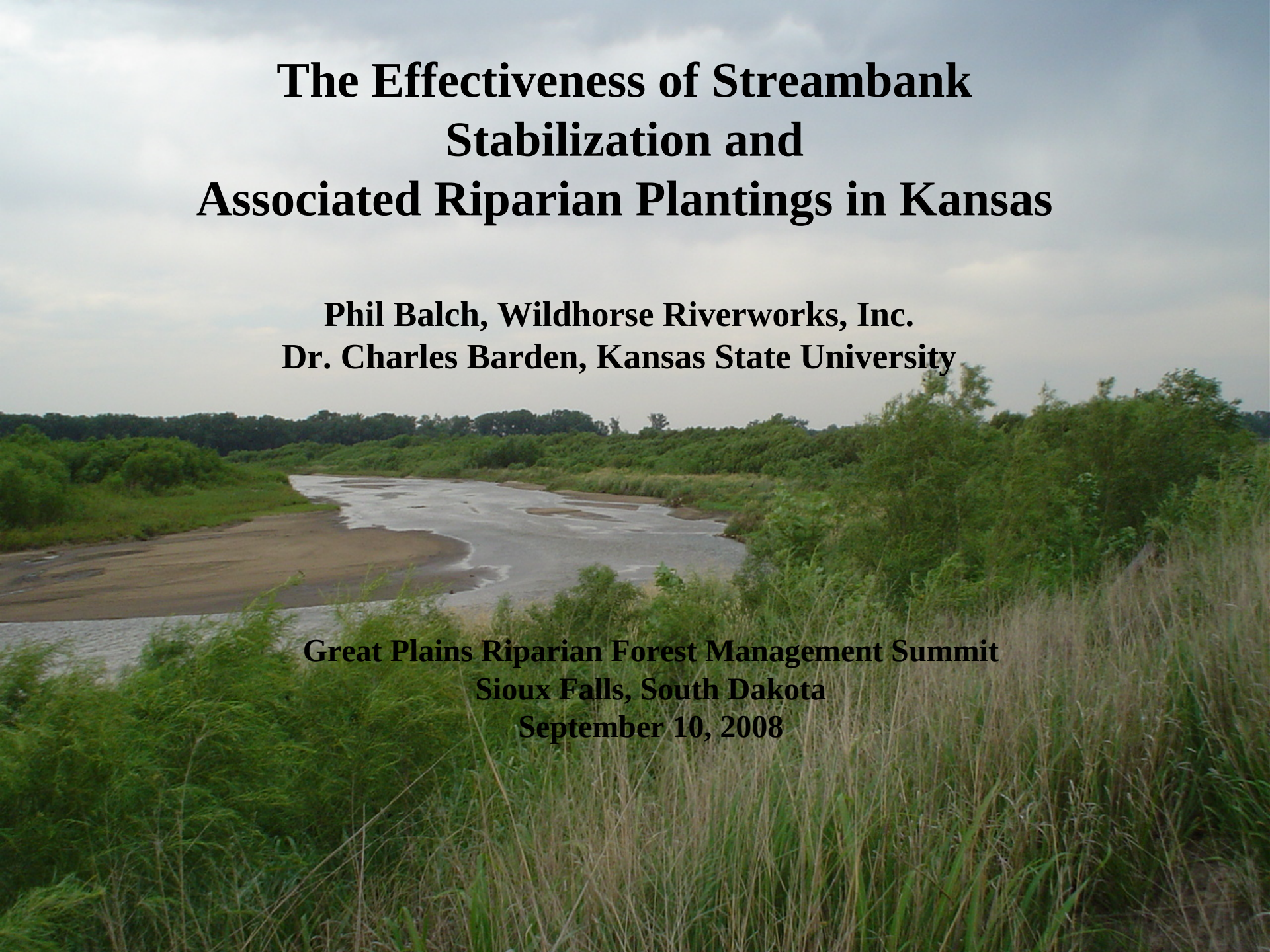
# The Effectiveness of Streambank Stabilization and Associated Riparian Plantings in Kansas

