

# Spring Lake Stormwater Integrated Assessment Project

## Rein in the Runoff

### Stakeholder Steering Committee Meeting

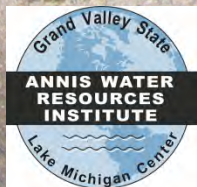
September 30, 2008

Elaine Sterrett Isely

Alan D. Steinman

Annis Water Resources Institute

Grand Valley State University



# Agenda

- ❖ Project Review (5 min.)
- ❖ Stakeholder Update (20 min.)
- ❖ Technical Update (20 min.)
- ❖ Wrap-Up (5 min.)



Photo credit: E. Isely



Photo credit: AWRI

# Integrated Assessment

- ❖ Applying existing scientific information
- ❖ Educating and involving stakeholders
- ❖ Our policy question:
  - Stormwater management alternatives
  - Allowing for future development
  - Mitigate impacts
  - Improve water quality

# Project Work Plan

1. Step 1: Document status/trends of stormwater problem
  - ✓ Examine existing datasets and information
  - ❑ Identify the scope of the stormwater problem in Spring Lake watershed
  - ✓ Develop conceptual ecological model
  
2. Step 2: Describe environmental, social, economic causes
  - ✓ Presentations to stakeholders
  - ✓ Stakeholder Steering Committee
  - ❑ Public meetings (Ongoing)
  - ❑ Feedback and input (Ongoing)
  
3. Step 3: Generate forecasts
  - ✓ Model simulations (PAM, L-THIA, Pload)
  - ❑ Stakeholders review future development scenarios
  - ❑ Develop menu of site-specific BMPs
  
4. Step 4: Provide technical guidance implementing BMPs
  
5. Step 5: Present final options
  - ❑ Review and revise findings
  - ❑ Final report and presentations



Photo credit: E. Isely

# Stakeholder Steering Committee



Photo credit: E. Isely

- ❖ Quarterly project update meetings
- ❖ Assistance in promoting project goals
- ❖ Assistance in identifying stormwater opportunities and challenges

❖ Input and review of project goals, progress and products

# Project Website

❖ <http://www.gvsu.edu/wri/reininth runoff>

## ❖ Web-Pages

- Introduction
- Project Description
- Stakeholders
- Stormwater Education page

- Water Quality Survey:  
<http://www.gvsu.edu/wri/waterqualitysurvey>

The screenshot displays the website for the Annis Water Resources Institute (AWRI) at Grand Valley State University. The header includes the university logo and navigation links: home, search, apply, library, people finder, email, blackboard, and contact us. The main content area features the AWRI logo and the title "Annis Water Resources Institute". Below this, a navigation menu lists: Introduction, Project Description, Stakeholders, Stormwater Education, and Contacts. The main heading is "Stormwater Management in Spring Lake 'Rein in the Runoff' Stormwater Education". A call to action asks, "What do you know about stormwater? Take our 'Rein in the Runoff' Water Quality Survey." The page also includes sections for "THE BASICS", "WHY IS STORMWATER RUNOFF A PROBLEM?", "HOW DO YOU MANAGE STORMWATER RUNOFF?", "WHAT CAN YOU DO TO REDUCE STORMWATER POLLUTION?", and "REFERENCES". A detailed paragraph explains that stormwater is rain, snow, or sleet that flows over or within land forms, collecting pollutants and debris. It notes that stormwater runoff is not treated in any way. Another section defines nonpoint source pollution as polluted stormwater runoff and other water pollution sources that are hard to pinpoint, citing the federal Clean Water Act of 1987. A photo credit for E. Sterrett Iseley is also present.

Director's Projects Home

- Economic Valuation of Ecosystem Services
- Muskegon Lake Long-Term Monitoring
- Muskegon River Project
- Non-Point Source Pollution Project
- Stormwater Runoff to Little Black Creek
- Stormwater Management in Spring Lake
- Completed Projects
- Staff Information
- AWRI Home

Introduction Project Description Stakeholders Stormwater Education Contacts

## Stormwater Management in Spring Lake "Rein in the Runoff" Stormwater Education

What do you know about stormwater?  
Take our "Rein in the Runoff" Water Quality Survey.

THE BASICS  
WHY IS STORMWATER RUNOFF A PROBLEM?  
HOW DO YOU MANAGE STORMWATER RUNOFF?  
WHAT CAN YOU DO TO REDUCE STORMWATER POLLUTION?  
REFERENCES

THE BASICS:

Stormwater is rain, snow or sleet that is a direct result of precipitation, which flows in both concentrated forms (pipes, gutters, ditches, streams, etc.) and diffuse forms (sheet flow) over or within all land forms. Stormwater soaks into the soil and becomes groundwater, is used by vegetation, evaporates, or flows into lakes or streams as surface flow. Stormwater collects pollutants and debris as it travels to our local waterways.

Stormwater runoff is rain or melting snow that cannot soak into the ground, and instead flows from the land into nearby waterbodies. Stormwater runoff is not treated in any way.

Nonpoint source pollution is another term for polluted stormwater runoff and other sources of water pollution whose sources are hard to pinpoint. The term comes from the federal Clean Water Act of 1987.

Impervious surfaces are hard surfaces that prevent stormwater from soaking into the ground. Where there are more impervious surfaces in a watershed, stormwater runoff enters local waterbodies in greater volumes and at faster rates.

Photo credit: E. Sterrett Iseley


# Project Logo




# Project Flyers

## ❖ Distribute throughout watershed


- Bulletin boards
- Websites
- Newsletters
- Schools
- Meetings
- Community events



**"REIN IN THE RUNOFF"**  
Improving water quality in Spring Lake



Rein in the Runoff is a collaborative, community-based project that is identifying the causes, consequences, and corrective actions required to minimize the adverse impacts of stormwater discharges to Spring Lake, the Grand River and Lake Michigan.




Algae bloom in Spring Lake at the Fruitport Boat Launch (July 2006).

Visit our Project Website:  
[www.gvsu.edu/wri/reinintheflow](http://www.gvsu.edu/wri/reinintheflow)

Visit our updated **Stormwater Education** page to learn more about what you can do to minimize your household contribution of pollutants to our waterways.


Take our online **water quality survey** and tell us what you know about stormwater and stormwater runoff:  
<http://www.gvsu.edu/wri/waterqualitysurvey>



Rain barrels capture rainwater that can be used to water lawns and gardens.

