

Watershed Management Primer

A Presentation to the Brown's Creek Watershed District Citizen Advisory Committee

Presented by:

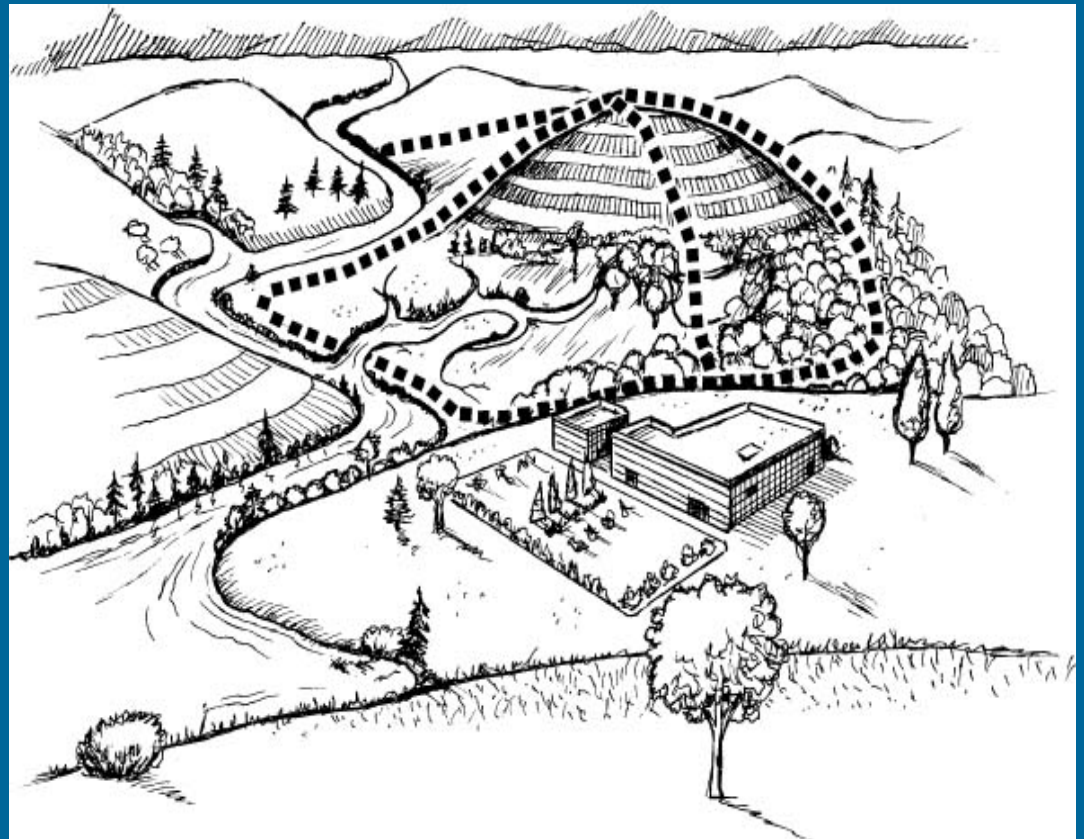
Pat Conrad – Emmons & Olivier Resources

February 8th, 2006



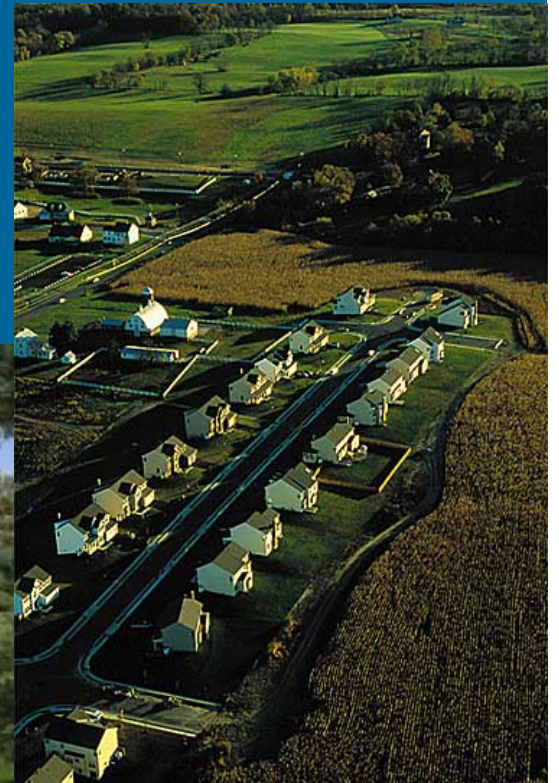
Natural Watershed Characteristics

- Size and Shape of Watershed
- Topography
- Soils
- Vegetative Cover



