Wetlands: What are wetlands and why are they important for biodiversity

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Wetlands

1. Wetland Definition/Types
2. Importance of Wetlands
3. Wetland Losses
4. Amphibians and Reptiles in Wetlands (live animals)
5. Wetland Restoration

Wetland Review: Definition

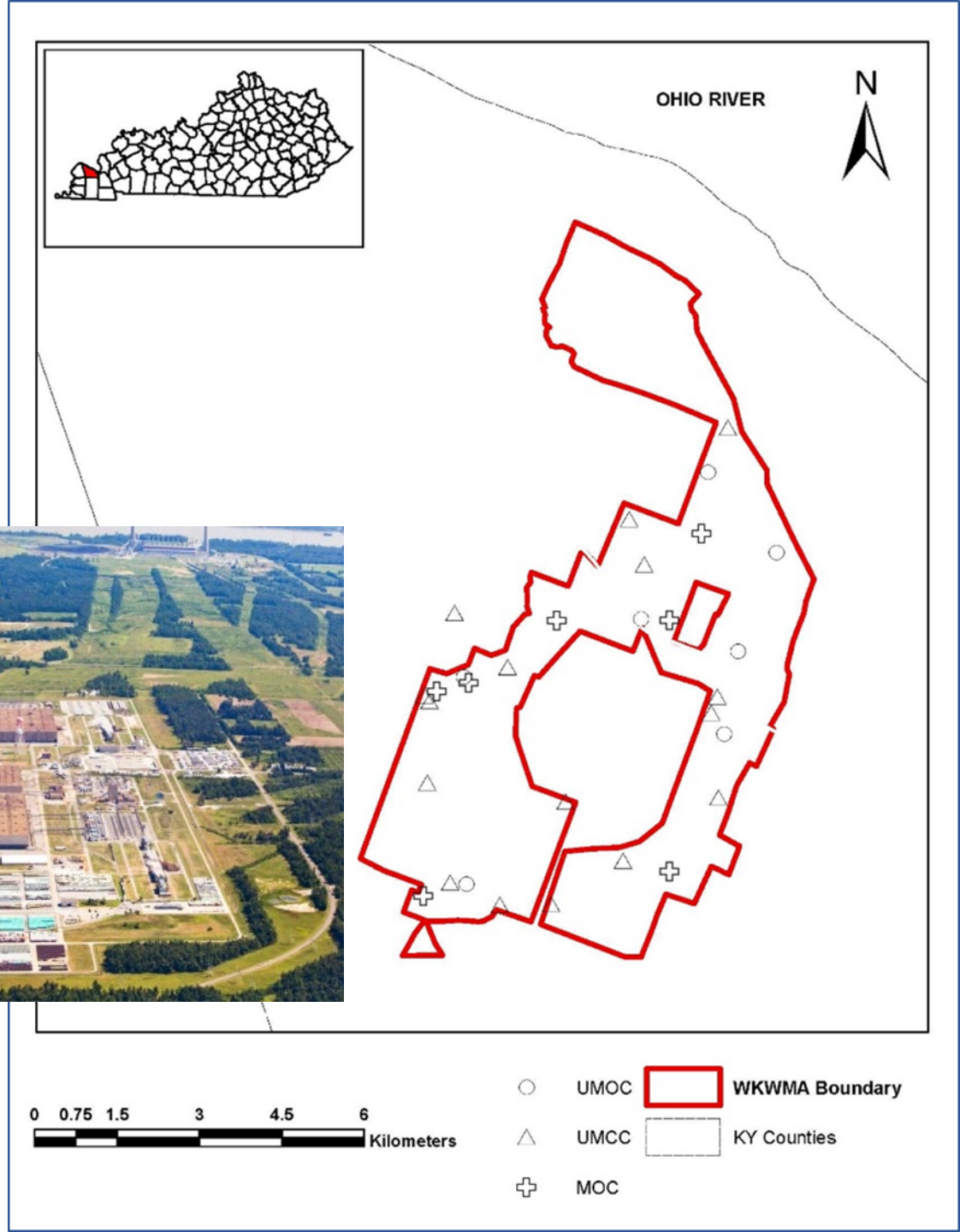
Wetlands are ecosystems that arise when inundation by water produces soils dominated by anaerobic processes and forces the biota, particularly the plants, to exhibit adaptations to tolerate flooding

Must have one or more of the following three attributes:

1. at least periodically supports predominantly hydrophytes (wetland plants)
2. substrate is predominantly undrained hydric soil
3. Saturated with water or covered by shallow water at some time during the growing season of each year.

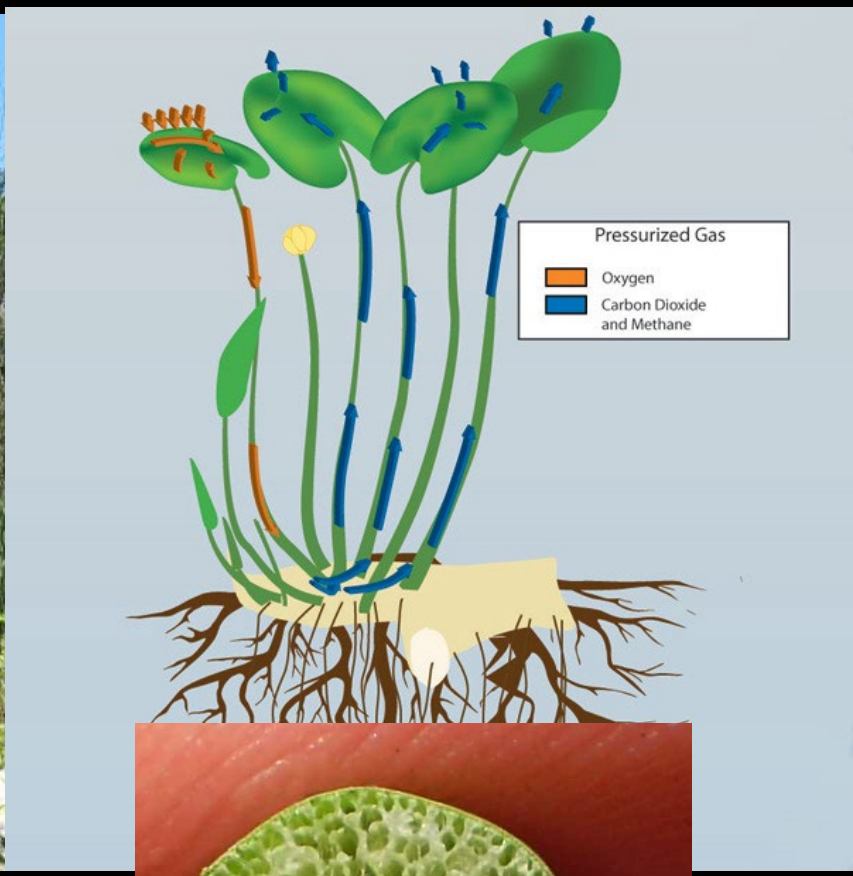
West Kentucky Wildlife Management Area

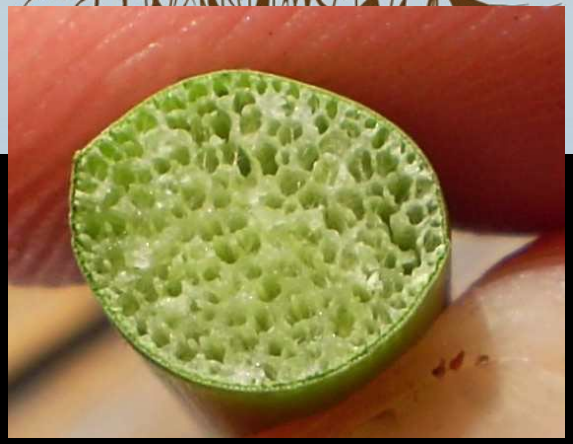
Paducah Gaseous Diffusion Plant



SOUTHERN
ILLINOIS
SALUKIS

Wetland Plants





Must be adapted to flooding and low oxygen conditions

Wetlands classified by vegetation

Swamps: Forests toleration of saturation; Associated with floodplains; vegetation varies depending on levels of inundation

Wetlands classified by vegetation

Marshes: Emergent, herbaceous vegetation, long inundation

Wet Meadow: Emergent, herbaceous vegetation; shorter inundation

Wetland Soils

Muck/peat: These are very dark-colored wetland soils made mostly of partially-decomposed plants. Very "loose" soils, they are easily compressed and rutted by vehicles or equipment. If they dry out they can subside; they can also catch on fire.

