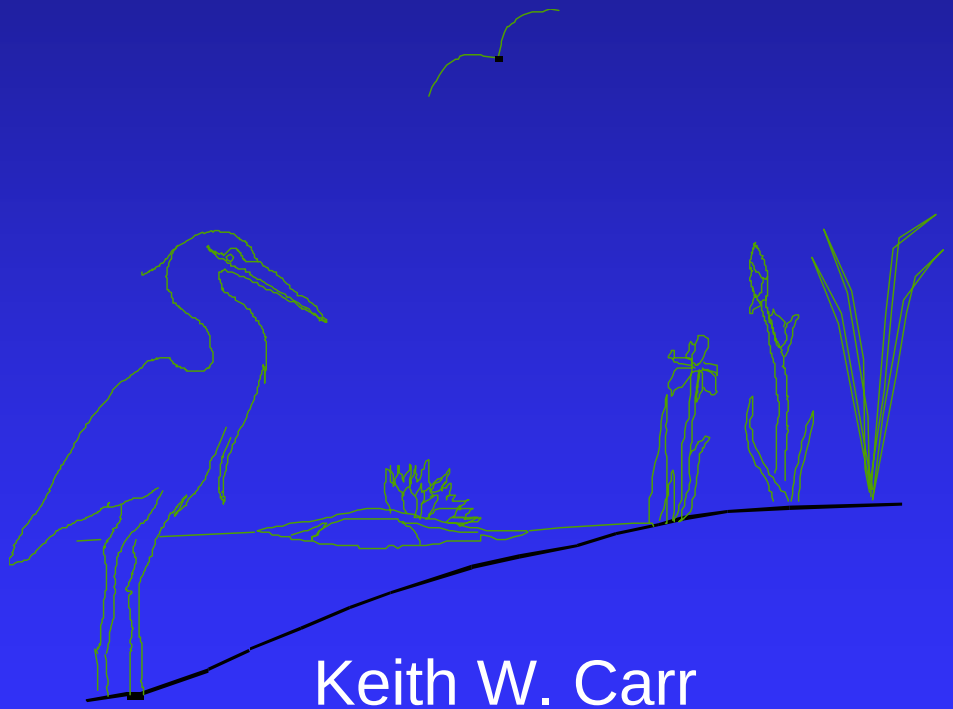
HYDROGEOLOGIC MONITORING OF AN ILLINOIS RIVER FLOODPLAIN WETLAND



Keith W. Carr
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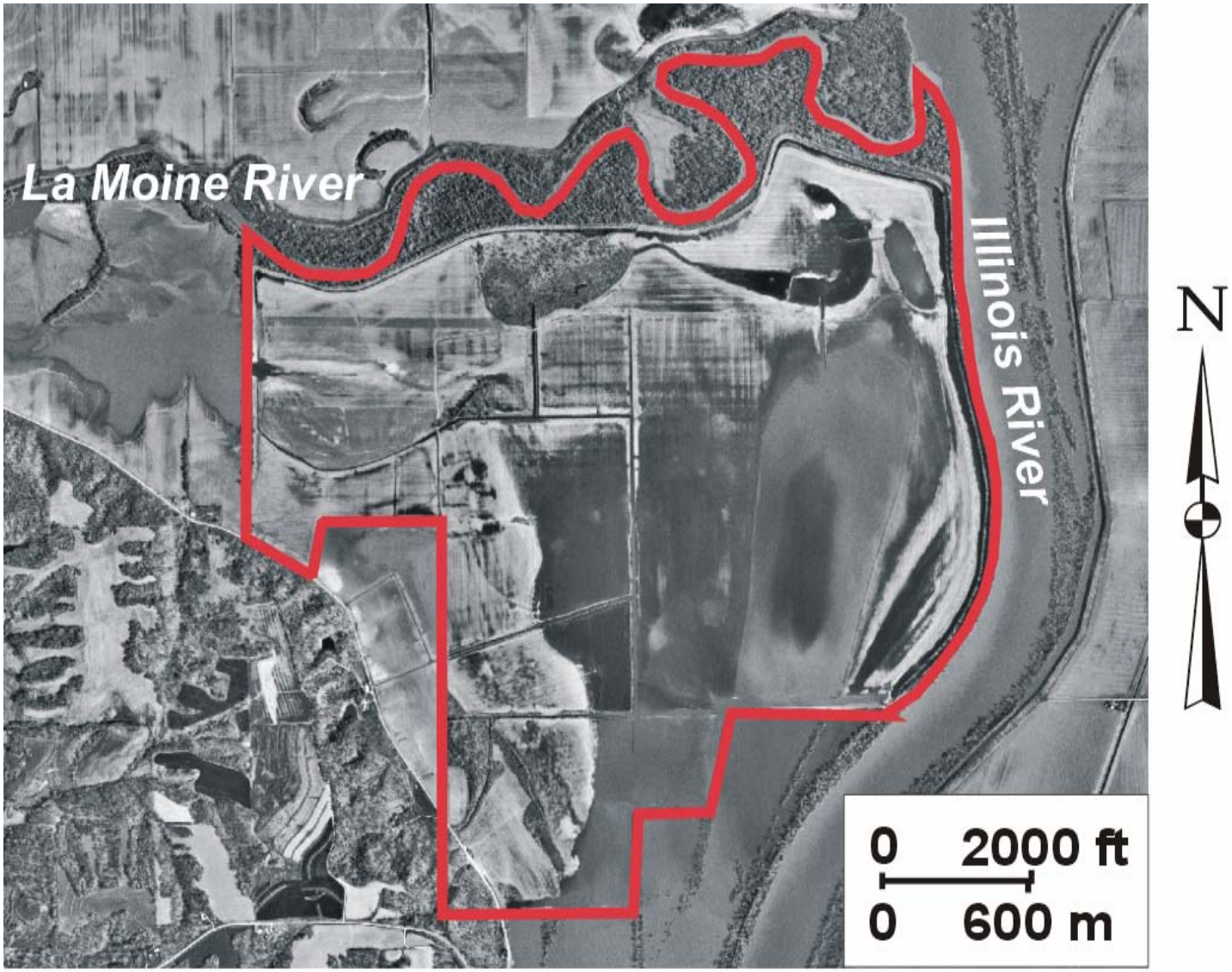


(4/14/98 NAPP photo)

