Challenges with water treatment, nutrient loading, success stories and the hardships encountered with the Lake Springfield Watershed

CITY WATER LIGHT AND POWER
SPRINGFIELD, IL

AGENDA

- **HISTORY OF LAKE SPRINGFIELD**
- **WATER TREATMENT CHALLENGES**
- **NUTRIENT LOADING CHALLENGES**
- **SUCCESS STORIES AND OBSTACLES**

CONSTRUCTION

Lake Springfield was constructed in 1935 as a drinking water source for Springfield

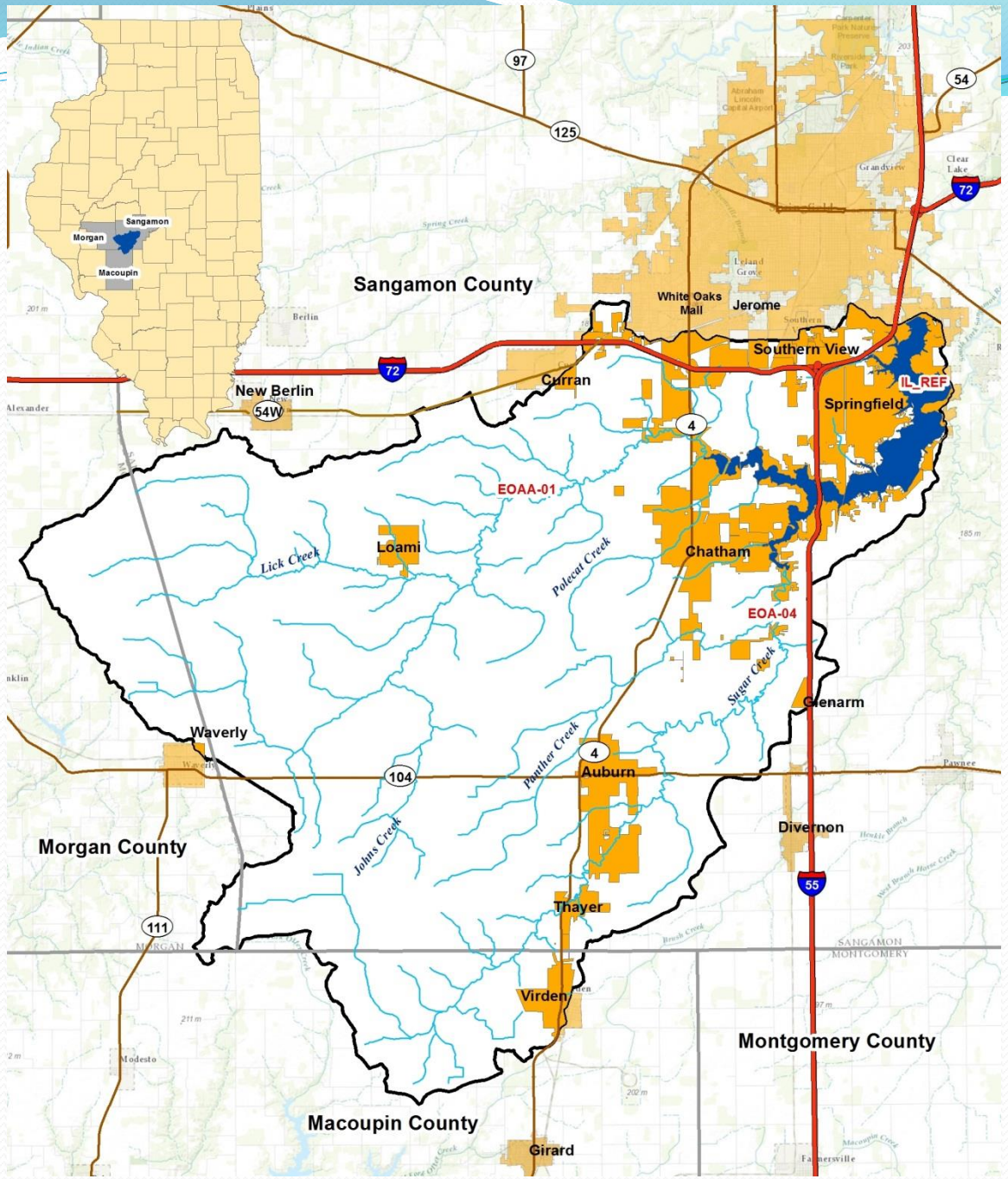
And as a cooling water source for the power plant

LAKE SPRINGFIELD

- **2 Dams: Spaulding and Saddle**
- **4,300 acres, holds appx. 17 billion gallons**
- **12 miles long and on average ½ mile wide.**
- **57 miles of shoreline.**
- **Water Plant produces on average 22 mgd.**
- **Each foot of Lake holds 1,000,000,000 gallons.**

