# Aquatic Vegetation and Fish Community Monitoring at The Nature Conservancy's Emiquon Nature Preserve

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**Floodplain Importance** 

### River and floodplain interaction essential

- maintains river integrity
  - ex. ecological, geomorphological, hydrological
- Floodplains
  - maintain biodiversity
  - provide ecosystem services
    - ex. ecological and societal benefits





# **Floodplain Restoration**

### Illinois River is a productive, floodplain river system

- among highest commercial fishing harvest rates historically
- natural biological productivity changed
  - <u>ex.</u> floodplain disconnection, elevated nutrient inputs, and invasive fish species

#### The Nature Conservancy's Emiquon Preserve

- intended to benefit Illinois River
- serve as model floodplain restoration



Figure 44. Illinois Natural History Survey scientists (from left), Miles Newberry, Frank Smith, Hatcher Brown, and William Shafer, enjoy lunch on the sandy shore of Thompson Lake after sampling in 1894 (INHS files).



Figure 14. Fishermen enjoyed abundant catches from the Illinois River and its backwater lakes (The Karl Collection).



Figure 45. Charles Kofoid (front) and Miles Newberry of the Illinois Natural History Survey spent many hours sampling in the Illinois River floodplain in the late 1890s (INHS files).



## **Restoration Evaluation**

#### Illinois Natural History Survey

- standardized monitoring
  - fish (2007-present) (Gutreuter et al. 1995)
  - aquatic vegetation (2008-present) (Yin et al. 2000)

### Key Ecological Attributes (KEA's)

success criteria and driving management tool









# **Relevant KEA's (19 Total)**

## Submersed Aquatic Vegetation (SAV)

- underwater irradiance
- hydrology
- community composition

## Emergent/Floating-Leaved Vegetation

- hydrology
- community composition

## Fish (Riverine and Backwater)

- fish community assemblages
- fish community composition
- spawning
- nursery
- feeding
- over-wintering







# **Dynamic SAV Community**

#### Sustains diverse and abundant

- SAV community
- 11 native species collected
- rare on Illinois River today







# **Native Species Richness/Biomass**





# **Native Species Richness/Biomass**





# **Native Species Richness/Biomass**





# **Dynamic Fish Community**





**Alternative Stable States** 



Mesocosm CWH additions (water quality, benthic invertebrates, spawning, predator-prey interactions)



# **Common Carp Biocontrol?**

### Stocking strategy (2007-2011)

- ≥30 native fish species stocked including:
  - bowfin, longnose gar, spotted gar
  - largemouth bass (>1.2 million stocked)

### Diet research (2008-2012)

- examined >2,200 bowfin, spotted gar, and largemouth bass diets
- no evidence to support common carp biocontrol









# **Common Carp Biocontrol?**

### Bajer et al. (2012)

- YOY common carp only found in shallow lakes
- experience winter hypoxia/low abundance of native egg predators

### Silbernagel and Sorensen (2013)

- >95% common carp eggs found disappeared
- bluegill consumed many common carp eggs/larval in lab

### Interesting note about bluegill

abundant at most study areas









# **Floodplain Reconnection**

### Illinois River experienced record flooding in 2013

- Emiquon experienced moderate flooding
  - levee overtopped
- Merwin experienced major flooding
  - levee breached

#### Emiquon Preserve







# **Floodplain Reconnection**

### Moderate flooding impacts (Emiquon)

- native fish species richness increased
- native aquatic vegetation species richness sustained
- non-native fish and aquatic vegetation abundance decreased

## Major flooding impacts (Merwin)

- native fish species richness increased
- YOY native fish species recruitment
- aquatic vegetation minimal/no pre-flood data











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**Future Research** 

- Sportfish/primitive fish dynamic rate functions
  - reproduction, recruitment, growth, mortality
- Sportfish intersex condition
- Sportfish/primitive fish population estimates



