

Watershed Management - Moving beyond the Same Old Cheese

Data Analysis
"some assembly required"

Cyd Curtis, US EPA
March 3, 2010
Illinois Lake Management
Association,
Annual Lake Conference



Approaches to NPS Pollution

Social
Systems

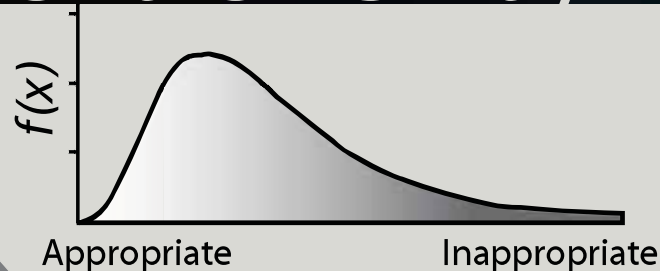
Biophysical
Systems

Water Quality Degradation

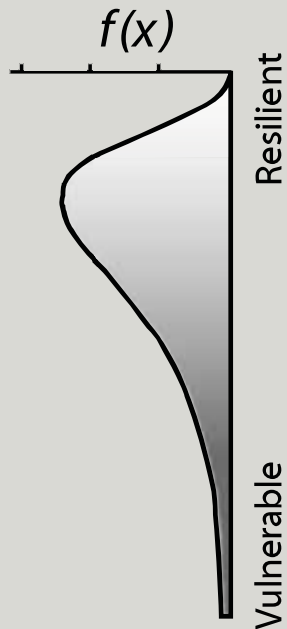
Source: Nowak et al

Disproportionality

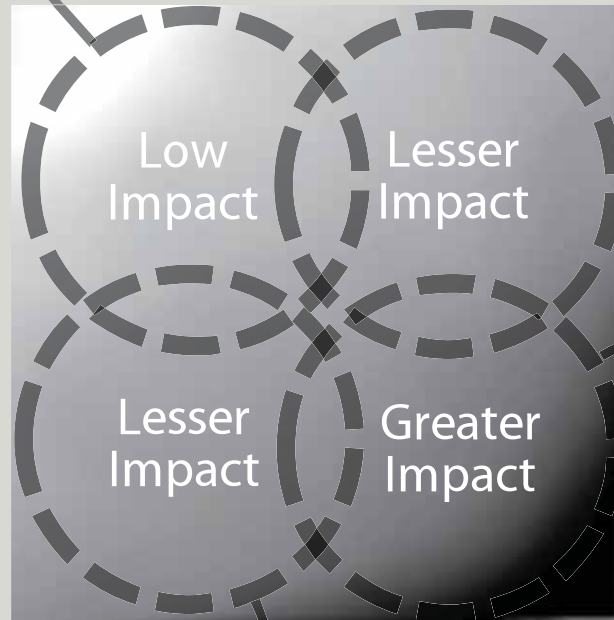
hydrologically-disconnected
(e.g., upland location)
minimal application of inputs
greater residue cover
(e.g., ridge or no tillage)
greater organic matter
fine-to-medium textured soils



