St. Joseph River Watershed 319 Project
Technical Subcommittee
August 21, 2003 Meeting Summary

Attendees
Sandra Nordmark, FOTSJR
Fred Edinger, FOTSJR
Dennis Haskins, USDA NRCS Hillsdale County
Steve Blumer, USGS Water Resources Division
Todd Kesselring, Elkhart County GIS
Jim Coury, Potawatomi RC & D Council
Elizabeth Moore, Great Lakes Commission (via conference call)
Christine Bauer, MDEQ
Andrew Fang, Kieser & Associates
Mark Kieser, Kieser & Associates
Nicole Ott, Kieser & Associates

Mark Kieser led the meeting and provided an update on the activities of the Road-Stream Crossing Subcommittee, which met two days prior. The summary from the last Technical Subcommittee meeting was reviewed next. No changes were noted, and it will be posted on the project website. The agenda for the meeting was introduced (Attachment A). Mark Kieser proceeded with an overview of technical efforts since the previous meeting on July 9, 2003. A PowerPoint presentation was also used by Mark Kieser (Attachment B).

Fred Edinger inquired about the addition of geographic references to the maps on the project website, as was discussed in the last Steering Committee meeting. It was indicated that county and city overlays were added to maps on the website. A clickable link allows viewers to add or remove the geographic layers. Viewers can also open a PDF file containing a high resolution image of each map to zoom in on the image or print it. Several additional available locational data layers were presented, and it was decided that cities, major roads and counties are the most useful layers. The ability to map townships should be utilized in the planning process, as land use planning and zoning occurs at the township level. Fred Edinger indicated that any layer that is added for geographic reference should only be used if it covers both Michigan and Indiana. The FOTSJR stresses that these projects occur on a watershed basis and that planning should be consistent across state boundaries. It was noted that including some watershed maps that only portray one state or the other will highlight the fact that the complementary data are not available for the other state. This may aid in compilation of those data. It was suggested that a footnote requesting data be added to those webpages containing data for only one state in this regard.

The discussion turned to an atrazine summary compiled and posted by Kieser & Associates on the project website. Steve Blumer indicated that three of the USGS continuous flow monitoring stations where atrazine is monitored may be discontinued due to local budget cuts. Many of the stations are not funded by federal monies. Stations which may be discontinued include the Little Elkhart River at Middlebury, IN; Pine Creek near Elkhart, IN; and Forker Creek near Burr Oak, IN. Discrete water quality sampling may continue at these stations, but continuous flow monitoring may not. Todd Kesselring indicated that two of the stations are in Elkhart County, and he will speak with someone who may be able to assist. Jim Coury indicated that these

program cuts are expected to increase. Two popular programs, Americorps and the D21 Trailways/Greeenways Programs, are experiencing funding cuts.

Mark Kieser described additional data related to atrazine use by county and corn production by county that Kieser & Associates is compiling. These data may help identify general areas of the watershed where atrazine loading to surface waters may be likely to occur. It was asked whether the atrazine use data were based upon sales or application rates. The data may be based upon sales at a county level. Therefore, some sales may occur in one county, while the actual use occurs in a different county. However, sales data most likely accurately portray usage on a watershed-wide scale. Atrazine sales and corn production will be mapped to help identify critical areas in the watershed. Steve Blumer indicated that the USGS had identified priority subwatersheds for atrazine use and presented those data at the December 2002 St. Joseph River Basin Commission Meeting. He will attempt to find those data. The fate and transport of atrazine are not fully understood, and the breakdown products are often found at concentrations of concern more often than the parent compound, according to an Iowa Geological Survey study through the National Water Quality Assessment Program. Jim Coury indicated that the other "zine" herbicides are also of concern. Simazine has been used heavily and for a longer period of time than atrazine. Sales of atrazine have decreased in the past three years as the U.S. EPA has limited the application rate to two pounds per acre. It will be interesting to find out if surface water concentrations decrease as a result. Soil types may greatly affect the transport and resulting levels in surface waters.

The Draft Water Quality Summary was discussed next. It was asked whether the term "water bodies" refers to both lakes and streams. The term will be clarified in the text. A paragraph describing the major pollutants and the desired uses needs to be added, and the human impacts, such as *E. coli* levels, needs to brought to the front. It was discussed whether the summary should be written in a non-technical manner such as a newspaper article is written. Perhaps two versions can be written: one containing technical information and one written for a non-technical audience. The latter may possibly be referred to the Education and Information Subcommittee, as a part of the Education component of the project. It was decided that the current summary should contain an opening non-technical paragraph, and then present technical information. Readers need to understand that watershed management is a complex science. Jim Coury offered an example in which woodlot owners were presented very simplified, non-technical information on woodlot management in a workshop and, consequently, instituted some potentially deleterious practices.

The section on project goals should replace the term "consistent" land use planning with "ecologically sensitive". The goals should also call for natural resource inventories to identify critical areas and stress a balance between sensible growth and open space preservation. Proposed BMPs will also need to be added to the summary. Acronyms and terms that lay persons may not understand are contained in the summary. It was decided that a glossary needs to be incorporated into the document and the website. Kieser & Associates will add popup windows including definitions of terms and acronyms to the project website.

Other available data were discussed including the USDA Census of Agriculture. This document includes data on land use and crop/livestock production by county. Todd Kesselring noted that crop land is decreasing and grazing is increasing in Elkhart County, for example. The Federal Emergency Management Agency is planning to make floodplain maps available electronically. Nicole Ott indicated that some Michigan counties have electronic floodplain maps available and that she would obtain and post those available for the watershed.