Silt and clay soils: These soils are dark in color, usually brownish gray or black, but sometimes dark red. Large amounts of water (e.g., rain or snow melt) pond on these soils because of their high clay content.

Sandy soils: Sand grains will be visible in these soils, which are usually darkly stained with organic matter. Because sandy soils can't trap water, wetlands with these soils signify visible groundwater.

Wetland Definition

- **What is a wetland?**
  - **Inundation of water**
  - **Soils**
  - **Vegetation**
- **Hydroperiod**
  - **Length of inundation**

Wetland Importance

Ecosystem services: Carbon sequestration

All wetlands sequestering carbon (i.e., carbon sinks) – they store carbon in vegetation, leaf litter and soils

The amount stored in wetland may approach the total amount of atmospheric carbon (estimated at 753 GT)

Climate change may result in falling water levels; carbon released due to oxidation by bacteria (or fires)

Wetland Importance

- Ecosystem service: Water purification and flood control

 - excess nutrients and chemicals flow off land, wetlands filter the run off before it reaches open water. Plants and micro-organisms use nutrients

Wetland Importance

- Ecosystem service: flood control

- prevent flooding by temporarily storing and slowly releasing storm water; also reduce water flow by allowing sediments and associated pollutants to settle out; natural sponges

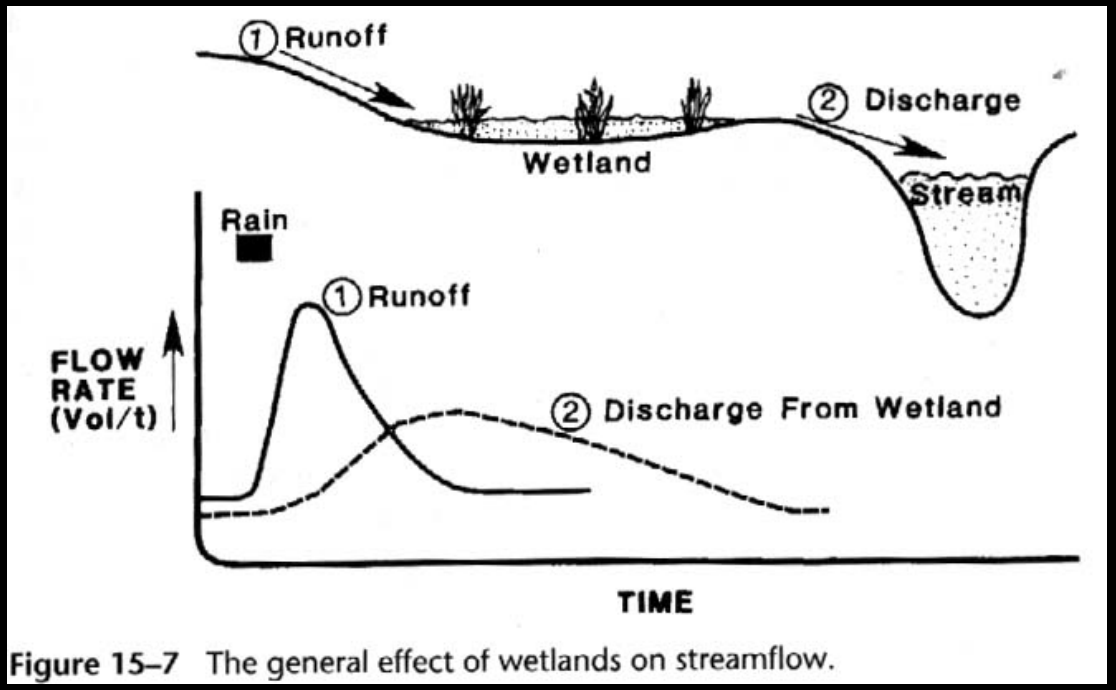
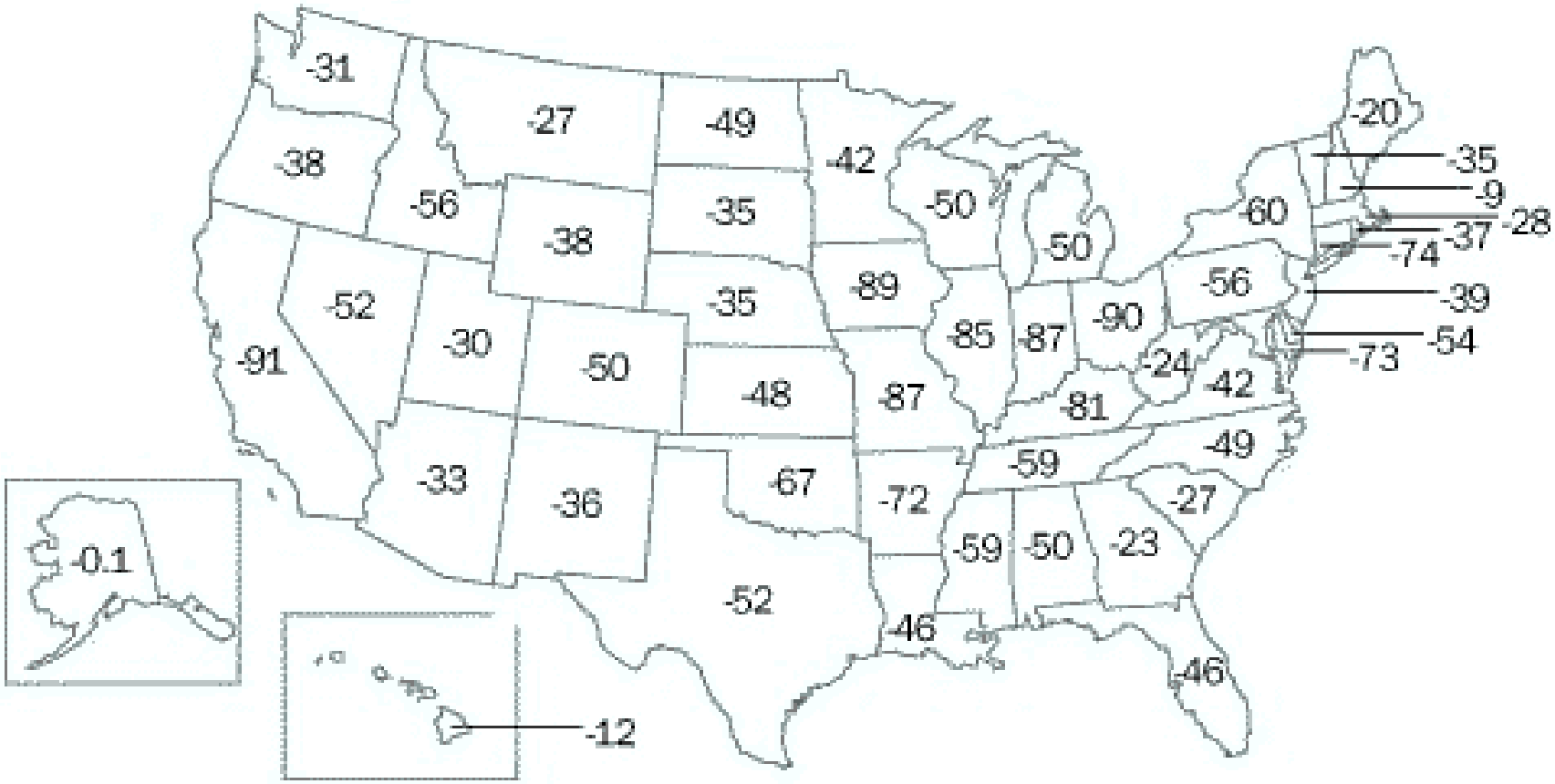


Figure 15–7 The general effect of wetlands on streamflow.

