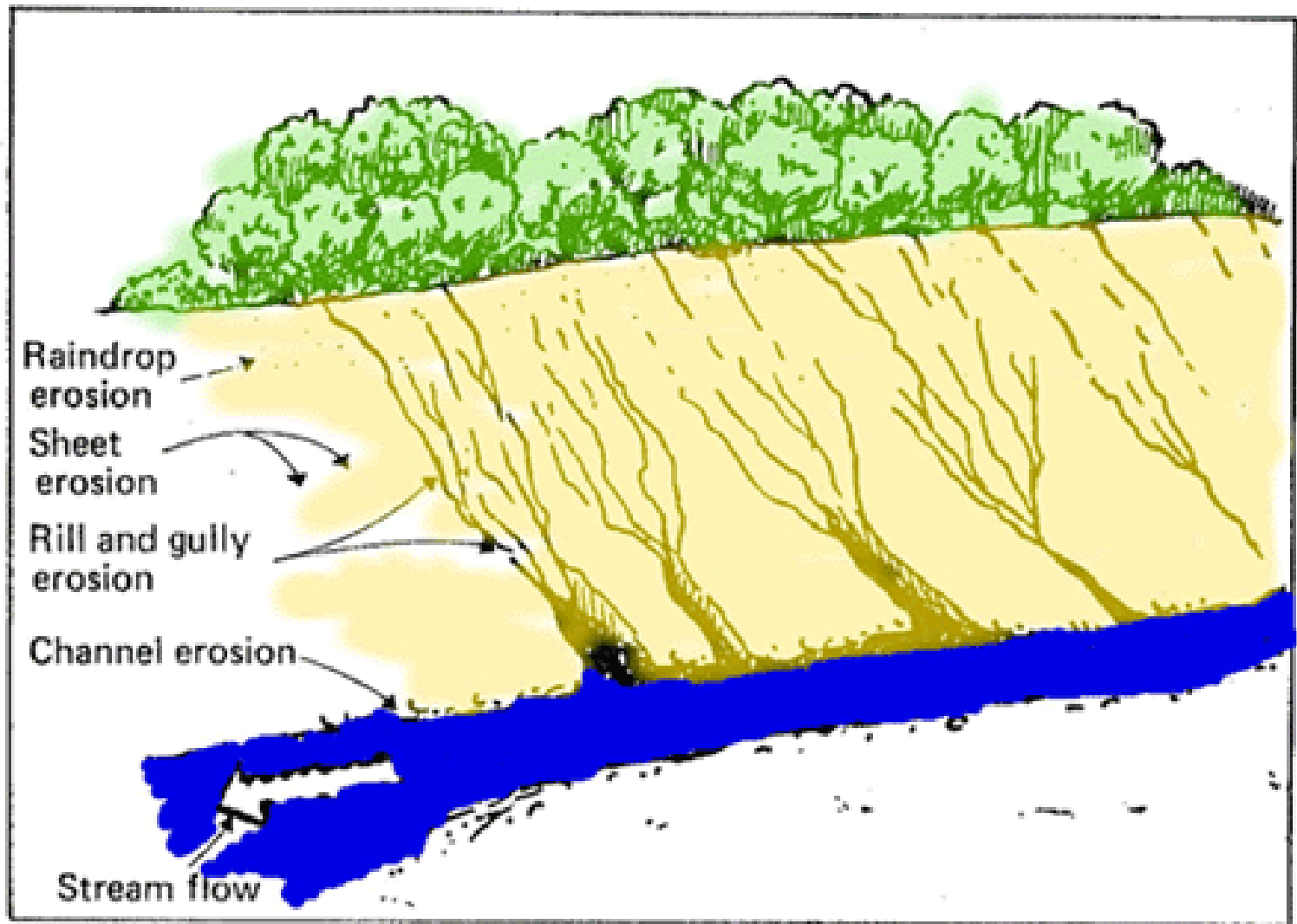


Fig. 1.3 Types of erosion. (Adapted from 1)

Developed Surfaces Change Where Water Flows



= Alteration of existing drainage patterns



**Greater Stormwater
Runoff Increases to
Flooding Risks and
Streambank Erosion and
Reduces Groundwater
Recharge**

Streambank erosion

Alters aquatic habitats and aquatic species' life cycle events by increasing turbidity, changing water temperature, and changing the depth of water bodies.



