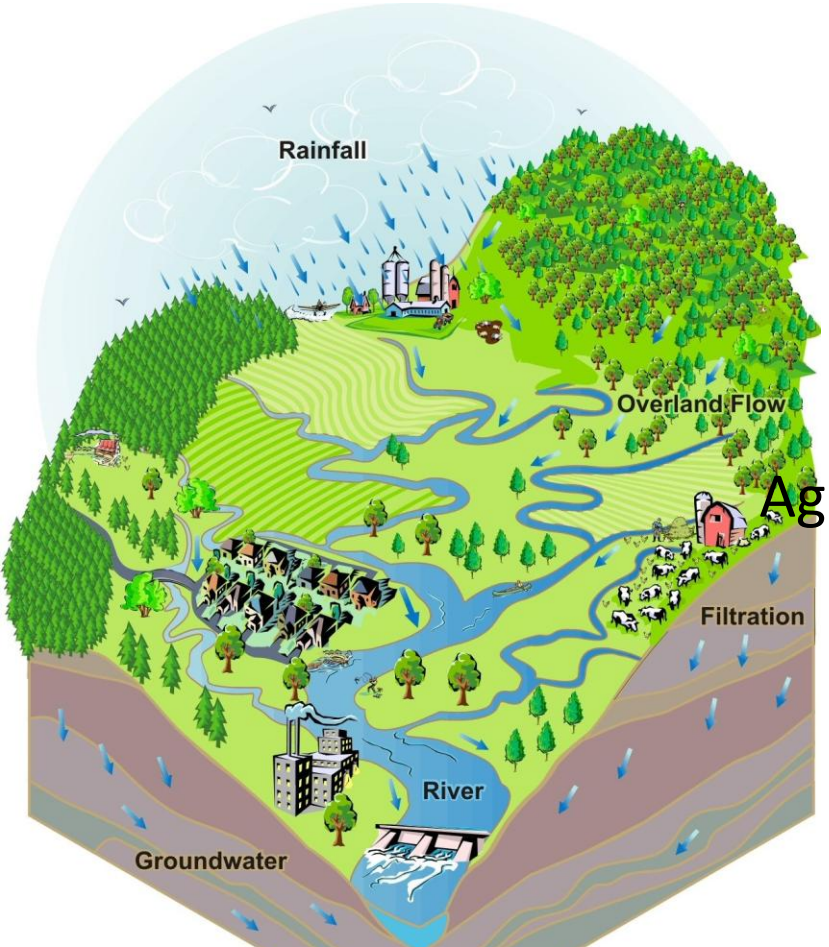
8 Top Web Tools for Watershed Management in Indiana

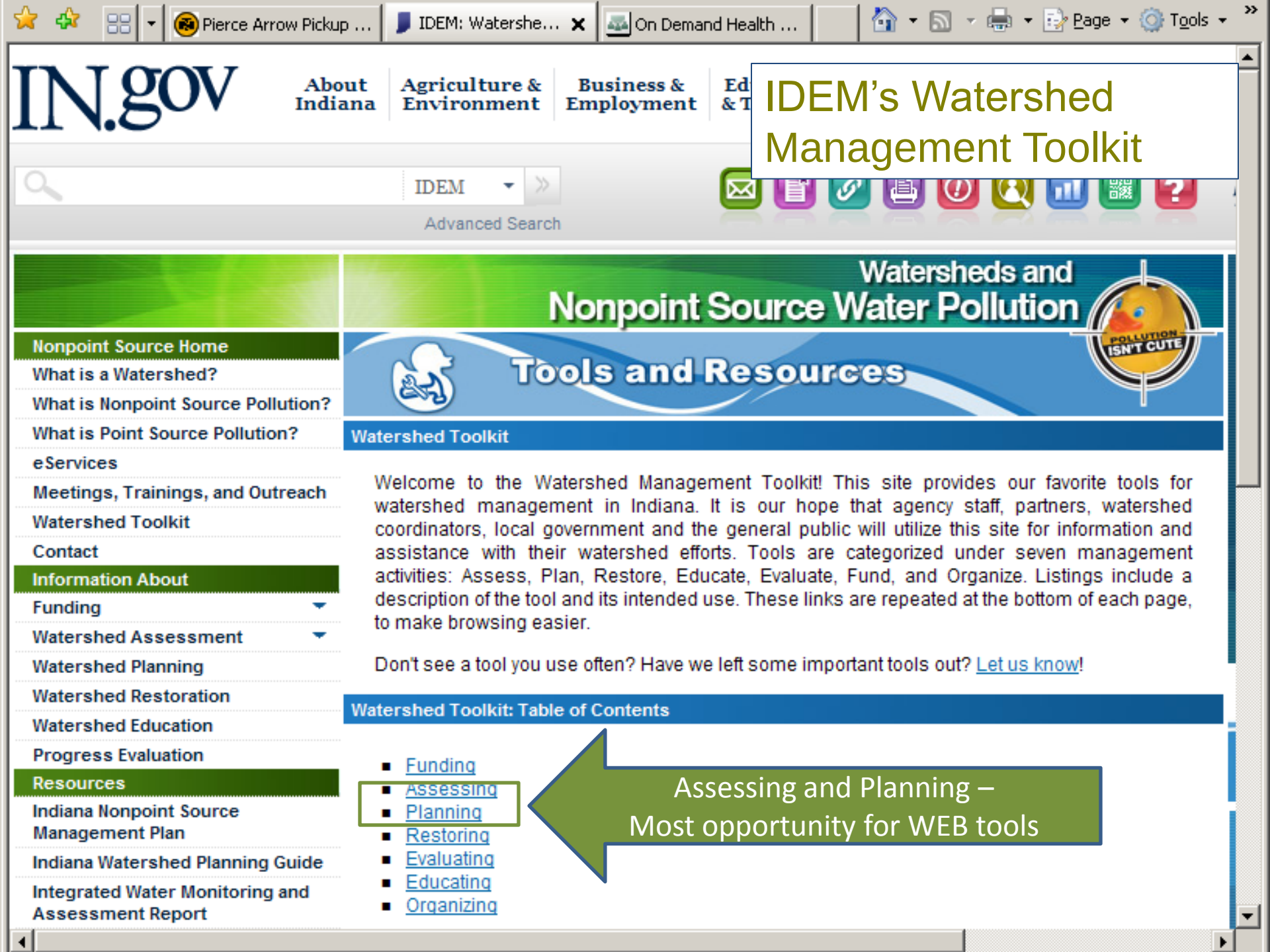


Jane Frankenberger
Professor and Extension Specialist
Agricultural and Biological Engineering
Purdue University

How did I decide what tools to include?

- They are inherently web-based – i.e., not a document that is on the web
- Most were developed in Indiana, and all are relevant to watershed management in Indiana
- All are accessible (i.e., free and publicly available, easy to use)
- I think all can be useful in watershed management.

IDEM's Watershed Management Toolkit



Indiana Watershed Leadership Program

Tools for Indiana Watersheds

Web-based tools can guide you to existing data, help you analyze your measurements, map your watershed and its resources, and provide critical watershed information. These are some we recommend.

Tools Developed by the Indiana Watershed Leadership Program

Indiana HUC Finder

Find the 8, 10, and 12-digit hydrologic unit code (HUC) for any location. Also shows the older 11 and 14-digit HUCs on the same map.

Indiana Water Monitoring Inventory

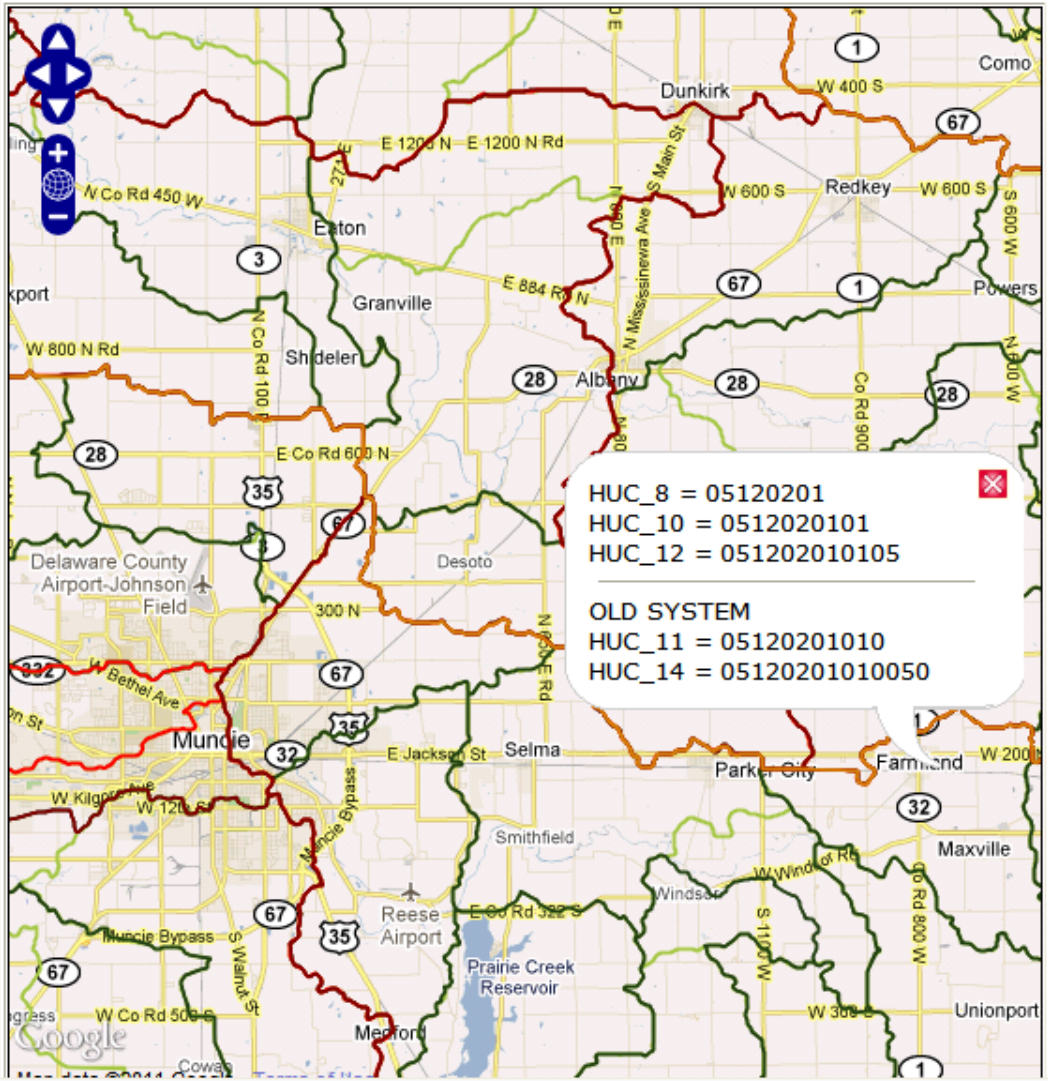
Indiana Watershed Leadership Program

PURDUE UNIVERSITY

Purdue Extension Knowledge to Go

Tools that Help with Assessing Your Watershed

8. HUC Finder



Indiana HUC Finder

View Original Map

Base Layer

- (•) Google Streets
- ( ) Google Satellite
- ( ) Google Hybrid
- ( ) Google Physical
- ( ) OpenStreetMap Mapnik
- ( ) OpenStreetMap Osmarender

