DuPage River Salt Creek Workgroup

# *Adaptive Watershed Management to Achieve the Designated Use for Aquatic Life: Salt Creek and the Upper DuPage River*

*M & R DEPT. 2013 SEMINAR SERIES*

*Stephen McCracken 07. 26. 2013*

# Agenda

- The DRSCW
- Project Area Brief
- TMDL summary
- Aquatic Life in the Program Area
- Adaptive Management
- Monitoring Activities
- IPS Tool

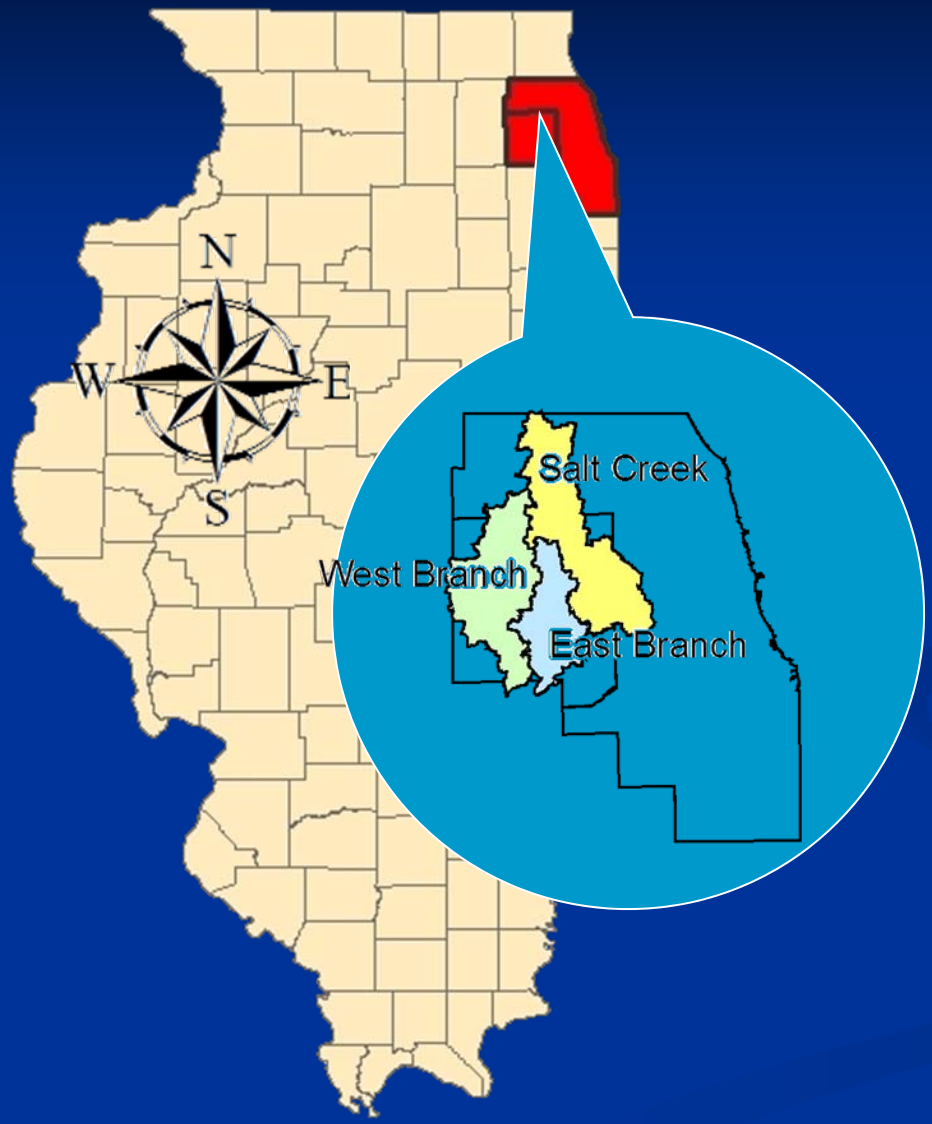

# Agency Members

- Village of Addison
- Village of Arlington Heights
- Village of Bartlett
- Village of Bensenville
- Village of Bloomingdale
- Village of Bolingbrook
- Village of Carol Stream
- Village of Clarendon Hills
- Village of Downers Grove
- Downers Grove Sanitary District
- The County of DuPage
- City of Elmhurst
- Village of Glen Ellyn
- Glenbard Wastewater Authority
- Village of Glendale Heights
- Village of Hanover Park
- Village of Hinsdale
- Village of Itasca
- Village of Lisle
- Village of Lombard
- Metropolitan Water Reclamation District of Greater Chicago
- City of Naperville
- City of Oakbrook Terrace
- Village of Roselle
- Salt Creek Sanitary District
- Village of Schaumburg
- Village of Villa Park
- City of West Chicago
- Village of Westmont
- City of Wheaton
- Wheaton Sanitary District
- City of Wood Dale
- Village of Woodridge

# Associate Members

- Baxter & Woodman, Inc.
- CDM Smith
- DuPage County Health Department
- Engineering Resource Associates
- Forest Preserve District of DuPage County
- Geosyntec Consultants
- HDR Inc.
- Huff & Huff, Inc.
- Illinois Department of Transportation
- Illinois State Toll Highway Authority
- Inter-Fluve, Inc.
- Naperville Park District
- Prairie Rivers Network
- RJN Group
- Robinson Engineering
- Ross A. Hill
- Salt Creek Watershed Network
- Sierra Club, River Prairie Group
- Steve Kaar
- Strand Associates, Inc.
- Suburban Laboratories, Inc.
- The Conservation Foundation
- The Morton Arboretum
- V3 Companies
- Walter E. Deuchler Associates, Inc.
- York Township Highway Dept.

# DRSCW Project Area




**Project Area lies in Cook and DuPage Counties (NE Illinois)**

Approximately 360 square miles of watershed

Three waterways (100 miles of main stem stream)

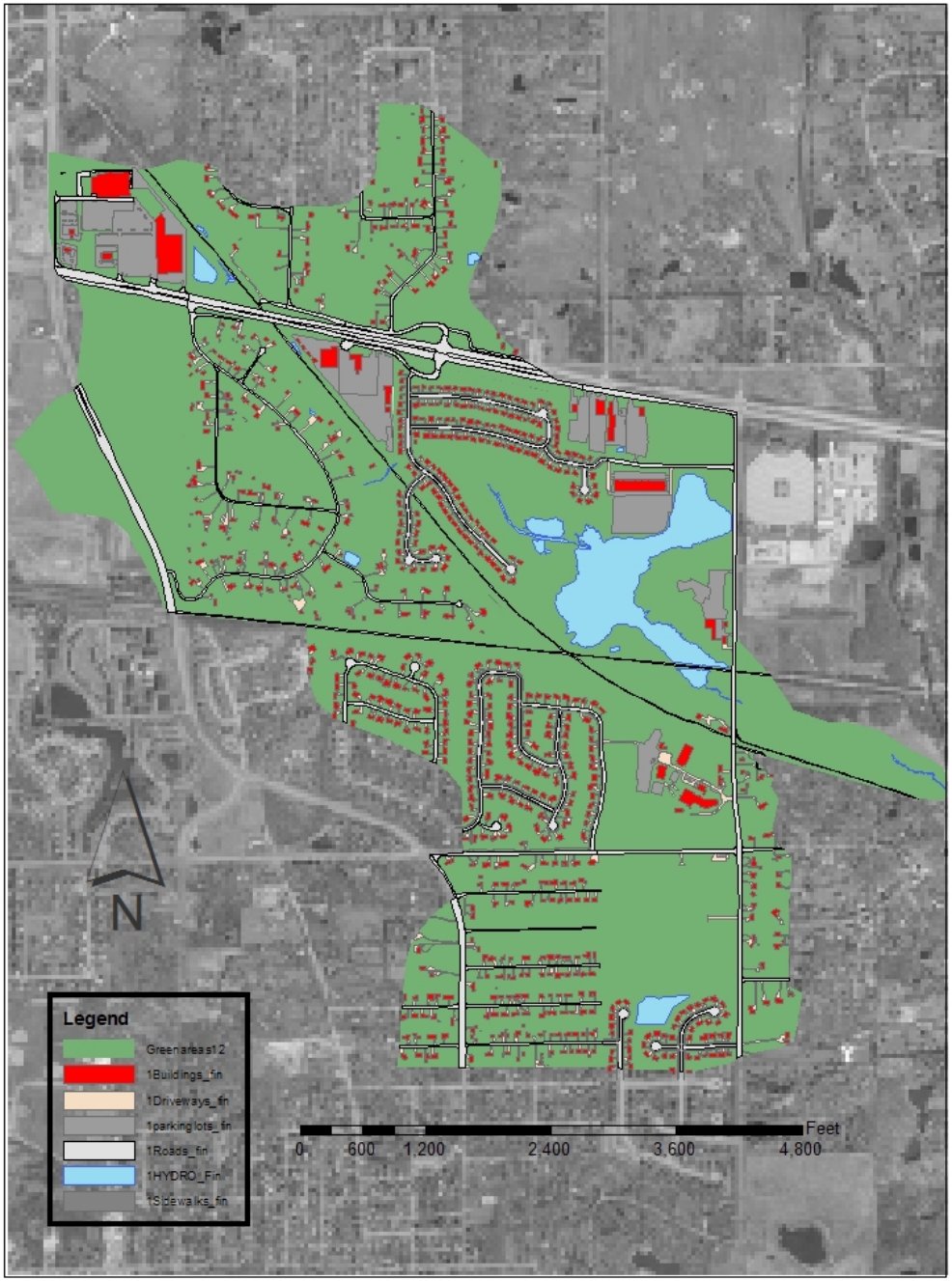
55 municipal entities

156 MGD of effluent (based on DAF) from 25 POTW operators

Urban to suburban with 48.7% being classified as residential, 24.7% as non-residential urban and 26.6% as open space, including water

Approved TMDLs for DO and chloride on several reaches

Plate 1.WinSLAMM Source Area Polygons(WestBranch Subbasin Mapping)




# TMDLs in Upper DuPage River & Salt Creek (2004)

All streams classified as general use (highest standard)

- **West Branch of the DuPage River**

**Impairments:** *chloride and copper*

- **East Branch of the DuPage River**

**Impairments:** *conductivity, chloride and dissolved oxygen (DO)*

- **Salt Creek**

**Impairments:** *copper, conductivity, chloride and dissolved oxygen (DO)*

# IEPA Recommendations

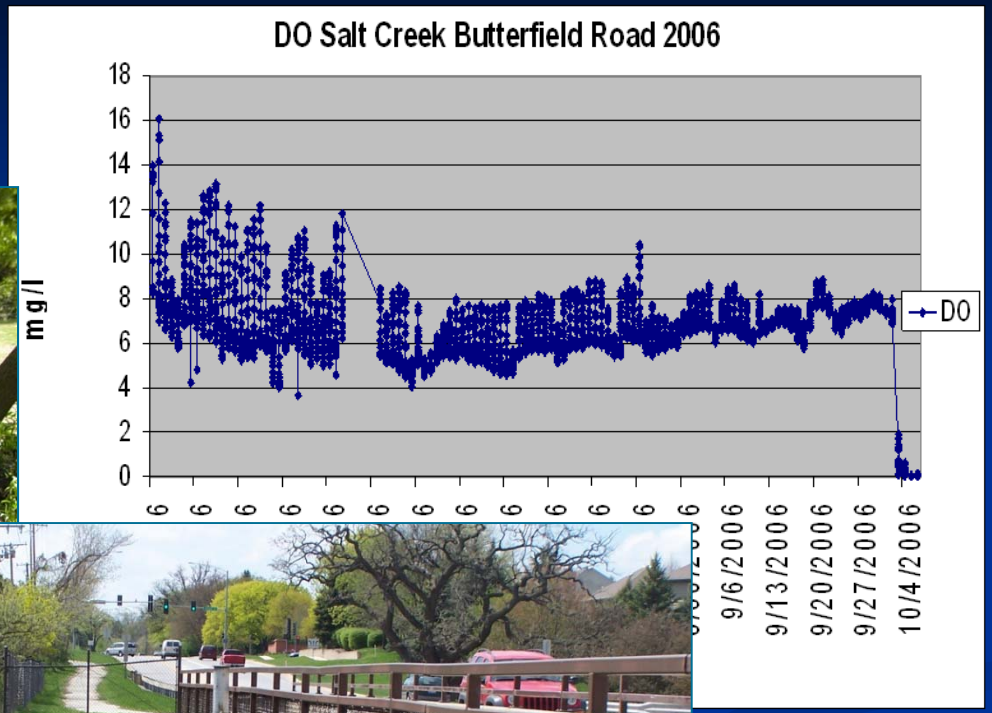
- Lower effluent limits for ammonia and CBOD for sewage treatment plants that discharge wastewater to these streams (8 mg/L CBOD5 and 1 mg/L ammonia-N levels recommended)
- Evaluate in-stream aeration or dam removal and implement if cost effective
- Manage storm water and combined sewer overflows to reduce organic loading
- Develop and implement BMPs for road de-icing activities

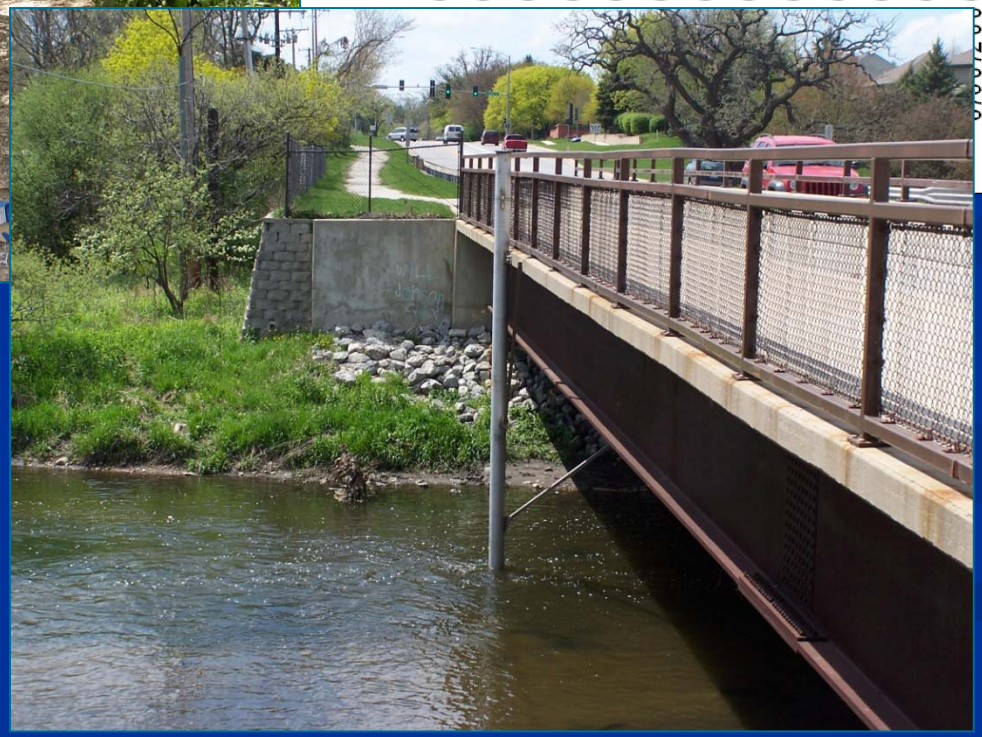
# Problems with the TMDLs

1. Water quality data based on insufficient sampling (limited temporally and spatially)
2. Currently POTWs all discharging at levels below the proposed new limits (no changes in practices were actually proposed)
3. POTW approach alone very expensive and not likely to attain water quality standards
4. Dams, in stream aeration, chloride BMPs –who researches, coordinates and pays for the project

