

Wetland Restoration In Altered Landscapes

Mike McClure, Wetland Service Biologist, MO Dept. of Conservation



Assessing the Landscape

- Watershed and Project Level

Developing the Restoration Plan

- Objectives and Priorities
- Topographic Survey and Design

Restoration Practices

- Earthwork
- WCS/Pipe
- Vegetation Establishment



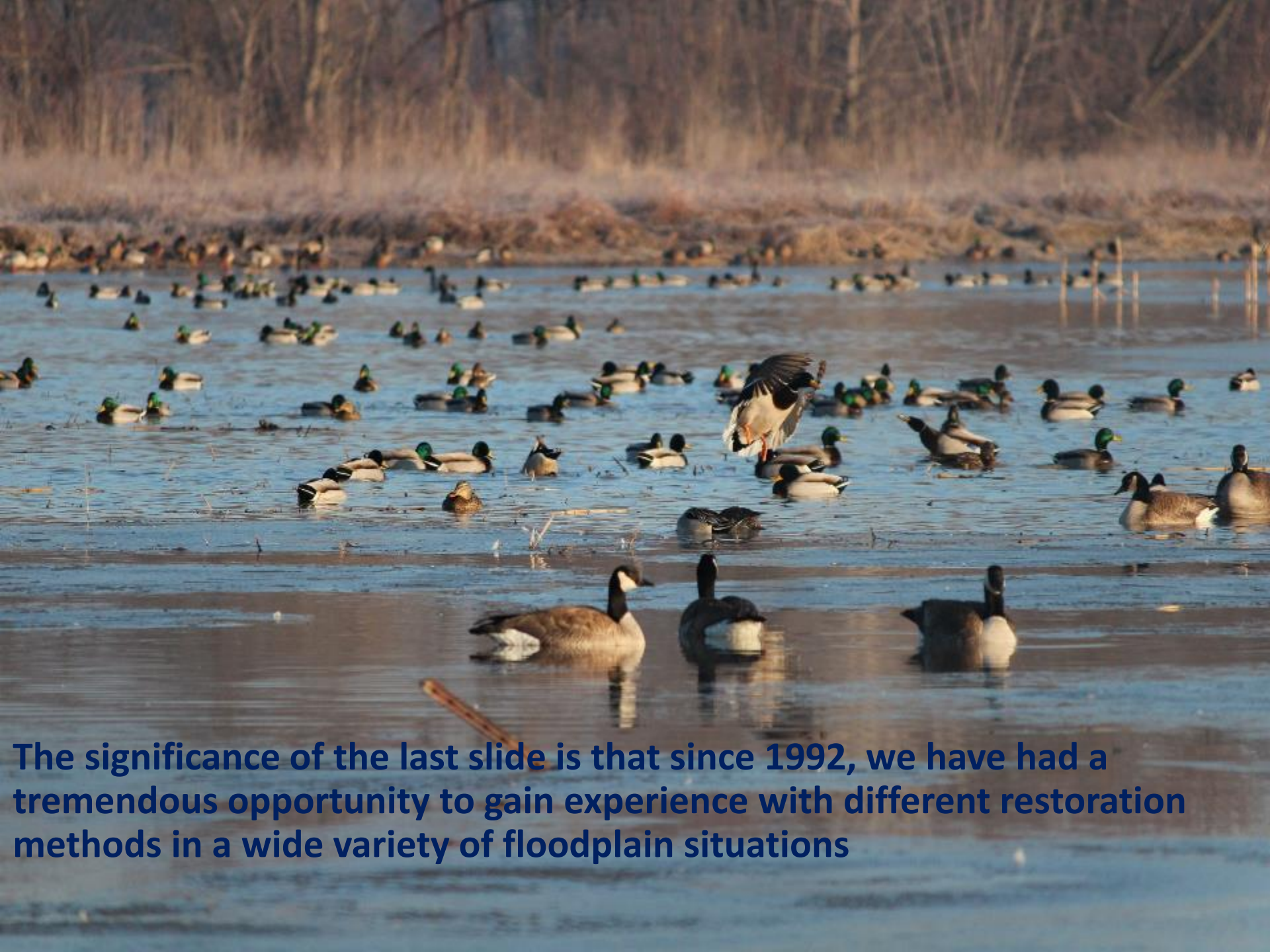


Missouri WRP/WRE (December 2018)

