Watershed Planning and How to Write a Fundable 319 Grant

Jeff Boeckler
Northwater Consulting

Introduction

- Discussion of IEPA 9 Minimum Elements
- Components of a “implementable” Watershed Based Plan
  - La Moine, Bear Creek, Bureau Creek, Upper Lake Michigan, Lower DuPage, Embarras
- Plan implementation and components of fundable 319 applications
  - La Moine, Indian Creek/Dago Slough, Otter Lake

The 9 Minimum Elements

1. Identify the causes and sources of pollutants
2. Estimates of the pollutant load reductions needed
3. The Non Point Source (NPS) measures and locations needed to meet reduction targets
4. Estimate of the technical and financial resources needed to implement the plan
5. Public/Information Component
6. A Schedule for Implementation
7. Milestones
8. Criteria to determine if reductions are being met
9. Monitoring plan

Minimum Element #1

- Pull water quality and impairment data directly from IEPA 303(d) list
  - Document what the problems are and where they are coming from

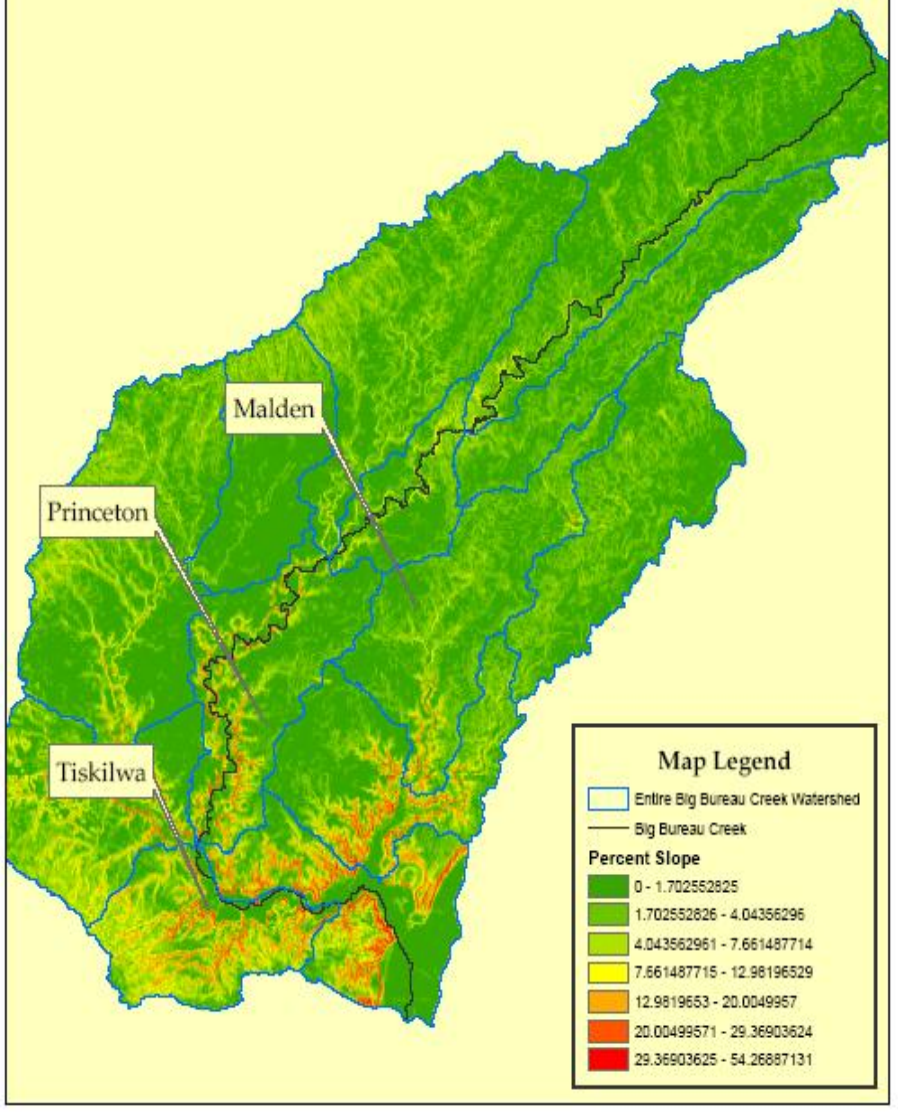
Segment ID	HUC 10 Cedar Creek	Waterbody Name	Miles / Acres	Designated Use	Potential Causes
IL_DJFC	0713000509	Indian Creek	8.13	Aquatic Life	Phosphorus (Total), Sedimentation/Siltation, Total Suspended Solids (TSS)
IL_DJFCA	0713000509	Dago Slough	3.23	Aquatic Life	Phosphorus (Total), Sedimentation/Siltation

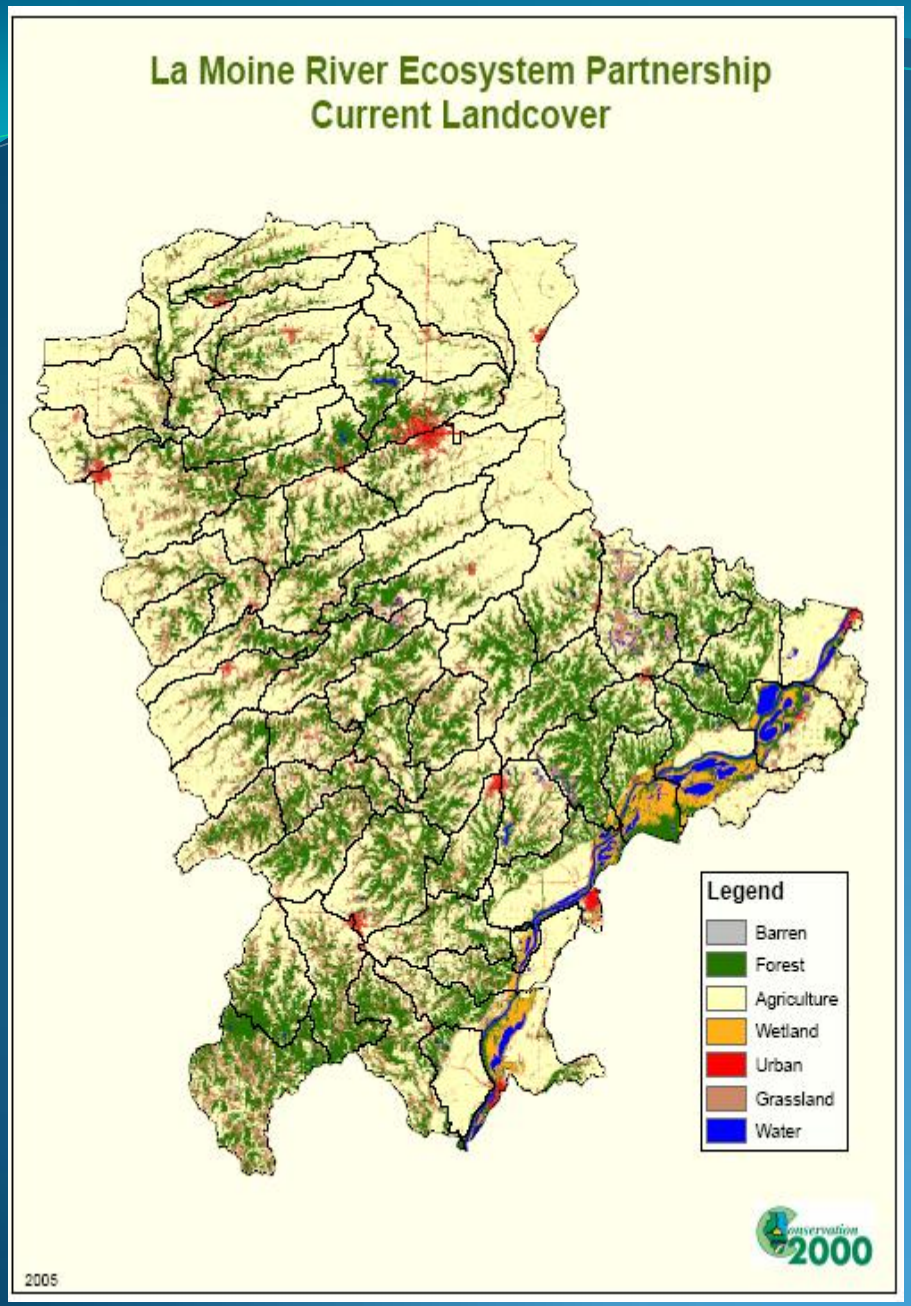
Minimum Element #1 +

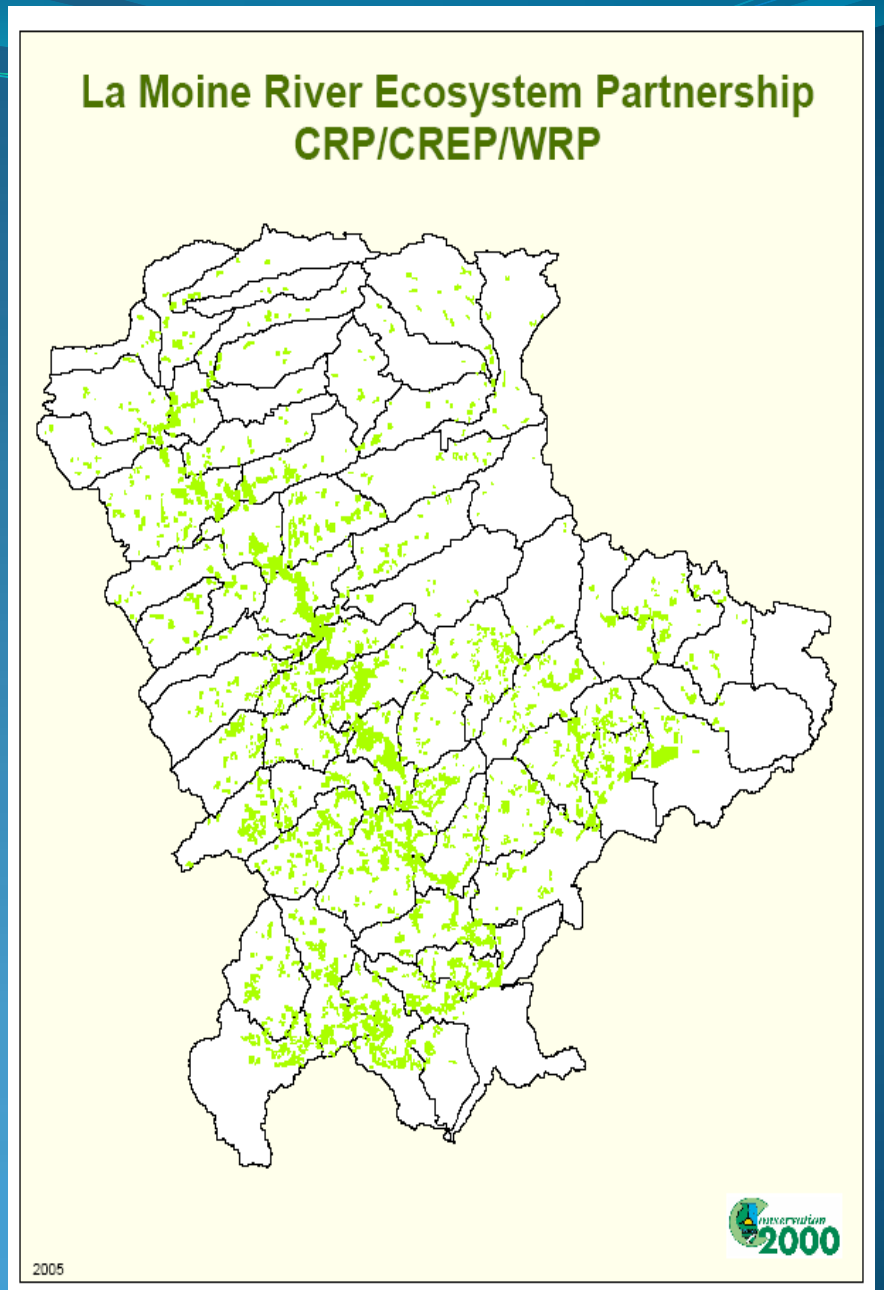
- Characterize watershed using available data
  - Landcover
  - Streams
  - Watershed Boundaries
  - Soils
  - Public Lands
  - High quality resources, T&E species
  - Cultural Resources
  - Elevation Data
  - Other……

La Moine River
2004 IEPA Impaired Waters

Total Watershed Area - 318,126 acres or 498 Square Miles
Total Stream Length - 392,772 feet




La Moine River Ecosystem Partnership
Current Landcover
Legend
Barren
Forest
Agriculture
Wetland
Urban
Grassland
Water
2005


La Moine River Ecosystem Partnership
CRP/CREP/WRP
2005

Collecting Available Data

- Agency websites and locations of available map based and other information
  - See state agency websites
  - EPA Digital Mapping tools
  - NRCS Soils Data Mart and NRCS Digital Gateway
  - Other – USGS etc…
    - Endless supply of GIS/other data available on the web or just call and ask someone

