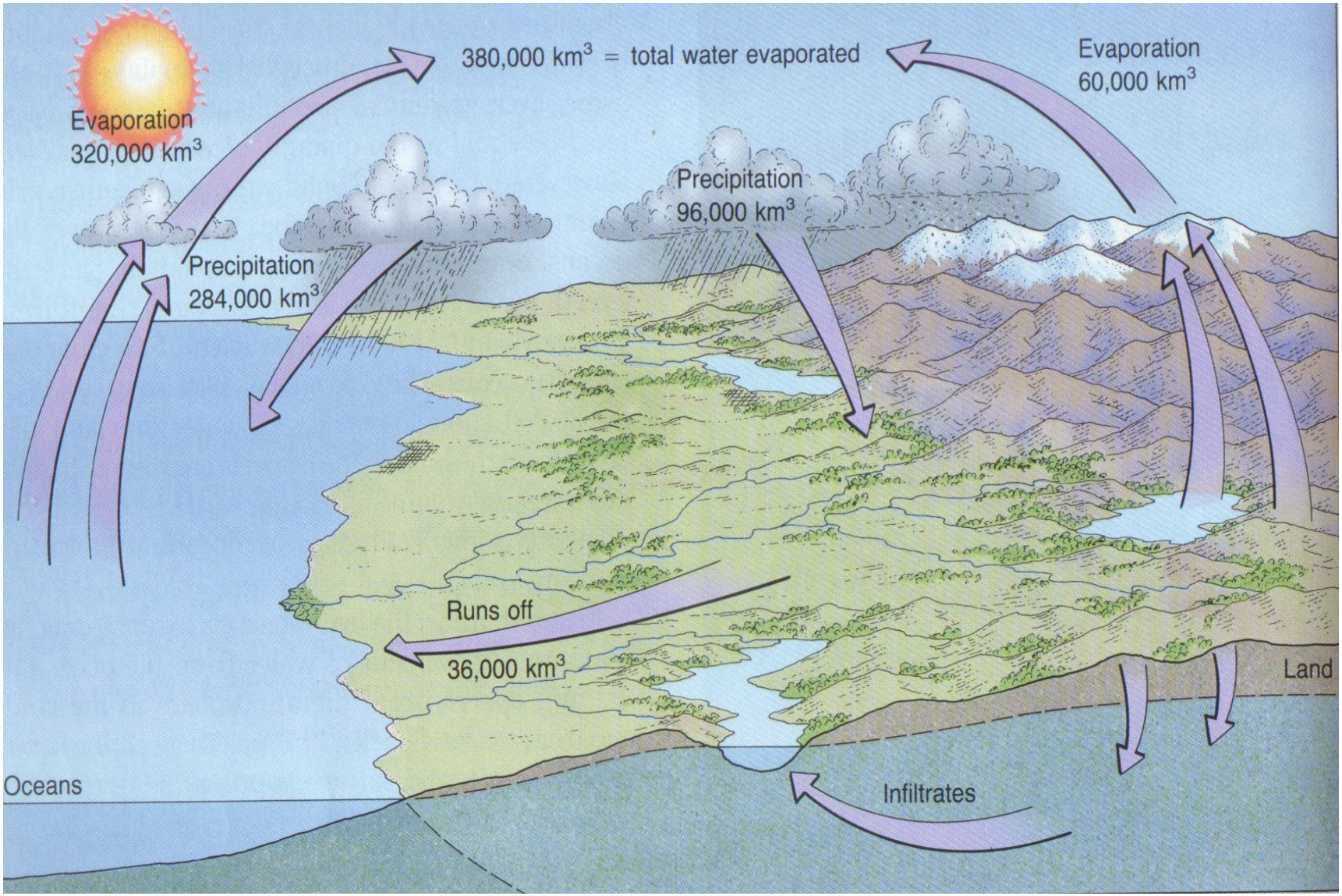
Conservation 101

Karen Kill
Washington Conservation District

MACDE
2007 Annual Meeting & Conference

The Water Cycle



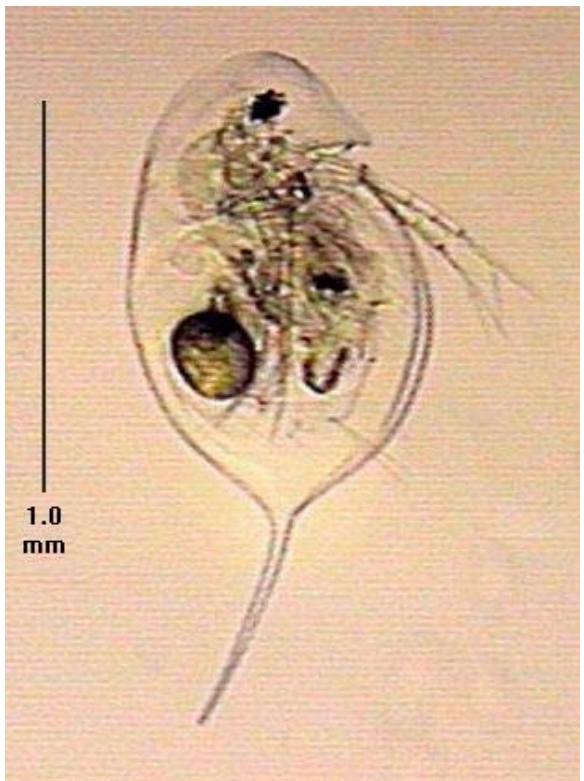
Hanson, 1994

Lakes

- Transparency
- Nutrients
- Algae
- Temperature
- Dissolved Oxygen

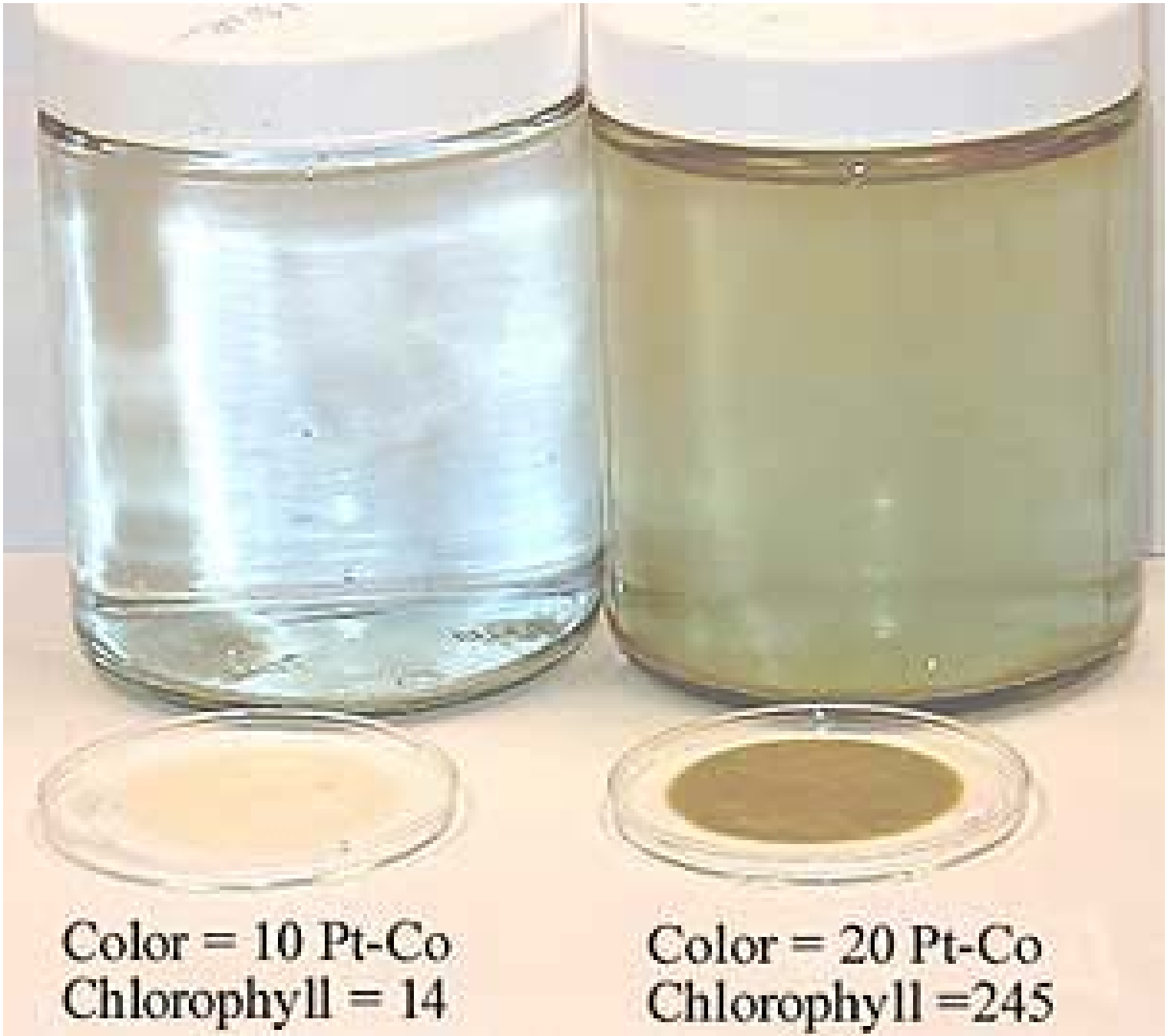
Lake Monitoring Equipment

Zooplankton Monitoring



Enlarged *Daphnia pulicaria*


Secchi = 1 m

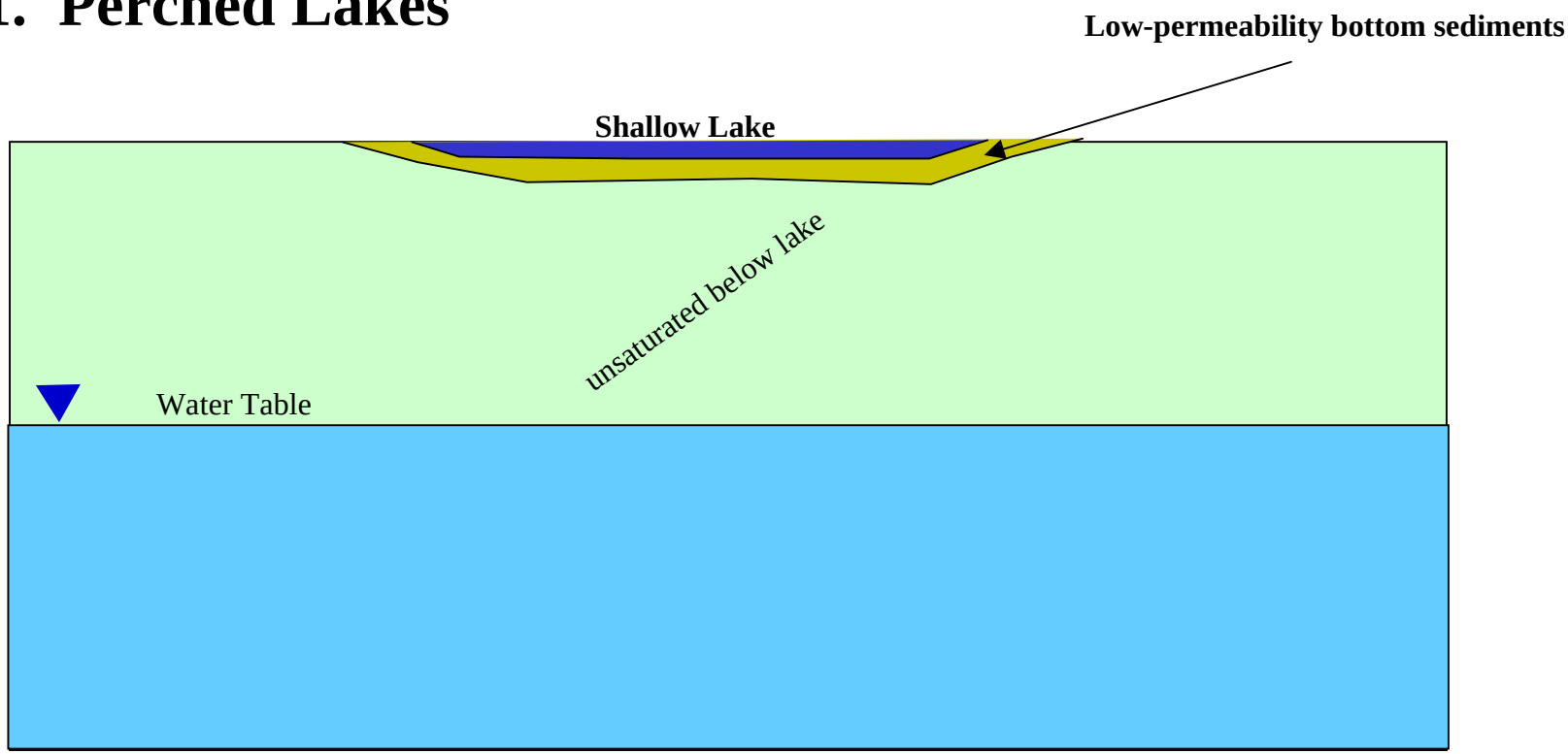

Color = 10 Pt-Co
Chlorophyll = 14
Color = 20 Pt-Co
Chlorophyll =245

Streams

- Flow
- Temperature
- Oxygen
- Nutrients
- Sediments

How does groundwater interact with lakes?

