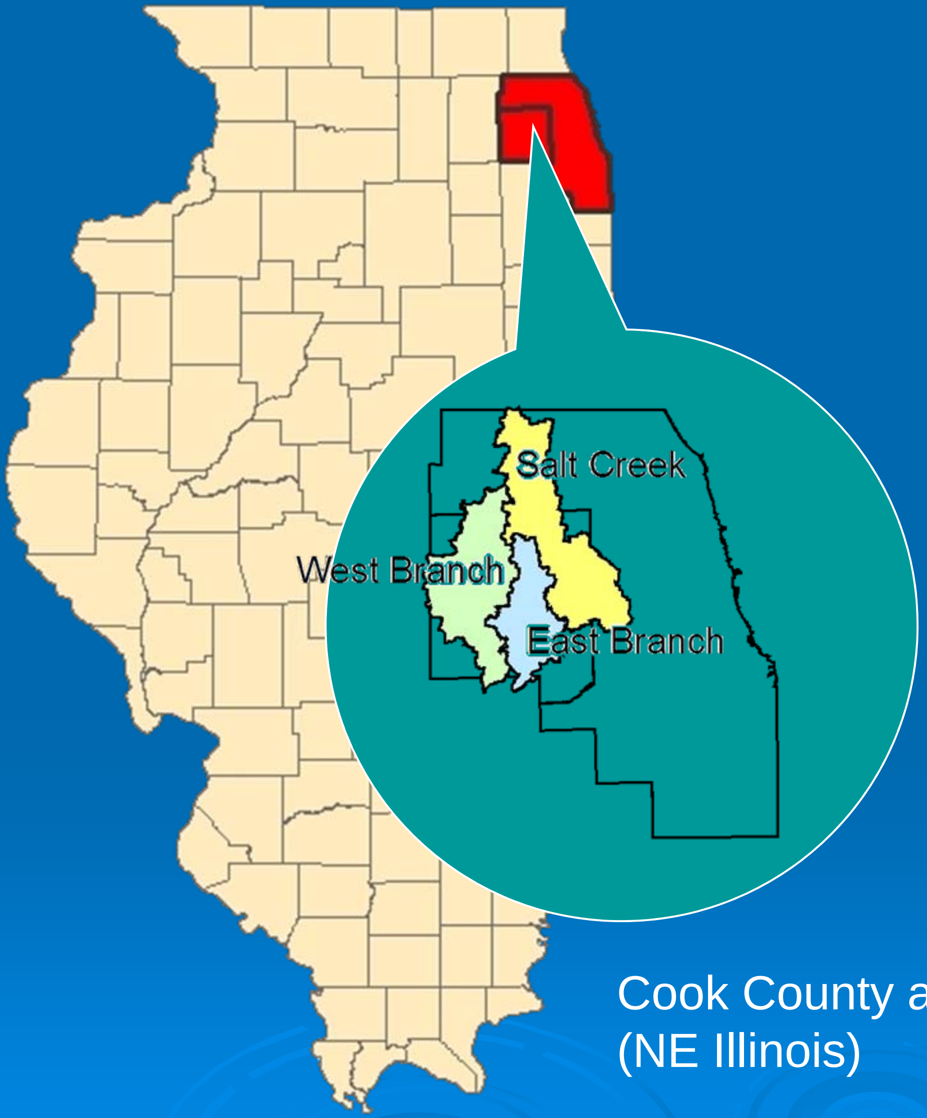
DuPage River Salt Creek Workgroup

Removal of Low Head Dams to Improve Water Quality and other DuPage River / Salt Creek Workgroup Watershed Management Efforts

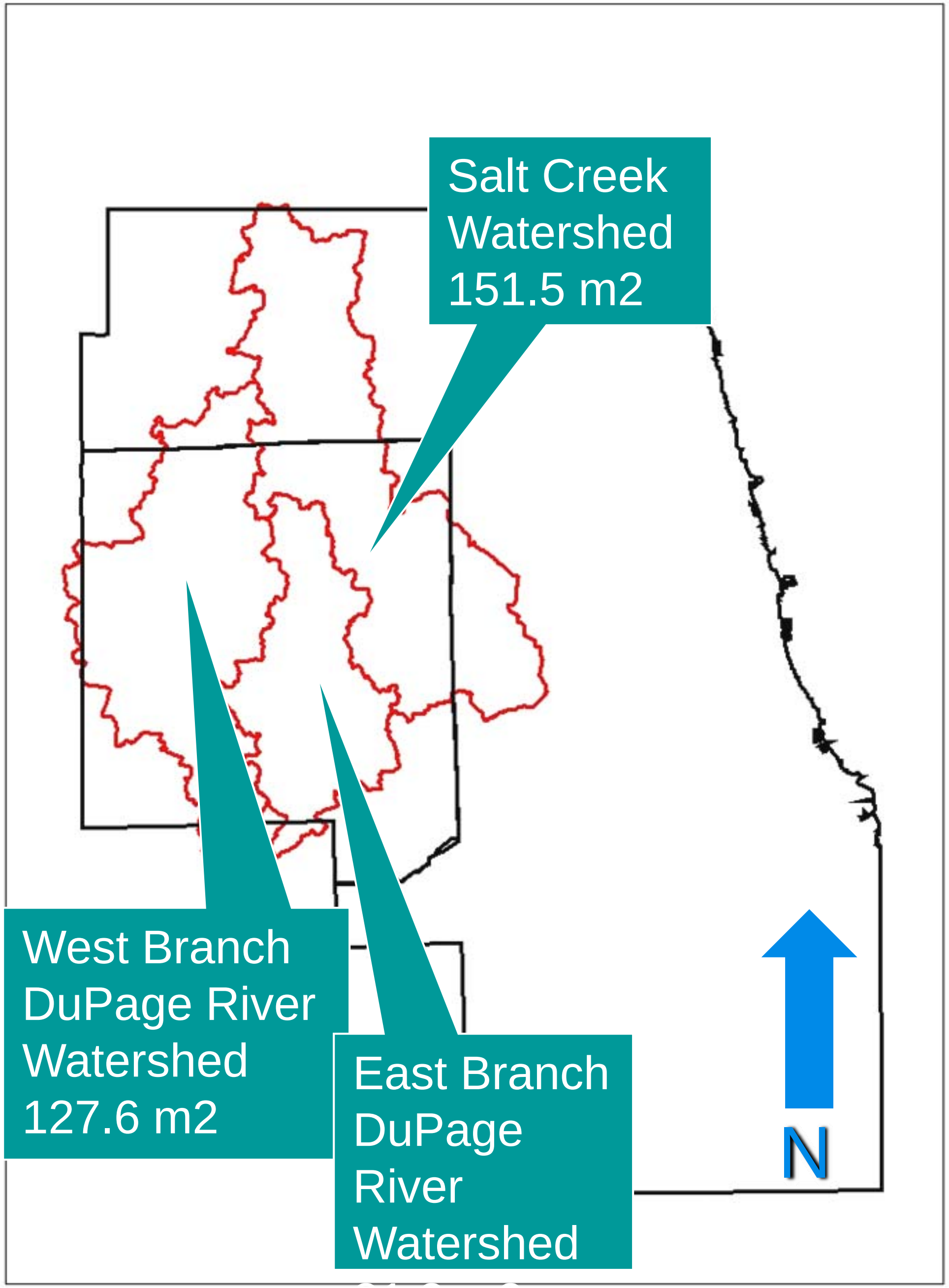
James Huff, PE – Huff & Huff
Dan Bounds, PE, D.WRE - CDM

2010 IAFSM Annual Conference
March 10, 2010

DuPage River Salt Creek Workgroup



Cook County and DuPage County
(NE Illinois)



DRSCW Area

- **360.4 square miles of watershed**
- **Three waterways (102 miles of main stem stream)**
- **Lies in 3 Counties**
- **55 municipal entities**
- **156 MGD of effluent (based on DAF) from 29 POTW operators**
- **Heavily urbanized (mainly suburban)**

TMDLs in DuPage County/Cook County (2000-2004)

- **West Branch of the DuPage River**
  Impairments: *chloride and copper*

- **East Branch of the DuPage River**
  Impairments: *conductivity, chloride and dissolved oxygen (DO)*

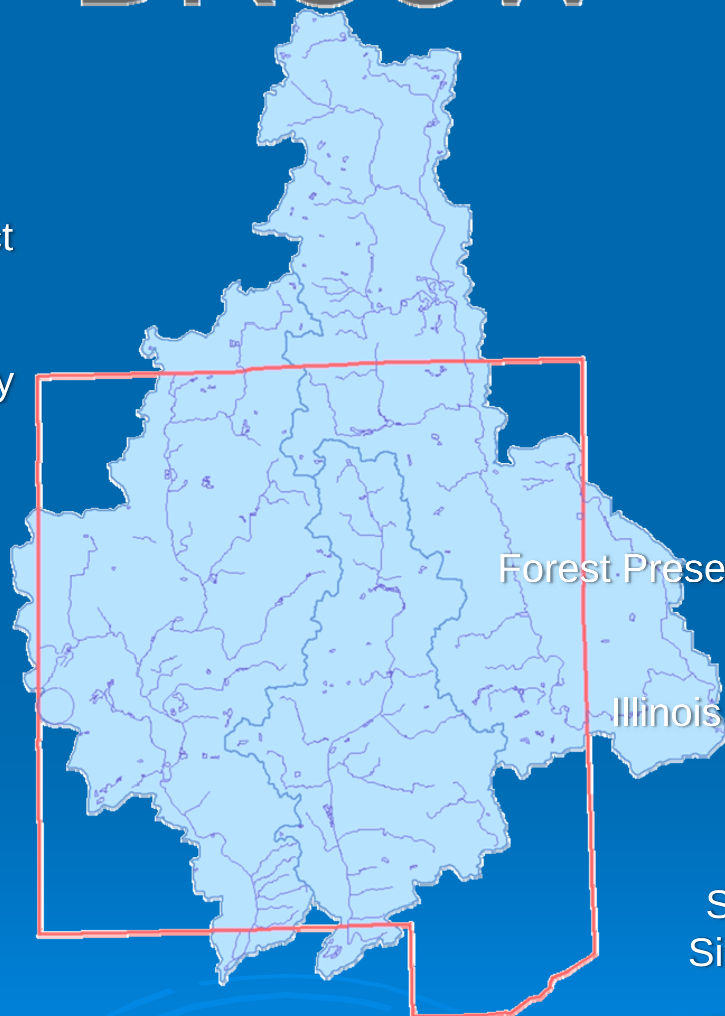
- **Salt Creek**
  Impairments: *copper, conductivity, chloride and dissolved oxygen (DO)*

  New TMDLs under development in 2010 for different pollutants

DRSCW Formation

- Formed April 2005
- Gained status of Illinois not for profit corporation in December 2005
- IEPA offered grant funding for start up $597,000 (to date the DRSCW has been rewarded approximately $1.3 million in 319 grant funding)
- Adopted a watershed approach (basin wide analysis)
- Funded by member dues

DRSCW



Village of Addison
Village of Arlington Heights
Village of Bensenville
Village of Bloomingdale
Village of Bolingbrook
Village of Carol Stream
Village of Downers Grove
Elk Grove Village
Downers Grove Sanitary District
DuPage County
City of Elmhurst
Glenbard Waste Water Authority
Village of Glen Ellyn
Village of Glendale Heights
Village of Hanover Park
Village of Hinsdale
Village of Hoffman Estates
Village of Itasca
Village of Lisle
Village of Lombard
MWRDGC
City of Naperville
Village of Northlake
Village of Oak Brook
City of Oakbrook Terrace
Village of Roselle

Salt Creek Sanitary District
Village of Schaumburg
Village of Villa Park
City of Wheaton
City of West Chicago
Wheaton Sanitary District
Village of Westmont
City of Wooddale
Village of Woodridge
Baxter Woodman, Inc.
Clark Dietz, Inc.
CDM, Inc.
The Conservation Foundation
ENSR, Inc.
Forest Preserve District of DuPage County
Hey and Associates, Inc.
Huff & Huff, Inc.
Illinois Department of Transportation
Kabbes Engineering, Inc.
Prairie Rivers Network
RJN Group, Inc.
Salt Creek Watershed Network
Sierra Club, River Prairie Group
Strand & Associates, Inc.
Wight Engineering, Inc.
York Township Highway Department

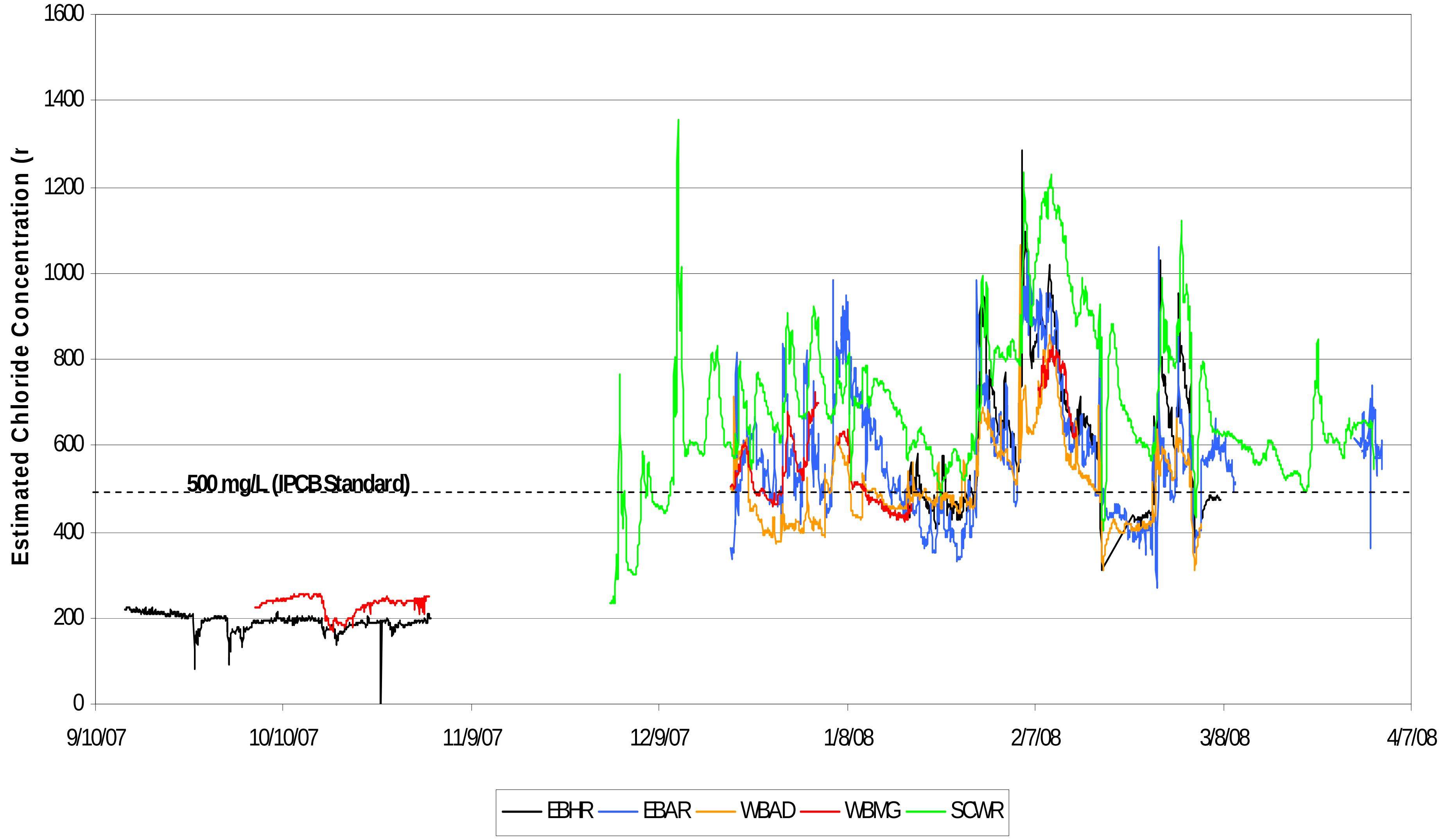
DRSCW Efforts Timeline

- 2004 / 2005 - TMDLs for DO and Chlorides released for Salt Creek and Upper DuPage River, DRSCW forms, awards contract to evaluate DO improvement studies
- 2006 – DO monitoring starts, bioassessment in West Branch DuPage River, DO model started
- 2007 – Chloride evaluation starts, bioassessment in East Branch/Salt Creek
- 2008 - Chloride reduction workshops begin, DO model completed for East Branch and Salt Creek
- 2009 - Private and public de-icing workshops held, dam removal on East Branch schedule for summer 2010