The database reference list was distributed next. It is meant to contain a listing of all available data sources for the St. Joseph River Watershed. Data sources that need to be added to the list include Michigan NPDES Facilities (an Excel file is available on-line) and USGS Surface Water and Groundwater Databases. On a side note, Jim Coury asked whether 1970s land use data could be compared with 1990s data in order to determine trends in the watershed. That analysis is beyond the scope of the project. If that analysis has been completed, the data could be used in this project. Dennis Haskins indicated that the USDA conducts natural resource inventories and compares land use trends at permanent points in each Midwest county. He will attempt to find those data. He also indicated that the Hillsdale County website contains maps and data on SSURGO soils. It was asked whether the soils maps on the project website could be zoomed in on and fit with an identify function. That task is beyond the scope of the project, as each SSURGO map is composed of many soil types. However, these soils data could be used and clarified on a small scale when critical areas are selected.

The subwatershed delineation and empirical nonpoint source load modeling was the next item discussed on the agenda. A sample table of the subwatersheds and their land use types was distributed. Each subwatershed is numbered and named by the water course that flows through it. Therefore, the subwatershed names are not unique, as several major watersheds have been divided into smaller subwatersheds. The subwatershed number, however, is unique. For example, there are many subwatersheds named "Nottawa Creek", but each has a different number. It was noted that this explanation needs to accompany the table. It was suggested that the subwatershed map on the website be fitted with clickable links that allow viewers to highlight major tributary subwatersheds, so that they can locate them in the watershed.

Tables describing the coefficients used in the nonpoint source model and the average loading rates (pounds/acre) for each river valley segment were distributed (Attachment C). It was noted that loading appears greater at the western end of the watershed where precipitation is greater. A sensitivity analysis should be conducted on the model in which precipitation is held constant. The selection of the coefficients and EMCs (event mean concentrations) rely almost exclusively on the Rouge River study. These data were derived from a watershed in southeastern Michigan which may have very different properties than the St. Joseph River Watershed. However, as there are limited data on wet weather monitoring for the St. Joseph River Watershed (and for most watersheds), Kieser & Associates is currently exploring the use of SWAT (Surface Water Assessment Tool) modeling for the watershed. This tool utilizes more physical watershed characteristics and is calibrated to monitoring stations in the watershed. A handout on the model was distributed (Attachment D).

The limitations of empirical models are that the data inputs are limited and they cannot incorporate field-scale practices. The Conservation Technology Information Center reports on the use of conservation tillage on a county basis. Though these data cannot be directly incorporated into the model, it may be possible that such information can be used with the models to score regions and identify critical areas.

Kieser & Associates then presented a strategy for identifying critical areas and working toward the development of the Watershed Management Plan that was approved by the Subcommittee. General concerns and limited impairments have been identified through research and Steering Committee input. However, the next step of reaching specifics is difficult to reach solely through Steering Committee input. Therefore, the identification of critical areas will also focus on working backward from a general project endpoint. For example, specific pollutants of concern can be identified, and the source of those pollutants can then be targeted. A scoring process will be developed by possibly overlaying various parameters together. Critical areas will be identified

by known impairments, modeling results, land use, source of specific pollutants, protected areas, and other factors. (Critical areas are both areas to protect and areas that are impacted.) The ability to implement BMPs in a geographic area will also be considered. For example, where do subwatershed groups or watershed management plans already exist? Kieser & Associates will proceed with this strategy by developing various watershed overlays and a scoring process. This strategy will be presented at the next Steering Committee meeting after it has been reviewed by the Technical Subcommittee. Therefore, the Subcommittee will meet again on September 8, 2003 before the next Steering Committee Meeting on September 18, 2003. The September meeting will begin at 2:30 p.m. instead of 3:00 p.m.

Prepared by Nicole Ott, Kieser & Associates

ATTACHMENT A

Meeting Agenda

St. Joseph River Watershed 319 Project
Technical Subcommittee
Second Meeting, Thursday, August 21, 2003 3:00-5:00 p.m.

DRAFT Meeting Agenda

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1. Review and approval of June 9, 2003 meeting minutes (see attached).

2. Summary of activities since last meeting, including presentation of Designated Use Tables to full Steering Committee.

3. Review of Water Quality Summary (see attached).

4. Review of Database Reference List (see attached).

5. Review of land cover maps and suggestions of other overlays to identify critical areas. http://www.stjoeriver.net/wmp/tasks/ag_cover.htm

6. Review of non-point source modeling efforts to date.

7. Introduction and preliminary discussion of methods for prioritizing watershed concerns. [Prioritization could be based on: a) specific categories of impairments by river segments; b) predominant pollutants that may cause one or multiple impairments (watershed-wide or by segments); c) already identified 319 subwatershed management priorities; d) TMDL impairments; e) education or monitoring, or; f) some combination of these and others stakeholder desires.]

8. Next steps and next meeting date.

A separate email will follow with supplemental information for this meeting regarding Items 6& 7.