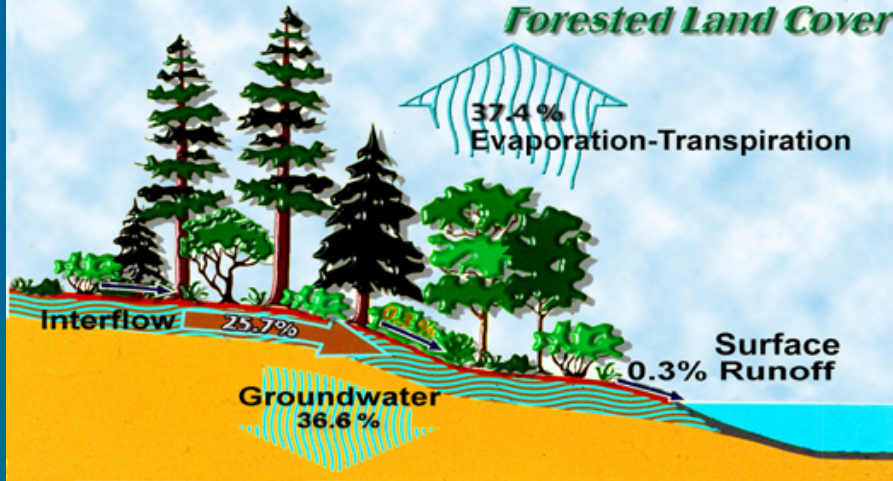
Land Uses Occurring in Watershed

- Agricultural
- Undeveloped
- Residential of Varied Density



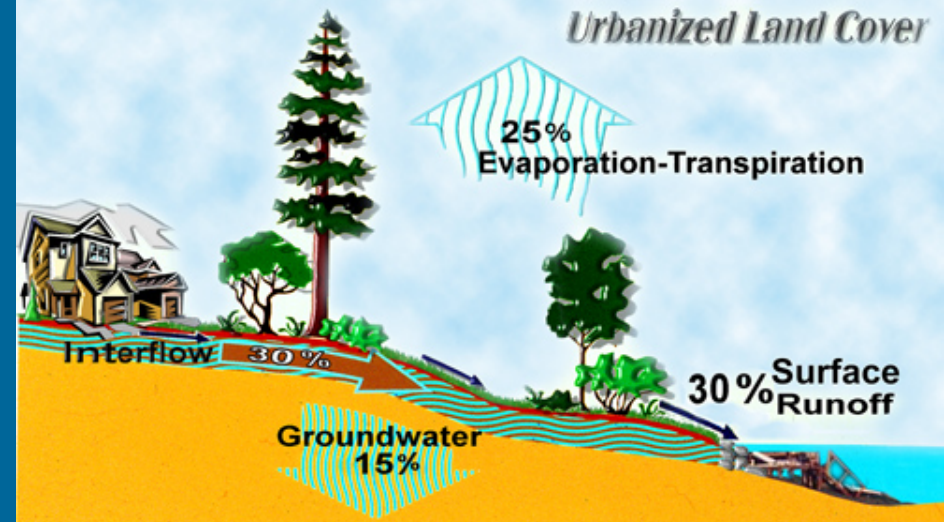
Typical Annual Water Budget

Forested Land Cover



Typical Annual Water Budget

Urbanized Land Cover



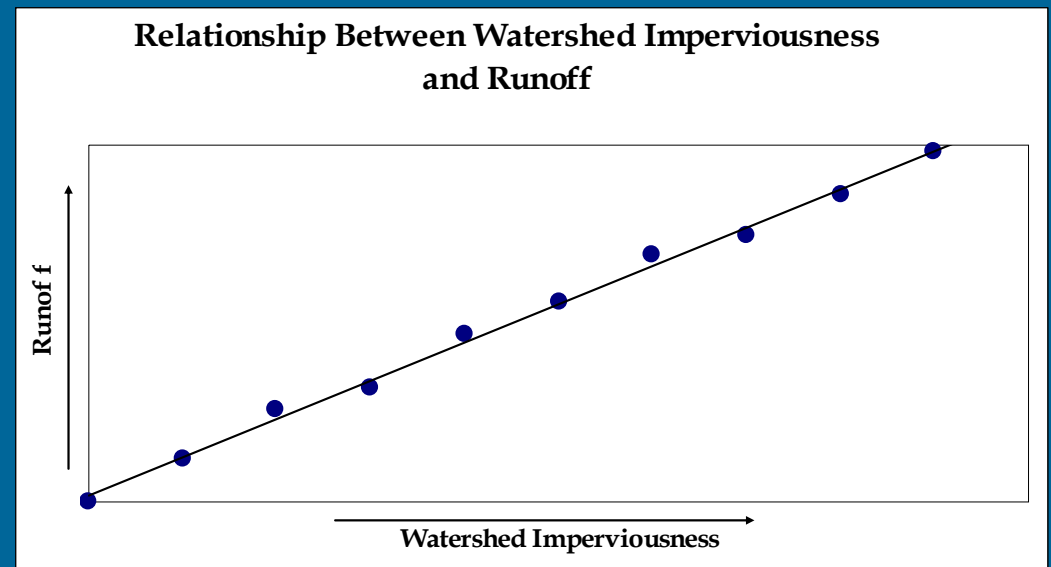
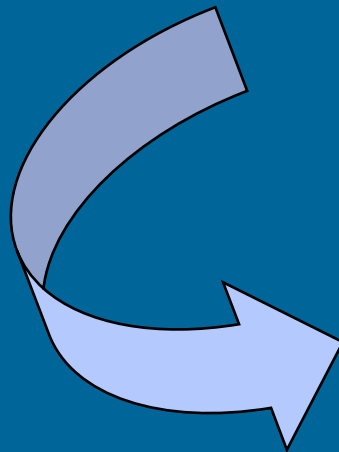
Stormwater Management Basics