Chloride Reduction Program

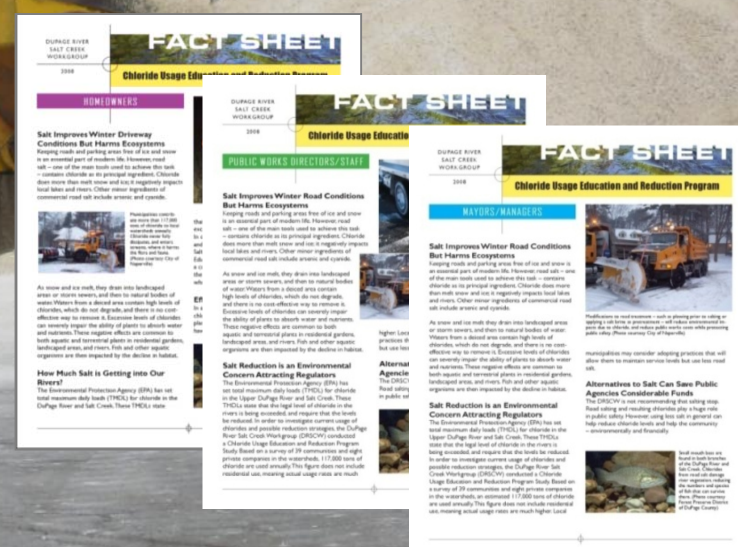
- **Questionnaire to all public agencies with de-icing operation**
- **Research existing deicing programs and efforts**
- **Called for adoption of pre-wetting, anti-icing, increased training and improved storage**
- **Started effectiveness monitoring**
- **Developed educational materials and workshops to accelerate adoption of alternatives**

Chloride Reduction



Education and Outreach

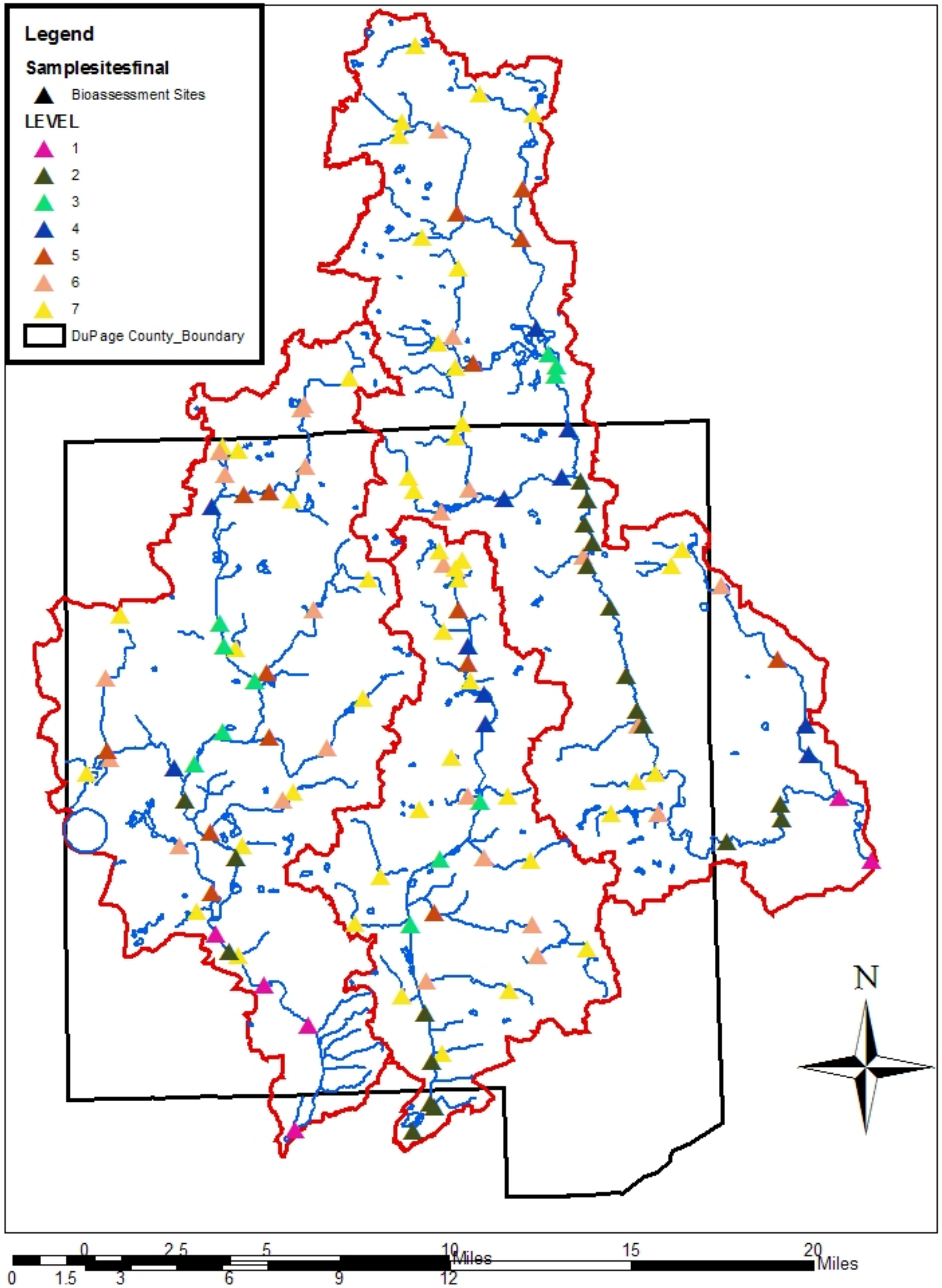
- Chloride reduction fact sheets have been developed and distributed
  - Mayors and Managers
  - Public Works Managers / Staff
  - Commercial Operations
  - Homeowners



- Alternative Products Memo
- www.drscw.org/winter


Bioassessment
2006 9 21

Map 2. Bioassessment Sites Geometric Levels



Bioassessment Plan

- 135 sites
- Geometric/ targeted design
- 3 year cycle

Bioassessment Plan Elements

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

BACKGROUND

- Both Streams identified as impaired due to low Dissolved Oxygen (DO) levels
- TMDL Studies completed in 2004 by IEPA Contractor for DO and chlorides
- QUAL(2)e model developed for TMDLs
- Concluded to meet DO Standard on Salt Creek, required:
  - 38% Reduction in NH3
  - 56% Reduction in BOD5
  - Or remove one dam and reduce NH3 by 38% and BOD5 by 34%

BACKGROUND, Continued

- Problem with TMDL/Model:
  - Insufficient DO data
  - No Sediment Oxygen Demand data
  - Limited Phosphorus data, not used
  - Temperature impact on DO critical
  - Assumed all POTWs at permitted loadings during low flow conditions
  - No way to calibrate or validate model, *potential garbage in = garbage out*

DRSCW Formed

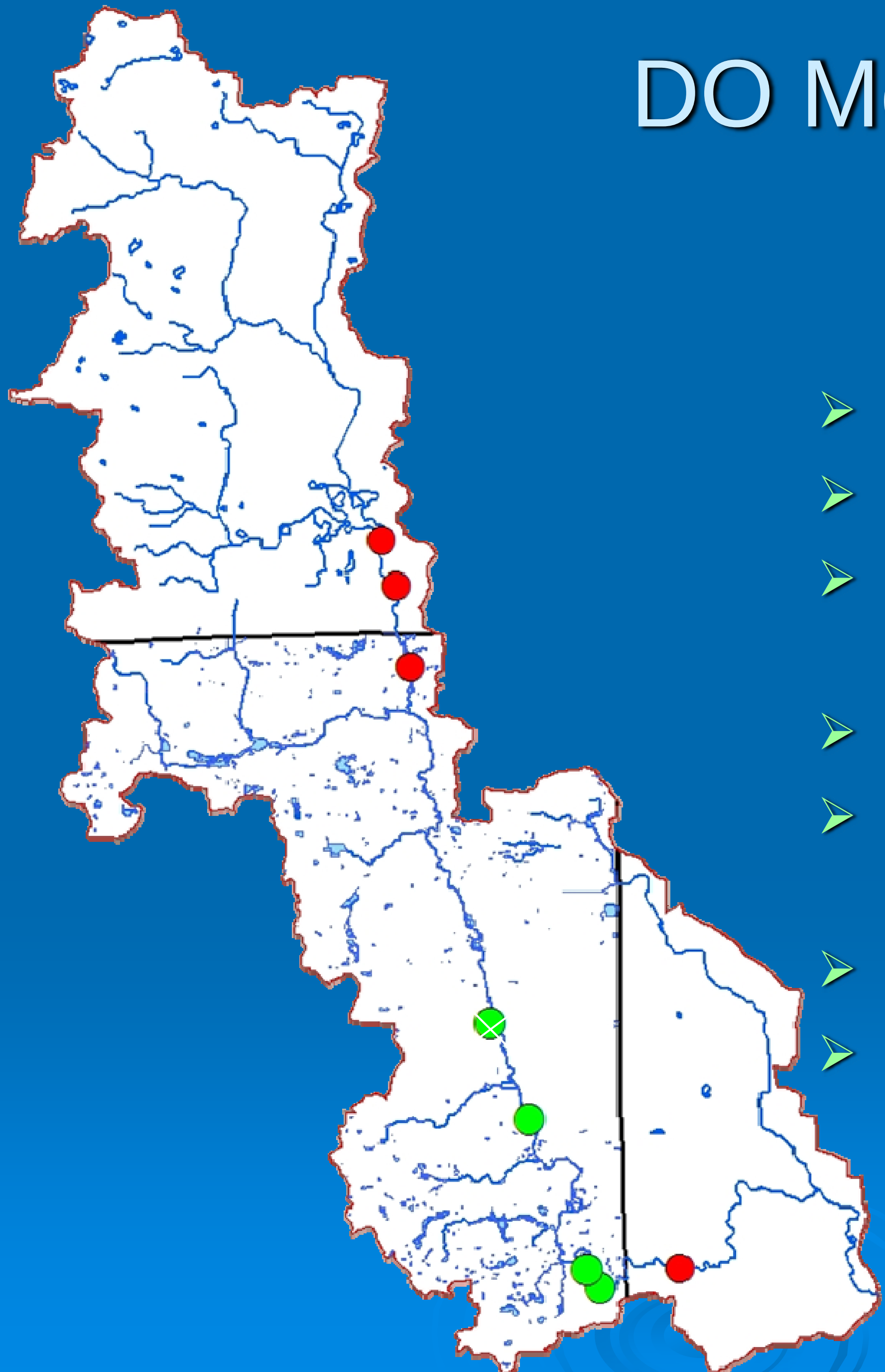
- POTW led workgroup
- Incorporated, so can secure grants directly
- Board is controlled by the regulated community
- 1.5 fulltime staff at the Conservation Foundation
- Aggressive Dues program for all municipalities and POTWs
- Goal is to improve water quality in a holistic manner

Stream DO Feasibility Study

- Both the East Branch and Salt Creek
- Data gaps readily apparent early on
  - Continuous DO data needed
  - Temperature data
  - Representative low flow pollutant loadings from POTWs-Design Basis
  - Sediment Oxygen Demand data needed
  - Phosphorus levels

