John M. Briggs
Arizona State University

- Brief overview of past and current work.
  - Hobbs et al. 2006. *(Global Ecol. Biogeogr.)* **15**, 1–7. *Novel ecosystems: theoretical and management aspects of the new ecological world order*
    - ‘Synthetic ecosystems include conditions and combinations of organisms never before in existence (Odum, 1962)’

- New experiment
  - Whole watershed “restoration”
  - Can (should?) we remove the wood?

LTER V: Global Change and Grassland Dynamics

Land Use Changes
- Fire
- Grazing
- Land use legacies

Climate Change
- Rainfall timing and amount
- Temperature

Nutrient Enrichment
- Elevated N deposition

Biological Invasions
- Species introductions

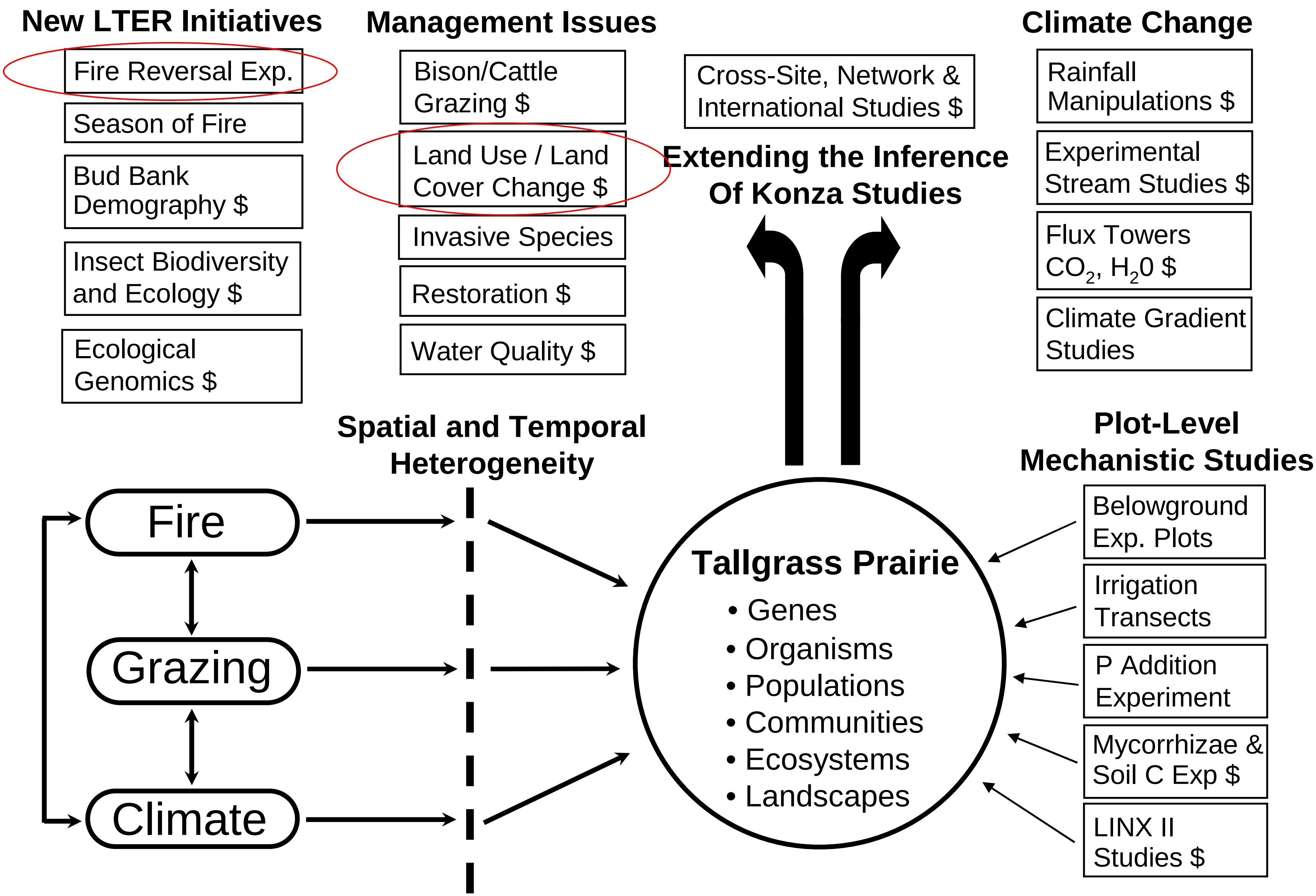
Tallgrass Prairie Ecosystems
Structure
Function
Biotic Interactions