HUC

- [x] HUC08
- [x] HUC10
- [x] HUC12
- [x] HUC11
- [x] HUC14

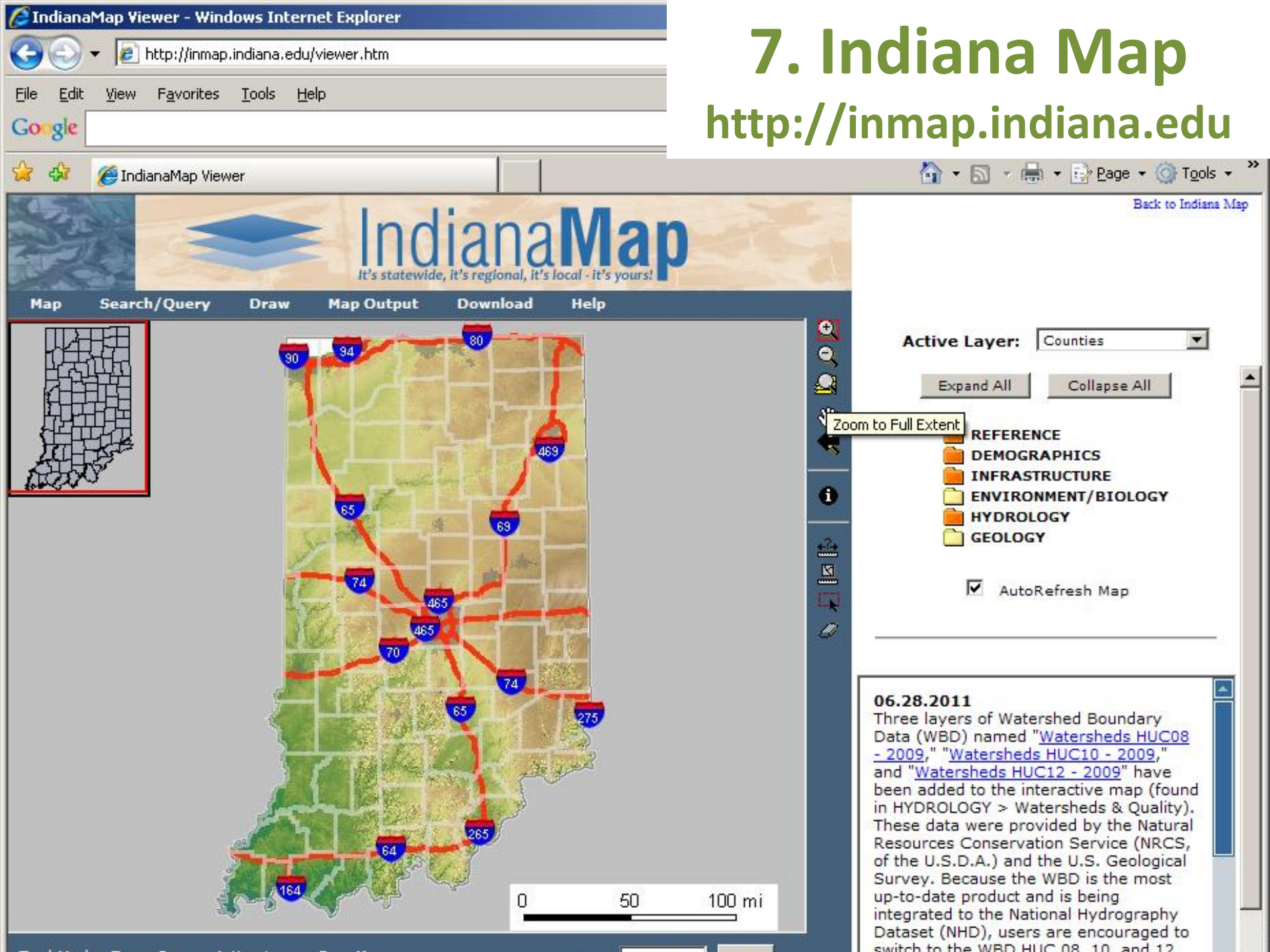
Search Address: [ ] go

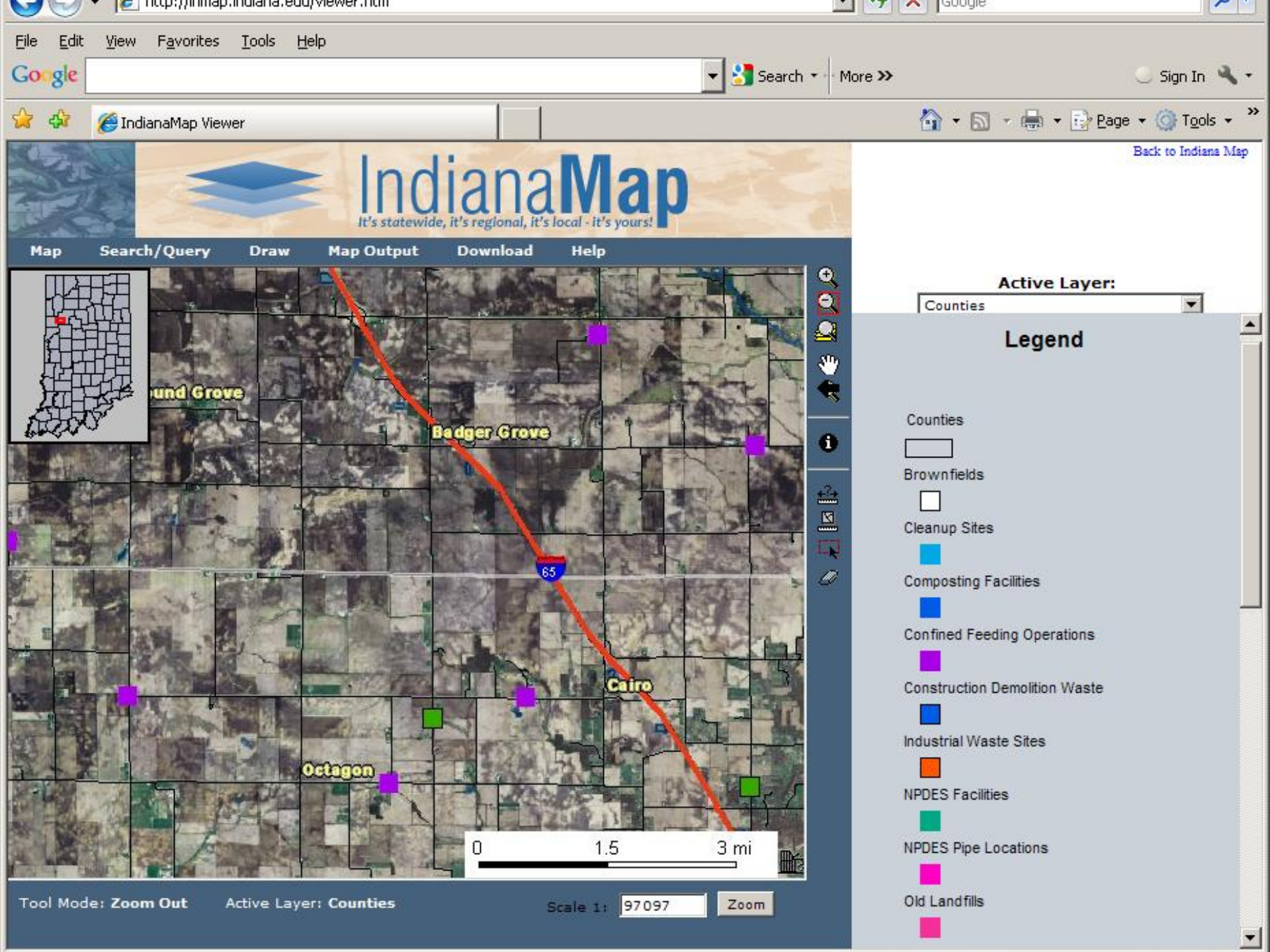
This site provides a quick way to identify the 8, 10, and 12-digit Hydrologic Unit Code (HUC) for any point in Indiana. The 11 and 14-digit HUCs in the older system are also provided, for reference between the two systems.
Instructions: Click on any point. The map will zoom in, so that the point is unambiguous. Click a second time and the HUC numbers will be displayed, both in the new system (HUC 8, 10, 12) and the old system (HUC 11 and 14).