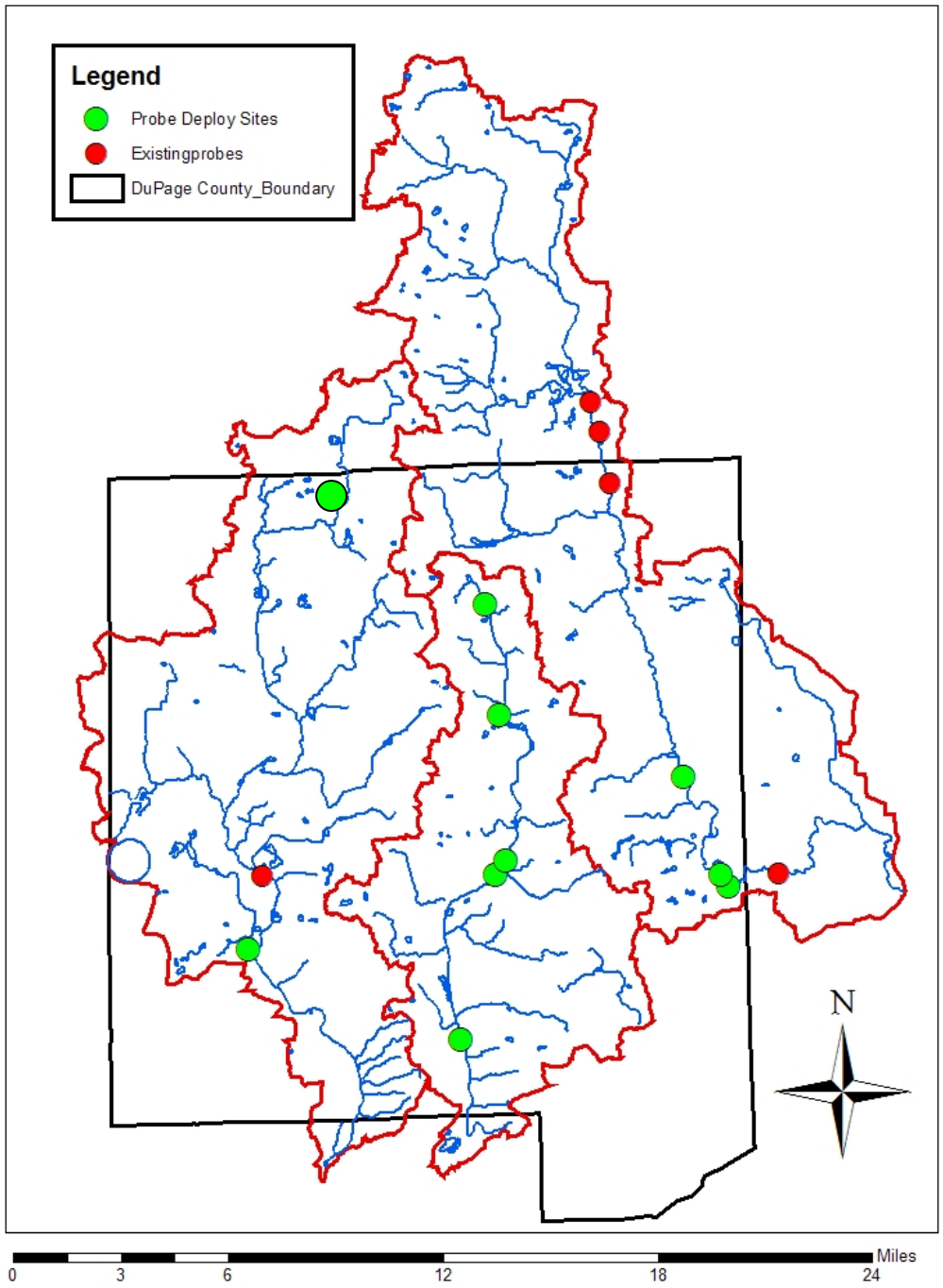
# Monitoring and TMDL Implementation Activities

# Continuous Dissolved Oxygen Monitoring



Map 1. DO Probe Deployment Sites, July 2006

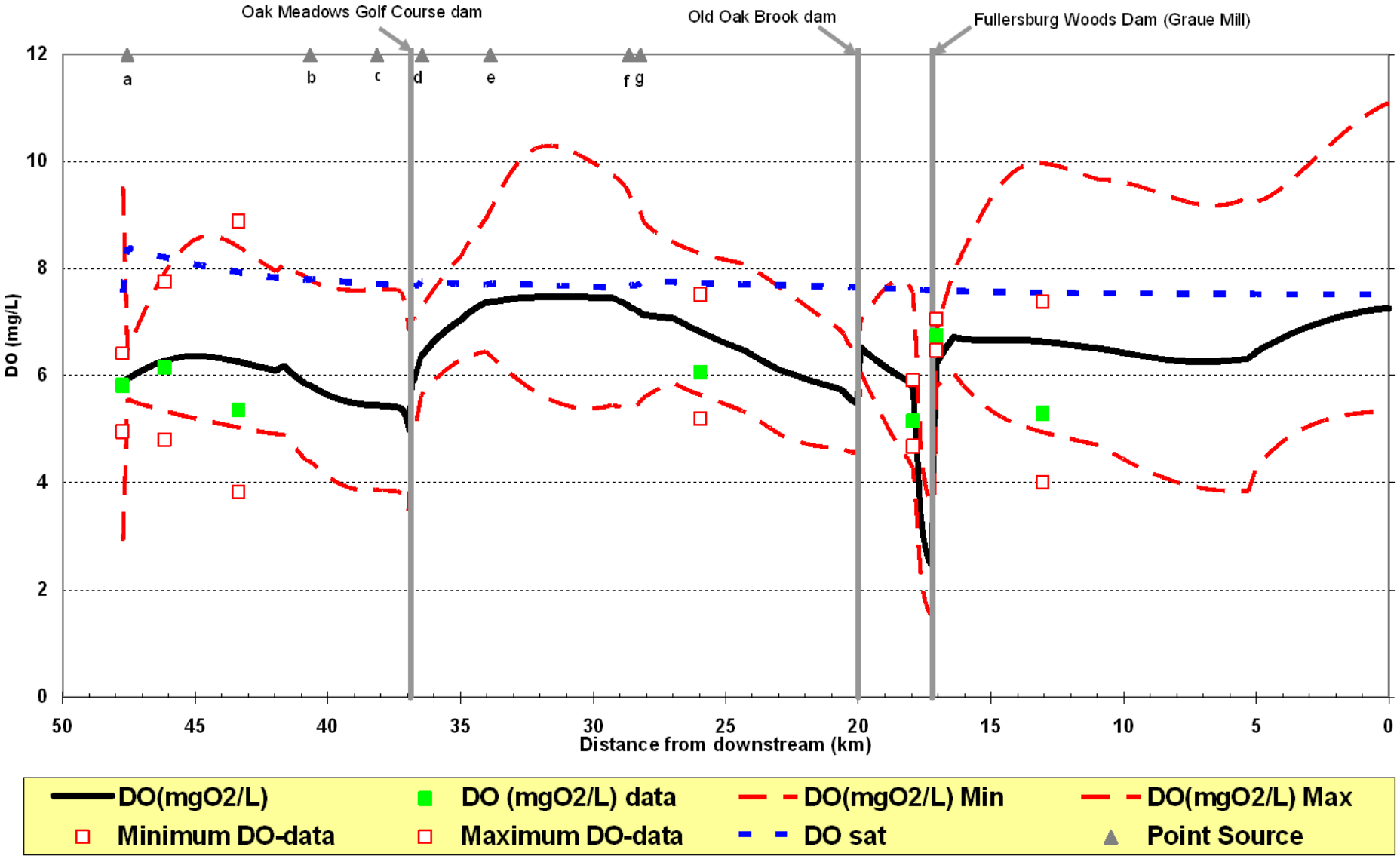



# Continuous DO Monitoring Project

- Started 2006
- 10 Green Icons probes deployed by Workgroup
- 5 Red Icons probes deployed by Workgroup agencies
- 16 SOD sites also sampled

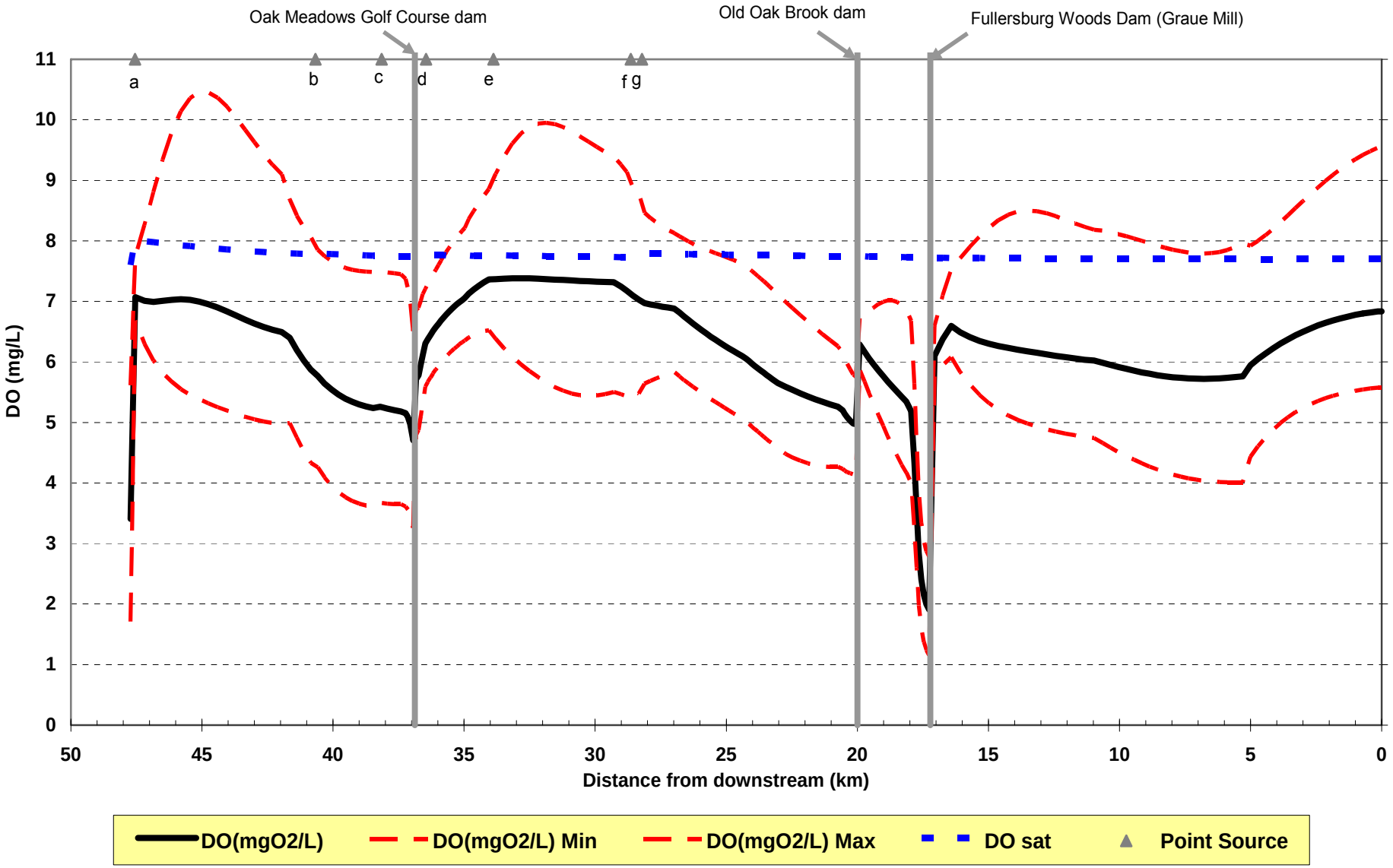
# Salt Creek (8/2/2007) Mainstem

Comparisons of Observed and Predicted Dissolved Oxygen: 2007 Calibration Run



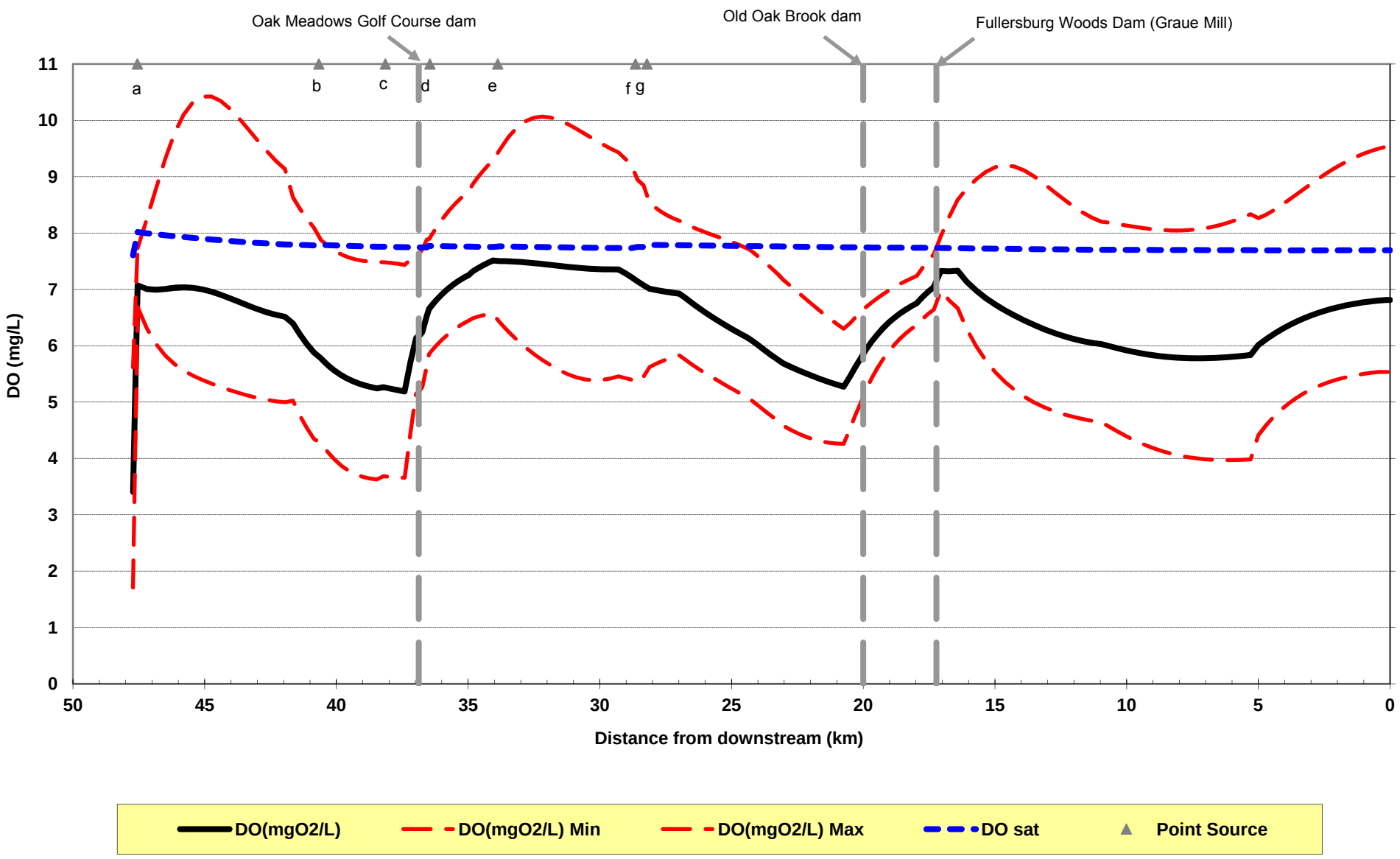
# Salt Creek Mainstem

*Monthly Average of June 2005 DMR Condition with 3 $^{o}$C Increased Plant Discharge and Air Temperature*

