Rein in the Runoff

Spring Lake Stormwater Integrated Assessment Project

"Rein in the Runoff"

Joint Council Work Session
February 16, 2009

Elaine Sterrett Isely
Alan D. Steinman
Annis Water Resources Institute
Grand Valley State University

Grand Valley State ANNIS WATER RESOURCES INSTITUTE Lake Michigan Center

Sea Grant Michigan

ECT Environmental Consulting & Technology, Inc.

Agenda

Rein in the Runoff

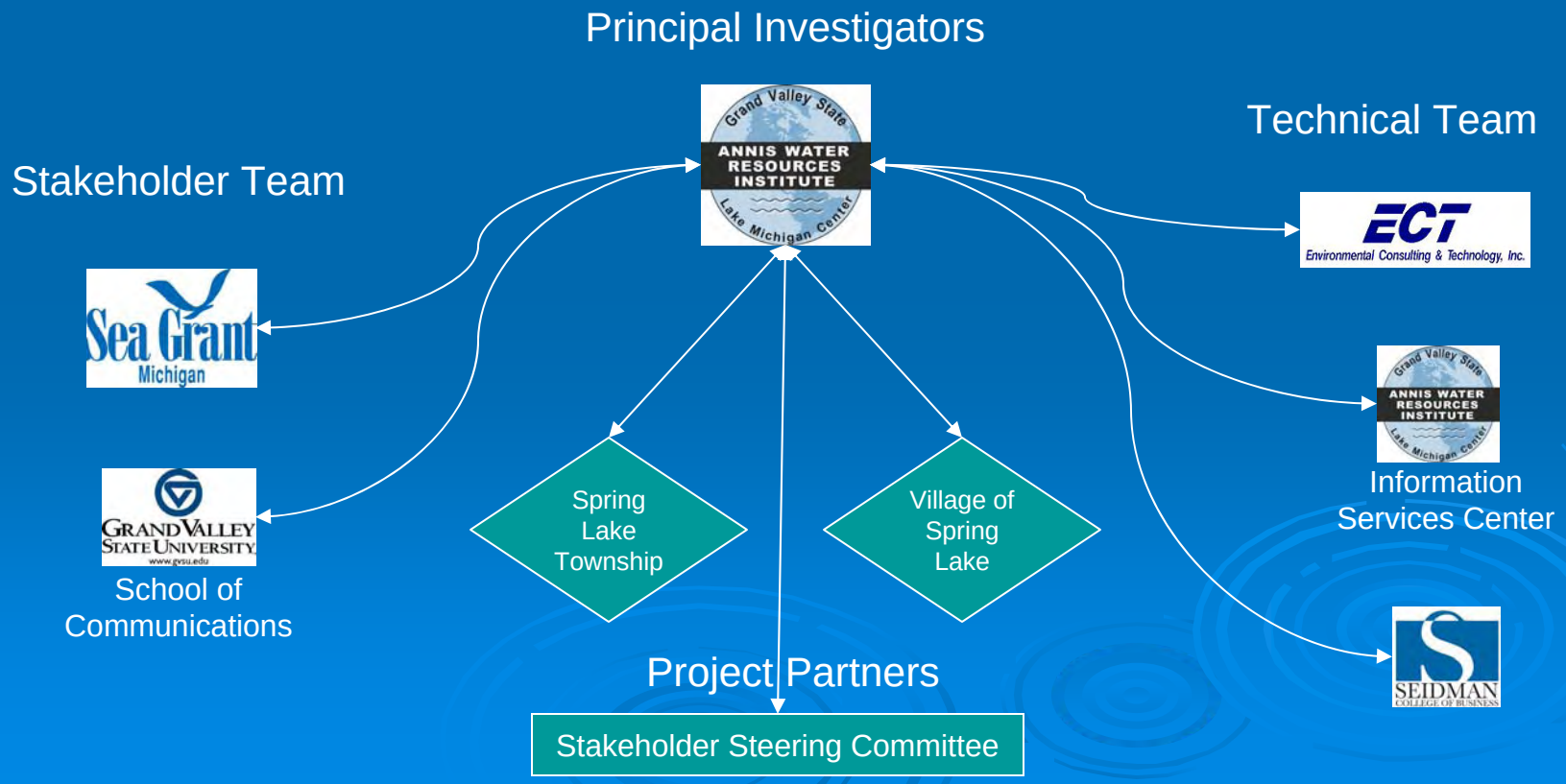
Logo design compliments of Shane VanOosterhout, Kendall College of Art & Design, Grand Rapids, MI

Photo credit: D. O'Keefe

- Project Overview (15 min.)
- Best Management Practices (BMPs) (5 min.)
- Stormwater Management Ordinance Review (60 min.)