SALT CREEK

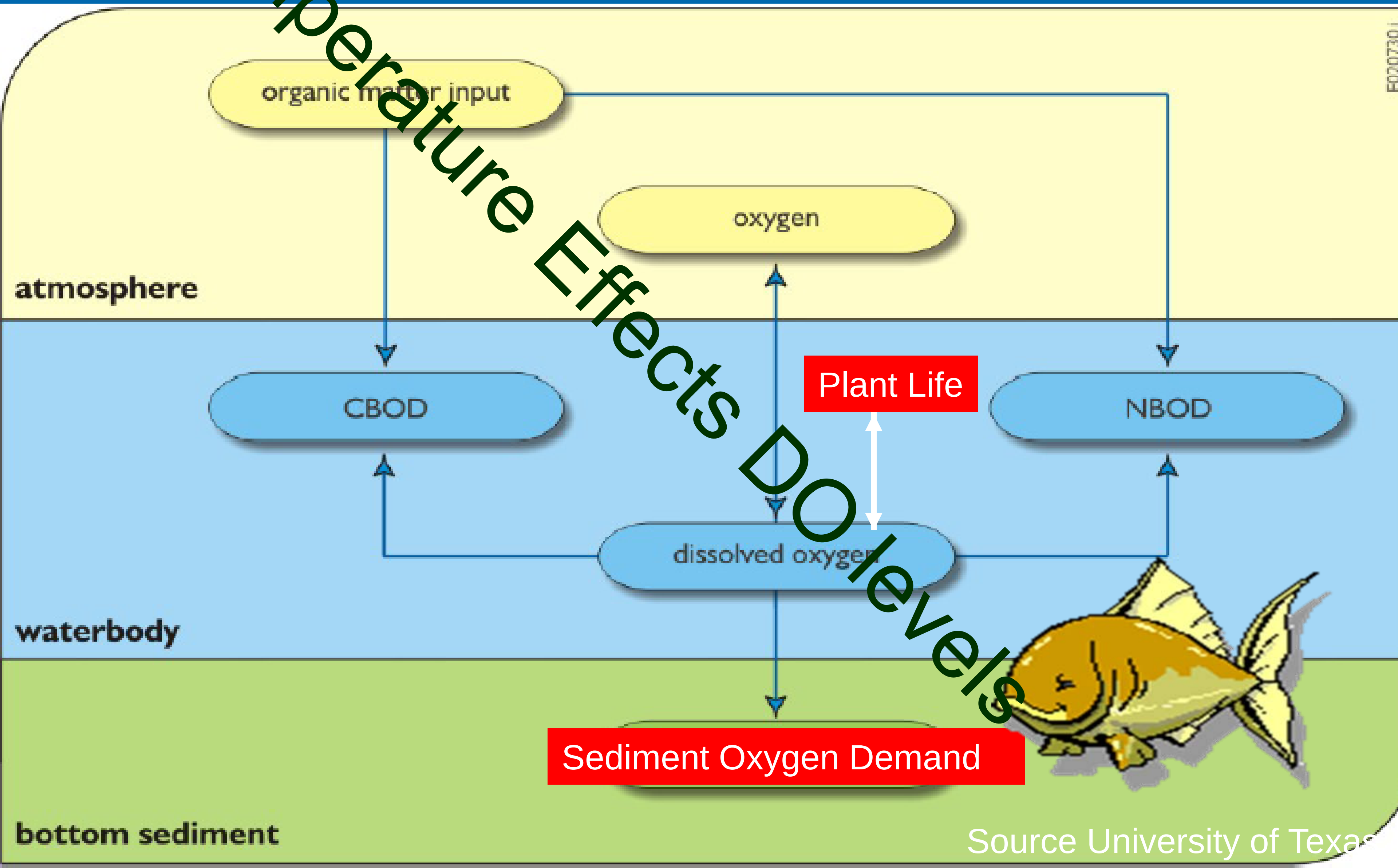
- 152 Square miles of highly urbanized land
- Main stem of Salt Creek 42 miles
- Elevation drop, 225 ft, or 5.4 ft per mile
- 11 Municipal Wastewater Treatment Plants
- 6 Combined Sewer Overflows
- During the summers, wastewater effluents constitute 60 to 70% of the flow.



DO Monitoring Study on Salt Creek

- Busse Woods (MWRD)
- JFK Boulevard (MWRD)
- Thorndale Avenue (MWRD)
- Butterfield Rd (DRSCW)
- Fullersburg Woods (DRSCW)
- York Road (DRSCW)
- Wolf Road (MWRD)

Sources and Sinks for DO



Salt Creek - Oak Meadows Golf Course Dam

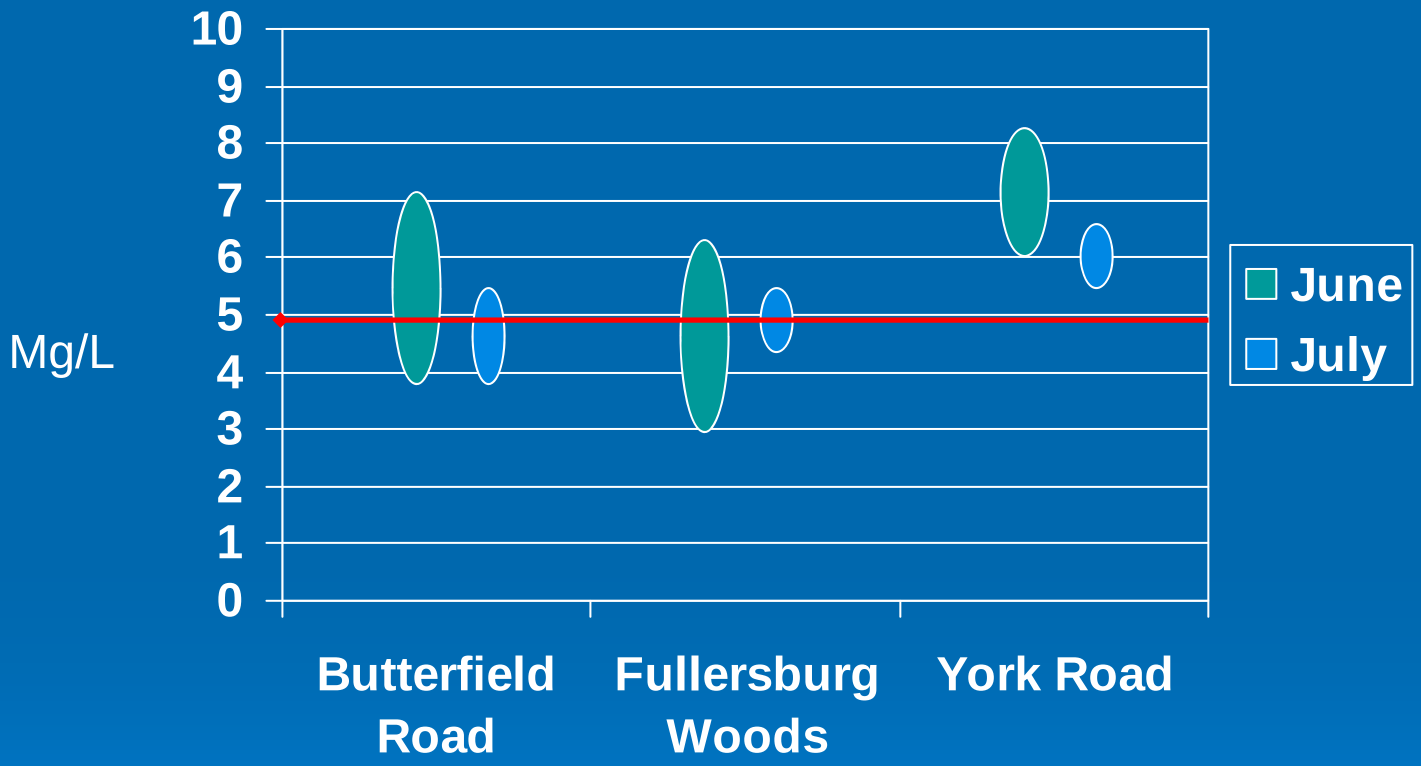
Salt Creek - Long pool (88 ft wide) north of Butterfield Rd., rooted vegetation present – RM 16.1