**Join us**

At our upcoming Stakeholder Steering Committee Meeting at the Spring Lake Library on **September 30, 2008 @ 7:00 – 8:15 p.m.**



The Village of Spring Lake's rain garden provides rainwater and runoff infiltration, and it beautifies the lot (July 2008)

**Contact us**

For more information about this project.  
Elaine Sterrett Isely (iselyel@gvsu.edu)  
Alan Steinman (steinmaa@gvsu.edu)  
At GVSU's Annis Water Resources Institute: (616) 331-3749

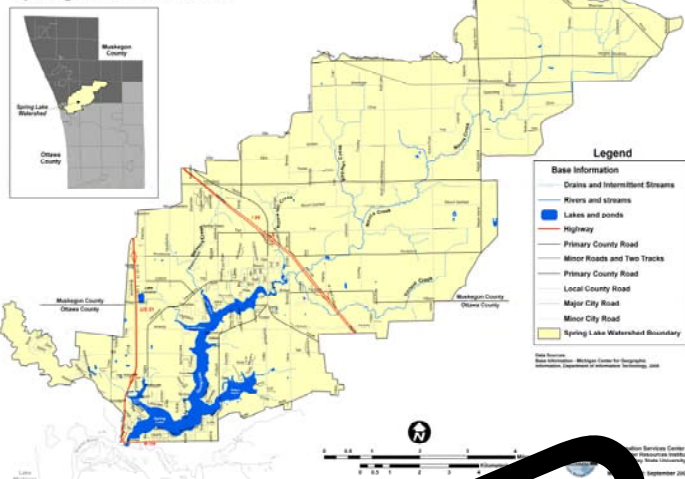


# Upcoming Meetings/Events

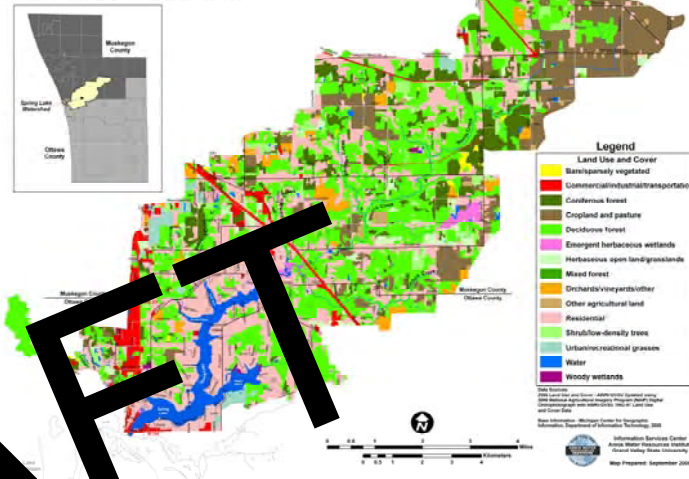


# Watershed Atlas

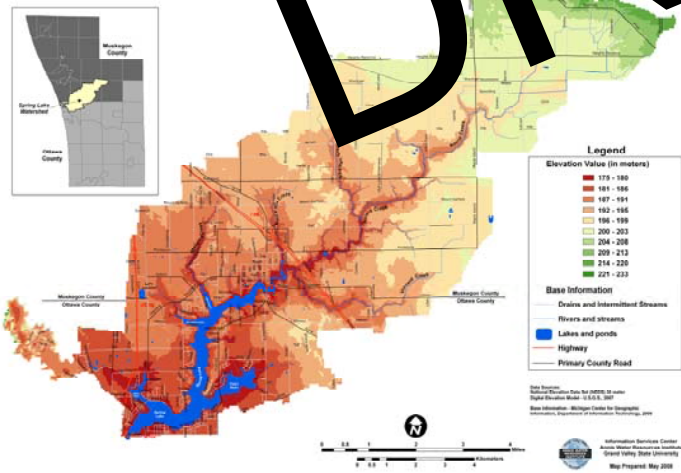
## Base Information Spring Lake Watershed



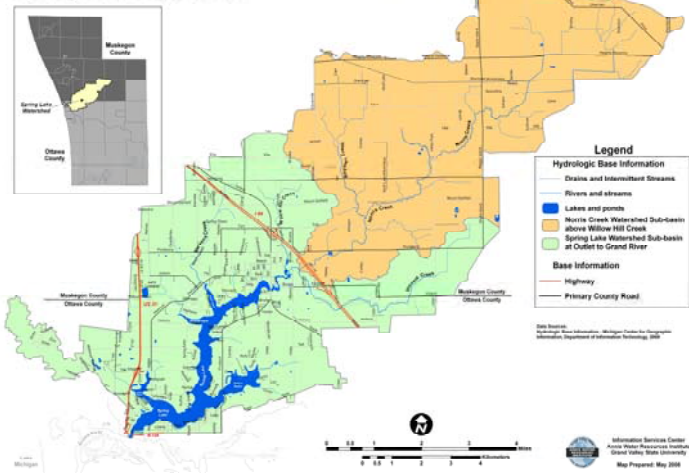
## 2006 Land Use and Cover Spring Lake Watershed