- Impervious Surfaces
- Rates of Discharge
- Stormwater Volume
- Water Quality

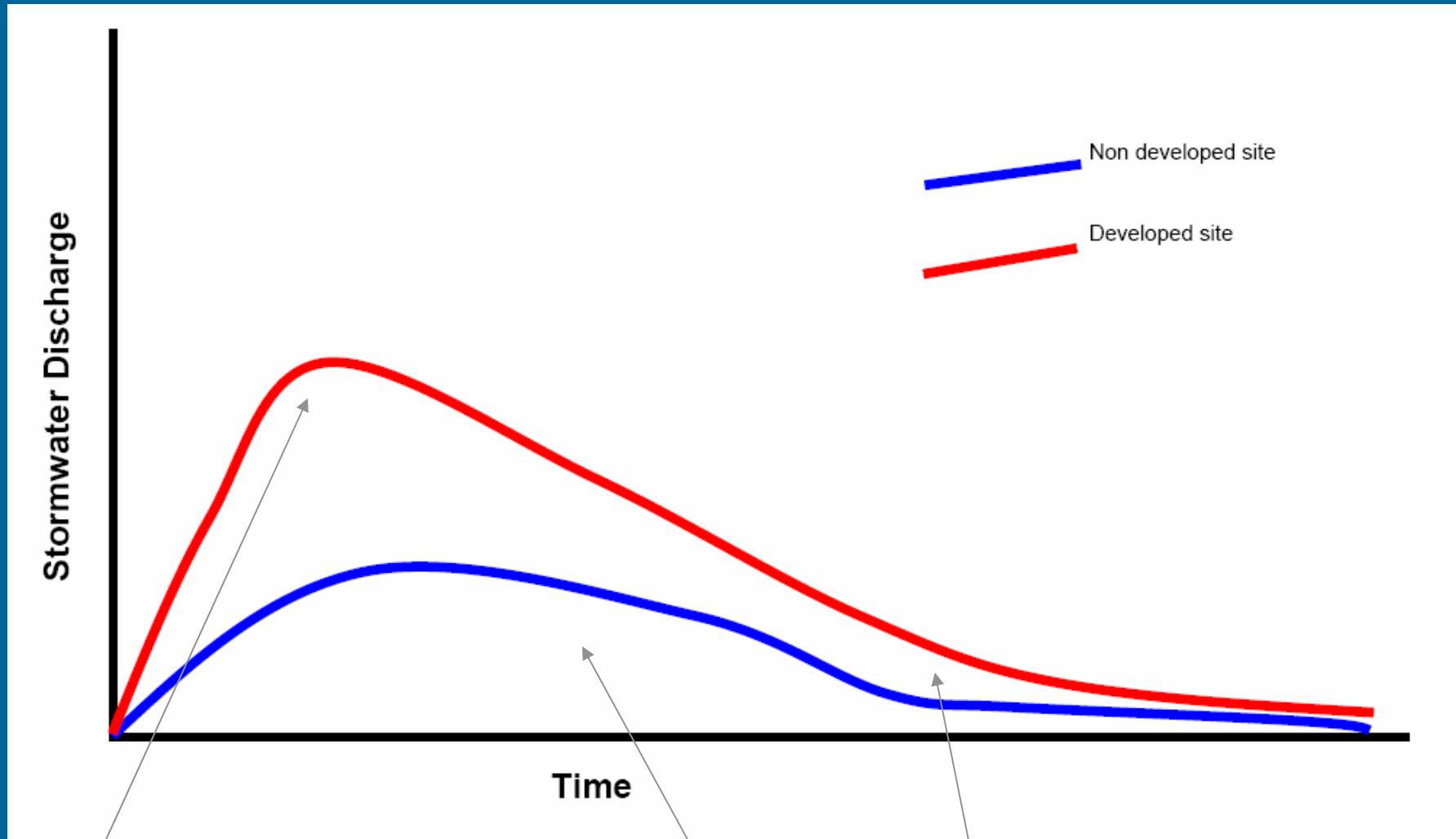
Impervious Surfaces



**Impervious
Surfaces increase
stormwater runoff**



Development Hydrology



Higher peak rate

Greater overall volume

High rates for longer time

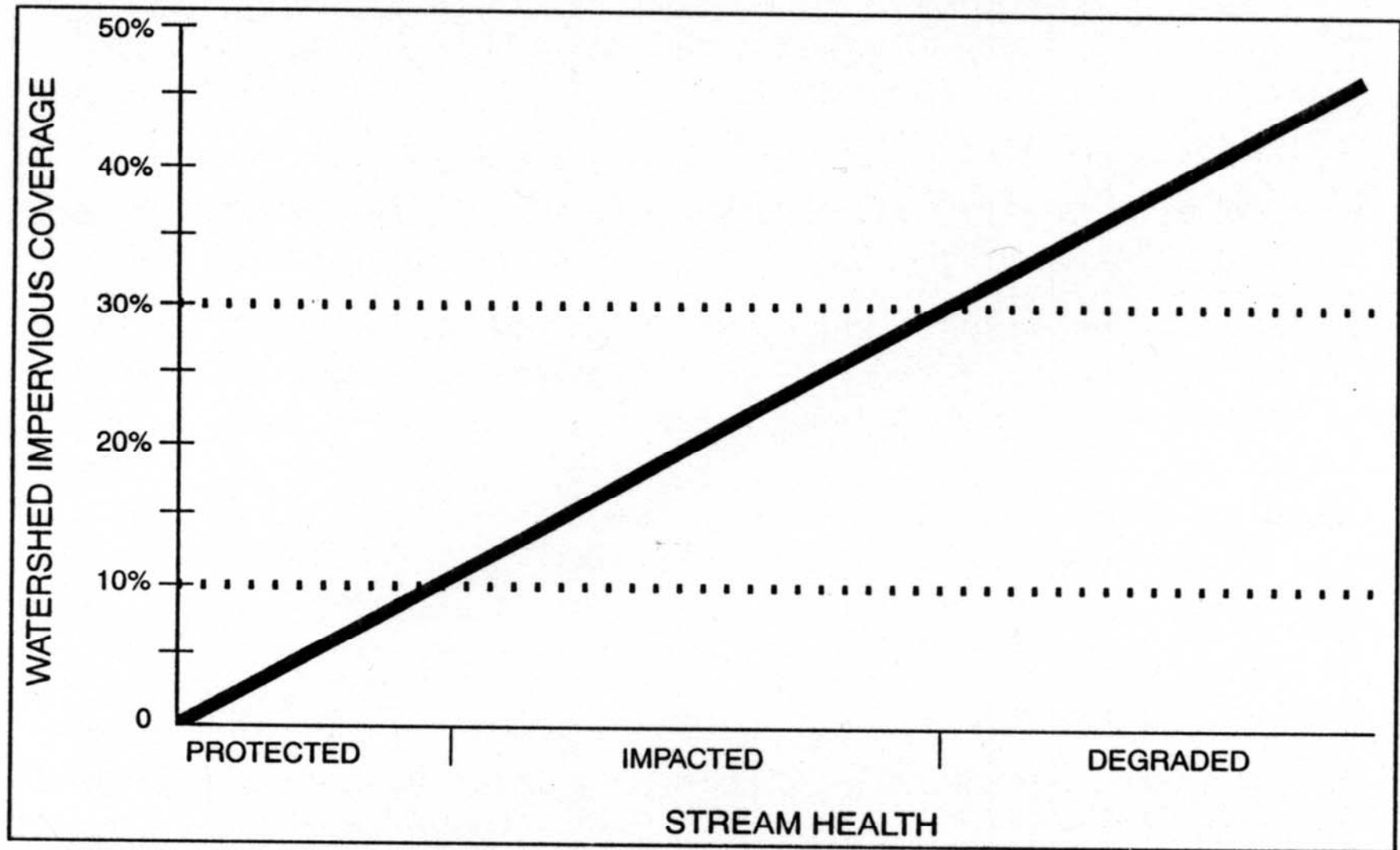


FIGURE 2. Stylized relationship of imperviousness to stream health
Modified from Schueler 1992

Stormwater Discharge Rates

How fast the stormwater flows

Importance

Stream bank Stability

Storm sewer Capacity

Brown's Creek Rule

Post development rates of discharge for the 1.5, 10 and 100 year storm events to be same as pre-development rate.

