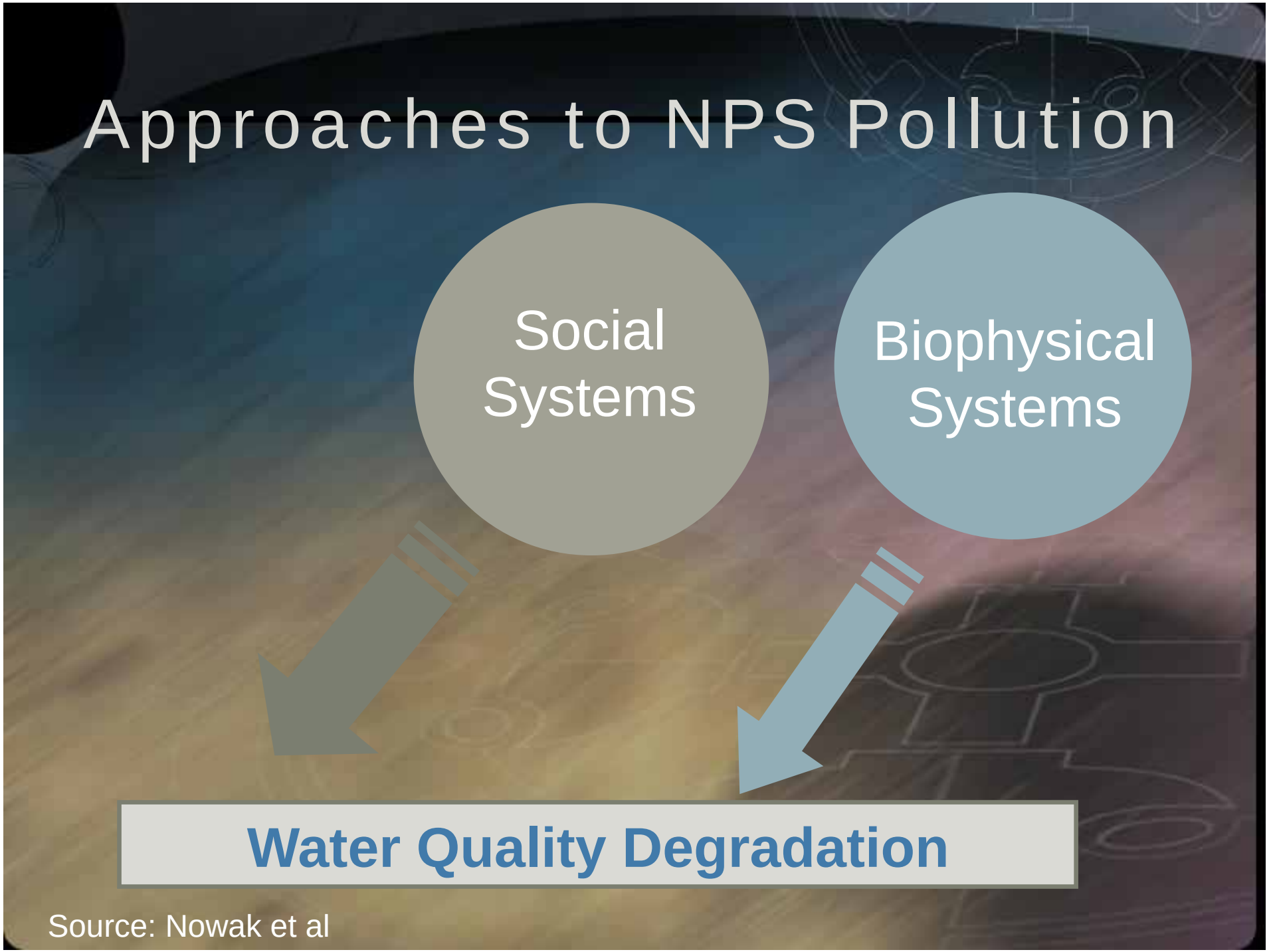
Watershed Management - Moving beyond the Same Old Cheese

Data Analysis
"some assembly required"