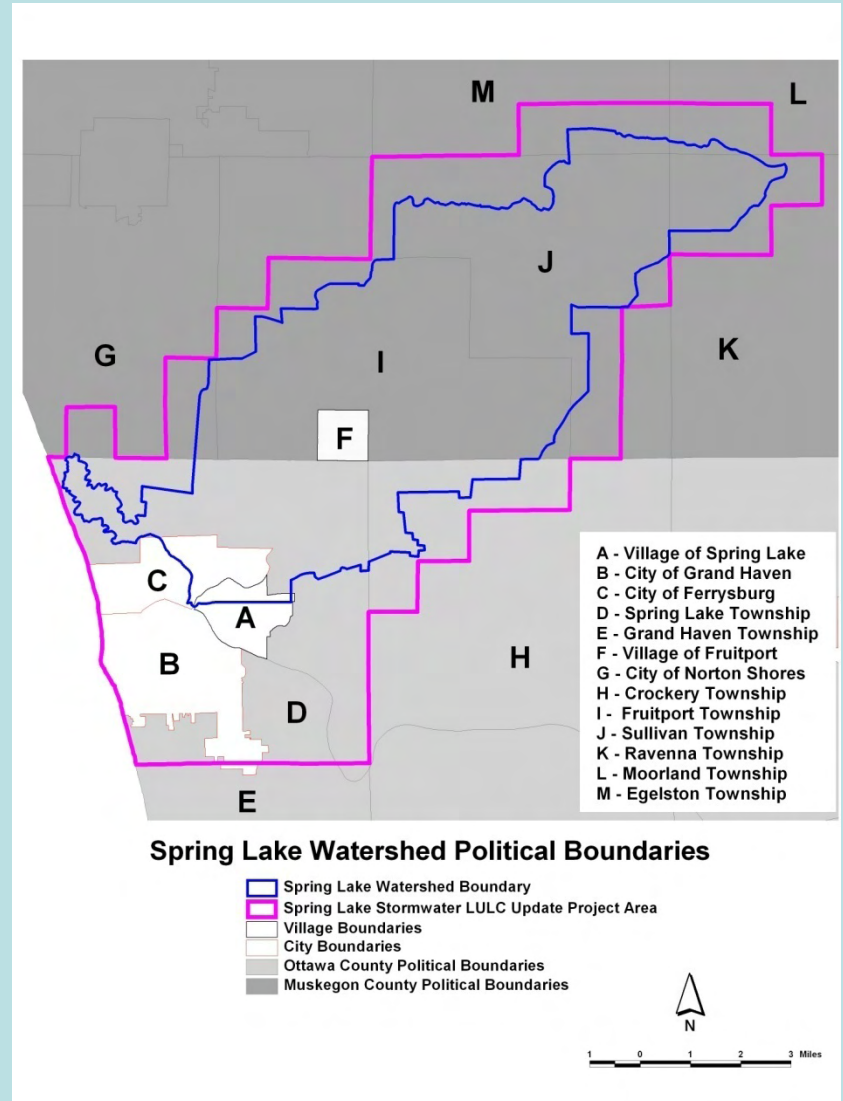
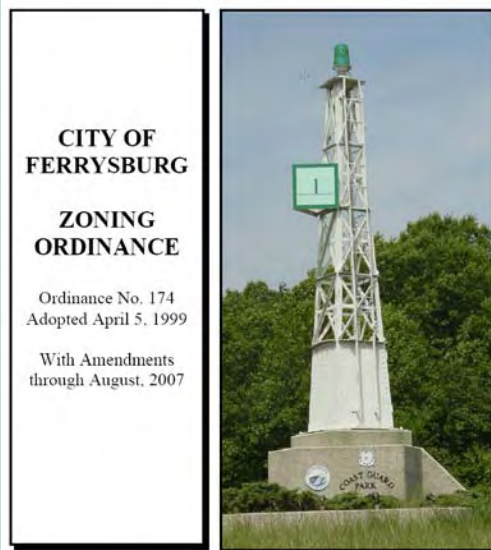
## Digital Elevation Model Spring Lake Watershed