Wetland Biodiversity

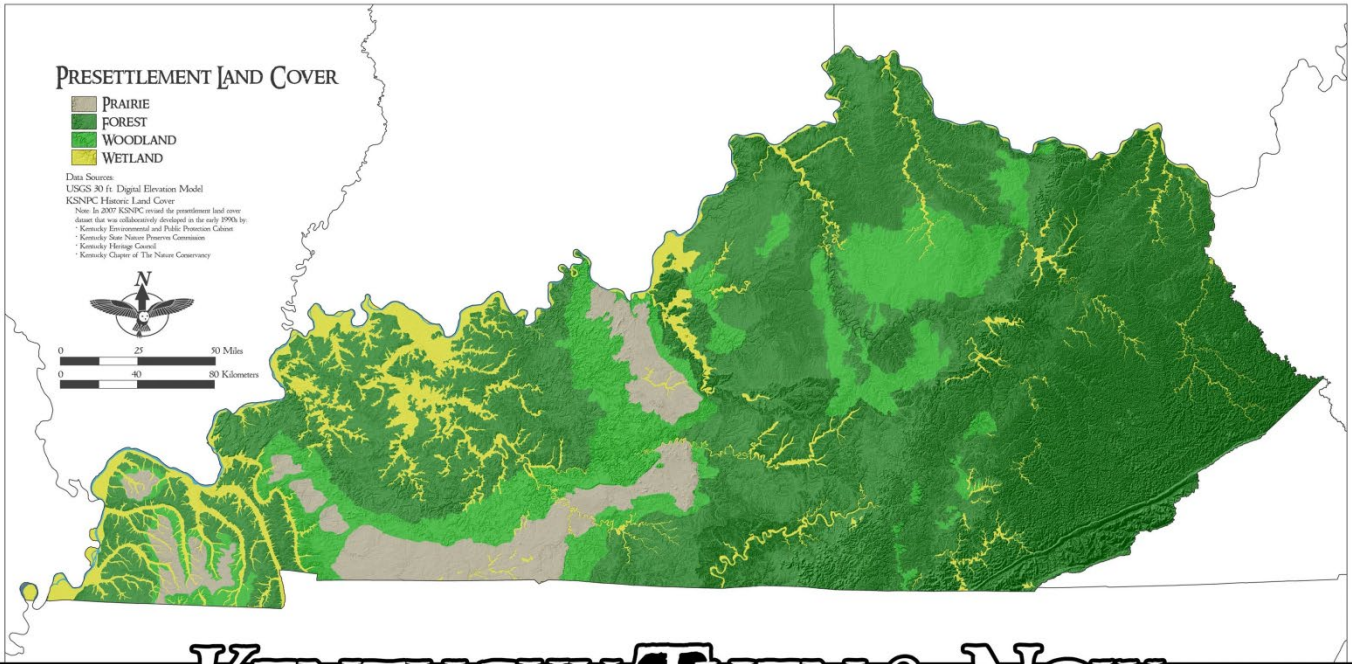
- Wildlife habitat (waterfowl, amphibians, fish, etc.)
  - 43% of federally threatened species rely on wetlands (USFWS)

Percentage of Wetlands Acreage Lost, 1780's-1980's

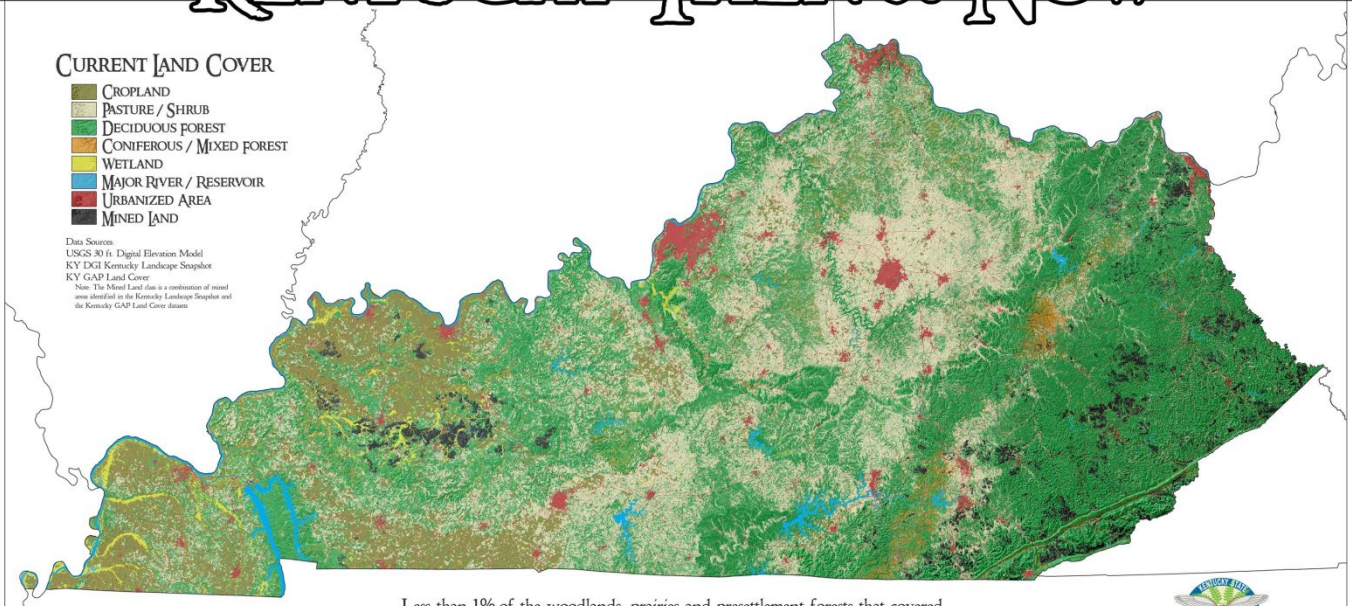


Twenty-two states have lost at least 50 percent of their original wetlands. Seven states—Indiana, Illinois, Missouri, Kentucky, Iowa, California, and Ohio—have lost over 80 percent of their original wetlands. Since the 1970's, the most extensive losses of wetlands have been in Louisiana, Mississippi, Arkansas, Florida, South Carolina, and North Carolina.

Source: Mitch and Gosselink. Wetlands. 2nd Edition, Van Nostrand Reinhold, 1993



Kentucky Then & Now



EPPC
Environmental & Public Protection Cabinet

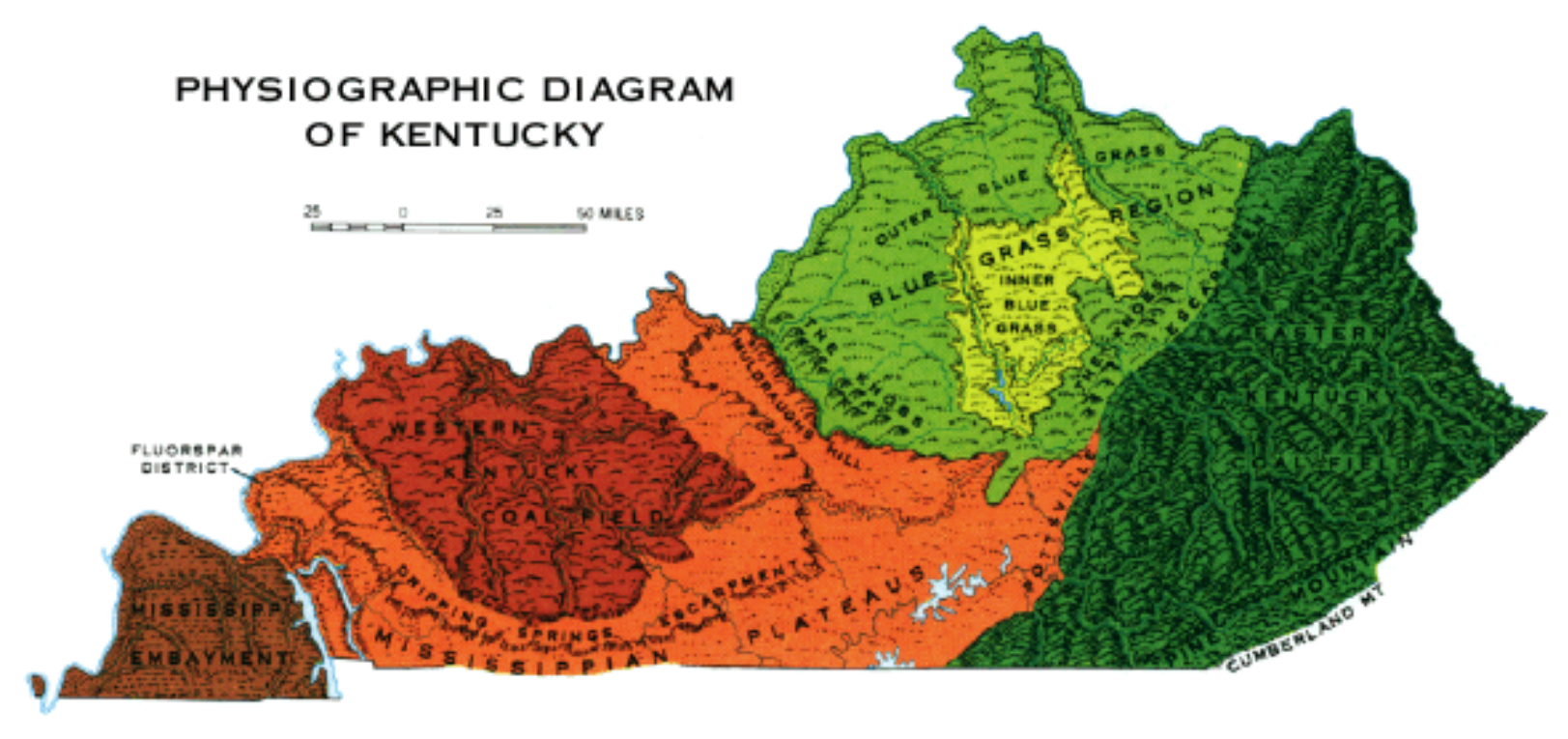
Less than 1% of the woodlands, prairies and presettlement forests that covered Kentucky 200 years ago occur here today (KY Natural Heritage Database 2007).
Kentucky has lost over 80% of its original wetland acreage (Dahl and Johnson 1991).