Altered Hydrology

Altered Communities/ Land Cover Change

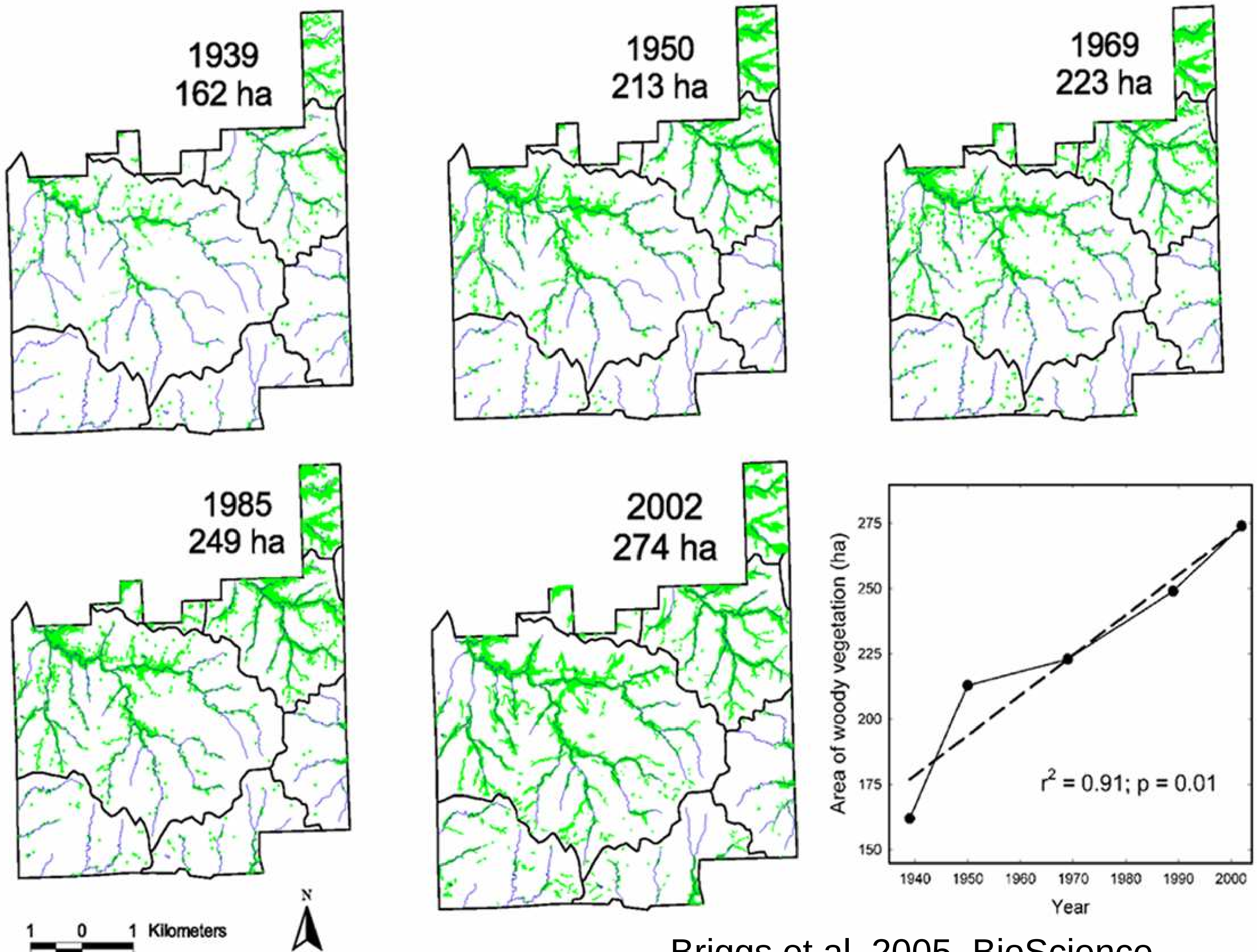
Altered Biogeochemistry

Integration of LTER Research at Konza Prairie



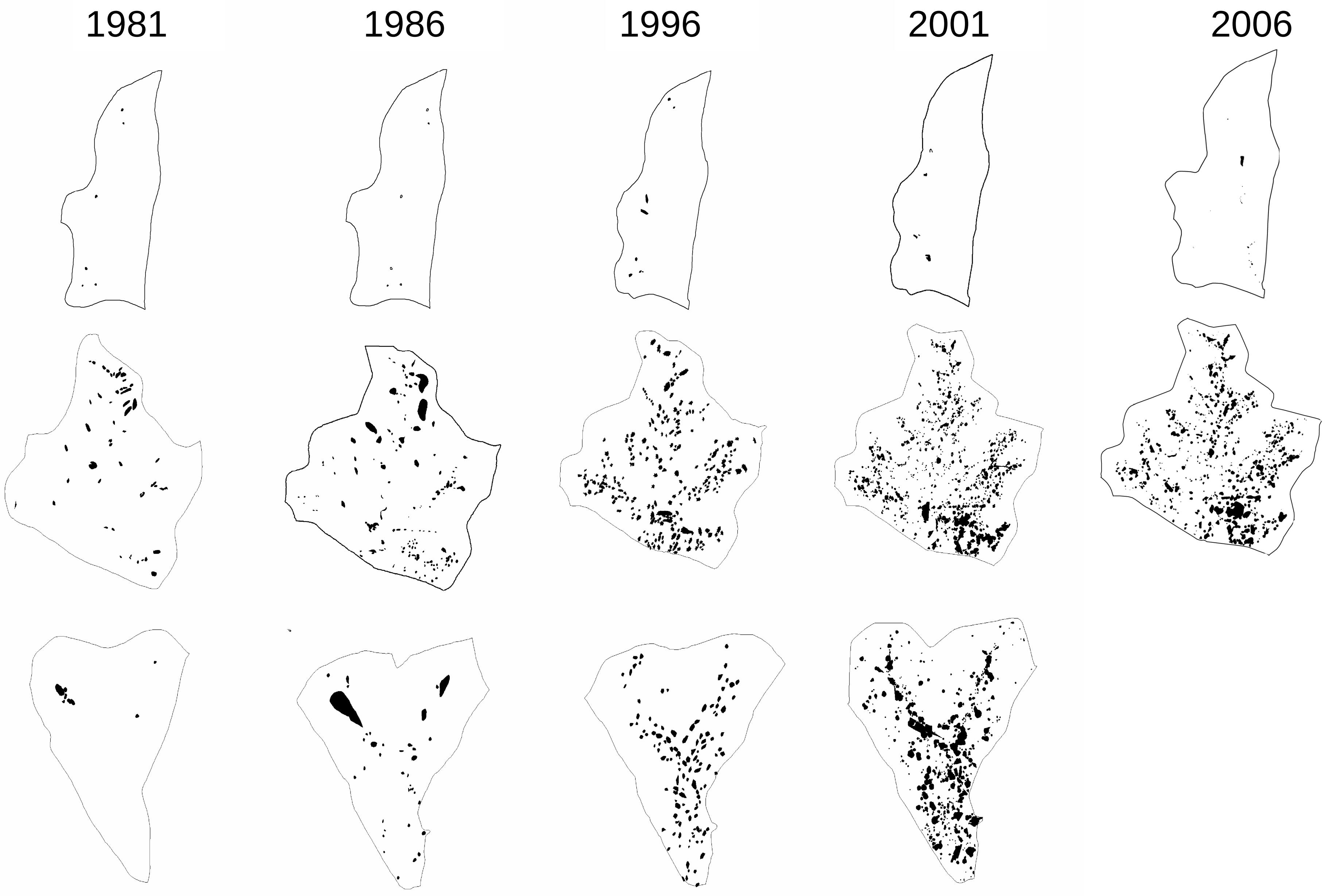
Planning for the future…

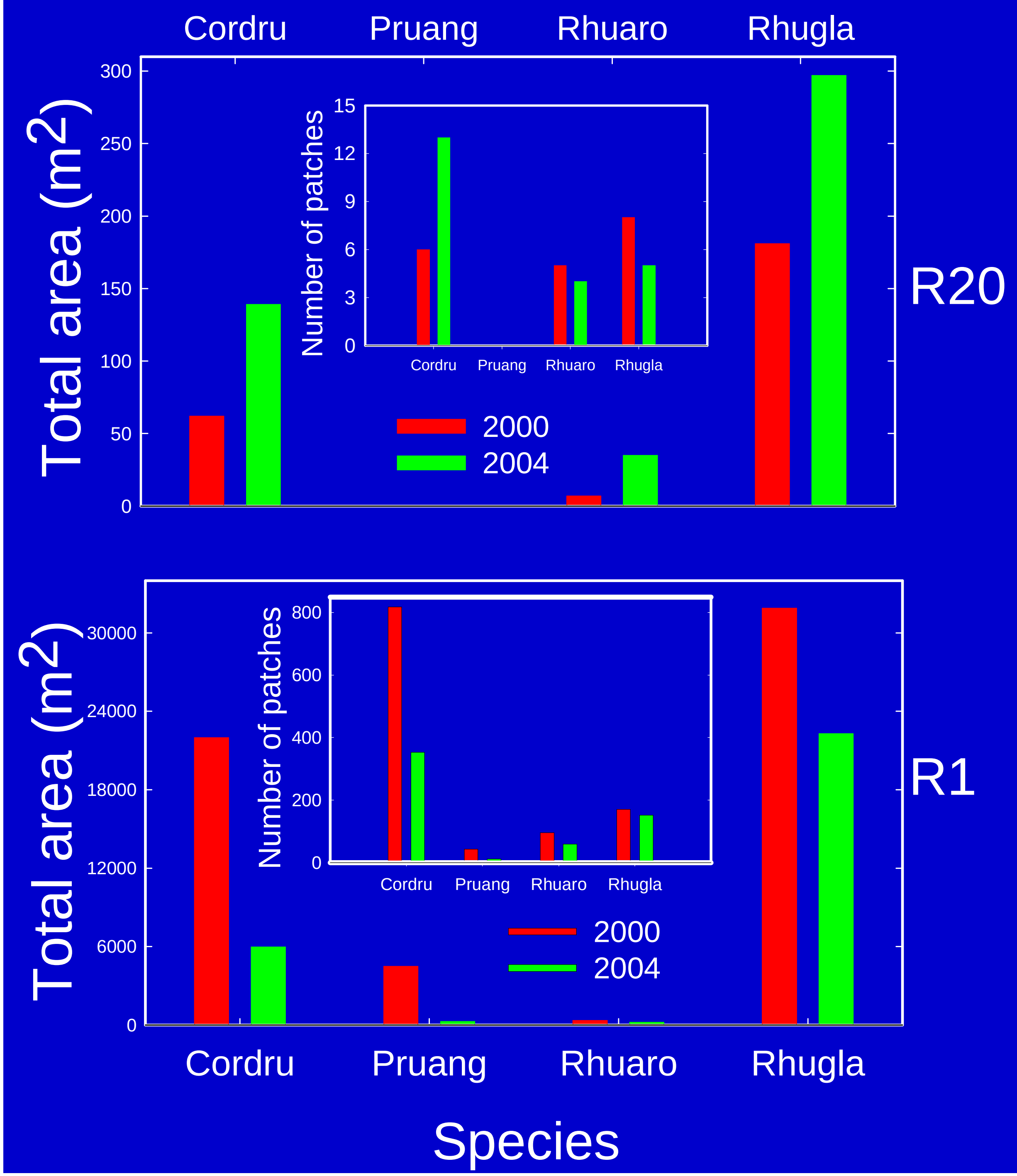
- ***Continue strong "core" long-term experiments and data collection on fire, grazing and climatic variability***; re-evaluate and refine as needed
- Mechanistic and predictive understanding of grassland dynamics and responses to multiple global change phenomena
- Synthesis (site-based, cross-site and network) of LTER results; continue developing and testing of ecological theory
- Complete conversion of the Konza LTER database to Network standards; enhance website & content delivery