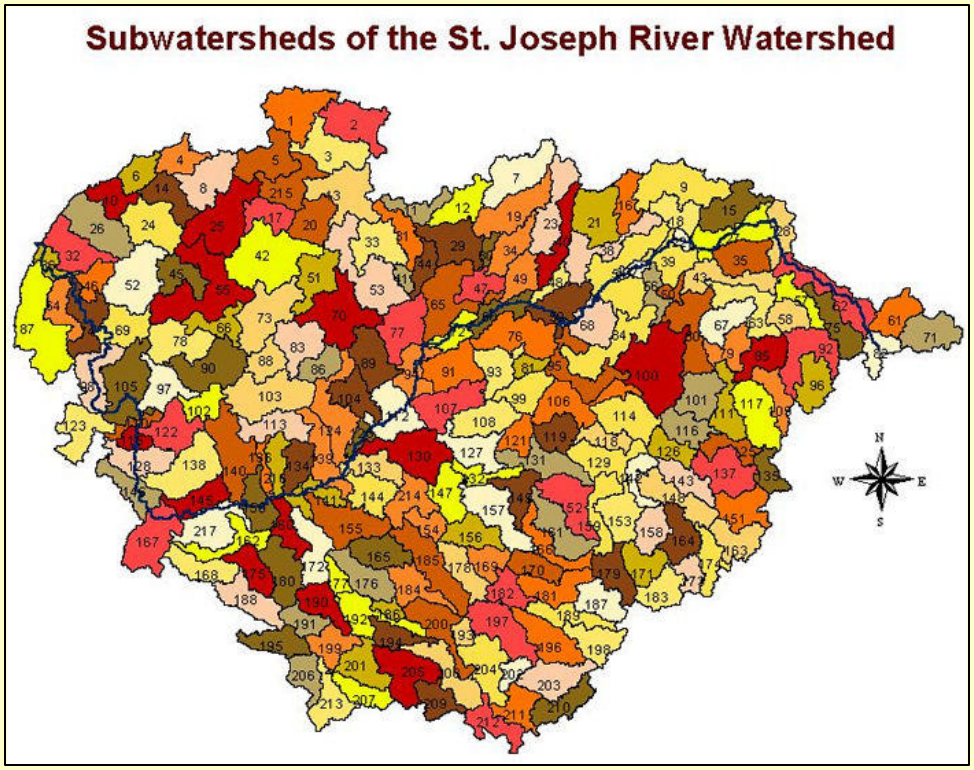
The meeting will be held at the FOTSJR Office/Calhoun County NRCS Office at 13464 15 Mile Road, Marshall, MI. Take I-69 to Exit 36 (Marshall exit). Turn right (west) on West Michigan Avenue. Turn left (south) on 15 Mile Road. The office is located on the left side of the road.

ATTACHMENT B

PowerPoint Presentation delivered at Meeting

St. Joseph River Watershed 319 Project

Technical Subcommittee Meeting



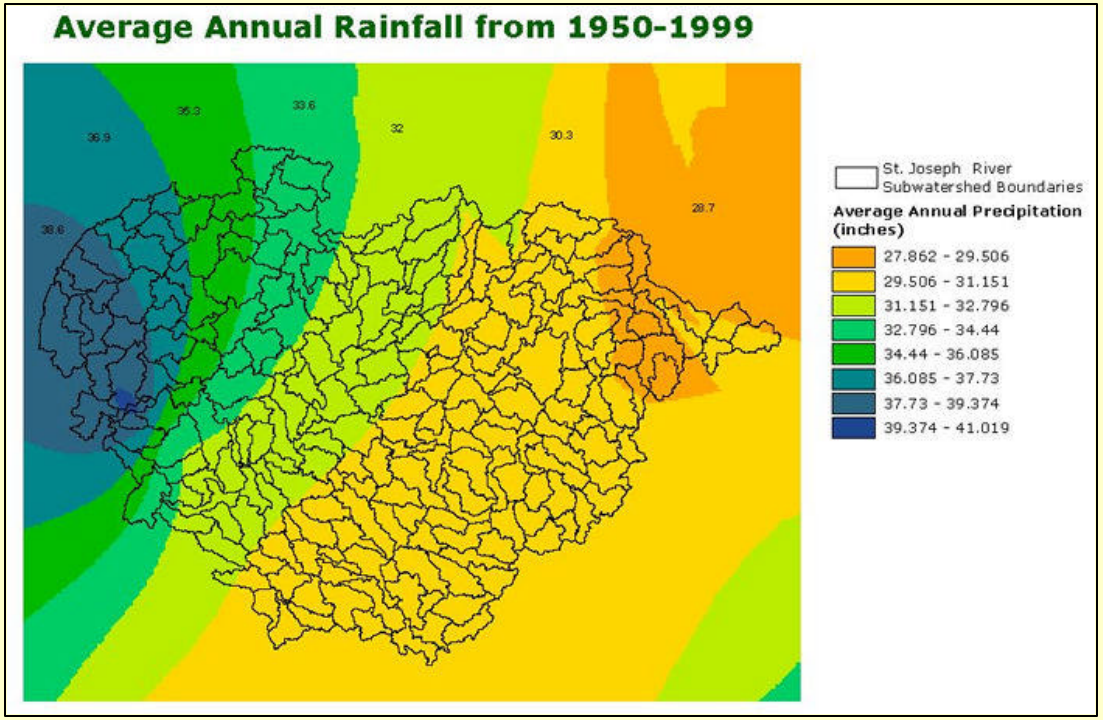
August 21, 2003

Orienting in the Watershed: Available Data Layers (Task 2)

- Cities
- Michigan Villages
- Counties
- State boundaries
- River main stem
- Major tributaries
- Townships
- Dams
- All water bodies (lakes and streams)
- Major roads

Nonpoint Source Model (Task 3)

1. **Delineate Subwatersheds**
2. **Determine land cover areas in each subwatershed (USGS NLCD)**
3. **Determine annual depth of precipitation in each subwatershed.**



4. Calculate runoff volume for each land use type in each subwatershed:

$$R_{L,i} = [C_P + (C_I - C_P)DCIA_f * IMP_L] * A_{L,i} * I_i$$

$R_{L,i}$ = runoff volume for each subwatershed

C_P, C_I, $DCIA_f$ = coefficients, (calibrated to river loading data reported by Robertson, 1997)