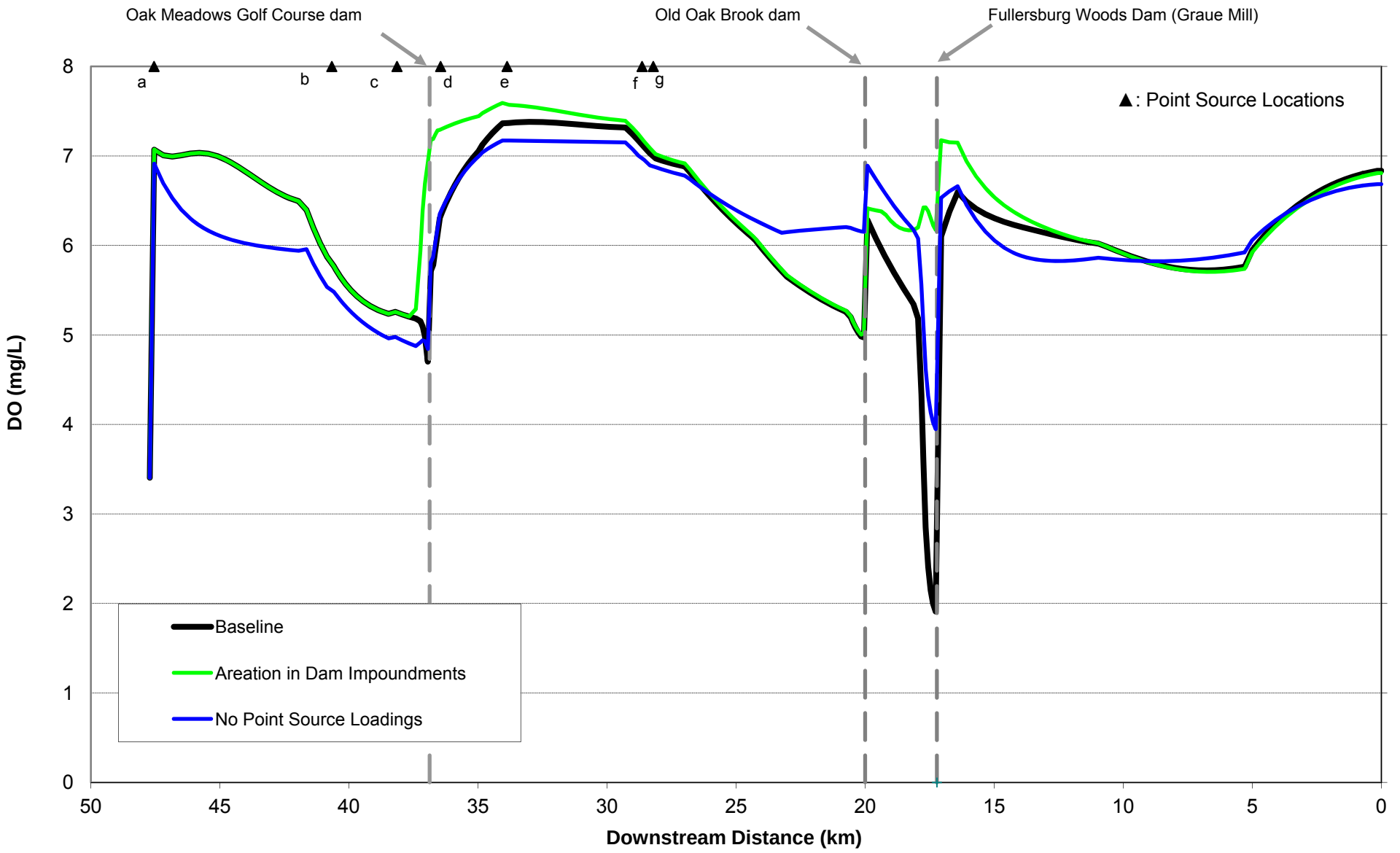


# *Salt Creek (8/15/2006) Mainstem*

*All Dams Removed*



# Daily Average Dissolved Oxygen vs. Downstream Distance
## Evaluation Scenarios 2 & 3



# Chloride Reduction and Education

# Chloride TMDLs Goals

- IEPA TMDL recommended chloride load reductions
  - East Branch DuPage River - 33% reduction
  - West Branch DuPage River - 35% reduction
  - Salt Creek - 14% reduction

| | Salt Creek | East Branch | West Branch | Total |
|---|---|---|---|---|
| TMDL Target, Tons of $Cl^-$/yr | 13,300 | 5,200 | 13,700 | 32,200 |
| TMDL Baseline, Tons of $Cl^-$/yr | 15,500 | 7,800 | 21,100 | 44,400 |
| DRSCW Baseline, Tons of $Cl^-$/yr | 32,600 | 16,900 | 21,200 | 70,700 |

# Pre-wetting of solids

# Anti-icing (liquids applications)

"Anti-icing is the application of a de-icer to the roadway
before a frost or snowfall to prevent
melted snow and ice from forming a bond with the road surface"

Photo: Hanover Park

# Less Salt, Less Money, Enough Said.

## Public Agency Deicing Workshop
## Sept. 24, 2009

APWA CHICAGO METRO

DRSCW

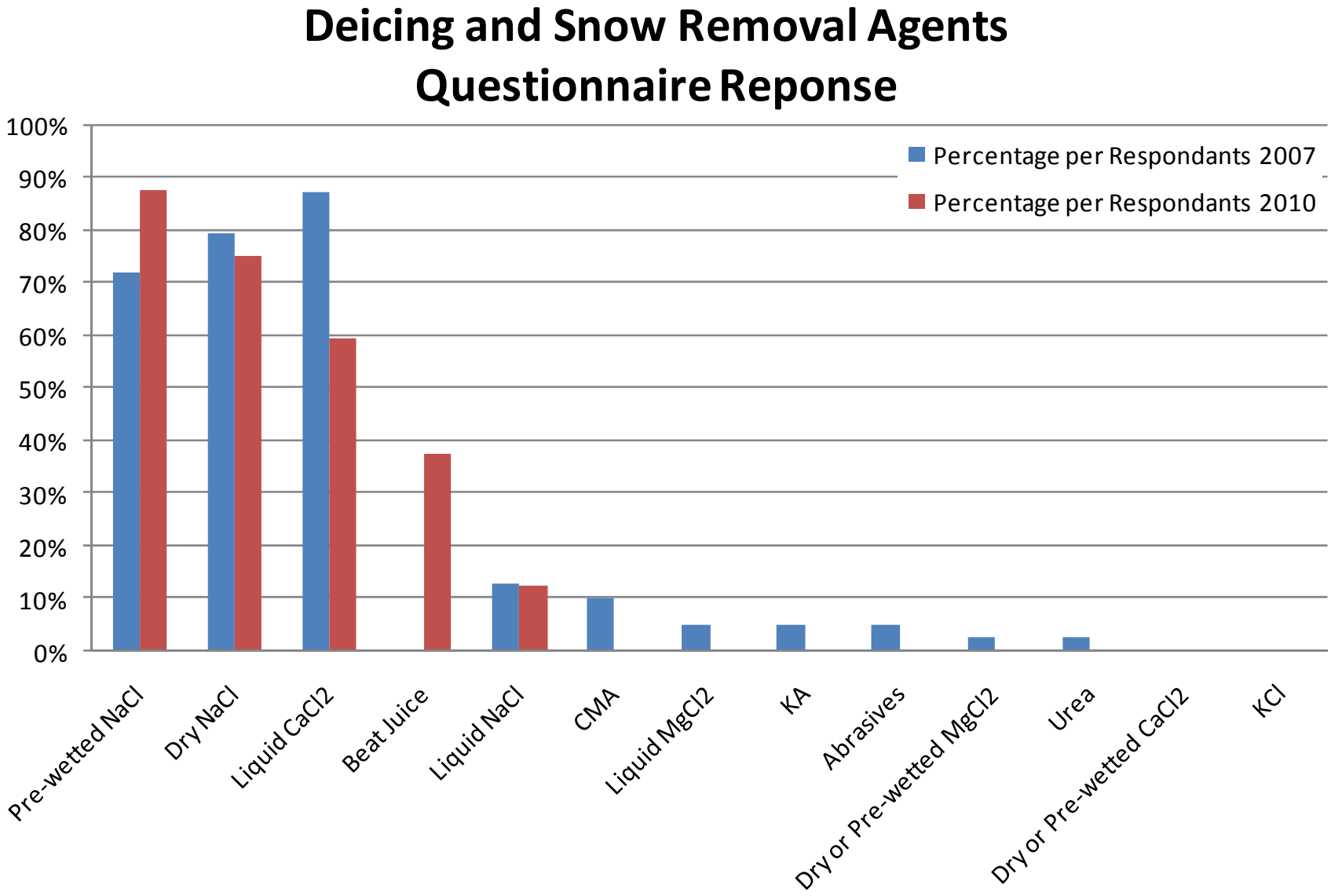
THE COUNTY OF DU PAGE WHEATON, ILLINOIS

CDM

# Education and Outreach

- Chloride reduction fact sheets have been developed and distributed
  - Mayors and Managers
  - Public Works Managers / Staff
  - Commercial Operations
  - Homeowners
- Alternative Products Memo
- www.drscw.org/winter

# Survey Results - Alternative Practices




# Beyond TMDLs
# Adaptive Management to meet the aquatic life goal of the CWA

# Simplified Decision Table of Assessment of Aquatic Life Use

| Bug IBI \ Fish IBI | Not impaired (F-IBI ≥ 41) | Moderate impaired (20 < F-IBI < 41) | Severe impaired (F-IBI ≤ 20) |
|---|---|---|---|
| Not impaired (M-IBI ≥ 41.8 | FULL | FULL or NON | NON |
| Moderate impaired (20.9 < M-IBI < 41.8) | FULL or NON | NON | NON |
| Severe impaired (M-IBI ≤ 20.9) | NON | NON | NON |

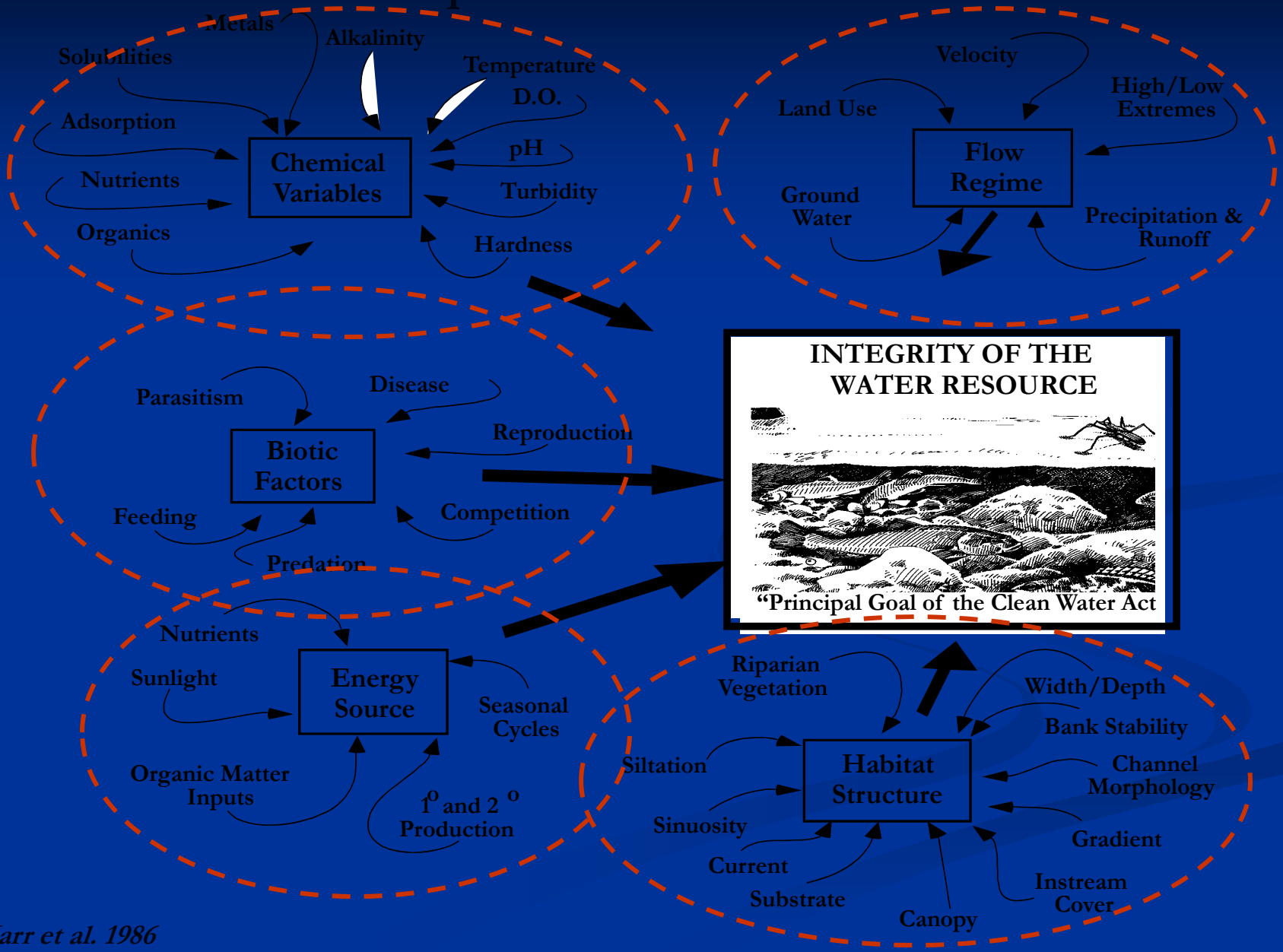
# Causes and sources of impairment 2010 IR for selected segments of program area waterways

