Stakeholders: Engaging Partners in Watershed-based Planning

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Chicago Metropolitan Agency for Planning

Watershed-based Planning Conference
November 30, 2017
Springfield, Illinois

CMAP

Our Agenda

- What is a stakeholder
- Why do we need them
- Where do we find them
- When & how do we involve them
- How do we keep it going

Stakeholder

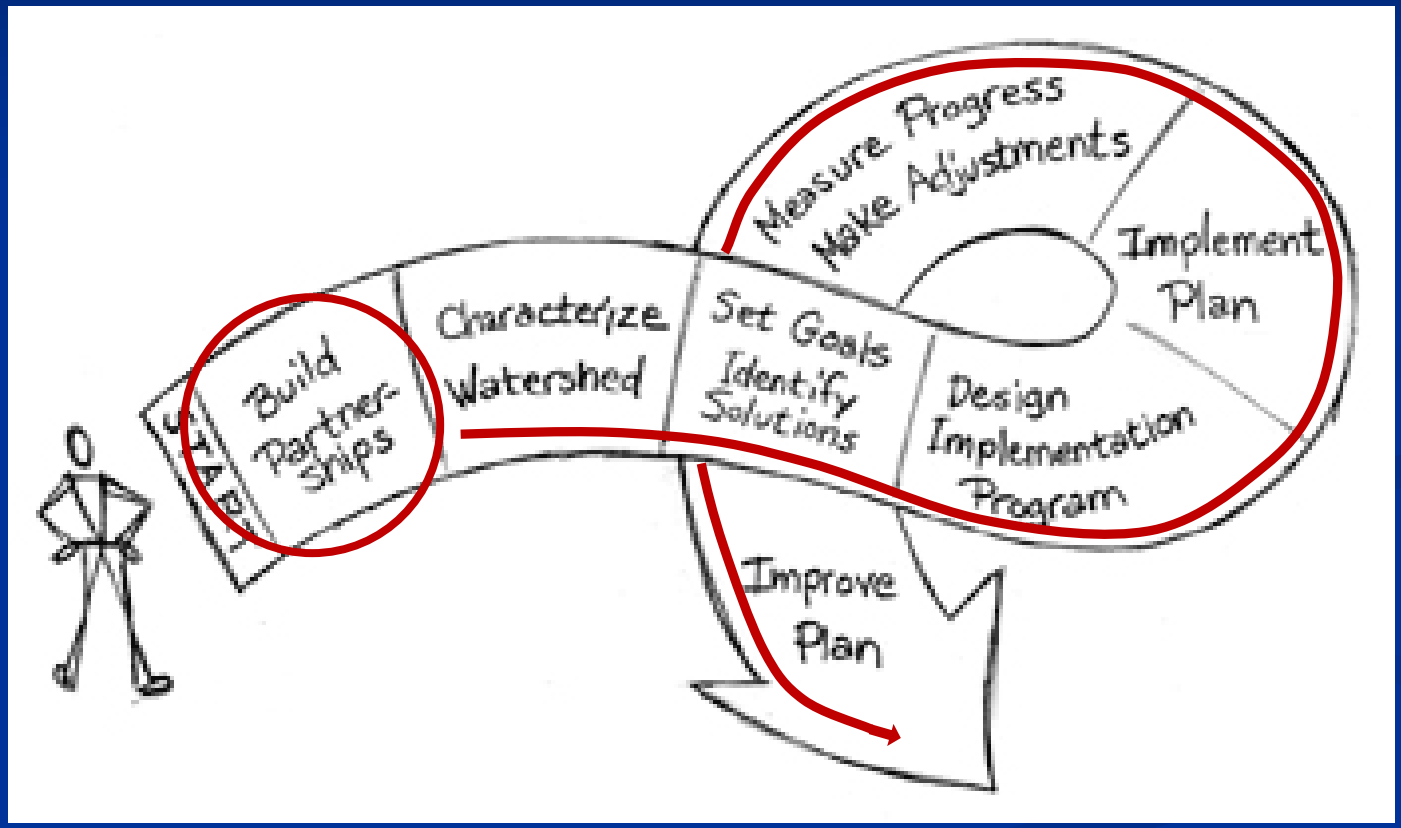
Person or group who has a *stake* in a process.

- **responsible for developing or implementing a management action**
- **affected by the action**
- **aid or prevent its implementation**

Watershed Stakeholders – *what they bring*

- Local knowledge, input
- Trust & support
- Shared responsibility
- Adoptable solutions
- Stronger working relationships
- Enhanced communication & resource coordination
- Plan implementation

Watershed Planning Steps



From *Handbook for Developing Watershed Plans to Restore and Protect our Waters* (USEPA, 2008)

Watershed Stakeholder Hideouts

Source: Univ. of Wisconsin – Extension and Wisconsin DNR

Nonpoint Source (NPS) Pollution

Stakeholder Categories

Technical Experts

Specific knowledge & skills, Advisors, Decision makers

Interested Folks

Want to contribute

General Public

“Population uninterested or unaware of environmental implications of their everyday actions.”

* slide modified from presentation by Mary Mitros, DuPage Co.

Watershed Stakeholder Categories

- Responsible for implementing
- Affected by implementation
- Can provide information on issues and concerns
- Have knowledge of existing plans, policies, politics, programs
- Can provide data
- Can provide technical or financial assistance in developing and/or implementing the WBP

Watershed Stakeholders – *a diversity of people and groups*

- Homeowners, HOAs
- Farm owners, operators
- Business & industry reps
- Schools, Colleges, Universities
- Community service orgs
- Religious orgs
- Libraries
- Land trusts
- Native American tribes
- Environ/Conserv groups
- Vol monitors/stewards
- Recreation-based clubs:
  fishing, hunting, sailing, canoeing, rowing …
- Municipal, Twp, County, State, Fed gov't agencies
- Regional planning cmsn.
- Park / Forest Preserve Districts
- Soil & Water Cons. Dists.
- Irrigation Dists.
- ...

Engaging Stakeholders in Watershed Planning

No "one size fits all" approach

Each process ~ unique

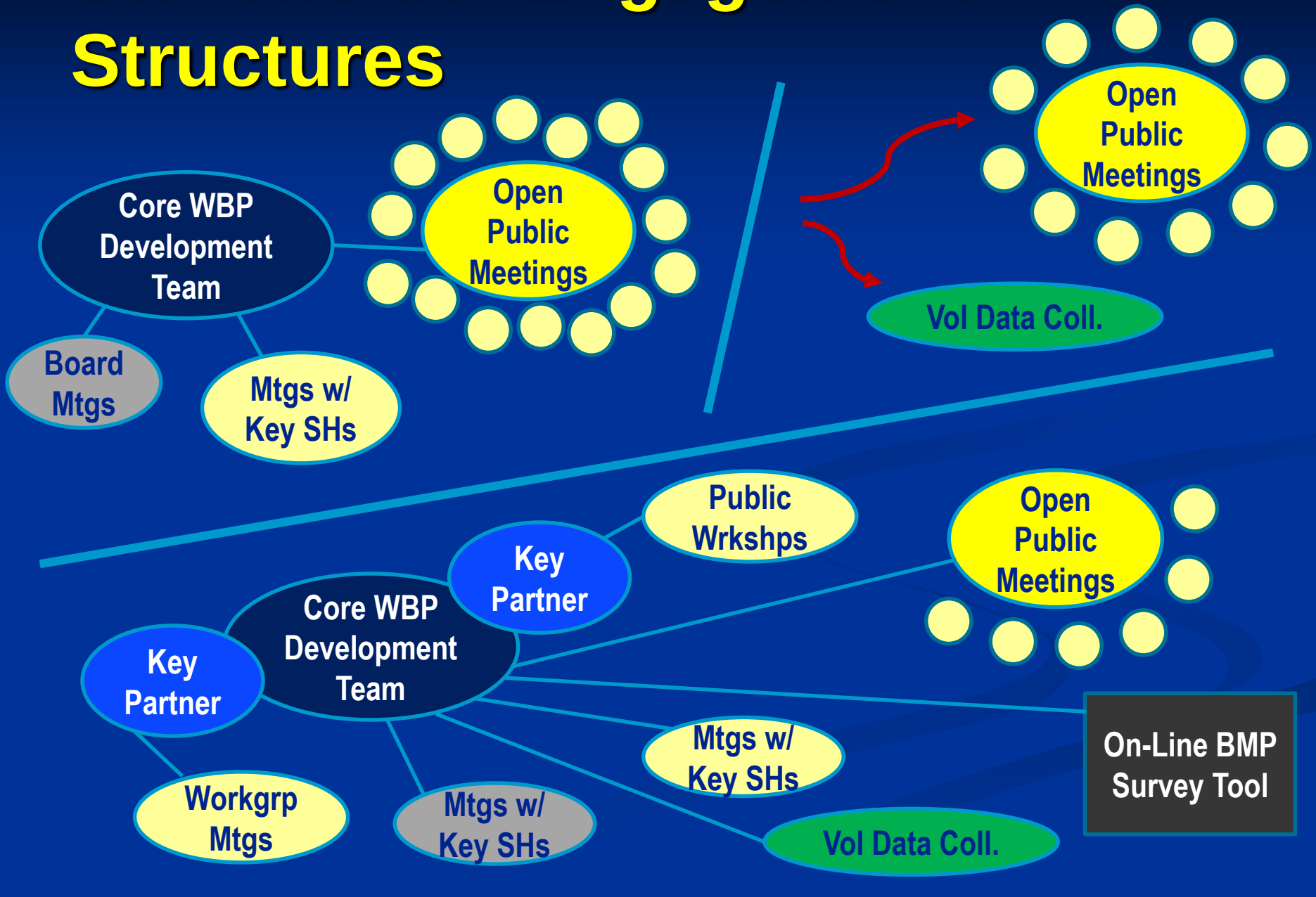
<u>Consider:</u>

- **Motivation / Driving forces**
- **Internal goals**
- **Political climate**
- **Geography: scale, location**
- **Time**
- **Budget**

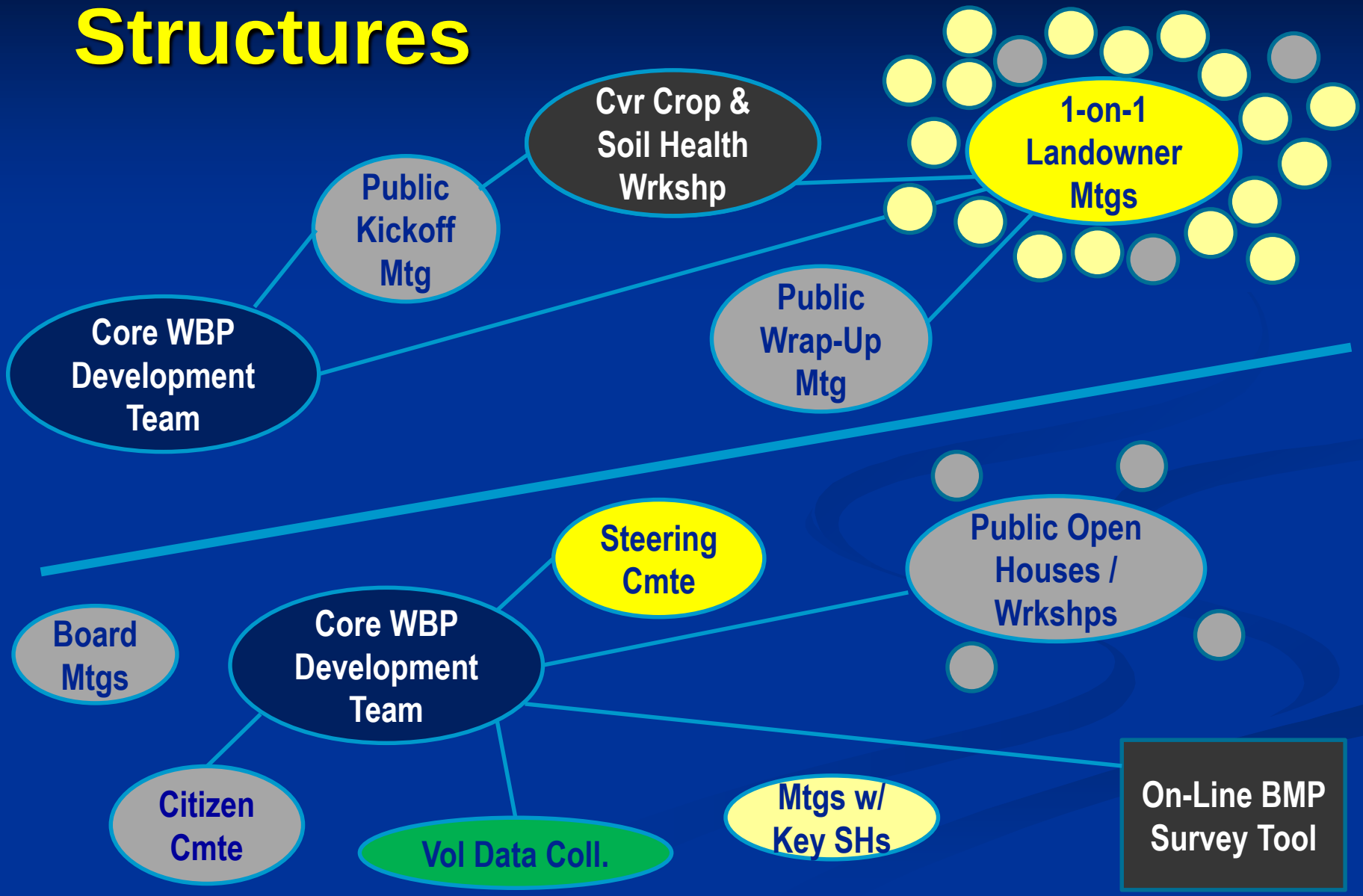
Engaging Stakeholders in Watershed Planning

- Build contact list
- Determine structure
- Consider communication pathways
- Convene stakeholders

Stakeholder Engagement Structures



Stakeholder Engagement Structures



Onward to Implementation!

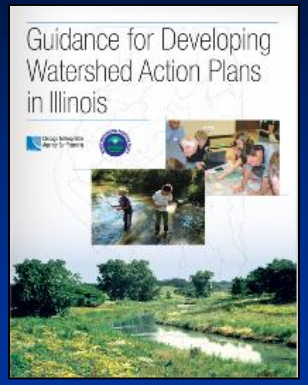
- Determine how continue to operate, secure funding support
- Prepare work plans
- Encourage action
- Share results
- Evaluate & make adjustments

Photo from:
http://www.hickorycreekwatershed.org/bioblitz-2016/bio-blitz-2016/

Stakeholder Engagement Resources

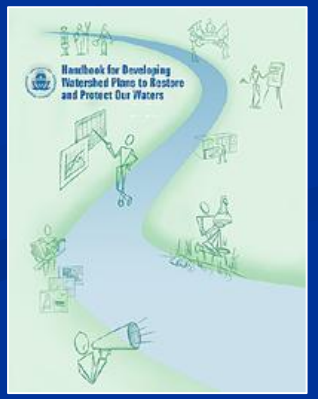
Guidance for Developing Watershed Action Plans in Illinois (CMAP & IEPA, 2007)

http://www.cmap.illinois.gov/livability/water/water-quality-management/watershed-planning



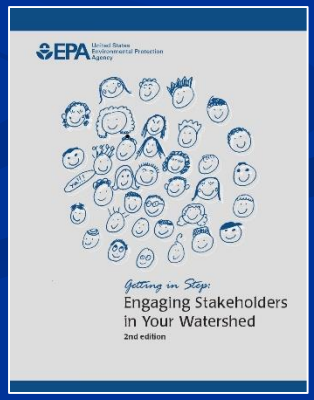
Handbook for Developing Watershed Plans to Restore and Protect our Waters (USEPA, 2005)

https://www.epa.gov/sites/production/files/2015-09/documents/2008_04_18_nps_watershed_handbook_handbook-2.pdf



Getting in Step: Engaging and Involving Stakeholders in your Watershed (2nd Ed.) (USEPA, 2013)

https://cfpub.epa.gov/npstbx/files/stakeholderguide.pdf



Watershed Academy Web

http://cfpub.epa.gov/watertrain/index.cfm

Watershed Stakeholders in Review

Questions? Cheers?

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Causes & Sources of Pollution, Load Reductions & Management Measures

Watershed-Based Planning Conference

Jeff Boeckler
Northwater Consulting

NORTHWATER CONSULTING

Watershed Plan

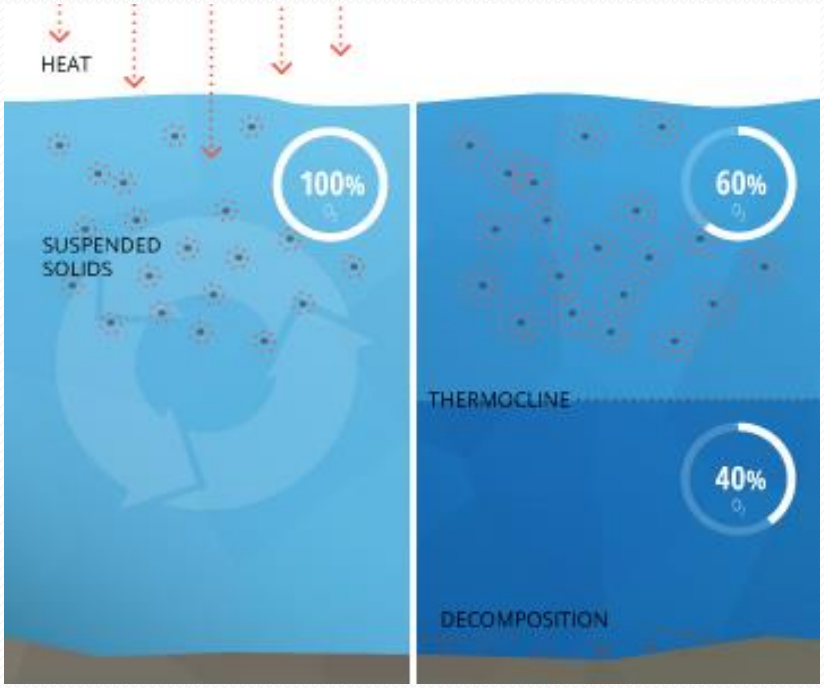
- A watershed description and characterization
- **Estimates of pollution loading**
- **Causes and sources**
- **Strategies (practices) to reduce loading and estimates of expected load reductions**
- Critical areas and priorities
- **Goals & targets**
- Milestones and cost estimates
- Education and outreach
- Monitoring

Causes of Pollution

- Typically established by regulatory agencies
  - Pollutant impacting support of a designated use
    - Aesthetic quality
    - Aquatic life
    - Fish consumption
- Can be a pollutant with/without a regulatory standard
  - Phosphorus – standard for lakes but not streams
    - Can cause algal blooms

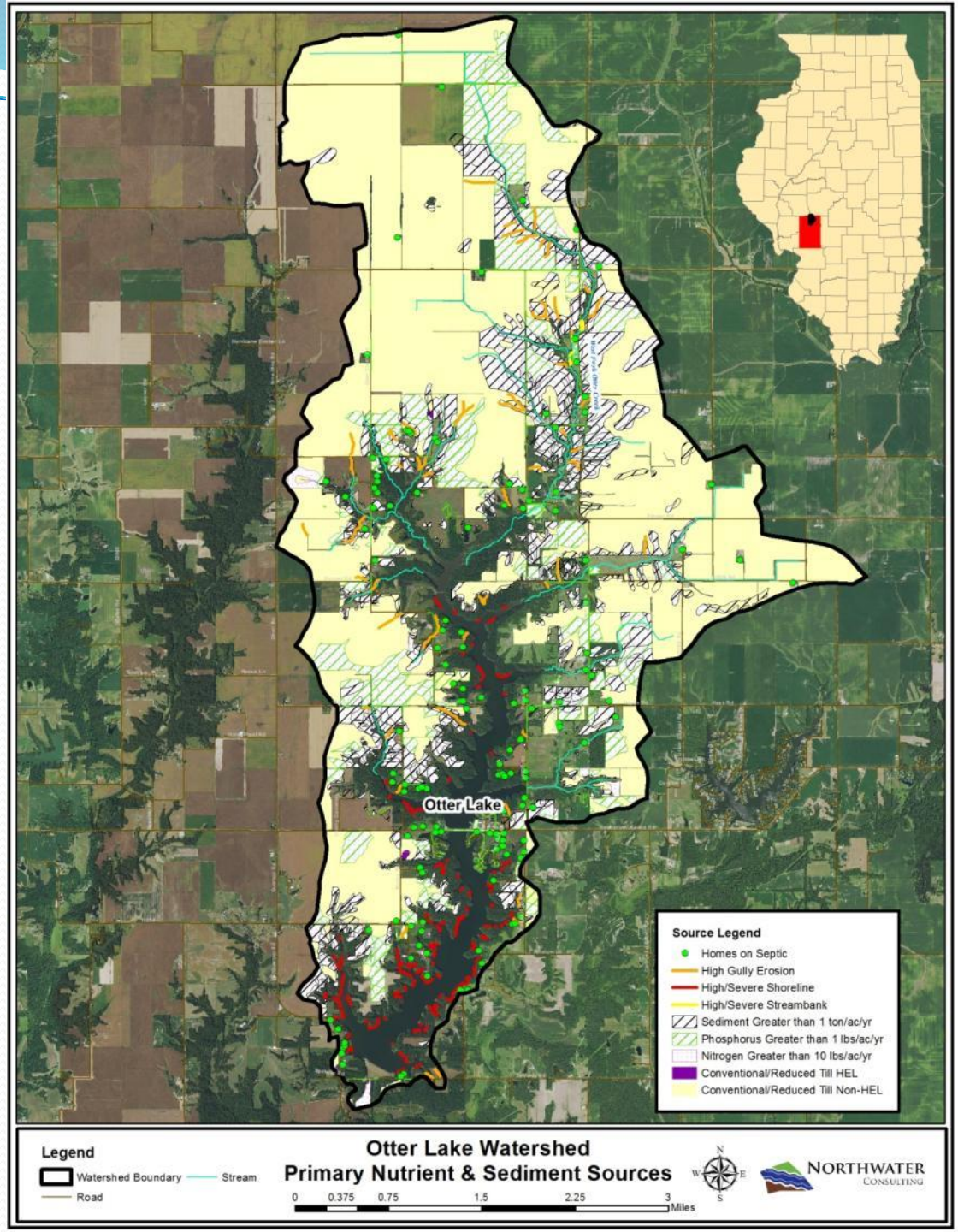
Causes of Pollution

- Total Suspended Solids
  - Degrades aquatic habitat, impacts water chemistry, and transports other pollutants
- Mercury
  - Public health issues if in fish that are consumed



Source Analysis

- Meaningful source assessment is critical for prioritization
- Simply stating sources is inadequate
  - Analysis is critical
  - Stating something is a source if it is not is both misleading and counterproductive



Why do it Right?