site boundary

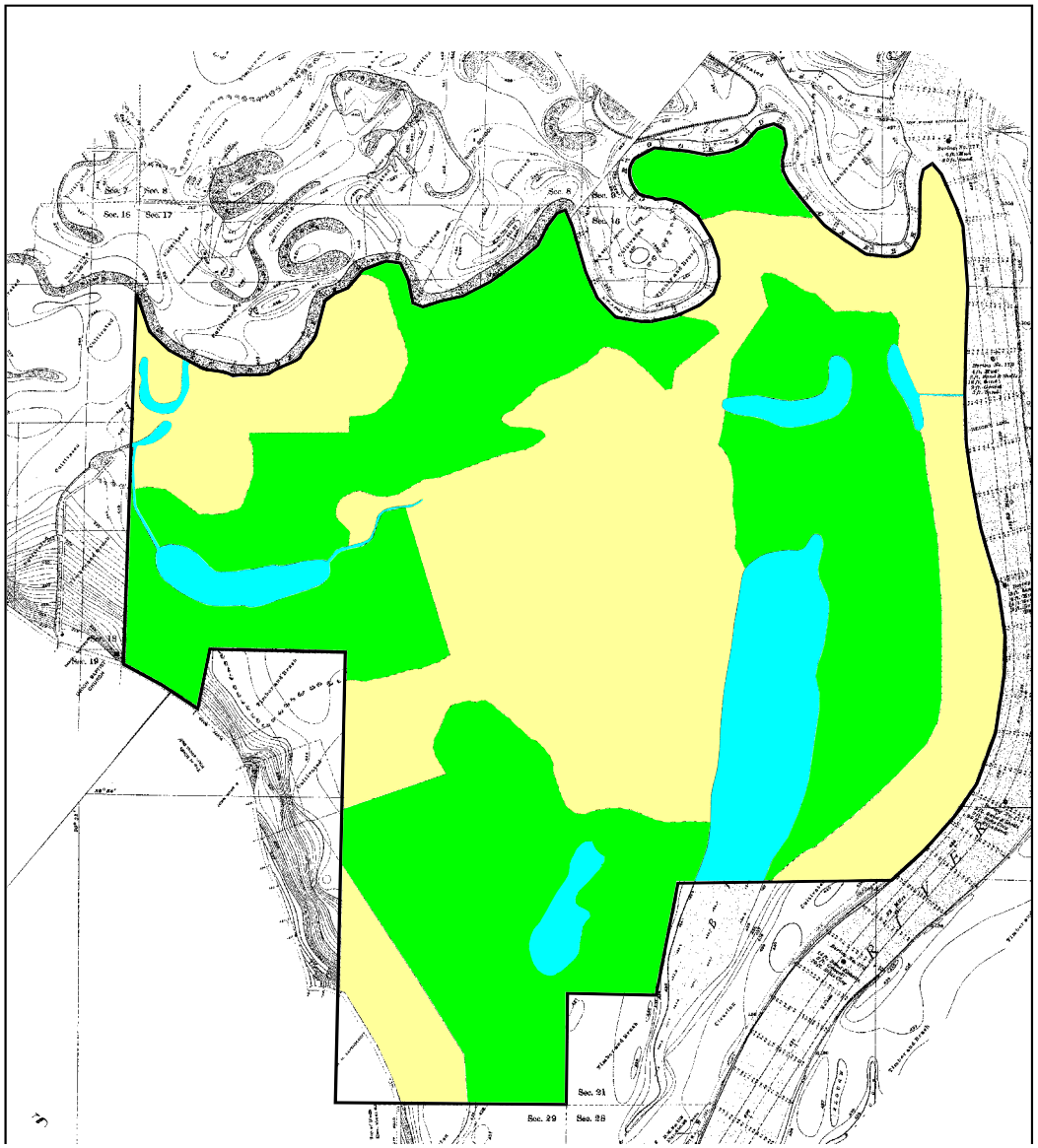
THE SITE

- 1645 acres of agricultural bottomland bordered by levees and a (~150 ft) bluff
- at confluence of the Illinois and LaMoine Rivers near LaGrange in Brown County, Illinois
- in agricultural use since early 1900s

WOERMANN MAP (1902-1904)

Color Key:

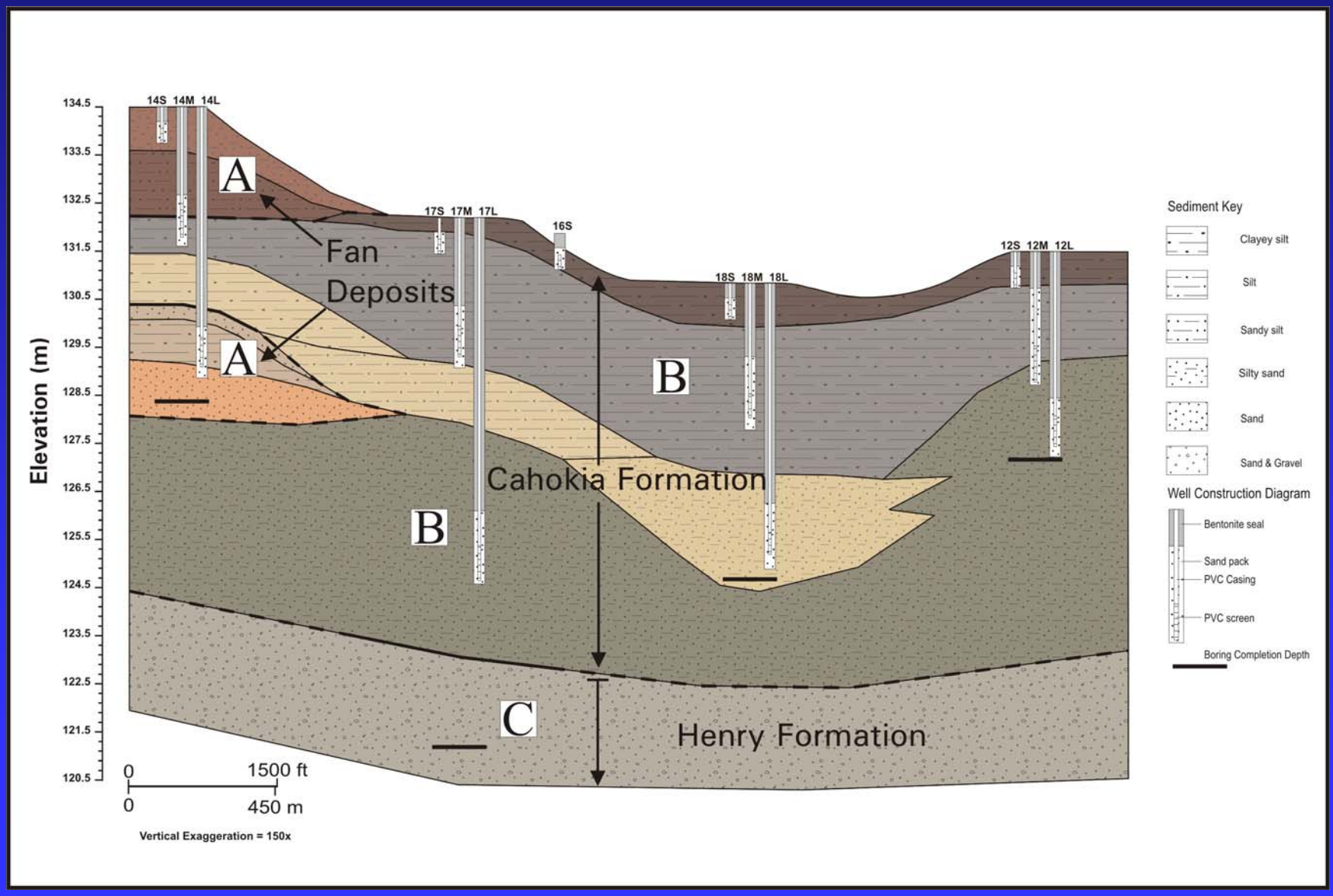
- Cultivated Lands
- Timber/Brush
- Open Water



SITE GEOLOGY

- ~20 feet (of recent) poorly sorted sand, silt, and clay alluvium over glaciofluvial sands and gravels
- slightly coarser alluvial fan deposits along the southwest bluff margin

GEOLOGIC CROSS-SECTION



ISGS ROLE

1. initial site assessment
2. pre-construction monitoring of surface water and ground water
3. aid in developing the wetland banking instrument (a 15-year plan)
4. annual monitoring of wetland hydrology (INHS monitors plants)

PROJECT INITIATION - 1999

- ISGS and INHS inspected the site

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- ISGS and INHS inspected the site
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- IDOT purchased the 1645 acre site to develop a wetland bank

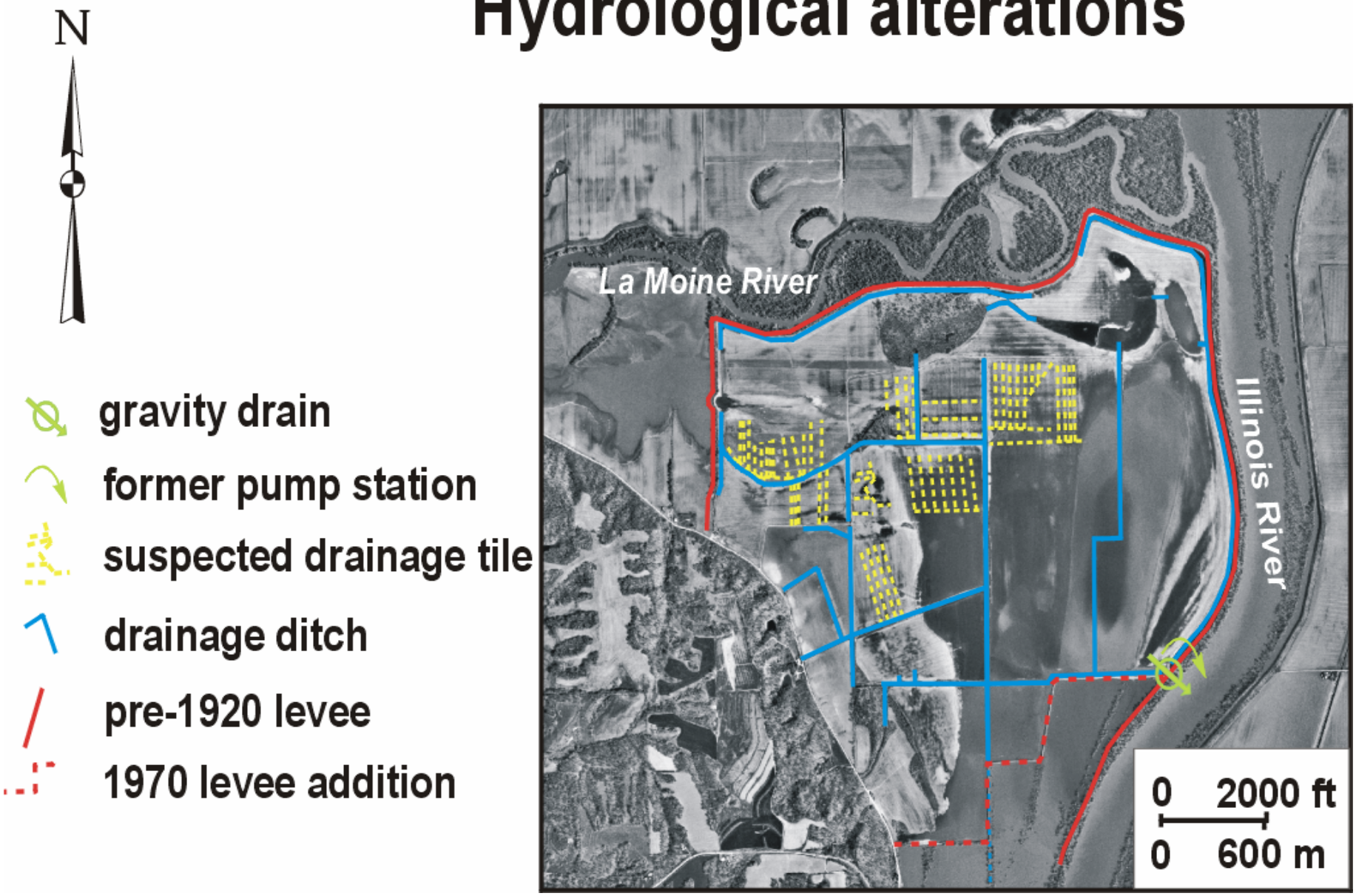
HIGH POTENTIAL FOR WETLAND RESTORATION ?