What is Rein in the Runoff?

- Integrated Assessment of stormwater management alternatives in Spring Lake Watershed
- Multidisciplinary project team



Integrated Assessment

- Application of existing scientific information
- Education and involvement of stakeholders
- To answer policy issue or question

Policy Question

What stormwater management alternatives are available to the municipalities surrounding Spring Lake that allow for future development and also mitigate the impacts of stormwater and improve the quality of Spring Lake, the Grand River and Lake Michigan?

Photo credits: E. Isely

Why do we care about stormwater?

- Stormwater discharges are generated by runoff from land and impervious surfaces during rain and snow events
  - Paved streets
  - Sidewalks
  - Parking lots
  - Driveways
  - Building rooftops

Photo credit: E. Isely

Photo credit: B. Raymond

Stormwater Impacts

- Impervious surfaces increase runoff volume, velocity and pollutants
- Reduce recharge to aquifers
- Increase erosion and sedimentation
- Potentially toxic to stream biota

Photo credit: A. Steinman

Photo credit: E. Isely

i

Photo credit: C. Morse (Muskegon Chronicle)

1978 Land Use and Cover
Spring Lake Watershed

Muskegon County
Ottawa County

Muskegon County
Ottawa County

Lake Michigan

Legend

Land Use and Cover

- Bare/sparsely vegetated
- Commercial/industrial/transportation
- Coniferous forest
- Cropland and pasture
- Deciduous forest
- Emergent herbaceous wetlands
- Herbaceous open land/grasslands
- Mixed forest
- Orchards/vineyards/other
- Other agricultural land
- Residential
- Shrub/low-density trees
- Urban/recreational grasses
- Water
- Woody wetlands

Data Sources:
1978 Land Use and Cover - Michigan Resources Information System (MIRIS): Michigan Department of Natural Resources, Land and Water Management Division

Base Information - Michigan Center for Geographic Information, Department of Information Technology, 2008

0 0.5 1 2 3 4 Miles

0 0.5 1 2 3 4 Kilometers

Information Services Center
Annis Water Resources Institute
Grand Valley State University

Map Prepared: September 2008

2006 Land Use and Cover
Spring Lake Watershed

Muskegon County
Ottawa County

Muskegon County
Ottawa County

Norris Creek

Vincent Creek

Spring Lake

Lake Michigan

Legend

Land Use and Cover

- Bare/sparsely vegetated
- Commercial/industrial/transportation
- Coniferous forest
- Cropland and pasture
- Deciduous forest
- Emergent herbaceous wetlands
- Herbaceous open land/grasslands
- Mixed forest
- Orchards/vineyards/other
- Other agricultural land
- Residential
- Shrub/low-density trees
- Urban/recreational grasses
- Water
- Woody wetlands

Data Sources:
2006 Land Use and Cover - AWRI-GVSU Updated using 2006 National Agricultural Imagery Program (NAIP) Digital Orthophotograph with AWRI-GVSU 1992-97 Land Use and Cover Data

Base Information - Michigan Center for Geographic Information, Department of Information Technology, 2008