- Lends validity to the process and plan
- Avoids making recommendations that will not adequately address the problem

Source Assessment

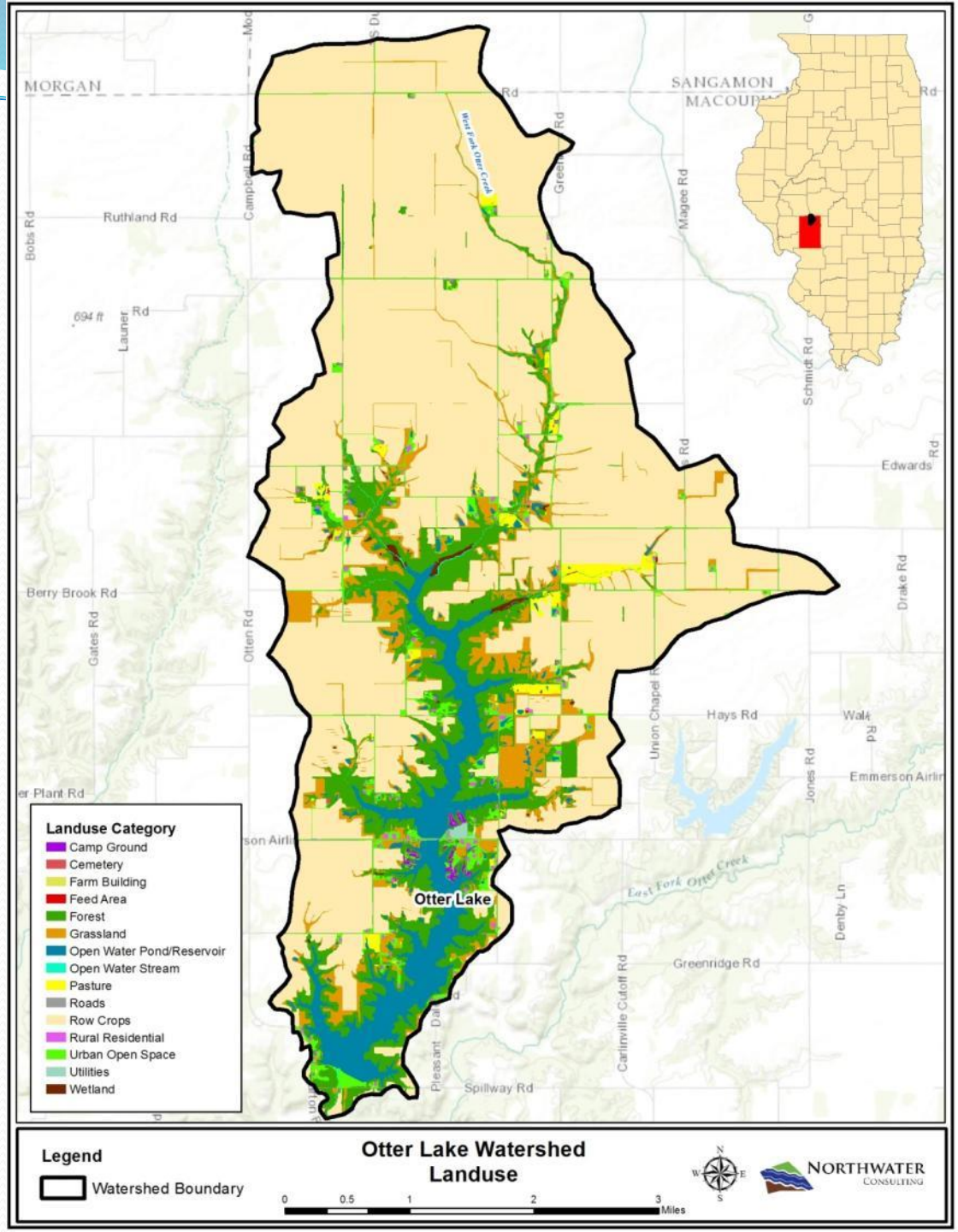
- In Lake Springfield, golf courses listed as a potential nutrient source in TMDL and water quality report
  - Golf courses are responsible for less than 1% of phosphorus load
- Crop ground:
  - Lake Springfield – 94% of N and 87% of P
  - Waverly – 81% of N and 70% of P
- Otter Lake
  - 63% of eroding gullies responsible for 90% of gully sediment load

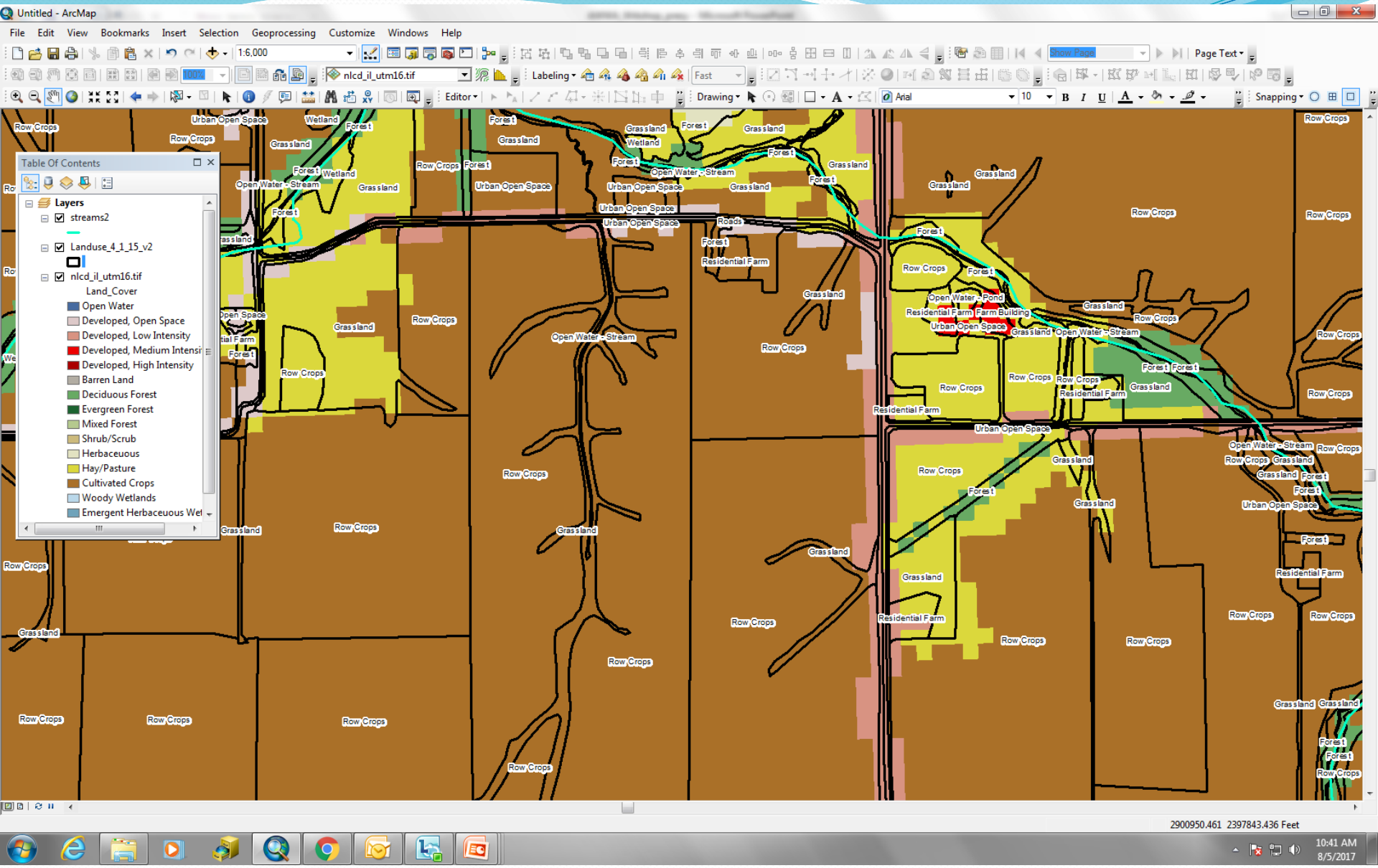
Useful Tools/Techniques for Source Assessment

- GIS mapping and analysis
  - Layers readily available
  - Can overlay and evaluate with other layers
    - Analysis to identify locations of pollutant sources
  - Custom layers – landuse
- Field assessments and direct measurements
  - Lake bank and streambank assessment
  - Watershed surveys

Landuse

- Understanding of type, quantity, and distribution of landuse and landcover
- Understanding of pollution sources
- Critical for modeling and analysis
  - Crap in is crap out

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Developed, Medium Intensi
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Barren Land
Deciduous Forest
Evergreen Forest
Mixed Forest
Shrub/Scrub
Herbaceuous
Hay/Pasture
Cultivated Crops
Woody Wetlands
Emergent Herbaceuous Wet
Row Crops
Grassland
Forest
Urban Open Space
Open Water - Stream
Open Water - Pond
Residential Farm
Farm Building
Roads
Wetland
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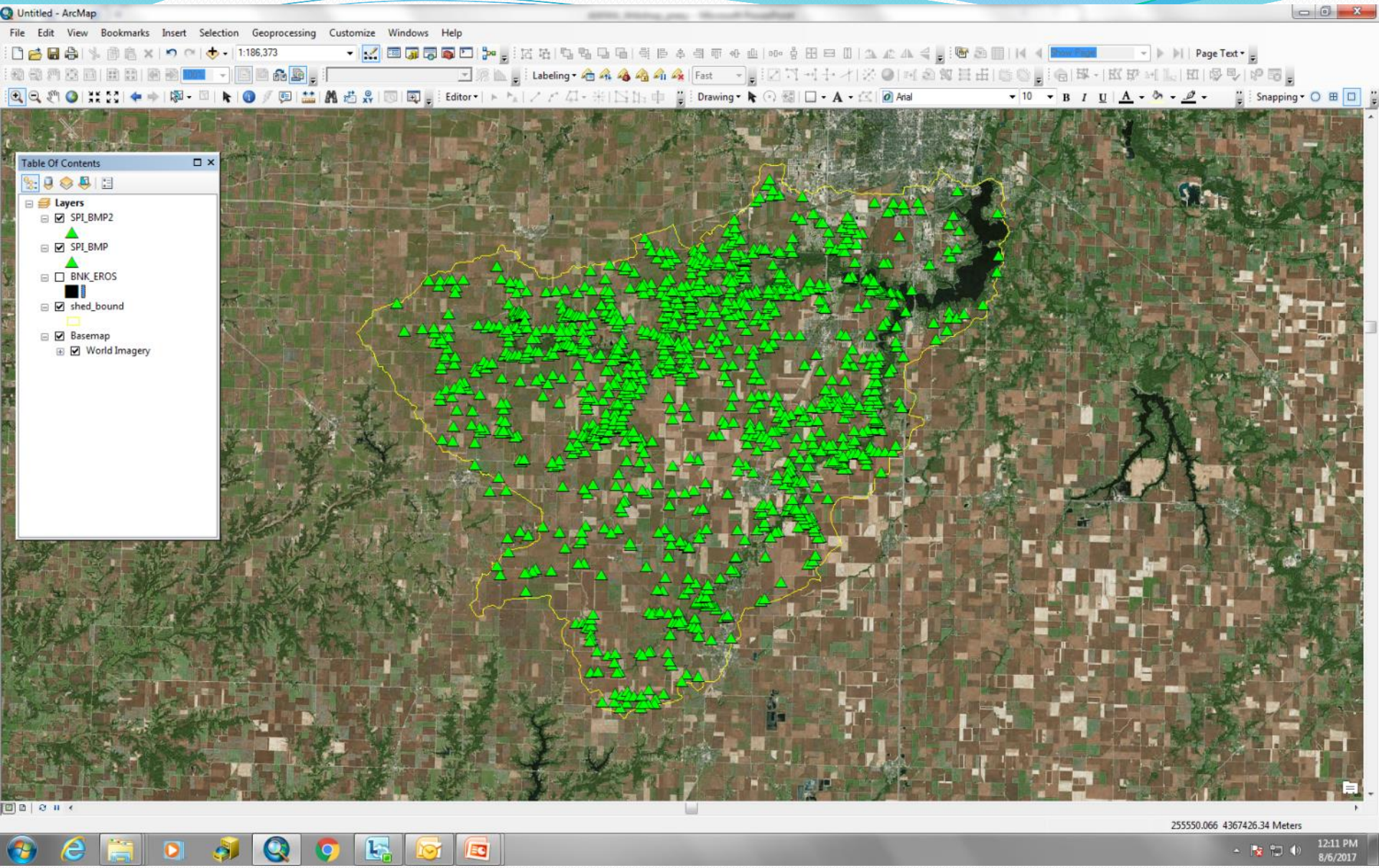
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Basemap
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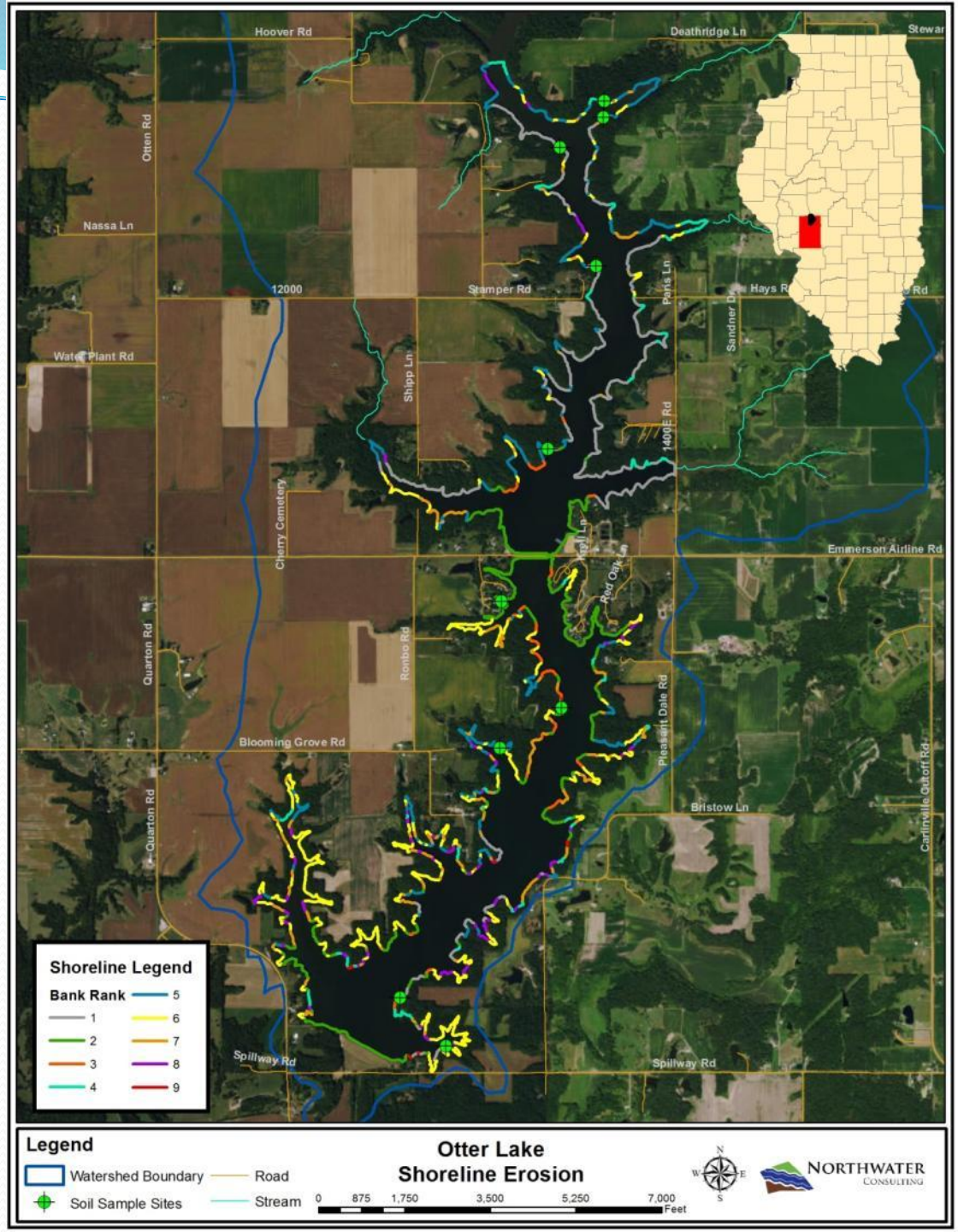
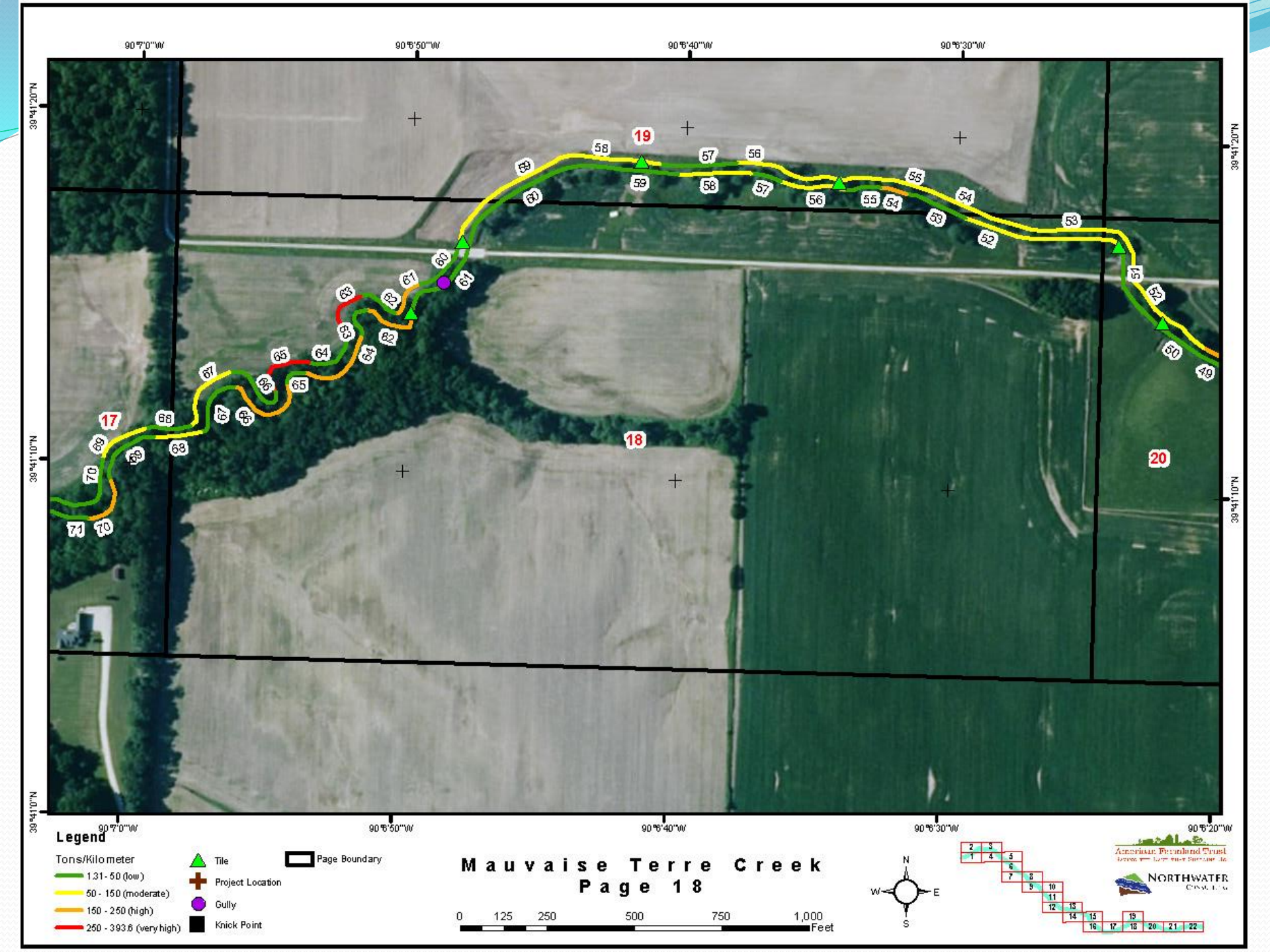
Stream/ Lake Bank Erosion

- Quantify source loads
  - Nutrient and sediment
- Aids in prioritization and site selection
- Direct measurements are critical or source locations can be mischaracterized




90°7'0"W
90°6'50"W
90°6'40"W
90°6'30"W
90°6'20"W
39°41'20"N
39°41'10"N
17
18
19
20
Legend
Tons/Kilometer
1.31 - 50 (low)
50 - 150 (moderate)
150 - 250 (high)
250 - 393.6 (very high)
Tile
Project Location
Gully
Knick Point
Page Boundary
Mauvaise Terre Creek
Page 18
0 125 250 500 750 1,000
Feet
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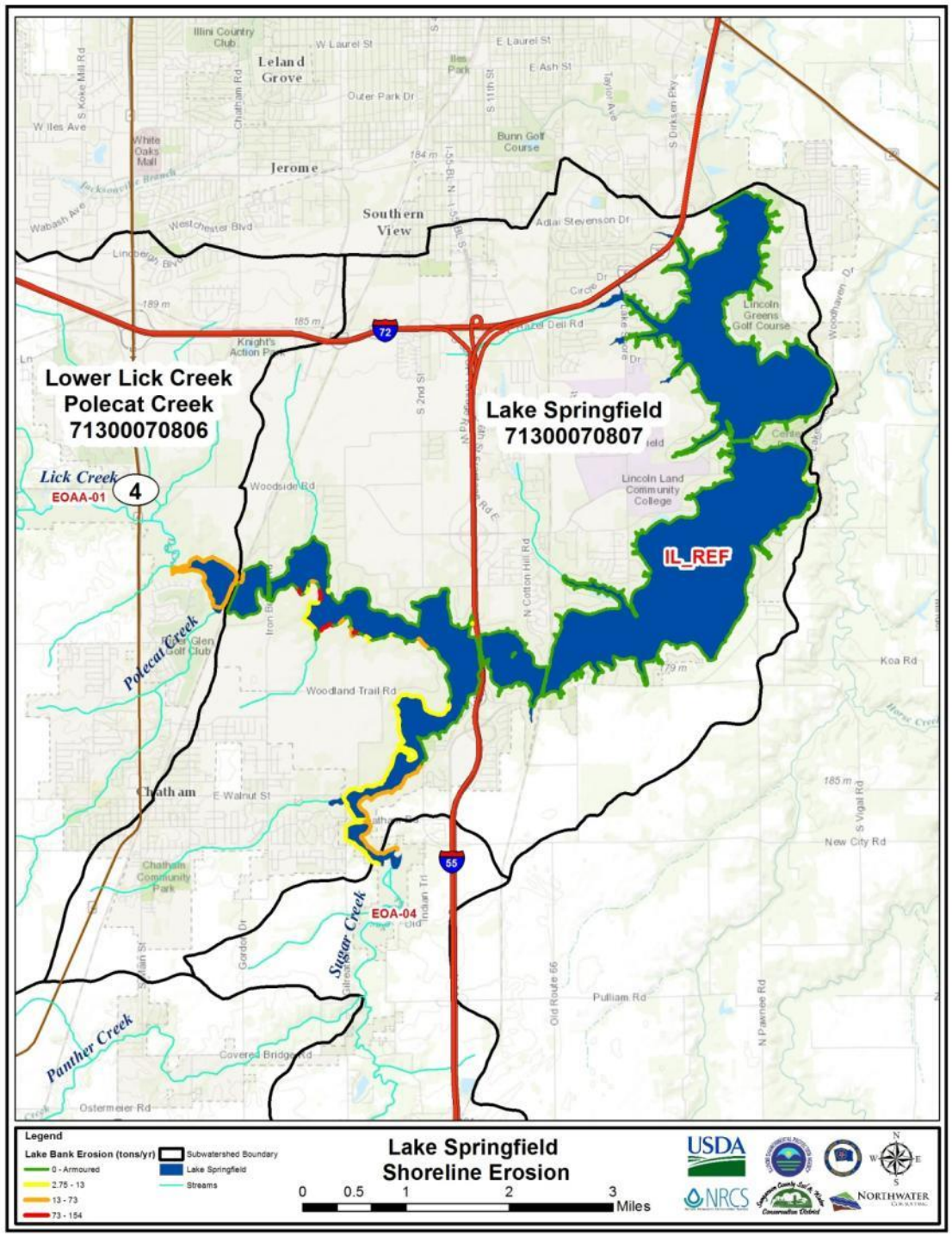
American Farmland Trust
NORTHWATER

Shoreline Erosion Lake Springfield

- Shoreline erosion minimal
- 912 tons/yr Sediment (0.6%)
- 1,049 lbs/yr Phosphorus (0.5%)
- 2,098 lbs/yr Nitrogen (0.6%)