**Phil Balch, Wildhorse Riverworks, Inc.**
**Dr. Charles Barden, Kansas State University**

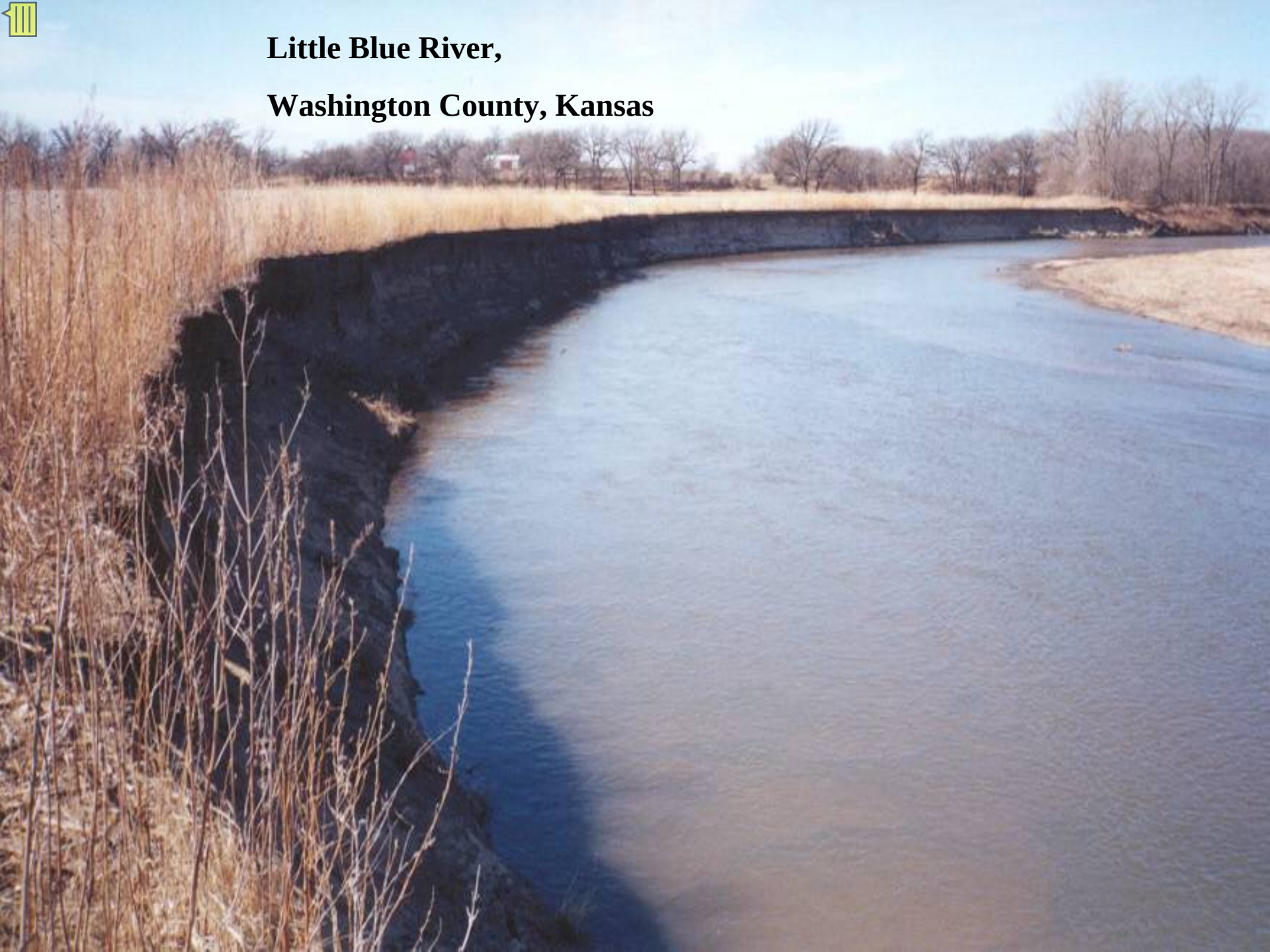


**Great Plains Riparian Forest Management Summit**
**Sioux Falls, South Dakota**
**September 10, 2008**

Kansas River
Riley County, Kansas

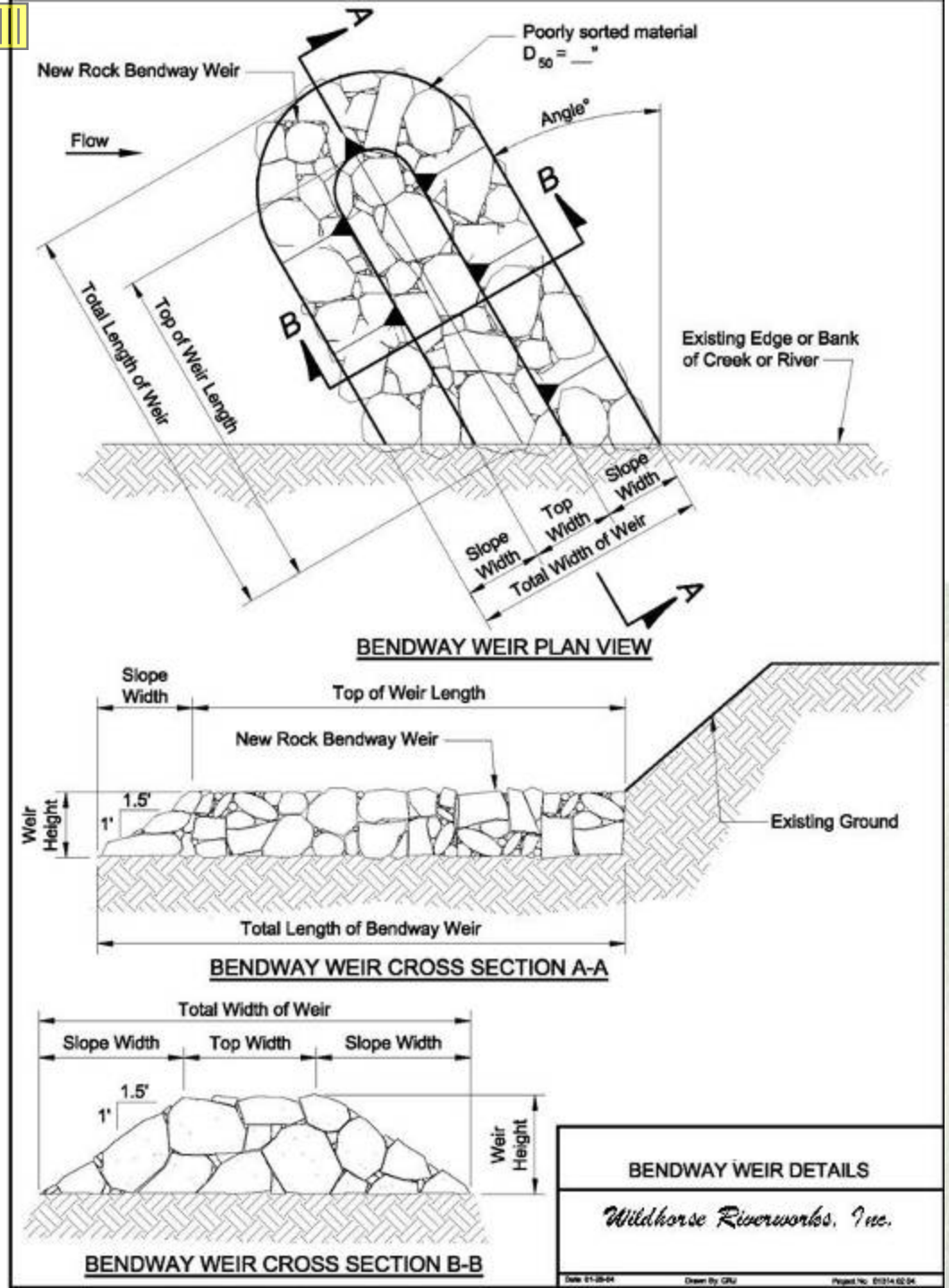
Smoky Hill River
Geary County, Kansas

Republican River
Clay County, Kansas


Little Blue River,
Washington County, Kansas

Hays City Park 1995