Video

7. Indiana Map

http://inmap.indiana.edu




File Edit View Favorites Tools Help
Search More
Sign In
IndianaMap Viewer
Page Tools
Back to Indiana Map
IndianaMap
It's statewide, it's regional, it's local - it's yours!
Map Search/Query Draw Map Output Download Help
Badger Grove
Cairo
Octagon
65
0 1.5 3 mi
Active Layer:
Counties
Legend
Counties
Brownfields
Cleanup Sites
Composting Facilities
Confined Feeding Operations
Construction Demolition Waste
Industrial Waste Sites
NPDES Facilities
NPDES Pipe Locations
Old Landfills
Tool Mode: Zoom Out
Active Layer: Counties
Scale 1: 97097
Zoom

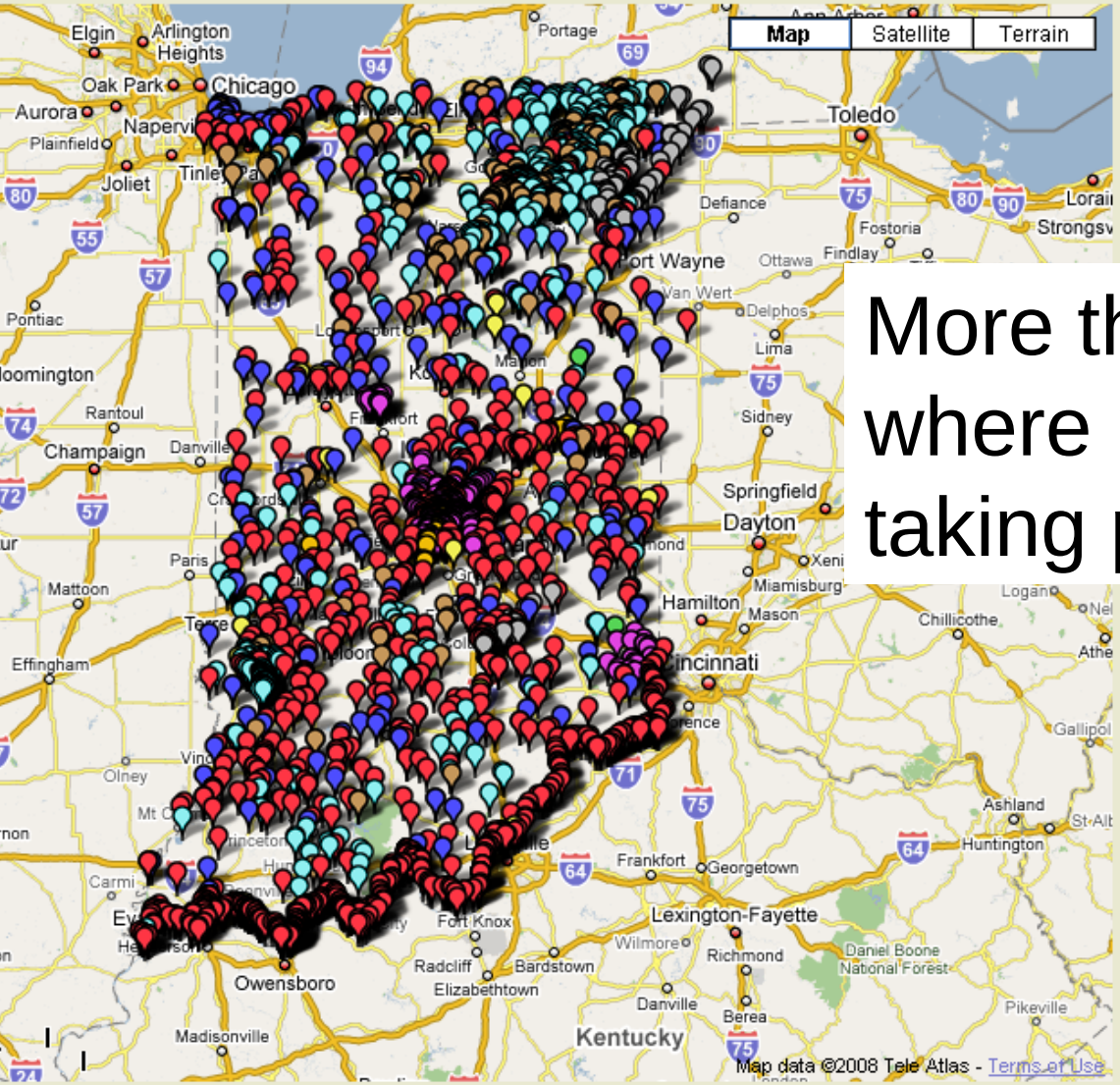

IndianaMap - Interactive Map, Tutorials, and Downloads
Page
Tools
home
indianamap
data
initiatives
gis resources
partners
help
faq
news
about
contact
Excellent support, including videos
IndianaMap
It's statewide, it's regional, it's local - it's yours!
Atlas News
06.28.2011
Three layers of Watershed Boundary Data (WBD) named "Watersheds HUC08 - 2009," "Watersheds HUC10 - 2009," and "Watersheds HUC12 - 2009" have been added to the interactive map (found in HYDROLOGY > Watersheds & Quality). These data were provided by the Natural Resources Conservation Service (NRCS, of the U.S.D.A.) and the U.S. Geological Survey. Because the WBD is the most up-to-date product and is being integrated to the National Hydrography Dataset (NHD), users are encouraged to switch to the WBD HUC 08, 10, and 12 data sets (2009) from the old HUC 08, 11, and 14 data sets (1991).
Three layers showing the results of redistricting in Indiana, named "Redistricted - U.S. Congress," "Redistricted House - Gen. Assembly," and "Redistricted Senate - Gen. Assembly" have been added to the interactive map (found in DEMOGRAPHICS > Political & Other Boundaries). Redistricting was completed in early 2011 for all 100 state house and 50 state senate districts and Indiana's nine congressional seats. New political districts are drawn every 10 years to incorporate the latest U.S. Census information. These data were supplied by the Indiana Election Division and the Indiana Geographic Information Officer, Indiana Office of Technology.
GO TO MAP
LATEST ADDITIONS
Tuesday, 06.28.2011
Watersheds HUC08 - 2009
Watersheds HUC10 - 2009
Watersheds HUC12 - 2009
Redistricted - U.S Congress
Redistricted House - Gen. Assembly
Redistricted Senate - Gen. Assembly
Liquefaction Potential
Seismic Shaking Materials Response
Ethanol Production Facilities
Tuesday, 06.21.2011
Bedrock Geol. - Monroe County
Bedrock Geol. - Bloomington Quad
Bedrock Geol. - Clear Creek Quad
Bedrock Geol. - Tunnelton Quad
Internet
100%

6. Indiana Water Monitoring Inventory

A tool for finding monitoring locations

- a central hub for monitoring locations and information about the monitoring data
- search for existing locations or enter new locations
- collaboration of many members of the Indiana Water Monitoring Council

NOTE: the inventory does not include actual water quality data



More than 4100 locations where monitoring is taking place (so far!)

View Monitoring Locations

To view all monitoring locations, select: Display All | Download All

To refine your search, use the criteria below to select locations:

1. Agency Type: All

- Aquatic Plants/Algal Biomass
- Bacteriology/Microbiology
- Fish
- Flow/Stage
- General Chemistry
- Groundwater Level
- Groundwater Quality
- Habitat
- Lake Clarity
- Macroinvertebrates
- Metals
- Nutrients
- Organics/Pesticides
- Radiological