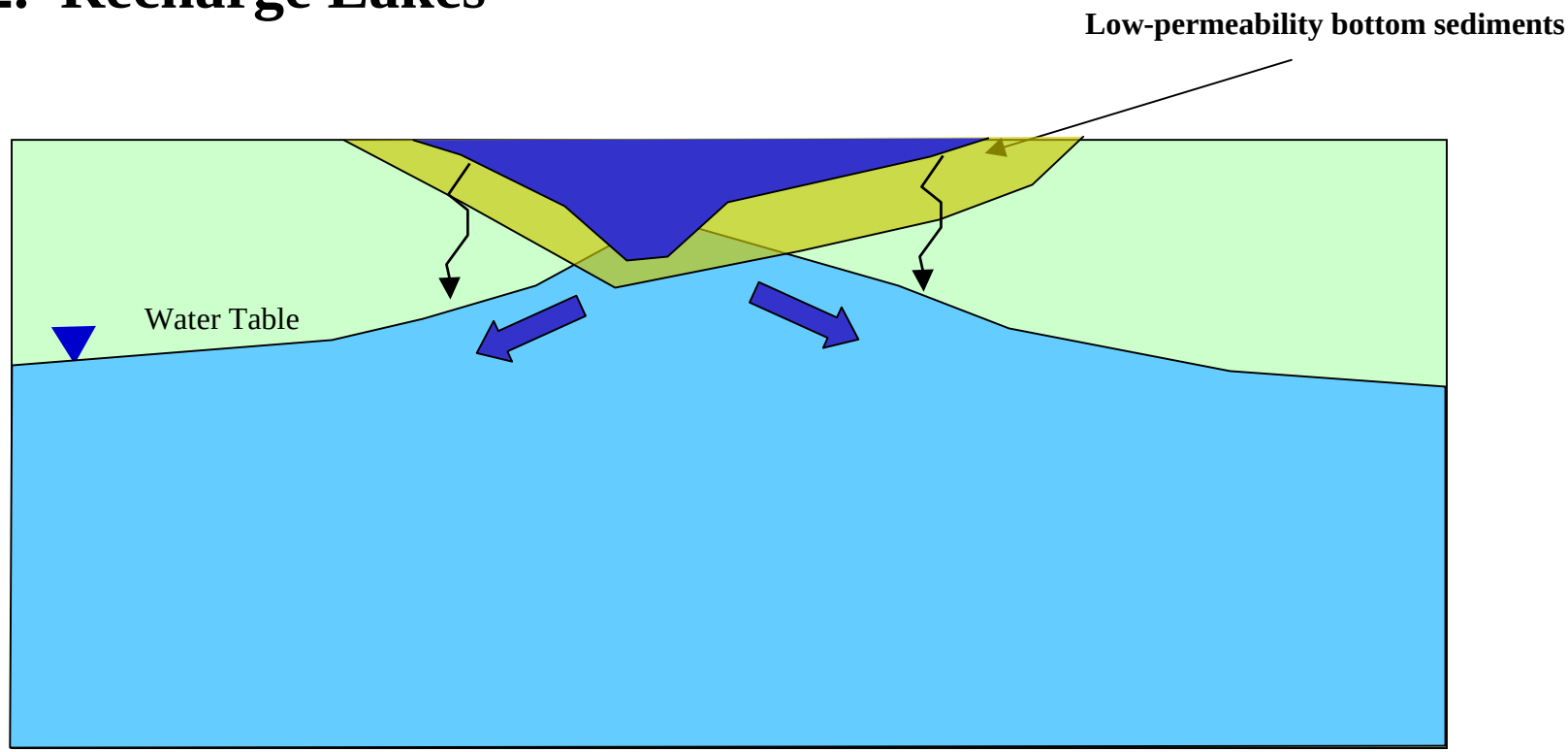
1. Perched Lakes



Generally small in area and/or shallow

How does groundwater interact with lakes?

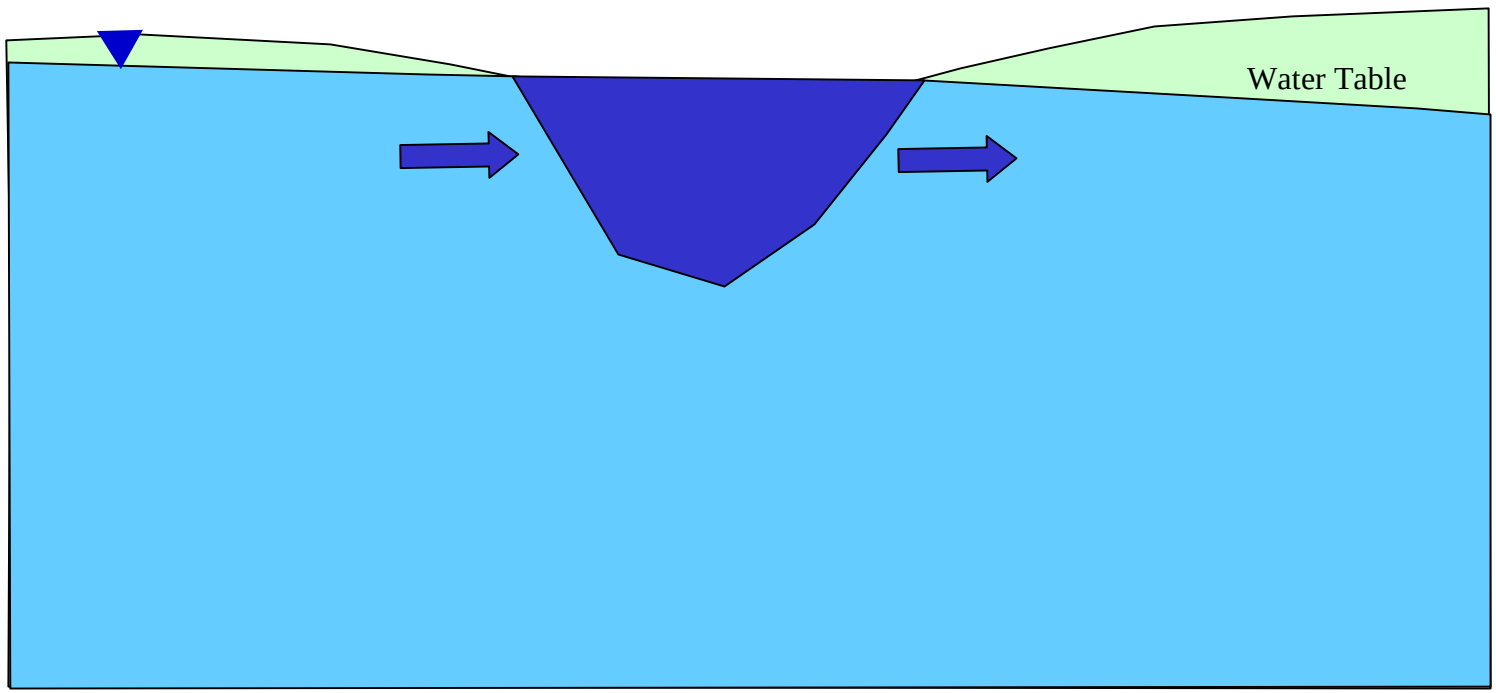
2. Recharge Lakes



Likely source of water to regional surficial aquifer

How does groundwater interact with lakes?

