

# ADVANCING USACE/CONSULTANT DESIGNS FOR THE UPPER MISSISSIPPI RIVER ENVIRONMENTAL MANAGEMENT PROGRAM

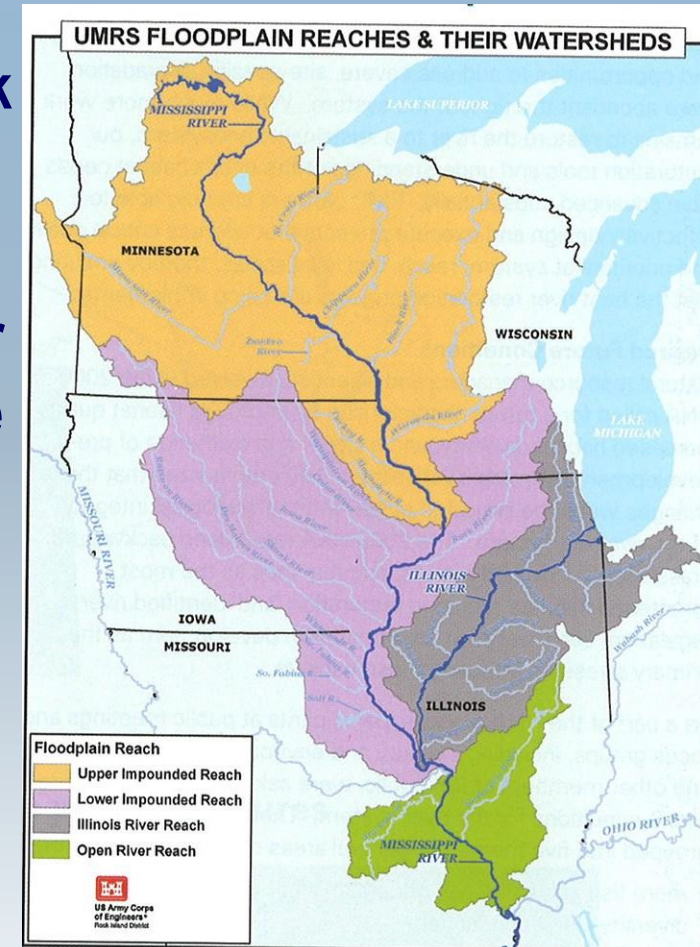


NCER 2011 Presentation - Thursday, 4 August - Dan Miller, P.E.

# Background

## Environmental Management Program (EMP)

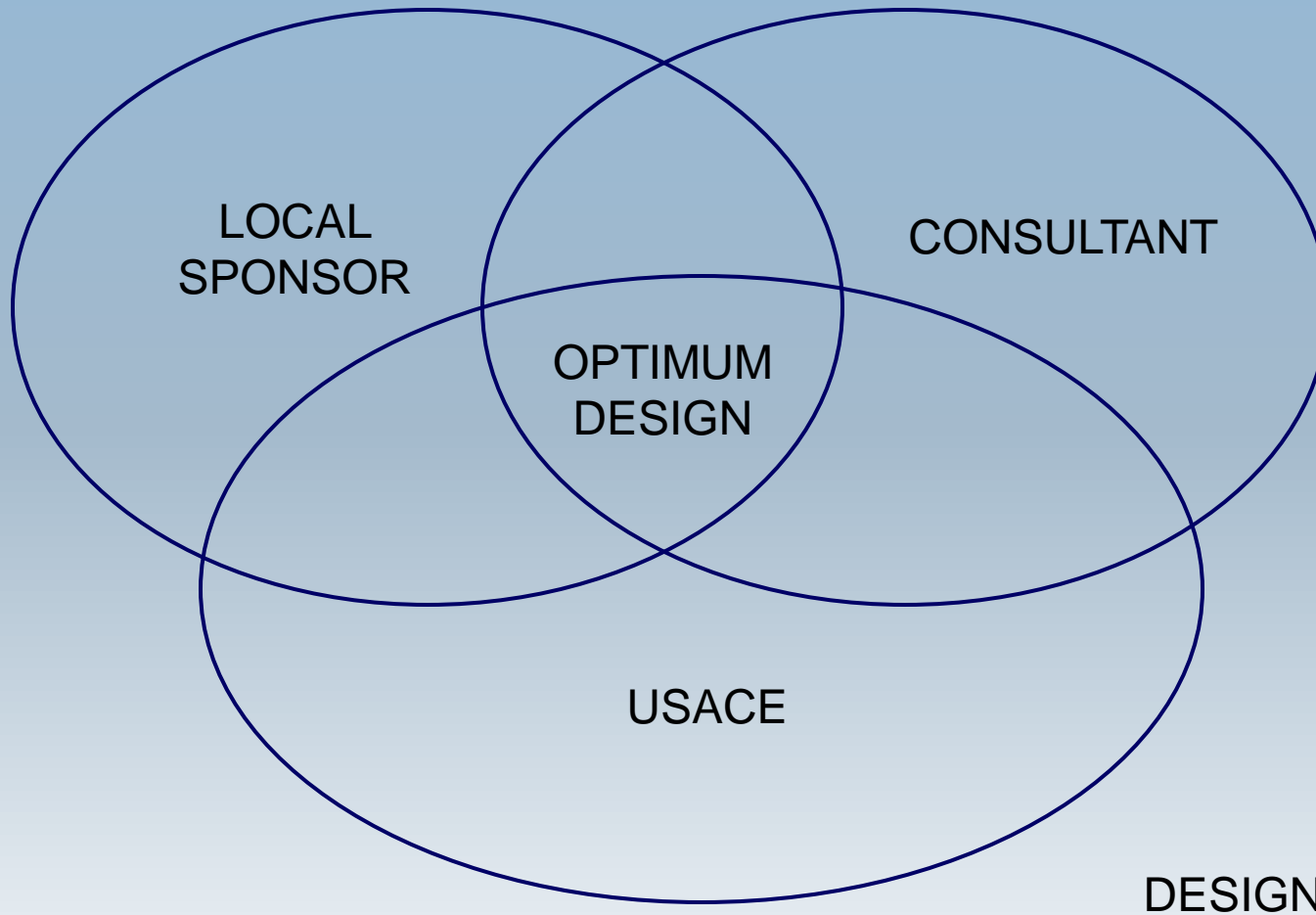
- EMP originated as a part of the 2<sup>nd</sup> lock at Mississippi River L&D 26 in 1986.
- EMP covers the Upper Mississippi River from the mouth of the Ohio River up to Minneapolis/St. Paul; then up the Illinois Waterway to Chicago.
- EMP has completed 53 projects restoring ecosystem to 95,000 acres.
- The EMP program is ongoing with 34 additional projects in the planning, engineering and/or design phases.