IMP_L = percent imperviousness for land use type

$A_{L,i}$ = Area of land use type

I_i = precipitation (inches/year)

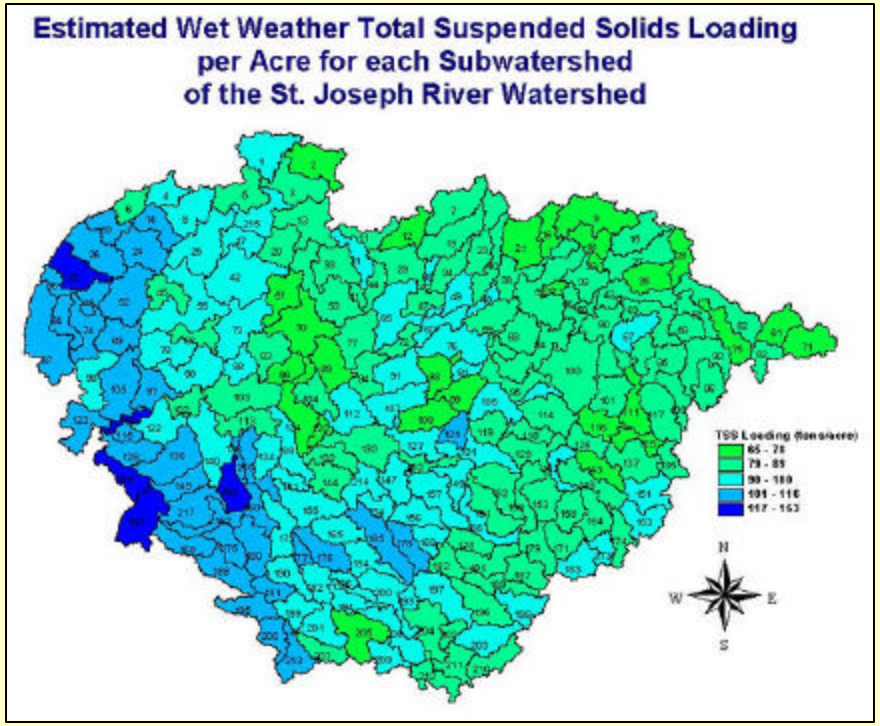
5. Calculate load for each land use type for each subwatershed.

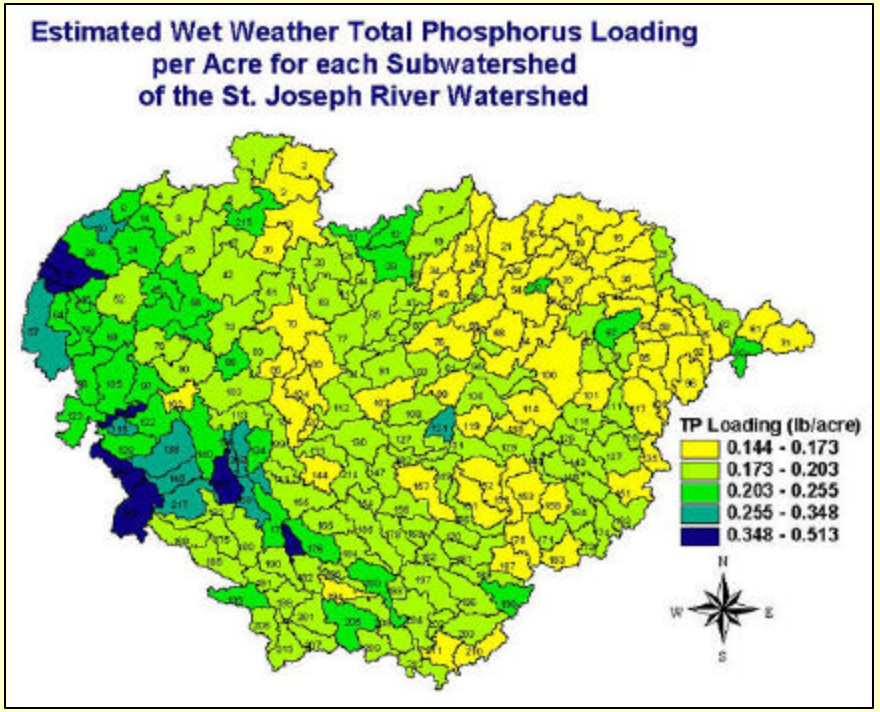
Load = $R_{L,i}$ * EMC * conversion factor