Notes -

Small storms provide the most frequent runoff events

Large storms result in the more destructive runoff events

Managing the range of storm events can be accomplished through simple structural means, i.e. multi-stage outlets.

Stormwater Volume

How much stormwater is produced

Importance

Flooding

Nutrient Loading

Groundwater Recharge

Brown's Creek Rule

Sites must retain the additional runoff generated from a 1.5 year storm event as compared to pre-development conditions.

Runoff from 5% impervious surface is exempted.

Considerations

Rule takes into consideration that there are varying levels of infiltration possible at a site based on soils.

Stormwater Quality

What is in the stormwater & How much

Importance

Lake and Stream Quality

Algal blooms, odor

Decreased recreational value, aesthetics

Brown's Creek Rule

Loads of sediment, metals and nitrogen must be maintained.

Concentration of phosphorus must be below standard of receiving body

Considerations

May not be enough for some resources – ie St. Croix River target phosphorus reduction.

Pre vs Post Development site conditions.



Parking lot design



Wet ponds



Bioretention systems



Permeable weir

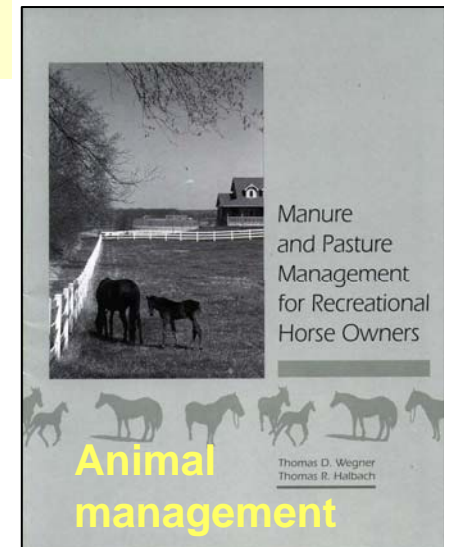
“Natural” BMPs



Dry swales



Surface wetlands



Manure and Pasture Management for Recreational Horse Owners

Animal management

Thomas D. Wegner
Thomas R. Halbach



Salt application



Education



Leaf collection