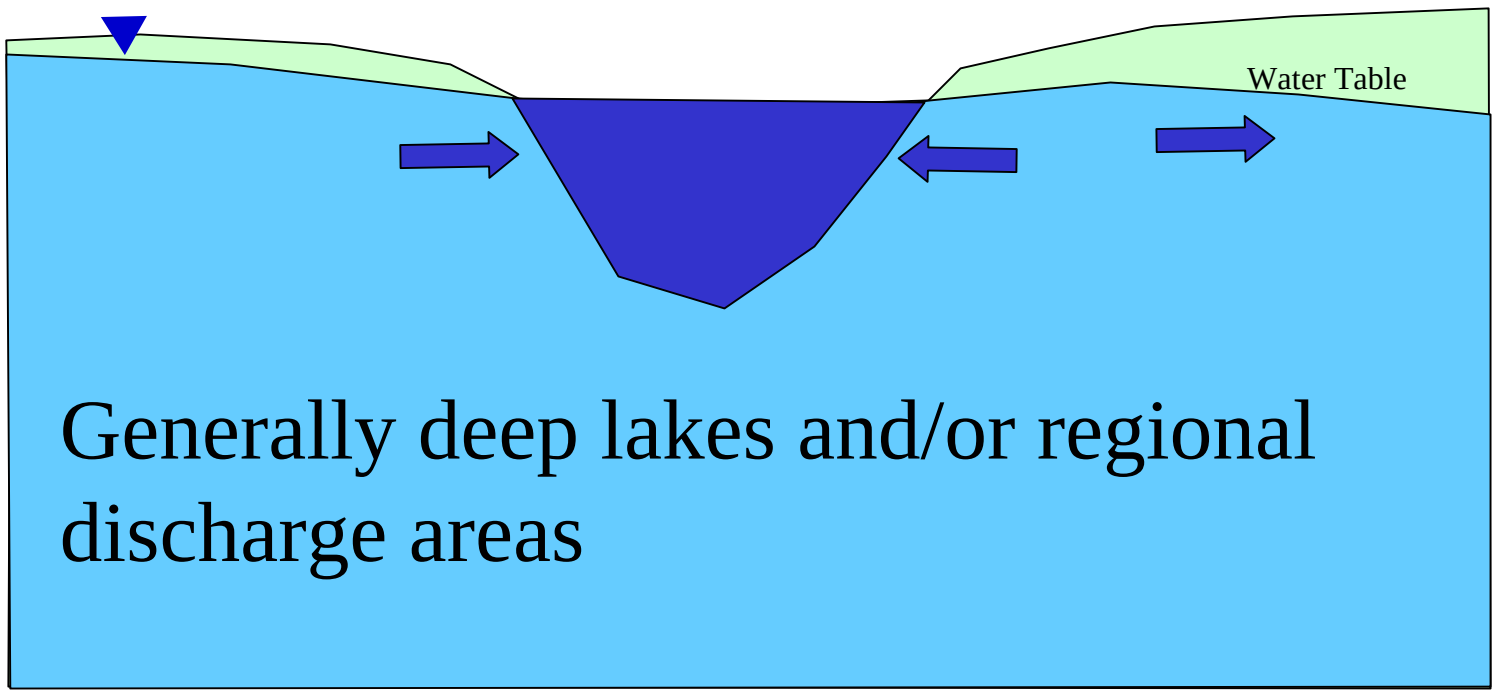
3. Flow-Through Lakes



"surface expression" of water table

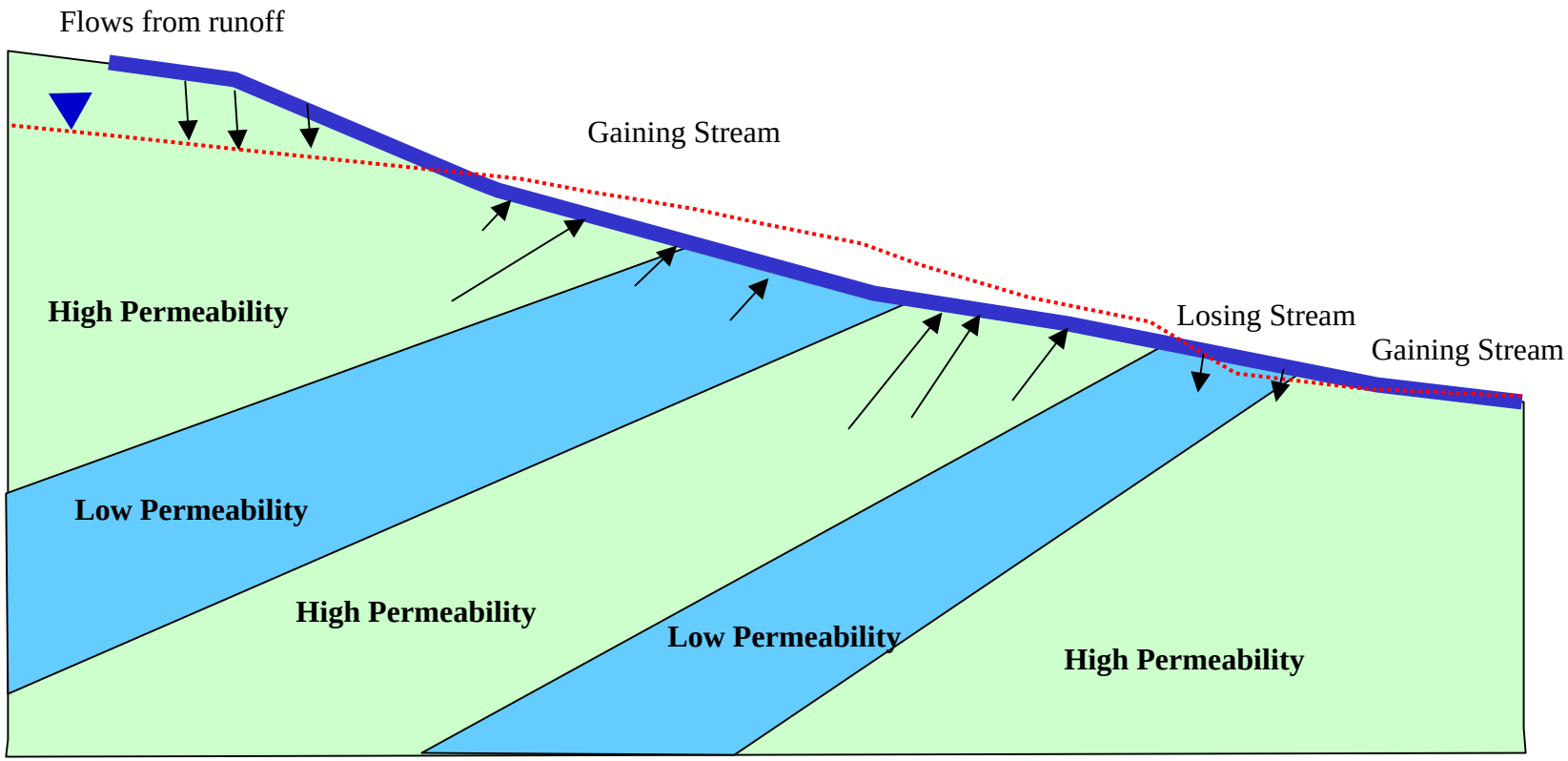
How does groundwater interact with lakes?

4. Discharge Lakes



Net inflow of groundwater

How Groundwater Contributes Flow to a Stream: Role of Geology

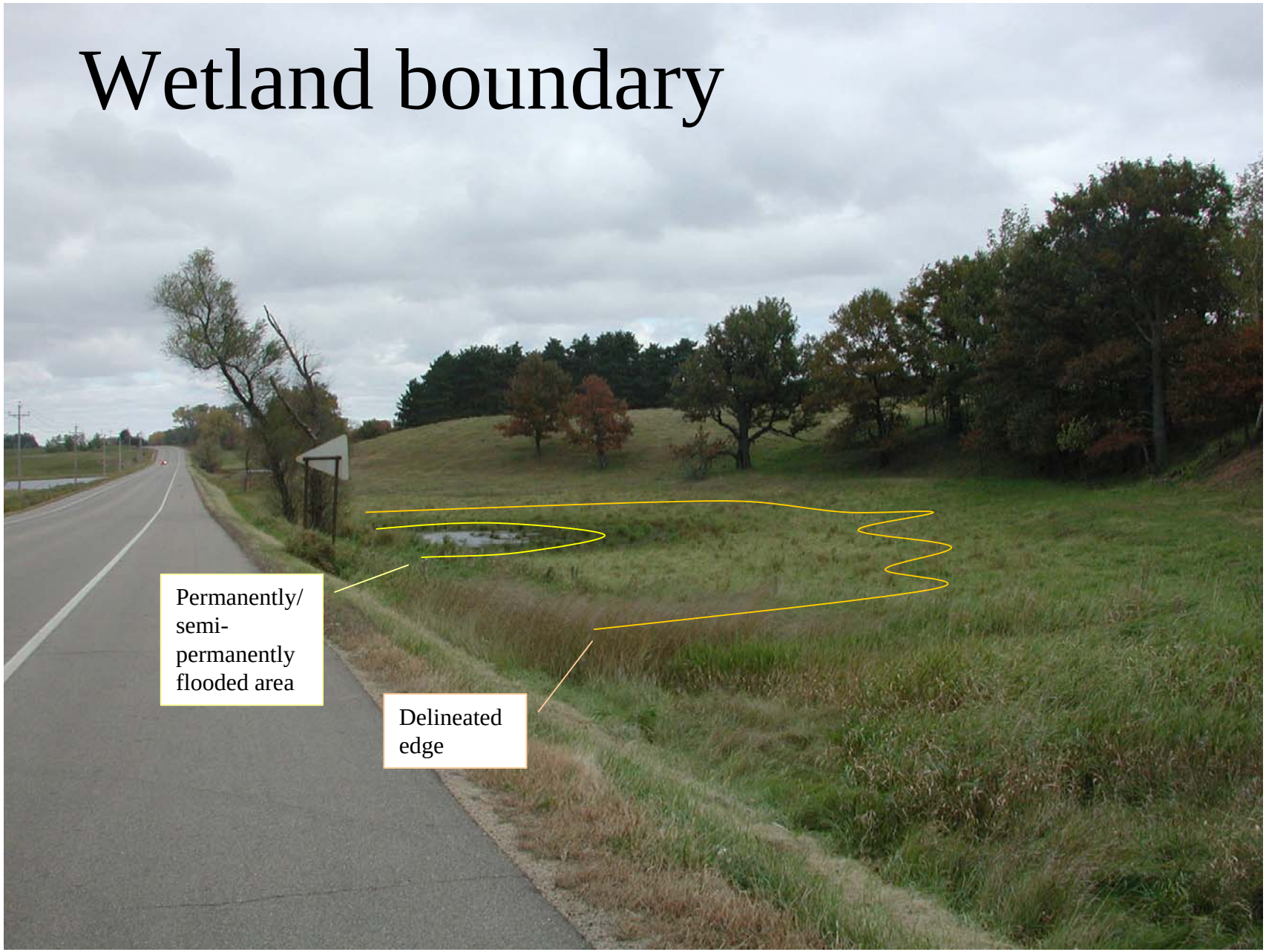


Wetlands: How to recognize them

Wetland Criteria

- Hydric **soils** – soils showing evidence of prolonged saturation
- Hydrophytic **vegetation** – plants adapted to wet conditions
- Saturation or inundation (**evidence of water**)– long enough to affect soils and vegetation

Wetland boundary



Type 1 – flooded temporarily

Type 2 – saturated soil much of year

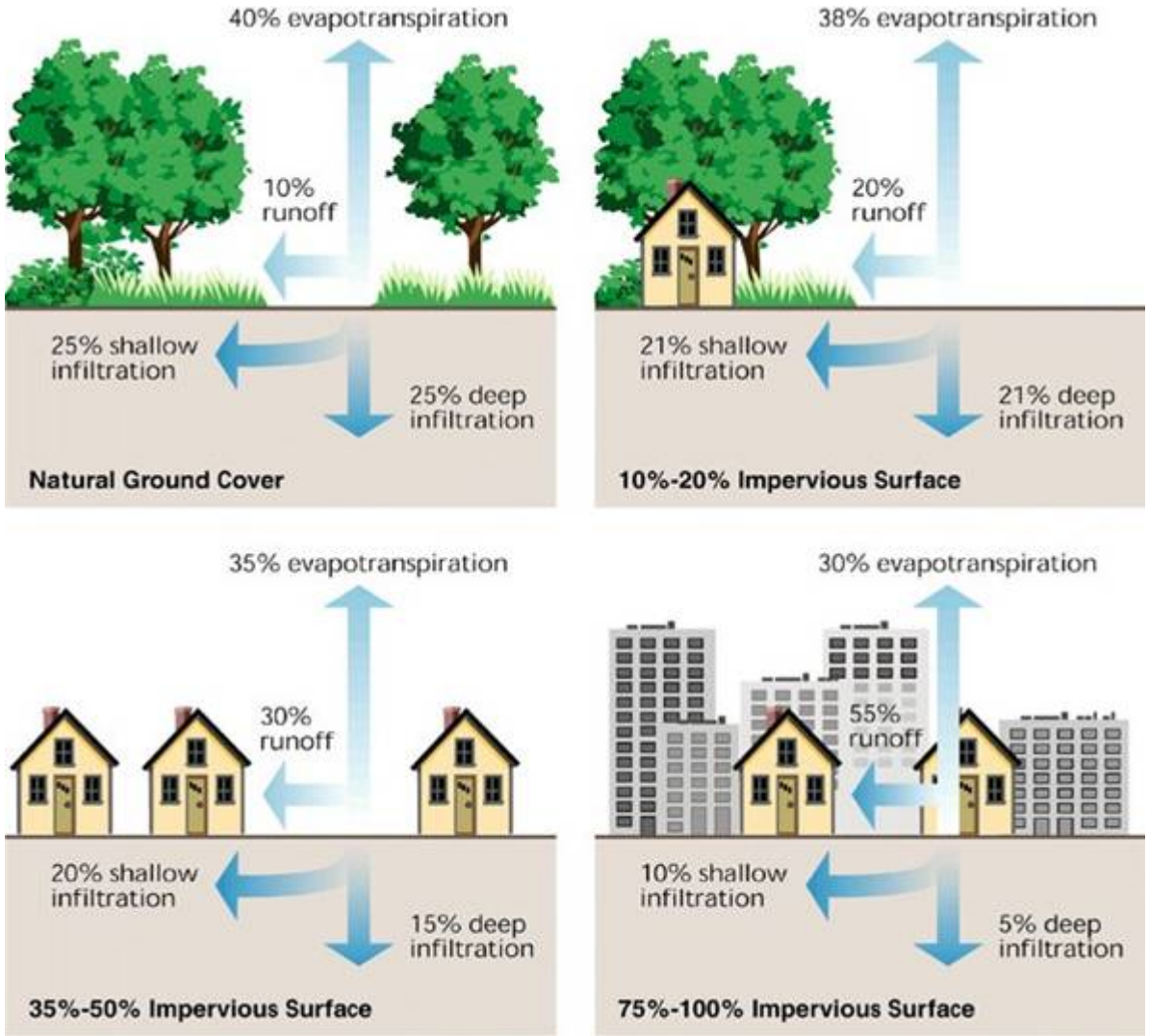
Type 4 – deep marsh

Type 6 – Shrub swamp

Bottom line on Wetlands

- No excavation in wetlands
  - Regulated activity
  - Not suitable for raingardens
- Revegetation with native species is okay
- Call local SWCD for assistance in determination of wetland or not