Salt Creek - Above Graue Mill – RM 10.9

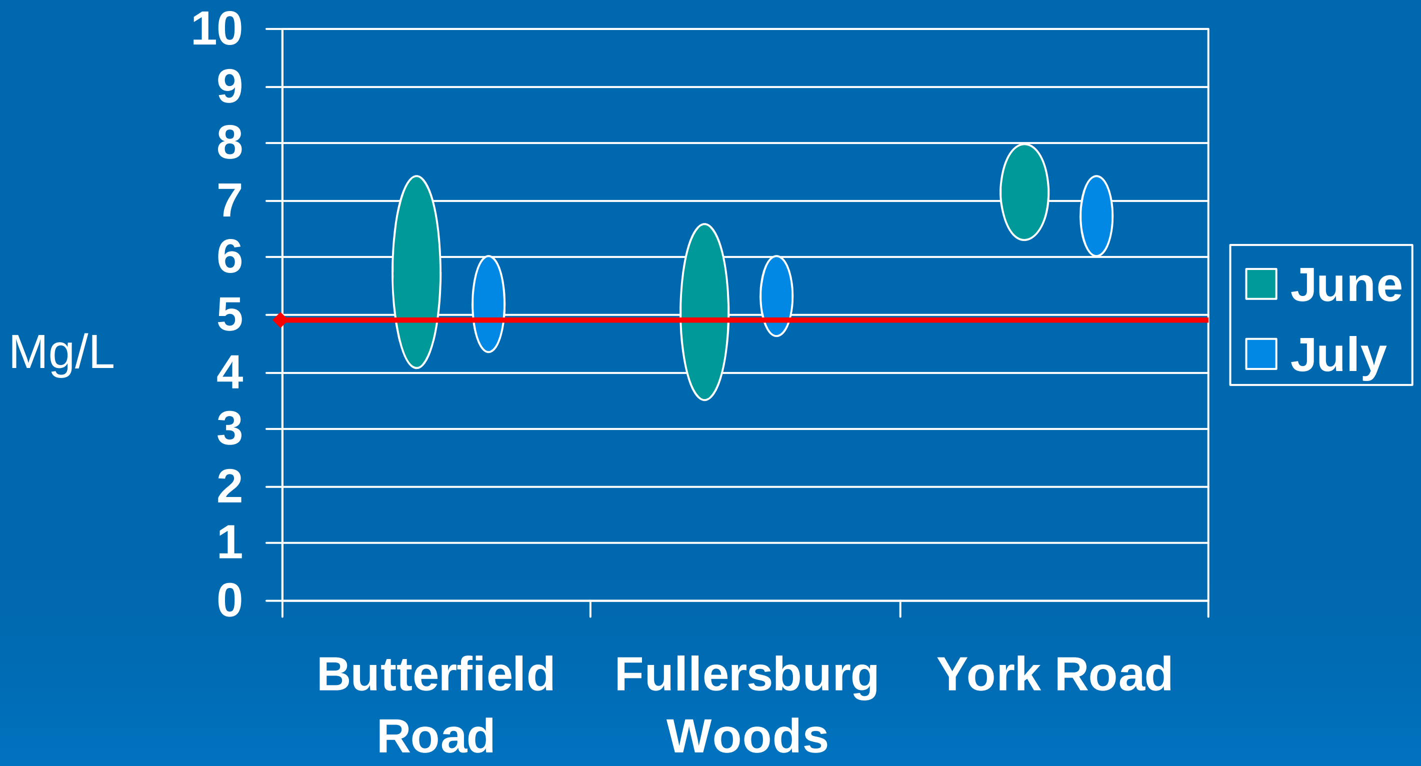

Salt Creek – Graue Mill
Dam – RM 10.7

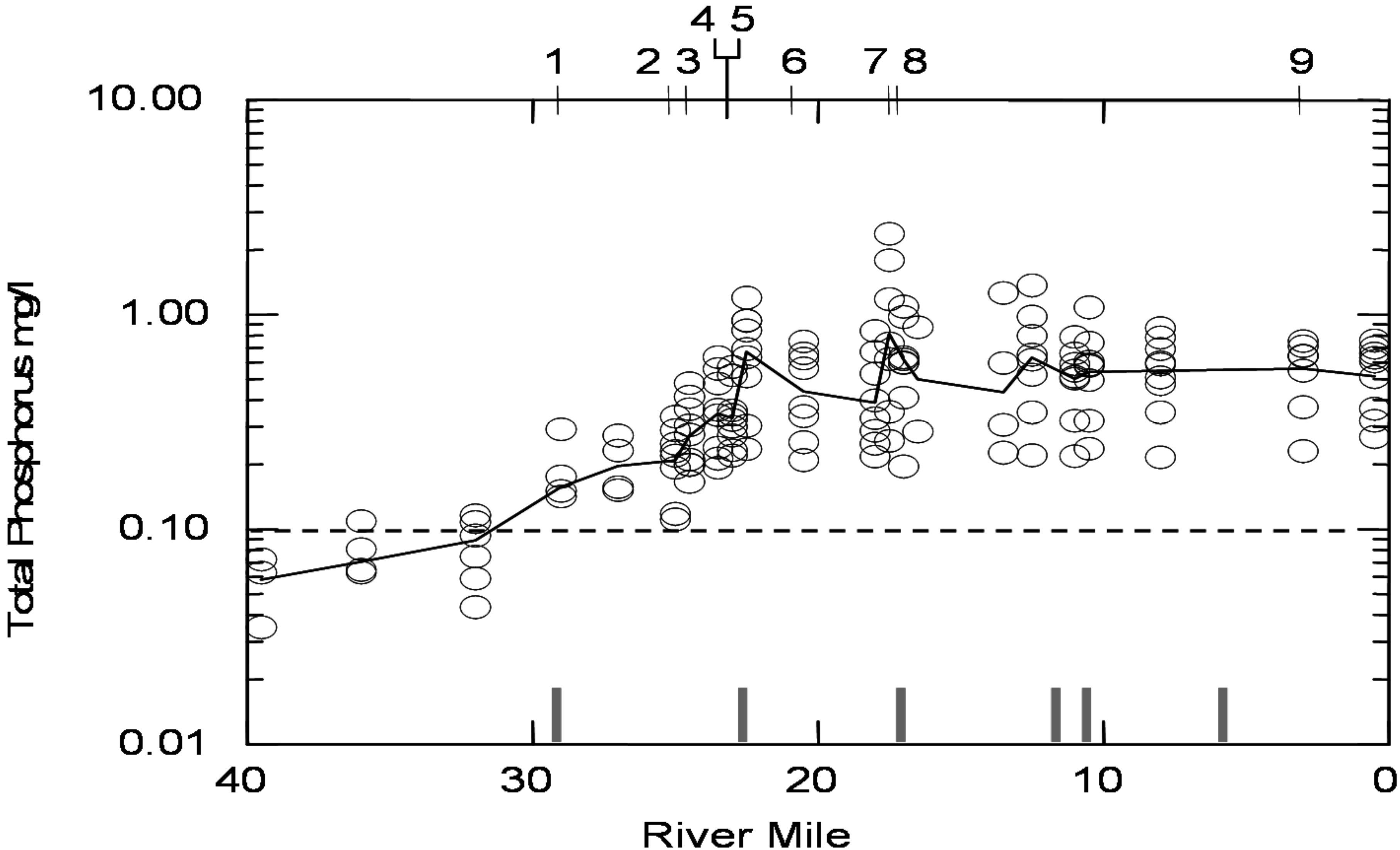
Graue Mill Dam
Existing View

DO Data for Sites on Salt Creek June and July 2006. Daily Minimums



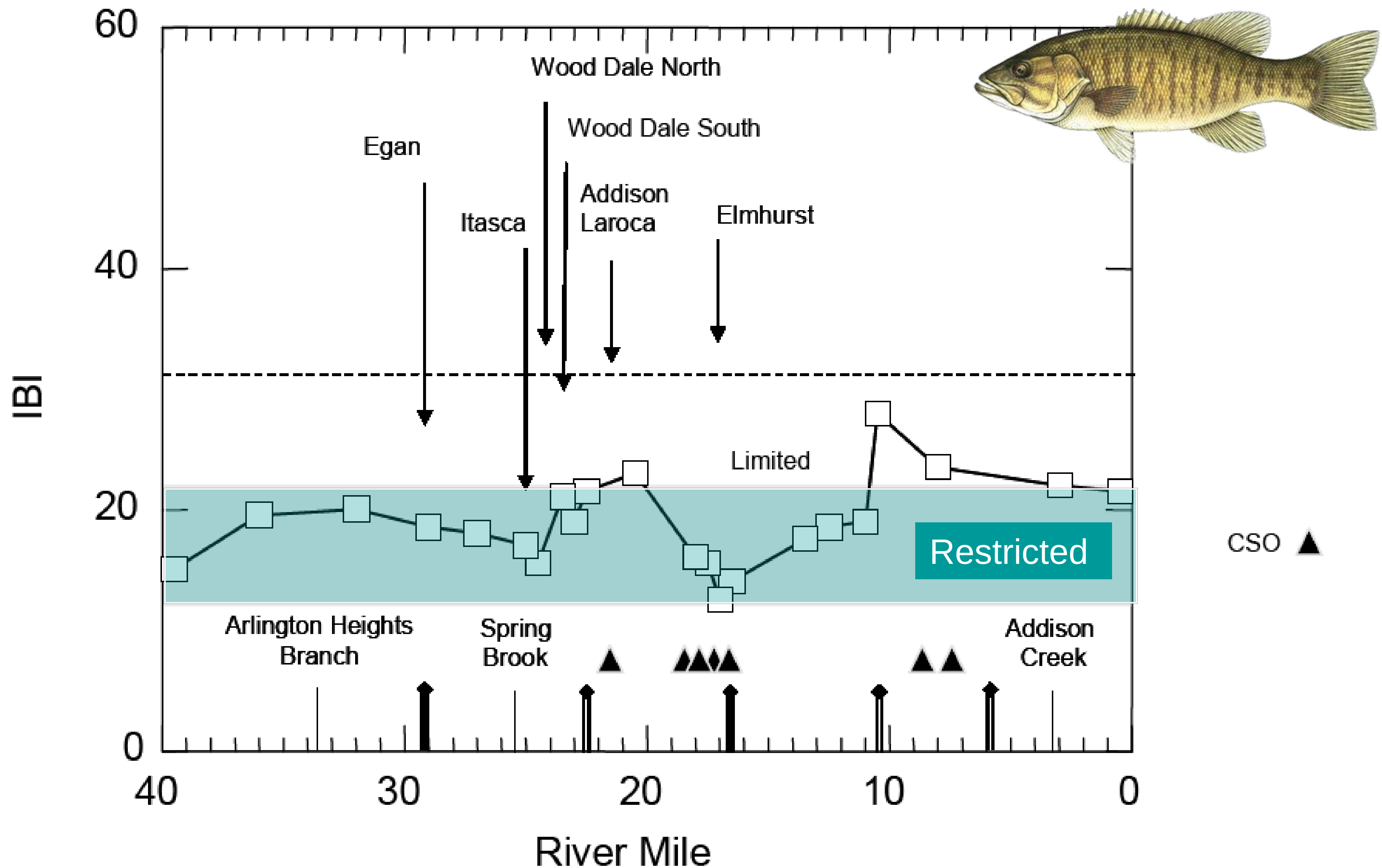
DO Data for Sites on Salt Creek June and July 2007. Daily Minimums

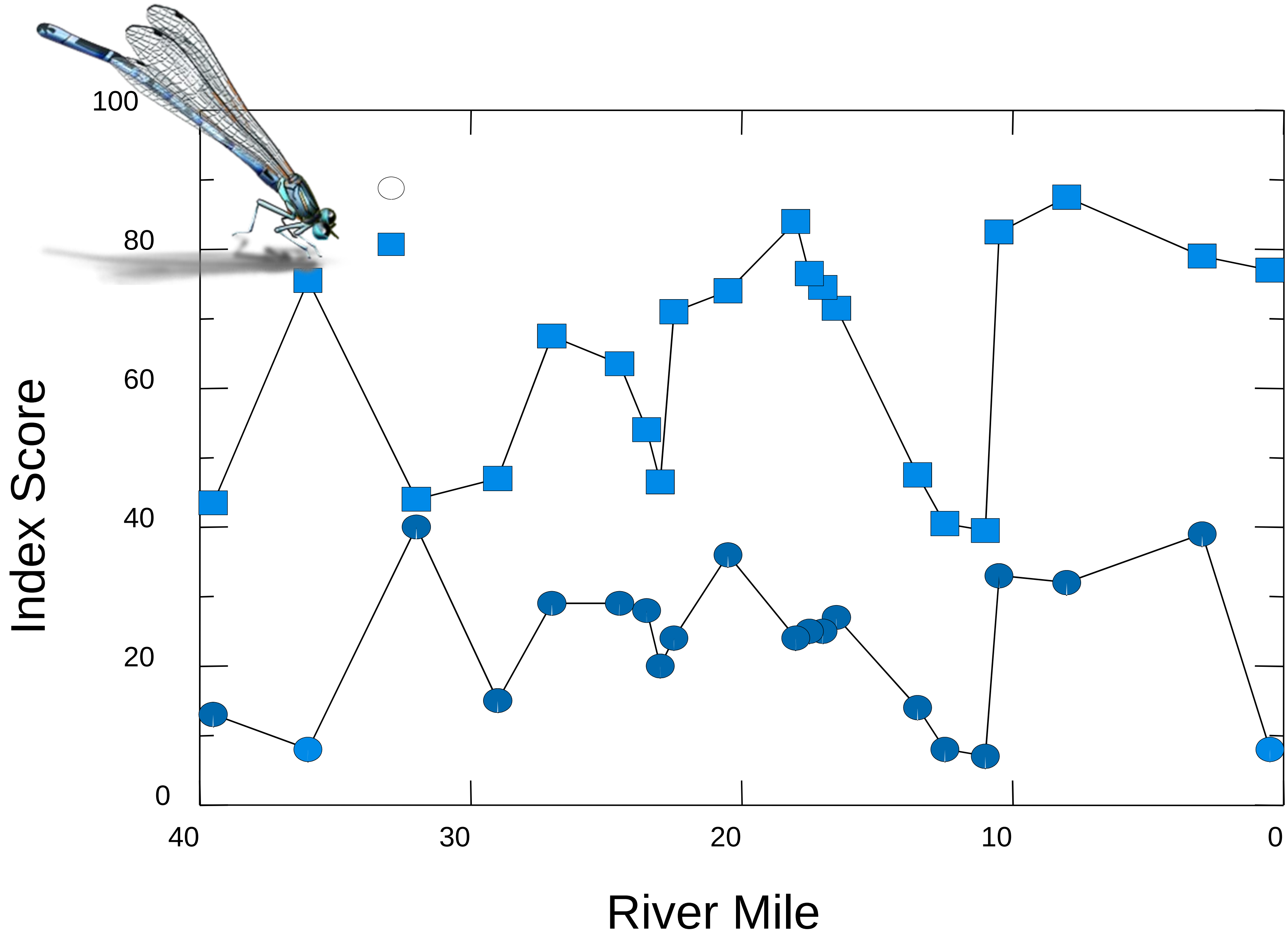




Phosphorus Levels in Salt Creek

Fish Biodiversity Scores Salt Creek





Index Score
100
80
60
40
20
0
40
30
20
10
0
River Mile

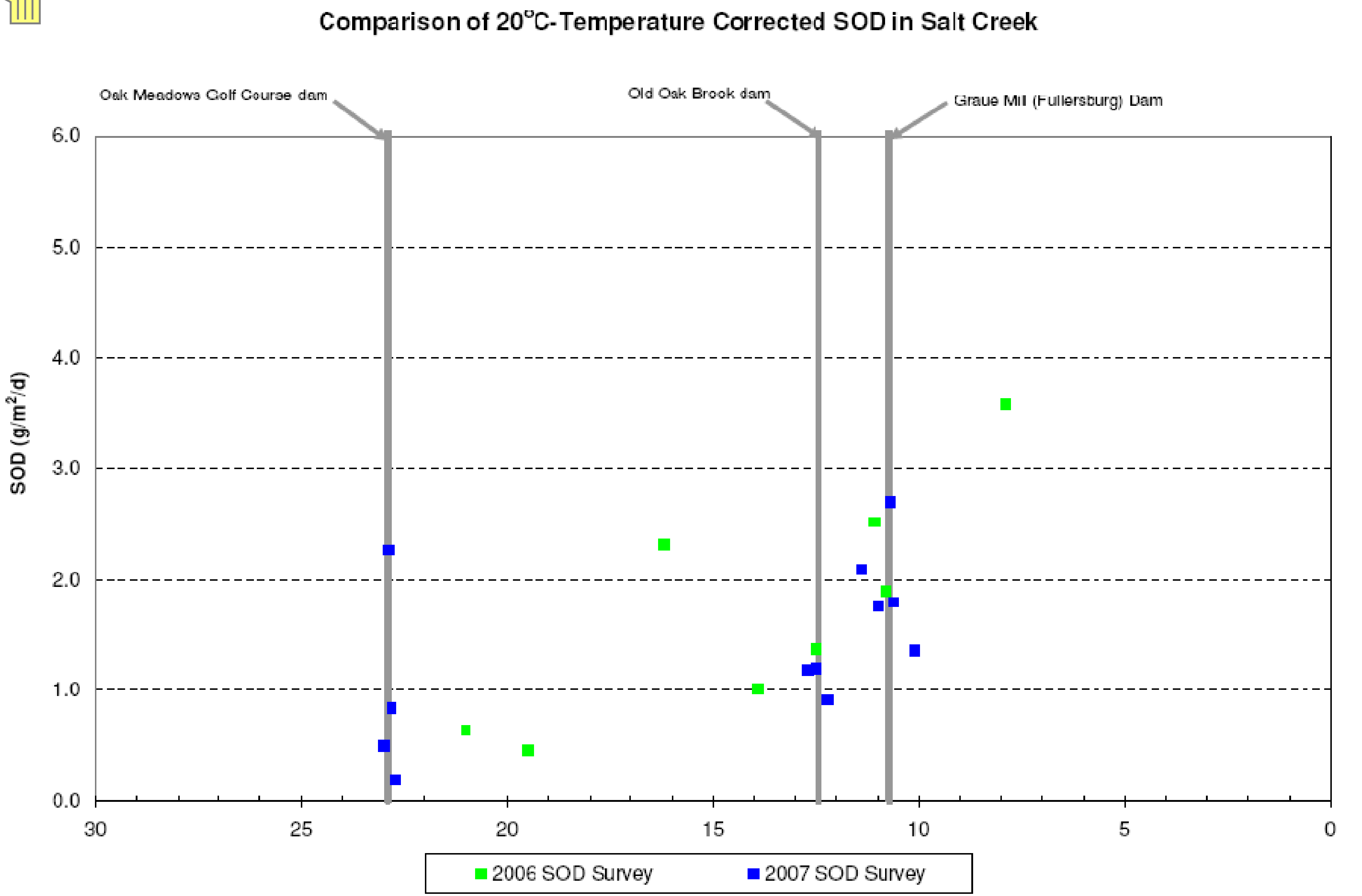
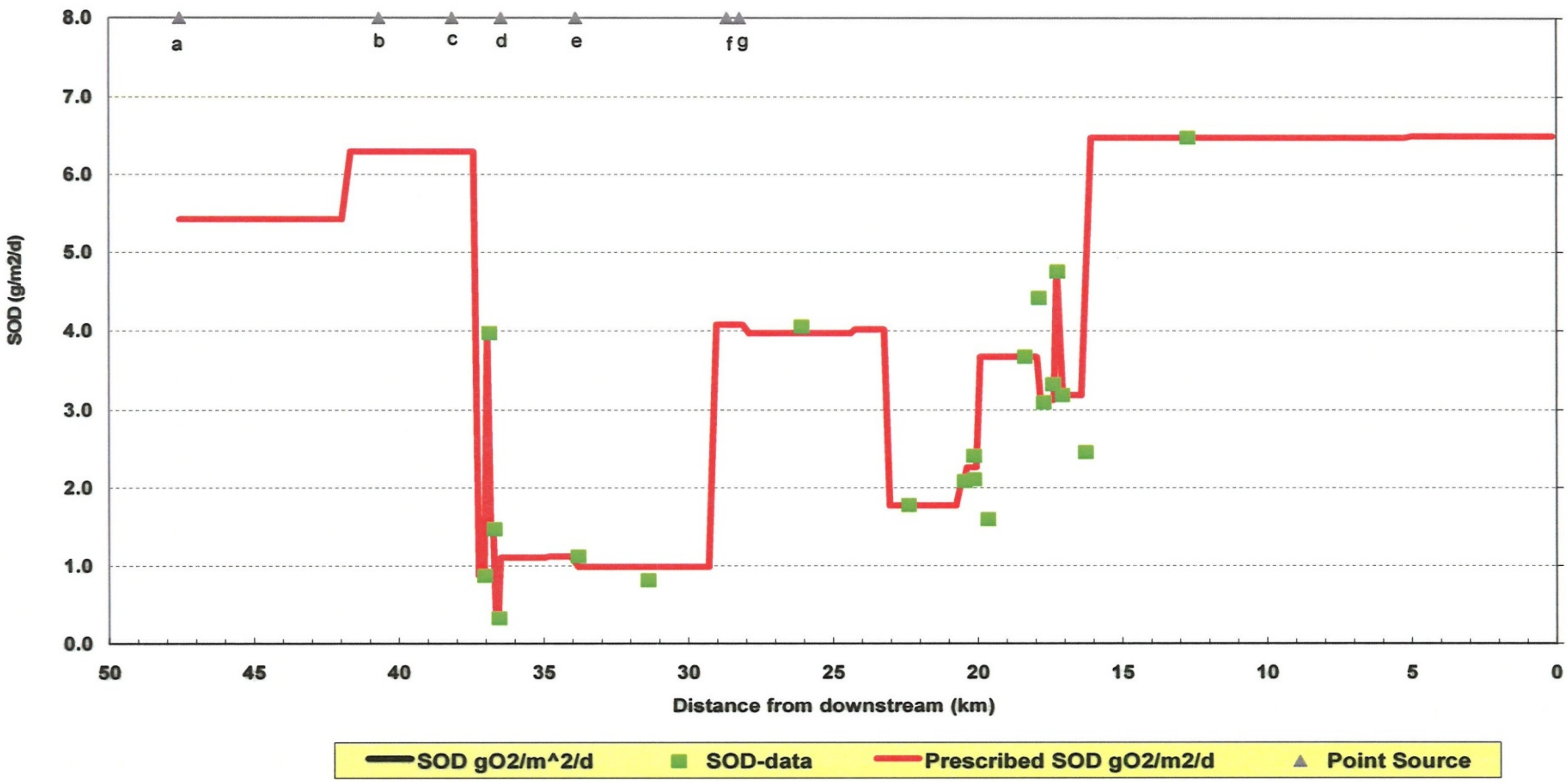