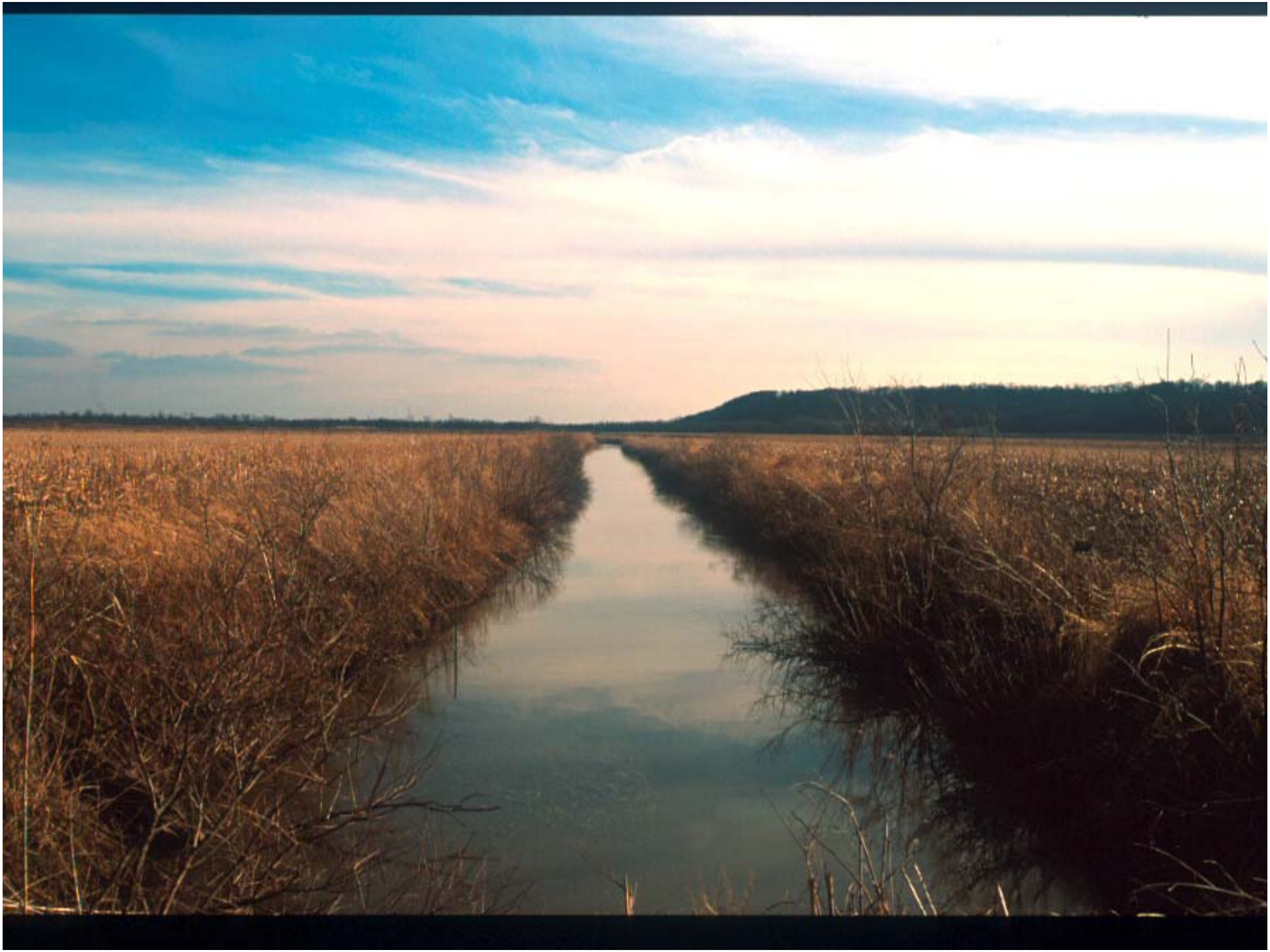
1. reversible hydrologic alterations

HYDROLOGIC ALTERATIONS

- levees (since 1917-18)
- agricultural drain tile
- ditch network
- gravity drain and pump station

Hydrological alterations





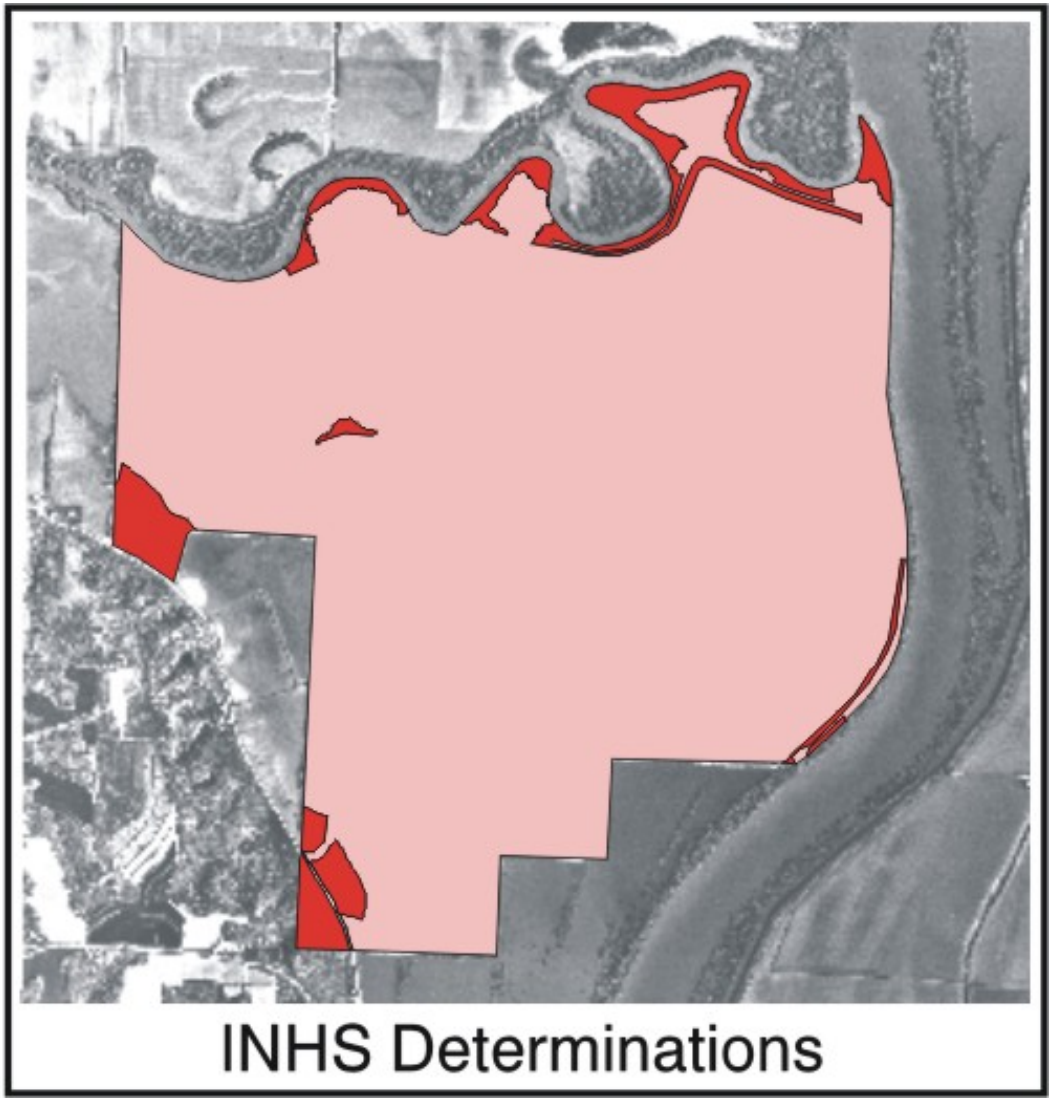
HIGH POTENTIAL FOR WETLAND RESTORATION ?