## Hydrology Spring Lake Watershed

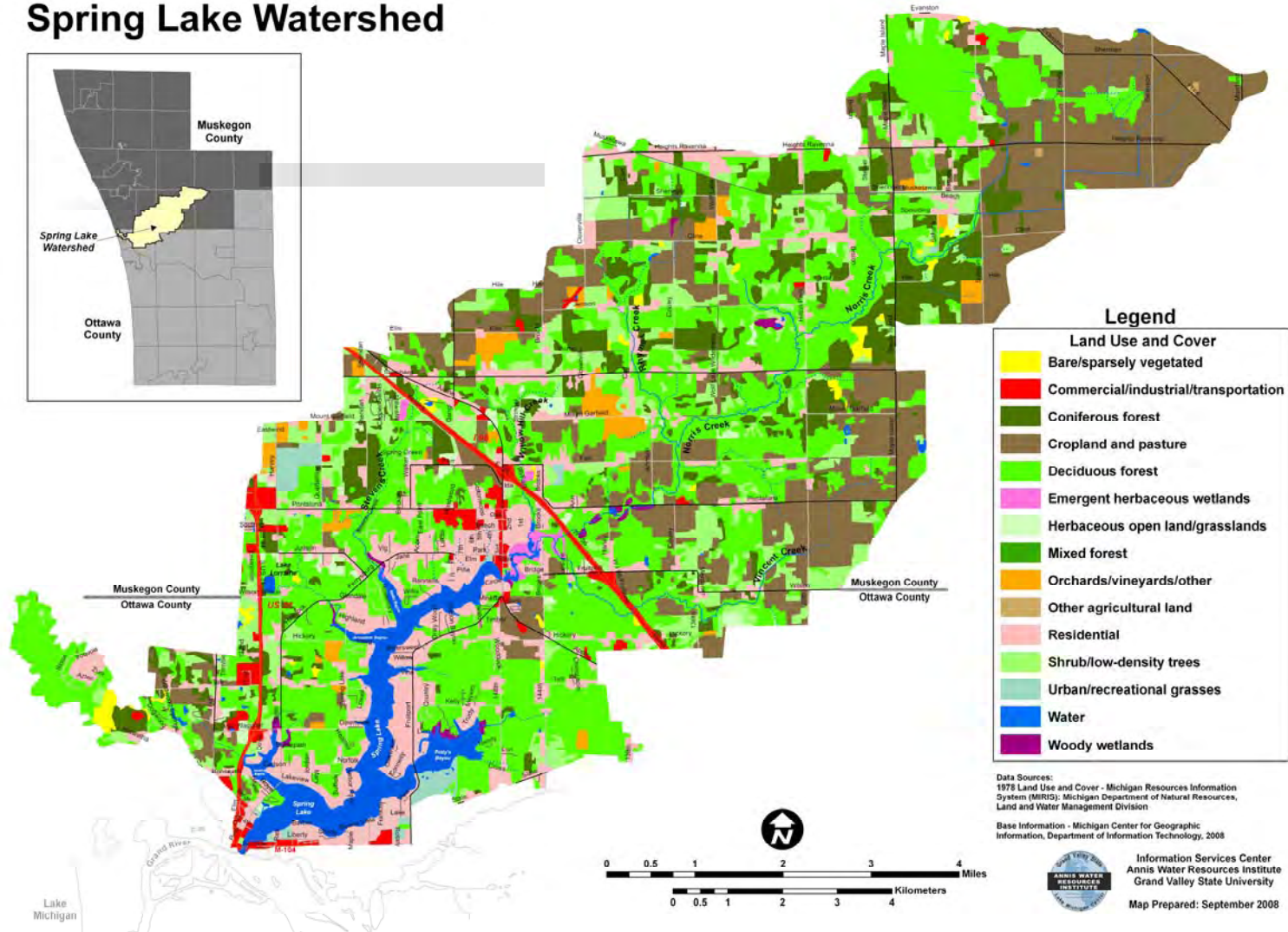


# Zoning Ordinances/Master Plans



# Land Use Change - Then

## 1978 Land Use and Cover Spring Lake Watershed



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

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

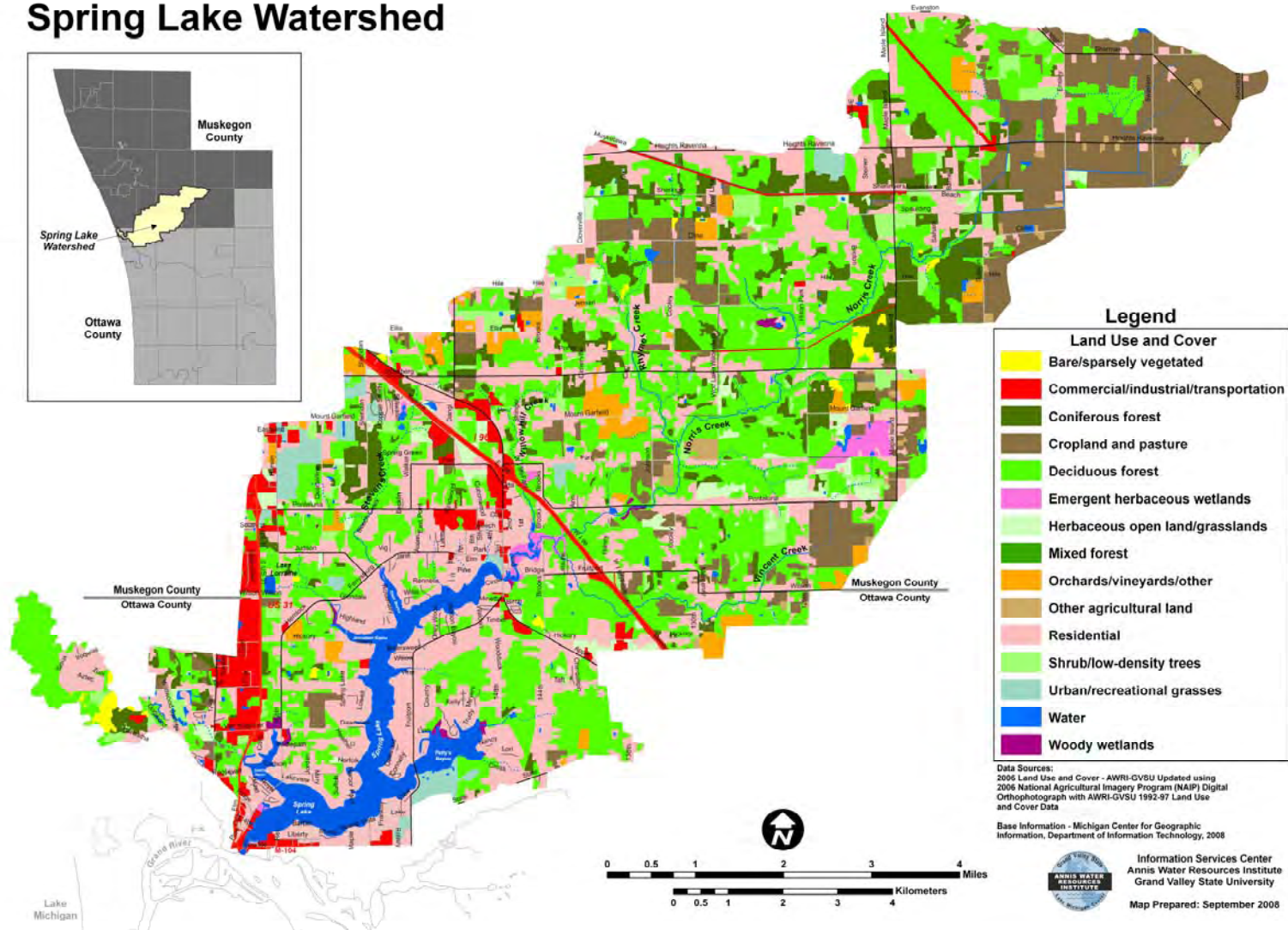


Information Services Center  
Annis Water Resources Institute  
Grand Valley State University

Map Prepared: September 2008

# Land Use Change - Now

## 2006 Land Use and Cover Spring Lake Watershed



**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

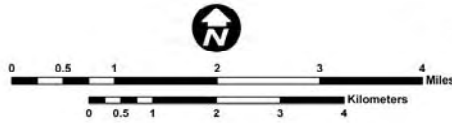
Data Sources:  
 2006 Land Use and Cover - AWRI-GVBU Updated using  
 2006 National Agricultural Imagery Program (NAIP) Digital  
 Orthophotograph with AWRI-GVBU 1992-97 Land Use  
 and Cover Data