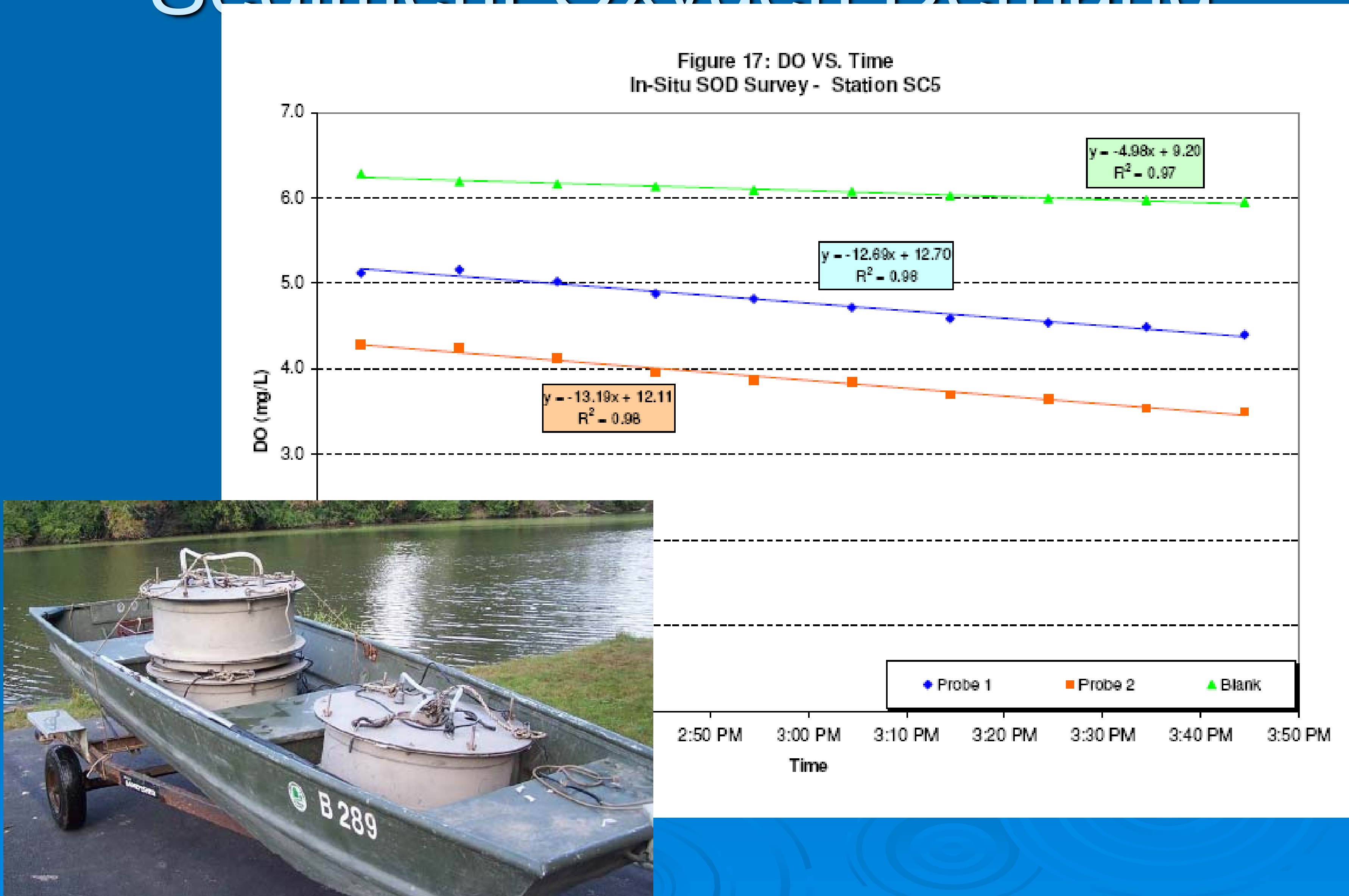
Figure 3-4. Comparison Temperature Corrected SOD in Salt Creek

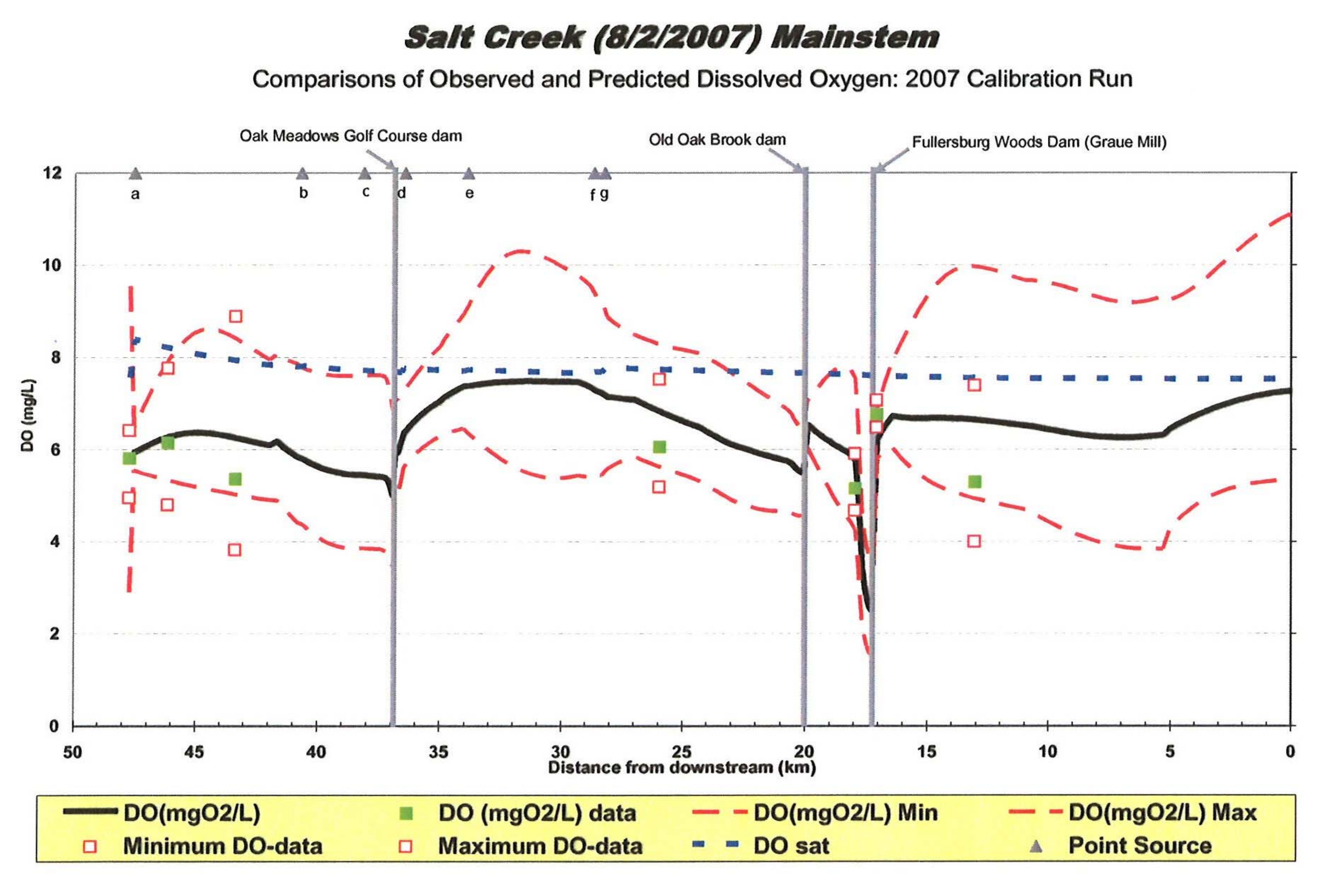
Salt Creek Mainstem

Monthly Average of June 2005 DMR Condition with 3° C Increased Plant Discharge and Air Temperature