Management



Biophysical

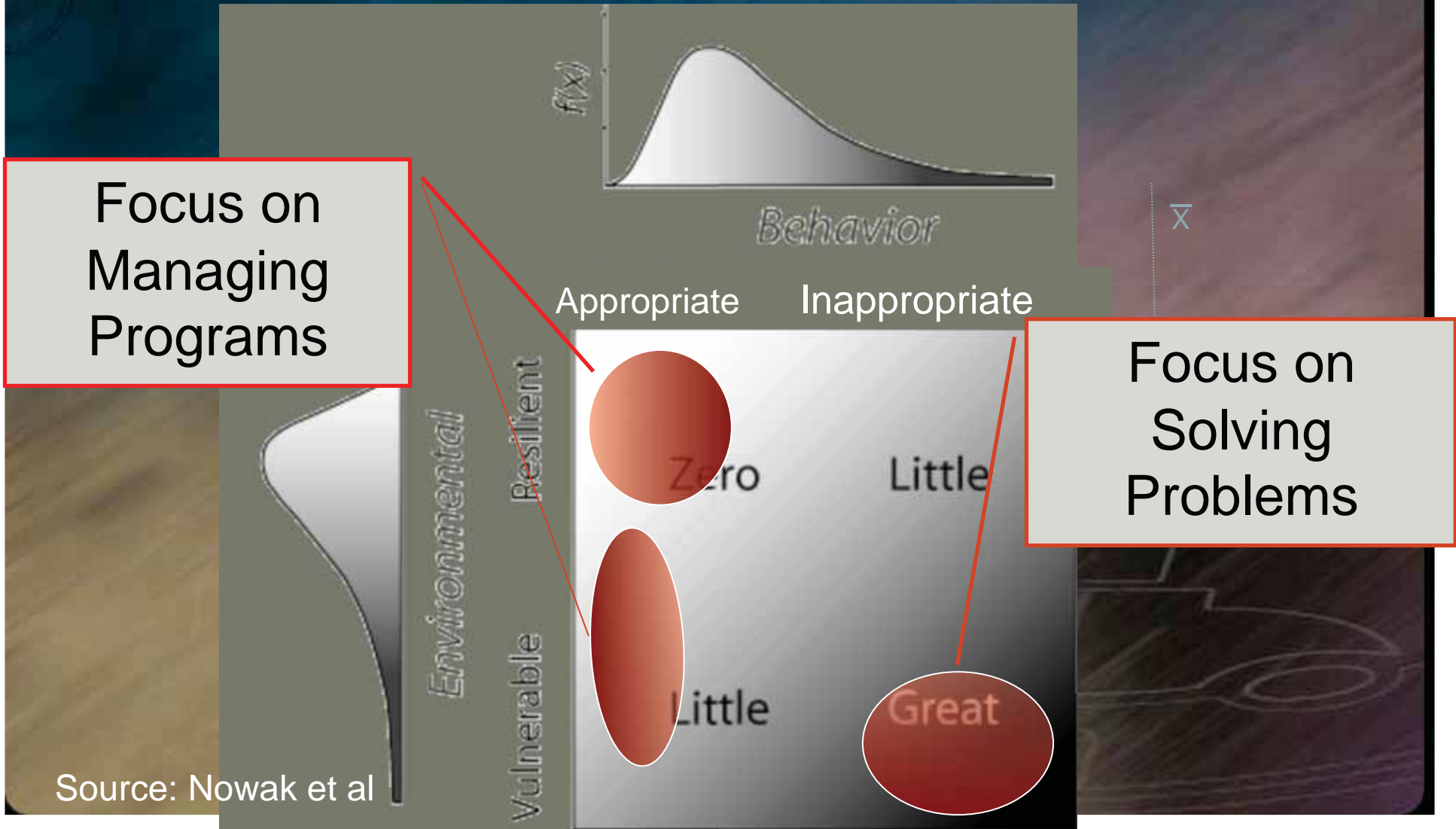


hydrologically-disconnected
(e.g., upland location)
over-application of inputs
minimal residue cover
fine-to-medium textured soils
greater organic matter

hydrologically-connected
medium-to-coarse textured soils
low organic matter
over-application + broadcasting
minimal residue cover
delayed incorporation of manure

hydrologically-connected
greater residue cover (e.g., ridge or no tillage)
minimal application
quickly-expedited incorporation of manure
medium-to-coarse textured soils
low organic matter

What Should be the Focus of NPS Management?



Solving Water Problems

Use biophysical measures to identify vulnerable locations within problem area.

Assess salient behaviors in these locations to determine where disproportionality may be occurring.

Gain understanding why inappropriate behaviors are occurring in these locations.

Design intervention effort based on this understanding.