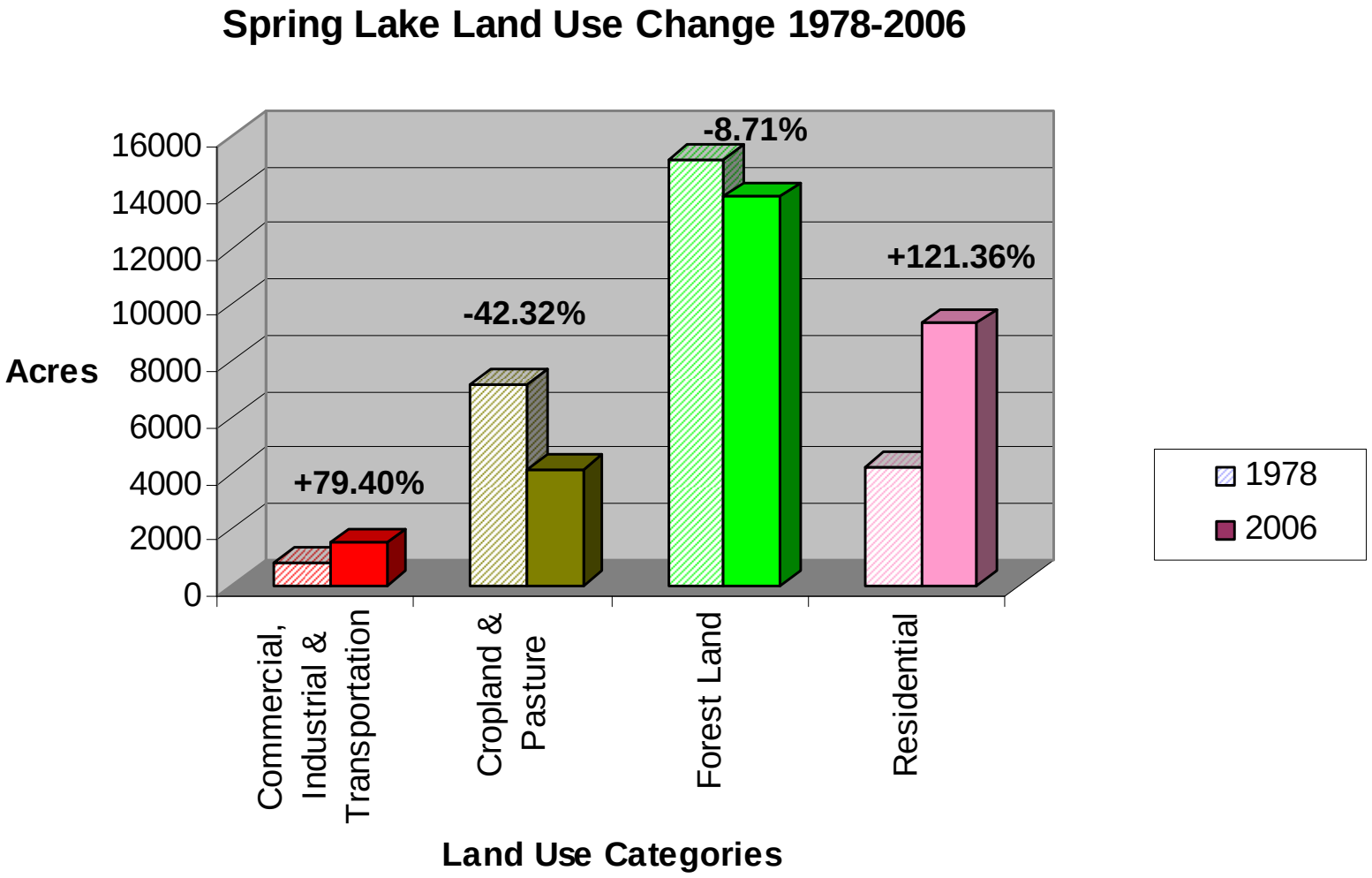
0 0.5 1 2 3 4 Miles

0 0.5 1 2 3 4 Kilometers

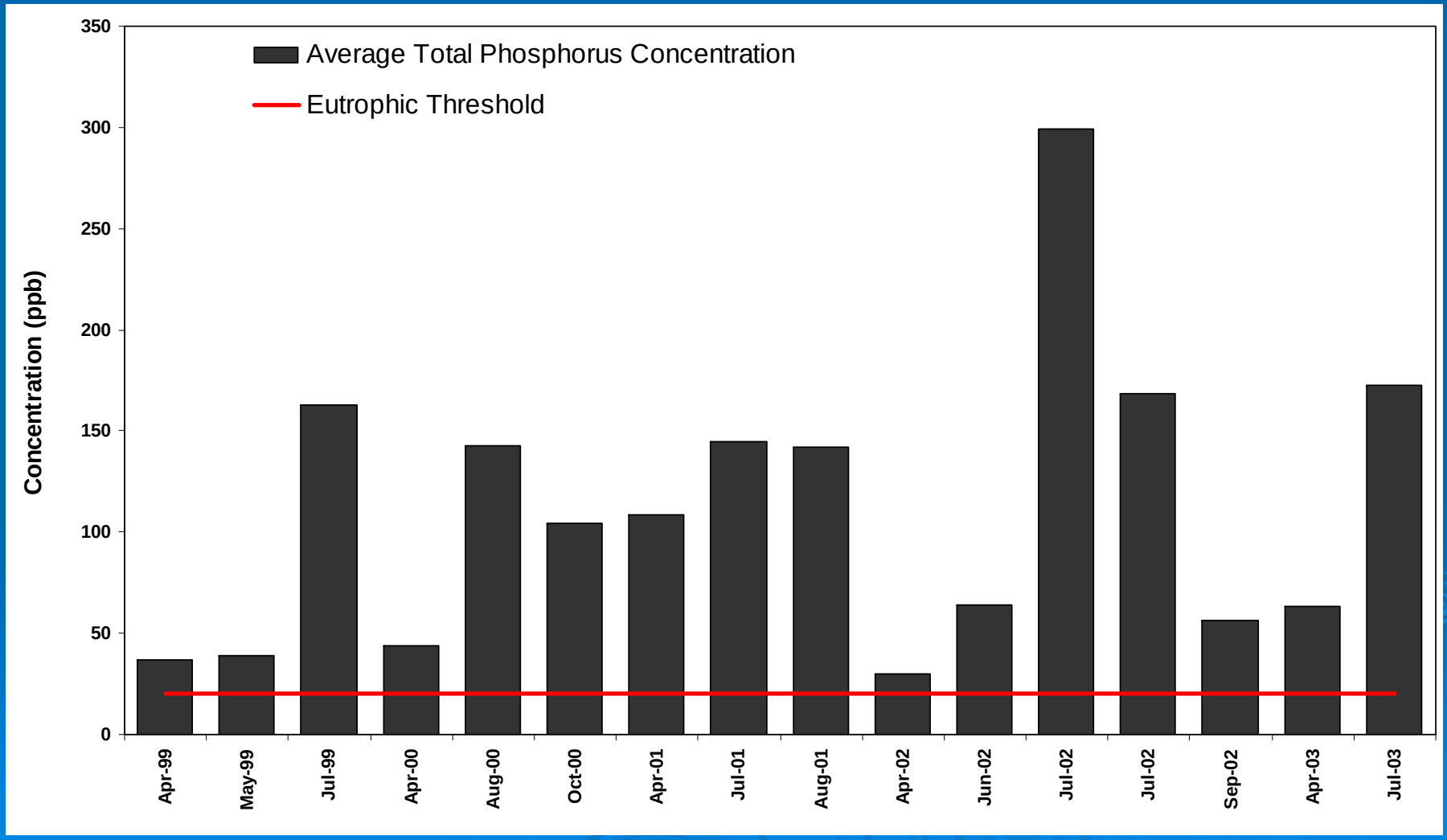
Information Services Center
Annis Water Resources Institute
Grand Valley State University

Map Prepared: September 2008

Land Use Change



Total Phosphorus: Spring Lake



Data courtesy of Progressive AE


Photo credit: Spring Lake Lake Board

Alum Treatment

Photo credit: AWRI

Photo credit: Progressive AE

- Reduced release of phosphorus from sediments
- Reduced total phosphorus levels in water column
- No effect on algal biomass
- Did not address new nutrient and other stormwater inputs

Steinman, A.D. and M. Ogdahl. 2008. Ecological Effects after an Alum Treatment in Spring Lake, Michigan. Journal of Environmental Quality 37:22-29.