LAKE SPRINGFIELD WATERSHED

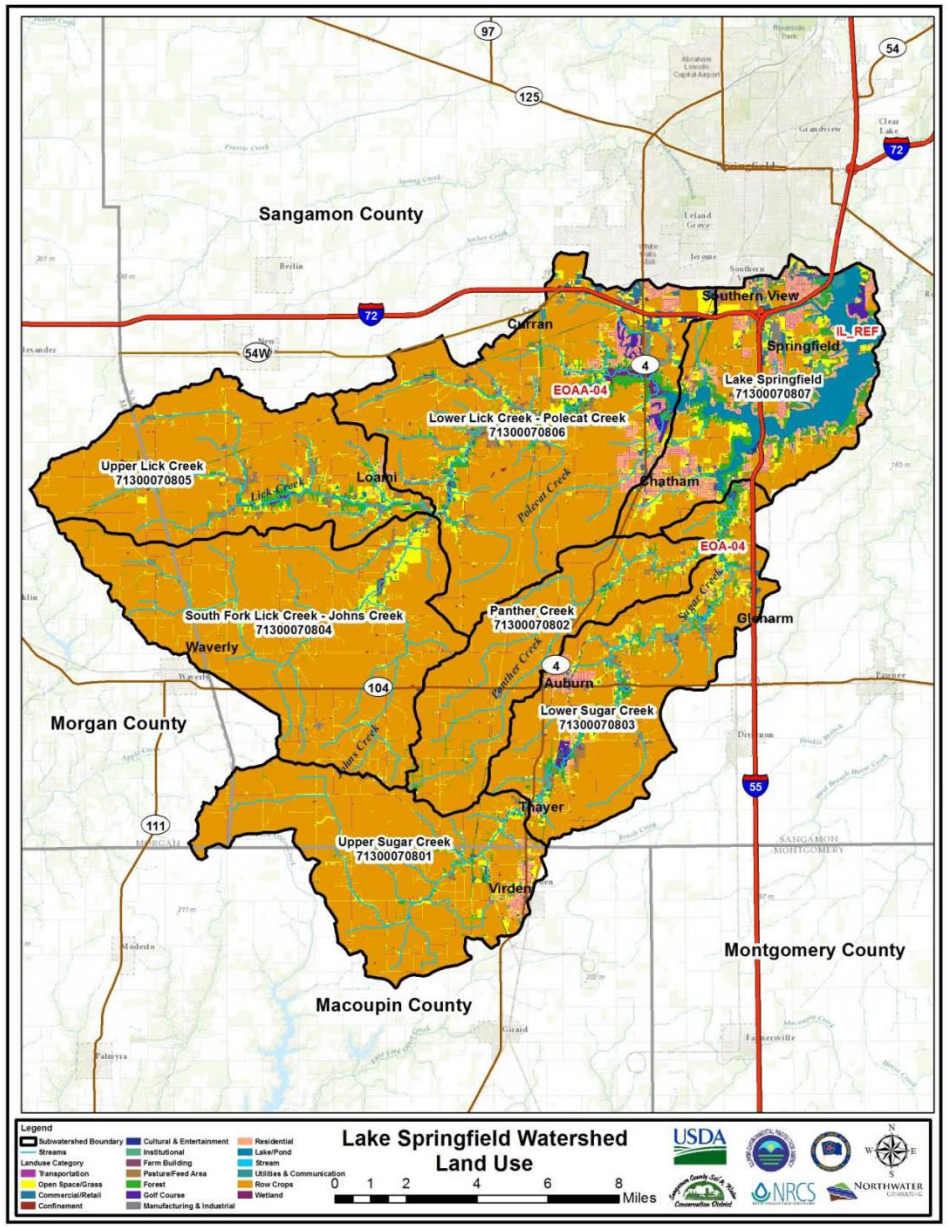
- **170,000 acres (265 mi^2)**
- **Mostly southwest of Springfield**
- **Bordered by I-72 to west and I-55 to south**
- **Main tributaries**
  - **Lick Creek (west)**
  - **Sugar Creek (south)**


Sangamon
Morgan
Macoupin
Sangamon County
Morgan County
Macoupin County
Montgomery County
White Oaks Mall
Jerome
Southern View
Springfield
IL_REF
Curran
New Berlin
EOAA-01
Loami
Lick Creek
Polecat Creek
Chatham
EOA-04
Sugar Creek
Glenarm
Waverly
Panther Creek
Auburn
Johns Creek
Divernon
Thayer
Virden
Girard
97
125
54
72
4
104
111
55
54W

Land Use

74% Cropland
5% Forest
4% Grassland

Highest % Row crops =
South Fork Lick & Panther Creek



EARLY SOURCE WATER PROTECTION PLANS

LAKE SPRINGFIELD WATERSHED – 37 YEARS

1982 - CWLP BEGAN LAKE SPRINGFIELD MAINTENANCE AND RESTORATION PLAN

REMOVE SEDIMENT FROM THE LAKE

PROVIDE SHORELINE STABILIZATION

WATERSHED PROTECTION

1983 - CWLP COST SHARE PROGRAM WITH SCSWCD BEGAN

$25,000/YEAR – ESTABLISH BMPs IN LSW TO:

REDUCE SOIL EROSION

IMPROVE WATER QUALITY

1987 - PHASE I DIAGNOSTIC/FEASIBILITY STUDY FOR LAKE SPRINGFIELD RESTORATION PLAN

1987–1990 - DREDGING PROJECT – PHASE 1 – 3.2 MILLION CUBIC YARDS OF SEDIMENT REMOVED FROM LAKE SPRINGFIELD

1990 - LAKE SPRINGFIELD WATERSHED RESOURCE PLANNING COMMITTEE (LSWRPC) WAS FORMED – 1ST RESOURCE PLAN WRITTEN

1991 - LAKE LAND USE PLAN DEVELOPED, revised 1994, 2005, 2012, 2014

1994 - NEAR VIOLATION OF DRINKING WATER STANDARD (3 PPB) FOR ATRAZINE

1995 - ADDENDUM TO 1990 WATERSHED PLAN TO ADDRESS PESTICIDE ISSUES

1995 - EPA 319 GRANT- URBAN CONSTRUCTION EROSION CONTROL BMPS

1997 - 5 YEAR STUDY – "ASSESSMENT OF BEST MANAGEMENT PRACTICES (BMPs) EFFECTIVENESS ON WATER QUALITY AND AGRONOMIC PRODUCTION IN THE LAKE SPRINGFIELD WATERSHED"

1997–2002 - Assessment of BMP effectiveness on Water Quality and Agronomic Production in the LSW began

2003 - EPA 319 GRANT (40% MATCH FROM CWLP)

600 ACRES OF GRASS FILTER STRIPS ESTABLISHED – 15 YEAR CRP

2004 - SEDIMENTATION SURVEY - 7% DECLINE IN EROSION RATE OVER 20 YEARS

2008 - USDA GRANT "NORTHERN BOBWHITE QUAIL CONSERVATION INITIATIVE"

HABITAT FOR WILDLIFE (SAFE) - 2,000 ACRES- 20 CONTRACTS IN LSW

2012 - LSWRPC MEET TO REVISE 1990 PLAN

2013 - IEPA PRIORITY LAKE AND WATERSHED IMPROVEMENT PLAN

GRANT - STABILIZED 2,756 FEET OF HIGHLY ERODIBLE SHORELINE

2013 - SPECIAL 3-YR. NITROGEN MANAGEMENT PROGRAM/STUDY BEGAN-
GOAL: REDUCE NITRATE N TO 5 PPM AT LAKE'S INTAKE AT ALL TIMES

2013 - EPA 319 GRANT TO IMPLEMENT BMPs IN WATERSHED and WRITE NEW WATERSHED-BASED PLAN: CWLP PROVIDES 40% MATCH

2014 - STAGE 1 TMDL STUDY COMPLETED FOR LAKE SPRINGFIELD AND SUGAR CREEK WATERSHED

2015 - ONGOING WORK WITH LAKE HOMEOWNERS TO EDUCATE ON URBAN BMPs FOR LAWN CARE MAINTENANCE, FERTILIZER AND PESTICIDE USE. USGS INSTALLS 2 GUAGES AT LICK & SUGAR CREEK

2015 - IL NUTRIENT LOSS REDUCTION STRATEGY RELEASED BY EPA
PHASE 1 MILESTONES - BY 2025 - REDUCE NITRATE NITROGEN BY 15%
- REDUCE PHOSPHORUS BY 25%

2016 - FINAL RESULTS OF THE 3-YR. NITROGEN MANAGEMENT STUDY
FINAL WATERSHED-BASED PLAN

- **2016–2017** - SCSWCD cover crop program in LSW. Thirty-five LSW producers planted 1,400 acres of cover crops in the fall of 2016.