# Working Together

## Consultant – USACE – Local Sponsor

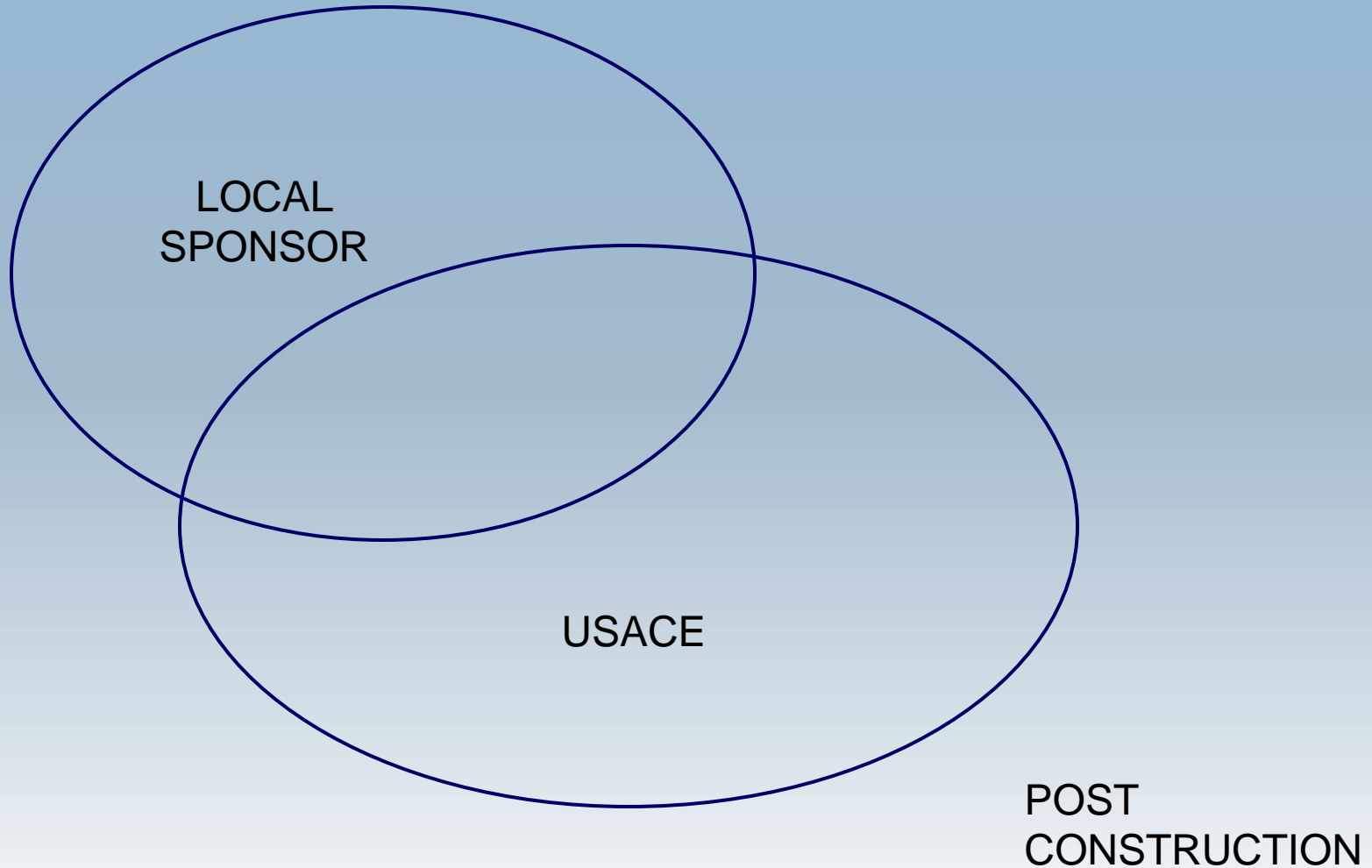
---



# Working Together

## Consultant – USACE – Local Sponsor

---



# Consultants Need the Time Perspective for Ecosystem Restoration Projects

In contrast to infrastructure projects, Ecosystem Restoration Projects take years to mature:

- How is the project progressing with respect to long term objectives?
- What would you do different?
- What worked better than expected?
- How can we adapt these lessons to the next project?



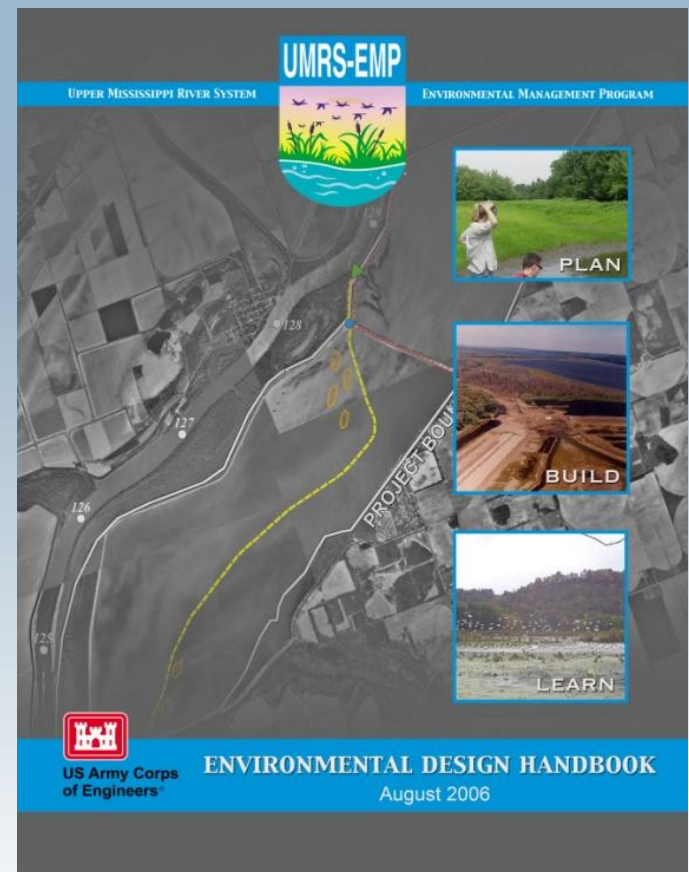
# Great Guidance is Available

**USACE, USFWS and others have prepared tremendously helpful Lessons Learned documents.**

But (paraphrasing Janvrin):

*“The desire for a simple approach that can be clearly presented as ecosystem restoration goals and objectives often treat vastly different restoration goals or portions of the ecosystem as if they were the same.”*