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



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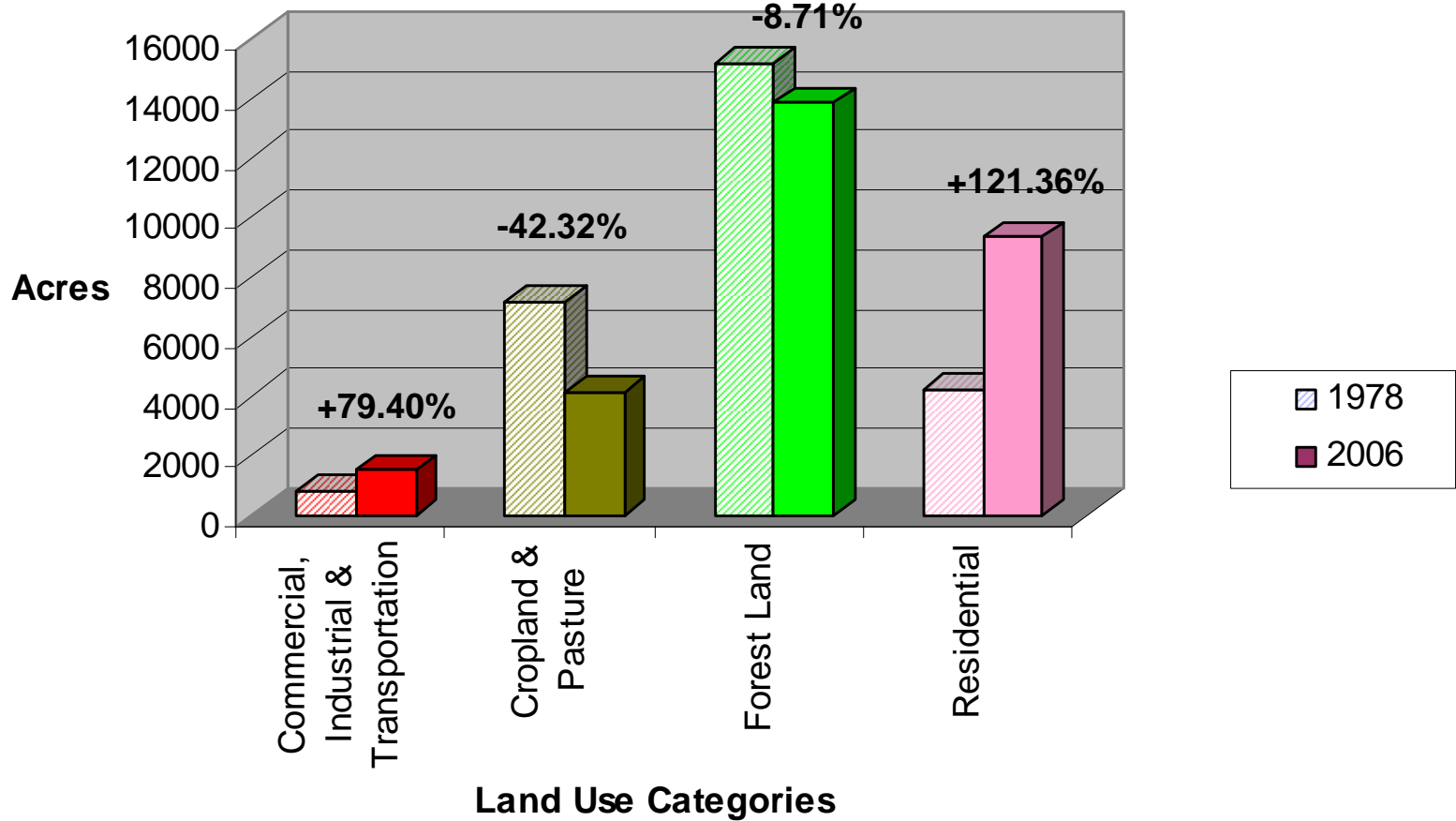
Map Prepared: September 2008