A. Identify Causes and Sources

The collage consists of several overlapping images:

- EPA Website:** The top left shows the EPA homepage with a news article titled "Hudson River Dredging Begins". The article states: "First phase of the six-year project will remove 265,000 cubic yards of sediment and 20,300 kilograms of PCBs." Below the article are sections for "Get Involved" and "MyEnvironment". The "MyEnvironment" section includes a "Location" search box with a blue circle around it.
- Google Earth:** The top right shows a Google Earth window displaying a satellite map of the Des Plaines River watershed. The map is overlaid with green lines representing the watershed boundary. Key locations labeled include Danada County Forest Preserve, Morton Arboretum, Old Tavern Rd Park, Belmont Prairie Nature Pr, Hitchcock Woods County Forest Preserve, Lisle Community Park, Seager Park, and Methodist Park. The map also shows the EPA Streamlines logo and coordinates: 41°48'04.11"N, 88°04'29.24"W, Alt: 870 ft, Elev: 28195 ft.
- MyWater Website:** The bottom center shows a "MyWater" website interface. It features a navigation menu with items like "Is streamflow high today", "What are the water cond", "Drinking water sources a", "Monitoring Stations by P", "New/expiring facility per", and "Watersheds". Below the menu is a map of the Des Plaines River watershed with labels for Cicero, Oak Park, and Joliet.

A. Identify Causes and Sources

STORET

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Welcome to **STORET**, EPA's largest computerized environmental data

STORET (short for STORage and RETrieval) is a repository for water quality, biological, and physical data and is used by environmental agencies, EPA and other federal agencies, universities, private citizens, and many others. Take a mirror around our site or click on the water drop to retrieve monitoring data!

Features

- [Download Data](#)
- [Watershed Summary](#)
- [WQX and WQX Web](#)

Date	Site	Stream Name	Area (acres)	Event	Flow	Flow (Lfs)	Temp (deg C)	DO (mg/L)	% Sat	pH	Conductivity (µmohs/cm)	Ammonia (mg/L)	Nitr	Quality
8/5/2004	1A	Cowles Bog (culvert)		storm	0.066	1.9	18.6	0.6	6.3	7.1	555	0.047		
8/5/2004	2	West Tributary		storm	0.764	21.6	18.1	6.0	63.4	7.8	351	0.082		ference
8/5/2004	3	Dunes Creek (pre-culvert)		storm	3.311	93.7	18.7	7.0	78.1	7.8	648	0.079		
8/5/2004	4	Dunes Creek Outlet		storm*	back wash from lake		19.2	7.4	78.8	8.4	485	0.055		
8/5/2004	5	Great Marsh Tributary		storm	0.859	24.3	19.3	0.8	6.6	6.9	145	0.011		
8/5/2004	6	East Tributary (Hawleywood Road)		storm	0.308	8.7	18.7	6.4	69.3	7.8	1723	0.062		
8/5/2004	7	East Tributary (downstream of US20)		storm	0.280	7.9	18.9	6.9	70.1	7.6	1760	0.042		
8/5/2004	8	East Tributary (upstream of US20)		storm	0.226	6.4	18.9	5.4	57.7	7.5	1664	0.044		
9/14/2004	1B	Cowles Bog outlet at Waverly		base	stagnant water		18.2	0.3	3.2	7.1	320	0.300		
9/14/2004	2	West Tributary		base	0.200	5.7	18.2	6.4	69	7.8	605	0.052		
9/14/2004	3	Dunes Creek (pre-culvert)		base	1.010	28.6	19.3	6.15	67.1	7.0	448	0.044		
9/14/2004	4	Dunes Creek Outlet		base	1.070	30.3	19.2	7.07	76.5	8.0	449	0.047		
9/14/2004	5	Great Marsh Tributary		base	0.327	9.3	20.3	0.7	8	7.1	368	0.015		
9/14/2004	6	East Tributary (Hawleywood Road)		base	stagnant water		18.7	0.82	9	7.5	1700	0.361		
9/14/2004	7	East Tributary (downstream of US20)		base	stagnant water		19.3	1.7	18	7.8	3270	0.033		
9/14/2004	8	East Tributary (upstream of US20)		base	stagnant water		18.7	1.5	15.5	7.8	1605	0.010		
6/21/2005	1B	Cowles Bog outlet at Waverly		base	0.001	0.03	18.7	1.15	12	6.8	275	0.170		
6/21/2005	2	West Tributary		base	0.193	5.5	16.7	7.56	78.1	8.0	680	0.140		
6/21/2005	3	Dunes Creek (pre-culvert)		base	0.351	9.9	18.4	6.7	71.6	7.8	512	0.080		
6/21/2005	4	Dunes Creek Outlet		base	0.384	10.9	18.5	8.64	93.7	7.9	719	0.070		
6/21/2005	5	Great Marsh Tributary		base	0.026	0.7	19.4	2.02	22	6.8	442	0.130		
6/21/2005	6	East Tributary (Hawleywood Road)		base	stagnant water		17.5	0.057	6.2	7.8	3825	3.500		
6/21/2005	7	East Tributary (downstream of US20)		base	0.120	3.4	17.8	2.87	21.8	8.2	>3999	1.000		