Briggs et al. 2005. BioScience

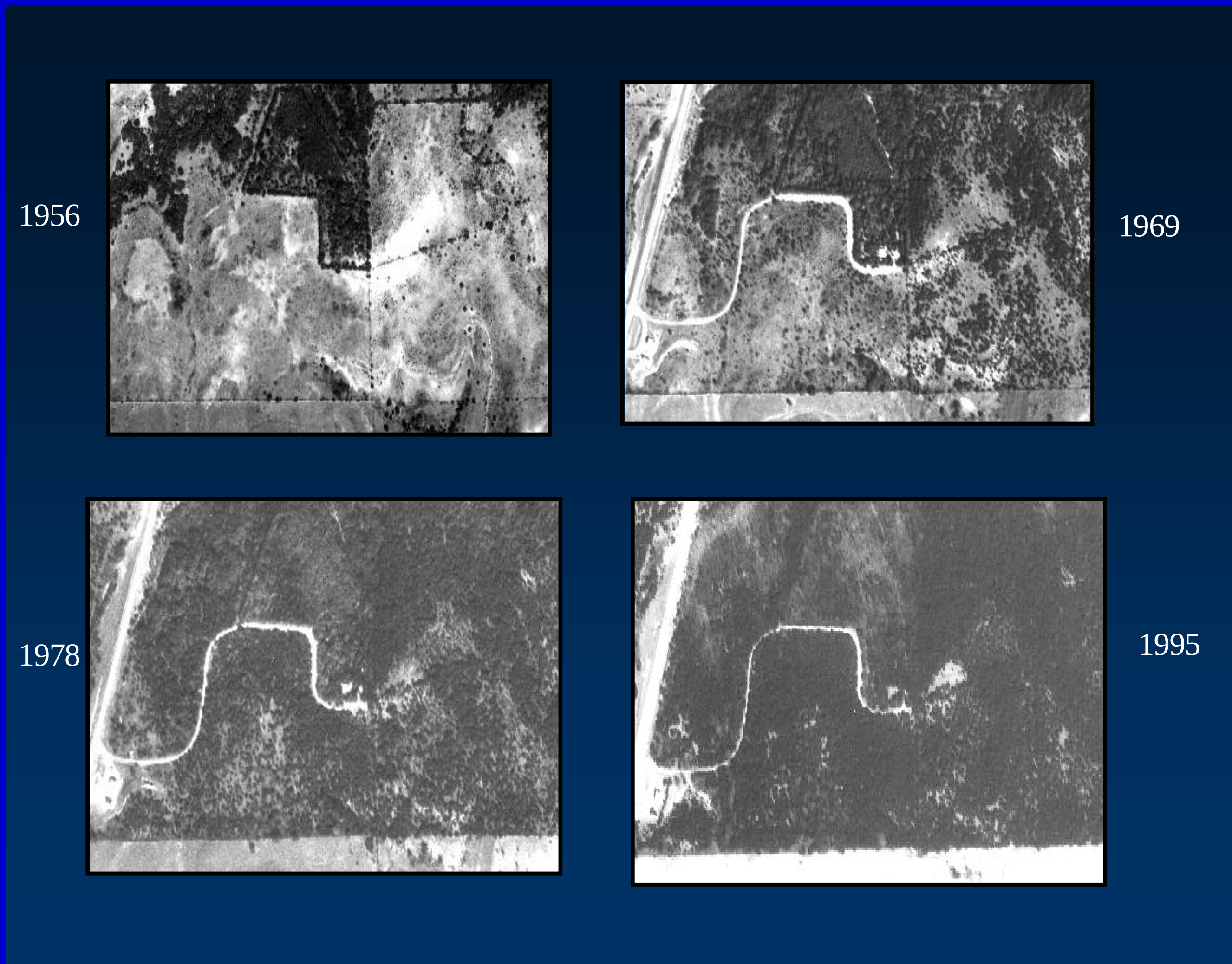
Updated from Briggs et al. 2005. BioScience





- Continue to survey entire watersheds every 3 years
- Develop/refine RS methods
- Establish permanent plots in “developing” Cornus islands in R20
- Establish “removal” plots?

