

Restore and Protect: The Case for Riparian Forest Buffers



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Overview

- **Why Riparian Forest Buffers?**
- **Riparian Forest Buffer Guidance**
- **Riparian Buffer Requirements in Chapter 102 – Erosion and Sedimentation Control and Stormwater Management Regulations**
- **Case Studies**

Functions and Benefits of Riparian Forest Buffers (RFBs)

- **Protection and Enhancement of Water Quality**
- **Protection and Enhancement of Aquatic Habitat**
- **Moderation of the Effects of Climate Change**
- **Protection of Channel and Lake Shoreline Stability**
- **Protection and Enhancement of Terrestrial Habitat**
- **Social and Economic Benefits**

Protection and Enhancement of Water Quality by RFBs

- **Filtration of Pollutants in Runoff**
- **Temperature Moderation**
- **Pollutant Processing**



Filtration of Pollutants in Runoff

- **71 % nitrate removal by buffers 85-164 feet wide (Mayer et al. 2007)**
- **> 50% phosphorus removal by buffers (Dorioz et al. 2006)**
- **92% sediment removal (Peterjohn and Correll 1984)**

Pollutant Processing

- RFB ecosystem processes pollutants.
- Leaves of native trees in RFB wash into stream to feed Macroinvertebrates that process pollutants.





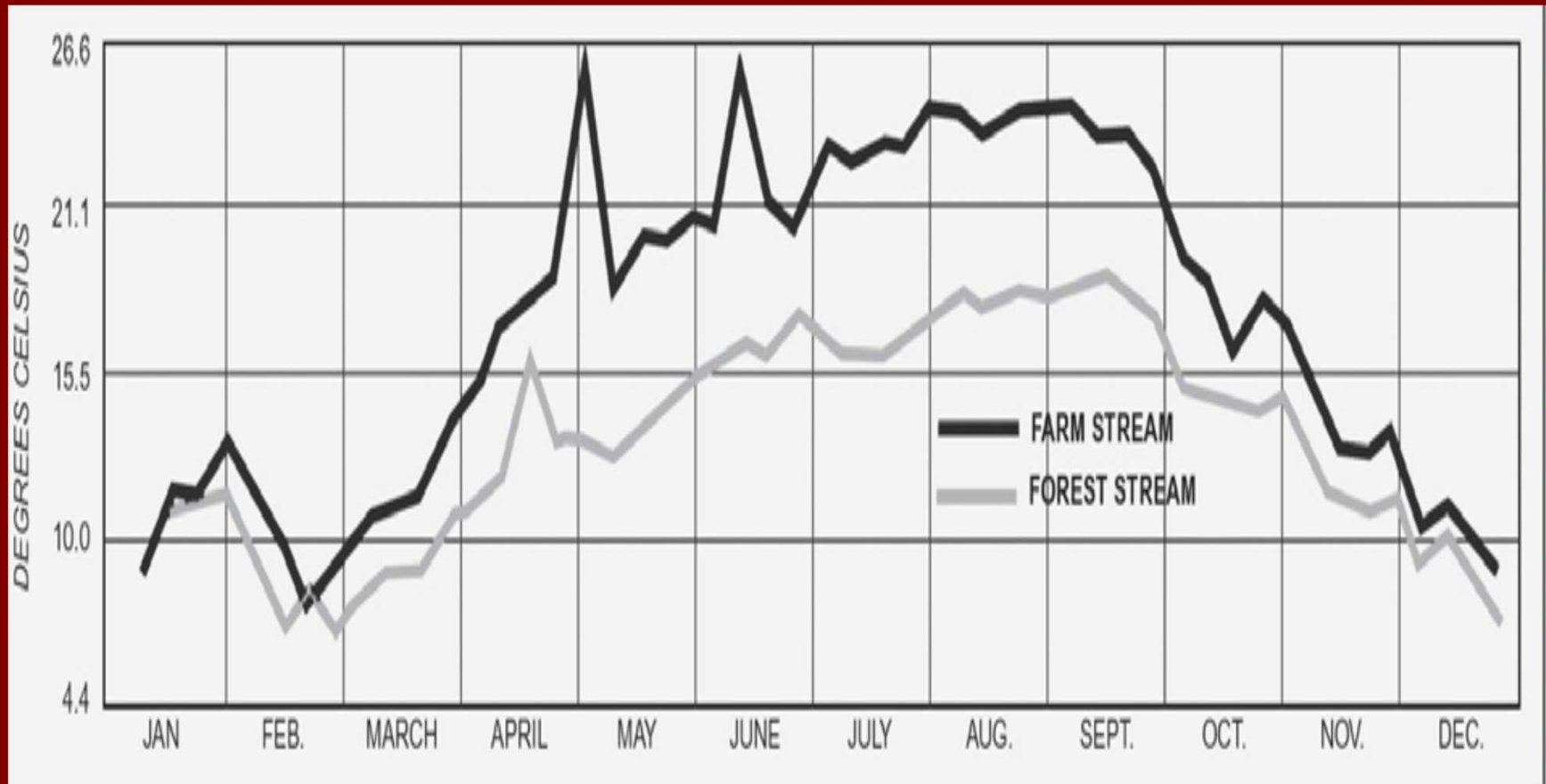




Weekly Maximum Temperature for Farm and Forest Streams

Trout prefer 55° F (13° C) to 65°F (18°C)