4. Hydrologic Unit Code :

HUC08 HUC10 HUC12

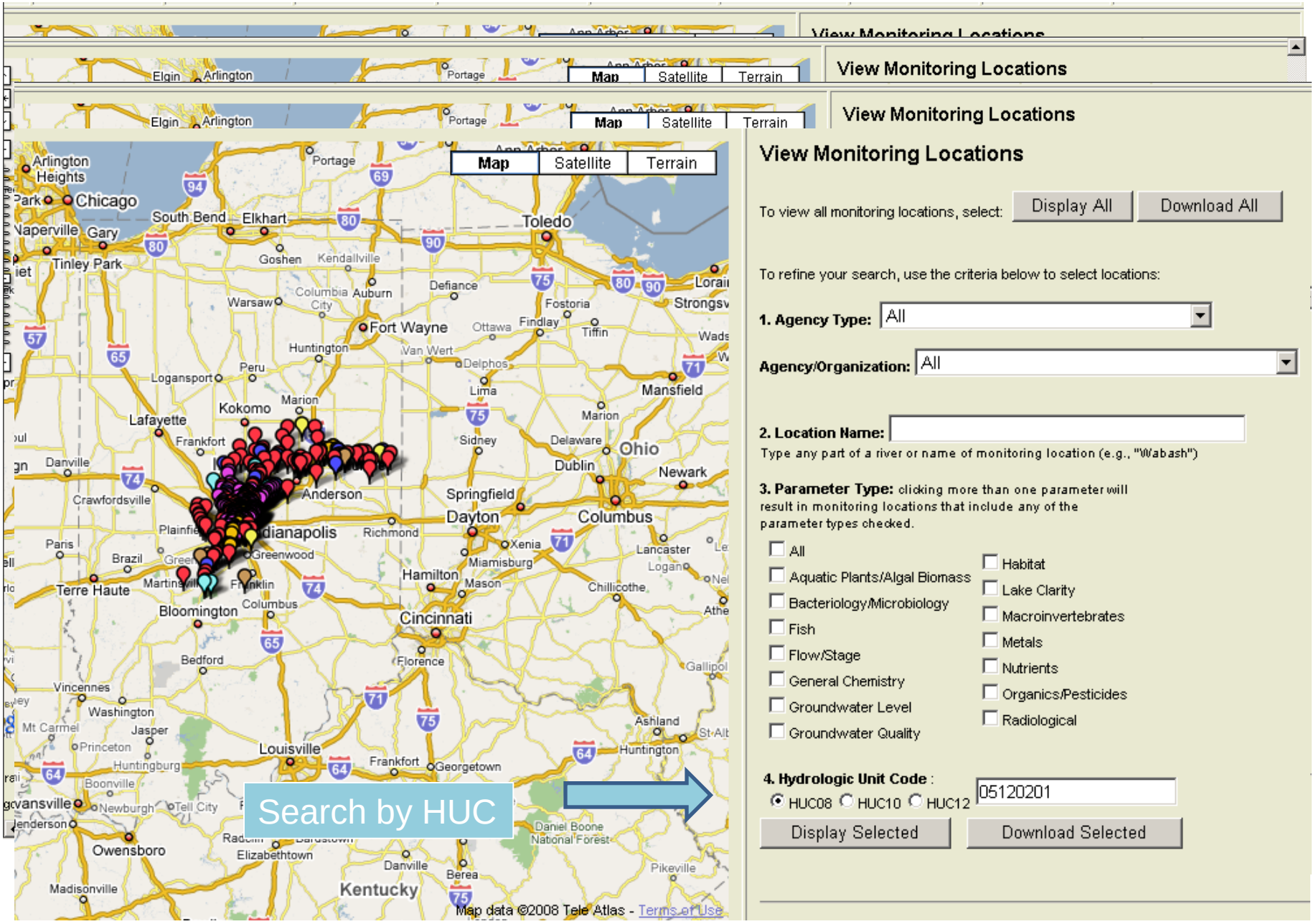
Display Selected | Download Selected

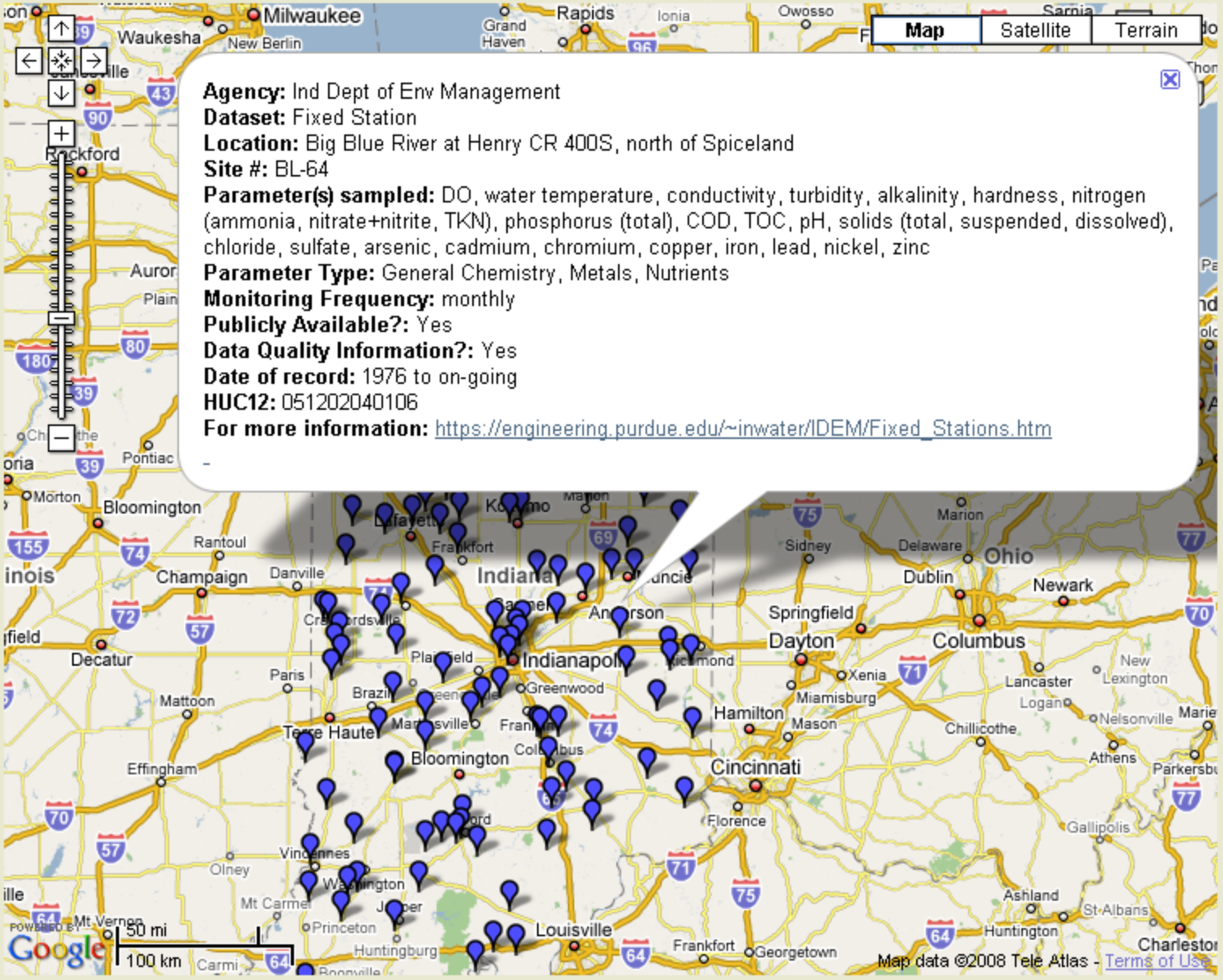
Enter Your Monitoring Locations

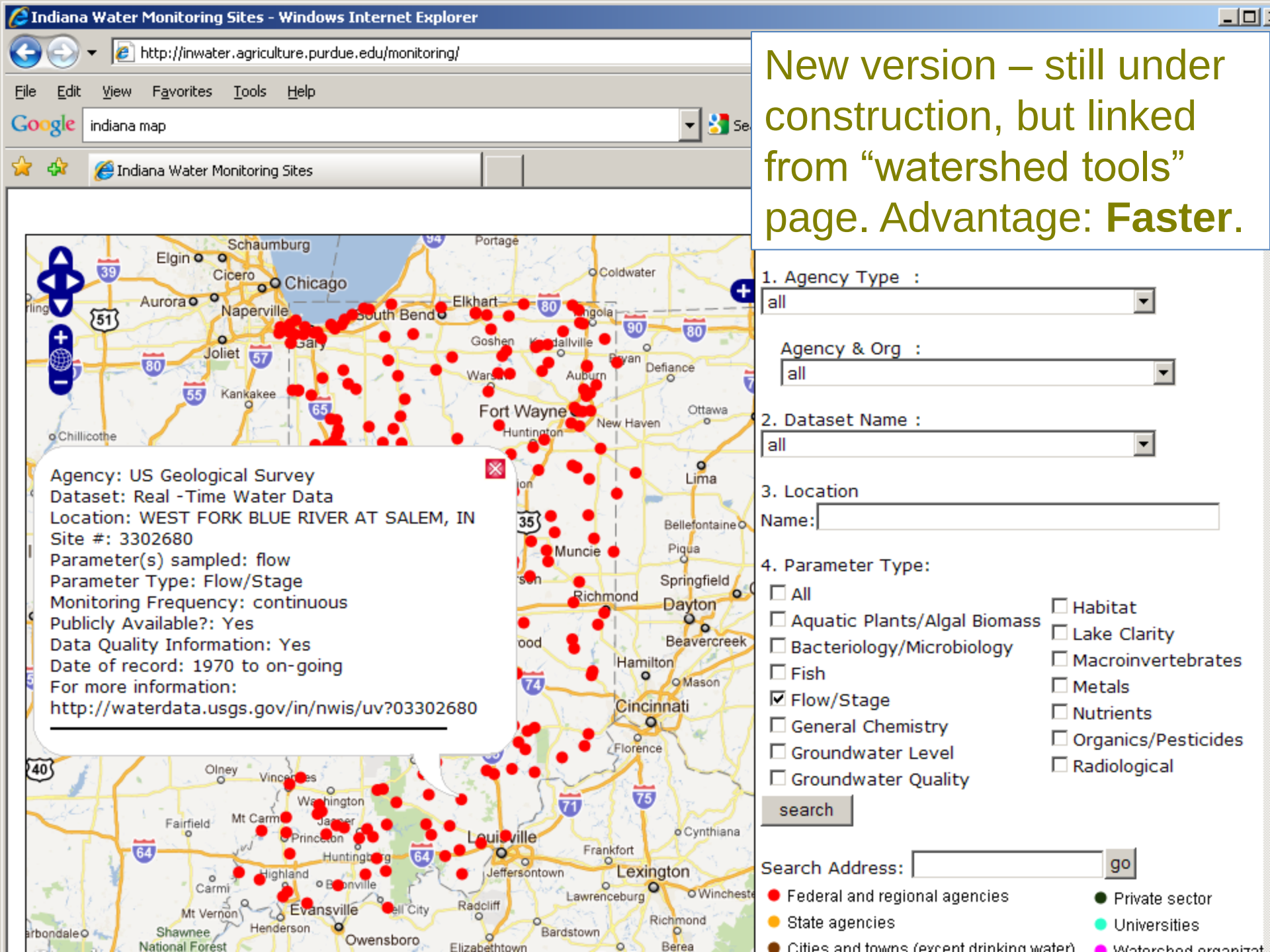
You are encouraged to share locations of your monitoring data -- here's how:

encies State agencies Cities and towns (except drinking water) Counties

nizations Private sector Universities Watershed organizations Drinking water Volunteers


View Monitoring Locations
Map
Satellite
Terrain
Chicago
Toledo
Fort Wayne
Indianapolis
Cincinnati
Louisville
Dayton
Columbus
Springfield
Kentucky
Ohio
Map data ©2008 Tele Atlas - Terms of Use
Search by HUC
To view all monitoring locations, select:
Display All
Download All
To refine your search, use the criteria below to select locations:
1. Agency Type:
All
Agency/Organization:
All
2. Location Name:
Type any part of a river or name of monitoring location (e.g., "Wabash")
3. Parameter Type: clicking more than one parameter will result in monitoring locations that include any of the parameter types checked.
All
Aquatic Plants/Algal Biomass
Bacteriology/Microbiology
Fish
Flow/Stage
General Chemistry
Groundwater Level
Groundwater Quality
Habitat
Lake Clarity
Macroinvertebrates
Metals
Nutrients
Organics/Pesticides
Radiological
4. Hydrologic Unit Code :
HUC08
HUC10
HUC12
05120201
Display Selected
Download Selected


Map
Satellite
Terrain
Agency: Ind Dept of Env Management
Dataset: Fixed Station
Location: Big Blue River at Henry CR 400S, north of Spiceland
Site #: BL-64
Parameter(s) sampled: DO, water temperature, conductivity, turbidity, alkalinity, hardness, nitrogen (ammonia, nitrate+nitrite, TKN), phosphorus (total), COD, TOC, pH, solids (total, suspended, dissolved), chloride, sulfate, arsenic, cadmium, chromium, copper, iron, lead, nickel, zinc
Parameter Type: General Chemistry, Metals, Nutrients
Monitoring Frequency: monthly
Publicly Available?: Yes
Data Quality Information?: Yes
Date of record: 1976 to on-going
HUC12: 051202040106
For more information: https://engineering.purdue.edu/~inwater/IDEM/Fixed_Stations.htm
Milwaukee
Waukesha
New Berlin
Rapids
Grand Haven
Ionia
Owosso
Rockford
Pontiac
Bloomington
Champaign
Danville
Decatur
Indianapolis
Anderson
Terre Haute
Bloomington
Effingham
Mattoon
Paris
Greenwood
Springfield
Dayton
Columbus
Cincinnati
Hamilton
Mason
Miamisburg
Xenia
Dublin
Newark
Delaware
Sidney
Marion
Ohio
Louisville
Florence
Frankfort
Georgetown
Huntington
Ashland
Chillicothe
Athens
Gallipolis
Lancaster
Logan
Nelsonville
Vincennes
Washington
Princeton
Huntingburg
Mt Vernon
Olney
50 mi
100 km
Google
Map data ©2008 Tele Atlas - Terms of Use
Federal and regional agencies
State agencies
Cities and towns (except drinking water)
Counties
Non-governmental organizations
Private sector
Universities
Watershed organizations
Drinking water
Volunteers