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

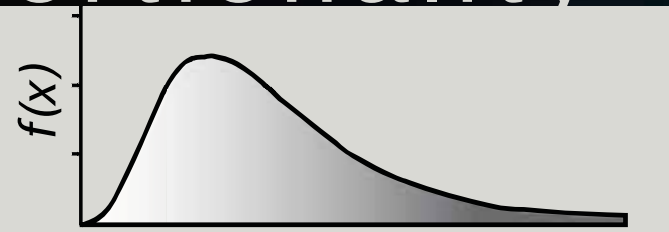
Approaches to NPS Pollution



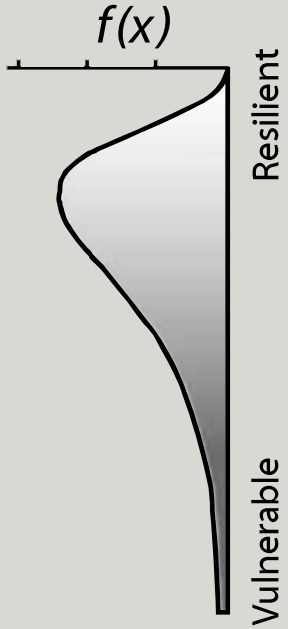
Source: Nowak et al

Disproportionality

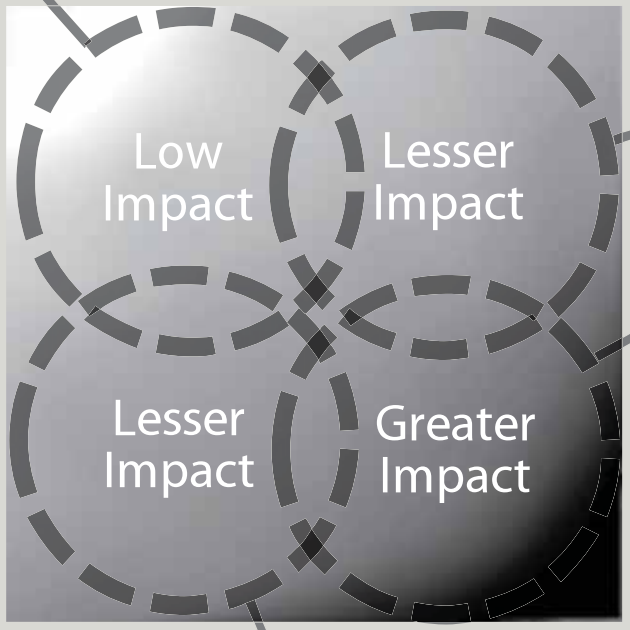
hydrologically-disconnected
(e.g., upland location)
minimal application of inputs
greater residue cover
(e.g., ridge or no tillage)
greater organic matter
fine-to-medium textured soils



Management



Biophysical



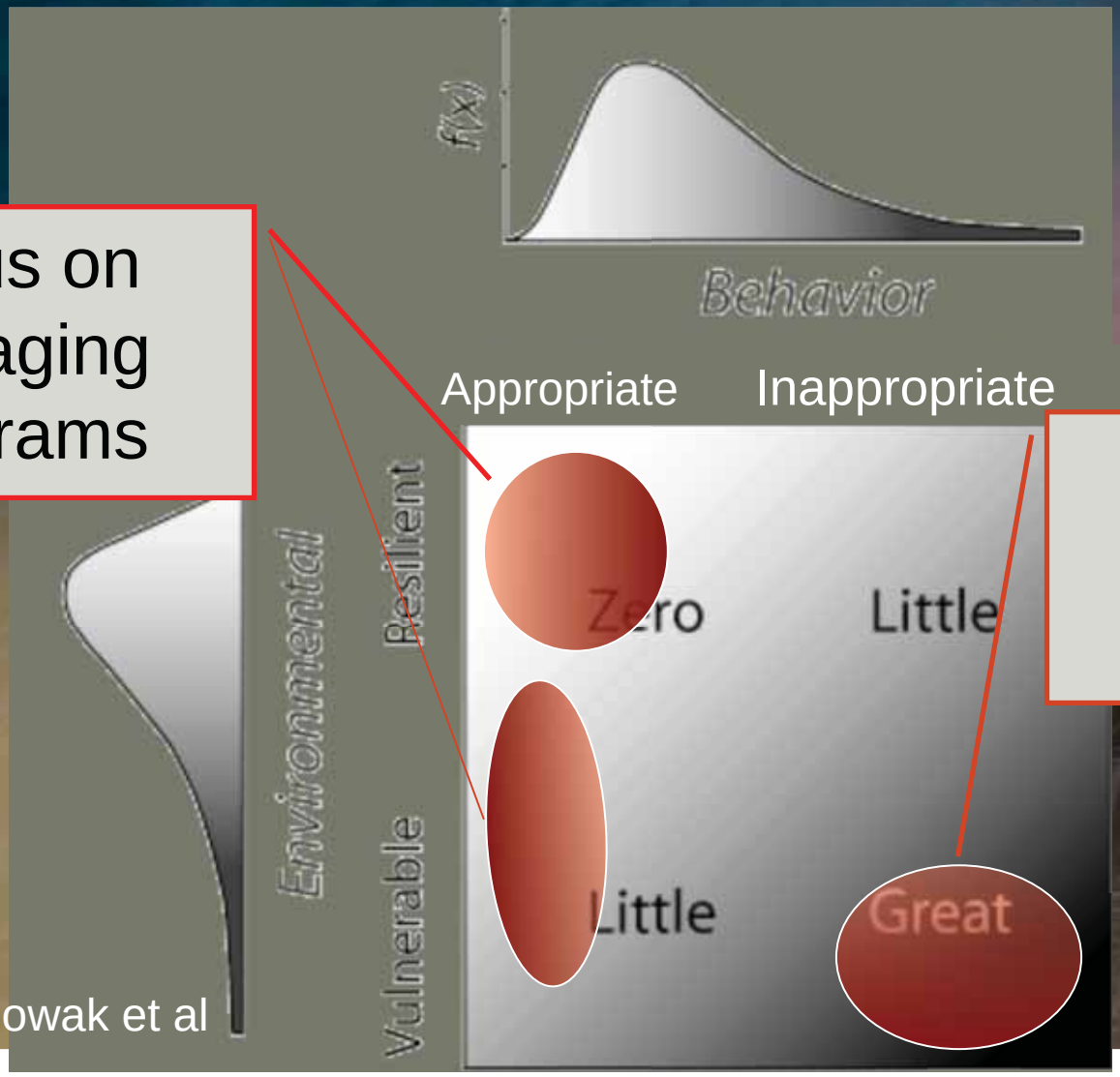
hydrologically-disconnected
(e.g., upland location)
over-application of inputs
minimal residue cover
fine-to-medium textured soils
greater organic matter