<http://www.alliancechesbay.org/pubs/projects/deliverables-145-7-2004.pdf>





Buffers and Trout

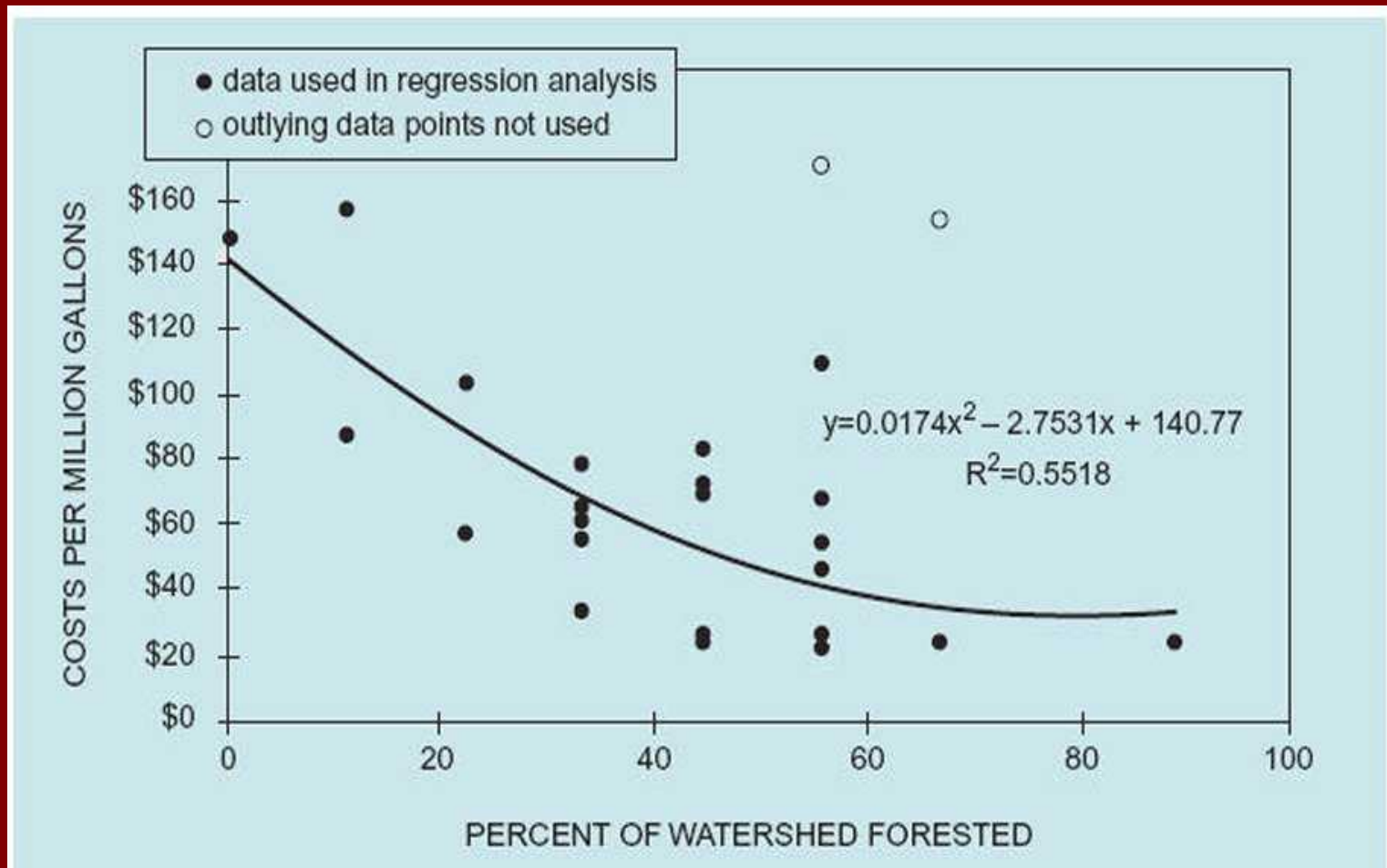
- **2005 study in Georgia-**
If RFB widths decline
from 100 to 50 ft :
 - **Stream temperatures**
increase by 2.9°F to
4.2°F.
 - **Fine sediments in**
riffles increase by
11%.
 - **Biomass of young**
trout reduced by
over 80%.



