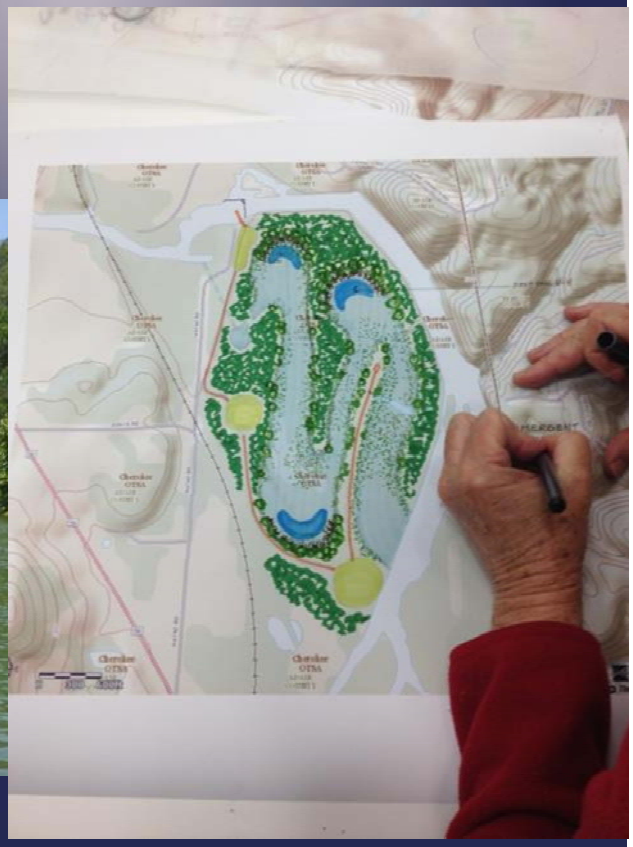
New Futures for Lake Frances
(and the Illinois River):
Ecological Design Opportunities

Steve Patterson
Bio x Design



OCLWA, Stillwater
April 3, 2014

Acknowledgements

American Ecological Engineering Society

ARKANSAS WATER RESOURCES CENTER
AWRC

Center for Agricultural and Rural Sustainability
University of Arkansas • Division of Agriculture

bioxdesign
Environmental Consulting • Ecological Restoration • Ecosystem Design

UofA DIVISION OF AGRICULTURE
RESEARCH & EXTENSION
University of Arkansas System

What if you could…?

- Improve water quality in the Illinois River
- Demonstrate techniques & technologies for water quality improvement that could be implemented elsewhere along the river
- Enhance river recreation, and
- Enhance the river's aquatic life
- Create new recreational & education opportunities
- Encourage economic development
- All while maintaining an important regional water supply

What is a design *charrette?*

- *Charrette* comes from the French for "little cart."
- Charrettes are **rapid, intensive, creative** work sessions in which design teams focuses on a particular problem to arrive at a **collaborative** solution.
- Charrettes are **product-oriented**.
- Public charrettes are increasing in popularity as a way to address complex planning challenges.

Image source: The National Charrette Institute

Photo by Brian Haggard

The best ecological design is:

- Multi-disciplinary
- Collaborative

American Ecological Engineering Society

Syracuse AEES CED Workshop 2012

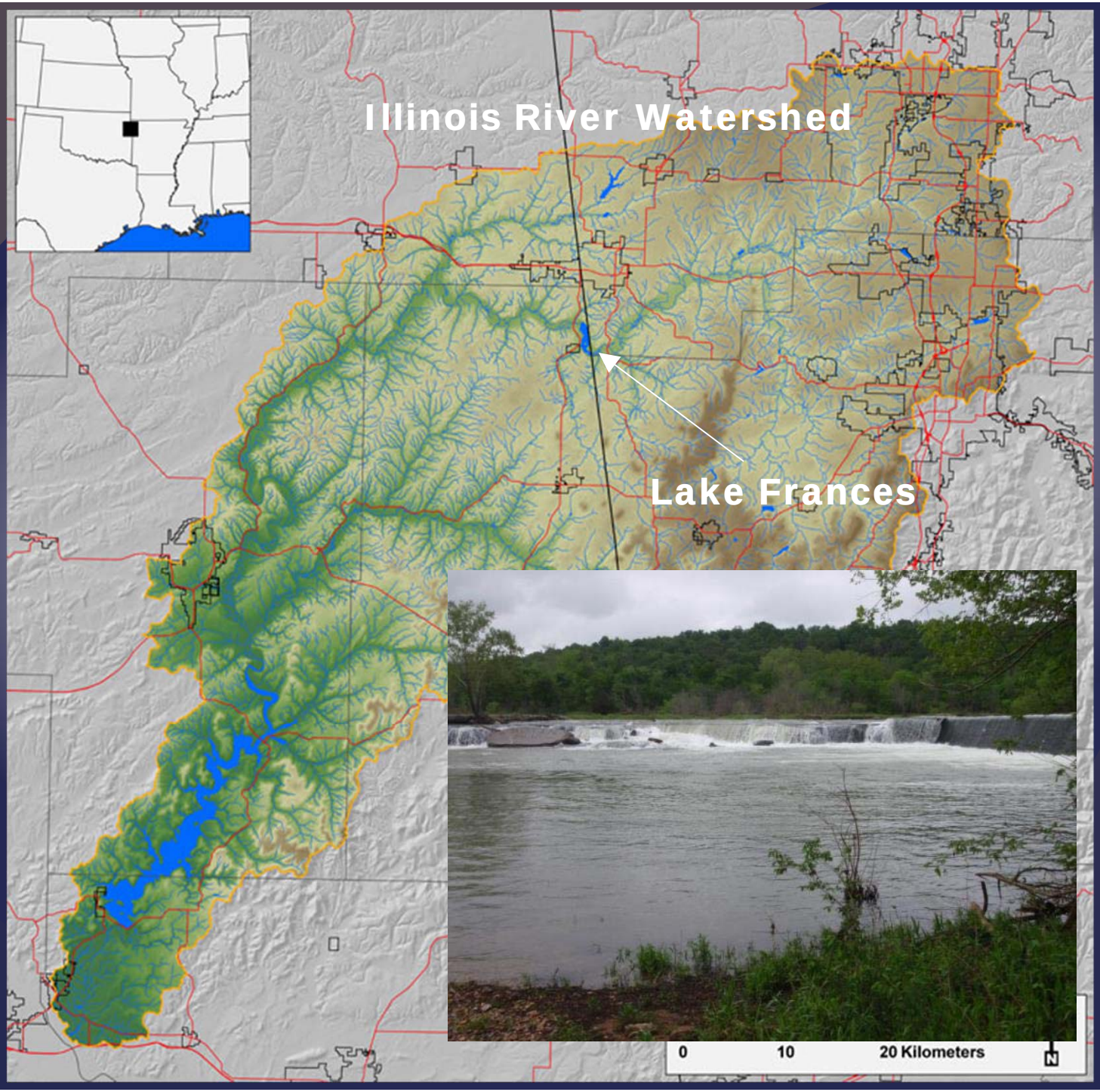
Save the Date

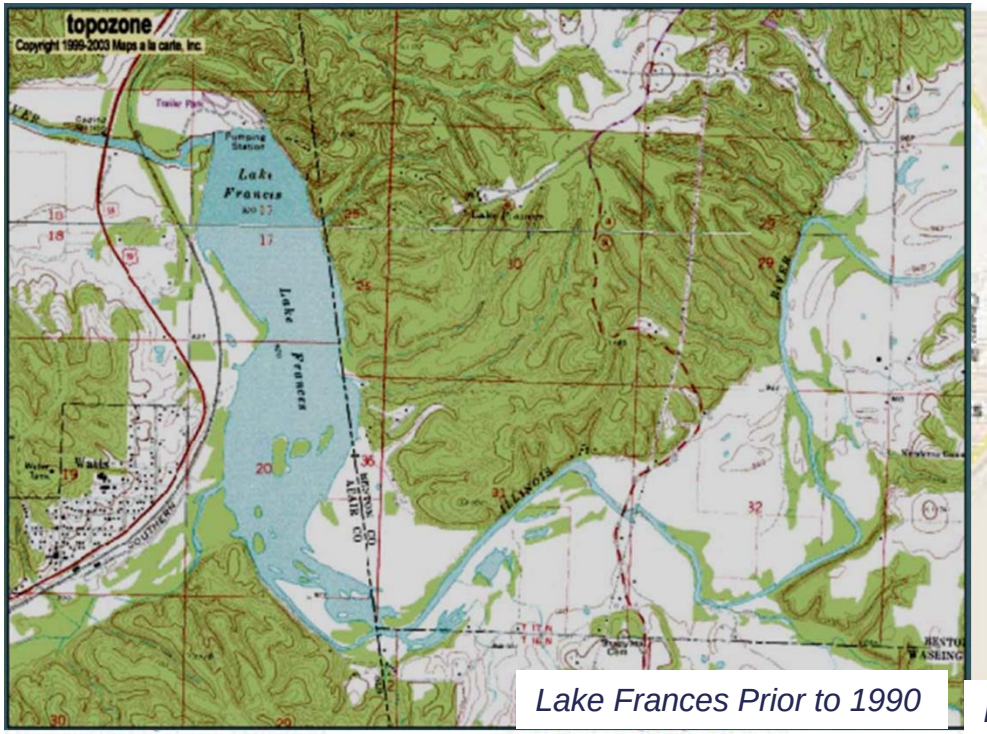
May 15-17 | 2013
Fayetteville, Arkansas

Ecological Design in the Ozarks

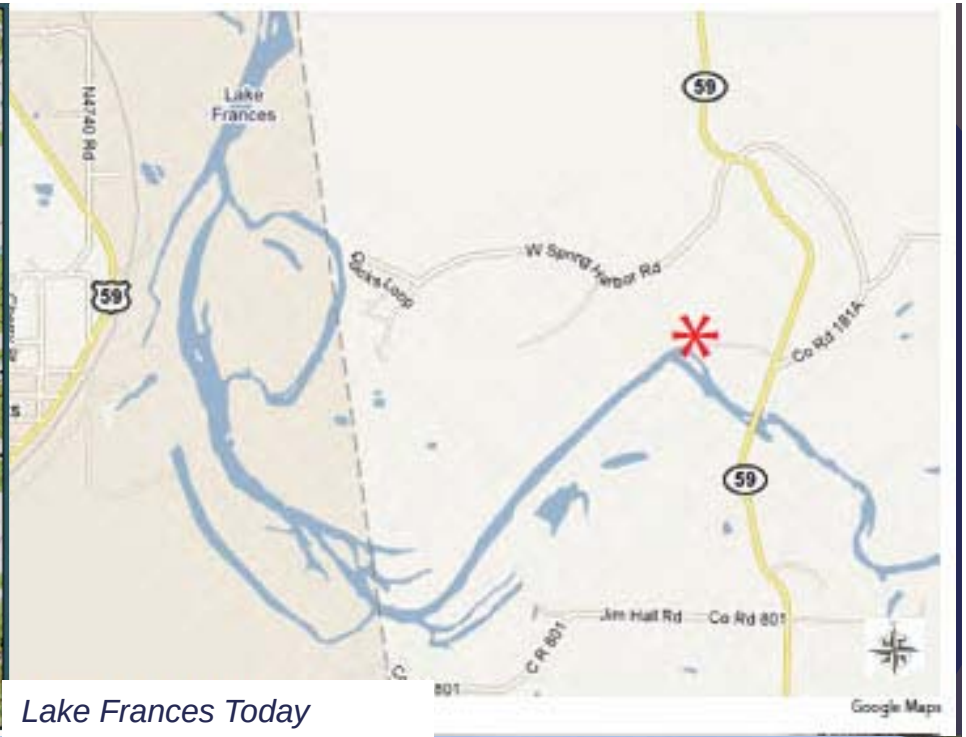
A Workshop and Charrette

This workshop satisfies the workshop requirement for the Certified Ecological Designer program of the American Ecological Engineering Society. Continuing Education Credits will also be available.