- **2017** - Final Total Maximum Daily Load (TMDL) Study for 5 impaired water body segments of the LSW, including Lake Springfield, 3 segments of Sugar Creek and the Hoover Branch segment north of Spaulding Dam.

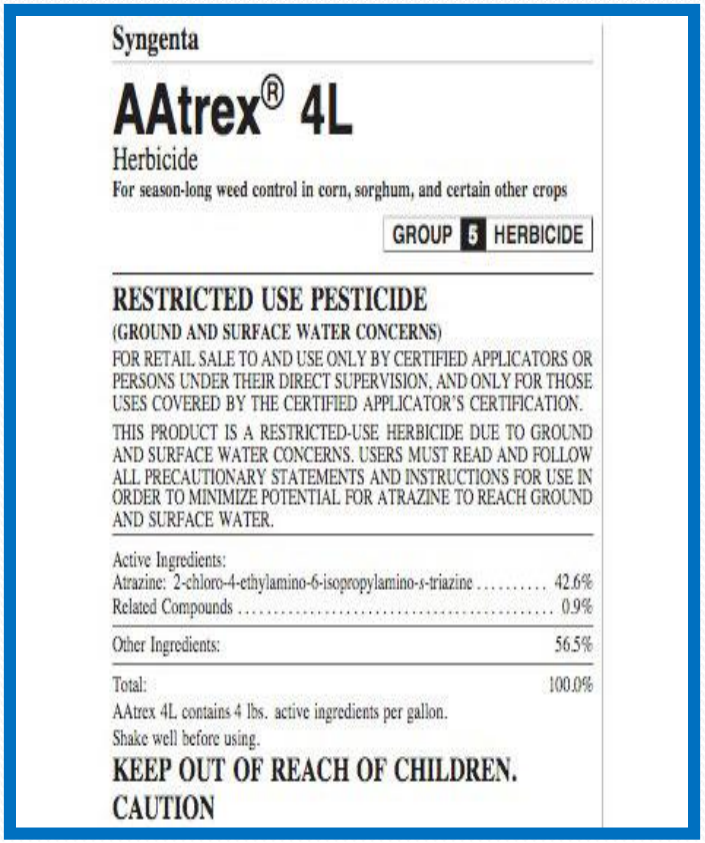
- **2017** - Final Lake Springfield Watershed-based Management Plan, a Strategy to Enhance and Protect the Water Quality and Natural Resources of Lake Springfield and Its Watershed.

- **2017–2019** - IEPA 319 Grant for agricultural and urban BMPs throughout the LSW, as a continuation and expansion of efforts to significantly reduce nutrient loadings in this watershed's streams from surface water runoff and to ultimately improve the quality of the water in the lake. Also this grant includes funding for cover crops, nutrient management plans and education activities.

Challenges in Water Treatment

- Removal of herbicides/pesticides
- Sediment
- Nitrates
- Corrosion Control-Lead Service Lines
- PFAS Compounds

Excessive levels of Atrazine found in our drinking water in 1994



Syngenta

AAtrex® 4L

Herbicide

For season-long weed control in corn, sorghum, and certain other crops

GROUP 5 HERBICIDE

RESTRICTED USE PESTICIDE

(GROUND AND SURFACE WATER CONCERNS)

FOR RETAIL SALE TO AND USE ONLY BY CERTIFIED APPLICATORS OR PERSONS UNDER THEIR DIRECT SUPERVISION, AND ONLY FOR THOSE USES COVERED BY THE CERTIFIED APPLICATOR'S CERTIFICATION.

THIS PRODUCT IS A RESTRICTED-USE HERBICIDE DUE TO GROUND AND SURFACE WATER CONCERNS. USERS MUST READ AND FOLLOW ALL PRECAUTIONARY STATEMENTS AND INSTRUCTIONS FOR USE IN ORDER TO MINIMIZE POTENTIAL FOR ATRAZINE TO REACH GROUND AND SURFACE WATER.

Active Ingredients:	
Atrazine: 2-chloro-4-ethylamino-6-isopropylamino-*s*-triazine	42.6%
Related Compounds	0.9%
Other Ingredients:	56.5%
Total:	100.0%

AAtrex 4L contains 4 lbs. active ingredients per gallon.

Shake well before using.

KEEP OUT OF REACH OF CHILDREN.

CAUTION

Nitrates

- 10 mg/l- Blue Baby Syndrome
- CWLP does not treat for Nitrates
- Lake Springfield tributaries as high as 57.2 mg/l
- Intake max level 7.5 mg/l
- If reach 10 mg/l – build treatment
- Ion Exchange- $7-10M