Map Created by:
Greg Abernathy, Marc Evans and Shawna Dunham
KSNPC July 2007

Amphibians and Reptiles Represent Hidden Biodiversity

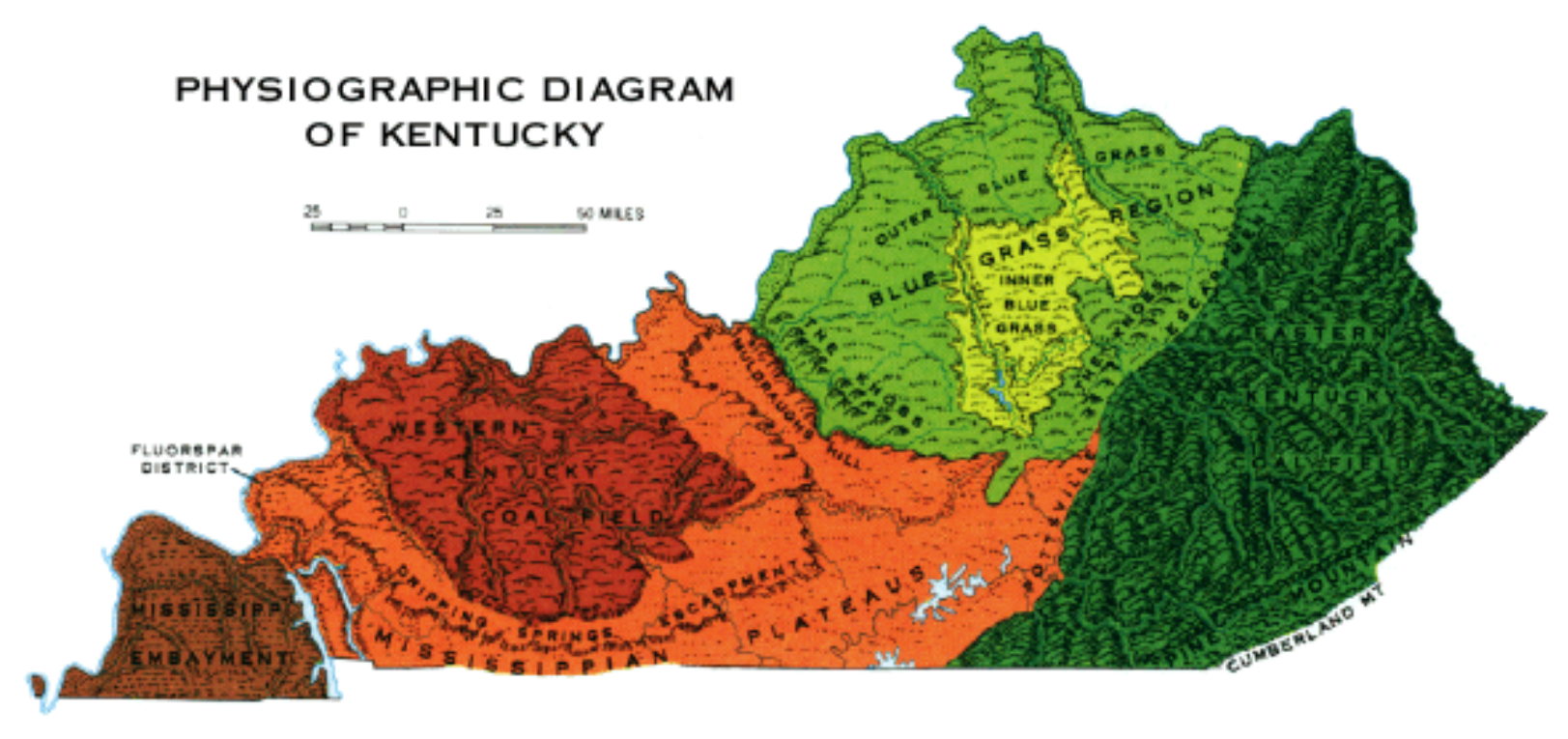
Kentucky

- **20 frogs and toads**
- **35 salamanders**
- **14 turtles**
- **9 lizards**
- **33 snakes**



Kentucky

- **Mississippi Embayment**
  - **83 reptile and amphibian species**



What types of wetlands are important to amphibians?