1. reversible hydrologic alterations

2. hydric soil over 94% of the site (INHS)

hydric soil

non-hydric soil

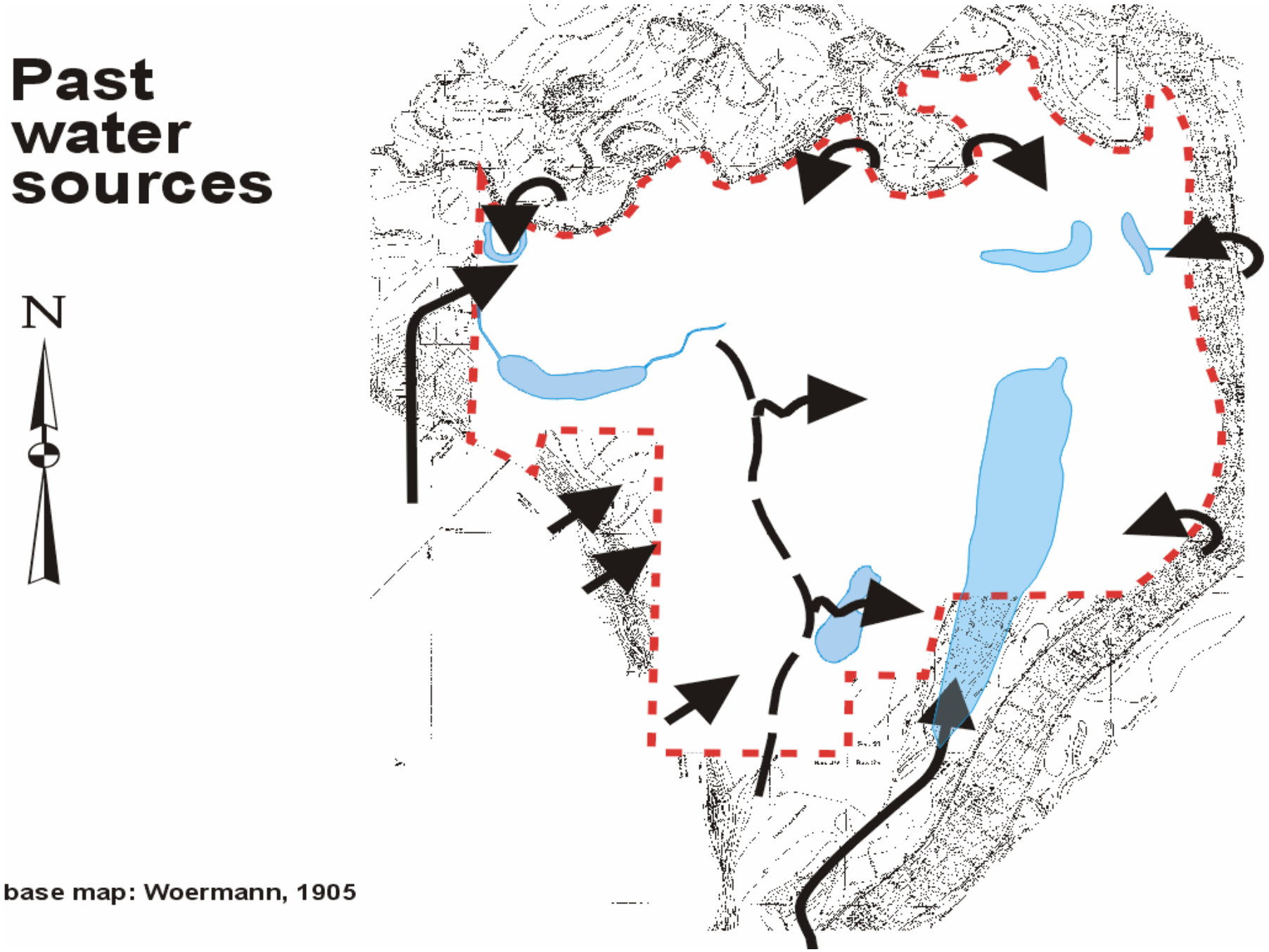


INHS Determinations

HIGH POTENTIAL FOR WETLAND RESTORATION ?

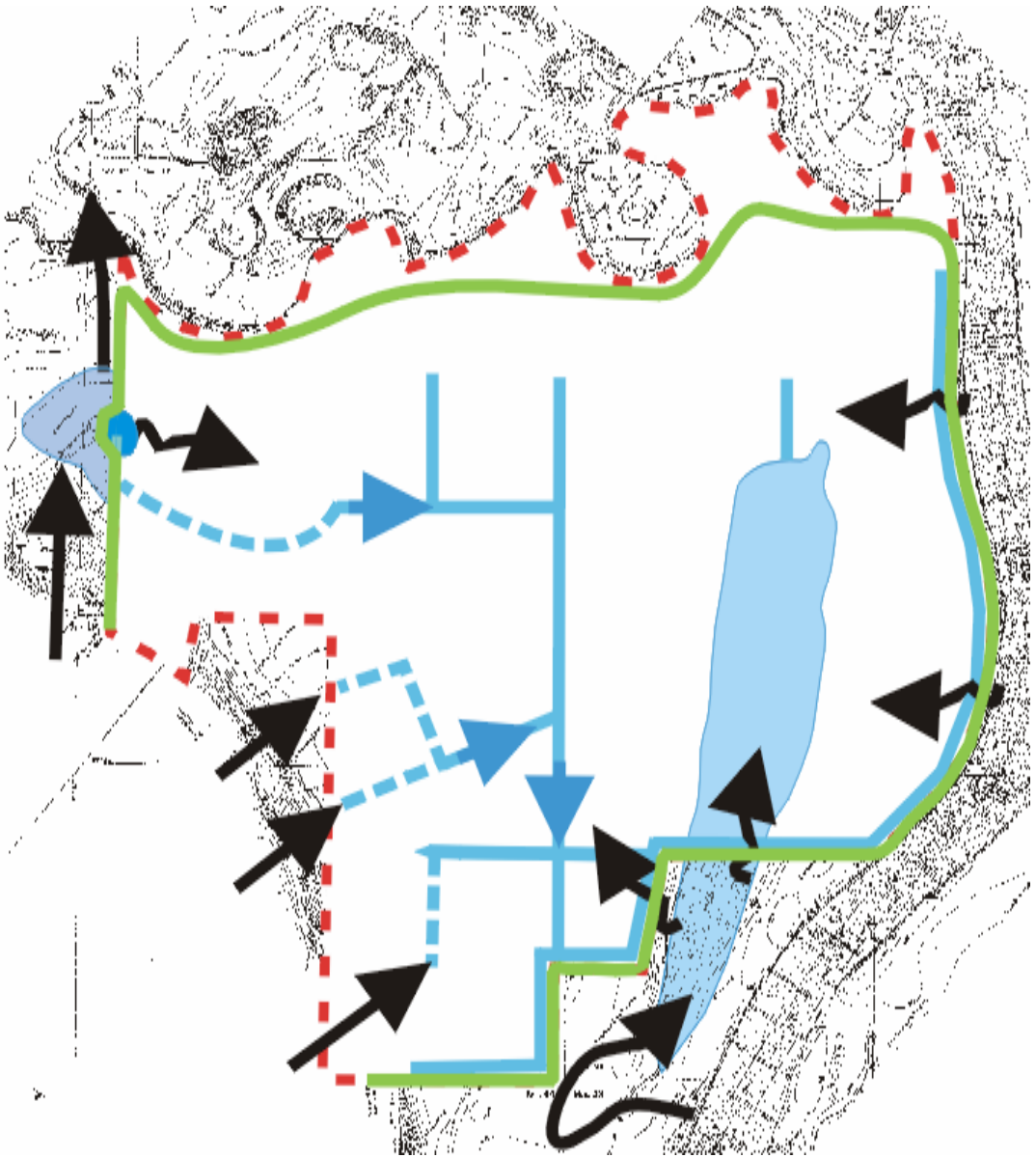
1. reversible hydrologic alterations
2. hydric soil over 94% of the site (INHS)
3. multiple water sources