Indiana Water Monitoring Sites - Windows Internet Explorer
http://inwater.agriculture.purdue.edu/monitoring/
File Edit View Favorites Tools Help
Google indiana map
Indiana Water Monitoring Sites
New version – still under construction, but linked from “watershed tools” page. Advantage: Faster.
Agency: US Geological Survey
Dataset: Real -Time Water Data
Location: WEST FORK BLUE RIVER AT SALEM, IN
Site #: 3302680
Parameter(s) sampled: flow
Parameter Type: Flow/Stage
Monitoring Frequency: continuous
Publicly Available?: Yes
Data Quality Information: Yes
Date of record: 1970 to on-going
For more information:
http://waterdata.usgs.gov/in/nwis/uv?03302680
1. Agency Type :
all
Agency & Org :
all
2. Dataset Name :
all
3. Location
Name:
4. Parameter Type:
All
Aquatic Plants/Algal Biomass
Bacteriology/Microbiology
Fish
Flow/Stage
General Chemistry
Groundwater Level
Groundwater Quality
Habitat
Lake Clarity
Macroinvertebrates
Metals
Nutrients
Organics/Pesticides
Radiological
search
Search Address:
go
Federal and regional agencies
State agencies
Cities and towns (except drinking water)
Private sector
Universities
Chicago
Indianapolis
Fort Wayne
Louisville
Cincinnati
Evansville
Lexington
Dayton
Springfield
Richmond
South Bend
Elkhart
Gary
Joliet
Naperville
Aurora
Elgin
Schaumburg
Cicero
Kankakee
Lima
Muncie
Hamilton
Mason
Beavercreek
Bellefontaine
Piqua
Defiance
Auburn
Goshen
New Haven
Huntington
Ottawa
Coldwater
Portage
Chillicothe
Olney
Fairfield
Mt Carmel
Washington
Princeton
Huntingburg
Jasper
Jeffersontown
Frankfort
Cynthiana
Lawrenceburg
Winchester
Richmond
Berea
Bardstown
Radcliff
Elizabethtown
Owensboro
Henderson
Mt Vernon
Carmi
Highland
Shawnee National Forest

Tools for helping you plan and use water quality monitoring in your own watershed

5. Catalog of Monitoring Protocols used by Indiana Agencies

Purpose: To provide

- accessible information on methods used for monitoring across the state of Indiana
- information on methods that other groups might use to undertake or improve water monitoring
- a foundation for possible discussions of aligning methods

http://monitoringprotocols.pbworks.com

Video

4. Online watershed delineation too
(and L-THIA model)

L-THIA HOME

Process: 3 separate ways:

A) Search / Zoom and Click "Delineate",
B) select 14 digit HUC
C) or type in your location coordinates.

Search for or Zoom-in to your area.

Search

Select "Delineate" button and click on the stream whose watershed you plan to analyze.

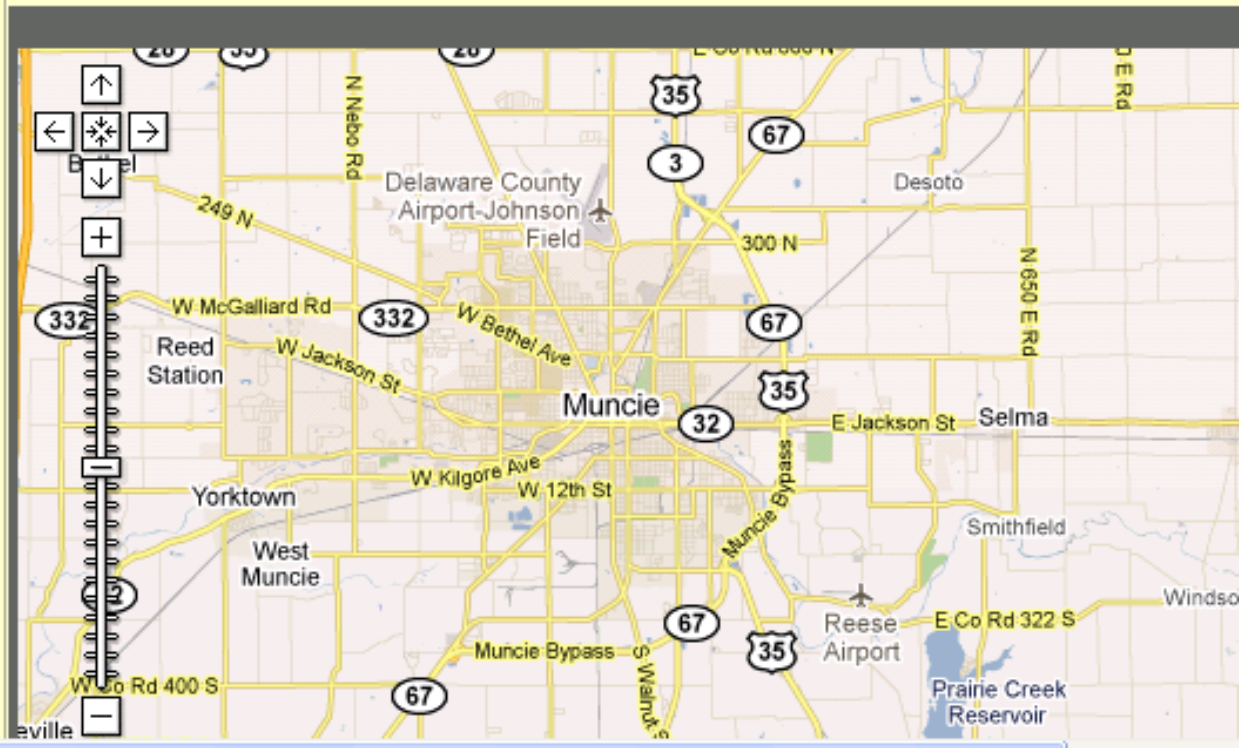
Delineate

To enter a specific latitude- longitude select "Lat-Lon" button below , longitude with minus sign must be

Check the checkbox to display streaming WMS layer

☑ HUC 8, 10, and 12 layer ☑ NHD water layer

Metadata



L-THIA HOME

Process: 3 separate ways to locate your point:

A) Search / Zoom and Click "Delineate",

B) select 12 digit HUC

C) or type in your location coordinates.

Search for or Zoom-in to your area.

Search

Select "Delineate" button and click on the stream whose watershed you plan to analyze. Your location is sent to our L-THIA engine and the watershed of that point is calculated; then you can run L-THIA model on it to predict runoff.

Delineate

To enter a specific latitude- longitude select "Lat-Lon" button below , longitude with minus sign must be within -89.00000 to -86.00000 and latitude within 37.00000 to 41.00000

Select UTM Zone16 N coordinates in meters: range of X should be within 401000 to 711000

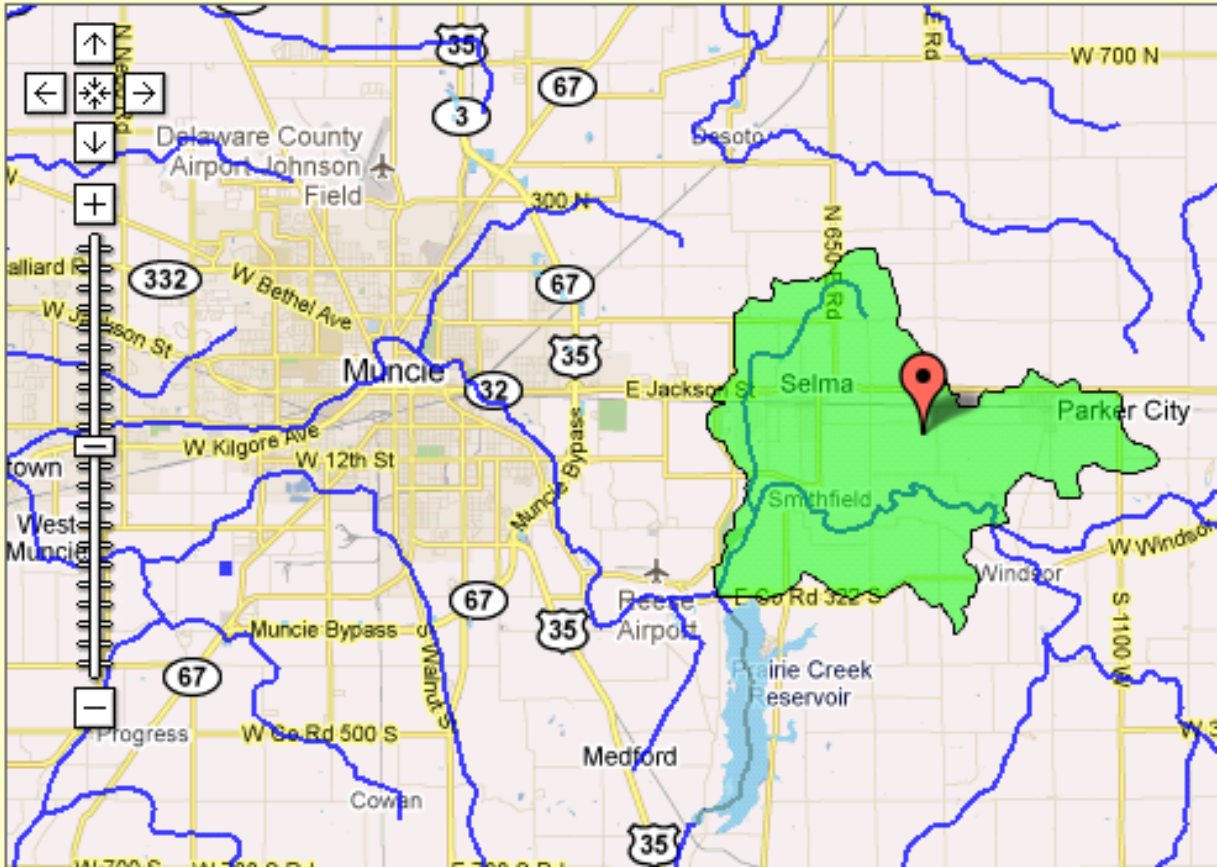
Calculate Impervious area | Download KML | Run TR-55 L-THIA | Run Mi