6. Add loads for each subwatershed.

7. Divide by acres.

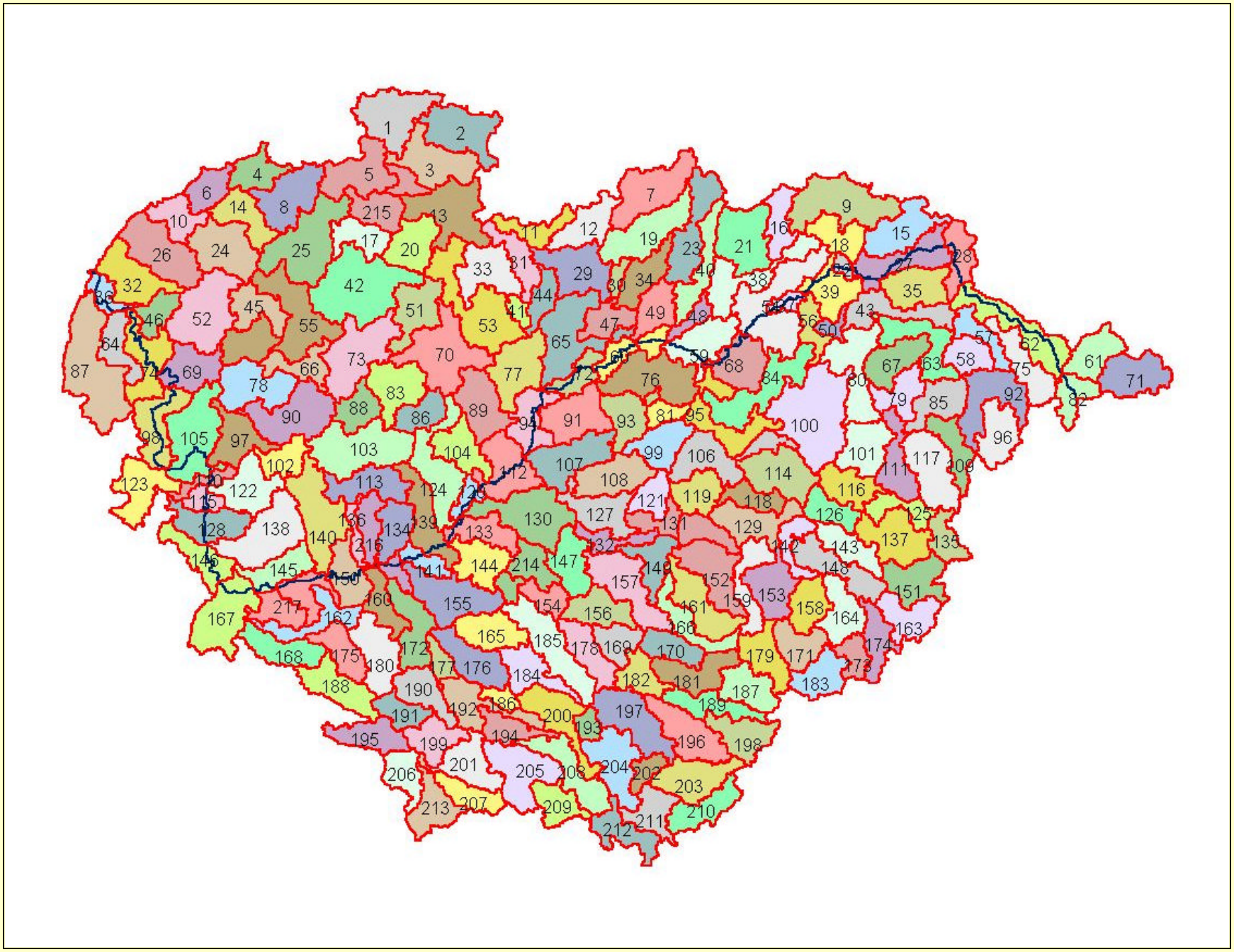
8. Map load/acre for each subwatershed.