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

Source: Nowak et al

What Should be the Focus of NPS Management?



Focus on Managing Programs

Focus on Solving Problems

Source: Nowak et al

Solving Water Problems

Use biophysical measures to identify vulnerable locations within problem area.

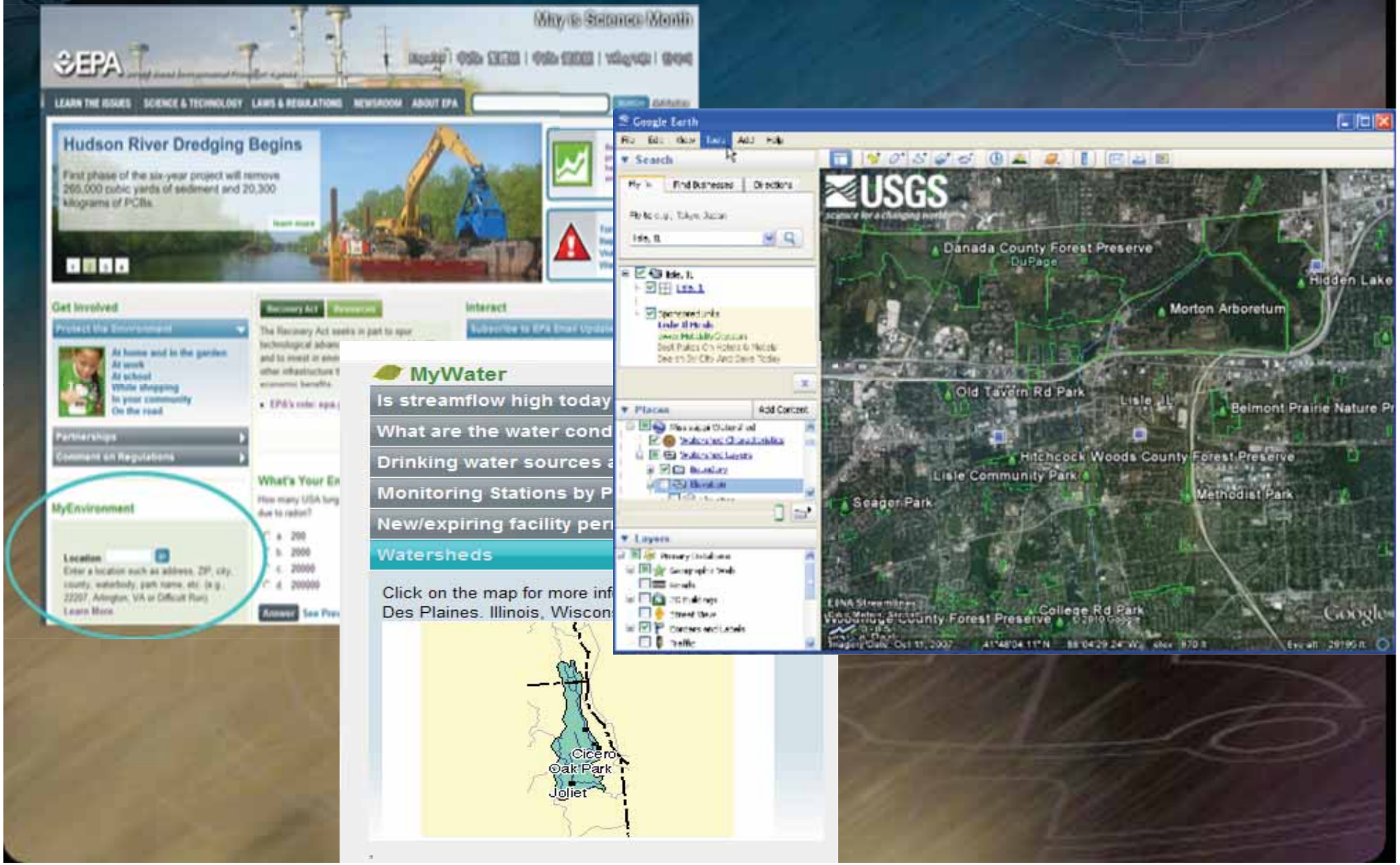
Assess salient behaviors in these locations to determine where disproportionality may be occurring.