Run SEDSPEC Erosion Control Structure Design

Check the checkbox to display streaming WMS layer

☐ HUC 8, 10, and 12 layer ☑ NHD water layer (Note: It takes some time)

Metadata



3. Web-based Load Calculation using LOADEST

Use your own concentration data to estimate annual load in your watershed

Your Water Quality Data

Information

Format:
Column 1: Date[yyyymmdd]
Column 2: Time (24-hour clock; If you do not have the time of sampling, use 1200 in all rows)
Column 3: Concentration (select units)

Date	Time	Concentration	mg/L
20000223	1300	0.015	
20000315	1310	<0.001	
20000406	1240	0.026	
20000419	1300	<0.001	
20000511	1320	0.013	
20000524	1410	0.021	
20000609	1400	0.013	
20000621	1320	0.042	
20000721	1210	0.032	
20000811	1410	0.015	

Parameter Name: phosphorus
Target Concentration: 0.3 mg/L

If you prefer, you may Upload a File
(File must be in .csv or .txt format)

Flow Data

Information

*If you have flow data, you may enter it (or upload file). Otherwise select "**USGS Gage Location Tool**" to identify a gage and automatically pull in flow data.*

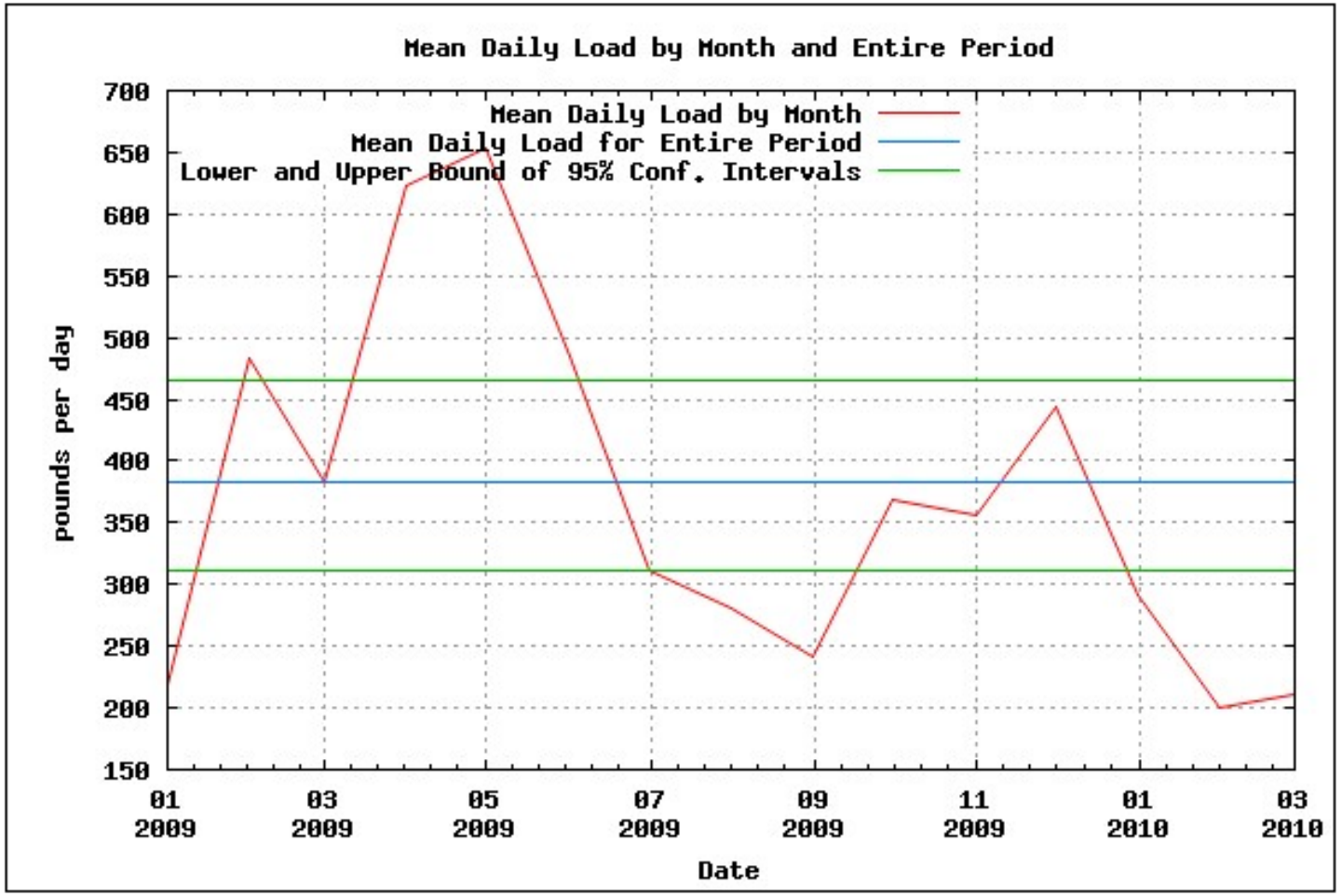
Date	Flow	cfs
20000101	46	
20000102	48	

Video

Tools to help in developing a watershed-based plan to restore your watershed

Load Results

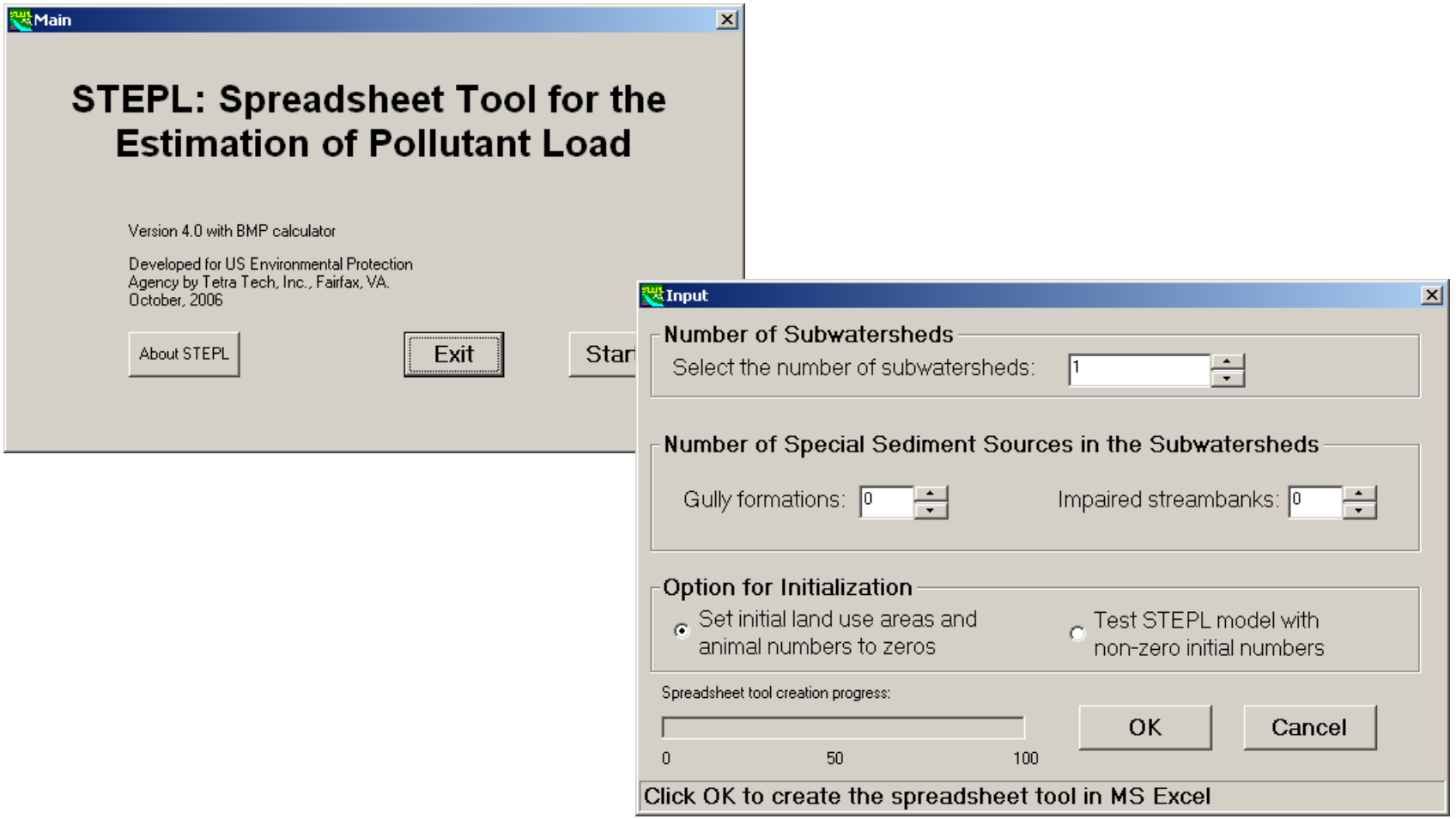
	Total	Per acre
Estimated Annual Load :	**139,641** lb/yr	**0.7** lb/ac/yr
Maximum Annual Load to Meet Target :	**72,194** lb/yr	**0.4** lb/ac/yr
Load Reduction Needed to Meet Target :	**67,447** lb/yr	**0.3** lb/ac/yr