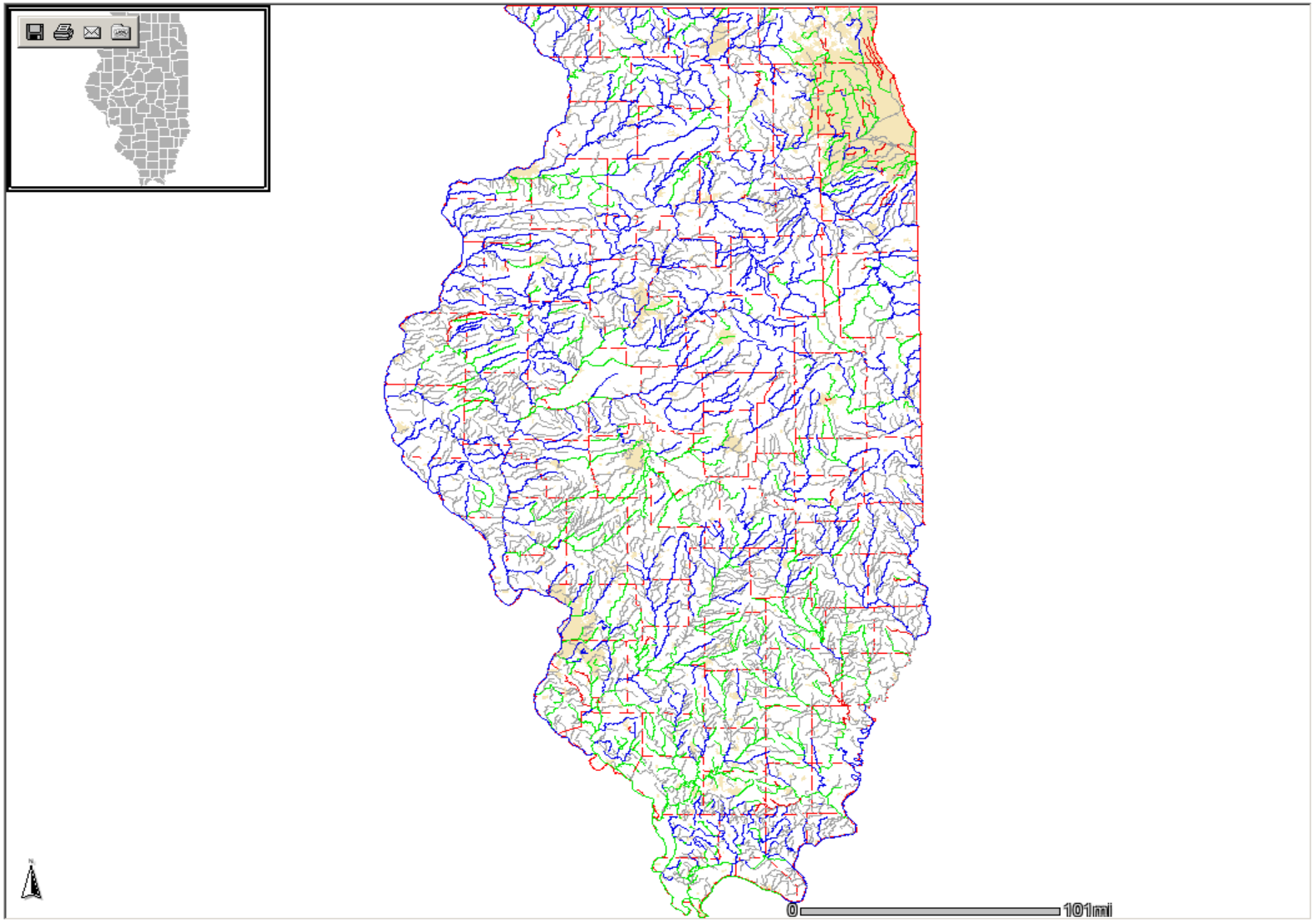
Illinois Water-Quality Information - Microsoft Internet Explorer

Illinois Environmental Protection Agency

www.epa.state.il.us

Rod R. Blagojevich, Governor

help | metadata | zoom in | zoom out | zoom last | full extent | pan | identify | query | measure | clear | use select | print | hyperlink | download | overview | legend/layer



Refresh Map

Select Active Layer:

IEPA 305(b) Assessed Streams

Available Layers:

- Water Quality
- Infrastructure
- Water Resources
- Admin/PLSS
- Background Images

Refresh Map

Agency Site Map | Privacy Information | Kids Privacy | Web Accessibility | Agency Webmaster

Map: 3565288.32 , 2333789.71 -- ScaleFactor: 2572.295025393767 -- Latitude/Longitude: 39.4174/-87.4882

Internet

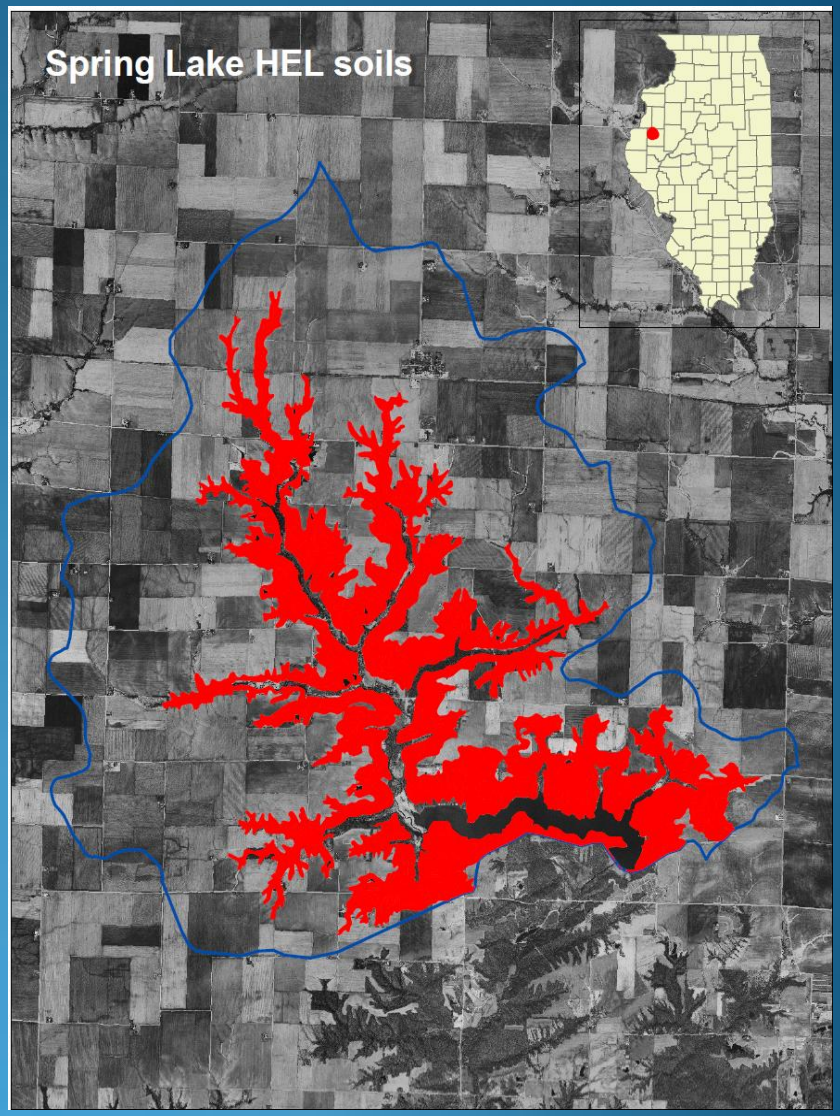
Start | Novell Group... | C:\Document... | Microsoft Po... | C:\Document... | Water Qualit... | Illinois Wat... | 11:50 AM

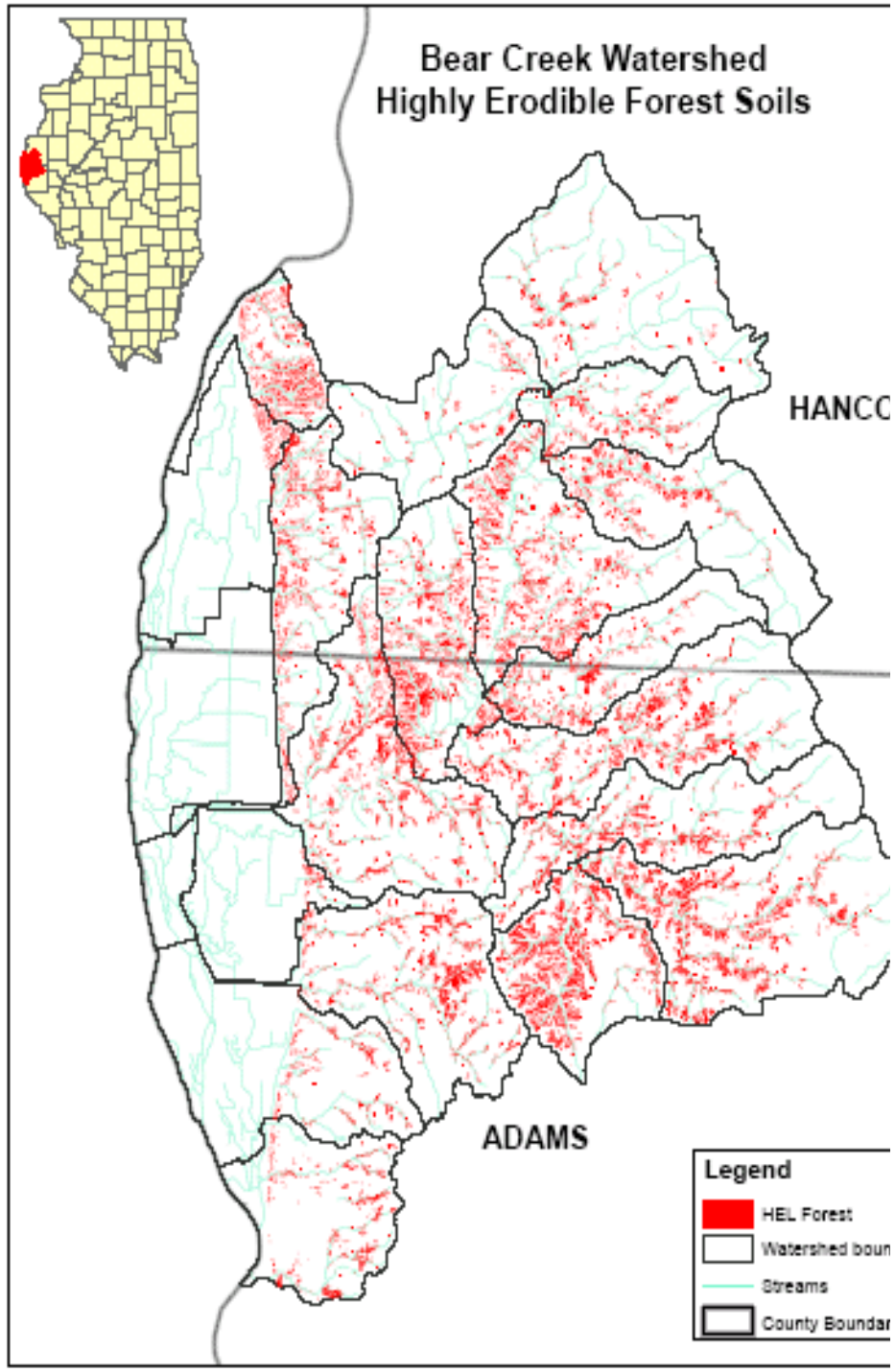
Minimum Element #1 +

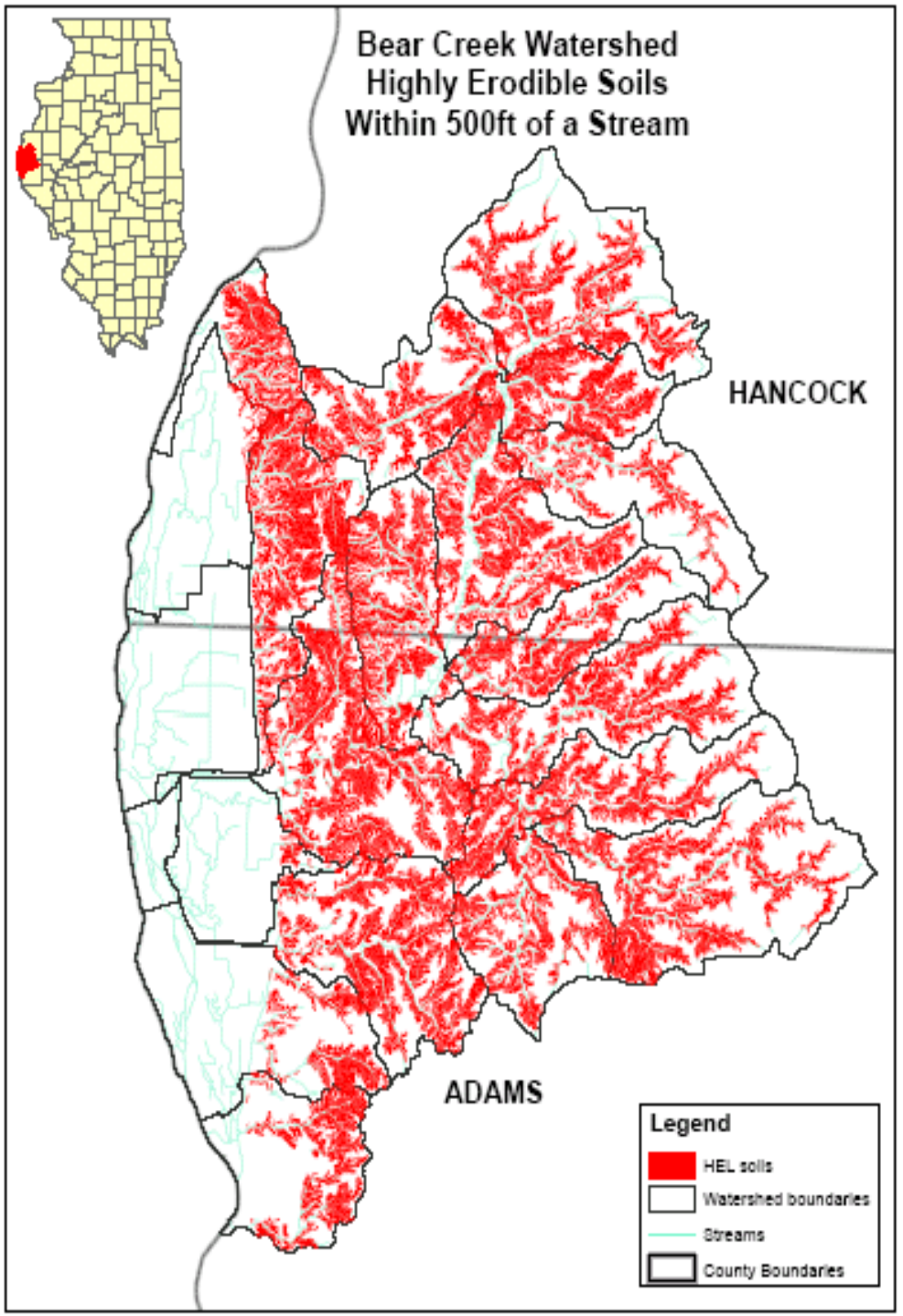
- Analyze watershed using available data
  - Especially important if dealing with a very large watershed
    - Allows you to compare and PRIORITIZE smaller “subwatersheds” where implementation and locating site specific BMPs is manageable