- **Total Easements: 1,111**
- **Total Acres: 154,577.5**

WET 1—Chillicothe

- **Total Easements: 418 (37.6%)**
- **Total Acres: 50,484.1 (32.7%)**



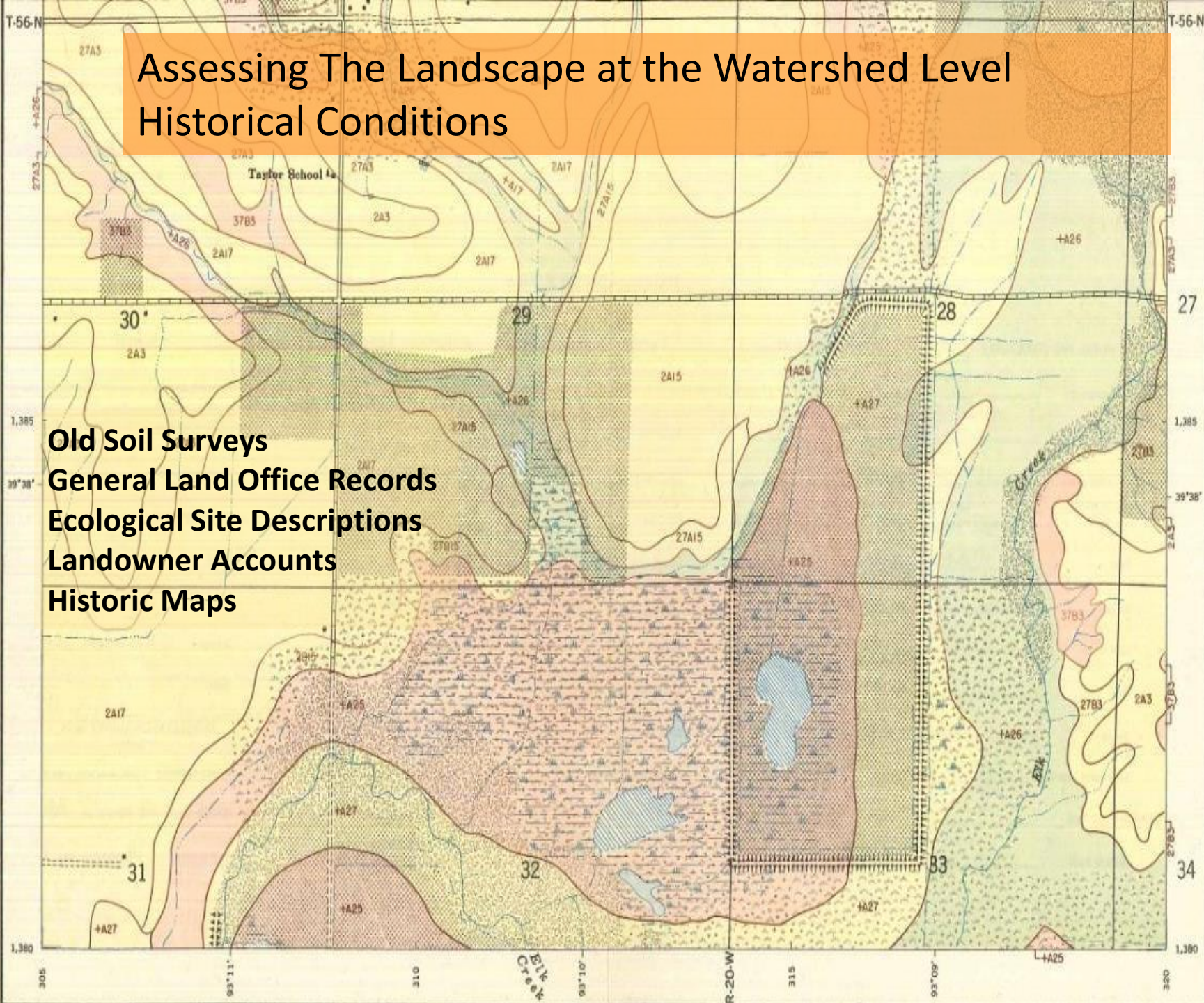
The significance of the last slide is that since 1992, we have had a tremendous opportunity to gain experience with different restoration methods in a wide variety of floodplain situations