Public Works BMPs



Road repair



Waste management



Chemical storage



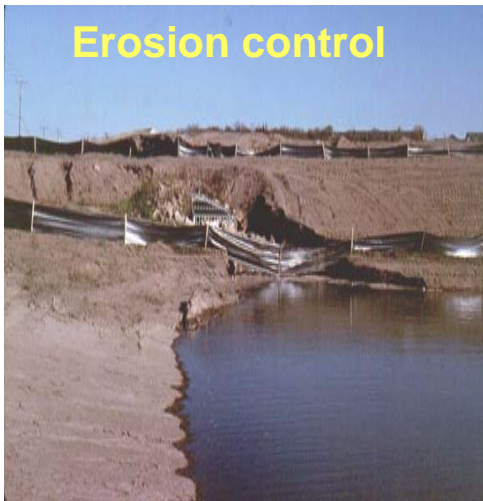
Bioretention



Infiltration



Open Space preservation



Erosion control



Runoff Integration

Surface Water Management BMPs



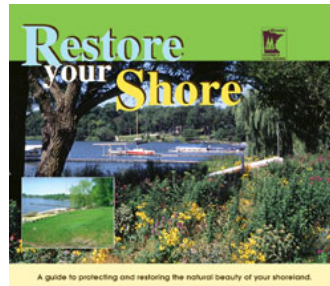
Low impact development

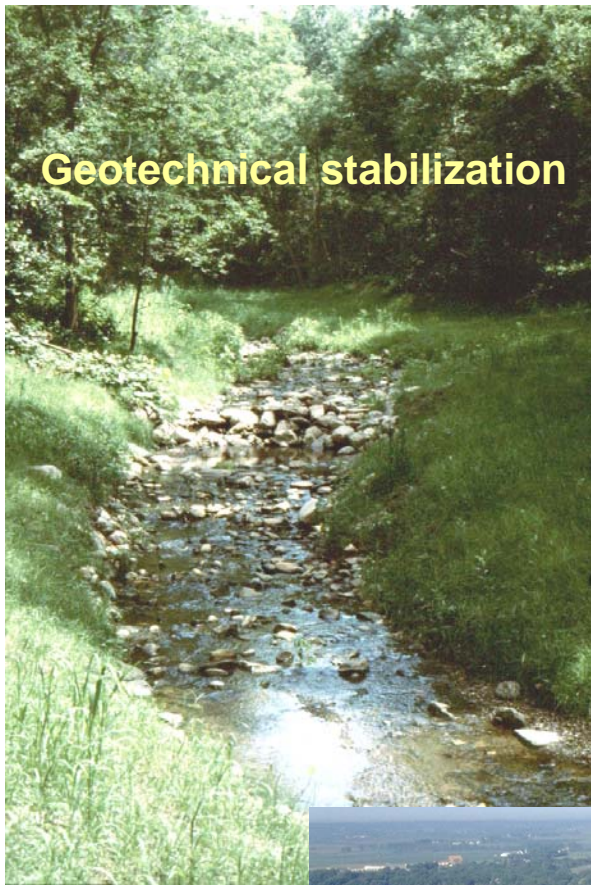


Minimize runoff

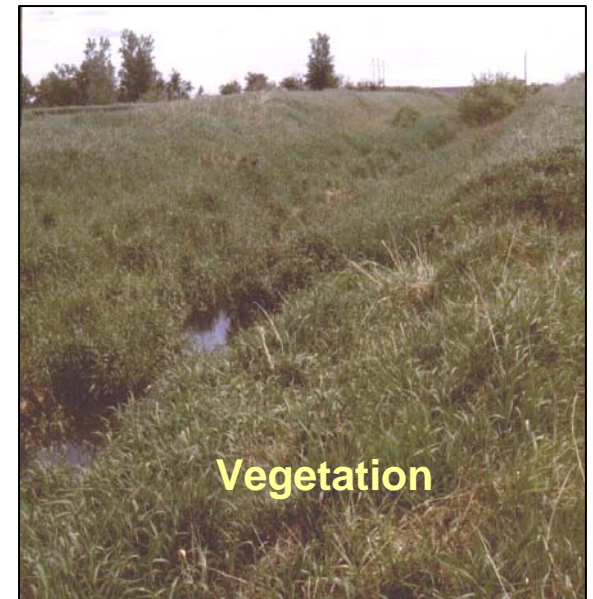


**Shoreland
BMPs**





Channel Stabilization BMPs



BCWD Capital Improvement Project: Trout Habitat Preservation Project

The goal of the Trout Habitat Preservation Project (THPP) was to restore a controlled overflow to control lake elevations on Goggins Lake, while reducing the impact to Brown's Creek, a naturally producing trout stream or other significant resources in the watershed.



THPP—MN Association of WD “2004 Project of the Year”



Created
Wetlands/
Infiltration
Basins

The project included an analysis of historic natural overland drainage routes & the design/implementation of a combined **wetland creation-infiltration groundwater recharge** system.

Capital Improvement Project: Kismet Basin Outlet Project

The Kismet Basin Stabilization Project, completed in 2002, provided an overflow for the water bodies in the Kismet Basin area to alleviate local flooding. The solution included multiple cell infiltration basins and following natural function and route of flow.



Kern Center Pond (Before)



Kern Center Pond (During)