Environmental Impacts of Conventional Urban Development



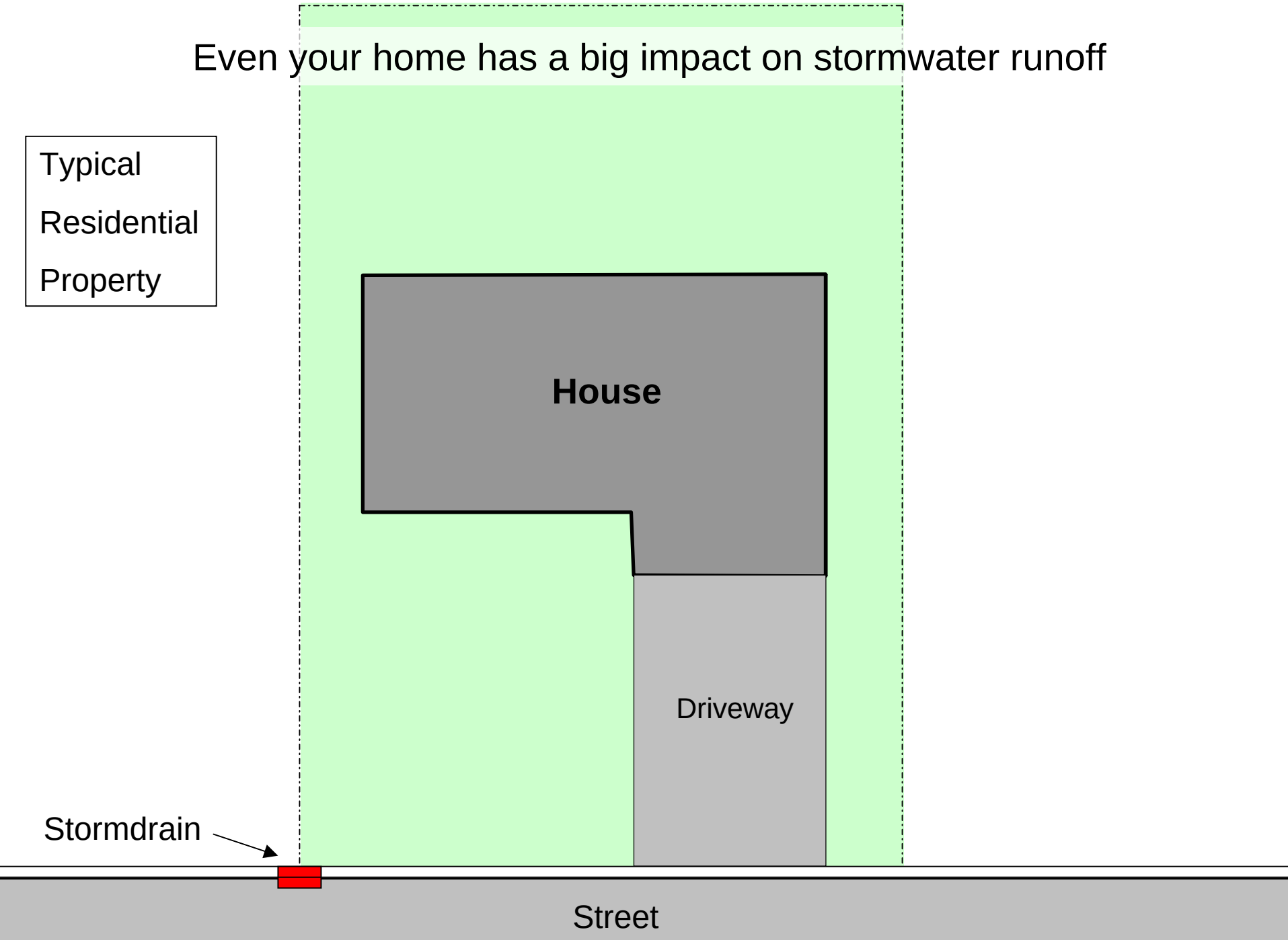
NRCS

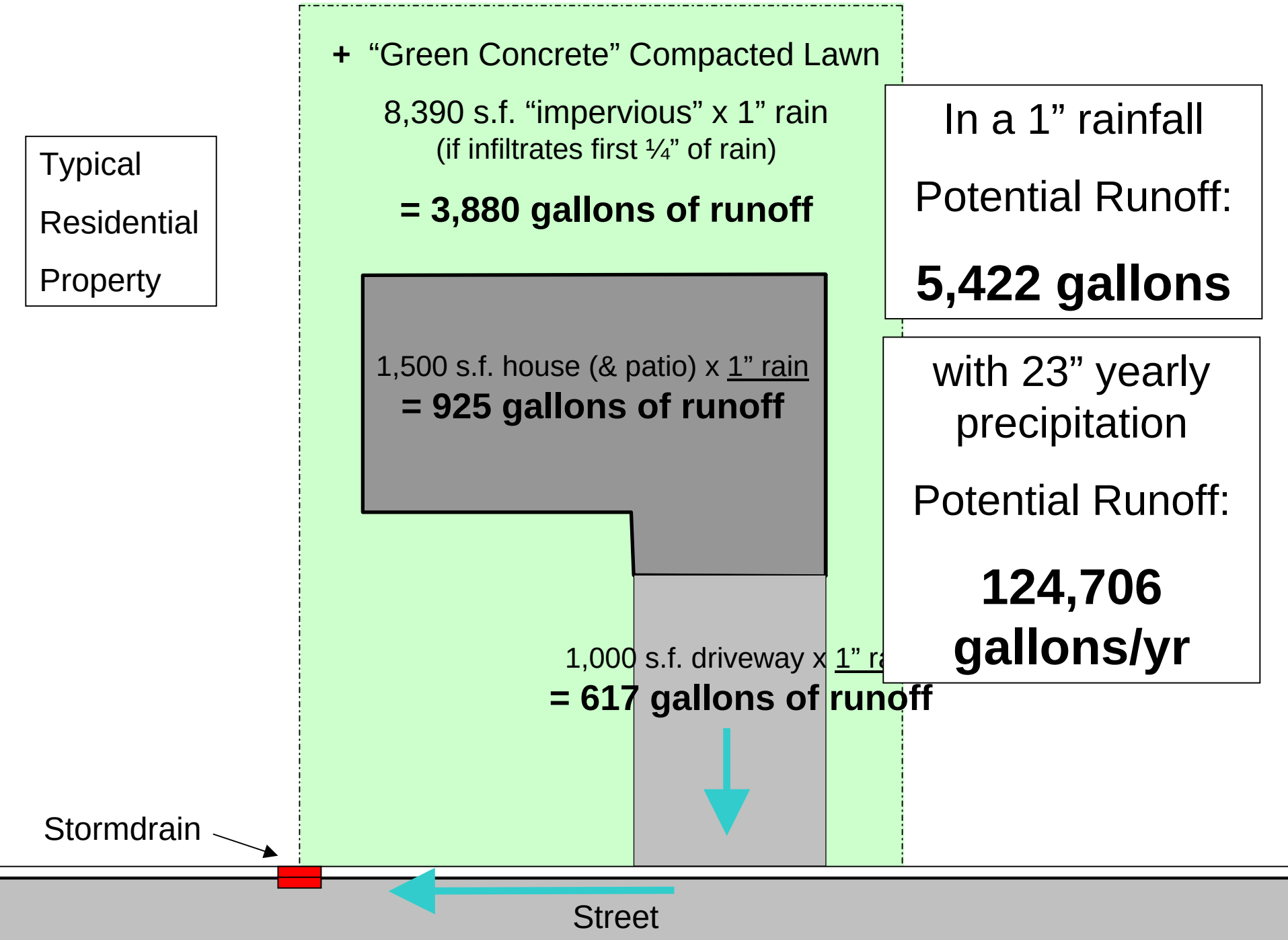
INTENSITY OF LAND USE

AMOUNT OF IMPERVIOUS SURFACE

POTENTIAL WATER QUANTITY & QUALITY PROBLEMS


SOIL
MANURE
FERTILIZERS
All together, a "little" polluted run-off adds up to
BIG PROBLEMS
Destroyed Habitats
Silt covered spawning beds
Fewer game fish
More rough fish
Too much weed and algae growth
Unpleasant Views

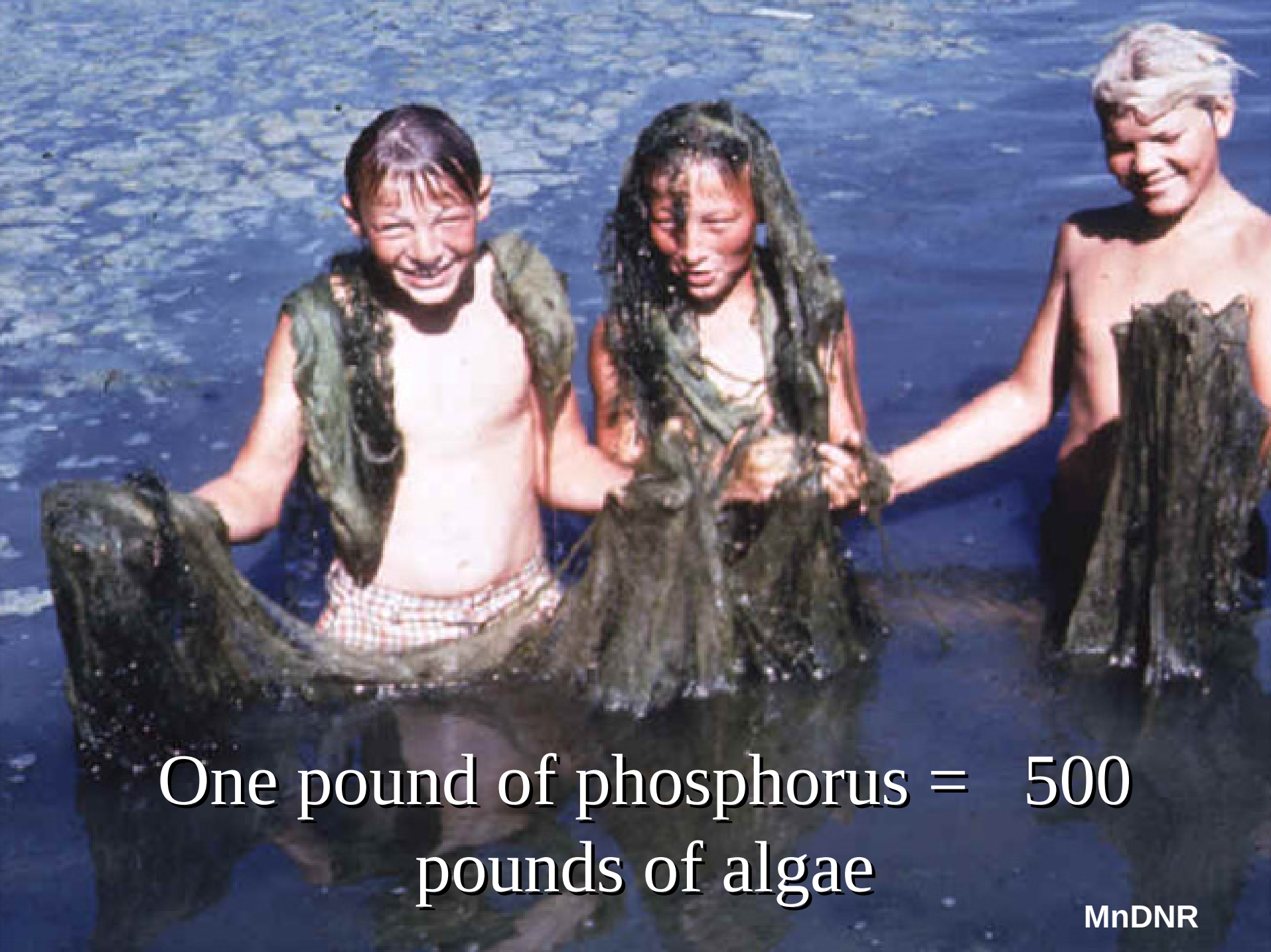

Even your home has a big impact on stormwater runoff
Typical
Residential
Property
House
Driveway
Stormdrain
Street


Typical
Residential
Property
+ “Green Concrete” Compacted Lawn
8,390 s.f. “impervious” x 1” rain
(if infiltrates first ¼” of rain)
= 3,880 gallons of runoff
1,500 s.f. house (& patio) x 1” rain
= 925 gallons of runoff
1,000 s.f. driveway x 1” ra
= 617 gallons of runoff
In a 1” rainfall
Potential Runoff:
5,422 gallons
with 23” yearly precipitation
Potential Runoff:
124,706 gallons/yr
Stormdrain
Street


Where can the rain soak in?
Bloomington

Stream Impacts of Impervious

Center for Watershed Protection


One pound of phosphorus = 500 pounds of algae
MnDNR

What is a Total Maximum Daily Load (TMDL)?