Assessing The Landscape

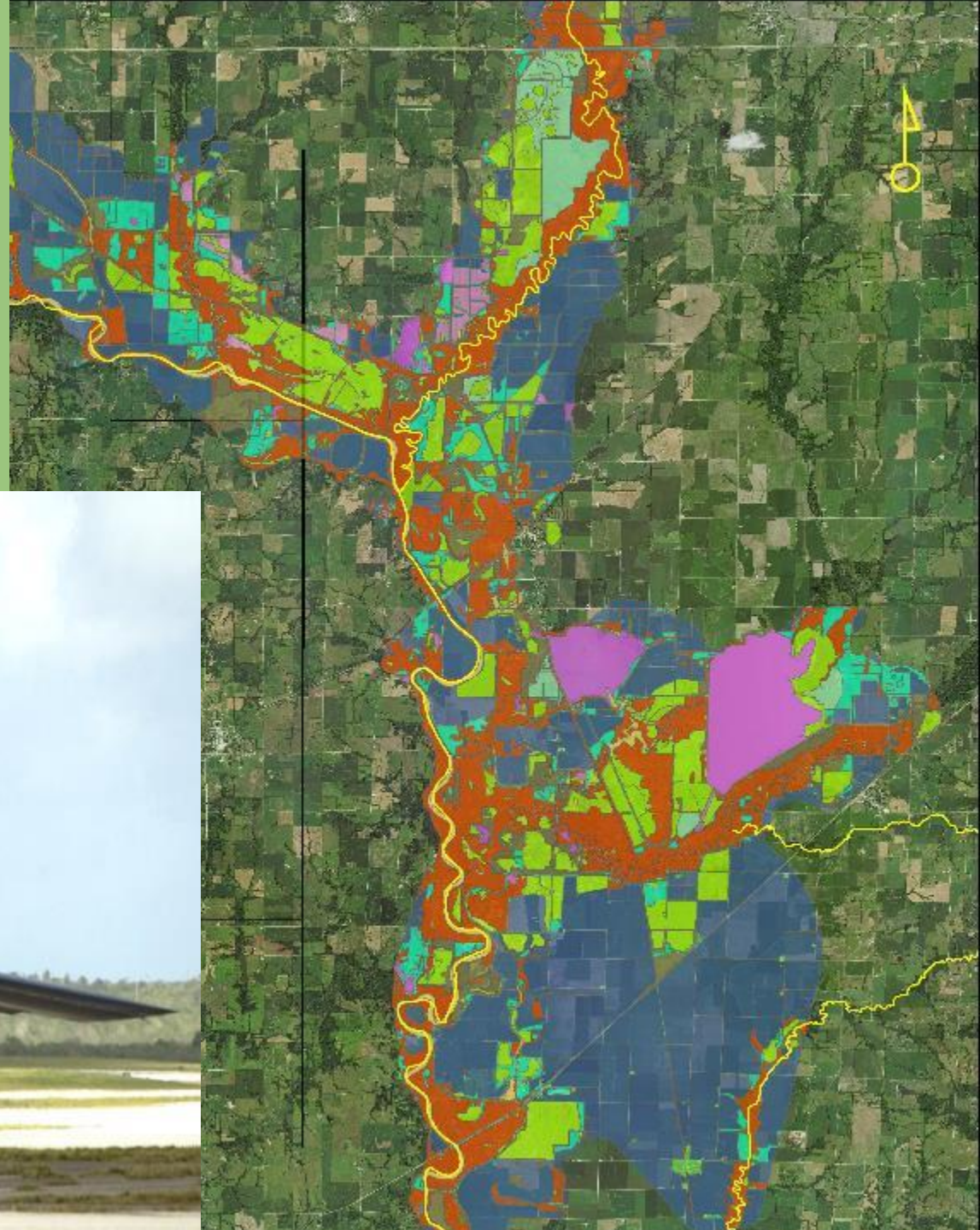
Assessing The Landscape at the Watershed Level Historical Conditions

- Old Soil Surveys
- General Land Office Records
- Ecological Site Descriptions
- Landowner Accounts
- Historic Maps



Assessing The Landscape at the Watershed Level--Existing Conditions

- What's out there?
- What's missing?



Has the Landscape Been Altered?

