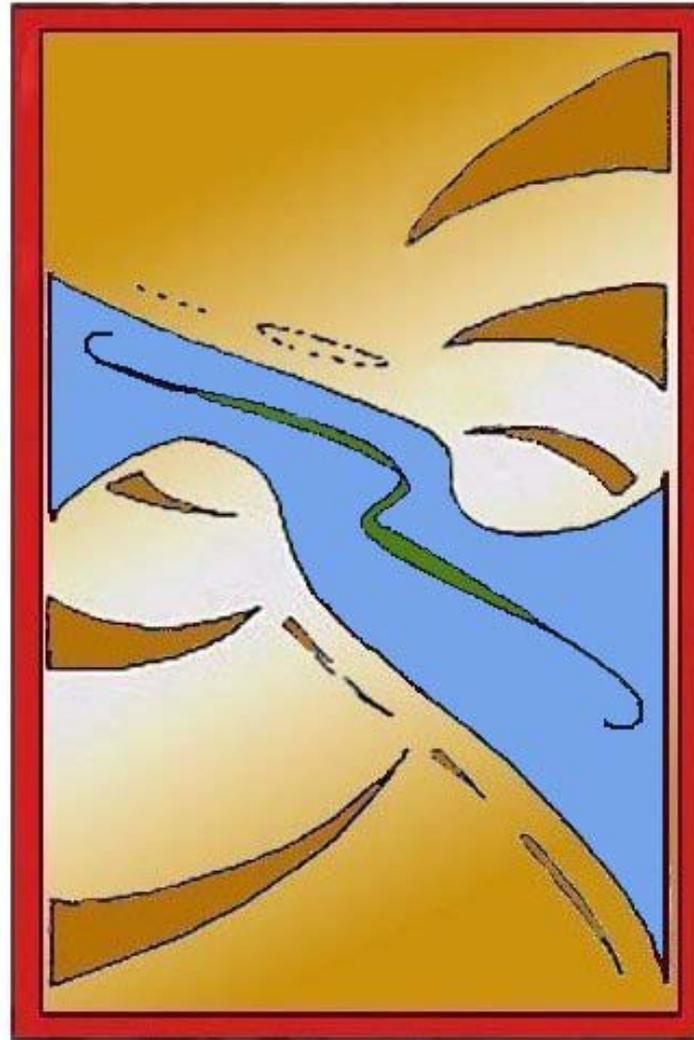


Green River Preserve



Western Kentucky University

Western Kentucky University's Green River Preserve:

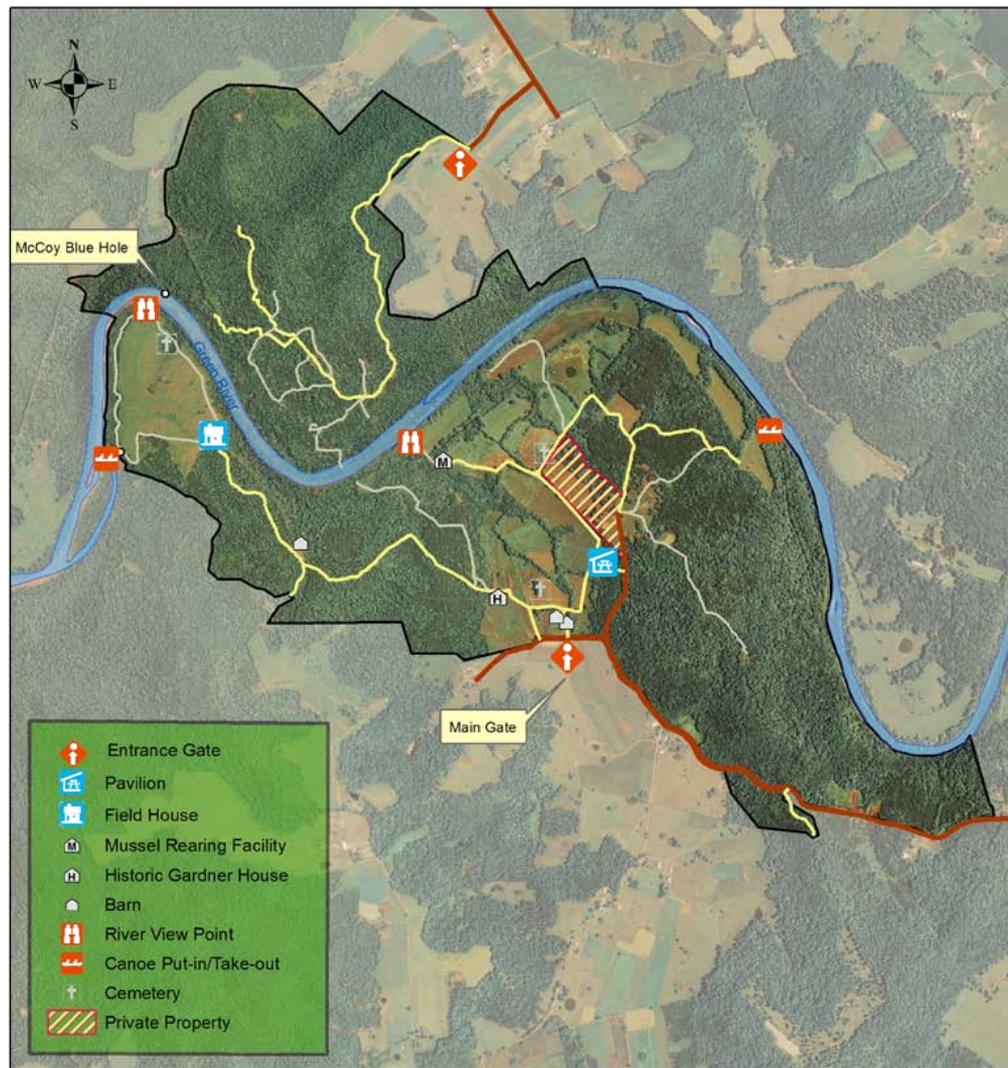
A History and a Future of Education, Research, Conservation, and Service

Drs. Ouida Meier, Albert Meier, & Scott Grubbs

24 January 2014

The mission of the Green River Preserve:
to foster knowledge and protection of our
highly diverse region and natural heritage
through research, education, and conservation.