Destabilization of steep slopes

Potential Problem Areas Steep Slopes



Reduced potential for groundwater recharge

due to coverage by impervious surfaces

or drainage control methods that take stormwater off-site



Increases Pollution of Water Resources



Polluted Runoff is the #1 Water Quality Problem in the U.S.*

* USEPA

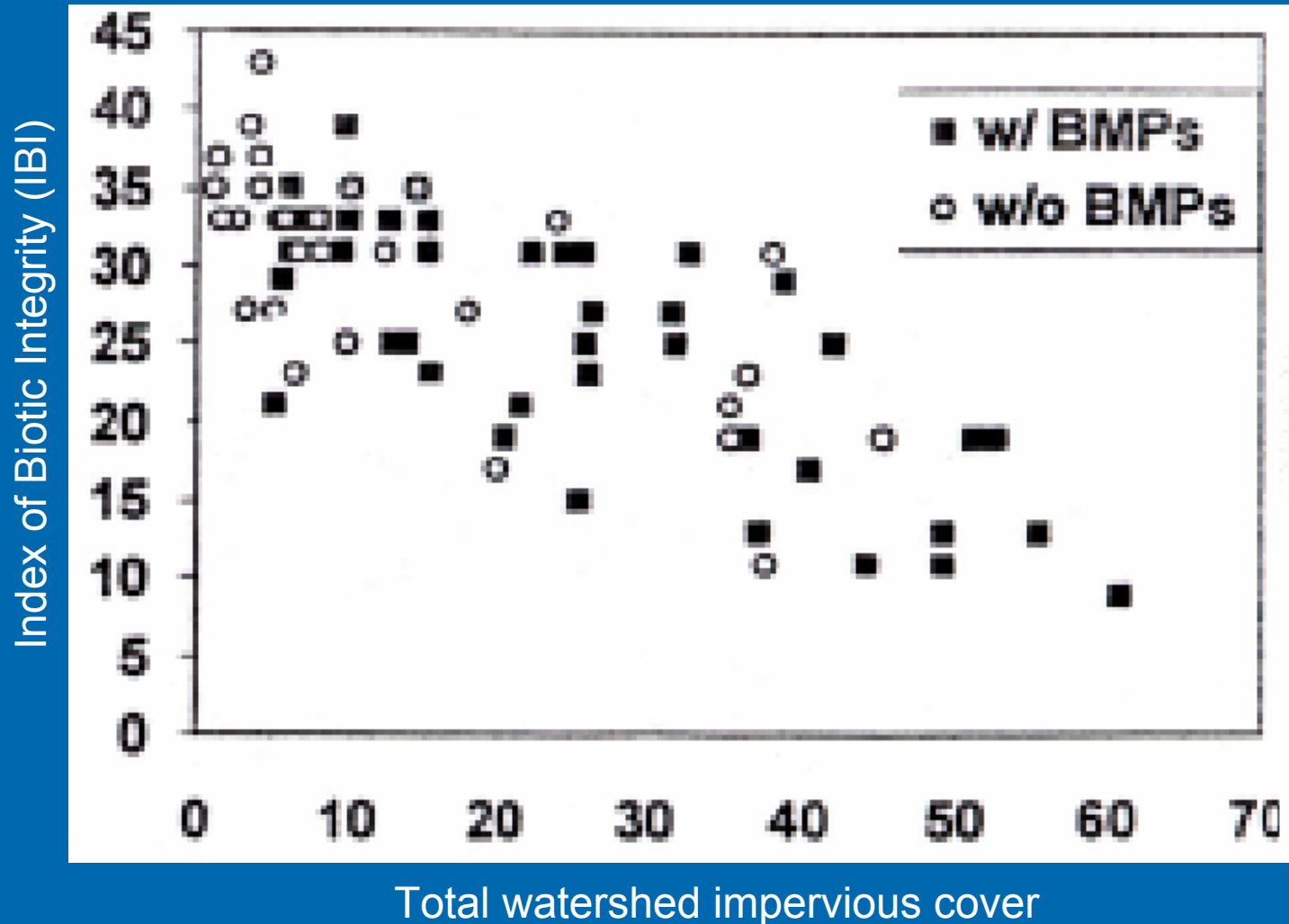
Runoff of chemicals and nutrients into water supplies

Nutrient runoff in Chesapeake, Va.

Nitrogen and phosphorous concentrations can result in accelerated eutrophication and the proliferation of non-native aquatic plant species.