Gain understanding why inappropriate behaviors are occurring in these locations.

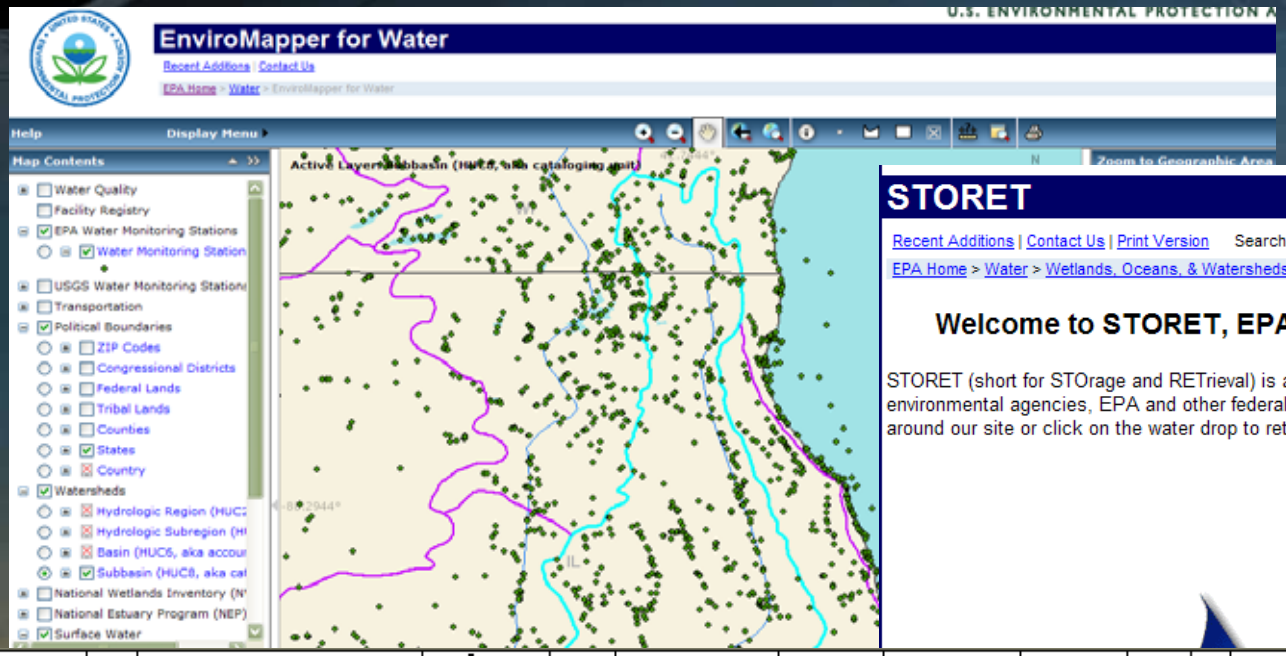
Design intervention effort based on this understanding.

Source: Nowak et al

A. Identify Causes and Sources



A. Identify Causes and Sources



Date	Site	Stream Name	Area (acres)	Event	Flow	Flow (L/s)	Temp (deg C)	DO (mg/L)	% Sat	pH	Conductivity (µmohs/cm)	Ammonia (mg/L)	Nitr
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	
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 oulet 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 oulet 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	