Seasonal wetlands hydrology

SALAMANDERS

WETLAND

OTHER WETLAND INHABITANTS

Wetland Inhabitants

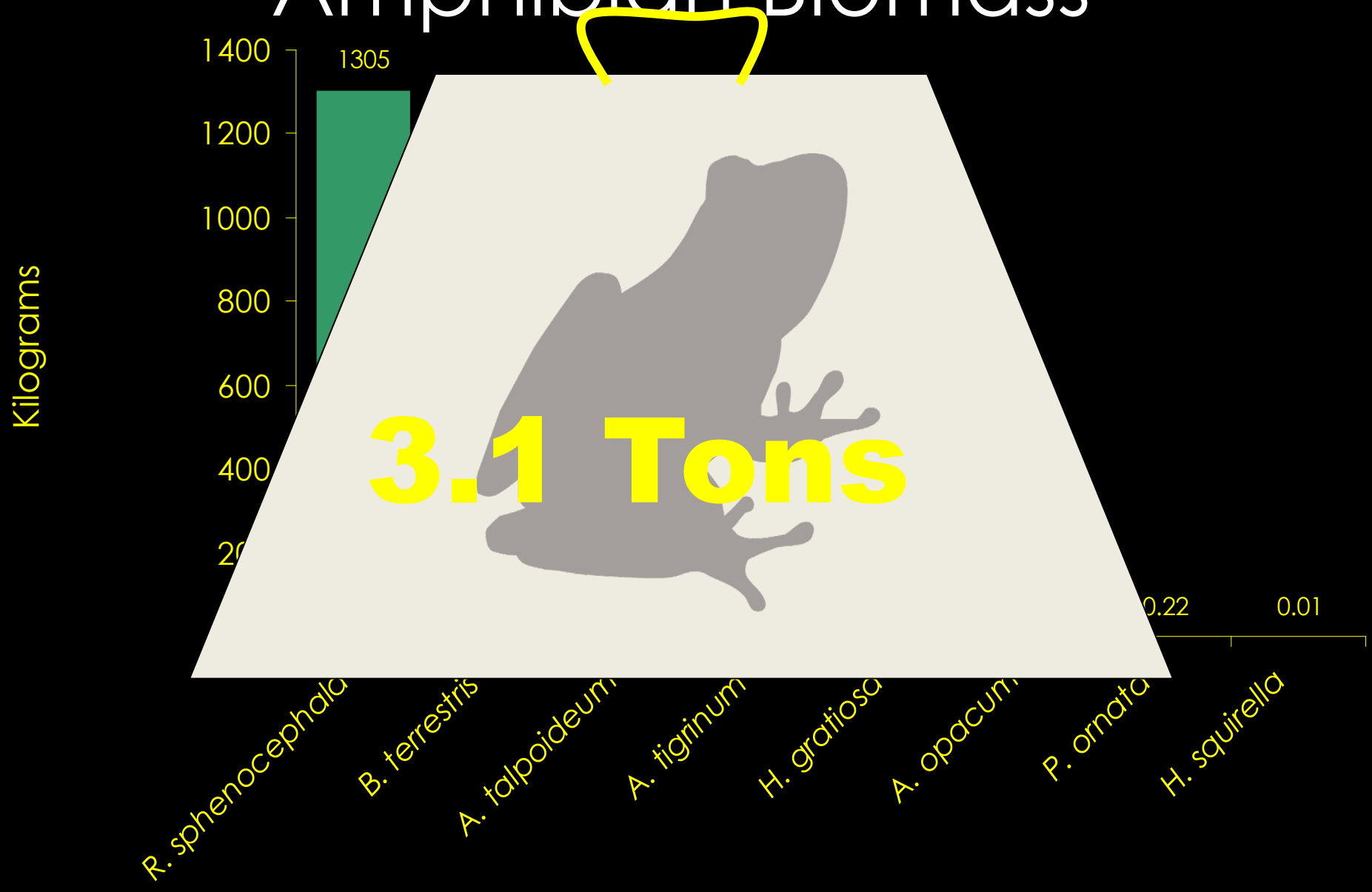
AQUATIC SALAMANDERS

MUD SNAKE

Diversity and Ecosystem function

Ellenton Bay
10 ha

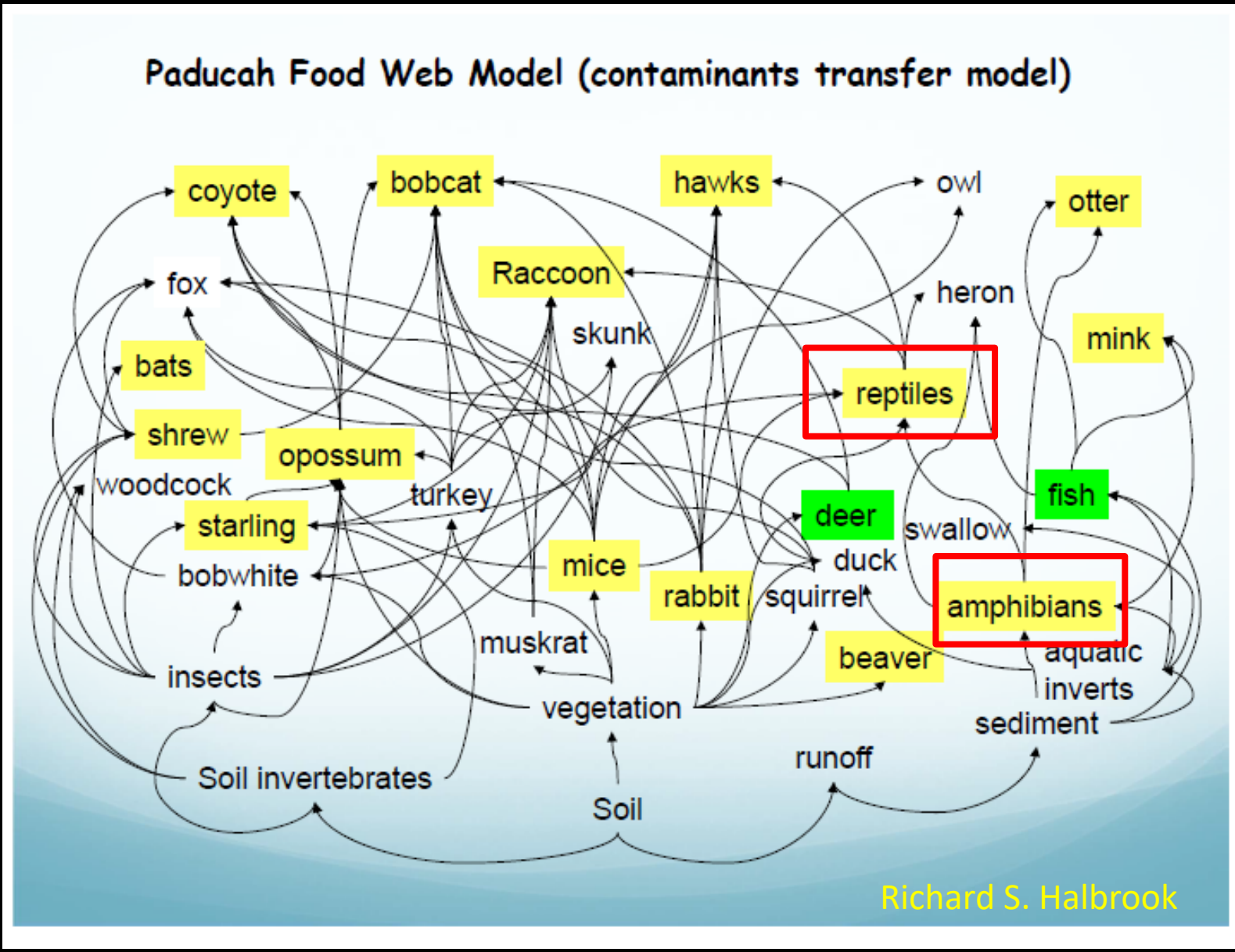
Amphibian Biomass



WHO EATS AMPHIBIANS?

EASTERN HOGNOSE SNAKE

EASTERN HOGNOSE SNAKE



AMPHIBIANS AND REPTILES IN THE FOOD WEB

Wetland Creation for Amphibians?

- Wetlands were created from 2002-2016 at the West Kentucky Wildlife Management Area (WKWMA) as part of a management plan for amphibians and waterfowl.
- Created wetlands had water control structures
- Do these created wetlands support amphibians?
  - Management?
  - Tree Cover?
  - Size?

Crawfish Frog (*Lithobates areolatus*)