| AUID | Name | Miles | Causes | Sources |
|---|---|---|---|---|
| IL_GBL-11 | East Branch DuPage River | 3.4 | Alteration in stream-side or littoral vegetative covers, Other flow regime alterations, Dissolved Oxygen, Phosphorus (Total), Polychlorinated biphenyls | Loss of Riparian Habitat, Site Clearance (Land Development or Redevelopment), Streambank Modifications/destabilization, Channelization, Urban Runoff/Storm Sewers, Source Unknown, Municipal Point Source Discharges |
| IL_GLA-02 | Addison Creek (Salt Creek) | 6.7 | Aldrin, Alteration in stream-ide or littoral vegetative covers, Chloride, Chromium (total), DDT, Hexachlorobenzene, , Other flow regime alterations, Phosphorus (Total), Changes in Stream Depth and Velocity Patterns, Fecal Coliform | Contaminated Sediments, Channelization, Loss of Riparian Habitat, Combined Sewer Overflows, Municipal Point Source Discharges, Urban Runoff/Storm Sewers, Upstream Impoundments (e.g., PI-566 NRCS Structures), Dam or Impoundment |

# 2010 303 (d) Impairment listings for selected segments of program area waterways

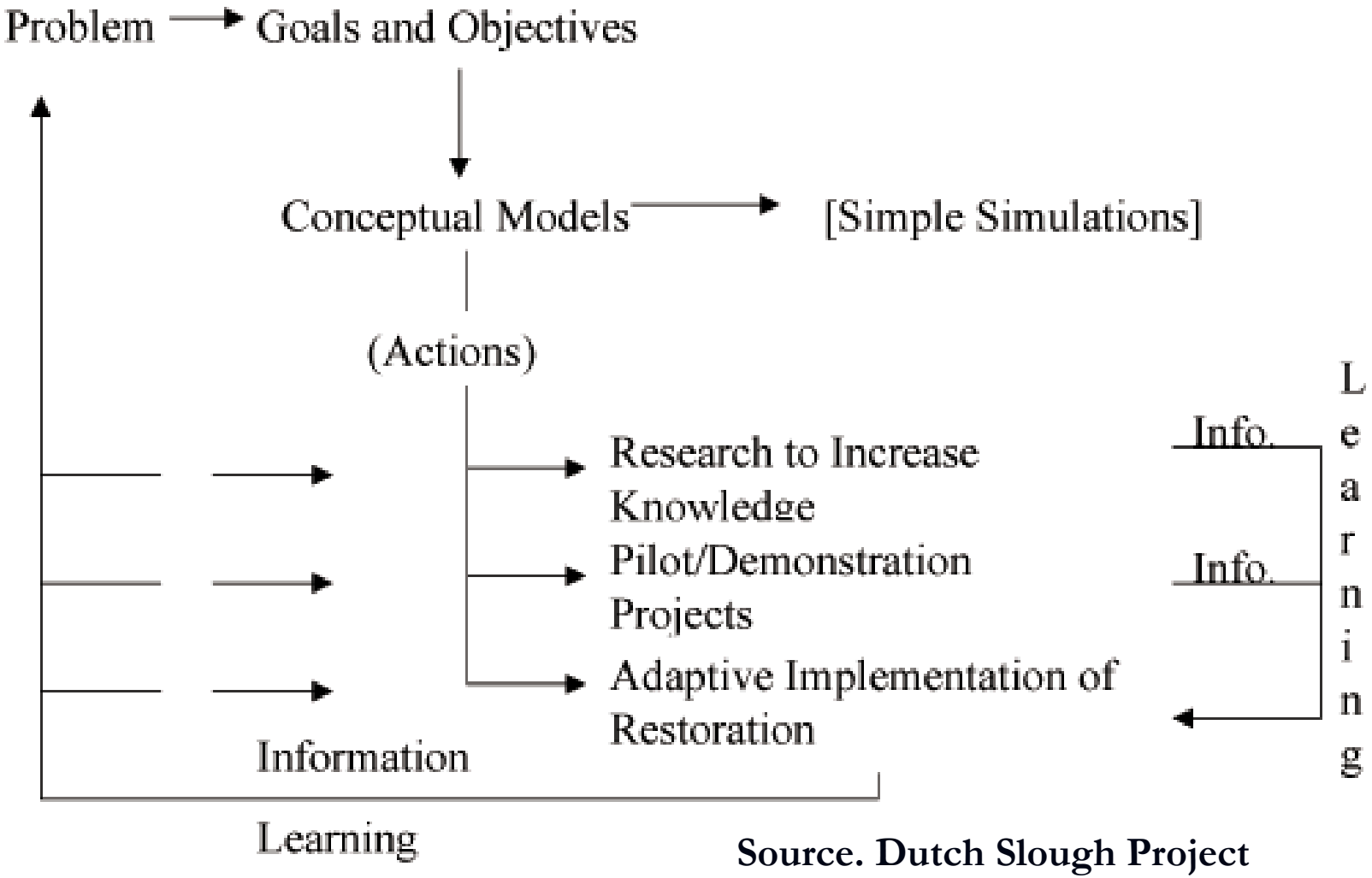
| Water Name | Water ID | Miles/Acres | Designated Use | Impairment Listing |
|---|---|---|---|---|
| E. Br. DuPage R. | IL_GBL-11 | 3.43 | Aquatic Life | Phosphorus (Total) |
| Addison Cr. | IL_GLA-02 | 6.69 | Aquatic Life | Aldrin, Chromium (total), DDT, Hexachlorobenzene, Nickel, Phosphorus (Total) |

# The Five Major Factors Which Determine the Integrity of Aquatic Resources



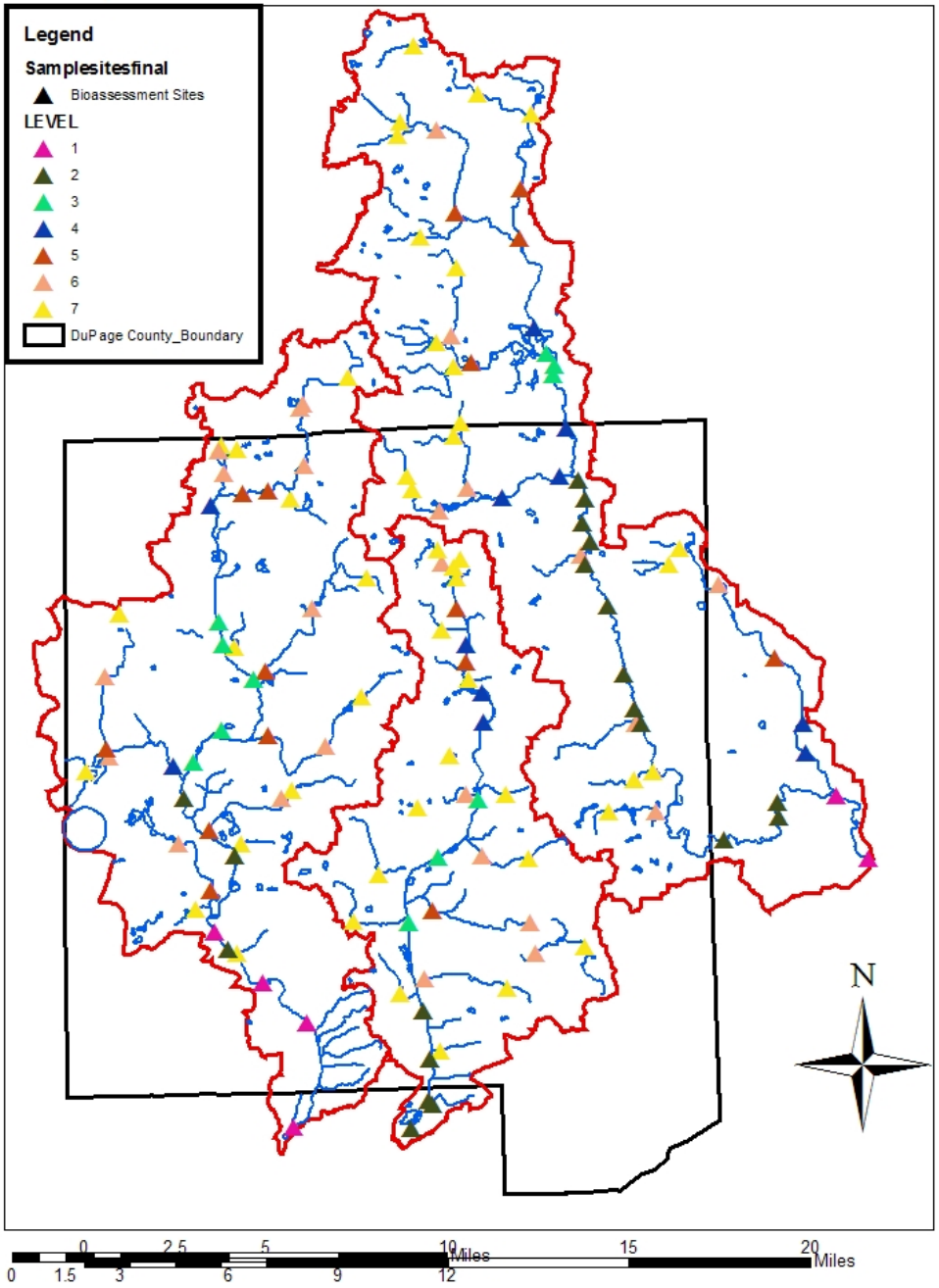

*after Karr et al. 1986*

# Adaptive Management Planning and Decision Process




**Source. Dutch Slough Project**

# DRSCW Bioassessment Plan

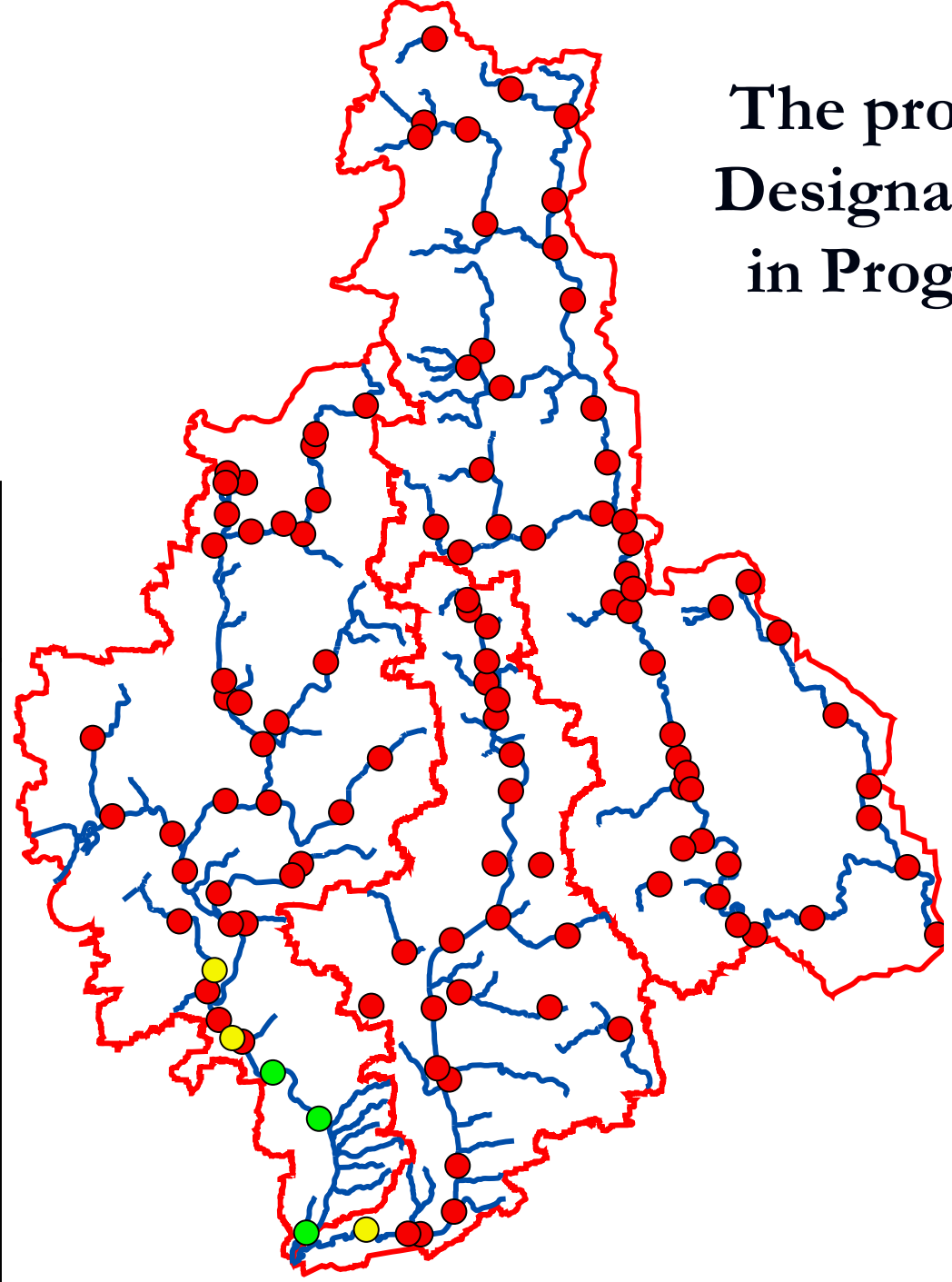




# Monitoring Bioassessment Plan Elements

- Fish
- Macroinvertebrates
- Habitat – QHEI
- Water Chemistry
- Sediment Chemistry