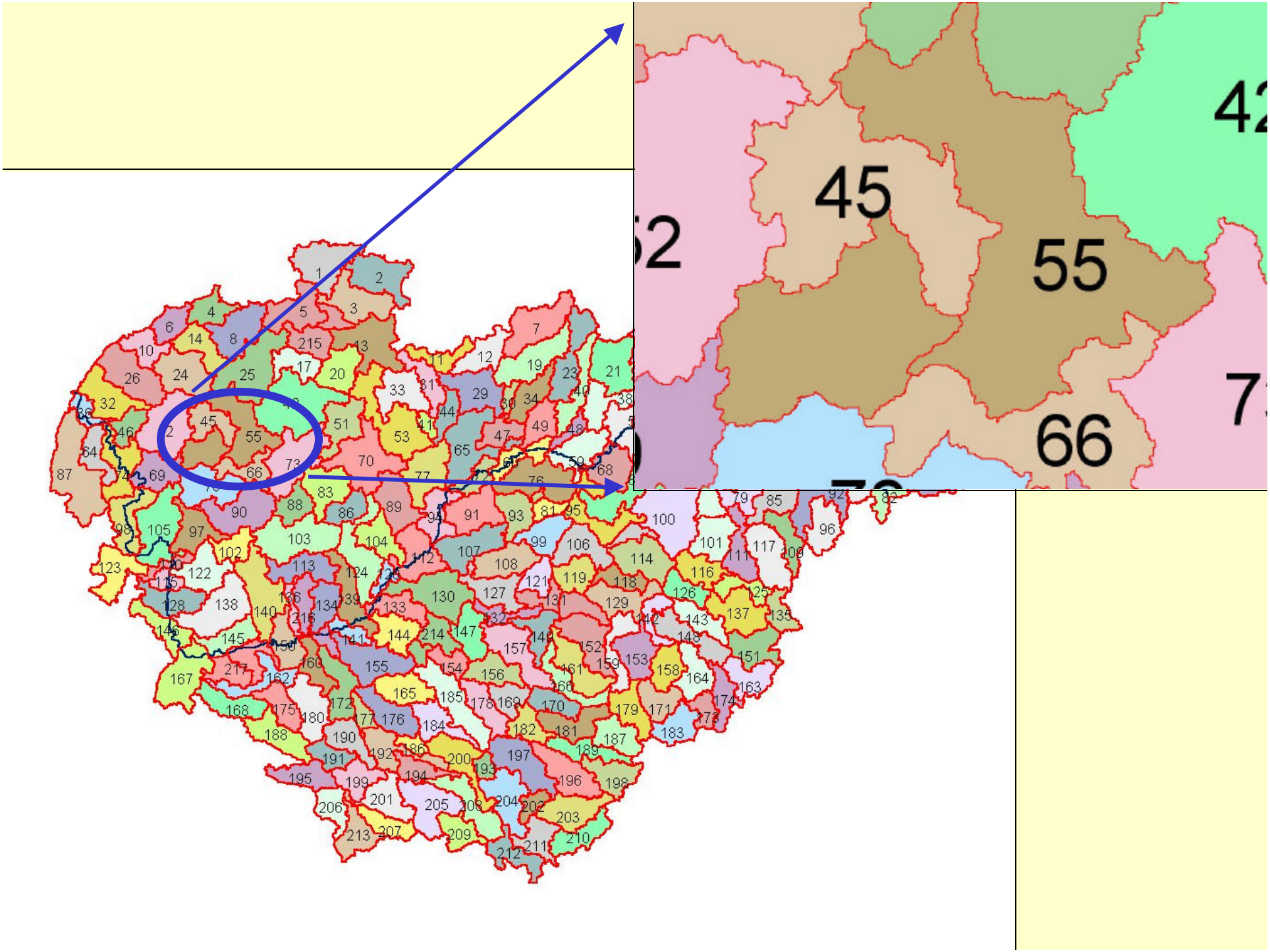




Digital Elevation Modeling

- 30-meter elevation data (MDNR Space Imaging Center, IN Geological Survey)
- USEPA BASINS GIS Platform
- Confirmed with MDEQ and USGS layer
- Combined extraneous subwatersheds with adjacent subwatersheds
- Named by water course

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SWAT Modeling

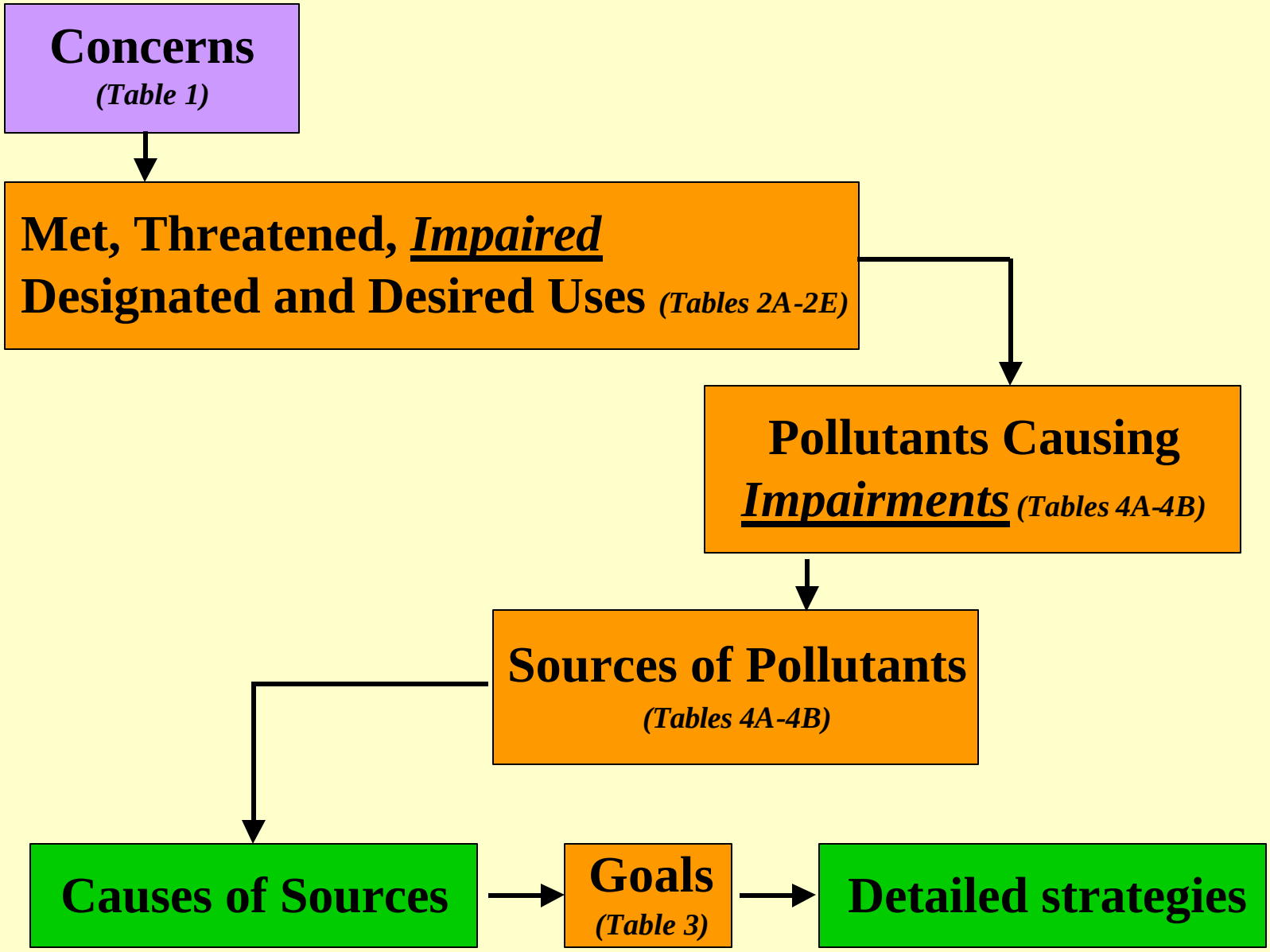
GIS-based model incorporating:

- **soils properties (STATSGO from USGS)**
- **land use (1990's data from USGS NLCD)**
- **topographic information (30-meter DEM)**
- **weather (temperature, precipitation from NOAA weather stations in BASINS)**

Attempting to calibrate model with monitoring data at Niles, MI USGS station.