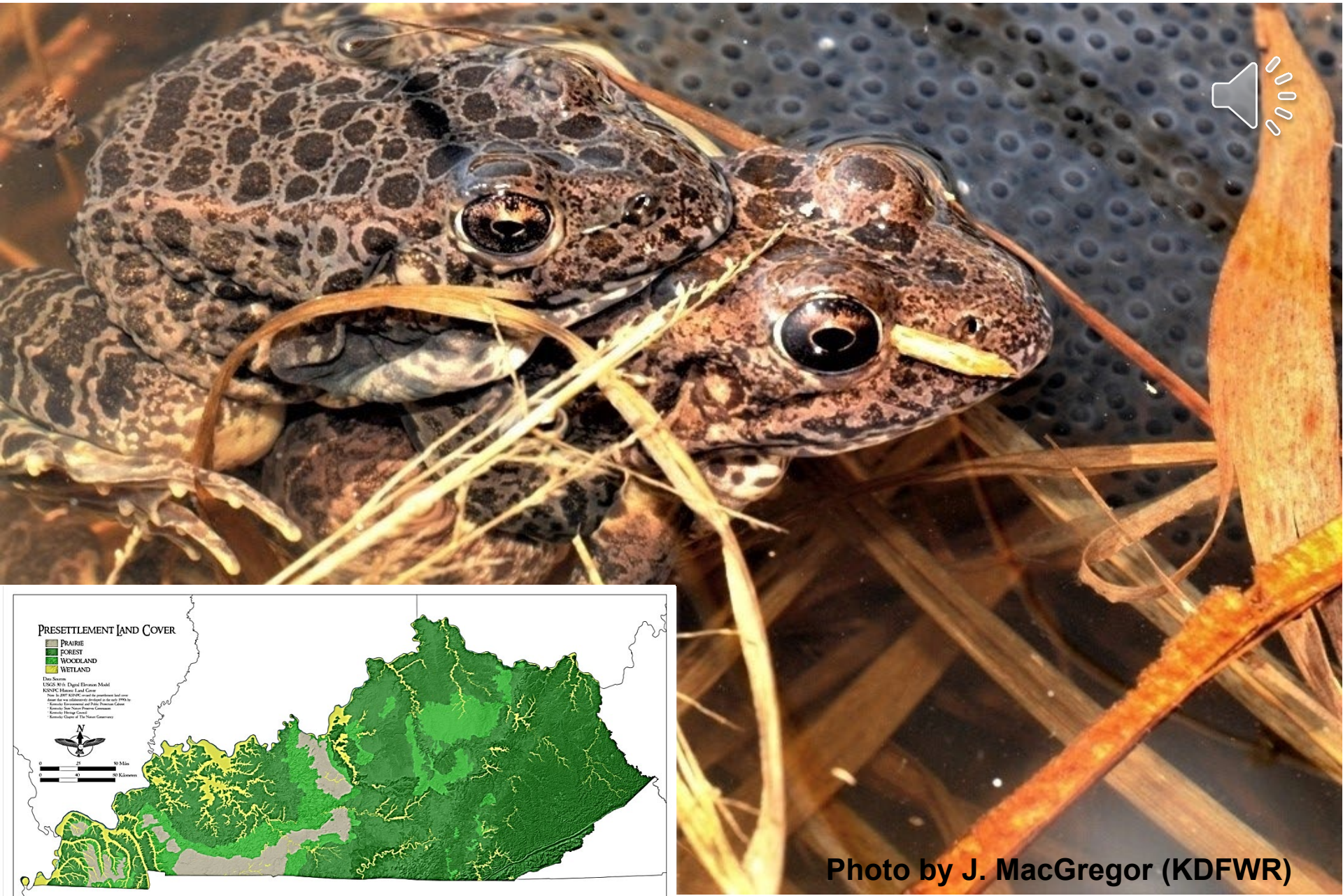
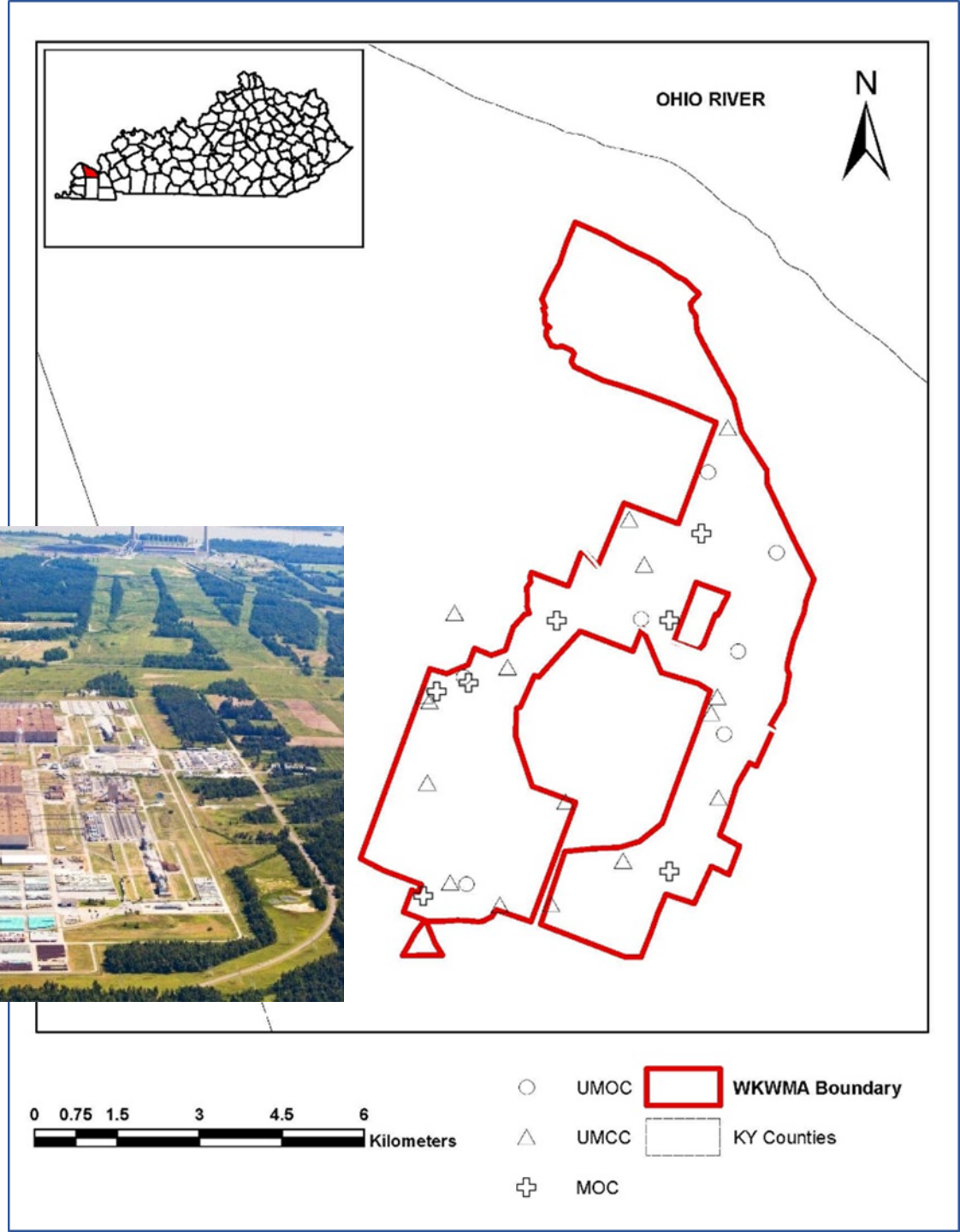


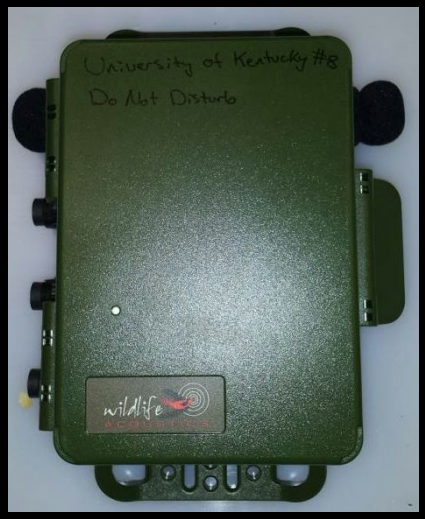
Photo by J. MacGregor (KDFWR)