Historical Aerial Photos: Importance of land management

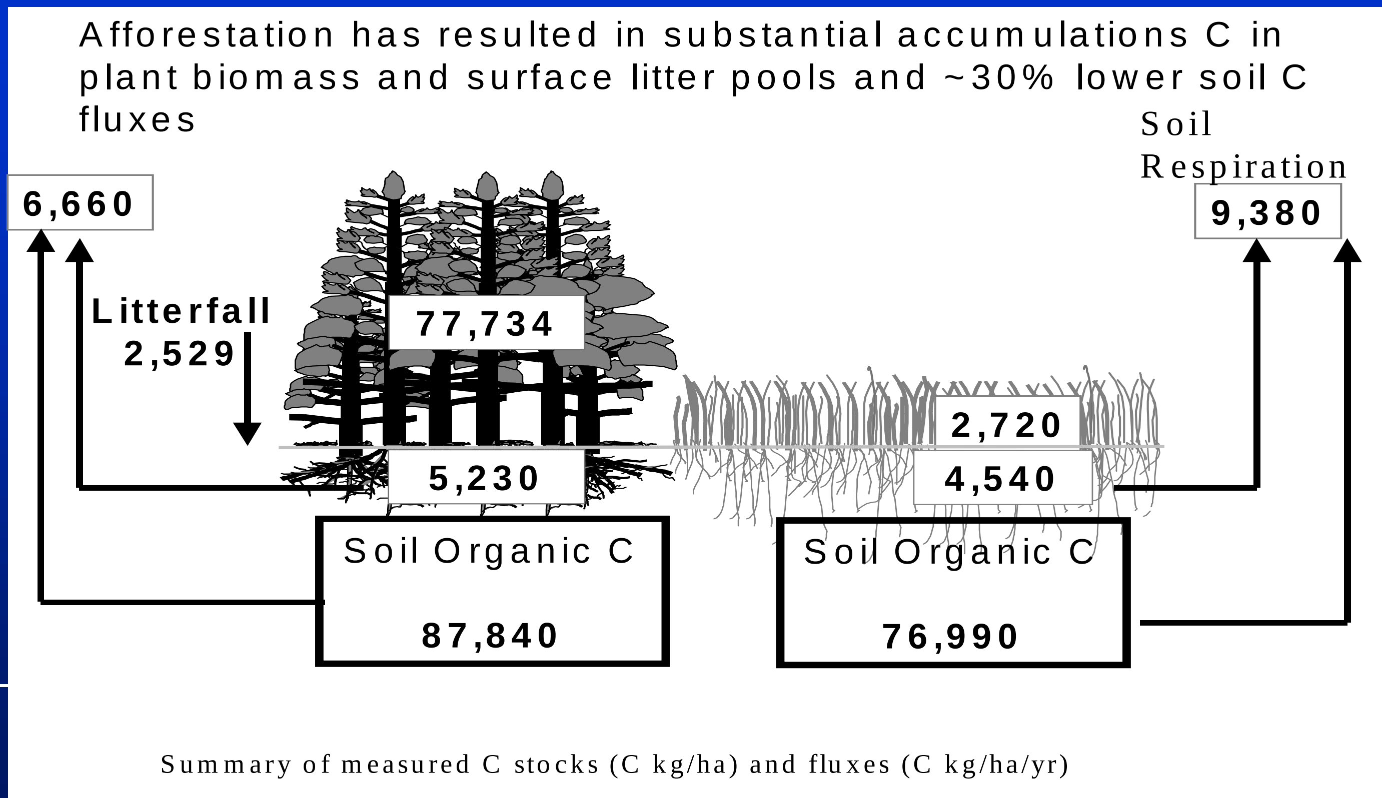


Junipers appear dark in color.

Note fenceline→ land management

Hoch et al. 2002. Ecosystems 5:578

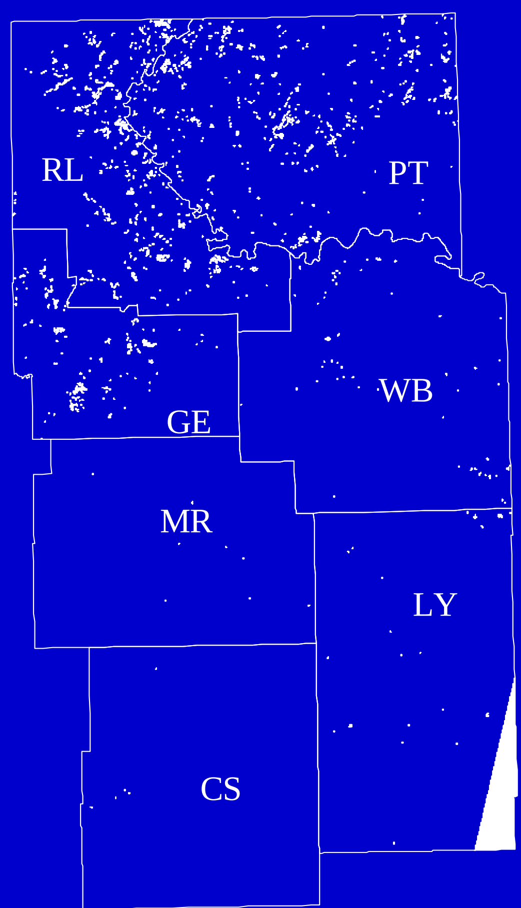
Ecosystem consequences of forest expansion



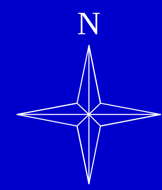
Summary of measured stocks and fluxes in grassland and closed canopy Juniper forest (40-60 year old forests). Note the dramatic shift in the distribution of C in biomass from belowground in prairie to aboveground in Juniper forest. Soil respiration in forest is reduced by~30% compared to grassland. (Norris et al.2001, Smith and Johnson 2004)

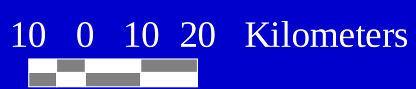
Effects of woody encroachment on ecological processes

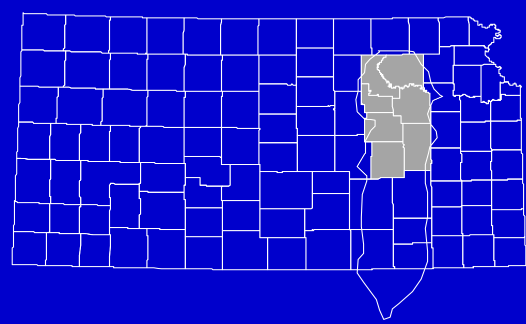
- ↓ herbaceous species diversity (over 50% lost of species)
- ↑ productivity (2-3x that of tallgrass prairie)
- ↑ plant biomass C and N (10- to 20x of tallgrass prairie)
- ↓ soil CO_2 flux (30% lower than prairie)
- ↑ soil C storage
- ↓ root tissue quality (higher C:N ratio)
- ↓ litter decomposition
- little change in soil N availability