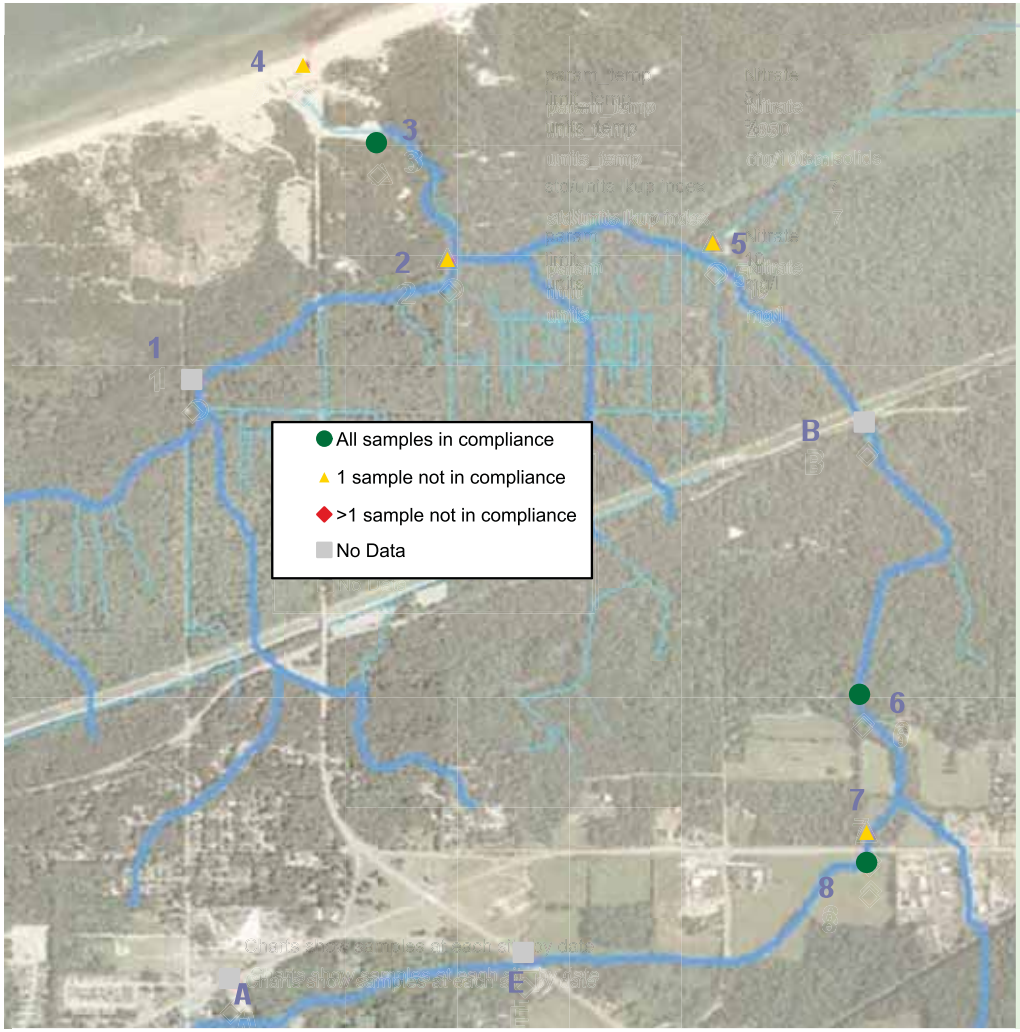
A. Identify Causes and Sources

Dunes Creek

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

PARAMETER: % Dissolved P
THRESHOLD: 51 %
last updated: January 30, 2007 10:04 AM

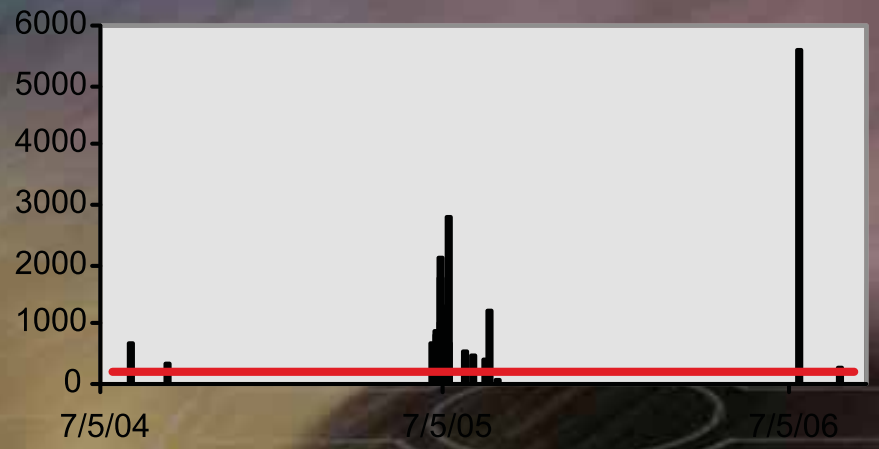
SHOW MAP | SHOW IMAGE



Focus in on site 2