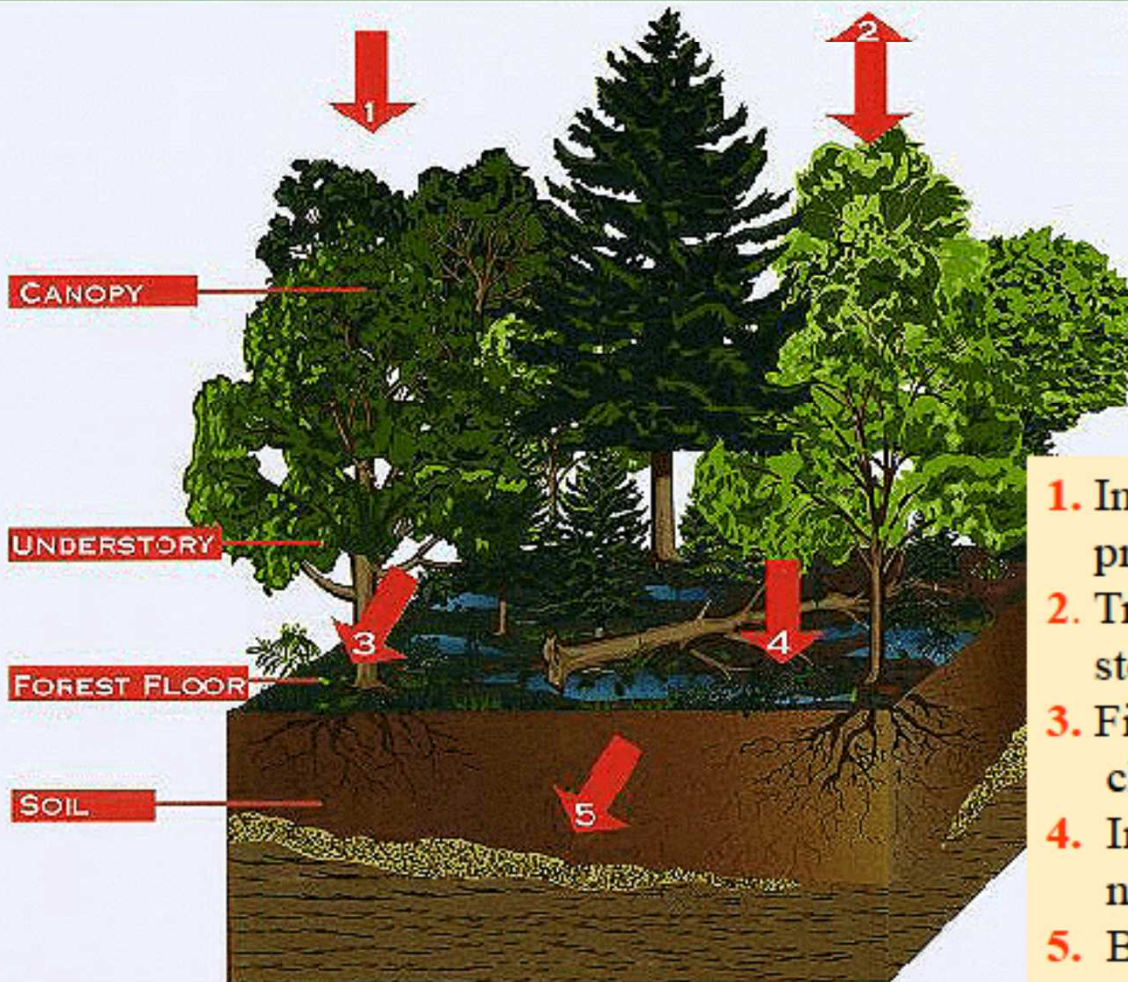


Reduced Cost of Water Treatment

(Trust for Public Land and American Water Works Association, *Protecting the Source*, (2004).)



Buffer Benefits



1. Intercept rainfall , protect soils, provide shade
2. Transpiration, nutrient storage, trap air pollutants.
3. Filter sediment and other chemicals.
4. Infiltration, water and nutrient storage
5. Biological removal of nutrients and pollutants.

DEP's Riparian Forest Buffer Guidance

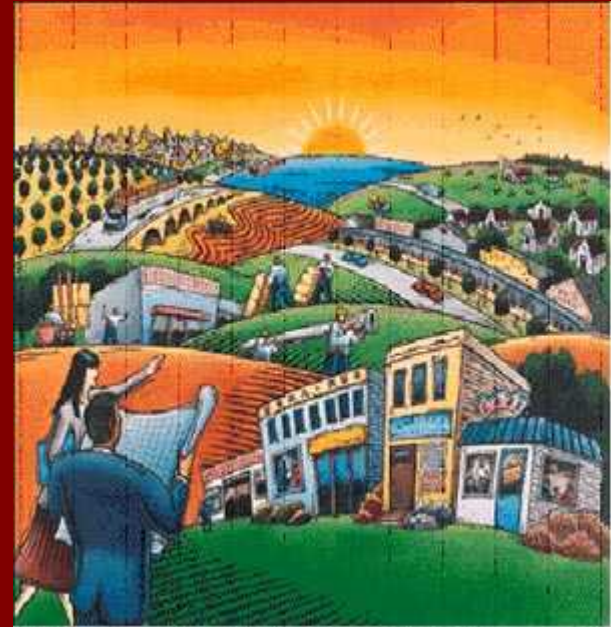
Assist DEP in making
Riparian Forest
Buffer
recommendations
in:

- Regulatory programs
- Voluntary programs
- Grant programs



Purpose of Guidance - continued

Assist outside entities in developing science-based guidelines or policies regarding Riparian Forest Buffers.



Purpose of Guidance - continued



**Tool for
regulated entities
in meeting
regulatory
requirements.**

Definitions - Riparian Buffer

- **Permanent vegetation along surface waters.**
- **Any combination of vegetation types (grasses, forbs, shrubs, trees).**



