Introducing Web-Based Decision Tools for Watershed Management

Midwest Spatial Decision Support System Partnership

- http://www.epa.gov/ waterspace/

Locally Led Watershed Management

- Bringing together scientific information
- Screening alternatives
- Writing, evaluating, and adjusting plans

Making Local Land Use Decisions

- *"What you do on the land, affects the quality of the water in the waterways."*

In Wisconsin

- 85% of the Land Is Owned by Private Parties
- Local Governments (1,800+ Units in Wisconsin) Have Primary Responsibility for Regulating Land Uses

In Wisconsin

- Private Landowners Make Land Use Decisions That Affect the Environment
- Citizens Forming Partnerships
- Neither Have the Necessary Information About Decision Impacts

Midwest Spatial Decision Support System Partnership

- Offers state and local decision-makers thirteen regional decision support tools
- Includes bundled data
- Means of clear impact analysis

Midwest Partnership for Watershed Management Decision Support Systems

Origin: April 2002

Midwest Web-based Spatial Workshop in Chicago

Co-hosts:	US EPA Region 5, Michigan State University, and Purdue University
Purpose:	Demonstration of various Decision Support and GIS Systems
Participants:	State, Federal, and Tribal water resource managers Land Grant University Extension community, Watershed managers, and local government representatives

Midwest Partnership for Watershed Management Decision Support Systems

Members:

- Indiana Department of Environmental Management
- International City/County Management Association
- Michigan State University, Institute of Water Research
- Purdue University - Agricultural and Biological Engineering, Forestry and Natural Resources

Midwest Partnership for Watershed Management Decision Support Systems

Members:

- State University of New York at Buffalo
- University of Wisconsin Extension
- U.S. EPA, Region 5 - Office of Public Affairs, Water Division and the Office of Information Services
- Wisconsin Department of Natural Resources

Midwest Partnership for Watershed Management Decision Support Systems

Purpose:

- Development, promotion and use of web-based, user-friendly, geo-spatial watershed management data and decision support tools
- Help set the standard for other watershed management programs

Midwest Partnership for Watershed Management Decision Support Systems

Accomplishments:

- Has brought together tool developers, resource managers, and decision makers
  - Federal, State, Tribal, and Local
- Commitment from participants to advance Region-wide SDSS efforts
- ICMA and Extension Community are helping to achieve local community outreach, and capacity development

Midwest Partnership for Watershed Management Decision Support Systems

Emerging Characteristics of the Tools:

- Web-based
- Spatially based and scalable
- Accessible (in public domain)

Midwest Partnership for Watershed Management Decision Support Systems

Lessons learned:

- WDNR workshop confirmed local decision makers' preferences for certain tool characteristics: web-base, spatial, public domain
- Scalability allows each level of decision maker look at appropriate level of data and detail
- Consistent data and methodology allow easy access to a variety of data

Midwest Partnership for Watershed Management Decision Support Systems

Lessons learned:

- Our focus is on public domain tools and data to ensure wide accessibility
- We're seeking input from decision makers, provide constant feedback to developers, and have a mechanism in place for this purpose
- This feedback can work on a variety of scales, both locational and policy. We'll continue to link tool makers with decision makers

Unique Characteristics Of The Tools

In demand by

local officials, natural resource managers, and the general public

because they deliver ease of use, bundled data, and means of clear impact analysis:

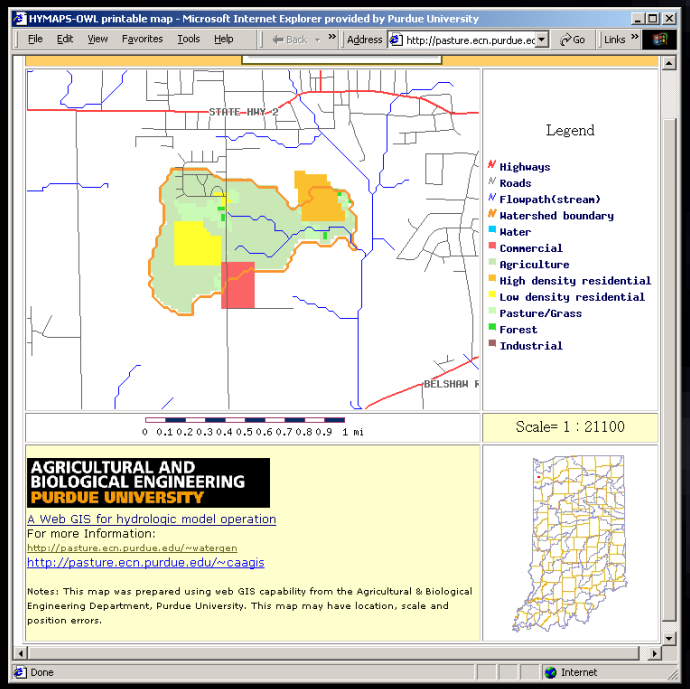
- Web-based
- Spatially Based and Scalable
- Science-based
- Accessible (in Public Domain)
- Intuitive
- Customizable via Features & Plug-ins
- Free-standing

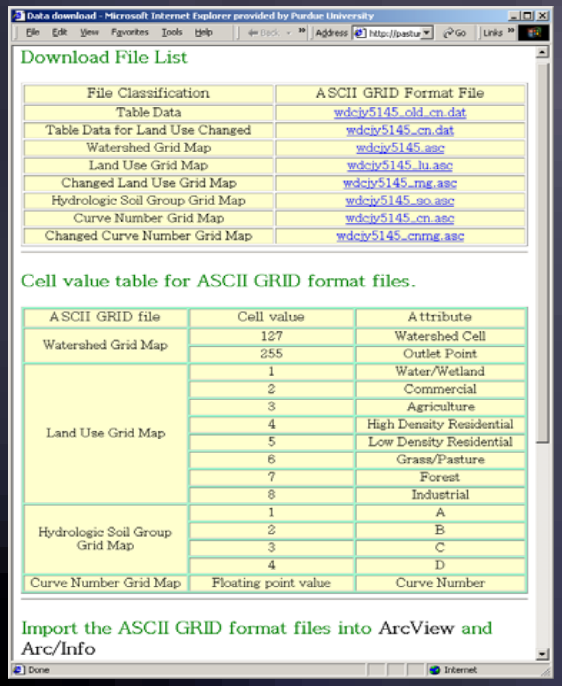
An example:

L-THIA

Is Specifically Designed To Serve Local Communities And Help Them Fulfill Their Watershed Management Needs And Responsibilities

Delineation GIS Output = L-THIA INPUT



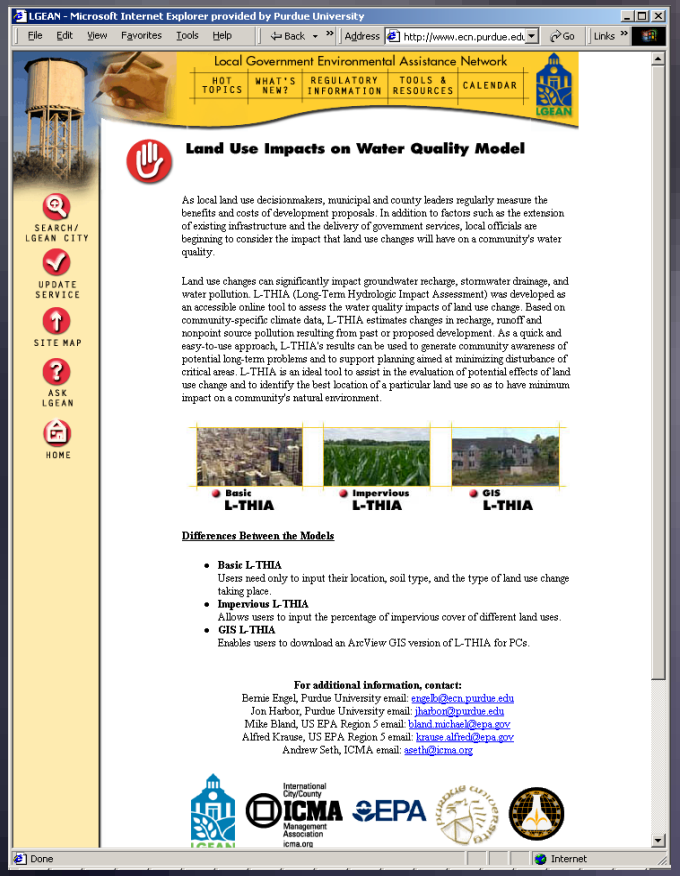


L-THIA's Front Page on LGEAN

L-THIA will be launched at ICMA's LGEAN

Local Government Environmental Assistance Network website

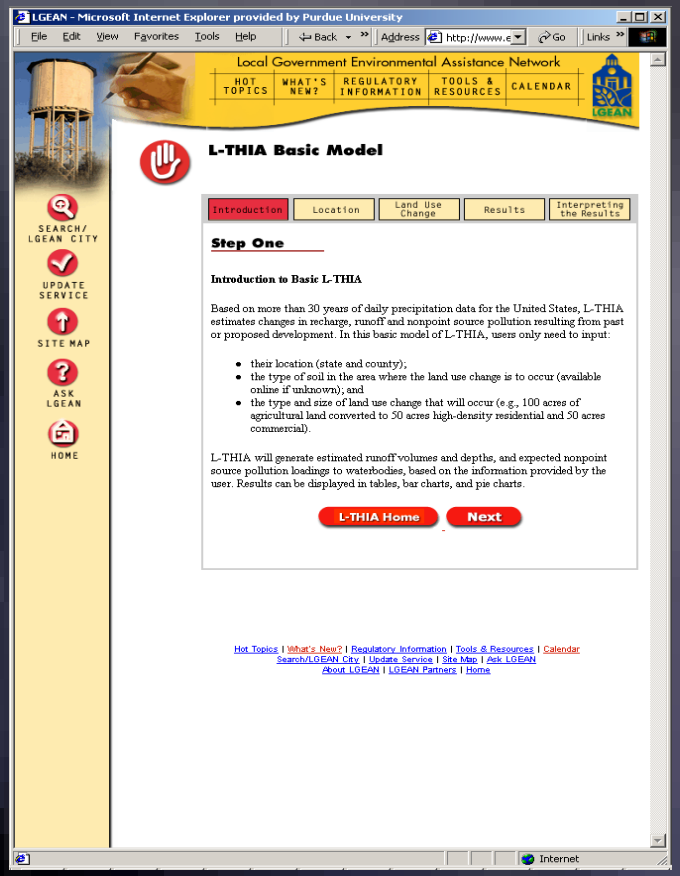
Through this partnership, L-THIA Will Reach Target users.