A Formula and Process, which will tell you…

the maximum amount of a specific

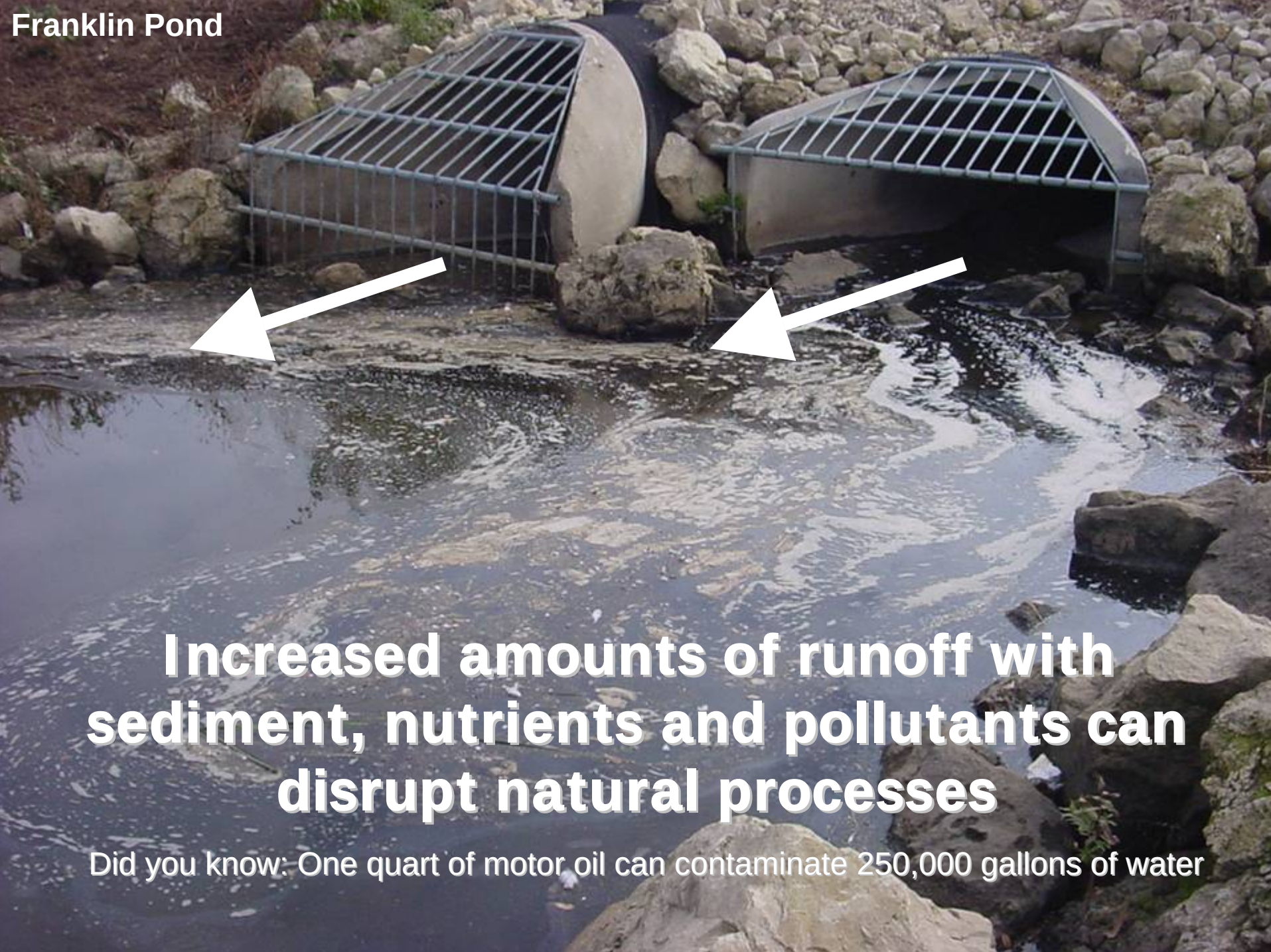
pollutant that can be discharged to a waterbody and still meet water quality standards

One Problem: Conventional Site Design

Engineered Drainage


To Storm Drain

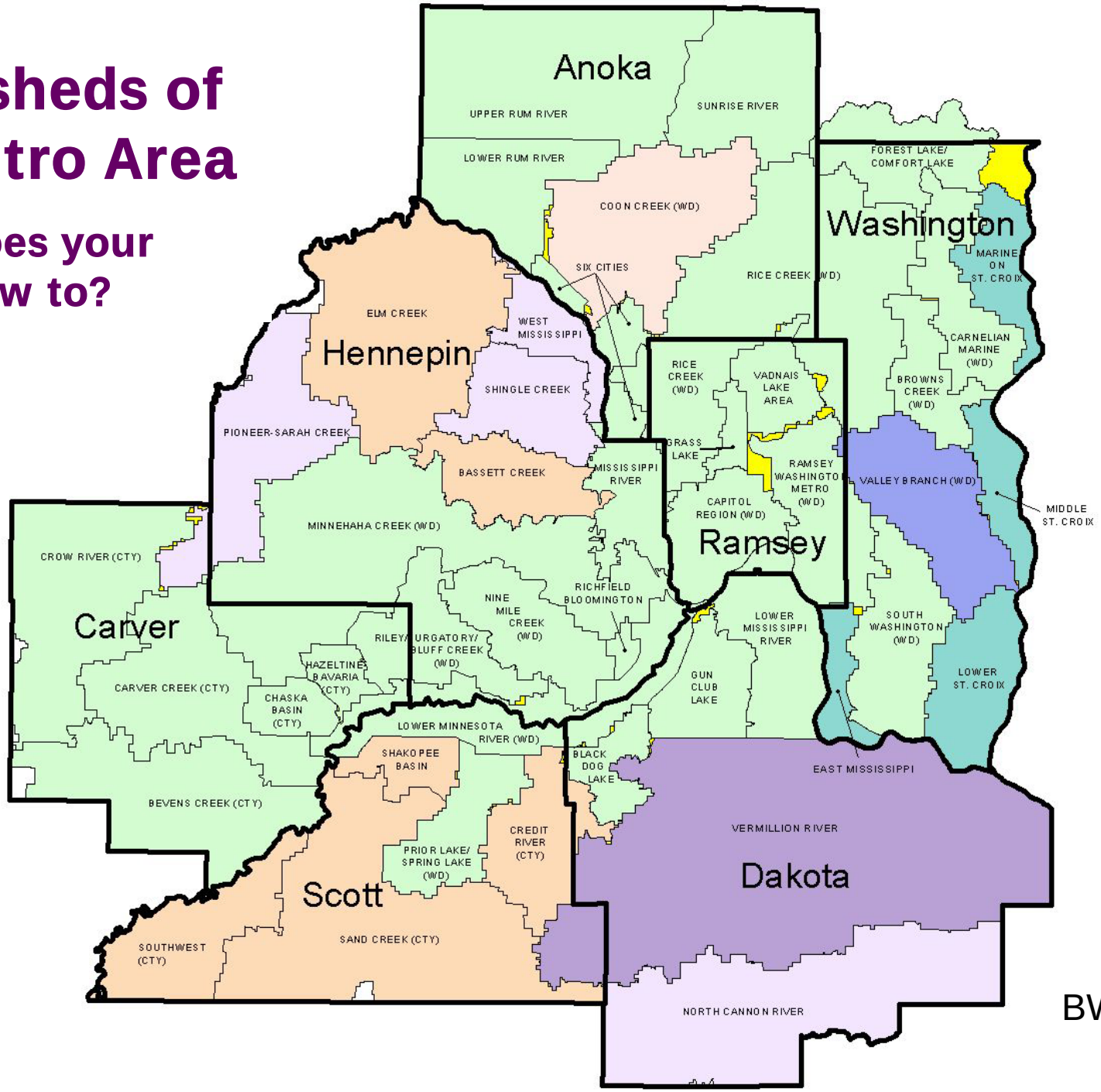
* Gunk= sediment, nutrients, bacteria, organic matter, oil, heavy metals, etc.


Franklin Pond
Increased amounts of runoff with sediment, nutrients and pollutants can disrupt natural processes
Did you know: One quart of motor oil can contaminate 250,000 gallons of water


Increased amounts of runoff with sediment, nutrients and pollutants can disrupt natural processes
Como Lake

Watersheds of the Metro Area

Where does your runoff flow to?

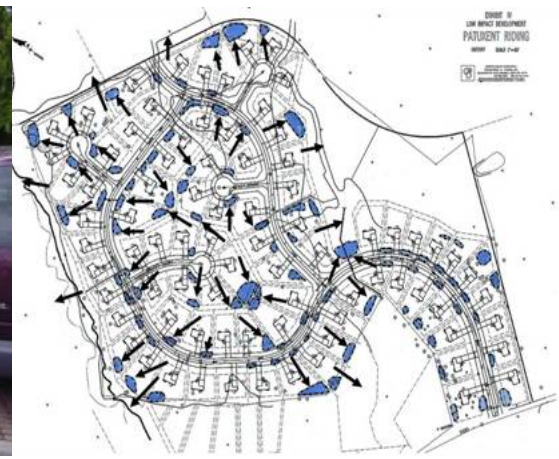


BWSR

What are BMPs?

- Best Management Practices –
  - Ways in which we try to minimize our impact on the environment.

Low Impact Development



The Low Impact Development Center, Inc.

MAPC

LID PRINCIPLES

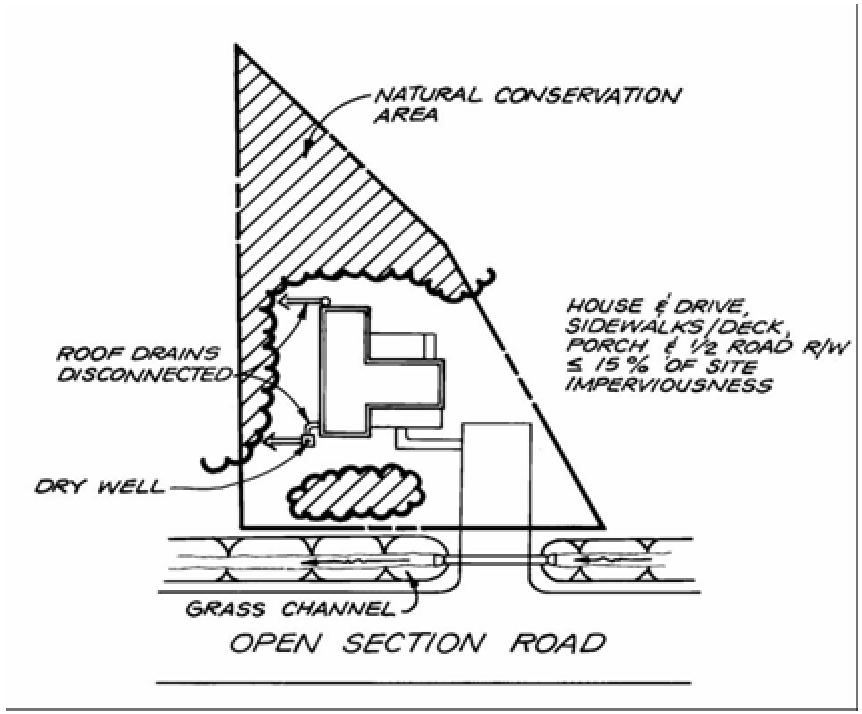
Use existing natural systems as the integrating framework for site planning

- Land use planning and watershed planning
- Identify environmentally sensitive resources:
  wetlands, mature trees, slopes, drainageways, permeable soils, waterway buffers
- Assess existing hydrology
- Define a development envelope

LID PRINCIPLES

Focus on prevention

- Minimize clearing and grading
- Cluster buildings and reduce building footprints
- Reduce road widths, use shared driveways, reduce parking area
- Align roads to minimize impact
- Use green rooftops
- Use permeable paving