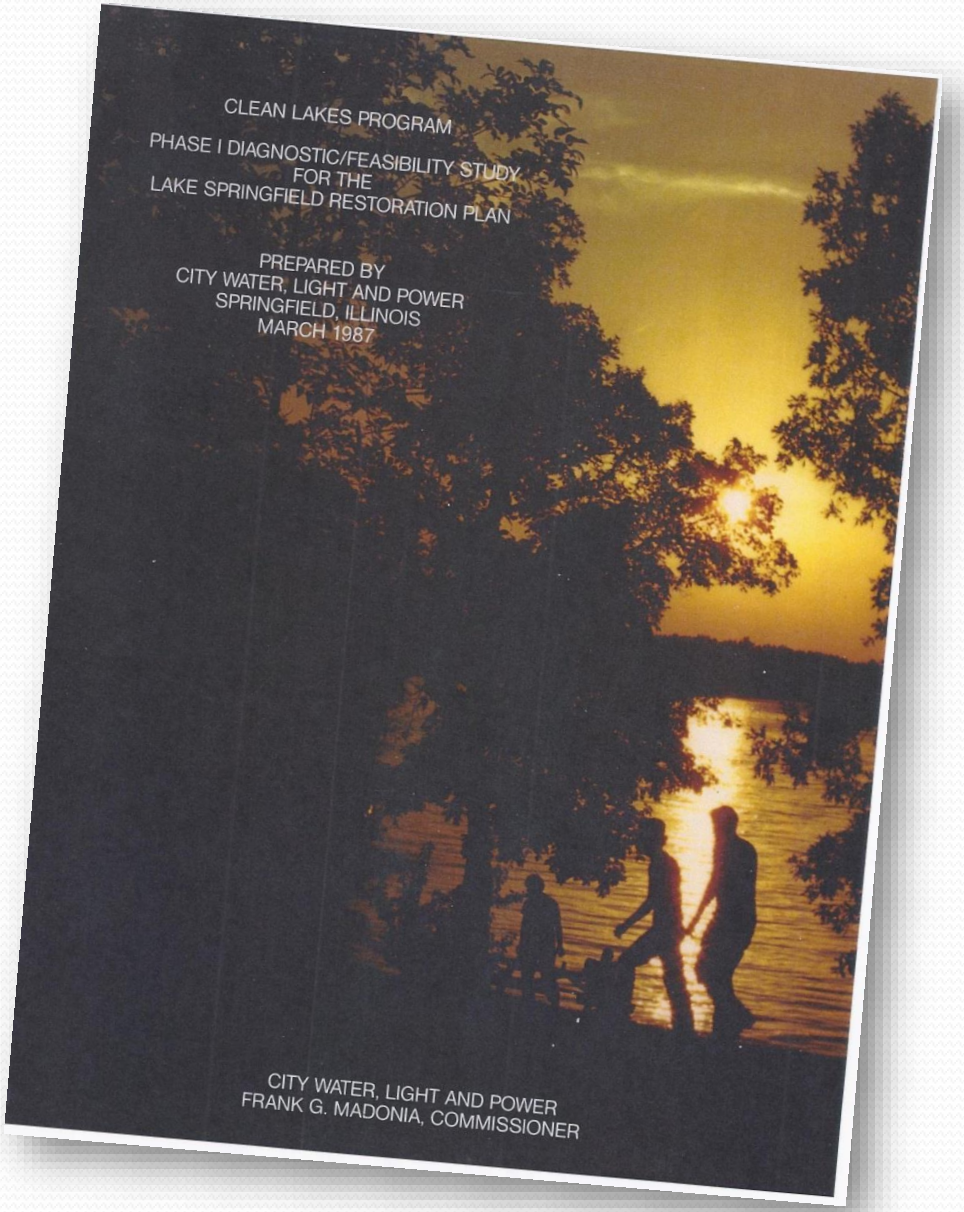
PFAS Compounds

- Per and polyfluoroalkyl substances
- Man-made chemicals (1940)
- Persistent in environment and human body
- Food packaging, water repellent, non-stick, waxes, paints, fire-fighting foam
- Contaminant ground water and some surface waters
- Very low levels - 20 ppt
- Health effects- low birth weight, immune issues, cancer, hormone disruption
- Must incinerate to dispose