**We need to look back at our own, individual projects.**



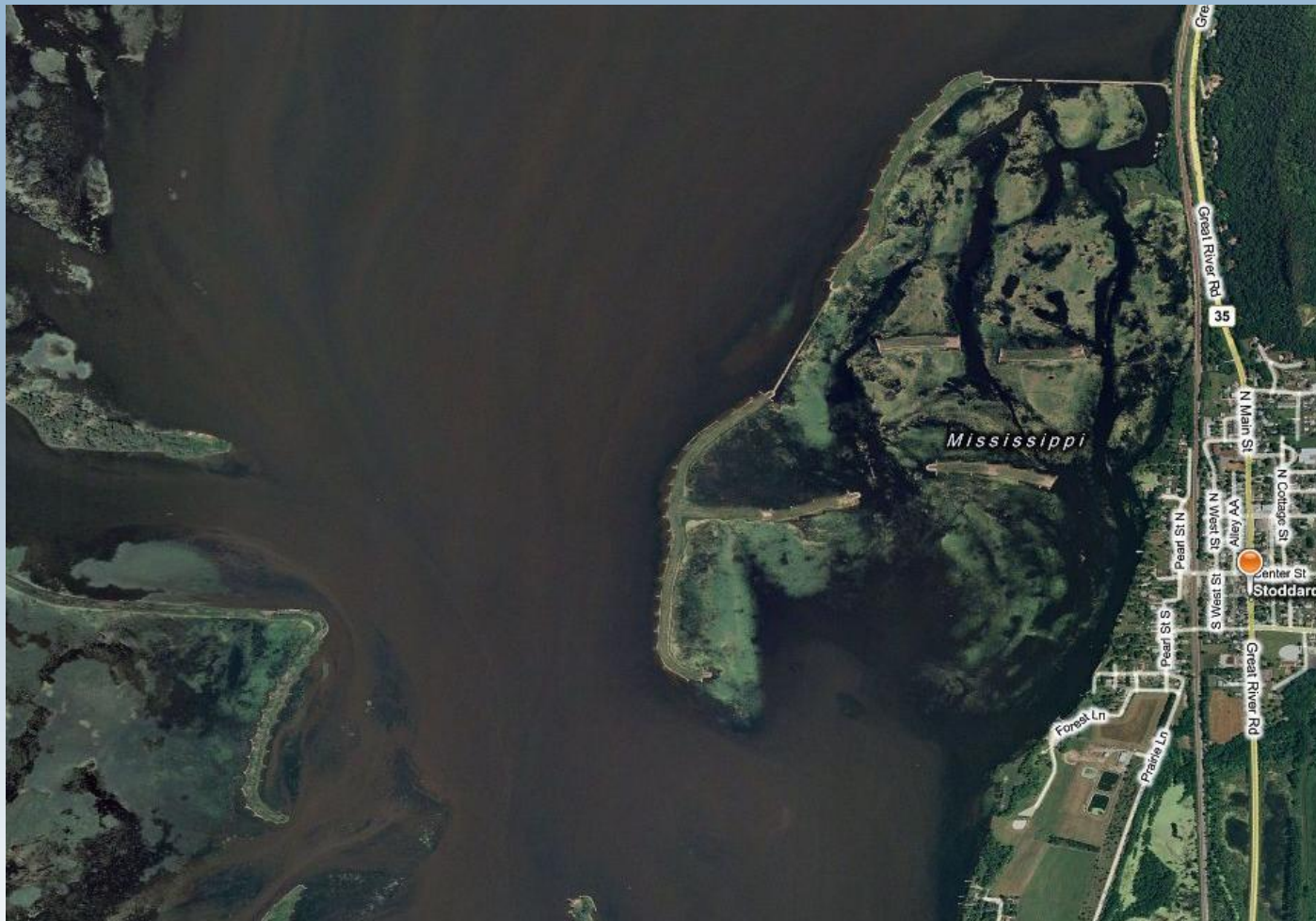
# A Look at Two Designs by Stanley Consultants Construction Completed About 10 Years Ago

- Calhoun Point HREP – at the confluence of Illinois and Miss.



# A Look at Two Designs by Stanley Consultants Construction Completed About 10 Years Ago

- Pool 8 Islands, Phase II, Stoddard Bay, Wisconsin

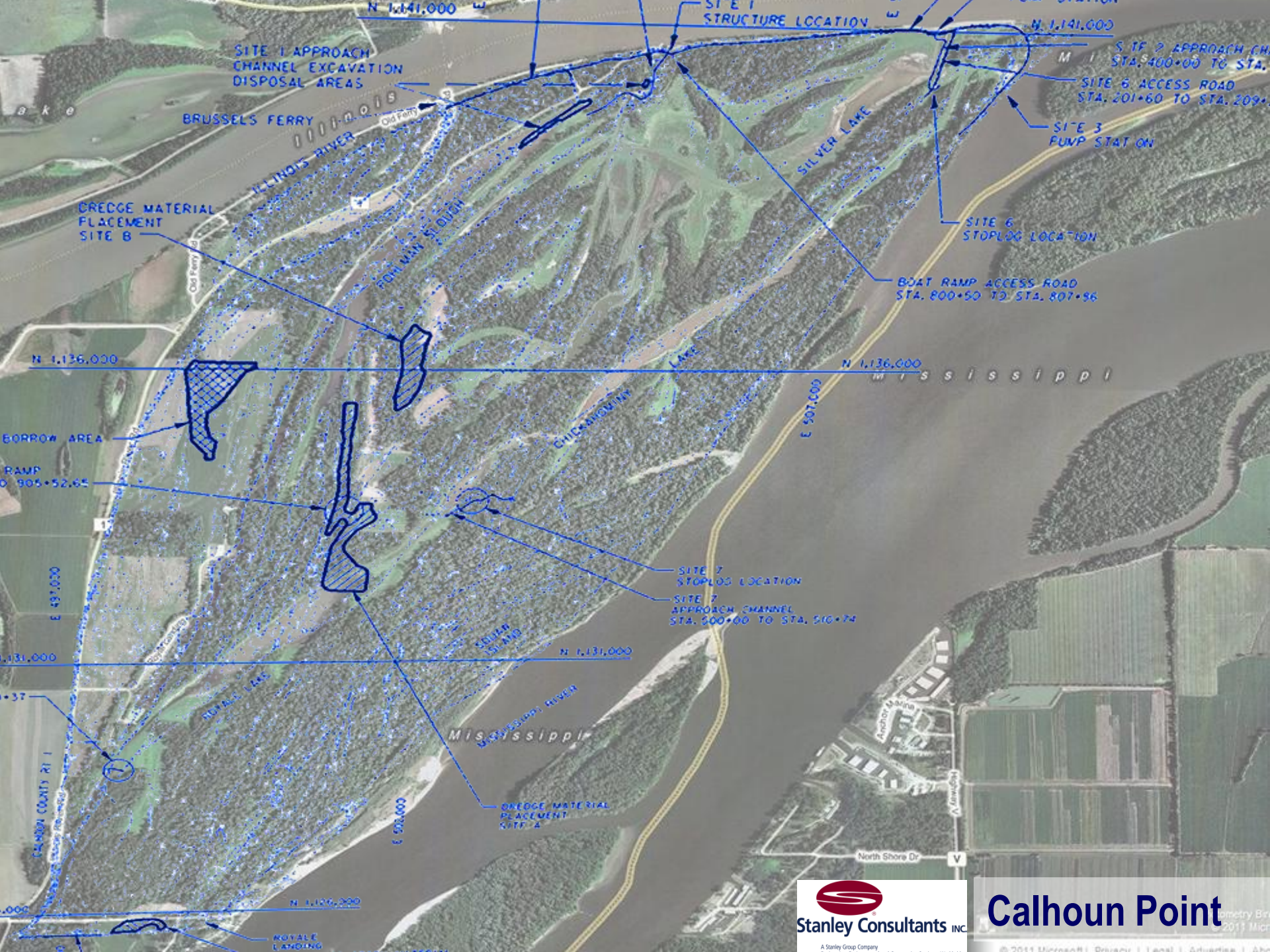




# Review Process

- **Revisit Local and USACE project managers:**
  - **Calhoun Point:**
    - **Kim Postlewait, Illinois DNR**
    - **John Mabery, USFWS, Two Rivers Refuge**
    - **Brian Markert, USACE, St. Louis District**
  - **Pool 8 Islands**
    - **Jeff Janvrin, Wisconsin DNR**
    - **Jon Hendrickson, USACE, St. Paul District**
- **Paddle in the water,  
boots on the ground**





SITE 1 APPROACH CHANNEL EXCAVATION DISPOSAL AREAS

STRUCTURE LOCATION

SITE 2 APPROACH CHANNEL STA. 400+00 TO STA. 401+00  
 SITE 6 ACCESS ROAD STA. 201+60 TO STA. 209+00

BRUSSELS FERRY

SILVER LAKE

SITE 3 PUMP STATION

GREGE MATERIAL PLACEMENT SITE B

SITE 6 STOPLOG LOCATION

BOAT RAMP ACCESS ROAD STA. 800+50 TO STA. 807+86

N 1,136,000

N 1,136,000

BORROW AREA

RAMP STA. 905+52.65

CHICAGO LAKE

SITE 7 STOPLOG LOCATION

SITE 7 APPROACH CHANNEL STA. 500+00 TO STA. 510+74

N 1,131,000

N 1,131,000

E 497,000

E 507,000

MISSISSIPPI RIVER

MISSISSIPPI

GREGE MATERIAL PLACEMENT SITE A

N 1,126,000

N 1,126,000

ROYALE LANDING

Stanley Consultants INC.  
 A Stanley Group Company

# Calhoun Point

# Calhoun Point and Swan Lake

## - Project Objectives

- Creation of aquatic, wetland, and upland habitat for fish, waterfowl, reptiles, and fur-bearing species
- Water level and sediment control to enhance habitat