Lake Michigan

# Land Use Change Analysis

## Spring Lake Land Use Change 1978-2006



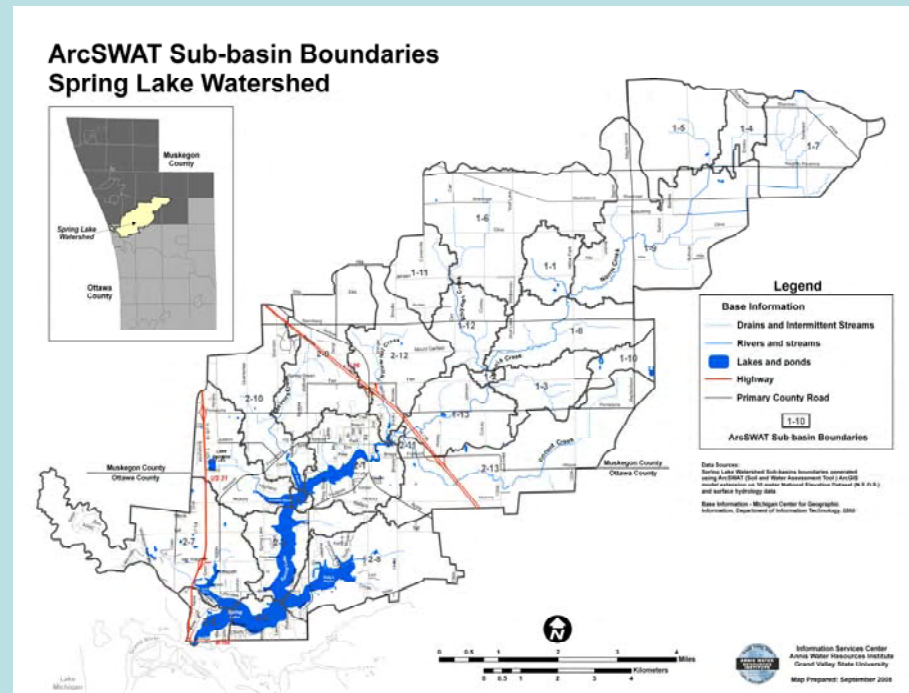
# PLOAD

## ❖ Strengths

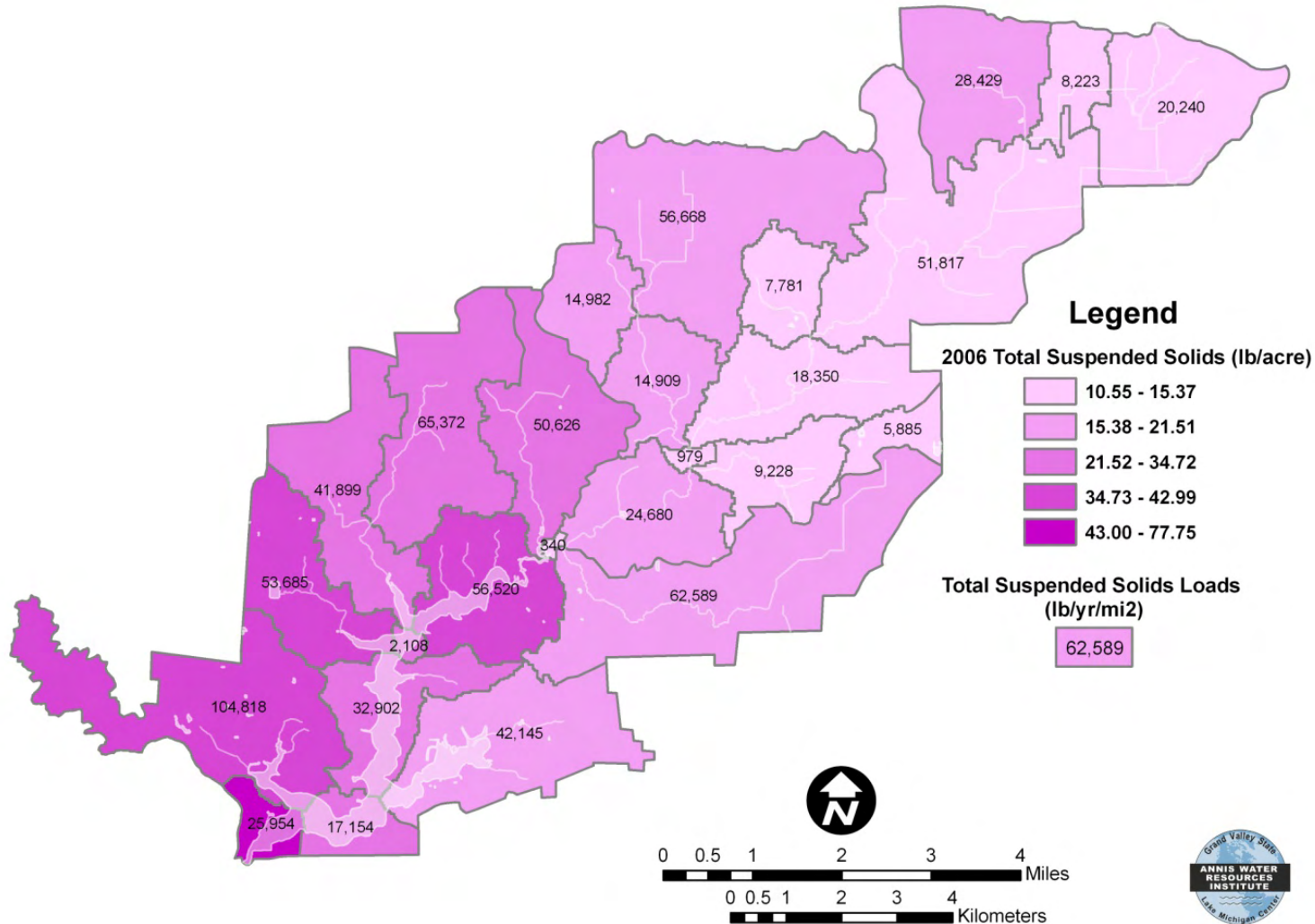
- Simplified GIS-based model
- Estimates annual average nonpoint source pollution
- Can take BMPs into account

## ❖ Weaknesses

- Generic screening tool
- Simple Method limited to sub-basins < 1 sq. mi.
- Export Coefficient Method largely untested
- Required modification to take into account differences in soils, yearly rainfall, runoff