Illinois River Watershed
Lake Frances
0
10
20 Kilometers
N



Lake Frances Prior to 1990

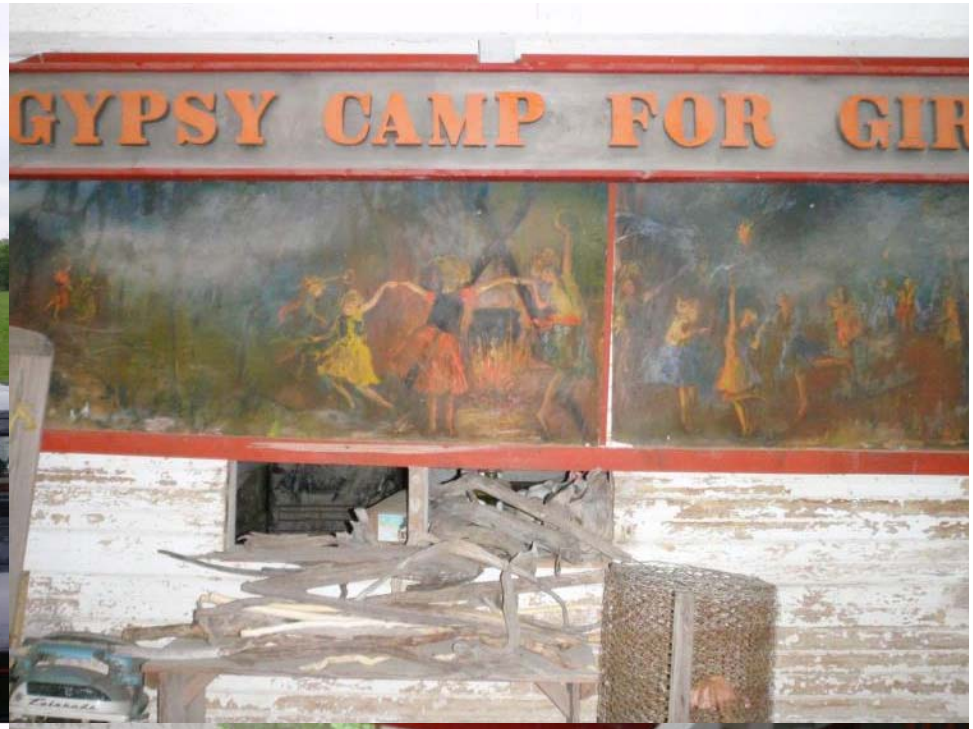


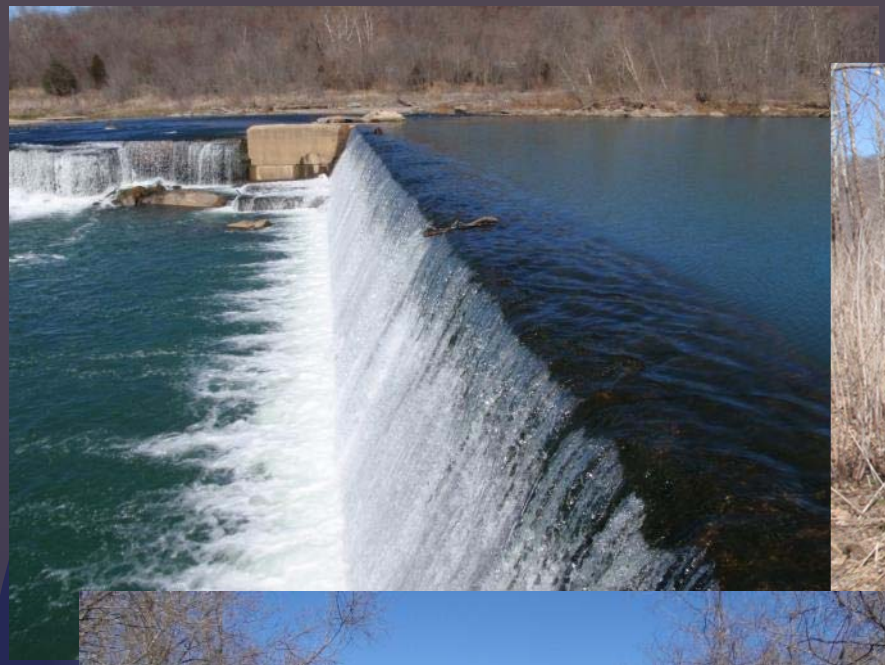
Lake Frances Today

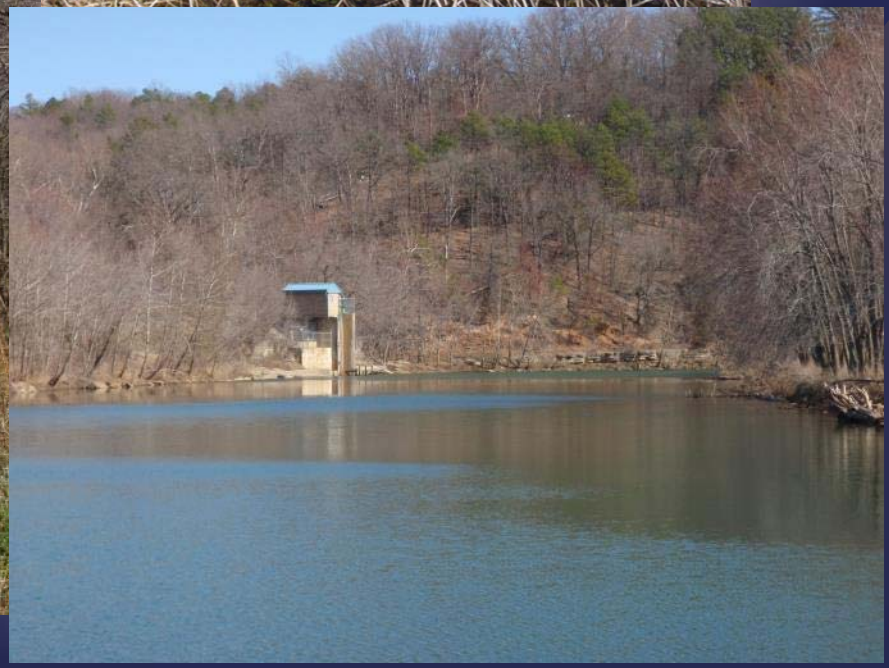
Photo Courtesy Kamp Paddle Trails

Lake Frances Today

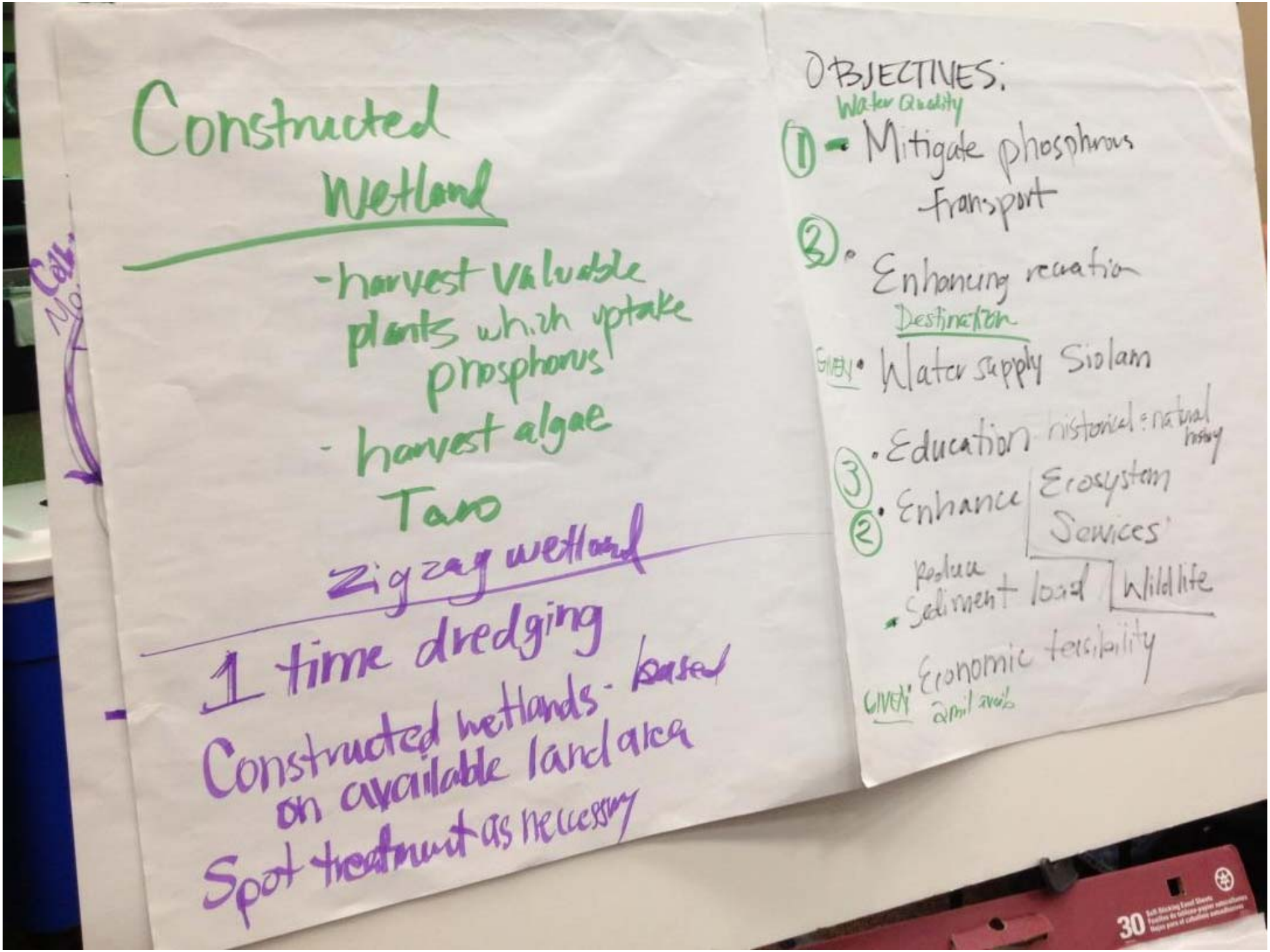
- Owned by the City of Siloam Springs (via an Oklahoma corporation)
- City owns close to 600 acres (Section 17), but no longer owns all the old lake bed (former lake bed in Section 20 owned by a private party)
- The City has water rights to 60% of the Illinois River flow at Lake Frances
- Currently use about 1.4 billion gallons per year (5 mgd)
- Their rights provide them with ca. a 25 year supply based on current growth projections
- Siloam Springs is growing, but not towards Lake Frances, growing north and east