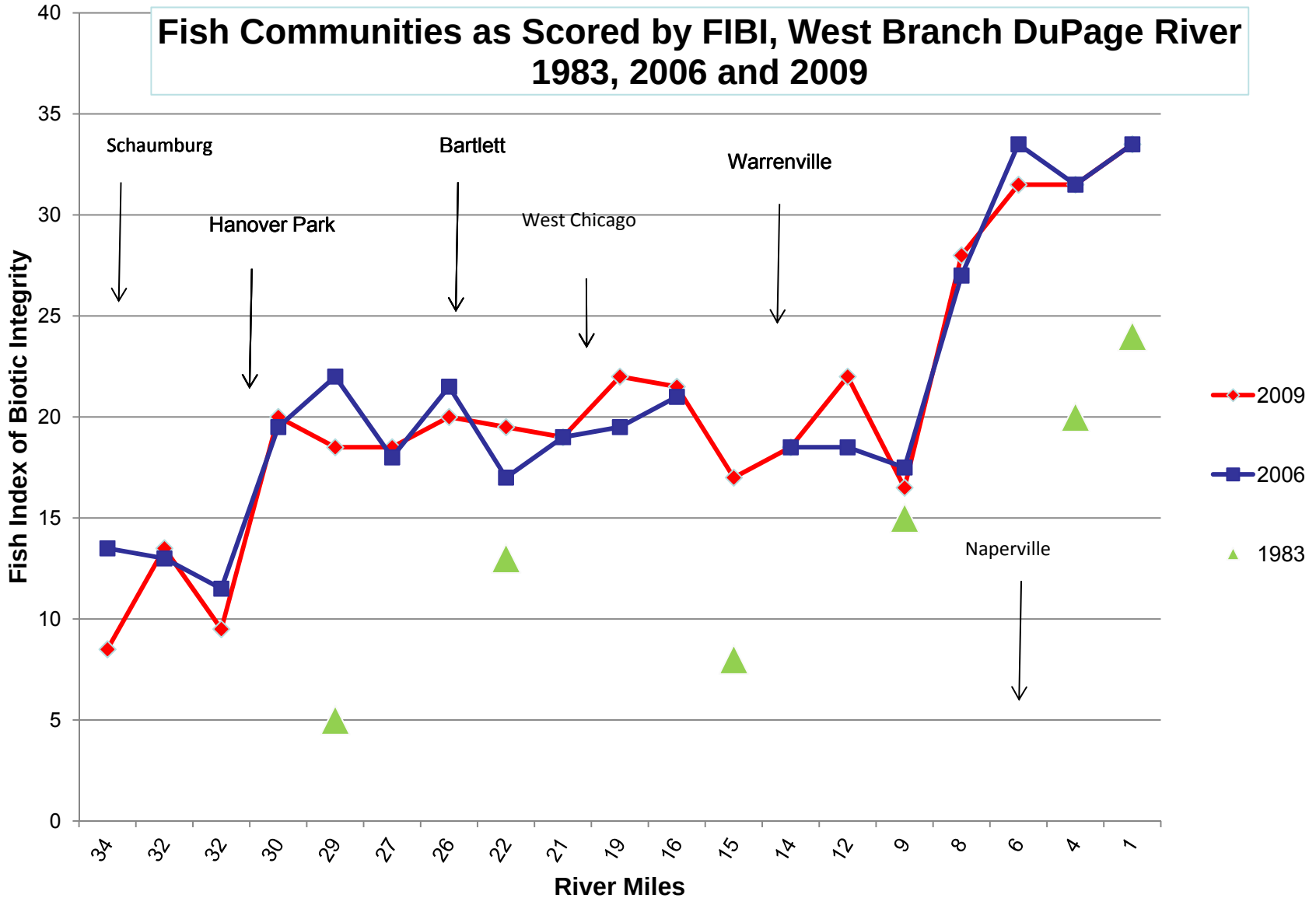
# The problem – Not Supporting Designated Use for Aquatic Life in Program Area (2006-7 data)



**Legend**

**Supporting Aquatic Life**

- Non
- Partial
- Full
- Project Area Streams
- DRSCW Watersheds


Fish Communities as Scored by FIBI, West Branch DuPage River
1983, 2006 and 2009
Schaumburg
Hanover Park
Bartlett
West Chicago
Warrenville
Naperville
Fish Index of Biotic Integrity
River Miles
0
5
10
15
20
25
30
35
40
34
32
32
30
29
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26
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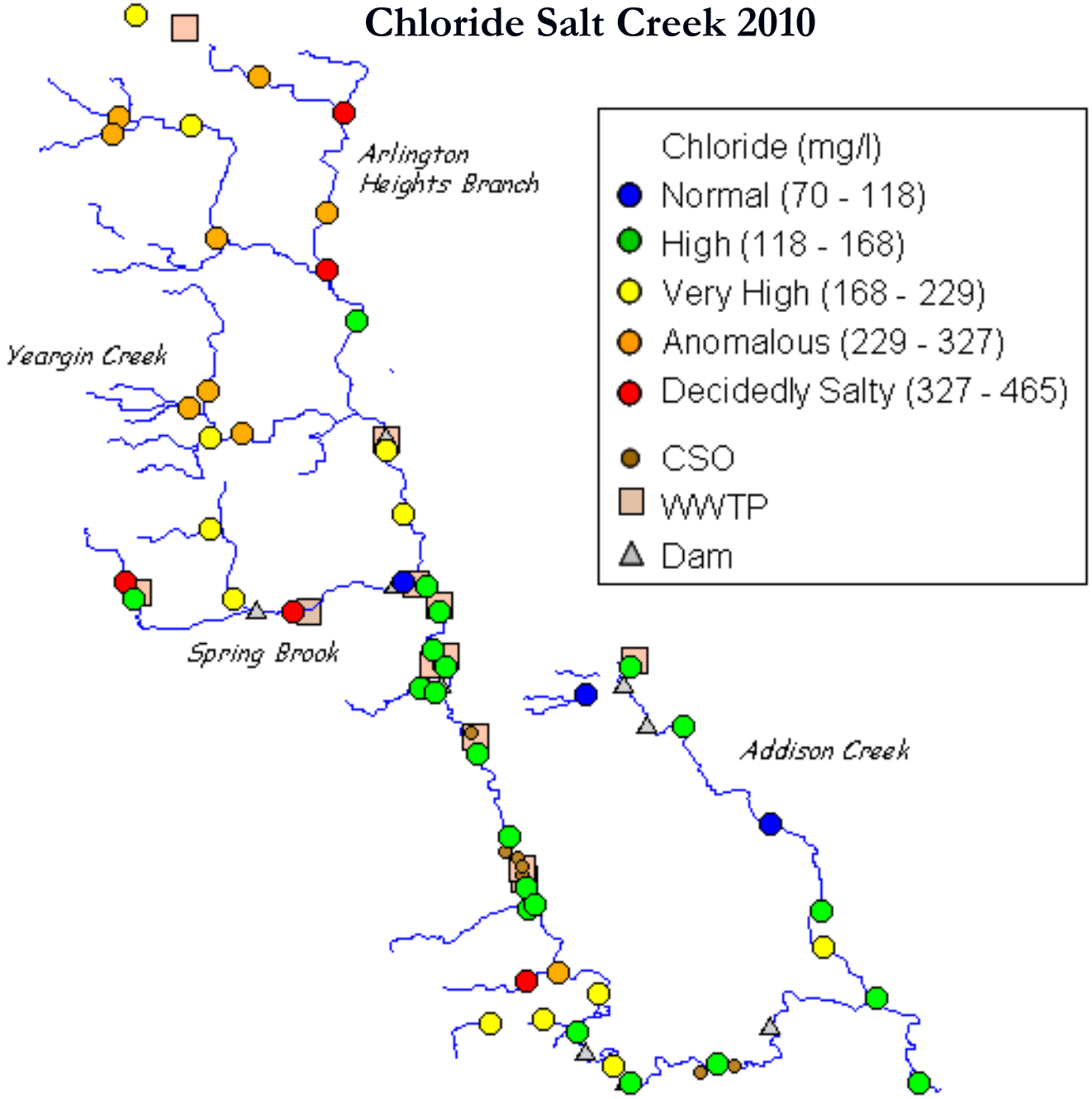
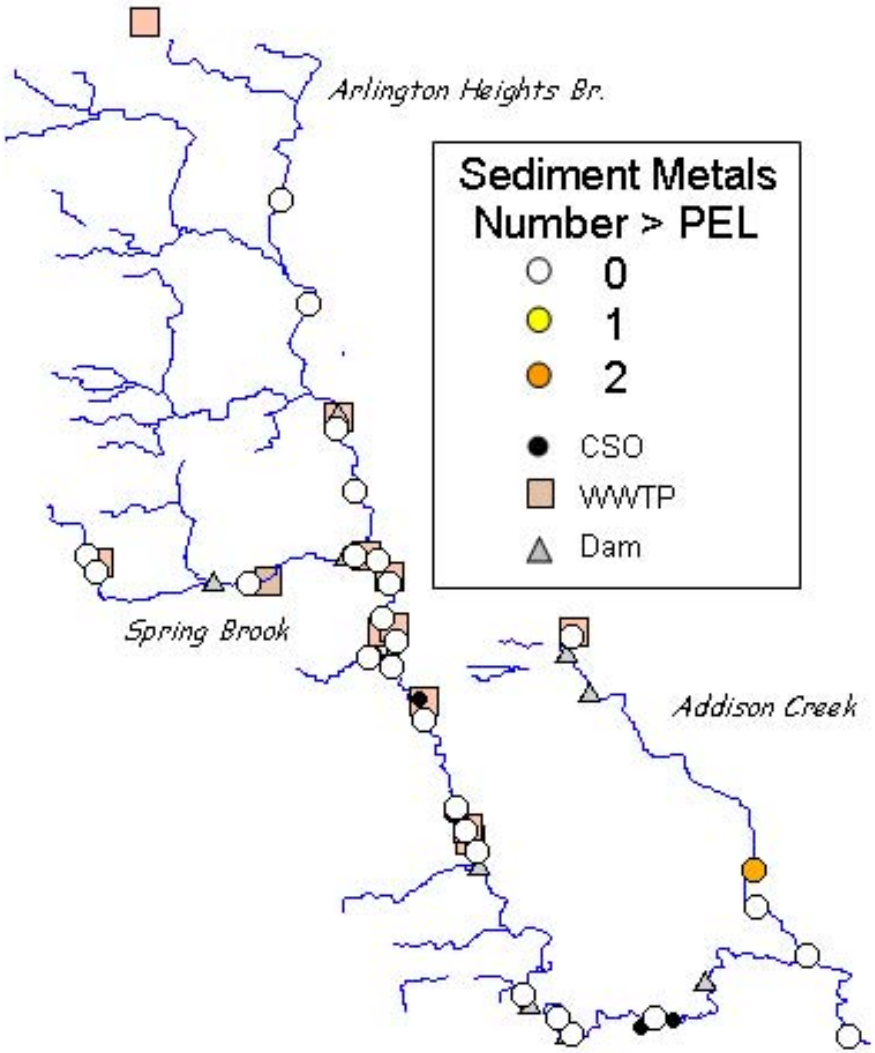
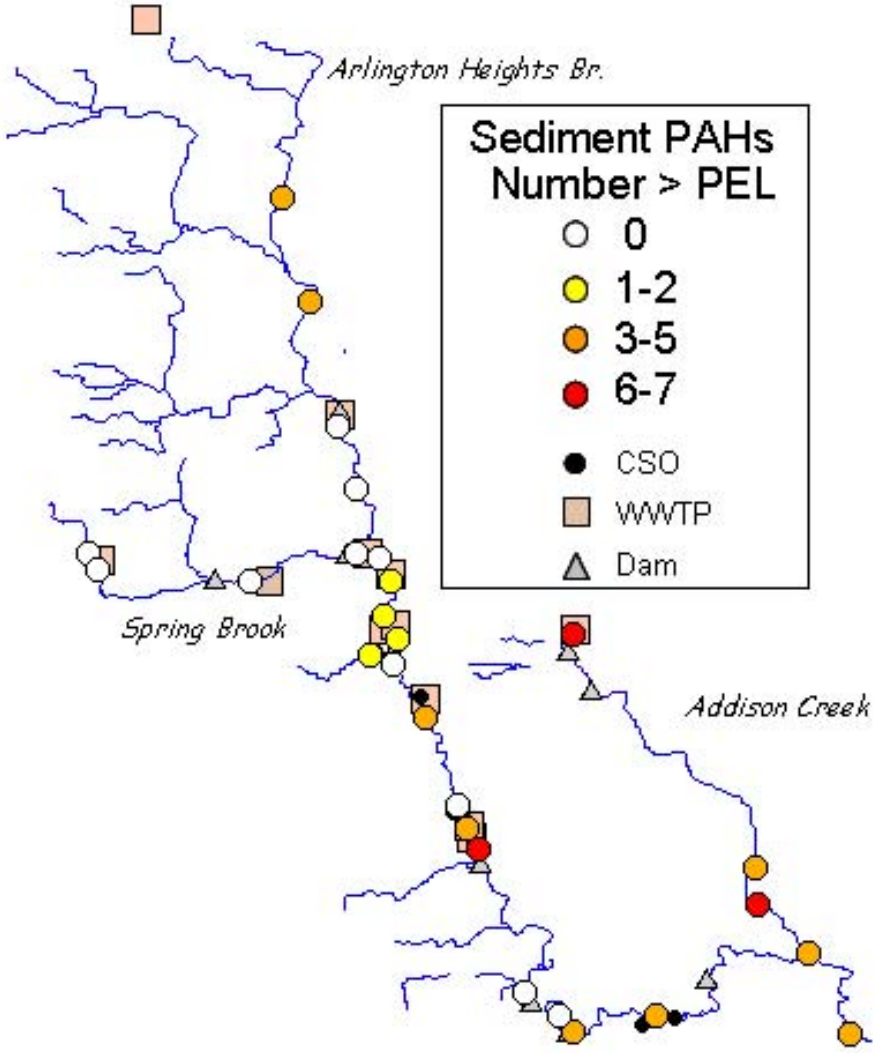
1
2009
2006
1983