# Water Control Structures - 2000



# Water Control Structures - 2011

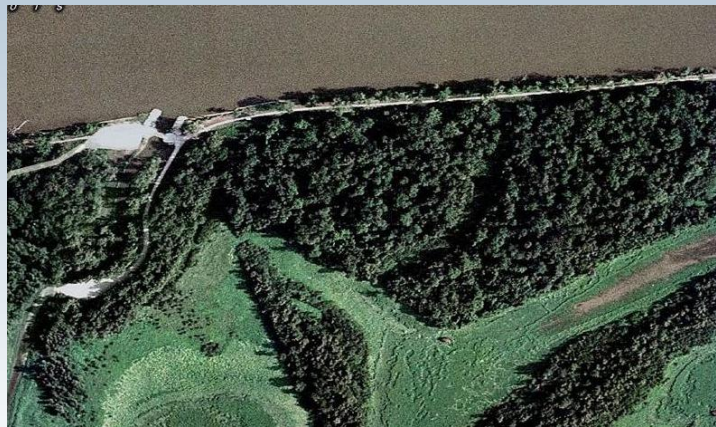


# Sluice Gate Operations

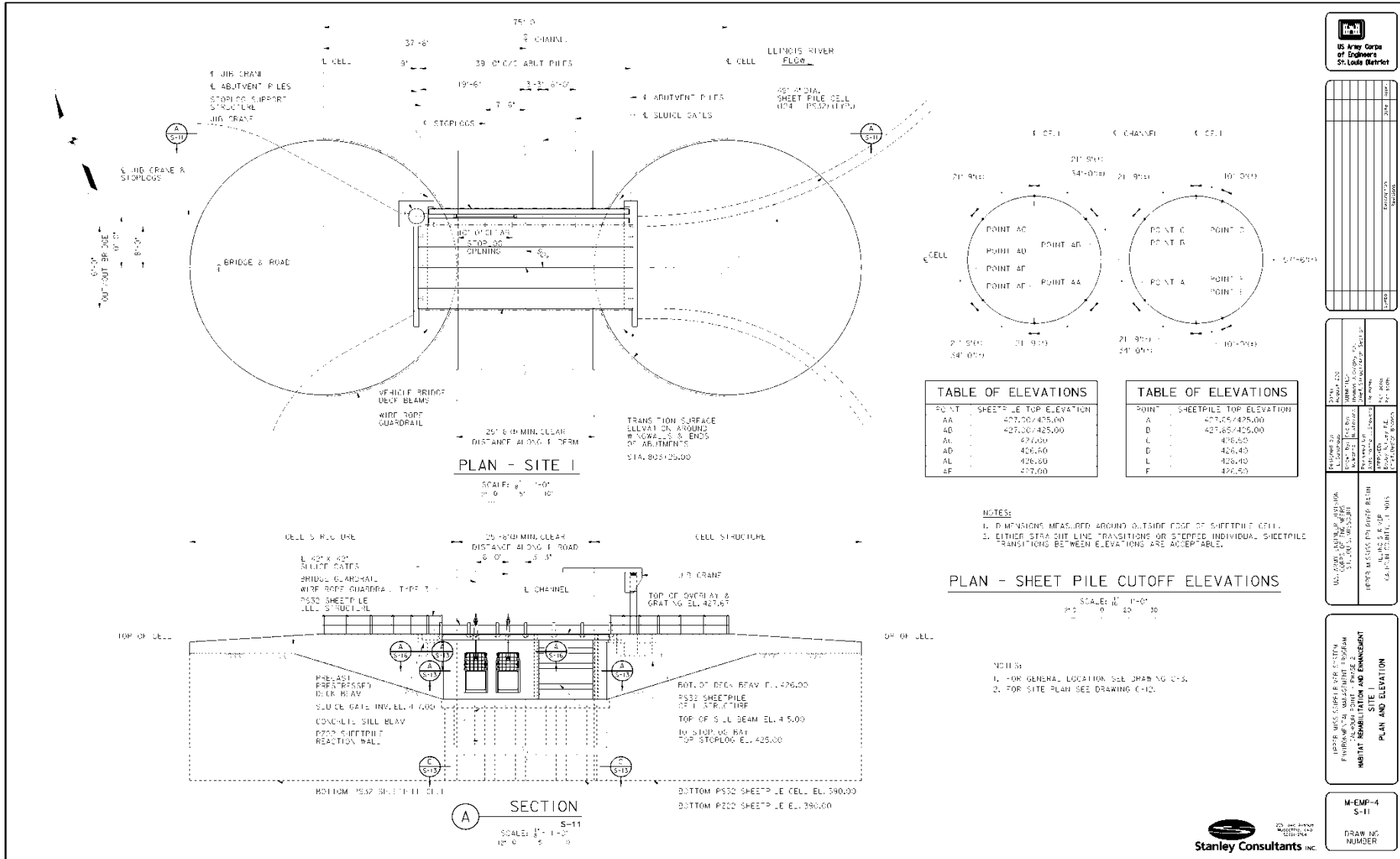
Use sealed stems and operators to prevent sand and sediment from floods from reaching the operating mechanism.



# Cellular Bridge and Water Control



# Cellular Bridge and Water Control



NO.	DATE	BY	CHKD.	APP'D.

NO.	DATE	BY	CHKD.	APP'D.

NO.	DATE	BY	CHKD.	APP'D.

NO.	DATE	BY	CHKD.	APP'D.

NO.	DATE	BY	CHKD.	APP'D.