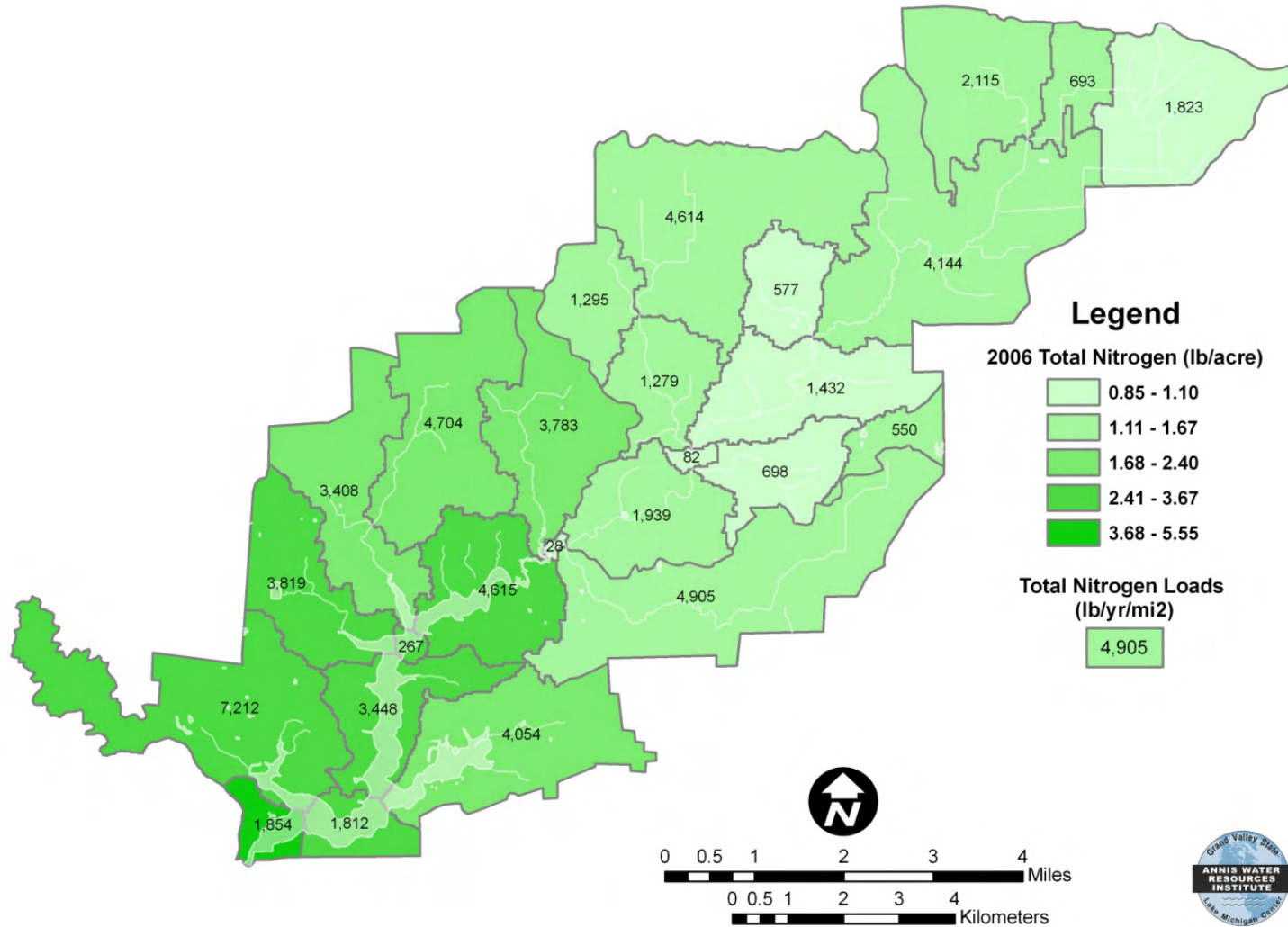


# Total Suspended Solids

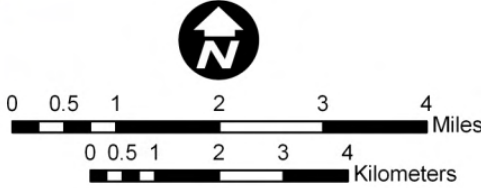
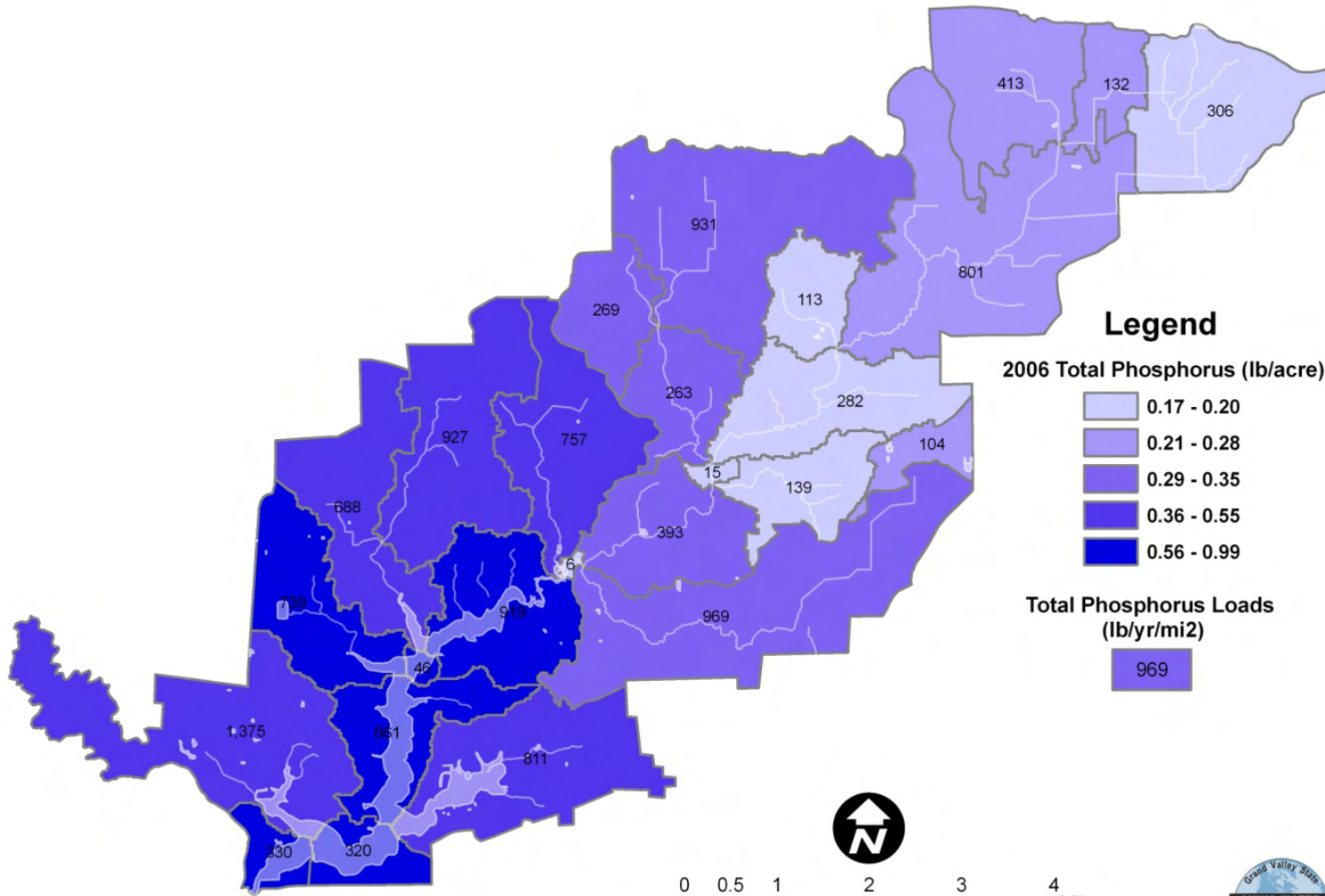