**Photo Courtesy of John McCullah – Salix Applied Earthcare**



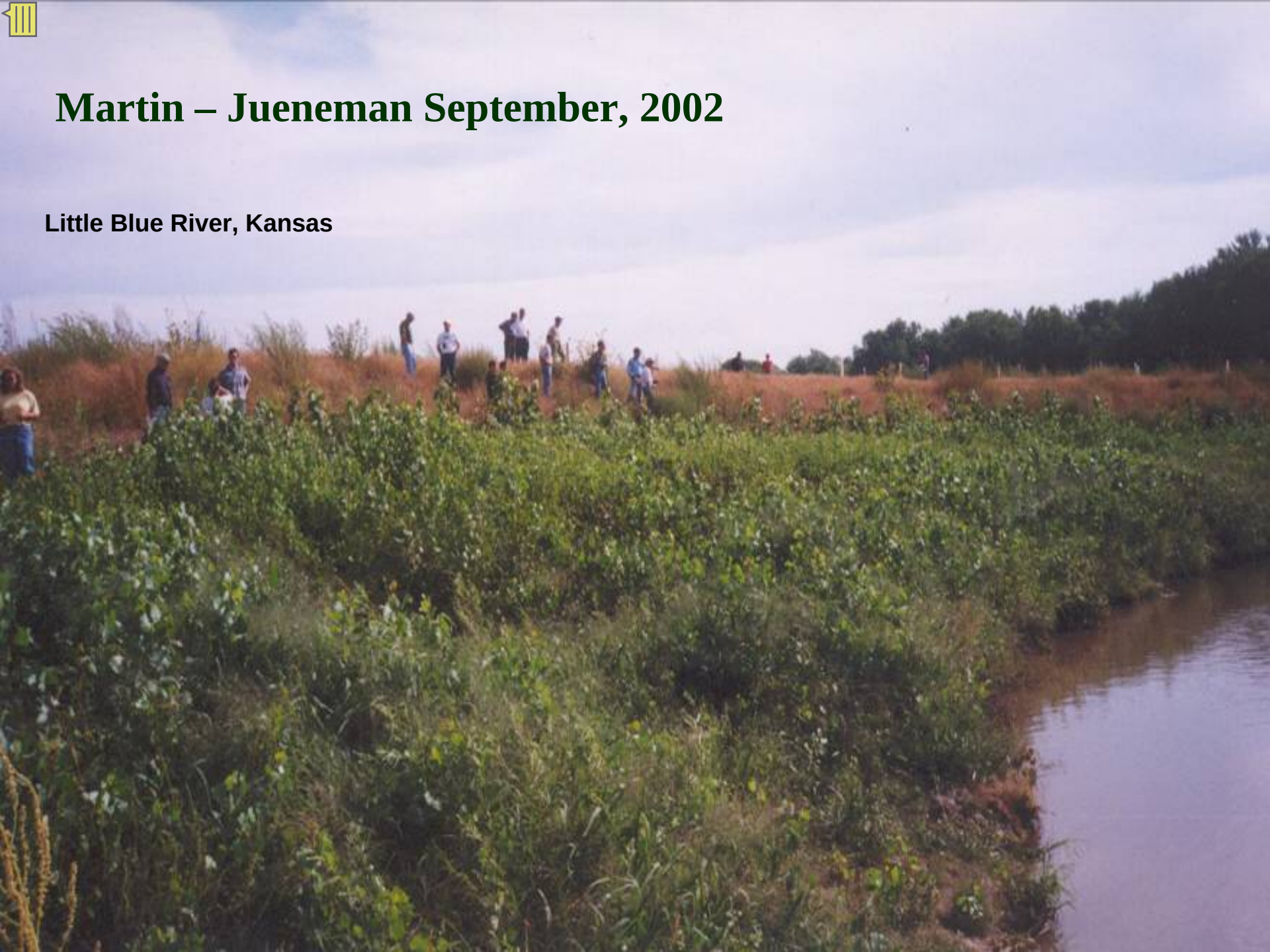

# Bendway Weirs

- Used in streams with a high width to depth ratios.
- Low, level-crested row of rocks.
- Slightly angled into streamflow.
- Re-directive stabilization method.
- Water passing over the weir turns perpendicular to the weir and away from the streambank.
- Reduce velocity in the near-bank region creating deposition along the bank and move the thalweg to the end of the weir.