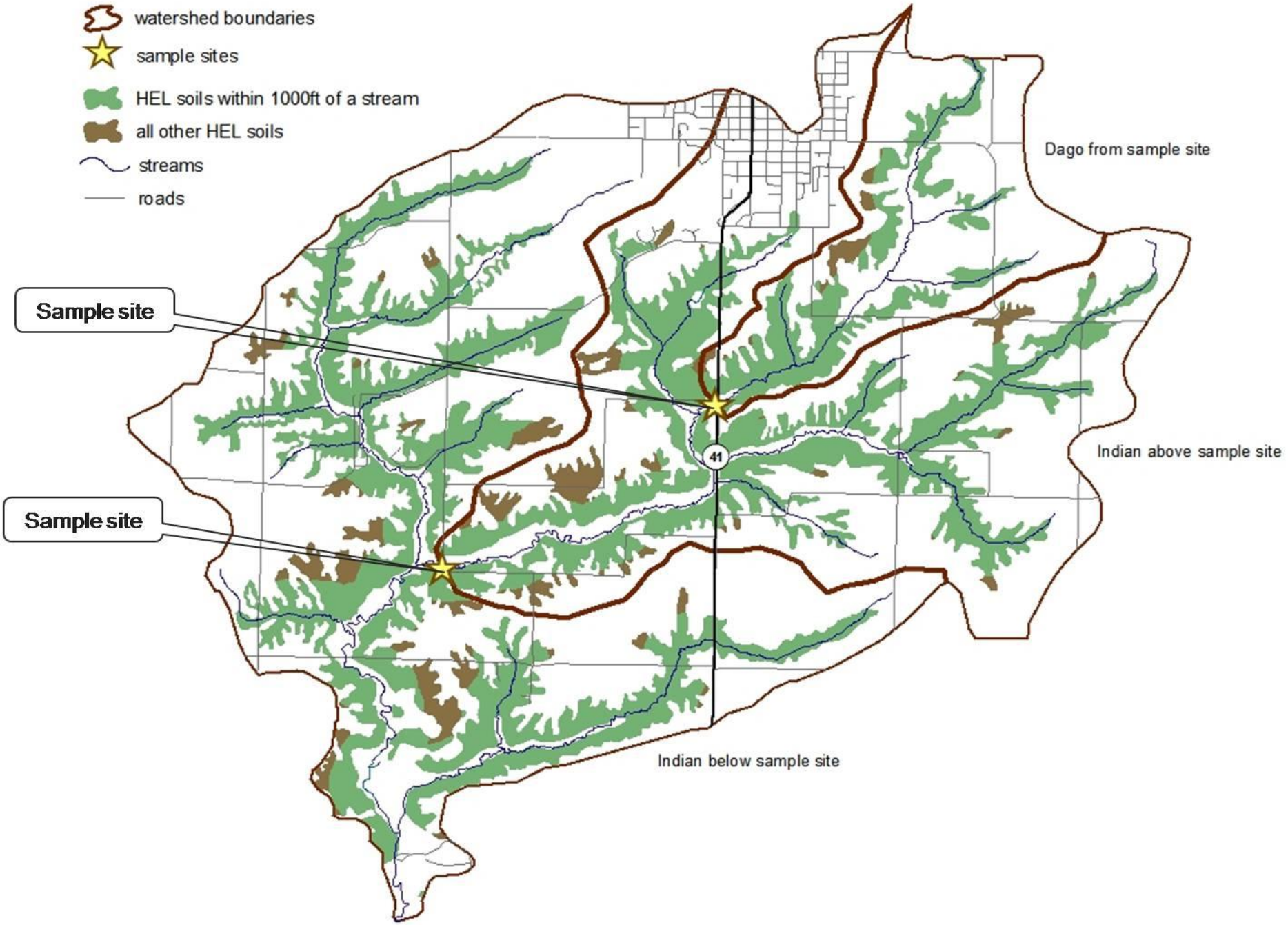
Examples of Some Analysis

- Acres of a particular landcover type
  - Forest, wetland, row crop
- Length of Impaired or high quality streams
- Percentage of streams buffered
- Stream Sinuosity
- Landscape fragmentation
- Acres of eroding soils

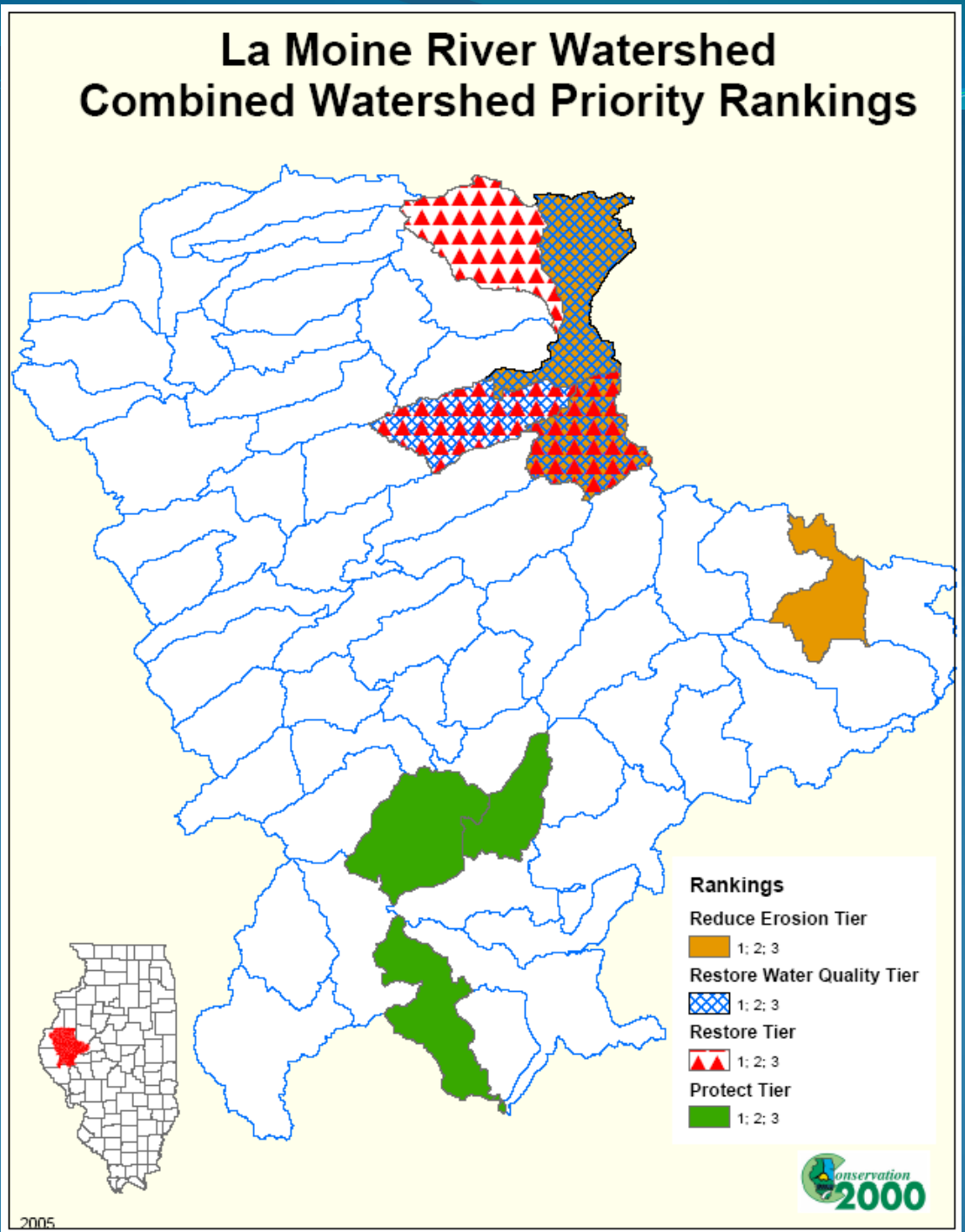



Bear Creek Watershed
Highly Erodible Forest Soils
HANCC
ADAMS
Legend
HEL Forest
Watershed boun
Streams
County Boundar

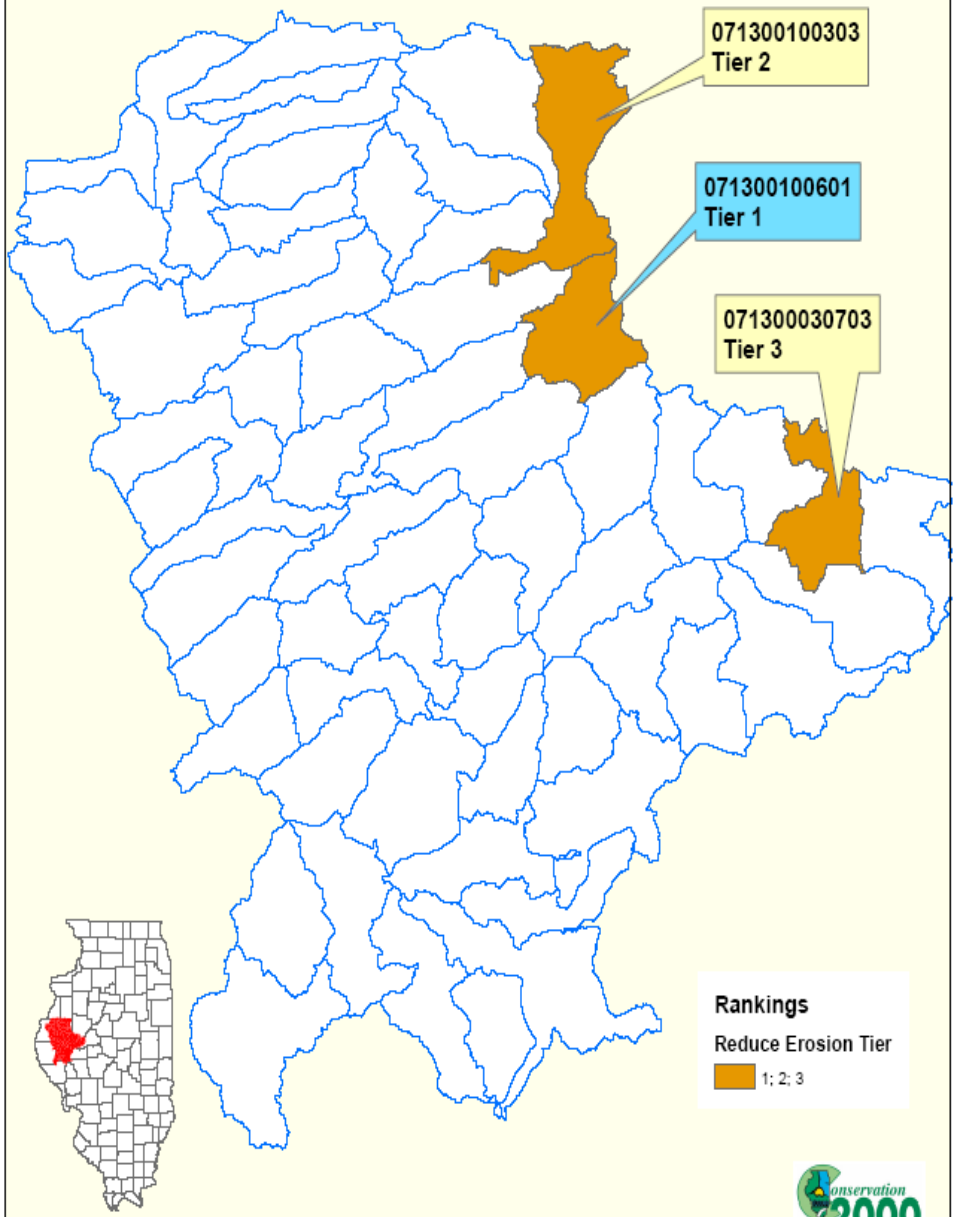

Bear Creek Watershed
Highly Erodible Soils
Within 500ft of a Stream
HANCOCK
ADAMS
Legend
HEL soils
Watershed boundaries
Streams
County Boundaries


watershed boundaries
sample sites
HEL soils within 1000ft of a stream
all other HEL soils
streams
roads
Sample site
Sample site
41
Dago from sample site
Indian above sample site
Indian below sample site