GYPSY CAMP FOR GIR



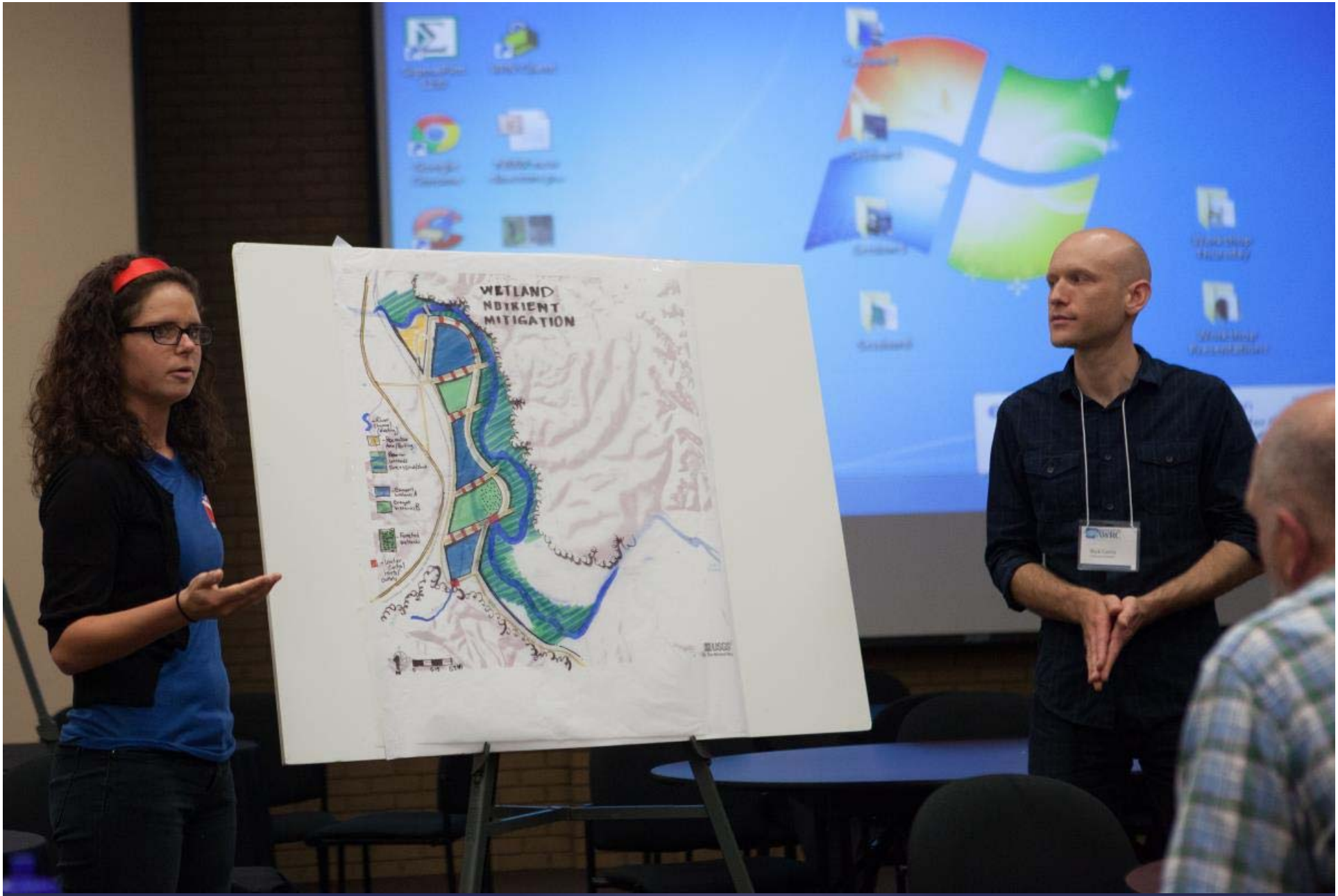



Ballard Creek Total Phosphorus
Oklahoma Conservation Commission


Constructed
Wetland
- harvest valuable plants which uptake prosphorus
- harvest algae
Taro
zigzag wetland
1 time dredging
Constructed wetlands - based on available land area
Spot treatment as necessary
OBJECTIVES:
Water Quality
1 - Mitigate phosphorus transport
2 - Enhancing recreation
Destination
GIVEN - Water supply Siolam
3 - Education - historical + natural history
2 - Enhance | Ecosystem Services
- reduce Sediment load | Wildlife
GIVEN - Economic feasibility
limit cost