Martin – Jueneman June, 2002
Little Blue River, Kansas

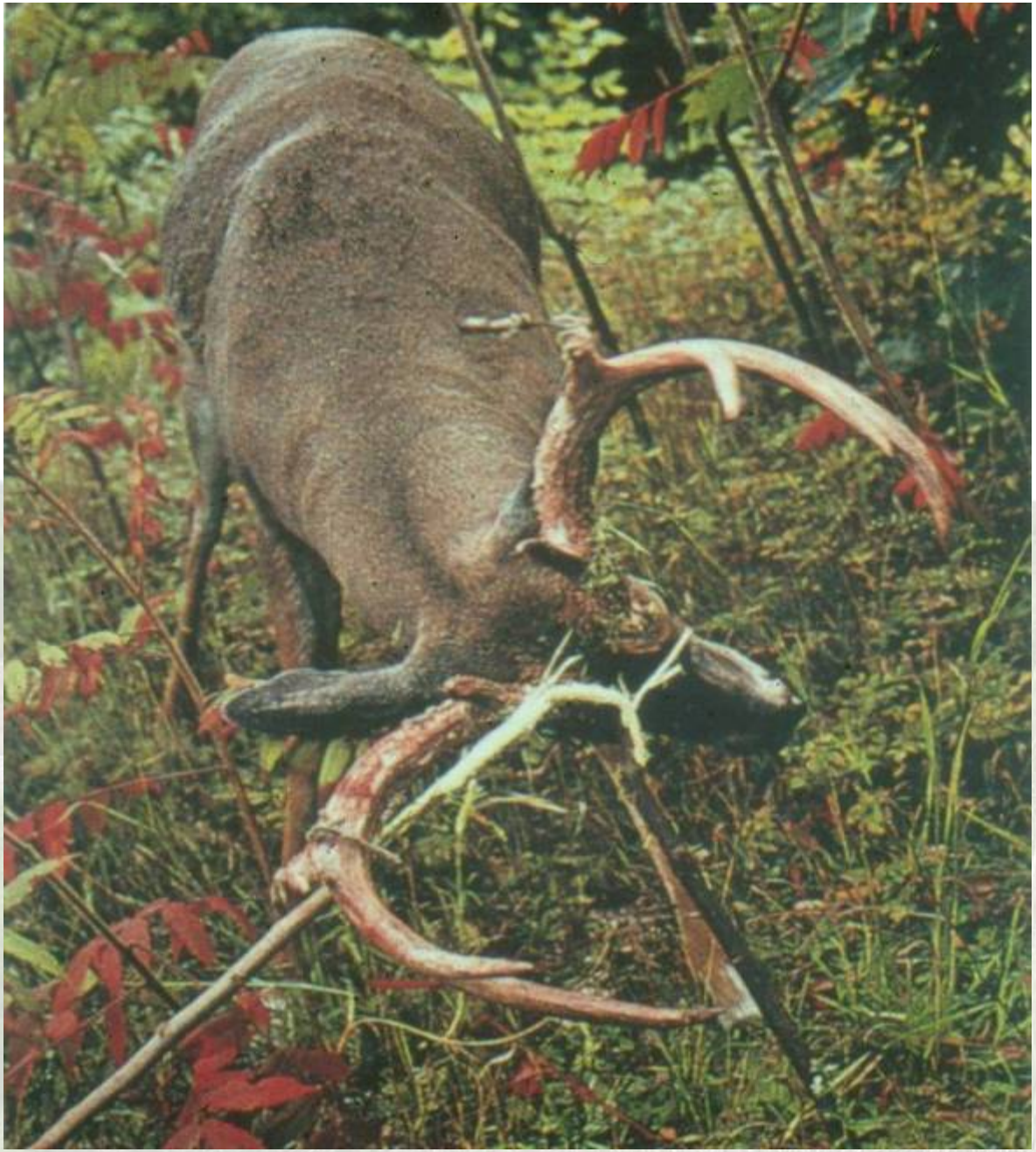
# Martin – Jueneman September, 2002

**Little Blue River, Kansas**



CAT
CAT
325B L
CAT

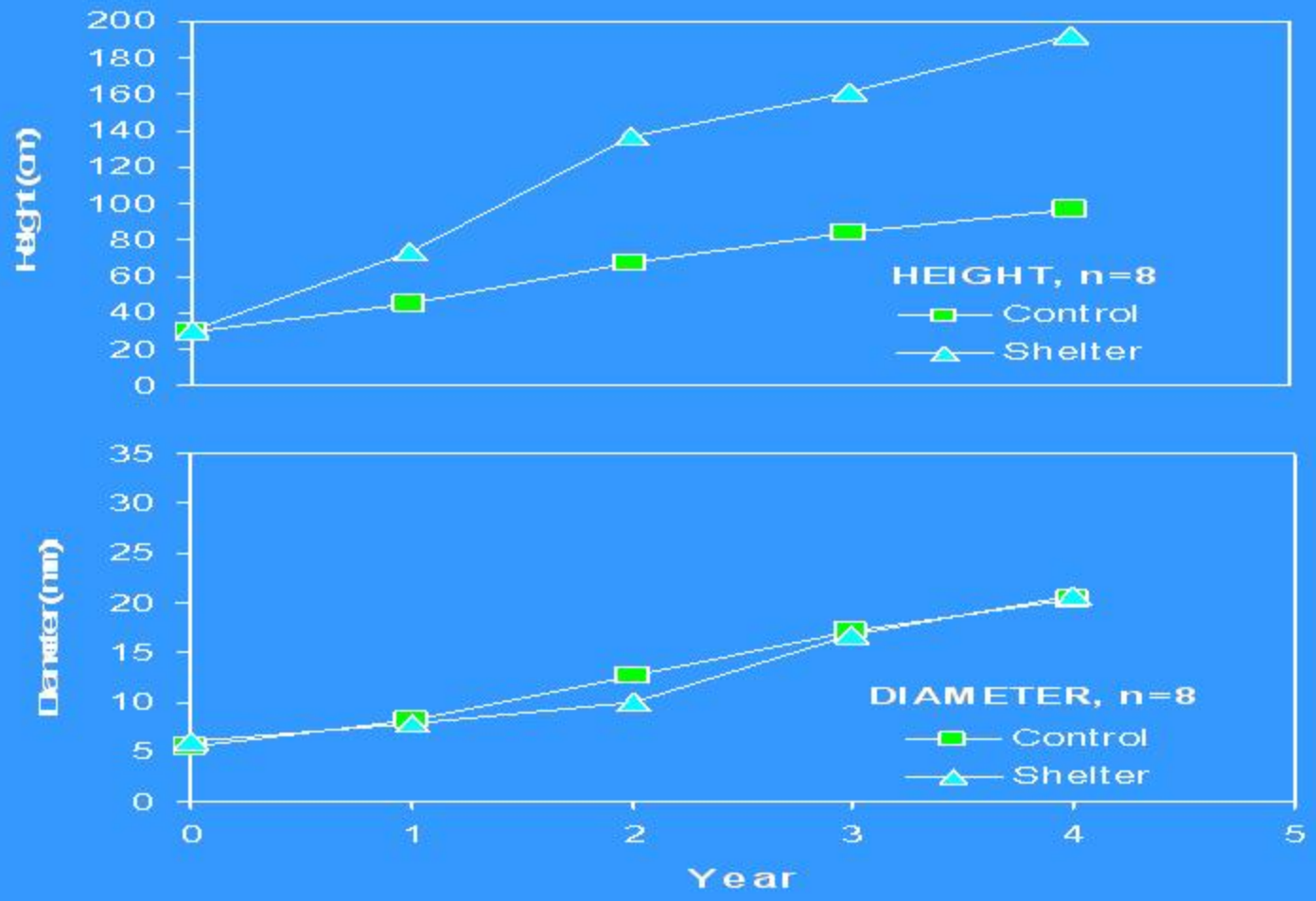
CAT
D5G



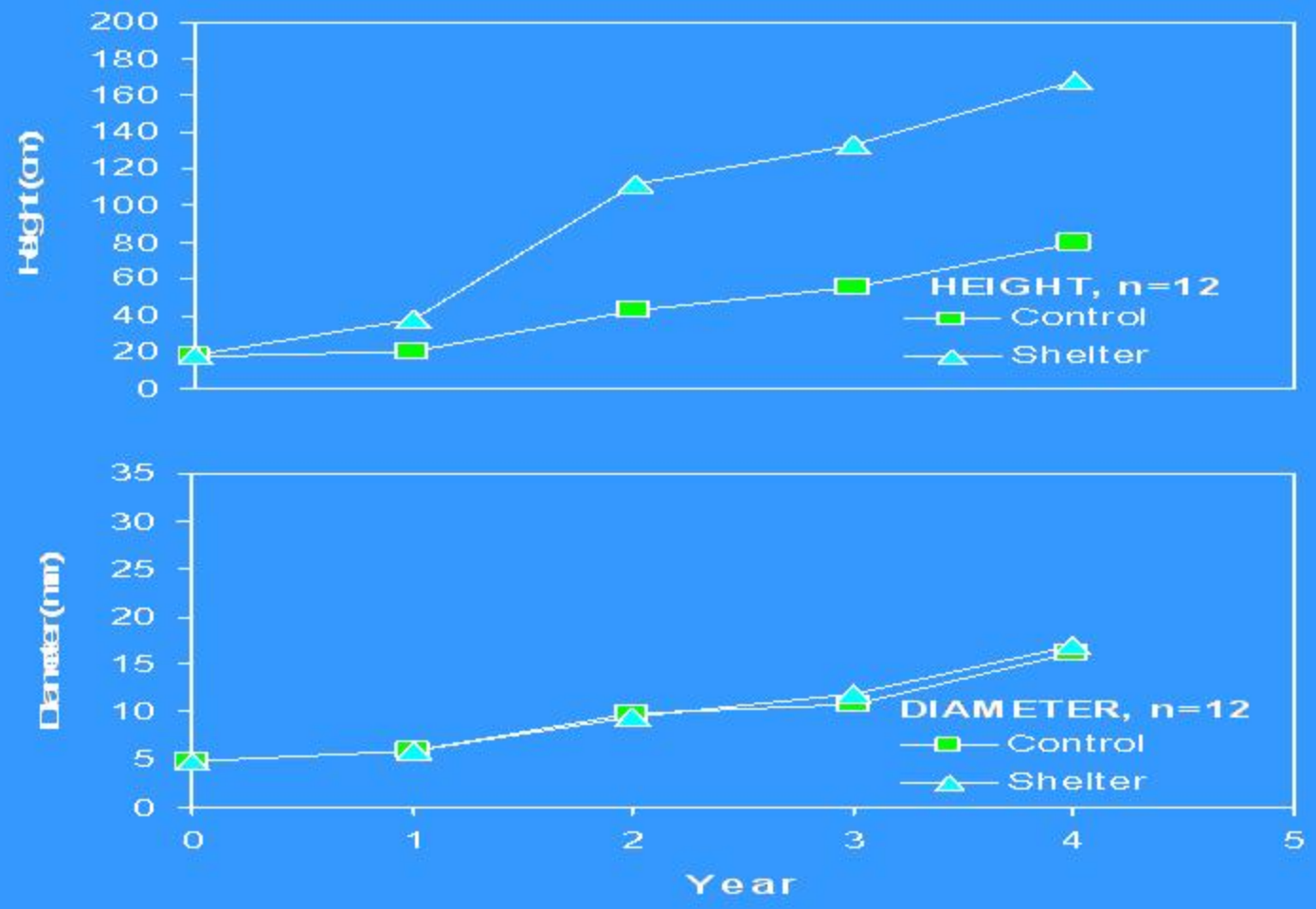
**Buck antler rub damage, can be severe on stems < 2” diameter**