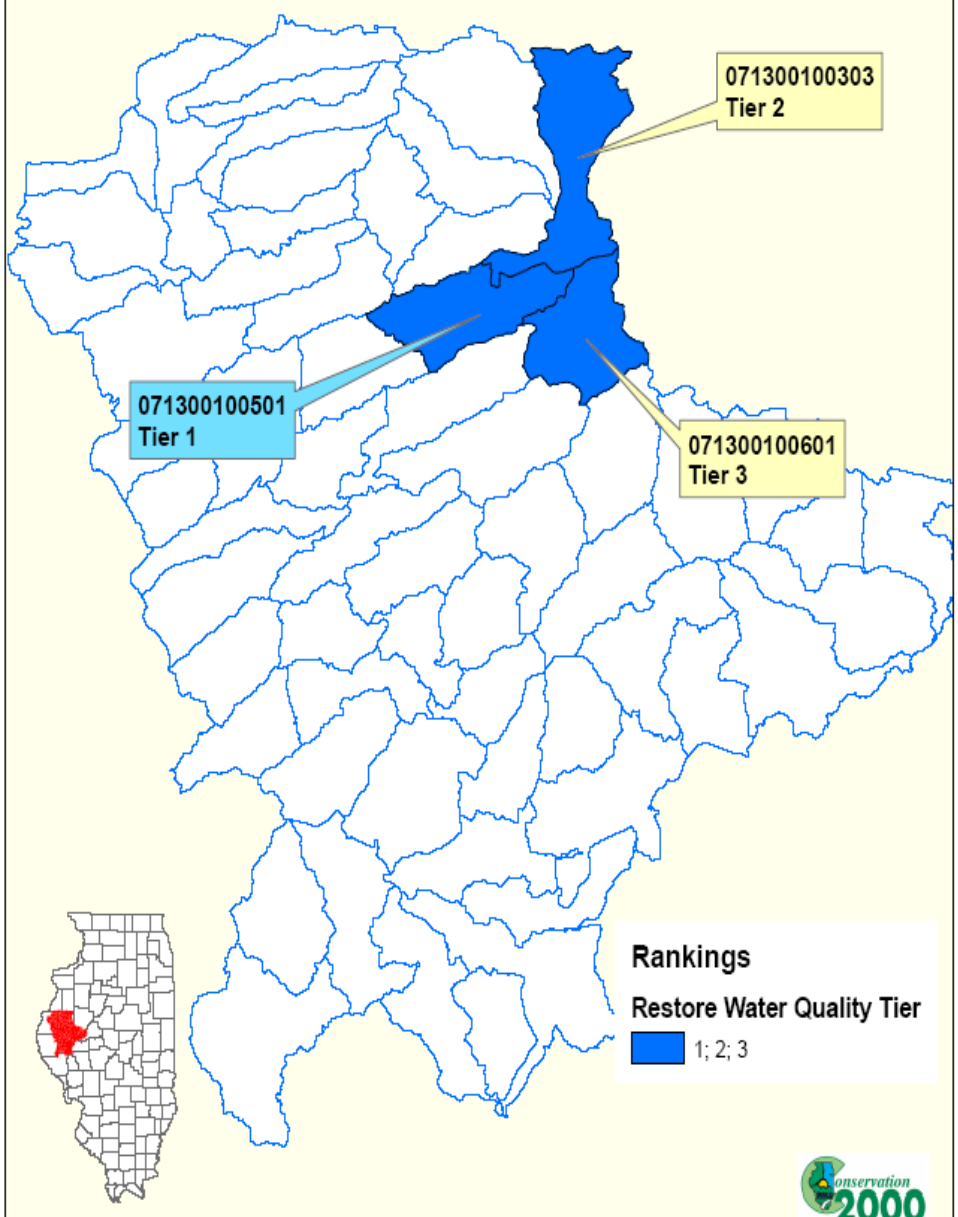
La Moine River Watershed
Combined Watershed Priority Rankings



La Moine River Watershed
Priority Watershed Rankings:
Erosion Reduction



La Moine River Watershed
Priority Watershed Rankings:
Restore/Improve Water Quality



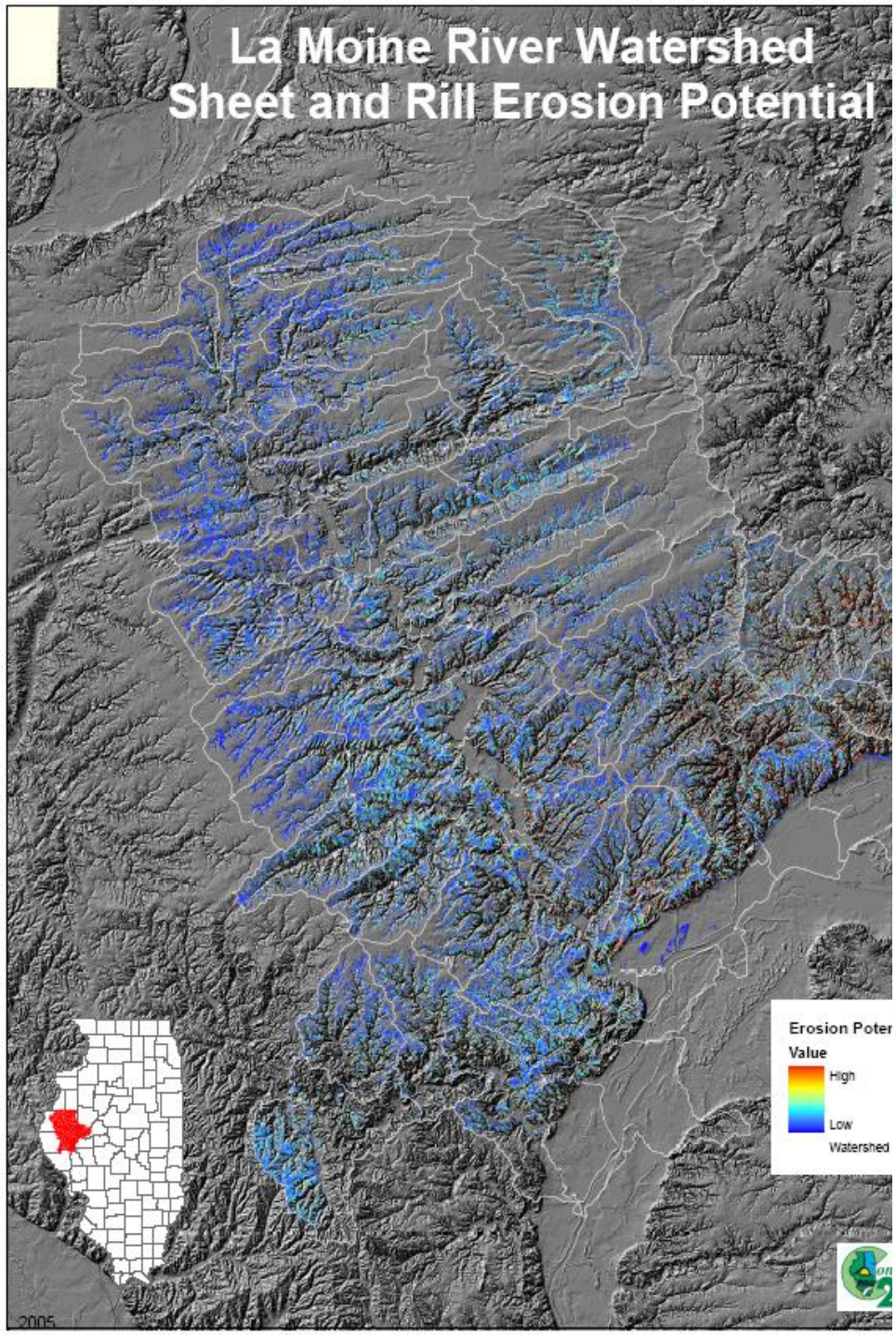
Minimum Element #2

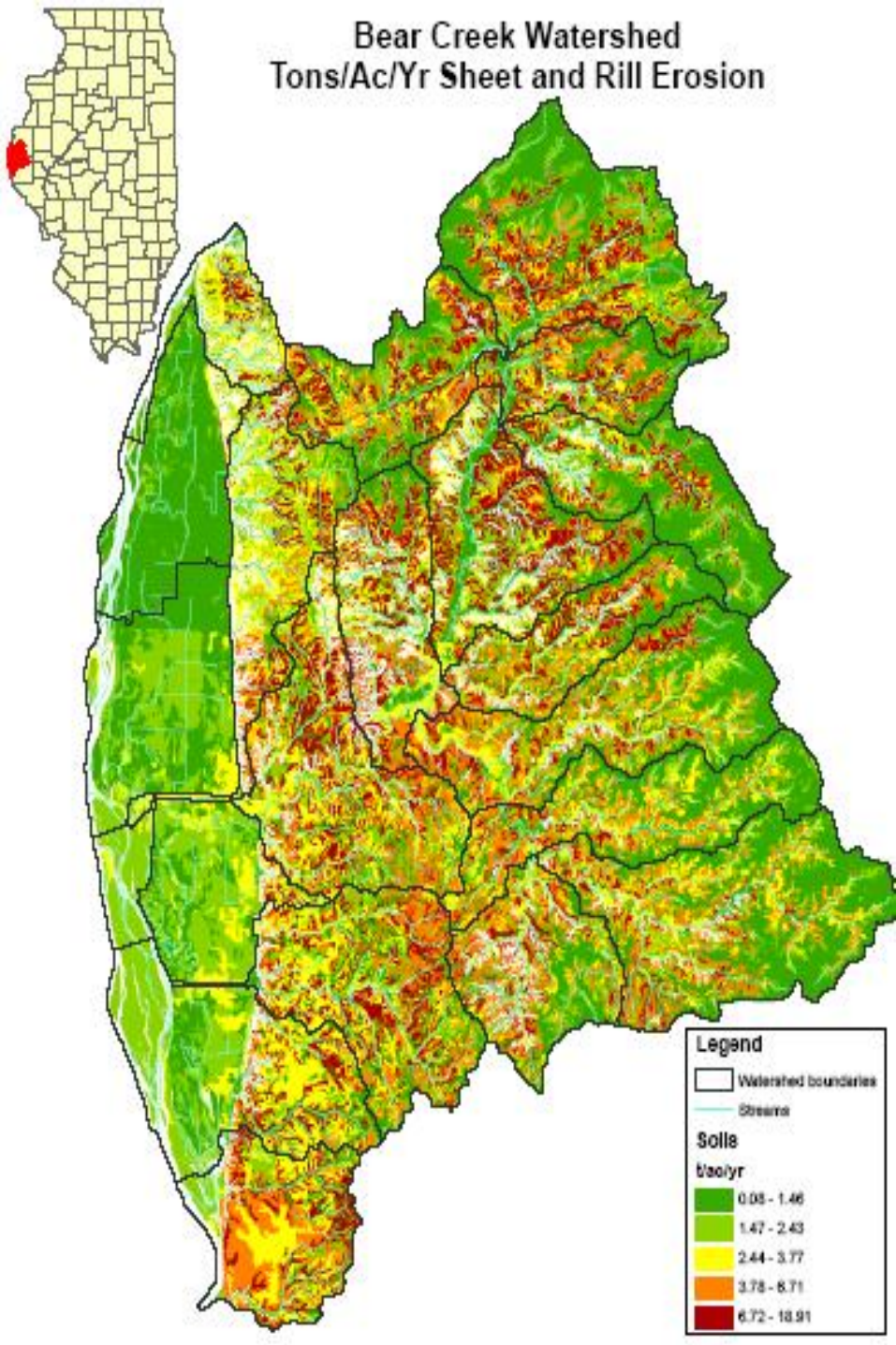
- Pollutant Load Reductions needed – Two ways:

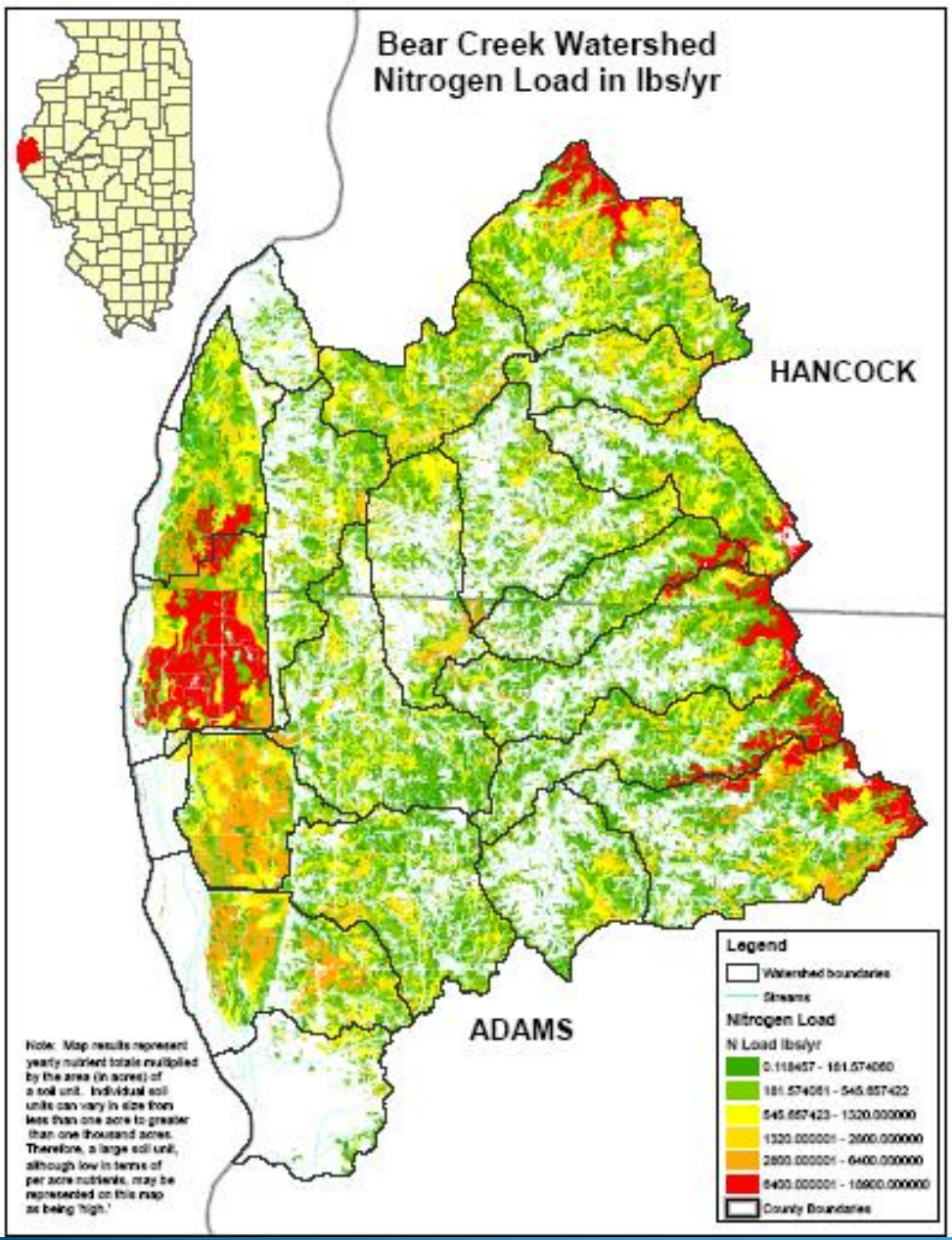
1. Build or implement pollution load model
    1. Pros: customized to watershed, flexible, can use to model individual BMPs
    2. Cons: based on assumptions, requires technical assistance
2. Estimate using existing literature
    1. Pros: relatively simple and cost effective
    2. Cons: general and based on broad averages, no ability to use to model BMPs, not site specific