Introduction page

For the integration in the LGEAN website, L-THIA interface redesigned

Users follow pages step by step to obtain runoff and NPS pollution results

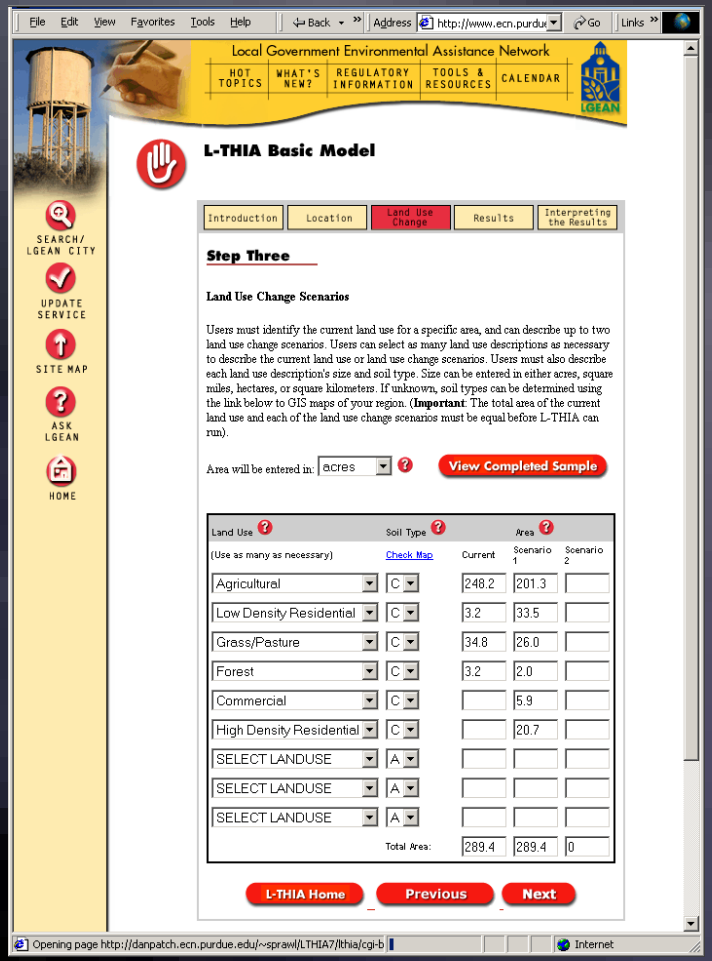


Data Input Pages

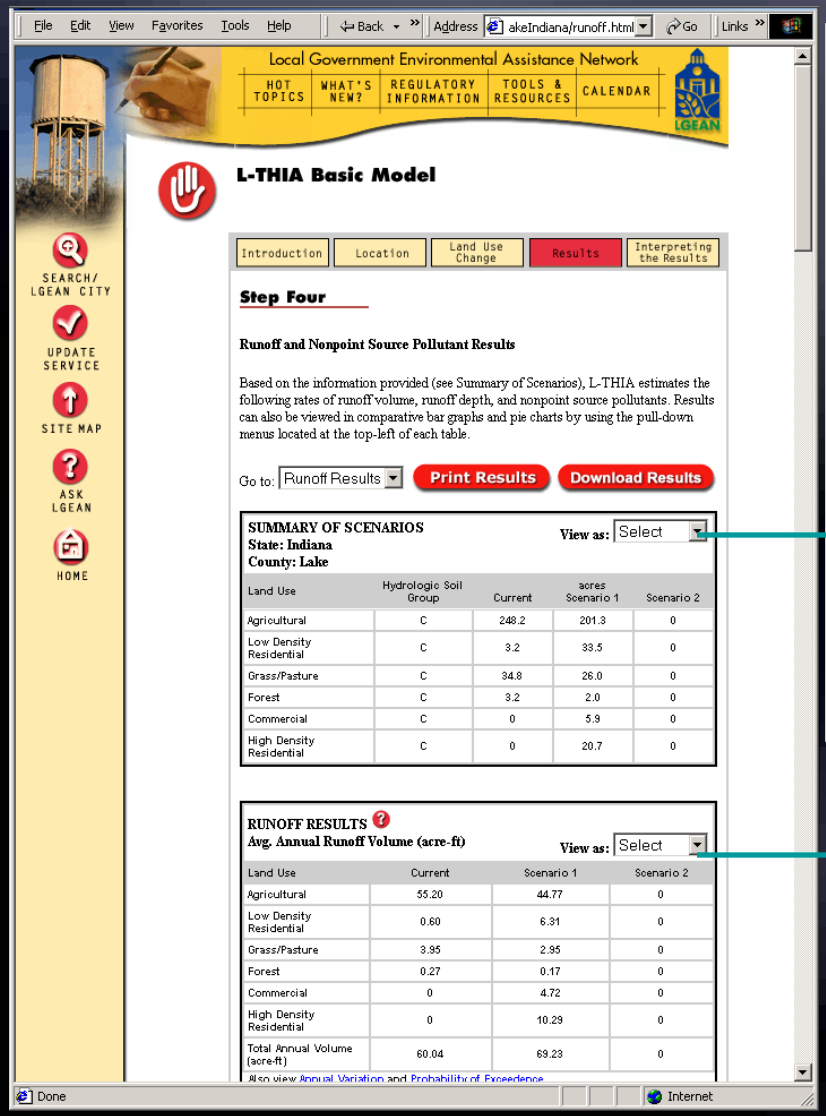
State and County Selection

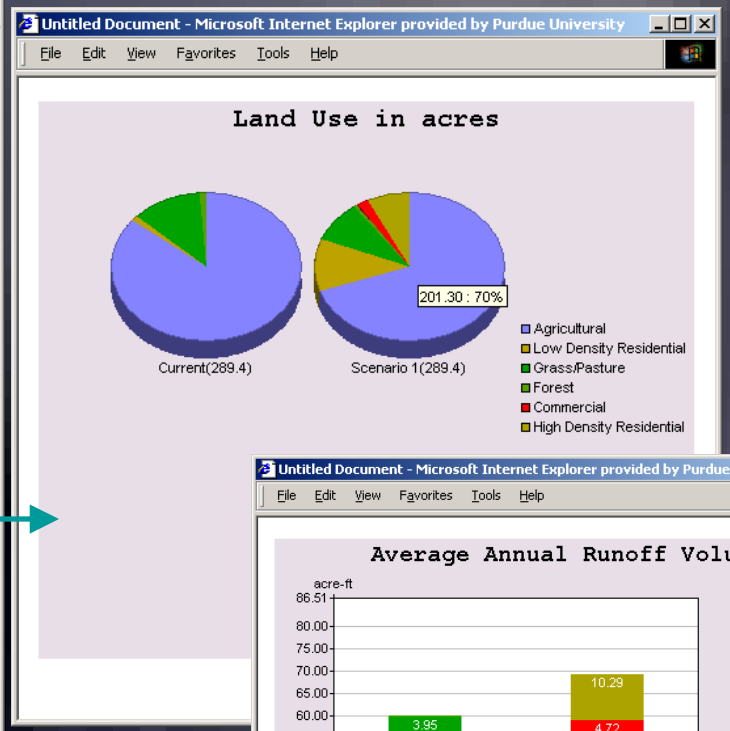
Data Input Pages

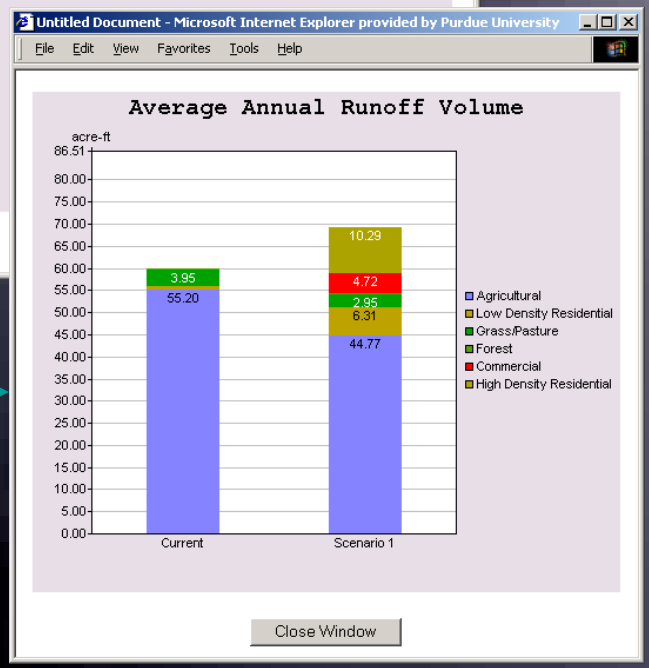
Land Uses and Hydrologic Soil Group Data Input for Current Situation and Alternative Scenarios