A. Identify Causes and Sources

Dunes Creek

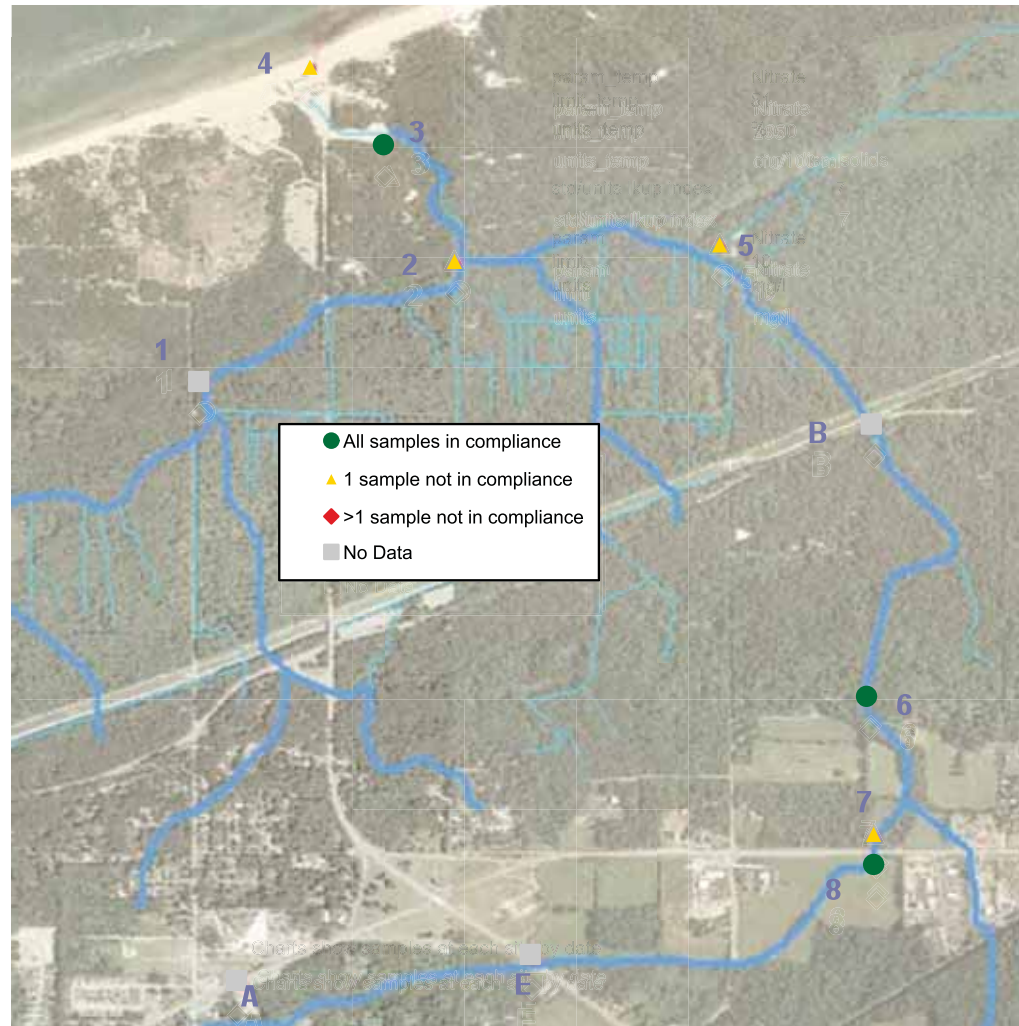
- Conductivity
- *E. coli*
- % Dissolved P