Project Objectives

- Increase understanding of the causes and consequences of stormwater runoff
- Increase stakeholder participation in stormwater control and management
- Identify regulatory mechanisms to improve local stormwater management and control
- Recommend alternative BMPs for stormwater management

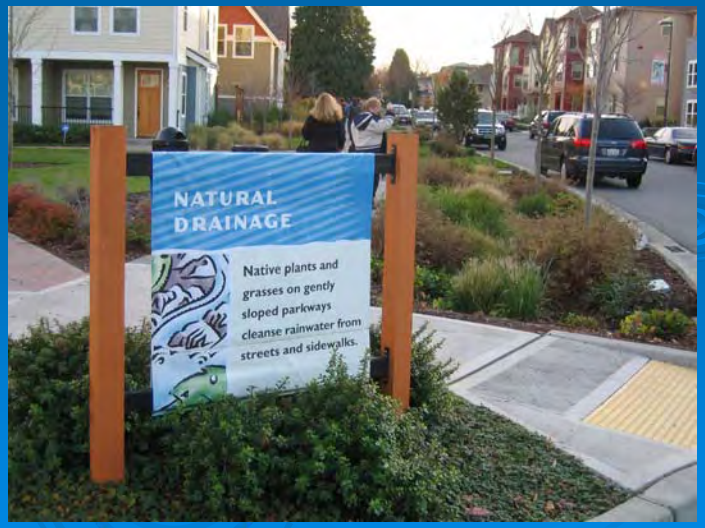
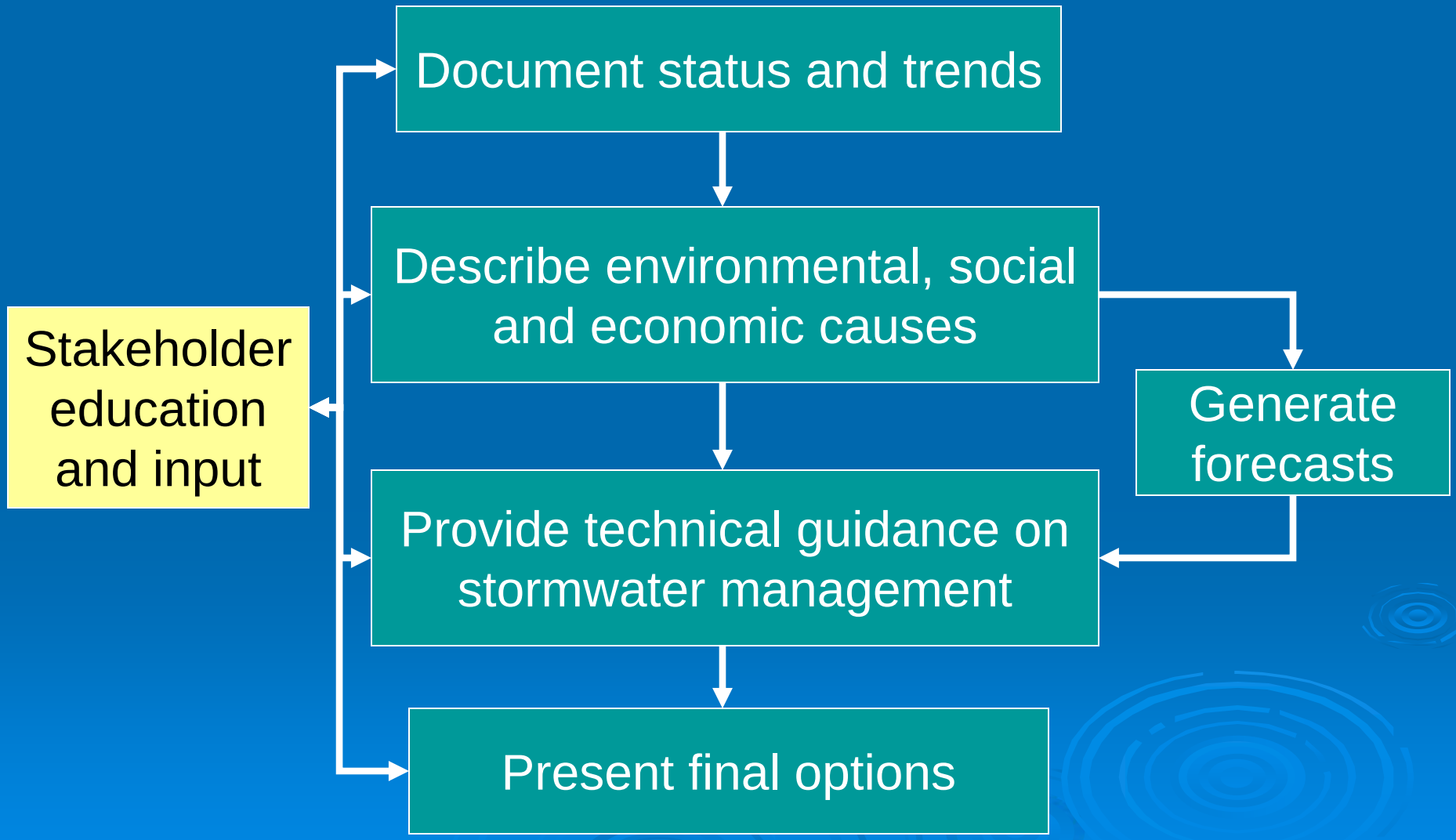