# Stop Log Structures



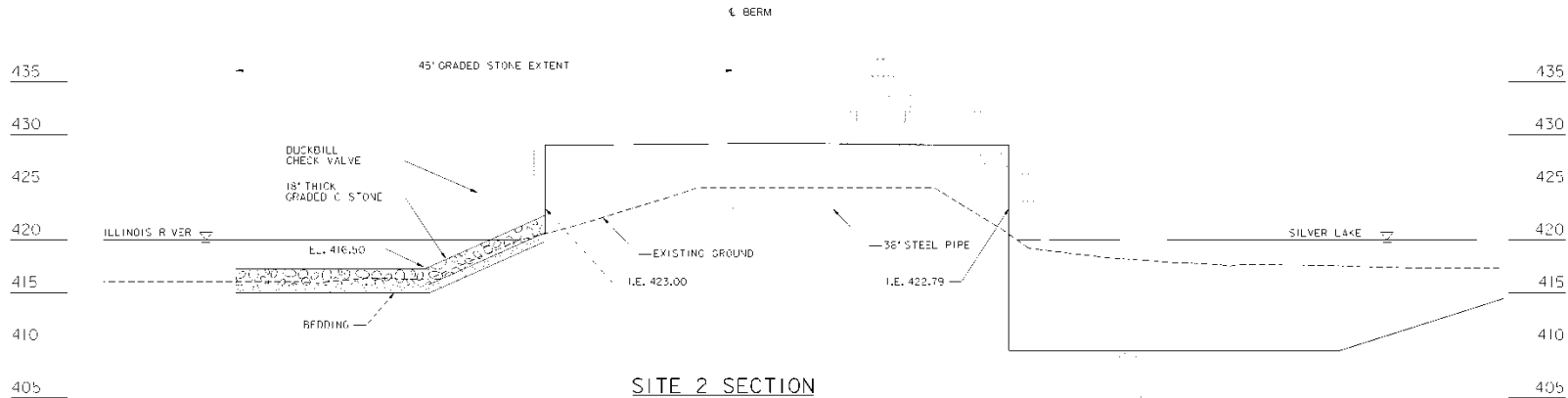
# Pinch Valves



# MWI Couch Pump



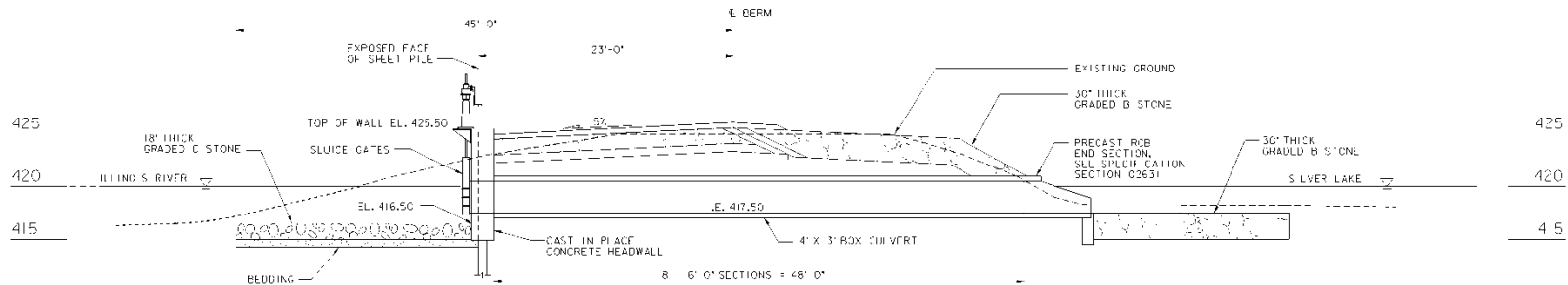
# Cross Section Thru Pump and Sluice Gate



SITE 2 SECTION

STATION 62+19

SCALE: 1" = 5'



SITE 2 SECTION  
 BETWEEN TWO BOX CULVERTS  
 STATION 63+80

SCALE: 1" = 5'

NOTE:

1. FOR PIPE BEDDING DETAILS, SEE DRAWING C-27.
2. FOR RIP RAP BEDDING DETAILS, SEE DRAWING C-42.



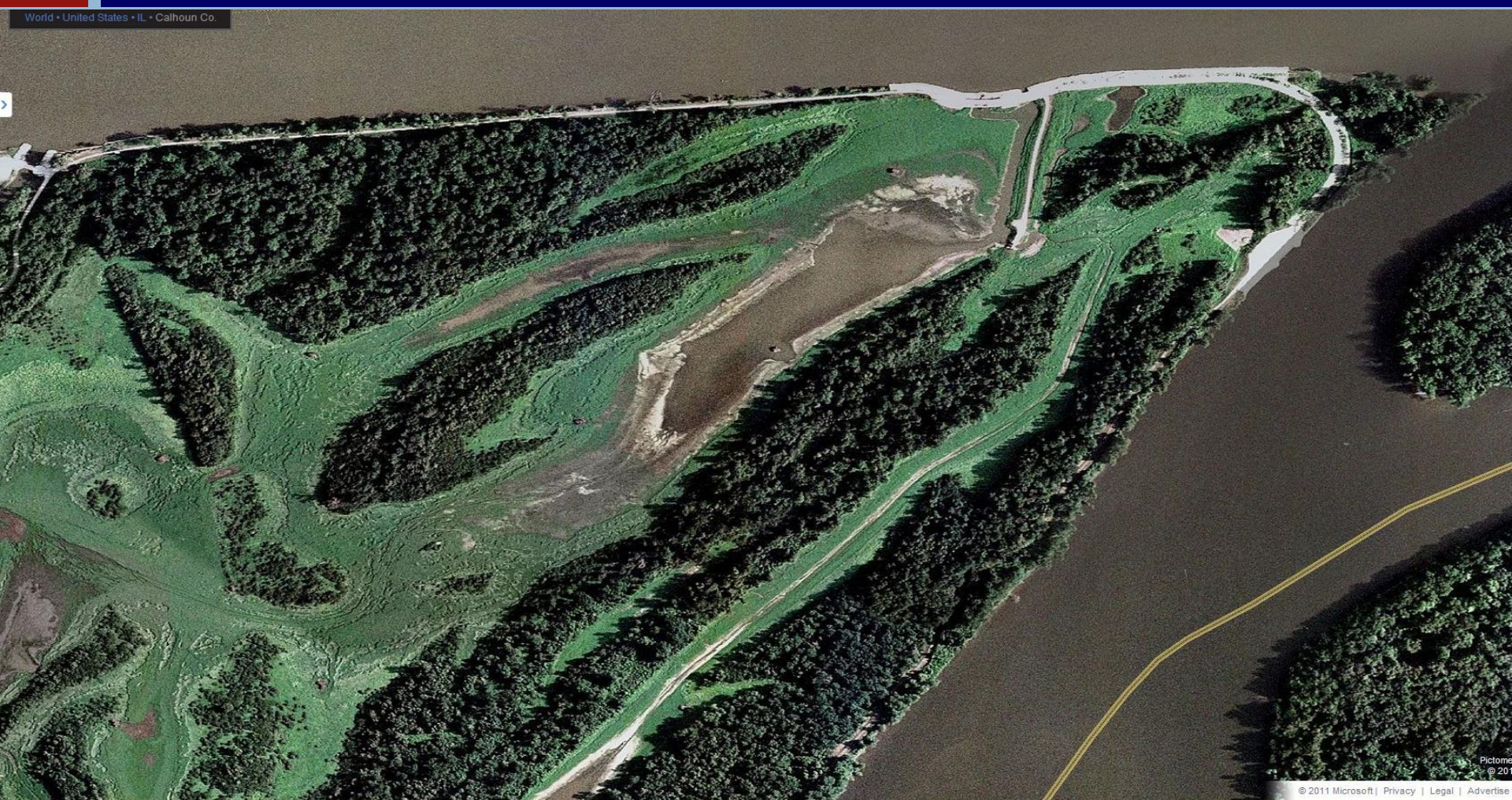
DATE	REVISION

REVISION	BY	DATE	DESCRIPTION


PROJECT: MISSOURI RIVER SYSTEM  
 PROJECT NO.: 63-001  
 DRAWING NO.: C-28  
 SHEET NO.: 28 OF 42  
 HABITAT REHABILITATION AND ENHANCEMENT  
 CULVERT CROSS SECTIONS  
 SHEET 2

# Point of Calhoun Point – Draw Down

World • United States • IL • Calhoun Co.