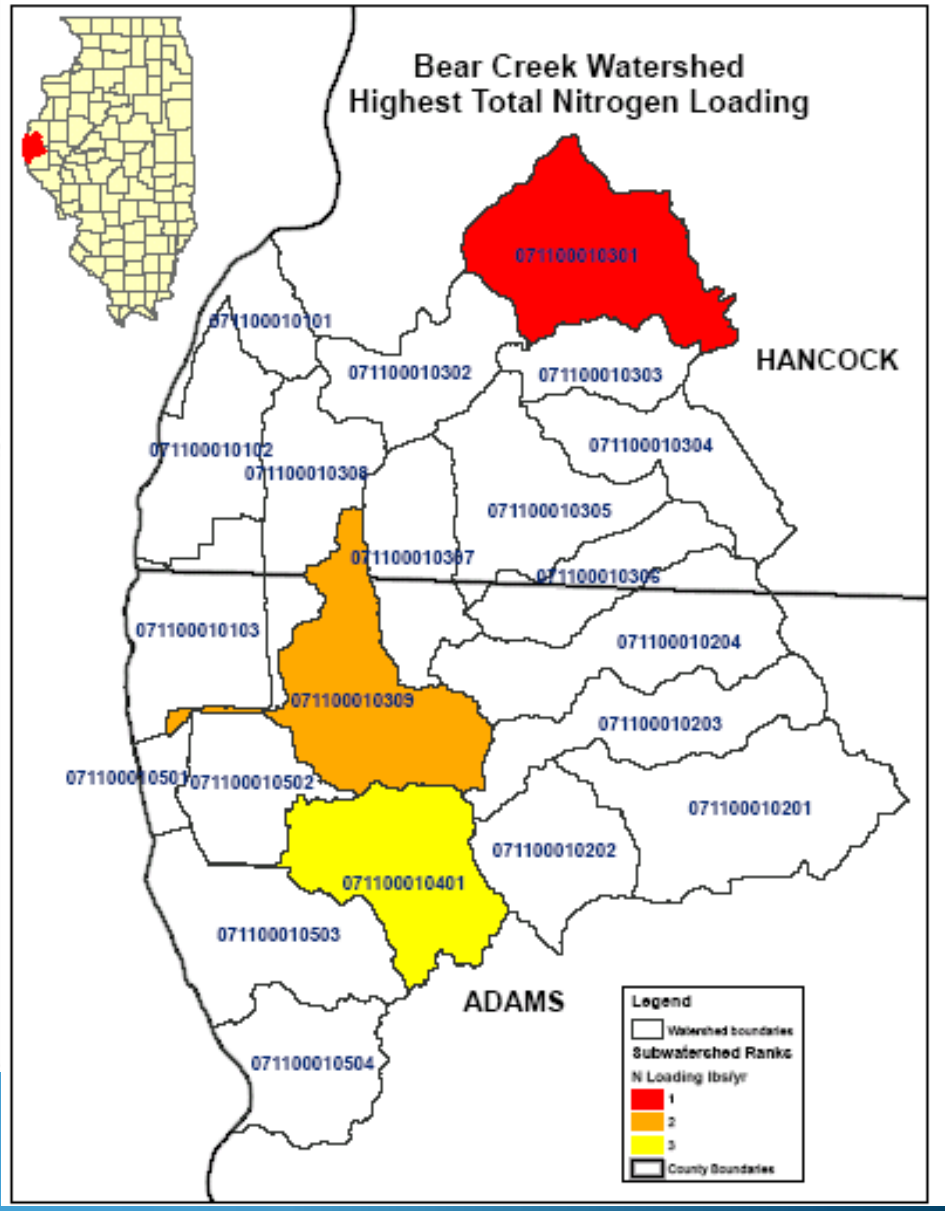
Pollution Loading Model

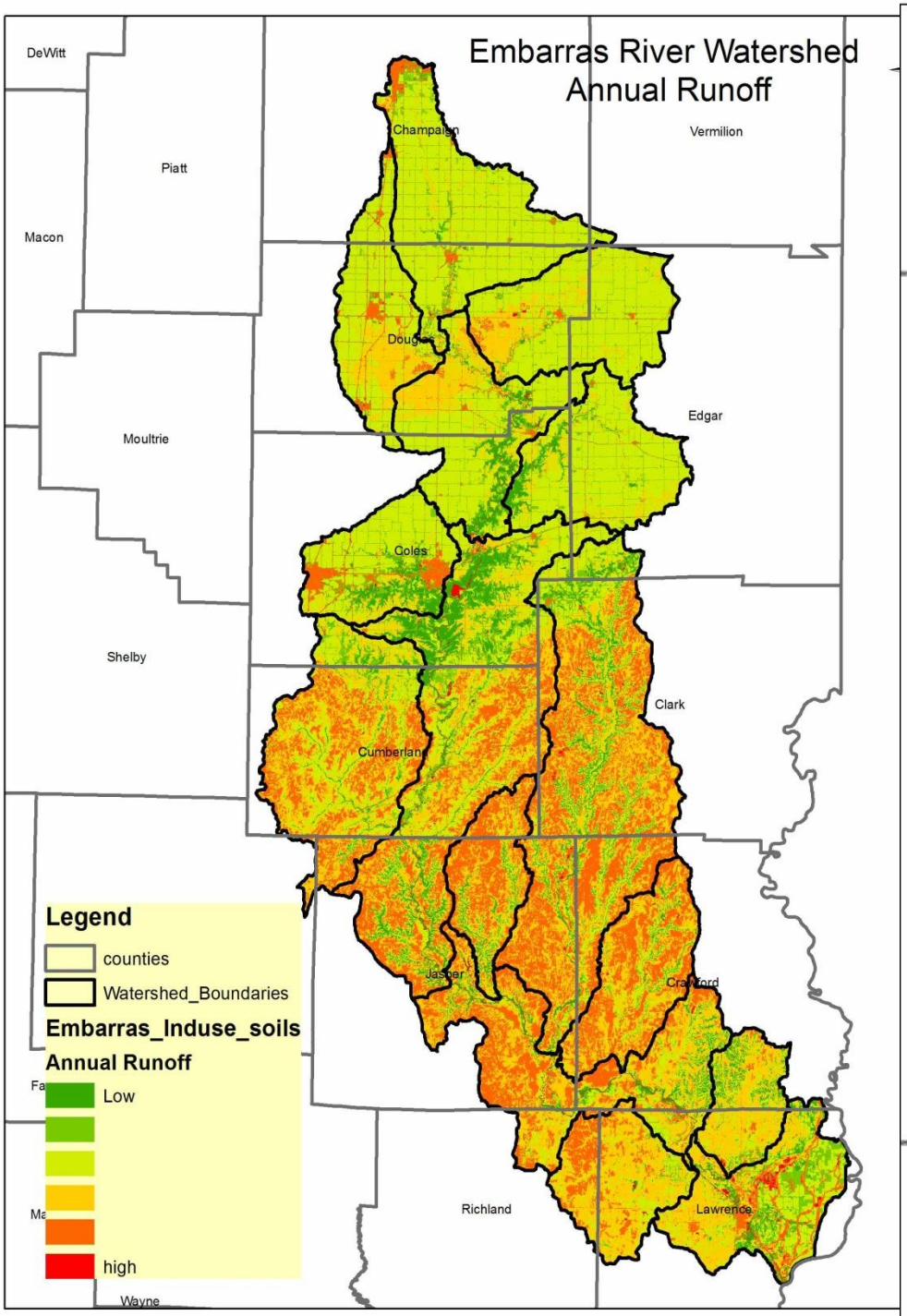
- Numerous models available
  - More complex, higher the cost
- Key: pick a model that allows you to 1) quantify pollutant loading for your watershed at the smallest scale and 2) allows you to evaluate BMPs
- Recommend using GIS and developing a custom model
  - Using soils, landuse, and rainfall
  - Ability to quantify pollutant loading at a very small scale

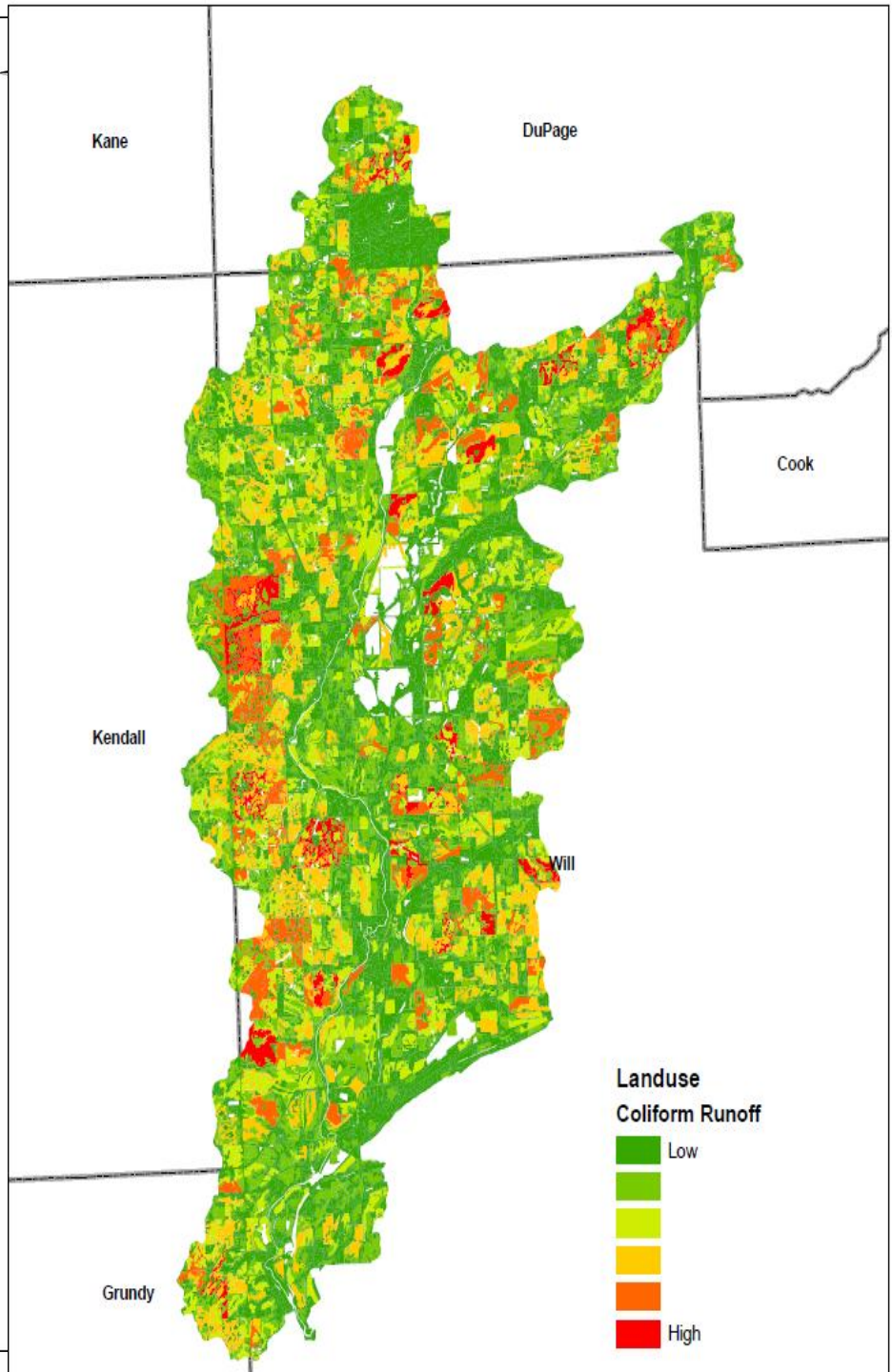

La Moine River Watershed
Sheet and Rill Erosion Potential
Erosion Poter
Value
High
Low
Watershed
2005


Bear Creek Watershed
Tons/Ac/Yr Sheet and Rill Erosion
Legend
Watershed boundaries
Streams
Soils
t/ac/yr
0.08 - 1.46
1.47 - 2.43
2.44 - 3.77
3.78 - 8.71
6.72 - 18.91


Bear Creek Watershed
Nitrogen Load in lbs/yr
HANCOCK
ADAMS
Note: Map results represent yearly nutrient totals multiplied by the area (in acres) of a soil unit. Individual soil units can vary in size from less than one acre to greater than one thousand acres. Therefore, a large soil unit, although low in terms of per acre nutrients, may be represented on this map as being 'high.'
Legend
Watershed boundaries
Streams
Nitrogen Load
N Load lbs/yr
0.118457 - 181.574060
181.574061 - 545.657422
545.657423 - 1320.000000
1320.000001 - 2800.000000
2800.000001 - 6400.000000
6400.000001 - 16900.000000
County Boundaries


Bear Creek Watershed
Highest Total Nitrogen Loading
071100010301
071100010101
071100010302
071100010303
HANCOCK
071100010102
071100010308
071100010304
071100010305
071100010307
071100010306
071100010103
071100010204
071100010309
071100010203
071100010501
071100010502
071100010201
071100010202
071100010401
071100010503
ADAMS
071100010504
Legend
Watershed boundaries
Subwatershed Ranks
N Loading lbs/yr
1
2
3
County Boundaries


Embarras River Watershed
Annual Runoff
DeWitt
Champaign
Vermilion
Piatt
Macon
Douglas
Edgar
Moultrie
Coles
Shelby
Clark
Cumberland
Jasper
Crawford
Richland
Lawrence
Wayne
Legend
counties
Watershed_Boundaries
Embarras_Induse_soils
Annual Runoff
Low
high