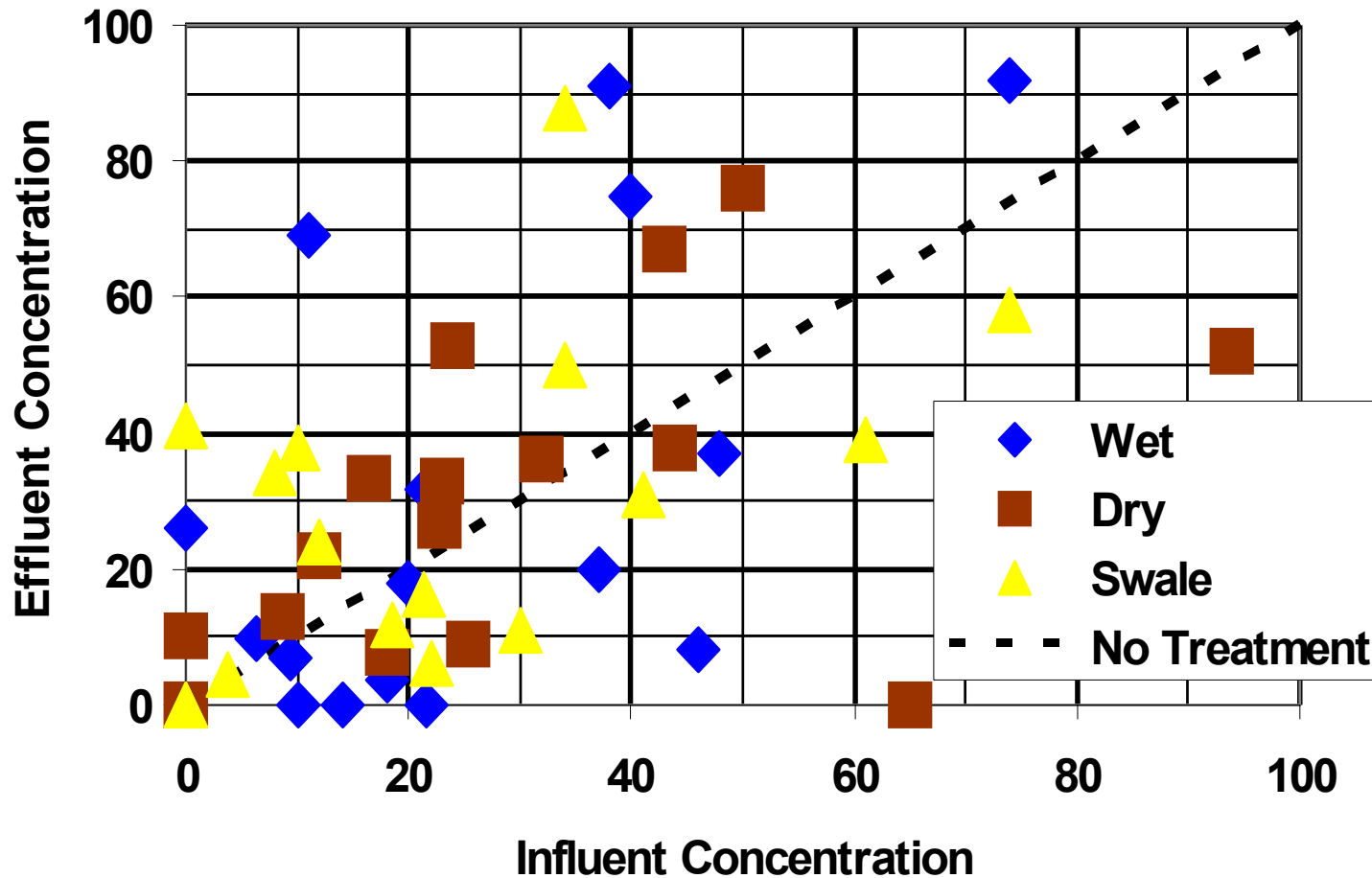


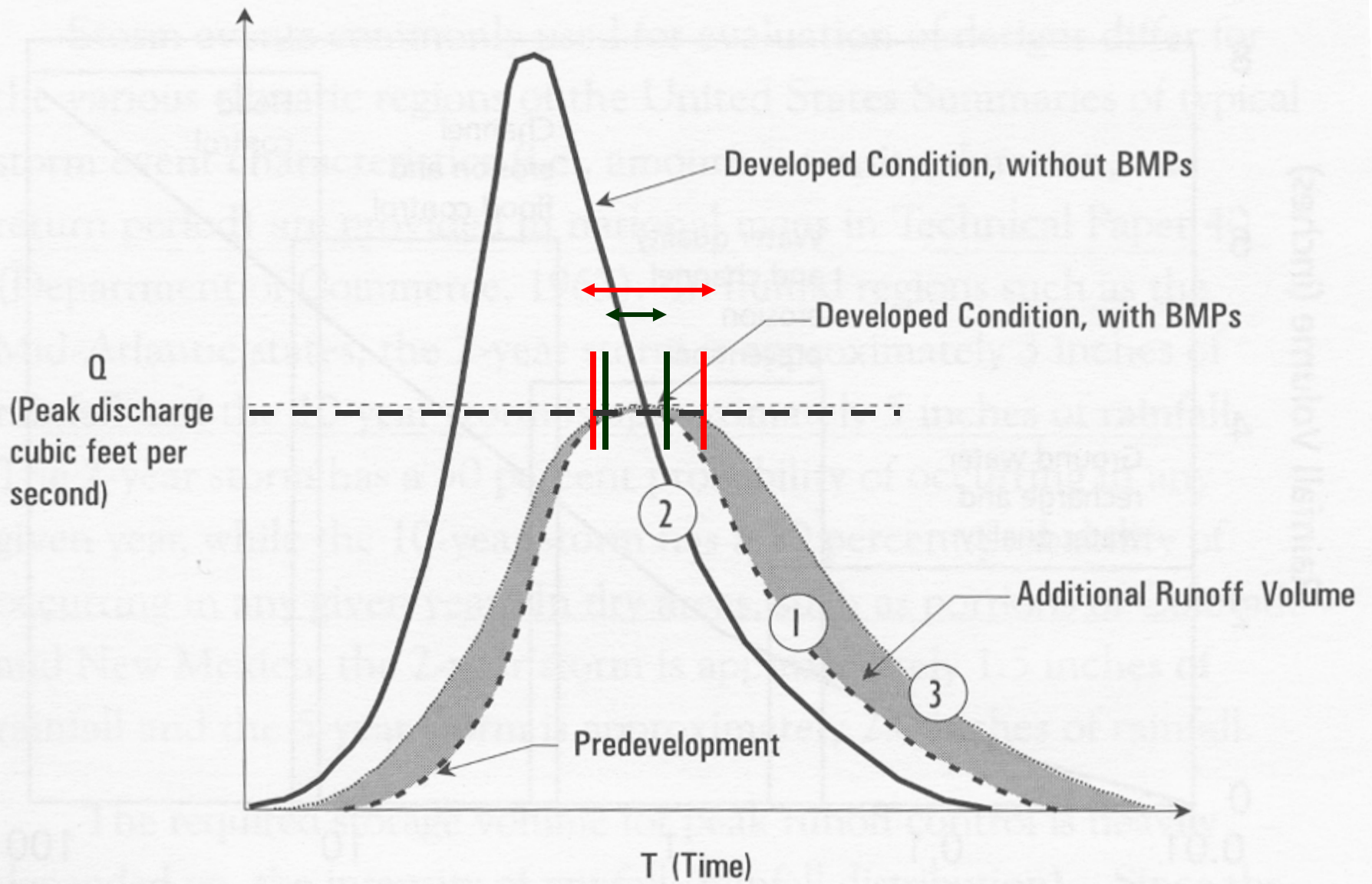
Waterway Health & Imperviousness



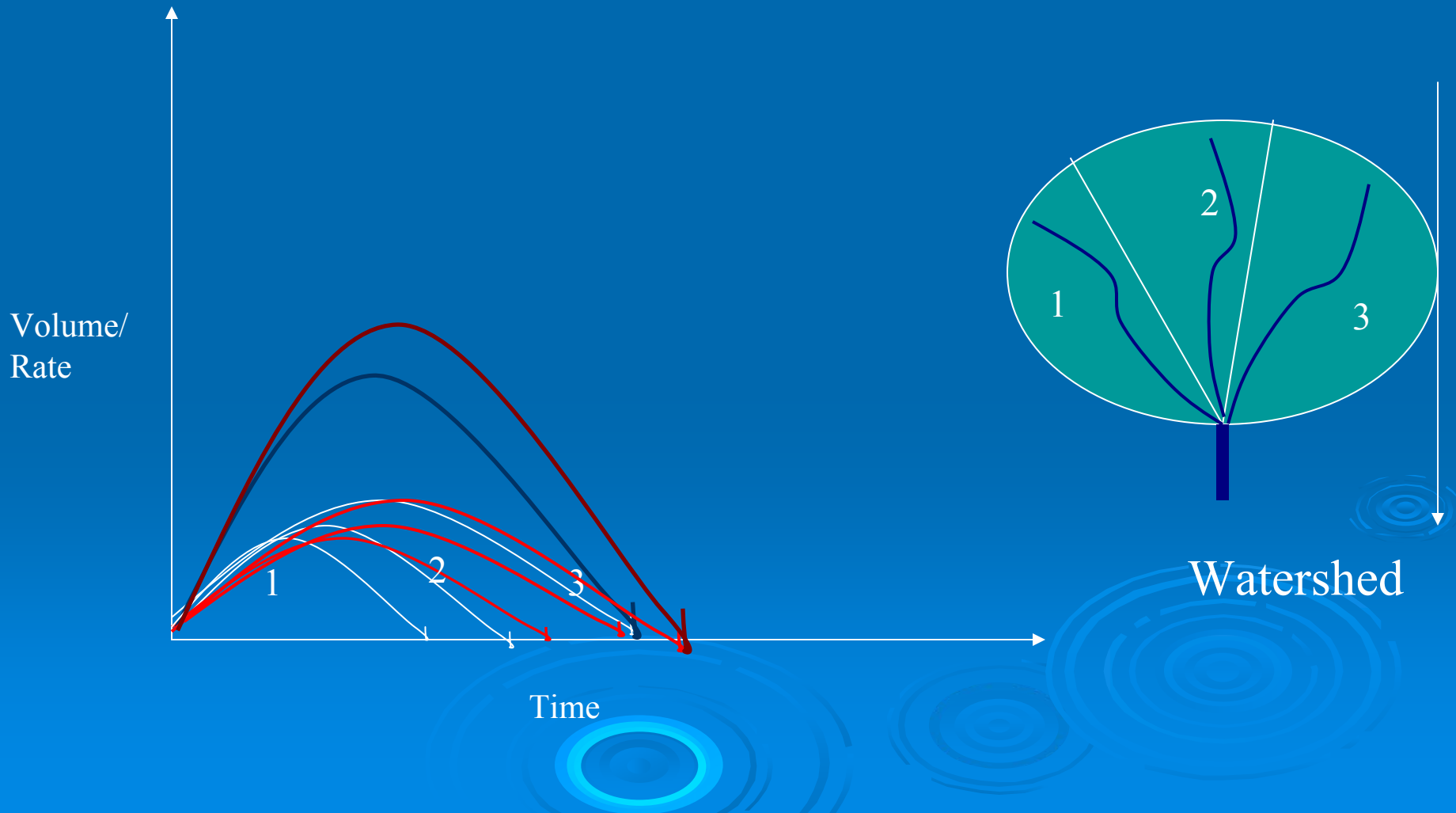
Conventional Stormwater Treatment Is Not Working!

Sediment Data (TS, TSS, VSS)





Cumulative Effect of Increased Volume of Stormwater Runoff




Regulatory Framework: Federal, State and Local

- Need to understand what is addressed by each level of regulation –
- Still need local regulation as backstop for Fed/State, authority for local enforcement, and to address smaller-scale disturbances (control cumulative impacts)

Federal Stormwater Management Program

National Pollutant Discharge Elimination System (NPDES) Permits