Nutrient Loading

- Sediment
- Phosphorus
- Nitrate

The 1987 Phase I Diagnostic/Feasibility Study



A Three-Phase Lake Restoration Program was Initiated by CWLP

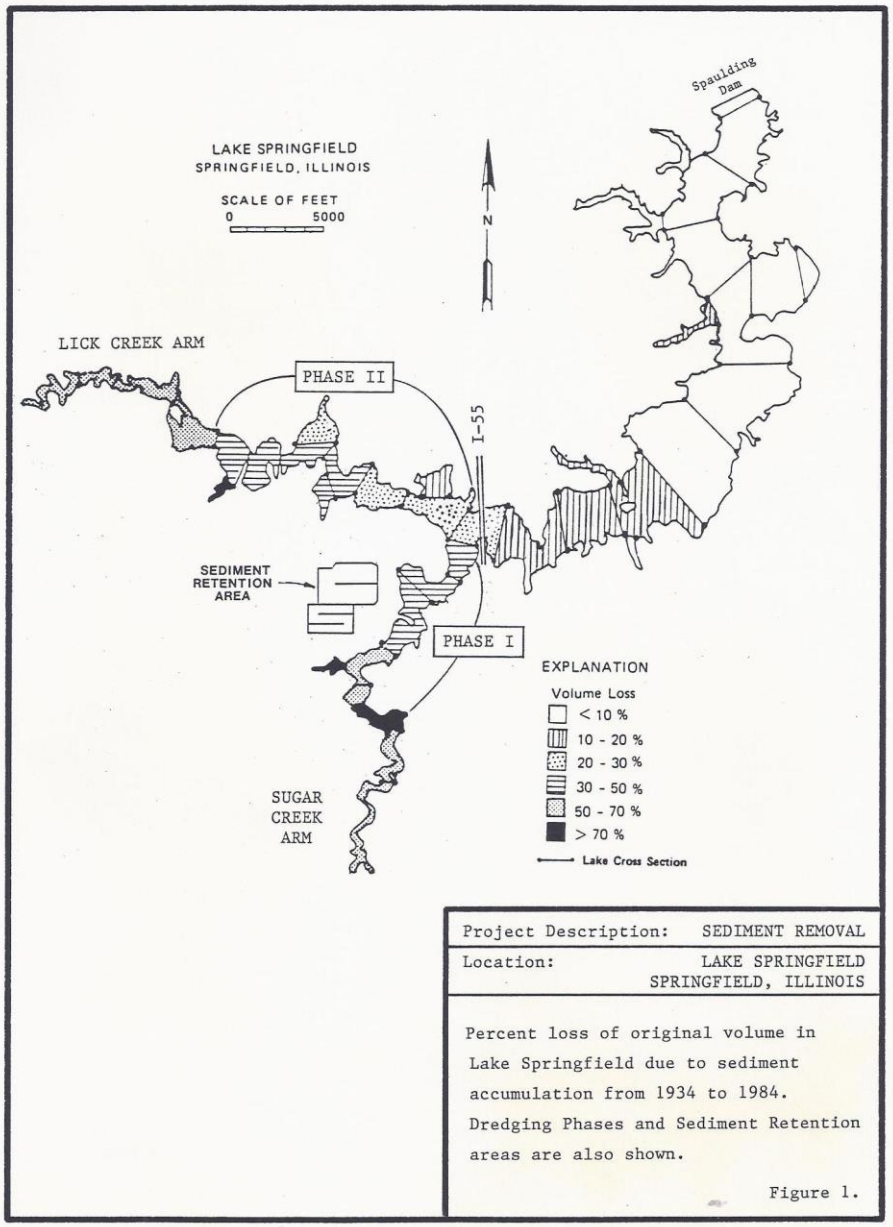
Phase 1: Soil Conservation

Phase 2: Hydraulic Dredging

Lake Springfield Dredging Project

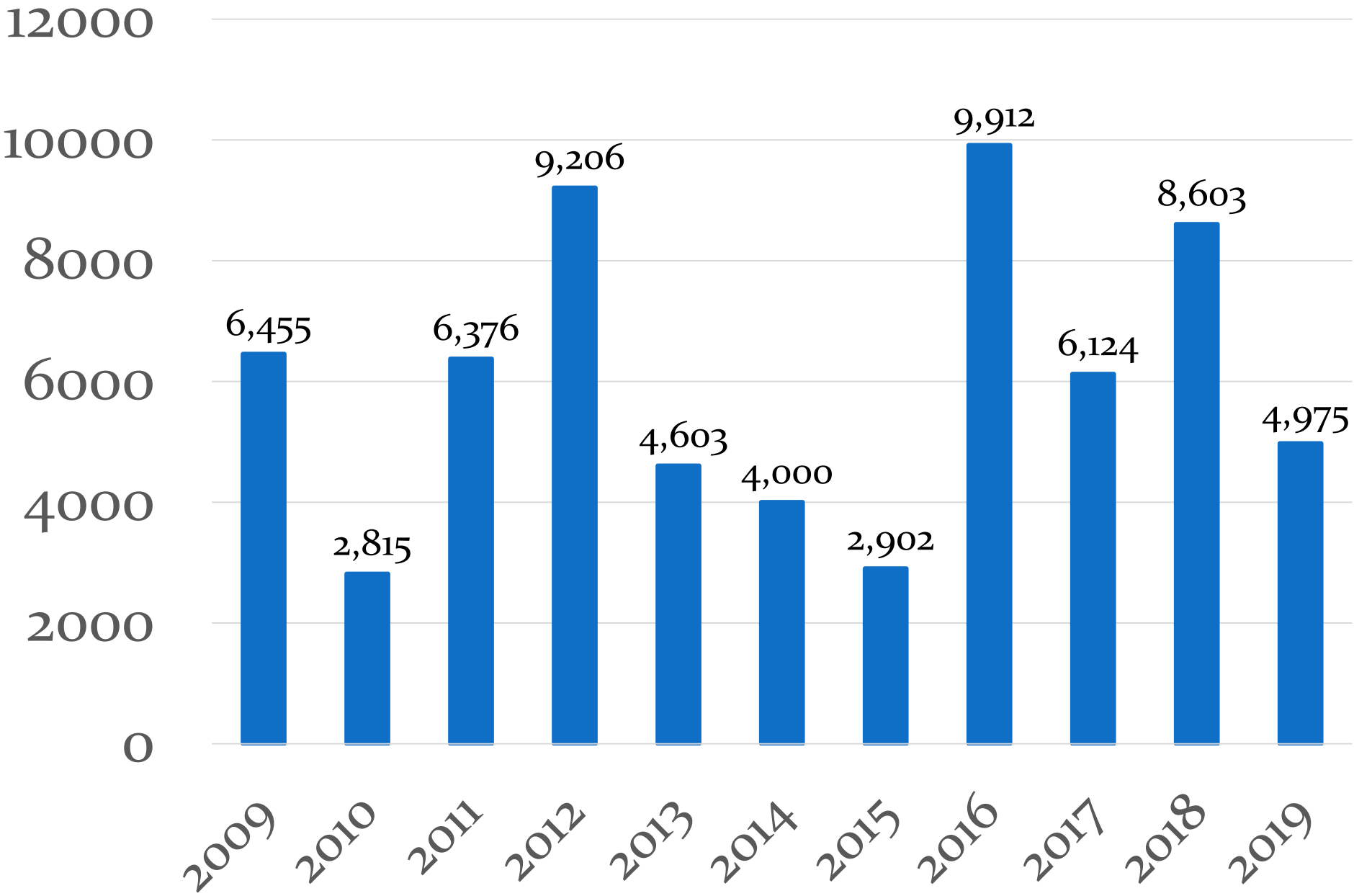
Phase I
Sugar Creek-
1.38M CY

Phase II
Lick Creek-
1.85M CY



Phase 3: Shoreline Stabilization

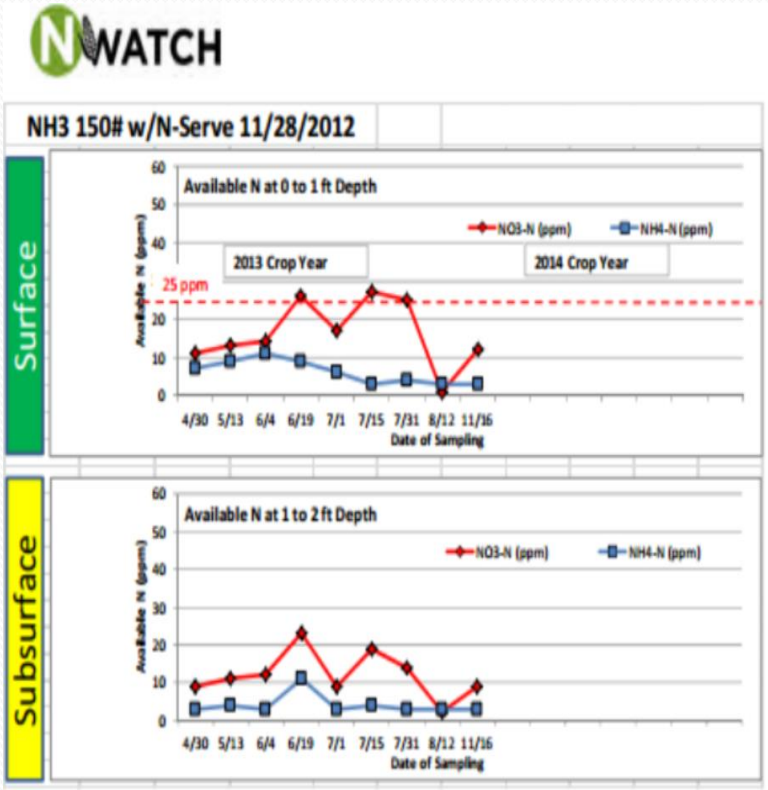
Shoreline Ft. per Year



Lake Springfield Watershed Nutrient Management Project

This program works with local ag retailers and producers to identify nitrate-N levels in their fields and encourage practices that minimize the risk of N loss and maximize N utilization by the crop.