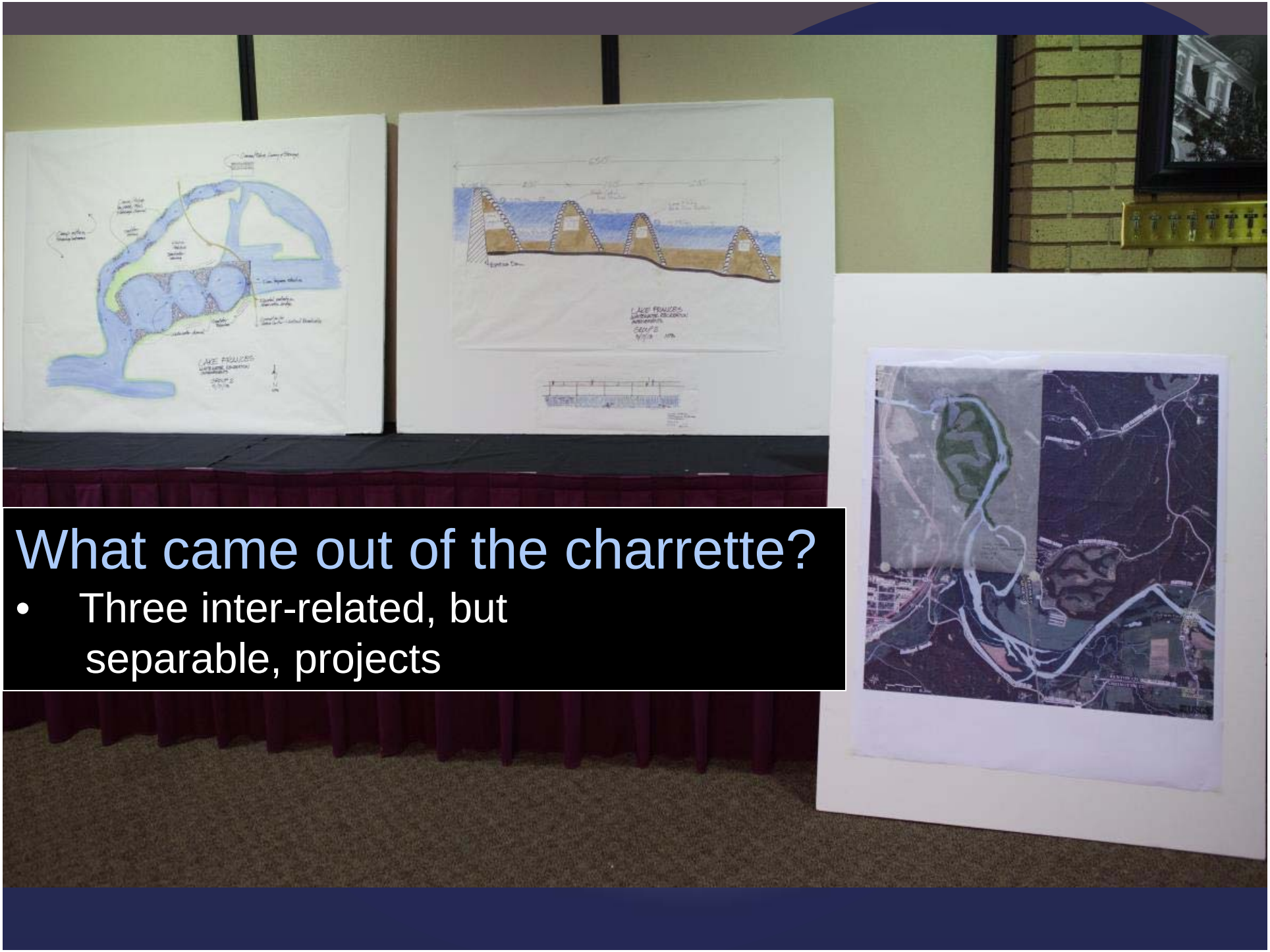

NRS


Cherokee
OTSA
ADAIR
COUNTY
N4740 RD
E0615 RD
59
DEEP POOL
EMERGENT
300
600ft


WETLAND
NUTRIENT
MITIGATION

What came out of the charrette?