4 year old bur oaks
Sheltered
Control

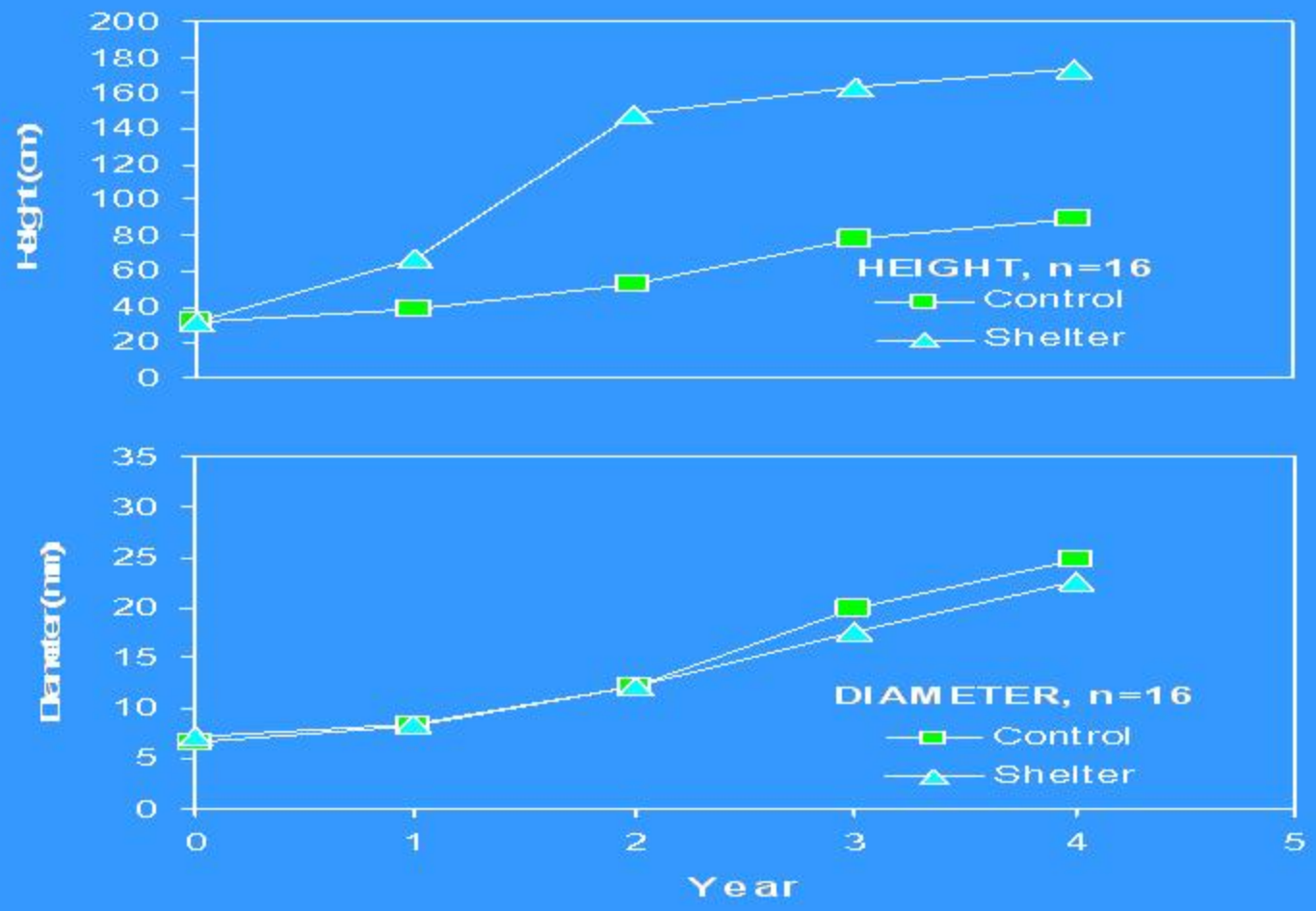
# BUR OAK RESPONSE TO SHELTERING



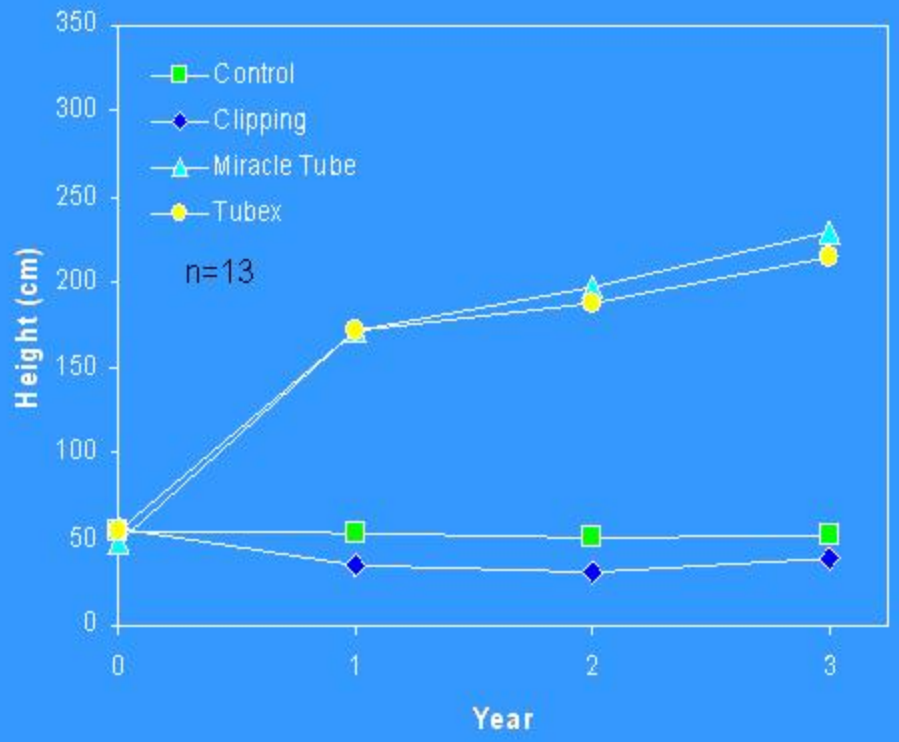
# PECAN RESPONSE TO SHELTERING



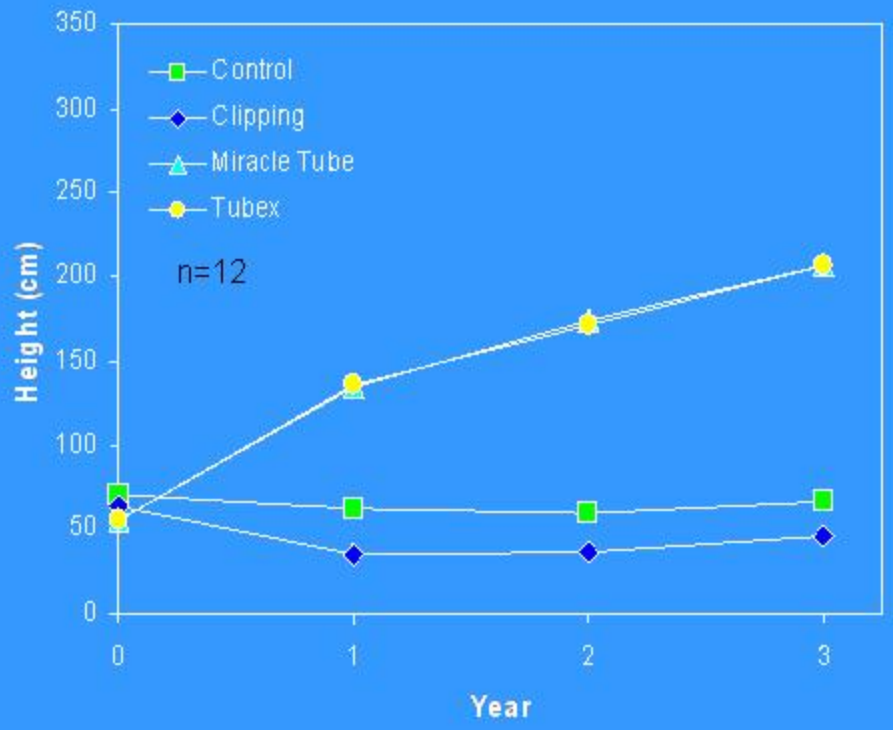
# BLACK WALNUT RESPONSE TO SHELTERING



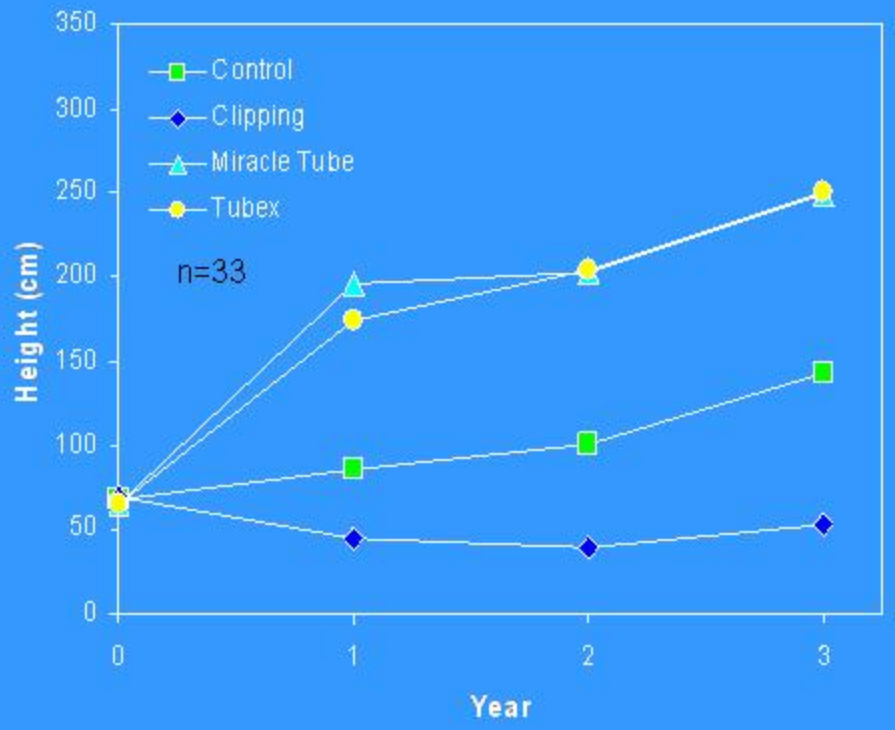
# Green Ash Response to Coppicing and Sheltering