# Chloride Salt Creek 2010

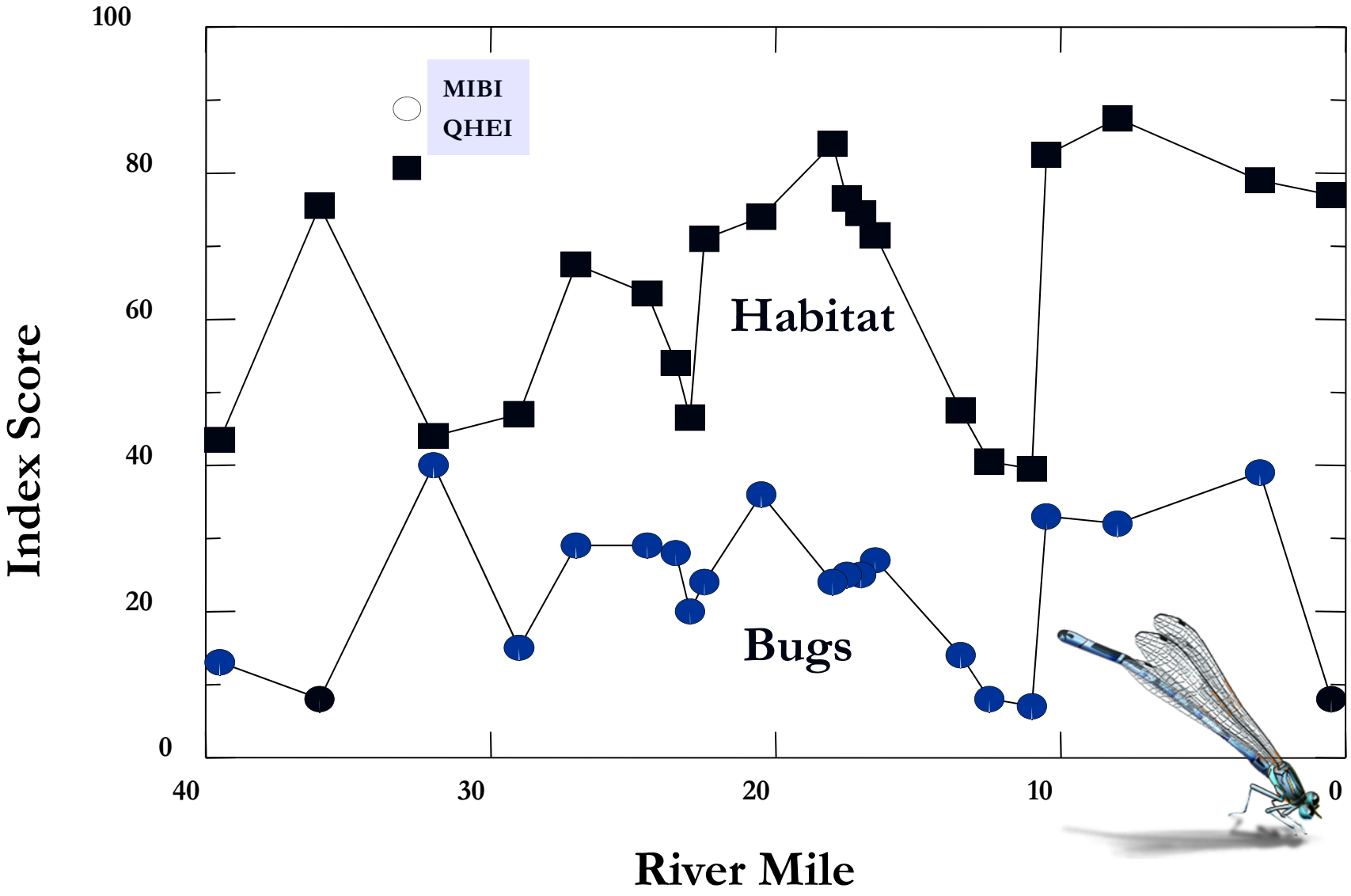




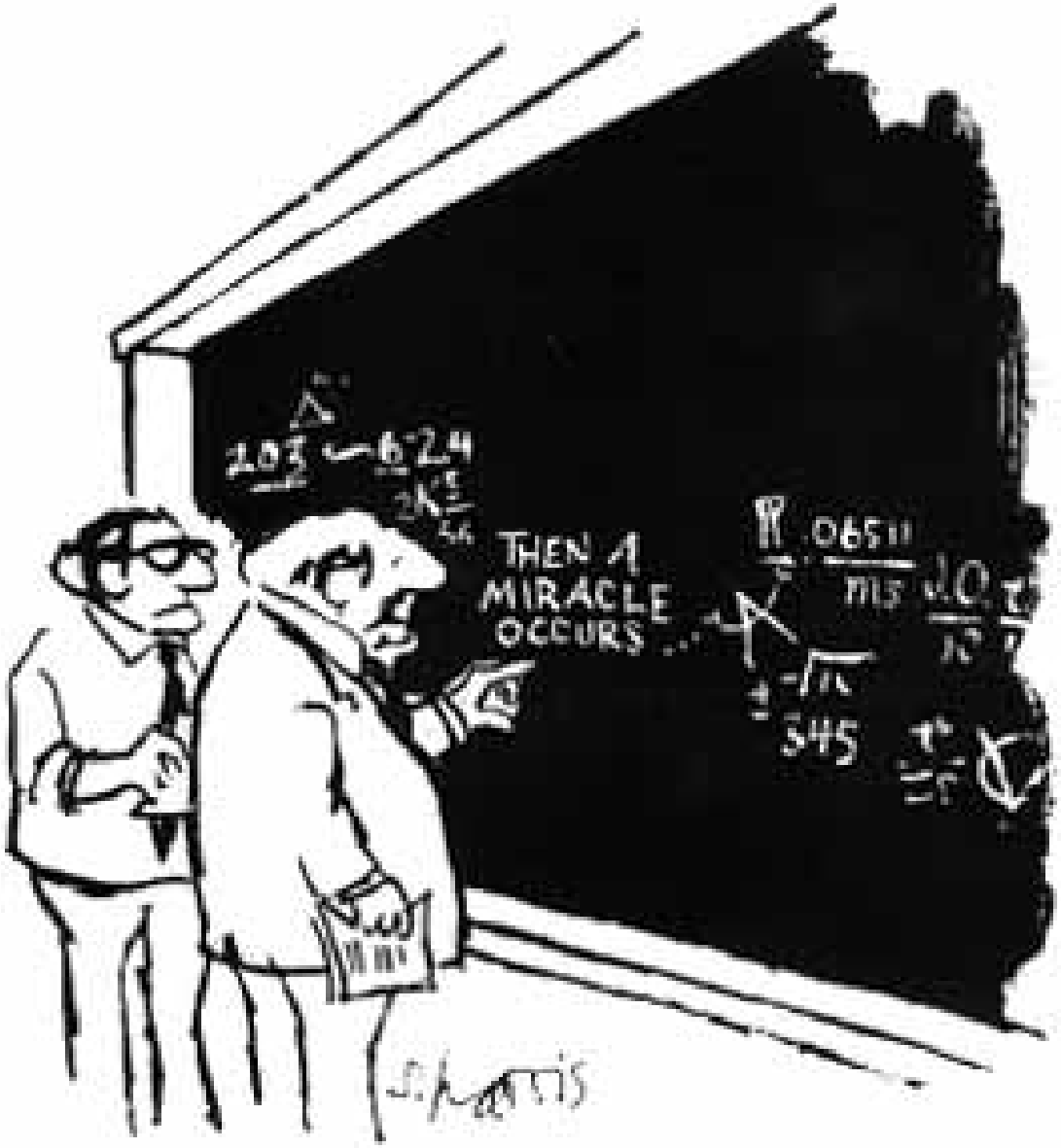

**Sediment metals and PAHS  Salt Creek 2010**

# Aquatic Insects and Habitat Scores for Salt Creek (2007)



# Problem Statement and Objectives

- Problem Statement- The majority of the program area not supporting AL
- Objective- Move aquatic assemblages towards state identified thresholds
  - Identify stressors to aquatic life
  - Develop a predictive tool to allocate resources efficiently to tackle stressors
  - Measure and document outcomes




"I think you should be more explicit here in step two."

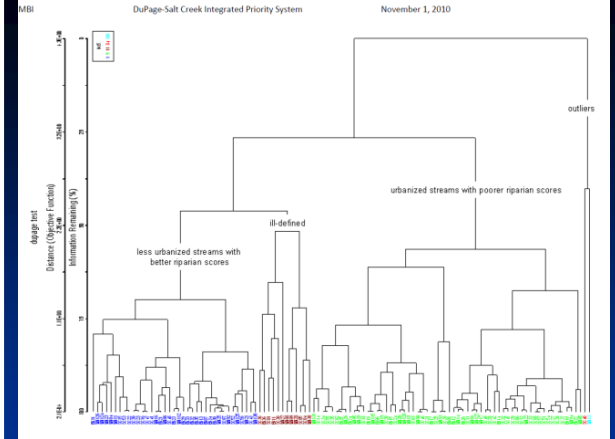
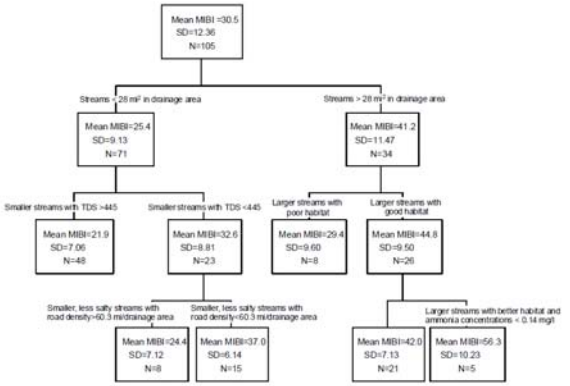
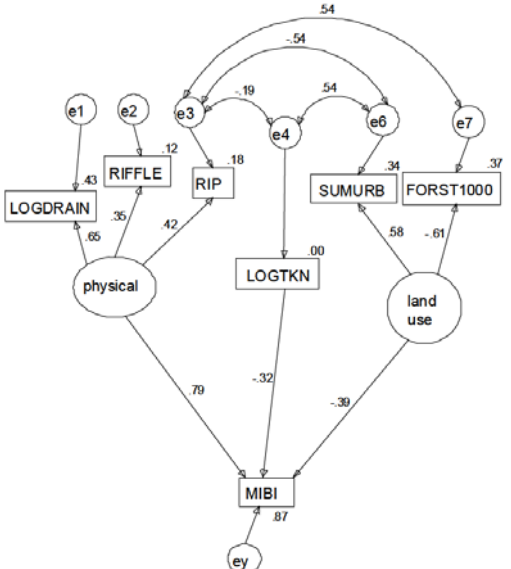



Figure 2. Cluster dendrogram based on Bray-Curtis similarity of fish assemblage attributes for sites in DuPage River-Salt Creek watersheds.




http://www.drscw.org/projectID.html

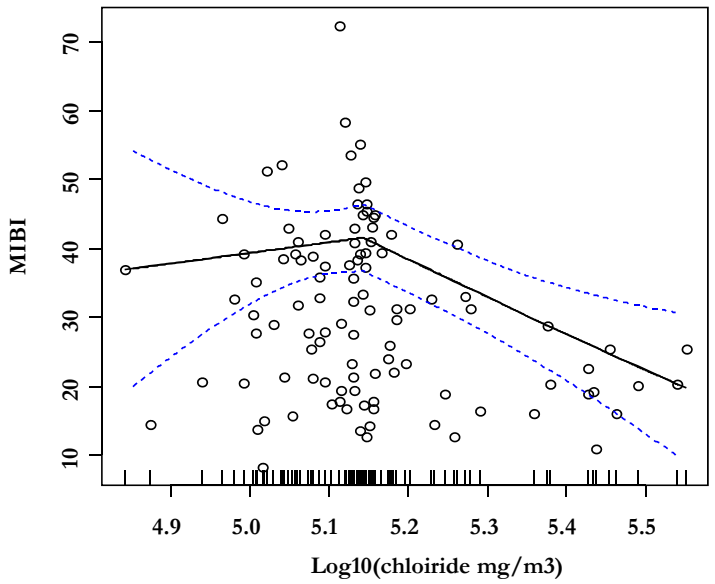
# Statistically Demonstrated Stressor Indicators

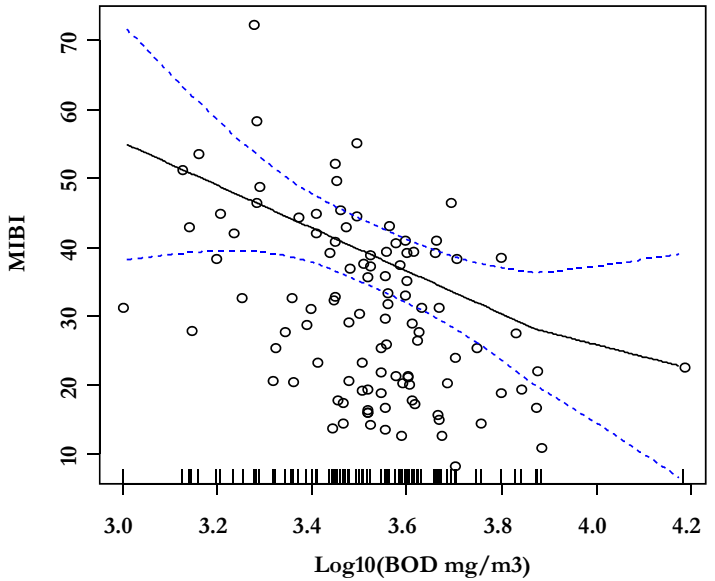
Environmental Parameter

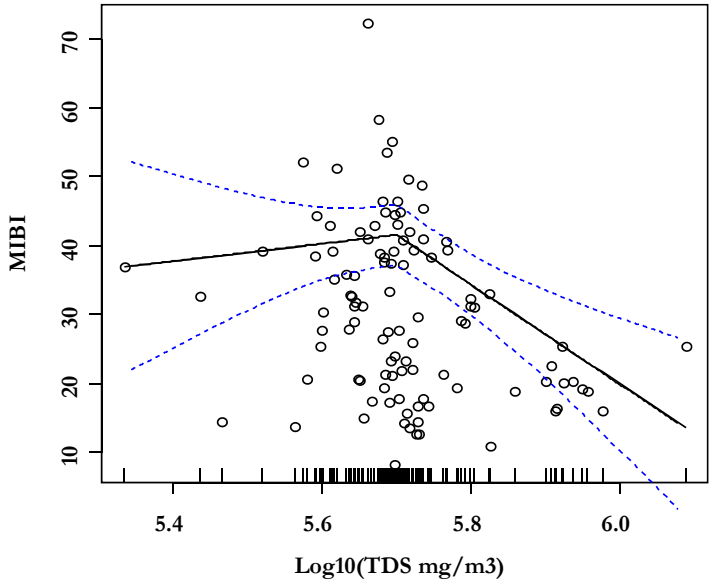
- Riparian Score
- Riffle Score
- Channel Score
- Substrate  Score
- Pool Score
- Chloride
- TKN
- BOD
- NH3N