- Three inter-related, but separable, projects



1. **Treat the lake to inactivate phosphorus in sediments**
   - **Improve water quality in the lake**
   - **Improve water quality downstream**

Alum (aluminum sulfate) or Phosloc (an engineered clay) can be used to inactivate sediment phosphorus

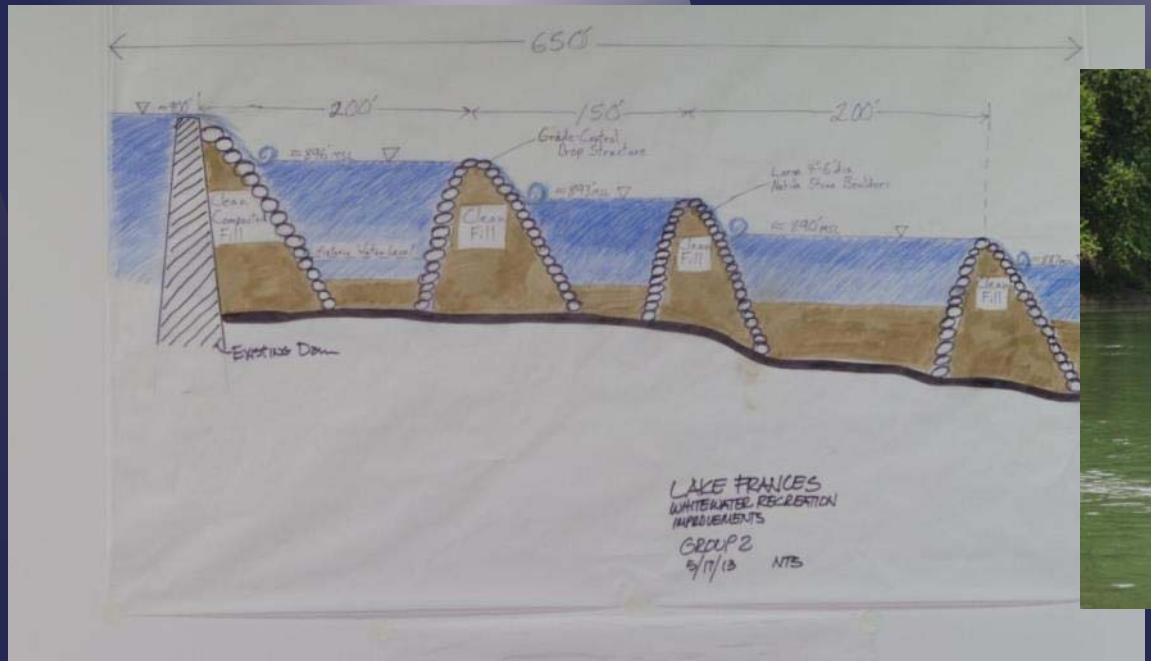
2. Develop a treatment wetland/wetland education & research complex

- improve river water quality downstream
- demonstrate techniques that can be used elsewhere along the river
- create access--boardwalks & trails—in the wetlands to facilitate recreation and education

Existing wetlands in the former lake bottom

3. Construct a paddling bypass/fish passage around the dam & kayak play park downstream

- Enhance river recreation
- Restore a migration pathway for rare fish
- Create an economic stimulus, as a complement to the wetland complex & providing funding for wetland O&M



By-pass example:

Argo Cascades,
Ann Arbor, Michigan

- Series of nine drops and pools
- Allows passage around the dam
- Located in the heart of Ann Arbor

Kayak park example:

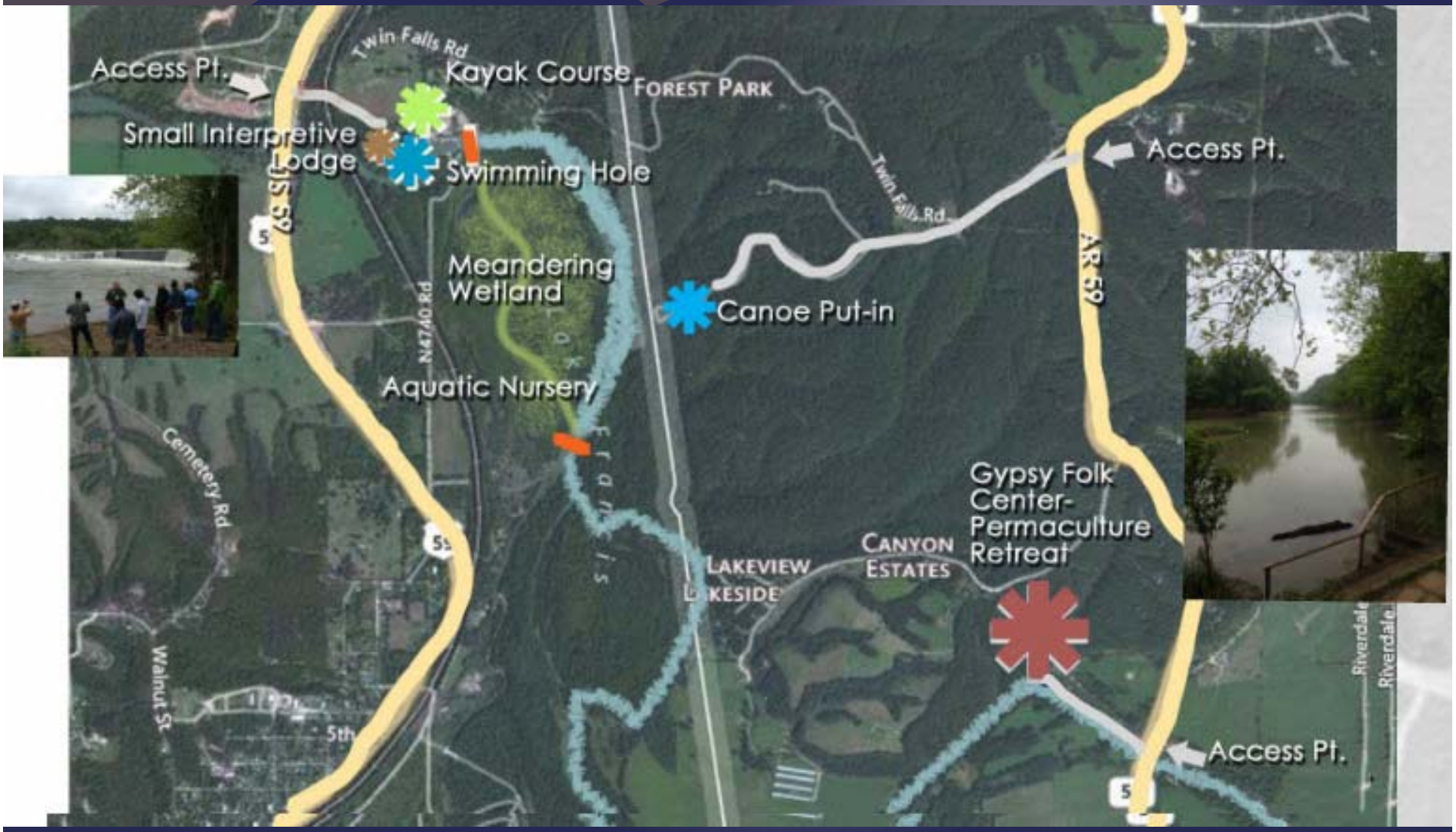
- **Reno Whitewater Park**
  Truckee River, Reno, NV
- **Fisher Ford, under construction upstream**