PARAMETER: % Dissolved P
THRESHOLD: 51 %

last updated: January 30, 2007 10:04 AM

SHOW MAP

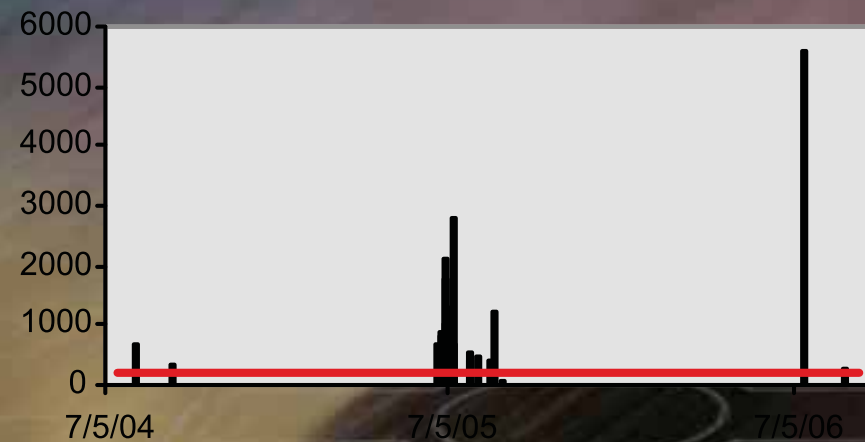
SHOW IMAGE



Focus in on site 2

Standard - 235cfu /100 ml

Site	Date	E. coli
2	8/5/04	680
2	9/14/04	360
2	6/21/05	700
2	6/22/05	0
2	6/23/05	600
2	6/24/05	400
2	6/25/05	900
2	6/26/05	800
2	6/27/05	400
2	6/28/05	1800
2	6/29/05	600
2	6/30/05	1000
2	7/1/05	2100
2	7/2/05	600
2	7/3/05	1100
2	7/4/05	1300
2	7/5/05	300
2	7/6/05	700
2	7/7/05	2800
2	7/9/05	200
2	7/27/05	400
2	7/27/05	550
2	8/5/05	500
2	8/14/05	400
2	8/19/05	1200
2	8/29/05	100
2	7/14/06	5600
2	8/26/06	300



Data2Maps Excel Template

- <http://groups.google.com/group/data2maps>

PARAMETER: % Dissolved P
THRESHOLD: 51 %

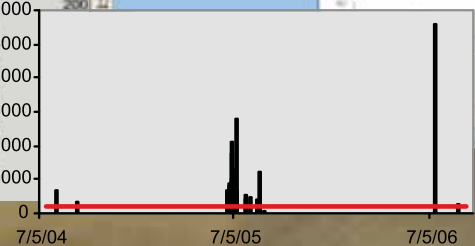
last updated: January 30, 2007 10:04 AM

SHOW MAP

SHOW IMAGE



Site	Date	E. coli
2	8/5/04	680
2	9/14/04	380
2	6/21/05	700
2	6/22/05	0
2	6/23/05	600
2	6/24/05	400
2	6/25/05	900
2	6/26/05	800
2	6/27/05	400
2	6/28/05	1800
2	6/29/05	600
2	6/30/05	100
2	7/1/05	2100
2	7/2/05	600
2	7/3/05	1100
2	7/4/05	1300
2	7/5/05	300
2	7/6/05	700
2	7/7/05	2800
2	7/9/05	200
2	7/27/05	6000
2	7/27/05	5000
2	8/5/05	4000
2	8/14/05	4000
2	8/19/05	3000
2	8/29/05	2000
2	7/14/06	2000
2	8/26/06	1000



Microsoft Excel D2M_Template_v2.xls

Step 1. Choose your parameters

- Bacteria
- Conductivity
- DO
- E. coli
- Flow
- Temp
- Water + Nitrite
- PH
- Chlor