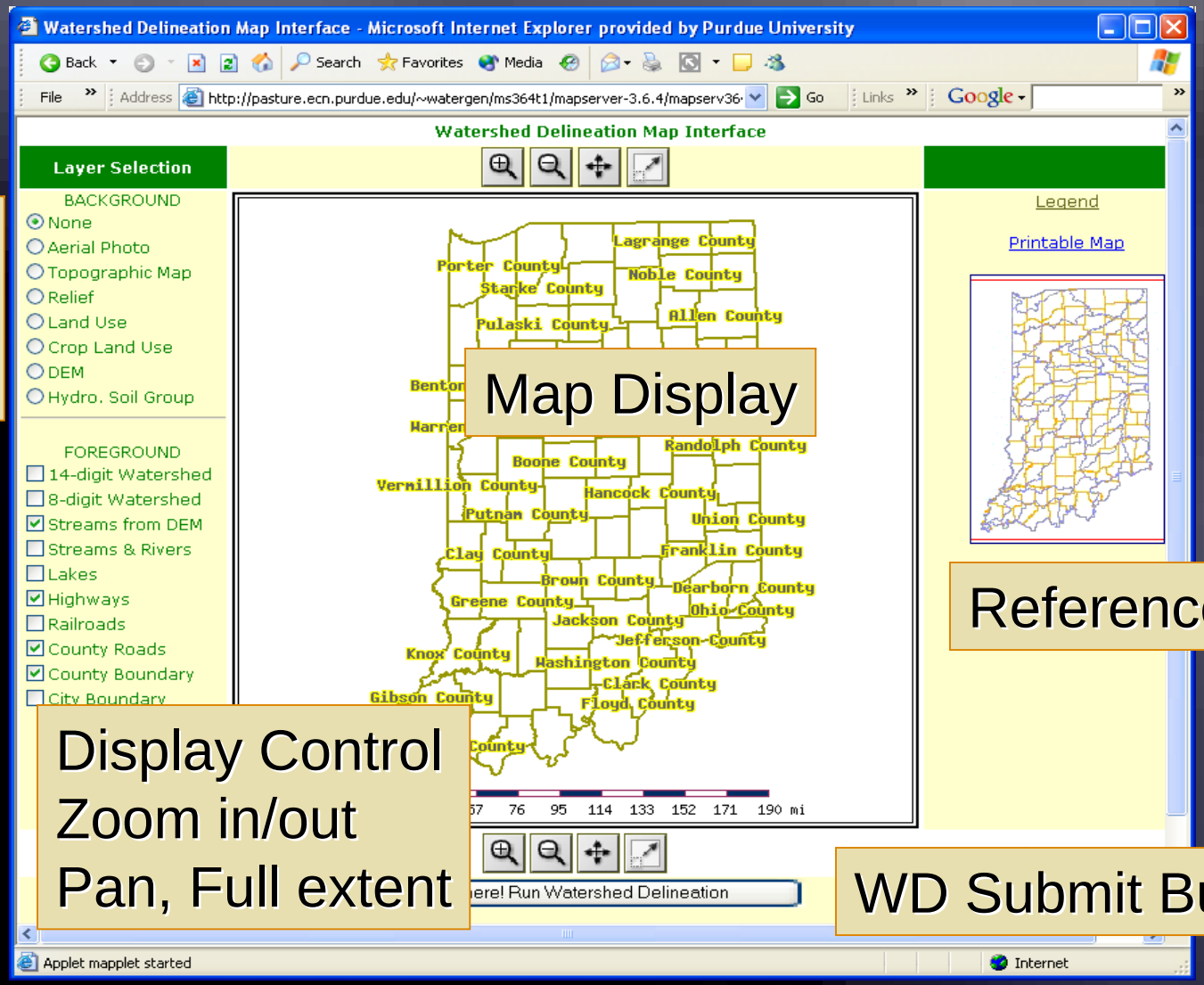
Runoff Results Pages







Online Watershed Delineation



Layer Control On/Off

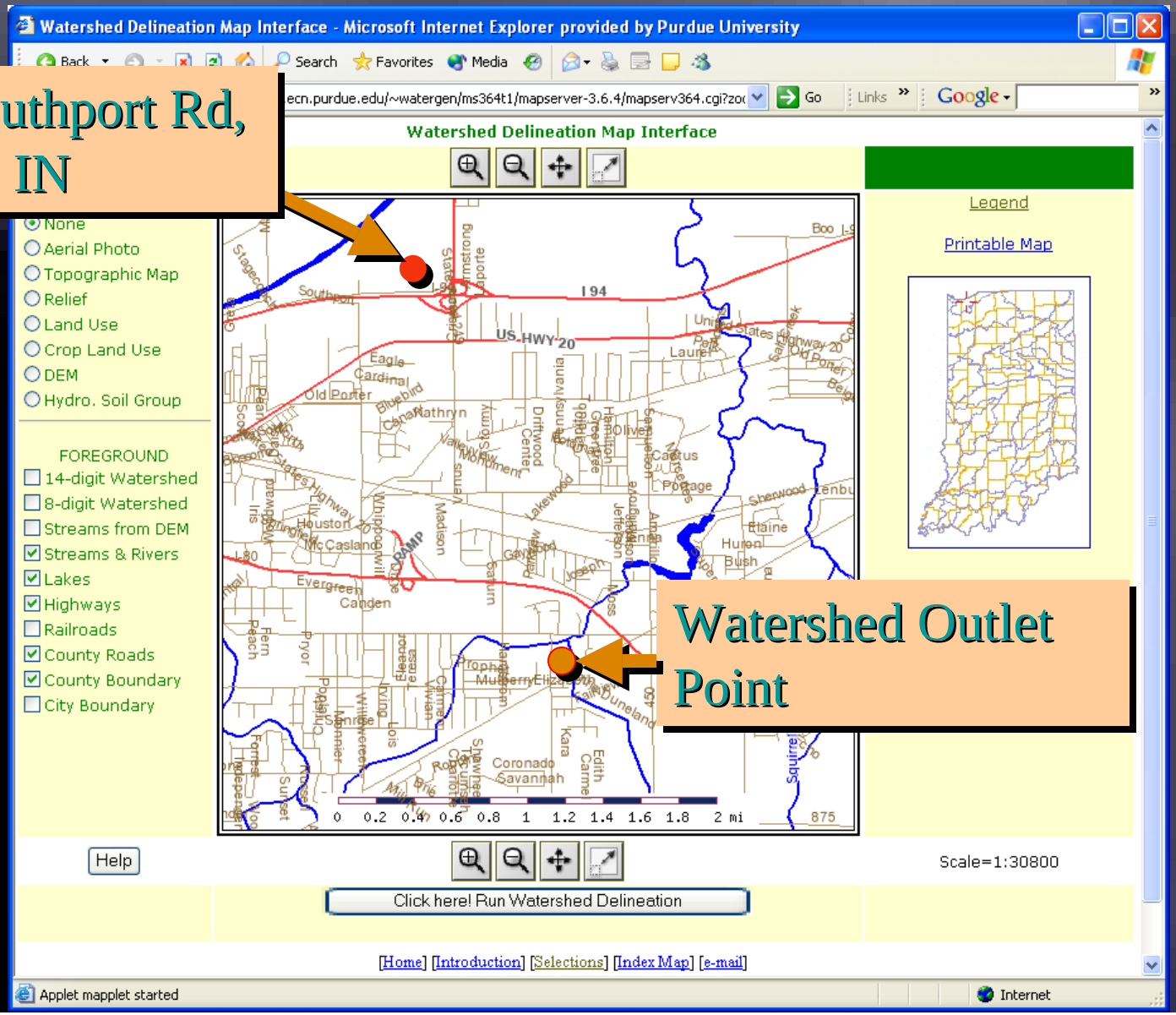
Map Display

Reference Map

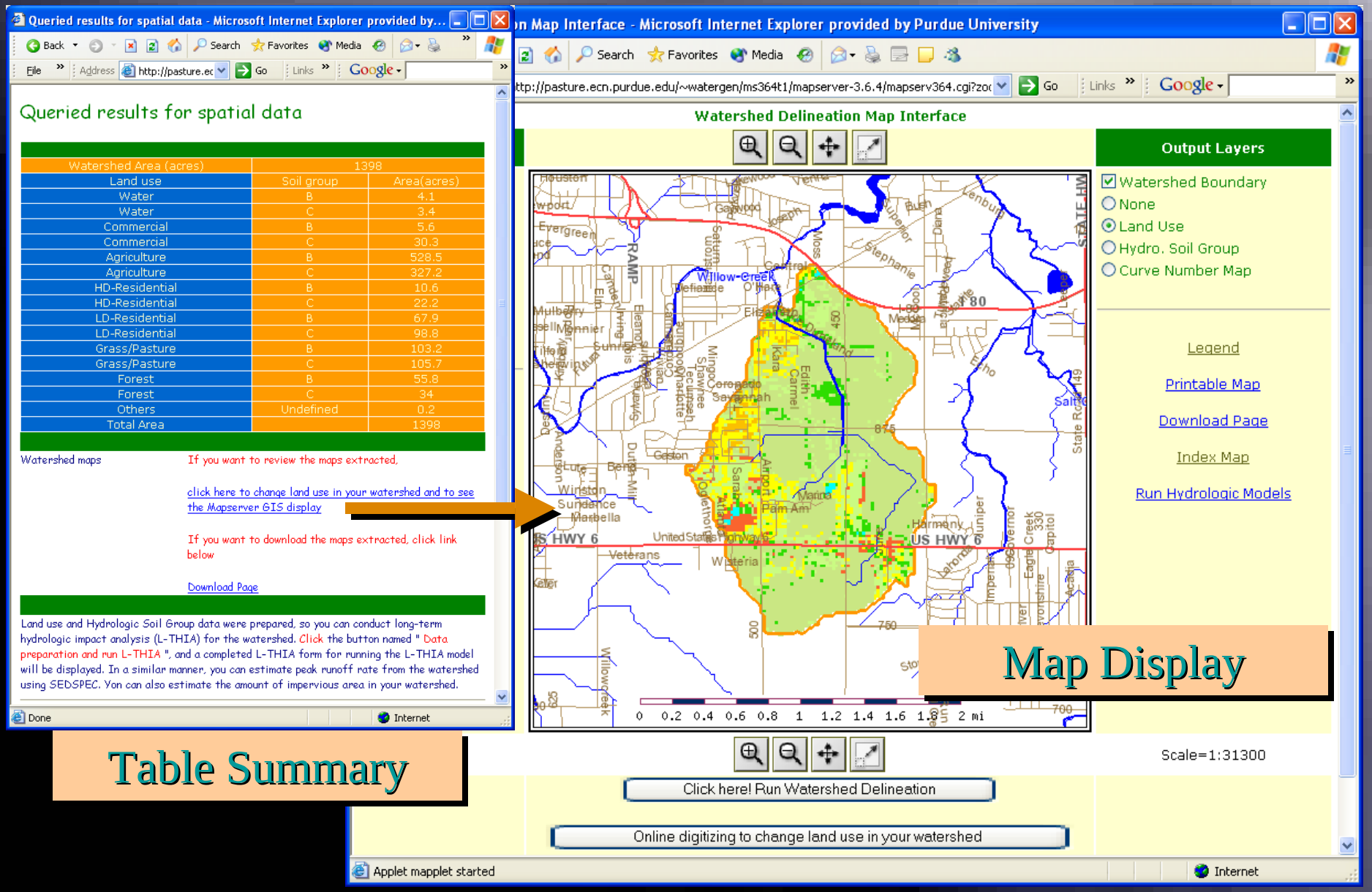
Display Control
Zoom in/out
Pan, Full extent