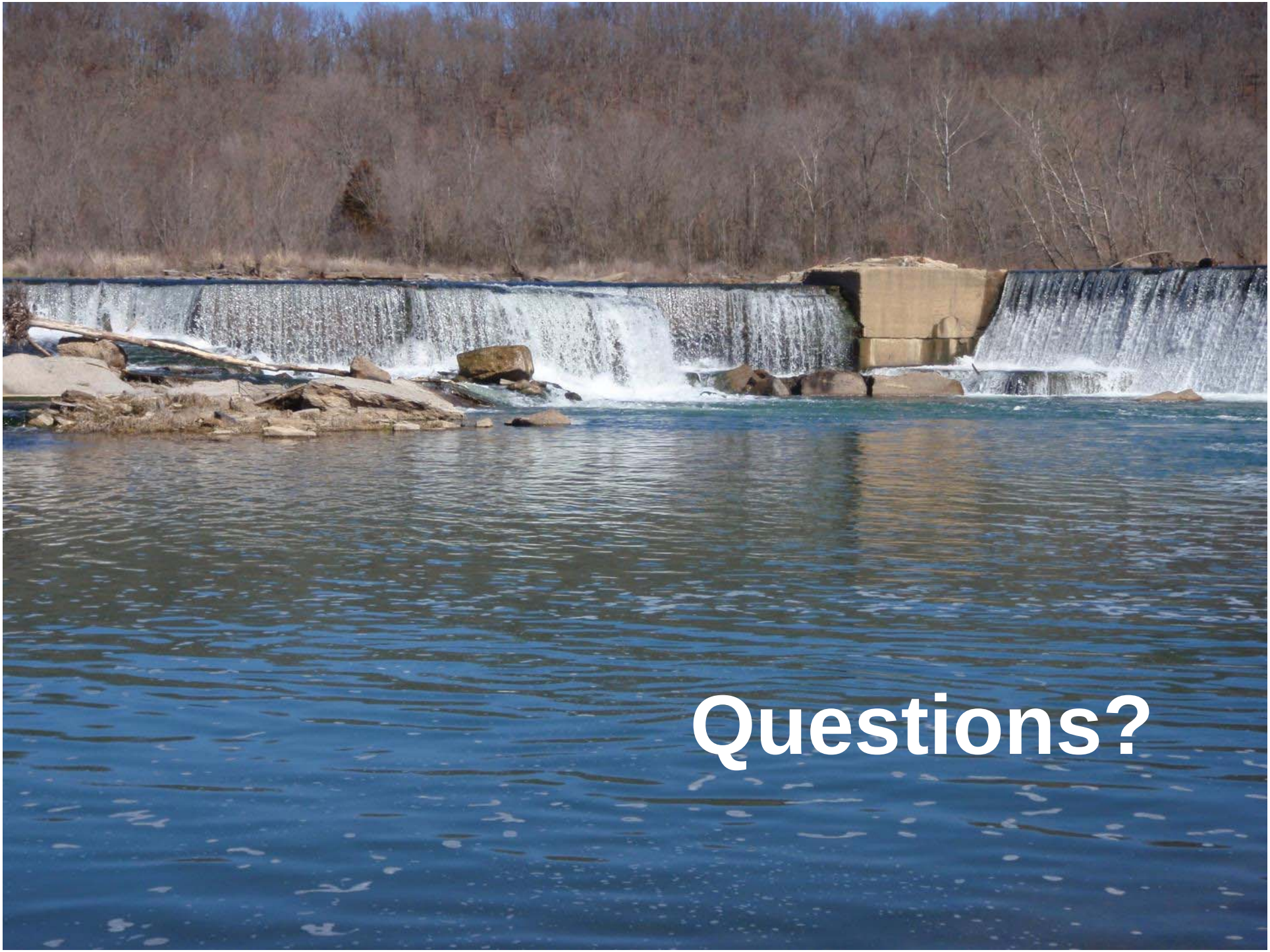
Fish passage around the dam

River redhorse (*Moxostoma carinatum*)

White sucker, (*Catostomus commersoni)*

Put all the pieces together:




Questions?