WKU Upper Green River Biological Preserve



0 200 400 800 1,200 1,600 Meters



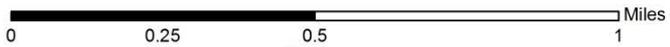
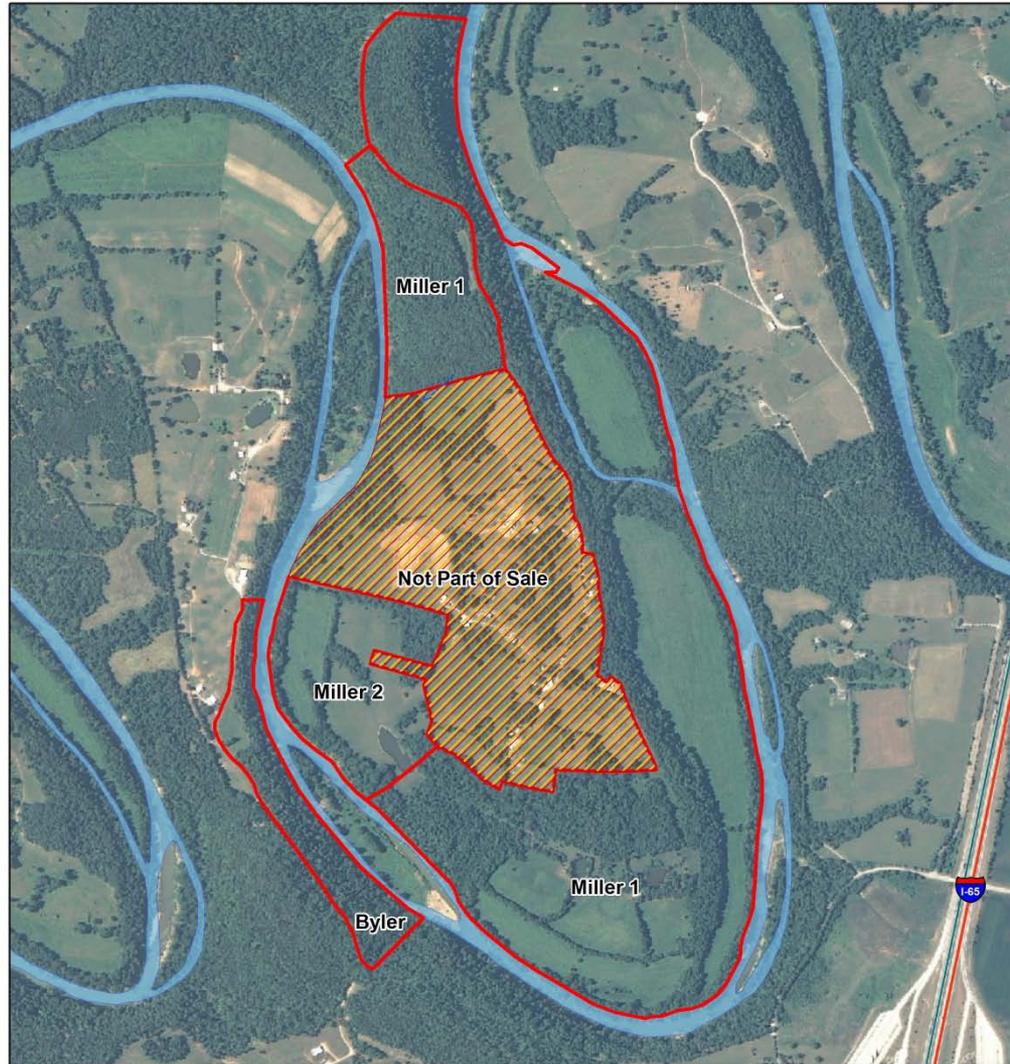
Road Type
 — Paved Road
 — Gravelled Road
 — Ungravelled Path



Sources: USGS, KY Div. of Geographic Information, WKU
 Cartographer: CJ Johanson, Western Kentucky University, October 2011
 In the lab of Dr. Ouida Meier, Center for Biodiversity Studies