- Multiple applications of N utilizing the 4Rs - Right source, rate, time and place
- N-watch soil nitrogen testing track nitrogen movement in the soil
- Establishment of cover crops for nitrogen fixation, soil erosion control, soil health and other water quality benefits.



Nutrient Loss Reduction Strategy goals

- Engaging producers will encourage adoption of practices that will minimize the risk of N loss and maximize N utilization by the crop.
- Demonstrating progress through engagement and increased adoption of BMPs will help keep the strategy voluntary.
- Voluntary programs will allow us to reduce losses while maintaining economic viability.
- Research
  - Research is needed for comprehensive analysis of nutrient movement under various conditions and scenarios
  - Individualized assessments and learning on each farm and field to determine which practices will be most effective
  - We hope to achieve this through our new Discovery Farms Program

Best Management Practices

No Till

- Recommended on 109,000 acres
- Annual N reduction = 599,000 lbs
- Annual P reduction = 50,000 lbs
- Annual Sediment reduction = 58,100 tons

Filter Strips

- 324 ac recommended (440,200ft)
- Annual N reduction = 54,000 lbs
- Annual P reduction = 9,300 lbs
- Annual Sediment reduction =9,700 tons

Cover Crops

- Recommended on 14,000 acres
- Annual N reduction = 51,000 lbs
- Annual P reduction = 3,000 lbs
- Annual Sediment reduction = 2,700 tons

Saturated Buffer

- Recommended for 9,000 ac
- Annual N reduction = 51,000 lbs
- Annual P reduction = 3,000 lbs
- Annual Sediment reduction =
- 2,700 tons

Challenges

- MOTHER NATURE
- LANDOWNERS
- FUNDING
- PARTNERSHIPS

MOTHER NATURE

Major Challenges

- We need a whole bunch $
- 400+ land owners
- 57 miles of shoreline
- Dredging


Landowners


Incentives


Government
PARTNER
SHIP

Success Stories

- A few successes but a long ways to go:
  - Partnerships
  - Ordinances and Plans
  - Atrazine
  - Reduction of Septic Systems
  - Nitrates??
  - Watershed Plan with SWAMM Model
  - Shoreline stabilization
  - And Hopefully more money