© 2011 Microsoft | Privacy | Legal | Advertise

# Point of Calhoun Point – In Flood



# Rock Spillway



**Frequent overtopping led to expansion of overflow section**

# North Access to Mississippi River Pump



**Intending to abandon road on levee along Mississippi River due to maintenance requirements from frequent overtopping. Currently constructing road across rock spillway. Also – no longer using geotextiles to support road surface. In flooding events the geotextile becomes tangled and creates problems with repairs. Switching to larger ballast and larger surface stone.**



# Mississippi River Levee



**We kept the levee footprint narrow, bending the alignment to preserve significant trees (roosts or rare species or old specimens), or other special features. Much more natural appearing than similar levees from earlier projects in this area.**

# Mississippi River Levee



**Not This**

# Mississippi River Levee



**More Like This**

# Mississippi River Levee



# Water Control Station



# Lower Swan Lake



- Stop Log Structure
- Pump Station

# Swan Lake Stop Logs



**Wooden stop logs jammed going in and coming out.**

**Aluminum Stop Logs are much better handling and sealing**



# Swan Lake Pumps



**Pump Station draws down Swan Lake in early summer to consolidate sediment and grow forage crop for migrating waterfowl.**

**For the last 4 Years in a row, 2008 thru 2011, water levels have remained too high.**



# Silver Carp Infestation



**Sediment from flooding and infestation of carp caused clogging of pump suction screens and premature failure of pump bearings.**