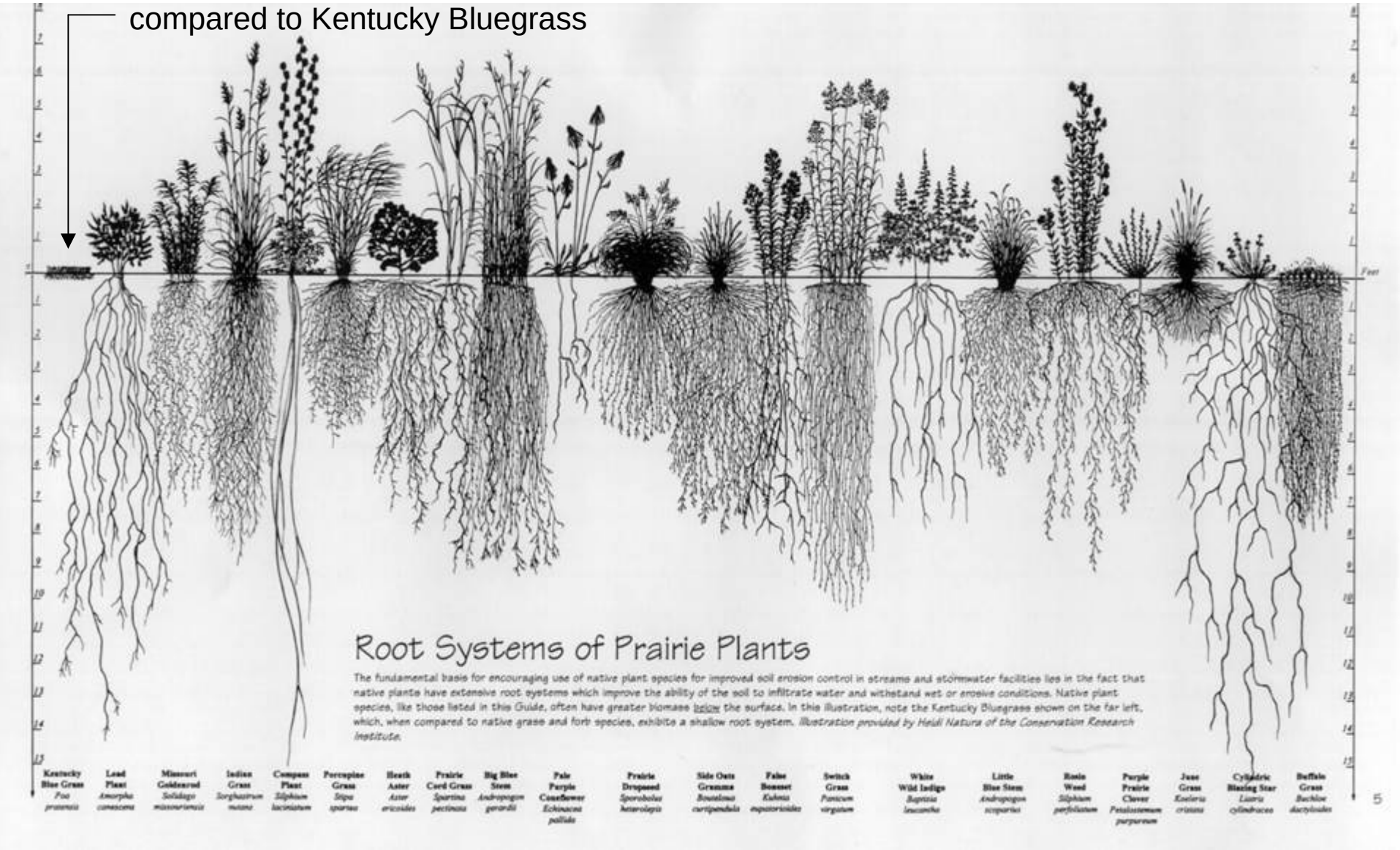
Blue Thumb

PLANTING FOR CLEAN WATER™

Native Gardens *Raingardens*

Native Shoreline Stabilization

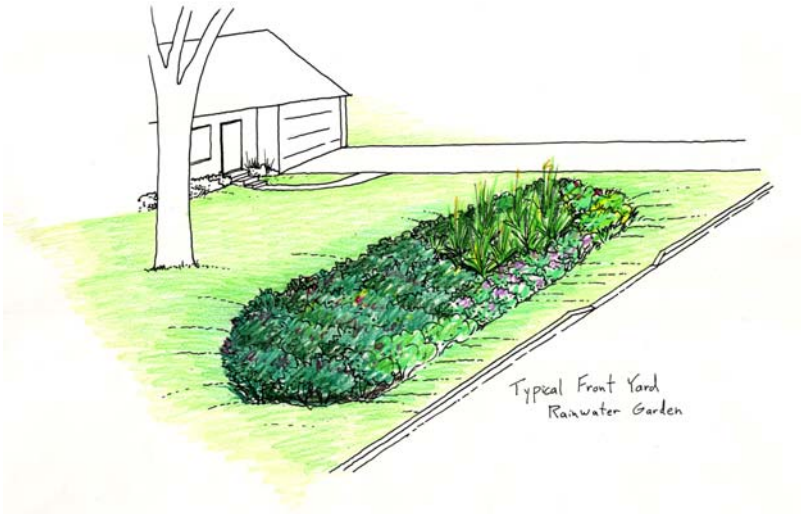
Roots of Native Prairie Plants



Conservation Research Institute and Heidi Natura

What are Rain Gardens?

- Shallow vegetated areas that are usually dry
- Use deep-rooted vegetation
- Designed to filter polluted runoff and enhance groundwater recharge
- Provides wildlife habitat
- Landscape amenity



Logo Courtesy MD DER

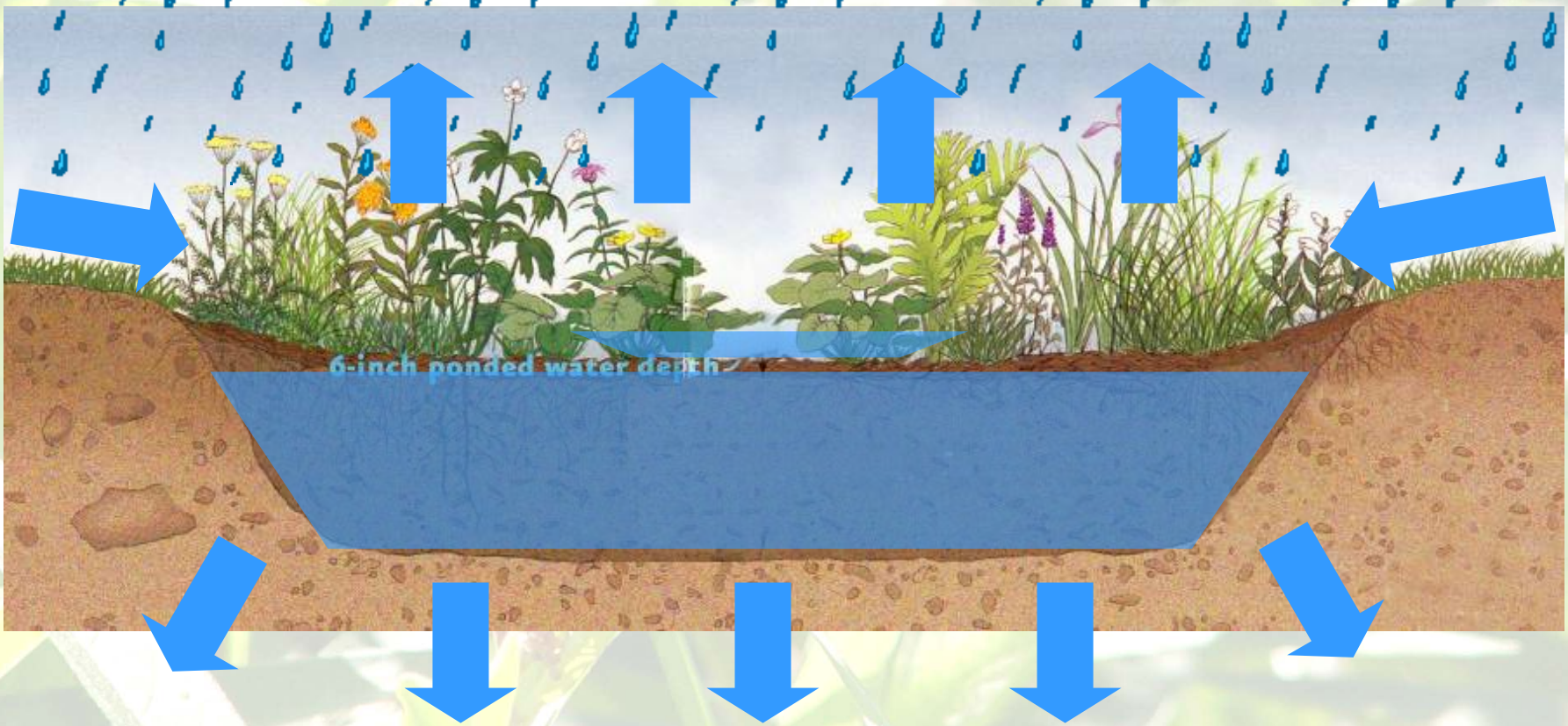
Why Raingardens?

City of Burnsville

Designed by: Barr Engineering

Raingardens

(Capturing Rainwater / Stormwater)



Just like a regular planting, but able to
absorb rainwater and breakdown pollutants

Concept - Gregg Thompson, Illustration - Taina Litwak, Animation - Ron Struss

Where would you put a raingarden?

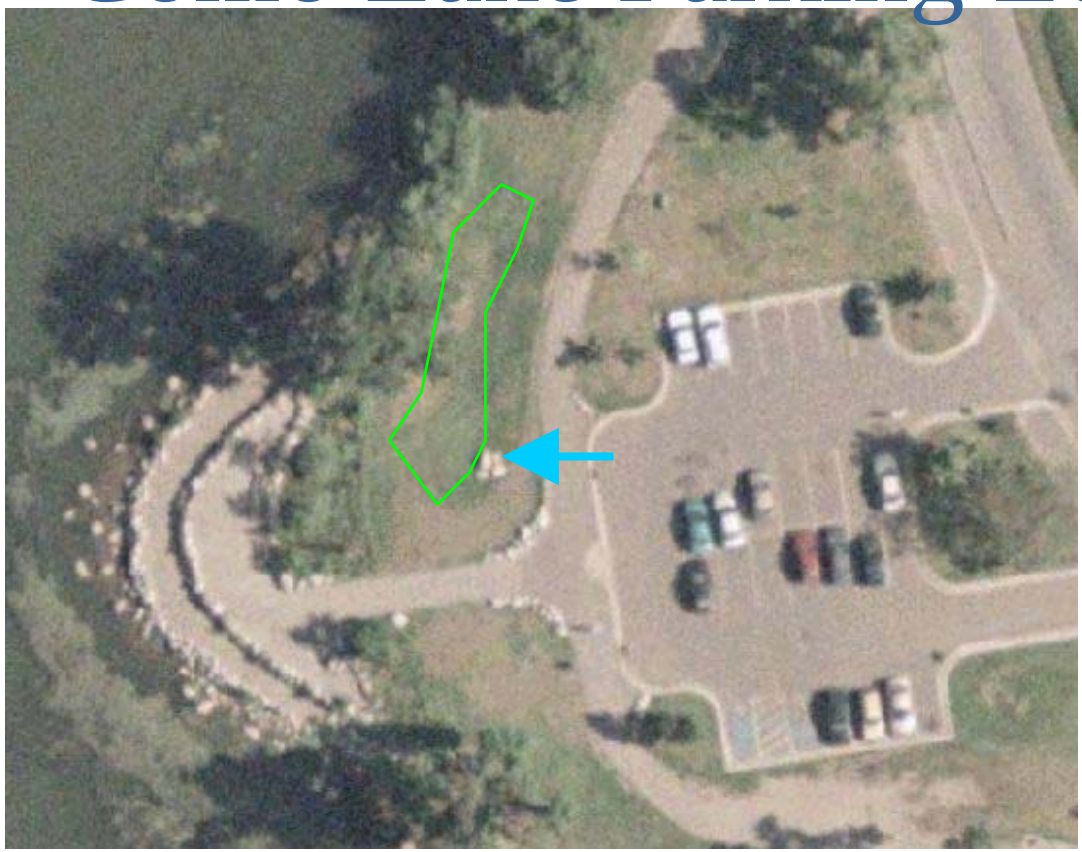
Total Rooftop Drainage Area = 660 sq ft

660 x 10% = 66 sq ft Raingarden Area

66 sq.ft. = 6’ x 11’ Raingarden


Where would you put a raingarden?