WD Submit Button

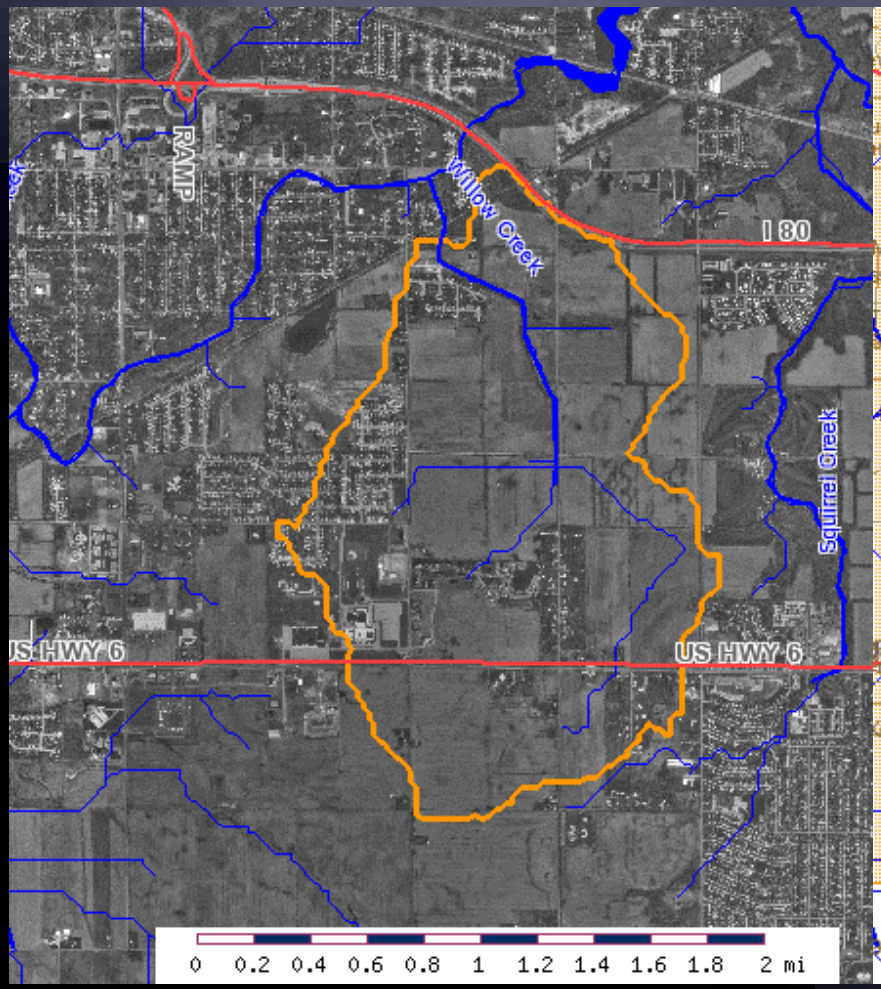
Online Watershed Delineation



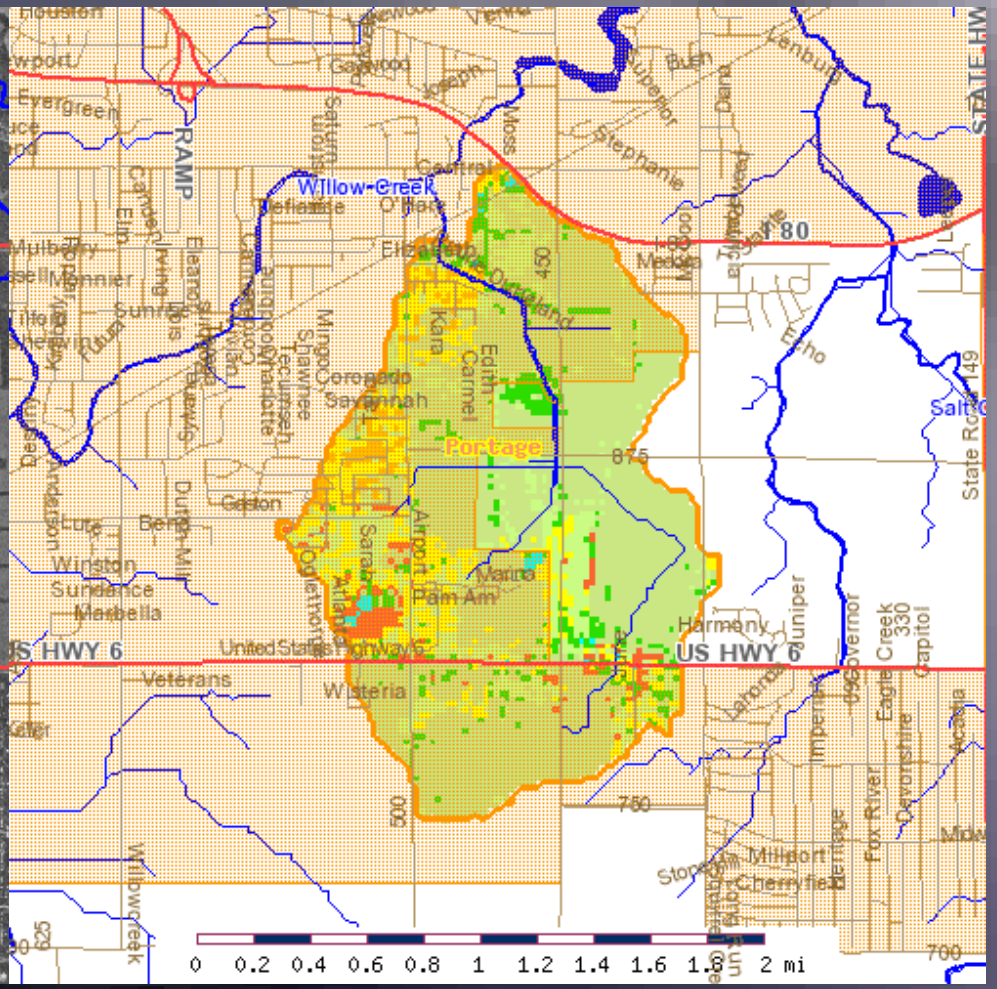
Online Watershed Delineation Result



Result Review with Other Spatial Data



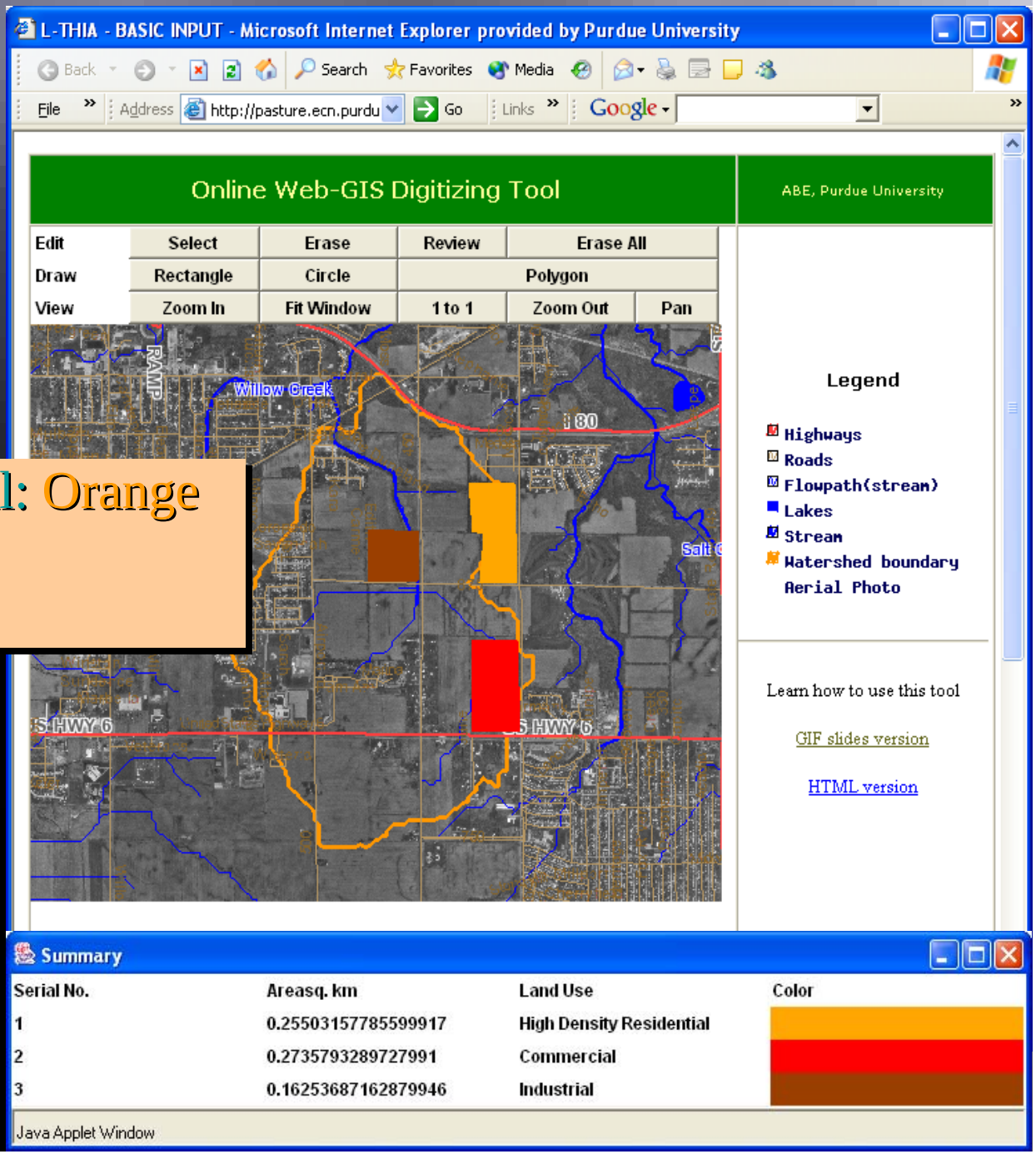
Aerial Photography



City Boundary

Online Digitizing for Land Use Change

High Density Residential: Orange
Commercial: Red
Industrial: Brown

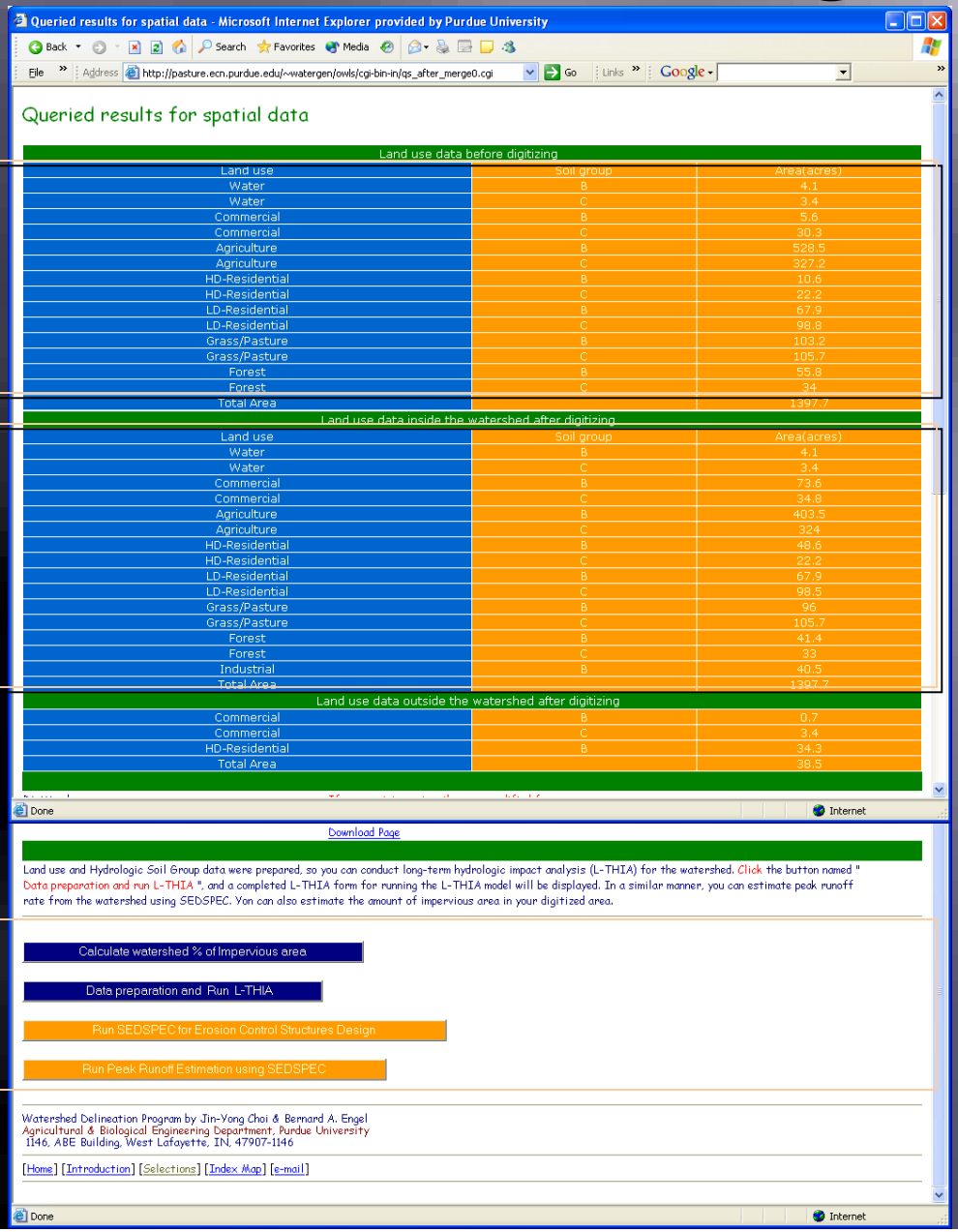


Results Page after the Land Use Change

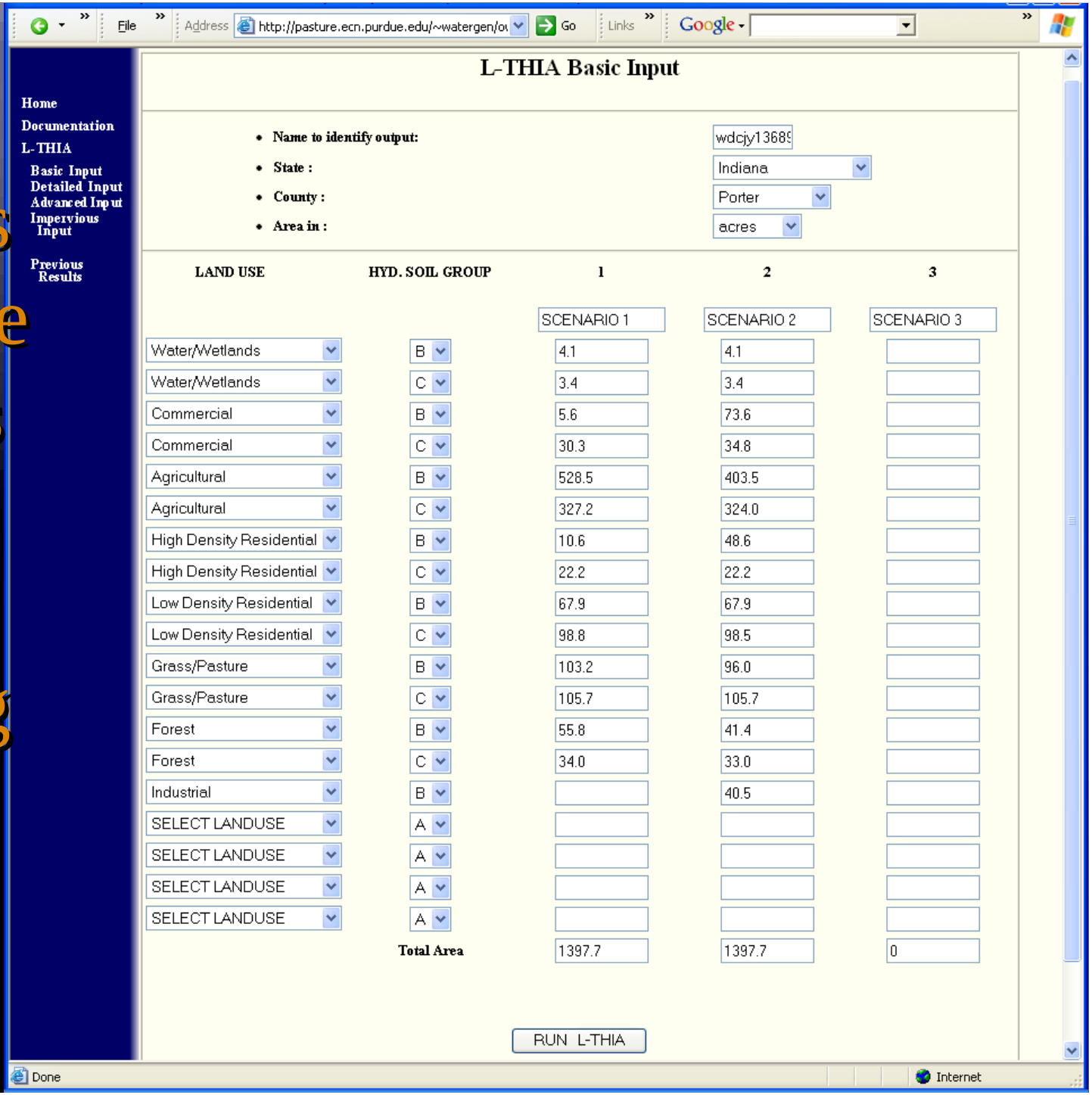
Present Land Use Data

Proposed Land Use Data

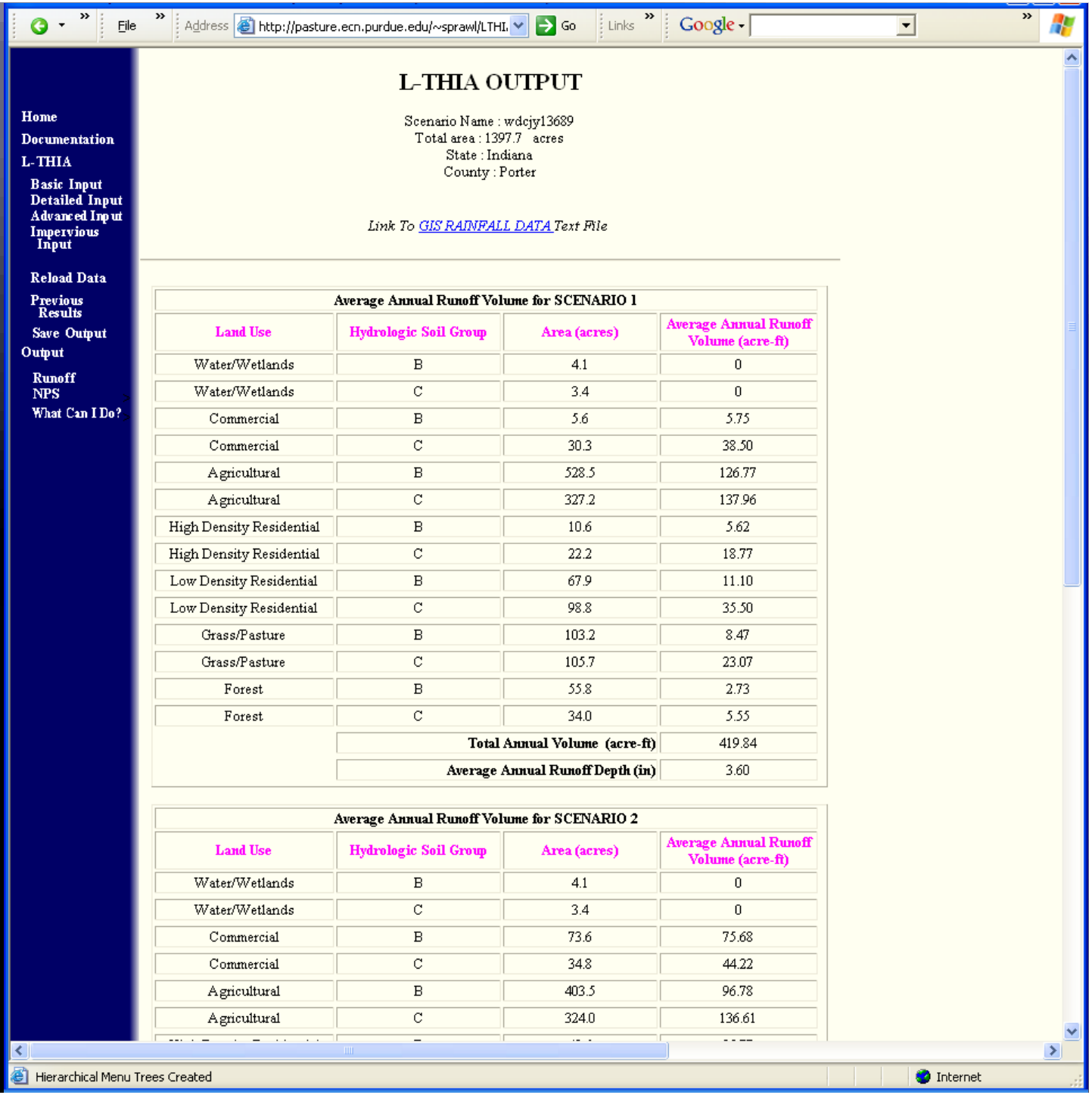
Application Buttons for Hydrological Model Operation



L-THIA Compares Alternative Scenarios from the Online Digitizing Result



L-THIA Results - Runoff Tables



Home
Documentation
L-THIA
Basic Input
Detailed Input
Advanced Input
Impervious Input
Reload Data