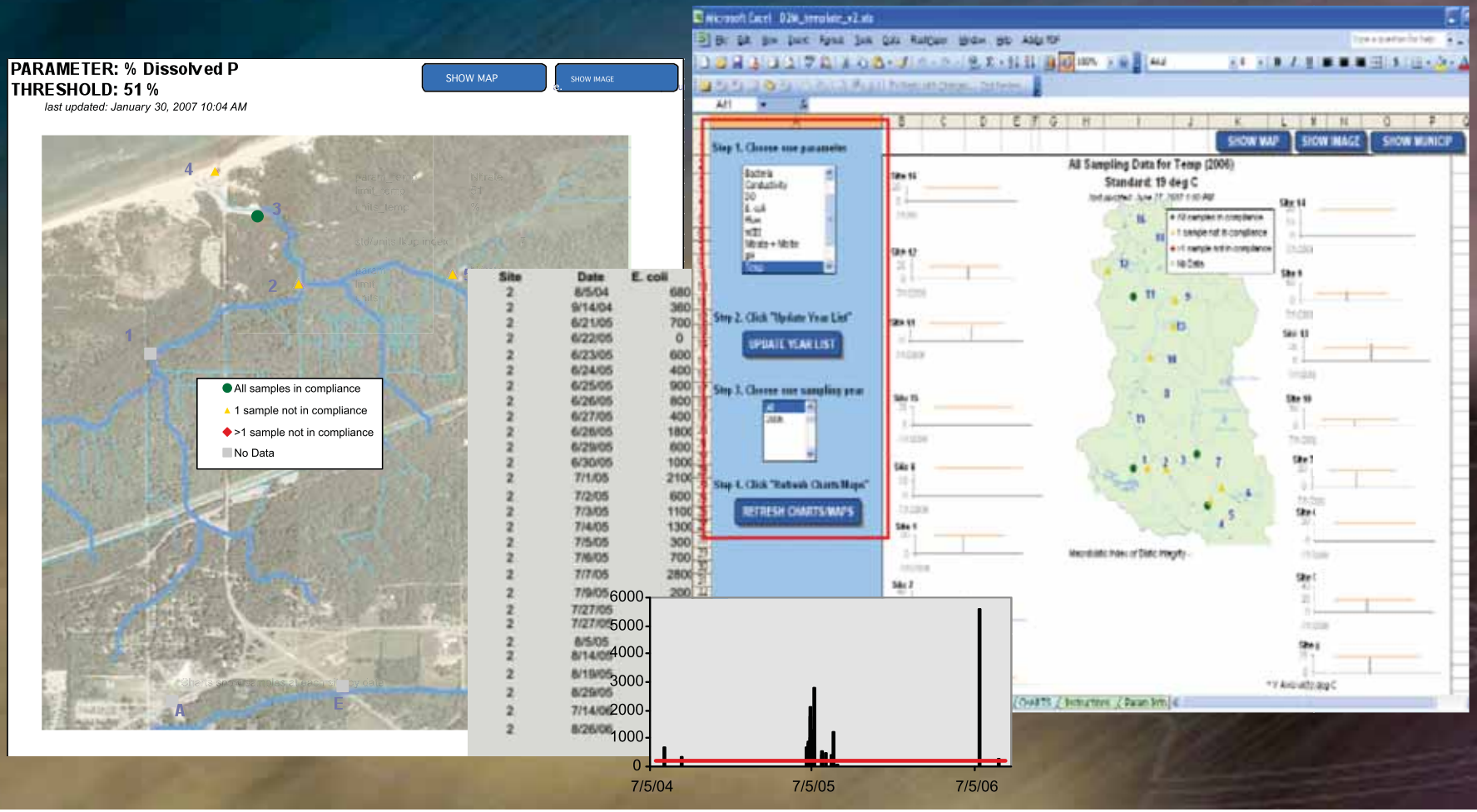
Standard - 235cfu /100 ml

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



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

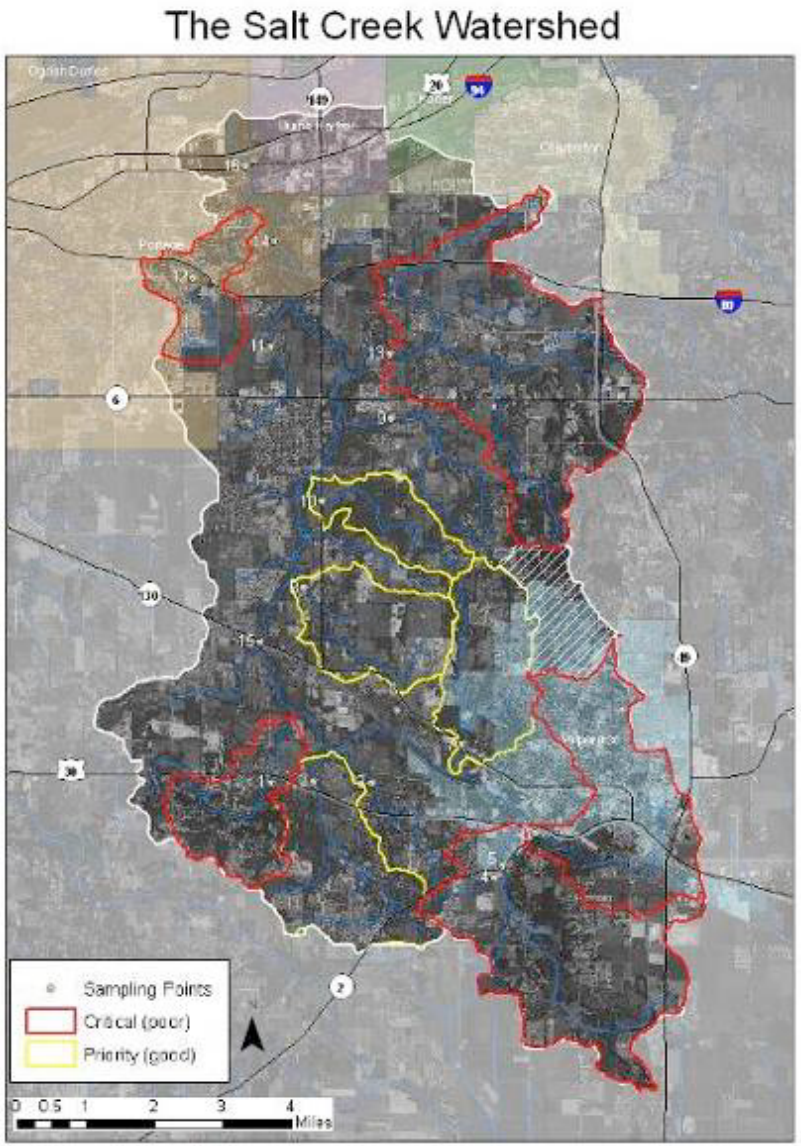
C. Critical Areas

Decision Making

- Protection and restoration
- BMP approaches