Como Lake Parking Lot Raingarden



Existing mown grass swale in parking lot area drainage area

Project Goal:

-filter & infiltrate parking lot runoff

-education opportunity for local residents / park users


Shredded Wood Mulch
Sediment Logs (wood-fiber)
Erosion-Control Blanket (coconut-fiber)
May 10, 2002


Shredded Wood Mulch
Beehive Inlet
Sediment Logs (wood-fiber)
Pipe Outlet
May 10, 2002

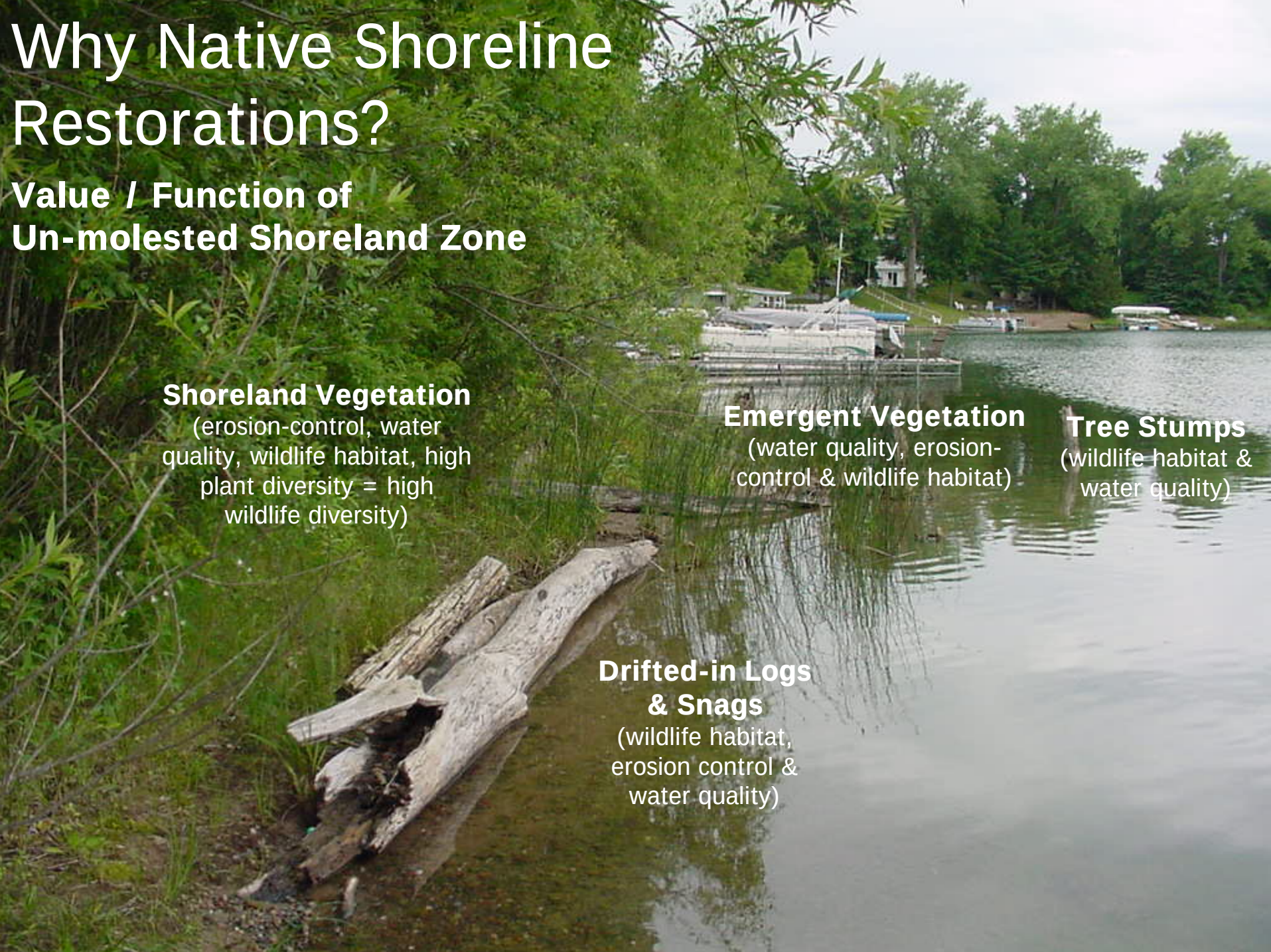

B
C


July 29, 2002


July 29, 2003

Why Native Shoreline Restorations?

Value / Function of Un-molested Shoreland Zone



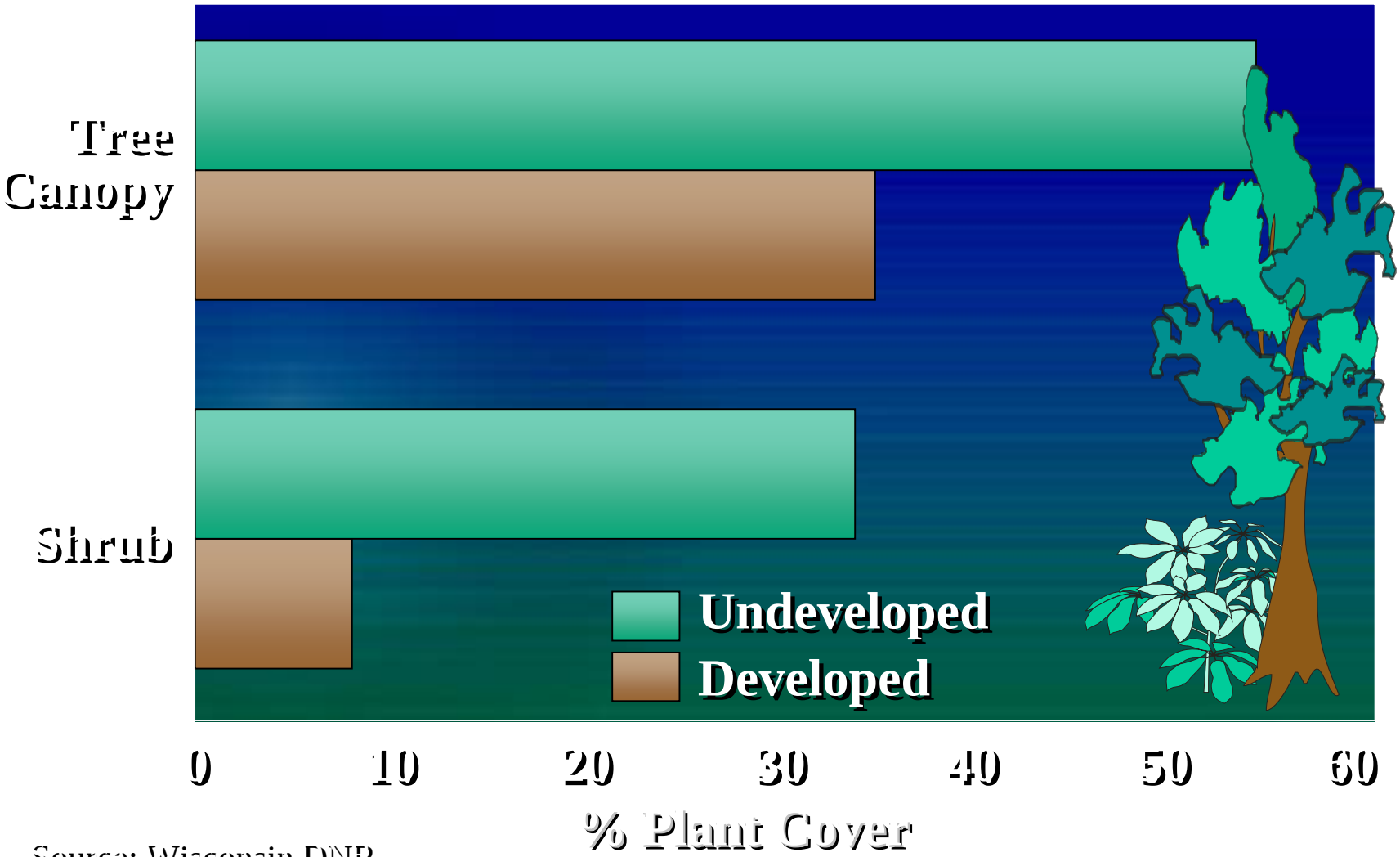
Shoreland Vegetation
(erosion-control, water quality, wildlife habitat, high plant diversity = high wildlife diversity)

Emergent Vegetation
(water quality, erosion-control & wildlife habitat)

Tree Stumps
(wildlife habitat & water quality)

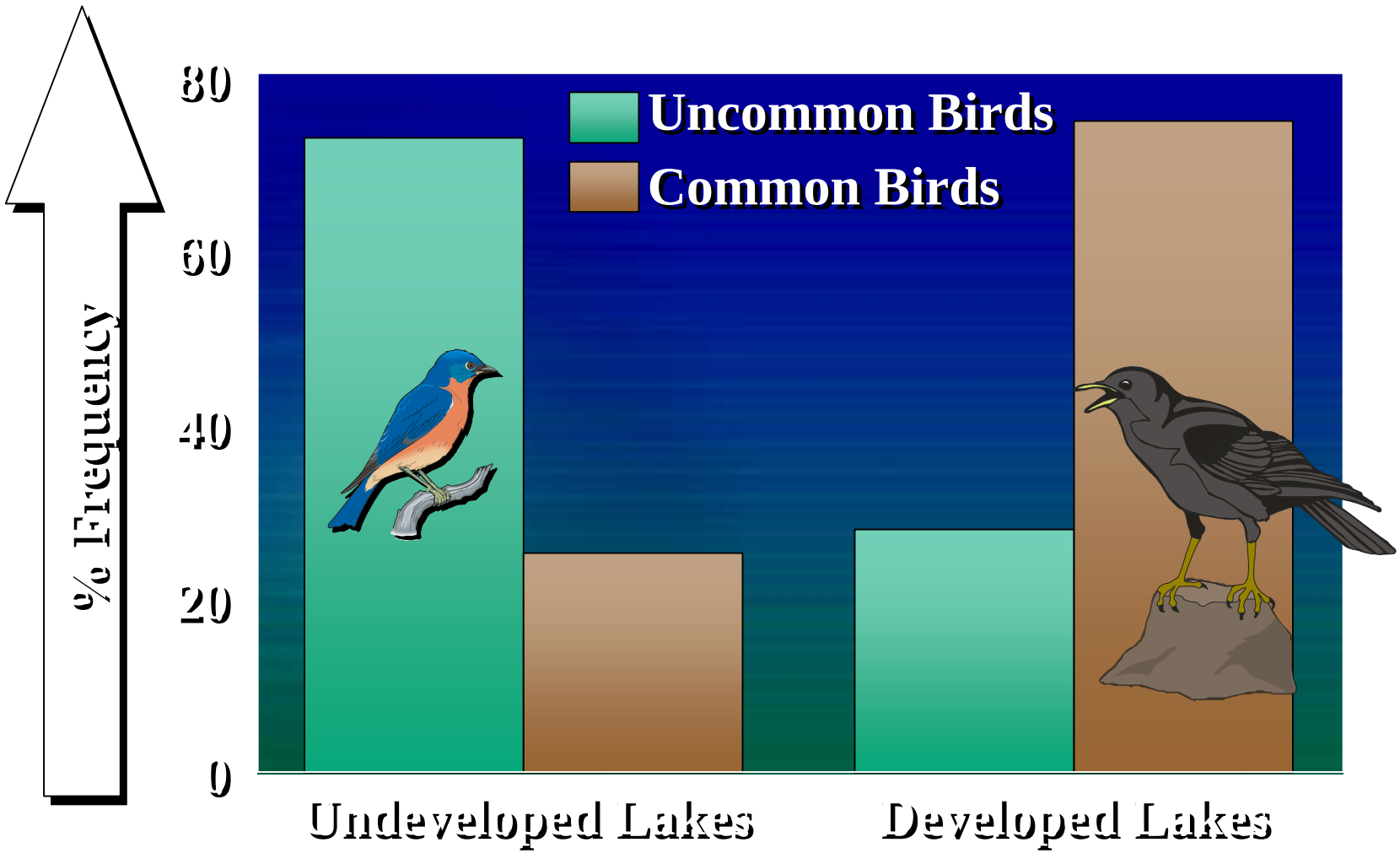
Drifted-in Logs & Snags
(wildlife habitat, erosion control & water quality)

What's Happened to Shoreland Plants?



