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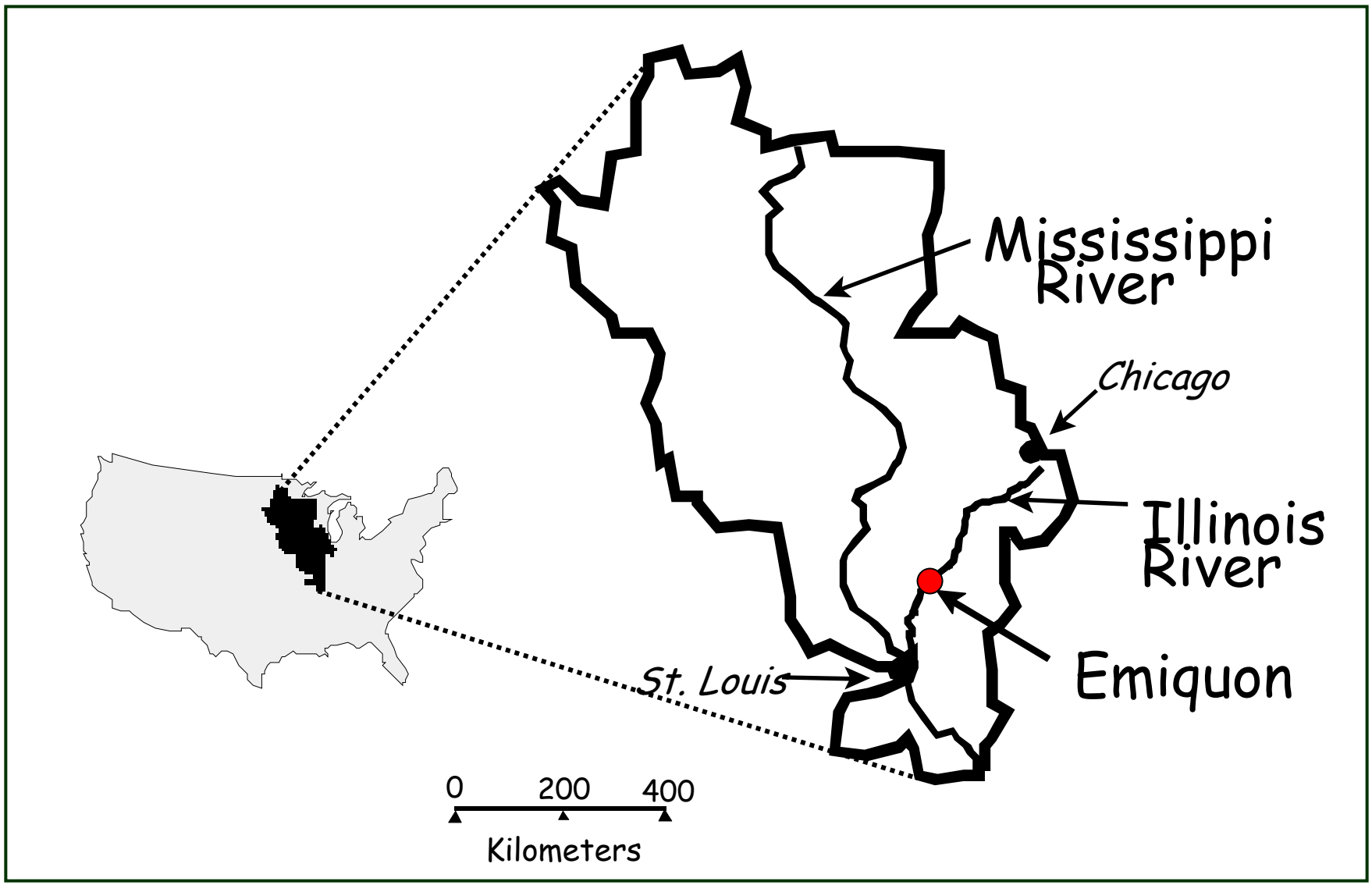
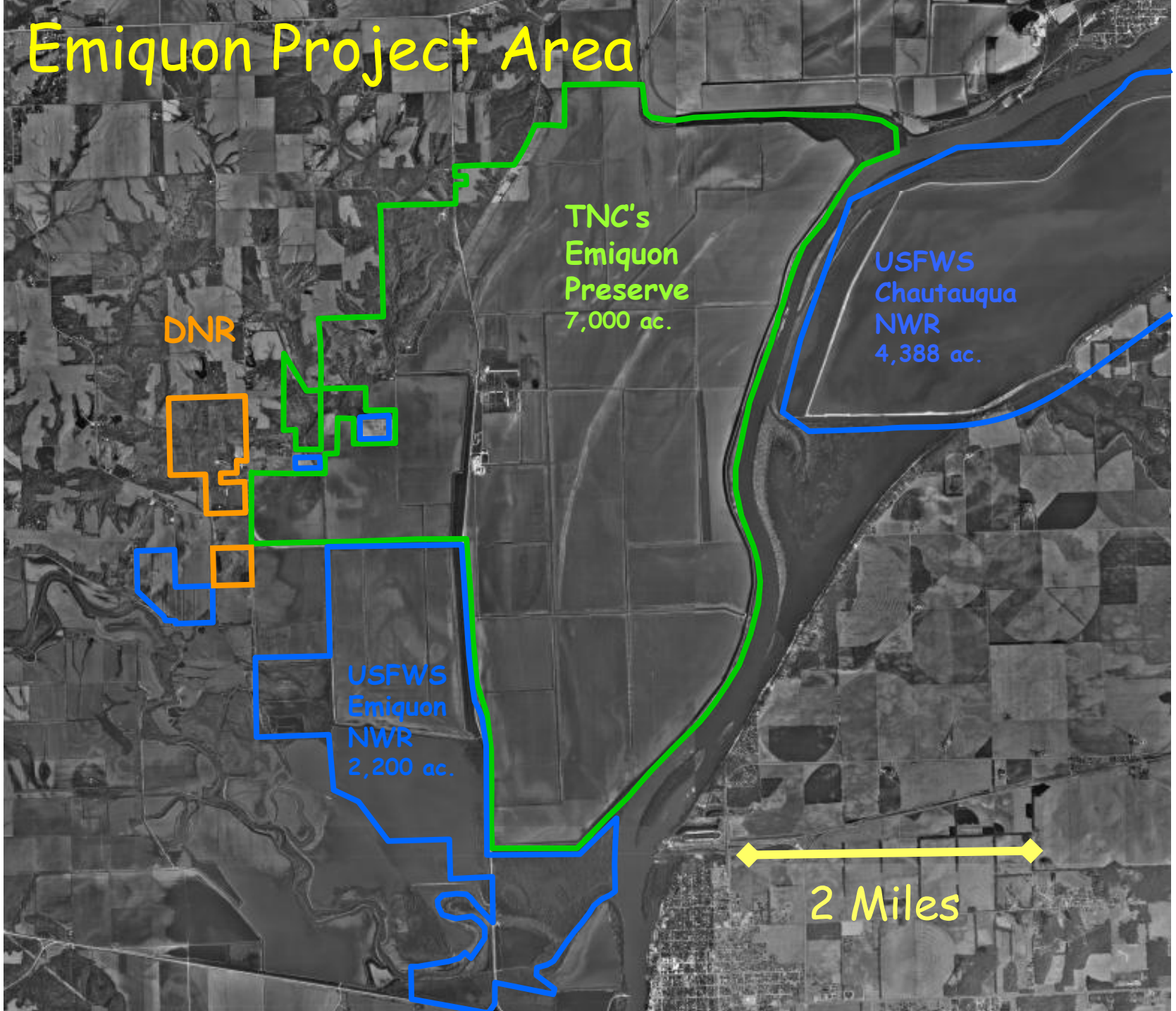
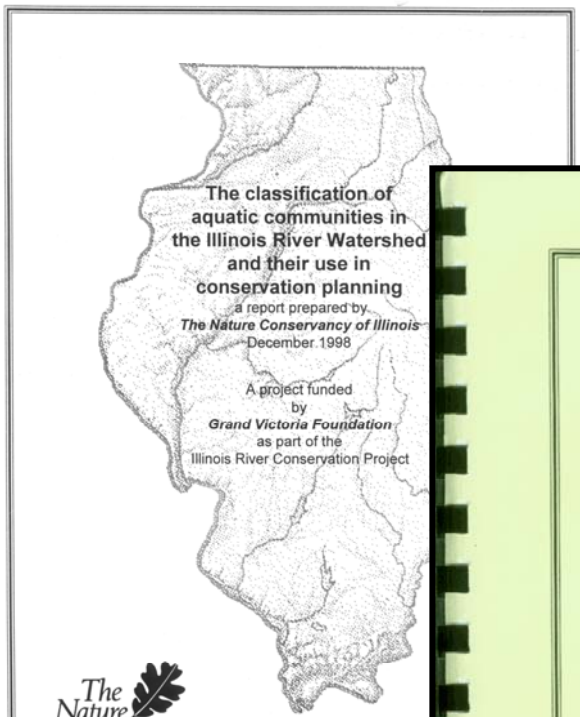
Use of Monitoring Instrumentation to Assist Management of an Illinois River Floodplain Restoration Site