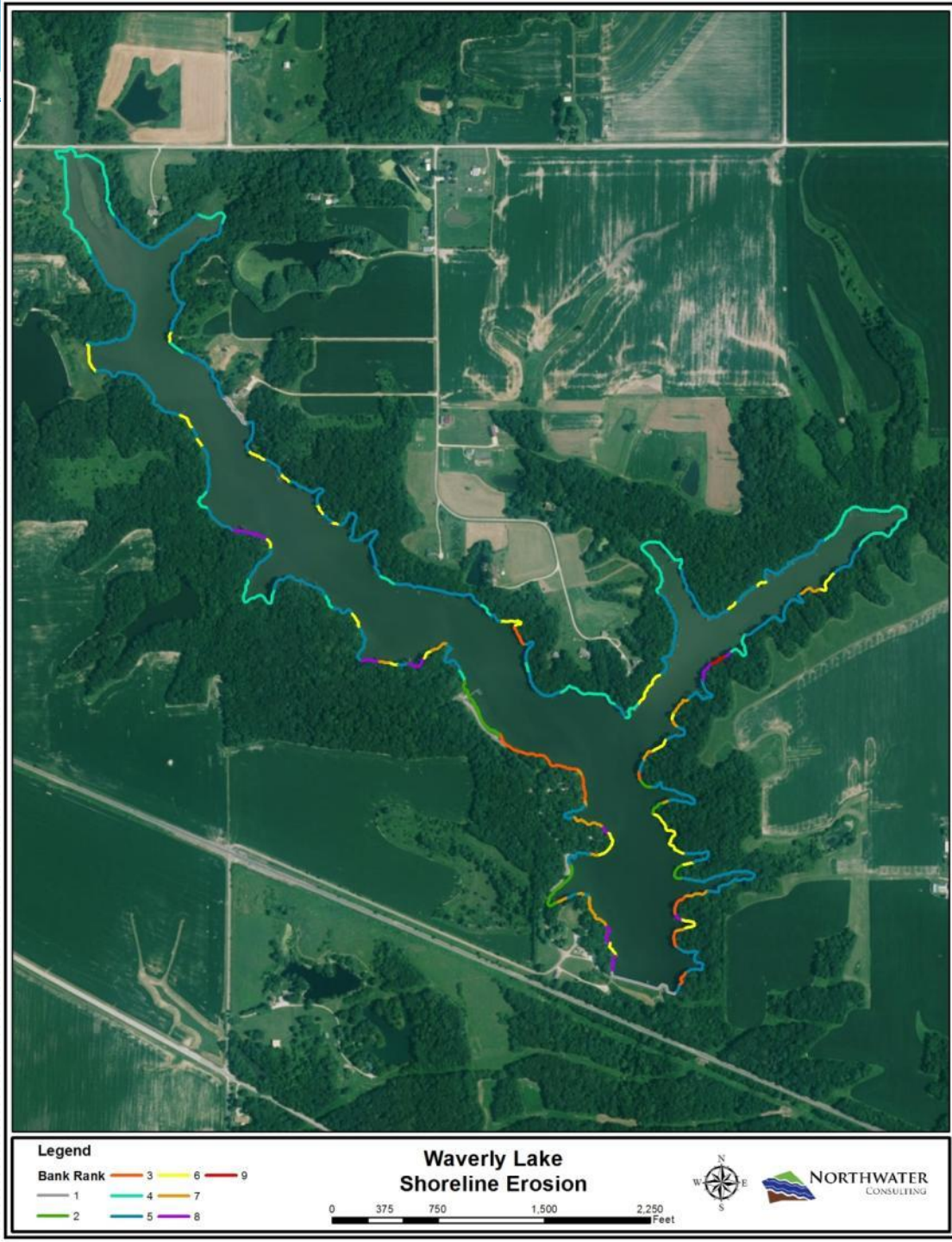


Waverly

- Lake shoreline erosion is responsible for 6% of the lakes' P load and 9% of its sediment load
  - 19% of banks responsible for 84% of the shoreline phosphorus load and 81% of the sediment load

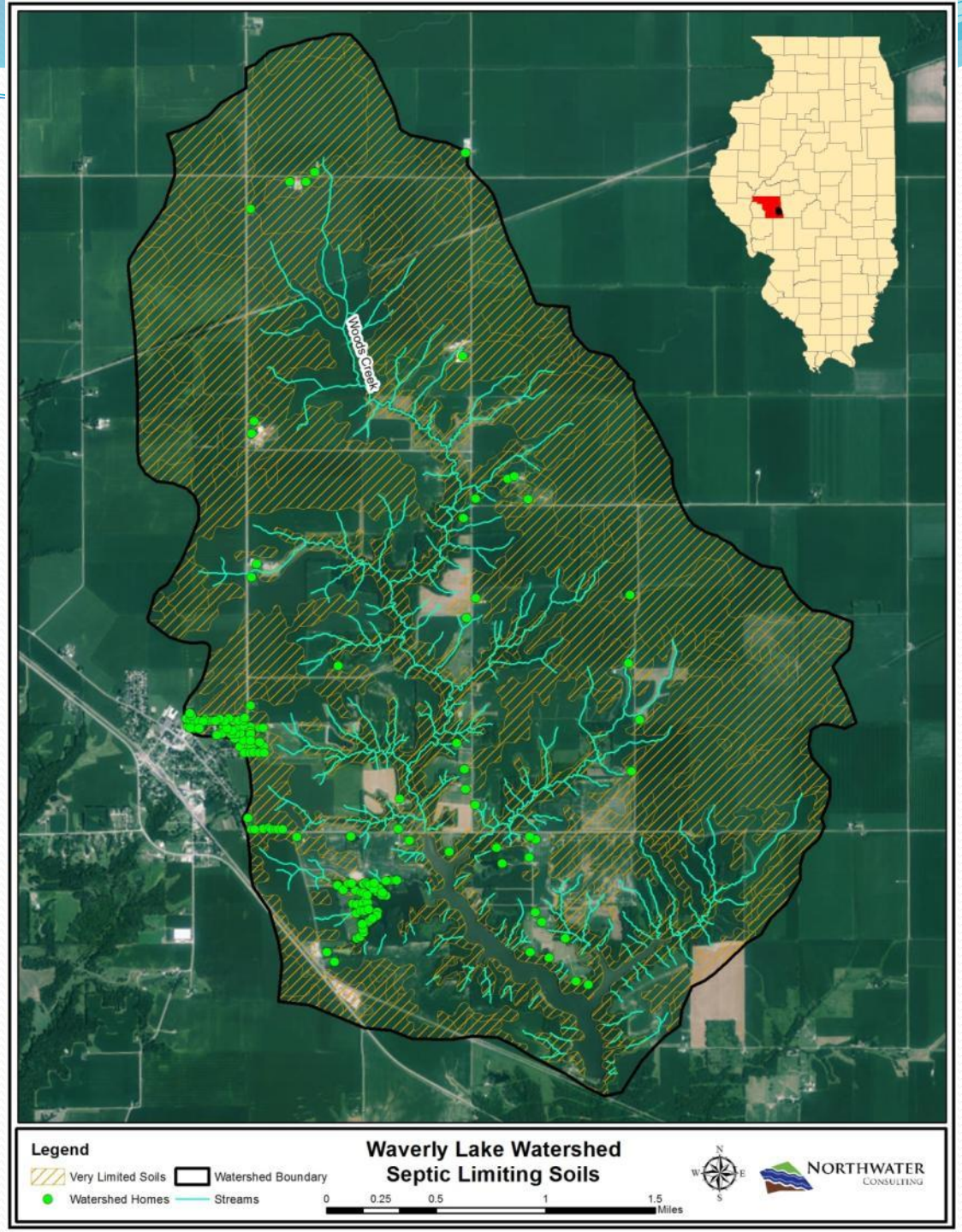
Otter

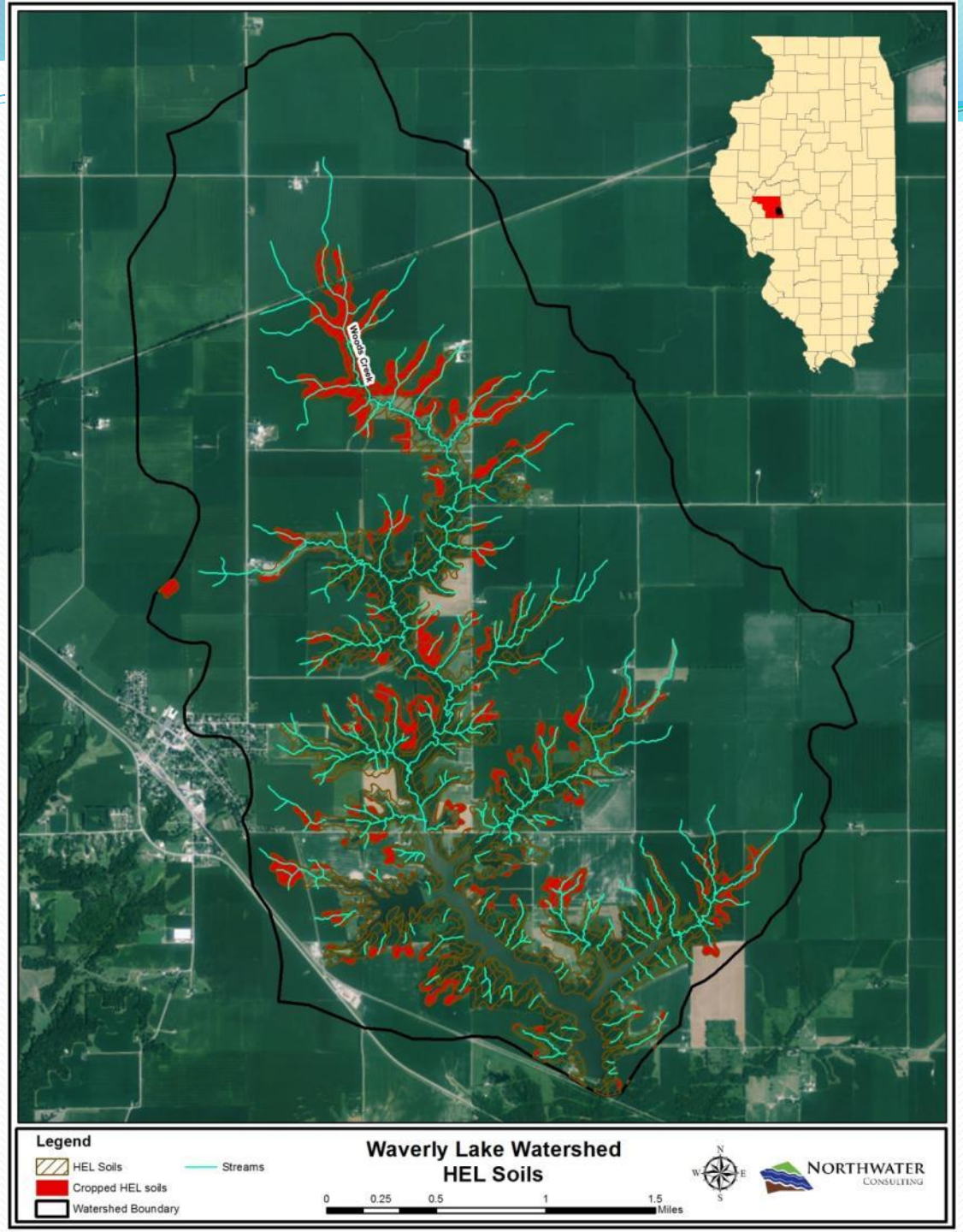
- 15% of shoreline responsible for 80% of N, 79% of P, and 78% of sediment load from shorelines



Soils

- Soil types, properties, and distribution
  - Hydrologic groupings
  - Septic suitability
  - Erosion potential (HEL)
- Critical for modeling
- Combine with other layers to draw meaningful conclusions on sources




Woods Creek
Legend
HEL Soils
Cropped HEL soils
Watershed Boundary
Streams
Waverly Lake Watershed
HEL Soils
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0.25
0.5
1
1.5
Miles
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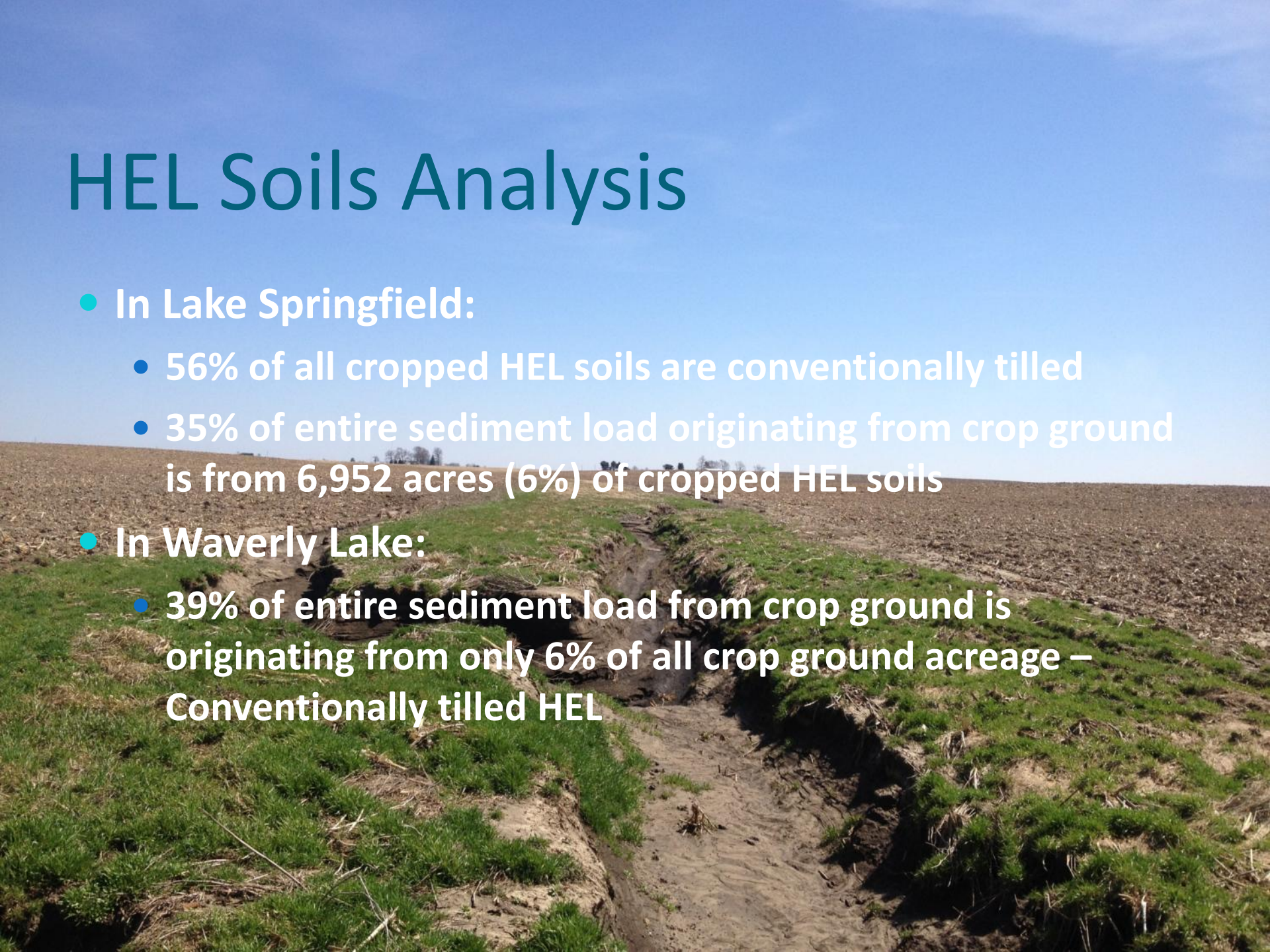
NORTHWATER
CONSULTING

HEL Soils Analysis

- **In Lake Springfield:**
  - **56% of all cropped HEL soils are conventionally tilled**
  - **35% of entire sediment load originating from crop ground is from 6,952 acres (6%) of cropped HEL soils**
- **In Waverly Lake:**
  - **39% of entire sediment load from crop ground is originating from only 6% of all crop ground acreage – Conventionally tilled HEL**



Water Quality Targets

- Several ways to skin this cat:
  - Based on TMDL modeling and percent reduction needed to meet a standard
  - Based on Illinois Nutrient Loss Reduction Strategy
  - Something more subjective
  - In Lake Springfield:
    - 93% reduction needed to meet P standard (TMDL)
    - 54% reduction in sediment needed (TMDL)
  - In Waverly Lake
    - 82% reduction needed to meet P standard (TMDL)
    - 82% reduction in sediment
    - 45% reduction in nitrogen (INLRS)

Lake Springfield

- All watershed practices outlined in the plan can:
  - Reduce total N load by 48%
  - Reduce total P load by 53%
  - Reduce total Sediment load by 59%
  - Additional reductions are still needed to meet phosphorus standard and may require:
    - In-lake sediment traps
    - Management of phosphorus rich sediment
    - conversion of crop ground to prairie or forest

Waverly Lake

TYPE	Quantity	N Reduction (% of total load)	P Reduction (% of total load)	Sediment Reduction (% of total load)
Cover Crop	330 (ac)	1.26%	0.75%	0.66%
No-Till/Strip-Till	4,334 (ac)	**23.2%**	**19.93%**	**26.05%**
Filter Strip	1.3 (ac)	0.5%	0.83%	1.25%
Field Border	61.6 (ac)	4.56%	3.98%	3.77%
Grass Conversion	16.3 (ac)	0.11%	0.06%	0.03%
Grade Control	33 (#)	0.49%	1.07%	1.52%
Streambank/Riffle	233 (ft) / 6 (#)	0.94%	1.84%	2.54%
Livestock Waste System	1 (#)	0.05%	0.05%	0.004%
Livestock Fencing/Crossing	6,708 (ft) / 3 (#)	0.24%	0.12%	0.03%
Grassed Waterway	15,367 (ft) / 18.3 (ac)	5.31%	5.4%	6.75%
In-Lake Low-flow Dam	1,960 (ft)	**12.19%**	**22.55%**	**29.36%**
WASCB	109 (#) / 16,350 (ft)	2.8%	5.14%	6.06%
Wetland	3 (ac)	0.67%	0.91%	1.21%
Pond	39 (#)	4.22%	5.01%	5.84%
Lake Shoreline Stabilization	6,418 (ft)	2.73%	5.37%	**7.50%**
Nutrient Management (Plan)	4,620 (ac)	**5.69%**	**8.19%**	0%
Septic Systems	14 (#)	1.12%	1.93%	0%
Dredging	N/A	0%	2.76%	N/A
Total		**66%**	**86%**	**93%**

Pollution Loading & Modeling

- Model selection generally based on the question that needs to be answered
  - Different models are needed to quantify in-lake nutrient concentrations vs stream loads
  - Different models are needed for different pollutants
- All models have limitations
  - Crap in is crap out
  - Data intensive if more accurate predictions are desired
  - Calibration using sampled data is important BUT data often lacking

SWAMM

- Spatially explicit GIS based nonpoint source model
- Shares characteristics with other models such as SWAT and pLoad except:
  - Can evaluate loading at the field level
  - Can evaluate the exact placement of treatment practices
  - Can be visualized in map format
- It is relatively simple, relying on good input data for accurate outputs rather than complicated equations
- Easy to perform needed analysis
  - Load allocation and load reductions

Landuse Category	Acres	Nitrogen Load (lbs/yr)	Per Acre	Phosphorus Load (lbs/yr)	Per Acre	Sediment Load (tons/yr)	Per Acre
Row Crops	8,948	**88,903**	**10**	**9,295**	**1.0**	**8,038**	**0.90**
Open Water Pond/Reservoir	817	**2,577**	3.2	**172**	0.21	5.2	0.01
Forest	1,533	**1,892**	1.2	**209**	0.14	**38**	0.03
Pasture	145	957	**6.6**	93	0.64	10	0.07
Urban Open Space	352	773	2.2	45	0.13	7.7	0.02
Roads	89	609	**6.8**	90	**1.0**	17	**0.19**
Grassland	854	401	0.5	73	0.09	**11**	0.01
Open Water Stream	22	236	11	21	0.92	0.29	0.01
Farm Building	23	132	5.7	8.1	0.35	1.6	0.07
Rural Residential	51	129	2.5	18	0.35	2.4	0.05
Camp Ground	17	88	5.3	11	0.64	2.7	**0.16**
Feed Area	2.6	33	13	5.6	**2.1**	0.32	0.12
Wetland	32	31	1.0	2.2	0.07	0.35	0.01
Utilities	10	20	2.0	4.7	0.46	0.48	0.05
Cemetery	0.92	0.69	0.75	0.10	0.11	0.01	0.01
Total	**12,898**	**96,782**	**7.5**	**10,047**	**0.78**	**8,135**	**0.63**

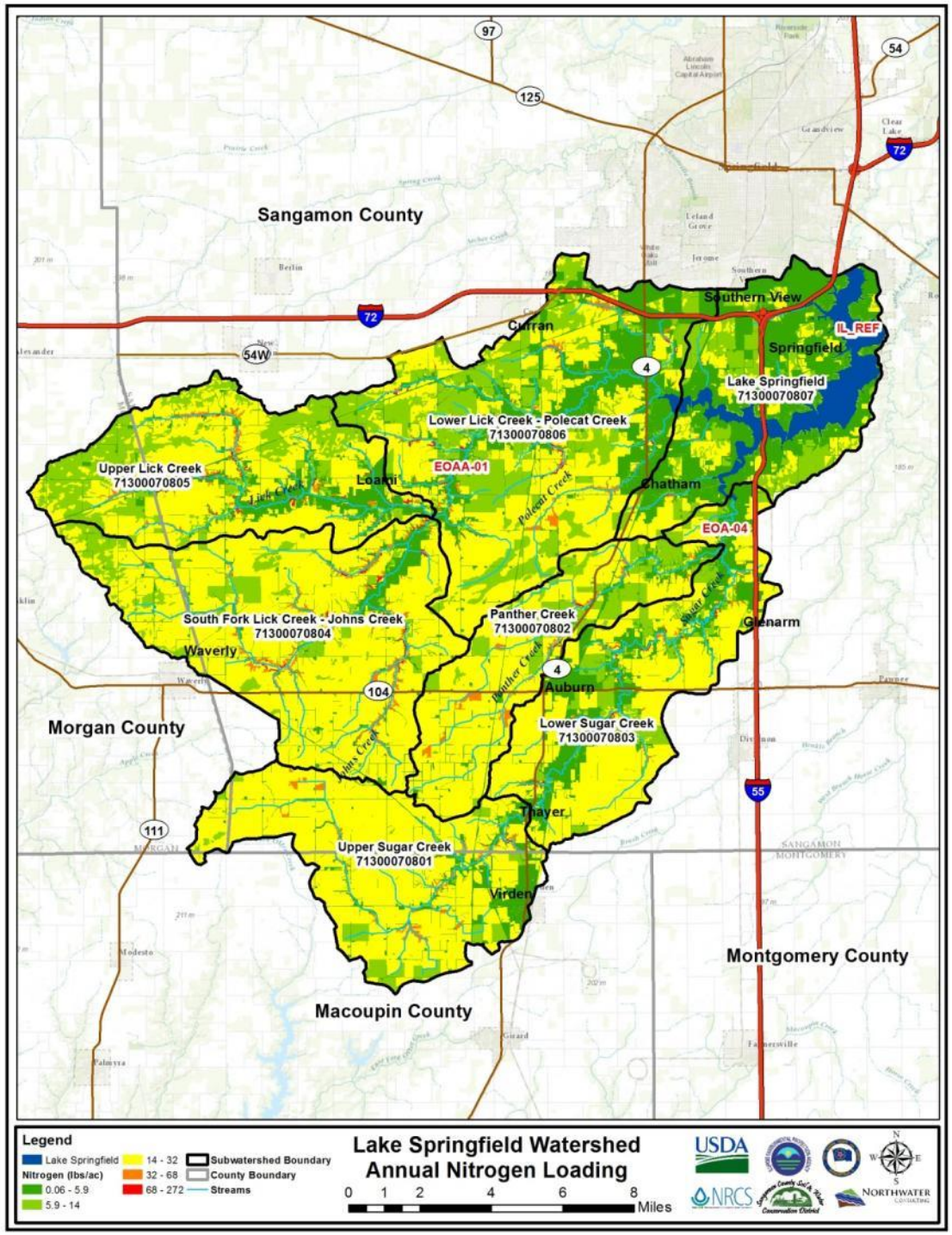
Lake Springfield Nitrogen Loading - Runoff