- Channelization
- Levees
- Drainage Ditches
- Land Leveling
- Railroads
- Highways
- Other Infrastructure/Uses





Conditions At the Project/Site Level

- Hydrology
- Soils
- Alterations: Drainage, Levees etc.
- Surrounding Land Uses
- Landowner Objectives

2013/09/25

Developing The Restoration Plan



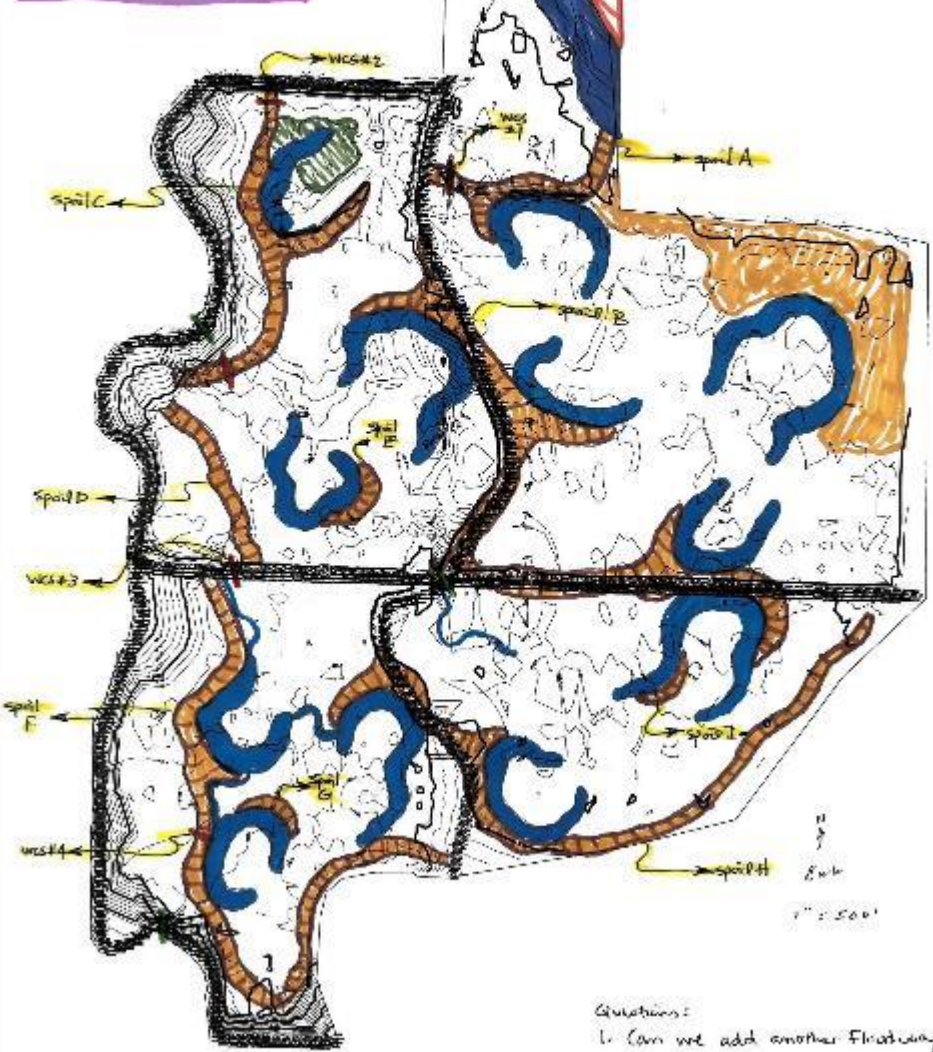


Developing the Restoration Plan—Objectives & Priorities

- **Restore site to historic conditions as much as possible**
- **Reintroduce landscape features/macro-topography to the site**
- **Do not “overpower” the existing topography—avoid “flood stage” wetlands**
- **Expand the floodplain where ever possible—levee takedowns**
- **Identify priority species and/or watershed priorities**
- **Don’t try to force a piece of land to do something it can’t**

Constraints & WCS/Prop
 Spoil A: Top Elev. 622.1
 Btl Slopes
 Spoil B-I: Top Elev. 622.6
 Btl Slopes
 WCS #1: 12" Agri Drain
 12" SDR 35 Pipe
 WL 623.0
 WCS#2: 12" Agri Drain
 12" SDR 35 Pipe
 WL 622.5
 WCS#3 & 4: Lets discuss