Step 2. Click "Update Year List"

UPDATE YEAR LIST

Step 3. Choose your sampling year

2006

Step 4. Click "Refresh Charts/Map"

REFRESH CHARTS/MAPS

All Sampling Data for Temp (2006)

Standard: 19 deg C

last updated: June 17, 2007 1:00 AM

Legend:

- All samples in compliance
- ▲ 1 sample not in compliance
- ◆ >1 sample not in compliance
- No Data

17 Annual Avg C

Basic Use and Benefits

Steering Committee Meetings

Prioritization

Watershed management plan

Public meetings and Outreach

Sampling plan for future projects

Cost savings of 25-30%

C. Estimate of Load reductions

- Multitude of Models



C. Critical Areas

Decision Making

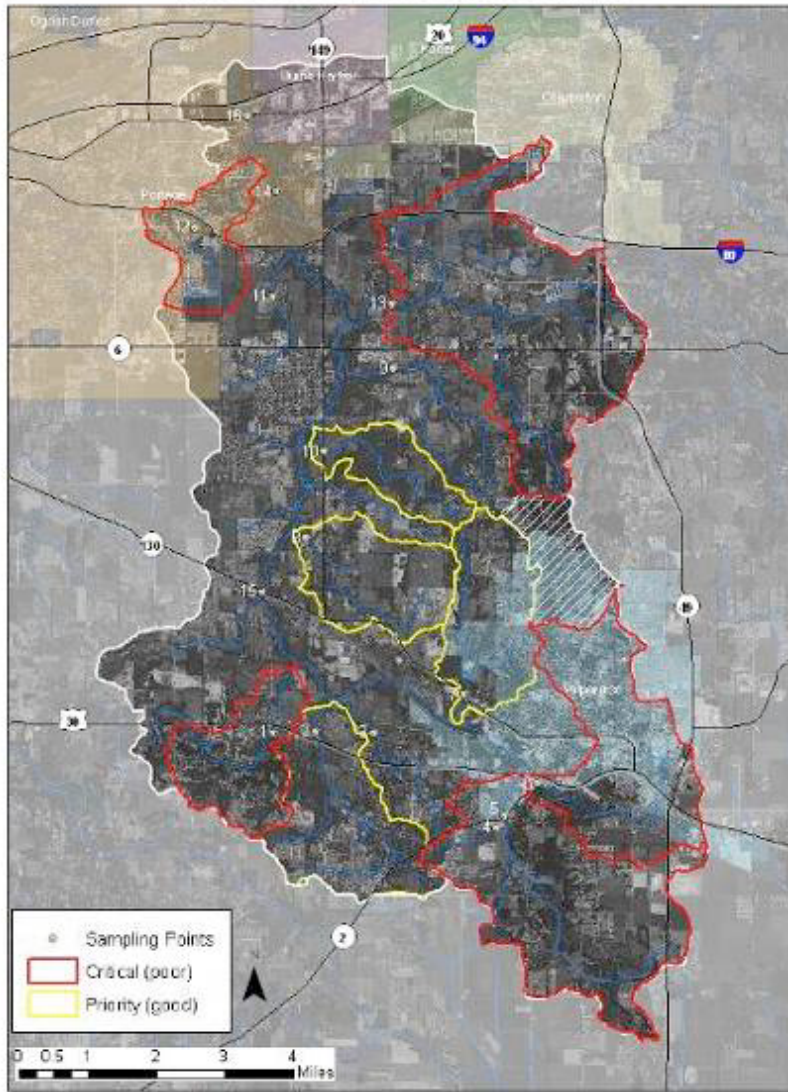
- Protection and restoration
- BMP approaches

Salt Creek Watershed,
Indiana



C. Critical Areas

The Salt Creek Watershed



Critical and Priority Areas

Critical Areas (Red)

- Need treatment to improve existing poor water quality

Priority Areas (Yellow)