C-BMP
Illinois Council on Best Management Practices

City Water, Light & Power
Springfield, Illinois

Strong, Active Partners Yield Results

Sangamon County Soil & Water Conservation District

Lincoln Land Community College

Ag Retailers

Producers

GROWMARK AGRONOMY SM

KIC 2025
Keep It for the Crop by 2025

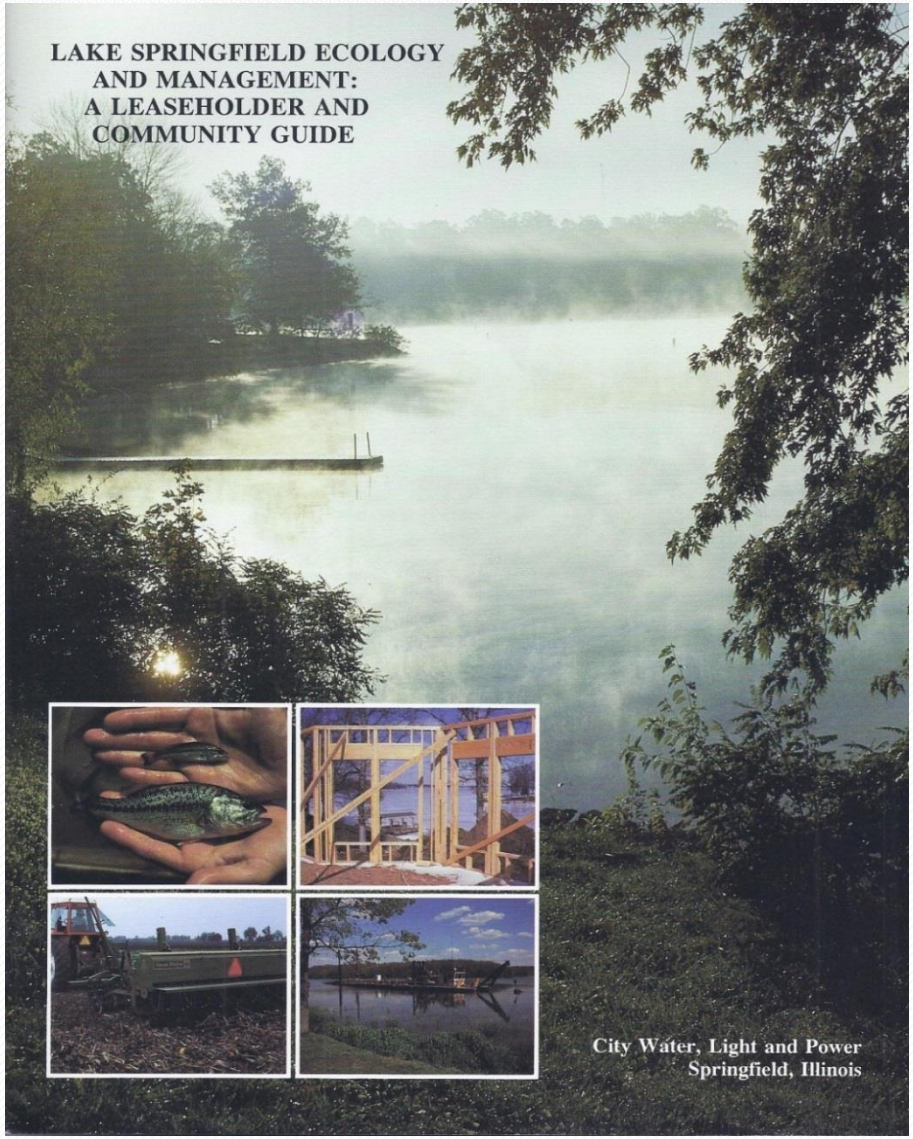
Plans

LAND USE PLAN
FOR
LAKE SPRINGFIELD AND ITS MARGINAL PROPERTIES

February 1991
Revised December 2005, September 2012 and May 2014

City Water, Light and Power

Springfield, Illinois

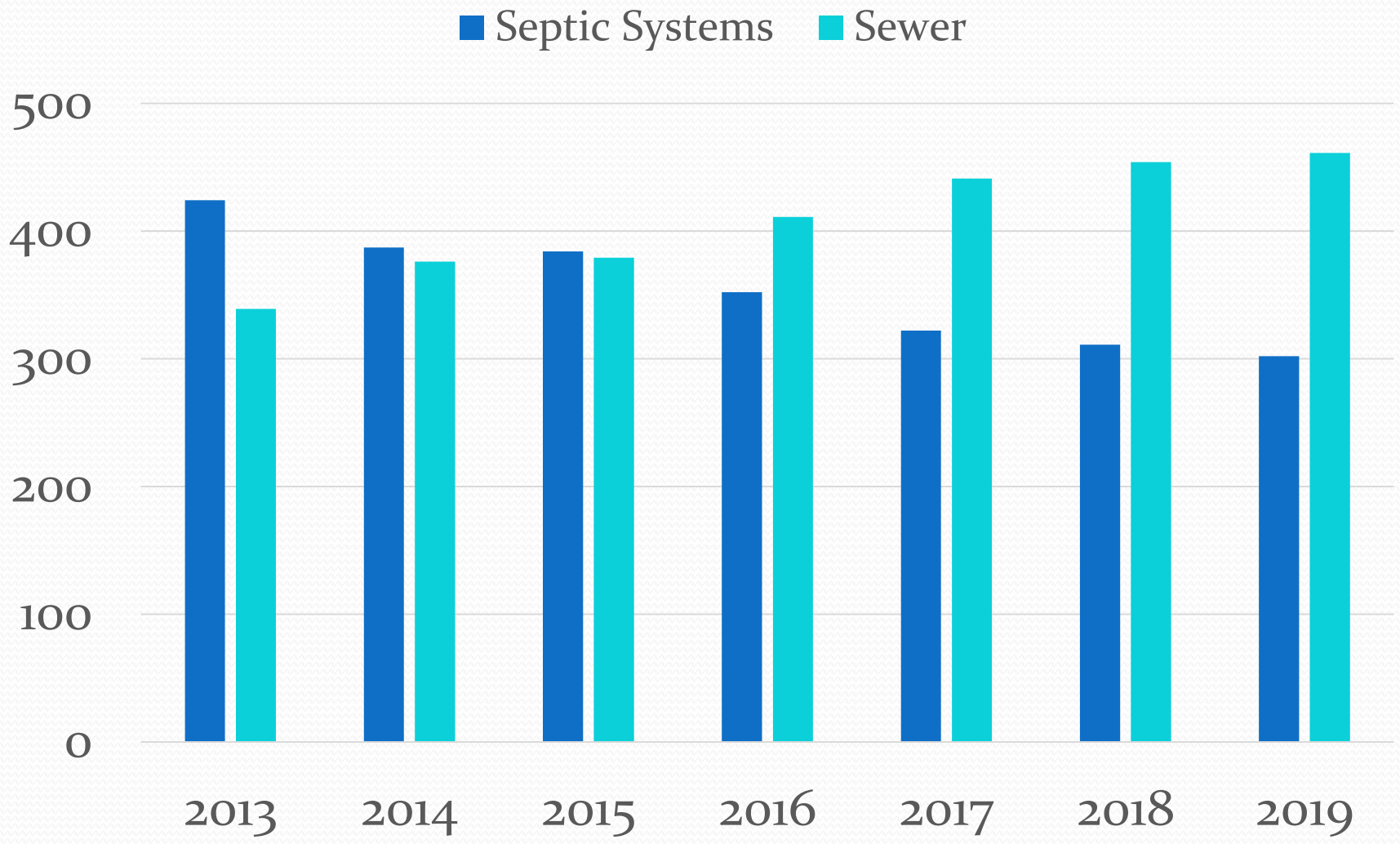


Erosion Control

- 2012 Springfield adopted an erosion Control ordinance.
- Requires developers to contain soil to their site
- Install detention ponds
- Protect sewer inlets
- Cover Crops > 4,000 acs -3 yrs

Since 2003 Powdered Activated Carbon has not been needed to remove atrazine from the lake water except last years.

Number of Homes Septic vs Sewer



Lake Springfield Watershed Nutrient Management Project

First Study of its Kind in Illinois

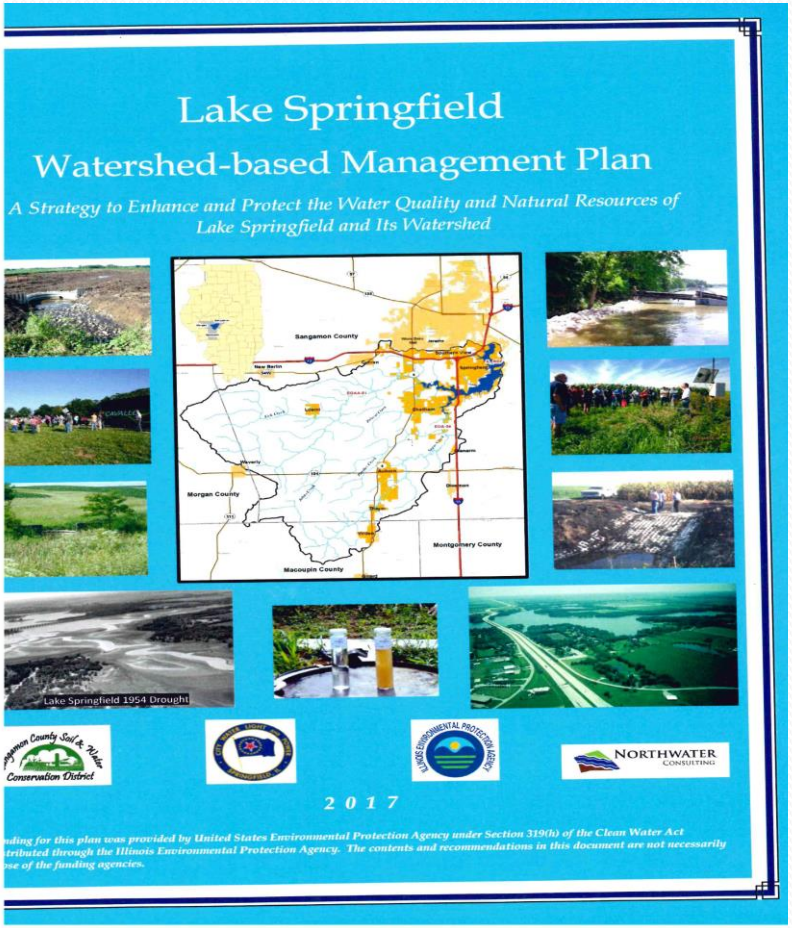
C-BMP
Illinois Council on Best Management Practices