(Efforts will determine applicability for EPA requirements)

Designated Use Tables (& Beyond)



Identifying Critical Areas

The Challenge…*Diminishing returns with direct requests*

Defining the Problem
✓(in generalities)

Nailing down
the specifics
????????????

How will we spend implementation $ *(“The Top 10”)*

Approach

Remaining Data Sources:
- **STORET data (consistency, recent, parameters of concern)**
- **Phase II community interviews**
- **FERC data**
- **BASINS data**

Forecast Targets & work backwards:
- **Specific area concerns**
- **General needs by segment**
- **Existing WMPs**
- **Overlays of existing data**
- **A specific pollutant**

Prioritizing Critical Areas

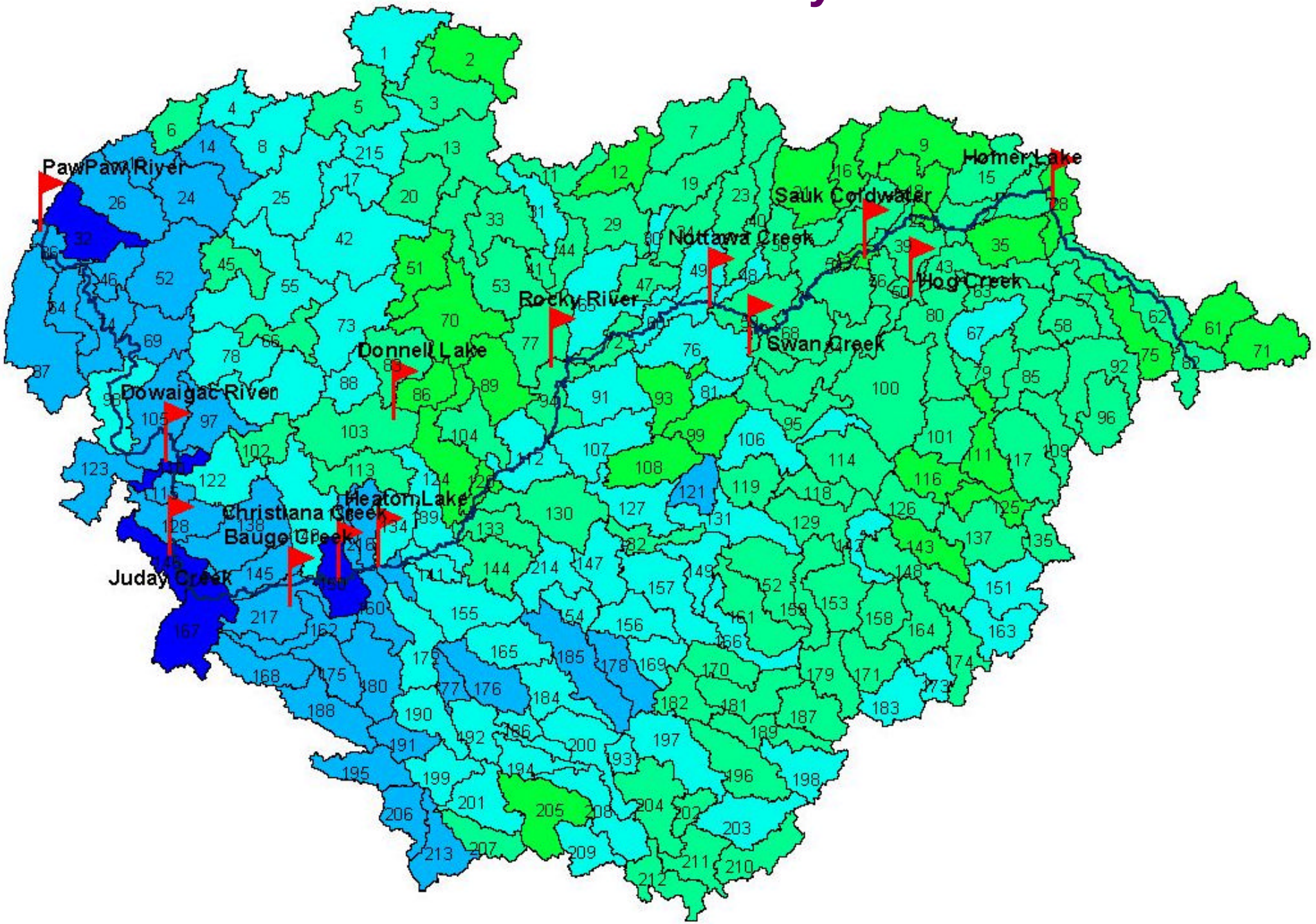
Score geographic areas (river valley segments or smaller) by:

- **TSS/TP loading**
- **303(d) list (TMDLs)**
- **Known impairments (M,T or I)**
- **Prior subwatershed projects/active subwatershed groups**
- **Protected areas**
- **Available WQ data**
- **Number of CSOs**
- **Number of dams – Fish passage, other…(pro or con?)**
- **Atrazine problems (WQ data, use by Co., corn production)**

Score for level of impairment, ability to implement BMPs

(Costs, efficiency, effectiveness)

Potential Overlays



ATTACHMENT C

Non-point Source Empirical Model Coefficients and Loading by River Valley Segment