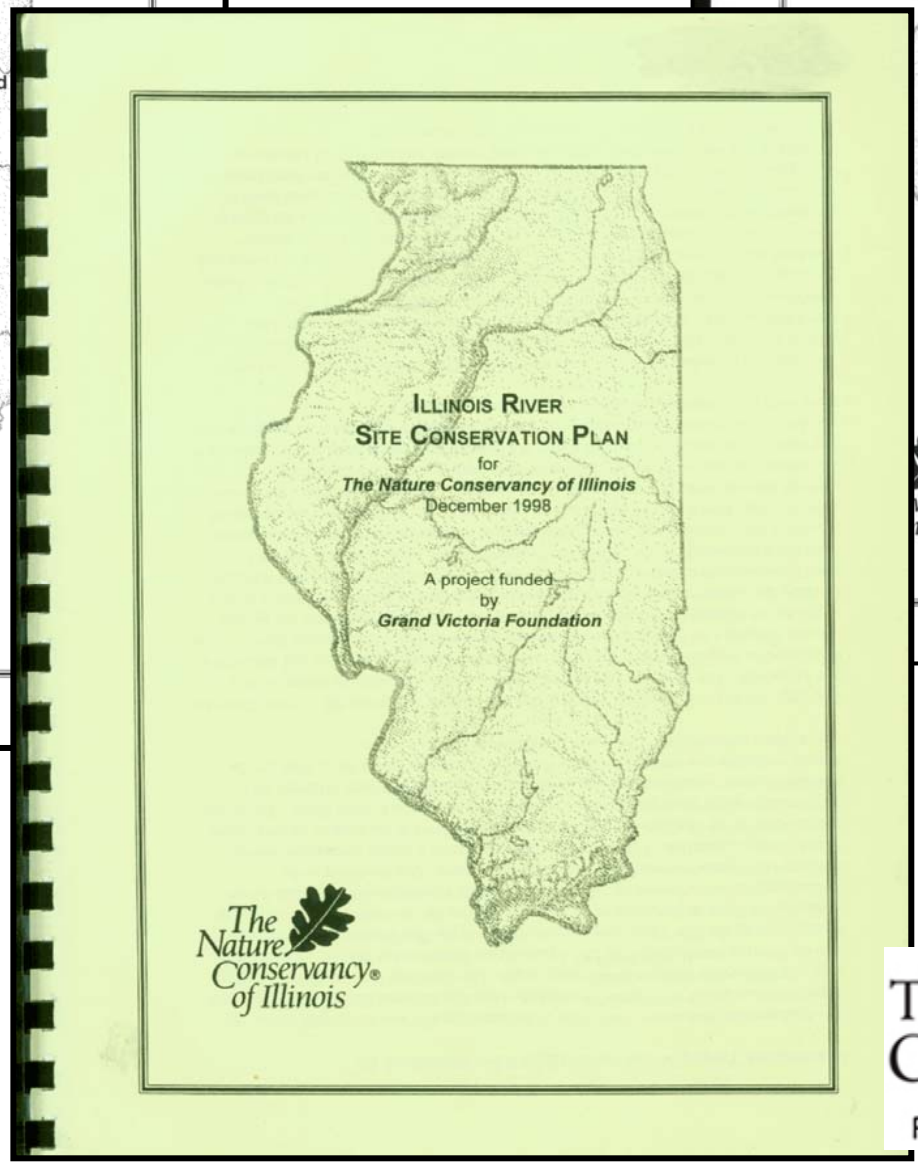
A.M. Lemke, J.R. Herkert, K.D. Blodgett,
T. Hobson, M.J. Lemke, T. Guinan

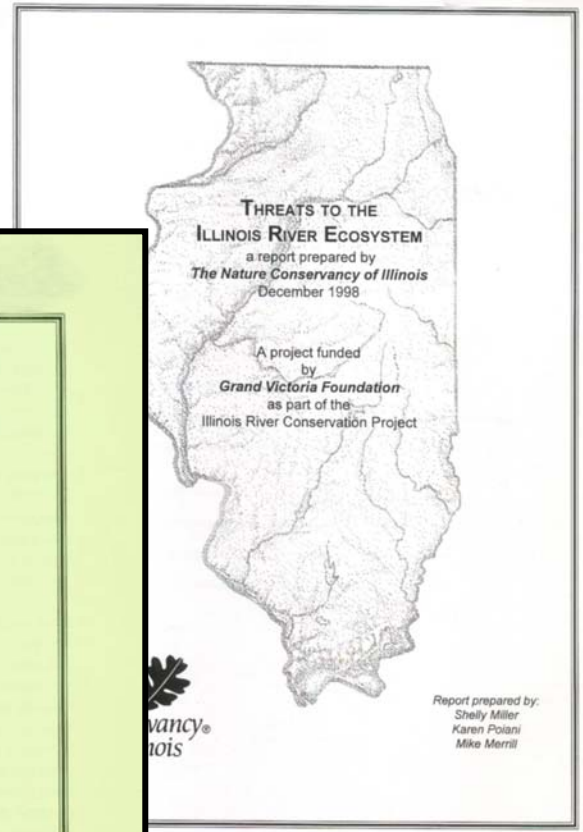
Floodplain Restoration at Emiquon




Emiquon Project Area
TNC's
Emiquon
Preserve
7,000 ac.
USFWS
Chautauqua
NWR
4,388 ac.
DNR
USFWS
Emiquon
NWR
2,200 ac.
2 Miles







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Illinois River Conservation Goals

December 1998

Reconnect an additional 25% of the historic floodplain to the river to provide additional habitat for *Boltonia decurrens*, large river floodplain communities, fish spawning, and fish feeding.