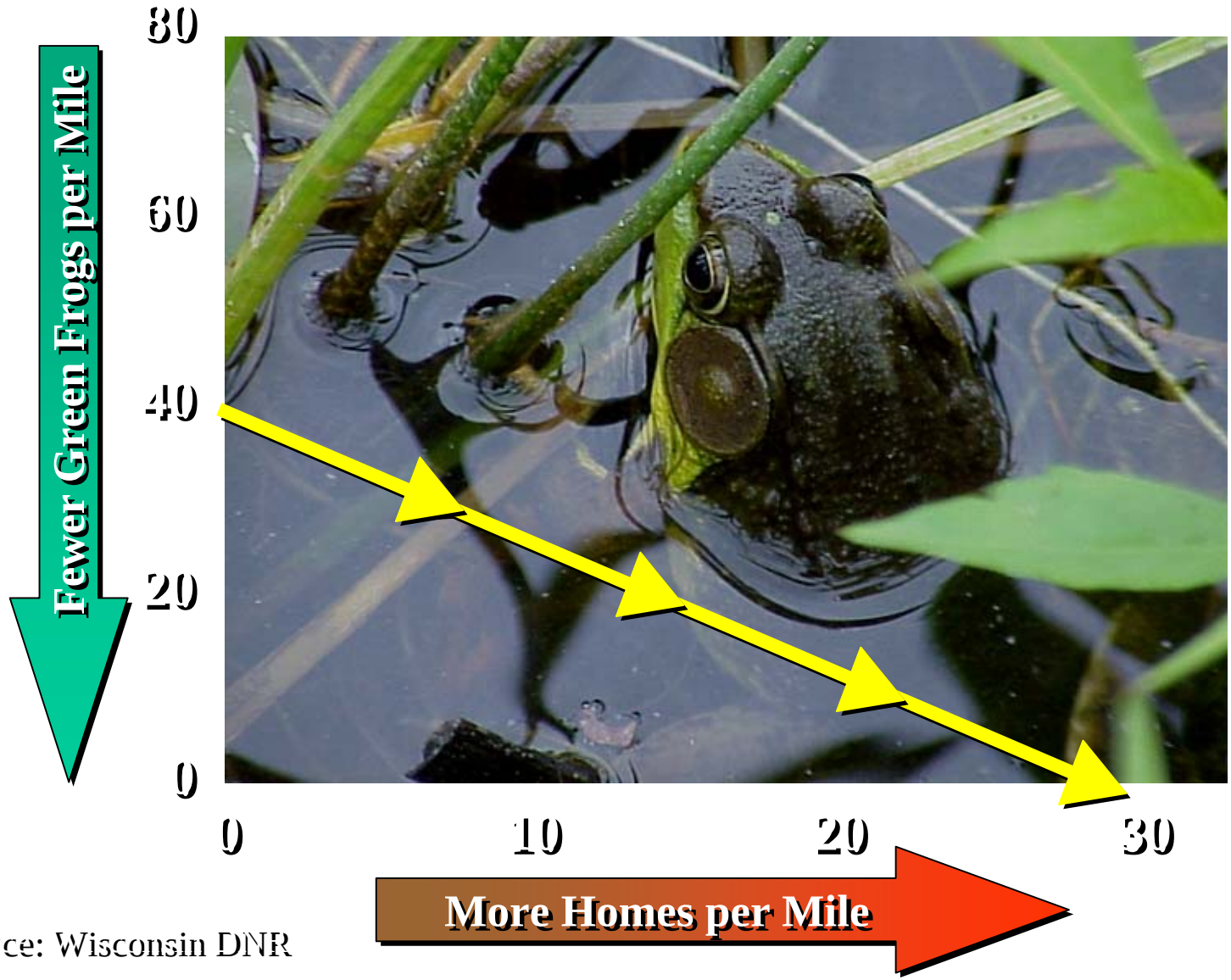
Source: Wisconsin DNR

What's Happened to Songbirds?



Source: Wisconsin DNR

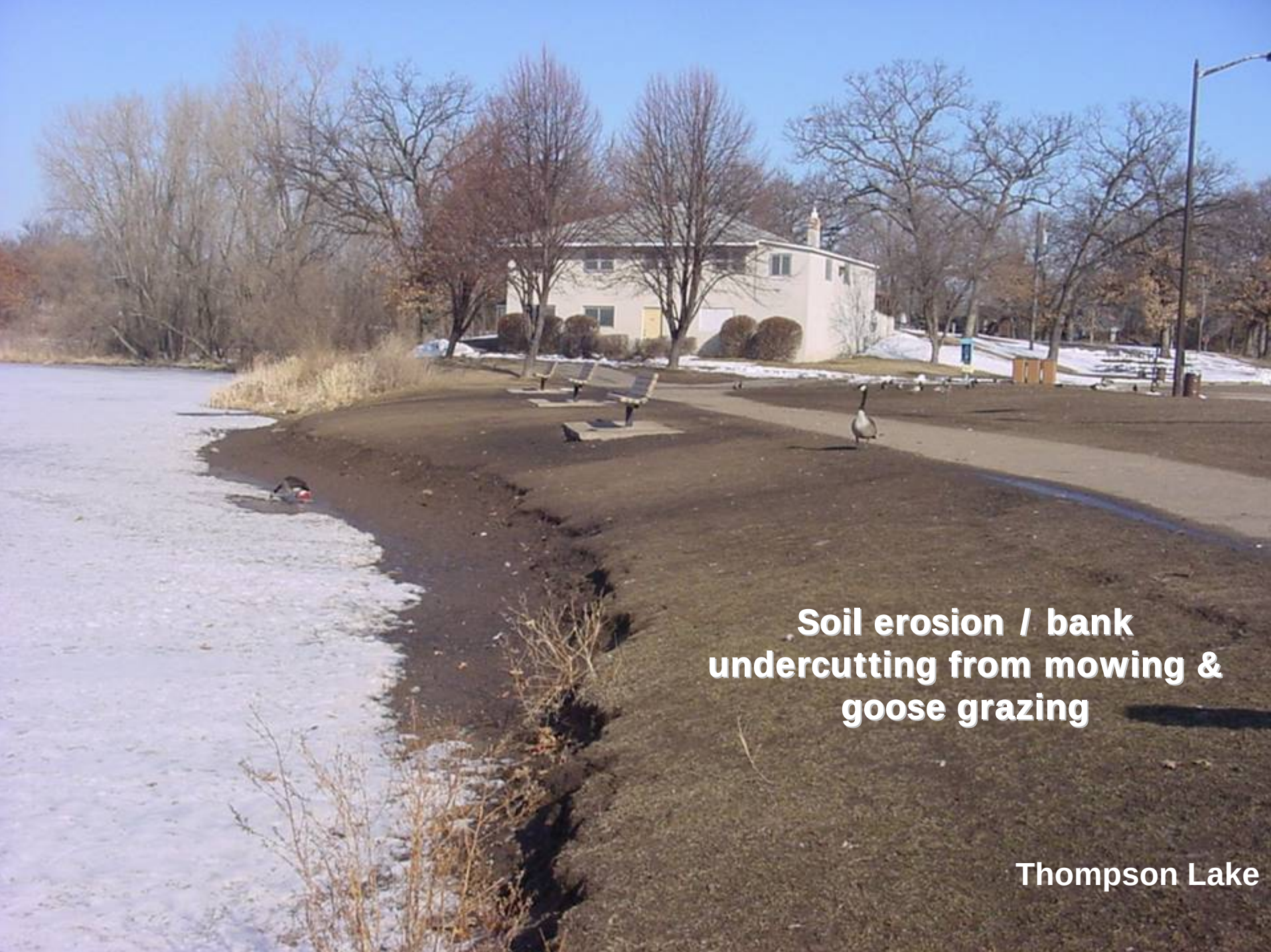
What's Happened to Frogs?



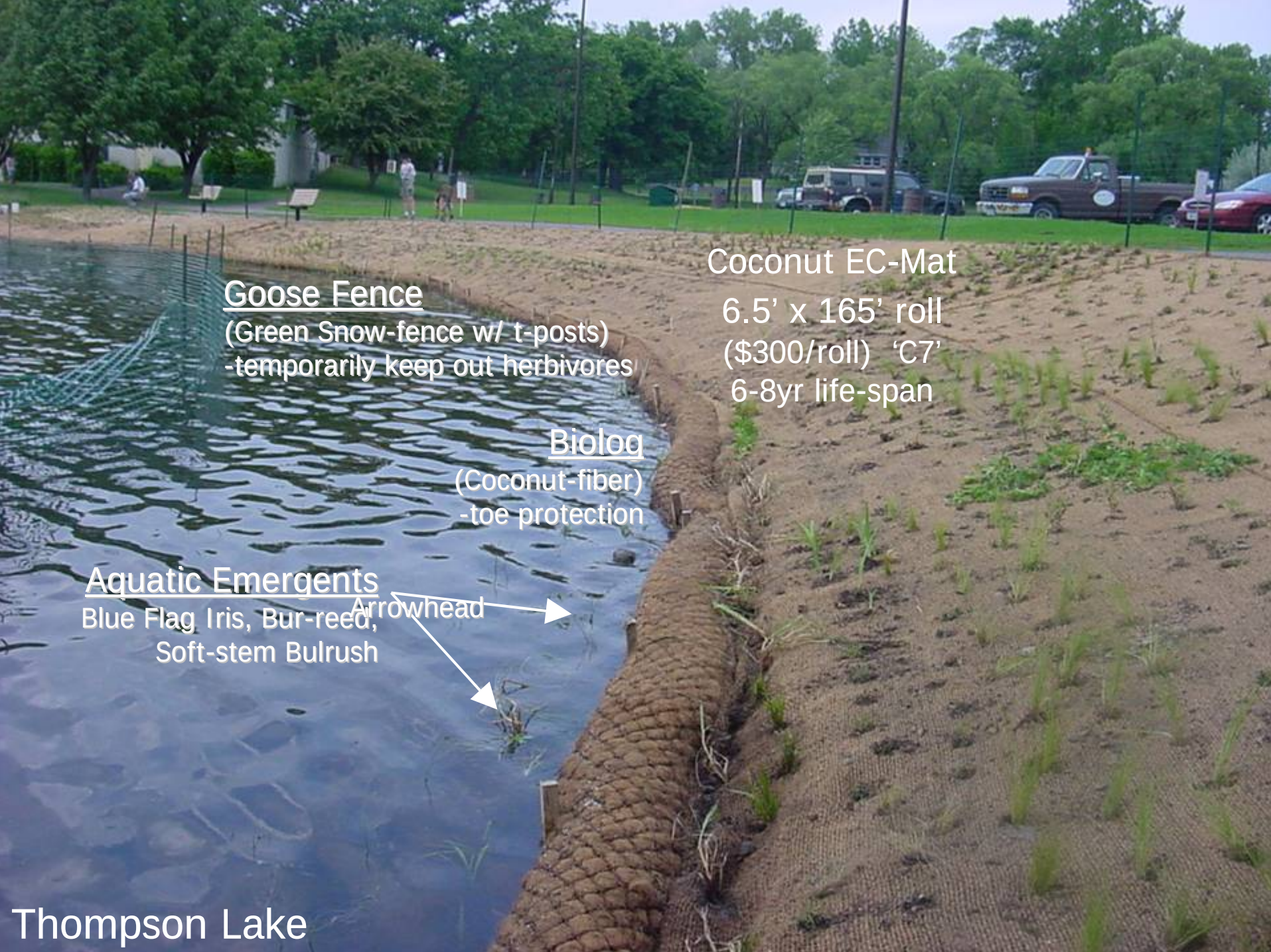
Source: Wisconsin DNR


. . . connection between land
and water . . .


Mowed shoreline vegetation provides ideal browsing habitat for waterfowl with wide field of view to watch for predators


Soil erosion / bank undercutting from mowing & goose grazing
Thompson Lake


Soil loss from mowing
to water's edge
Coon Lake


Goose Fence
(Green Snow-fence w/ t-posts)
-temporarily keep out herbivores
Coconut EC-Mat
6.5' x 165' roll
($300/roll) 'C7'
6-8yr life-span
Biolog
(Coconut-fiber)
-toe protection
Aquatic Emergents
Blue Flag Iris, Bur-reed,
Soft-stem Bulrush
Arrowhead
Thompson Lake

Thompson Lake – 1 yr after planting

Gustafson Residence

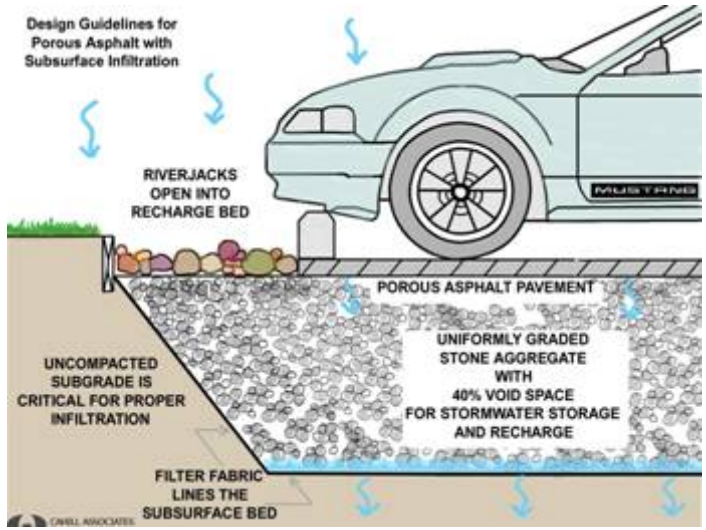
Lake Johanna – Ramsey County

photo by RCWD

Permeable Paving

Runoff reduction – up to 70-80%

- Grass pavers
- Paving stones
- Porous asphalt
- Pervious concrete



Rain Barrels

Benefits

- Outdoor water use can average 40 % of household consumption during the summer

Aesthetics are important culturally

All BMPs Can Be Designed for Aesthetic Appeal:

BORDERS

Brick Edging

Designed & Installed by:
Natural Shore Technologies


1904
MOWN
BORDER


Questions?

Acronyms

- TMDL: total maximum daily load
- MS4: municipal separate storm sewer system
- WLA: wasteload allocation
- LA: load allocation
- NPDES: National Pollutant Discharge Elimination System
- SWPPP: stormwater pollution prevention plan (construction) or stormwater pollution prevention program (municipal)
- BMP: best management practice