# Bur Oak Response to Coppicing and Sheltering



# Saw Tooth Oak Response to Coppicing and Sheltering



Hennerberg Project
September 2002

**Hennerberg Project**
**October 2005**

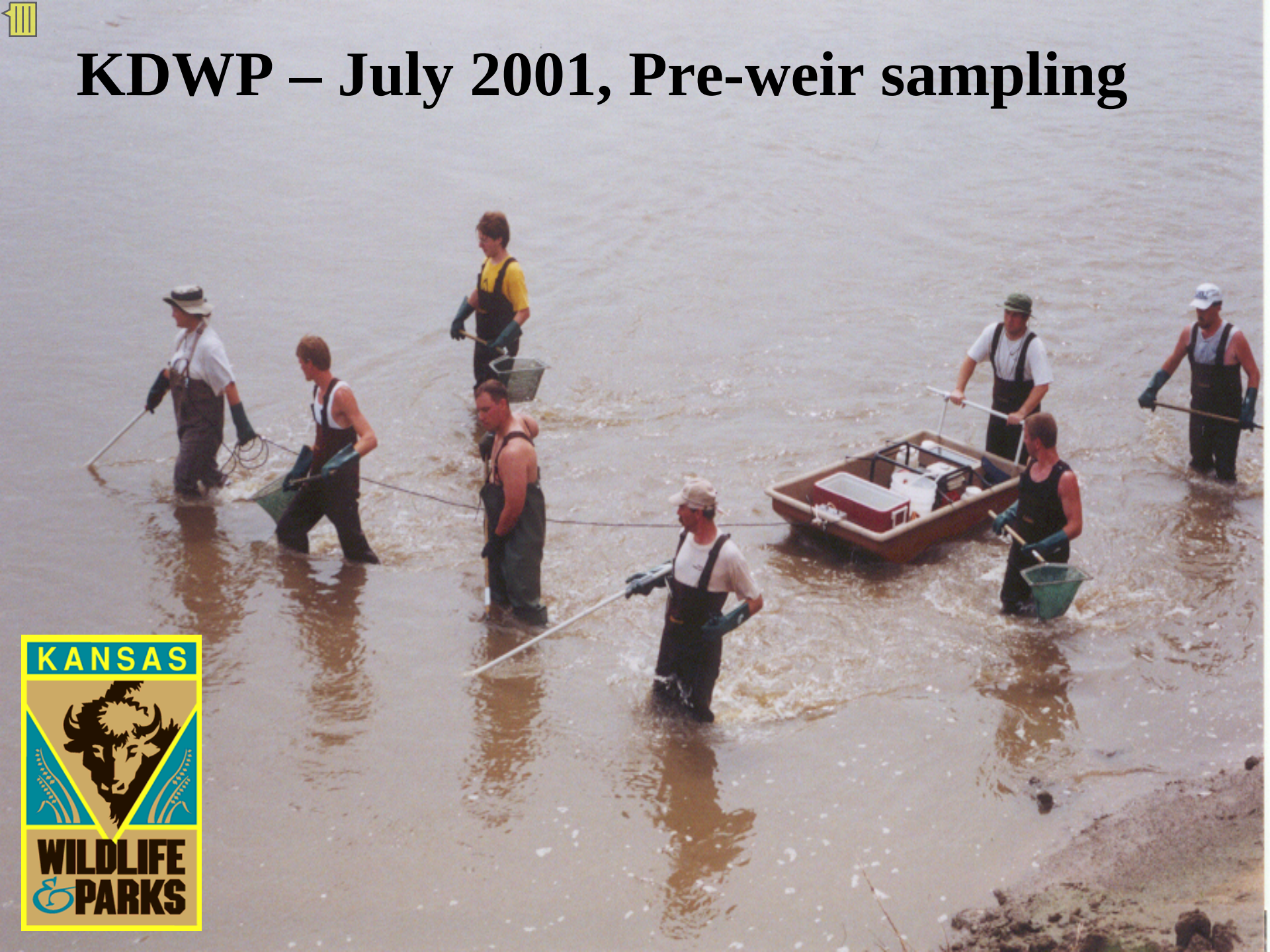
Hennerberg Project
July 2008

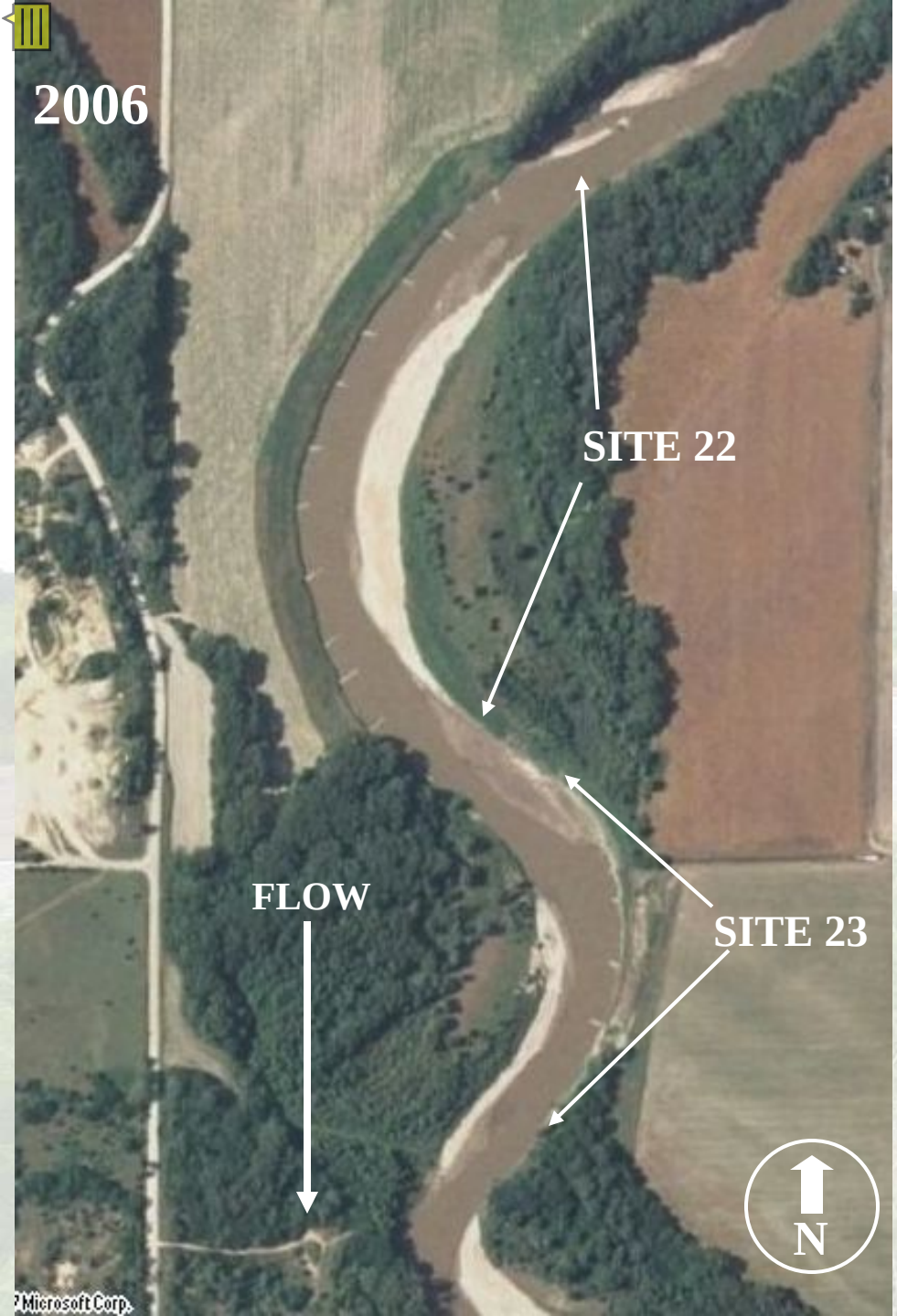
Cott River Project
April 2000

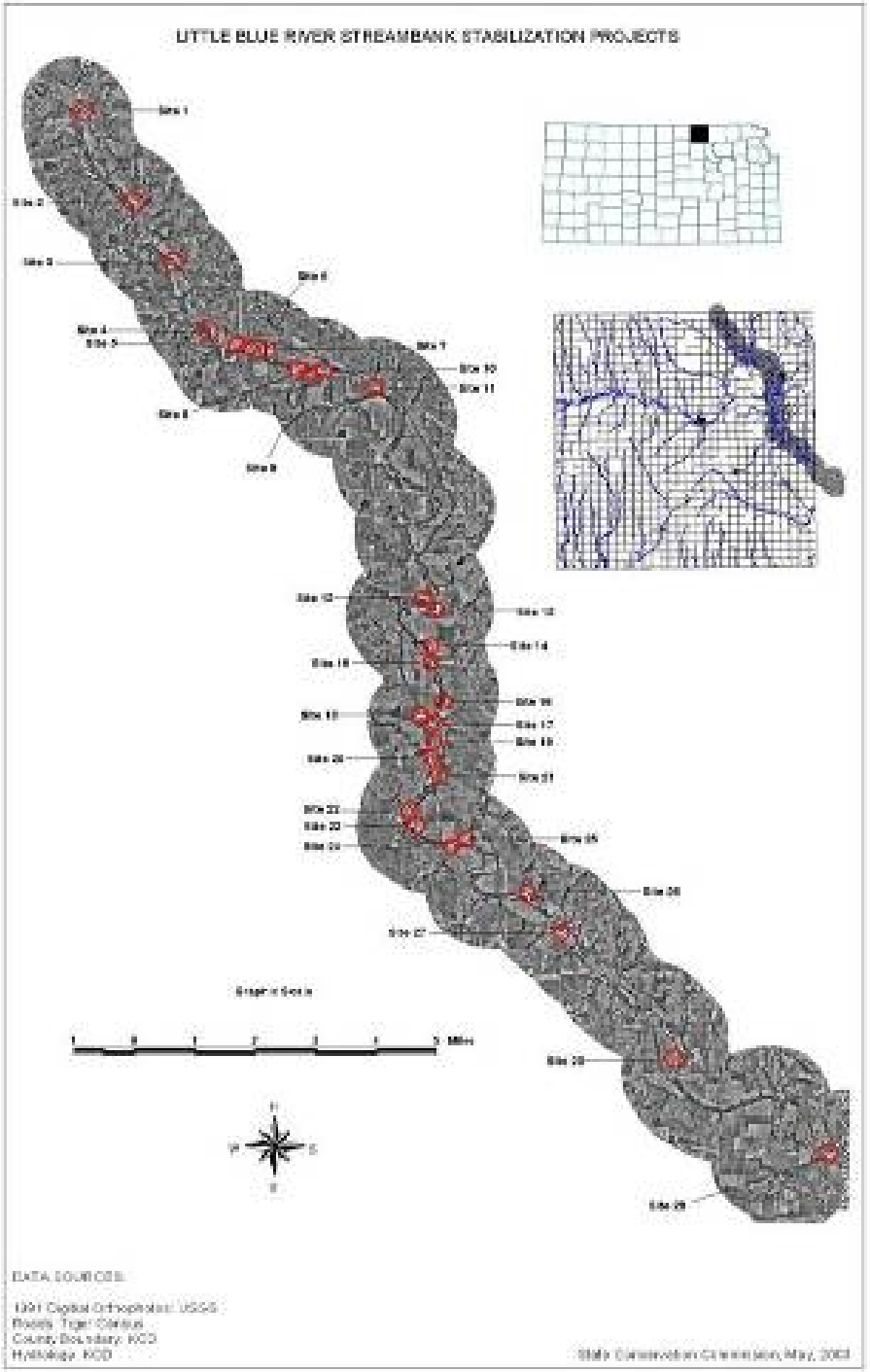
Cott River Project
July 2003
20,000 cfs flow

Cott River Project
June 2006

# KDWP – July 2001, Pre-weir sampling




2006
SITE 22
SITE 23
FLOW
N
Microsoft Corp.


LITTLE BLUE RIVER STREAMBANK STABILIZATION PROJECTS
DATA SOURCES:

# SITE 22 – Spring 2002

2,000 feet long

16’ vertical banks

Soil loss 1977 – 2000 = 14.9 acres (461,542 tons)