Salt Creek Watershed, Indiana

C. Critical Areas



Critical and Priority Areas

Critical Areas (Red)

- Need treatment to improve existing poor water quality

Priority Areas (Yellow)

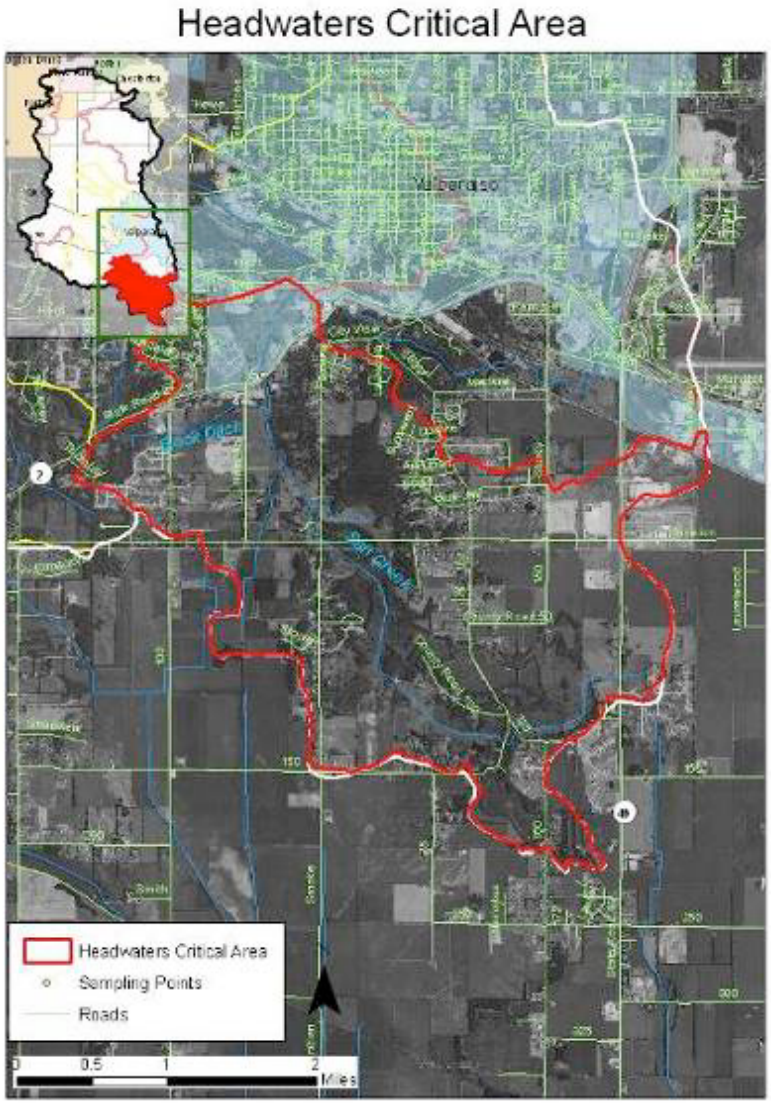
- Need protection to protect relatively good water quality

Based upon:

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

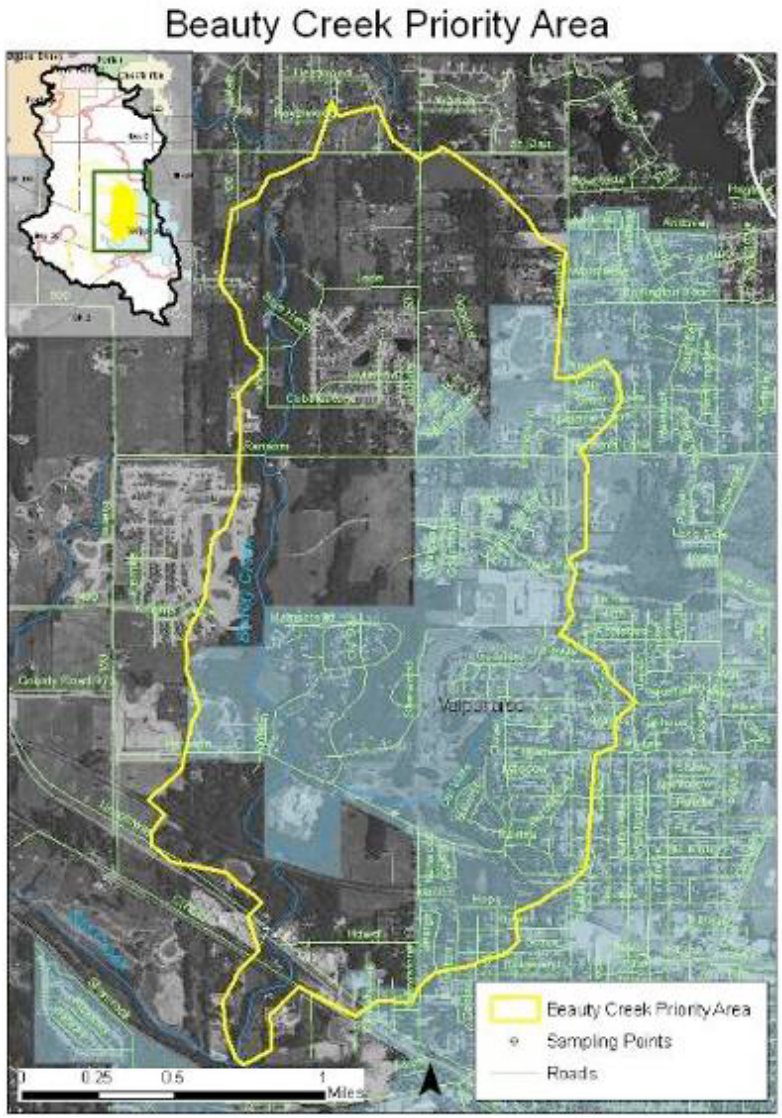
C. Critical Areas

Salt Creek Headwaters



- 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

- 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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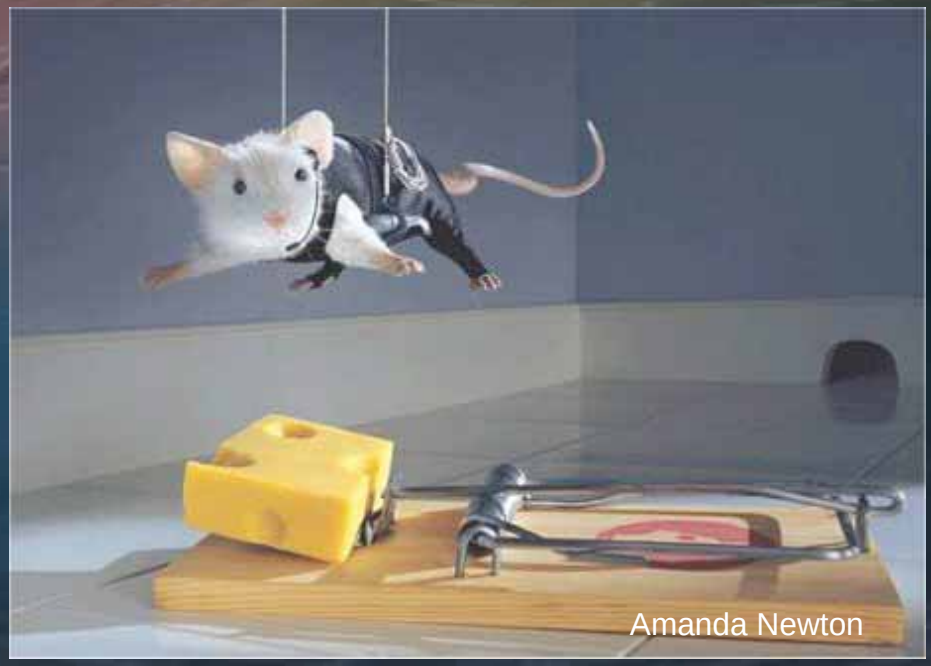

Amanda Newton