- Model calibrated to in-stream data
- Annual Nitrogen load – 2,281,826 lbs or 13.51 lbs/ac (98%)

  - 94% from crop ground (50% of this is tile flow)

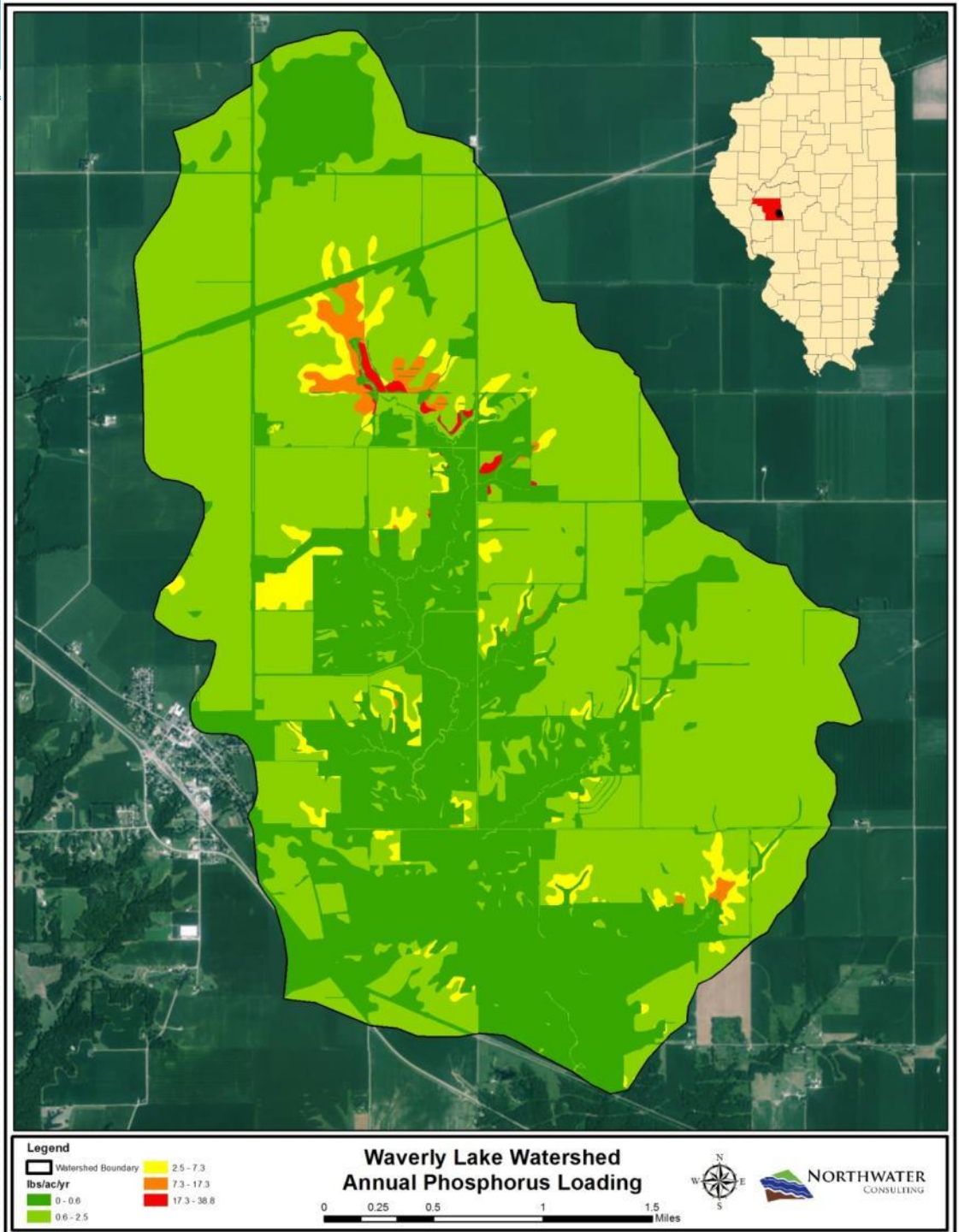
- South Fork Lick – Johns Creek – 17.11 lbs/ac/yr (24%)

- Panther Creek – 16.6 lbs/ac/yr (11%)



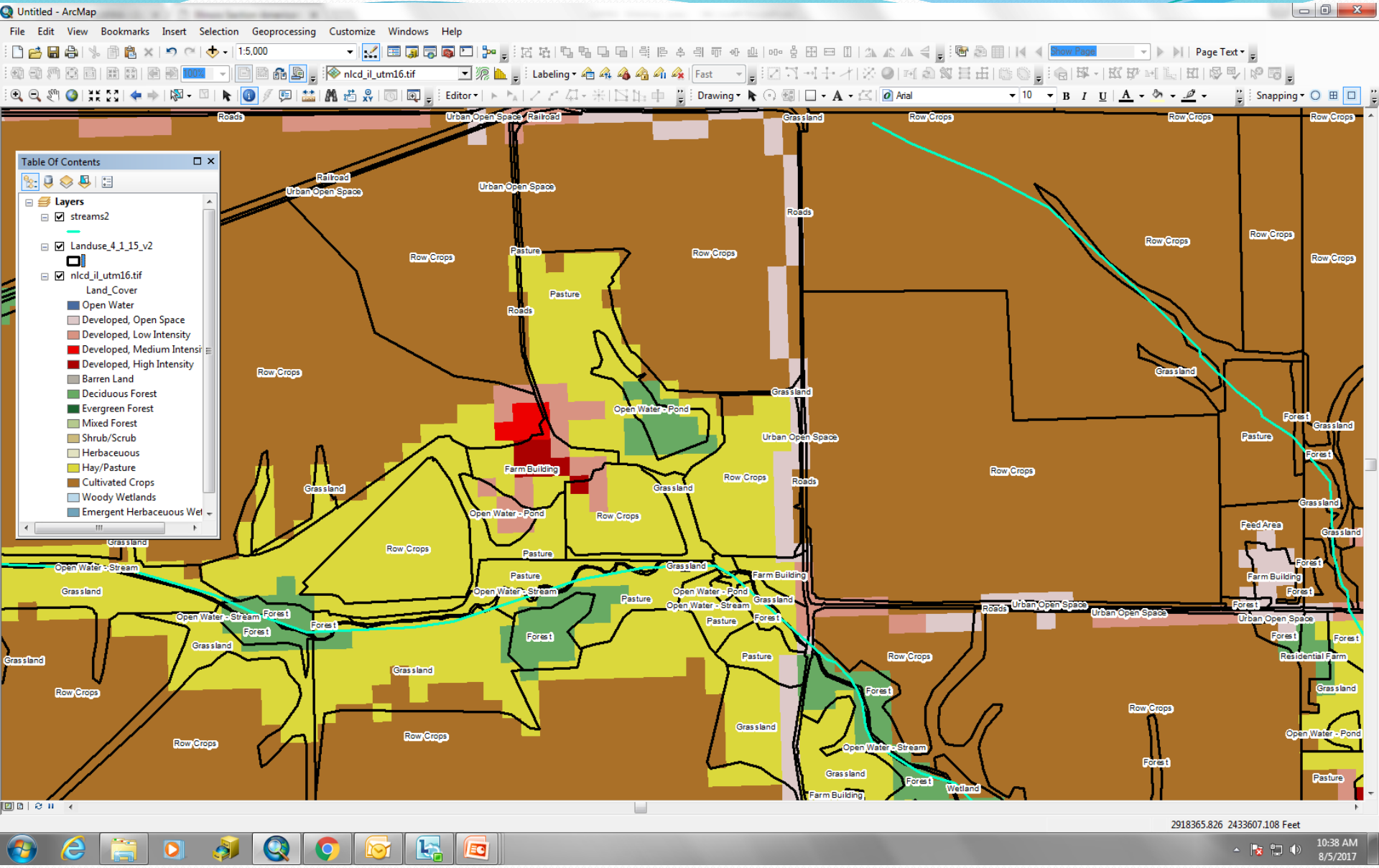
Waverly Lake

- Total nutrient and sediment loading to Lake Waverly is: 39,698 lbs/yr nitrogen, 8,990 lbs/yr phosphorus, 7,074 tons/yr sediment.
  - Row crops: 78% of nitrogen, 67% of phosphorus, 66% of sediment



Best Management Practices

- Must be specific
  - Tied to an ACTUAL location
    - Focused the greatest bang-for-the-buck; lowest per dollar load reductions
  - Education and outreach can be more general because it is
  - Must address the actual problems and be cost-effective
    - Avoid broad recommendations, those that are unrealistic, or those that poorly thought out (lazy)
      - IE – recommending buffer strips on streams where there are no streams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Land_Cover
Open Water
Developed, Open Space
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Barren Land
Deciduous Forest
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Herbaceuous
Hay/Pasture
Cultivated Crops
Woody Wetlands
Emergent Herbaceous Wet
Roads
Urban Open Space
Railroad
Grassland
Row Crops
Pasture
Open Water - Pond
Farm Building
Open Water - Stream
Forest
Feed Area
Residential Farm
Wetland
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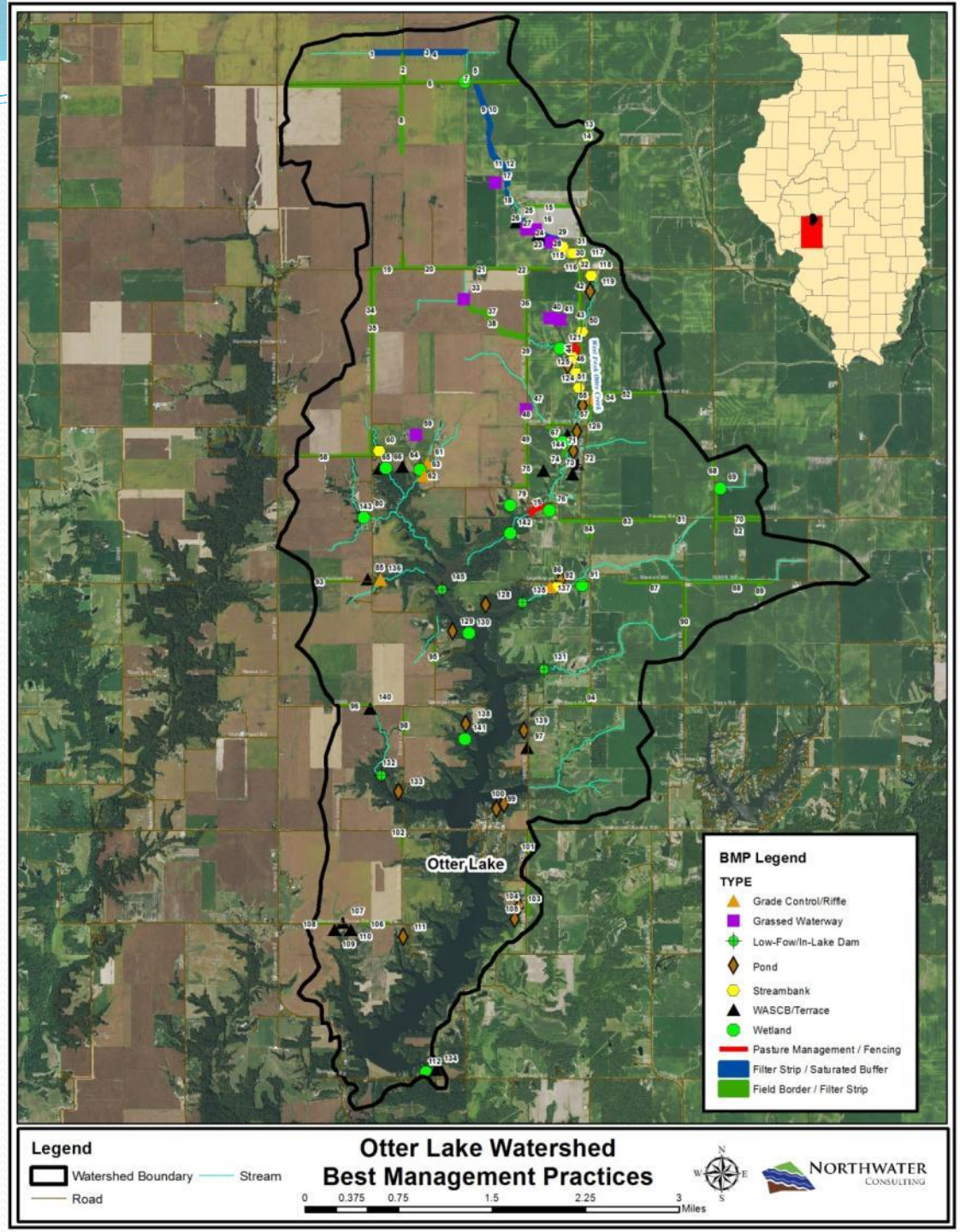
Otter Lake
BMP Legend
TYPE
Grade Control/Riffle
Grassed Waterway
Low-Fow/In-Lake Dam
Pond
Streambank
WASCB/Terrace
Wetland
Pasture Management / Fencing
Filter Strip / Saturated Buffer
Field Border / Filter Strip
Legend
Watershed Boundary
Stream
Road
Otter Lake Watershed
Best Management Practices
0 0.375 0.75 1.5 2.25 3
Miles
N
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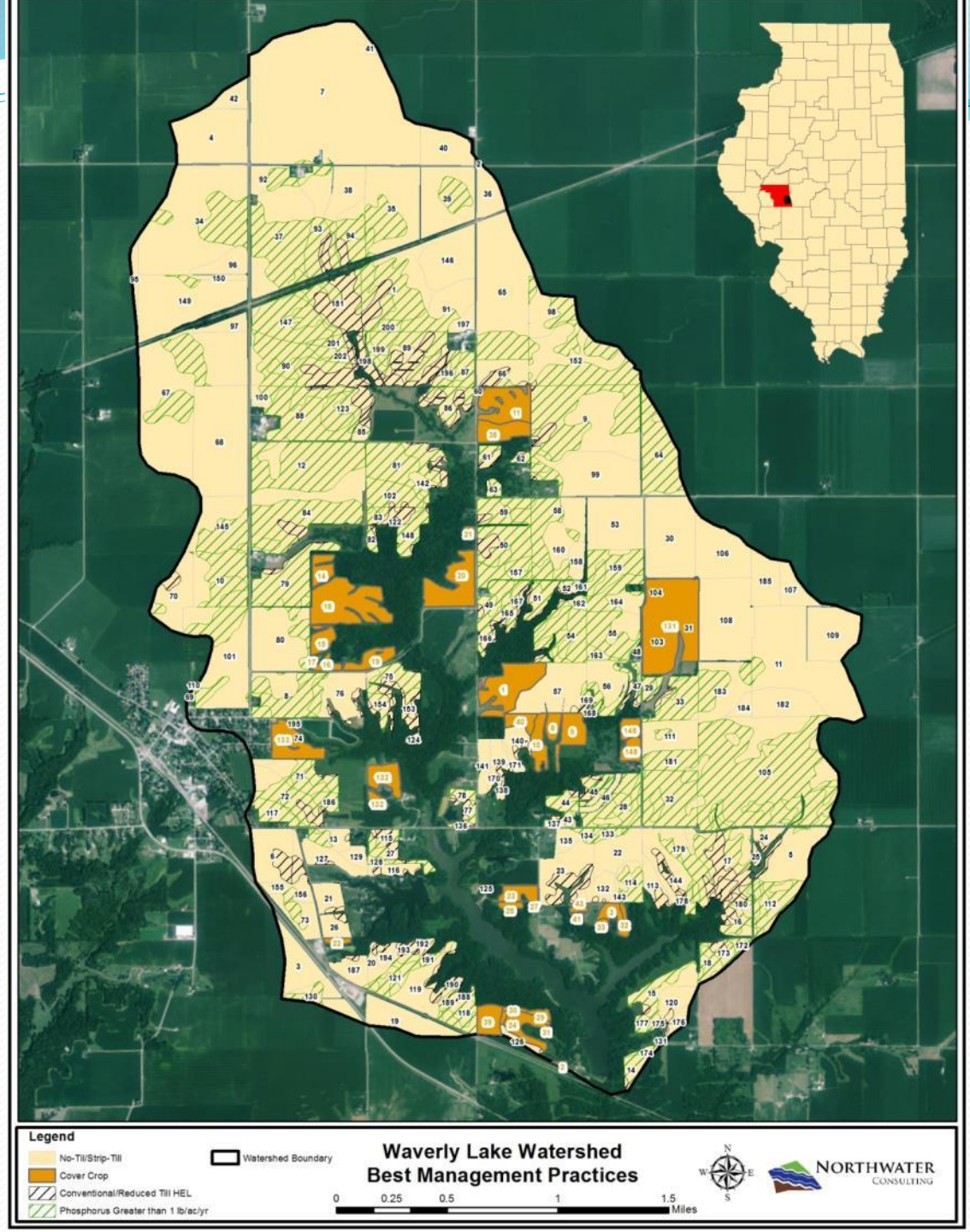
NORTHWATER
CONSULTING

BMP Expected Pollutant Removal Efficiencies

BMP	Reduction % Nitrogen	Reduction % Phosphorus	Reduction % Sediment
WASCB/Terrace[1,3]	20%	60%	70%
Grade Control/Riffle[1]	2%	5-10%	10-15%
Detention Basin/Pond	22-31%	34-50%	60-70%
Pasture Management System	40%	45%	65%
Feed Area Waste System	80%	90%	90%
Grassed Waterway[3]	30%	25%	45%
Filter Strip/Field Border	10%	40%	65%
Saturated Buffer[4]	50%	0%	0%
In-Lake/Low Flow Dam	10-30%	10-30%	20-40%
Livestock Stream Fencing	40%	45%	65%
Wetland[2]	20-90%	10-90%	38-95%
No-Till/Strip Till	10%	50%	70%
Cover Crop	30%	30%	40%
Nutrient Management (Plan)[4]	15%	7%	0%
Bioreactor[4]	40%	0%	0%

Type	Quantity	Area Treated (ac)	Nitrogen Reduction (lbs/yr)	Phosphorus Reduction (lbs/yr)	Sediment Reduction (tons/yr)
Cover Crop	85 locations	658	1,636	188	207
No-Till/Strip-Till	443 locations	8,263	8,334	4,329	5,262
Saturated Buffer	13 structures	628	1,653	0	0
Denitrifying Bioreactor	76 locations/82 structures	4,097	6,622	0	0
Filter Strip	15 locations / 24.2 ac	774	841	331	319
Field Border	47 locations/73.6 ac	1,989	1,681	662	769
Grade Control	5 locations/10 structures	481	297	45	93
Livestock Waste System	4	1.03	9.5	1.9	0.1
Pasture Management/ Fencing	2,695 ft / 2 locations	11.3	99.41	10.37	2.20
Grassed Waterway	11,006 ft/12.51 ac	789	2,498	238	385
New In-Lake / Low-flow Dam	3 structures	2,091	4,262	279	554
Existing In-Lake / Low-flow Dam	13.6 ac	6,944	6,360	664	1,098
WASCB/Terrace	36 structures/ 5,540 ft	87	520	111	158
Constructed Wetland	14 locations/22.8 ac	2,149	4,412	283	667
Pond	17 structures	782	2,669	361	598
Nutrient Management (Plans)	8,948 ac	8,948	13,335	651	0
Streambank Stabilization / Riffle	14 locations/26 riffles/1,550 ft	N/A	631	171	159
Lake Shoreline Stabilization	23,792 ft	N/A	1,391	2,211	3,429
Septic Systems	22 (#)	N/A	686	268	0
Total		**38,692**	**57,937**	**10,804**	**13,700**