Previous Results
Save Output
Output
Runoff
NPS
What Can I Do?

L-THIA OUTPUT

Scenario Name : wdcjy13689
Total area : 1397.7 acres
State : Indiana
County : Porter

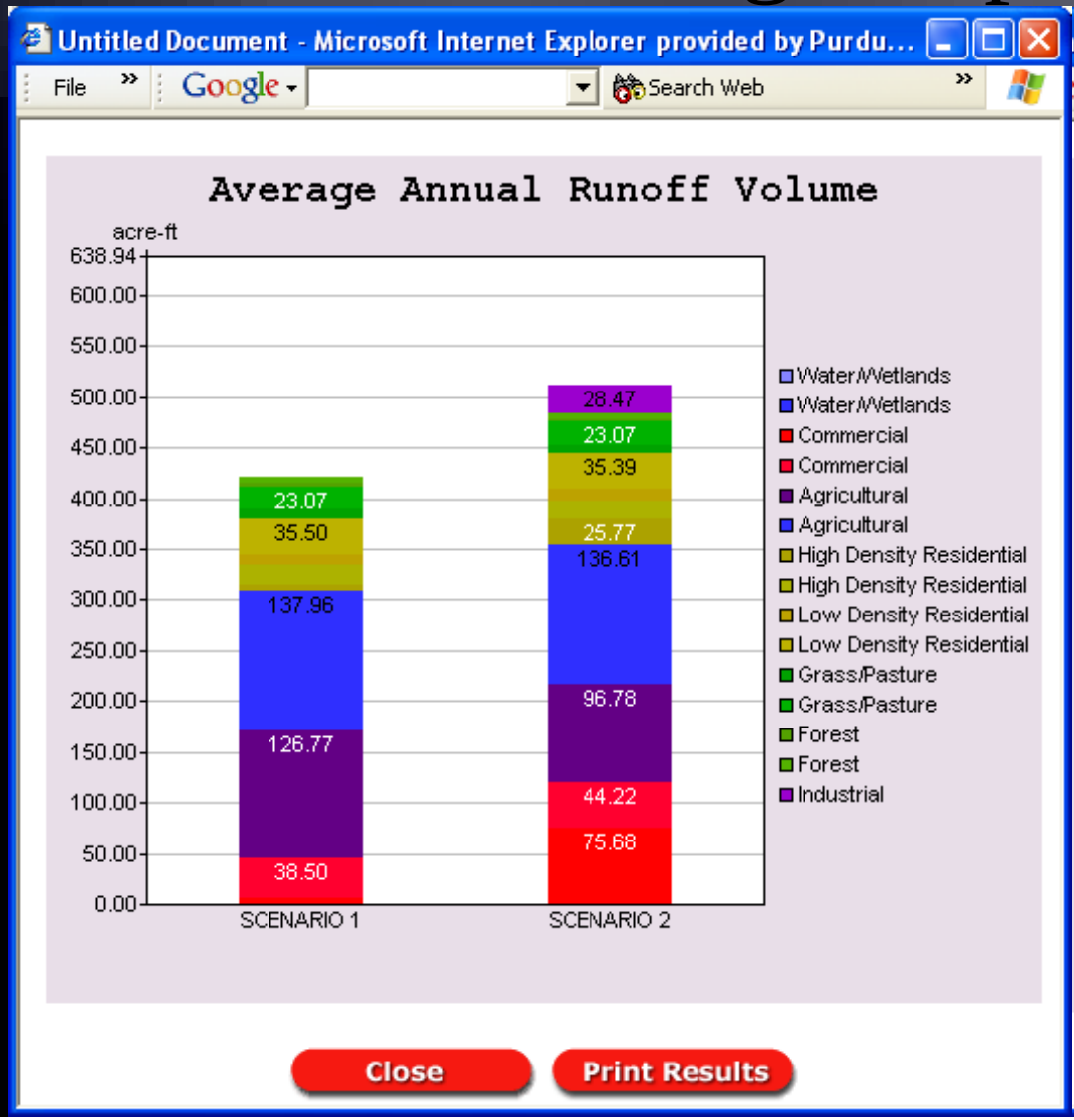
Link To GIS RAINFALL DATA Text File

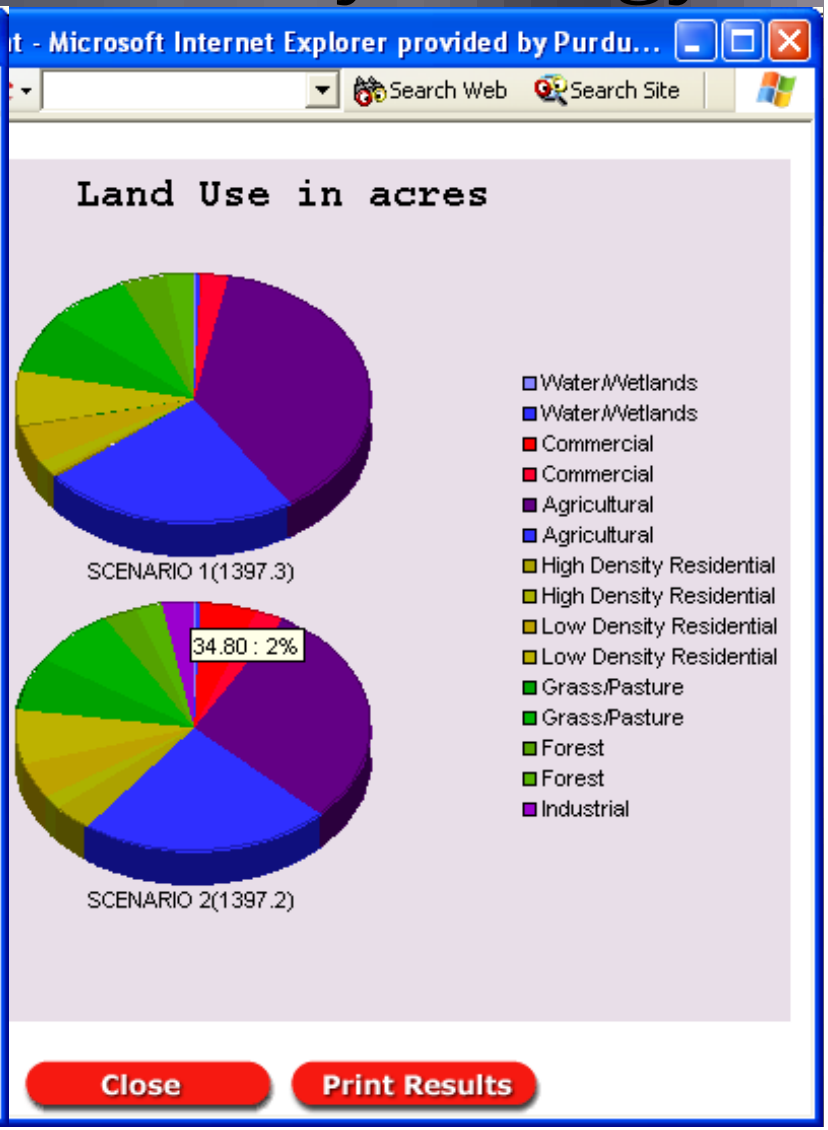
Average Annual Runoff Volume for SCENARIO 1			
Land Use	Hydrologic Soil Group	Area (acres)	Average Annual Runoff Volume (acre-ft)
Water/Wetlands	B	4.1	0
Water/Wetlands	C	3.4	0
Commercial	B	5.6	5.75
Commercial	C	30.3	38.50
Agricultural	B	528.5	126.77
Agricultural	C	327.2	137.96
High Density Residential	B	10.6	5.62
High Density Residential	C	22.2	18.77
Low Density Residential	B	67.9	11.10
Low Density Residential	C	98.8	35.50
Grass/Pasture	B	103.2	8.47
Grass/Pasture	C	105.7	23.07
Forest	B	55.8	2.73
Forest	C	34.0	5.55
	Total Annual Volume (acre-ft)		419.84
	Average Annual Runoff Depth (in)		3.60