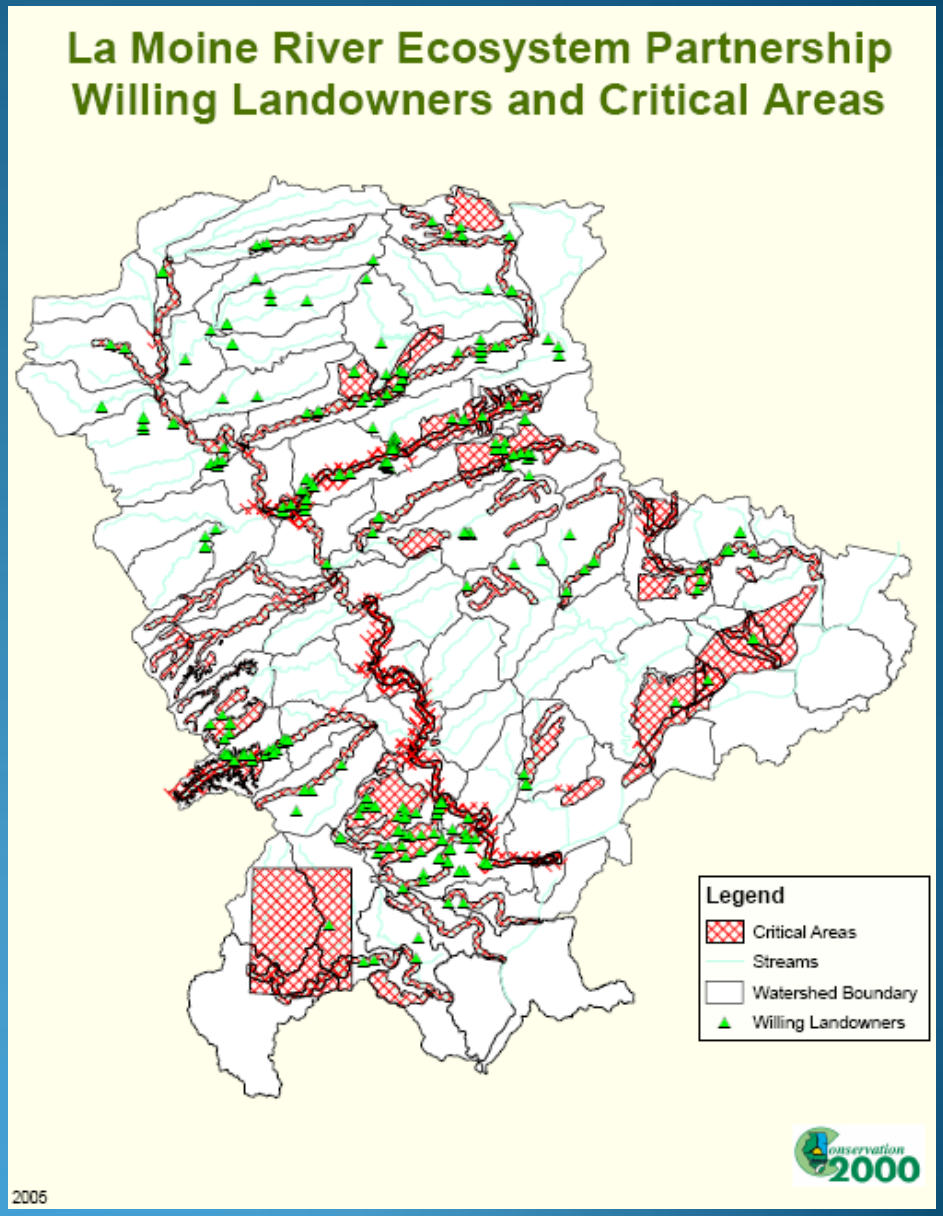

Kane
DuPage
Cook
Kendall
Will
Grundy
Landuse
Coliform Runoff
Low
High

Minimum Element #3

- Identify treatment measures and expected load reductions from implementation
  - GET OUT IN THE WATERSHED AND ASSESS THE LAND AND TALK TO PROPERTY OWNERS!
  - If specific locations are not identified it is very difficult to take a plan and use it to apply for funding on-the-ground projects
  - If locations are known, it is easier to estimate pollution load targets and expected reductions

Identifying Landowners/BMP Locations

- Implement mail survey to assess willingness
- "Cold Calling"
- NOW – GET OUT AND ASSESS THE WATERSHED!
- "Windshield Survey"
  - Compare locations to plat maps



Data Sheet Gully Erosion	Date	
	County	

ID # (corresponds to GPS point)	
Average Width (ft)	
Depth (ft)	
Length (ft)	
Number of years eroding (estimate)	
Soil Texture	
Dry Density	
Correction Factor	

Soil Textural Class	Dry Density (tons/ft3)	Correction Factor
Sands, Loamy sands	0.055	0.85
Sandy loam	0.0525	0.85
Fine Sandy loam	0.05	0.85
Loams, sandy clay loams, sandy clay	0.045	0.85
Silt Loam	0.0425	1
Silty clay loam, silty clay	0.04	1
Clay loam	0.0375	1.15
Clay	0.035	1.15
Organic	0.011	1.5

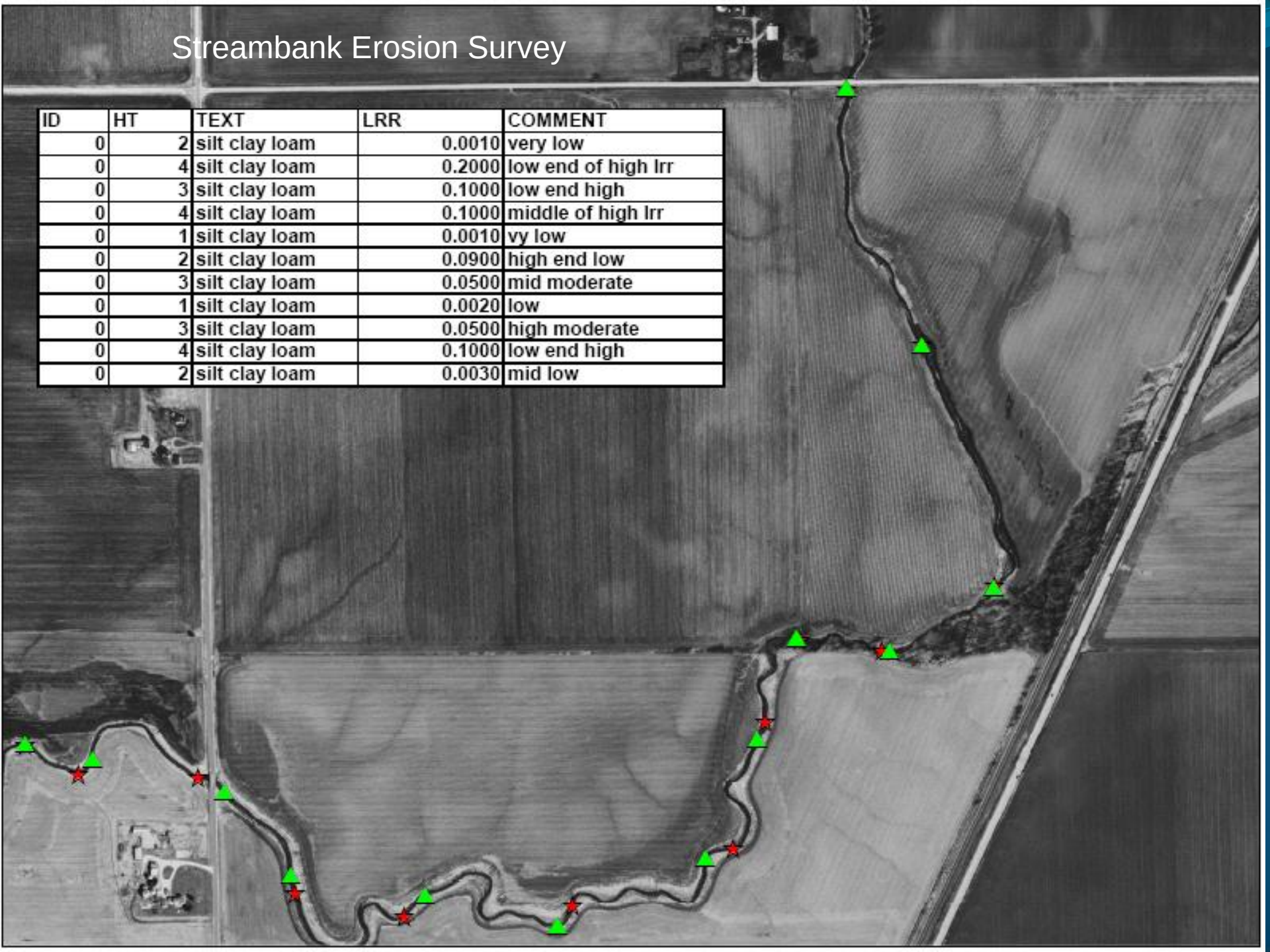
Willing Landowner (Yes or No)	
Other BMP Reccomendations	
Comments/Notes	

Field survey of gully erosion

- Used to quantify problems and identify project sites

Streambank Erosion Survey

ID	HT	TEXT	LRR	COMMENT
0	2	silt clay loam	0.0010	very low
0	4	silt clay loam	0.2000	low end of high lrr
0	3	silt clay loam	0.1000	low end high
0	4	silt clay loam	0.1000	middle of high lrr
0	1	silt clay loam	0.0010	vy low
0	2	silt clay loam	0.0900	high end low
0	3	silt clay loam	0.0500	mid moderate
0	1	silt clay loam	0.0020	low
0	3	silt clay loam	0.0500	high moderate
0	4	silt clay loam	0.1000	low end high
0	2	silt clay loam	0.0030	mid low



La Moine Results Streambank Survey

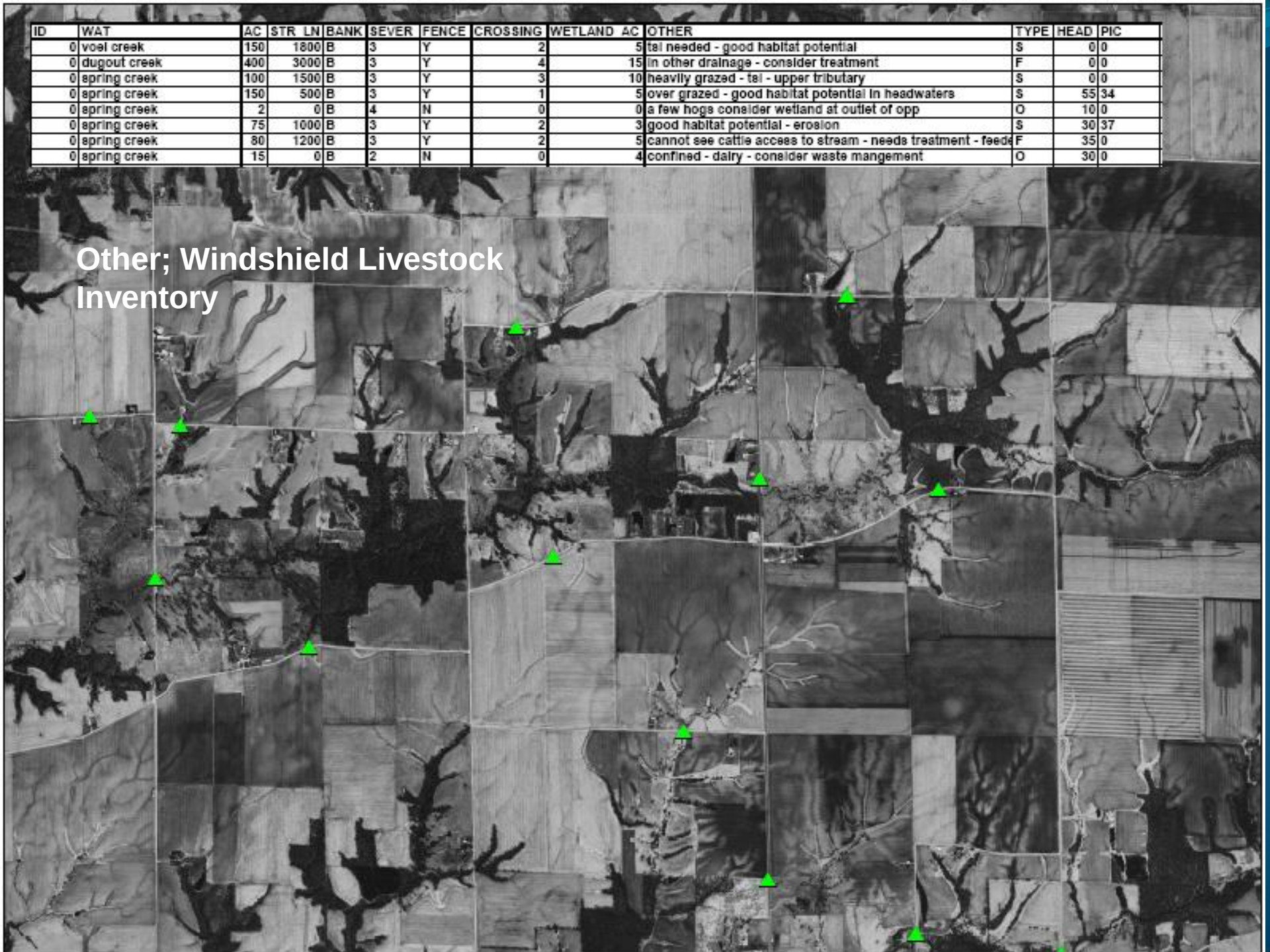
Total Net Erosion (tons/yr)	Average Height (ft)	Average Annual Recession Rate	Total Length (in ft; both banks)	Nitrogen Load (lbs/yr)	Phosphorous Load (lbs/yr)
3,276	3.75	Moderate-High	266,414	12,273	3,682

- This represents approximately 24.6 lbs of sediment for every foot of eroding bank per year.

- Considering the entire La Moine River basin has 17,735,291 stream feet, at 24.6 lbs/ft of erosion, this would mean the basin could contribute (conservatively) over 200,000 tons of sediment annually form streambank erosion alone.