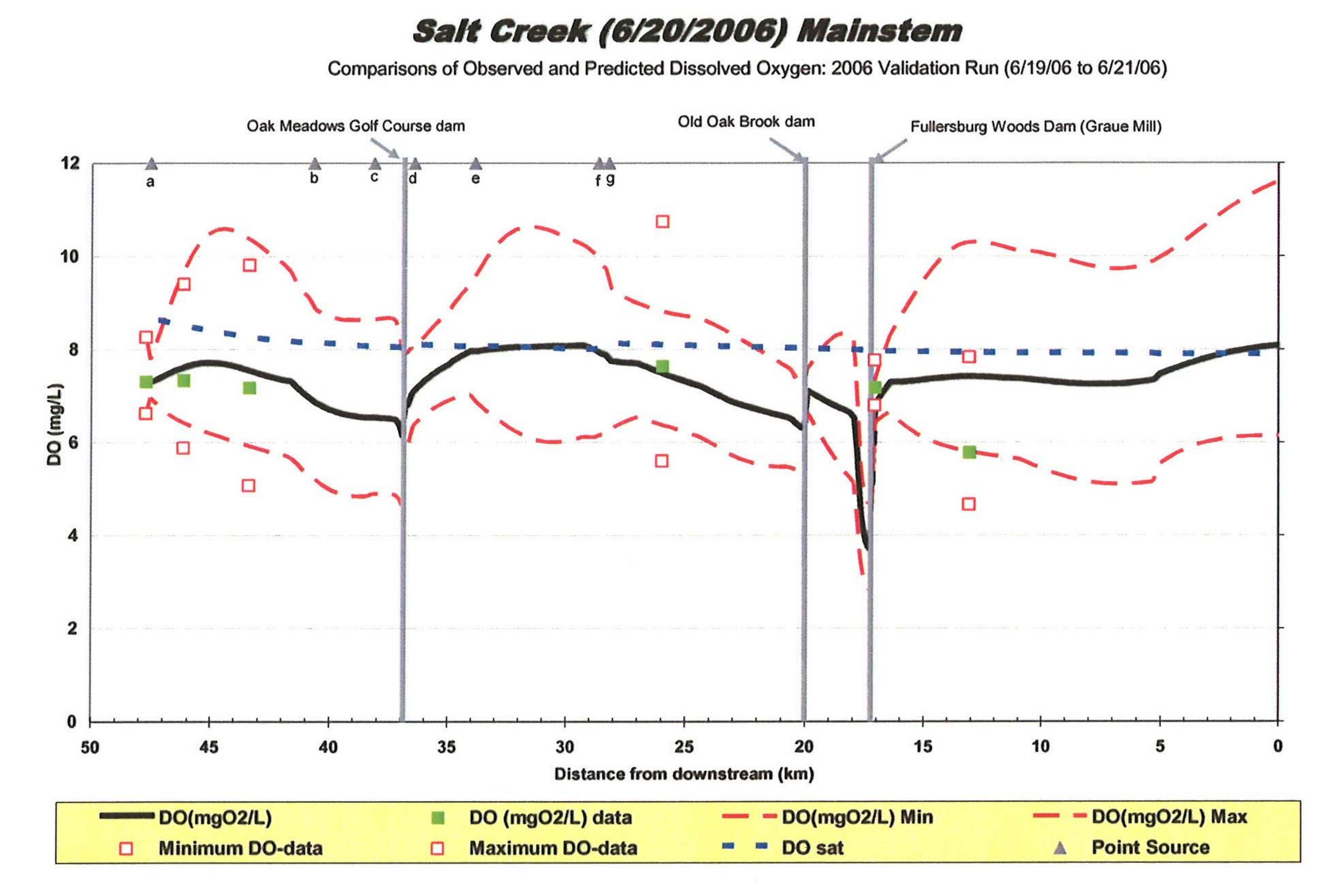


Sediment Oxygen Demand

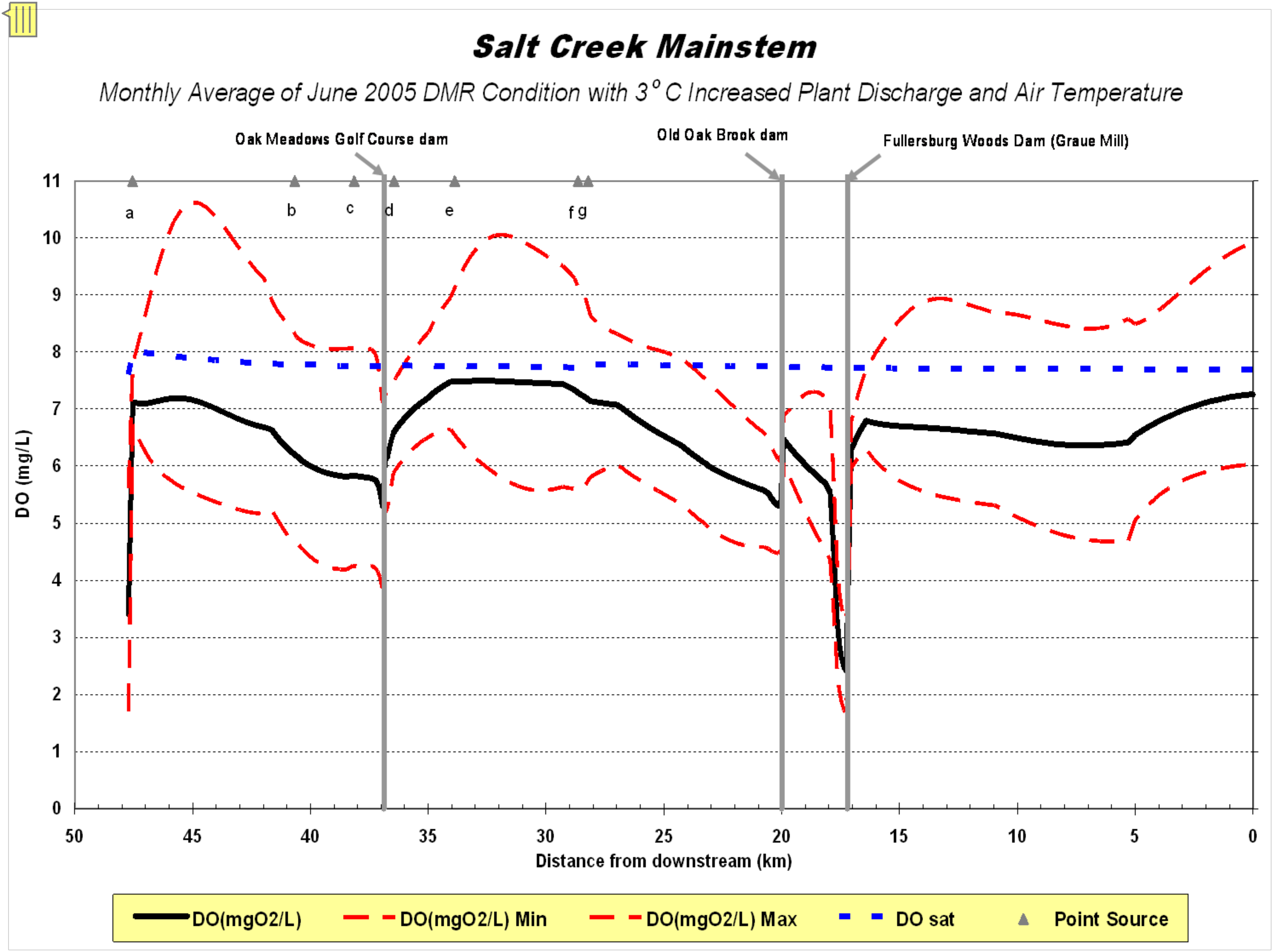




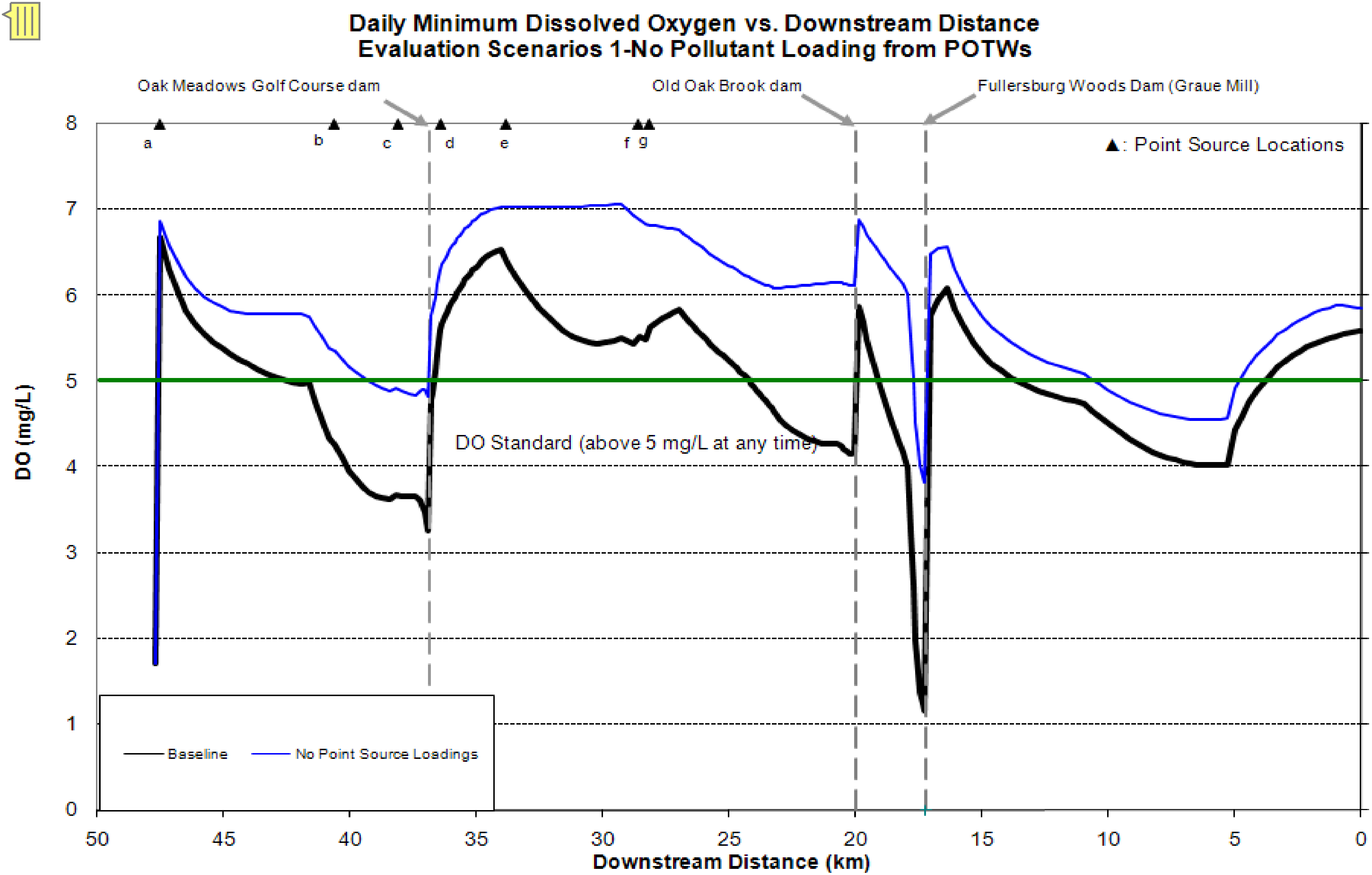
Predicted vs. Measured Dissolved Oxygen for August 2007 for Salt Creek



Predicted vs. Measured Dissolved Oxygen for July 2006 for Salt Creek



Salt Creek Mainstem
Monthly Average of June 2005 DMR Condition with 3°C Increased Plant Discharge and Air Temperature
Oak Meadows Golf Course dam
Old Oak Brook dam
Fullersburg Woods Dam (Graue Mill)
a
b
c
d
e
f g
DO (mg/L)
11
10
9
8
7
6
5
4
3
2
1
0
50
45
40
35
30
25
20
15
10
5
0
Distance from downstream (km)
DO(mgO2/L)
DO(mgO2/L) Min
DO(mgO2/L) Max
DO sat
Point Source



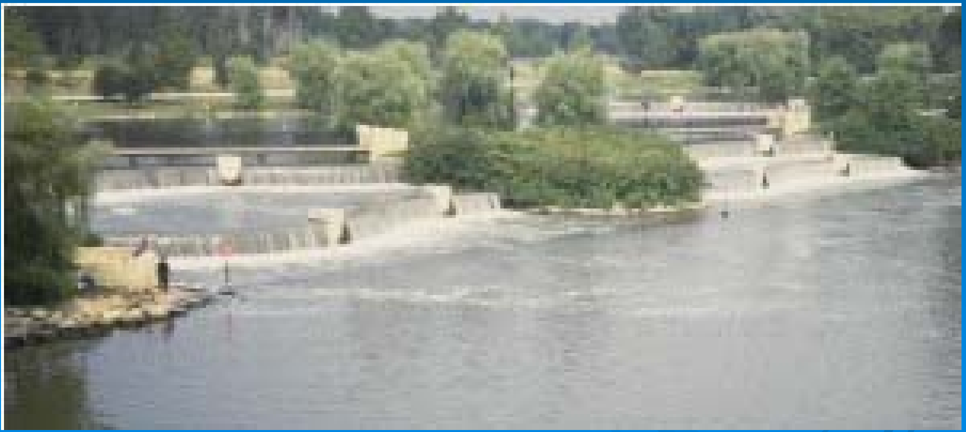
Minimum D.O. vs. Downstream Distance, w & wo POTW Loadings

Qualitative Screening for Stream Aeration

Air-based Alternatives

High-purity O_2 Alternatives

Side-stream Alternatives



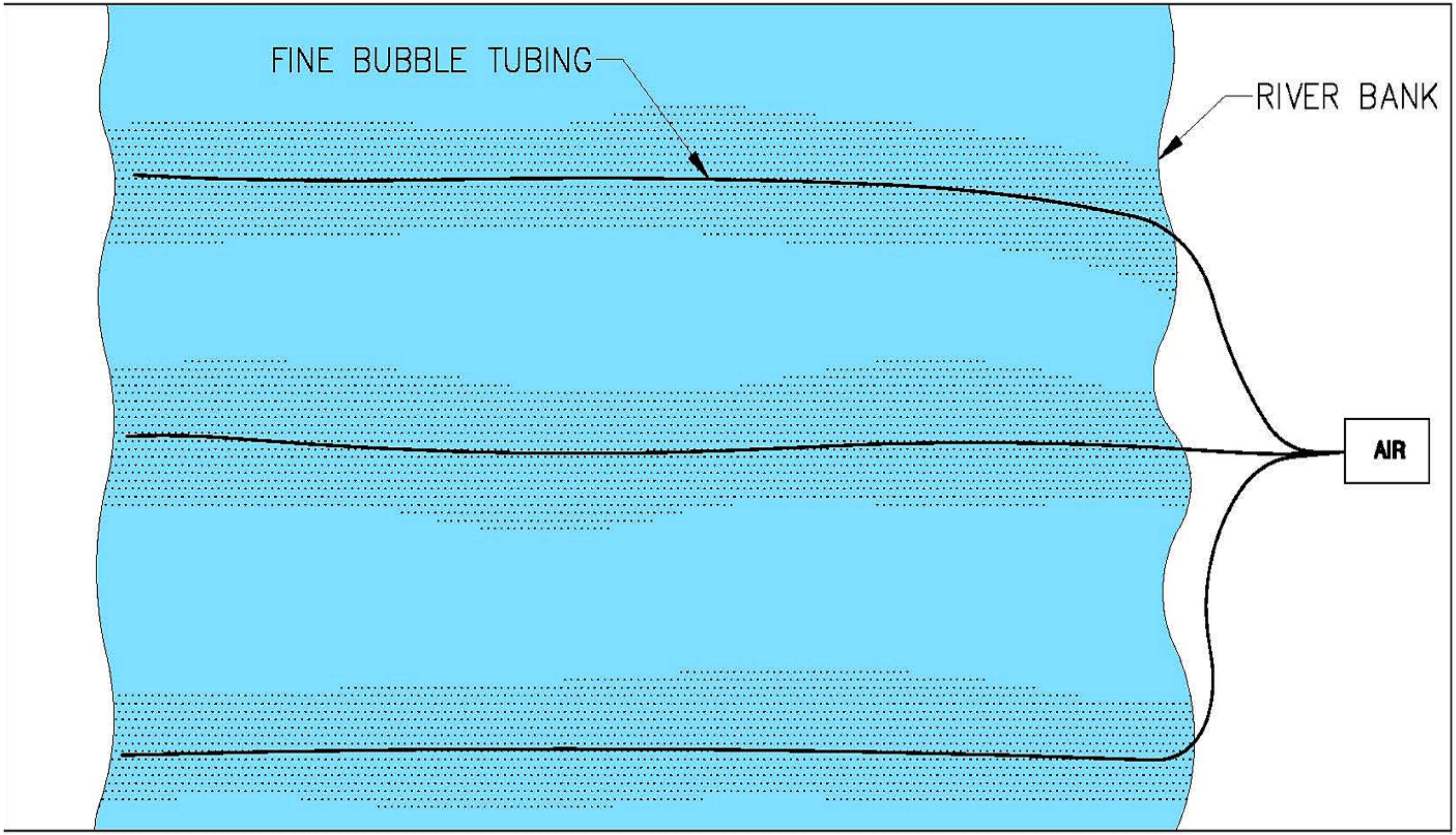
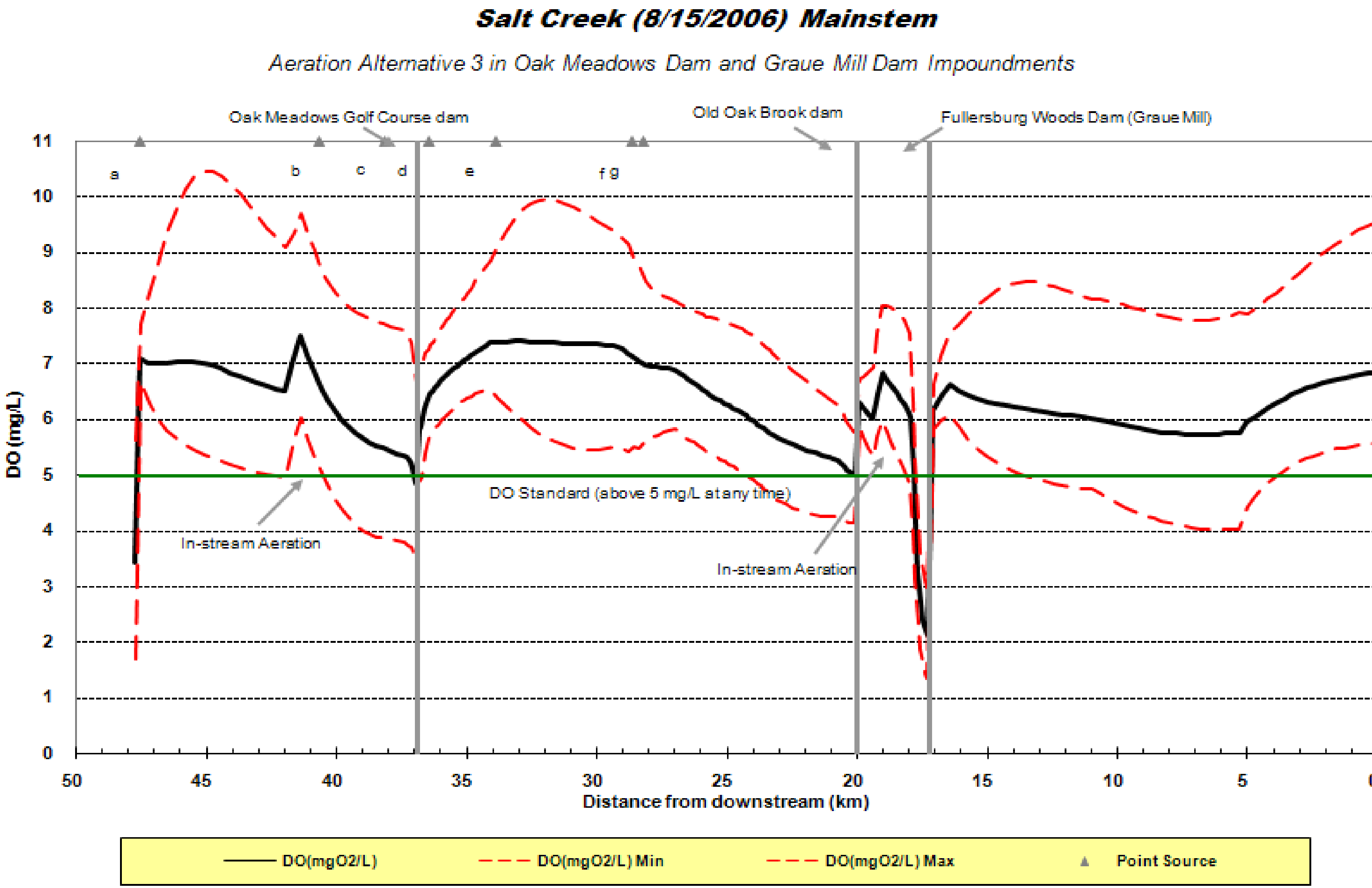
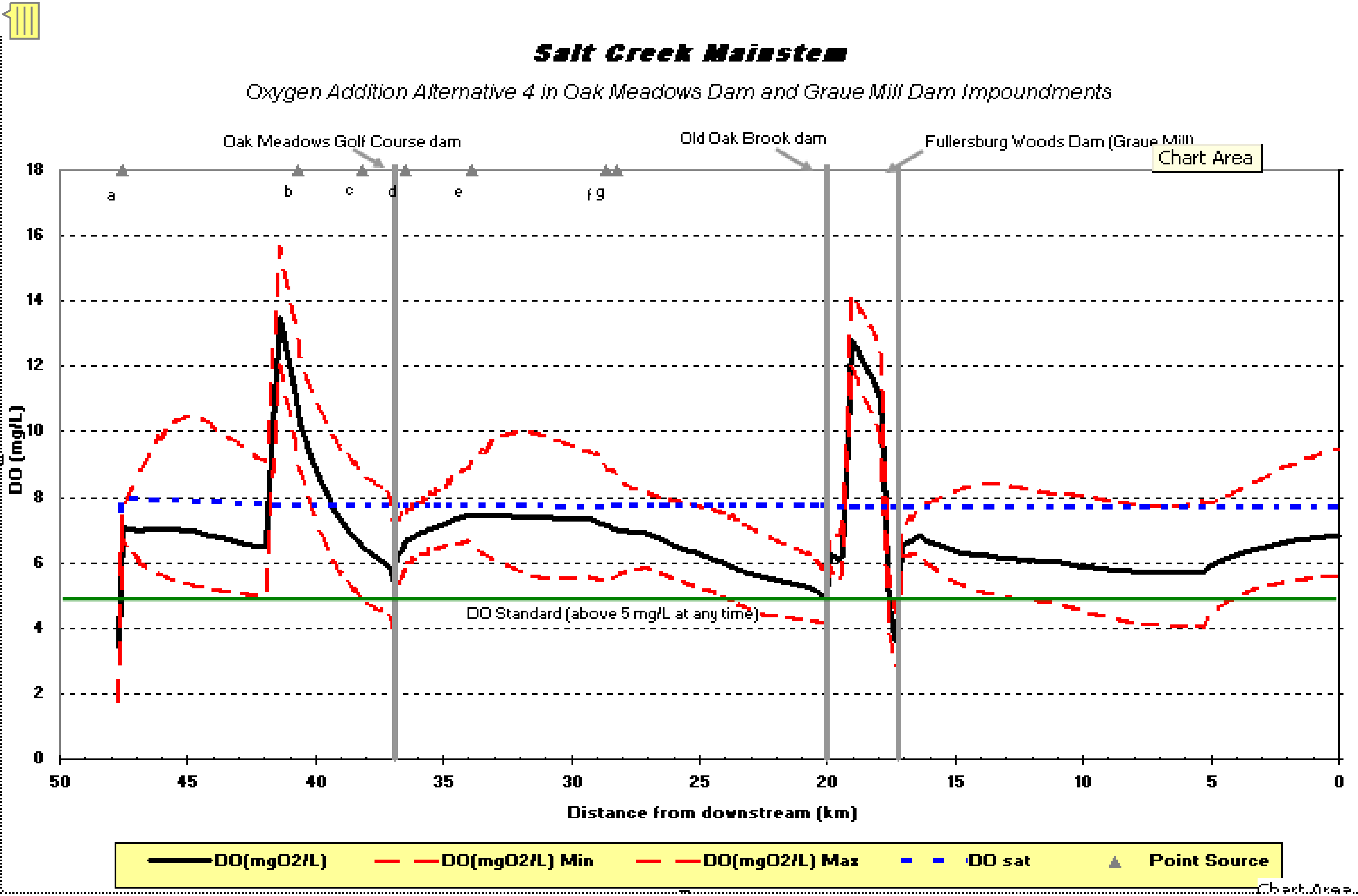