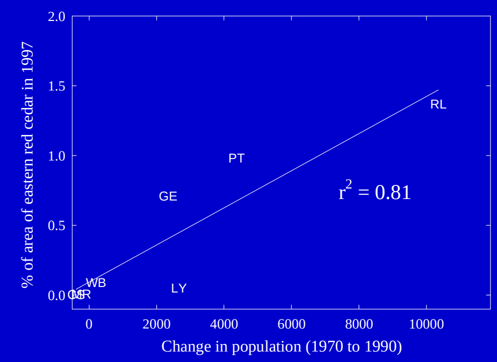


County	
CS	9 ha
GE	733
LY	104
MR	17
PT	2179
RL	2187
WB	196







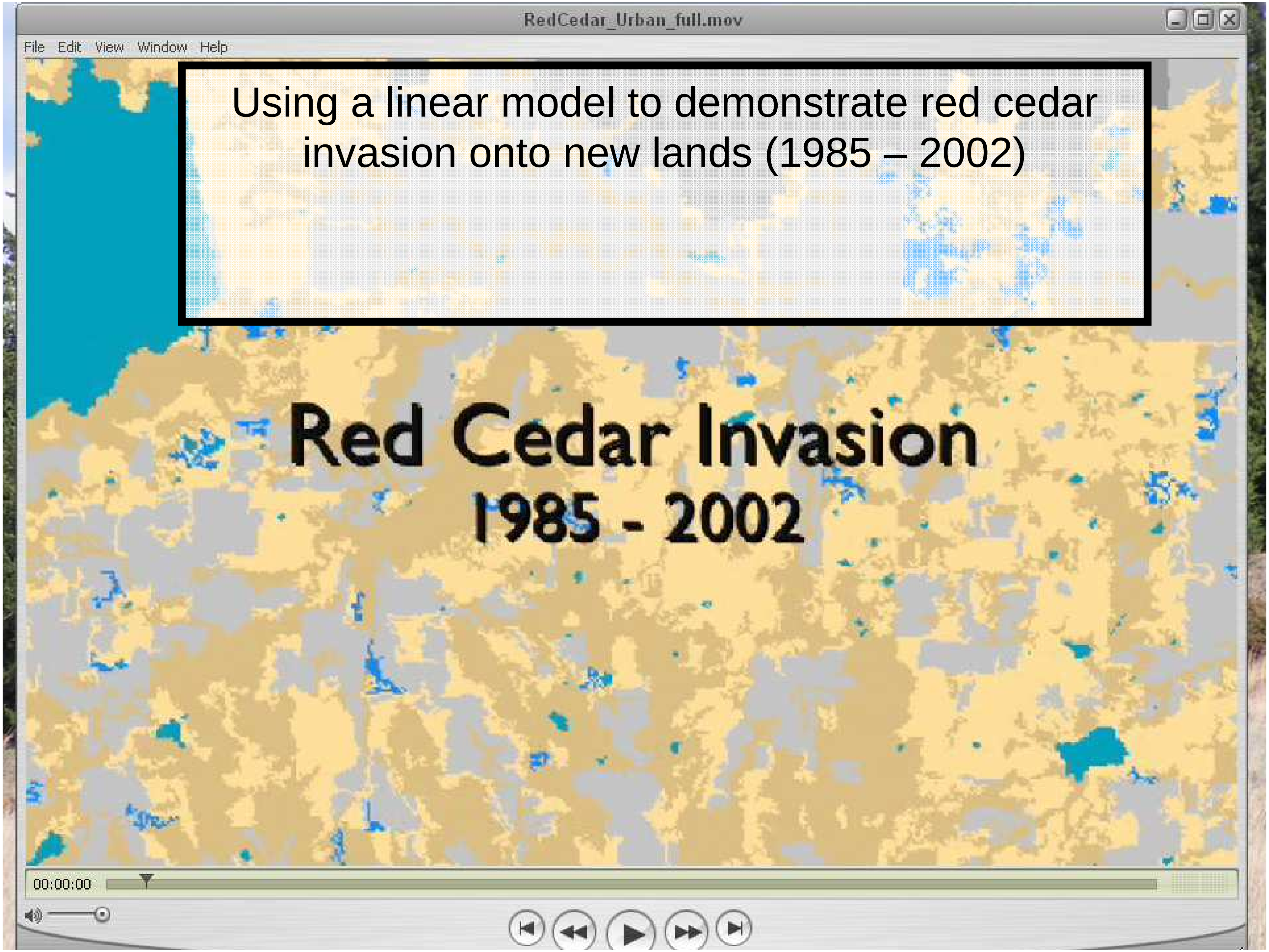


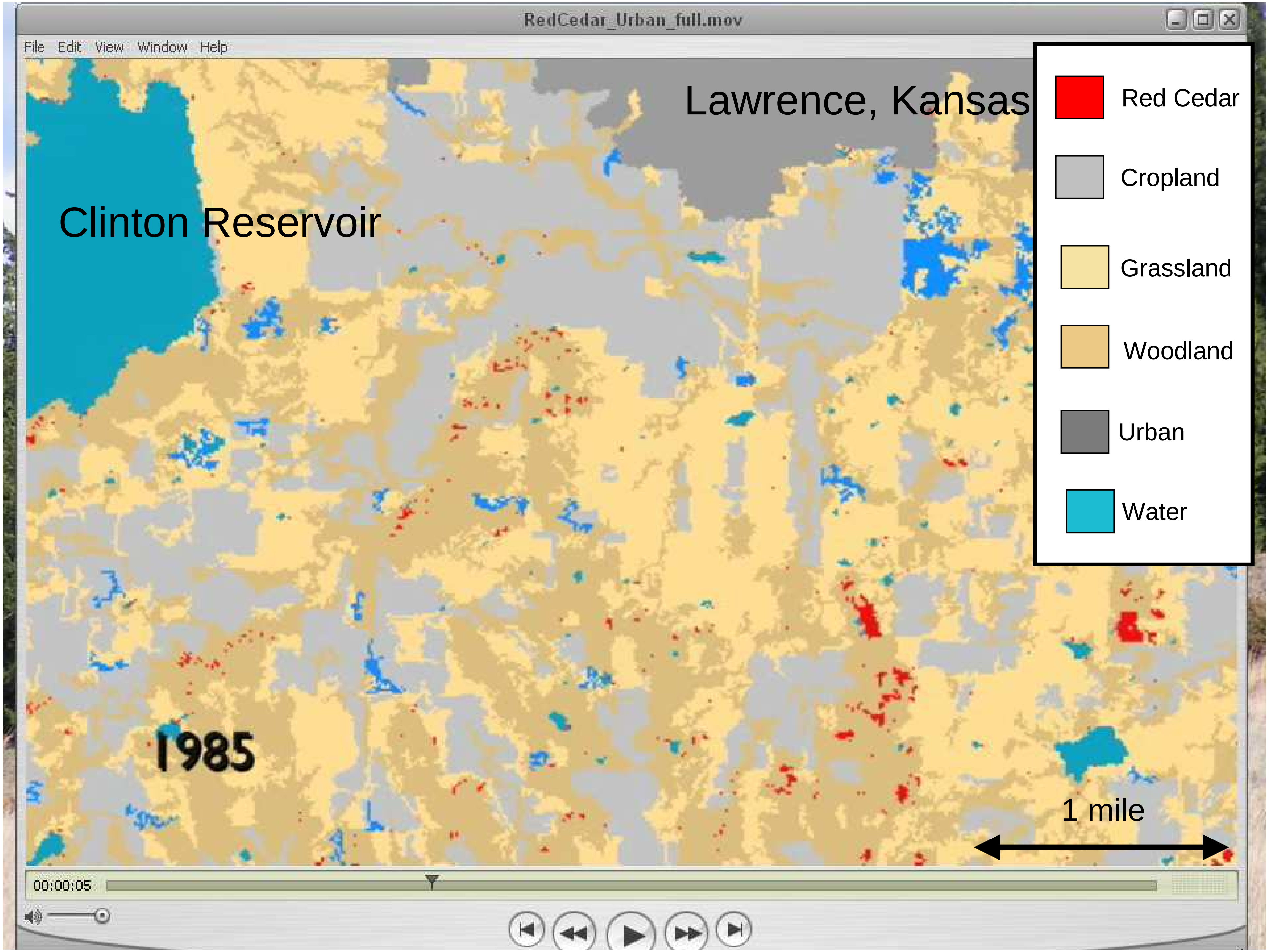
Estimating Cover of Red Cedar and Modeling its Invasion Patterns in a Central Great Plains Tallgrass Ecosystem