- Need protection to protect relatively good water quality

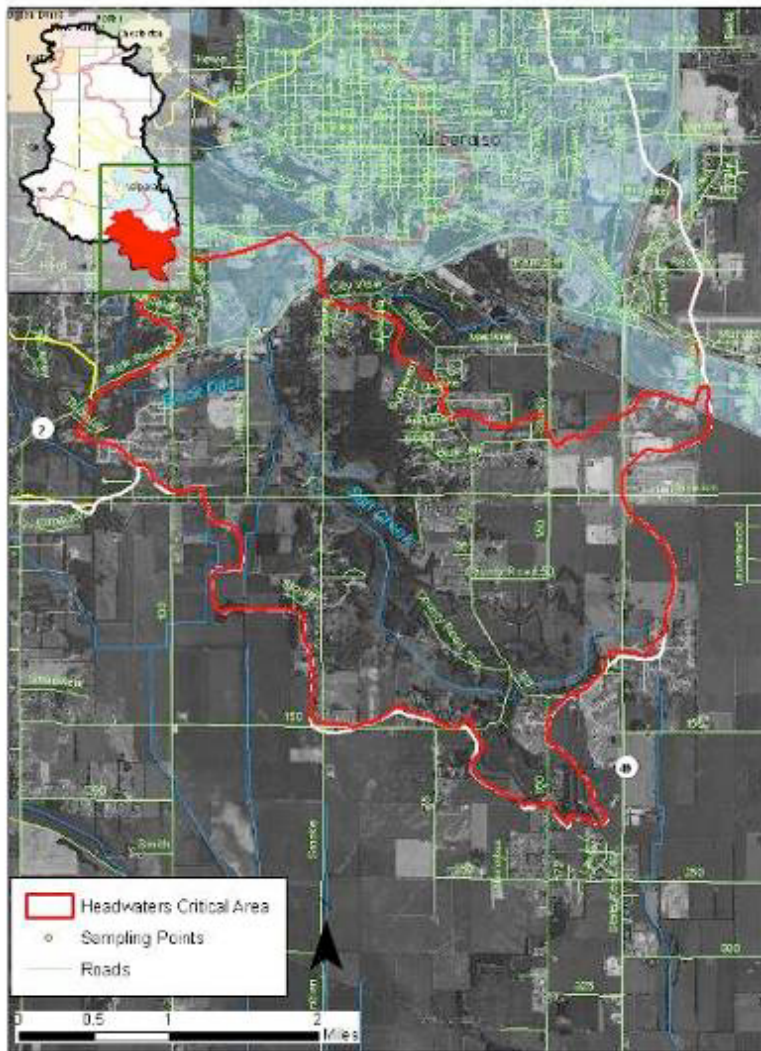
Based upon:

- historic water quality data,
- current water quality data,
- confirmed sources,
- projected future development,
- and causes of impairment.