Photo credits: E. Isely

Project Tasks



Stakeholder Process

- Stakeholder Steering Committee
- Project Name
- Project Logo
- Water Quality Survey
- Project Flyers and newsletters postings
- Ongoing project input
- Review of final integrated assessment

Photo credits: E. Isely

Online Resources

http://www.gvsu.edu/wri/reinintherunoff

WHAT CAN YOU DO TO REDUCE STORMWATER POLLUTION?

- **Cars and boats**
  - Maintain your vehicles so that they do not leak oil or other fluids.
  - Be sure to wash vehicles on the grass or at a designated car or boat wash so that dirt and soap do not flow into our storm drains and waterways; even biodegradable cleaning products can still be toxic to fish and stimulate algae growth.
- **Yards and gardens**
  - Apply only the recommended amount of fertilizer.
  - Never apply fertilizers or pesticides before a heavy rain.
  - If fertilizer falls onto driveways or sidewalks, sweep it up instead of hosing it away.
  - Mulch leaves and grass clippings and place in the yard at the curb - not in the street. This keeps leaves out of the gutter, where they can wash into the water or storm drain.
  - Turn your gutter downspouts away from hard surfaces.
  - Seed bare spots in your yard to avoid erosion.
  - Consider building a rain garden in low-lying areas of your lawn.
  - Use captured rainwater to water your garden.

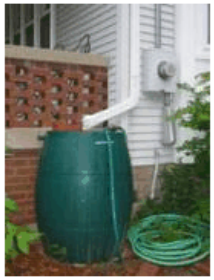
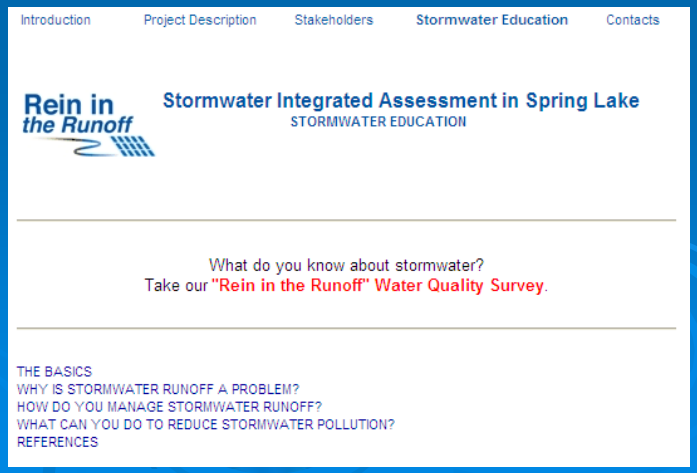


Photo credit: E. Sterrett Isely

- **Septic systems**
  - Proper maintenance includes having your septic system pumped every three (3) to five (5) years.
  - For older systems, make sure it can still handle current volumes.
  - Never put chemicals down your septic system. This can harm the system and seep into the groundwater.
- **Pets**
  - Clean up after your pet on walks and in your yard.
  - Dispose of all pet waste in the garbage.
- **Chemicals**
  - Keep lawn and household chemicals in tightly-sealed containers, where rain cannot reach them.
  - Dispose of old or unwanted chemicals at household hazardous waste collection sites or events.
- **Other**
  - Never put anything in a storm drain.
  - Don't litter.