Canoe Inventory

ID	WAT	AC	STR_LN	BANK	SEVER	FENCE	CROSSING	WETLAND_AC	OTHER	TYPE	HEAD	PIC
0	voel creek	150	1800	B	3	Y	2	5	tal needed - good habitat potential	S	0	0
0	dugout creek	400	3000	B	3	Y	4	15	in other drainage - consider treatment	F	0	0
0	spring creek	100	1500	B	3	Y	3	10	heavily grazed - tal - upper tributary	S	0	0
0	spring creek	150	500	B	3	Y	1	5	over grazed - good habitat potential in headwaters	S	55	34
0	spring creek	2	0	B	4	N	0	0	a few hogs consider wetland at outlet of opp	O	10	0
0	spring creek	75	1000	B	3	Y	2	3	good habitat potential - erosion	S	30	37
0	spring creek	80	1200	B	3	Y	2	5	cannot see cattle access to stream - needs treatment - feede	F	35	0
0	spring creek	15	0	B	2	N	0	4	confined - dairy - consider waste mangement	O	30	0



La Moine Results

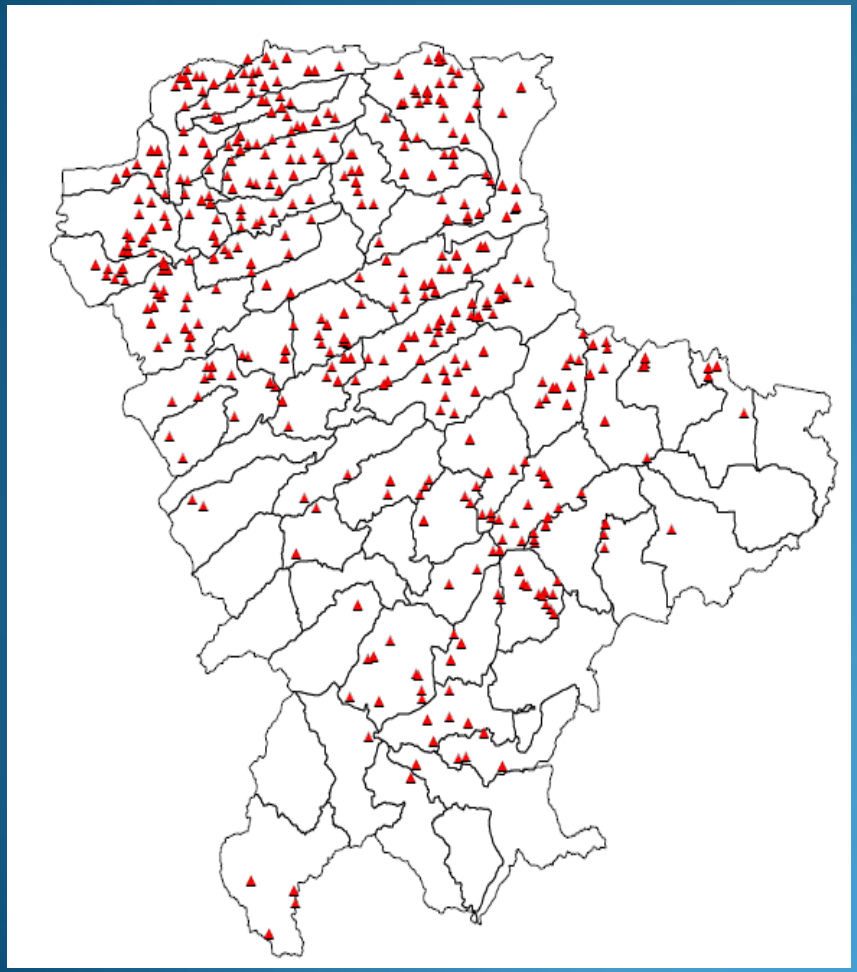
Total Number of Livestock Operations in the La Moine River Watershed
1,539

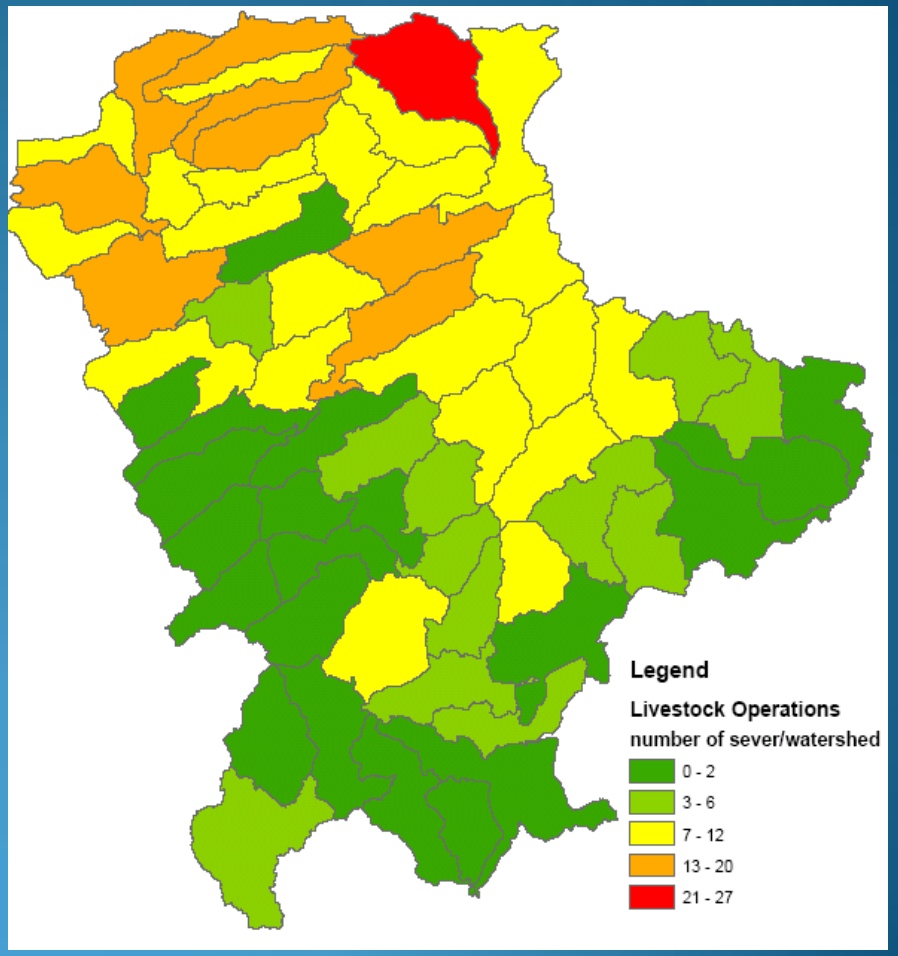
Waterbody	Acres	Stream Length
Name of stream or drainage where operation is located	Approximate size of operation in acres	approximate length in feet of stream impacted
N/A	223,930	1,362,315 ft or 258 miles

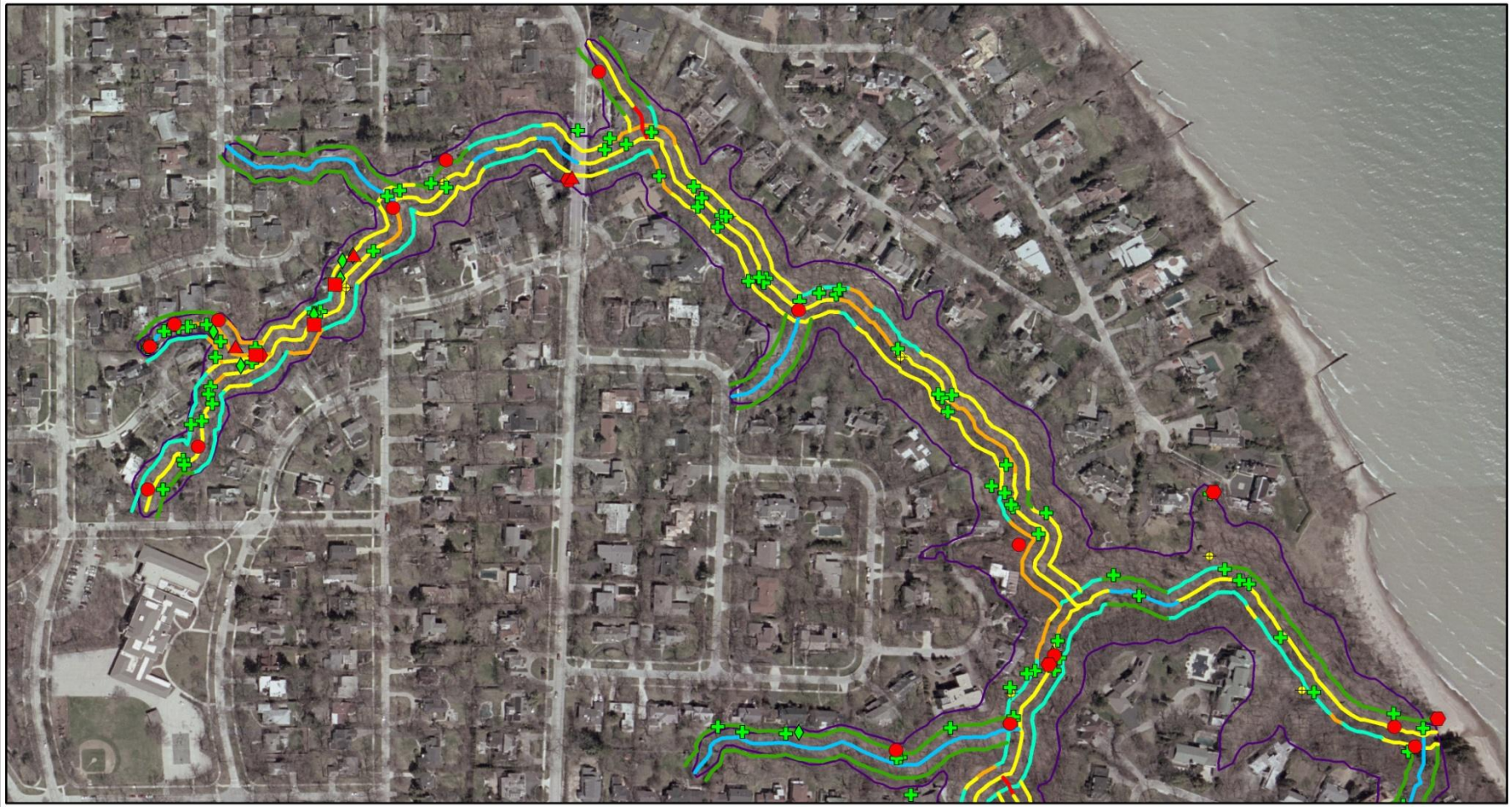
Bank	Severity	Fence
L/R	1, 2, 3, or 4	y/n
N/A	27% of all operations have a significant or severe (3 or 4) impact	44% of all operations require stream fence

Crossing	Wetland Acres	Type	Head
Number of stream crossings needed	Estimate of the acres of runoff retention or wetland restoration needed	S = stockers or cow/calf / F= feeders / C = confinement	Estimate of the number of head of cattle if visible
1207	3929	54 confinement operations	18,825 (under estimation)

La Moine Results
Severe Livestock Operations







Lake Michigan Watershed
Ecosystem Partnership
Strategic Subwatershed
Identification

c/o Alliance for the Great Lakes
17 N. State St., Suite 1390
Chicago, IL 60602
312-939-0838

Date: 2/2009

Legend

	Channel Stability Rank	Bank Stability Rank
Gully		
Existing/Working Structure		
Failing Structure	1	1
Log Jam	2	2
Knick Point	3	3
Residential/Municipal Stormwater	4	4
Exposed Pipe	5	5
Top of Bank		