Past water sources



base map: Woermann, 1905

Present water sources



AIMS OF THE PROJECT

- maximize acreage of wetlands restored
- re-create mix of various types of wetland: floodplain forest, marsh, wet meadow
- control costs and minimize long-term maintenance requirements

THREE STRATEGIES CONSIDERED

1. total isolation from the river
   (not enough water to supply wetlands)

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2. engineered connection to river
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3. open to the river at chosen elevation
   (natural levee degradation)

OPEN TO RIVER
- ADVANTAGES

1. sediment-nutrient-pollutant removal from river

2. backwater habitat – river fauna

3. off-line floodwater storage...and dry-down potential (critical for healthy wetlands)

OPEN TO RIVER - DISADVANTAGES

1. excessive sedimentation and possible scour
2. weedy tree species and exotics
3. carp and other coarse fish

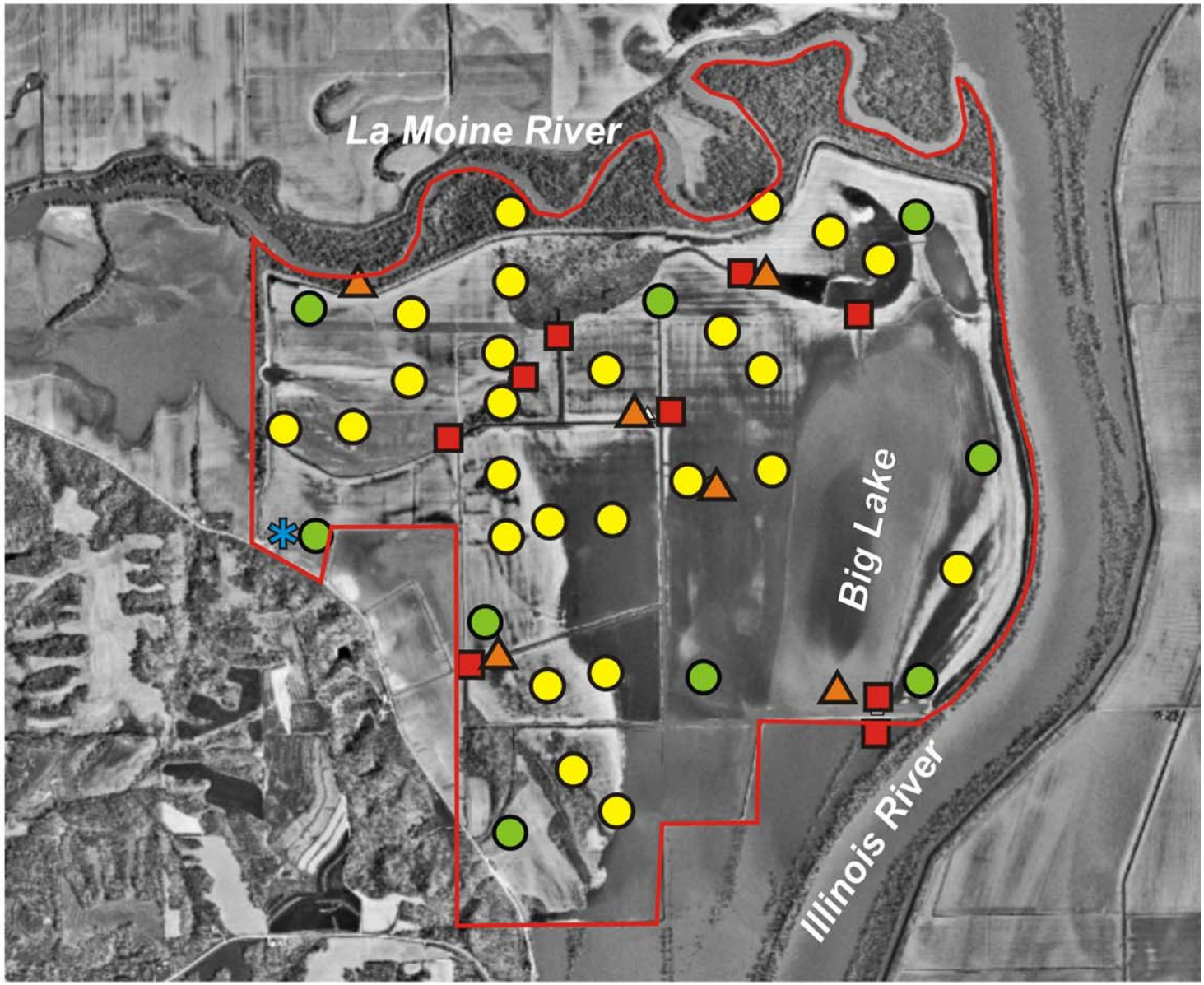
INSTRUMENTATION NETWORK

1. deep monitoring wells (9 nests)
2. shallow soil-zone wells (25 additional locations)
3. ground water dataloggers (2)
4. surface water dataloggers and staff gauges (11 locations)