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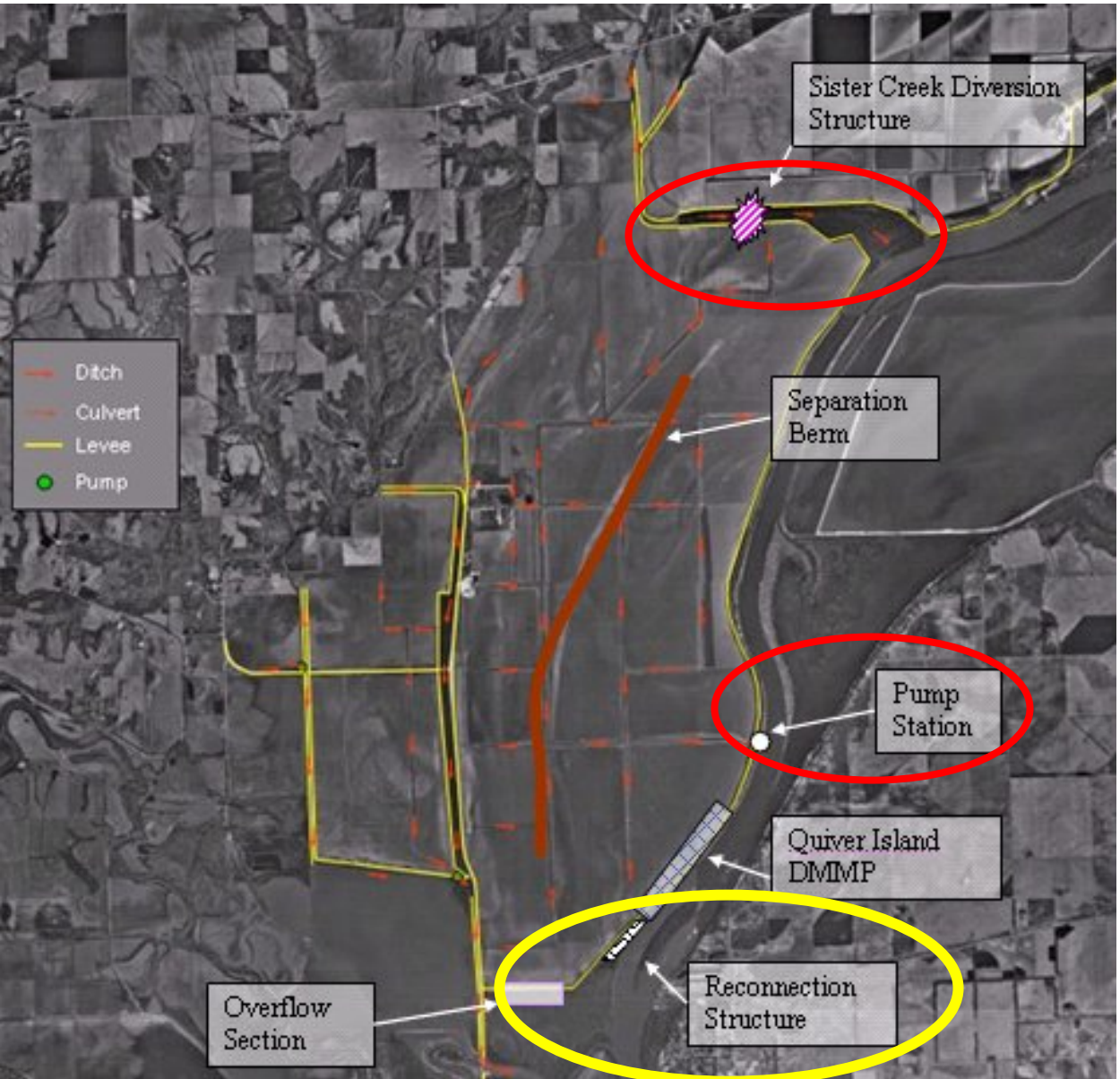
Emiquon - COE 206 Project

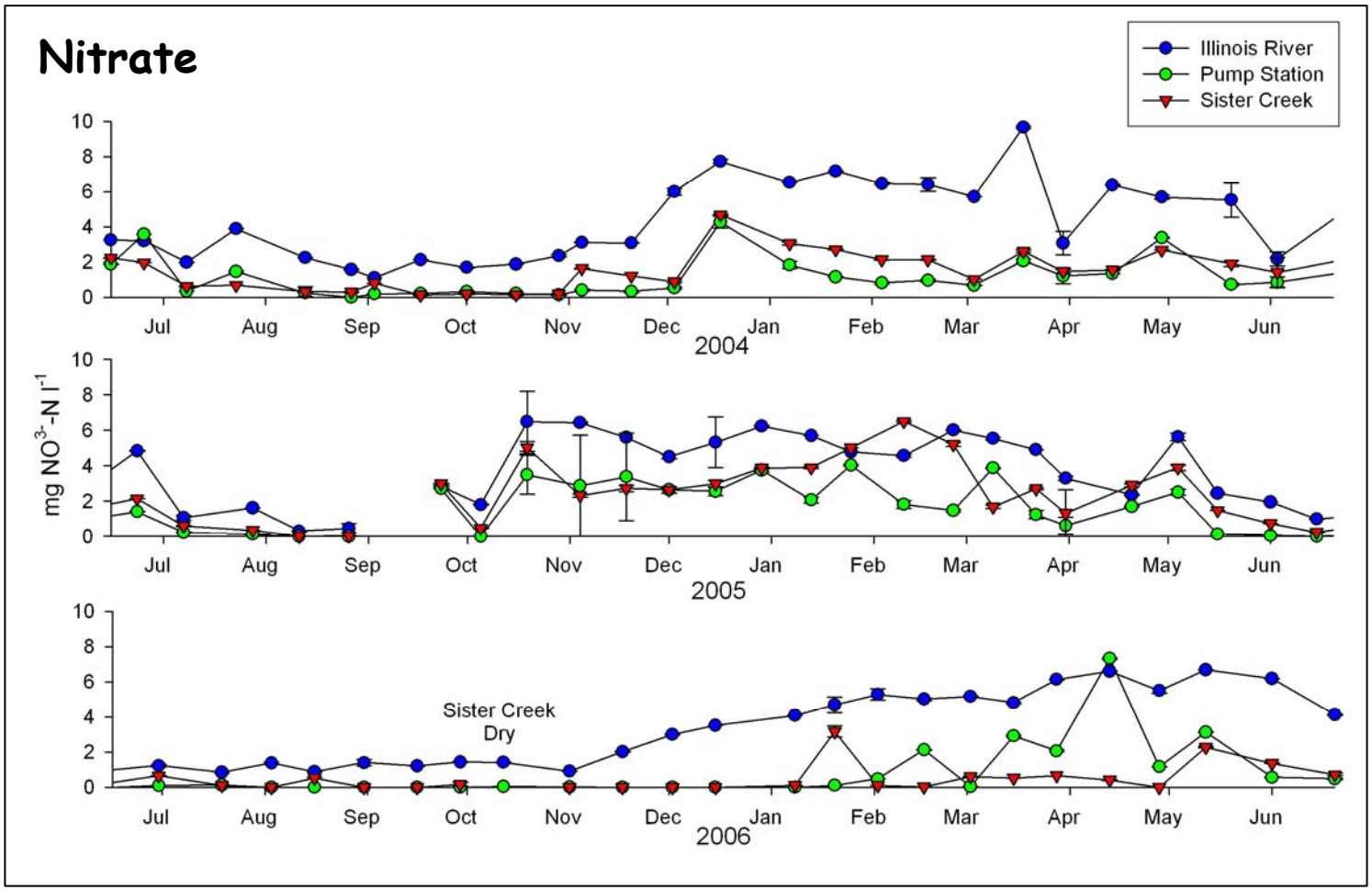


- 5,400 acres of floodplain restoration
- Reconnection "gate" structure in mainline levee
- A weir and water intake structure for Sister Creek
- Hardened overflow section of levee

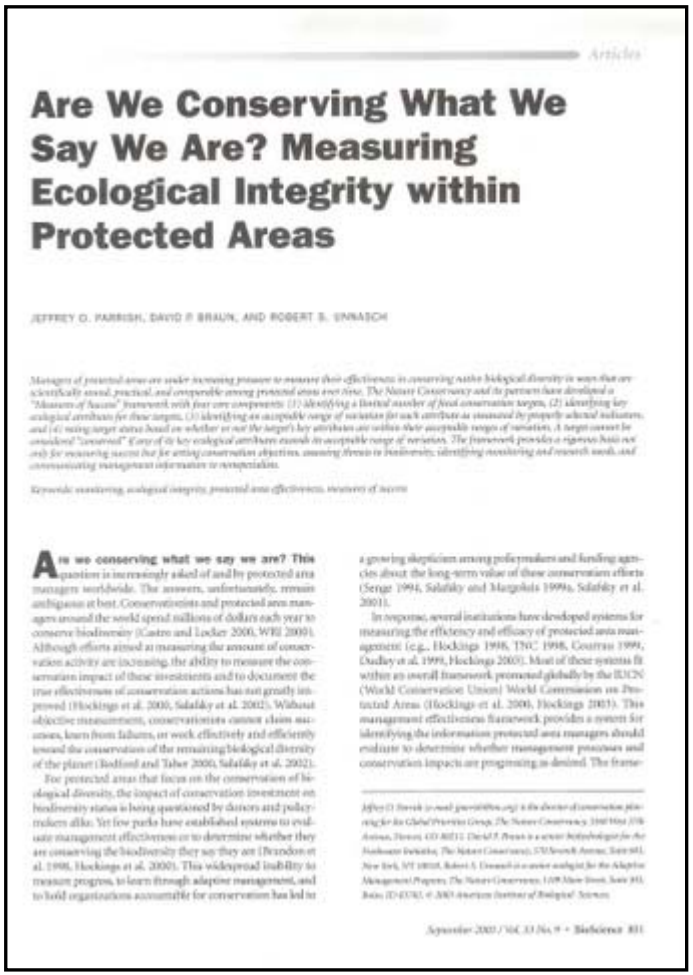
Broad-Scale WQ Impacts

Pre-Restoration Data (July 2004 to June 2006)