**Solution involves new intake design with screens and sediment barrier.**



# Changing Rivers



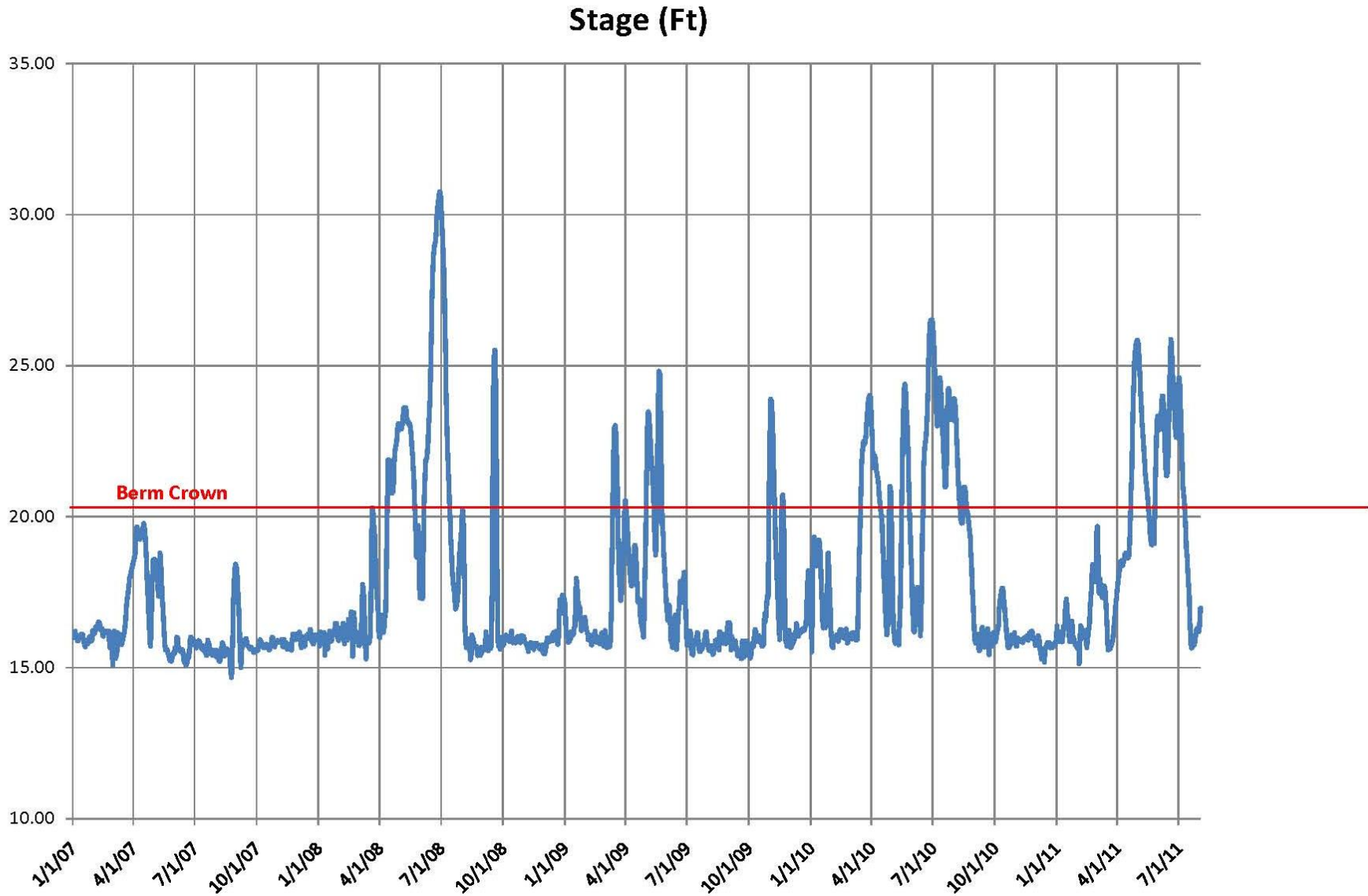
2000



2011



# Changing Rivers



# Royale Landing Access Road



2000



2011



# Trees – RPM Stock



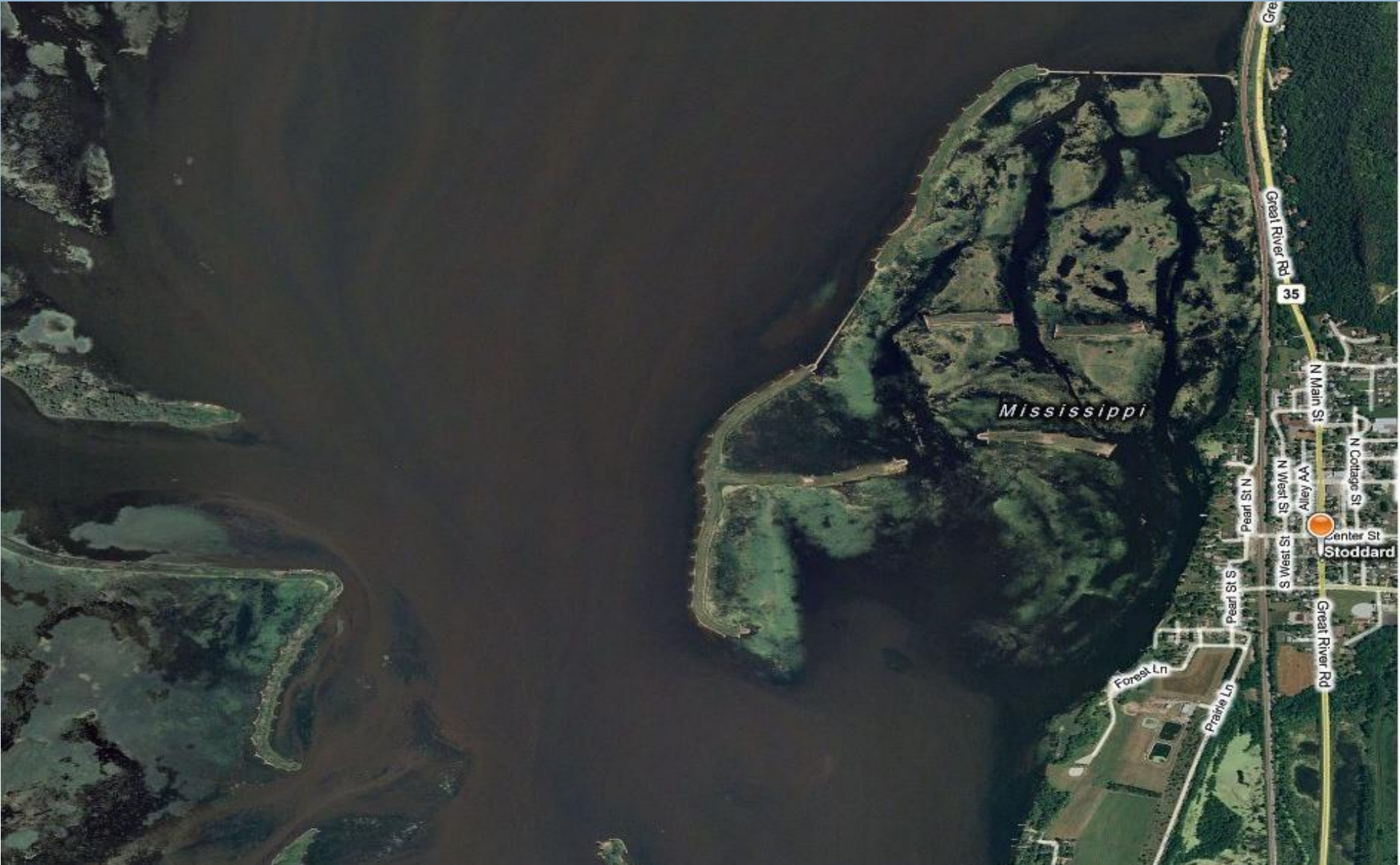
# Created Wetlands - 2000



# Created Wetlands - 2011



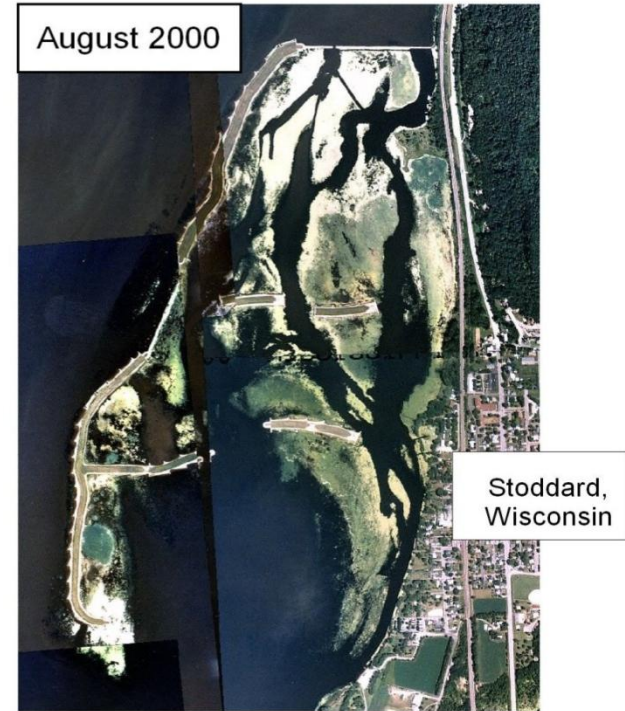
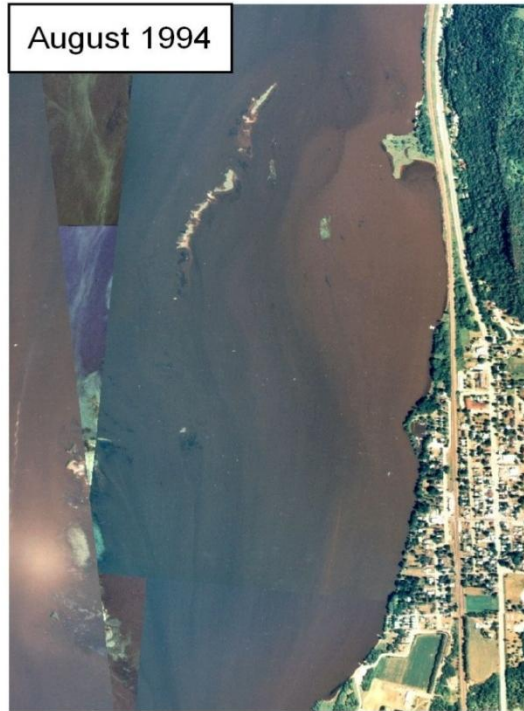
# Pool 8 Islands, Phase II, Stoddard Bay, Wisconsin







# Pool 8 Island Restoration – Mimic the Natural Condition



# Project Objectives (1)

Goal	Objectives	Criteria
<p>Improve habitat conditions for backwater fish species with an emphasis on habitat for Centrarchids.</p>	<p>Create 200 acres of overwintering habitat meeting the following criteria:</p>	<p>a) Dissolved oxygen levels &gt; 3 mg/l            b) Current velocity &lt; 0.3 cm/sec over 80% of the area.            c) Water temperature as follows:            • 4°C over 35% of the area,            • 2-4°C over 30% of the area,            • 0-2°C over 35% of the area.            d) Water depths &gt; 4 feet over 40% of the wintering area in year 25</p>
	<p>Enhance and/or create Centrarchid summer habitat meeting the following criteria:</p>	<p>a) Dissolved oxygen levels &gt; 5 mg/l.            b) Aquatic vegetation cover in the range of 25-50%.</p>
	<p>Enhance and/or create spawning, rearing, and juvenile Centrarchid habitat in three locations, each approximately 5 acres in size, meeting the following criteria:</p>	<p>a) Dissolved oxygen levels &gt; 5 mg/l.            b) Current velocity &lt; 0.5 cm/sec.            c) Aquatic vegetation cover of approximately 80%.            d) Substrates of sand and/or gravel available for spawning.</p>

# Project Objectives (2)

Goal	Objectives	Criteria
Increase high quality waterfowl habitat to 600 acres and then maintain	Increase and then maintain 600 acres of habitat meeting the following criteria	<p>a) Aquatic plant growth covering approximately 60% of the area with a mix and interspersion similar to conditions that existed in 1975.</p> <p>b) Create 2 to 3 acres of nesting habitat isolated (0.5 mile) from land based predators and with a vegetative cover having an average obscenity rating of 1.5 dm within 2 years.</p> <p>c) Protected sites (i.e., beaches, mudflats, and logs) for birds to get out of the water to loaf and rest totaling approximately 6 acres.</p>

# Project Objectives (3)

Goal	Objectives	Criteria
<p>Create habitat for migratory birds other than waterfowl (Neotropical migrants, marsh and water birds, and shorebirds); increase turtle nesting habitat; restore habitat for mammals (primarily beaver, mink, and muskrats), reptiles, and amphibians; and improve conditions for the reestablishment of roosting habitat for species such as bald eagles, peregrine falcons, and other raptors.</p>	<p>When planning and designing habitat features for the Stoddard area, the following habitat types or conditions should be provided</p>	<ul style="list-style-type: none"> <li>a) For Neotropical migrants (grassland and woodland), provide islands seeded to grass and/or planted to trees.</li> <li>b) For marsh and water birds, provide habitat consisting of an interspersed of submergent, rooted floating aquatics, emergent plants, and open water, in proximity to islands.</li> <li>c) For shorebirds provide gradual sloping breaches and/or shallow backwater lagoons.</li> <li>d) For nesting turtles, provide isolated islands having gently sloping beaches with sparse vegetation and a substrate capable of maintaining soil moisture suitable for turtle egg incubation.</li> <li>e) For aquatic and semi-aquatic mammals, reptiles, and amphibians, provide wetland habitat consisting of an interspersed of submergent, rooted floating aquatics, emergents, and open water in proximity to islands.</li> <li>f) For raptors, maintain existing mature trees and accelerate succession on new islands to mature trees, floating aquatics, emergents, and open water in proximity to islands.</li> </ul>