NFWF

Sangamon County Soil & Water Conservation District

Lake Springfield Watershed-Based Management Plan

Final Draft Approved and Completed 2017



2016 Lake Springfield Watershed-Based Plan

Watershed Characterization

74% cropland, 5% Forest, 4% Grassland, 11% HEL

Nutrient and Sediment Loading

Annual P load – 194,762 lbs or 1.15 lbs/ac
Annual N load – 2,281,826 lbs or 13.51 lbs/ac
Annual Sediment load – 153,892 tons or 0.92 tons/ac

Identify Sources and Quantities

Load Reductions and Best Management Practices

No-Till, Cover Crops, Filter Strips, Saturated Buffers, Wetlands, Bioreactors, Grassed Waterways, Detention

Modeling - SWAMM

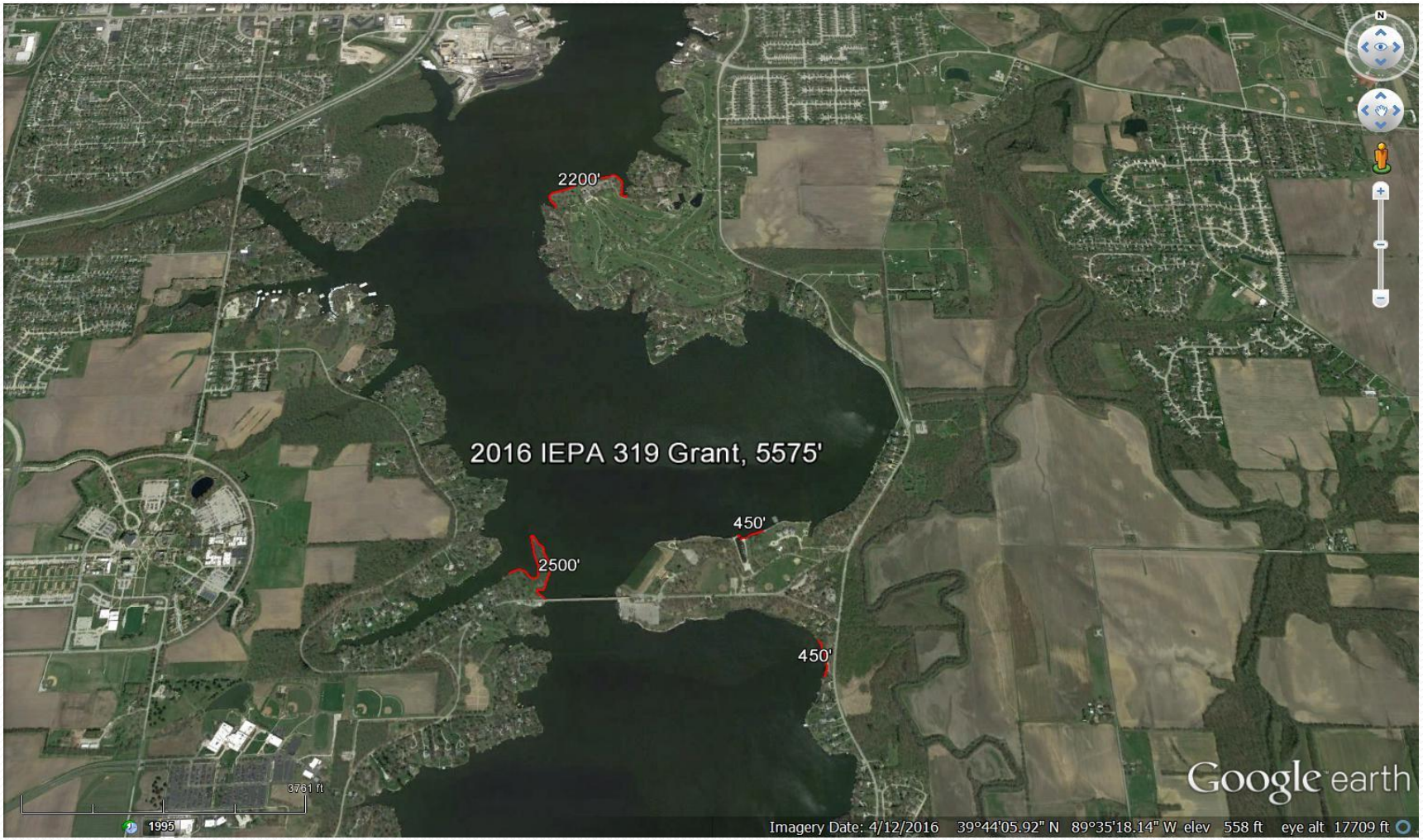
- Spatial Watershed Assessment and Management Model
  - Developed by Northwater Consulting and partners
  - Web-based
  - GIS mapping of entire watershed
    - Land use, Land type, Land cover, etc.
  - Allows user to input specific BMP's and determine load reductions, Phosphorus, Nitrate, Sediment
  - Easily identify best bang for the buck locations and BMP's

Shoreline Work

- Mapping all leased and non-leased shoreline
  - Identify material, install date, tons installed
  - Annual condition assessments
  - CWLP and IEPA (319 grant) annual 3,000-9,000 feet/yr.

IEPA Priority Lake and Watershed Improvement Project Grant 2013

IEPA 319 Grant 2016



Funding

- CWLP matches grants up to $300,000/year
- Continue to apply for IEPA 319 grants
- Applied for NWQI grant $250,000
- Applied for RCPP thru 2018 Farm Bill $1.2M
- We take donations

Lake Springfield is a Successful Case in Point.

THANK YOU

CONTACT INFORMATION

Ted Meckes, P.E., Water Division Manager

217-789-2116 ext. 2624

ted.meckes@cwlp.com