St. Joseph River Watershed 319 Project
Nonpoint Source Model Coefficients

Coefficient	Model Value	Range of Acceptable Values
C_P	0.068	0.03 - 0.08 (Rouge River)
C_I	0.89	0.90 (Rouge River)
$DCIA_f$	0.50	0.50, 0.57 (Rouge River, Kalamazoo River)

Percent Imperviousness and EMCs for Each Land Use Type

Land Use Type	Percent Imperviousness	TP (mg/L)	TSS (mg/L)
Wetland + Open Water	100%	0.08	6
Forest + Open Land	0.5%	0.11	51
Residential	30%	0.43	79
Agricultural	0.5%	0.37	216
Commercial/Industrial/ Transportation	90%	0.32	100

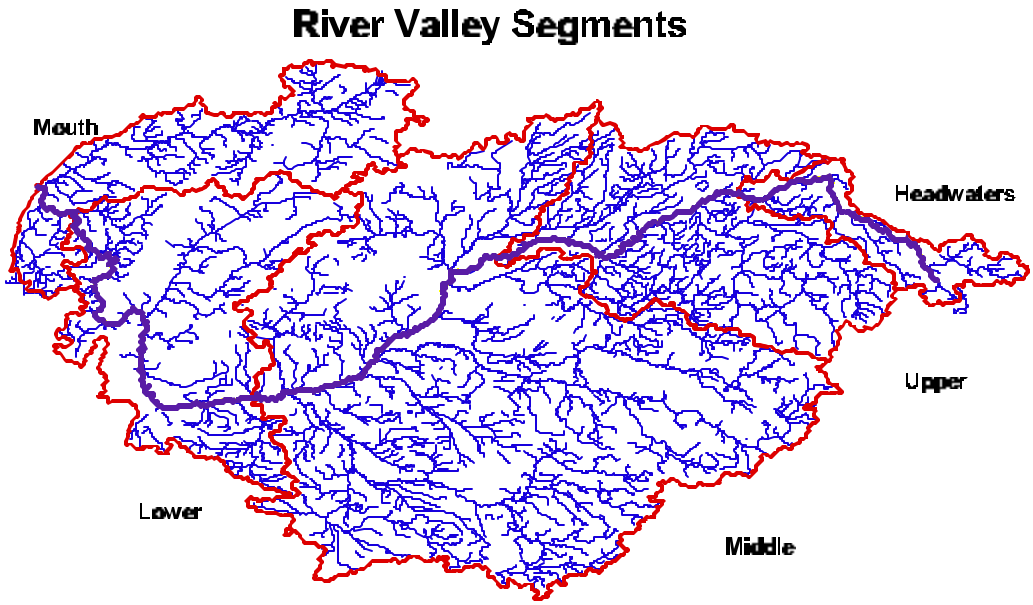
Sources

Kieser & Associates. Nonpoint Source Modeling of Phosphorus Loads in the Kalamazoo River/ Lake Allegan Watershed for a Total Maximum Daily Load. 2001.

Wayne County Rouge River National Wet Weather Demonstration Project. Urban Storm Water Quantification Protocols. 1998.

St. Joseph River Watershed Nonpoint Source Model
Loading by River Valley Segment

River Valley Segment	Average TSS/acre (pounds)	Average TP/acre (pounds)	Average Percent Wetland + Open Water Land Cover	Average Percent Open Land + Forest Land Cover	Average Percent Agricultural Land Cover	Average Percent Urban Land Cover
Mouth	95.8	0.23	8.7	24.0	59.8	6.1
Lower	103.3	0.24	6.5	18.7	66.8	6.8
Middle	89.9	0.19	8.9	13.0	74.4	2.6
Upper	82.7	0.17	8.2	18.3	72.0	1.3
Headwaters	79.0	0.17	8.8	21.5	66.2	2.7



ATTACHMENT D

Details on SWAT Modeling

SWAT: Soil and Water Assessment Tool

A river basin, or watershed, scale model developed by the USDA-ARS.

SWAT was developed to predict the impact of land management practices on water, sediment and agricultural chemical yields in large complex watersheds (including urban lands) with varying soils, land use and management conditions over long periods of time.

SWAT:

- is physically based. Rather than incorporating regression equations to describe the relationship between input and output variables, SWAT requires specific information about weather, soil properties, topography, vegetation, and land management practices occurring in the watershed. The physical processes associated with water movement, sediment movement, crop growth, nutrient cycling, etc. are directly modeled by SWAT using this input data.
- uses readily available inputs (minimum data required to make a run are commonly available from government agencies).
- enables users to study long-term impacts (continuous time model). Many of the problems addressed by the model involve the gradual buildup of pollutants and the impact on downstream water bodies.
- is not designed to simulate detailed, single-event flood routing
- has been updated several times and has undergone extensive validation
- is incorporated in US EPA's BASINS watershed modeling GIS

The SWAT 2000 manual can be found at http://www.epa.gov/waterscience/basins/bsnsdocs.html

SWAT data requirements (we are using):

- soils properties (STATSGO from USGS)
- land use (1990's data from USGS)
- topographic information (30-meter DEM)
- weather (temperature, precipitation from NOAA weather stations in BASINS)

Status of SWAT modeling for the St. Joe River Basin

- All necessary data input built-up and incorporated in the model
    - Watershed delineation with 30-m DEM
    - Incorporating updated 1990s land use data layer
    - Soil and weather information
    - Cleaned up mismatching data points of all the input databases
- Test run successfully with all default parameters
- Need to calibrate the model (flow, sediment, and nutrients) against monitoring data in the St. Joe River Basin (USGS data at Niles are being used).