Nitrates = 5,539 lbs

Phosphorus = 36,000 lbs

Potassium = 138,463 lbs

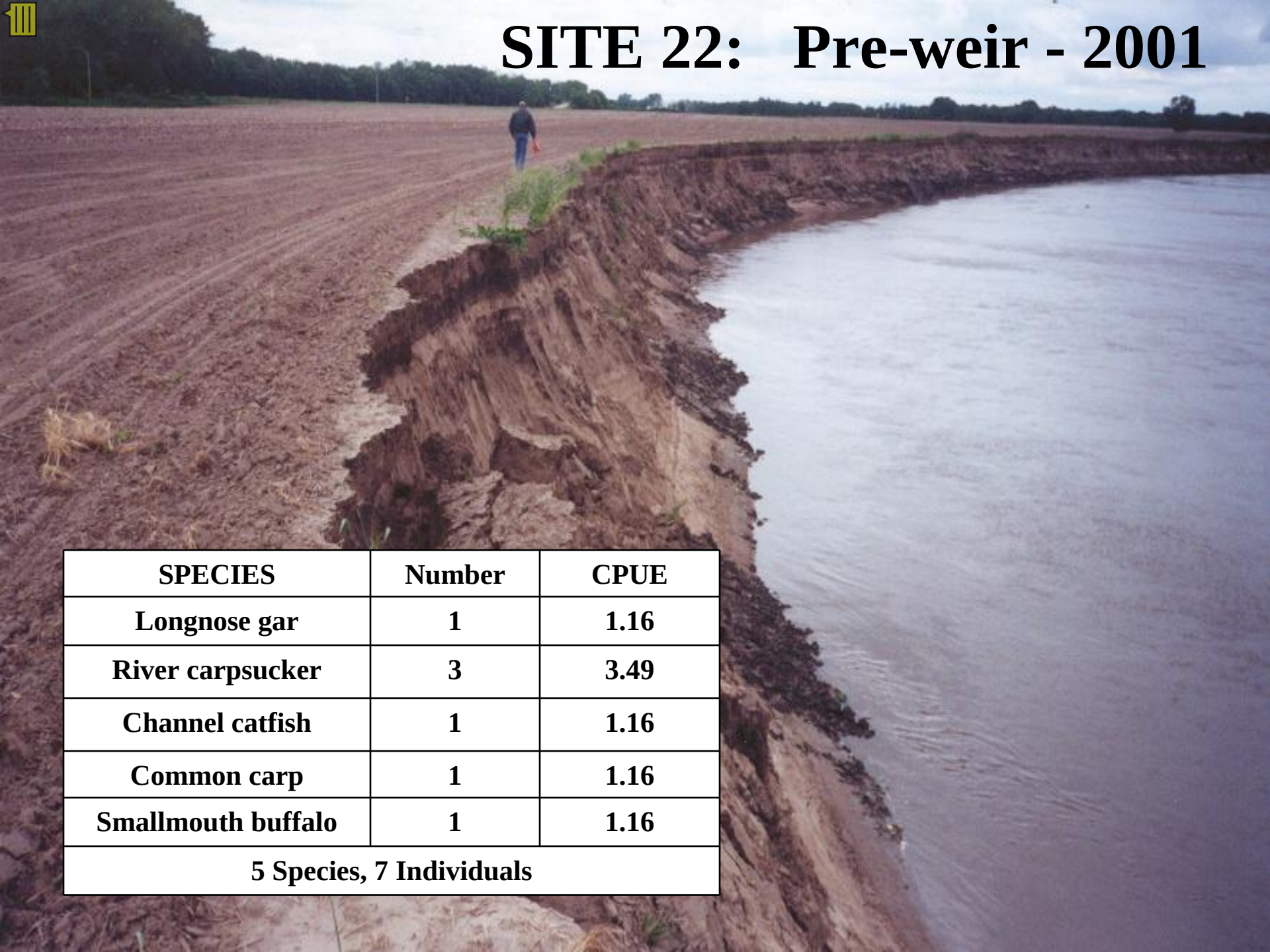
# SITE 22 – July 2002

# SITE 22 – April 2003

# SITE 22 – August 2003

# SITE 22 – July 2006

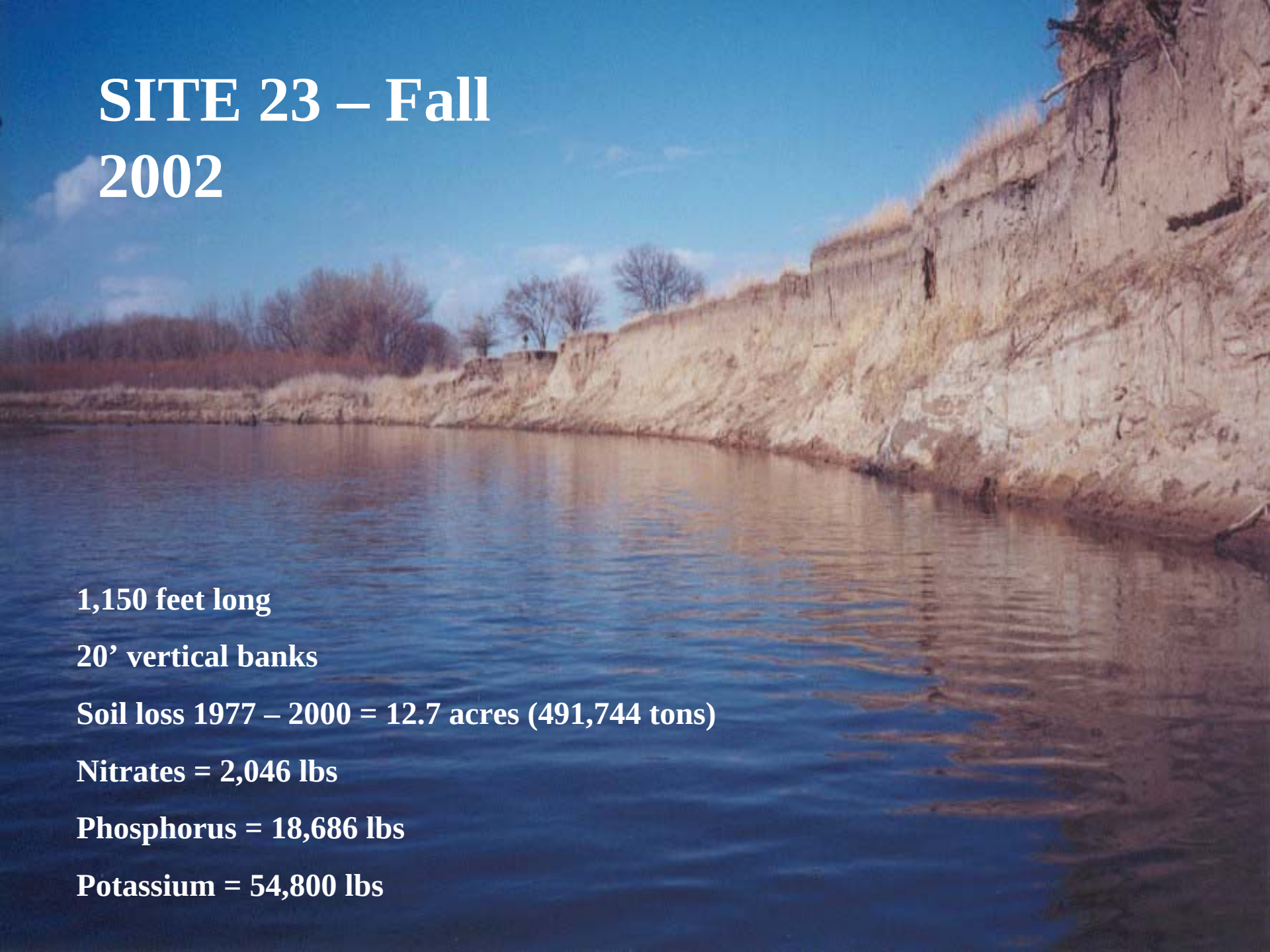
# SITE 22: Pre-weir - 2001



| SPECIES | Number | CPUE |
|---|---|---|
| Longnose gar | 1 | 1.16 |
| River carpsucker | 3 | 3.49 |
| Channel catfish | 1 | 1.16 |
| Common carp | 1 | 1.16 |
| Smallmouth buffalo | 1 | 1.16 |
| 5 Species, 7 Individuals | | |

# SITE 22: Post-weir 2006

| SPECIES | Number | CPUE |
|---|---|---|
| Longnose gar | 6 | 5.8 |
| River carpsucker | 57 | 54.8 |
| Channel catfish | 47 | 45.2 |
| Common carp | 21 | 20.2 |
| Flathead catfish | 17 | 7.8 |
| Freshwater drum | 6 | 5.8 |
| Quillback | 12 | 11.5 |
| Gizzard shad | 145 | 139.4 |
| Fathead minnow | 1 | 0.9 |
| Suckermouth minnow | 42 | 40.4 |
| Emerald shiner | 32 | 30.8 |
| Sand shiner | 185 | 177.9 |
| Red shiner | 827 | 795.2 |
| Bluntnose minnow | 2 | 1.9 |
| Bullhead minnow | 295 | 283.7 |
| Mosquitofish | 1 | 0.9 |
| Bluegill | 3 | 2.9 |
| Orangespotted sunfish | 5 | 4.8 |
| 18 Species, 1704 Individuals | | |



# SITE 23 – Fall 2002

**1,150 feet long**

**20’ vertical banks**

**Soil loss 1977 – 2000 = 12.7 acres (491,744 tons)**

**Nitrates = 2,046 lbs**

**Phosphorus = 18,686 lbs**

**Potassium = 54,800 lbs**

# SITE 23 – March 2003

~7 months post-construction.

# SITE 23 – May 2003

# SITE 23 – Oct. 2003

SITE 23 – July 2006

# SITE 23: Pre-weir 2001

| SPECIES | Number | CPUE |
|---|---|---|
| Longnose gar | 4 | 5.71 |