# Prairie Habitat



# Woodlands



# Shoreline





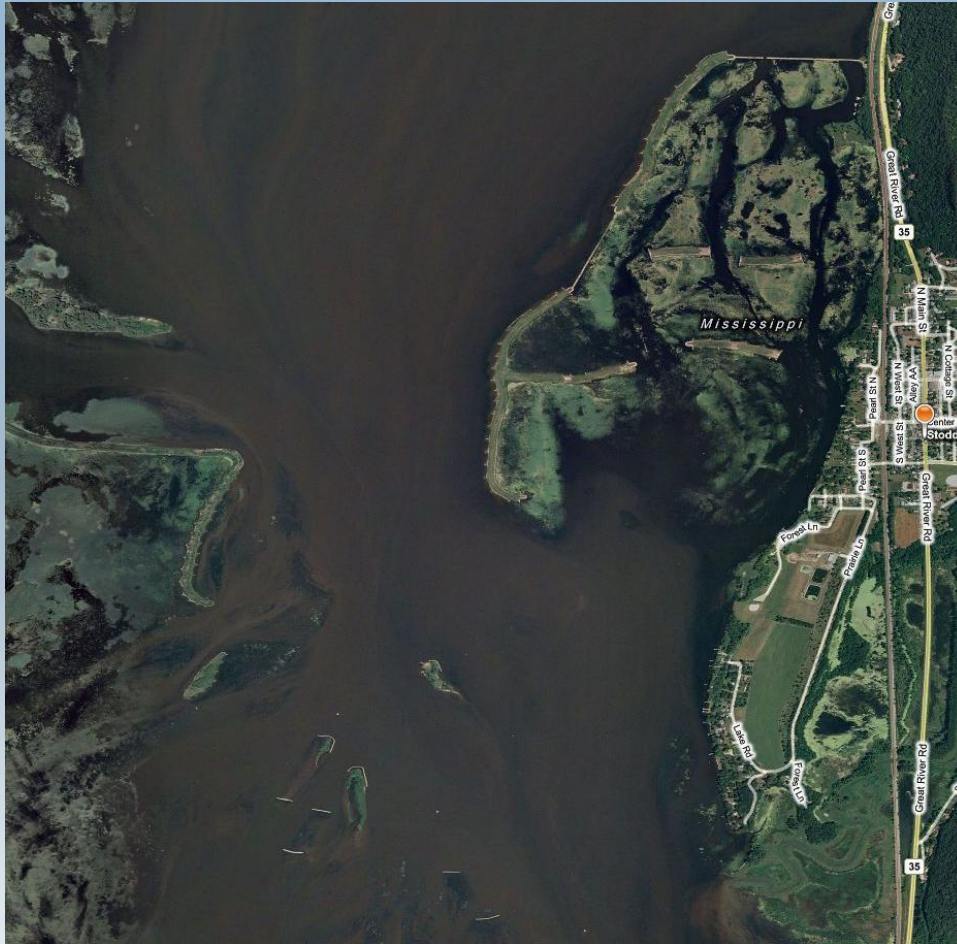
# Aquatics



# Invasives



# Centrarchids Habitat



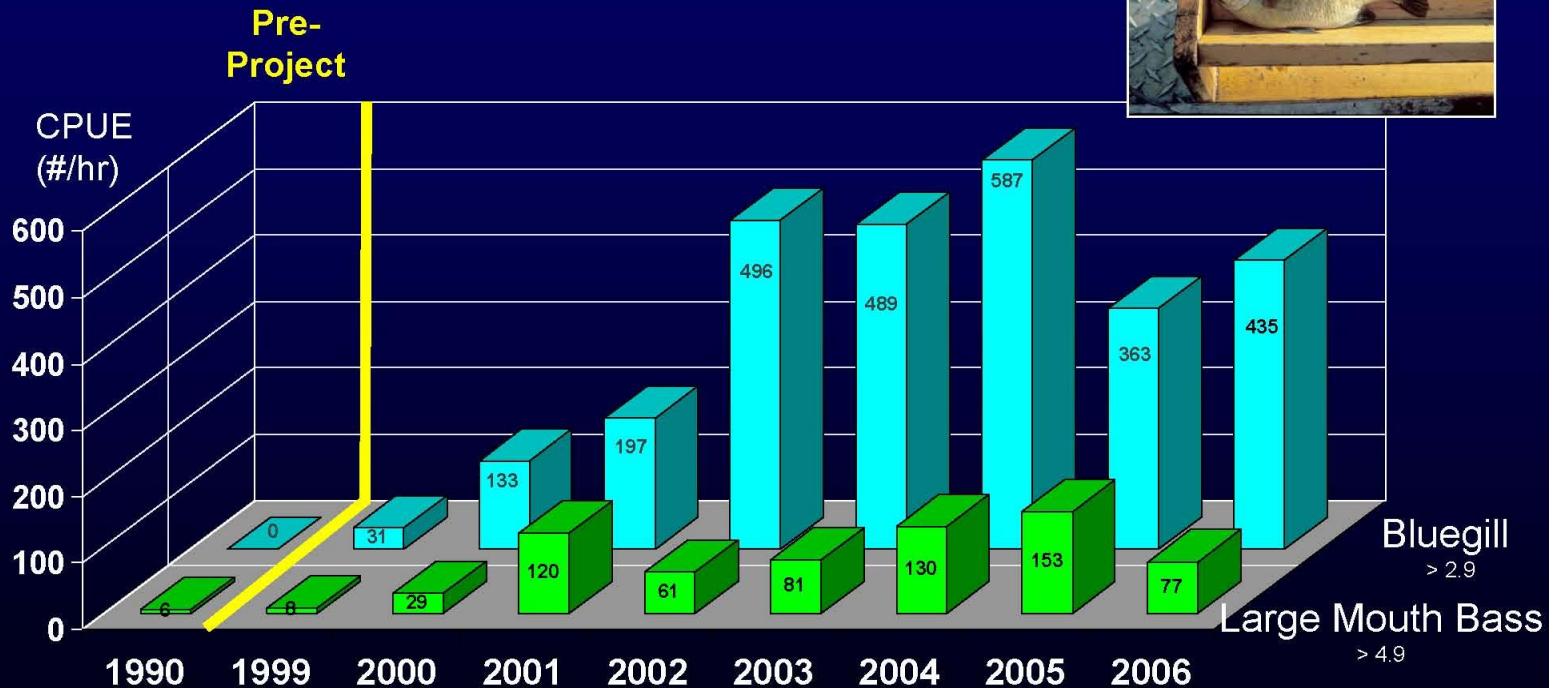
## Overwinter:

- DO > 3 ppm
- Temperature > 0° C.
- Velocity < 0.3 cm/s (0.01 fps)
- Depth ≥ 4 ft.



# Centrarchids Habitat

## Pool 8 Islands Phase II Pre- and Post-Project Fall Electro-fishing



(Project began functioning as over wintering habitat November 1998)

# Phase III Under Construction



# Pool 8 Restoration



# Pool 8 Restoration



# Overview and Summary

---

- Go back and check it out - results do not come immediately.
- Many things go better than planned, some do not. Make each new project better than the one before.
- Communicate – *“In academic science, interdisciplinary work is productive and praised, but is relatively rare. Scientists don't need to cooperate to have their results fit together: they are all describing different parts of the same thing—nature—so in the long run, their results tend to come together into a single picture. Engineering, however, is different. Because it is more creative (it actually creates complex things), it demands more attention to teamwork. If the finished parts are going to work together, they must be developed by groups that share a common picture of what each part must accomplish. Engineers in different disciplines are forced to communicate; the challenge of management and team-building is to make that communication happen.”* K. Eric Drexler