Average Annual Runoff Volume for SCENARIO 2			
Land Use	Hydrologic Soil Group	Area (acres)	Average Annual Runoff Volume (acre-ft)
Water/Wetlands	B	4.1	0
Water/Wetlands	C	3.4	0
Commercial	B	73.6	75.68
Commercial	C	34.8	44.22
Agricultural	B	403.5	96.78
Agricultural	C	324.0	136.61

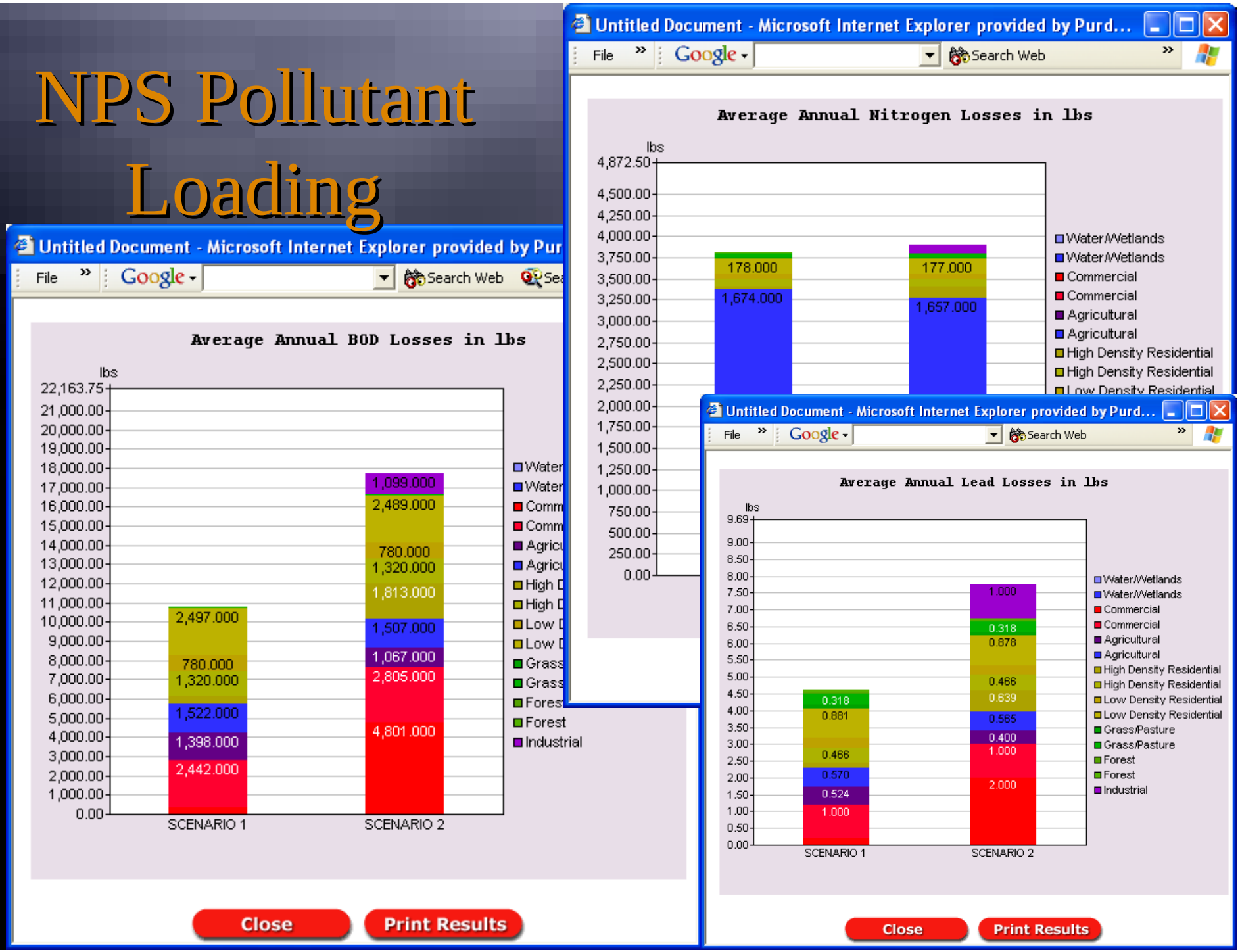
Hierarchical Menu Trees Created
Internet

Runoff and Land Use to Evaluate the Land Use Change Impact on Hydrology





NPS Pollutant Loading



L-THIA
Has Been Used by

Brevard County, FL (Coco Beach, Cape Kennedy, Etc.)

Research Triangle Park, NC

Cincinnati, OH

Columbus, OH (Collar Counties)

Indianapolis, IN

Fort Wayne, IN

Johnson County, IN

And

Wisconsin DNR Small Community Workshop, January 2003

Digital Watershed

Another Nationwide Web Application Tool for Effective Watershed Management

Institute of Water Research
Michigan State University

Introduction

- Centralized Hierarchical Information Repository
- Online Watershed Computing Center
- Comprehensive Datasets of EPA BASINS
- Online Environmental Modeling

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Overview

- Nationwide Watershed Coverage
- Multiple Forms of Access
- Comprehensive Datasets
- Scaling Function
- Online Environmental Modeling

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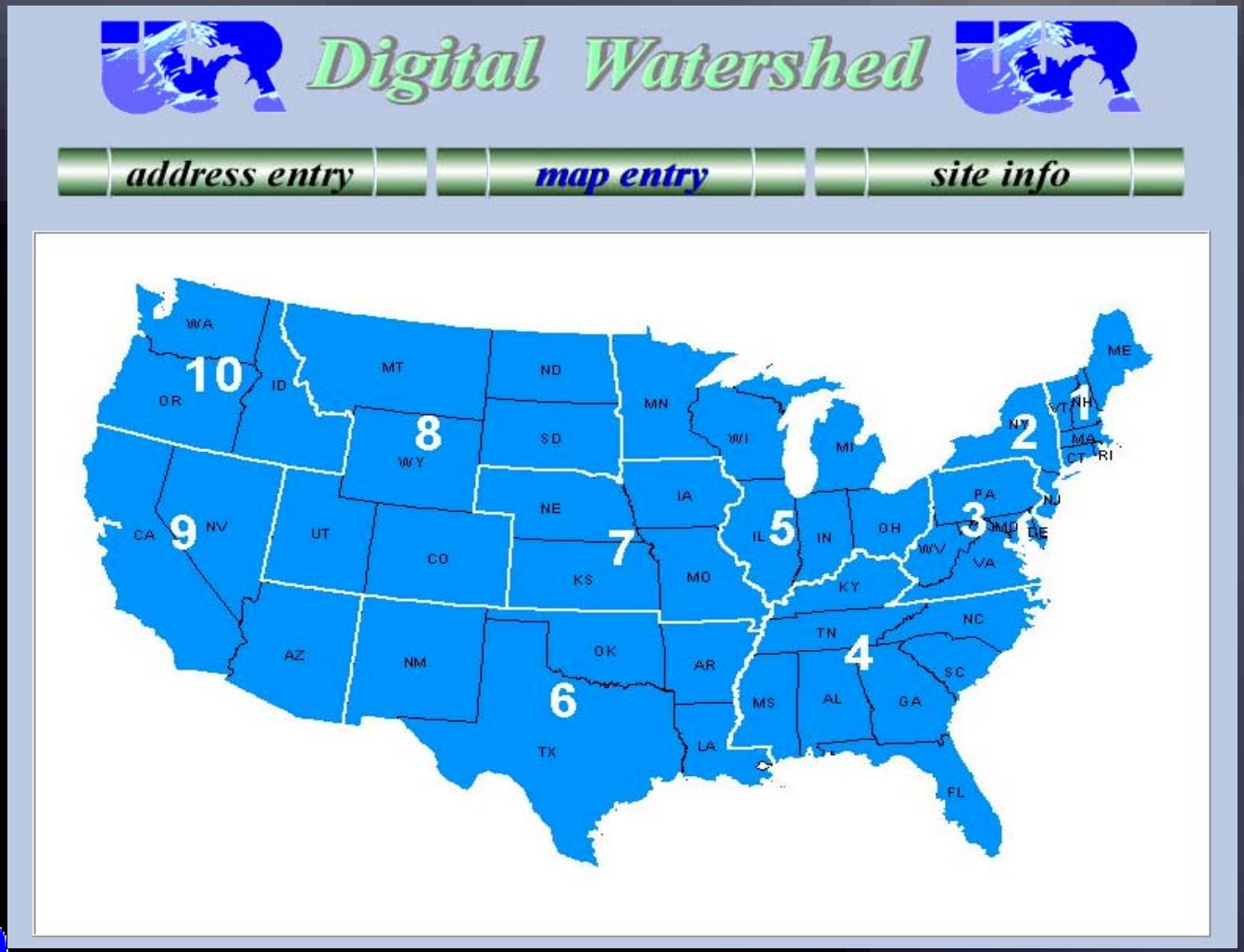
Nationwide Watershed Coverage