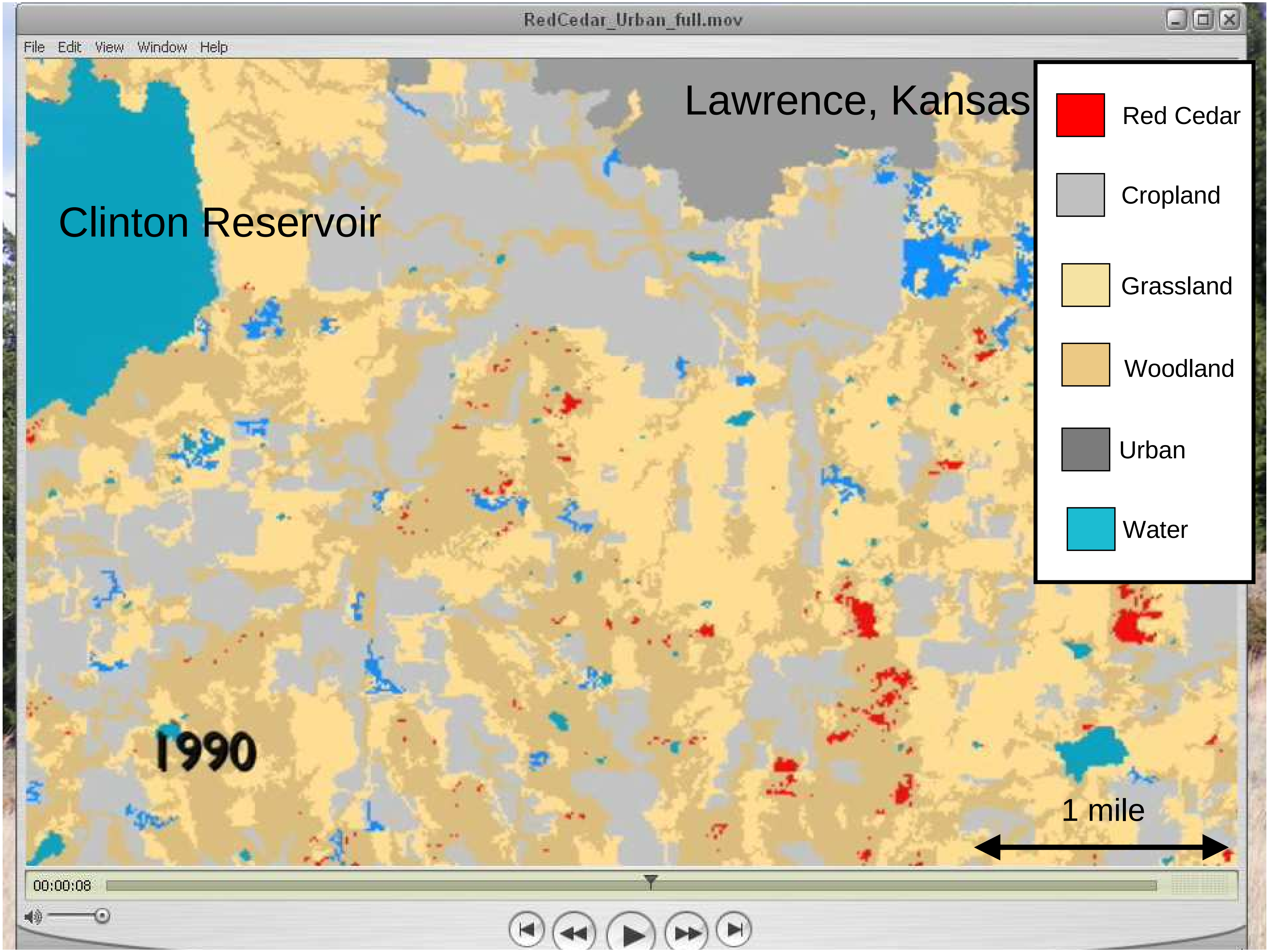
Kevin P. Price - University of Kansas
Jonathan B. Thayn - University of Kansas
Fangfang Yu - University of Kansas
Matthew E. Ramspott - University of Kansas
Derrick W. Voisey - University of Kansas
Jude H. Kastens - University of Kansas
Loretta C. Johnson - Kansas State University

Funded by
NASA Land Cover and Land Use Change Program
PI- Dr. Loretta C. Johnson
Kansas State University

Using a linear model to demonstrate red cedar invasion onto new lands (1985 – 2002)




RedCedar_Urban_full.mov
File Edit View Window Help
Lawrence, Kansas
Clinton Reservoir
Red Cedar
Cropland
Grassland
Woodland
Urban
Water
1985
1 mile
00:00:05