Vegetation Establishment	
	RPM Trees ac
	Wet Prairie ac
	Upland Prairie ac
	Pollinator Plat ac



Questions:
 1. Can we add another flowway
 2. Do we need to grade & slope spoils

Topographic Survey & Conceptual Design

Topographic Survey

- Typically done with survey grade GPS (Trimble)
- 50'x50' grid
- Pay attention to detail—ditches, etc
- A survey is only as good as the surveyor
- Is your canvas

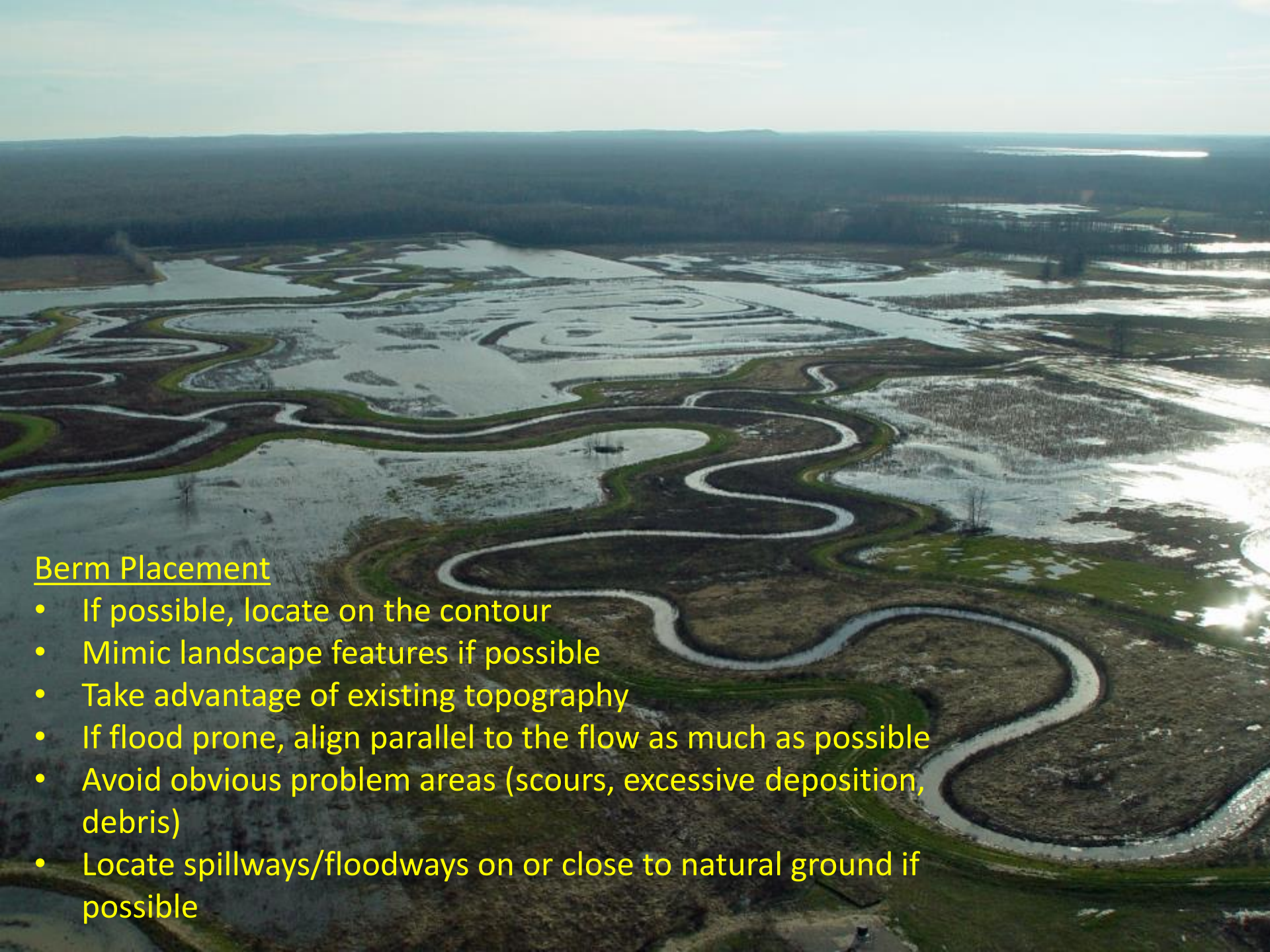
Conceptual Design

- ...is the Biologist/planner's vision of the best restoration options for a site
- Will serve as the road map the engineer/designer will use to complete the final design
- Includes berm type, placement of berms, berm elevation, water line/pool area, WCS locations, vegetation establishment, etc.