Legend
No-Till/Strip-Till
Cover Crop
Conventional/Reduced Till HEL
Phosphorus Greater than 1 lb/ac/yr
Watershed Boundary
Waverly Lake Watershed
Best Management Practices
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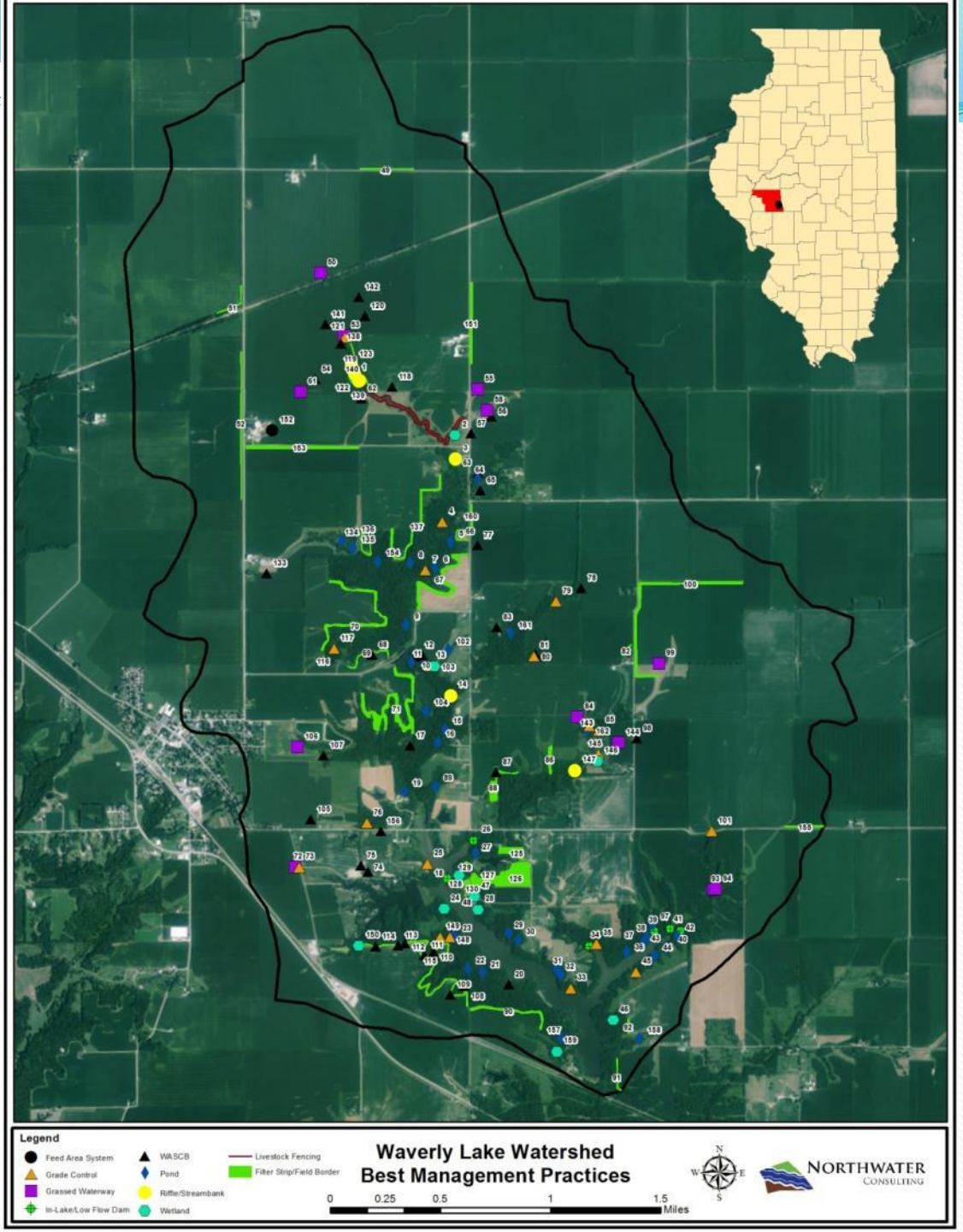
Legend
Feed Area System
Grade Control
Grassed Waterway
In-Lake/Low Flow Dam
WASCB
Pond
Riffle/Streambank
Wetland
Livestock Fencing
Filter Strip/Field Border
Waverly Lake Watershed
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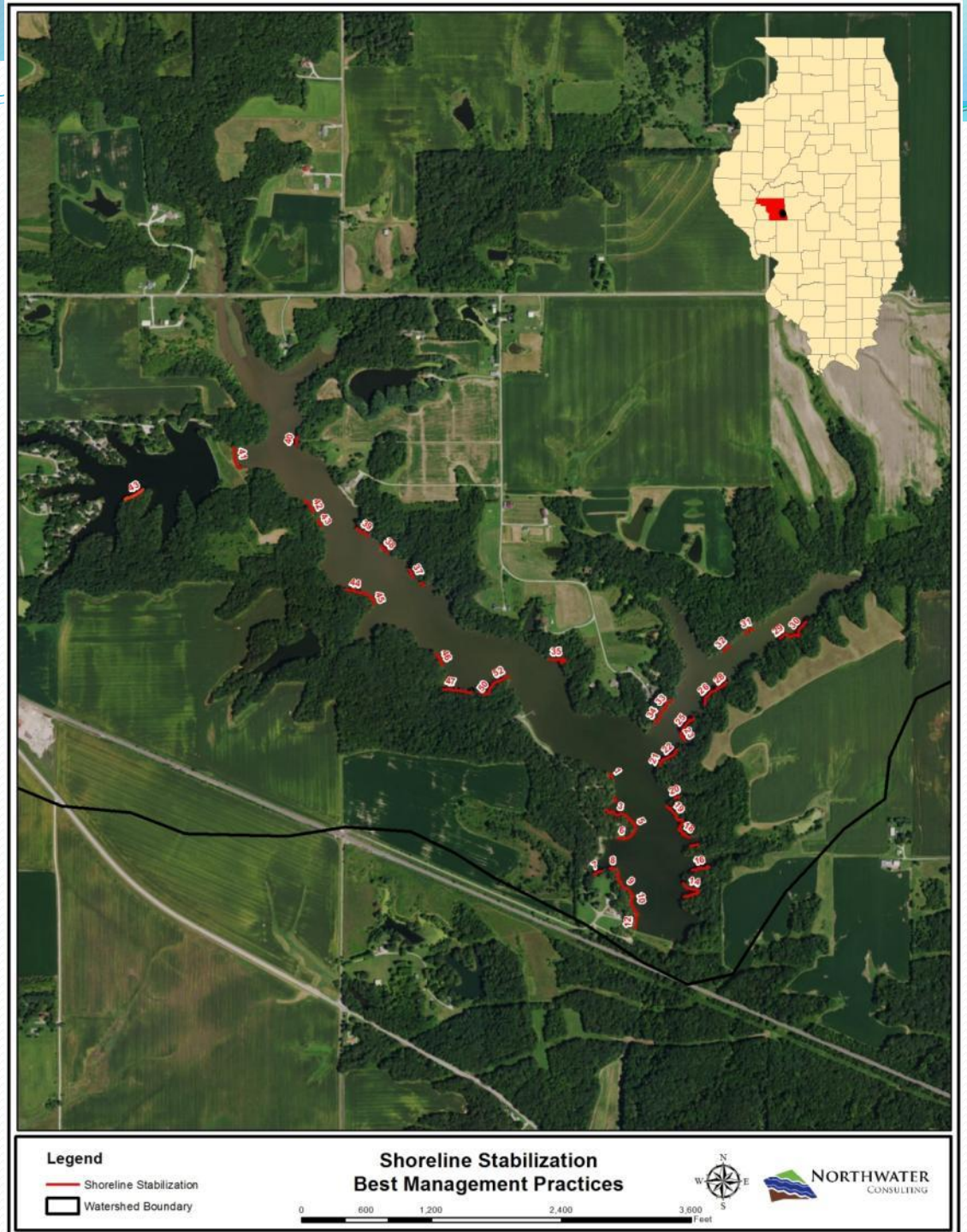
Legend
Shoreline Stabilization
Watershed Boundary
Shoreline Stabilization
Best Management Practices
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600
1,200
2,400
3,600
Feet
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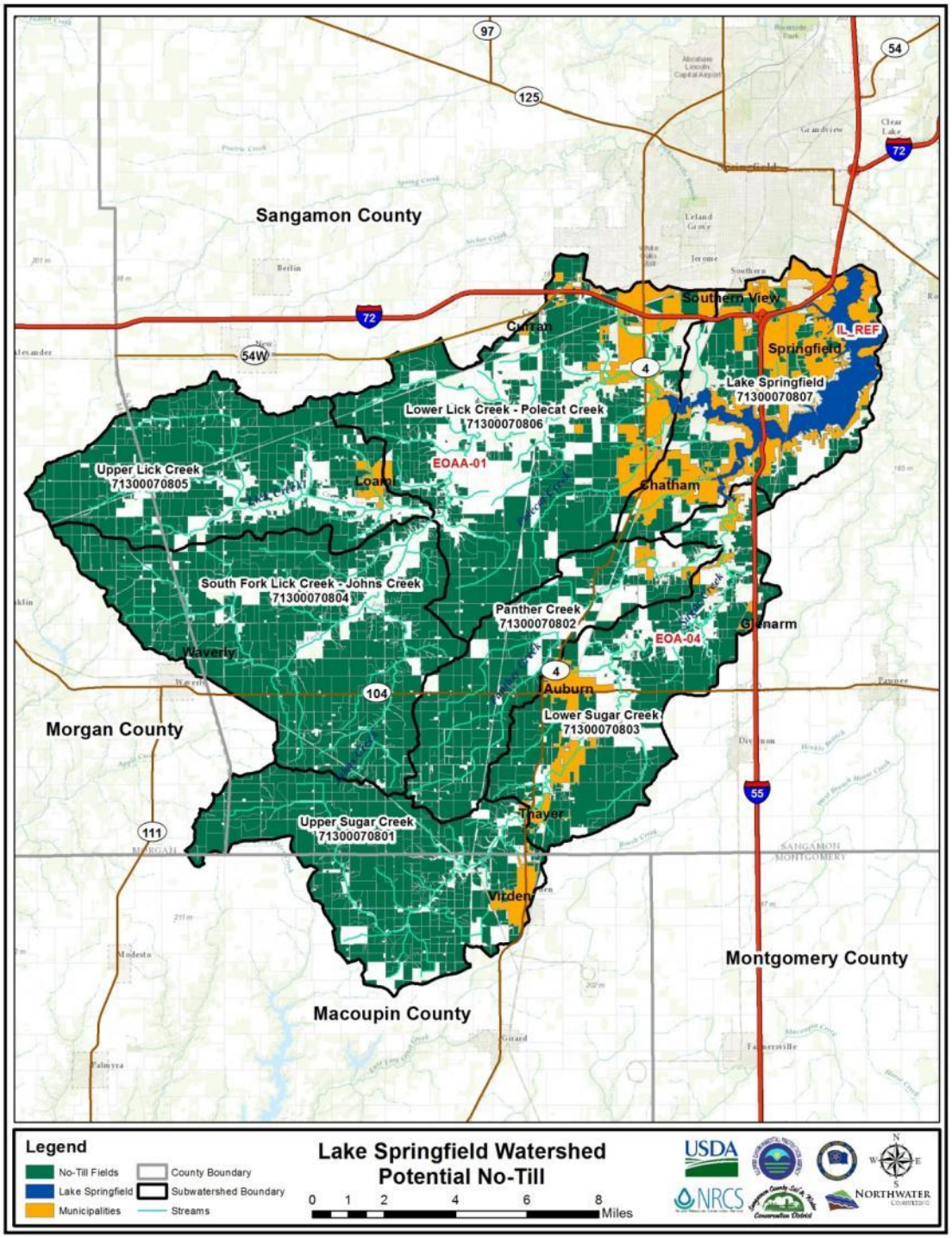
NORTHWATER
CONSULTING

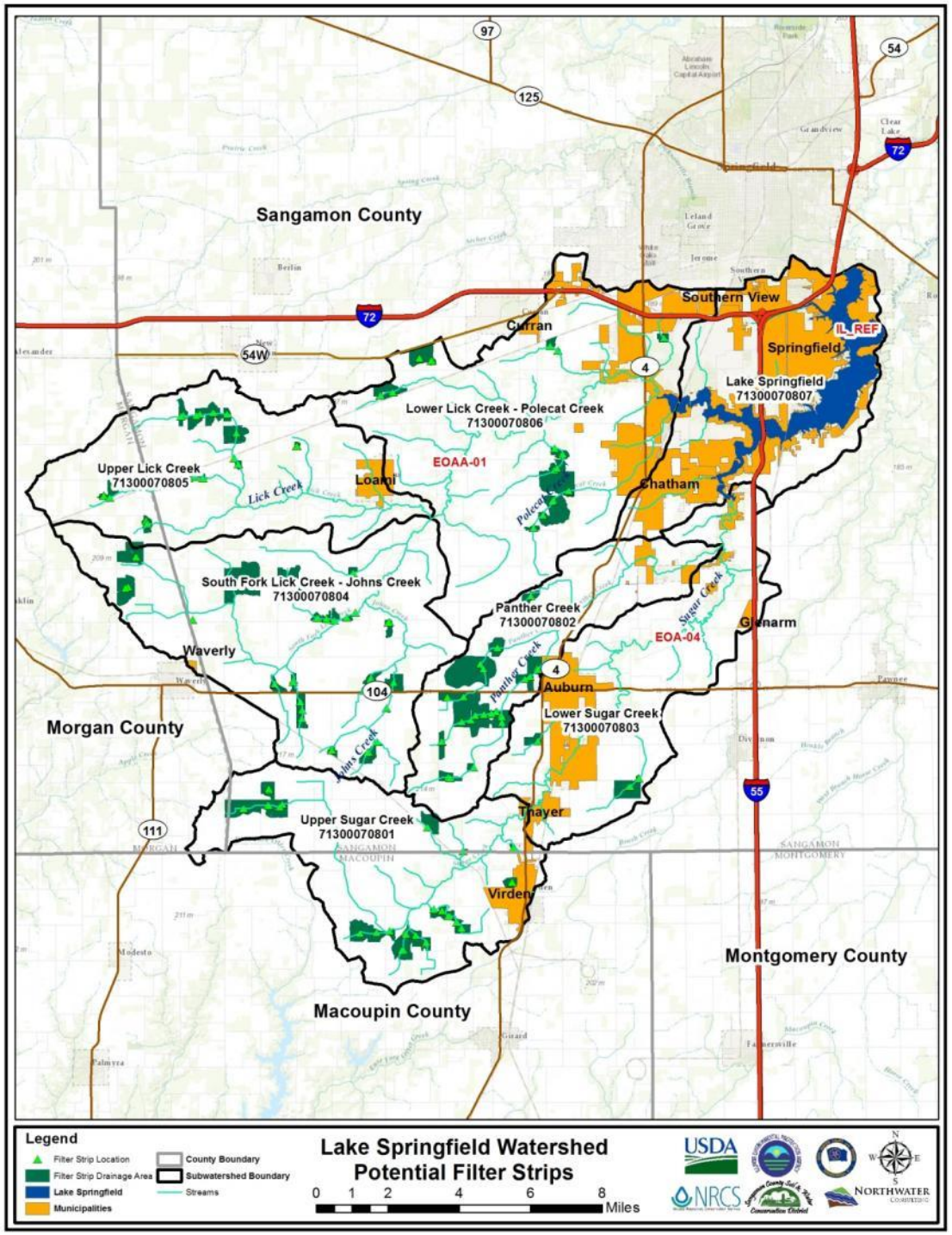
Lake Springfield - No-Till

- Possible on 109,083 ac
- Annual Nitrogen reduction = 599,141 lbs
- Annual Phosphorus reduction = 49,728 lbs
- Annual Sediment reduction = 58,138 tons



Lake Springfield - Filter Strips

- 324 ac possible (440,200 ft)
- Annual Nitrogen reduction = 54,298 lbs
- Annual Phosphorus reduction = 9,279 lbs
- Annual Sediment reduction = 9,651 tons



Questions?

Watershed-based Planning:

Management Measures and Implementation Schedule Elements C & F

Watershed-based Planning Conference
November 30, 2017

Element C :

Describe management measures that will achieve load reductions and targeted critical areas

Prerequisites for recommending best management practices (BMP)

- Identify sources of pollutants and impairments to waterbodies
- Define pollutant loads for watershed and subwatersheds
- Develop pollutant load reduction targets

BMP Checklist

- Identify potential BMP
- Goals of the Plan
- Watershed Council/ Public input
- Land Use
- Site-specific/ Watershed-wide measures
- Load Reductions
- Cost

Identify Potential BMP

- Create a list of BMP
- Find speakers to discuss successful implementation

	BEST MANAGEMENT PRACTICES IDEAS	
	STRUCTURAL	**NONSTRUCTURAL**
AGRICULTURE	Contour buffer strips	Brush management
	Grassed waterway	Conservation coverage
	Herbaceous wind barriers	Conservation tillage
	Mulching	Educational materials
	Live fascines	Erosion and sediment control plan
	Live staking	Nutrient management plan
	Livestock exclusion fence (prevents livestock from wading into streams)	Pesticide management
		Prescribed grazing
	Revetments	Residue management
	Riprap	Requirement for minimum riparian buffer
	Sediment basins	Rotational grazing
	Terraces	Workshops/training for developing nutrient management plans
	Waste treatment lagoons	
FORESTRY	Broad-based dips	Education campaign on forestry-related nonpoint source controls
	Culverts	
	Establishment of riparian buffer	Erosion and sediment control plans
	Mulch	Forest chemical management
	Revegetation of firelines with adapted herbaceous species	Fire management
		Operation of planting machines along the contour to avoid ditch formation
	Temporary cover crops	
	Windrows	Planning and proper road layout and design
		Preharvest planning
		Training loggers and landowners about forest management practices, forest ecology, and silviculture
URBAN	Bioretention cells	Planning for reduction of impervious surfaces (e.g., eliminating or reducing curb and gutter)
	Breakwaters	
	Brush layering	Management programs for onsite and clustered (decentralized) wastewater treatment systems
	Infiltration basins	
	Green roofs	Educational materials
	Live fascines	Erosion and sediment control plan
	Marsh creation/restoration	Fertilizer management
	Establishment of riparian buffers	Ordinances
	Riprap	Pet waste programs
	Stormwater ponds	Pollution prevention plans
	Sand filters	No-wake zones
	Sediment basins	Setbacks
	Tree revetments	Stormdrain stenciling
	Vegetated gabions	Workshops on proper installation of structural practices
	Water quality swales	Zoning overlay districts
	Clustered wastewater treatment systems	Preservation of open space
		Development of greenways in critical areas
	* BMP are not exclusive to one category	

Modified from EPA

BMP Considerations

Goals of the Plan

- Incorporate objectives in plan with BMP selection
- Goals and BMP selection can vary in size and scope

Public Input

- Local knowledge of watershed issues
- Attempt to reach out to larger group beyond planning council
- Public meetings

Public Input

- Watershed Planning Committee suggestions
- Public input and acceptance of proposed BMP
- May require meeting with individuals or groups

Hurricane Creek Watershed BMP Worksheet			
BMP	Target Area (Be as specific as possible)	Amount (If applicable)	Unit (If applicable)
e.g. Bioswales	*E Cherry St. between 148 and N 14th St.- Herrin,IL*	*450*	*square feet*
e.g. Dry Detention Area	*Intersection of N 43rd St. and Herrin-Colp Rd.*	*13,068*	*square feet*
e.g. Permeable Pavement	*Herrin High School Parking Lot*	*14,500*	*square feet*
e.g. Streambank Stabilization	*Hurricane Creek, North of Herrin-Colp Rd.*	*1,400*	*feet*

Land Use

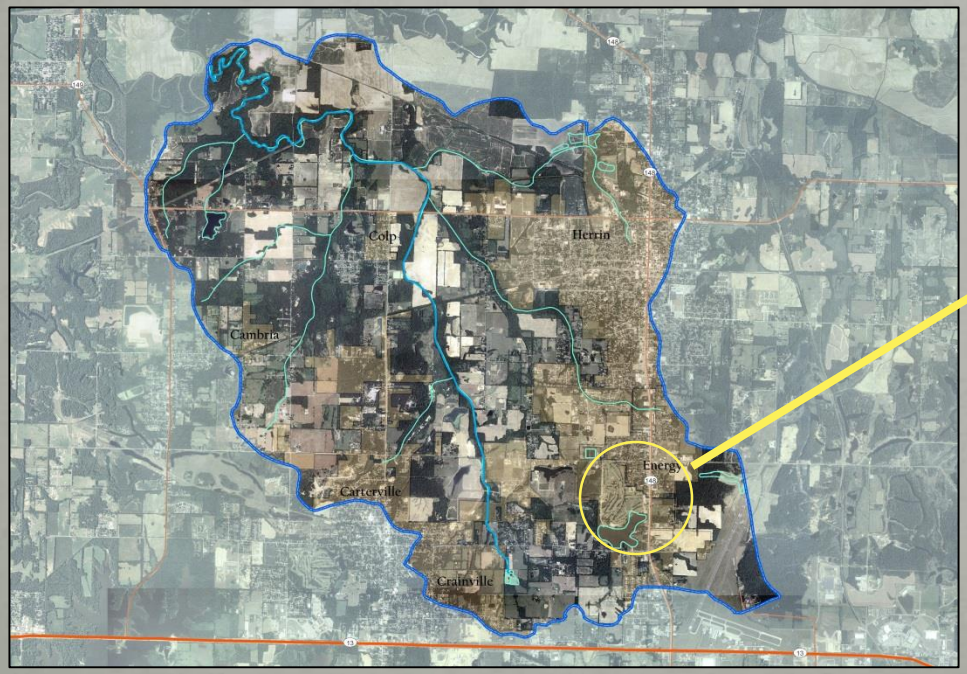
Agricultural/ Forested/ Urban

- Land use in Illinois
- Can dictate types of BMP
- Various limitations for each category

Source: Living History Farm

Location of Management Measures

- Watershed-wide practices
- Site-specific BMP

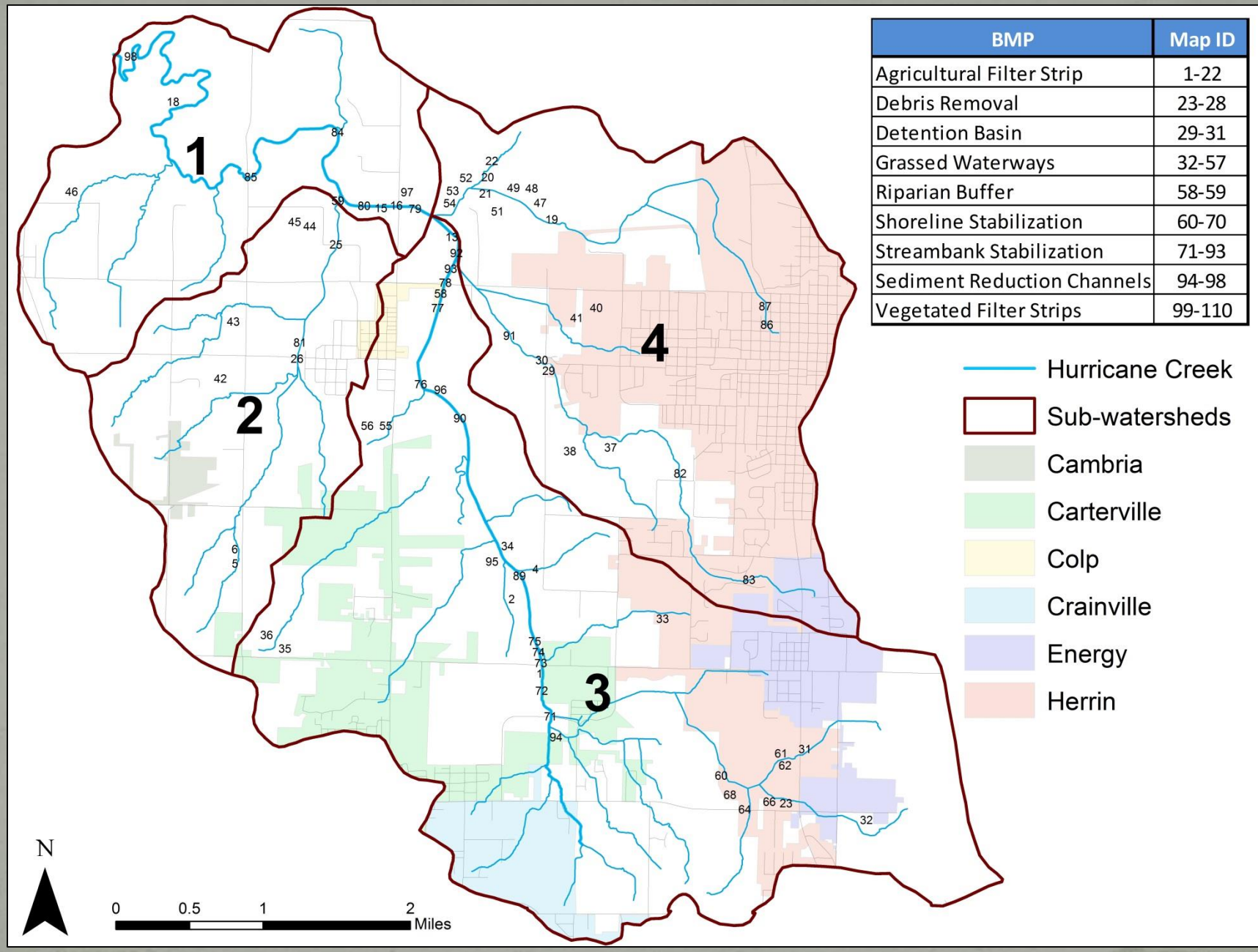


Load Reductions

- Calculate load reductions for BMP
  - Various models
- Load reductions should be for watershed-wide and site-specific BMP
- Consider reduction targets

BMP	Amount	Unit	Load Reductions- lbs/ yr (N,P, TSS, BOD, COD), ton/yr- (Sediment)					
			N	P	Sediment	TSS	BOD	COD
Conservation Tillage	306.5	acres	1467	786	671	-	-	-
Green Roof	2	acres	17	1	-	1723	86	471
Porous Pavement	20	acres	784	59	-	92934	-	34608
Streambank Stabilization	43,349	feet	4421.6	2210.8	2210.8	-	-	-
		TOTALS:	**6689.6**	**3056.8**	**2881.8**	**94657**	**86**	**35079**
			N	P	Sediment	TSS	BOD	COD