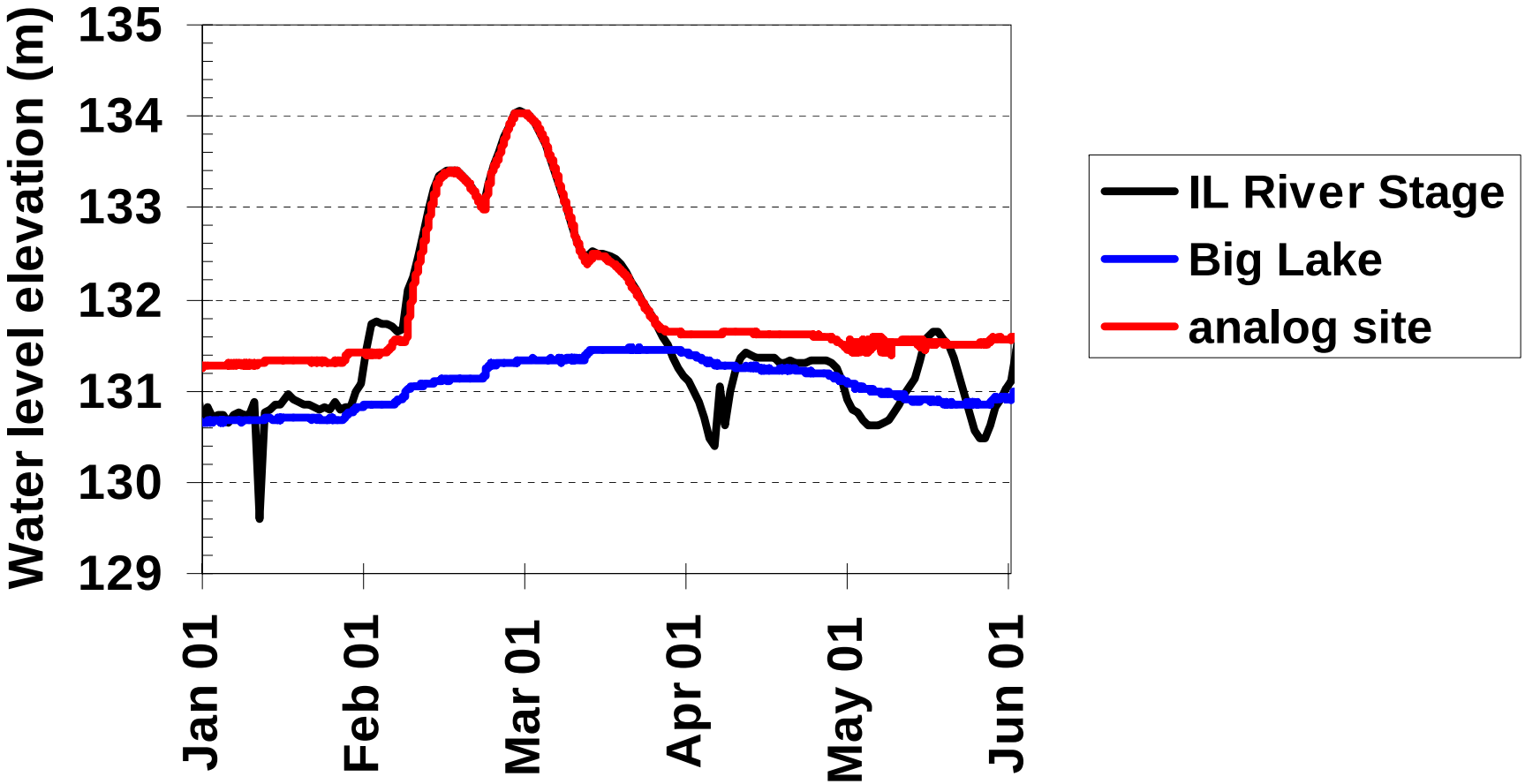

RANGER

Locations of ISGS monitoring equipment

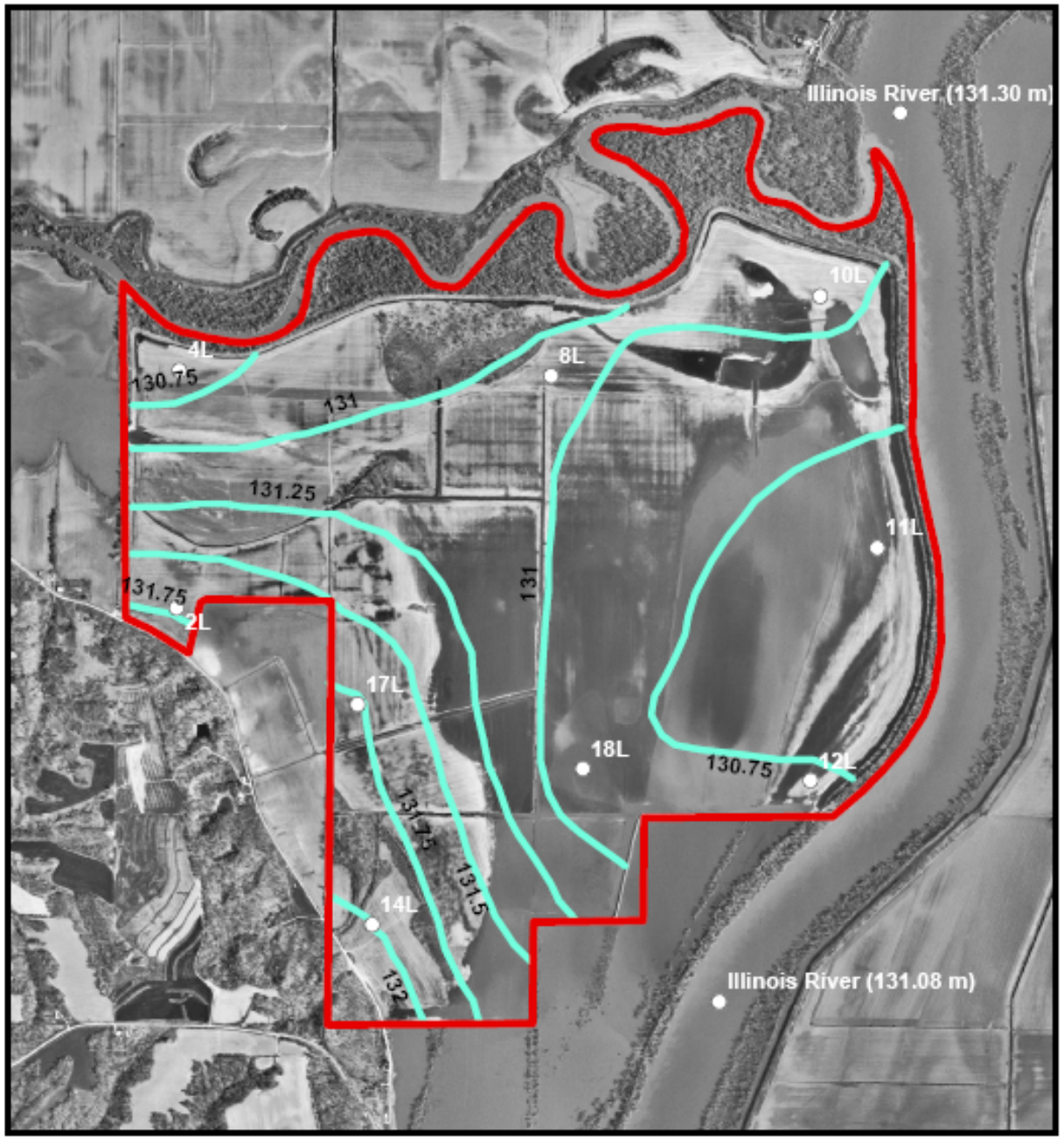
- nested wells
- soil-zone well
- stage gauge
- rain gauge
- data loggers (various types)



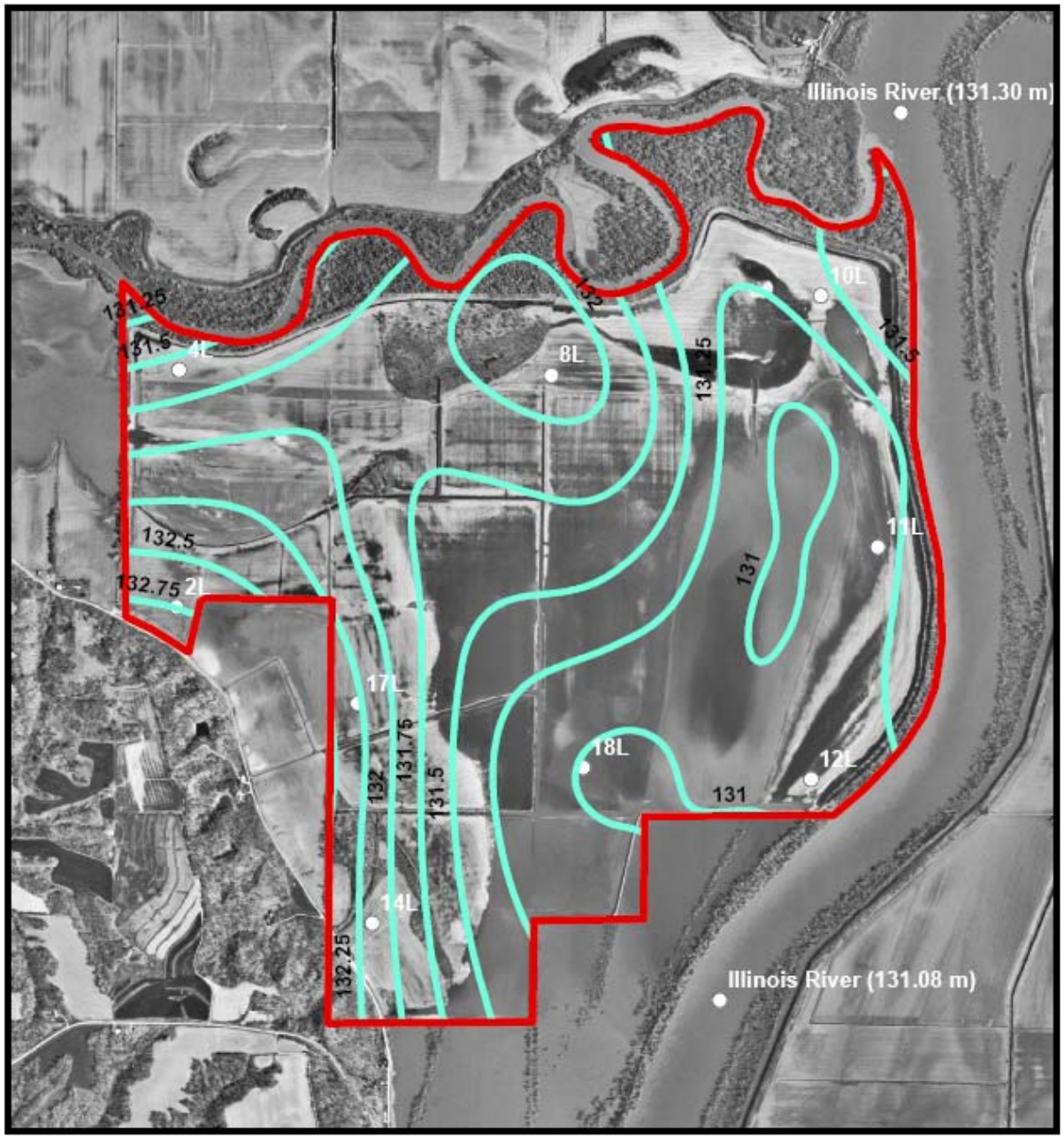
Comparative water levels (2001)



Deep Ground Water Contours



Shallow Ground Water Contours



SITE DEVELOPMENT PLAN

1. remove or reverse hydrologic alterations

2. re-establish more native wetland vegetation and multiple types of wetland environment

3. use monitoring and flood frequency data to plan the re-introduction of the river

RIVER HAD OTHER PLANS?