C. Critical Areas

Salt Creek Headwaters

Headwaters Critical Area

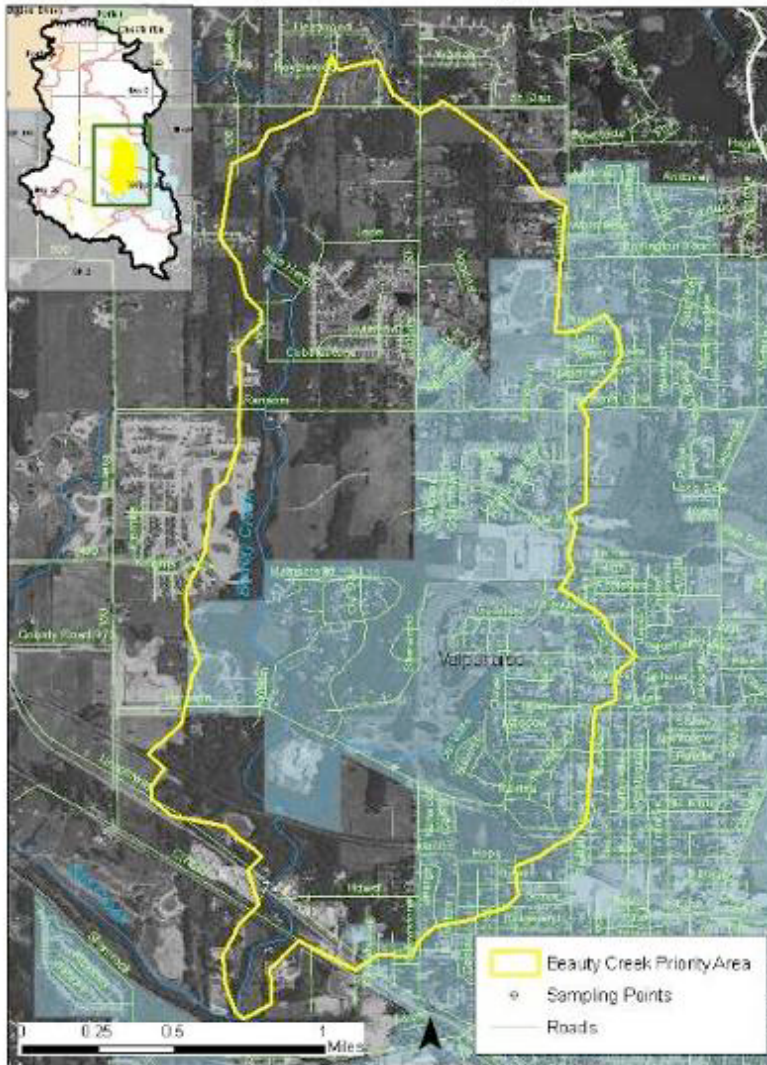


- Highest average *E. coli* concentration
- Highest average TSS concentration and loading rate
- High nutrient loading rates
- Low DO
- Poor habitat rating

C. Critical Areas

Beauty Creek

Beauty Creek Priority Area



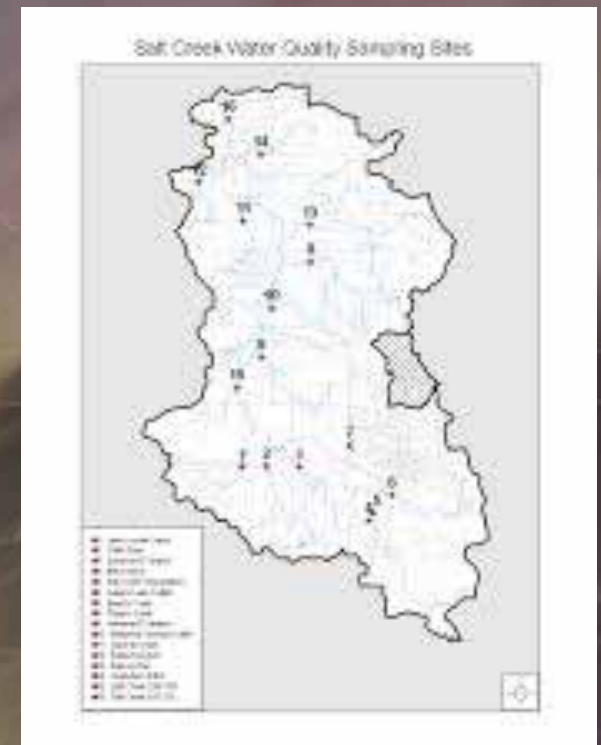
- Lowest average *E. coli* concentration
- Lowest average TSS concentration and areal loading rate
- Relatively low nutrient concentrations
- Highest habitat rating

Element I - Monitoring

- Determining monitoring:

Level of significance
Parameters
Locations
Frequency

Water Quality/ Habitat



Element I - Monitoring

Photo documentation



Figure 1. West Branch Sugar River: Pre-rehabilitation conditions.



Figure 2. West Branch Sugar River: Post-rehabilitation conditions.



<http://www.fs.fed.us/pnw/pubs/gtr503/>

Element I - Monitoring Social Systems

Watershed Social Profile

<http://www.watershedplanning.illinois.edu/>



Social Indicators: Pilot Phase



<http://www.uwex.edu/ces/regionalwaterquality/Flagships/Indicators.htm>

Thank you!

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