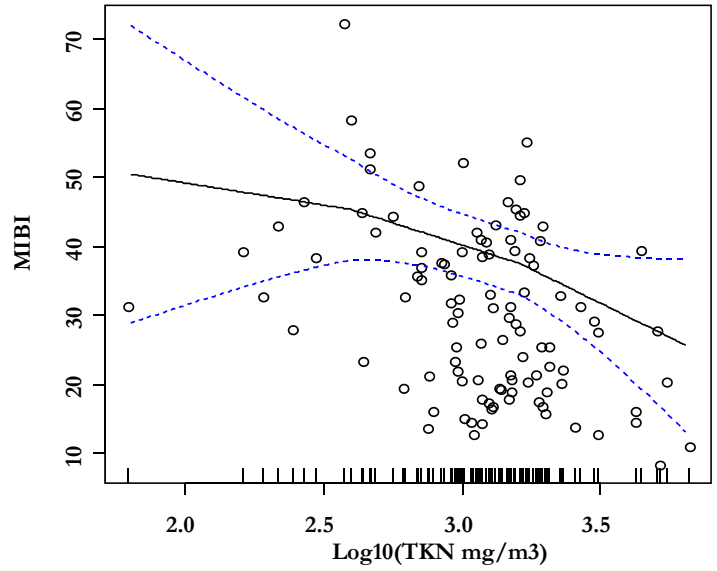
# Identifying Environmental Thresholds

## Water Quality Indicators



# Composite of Three Scores:

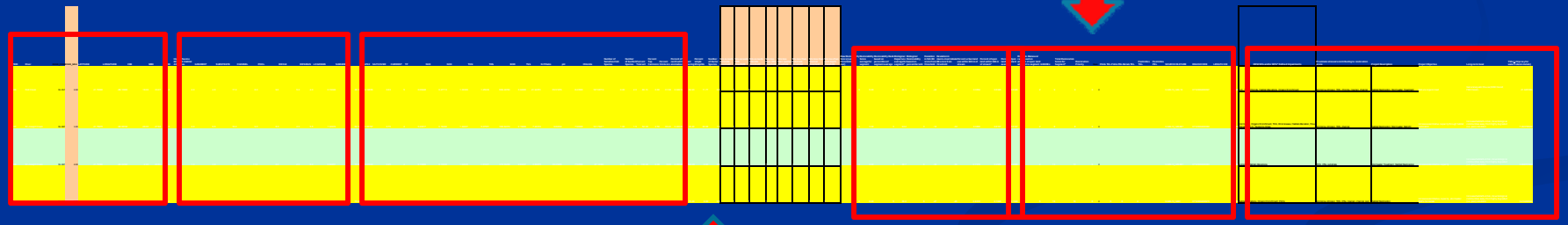
- Rank segments based on how many stressors were present
- Rank extent of open space for segments as proxy for implementability
- Rank segments based on how far biological scores deviate from their benchmark expectations

# IPS Tool

fIBI, mIBI and QHEI

Exceedence of the nine proximate stressors (1)

Other non – proximate stressor stressors (PAHs and metals)



Site ID, RM, name, coordinates

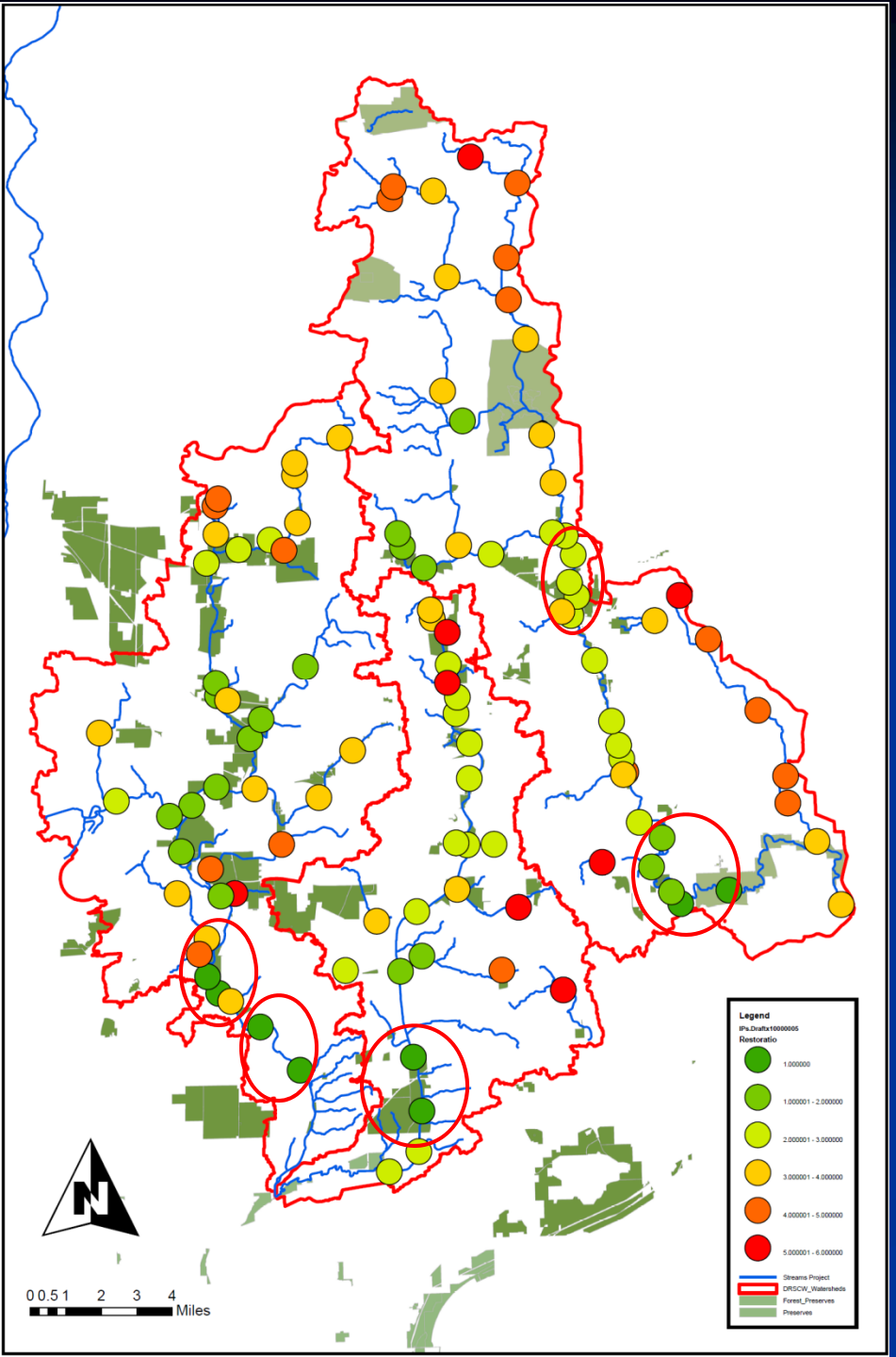
Chemistry Data

Details on fIBI and mIBI scores

Computed values for open space, number of proximate stressor exceedences and deviation from biological end point

Project Descriptions and objectives

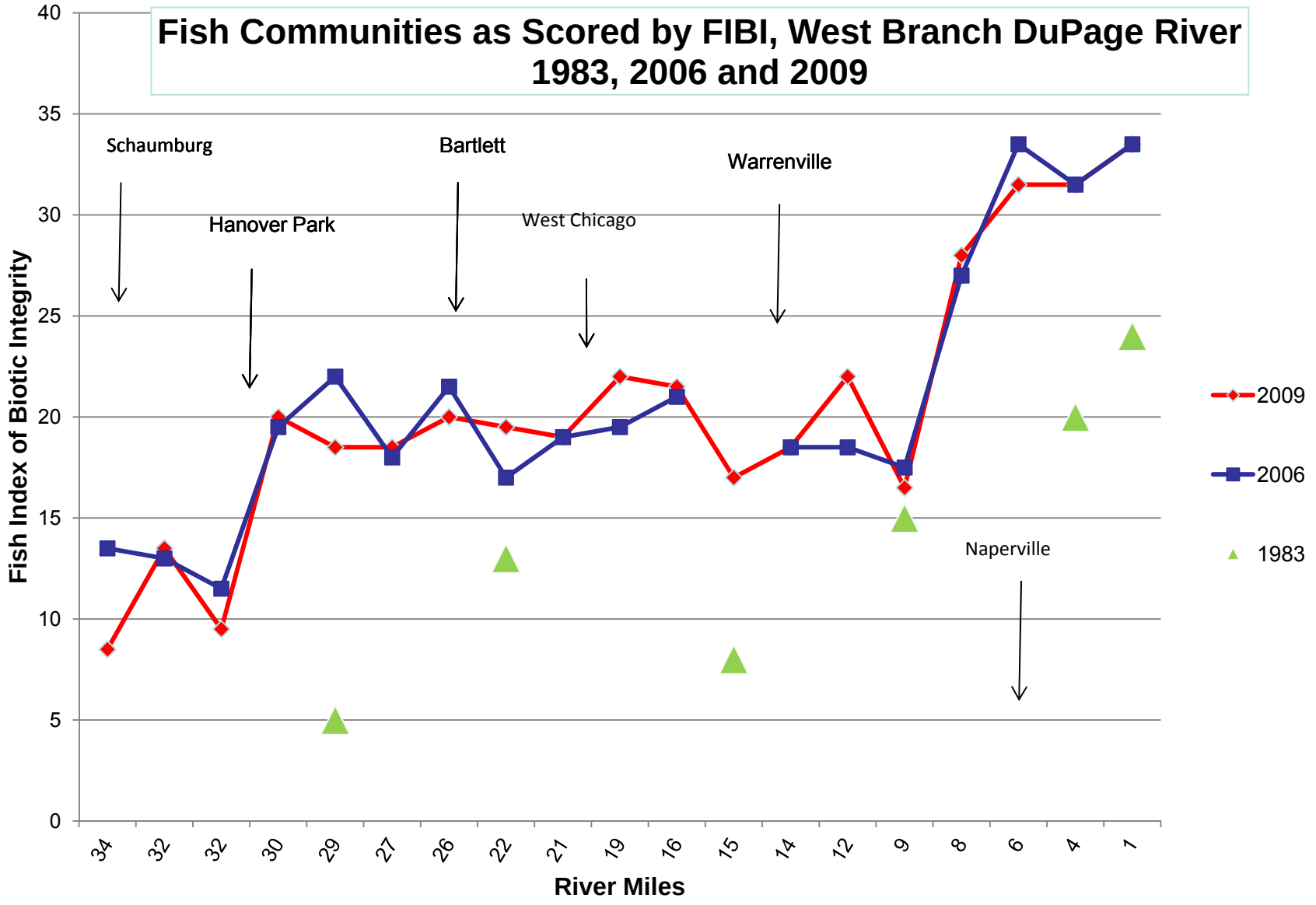
# IPS Priority Sites Graded 1-6




Number of proximate stressors (-)

Deviation from biological end point (-)

Presence of open space (+)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Schaumburg
Hanover Park
Bartlett
West Chicago
Warrenville
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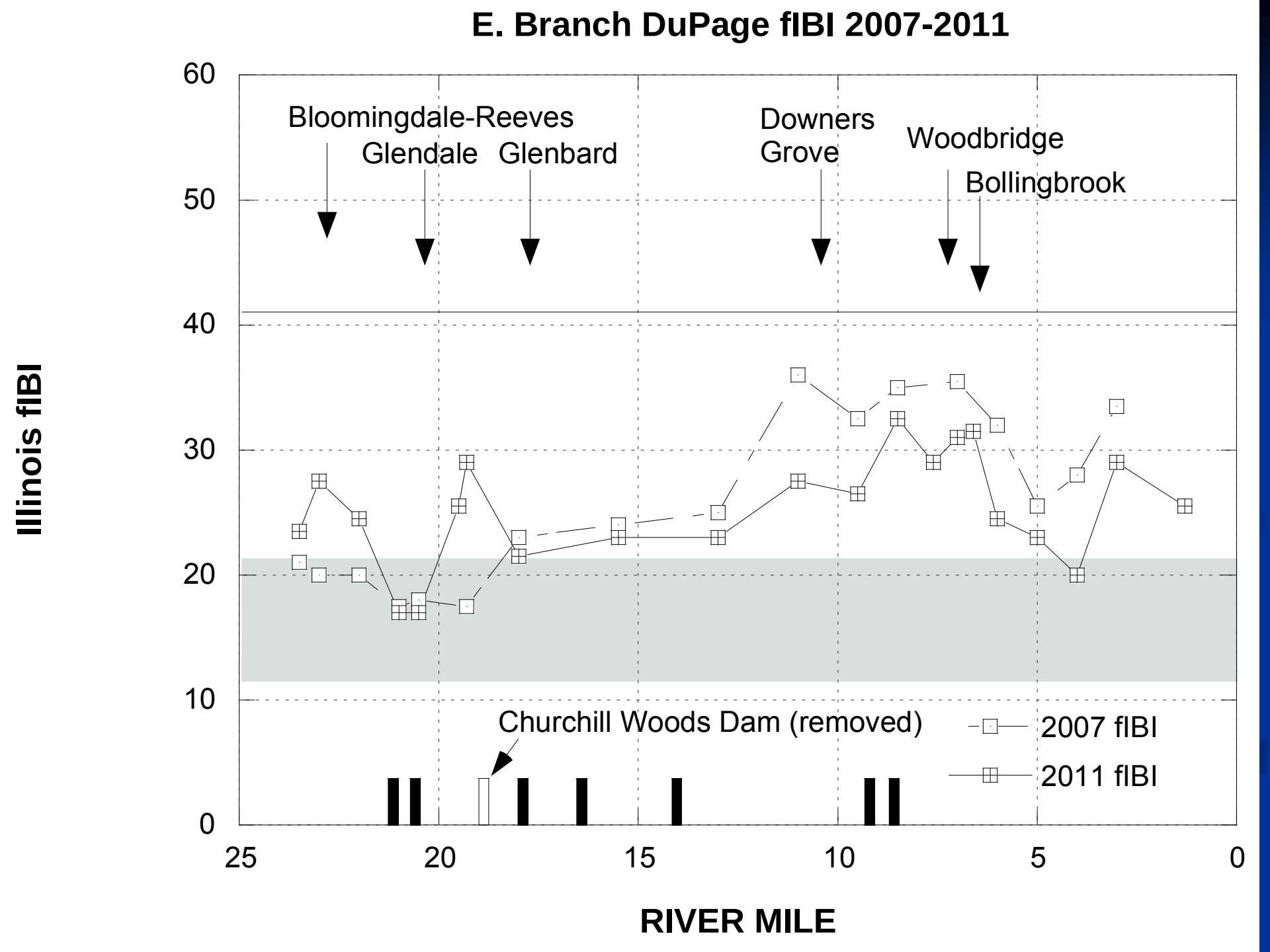
Fish Index of Biotic Integrity
River Miles
0
5
10
15
20
25
30
35
40
34
32
32
30
29
27
26
22
21
19
16
15
14
12
9
8
6
4
1
2009
2006
1983