RedCedar_Urban_full.mov
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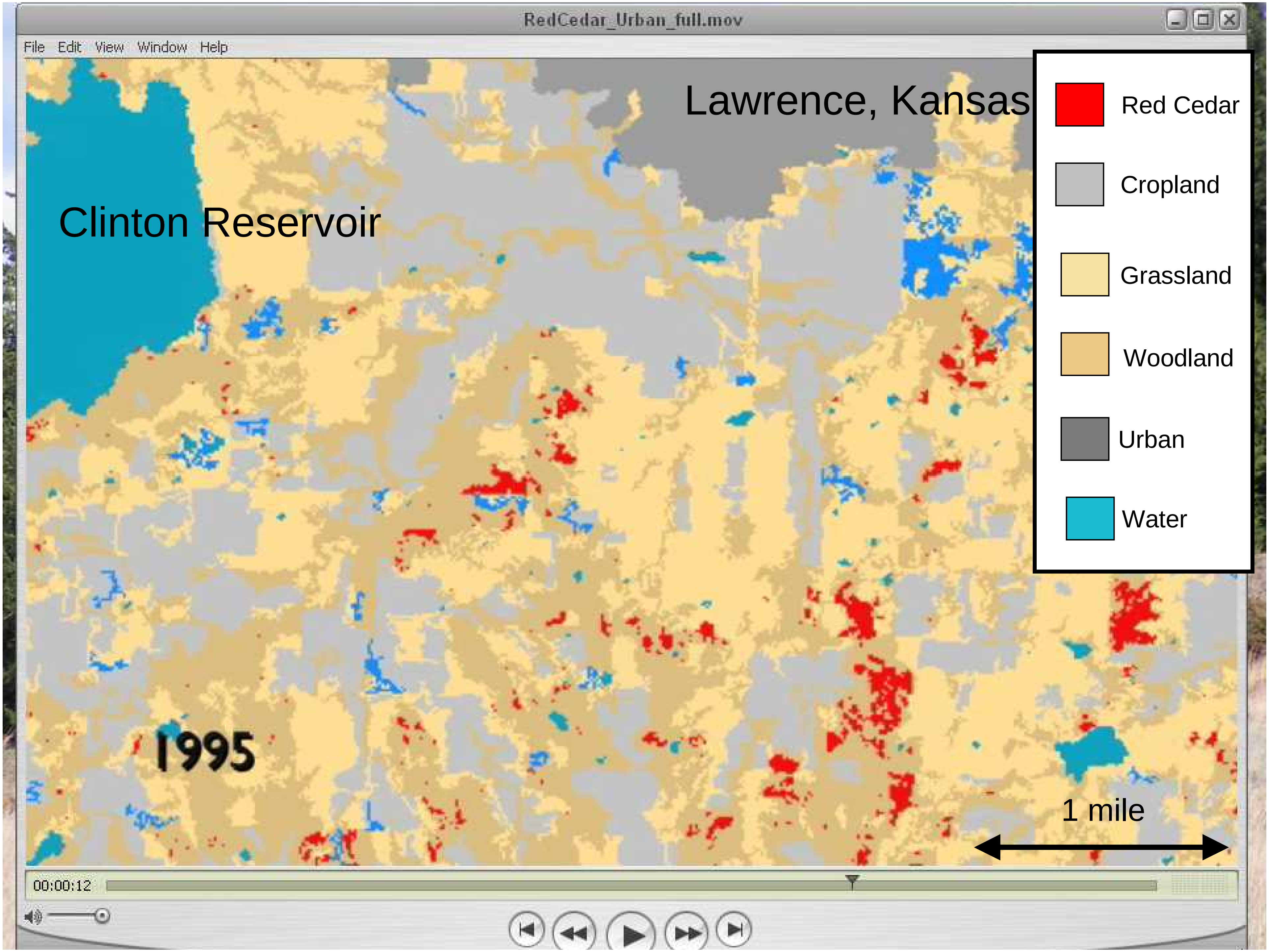
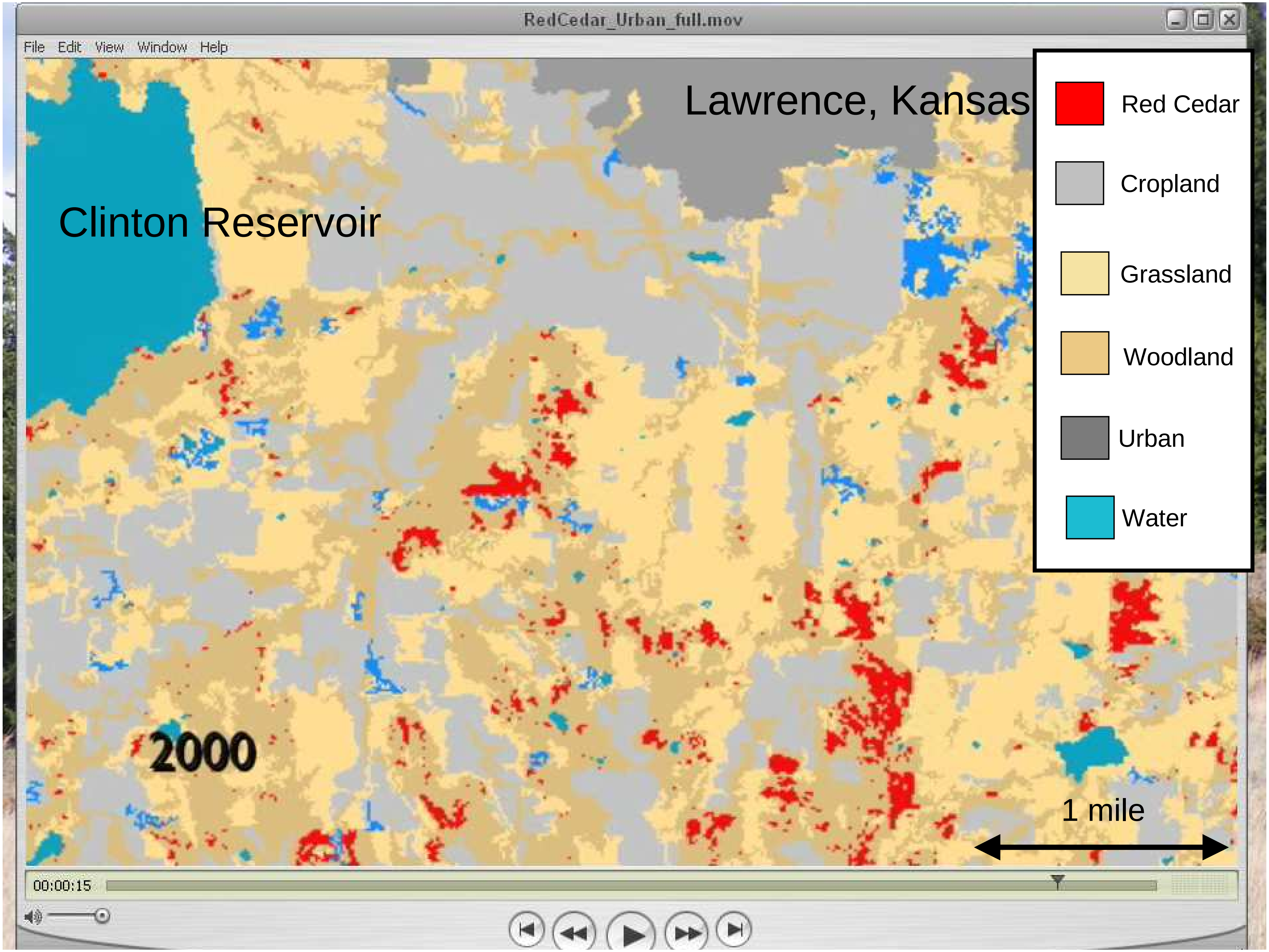
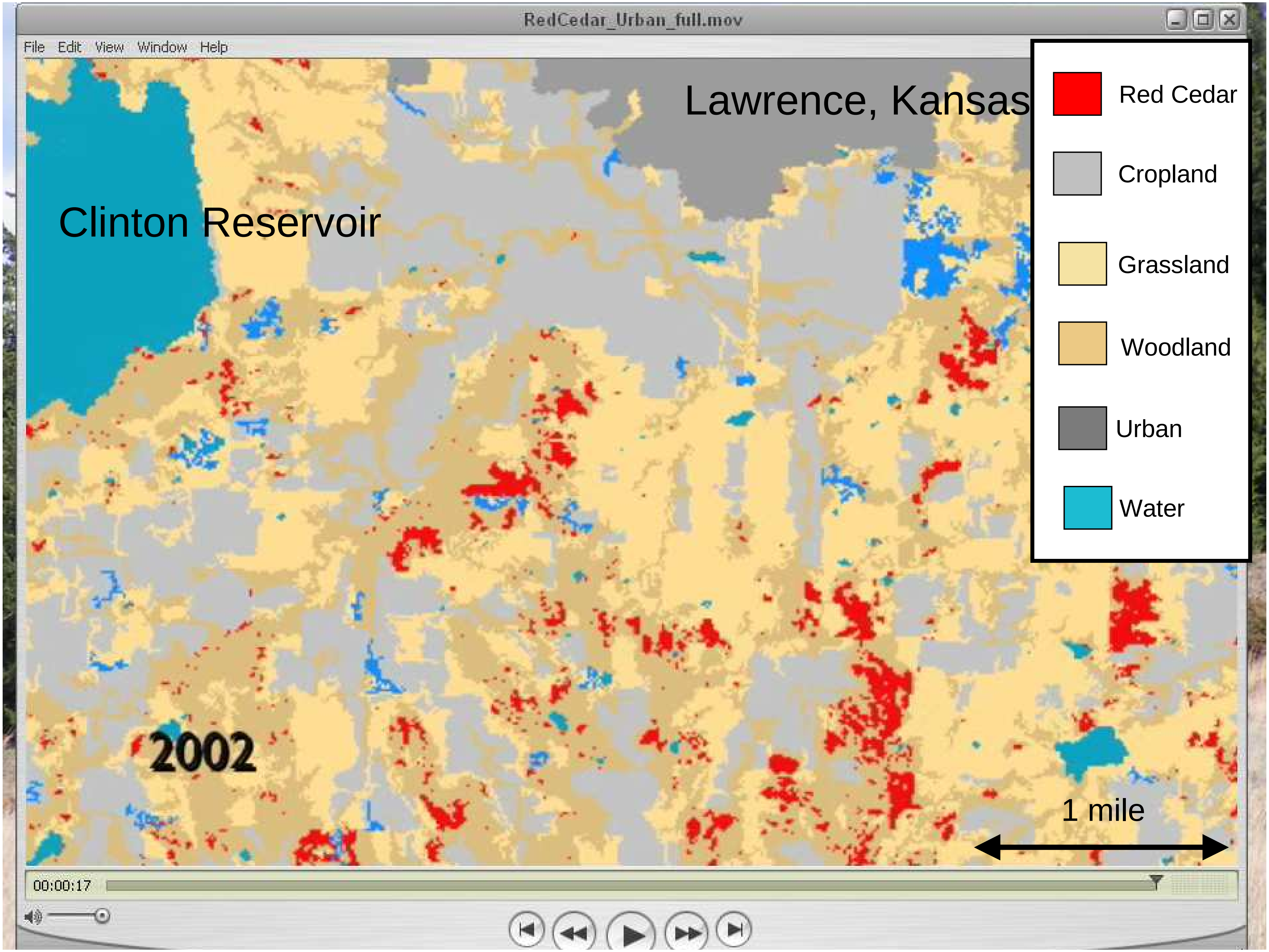
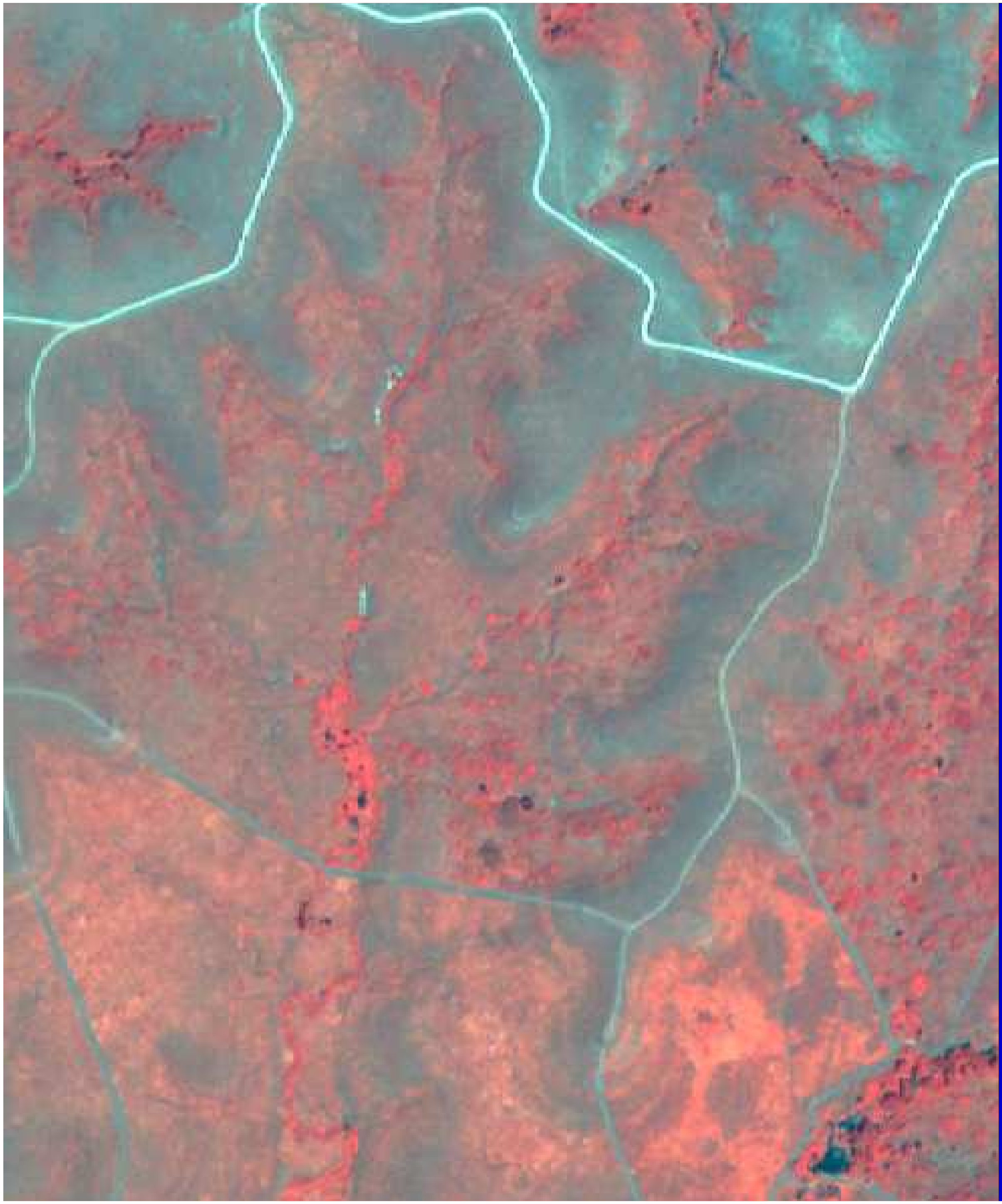
Lawrence, Kansas
Clinton Reservoir
Red Cedar
Cropland
Grassland
Woodland
Urban
Water
1990
1 mile
00:00:08