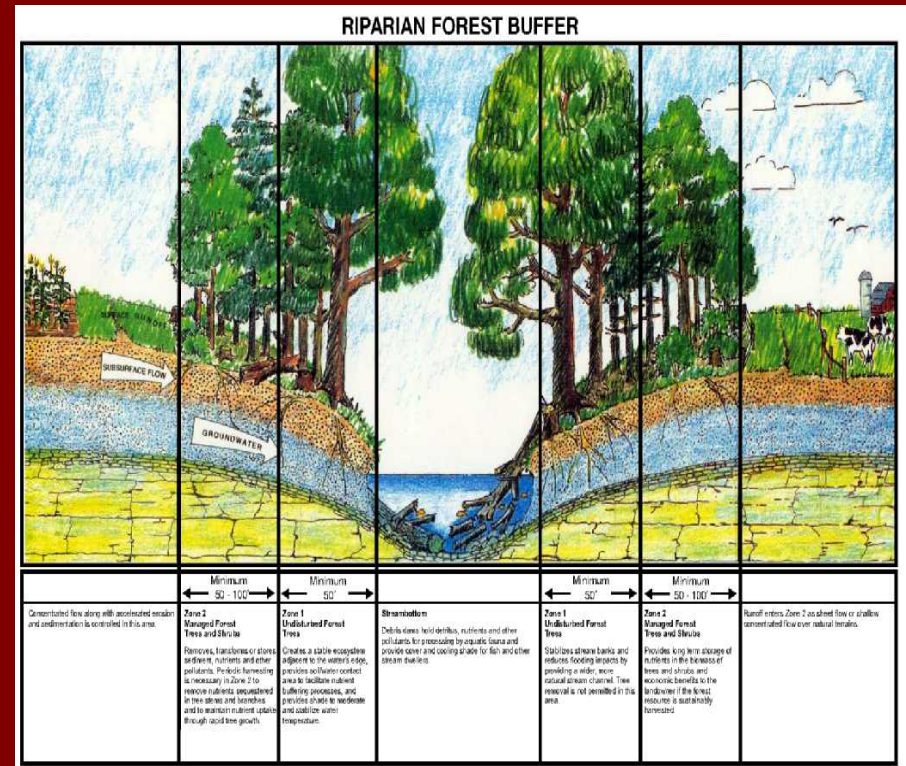
Definitions - Riparian Forest Buffer



- Type of riparian buffer
- Permanent vegetation that is predominantly native trees and shrubs along surface waters
- Maintained in natural state or sustainably managed

Composition of Newly Established Riparian Forest Buffer

- Zone 1 – Undisturbed Forest (Native Trees)
- Zone 2 – Managed Forest (Native Trees and Shrubs)



Composition of Existing Riparian Forest Buffer

- **Predominantly native trees and shrubs.**
- **Provides at least 60 % uniform canopy cover.**
- **Noxious weeds and invasive species removed or controlled to extent possible.**



Average Minimum Width

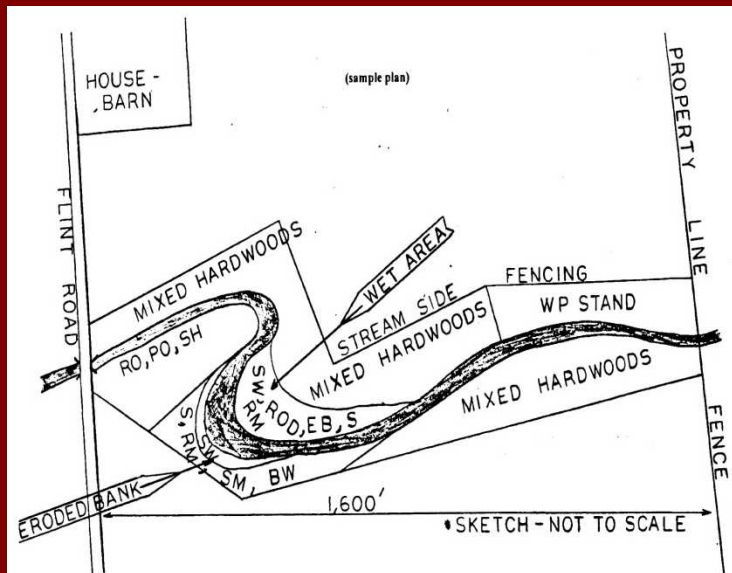
Special Protection (High Quality and Exceptional Value) waters

- Total of 150 feet.**
- 50 feet Zone 1 and 100 feet Zone 2 in newly planted RFBs.**

Non Special Protection waters

- Total of 100 feet.**
- 50 feet Zone 1 and 50 feet zone 2 in newly planted RFBs.**

Riparian Forest Buffer Management Plan Overview



Tree/Shrub	Number	Symbol	Tree/Shrub	Number	Symbol
White Pine	60	WP	Red Oak	150	RO
Pin Oak	170	PO	White Ash	180	WA
Red Maple	140	RM	Silver Maple	70	SM
Sycamore	100	S	Black Willow	100	BW
Shagbark Hickory	60	SH	Sandbar Willow	150	SW
Red-osier Dogwood	170	ROD	Elderberry	150	EB

Spacing: All hardwood and shrub species will be planted at a more or less random 8'-10' spacing. Sandbar Willow and Red-osier Dogwood will be planted immediately along the stream in flagged out areas. White Pine will be planted in groupings at a spacing of 8' and a minimum of 15' from any hardwood.