Jan 6, 2005

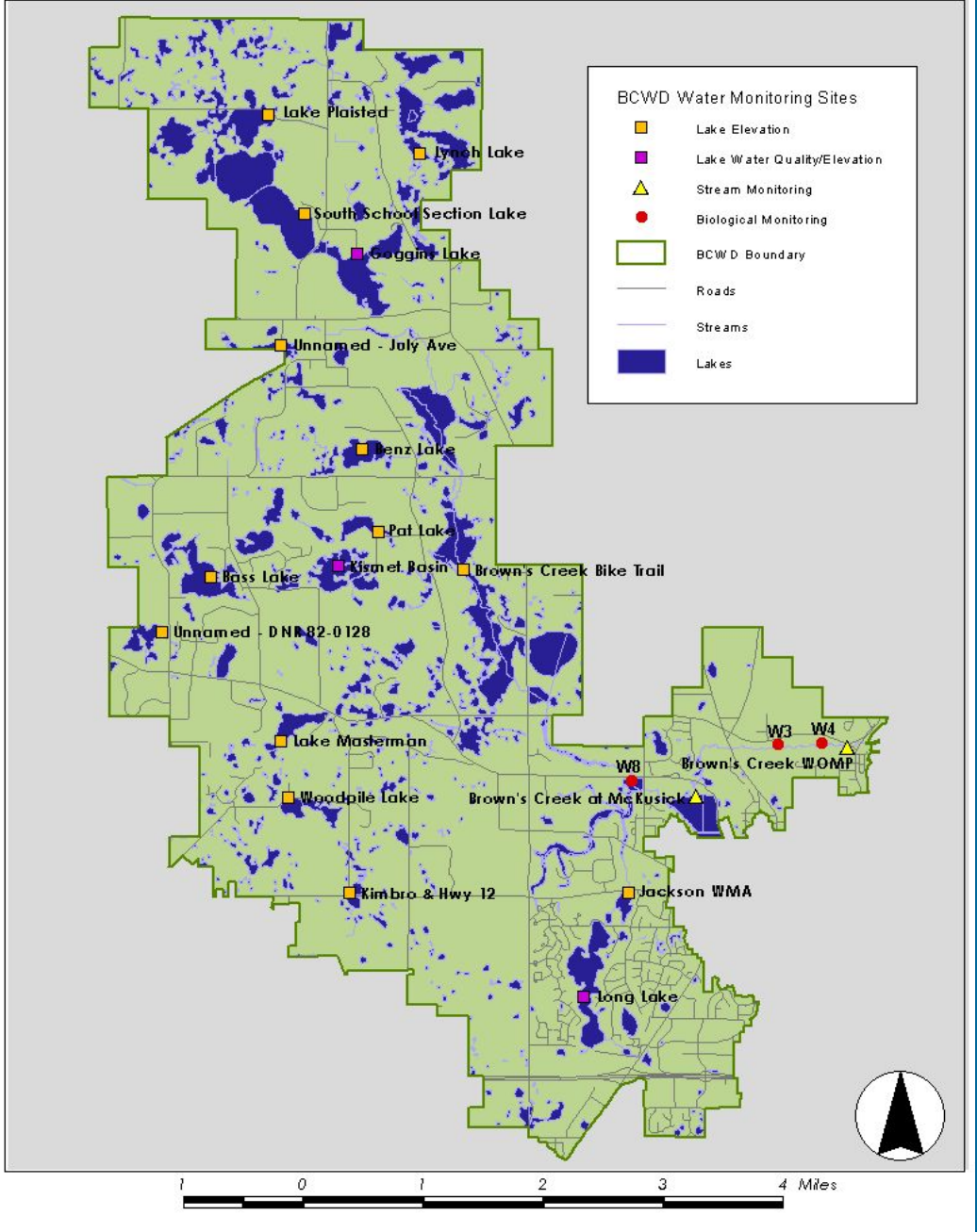


May 5, 2005



May 5, 2005

District Water Monitoring Program



Volunteer Macroinvertebrate Stream Monitoring



Brown's Creek Realignment

Goal: Reduce water temp & improve trout habitat in Brown's Creek.