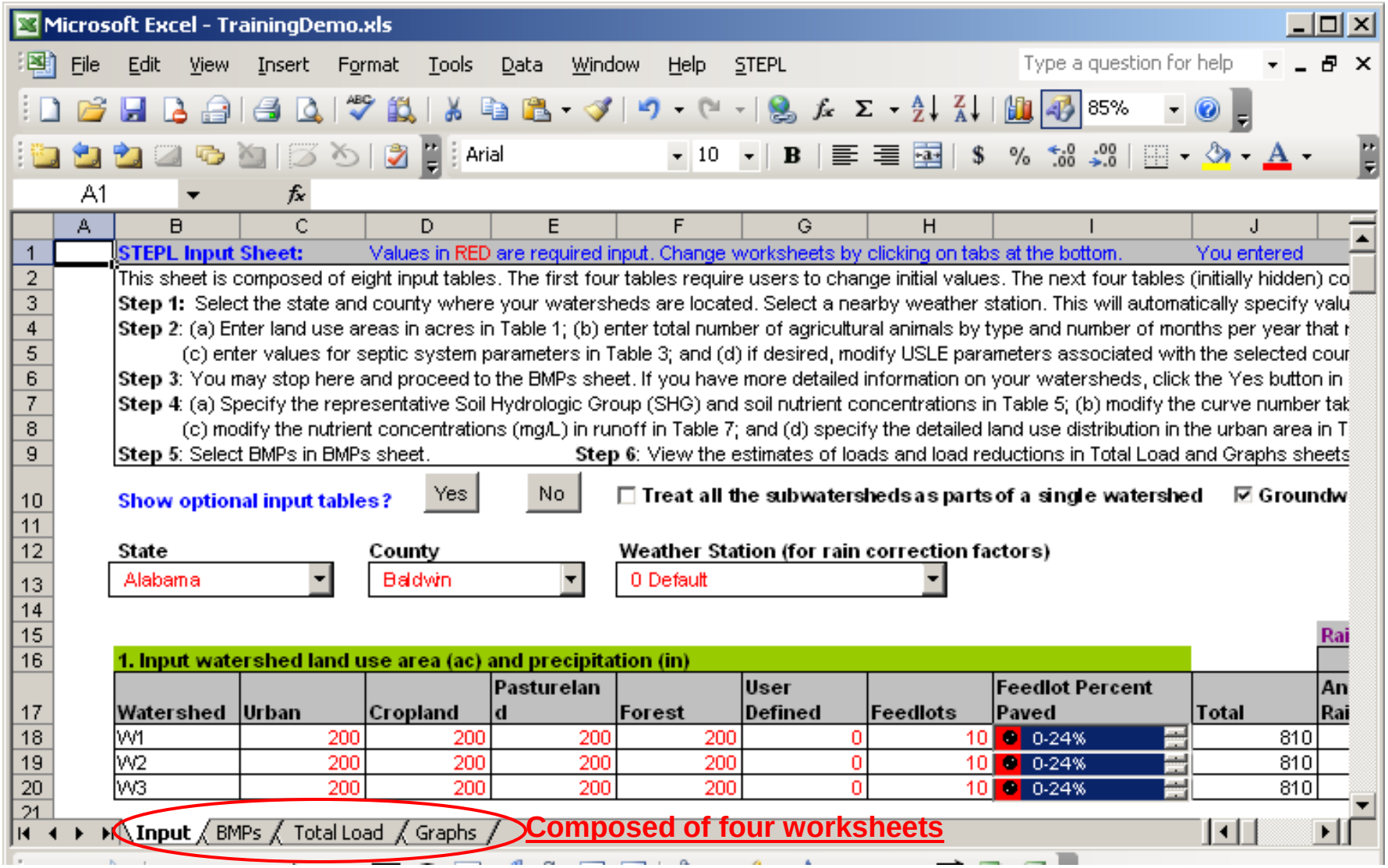
2. Estimating Load Reductions from BMPS – STEPL and Region 5 Models

STEPL Main Program

- Based in an Excel spreadsheet



STEPL Spreadsheet



BMP reduction estimates based on a percentage of current loads (% can be adjusted if you have more information).

Urban BMP Tool

Gully and Streambank Erosion

1. BMPs and efficiencies for different pollutants on CROPLAND, ND=No Data

Watershed	Cropland				
	N	P	BOD	Sediment	BMPs
WV1	0.485	0.55	ND	0.405	Contour Farming
WV2	0.1	0.3	ND	0.35	Diversion
WV3	0	0	0	0	0 No BMP

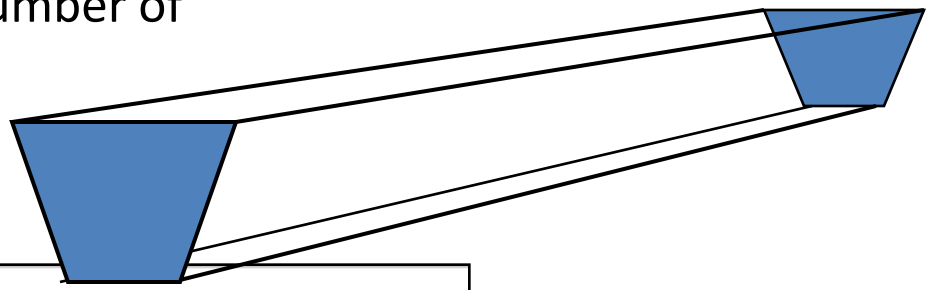
Region 5 Model

- Provides a general estimate of pollutant reduction at the source level
- Initially developed by Indiana Department of Environmental Management (IDEM) based on Michigan DEQ's pollution control manual for section 319 watersheds.
- Sources and BMPs included:

Source	BMP
Gully	Gully Stabilization
Streambank	Streambank Stabilization
Agricultural Fields	Field Management Practices and Filter Strips
Feedlot	Animal Waste System
Urban Runoff	Various BMPs

Gully Erosion: Estimate Load, then Load Reduction

- Enter gully dimensions and the number of years since the gully formed



Please fill in the gray areas below:

Parameter	Gully	Example
Top Width (ft)	13	**15**
Bottom Width (ft)	2	**4**
Depth (ft)	1.5	**5**
Length (ft)	300	**20**
Number of Years	5	**5**
Soil Weight (tons/ft3)	0.0425	**0.05**
Soil P Conc (lb/lb soil)* USER	0.0005	**0.0005** *
Soil N Conc (lb/lb soil)* USER	0.001	**0.001** *

* If not using the default values, users must provide input (in red) for Total P and Total N soil concentrations

Estimated Load Reductions

	BMP Efficiency*	Gully	Example
Sediment Load Reduction (ton/year)	1.0	28.7	**10**
Phosphorus Load Reduction (lb/year)		28.7	**8**
Nitrogen Load Reduction (lb/yr)		57.4	**16**

* BMP efficiency values should be between 0 and 1, and 1 means 100% pollutant removal efficiency.

Stream Bank Erosion

- Load (Channel Erosion)

  = Length * Height * Lateral Recession rate * Soil weight

Determining Lateral Recession Rate by Field Observation

Lateral Recession Rate (ft/yr)	Category	Description
0.01 – 0.05	Slight	Some bare bank, no exposed roots
0.06 – 0.2	Moderate	Bank is mostly bare
0.3 – 0.5	Severe	Bank is bare with exposed roots
0.5+	Very Severe	Bank is bare with fallen trees

Stream Bank Erosion

- Select a soil texture (e.g. silty clay)
- Enter the dimensions of the eroding stream banks

Please fill in the gray areas below:

Parameter	Bank #1	Bank #2	Example	
Length (ft)	500	500	**500**	
Height (ft)	10	10	**15**	
Lateral Recession Rate (ft/yr)*	0.2	0.2	**0.5**	
Soil Weight (tons/ft3)	0.0425	0.0425	**0.04**	
Soil P Conc (lb/lb soil)** USER	0.0005	0.0005	**0.0005**	**
Soil N Conc (lb/lb soil)** USER	0.001	0.001	**0.001**	**

** If not using the default values, users must provide input (in red) for Total P and Total N soil concentrations
*Lateral Recession Rate (LRR) is the rate at which bank deterioration has taken place and is measured in feet per year. This rate may not be easily determined by direct measurement. Therefore best professional judgement may be required to estimate the LRR. Please refer to the narrative descriptions in Table 1.

Estimated Load Reductions

	BMP Efficiency* Bank #1	BMP Efficiency* Bank #2	Bank #1	Bank #2	Example
Sediment Load Reduction (ton/year)	1.0	1.0	42.5	42.5	**150**
Phosphorus Load Reduction (lb/year)			42.5	42.5	**150**
Nitrogen Load Reduction (lb/yr)			85.0	85.0	**300**

* BMP efficiency values should be between 0 and 1, and 1 means 100% pollutant removal efficiency.

Agricultural - Based mainly on erosion

(estimated using USLE)

Please check which BMPs apply:

☑ Agricultural Field Practices

☑ * Filter Strips

Please select a state and a county, and default USLE parame

Users should use the local USLE parameter values if available!

State: Alabama

County: Autauga

Please fill in the gray areas below:

USLE or RUSLE	Before Treatment	After Treatment	Example **Before Treatment**	Example **After Treatment**
Rainfall-Runoff Erosivity Factor (R)	374.69	374.69	**120**	**120**
Soil Erodibility Factor (K)	0.20	0.20	**0.35**	**0.35**
Length-Slope Factor (LS)	0.29	0.29	**0.44**	**0.44**
Cover Management Factor (C<=1.0)*	0.20	0.04	**0.7**	**0.5**
Support Practice Factor (P<=1.0)*	0.99	0.99	**0.775**	**0.11**
Predicted Avg Annual Soil Loss (ton/acre/year)	4.21	0.84	**10.03**	**1.02**

* User must use the local C and/or P values (in red) to obtain the reduction due to the field practices.

Other types of practices available

Source	BMP
Gully	Gully Stabilization
Streambank	Streambank Stabilization
Agricultural Fields	Field Management Practices and Filter Strips
Feedlot	Animal Waste System
Urban Runoff	Various BMPs

1. Local Decision Maker

Local Decision Maker - The 4-Step Process to Protecting Your Community's Water and Environmenta - Windows Internet Explorer

http://ldm.agriculture.purdue.edu/

File Edit View Favorites Tools Help

Google local decision maker Search More >> Sign

Local Decision Maker - The 4-Step Process to Protecti... Page

Local Decision Mak

Home

Inventory & Analysis

- Overview
- Land Cover & Use
- Demographics
- Environment & Natural Resources
- Transportation & Mobility
- Education
- Economy & Labor Market
- Health & Human Resources
- Governance

GIS Maps

Resources

About Us

Welcome to Local Decision Maker

Our Mission ...

to assist Indiana communities in making informed and integrated land use and economic development decisi

Local Decision Maker (LDM) is a powerful decision support system for comprehensive planning. LDM brings together the data, current research, analyses, mapping tools, and models to assist communities throughout the planning process. If vexing issues such as too much growth, too little growth, loss of natural resources, poor employment outlook, or declining school populations have driven your community to the point that change is wanted, you will find LDM useful. LDM will help you assess existing conditions, develop a realistic vision of the future, identify future development strategies, and select a preferred strategy consistent with the community's economic, natural resource, social and cultural objectives and projected resource bases. Conflicts are unavoidable given competing objectives. Overall, we expect communities that use LDM will find ways to navigate through these conflicts and develop a comprehensive plan supported by the community.