Figure 5-2 - Bubble Aeration



Aeration Alternative Minimum D.O. vs. Downstream Distance



Oxygen Addition Alternative Minimum D.O. vs. Downstream Distance

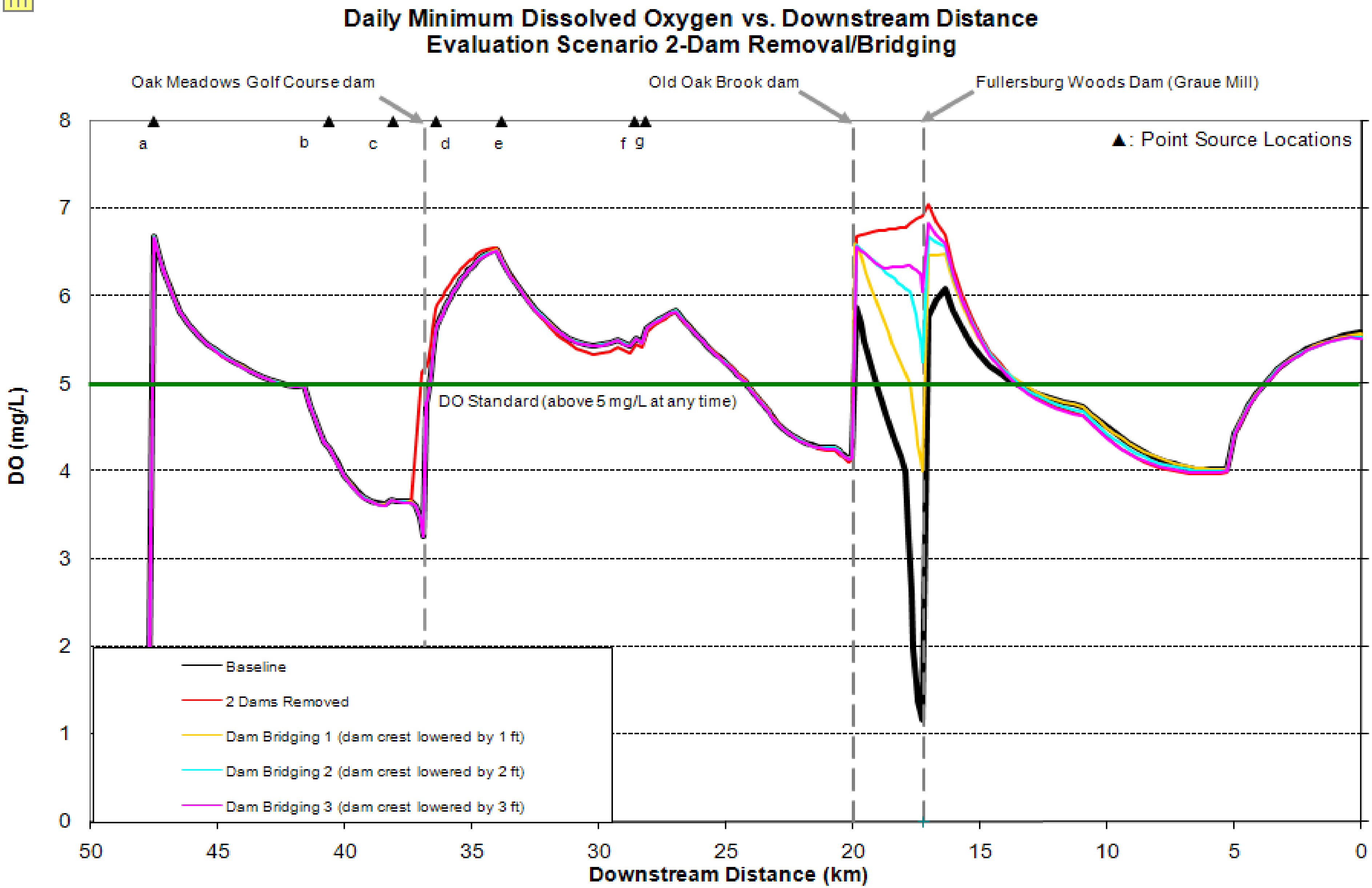


Figure 6-3. Dam Removal Minimum D.O. vs. Downstream Distance

Why do dams damage bio-diversity?

Dam impoundments contain large amounts of settled sediment – poor breeding and feeding habitat for most desirable species.

Lack of pools and riffles means poor functional habitat

Low dissolved oxygen, warmer water and high algae mass with large DO swings

Physical barrier to movement of fish and mussels (19 species of fish below Graue Mill Dam and 13 above it)

Evaluation Brief of Crest Reduction and Bridging

- **Pros**

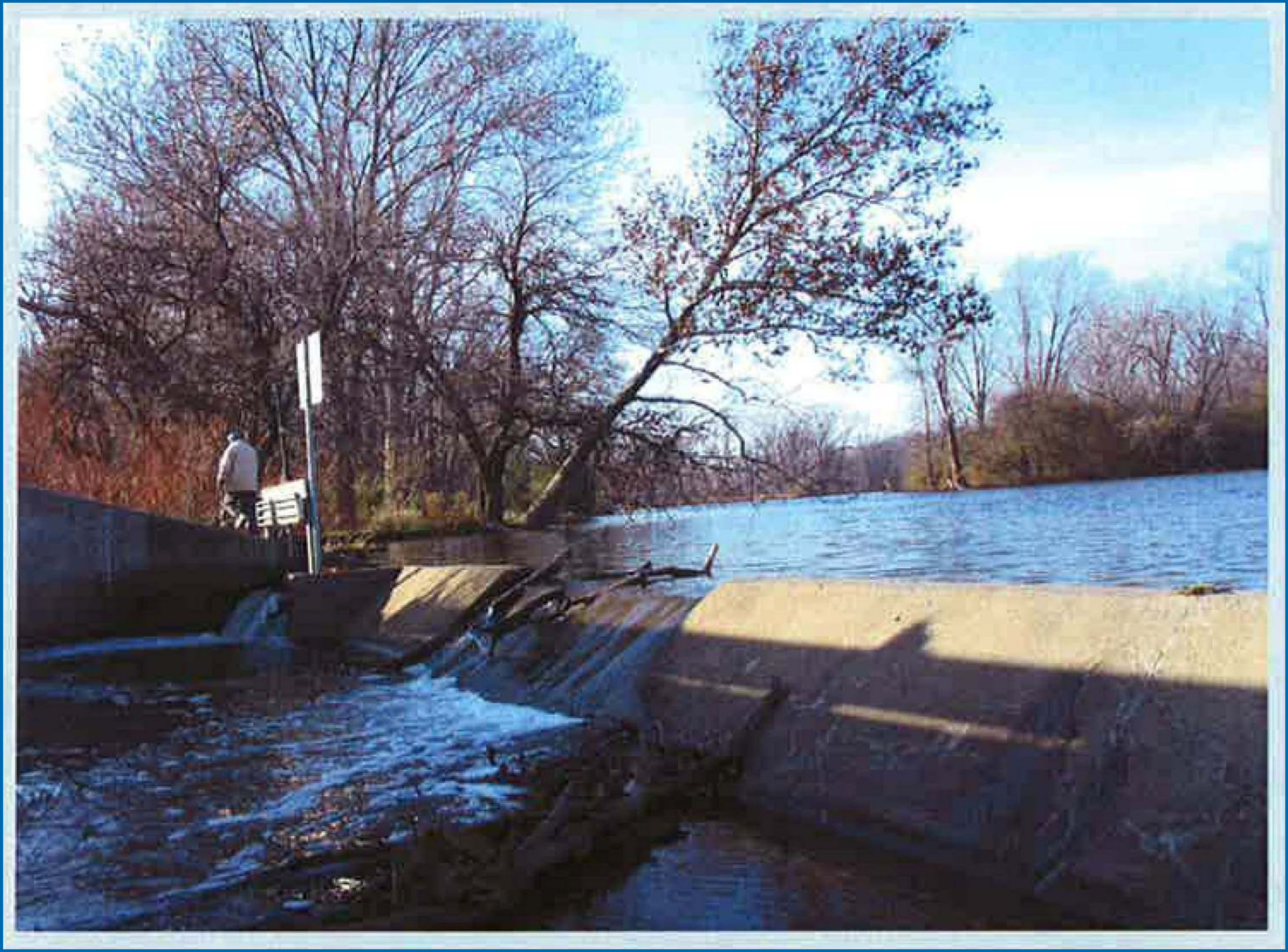
1. Meets DO standard under most conditions
2. Maintains some of the impoundment
3. Improves fish passage
4. Maintains some of dam structure
5. Maintains flow in raceway

- **Cons**

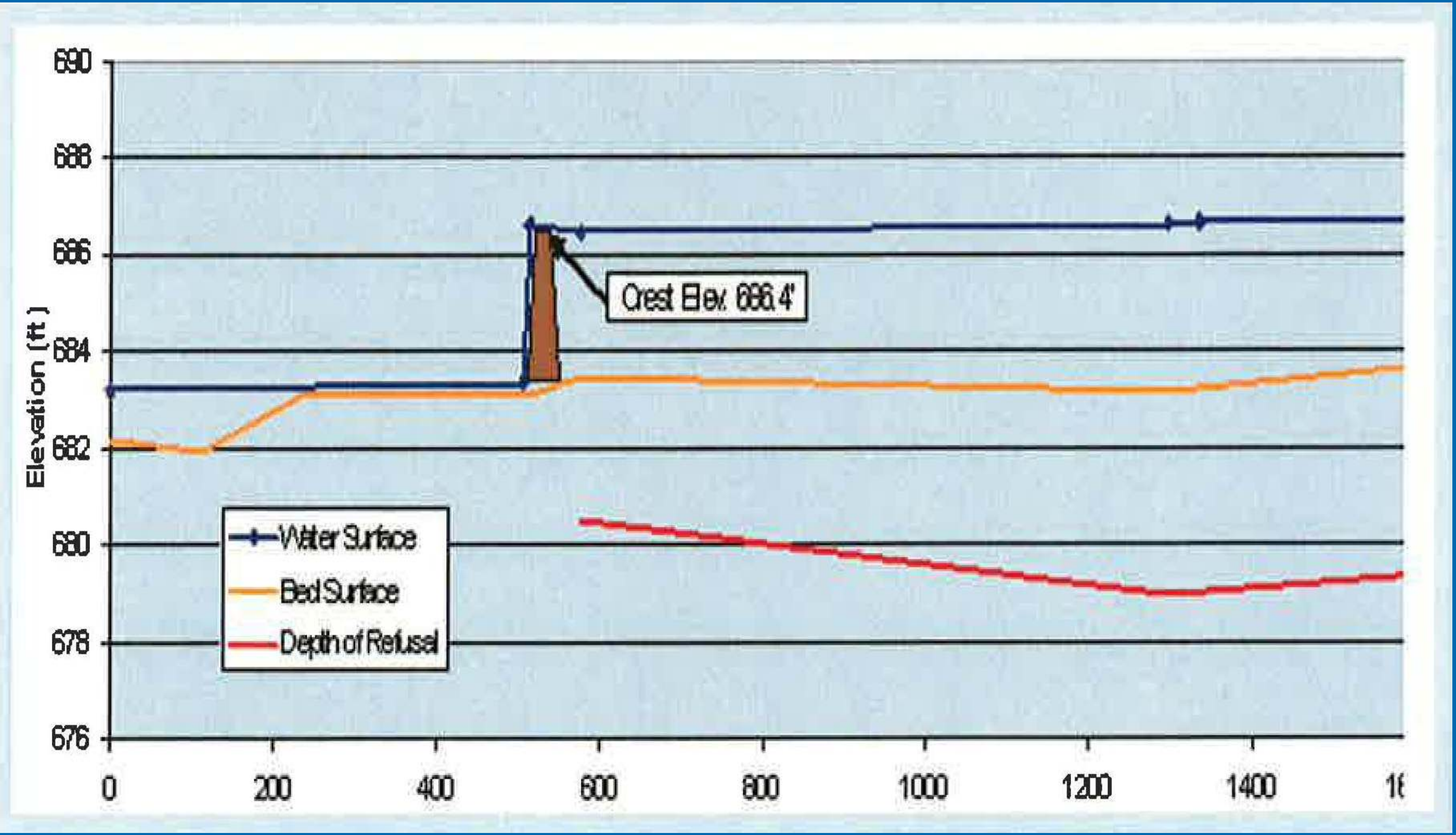
1. Maintains some of impoundment , poor habitat
2. Alters dam appearance significantly
3. May become attractive nuisance