- **Measurements at three sites**
  1) Ammonia, 2) Nitrate, 3) Organic Nitrogen, 4) Total Phosphate



Monitoring & Evaluating at Emiquon --



Articles

Are We Conserving What We Say We Are? Measuring Ecological Integrity within Protected Areas

JEFFREY D. PARRISH, DAVID P. BRAUN, AND ROBERT S. UNNASCH

Managers of protected areas are under increasing pressure to measure their effectiveness in conserving native biological diversity in ways that are scientifically sound, practical, and comparable among protected areas over time. The Nature Conservancy and its partners have developed a "Measures of Success" framework with four core components: (1) identifying a limited number of focal conservation targets, (2) identifying key ecological attributes for those targets, (3) identifying an acceptable range of variation for each attribute as measured by properly selected indicators, and (4) rating target status based on whether or not the target's key attributes are within their acceptable ranges of variation. A target cannot be considered "conserved" if any of its key ecological attributes exceeds its acceptable range of variation. The framework provides a rigorous basis not only for measuring success but for setting conservation objectives, assessing threats to biodiversity, identifying monitoring and research needs, and communicating management information to nonspecialists.

Keywords: monitoring, ecological integrity, protected area effectiveness, measures of success

As we conserving what we say we are? This question is increasingly asked of and by protected area managers worldwide. The answers, unfortunately, remain ambiguous at best. Conservationists and protected area managers around the world spend millions of dollars each year to conserve biodiversity (Castro and Locker 2000, WRI 2000). Although efforts aimed at measuring the amount of conservation activity are increasing, the ability to measure the conservation impact of these investments and to document the true effectiveness of conservation actions has not greatly improved (Hockings et al. 2000, Salafsky et al. 2002). Without objective measurement, conservationists cannot claim successes, learn from failures, or work effectively and efficiently toward the conservation of the remaining biological diversity of the planet (Redford and Taber 2000, Salafsky et al. 2002).

For protected areas that focus on the conservation of biological diversity, the impact of conservation investment on biodiversity status is being questioned by donors and policymakers alike. Yet few parks have established systems to evaluate management effectiveness or to determine whether they are conserving the biodiversity they say they are (Brandon et al. 1998, Hockings et al. 2000). This widespread inability to measure progress, to learn through adaptive management, and to hold organizations accountable for conservation has led to a growing skepticism among policymakers and funding agencies about the long-term value of these conservation efforts (Serge 1994, Salafsky and Margoluis 1999a, Salafsky et al. 2001).

In response, several institutions have developed systems for measuring the efficiency and efficacy of protected area management (e.g., Hockings 1998, TNC 1998, Courrau 1999, Dudley et al. 1999, Hockings 2003). Most of these systems fit within an overall framework promoted globally by the IUCN (World Conservation Union)/ World Commission on Protected Areas (Hockings et al. 2000, Hockings 2003). This management effectiveness framework provides a system for identifying the information protected area managers should evaluate to determine whether management processes and conservation impacts are progressing as desired. The frame-

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Monitoring & Evaluating at Emiquon --

- Framework for evaluating the success of Conservancy conservation work (Parrish et al. 2003).

(1) identification of a limited number of focal conservation targets,

(2) identification of key ecological attributes for these targets,

(3) identification of indicators for each attribute, and

(4) the rating of target status based on whether the target's key attributes are within acceptable ranges.

Illinois River at Emiquon					
Target	**Key Ecological Attribute**	**Indicator**	**Desired Range**	**Notes**	**Basis for Rating Scale**
Fish (riverine & backwater)	Fish community assemblages	Number and percentage of native species populations	At least 25 native species represented (30+ native species very good); native species >50% numbers and biomass (VG = >75% numbers and biomass)	*Theiling et al.(1999) show that flooding can increase fish diversity.*	Expert review (ESAC II Animal breakout group) & D. Blodgett
Fish (riverine & backwater)	Fish community composition	Native predatory fish population	100/hr catch rate (electroshocking) for Bass; Plus Bowfin present		Expert review (ESAC II Animal breakout group)
Fish (riverine & backwater)	Spawning	Water dissolved oxygen	4ppm Oxygen (Very Good = > 5ppm)		Expert review (ESAC II Animal breakout group)
Fish (riverine & backwater)	Spawning	Substrate variability and structure (marcrophytes and large woody debris)	Subset representing several of the following types present: diverse shoreline, shade, fallen trees, open areas, and emergent, floating-leaved and submerged plants. (Very Good = all types present).		Expert review (ESAC II Animal breakout group)
Fish (riverine & backwater)	Spawning	Frequency of Apr/May connection to the River	Every three years for long-lived species; more frequently for short-lived s)pecies (Annual connection would be very good).	*Note: avoid carp spawning time if possible, Carp spawn Jul-Aug.*	Expert review (ESAC II Animal breakout group)
Fish (riverine & backwater)	Nursery	Accessibility for riverine fish	Presence of young-of-the-year freshwater drum, goldeye, bigmouth buffalo (all of the above plus paddlefish = very good).		Expert review (ESAC II Animal breakout group)
Fish (riverine & backwater)	Nursery	Native fish larvae	Dominance of native species		Expert review (ESAC II Animal breakout group)

Monitoring & Evaluating at Emiquon --

- The main premise of TNC's conservation framework is that key ecological attributes must be managed and conserved to sustain each conservation target (Parish et al. 2003).

Monitoring & Evaluating at Emiquon --

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- By explicitly identifying such attributes, land managers can specify what elements of a specific conservation target are important to manage and monitor in order to assess conservation progress.