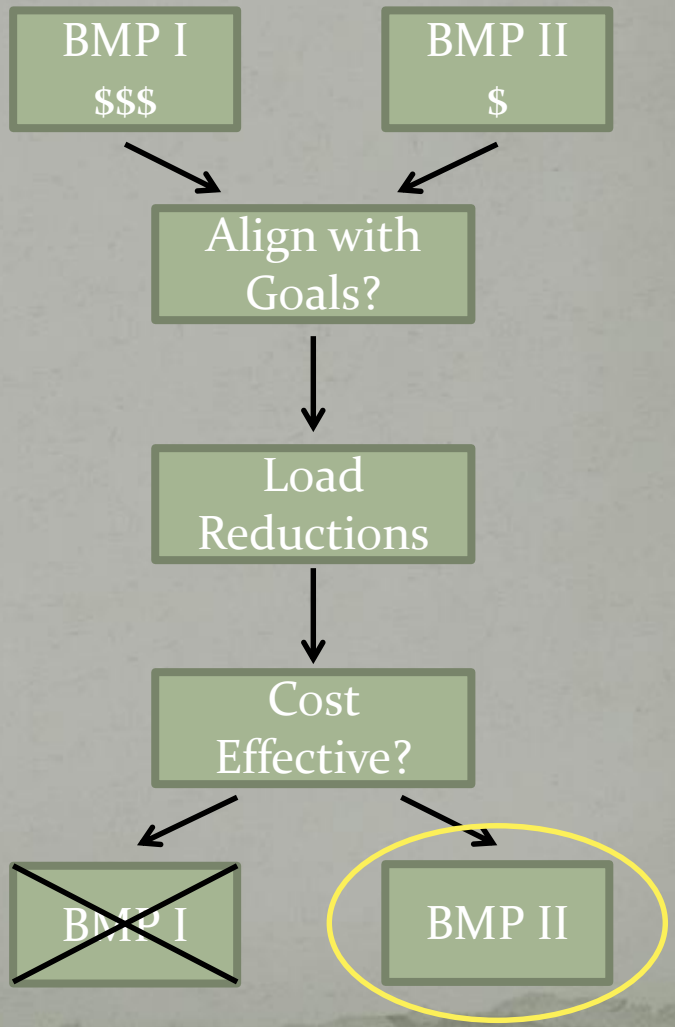
General Area (Contributing Area)	BMP	Map ID	Target Area (Reach Code)	Amount	Unit	Load Reductions- lbs/ yr (N,P, TSS, BOD, COD), ton/yr- (Sediment)							
						N	P	Sediment	TSS	BOD	COD	K	Priority
North Herrin Tributary	Agricultural Filter Strip	19	7140106001218	196	feet	59	32	29	-	-	-	-	I
		20	7140106001218	3543	feet	873	468	405	-	-	-	-	H
		21	7140106001218	1340	feet	383	205	182	-	-	-	-	H
		22	7140106006989	503	feet	59	32	29	-	-	-	-	L
	Grassed Waterways	47	7140106001218	587	feet	40.9	20.5	20.5	-	-	-	-	L
		48	7140106001218	897	feet	62.5	31.3	31.3	-	-	-	-	L
		49	7140106001218	713	feet	277.3	138.6	138.6	-	-	-	-	L
		50	7140106001218	547	feet	72.1	36	36	-	-	-	-	L
		51	7140106001218	1111	feet	136	68	68	-	-	-	-	L
		52	7140106001218	403	feet	17.6	8.8	8.8	-	-	-	-	L
		53	7140106001218	252	feet	16.1	8	8	-	-	-	-	M
		54	7140106001218	375	feet	37.3	18.7	18.7	-	-	-	-	M
	Streambank Stabilization	86	7140106001218	206	feet	7	3.5	3.5	-	-	-	-	L
		87	7140106001218	1052	feet	36	18	18	-	-	-	-	M
	Vegetative Filter Strip	106	7140106001218	1304	feet	79	10	-	7773	375	2061	-	M
		109	7140106001218	194	feet	3	0	-	825	13	176	-	L
		110	7140106001218	1087	feet	13	2	0	1196	59	297	-	L
South Herrin Tributary	Agricultural Filter Strip	8	7140106001217	441	feet	22	12	11	-	-	-	-	L
		9	7140106001217	492	feet	110	59	54	-	-	-	-	L
	Grassed Waterways	37	7140106001217	348	feet	76.9	38.5	38.5	-	-	-	-	M
		38	7140106001217	799	feet	108.7	54.3	54.3	-	-	-	-	M
		39	7140106007055	521	feet	62	31	31	-	-	-	-	L
		40	7140106007055	829	feet	98.7	49.3	49.3	-	-	-	-	L
		41	7140106007055	360	feet	32.1	16.1	16.1	-	-	-	-	L
	Detention Basin	29	7140106001217	10	acres	18	2	-	3564	61	290	-	M
		30	7140106001217	12	acres	14	2	-	2398	36	184	-	M
	Streambank Stabilization	82	7140106001217	520	feet	265.2	132.6	132.6	-	-	-	-	H
		83	7140106001217	955	feet	568.4	284.2	284.2	-	-	-	-	H
		91	7140106001217	473	feet	32	16	16	-	-	-	-	M
					TOTALS:	**3579.8**	**1797.4**	**1683.4**	**15756**	**544**	**3008**	**0**	
						N	P	Sediment	TSS	BOD	COD	K	



BMP	Map ID
Agricultural Filter Strip	1-22
Debris Removal	23-28
Detention Basin	29-31
Grassed Waterways	32-57
Riparian Buffer	58-59
Shoreline Stabilization	60-70
Streambank Stabilization	71-93
Sediment Reduction Channels	94-98
Vegetated Filter Strips	99-110

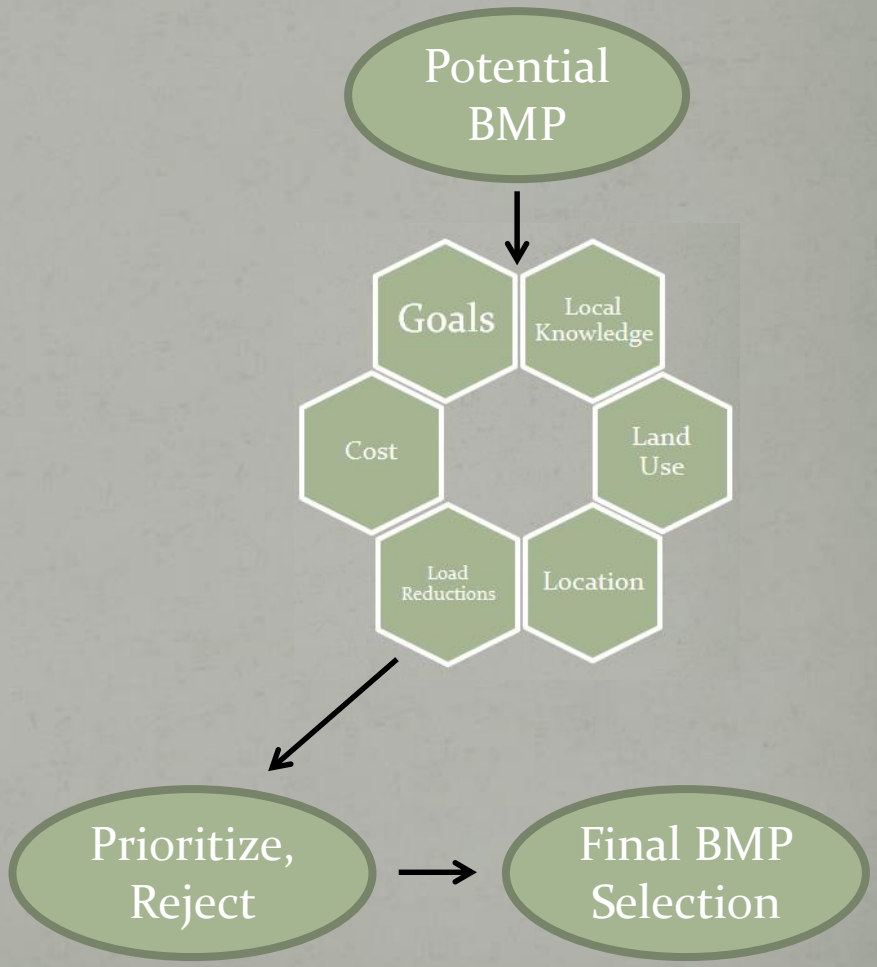
Cost

- Weigh various components of management measures with cost
  - Goals
  - Load reductions
  - Cost Effective



Final Selection of BMP

- List of Potential BMP
- Watershed Committee and public input
- Consider previous components
- Prioritize BMP
- Other considerations
  - Structural vs. non-structural
  - Labor
  - Legal requirements/ ordinances
  - Other benefits



Element F :

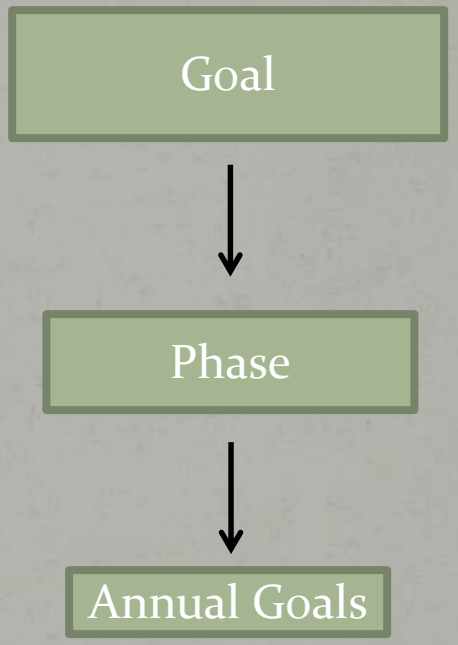
Develop an Implementation Schedule

Part of the overall implementation program that can:

- Provide a timeline for goals and objectives
- Guide development of the plan
- Prioritize BMP in plan

Timeline for Goals and Objectives

- Helps guide implementation of plan
- Can include general goals or specific BMP
  - This includes other components of plan
- Schedule can be divided into phases and other increments



Target	Phase I		Phase II				Phase III			
	Short-term (2 yr)		Mid-term (3-6 yr)				Long-term (7-10 yr)			
	1	2	3	4	5	6	7	8	9	10
Establish watershed action committee	X									
Hold public meetings to gain input	X	X	X	X	X	X				
Post watersheds sign for public awareness and BMP implementation	X	X	X	X	X	X	X	X	X	X
Create a website for watershed activities and key dates		X								
Enlist volunteers for litter cleanup days	X	X	X	X	X	X	X	X	X	X
Distribute flyers for stormwater management and similar topics	X		X		X		X		X	
Hold workshops to inform public on stormwater management		X		X		X		X		
Continue researching funding and technical assistance	X	X	X							
Select site-specific BMPs for preliminary designs	X	X	X							
Submit grant applications based on BMPs in plan		X	X	X	X	X	X	X		
Meet with landowners to review BMPs in plan		X	X	X	X	X	X	X		
Implement and execute BMPs			X	X	X	X	X	X	X	X
Monitor BMP implementation				X	X	X	X	X	X	X
Announce success of plan implementation					X	X	X	X	X	X

Phases and Quarters

Target	Phase I		Phase II				Phase III			
	Short-term (2 yr)		Mid-term (3-6 yr)				Long-term (7-10 yr)			
	1	2	3	4	5	6	7	8	9	10

Phase I Goals

- Short-term (0-2 years)
- Immediate actions
- Public participation
- BMP selection

Phase II Goals

- Mid-term (3-6 years)
- Bulk of components
- BMP applications and implementation
- Continued public participation
- Monitoring

Phase III Goals

- Long-term (7-10 years)
- Monitor implementation
- Continued BMP implementation
- Continued public participation
- Review plan

Key Components of Elements C & F

Management measures:

- Incorporate goals in plan
- Involve various groups and public
- Meet load reduction targets
- Be cost effective

Implementation Schedule:

- Part of overall implementation and monitoring strategy
- Use a timeline for goals and objectives
- Helps guide development of plan

Questions/Comments

Tyler Carpenter
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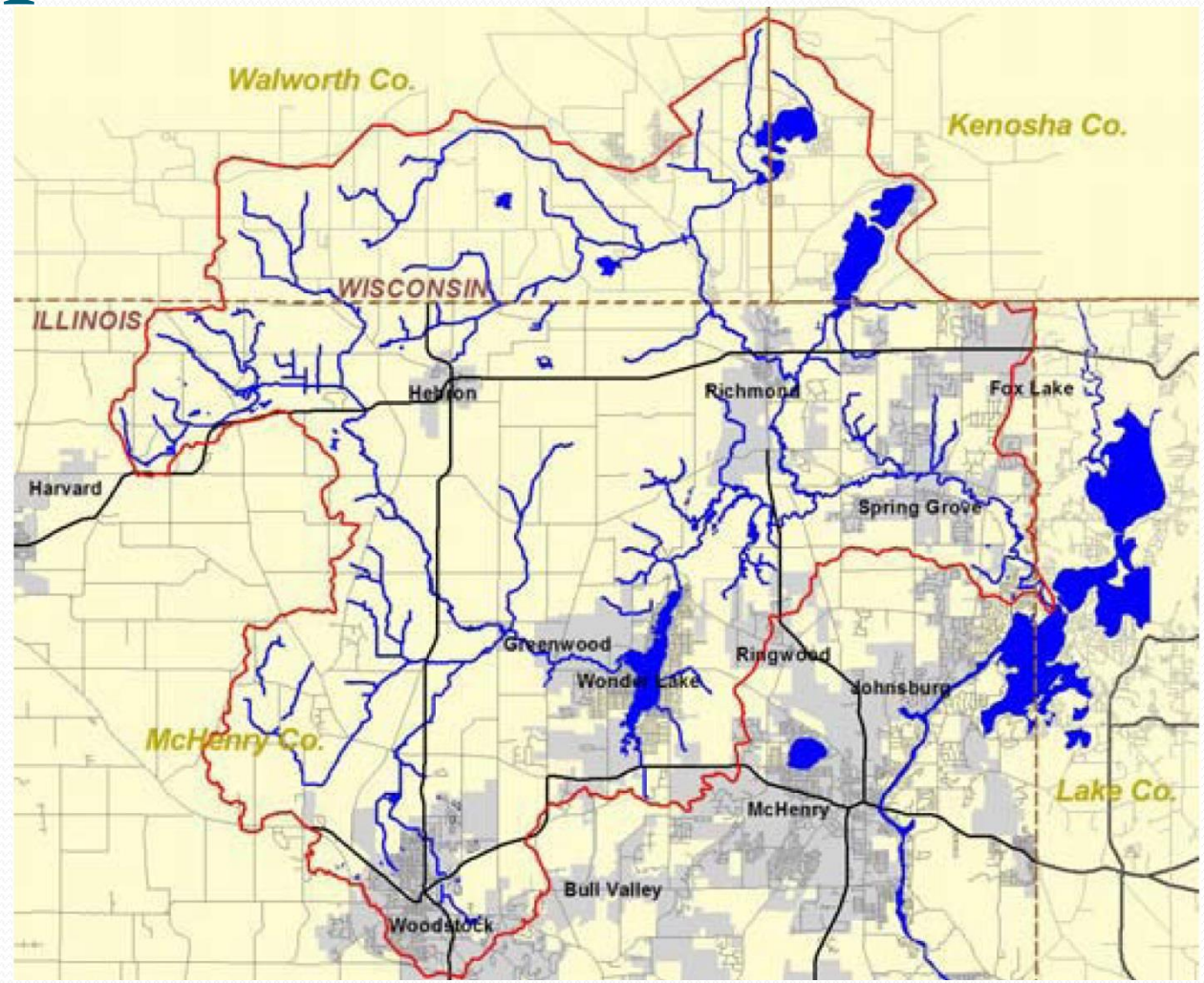
618-997-9351
tylercarpenter@greateregypt.org

Technical & Financial Assistance; Relevant Authorities; and Information & Education Outreach Requirements for a WBP

Randy Stowe
Nippersink Watershed Association
www.nippersink.org
nippersinkcreek@gmail.com

Nippersink Creek Watershed



- Description of technical and financial assistance (i.e., amount, estimate costs, sources) for the WBP.

Once a WBP has been prepared, and has been approved by USEPA / IEPA, watershed stakeholders can apply for Section 319 funding cost-share grants through IEPA to help implement water quality BMP projects identified in the plan.

If a Section 319 grant is awarded, the 319 grant will provide up to 60% of the project cost; with the applicant required to provide the remaining 40% portion as local cost-share match. Local cost-share match can come from a variety of sources, as long as they are "non-federal" dollars. This match can be provided as cash from the cooperating stakeholder(s); other "non-federal" grants; approved donated services; and even the value of a conservation easement placed on land critical to water quality protection.

While the exact source and composition of this local cost-share funding, or final project cost, may not be known until a particular BMP project is ready to be implemented, potential sources of technical and financial assistance must be identified in the WBP in order to be approved as a compliant "9-element" plan.

- Description of technical and financial assistance (i.e., amount, estimate costs, sources) for the WBP.

Some of the most important considerations in preparing to implement WBP Best Management Practices include identifying the potential logistics / costs of initially designing the project and securing any required regulatory approvals. This is in addition to the actual cost of the BMP implementation itself.

To receive Section 319 funding, IEPA generally requires that any "construction-type" BMP will need plans prepared by a Professional Engineer, USDA-NRCS staff, or a NRCS certified Technical Service Provider. Depending on your area, the costs and availability of these services may vary greatly, and should be budgeted accordingly.

Similarly, any "construction-type" BMP will also typically require regulatory permits or written clearance from a variety of agencies, including, but not limited to: U.S. Army Corps of Engineers; U.S. Fish and Wildlife Service; Illinois Department of Natural Resources – Office of Water Resources; IEPA Water Quality Section; Illinois DNR Endangered Species; Illinois Historic Preservation Agency; local County & Municipal entities, etc.

- Description of technical and financial assistance (i.e., amount, estimate costs, sources) for the WBP.

For more common BMP's, potential design / permitting / construction cost estimates may be available from local resource agencies, consultant's, or land improvement contractors.

As a significant amount of time may pass before a specific WBP recommended BMP is actually implemented, it is critical that consideration be given to factoring in some type of "cost-of-living" increase adjustment when budgeting BMP projects during the WBP planning process. Often, a 3% to 5% per year adjustment factor is warranted.

The estimated cost of installing required Soil Erosion and Sediment Control (SESC) practices; regulatory permit and SESC inspection fees; or other costs required to implement a BMP project should also be included in the budget.

Finally, Section 319 grants typically require that a 10-year operation and maintenance (O&M) plan be implemented upon completion of the BMP to ensure its success. While this O&M cost is typically not eligible for Section 319 funding, the cost of implementing the O&M plan should be considered.

- Who are the parties (i.e., authorities) needed to implement the WBP?

Unless situated entirely on a privately owned parcel, it often takes more than one "party" to move a WBP recommended BMP to actual implementation.

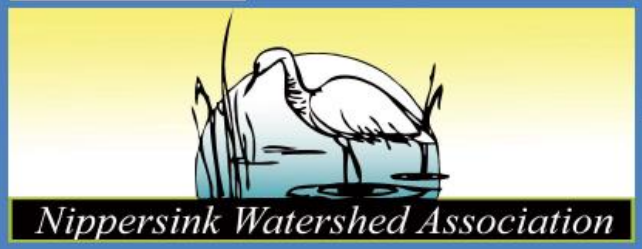
In addition to the landowner, these parties could include:

- County and/or local municipalities that might have some type of regulatory permit oversight, potential in-kind labor and equipment contributions, or even better, MONEY!;
- County, Municipal or Township Highway Departments;
- Wastewater Treatment operators, Water Supply operators;
- Drainage Districts;
- Park District, County Park, Forest Preserve District, Conservation District;
- Homeowner Associations;
- Soil & Water Conservation District / NRCS;
- Local not-for-profit environmental advocacy groups, Land Trusts.

- Who are the parties (i.e., authorities) needed to implement the WBP?

As part of the WBP development process, you want to identify the "logical" parties that would likely be involved in implementing a particular BMP. It is sometimes necessary to point out to the included parties that being listed as a "party" in no way obligates them to anything.

Watershed Partners



Wonder Lake
Illinois, 60097

M.P.O.A.

Masters Property
Owner Association

Illinois Environmental
Protection Agency

- Description of technical and financial assistance (i.e., amount, estimate costs, sources) for the WBP.
- Who are the parties (i.e., authorities) needed to implement the WBP?

D. Technical and financial assistance and relevant authorities

	Component	Local Review	Location in Plan		Comment	For IEPA Use Only	For USEPA Use Only
			Section(s)	Page(s)		IEPA Review	USEPA Review
39	Potential local, state, and federal technical assistance and authorities needed to implement the plan	◯Yes ◯No				◯Yes ◯No	◯Yes ◯No

Does the plan describe the technical and financial assistance (amount, costs, and sources) and relevant authorities needed to implement the plan?

◯Yes ◯Partial ◯No

- I&E tools to provide public understanding, direction and encourage for the implementation of the WBP.

Information and Education is a major component of developing and implementing a 9-element WBP.

It should be recognized that those folks actively participating in the WBP development likely already have some level of understanding about watershed issues and potential solutions.

However, the critical path in having a WBP gain traction in the larger watershed community is having a strategic program in place to inform and educate watershed stakeholders, whether units of governments, local businesses, property owners, or individual residents.

To develop this program, you must set realistic goals and objectives for how to structure and focus your I&E efforts, and correctly identify your ideal target audiences. Keep in mind that these goals and objectives may vary depending on the watershed stakeholder group being targeted.

E. Information and education component

	Component	Local Review	Location in Plan		Comment	For IEPA Use Only	For USEPA Use Only
			Section(s)	Page(s)		IEPA Review	USEPA Review
40	I/E goals and objectives	◯Yes ◯No				◯Yes ◯No	◯Yes ◯No
41	I/E target audiences	◯Yes ◯No				◯Yes ◯No	◯Yes ◯No
42	I/E programs, tools, materials, actions, campaigns	◯Yes ◯No				◯Yes ◯No	◯Yes ◯No
43	I/E delivery mechanisms	◯Yes ◯No				◯Yes ◯No	◯Yes ◯No
44	I/E priority/schedule	◯Yes ◯No				◯Yes ◯No	◯Yes ◯No
45	I/E lead and supporting organizations	◯Yes ◯No				◯Yes ◯No	◯Yes ◯No
46	I/E expected outcome / behavior change	◯Yes ◯No				◯Yes ◯No	◯Yes ◯No
47	I/E estimated cost	◯Yes ◯No				◯Yes ◯No	◯Yes ◯No
48	I/E indicators of success	◯Yes ◯No				◯Yes ◯No	◯Yes ◯No

Does the plan describe an information and education component to enhance public understanding and to encourage implementation of the plan?

◯Yes ◯Partial ◯No

Maintaining What We Value

The Nippersink Creek Watershed Management Plan

A Report on the Community Survey

Photo Credit: Ray Mathis

Prepared By the Department of Sociology and Anthropology, Illinois State University

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4. Please indicate your level of agreement or disagreement with the statements below.