West Kentucky Wildlife Management Area

Paducah Gaseous Diffusion Plant

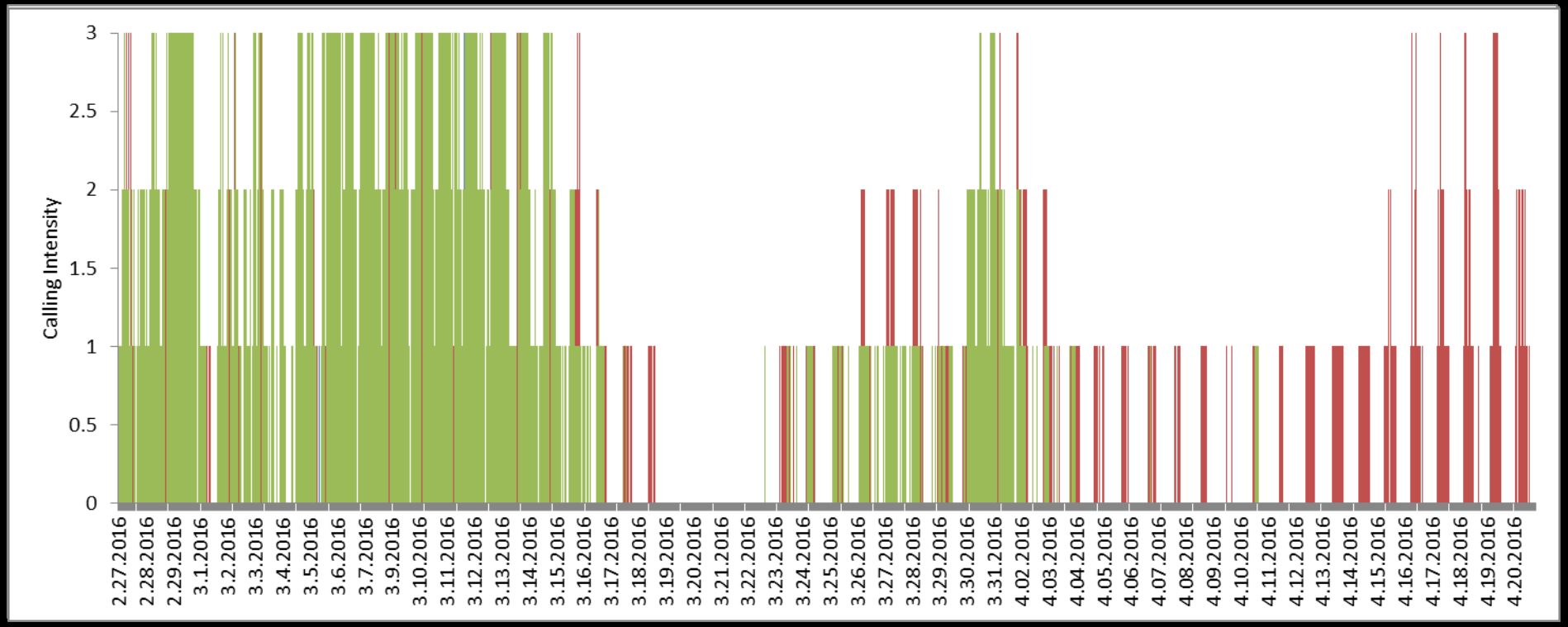


Amphibian Monitoring in Seasonal Wetlands



TODD PIERSON 2012

©2003 Will Cook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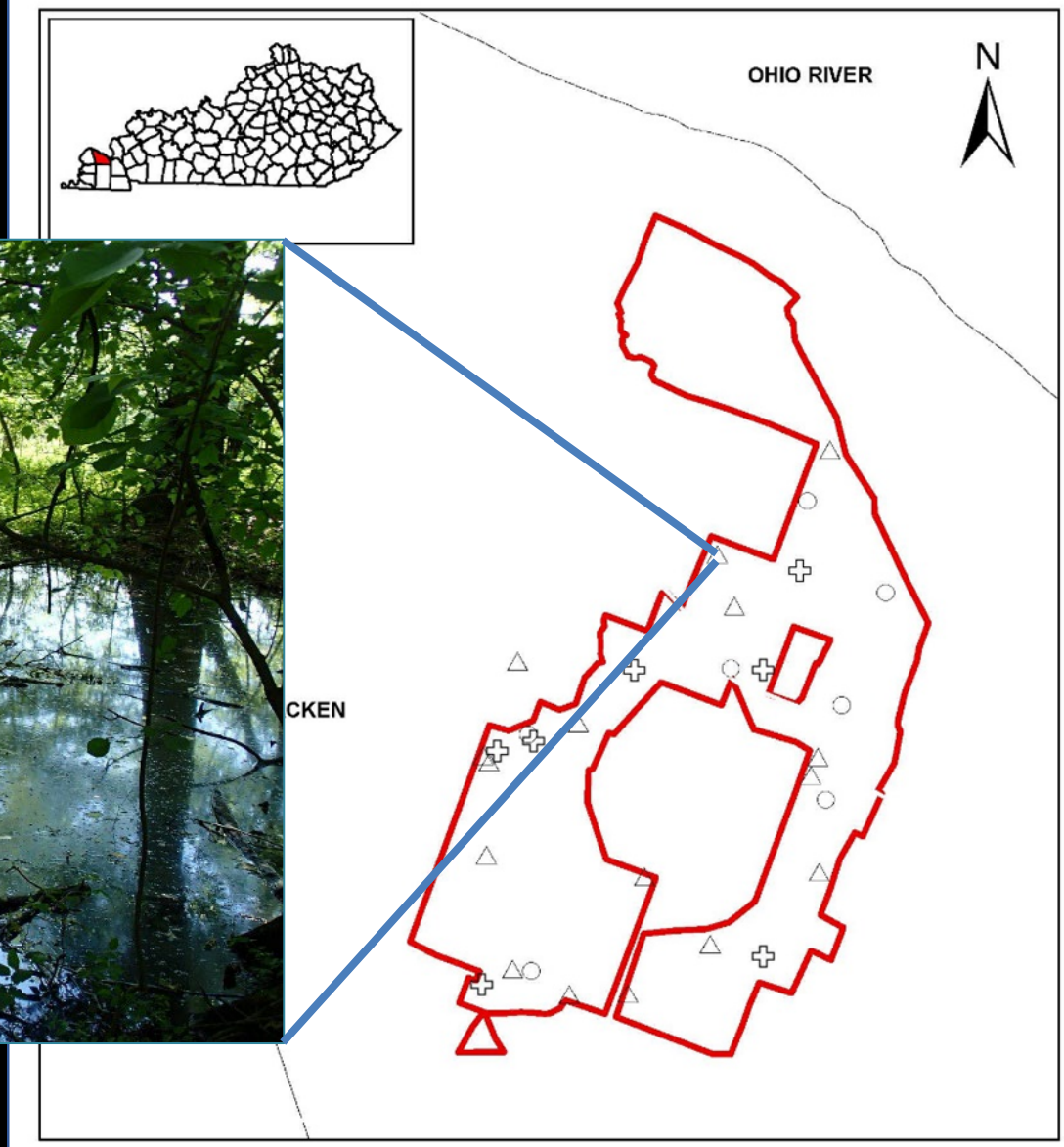
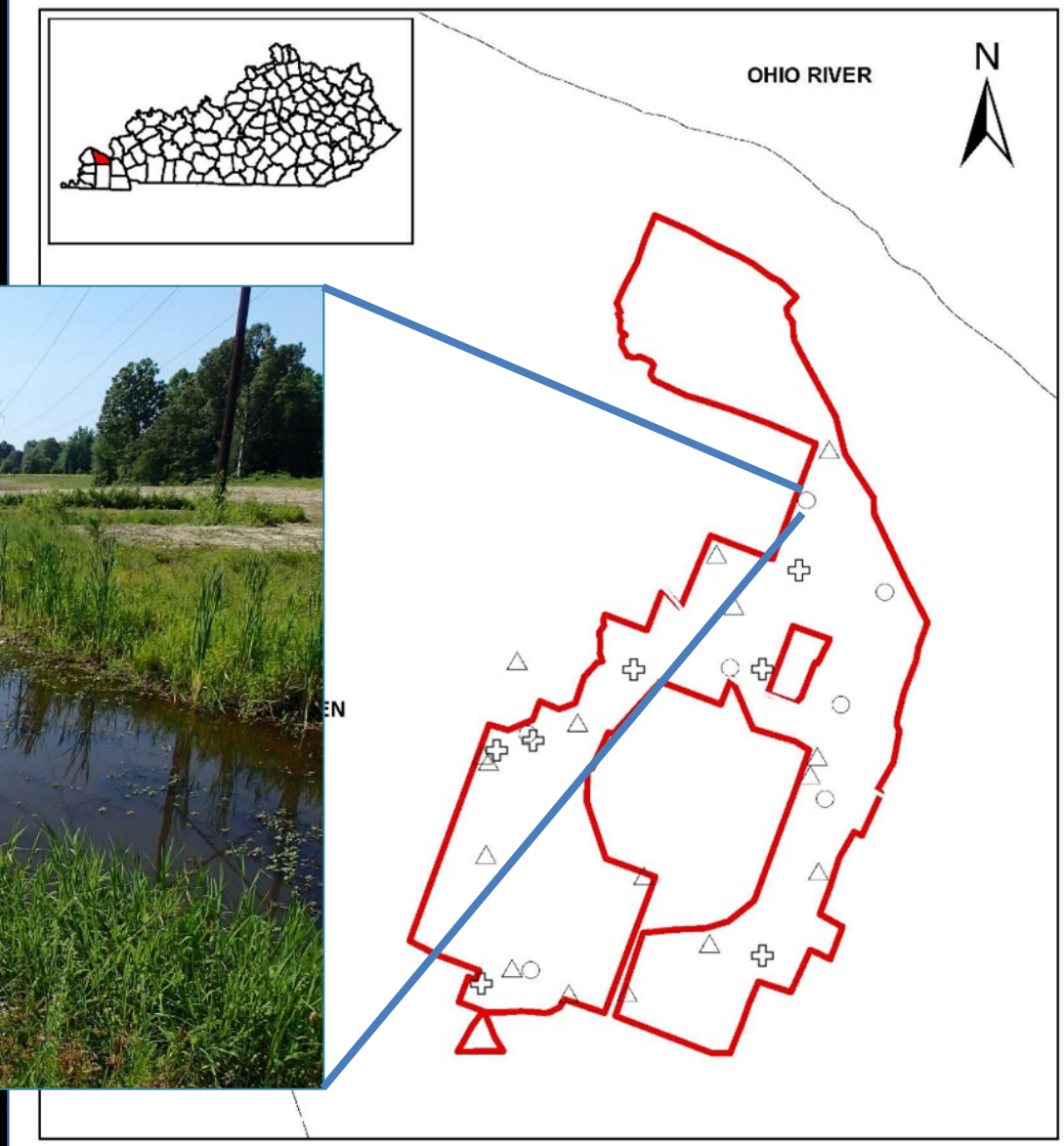
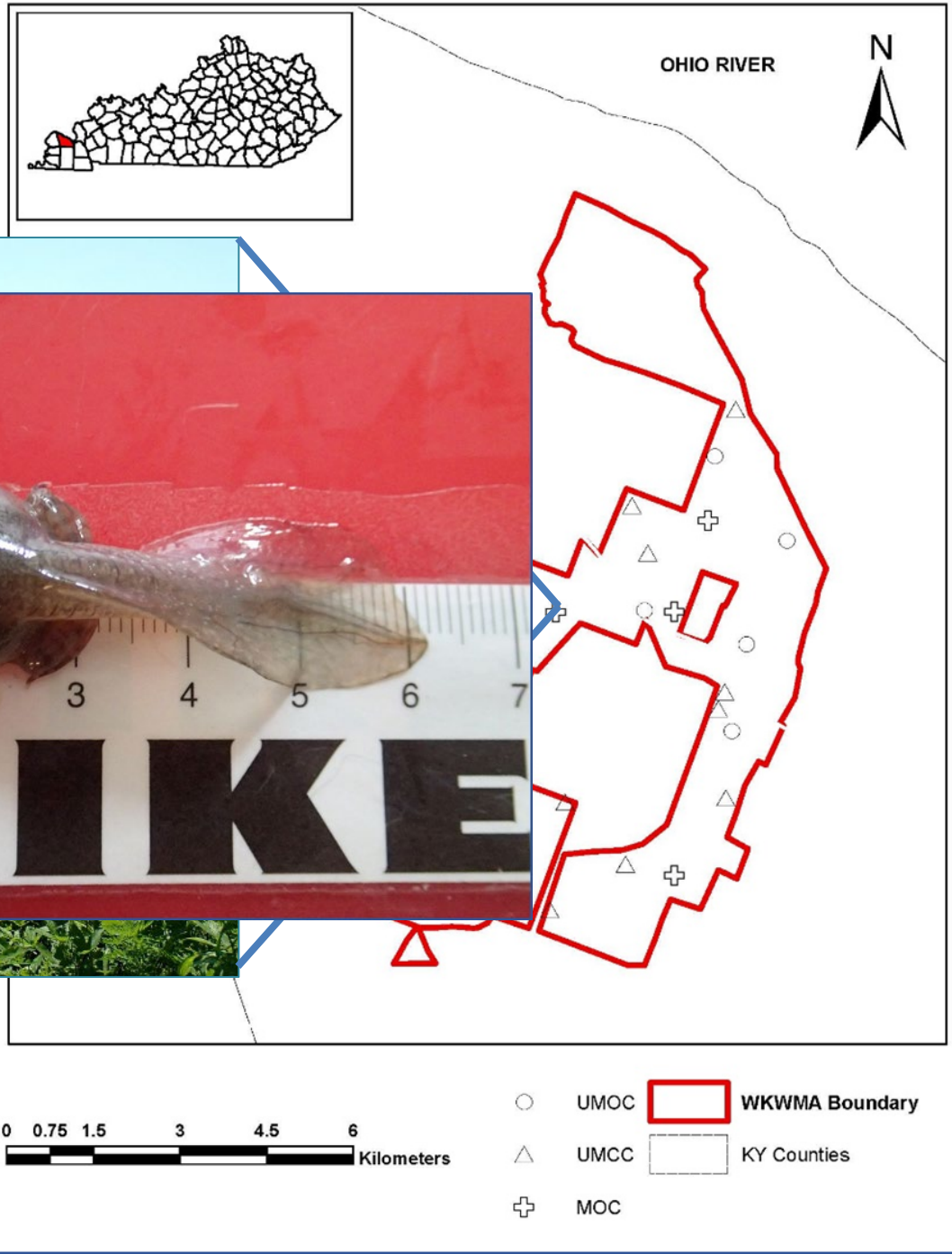