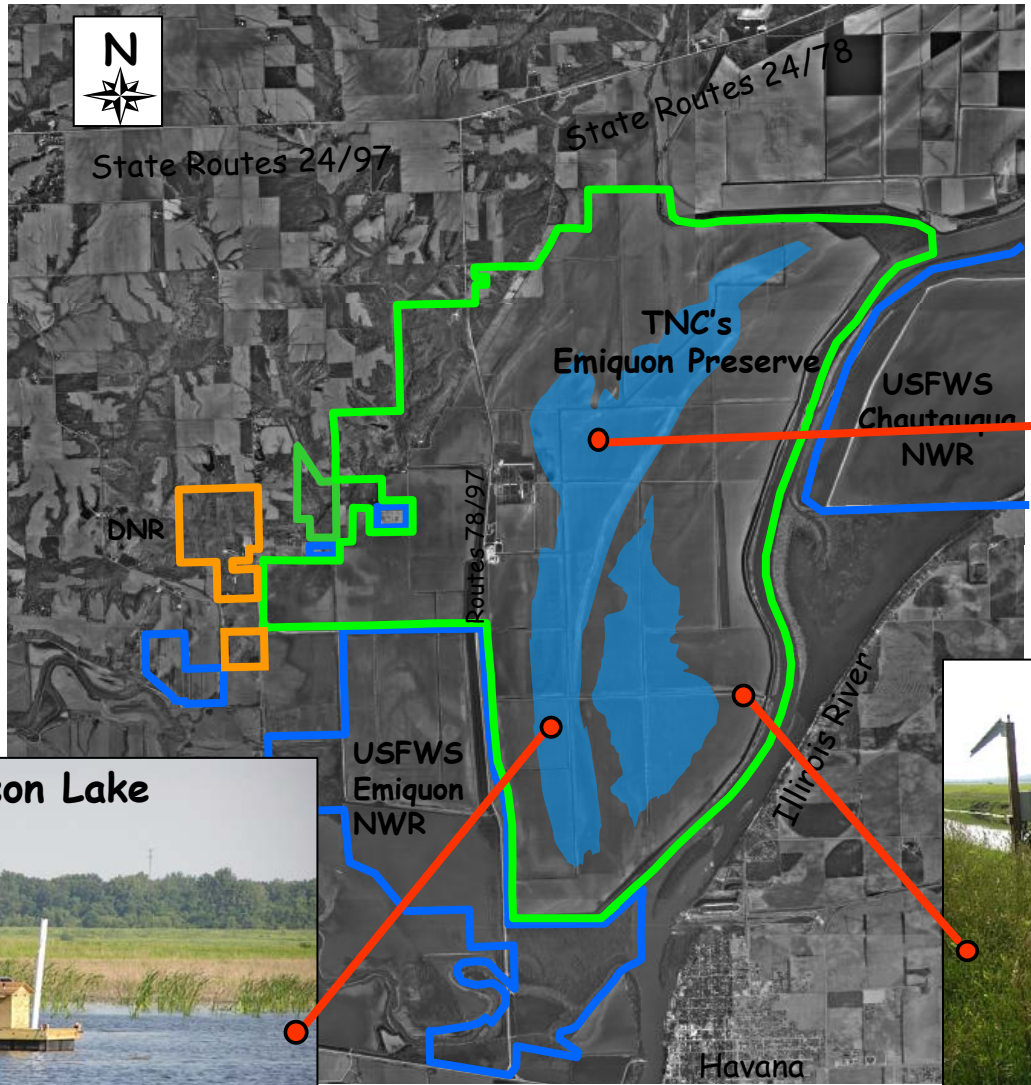
Illinois River Conservation Targets:

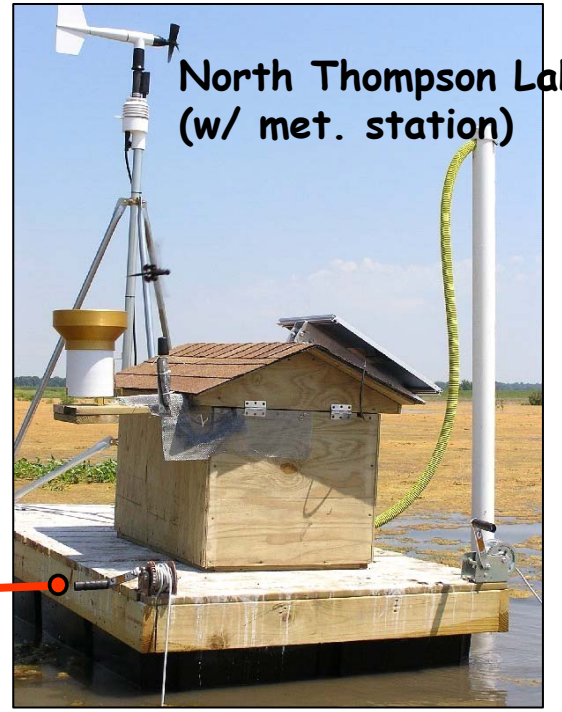
- Floodplain Vegetation
  - Submersed Aquatic Vegetation
  - Emergent/Floating-leaved Vegetation
  - Moist Soil Vegetation
  - Floodplain Forest
- *Boltonia decurrens* (Decurrent False Aster)
- Fish (riverine and backwater)
- Mussels
- Migratory Birds

WQ Attributes

Water Clarity	-Submersed Aquatic Vegetation
Dissolved O_2	-Fish
H_2O Temperature	-Fish
Hydrology	-Submersed Aquatic Vegetation, -Emergent/Floating-leaved Vegetation -Moist Soil Vegetation -Floodplain Forest -*Boltonia decurrens* -Fish -Migratory Birds (waterfowl & Shorebirds)

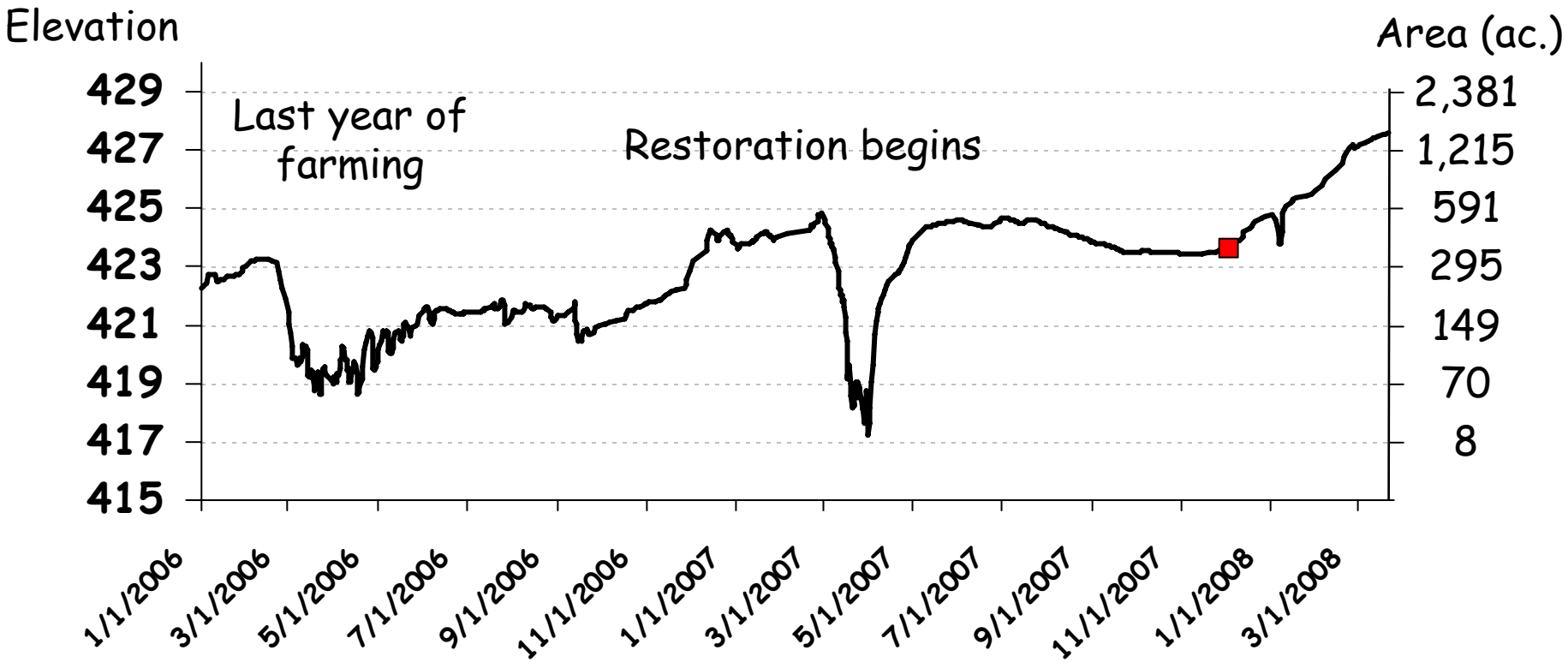
YSI EcoNet and Meteorological Station sites at Emiquon Preserve