Tree protectors: Use for Red Oak, Pin Oak, White Ash, Red Maple, Silver Maple, Shagbark Hickory

Total number of trees and shrubs to plant: 1500

Number of tree protectors (and wood stakes): 970

Number of people needed to plant: 30 (3 hours of work with each person planting 8-10 trees per hour)

1. Planting plan .
2. Maintenance Schedule .
3. Inspection Schedule.

Sample Planting Recommendations According to Moisture Conditions

- **Very wet**
 - Silver Maple
 - Red Osier Dogwood
- **In Between**
 - Pin Oak
 - Gray dogwood
- **Dry**
 - Sassafras
 - Staghorn sumac



Chapter 102 – Erosion and Sedimentation Control and Stormwater Management Regulations

- Updated in 2010
- Apply to earth disturbance activities
- 1 acre and above need permit
- Below 1 acre – erosion and sedimentation plan



Riparian Forest Buffer = Gold Standard of Best Management Practices

1. Antidegradation presumption.
2. Trading or offsetting credits.
3. Voluntary Riparian Forest Buffer.



Chapter 102 Riparian Buffer Requirements

Project site located in Special Protection (EV or HQ) watershed attaining designated use at the time of application:

- No earth disturbance within 150 of perennial or intermittent river, stream, creek, lake, pond or reservoir.**
- Protect any existing riparian buffer.**

Chapter 102 Riparian Forest Buffer Requirements

Project site located along Special Protection waters failing to attain designated use (Category 4 or 5 of Integrated Water Quality Report) at time of application:

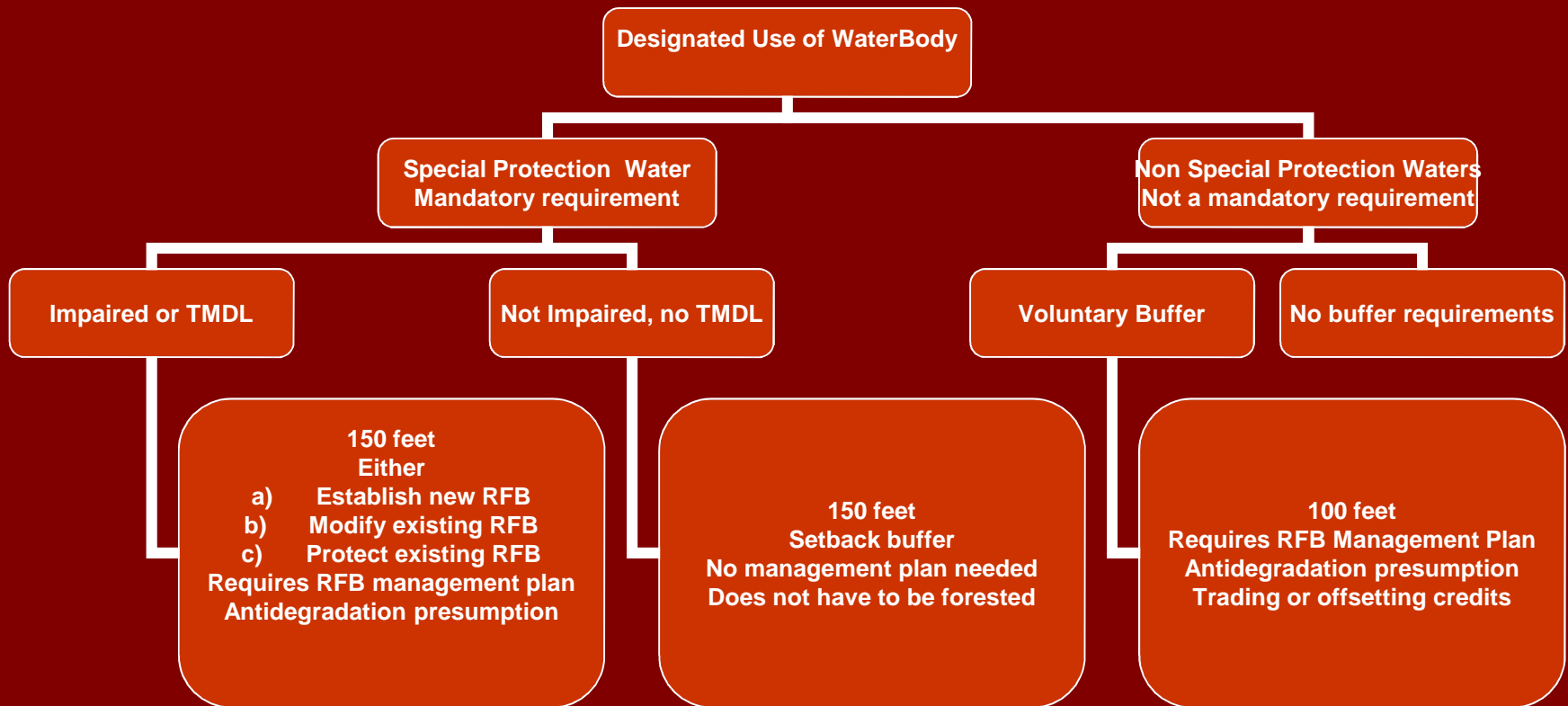
- Protect an existing Riparian Forest Buffer – 150 feet wide.**
- Convert an existing Riparian Buffer to a Riparian Forest Buffer - 150 feet wide.**
- Establish a new Riparian Forest Buffer - 150 feet wide..**

Chapter 102 Mandatory Requirements - All Riparian Buffers

- 1. Ensure that stormwater enters the buffer as sheet flow.**
- 2. Protect in perpetuity.**
- 3. Clearly mark the boundary.**



Chapter 102 Buffer Requirements



Pierceville Run – York County

6.7 square mile agricultural watershed

- **Problem - 2002**
Impaired List of streams for :
 - **Unstable streambanks**
 - **Severe erosion**
 - **Excessive nutrients**
 - **Suspended solids**
- **Solution:**
 - **Stream restoration (Natural Stream Design)**
 - **Riparian Forest Buffer**