2002 FLOOD AND LEVEE BREACH

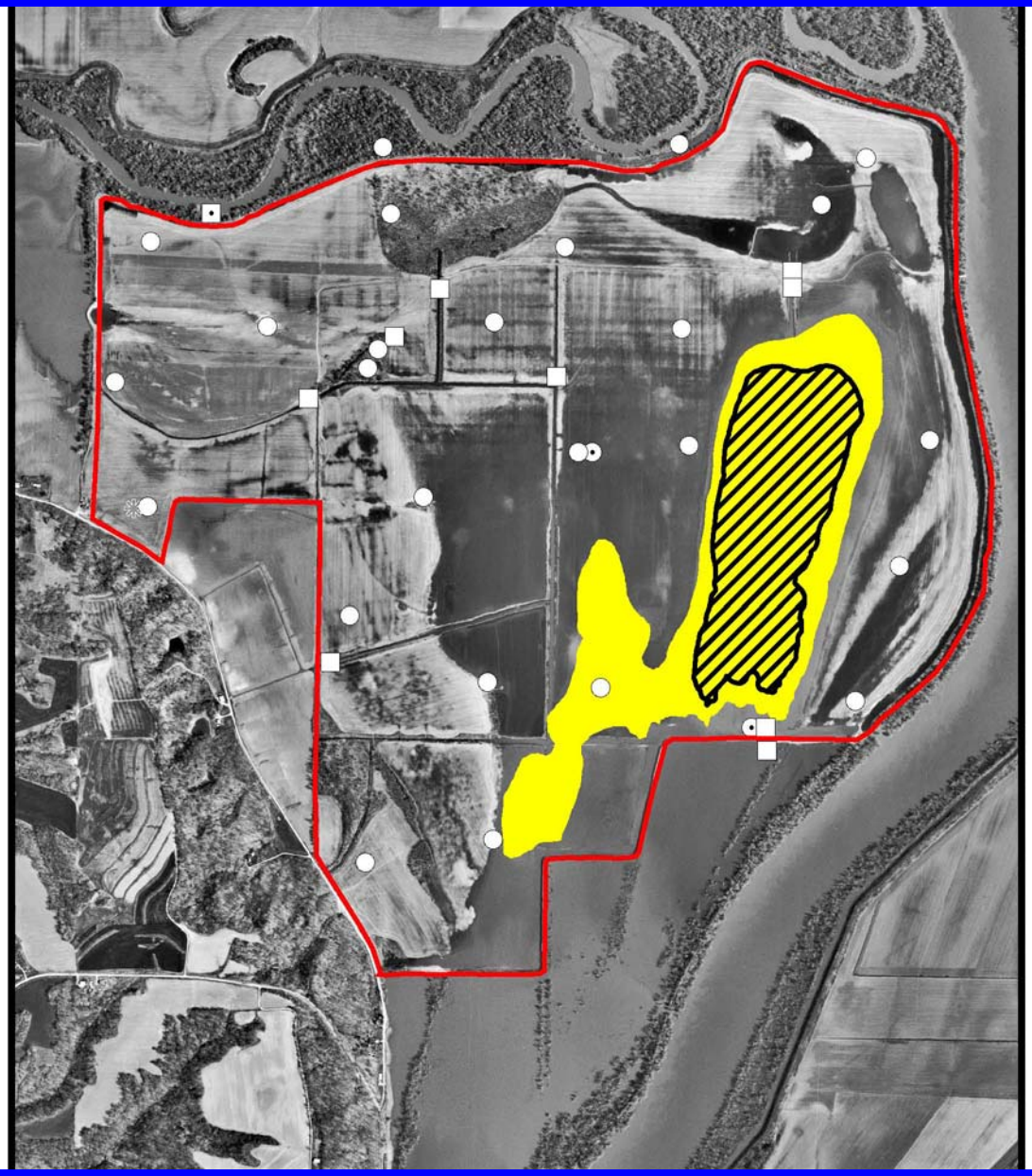
- south levee breach – over 100 feet wide
- similar breach in west levee
- this event alone provided over 11,200 acre feet of storage for up to 45 days