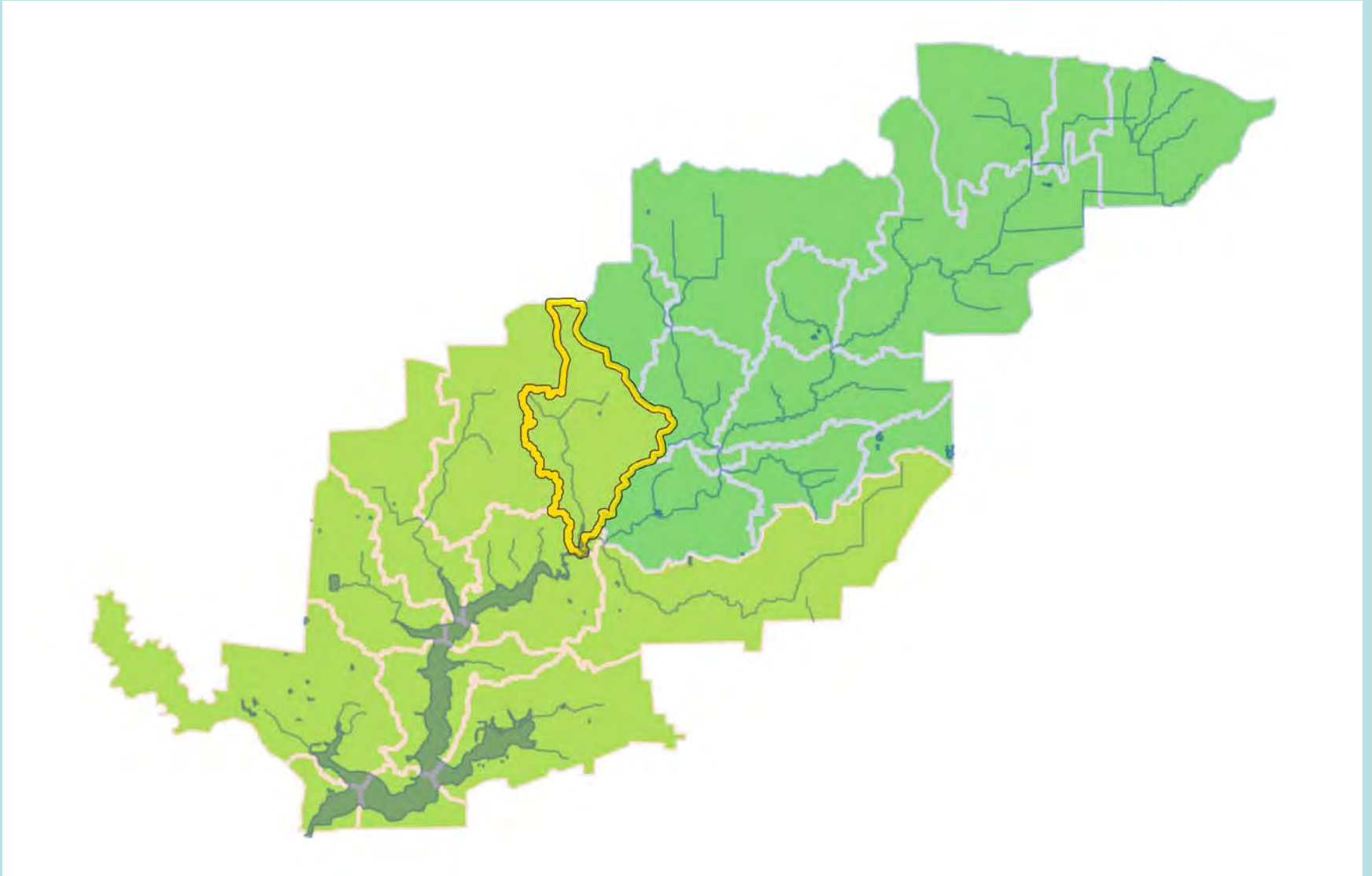
# Total Nitrogen



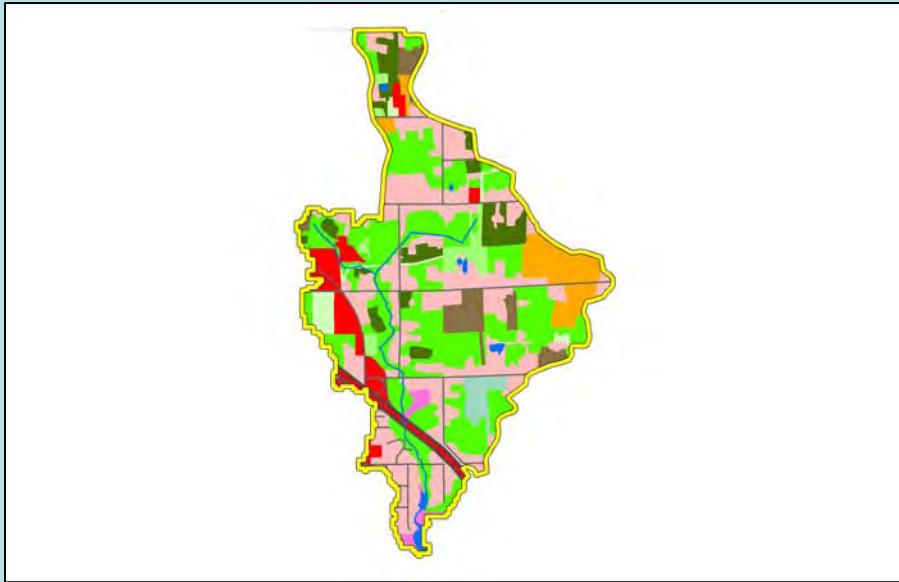
# Total Phosphorus



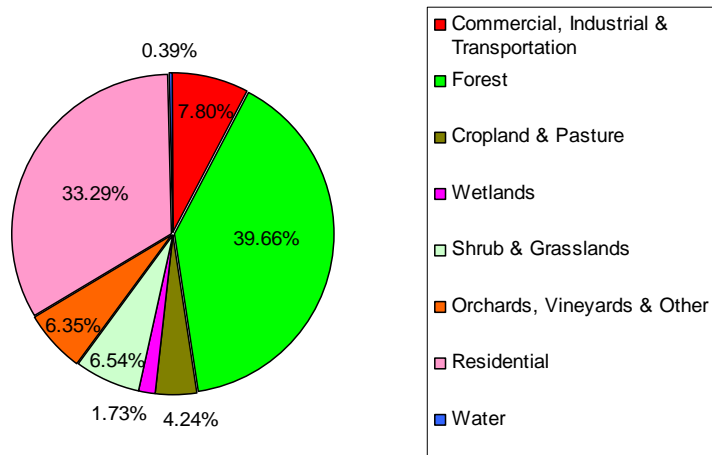
# Willow Creek Sub-Basin (2-12)



# Willow Creek Land Use (2006)



Willow Creek Sub-Basin Land Use Breakdown



Land Use & Cover Category	Acres
Commercial, Industrial & Transportation	125.65
Forest	638.64
Cropland & Pasture	68.34
Wetlands	27.82
Shrub & Grasslands	105.39
Orchards, Vineyards & Other	102.23
Residential	536.15
Water	6.21
<b>TOTAL</b>	<b>1610.43</b>

# BMPs

Average % Reduction of Stormwater Pollutants			
	Total Suspended Solids	Total Phosphorus	Total Nitrogen
Detention Basins as Wetland Basins	80%	60%	30%
Detention Basins as Dry Extended Ponds	60%	20%	30%
Riparian Buffers (5 meter width)	60%	45%	45%
Riparian Buffers (15 meter width)	70%	65%	65%
Riparian Buffers (50 meter width)	80%	75%	75%
Bioretention/Rain Gardens (Filtering Practice)*	60%	80%	20%
Bioswales (Filtering Practice)*	60%	80%	20%
Infiltration (Infiltration Basins/Porous Pavement)	90%	65%	40%

\*dependent on management of storm water runoff volume

# BMP Application

- ❖ Riparian buffers (15 m. width): 32.9 acres
- ❖ Bioretention (rain gardens): 9.5 acres
- ❖ Bioswales (filtering practices): 29.7 acres



# Results

Pollutant	Pollutant Load Reduction
Total Nitrogen	↓ 1.82%
Total Phosphorus	↓ 3.31%
Total Suspended Solids	↓ 2.89%

## ❖ Pollutant load reductions will vary

- Different BMPs
- Combination of BMPs
- Amount of BMPs

# Wrap Up & Announcements