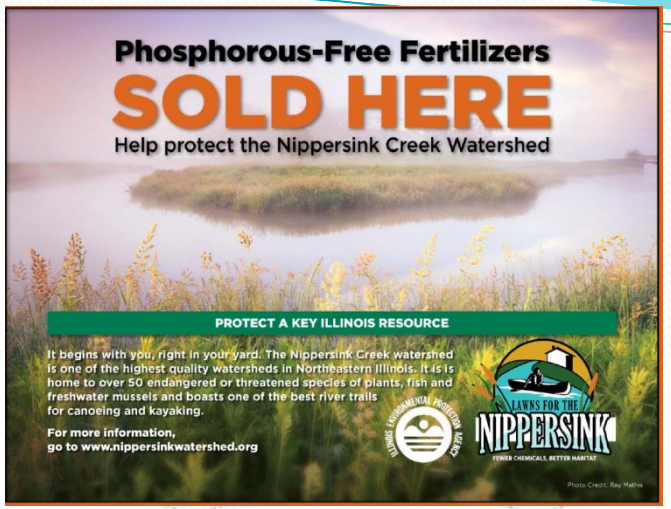
	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
a) The economic stability of my community depends upon good water quality.	○	○	○	○	○
b) The way that I care for my lawn and yard can influence water quality in local streams and lakes.	○	○	○	○	○
c) It is my personal responsibility to help protect water quality	○	○	○	○	○
d) It is important to protect water quality even if it slows economic development.	○	○	○	○	○
e) What I do on my land doesn't make much difference in overall water quality.	○	○	○	○	○
f) Lawn and yard-care practices (on individual lots) do not have an impact on local water quality.	○	○	○	○	○
g) My actions can have an impact on water quality.	○	○	○	○	○
h) Taking action to improve water quality is too expensive for me.	○	○	○	○	○
i) It is okay to reduce water quality to promote economic development.	○	○	○	○	○
j) It is important to protect water quality even if it costs me more.	○	○	○	○	○
k) I would be willing to pay more to improve water quality (for example: through local taxes or fees).	○	○	○	○	○
l) I would be willing to change the way I care for my lawn and yard to improve water quality.	○	○	○	○	○
m) The quality of life in my community depends on good water quality in local streams, rivers and lakes.	○	○	○	○	○

Table 7: Crosstab Comparison between Survey Year on Respondents' Values and Attitudes about Water Quality Issues

Value	Survey Year 2010			Survey Year 2013		
	Disagree	Neutral	Agree	Disagree	Neutral	Agree
The economic stability of my community depends upon good water quality	8.2%	20.4%	71.4%	3.7%	18.1%	78.2%
The way that I care for my lawn and yard can influence water quality in local streams and lakes	4.3%	9.0%	86.7%	4.1%	12.7%	83.2%
It is my personal responsibility to help protect water quality	2.3%	8.3%	89.4%	3.0%	8.9%	88.2%
It is important to protect water quality even if it slows economic development	6.0%	12.4%	81.6%	4.5%	18.6%	77.0%
What I do on my land doesn't make much difference in overall water quality	76.8%	11.2%	12.0%	74.9%	13.1%	12.0%
Lawn and yard care practices (on individual lots) do not have an impact on local water quality	76.5%	9.2%	14.3%	73.5%	10.2%	16.1%
My actions can have an impact on water quality	3.7%	8.0%	88.4%	4.1%	11.8%	84.1%
Taking action to improve water quality is too expensive for me	41.6%	44.2%	14.2%	42.4%	47.2%	10.4%
It is OK to reduce water quality to promote economic development	86.7%	7.7%	5.7%	83.8%	11.8%	4.5%
It is important to protect water quality even if it costs me more	11.8%	28.3%	59.8%	13.4%	27.9%	58.7%
I would be willing to pay more to improve water quality	32.8%	26.3%	40.8%	36.9%	28.6%	34.5%
I would be willing to change the way I care for my lawn and yard to improve water quality	6.0%	19.9%	74.1%	6.7%	22.7%	70.6%
The quality of life in my community depend on good water quality in local streams, rivers and lakes	5.5%	15.9%	78.6%	3.0%	16.8%	80.2%

LAWNS FOR THE NIPPERSINK

FEWER CHEMICALS, BETTER WATER QUALITY



Runoff from lawn fertilizers with phosphorus can stimulate over-growth of algae and aquatic plants in the Nippersink Watershed. This causes a lack of oxygen for native aquatic life throughout our watershed. Homeowners can do many simple steps to help protect our local water quality.

1) Use phosphorus-free fertilizers
2) Use lawn clippings as a source of Nitrogen for the soil
3) Mow your grass 3 to 4 inches tall
4) Test your soil to see if your soil needs additional nutrients

Bags of lawn fertilizer contain three numbers to represent the amount of Nitrogen-Phosphorus-Potassium (N-P-K). A "zero" in the middle means it is phosphorus-free. Most lawns have enough phosphorus and may only need some extra nitrogen. The best time to fertilize your lawn is in the spring and fall. Don't waste money by applying expensive unneeded chemicals. Use phosphorus-free fertilizers and help protect our valuable watershed.

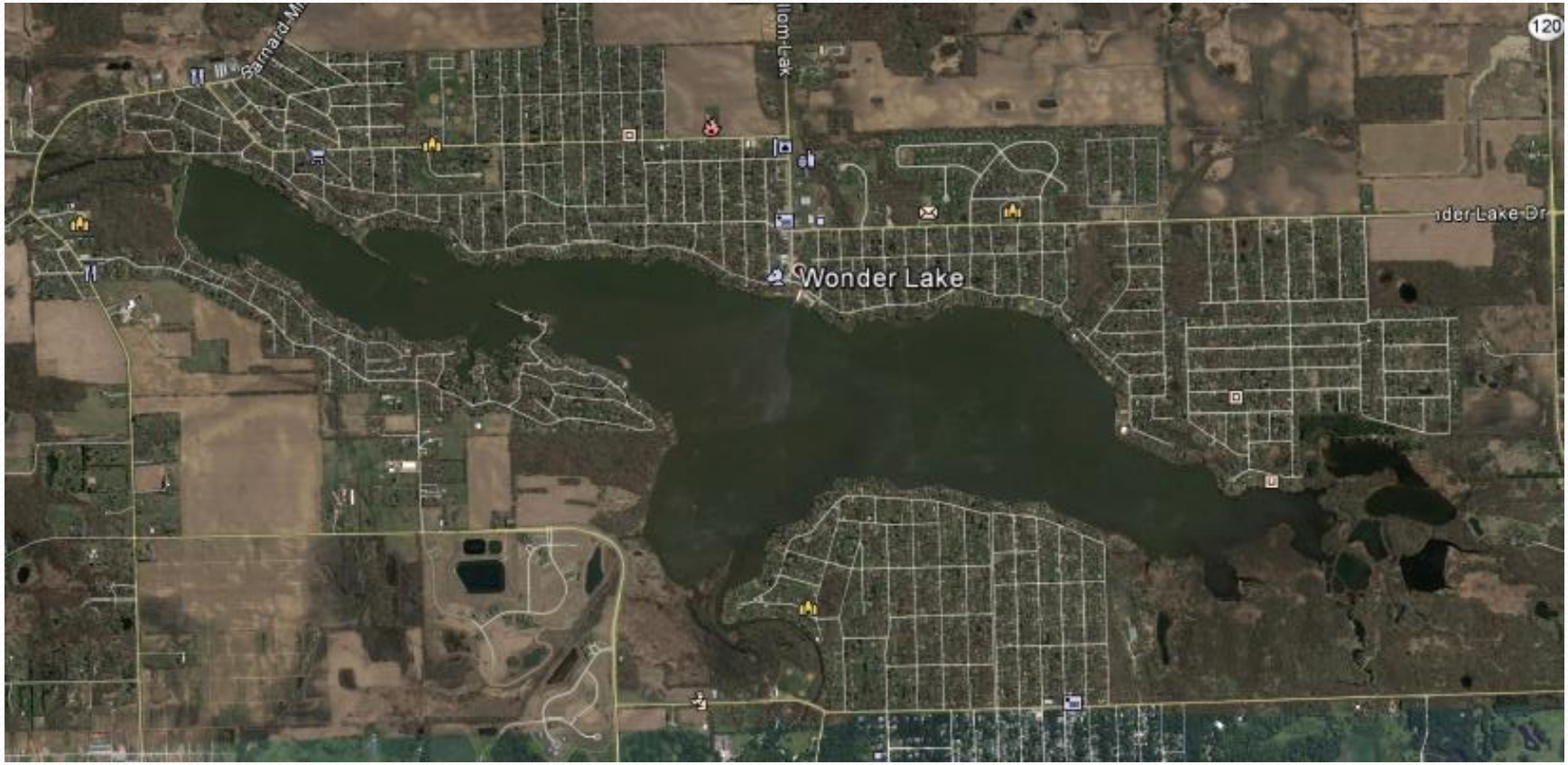
From a 2012 survey of homeowners in the Nippersink Watershed, the majority of your neighbors stated they were willing to change the way they care for their lawn and yard to improve water quality. Help do your part by protecting the water quality in the Nippersink Watershed.

Check out www.nippersink.org for a complete list of local garden retailers who sell phosphorus-free fertilizers.

Back

Front

Wonder Lake



A Septic Social Event

Mon., March 11, 2013, 7-8pm, MPOA Offices

OR

Tues., March 12, 2013, 7-8pm, Wonder Lake Village Hall

Refreshments will be provided, along with an opportunity to win a $100 certificate towards a septic cleaning from local professionals at Pitel Septic.

Did you know that most of the homes in Wonder Lake use a septic system to manage their wastewater? Are you one of them? Are you concerned about how Wonder Lake looks and if it is safe for residents' recreation? Do you want to avoid costly repairs to your septic system?

If so, please join your neighbors on March 11 or March 12, 2013 for the first of several "septic social" events in the watershed – a free one-hour gathering organized by the Nippersink Watershed Association and the Wonder Lake Master Property Owners Association to share information about healthy septic systems and how to minimize the costs of their maintenance by ensuring they work properly. Local experts from the Nippersink Watershed Association, Illinois State University, and Pitel Septics will lead an informal discussion among neighbors to share important tips and information. Understanding how your septic works can help you to do something good for your home, your family, your community and the environment.

All information exchanged will be used to assist homeowners in understanding and properly maintaining their systems. These actions will in turn contribute to protecting the water quality of Wonder Lake and Nippersink Creek. **This event is being organized for one simple reason: We want to help you to learn easy and inexpensive practices you can use to keep your system running effectively and to know the signs that you might have a problem, before it becomes a very expensive problem.**

Sponsored by:

The Nippersink Watershed Association

Illinois Environmental Protection Agency

Illinois State University
Illinois' first public university

M.P.O.A.
Wonder Lake Masters Property Owner Association

Funding for this project provided, in part, by the Governor of Illinois and the Illinois Environmental Protection Agency through Section 319 of the Clean Water Act.

For more information, or to RSVP, please contact the MPOA Office, 815-653-1000 or email nippersinkcreek@gmail.com

Wonder Lake water subject of 3-day study

EcoMapper maps lake bottom, measures water quality

By CAROLYN HANDROCK
The Independent

In 2009 at an Illinois Lake Management Association conference, Wonder Lake Manager Randy Stowe saw an interesting new technology – the United States Geological Survey's new EcoMapper, a torpedo-shaped instrument that measures water quality in large bodies of water.

Stowe approached USGS officials and asked if they would be interested in mapping Wonder Lake. They agreed to use the EcoMapper to analyze the lake.

"Knowing that we were moving toward the dredging process, it seemed like a great idea," said Stowe.

"They were familiar with our area, and they thought it would be cool to come out here and do pre- and post-dredging surveys," added Master Property Owner's Association President Dick Hilton.

The EcoMapper is an AUV – autonomous underwater vehicle – designed to map water quality, currents and the depth of a lake's bottom. It can be fitted with a number of water quality sensors and is programmed with GPS coordinates. The USGS has one of only a handful of the units. Other EcoMappers are owned by the Navy and Purdue University.

The EcoMapper is based on similar units used in oceanography. These machines cost upward of $500,000. The company YSI, Yellow Springs, Ohio, decided to make a more affordable AUV to use in lakes. The EcoMapper came out in 2008 with a base price of $60,000, and the USGS was the first to purchase one. Its model cost about $120,000, because or it can dive up to 200 feet, useful in bigger lakes such as Lake Michigan. Water quality sensors take a reading once a second.

The USGS spent three days, Aug. 11 to 13, mapping all of Wonder Lake. The plan is to return for a second scan after the dredging is completed.

"We would like to see if the dredging had any overall effect in the water quality," said Ryan Jackson, a hydrologist with the USGS.

> **"We are doing more intensive monitoring than most of the rest of the state."**
>
> — Randy Stowe, Wonder Lake Manager

Although it will be a while before all the data has been analyzed, Jackson said Wonder Lake was very still.

"I was pretty amazed at the level and concentration of algae," he said.

Jackson also was surprised how warm the water was. The USGS had previously studied Clinton Lake in Central Illinois, which receives water runoff from the Clinton Nuclear Generating Station. At Clinton Lake, the USGS studied thermal pollution. The USGS staff was surprised to find water temperatures in Wonder Lake were higher than in Clinton Lake. According to Jackson, Wonder Lake's warm water is at least partly due to its shallowness.

The USGS also examined lake currents, particularly at the entrance points of Nippersink Creek and two other small streams. The USGS is interested in how sediment enters the lake and whether there is a way to keep as much as possible out of the lake.

Under the current dredging plan, 1 million to the data collected by the EcoMapper, the USGS will use water data collected throughout the year by Stowe and several trained volunteers as well as the McHenry County Health Department's data from testing the beaches for E. coli.

"It wasn't just us out there," said Jackson. "It took fantastic organization to bring all these people together."

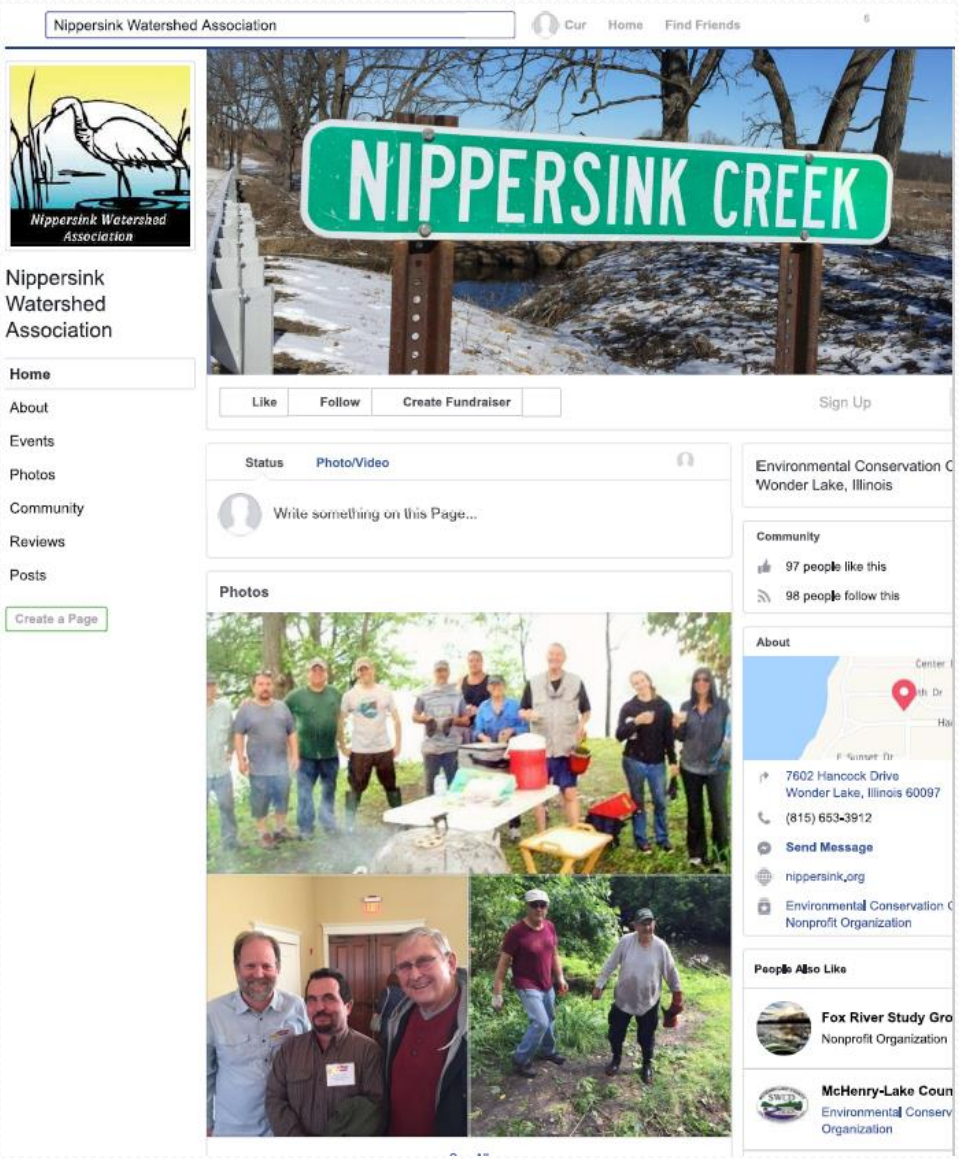
"There is a lot of different testing going on during the year," said Stowe. "We are doing more intensive monitoring than most of the rest of the state."

The M.P.O.A. is currently obtaining various permits required before actual dredging can begin. The USGS data, as well as information on sediment, will be used in the process.

"This will be of great significance to our consultants," said Hilton.

Depending on how long the actual dredging takes, the USGS will return in August 2011 to ensure data are comparable.

"The main thing we are trying to do is get a baseline," said Stowe. "We expect to be able to show scientifically the improvement in the water quality after the dredging."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Nippersink Watershed Association

Home | Helpful Information | News & Meetings | Resources & Links | Watershed Plan

Maintaining the Health of the Nippersink Creek Watershed:
An Evaluation of Phase II Outreach Activities and Community Survey

New Project:

LAWNS FOR THE NIPPERSINK
FEWER CHEMICALS, BETTER WATER QUALITY

The Nippersink Watershed Association and Illinois State University (with funding from the Illinois EPA), have partnered to develop the "Lawns for the Nippersink" campaign geared at educating local watershed residents and retailers about the value of using phosphorus-free fertilizers for lawn care.
CLICK HERE for details

Hackmatack National Wildlife Refuge a reality!

CLICK HERE to watch the video
"National Wildlife Refuge Born in Illinois"

from PBS Chicago Tonight

Observations……

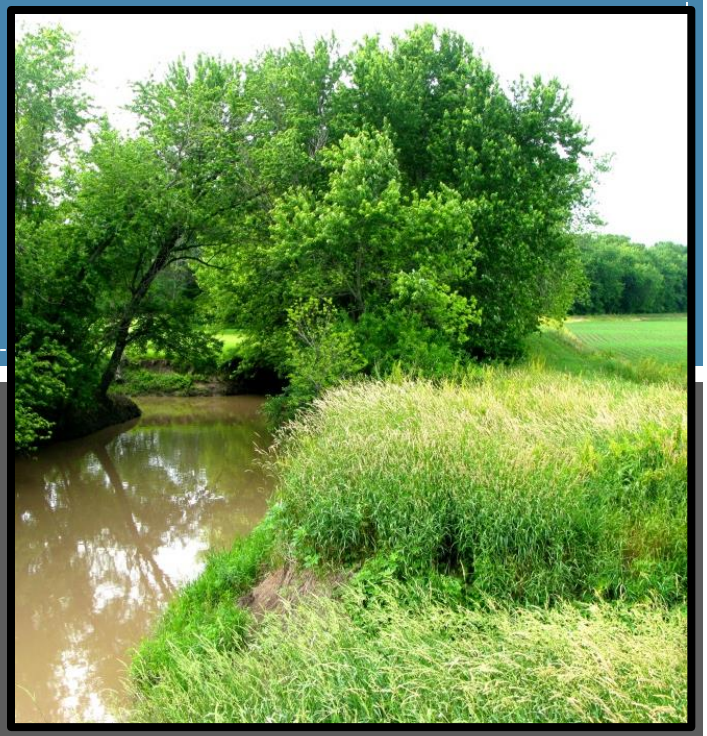
1) It is sometimes thought that with the completion of a USEPA/IEPA approved 9-Element WBP, the hard work has been completed. This perspective may explain why some watershed plans languish, and never really move to implementation. **In reality, the hard work has just begun……**
2) Make sure you (or your consultant) truly understands the watershed, the watershed stressor's, and what BMP's watershed stakeholders may realistically be willing to consider / cost-share. There is sometimes a tendency for WBP's to recommend very expensive "urban" type BMP's to achieve Pollution Loading Reduction (PLR) goals, even if the watershed isn't necessarily urban. Identifying millions of dollars in urban BMP's in a "non-urban" community (whose main source of municipal revenue maybe a highway speed-trap) will likely cause "sticker-shock", and probably won't result in much BMP implementation.
3) In the current economic climate, it may be easier to work with private landowners on BMP implementation, rather than cash-strapped units of government.
4) Education and outreach can often be a successful means of achieving "incremental" water quality benefits, even if the resulting PLR benefits may be harder to quantify.