# DRSCW Physical Restoration Projects

| Project | River | Project Description | Objectives |
|---|---|---|---|
| Fullersburg Woods dam modification and stream restoration | Salt Creek | Modify dam to eliminate pond and allow fish passage. Rebuild stream habitat. | Raise fIBI from 19 to 27. Raise mIBI from 35 to > 42 for 1.5 miles of river and introduce new fish species upstream. |
| Fawell Dam Fish Passage Modification and lower West Branch Restoration | West Branch DuPage River | Modify dam to allow fish species passage to the 24 miles of upstream river. Rebuild stream habitat for .0 miles. | Raise fIBI from 17.5 to 27 for 2 miles upstream of project. |
| Southern East Branch Stream Enhancement Project | East Branch DuPage River | Rebuild stream habitat for 2 miles of stream corridor. | Raise fIBI from 27-35 to > 42. Raise mIBI from 27-35 to 42. |
| Oak Meadows Golf Course dam removal and stream restoration | Salt Creek | Rebuild stream habitat for 1.5 miles of stream corridor. | Raise MIBI from 21 to > 35 to 1-1.5 miles of river. Raise fIBI from 19 to 25 for 1.5 miles of river. |

# DRSCW Watershed Wide Activities

| Project | Project Description | Objectives |
|---|---|---|
| Chloride Abatement | Education program for pre-wetting, anti-icing and calibrating equipment. | Increase communities participating in survey by 10 (currently 33).<br>Average application rate - all surveyed communities to be < 500 lbs./lm (currently 3 higher than that).<br>18 communities anti-icing (currently 12).<br>33 communities pre wetting (currently 33).<br>Storing exposed salt 0 (currently 11). |
| PAH Abatement | Voluntary agreement to discontinue use of coal tar sealants by members. | 75% of agency members discontinue use of coal tar sealants for public operations. |
| Municipal Level IPS Information & Outreach | Design and disseminate an IPS report and summary tailored to member communities. | Integrate IPS outputs into local projects and decision making. |


E. Branch DuPage fIBI 2007-2011
Illinois fIBI
RIVER MILE
60
50
40
30
20
10
0
25
20
15
10
5
0
Bloomingdale-Reeves
Glendale
Glenbard
Downers Grove
Woodbridge
Bollingbrook
Churchill Woods Dam (removed)
2007 fIBI
2011 fIBI

# Our Proposal

- Member POTWs would pay assessments into a pooled fund to complete projects prioritized by the IPS Tool.
- DRSCW would measure the impacts of the projects and report frequently to State and EAGs .
- Further permit limits on Member POTWs would be delayed for 2-3 permit cycles.

# Constraints

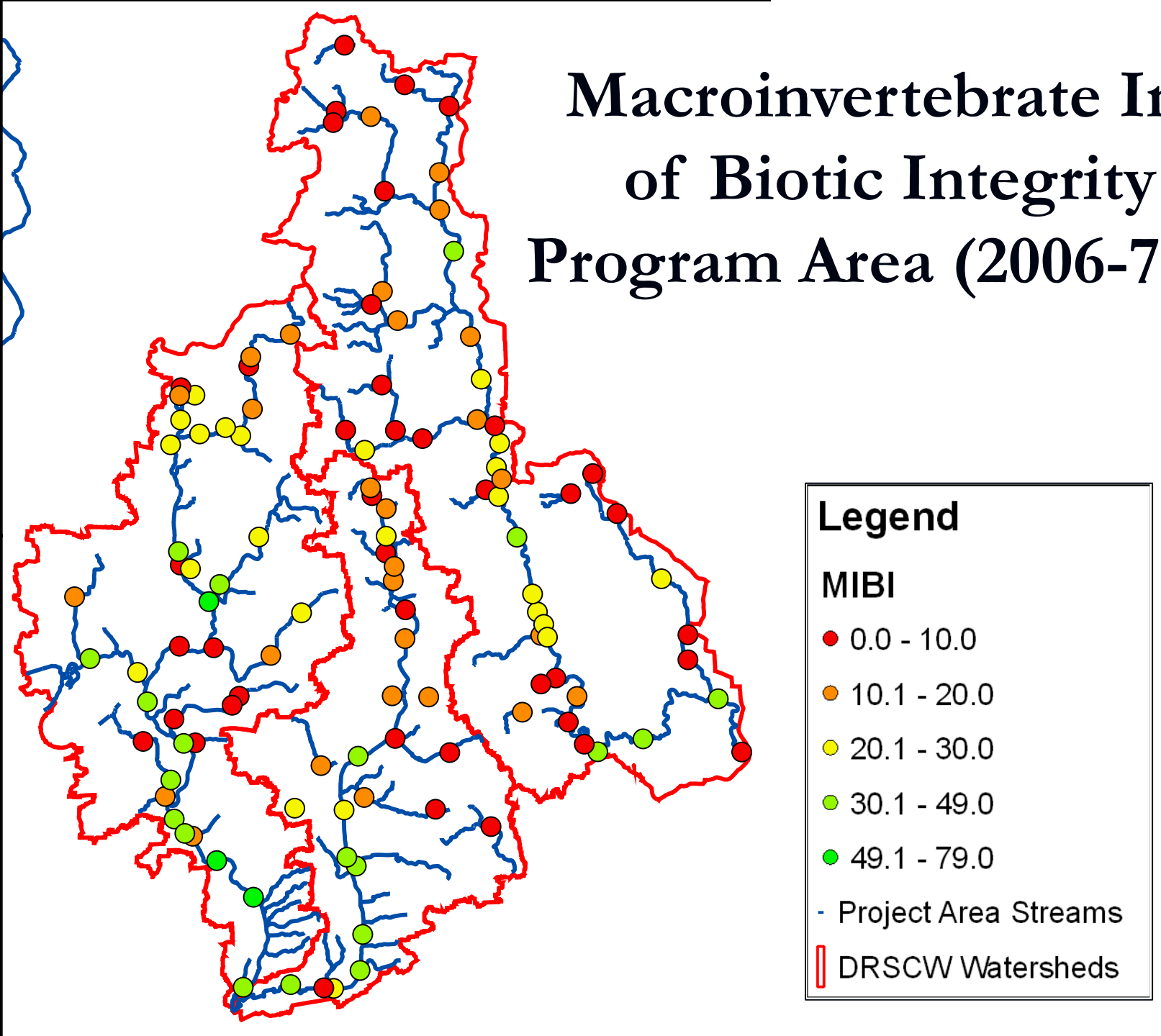
- For what period of time would the agreement exist?
- What would it include (plants under expansion, MS4s, etc.)?
- Would it cover all pollutants (ammonia –N?)?
- Project time lines, longer than anticipated?
- Cash flow and project cost projection accuracy?
- What form of agreement and reporting is needed?
- What happens when the pilot period ends?

# Final Comments

- Current system cannot solve non-support issue
- Urban waterways are complex in their physical, chemically and in terms of flow. Not well understood AM is superior to water quality standard driven system in dealing with uncertainty of diagnosis and remedies
- Is set up to work directly towards Aquatic life Goal of CWA not targeting surrogates


Questions ?

# Macroinvertebrate Index of Biotic Integrity in Program Area (2006-7 data)

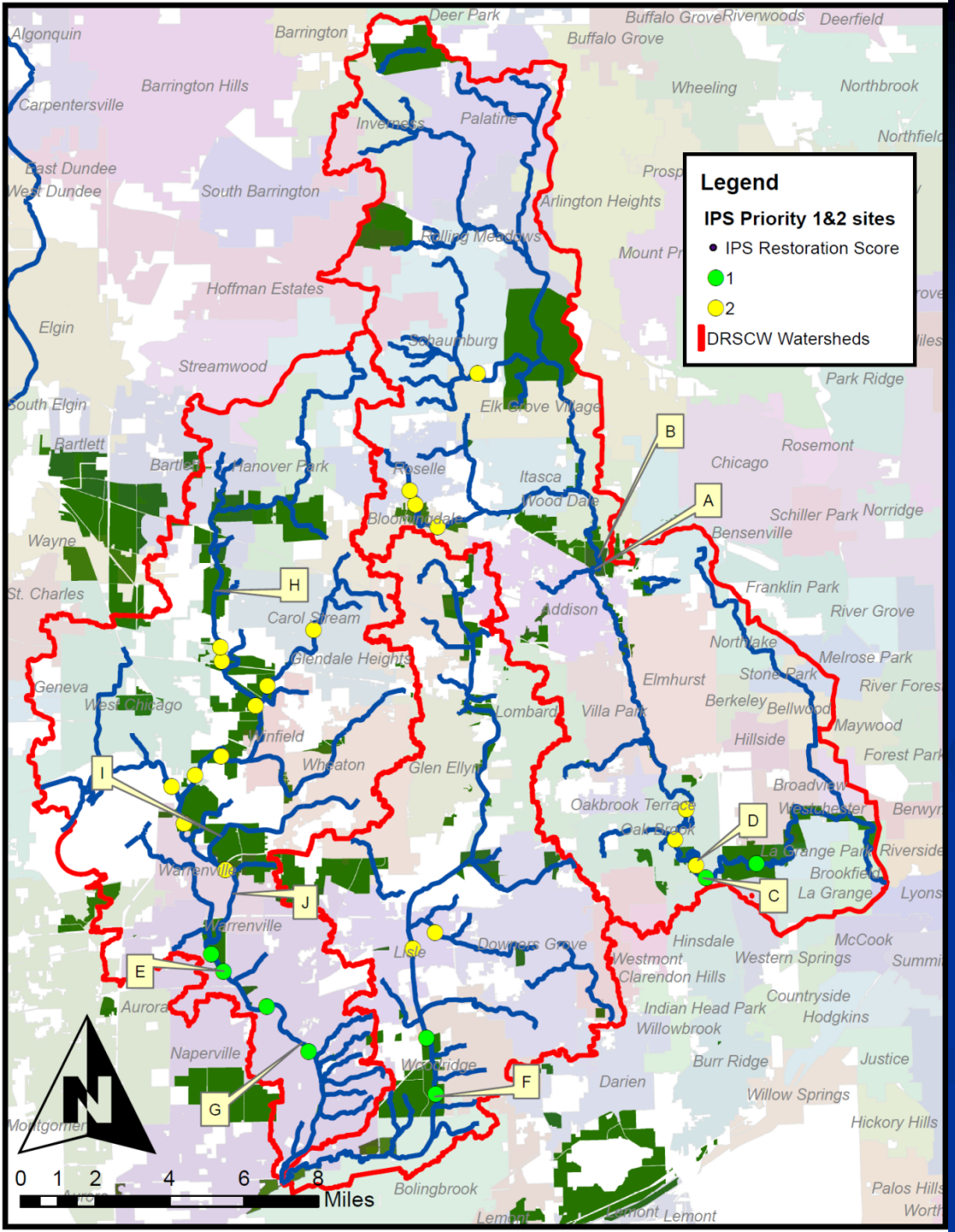


# State IR Report Output

| Water Name | Segment ID | HUC 10 | Priority | Miles/ Acres | Designated Use | Impairment(s) | TMDL Status |
|---|---|---|---|---|---|---|---|
| Salt Cr. | IL_GL-09 | 0712000404 | Medium | 12.04 | Aquatic Life | Aldrin, Methoxychlor, Sedimentation/Siltation, Total Suspended Solids (TSS), pH, Phosphorus (Total) | |
| Salt Cr. | IL_GL-09 | 0712000404 | Medium | 12.04 | Fish Consumption | Mercury, Polychlorinated biphenyls | |
| Salt Cr. | IL_GL-09 | 0712000404 | Medium | 12.04 | Primary Contact Recreation | Fecal Coliform | (TMDL Ongoing) |

# DRSCW Monitoring Output

| SITEID | River | RIVER_MILE | FIBI | MIBI | QHEI | DRSCWG/IEPA Defined Impairments | Proximate stressors contributing to restoration score | Project Description | Project Objective |
|---|---|---|---|---|---|---|---|---|---|
| SC49 | Salt Creek | 8.00 | 23.50 | 44.93 | 87.5 | Organic Enrichment | Ammonia-nitrogen, TKN | Habitat Restoration (dam removal); reduce remineralized nitrogen | increase assimillative capacity; reduce organic loads, metals |
| SC51 | Salt Creek | 17.00 | 12.50 | 37.28 | 74.5 | D.O., Organic Enrichment, PAHs | Ammonia-nitrogen, TKN, substrate | CSO control | Reduce organic load, metals |
| SC52 | Salt Creek | 10.50 | 28.00 | 43.05 | 82.5 | Organic Enrichment | Ammonia-nitrogen, TKN | Habitat Restoration (dam removal); reduce remineralized nitrogen | increase assimillative capacity; reduce organic loads, metals |
| SC53 | Salt Creek | 11.00 | 19.00 | 17.40 | 39.5 | Habitat Alterations, Organic Enrichment | Ammonia-nitrogen, TKN, riffle, substrate, channel, pool | Habitat Restoration (dam removal); reduce remineralized nitrogen | increase assimillative capacity; reduce organic loads |
| SC55 | Salt Creek | 13.50 | 17.50 | 21.87 | 47.5 | Habitat Alterations | Riffle, substrate, channel, pool | Habitat Restoration | increase assimilative capacity |
| SC56 | Salt Creek | 12.50 | 18.50 | 17.92 | 40.5 | D.O., Habitat Alterations, Organic Enrichment, PAHs, N, Sediment, TSS, TDS, DDT, Aldrin, TP, Flow Alteration, Chloride | Ammonia-nitrogen, TKN, riffle, substrate, channel, pool | Habitat Restoration (dam removal); reduce remineralized nitrogen | increase assimilative capacity; reduce organic loads, metals |




| Project Name (Map 1 code) |
| --- |
| Oak Meadows Golf Course dam removal and stream restoration (A) |
| Oak Meadows Golf Course dam removal and stream restoration (B) |
| Fullersburg Woods dam modification (C) |
| Salt Creek Fullersburg Woods dam impoundment area stream restoration (D) |
| Fawell Dam Fish Passage Modification (E) |
| Southern East Branch Stream Enhancement Project, RM 6.5 to RM 8.5 (F) |
| West Branch South Physical Enhancement Project (G) |
| Chloride Abatement (A3) |
| Municipal level IPS Implementation Plan and Phase 2 project Identification |
| PAH Abatement |
| West Branch Reserve Fen and Stream Restoration Project (H) |
| Spring Brook Restoration (I) |
| Surface Water Management Education |
| West Branch DuPage River Corridor Restoration (J) |