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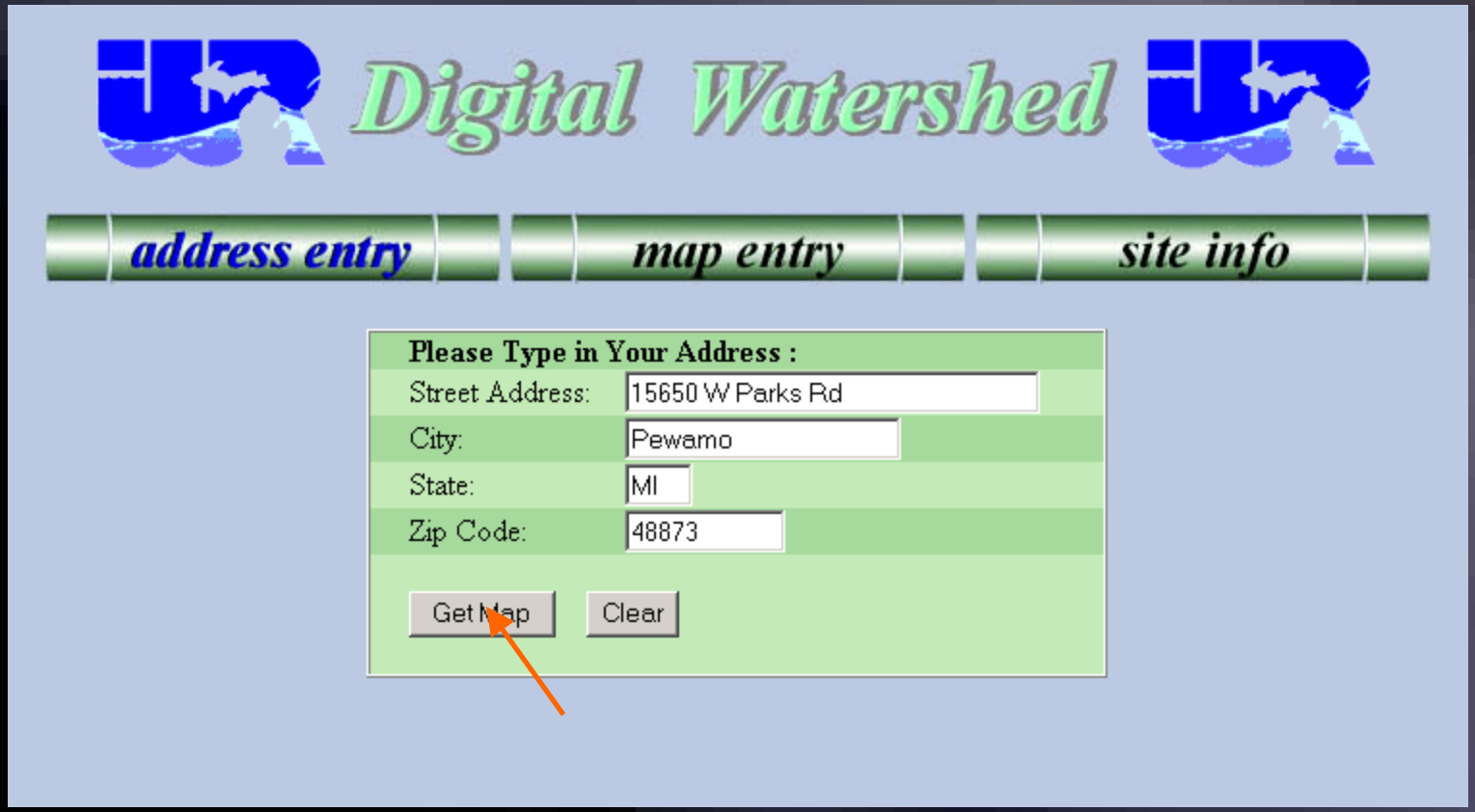
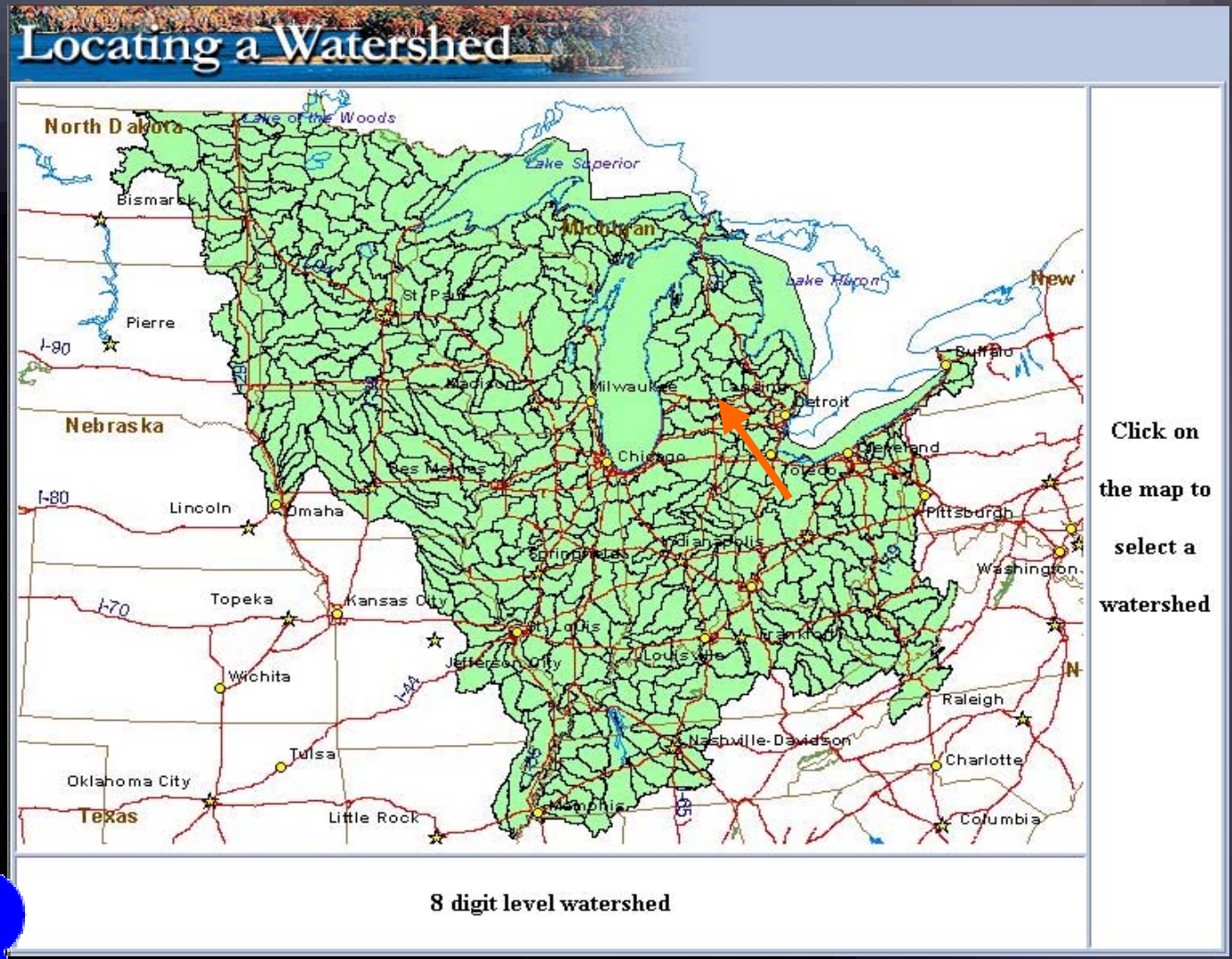
Multiple Forms of Access



Multiple Forms of Access



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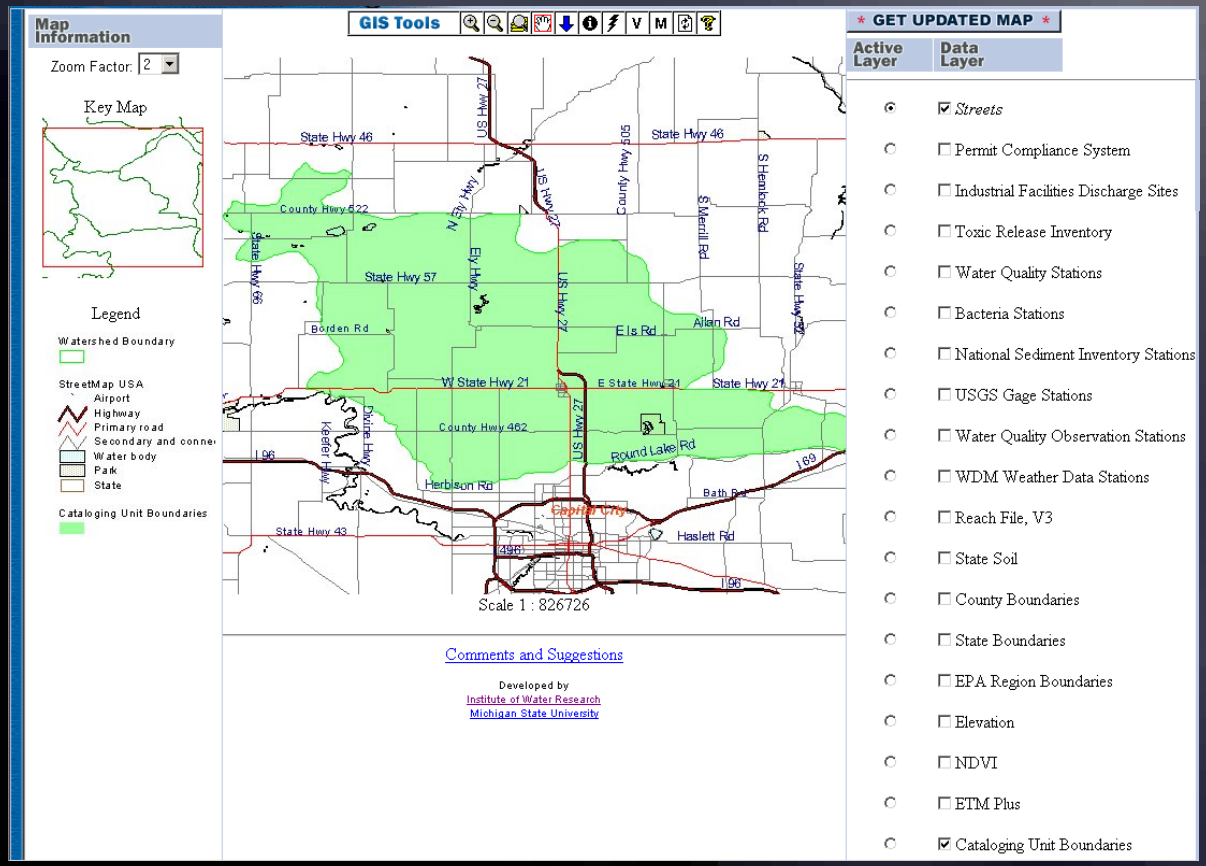
Comprehensive Datasets
(EPA BASINS Database)



- 8 Digit HUC
- Regulated facilities
- River network
- DEM
- State soil

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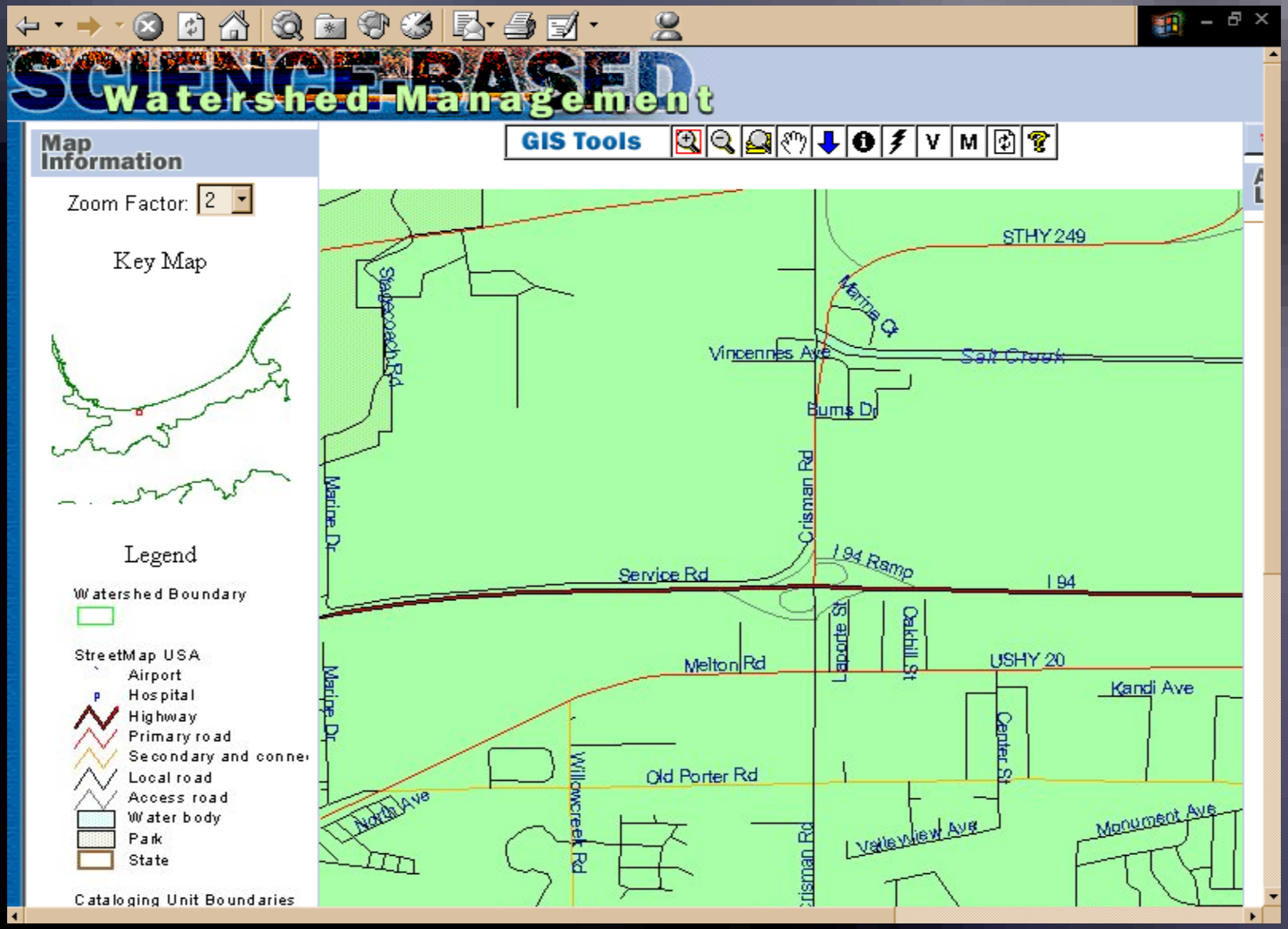
NIRPC Office Area:



Scaling Function

- Scaling Function allows users scale up and down between National Level 8-Digit and 12-Digit Local Level Watersheds
- It also provides the seamless linkage between National Watershed Portal and Distributed Local Level Watershed Systems
- The Local Level Systems can be anywhere on the Web and their locations are transparent to end users

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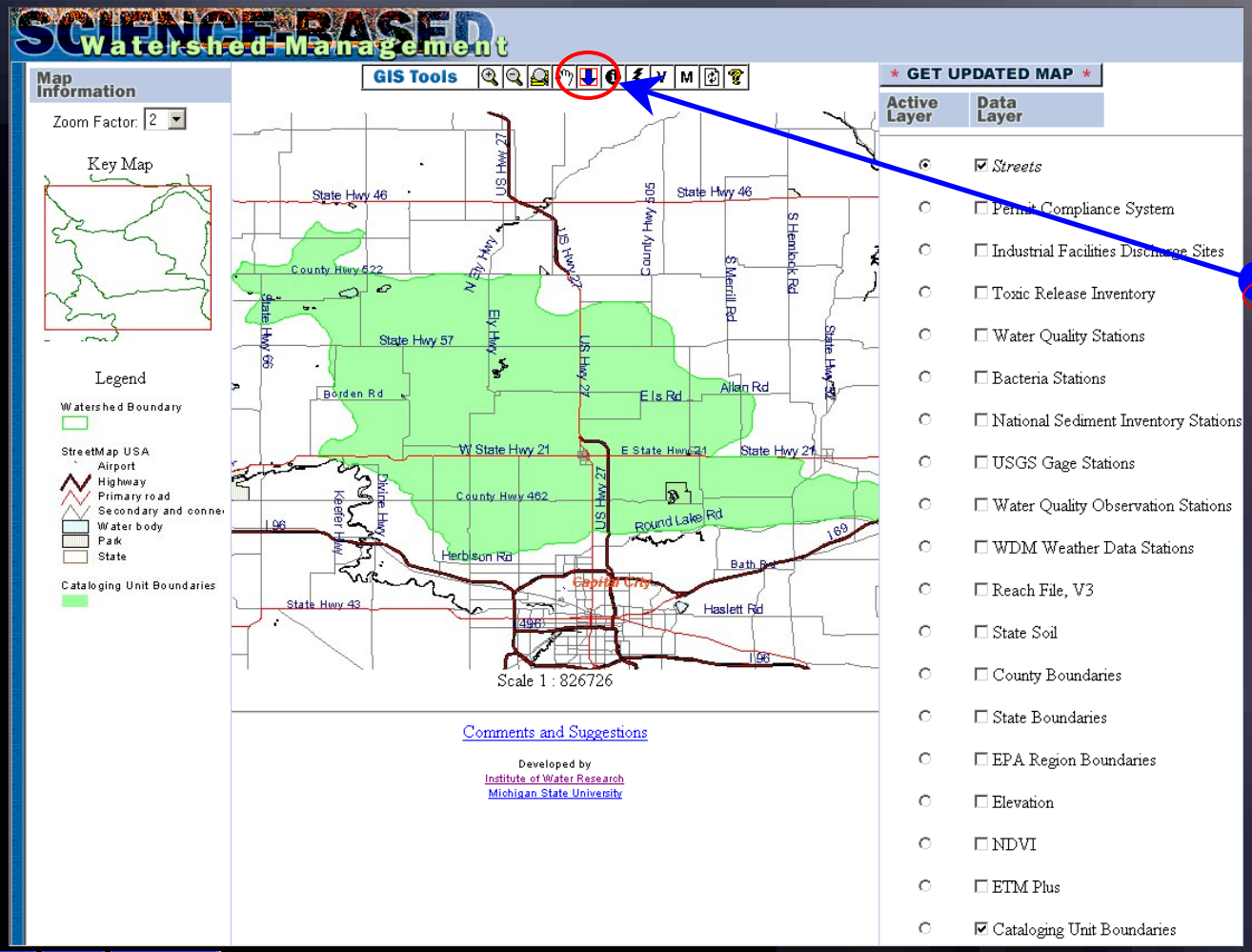
Scaling Function



The scaling function is provided by the blue arrow button. It allows users to scale down to local 12 digit watershed system.

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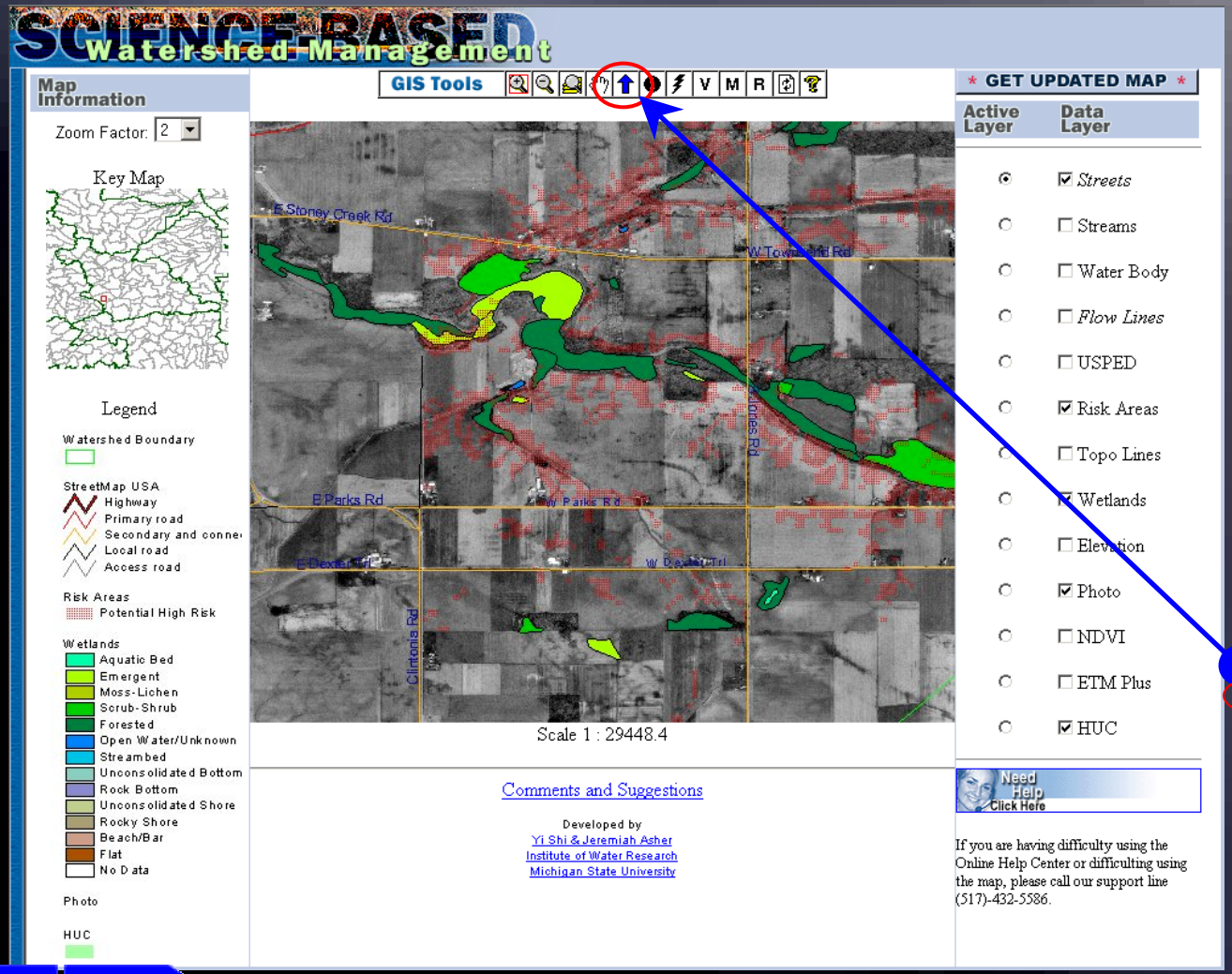
Scaling Function



Users of local 12-digit watershed system can also scale up to nationwide 8-digit watershed system by clicking the blue arrow button.

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Online Environmental Modeling

- Advances in Distributed Computing Technologies has made online real time or quasi-real time environmental modeling possible
- Online environmental modeling as national watershed computing infrastructure
- A demo of online environmental modeling for erosion and deposition modeling

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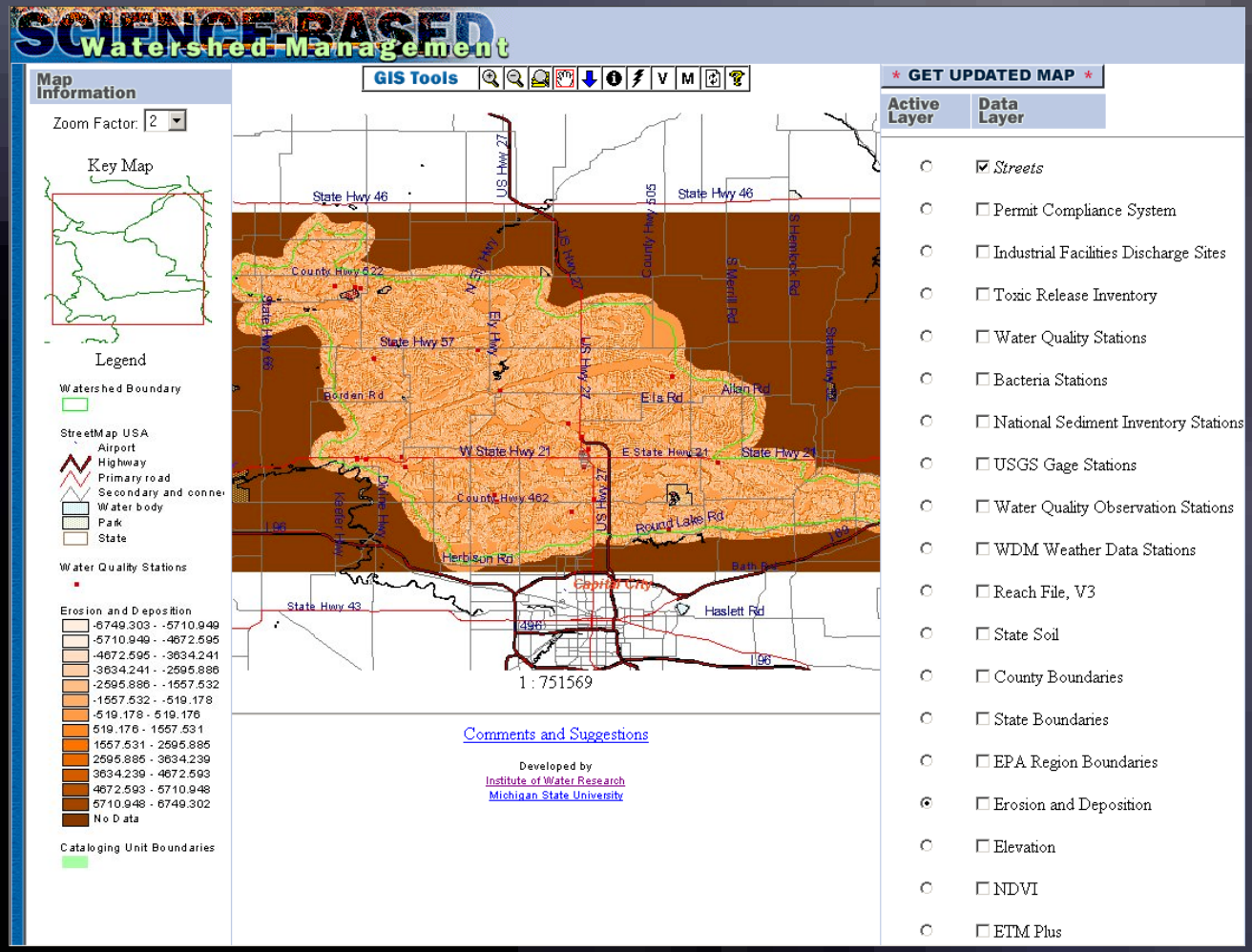
Erosion and Deposition Modeling Online

(A Demo for Online Environmental Modeling)



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