The site is designed for county planners, planning consultants and public officials. If you are new to the comprehensive planning process, please spend some time in the Resources section. In addition, we recently ac the map to the right that summarizes existing planning efforts throughout Indiana. Before starting a planning effort, you may want to visit some of the counties that have recently completed or updated their comprehensi plans.

Inventory and Analysis

A community's existing conditions, some say current state-of-affairs, help a community learn about itself. Th inventory helps a community identify available economic, social, cultural and environmental resources,

Local Decision Maker

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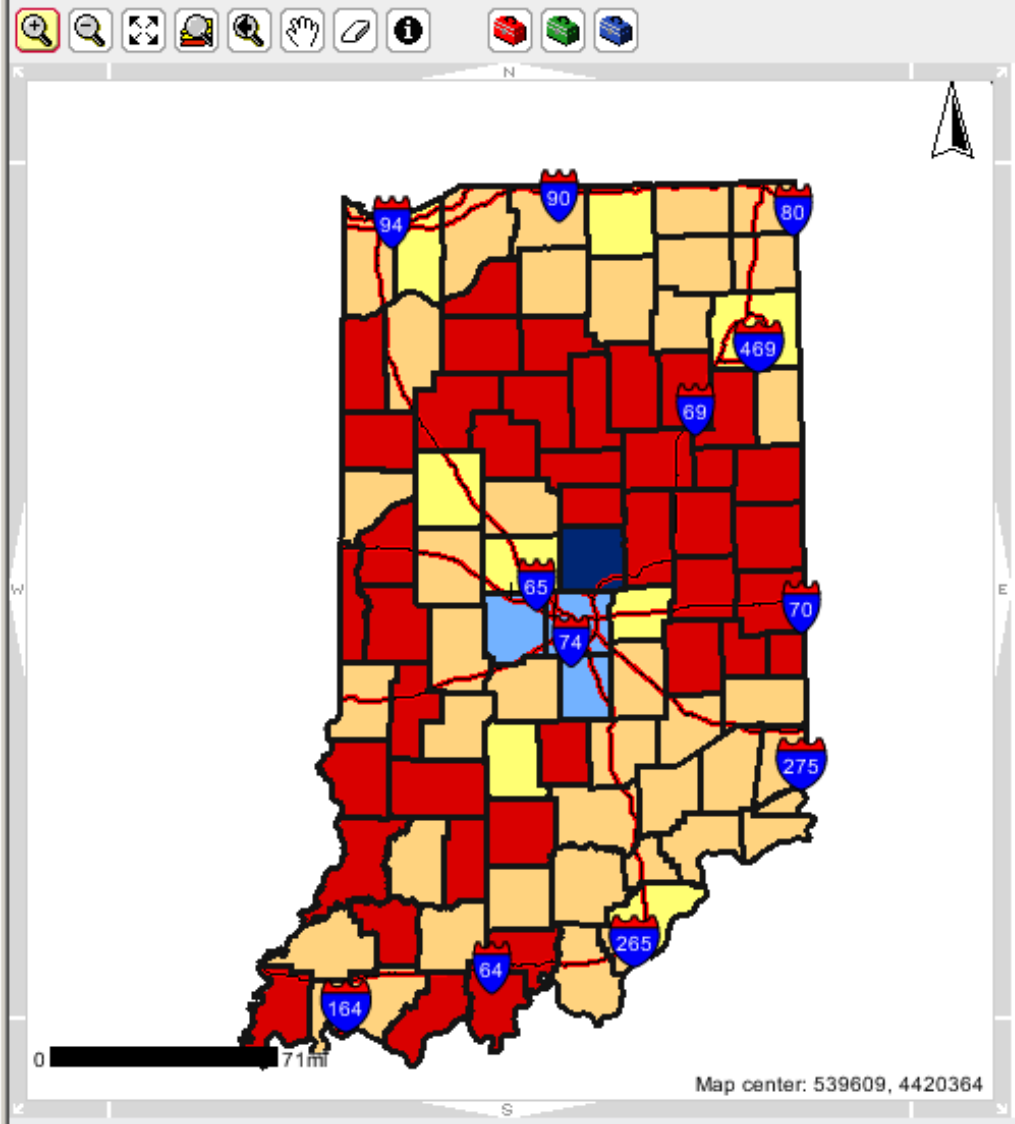

Map Legend

Settings

- Indiana counties
- Interstates

Population change 2000-2009

- -4,607 - 0
- 1 - 10,000
- 10,001 - 25,000
- 25,001 - 50,000
- 50,001 - 75,000
- 75,001 - 96,547

Scale: 1: 4,063,763 go Quick View: Select a location Map Tool: Zoom In Active Layer: * NO ACTIVE LAYER *

powered by Geocortex

Done | Internet | 100%

Local Decision Maker - The 4-Step Process to Protecting Your Community's Water and Environmenta - Windows Internet Explorer

http://ldm.agriculture.purdue.edu/

local decision maker

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Local Decision Maker - The 4-Step Process to Protecti...

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About Us

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Welcome to Local Decision Maker

Our Mission ...

to assist Indiana communities in making informed and integrated land use and economic developn

Local Decision Maker (LDM) is a powerful decision support system for comprehensive planning. LDM brings together the data, current research, analyses, mapping tools, and models to assist communities throughout the planning process. If vexing issues such as too much growth, too little growth, loss of natural resources, poor employment outlook, or declining school populations have driven your community to the point that change is wanted, you will find LDM useful. LDM will help you assess existing conditions, develop a realistic vision of the future, identify future development strategies, and select a preferred strategy consistent with the community's economic, natural resource, social and cultural objectives and projected resource bases. Conflicts are unavoidable given competing objectives. Overall, we expect communities that use LDM will find ways to navigate through these conflicts and develop a comprehensive plan supported by the community.

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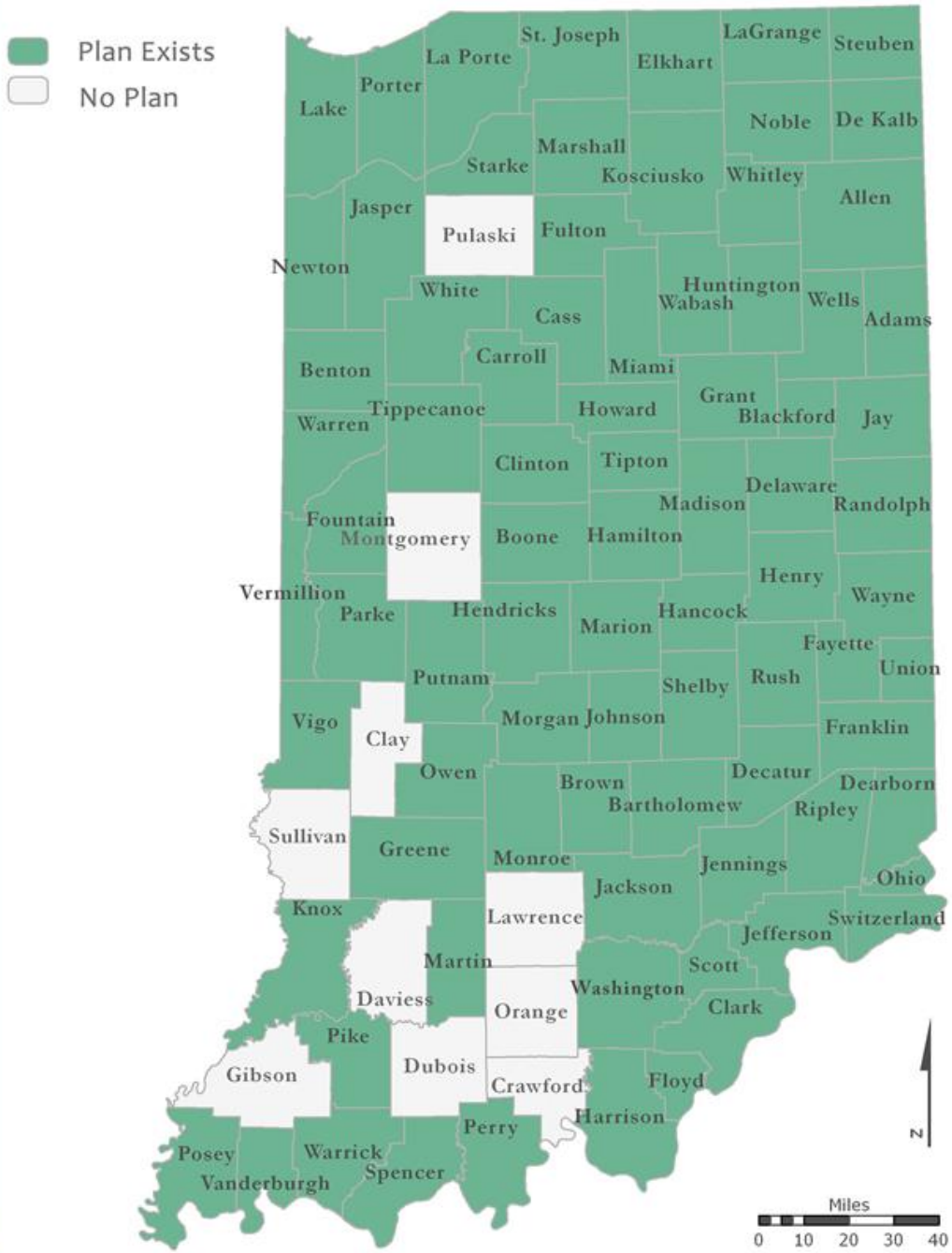
Inventory and Analysis

http://ldm.agriculture.purdue.edu/Pages/Resources/PlanIN.html

Internet 100%

Status of County Comprehensive Land Use Plans



County Comprehensive Plans and Websites:

The following table contains links to each county's planning office, homepage, and GIS website when ava

County	Plan	Website	GIS site
Adams			
Allen			
Bartholomew			
Benton			
Blackford			
Boone			
Brown			
Carroll			
Cass			
Clark			
Clay			
Clinton			

Conclusion

- Modern watershed management requires the informed use of innovative web-based tools.
- These are tools I know can be useful in watershed management. Let's end by sharing your experiences and ideas.

Please type in the chat box your answers to either of the questions below:

- Are there tools that you would like to suggest to others or that you hope we will discuss today?
- What kind of tools do you wish you had?