| River carpsucker | 1 | 1.43 |
| Channel catfish | 6 | 8.57 |
| Common carp | 4 | 5.71 |
| Red shiner | 22 | 31.43 |
| Gizzard shad | 1 | 1.43 |
| Freshwater drum | 1 | 1.43 |
| 7 Species, 39 Individuals | | |

# SITE 23: Post-weir 2006

| SPECIES | Number | CPUE |
|---|---|---|
| Longnose gar | 1 | 1.1 |
| River carpsucker | 54 | 60.0 |
| Channel catfish | 39 | 43.3 |
| Common carp | 14 | 15.6 |
| Red shiner | 533 | 592.2 |
| Gizzard shad | 342 | 380.0 |
| Flathead catfish | 7 | 7.8 |
| Smallmouth buffalo | 1 | 1.1 |
| Suckermouth minnow | 33 | 36.7 |
| Bluntnose minnow | 10 | 11.1 |
| Emerald shiner | 22 | 24.4 |
| Sand shiner | 208 | 231.1 |
| Bullhead minnow | 149 | 165.6 |
| Mosquitofish | 6 | 6.7 |
| Orangespotted sunfish | 4 | 4.4 |
| Green sunfish | 3 | 3.3 |
| Freshwater drum | 7 | 7.8 |
| 17 Species, 1,433 Individuals | | |

| SPECIES | PRE-WEIR | POST-WEIR | |
|---|---|---|---|
| Bullhead minnow | - | 231.6 | |
| Bluntnose minnow | - | 6.7 | |
| Fathead minnow | - | 0.5 | |
| Emerald shiner | - | 28.5 | |
| Sand shiner | - | 210.8 | |
| Red shiner | 20.2 | 715.2 | |
| Suckermouth minnow | - | 39.7 | |
| Common carp | 4.4 | 18.7 | |
| Channel catfish | 6.2 | 45.6 | |
| Flathead catfish | - | 12.4 | |
| Freshwater drum | 0.9 | 7.0 | |
| Smallmouth buffalo | 0.8 | 0.6 | |
| Quillback | - | 6.0 | |
| River carpsucker | 3.2 | 59.2 | |
| Bluegill | - | 3.2 | |
| Green sunfish | - | 4.2 | |
| Orangespotted sunfish | - | 4.8 | |
| Gizzard shad | 0.9 | 267.7 | |
| Longnose gar | 6.2 | 3.6 | |
| Mosquitofish | - | 3.9 | |

# Sept. 2006, Post-weir sampling