* sections with a rank of 1 are considerd the worst

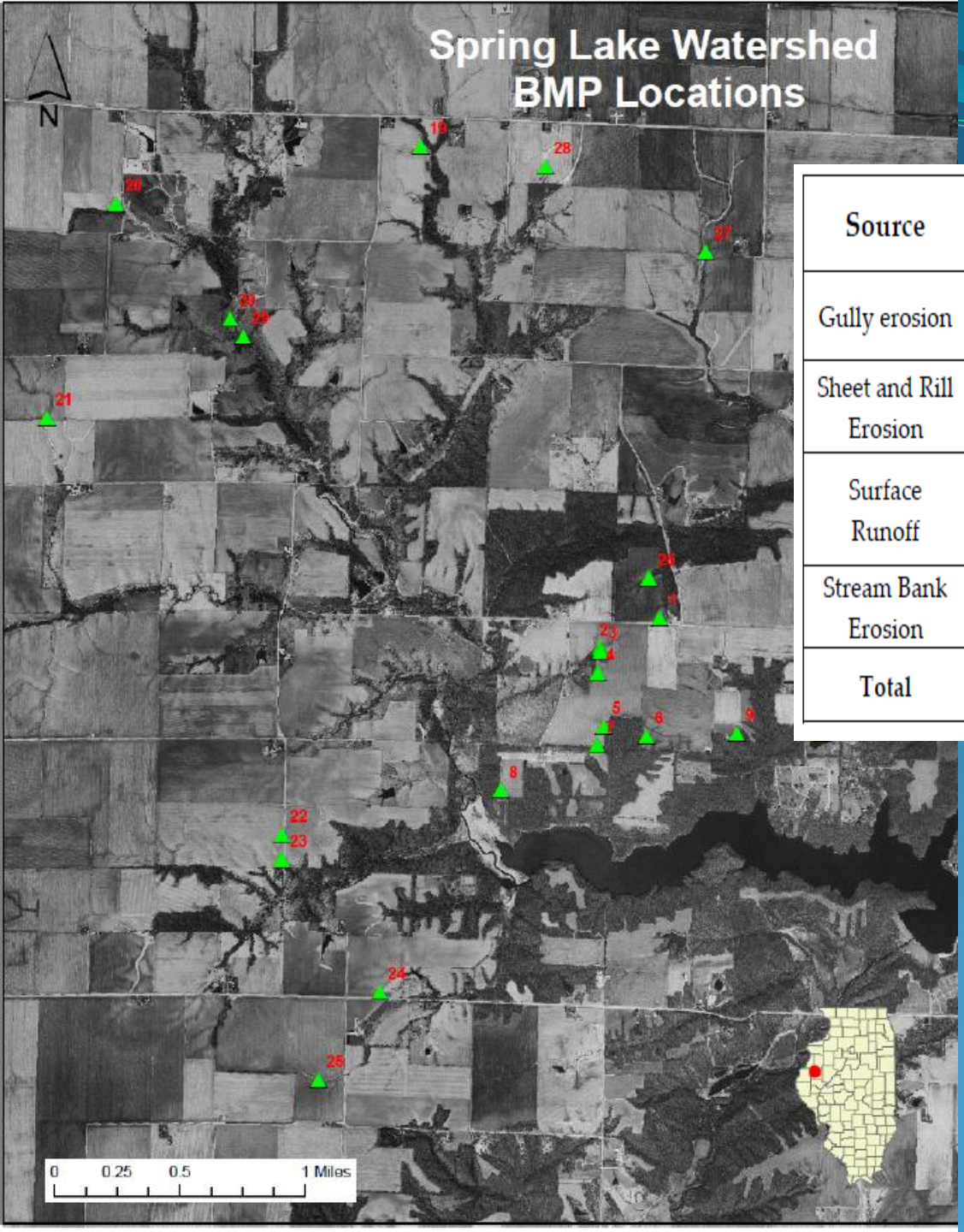
N
W E
S

1:4,112

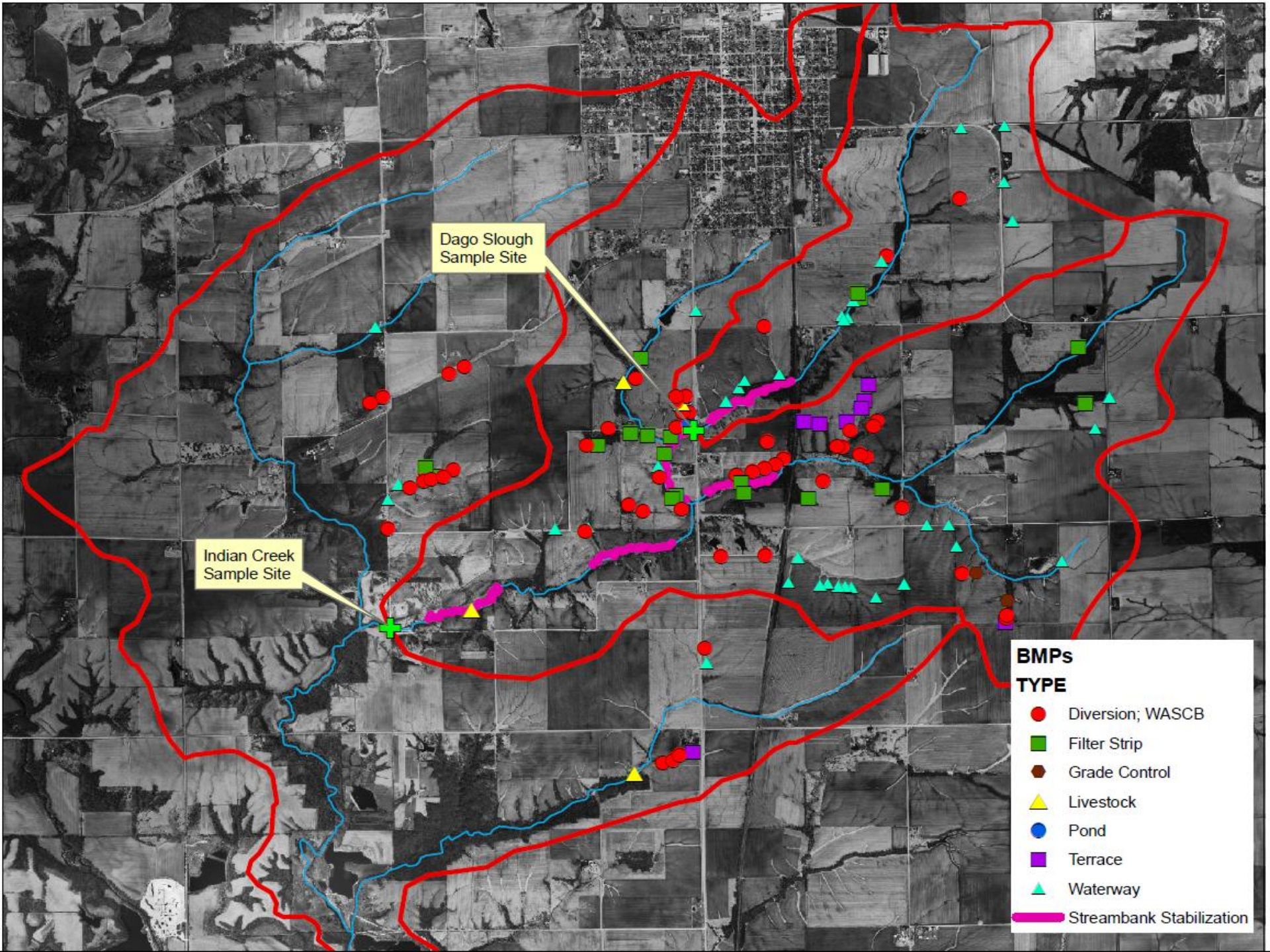
0 0.02 0.04 0.08 Miles

Ravine 1L
North Section
Ranked 5 out of 47

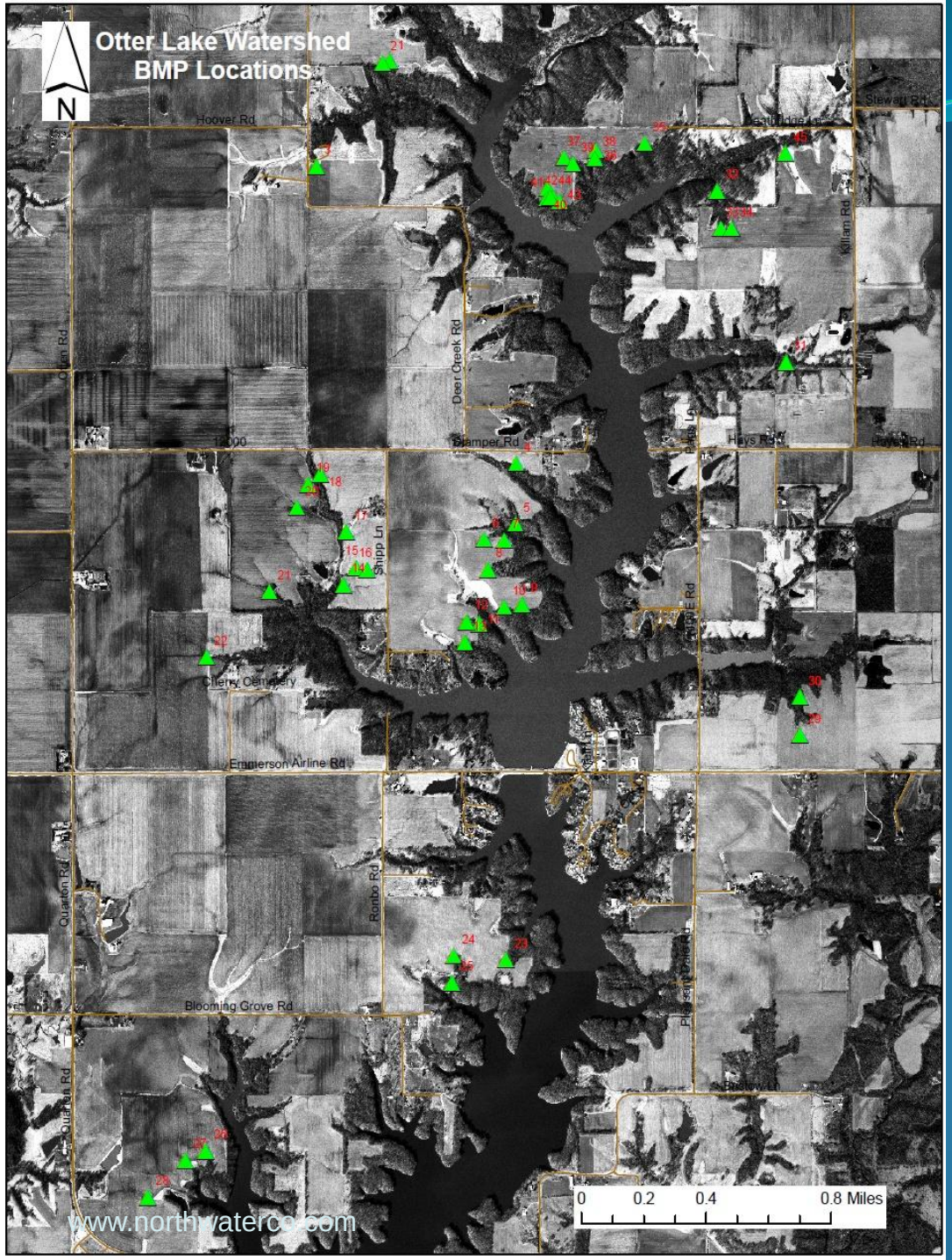
For
Erosion Potential



Source	Number	Sediment (tons/yr)	N (lbs/yr)	P (lbs/yr)
Gully erosion	29	729	2345	894
Sheet and Rill Erosion	29 drainages	962	3261	1223
Surface Runoff	29 drainages	n/a	1317	208
Stream Bank Erosion	500ft	46	158	47
Total		1,737	7,081	2,372


Dago Slough
Sample Site
Indian Creek
Sample Site
BMPs
TYPE
Diversion; WASCB
Filter Strip
Grade Control
Livestock
Pond
Terrace
Waterway
Streambank Stabilization

Best Management Practice Locations – Otter Lake



Minimum Element #4

- Technical and financial resources

BMP Type and Number	Unit Cost	Indian Creek Above Sample Site	Total Cost	Indian Creek Below Sample Site	Total Cost	Dago Slough	Total Cost
WASCB	$2,500	54	$135,000	21	$52,500	14	$35,000
Filter Strip*	$500	15	$7,500	2	$1,000	2	$1,000
Terrace	$1,500	7	$10,500	1	$1,500	0	0
Livestock**	$8,700	1	$8,700	1	$8,700	0	0
Grass Waterway	$1,800	20	$36,000	4	$7,200	15	$27,000
Grade Control	$8,000	2	$16,000	0	0	0	0
Streambank Stabilization	N/A	3	$386,487	0	0	2	$236,475
Wetland	N/A	0	0	0	0	0	0
Retention Basin	$10,000	0	0	0	0	1	$10,000
Gutter System (livestock)	$3,000	1	$3,000	0	0	1	$3,000
Diversion	$2,000	1	$2,000	0	0	2	$4,000
Other	N/A	0	0	0	0	0	0
Total – All BMPs		**101**	**$604,987**	**29**	**$70,900**	**35**	**$316,475**

Minimum Element #4

- Technical and financial resources

Best Management Practice	Funding Sources	Notes/Cost Share Rates
Filter Strips Riparian Buffers Dry Dams (WASCBs) Grass Waterways Terrace Diversion	IEPA – 319 program NRCS – EQIP program FSA – CRP program SWCD – CPP program US F&W – Acres for wildlife program IDNR/SWCD – CREP program IDNR – SWG program NRCS – WHIP program IDNR – Special Wildlife Funds Grants	CREP eligible acres must be in the 100 year floodplain and/or have cropped ground with erodibility index of 8 or greater adjacent to riparian zones; must have cropping history of at least 4 years between 1995 and 2001. SWG program requires 50% state match and must address goals/species outlined in the State of Illinois Comprehensive Wildlife Plan. NRCS, FSA, and SWCD programs provide 60% cost-share, however, some special programs and practices can provide up to 90%. FSA, CREP and some NRCS programs also provide annual rental payments for taking ground out of production.

Minimum Elements: The Rest

- Develop a implementation schedule
- Identify Milestones
  - “Install 50 Dry Dams in priority watersheds by 2015”
- Criteria; are pollutant reductions being met?
  - Tons/sediment
  - Improved aquatic habitat
- Monitoring Plan
  - Monitoring of water quality
  - Administrative monitoring

Overall Keys to Successful Plans

- Strong local leadership and dedicated support/management staff
- Clear direction; must have someone to keep the plan on track and push implementation
- Plan must be SPECIFIC but try to keep things simple
  - Exactly where and what
- Plan should meet requirements of multiple funding sources

La Moine River Watershed Plan Implementation

Implementing a Plan

- Plan must have clear direction with actual projects identified
- Match projects with appropriate state and federal funding programs
  - USDA – Agricultural programs
  - IEPA – Federal clean water programs
  - State – varies by state

FSA Farm Service Agency *Online*

NRCS Natural Resources Conservation Service

US Army Corps of Engineers ®

Illinois Department of Agriculture

Illinois Environmental Protection Agency

La Moine River Ecosystem Partnership (LMREP)

- collaboration of more than 25 organizations
- dozens of committed landowners and residents

Preserve, Protect & Enhance

- Numerous grants funded and projects completed 2006-2008
  - Restoration conservation, and research
  - Education and outreach to landowners and residents

Source	# grants	Cash	Match	Total
C2000 (includes EQIP)	9	113,275	135,792	249,067
IEPA	7	305,000	177,000	482,000
State Wildlife Grants	1	90,000	90,000	180,000
US Fish and Wildlife	1	5,000	2,200	7,200
		$513,275	$404,992	$918,267

- **Ralph Welch Gully Stabilization**
  - **Stabilize and stop erosion on 300ft gully draining to La Moine River**
  - **Funded by Illinois Environmental Protection Agency**

- Runoff control system; livestock operation
  - Funded with unused grant funds

Restoration and Conservation

Wolf/Hutchins Livestock Management Project

- $120,000.00 Project; Livestock fencing, crossings, pasture management, watering system, wetland and riparian zone restoration, streambank stabilization, upland erosion control, modeling
- Funding sources: NRCS EQIP, SSRP, C2000, Trees Forever


CASE

Streambank Stabilization – Stone Toe Protection


Grade Control - Riffle

Tree Clearing and Prairie Restoration

Restoration and Conservation

- La Moine dump cleanup and Illinois River Sweep

Education and Outreach

- Wheels for Conservation
  - 44 people including 8 presenters and 14 landowners

Education and Outreach

- Developed a presentation for civic, conservation, and service groups

Organization	# of Participants	City
Schuy-Rush Audubon	10	Rushville
Macomb Kiwanis	30	Macomb
Prairie River Network Mtg	20	
Rushville Rotary	20	Rushville
Two River RC&D Annual Mtg	20	Roseville
4th graders-RIMiddle School	16	Rushville
Environmental Summit	250	Macomb
PreK-8th Science Update Conference	189	Macomb
Earth Day Fair	150	Macomb

Congratulations
You made it

The END

Questions?