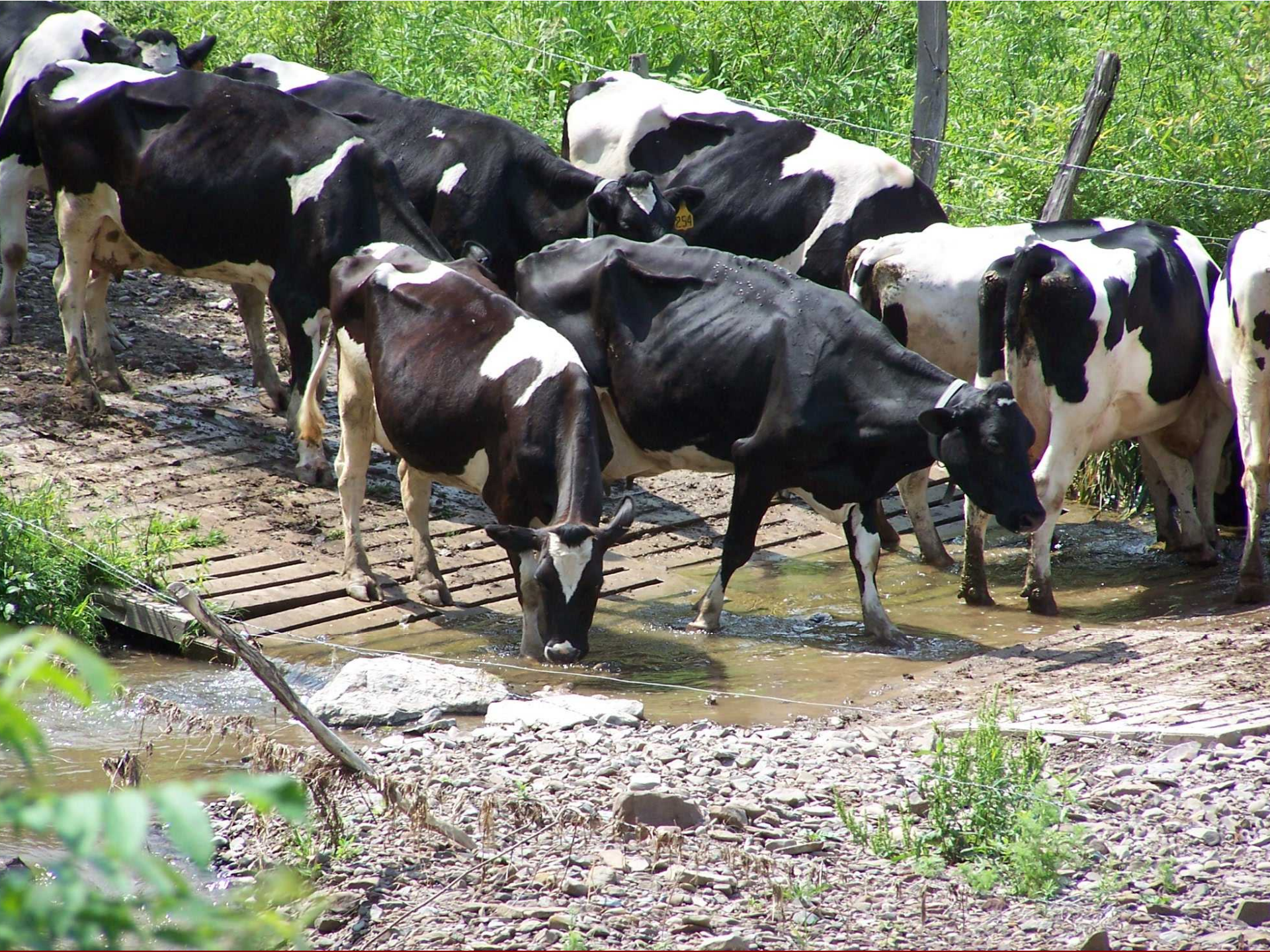




Mill Creek – Bradford County

11 square mile agricultural watershed

- **Problem - Stephen Foster (75 acre)**
Lake impaired :
 - **Excess sedimentation**
 - **Algal blooms**
 - **High Total Suspended Solids**
 - **High Phosphorus**
- **Solution – Best Management Practices in watershed:**
 - **Exclusion fencing**
 - **Natural stream channel design**
 - **Riparian Forest Buffers**