HEARTLANDS CONSERVANCY

Investing In The Nature Of Southwestern Illinois

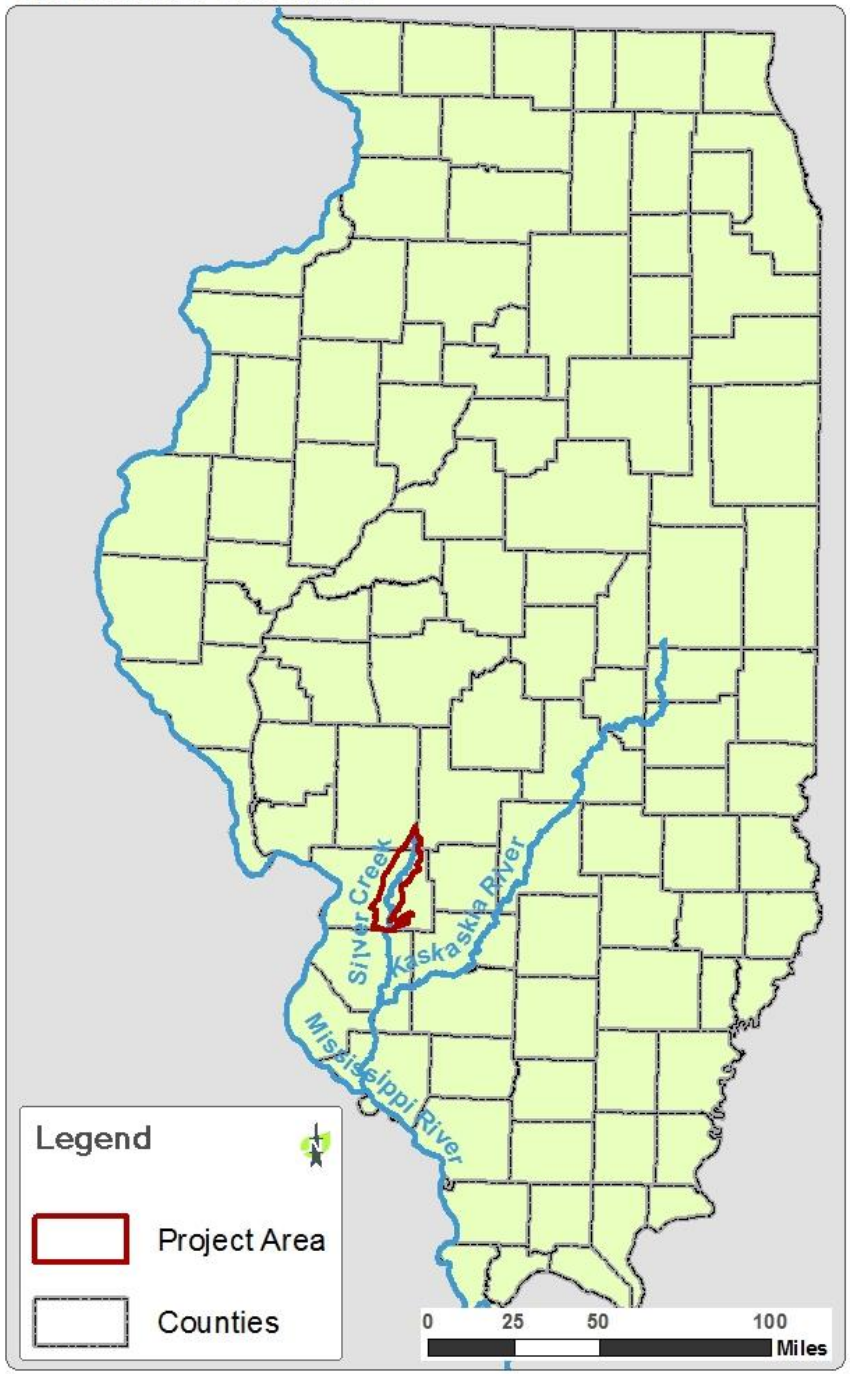
Janet Buchanan

Project Manager



WATERSHED PLANNING – ELEMENTS 7, 8, 9

Watershed Location

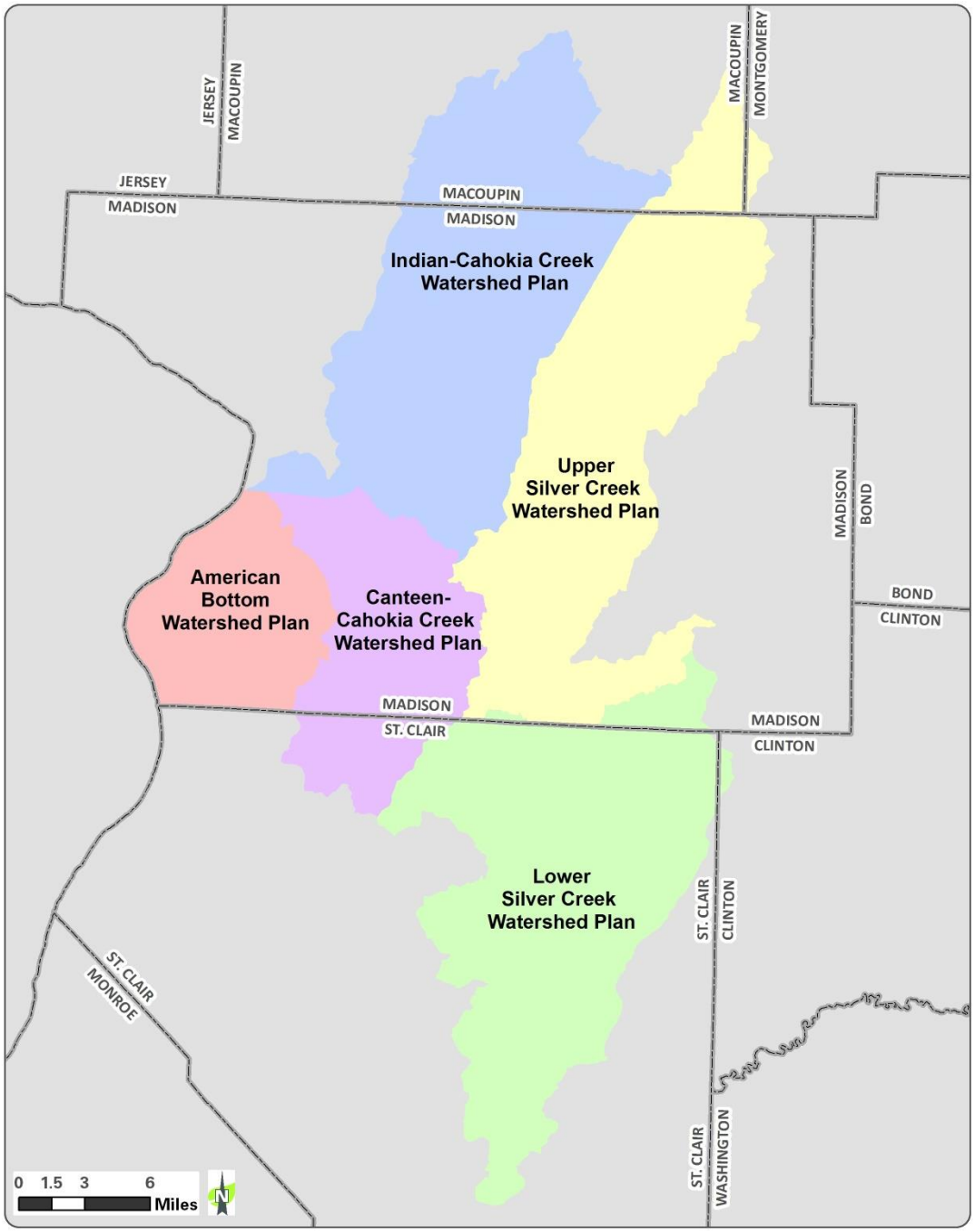


Watershed Plans in St Louis Metro East

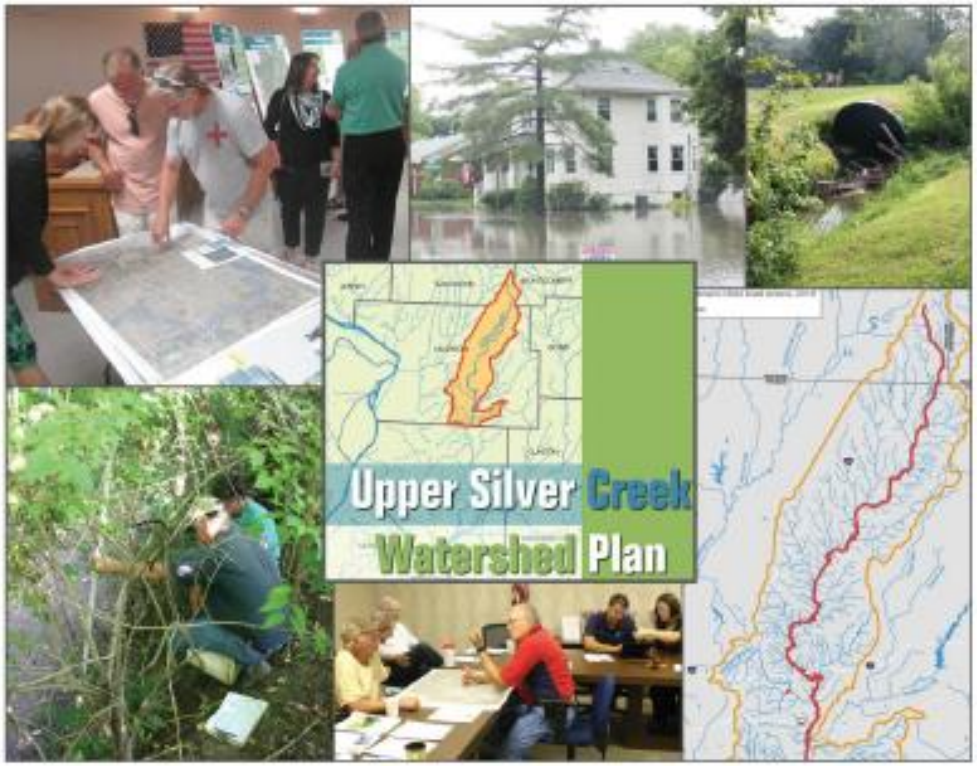
Groups involved:

- Local govt.s
- USACE
- Scott Air Force Base
- HOAs
- NRCS & SWCDs
- Universities
- Sanitary districts

and many more…



Upper Silver Creek Watershed Plan



A Guide to Protecting and Restoring Watershed Health

June 2016
Review Draft

MADISON COUNTY
PLANNING & DEVELOPMENT
PLAN | GROW | SUSTAIN

HEARTLANDS
CONSERVANCY
Investing In The Nature Of Southwestern Illinois

MADISON COUNTY ILLINOIS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Overview

Element 7/g - Milestones

g. A description of interim measurable milestones for determining whether nonpoint source management measures or other control actions are being implemented. (↪ Chapter 12.)

Element 8/h - Assessing load reduction

h. A set of criteria that can be used to determine whether loading reductions are being achieved over time and substantial progress is being made toward attaining water quality standards.

Element 9/i - Monitoring

i. A monitoring component to evaluate the effectiveness of the implementation efforts over time, measured against the criteria established under item h *immediately above.*

Element 7 / g - Milestones

g. A description of interim measurable milestones for determining whether nonpoint source management measures or other control actions are being implemented. (Chapter 12.)

"…**interim, measurable** milestones"

Upper Silver Creek - Milestones

- Progress Report Cards (included in Appendix H)
- Milestones for short-term (1-10 years; 2016-2026), medium-term (10-20 years; 2026-2036), and long-term (20+ years; 2036+) timeframes
- Use to track plan implementation and effectiveness

Upper Silver Creek – types of milestone

- Document success in terms of:
  - Action Plan effectiveness: absolute improvements seen in water quality, flooding, habitat, & other plan goals
  - Action Plan implementation: the # and extent of Management Measures implemented
- Measurement indicators for both were identified
- Interim – tracking steps along the way
- Measurable – knowable factors
- Measuring ongoing improvement allows for more dynamic, directed, and effective implementation.

Upper Silver Crk – Interim milestones

Interim milestones

- Meetings of watershed plan partners held twice a year, at six month intervals
- Larger annual meeting incl. stakeholders & the public
- Plan revision assessed at 5-year intervals
- As deficiencies in plan implementation are found, the timeline and focus should be revised
  - Pay attention to new data
  - Reiterate the watershed planning process of issue identification, goal-setting, and management measure recommendation should be reiterated

Measures of success & measurement indicators

Measure of success,

e.g., Projects and practices implemented

Measurement indicator,

e.g., Number & extent of projects implemented

Measures of success & measurement indicators by plan goal

Goal(s) Addressed	Measure of Success	Measurement Indicators
Surface Water Quality	Use Impairments: The reduction of use impairments as defined by IEPA.	Removal of Silver Creek and Troy Creek from the IEPA 303(d) list.
	Pollutant Loads: A decrease in pollutants observed through water quality monitoring.	Concentrations and loads of in-stream pollutants including phosphorus and sediment (assessed by monitoring), to measure against plan target reductions.
	Point-source Pollution Facility Upgrades: Upgrades to facilities such as sewage treatment plants and others that require a NPDES permit.	Nutrient removal technologies incorporated into upgrades of wastewater treatment plants in the watershed. New pollutant loads in effluent.
	Connecting to Public Sewers: Connection of new and existing properties to public sewers so that individual septic systems are no longer needed.	Percentage of new development projects with private sewer. Number of existing on-site treatment systems connected to public sewers.
	Inspection and Maintenance of On-Site Waste Systems: Local government codes and programs for on-site treatment systems.	Number and extent of local ordinances requiring regular inspection and maintenance of on-site sewage systems. Number of county/municipal programs inspecting more frequently than is complaint-driven.

Measures of success & measurement indicators by plan goal

Goal(s) Addressed	Measure of Success	Measurement Indicators
Surface Water Quality / Flooding and Flood Damage	Wetlands: Restoring and creating wetlands, which are very effective at storing and filtering stormwater.	Number and acreage of wetland construction/restoration, enhancement, and protection.
Flooding and Flood Damage	Stream Discharge: Moderate peak flows and adequate minimum stream flows.	Stream flow data from the USGS gauge on mainstem Silver Creek, plus flow data collected from monitoring at other HUC14 locations. Data correlated with rainfall.
	Flood Protection Ordinances: Enaction of local ordinances to restrict construction in floodplains and floodprone areas.	Number and extent of flood damage prevention ordinances, riparian buffer ordinances, and other actions by local governments to restrict construction in floodplains and riparian areas.
Environmentally Sensitive Development Practices	Infiltration: Practices allowing stormwater to infiltrate to groundwater.	Area of impervious surfaces in new development (see NLCD Percent Developed Impervious Surface dataset) and number of detention basins or other stormwater infrastructure constructed and retrofitted to allow more infiltration.

Progress Report Cards

- The Progress Report Cards provide for each goal:
  - Summaries of current conditions
  - Measures of progress (Measurement Indicators)
  - Milestones for short-, medium-, and long-term timeframes
  - Sources of data required to evaluate milestones
  - Notes section

Progress Report Cards

- Use at every meeting of watershed plan partners, and fully filled out every five years
- Grades for each milestone term should be calculated using the following scale:

Grade	Percentage milestones met
A	80-100%
B	60-79%
C	40-59%
Fail	<40%

- Lack of progress should be explained in Notes section
  - e.g. water quality monitoring results show no improvement, new environmental problems, lack of technical assistance, or lack of funds

Progress Report Card example

- Goal, Existing Conditions, Targets & Recommendations, Milestones

Goal 1: Improve Surface Water Quality
Existing Conditions
264,952 lbs/year of phosphorus, 60,230 tons/year of sediment, and 1,178,496 lbs/yr of nitrogen enter the upper Silver Creek watershed every year, based on the STEPL model.
Silver Creek has seen low Dissolved Oxygen (DO) levels between 1972 and 2011, with a minimum of 2 mg/L (mean 7.7 mg/L).
High concentrations of dissolved manganese have been found in Silver Creek between 1972 and 2011 (mean 417 µg/L, median 290 µg/L, and maximum 3200 µg/L).
Fecal coliform levels in Silver Creek have spiked several times between 1972 and 2011 (with most spikes in the 70's and 80's); the median level was 630 cfu/100ml.
Over 3,000 private sewage systems are present in the watershed. Given a national estimated failure rate of 10%, 300 systems are currently failing. The actual number may be higher because many of these systems are older.
Watershed Impairment Reduction Targets and recommendations
25% or 66,238 lbs/year reduction in phosphorus loading by 2025, based on the Illinois Nutrient Loss Reduction Strategy.
20% or 12,046 tons/year reduction in sediment loading by 2025, based on estimated impacts of proposed BMPs.
15% or 176,774 lbs/year reduction in phosphorus loading by 2025, based on the Illinois Nutrient Loss Reduction Strategy.
No DO samples lower than the minimum concentration in streams: March – July: 5.0 mg/L at any time, 6.0 mg/L as a daily mean averaged over 7 days; August – February: 3.5 mg/L at any time, 4.0 mg/L as a daily mean averaged over 7 days, 5.5 mg/L as a daily mean averaged over 30 days. Based on 35 Ill. Adm. Code 302.
No manganese samples higher than the general use water quality standard of 1,000 µg/L, and a general reduction in mean manganese concentrations.
68% or 430 cfu/100 ml reduction in fecal coliform, to reach a geometric mean of 200 cfu/100 ml in a minimum of 5 samples taken over a period of ≤30 days; based on 35 Ill. Adm. Code 302.
Removal of Silver Creek and Troy Creek from the Illinois EPA 303(d) list.
Programmatic changes regarding wastewater treatment, private sewer, and conservation easements.

Progress Report Card example

Measurement Indicator	Milestone				Data source	Achieved?
	Short-term (1-10 years)	Medium-term (10-20 years)	Long-term (20+ years)			
Number and extent of Management Measures (BMPs) implemented	108	216	324	... acres contour buffer strips (100% of locations identified by the ACPF) (cumulative)	SWCD, NRCS, farmers, contractors	
	8,798	17,595	26,393	… acres cover crops (30% of total agricultural land area) (cumulative)		
	60	119	179	… acres grassed waterways (100% of locations identified by the ACPF) (cumulative)		
	33	67	100	... acres ponds (cumulative)		
	10,264	20,528	30,792	... acres reduced tillage (conservation tillage/no-till) (35% of total agricultural land area) (cumulative)		
	19,131	38,263	57,394	… feet of poor condition riparian areas ecologically restored, including 100% Critical Riparian Areas (cumulative)		
	33,333	66,667	100,000	... feet terraces (cumulative)		
	7	13	20	... acres waste storage structures/waste management systems (cumulative)		
	294	587	881	... acres Water and Sediment Control basins (100% of locations identified by the ACPF) (cumulative)		
	…	…	…	…		

Progress Report Card example

Measurement Indicator	Milestone				Data source	Achieved?
	Short-term (1-10 years)	Medium-term (10-20 years)	Long-term (20+ years)			
Removal of Silver Creek and Troy Creek from Illinois EPA 303(d) list.	PM	PM	A	All streams in the watershed removed from the 303(d) list	Illinois EPA 303(d) list	
Concentrations and loads of in-stream pollutants	PM	PM	A	Measured reductions in in-stream phosphorus, sediment, nitrogen, fecal coliform, and manganese (see Monitoring Plan). Measured increases in in-stream dissolved oxygen (see Monitoring Plan).	NGRREC (water quality monitoring results)	
Enrollment of land in conservation easements including CRP and CREP	1.5	2	2.5	... times the 2015 acreage enrolled in CRP and CREP	NRCS	
	...	...	...	...	...	
GRADE						

Progress Report Card example 2

Goal 4: Support Healthy Fish and Wildlife Habitat				
Existing Conditions				
57,918 feet of riparian areas are currently in poor condition, per the aerial assessment results. Of this, 183,036 feet are Critical Riparian Areas. 37.5 miles Critical Logjam Areas have been identified.				
Thousands of acres of wetlands have been lost since pre-settlement; the associated loss of ecosystem functions has been great since that time.				
Watershed Impairment Reduction Targets and recommendations				
100% Critical Riparian Areas restored				
Majority of riparian areas in poor condition restored				
100% Critical Logjam Areas assessed				
5% Critical Logjam areas have logjams removed				
100% Critical Wetlands Areas restored				
Macrointertebrate & fish samples showing increased stream health				
Programmatic changes regarding stream cleanup activities				

Progress Report Card example 2

Measurement Indicator	Milestone				Data source	Achieved?
	Short-term (1-10 years)	Medium-term (10-20 years)	Long-term (20+ years)			
Number and extent of Management Measures (BMPs) implemented	19,131	38,263	57,394	... ft of poor condition riparian areas ecologically restored, including 100% Critical Riparian Areas (cumulative)	NRCS, SWCD, contractors	
	240	481	721	… acres wetlands restored, enhanced, or created (100% of Critical Wetland Areas) (cumulative)		
	3,300	6,600	9,900	… ft logjam removal sites (5% of the Critical Logjam Areas)		
Macroinvertebrate sampling results from RiverWatch volunteers and fish sample data collected by INHS	PM	PM	A	All Illinois RiverWatch samples indicate "Good", "Fair", or "Excellent" Taxa Richness, EPT Taxa Richness, and MBI water quality scores No decrease in water quality indicated by INHS fish sampling	Illinois RiverWatch, Illinois Natural History Survey	
	…	…	…	…	…	
GRADE						

Other examples

- *What kind of measuring success have you seen?*
  - *Ongoing continuity of plan implementation & evaluation – Nippersink watershed*
  - *Regular monthly meetings (eg Lake County)*
  - *Slower followup due to a lack of funds*
  - *Early implementation of plan incl 319 funds, with outreach including annual BioBlitz (Big Muddy watershed)*

Element 8 / h – Assessing load reduction

h. A set of criteria that can be used to determine whether loading reductions are being achieved over time and substantial progress is being made toward attaining water quality standards.

"…**set of criteria**… **loading reductions**… over time"

Load reduction criteria = Targets

- Refer back to Targets set earlier in the plan
- Can be direct measurements (e.g. fecal coliform concentrations) or indirect indicators (e.g. numbers of beach closings)
- Indicate how plan may be revised if criteria not met

Element 9 / i – Monitoring

i. A monitoring component to evaluate the effectiveness of the implementation efforts over time, measured against the criteria established under item h *immediately above.*

"…**monitoring**… criteria established under item h"

Upper Silver Creek - Monitoring

- Water quality monitoring will be conducted by the National Great Rivers Research and Education Center (NGRREC), as funding allows, on a 3-5 year cycle through the year 2025.

The National Great Rivers Research & Education Center

Sample sites

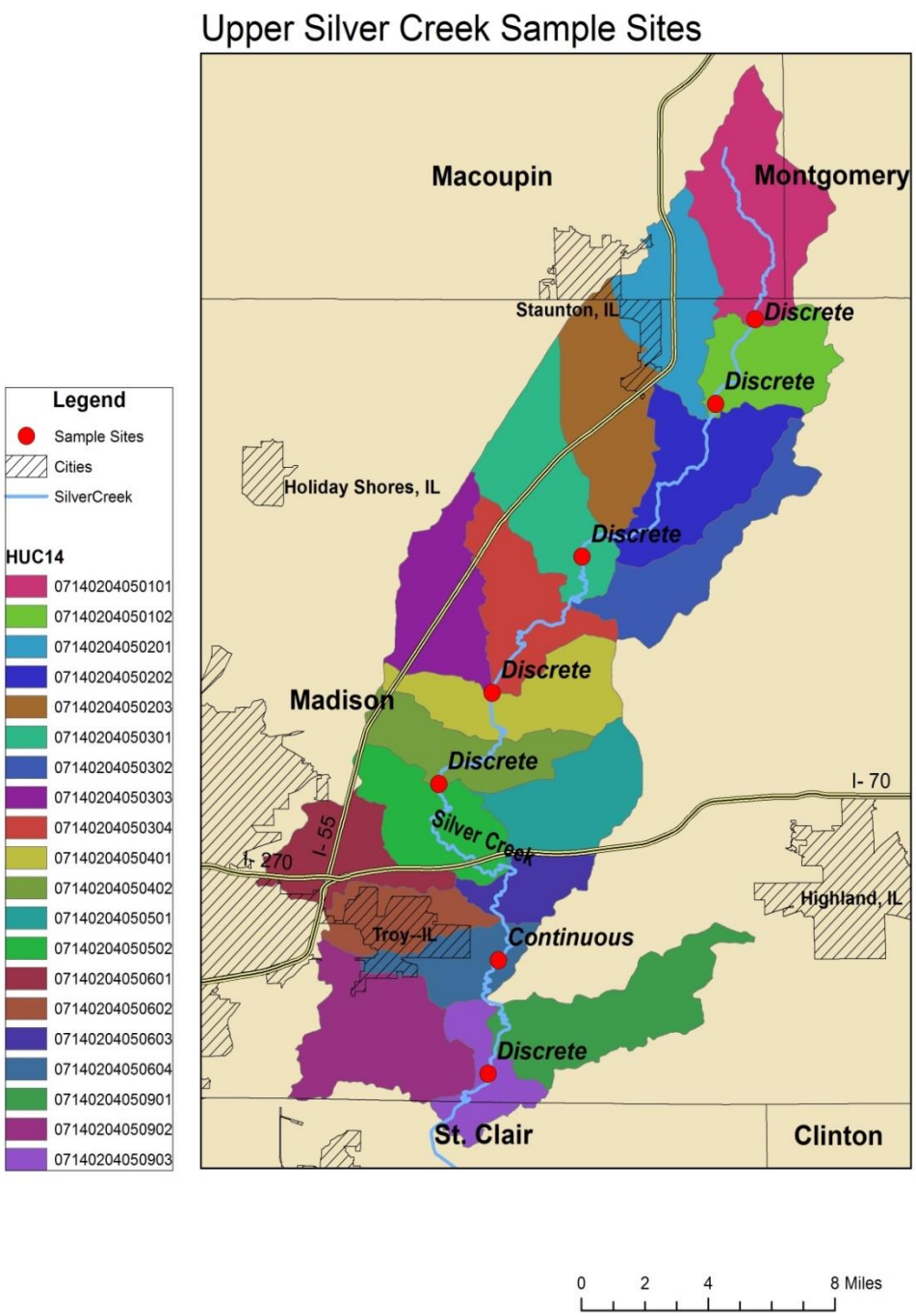

Fig. 2. Map showing the locations of one *Continuous* and six *Discrete* sampling sites on the main stem of Silver Creek in Madison County, IL.

HUC14 watersheds are designated by areas with colored backgrounds.

Continuous & discrete sampling

- **Continuous automated sampling**
  - At USGS gage on Silver Creek
  - Will provide data year-round
  - Will allow comparison with historical water quality data collected by the USGS and the Illinois Water Sciences Center (IWSC) from this same location for several periods between 1974 and 2011
- **Discrete sampling**
  - All upstream from USGS gage
  - Conducted on a quarterly basis (spring, summer, fall, and winter)
  - Identify the relative contributions of subwatersheds
  - Additional dates added based on precipitation events in order to capture a range of hydrologic conditions – specifically, sampling stormflow conditions

Following initial sampling season, create future sampling strategies.

Assess where BMPs have been implemented – has this impacted results?

Sampling schedule & equipment

Sampling schedule

- Continuous monitoring at one site – year-round
- Discrete sampling at the sub-watershed level
  - Generally collected quarterly in March, June, September, and December
  - Emphasis on capturing stormflow eventsSampling completed by August 30, 2018

Equipment

- Isco 6712 automatic sampler with a 720 Bubbler Flow module
- SmartChem Discrete analyzer – measurement of all forms of N and P
- Elementar Vario TOC – carbon analysis
- Cable-suspended Price velocity meter outfit with bridgeboard and sounding reel

Thank You!

Questions?

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