Unmanaged Closed Canopy (*n* = 16)

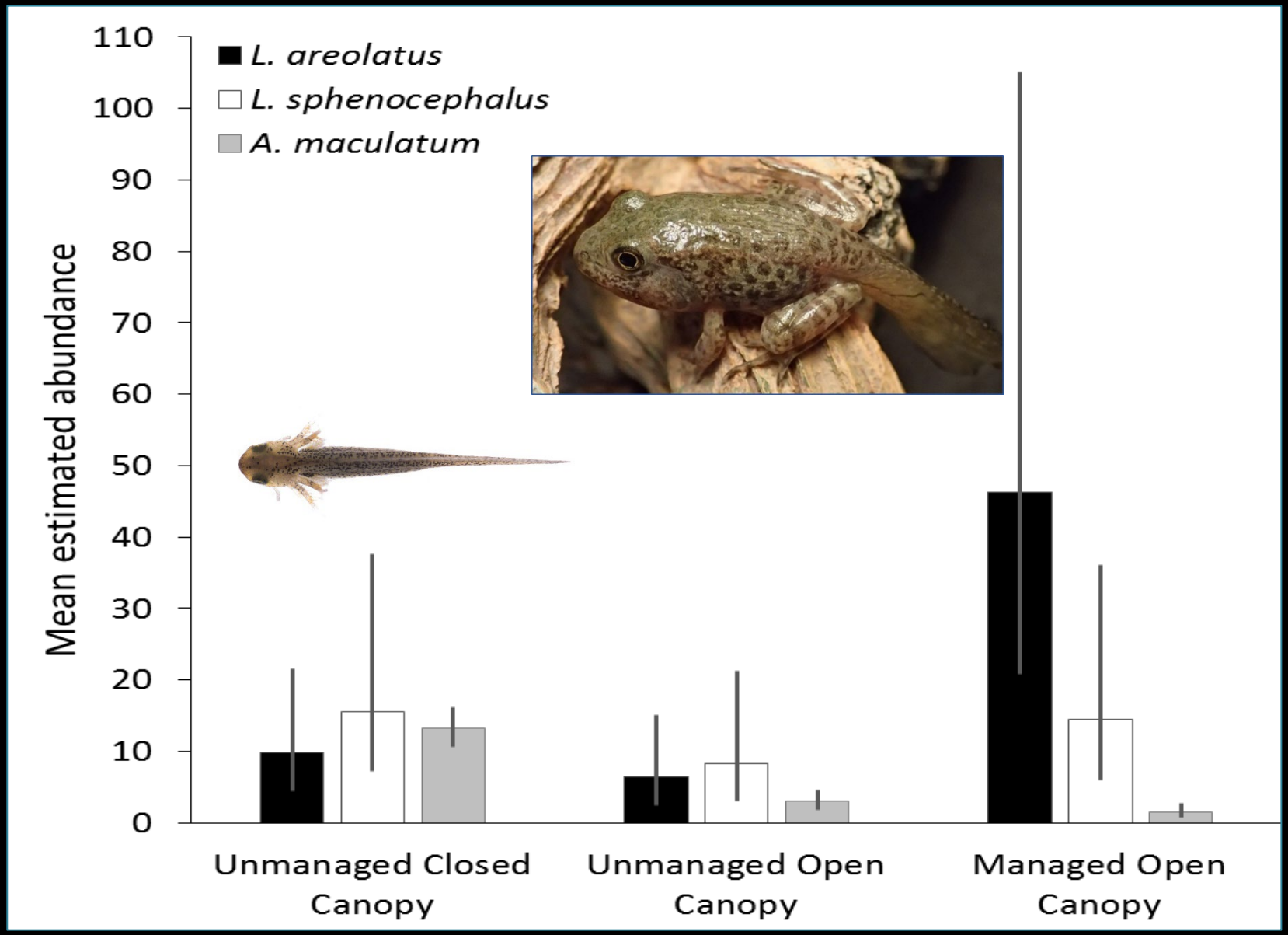


Unmanaged Open Canopy (*n* = 7)



Managed Open Canopy (*n* = 7)

Management Categories and Abundance



Drayer et al 2020 *Wetlands Eco. Man.*

What did we learn?

- Created wetlands with water control structures can support high diversity and abundant populations
  - Similar to unmanaged wetlands
- Created wetlands with water control structures appear to support abundant Crawfish Frog populations (tadpoles)
- Adjacent habitat matters too!

Wetlands

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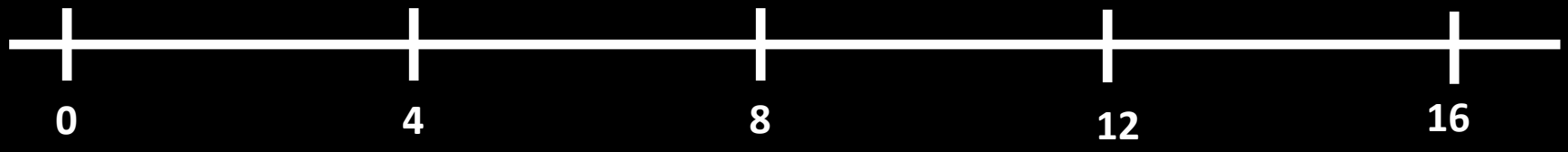
Wetland-breeding Amphibians

Reptiles, Amphibians and Wetlands