- **Municipal Separate Storm Sewer System General Permit (MS4's)**
 - **Construction General Permit**
 - **Multi-Sector General Permit**
- 

Authority



- Federal law requires small MS4 operators to **develop, implement, and enforce a program to reduce pollutants** in any storm water runoff **from construction activities** that result in a land disturbance of **greater than or equal to one acre,**
- **or less than one acre, if part of a common plan** that would disturb one acre or more.

State Stormwater Management Programs

- Alteration of Terrain Permit – Rules Being Updated
 - 100,000 sq ft/50,000 sq ft if in protected shoreland
- 401 Water Quality Certification
- NH Surface Water Quality Regulations
 - Antidegradation – no additional pollutant load
- Technical Guidance
 - Planning for Updated Stormwater Manual
 - Model Local Stormwater Management Ordinance

NH Alteration of Terrain – Proposed Changes

The Alteration of Terrain proposed rules are in draft form and are subject to change.

- **General permit by rule**
- **New application requirements**
- **Drainage reports**
- **New stormwater treatment BMPs**
- **Groundwater recharge**
- **Further Protection**
 - **Water Supply Intake Protection Area**
 - **Groundwater Protection Area**
 - **Water Supply Well Setbacks**
- **Identifying water quality impacts to surface waters**
- **100-year floodplain criteria**