Technical Guidance

The primary way to control stormwater discharges is through the use of Best Management Practices (BMPs)

Photo credit: E. Isely

Photo credit: greenroofs.com

Photo credit: E. Isely

Structural BMPs

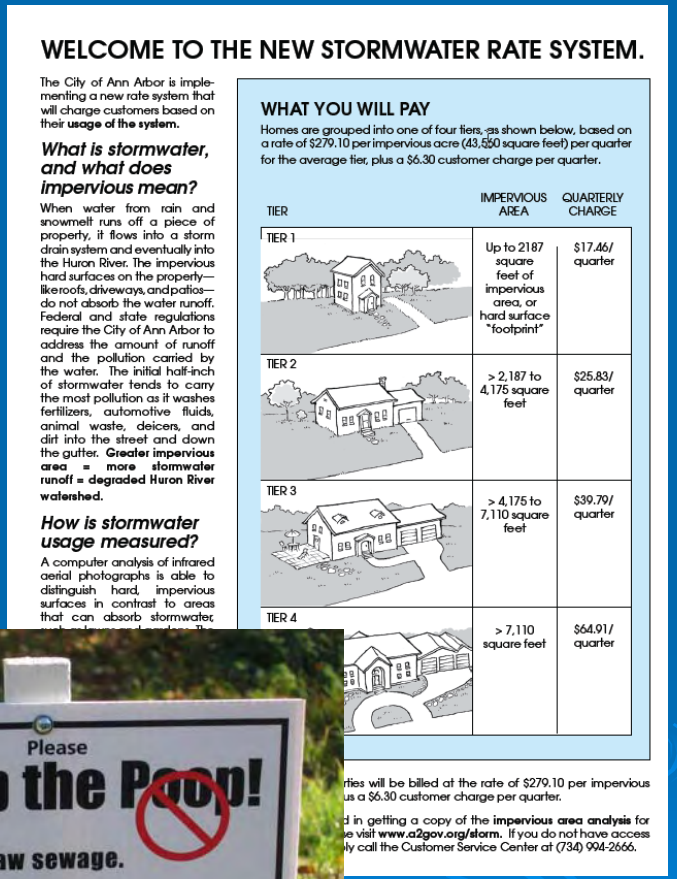
Photo credits: E. Isely

- Riparian and lake-front buffers
  - Agricultural areas
  - Lake-front dead end roads
- Vegetative/infiltration swales
  - Along roads with existing swales
- Regional storage/infiltration
  - Public properties
- Cisterns/rain barrels
- Rain gardens
  - Neighborhood wide project
- Porous streets and sidewalks

Photo credits: E. Isely

Non-Structural BMPs

- Ordinances
  - Stormwater
  - Riparian buffers
  - Wetlands/woodlands protection
  - Fertilizer
- Good housekeeping practices
  - Regular street sweeping
- Stormwater utility



WELCOME TO THE NEW STORMWATER RATE SYSTEM.

The City of Ann Arbor is implementing a new rate system that will charge customers based on their **usage of the system.**

What is stormwater, and what does impervious mean?

When water from rain and snowmelt runs off a piece of property, it flows into a storm drain system and eventually into the Huron River. The impervious hard surfaces on the property—like roofs, driveways, and patios—do not absorb the water runoff. Federal and state regulations require the City of Ann Arbor to address the amount of runoff and the pollution carried by the water. The initial half-inch of stormwater tends to carry the most pollution as it washes fertilizers, automotive fluids, animal waste, deicers, and dirt into the street and down the gutter. **Greater impervious area = more stormwater runoff = degraded Huron River watershed.**

How is stormwater usage measured?

A computer analysis of infrared aerial photographs is able to distinguish hard, impervious surfaces in contrast to areas that can absorb stormwater,

WHAT YOU WILL PAY

Homes are grouped into one of four tiers, as shown below, based on a rate of $279.10 per impervious acre (43,560 square feet) per quarter for the average tier, plus a $6.30 customer charge per quarter.

TIER	IMPERVIOUS AREA	QUARTERLY CHARGE
TIER 1	Up to 2187 square feet of impervious area, or hard surface "footprint"	$17.46/ quarter
TIER 2	> 2,187 to 4,175 square feet	$25.83/ quarter
TIER 3	> 4,175 to 7,110 square feet	$39.79/ quarter
TIER 4	> 7,110 square feet	$64.91/ quarter

...rties will be billed at the rate of $279.10 per impervious ...us a $6.30 customer charge per quarter.