Graue Mill Dam
Mock Up for Bridging

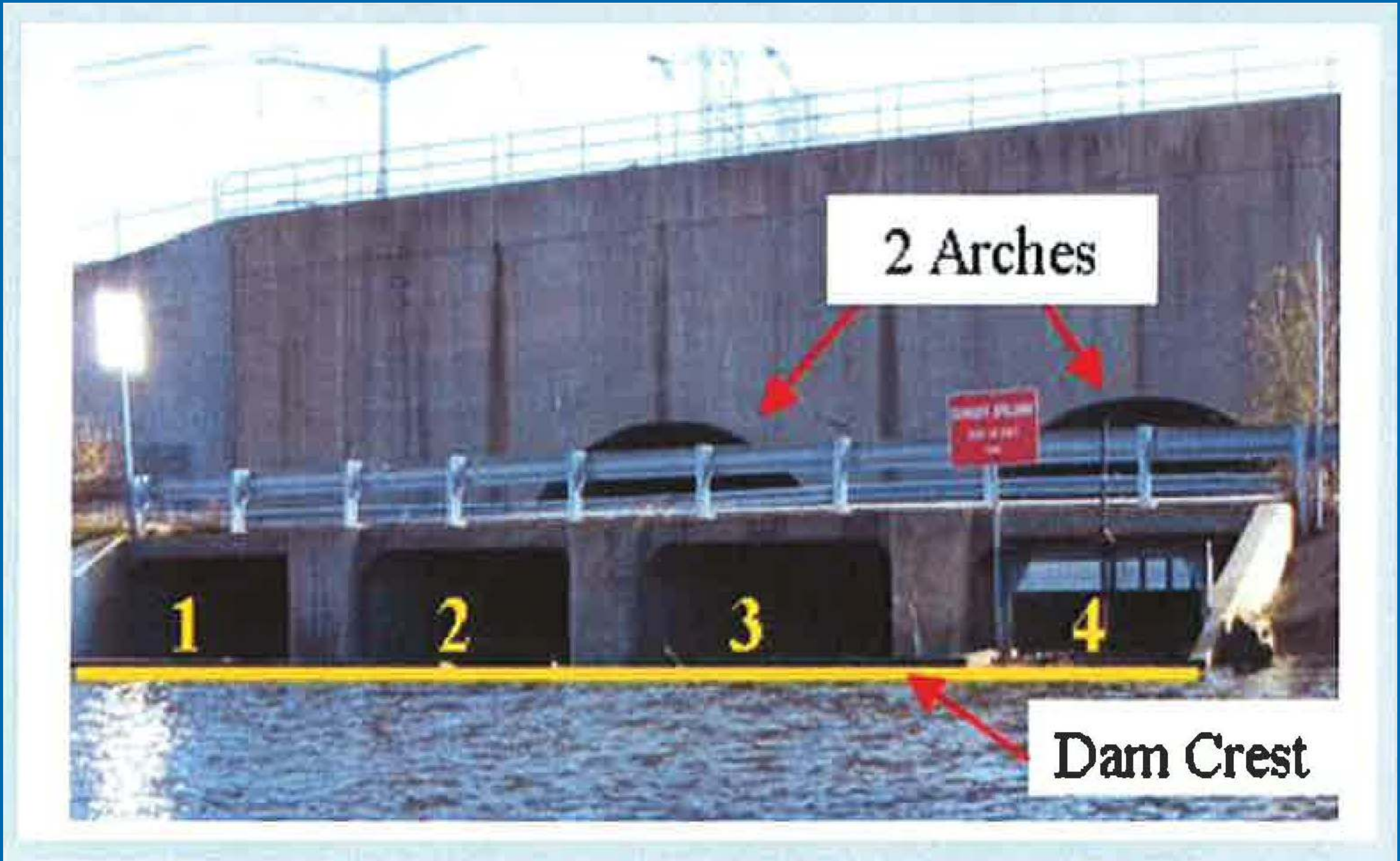
Option	Net Present Value, $	DO Compliance	Habitat Impact	Fish Passage
1-Eliminate Point Source Pollutants	> $388,000,000	Not in the Fullersburg Woods Impoundment	No	No
2-Oak Meadows Dam Removal and Bridging/Partial breach at Graue Mill	OM-$250,000 GM-$800,000 to $1,100,000	Likely achieved above , achieved in Fullersburg Woods Impoundment. Not in Butter-field Rd to Old Oak Brook Dam	Im-proved	Yes
3-Air based In-stream Aeration	OM-$1,190,000 GM-$2,050,000	OM-Yes (1 or 2 units) GM-Yes	No	No
4-High purity Oxygen Addition	OM -$1,410,000 GM-$1,710,000	OM-Yes GM-Yes No-Butterfield to Old Oak Brook Dam	No	No



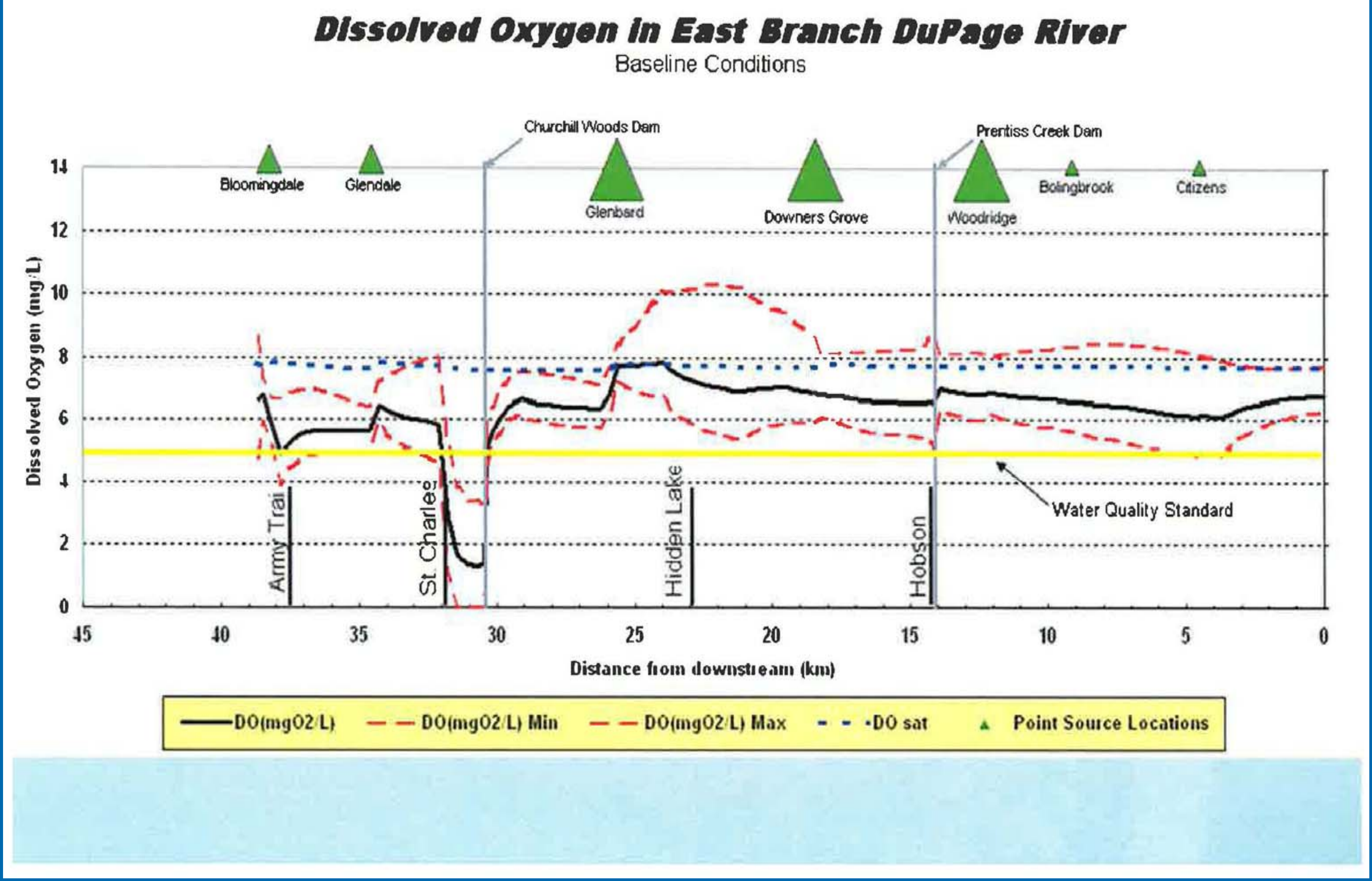
Churchill Woods Dam-East Branch DuPage River



Water Surface Profile at Churchill Woods Dam



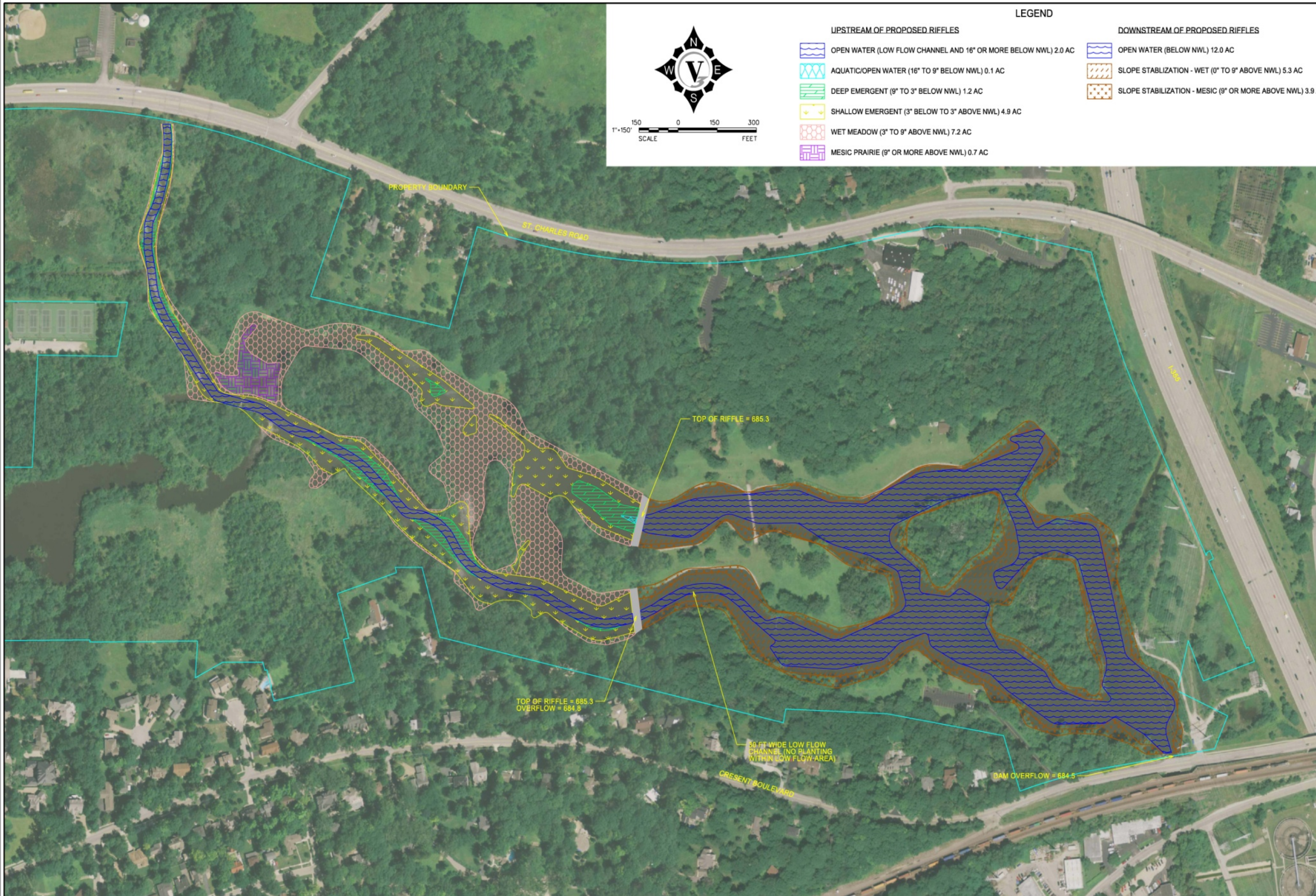
Dam Outlet Structure



East Branch DuPage – Baseline DO

1939 Aerial at Churchill Woods

Churchill Woods Dam
Existing Conditions



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REVISIONS

NO.	DATE	DESCRIPTION	NO.	DATE	DESCRIPTION

SEAL:

PROJECT NO.: 09102	DESIGNED BY: DLM
FILE NAME: plant09102.dgn	DRAWN BY: JAS
ORIGINAL ISSUE DATE: 02/05/10	CHECKED BY: DLM
SCALE: 1"=150'	PROJECT MANAGER: DLM

CHURCHILL WOODS

LOMBARD ILLINOIS

DAM MODIFICATION AND WETLAND RESTORATION EXHIBIT

DRAWING NO.
4.2

09102 - DAM MODIFICATION AND WETLAND RESTORATION EXHIBIT

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SUMMARY

- Sufficient time and budget for data collection is imperative to developing solutions based on good science
- Stakeholder led workgroup has been very effective in securing funding
- The DO monitoring, DO modeling and biological surveys all pointed to the low head dams as the biggest problem to improved water quality