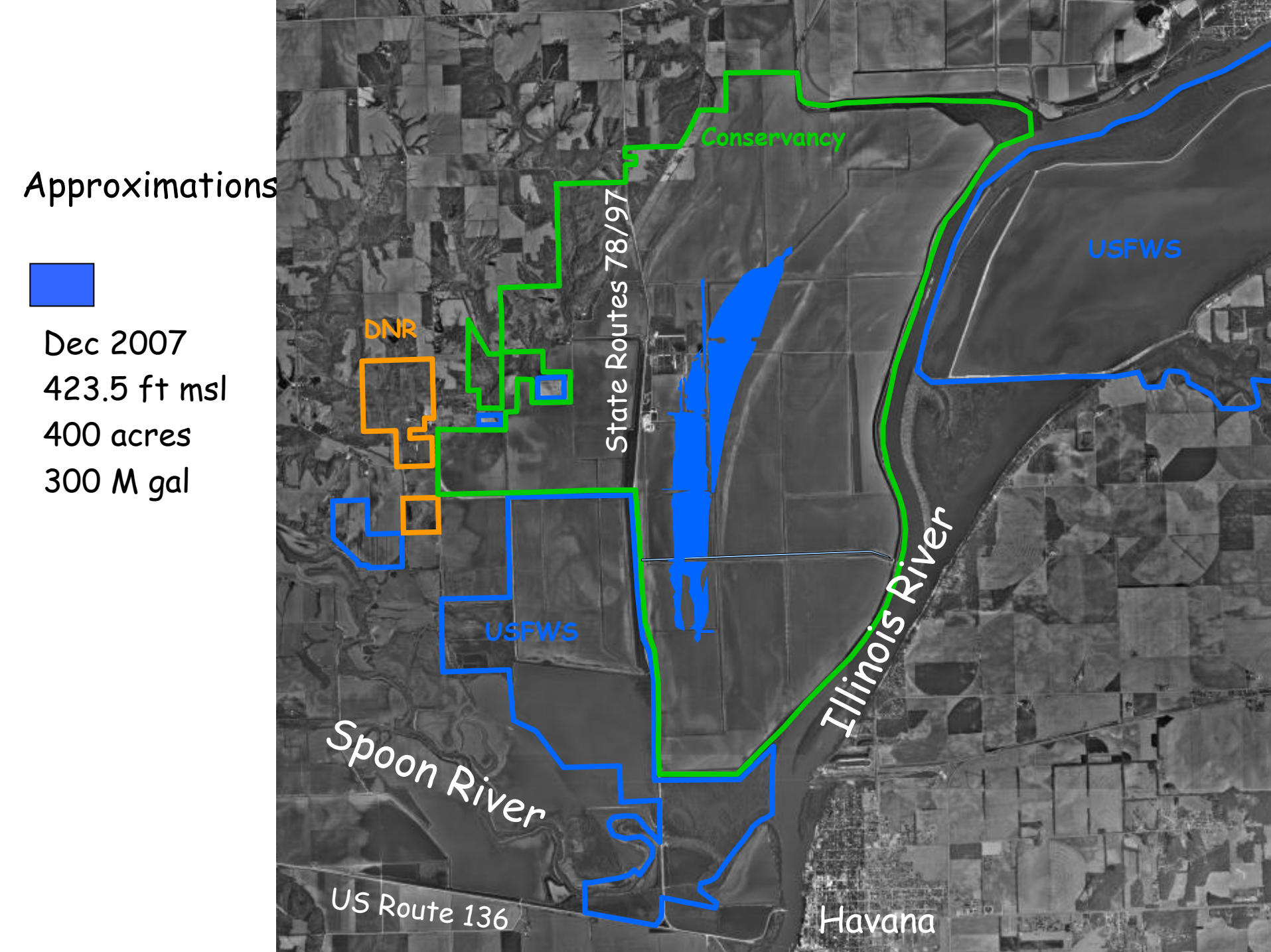


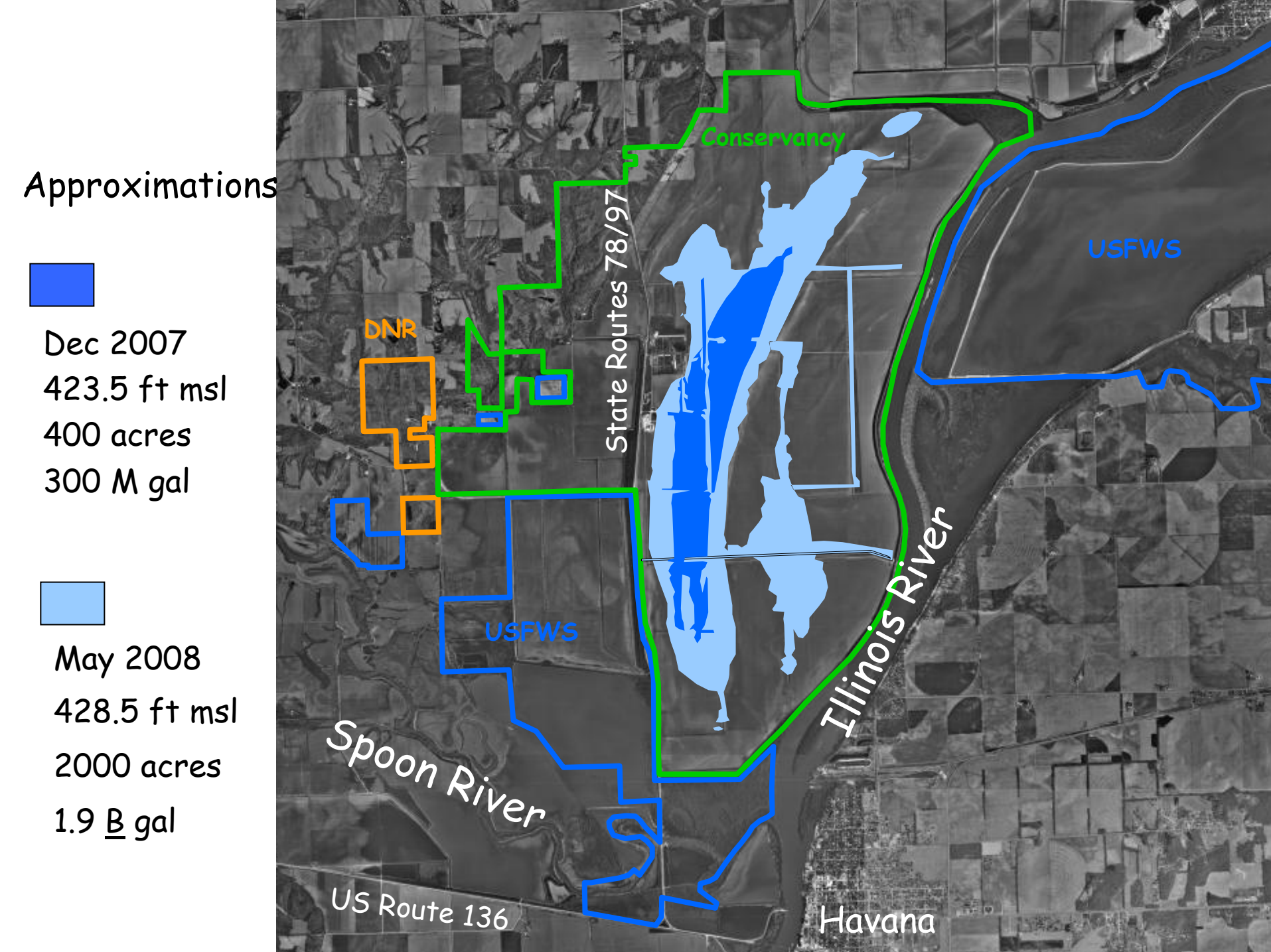


Data are online at:
www.uis.edu/emiquon/research/livedata.html

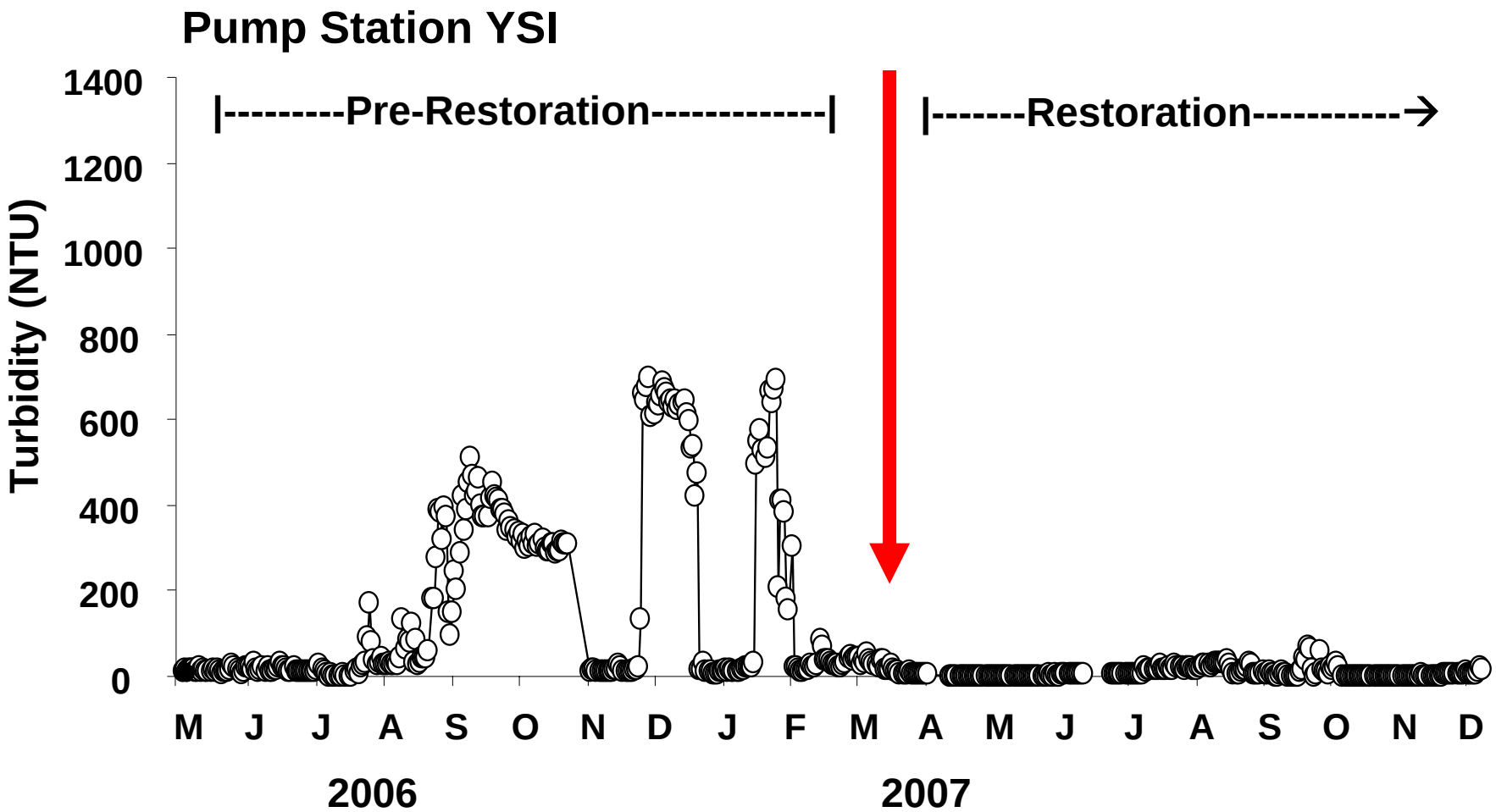
Water Surface Elevations at Emiquon

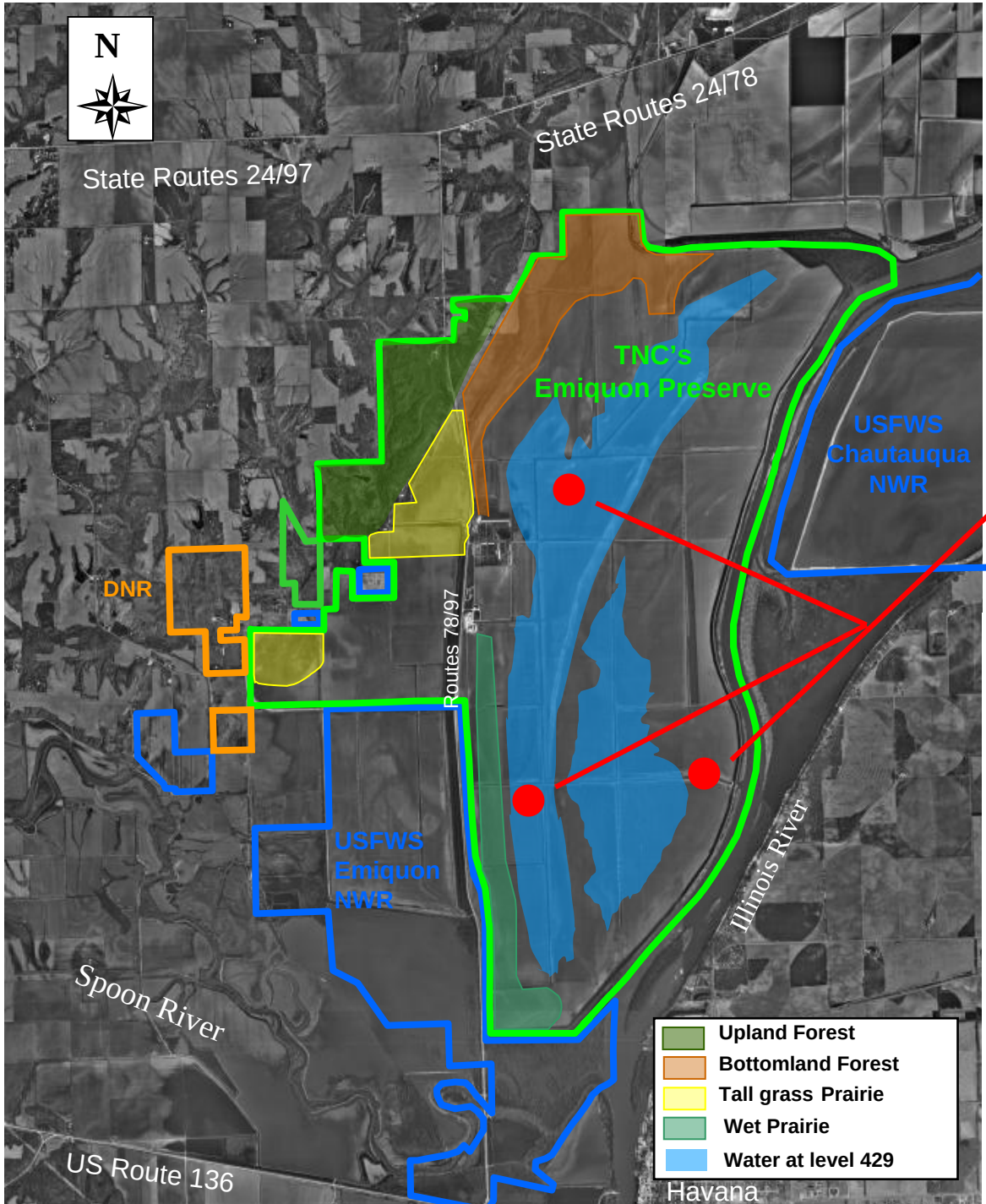



Approximations
Dec 2007
423.5 ft msl
400 acres
300 M gal
Conservancy
DNR
State Routes 78/97
USFWS
USFWS
Illinois River
Spoon River
US Route 136
Havana


Approximations
Dec 2007
423.5 ft msl
400 acres
300 M gal
May 2008
428.5 ft msl
2000 acres
1.9 B gal
Conservancy
DNR
USFWS
USFWS
State Routes 78/97
Illinois River
Spoon River
US Route 136
Havana