RedCedar_Urban_full.mov
File Edit View Window Help
Lawrence, Kansas
Clinton Reservoir
Red Cedar
Cropland
Grassland
Woodland
Urban
Water
1995
1 mile
00:00:12



RedCedar_Urban_full.mov
File Edit View Window Help
Lawrence, Kansas
Clinton Reservoir
Red Cedar
Cropland
Grassland
Woodland
Urban
Water
2000
1 mile
00:00:15


RedCedar_Urban_full.mov
File Edit View Window Help
Lawrence, Kansas
Clinton Reservoir
Red Cedar
Cropland
Grassland
Woodland
Urban
Water
2002
1 mile
00:00:17



- Quickbird© image 13 Aug. 2007
- ~2 m resolution (multi-band)
- ~60 cm (pan)
- Using object-based classification methodology (eCognition©) to merge field collected data with image file
- This will be test project for determining woody coverage of “region”
  - Gradient from Tallgrass Prairie Preserve (OK) to Konza
- NEON spectral data?

Pan QuickBird Image

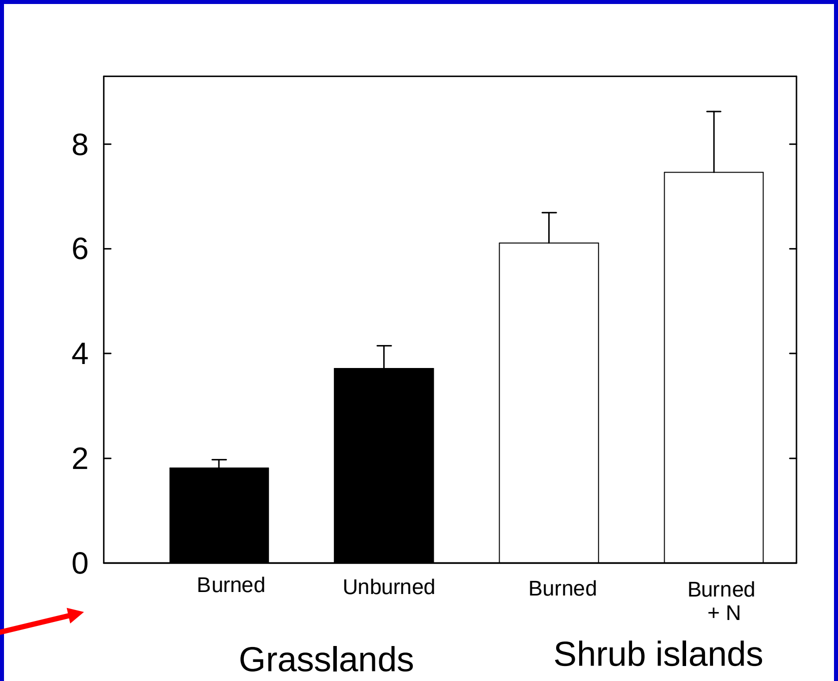
- 70cm resolution

•See individual trees

•Historic land use (seeding of brome fields)

Watershed Restoration

- Overall goal is to examine the role of chronic resource alteration as both a driver of change and a barrier to recovery, using grasslands that have recently experienced large increases in woody plant cover.
  - Change fire frequency on K20A and N20A to annual burns
    - Permanent plots of shrub (*Cornus* and *Rhus glabra*) areas
    - Alter resource (N) availability
  - Resample/revise Michelle's shrub removal plots
  - Establish new shrub removal plots
- Will require extra funds



Nitrogen gradient resulting from experimental manipulations of grasslands at Konza Prairie. Data from Heisler (2003) and Blair (1987).