GOING FORWARD

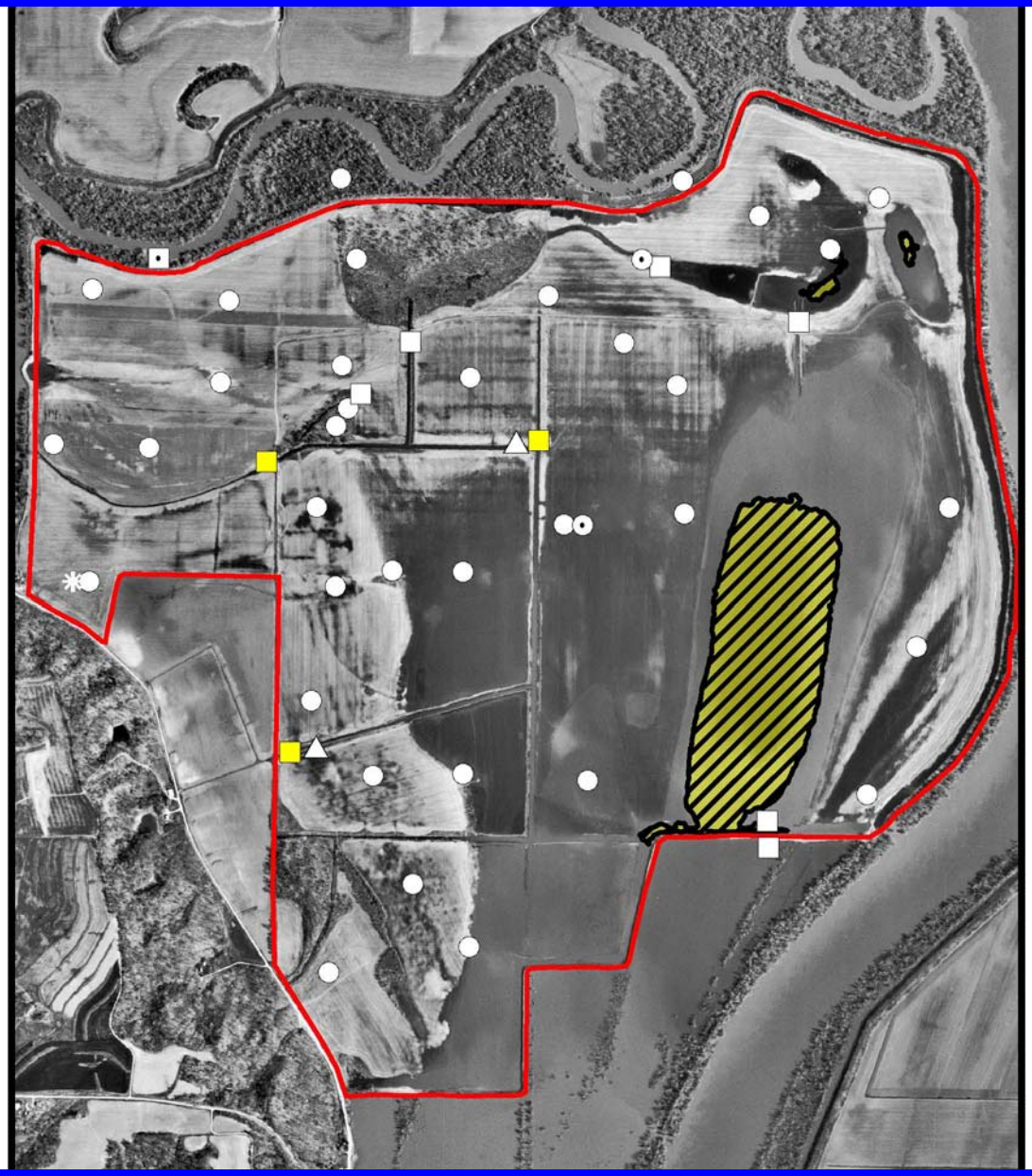
1. monitor wetland hydrology

2004

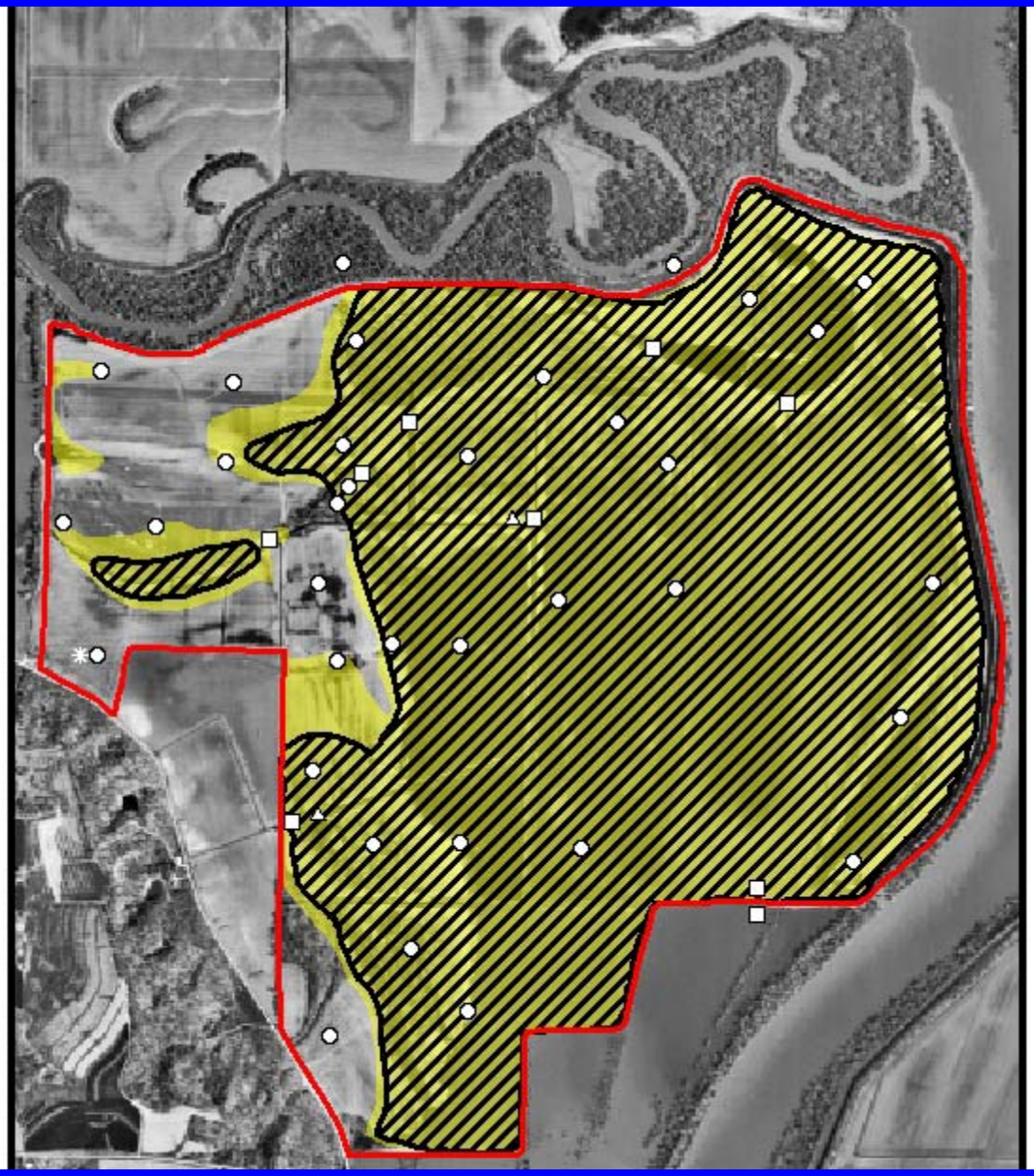
2005



2006



2007

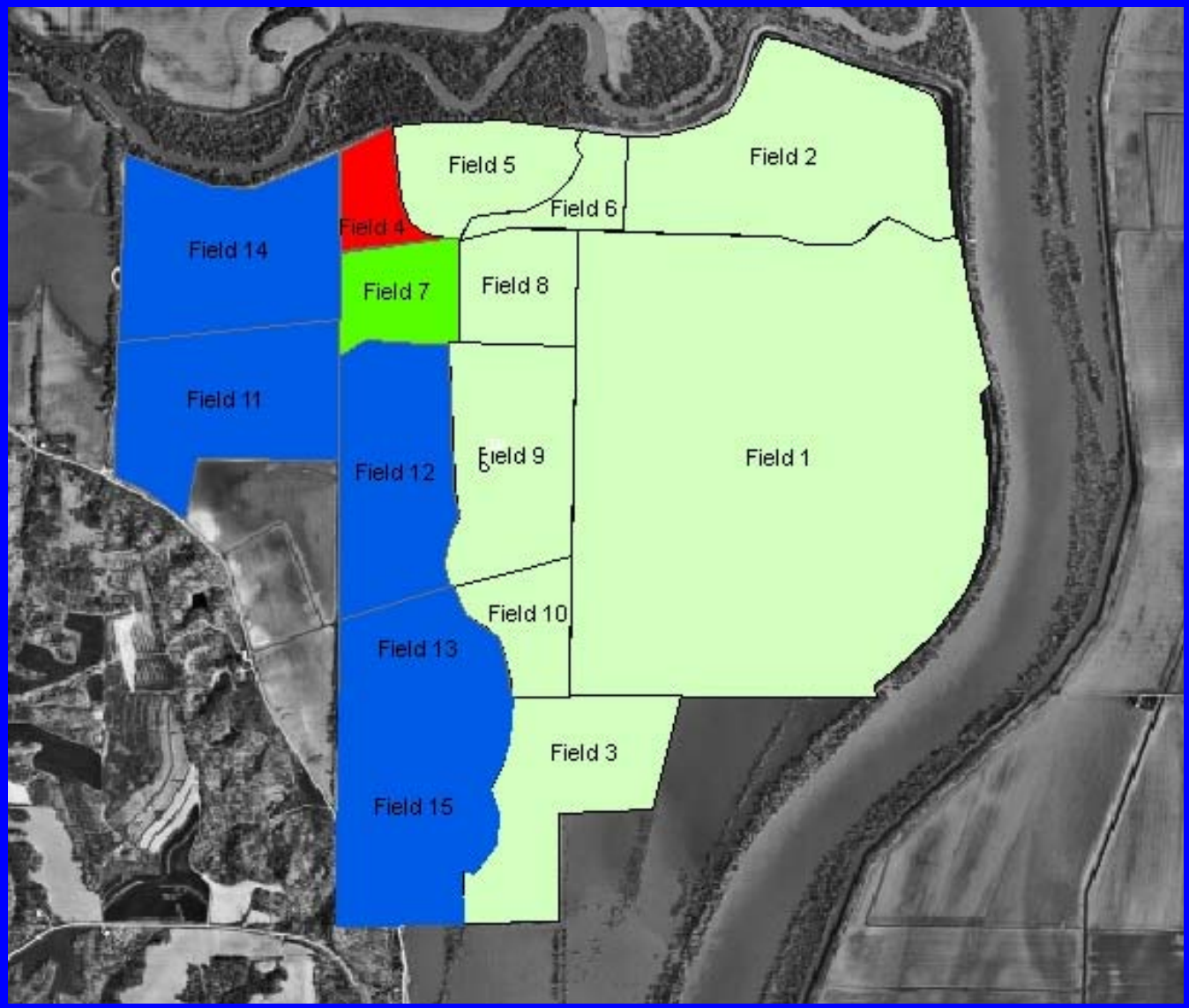


GOING FORWARD

1. monitor wetland hydrology

2. continue filling ditches, removing drain tile, and planting trees

FIELD BOUNDARIES



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1. monitor wetland hydrology
2. continue filling ditches, removing drain tile, and planting trees
3. disasters? – adaptive management

SO FAR SO GOOD..

- south levee sill is at a good elevation to let in the 1-2 year annual flood
- it keeps out the smaller, more routine floods (multiple events per year)
- it allows slower water equalizations which reduces scour

SO FAR SO GOOD..

- dry-down in 2005-2006 consolidated lake sediments, reduced turbidity, and re-established aquatic vegetation
- sedimentation and undesirable plant colonization minimal – we are monitoring this along with INHS

SO FAR SO GOOD..

- plant succession proceeding in the marsh areas, we have the listed Decurrent False Aster on site
- use of the site by state listed short-eared owls – direct result of the floodwater rise

SO FAR SO GOOD..

- 2007 winter and spring flooding caused some damage to planted trees
- but damage was found to be minimal and the trees were righted at a reasonable cost
- INHS puts tree survivorship at 87%

Study funded by the Illinois Department of Transportation

ILLINOIS DEPARTMENT OF NATURAL RESOURCES

ISGS Illinois State Geological Survey