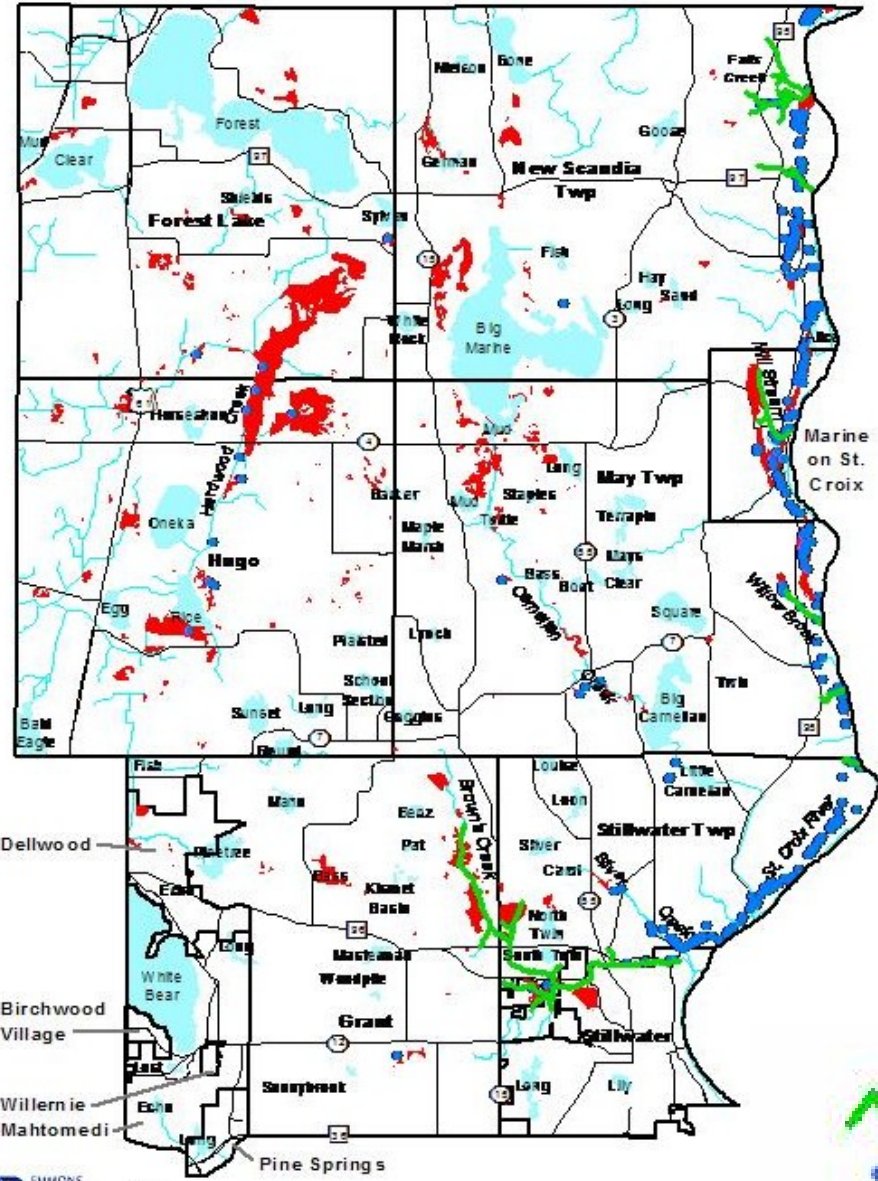





Old channel through golf course—Note lack of shade, and wide shallow channel.



New channel—Improved habitat with native shrubs & trees along banks.

North Washington County Groundwater Study



-  Groundwater Dependent Trout Streams
-  Groundwater Discharge Points / Streams
-  Groundwater Dependent Natural Resources

EOR EDMONS & OLIVER RESOURCES

2 0 2 Miles

Source: 2012, MNR, DNR, SDWA, MWMD, CWSRF, MMS&E, DNR, Washington County OpenSpaceMap geodatabase, 2011, www.springs.com

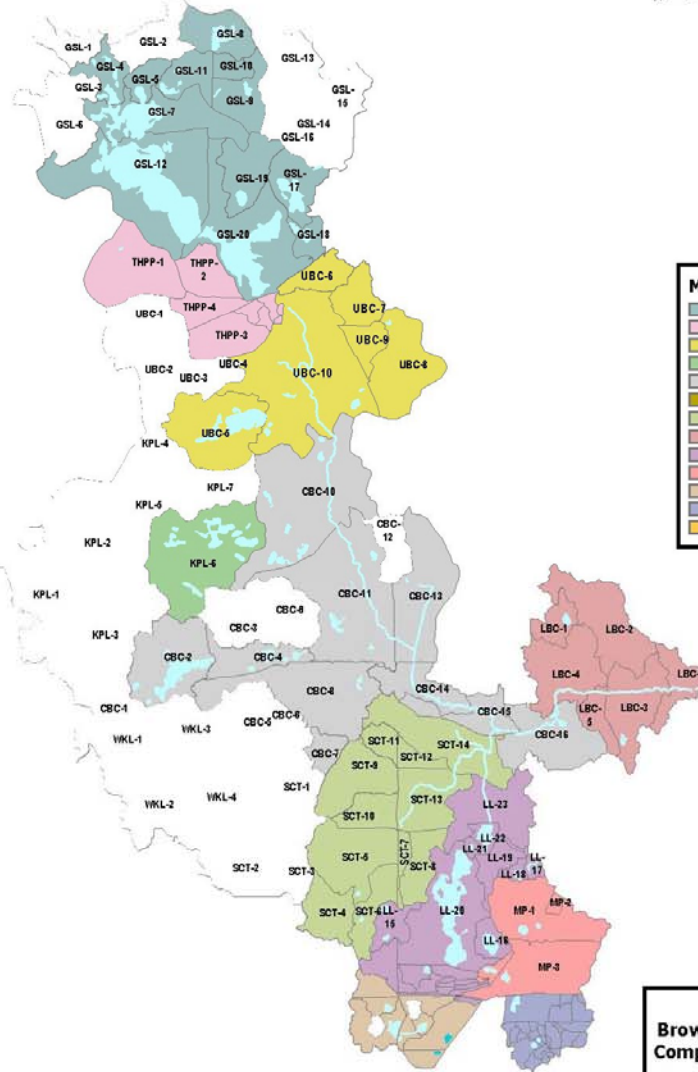
Hydrologic & Hydraulic Study



1998 Subwatershed Delineations



2003 Subwatershed Delineations



Subwatershed boundaries
 Landlocked for the 100-year 24-hour rainfall event.
 Streams
 Open water
 Highways

Major Subwatersheds

	GSL	Goggins/School Section Lake
	THPP	Trout Habitat Preservation Project
	UBC	Upper Brown's Creek
	KPL	Kismet/Pat Lake
	CBC	Central Brown's Creek
	WKB	Wood Pile/Kismet Basin
	SCT	South Central Tributary
	LBC	Lower Brown's Creek
	LL	Long Lake
	MP	Market Place
	H36	Highway 36
	OPH	Oak Park Heights
	SWL	Southern Land Locked Basins



Figure 7
Brown's Creek Watershed District
Comparison of the 1998 and 2003
H/H Models