...d in getting a copy of the **impervious area analysis** for ...e visit **www.a2gov.org/storm.** If you do not have access ...ly call the Customer Service Center at (734) 994-2666.

Photo credits: E. Isely

BMP Matrix

	Bioretention/Rain Gardens	Vegetated/Bio Swales	Grow Zones
Description	Shallow landscaped surface depressions designed to infiltrate and/or filter stormwater	Stormwater conveyance channel designed to filter and/or infiltrate stormwater	Native planting area
Detail	Shallow landscaped surface depressions; recommended to use deep-rooted native plants; underdrain and mechanism to direct overflow runoff is necessary; should be located at least 10' from any building.	Shallow stormwater channel that is densely planted with a variety of grasses, shrubs, and/or trees. Check dams can be used to improve performance and maximize infiltration, especially in steeper areas.	A grow zone is an upland and/or riparian native planting area.
Where Effective	Roof runoff from residential / commercial areas; parking lots (use curb cuts to direct stormwater runoff to depressed areas and/or consider "inverted" islands rather than landscaped islands.	Vegetated swales typically treat runoff from highly impervious surfaces such as roadways and parking lots.	Parks, riparian corridors and other areas that are currently maintained as mowed lawn but may not be actively used or accessed. Grow zones are excellent opportunities for reducing local maintenance costs by converting turf (or impervious) areas to deep-rooted native vegetation.

Costs/Benefits of BMPs

- Cost data for BMP installation and maintenance
- Values associated with improved water quality
  - Real estate values
  - Recreation and aesthetic values
- Savings associated with decreased water treatment and supply

Photo credit: Progressive AE

Current Ordinances

	Spring Lake Township	Spring Lake	Ferrysburg
Stormwater Ordinance	Yes	Yes	Yes
Low Impact Development Ordinance	Yes	No	No
Illicit Discharge/Connections Ordinance	Yes	Yes	??
Fertilizer Ordinance	Yes	Yes	Yes
Animal Waste Ordinance	Yes	Yes	Yes
Flood Prevention	Yes	Yes	Yes
Wetlands Ordinance	Yes	Yes	No
Watercourse/Natural Resource Setback	Draft	Yes	No
Tree/Woodland Protection	Yes	No	No
Native Vegetation	Yes	No	Yes
Stormwater Utility Ordinance	No	No	No

Discussion

- Proposed Stormwater Ordinance
- Proposed Stormwater Utility Ordinance

Photo credits: Progressive AE

Photo credits: B. Raymond

Proposed Stormwater Ordinance

- Article I. General Provisions (p1)
- Article II. Definitions (p4)
- Article III. Stormwater Permits (p9)
- Article IV. Stormwater System, Floodplain and Other Standards, Soil Erosion (p15)
- Article V. Prohibitions and Exemptions (p18)
- Article VI. Performance and Design Standards, Best Management Practices (BMPs) (p20)
- Article VII. Inspection, Monitoring, Reporting, and Record Keeping (p23)
- Article VIII. Stormwater Management Easement and Maintenance Agreements (p24)
- Article IX. Enforcement (p26)
- Article X. Other Matters (p28)

Stormwater Utility Ordinance 1

- Article I. General Provisions
- Article II. Stormwater Management Fund
- Article III. Classification of Property: Rates and Charges
- Article IV. Enforcement

Photo credit: Progressive AE

Photo credit: E. Isely

Stormwater Utility Ordinance 2

- Base stormwater discharge rate for commercial properties is $309.79 per impervious acre per quarter
- Exceptions for Single-Family and Two-Family Residential properties
- Credits applied for stormwater BMPs (rain barrels, rain gardens, cisterns, dry wells, etc.)

Measured Impervious Area	Representative Impervious Area	Quarterly Charge
< 2,187 sq ft	0.04 acres	$19.16
2,187–4,175 sq ft	0.07 acres	$28.46
4,175-7,110 sq ft	0.12 acres	$43.94
> 7,110 sq ft	0.21 acres	$71.83

Questions??

Elaine Sterrett Isely
iselyel@gvsu.edu
(616) 331-8788

Alan Steinman
steinmaa@gvsu.edu
(616) 331-3749