Data Summary: Turbidity

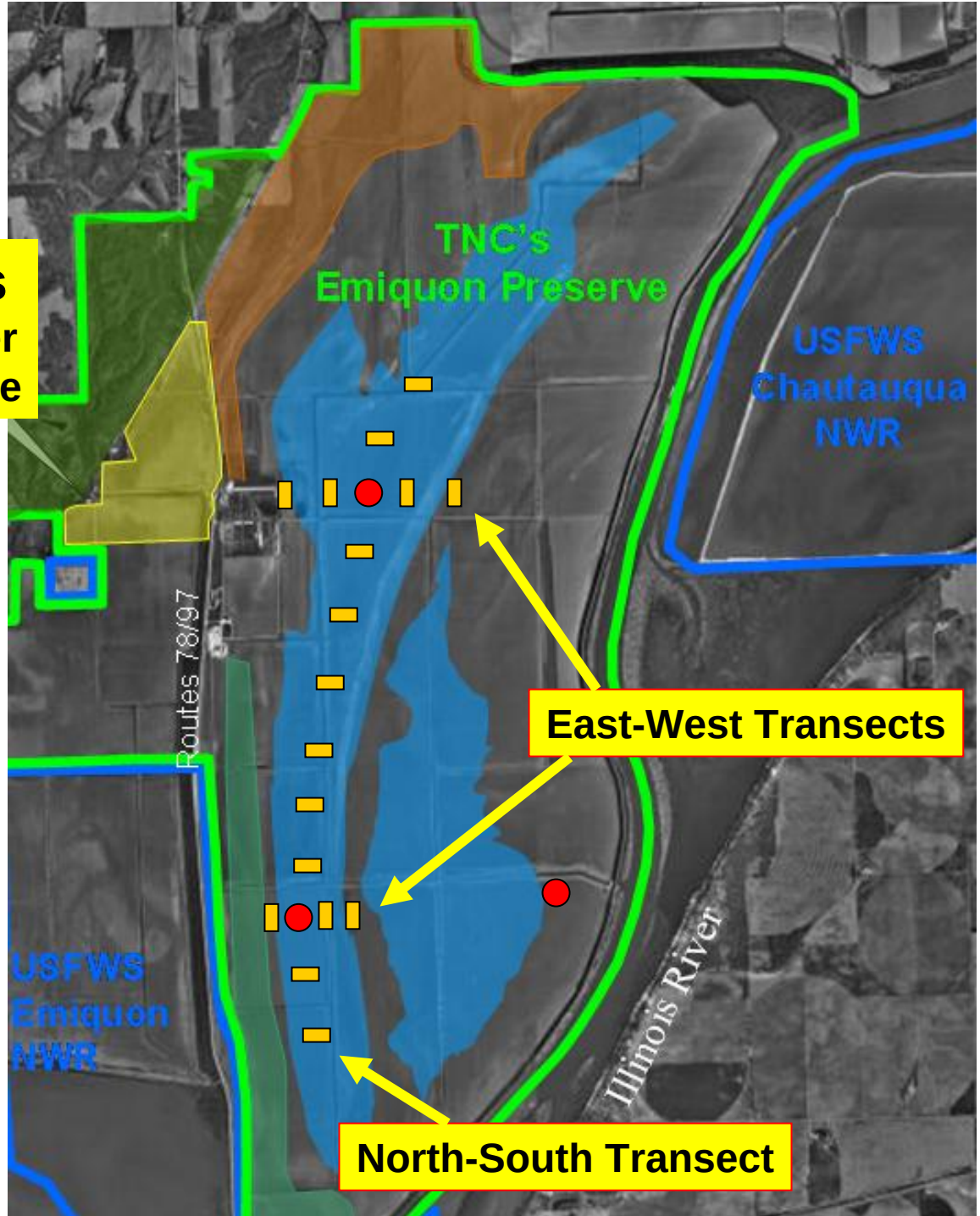




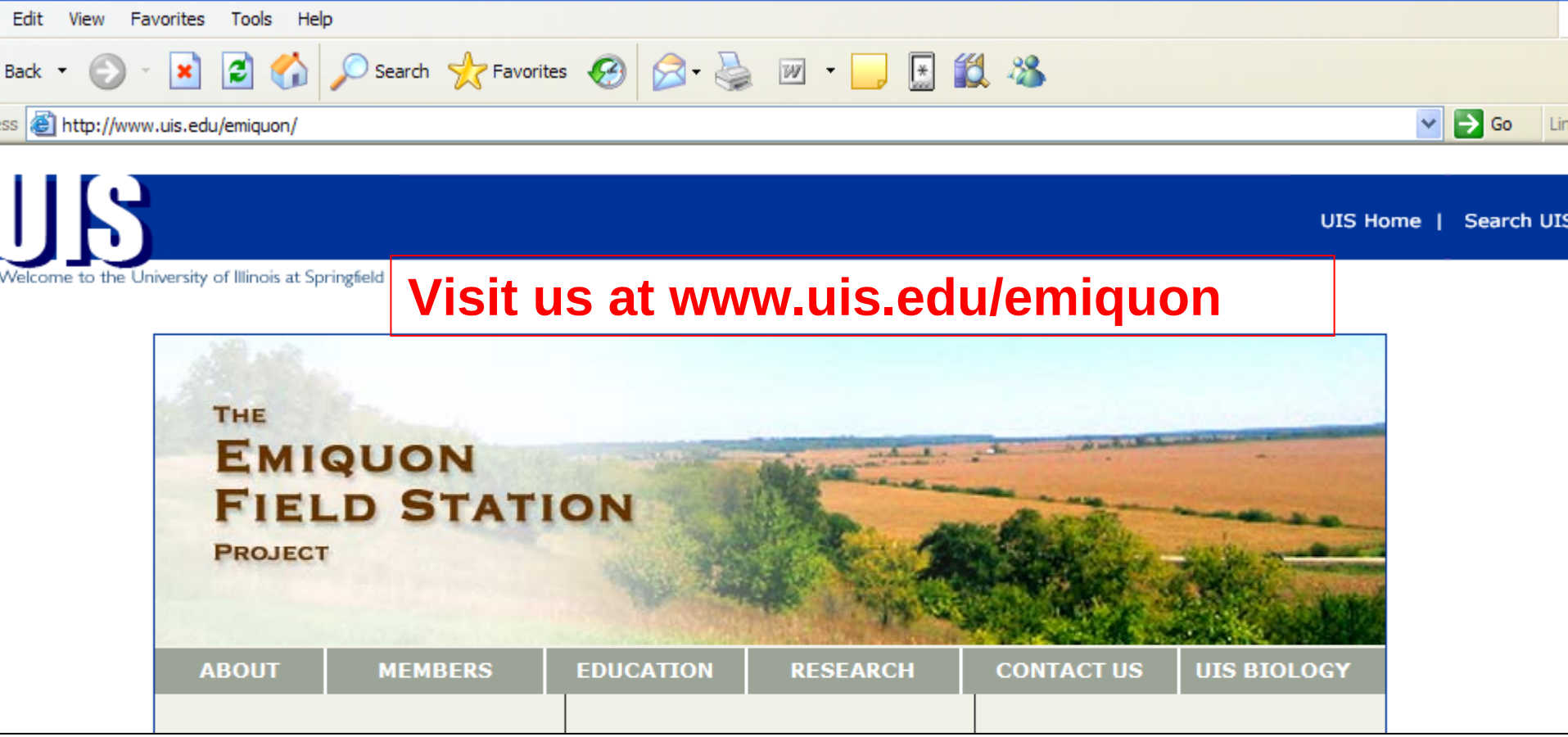
YSI EcoNet Sites

YSI EcoNet
Multi-parameter collecting stations

Hobo Samplers
- Top & bottom water
- Light & temperature



Source	Interval	Nutrients	Turbidity or secchi	Temperature	Chlorophyll	pH	Oxygen	Conductivity	Depth	Light	Weather station
YSI EcoNet Stations	15 min.		x	x	x	x	x	x	x		(x)
YSI Handheld Units (14 sites)	1-2 wks		x	x	x	x	x	x	x		
Hobo Samplers (UIS)	1 hour			x						x	
Fish & Veg. Sampling (INHS)	monthly		x				x	x	x		
Pump Station Sampling (EPA)	• 2 wks • During pumping	x									
Bacteria Study	2 wks	x	x	x	x	x	x	x	x		



Here's where you will find:

- Water Temperature
- Dissolved Oxygen
- pH
- Turbidity
- Conductivity
- Water Depth
- Wind Speed & Direction
- Rainfall
- Air Temperature
- Barometric Pressure

Thanks to our partners…