Determining the Waterline

- May be the most important decision
- What species are you targeting?
- Do not “over power” the topography—avoid “flood stage” wetlands
- Don’t be afraid to split hairs
- Recognize the importance of temporally flooded, saturated and terrestrial areas



Berm Placement

- If possible, locate on the contour
- Mimic landscape features if possible
- Take advantage of existing topography
- If flood prone, align parallel to the flow as much as possible
- Avoid obvious problem areas (scours, excessive deposition, debris)
- Locate spillways/floodways on or close to natural ground if possible

Final Design

- The end product, complete with cross sections, quantities, seeding specs, construction standards and specifications
- It will be important that the biologist/planner and engineer/designer continue to work together during the development of engineering plans



Restoration Practices



- Earthwork (spoils/berms)
- Creative Borrow
- WCS/pipe
- Floodplain expansion
- Existing Infrastructure
- Vegetation establishment

Spoils

- **Emulate natural stream levees or other high ground features**
- **Very flood friendly-virtually damage free**
- **Become living, breathing landscape features w/native vegetation**
- **Provide habitat as well as impoundment structures**



...spoils are more than just a habitat mound

- **Serve as wave barriers for critical infrastructure**
- **Used as interior plugs to create “sub-impoundments**
- **Playground for burrowing animals**

2013/05/28



Levees/Berms

- **Traditional style earthwork**
- **Should have minimum 15' top and 8:1 side slopes**
- **May be prone to damage**
- **Function is basically limited to impoundment structure—very little benefit as habitat—typically seeded to non-native grasses**
- **Despite the negative image, they still have their place**

Creative Borrow

An aerial photograph showing a large, irregularly shaped water body, likely a reservoir or a large pond, with a complex, winding internal channel system. The water body is surrounded by agricultural fields and a forested area. The water is a light blue-grey color, and the surrounding land is a mix of brown and green. The overall scene is a rural landscape with a large, man-made water feature.

- This is where we get our depth
- Shapes should mimic the watershed
- Needs and soils will determine depth of cut
- Incorporate islands, basking logs etc.

More Things to Consider on Creative Borrow

- **On site verification of soils**
- **Balance your cuts and fills**
- **Encourage the contractor to haul and not push**
- **Remember, the borrow is a design feature, not just a hole or source of dirt**





WCS

- Inline
- Manhole
- “Ender”
- Slide gate



Floodplain Expansion & Levee Takedowns

Why? Because in riverine systems, floodwaters are often times the life blood of floodplain wetlands

A couple things to think about...

- **Locate in backwater flooding situations-- avoid headwater flooding**
- **Size according to the stream—they cannot be too wide. Tailwater will cause the most damage**
- **If possible, locate on natural ground to avoid over fall**
- **Undesirable flood born seed**
- **Debris—woody, appliances, other trash**

2013/05/28

Existing Infrastructure

- Be cautious of using existing levees
- Often times in bad shape-trees, slides other sore spots
- Subject to wave wash and subsequent animal damage
- Construction methods may have been somewhat dubious
- Meant to keep short term water out, not long term water in
- Existing Easements?

A photograph showing a grassy bank on the left side of a body of water. A tree with white blossoms is leaning over the water from the bank. The water is dark blue and reflects the sky. In the foreground, there are some green leaves and a fallen branch.

If you must use...

- Consider constructing a bench
- Consider grading and shaping

Vegetation Establishment

- Wet Prairie—Mulch
- Wet Prairie—Plugs
- Tree Planting
- Natural Regeneration



The Mighty Mallard



WATER QUALITY
BIOLOGICAL DIVERSITY
FLOOD STORAGE
TIMBER PRODUCTION
RECREATION
ESTHETIC QUALITY
OTHER FUNCTIONS



Oh, man ... don't hit me with them negative waves.

NEGATIVE WAVES

Don't hit me with them.

The End