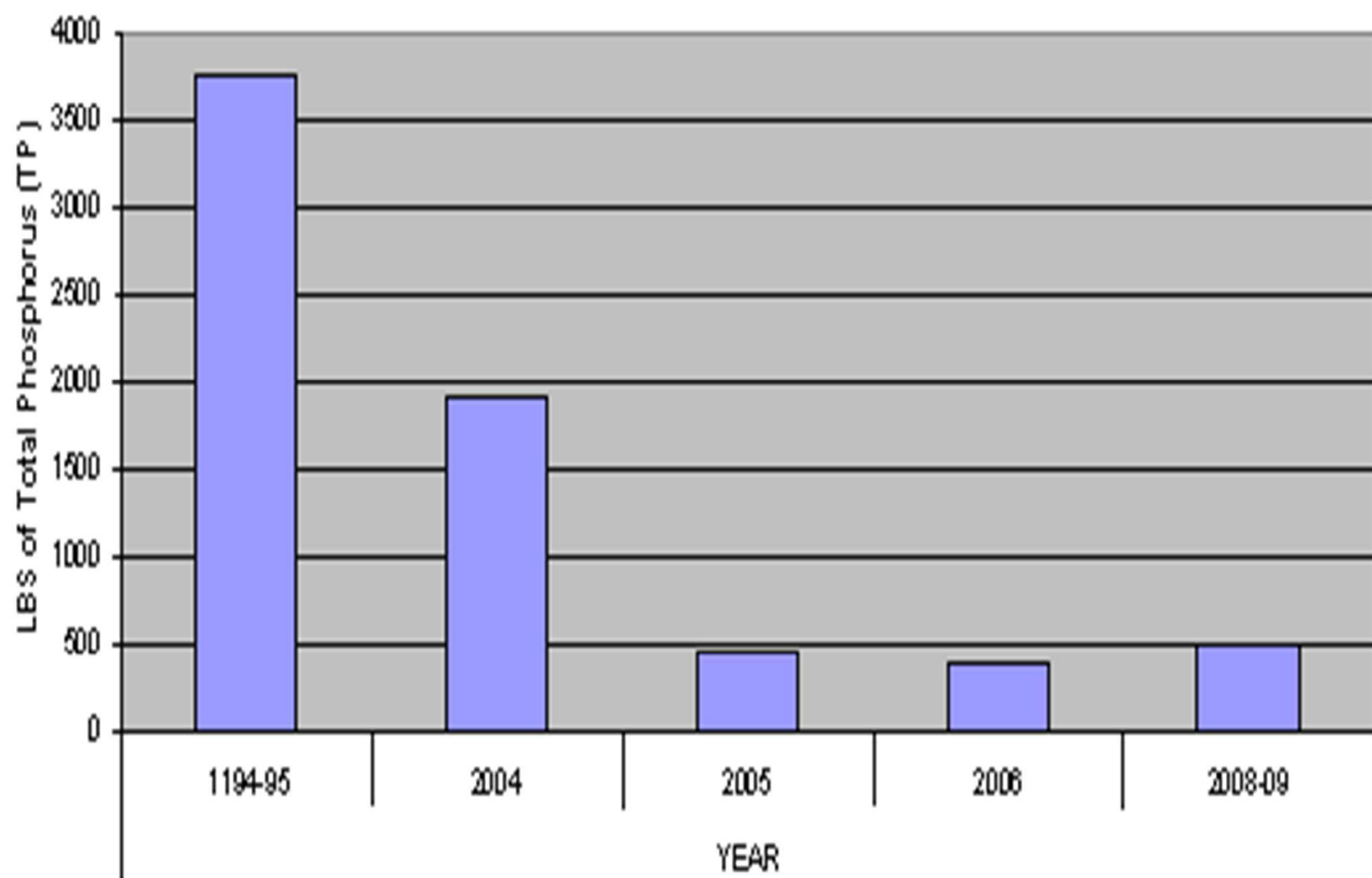




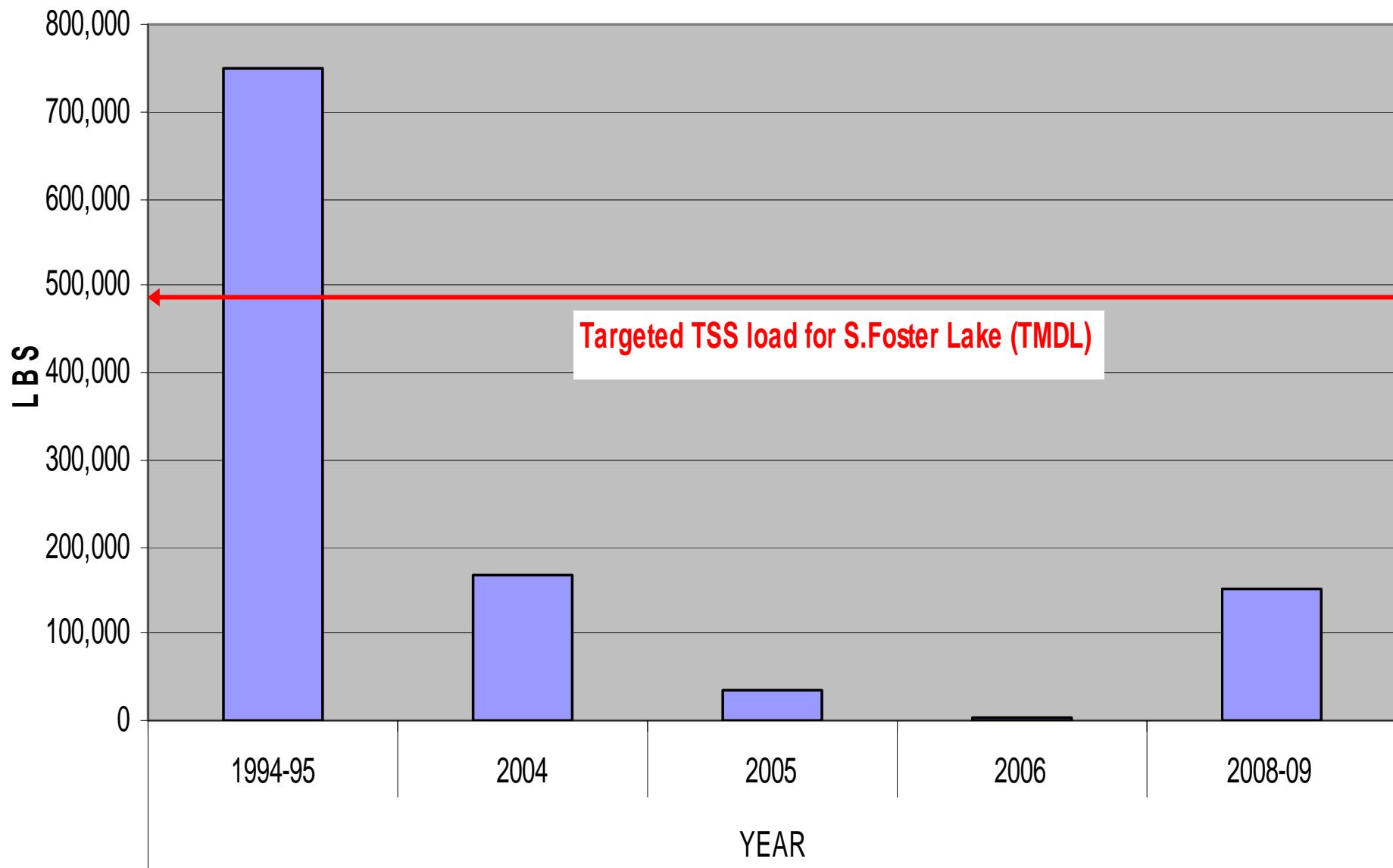




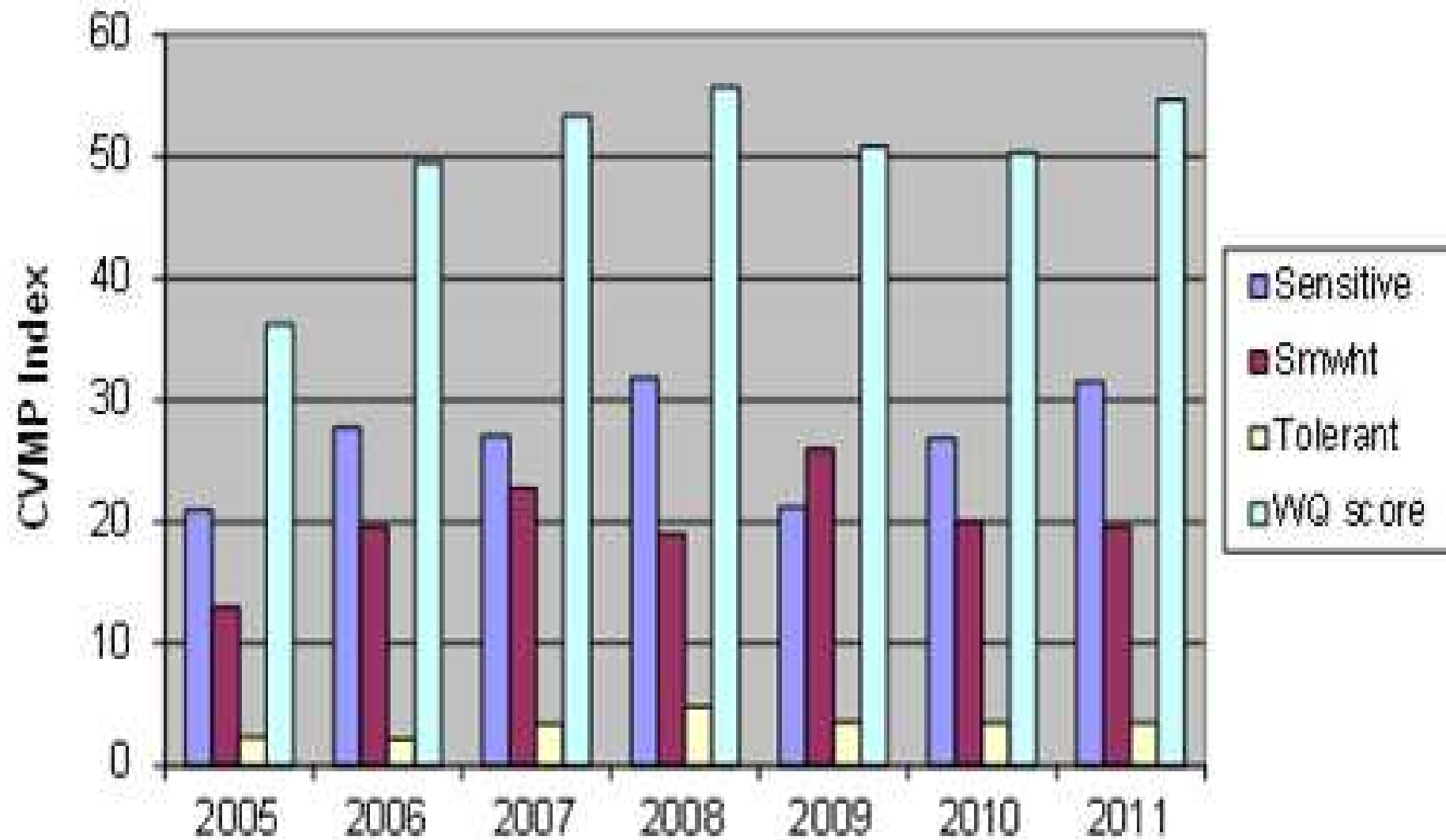
Growing Season TP Load entering Stephen Foster Lake from Mill Creek



Growing Season TSS Load entering Stephen Foster Lake from Mill Creek



Macroinvertebrate Index Trends at Mill Creek Inlet





Contact Information

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