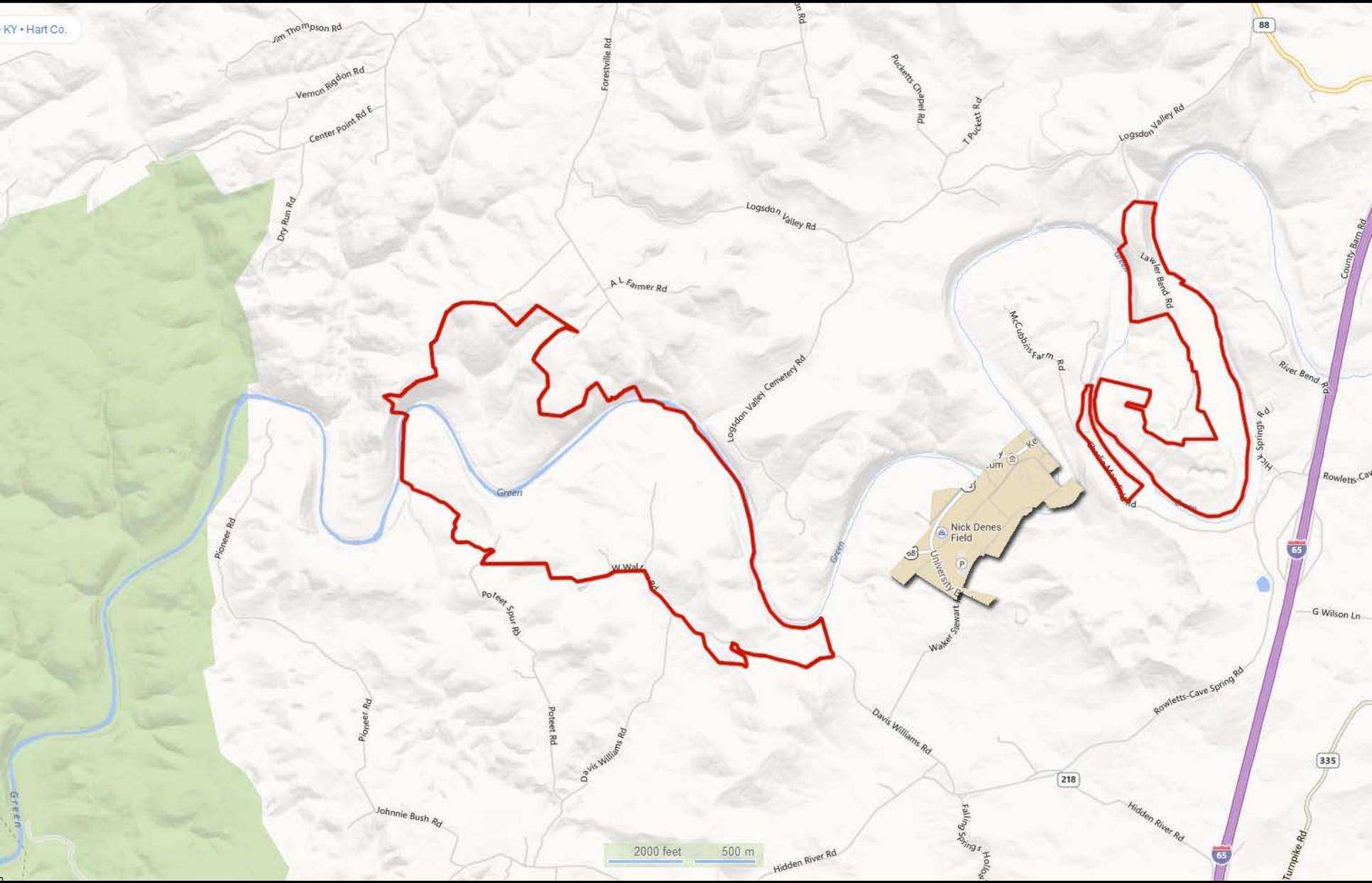
WKU Upper Green River Biological Preserve



Lawler Bend Purchase

Sources: USGS, KY Div. of Geographic Information, WKU
Cartographer: CJ Johanson, Western Kentucky University, February 2012
In the lab of Dr. Ouida Meier, Center for Biodiversity Studies





2000 feet 500 m

- 
- Funding
 - Education
 - Research
 - Conservation
 - Service
 - Future Directions

Kentucky Heritage Land Conservation



Funding

Over \$3.6 million received to date for acquisition, management, and baseline inventories / research

Most from KHLCFB

Some from USFWS mitigation

Cooperation with DOW for 2 tracts

Total area of WKU GRP is 1,508 acres (as of Dec. 19, 2013)

Education:



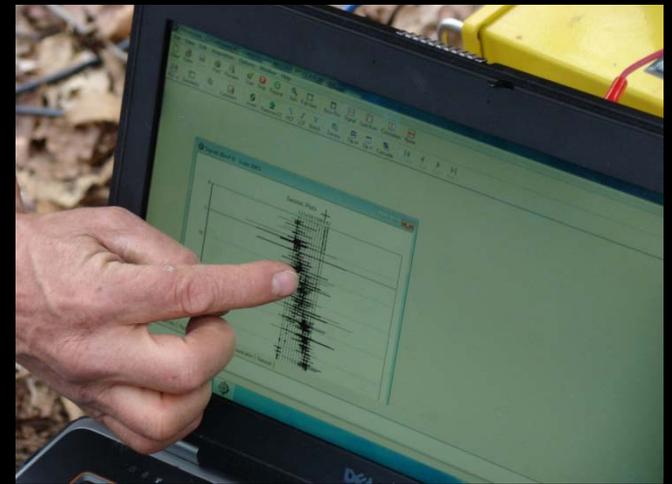
Biology:

zoology, ecology,
wildlife management,
aquatic field biology,
entomology, aquatic
insects, plant taxonomy,
internships



Education:

Geology:
structural geology,
environmental
geology,
sediments and
stratigraphy



Education:

Folk studies:
vernacular architecture,
field anthropology,
internships



Education:

K-12:

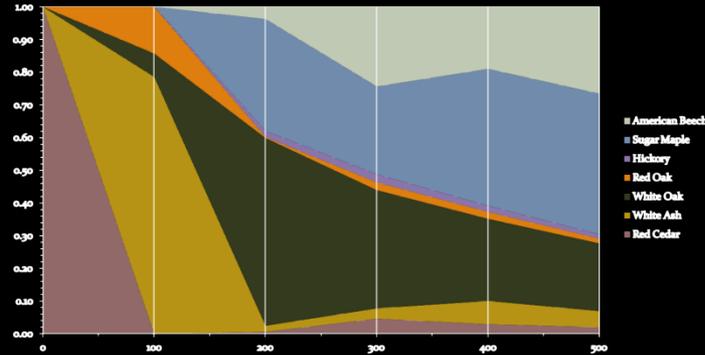
VAMPY

ecology,

Hart Co. H.S.

AP environ.sci.

Forest Succession



Education – Student Awards:

National

2008 Goldwater Scholarship awarded
and 1 current nominee

University/College

2010 Minton Award

2011 Outstanding Female Scholar Athlete of the Year

2010 Outstanding Ogden College Graduate Student of the Year

Departmental

2010 Outstanding Biology Teaching Assistant

2009, 2012 Outstanding Biology Undergraduate

2011 Outstanding Geography Undergraduate

2008, 2011, 2013 Gleason Award - best research, Biology undergrad

2003, 2007, 2010, 2012 Outstanding Biodiversity Student



Research

- 14 Peer-reviewed publications
 - 12 since 2008; 5 in 2013-2014
 - 8 with a total of 19 student authors
- 12 Master's theses
- 7 Honor's theses
- Over 100 Presentations at conferences
- Students included as co-authors in most of this work

- Acceleration of research within the past 5 years

- Over \$2.2 million in external grants & contracts associated with work at the GRP or including it as a study site

Ecology Research Areas:

Ecology of the Green River Watershed

- Algae: distributions across time and space; nutrient enrichment
- Stable isotopic analysis of food webs
- Influences of karst on food webs of the Green River and global change
- Mussel research
- Impact of CREP restoration on water quality in the Green River basin

Restoration Ecology

- Native grassland species / small mammal interaction
- Forest restoration research
 - Herbaceous plant dispersal and restoration
 - Influence of fire on forest herbs
- Influences of CREP grasslands on avian communities

Bioacoustic work

- Bioacoustic monitoring and analysis (birds and frogs)

Aquatic ecology research in the Green River: Evaluating excess nutrients in a karst watershed



Barrens re-creation and research on plant-animal interactions



Bioacoustic research on birds and frogs





Avian species in CREP and non-CREP Fields



Species	p-value < 0.05
American goldfinch	0.000060
Blue grosbeak	0.003844
Brown-headed cowbird	0.049489
Common yellowthroat	0.027059
Field sparrow	0.000450
Indigo bunting	0.033239
Northern bobwhite	0.015973
Notthern cardinal	0.001199
Ruby-throated hummingbird	0.049489
Yellow-breasted chat	0.033469

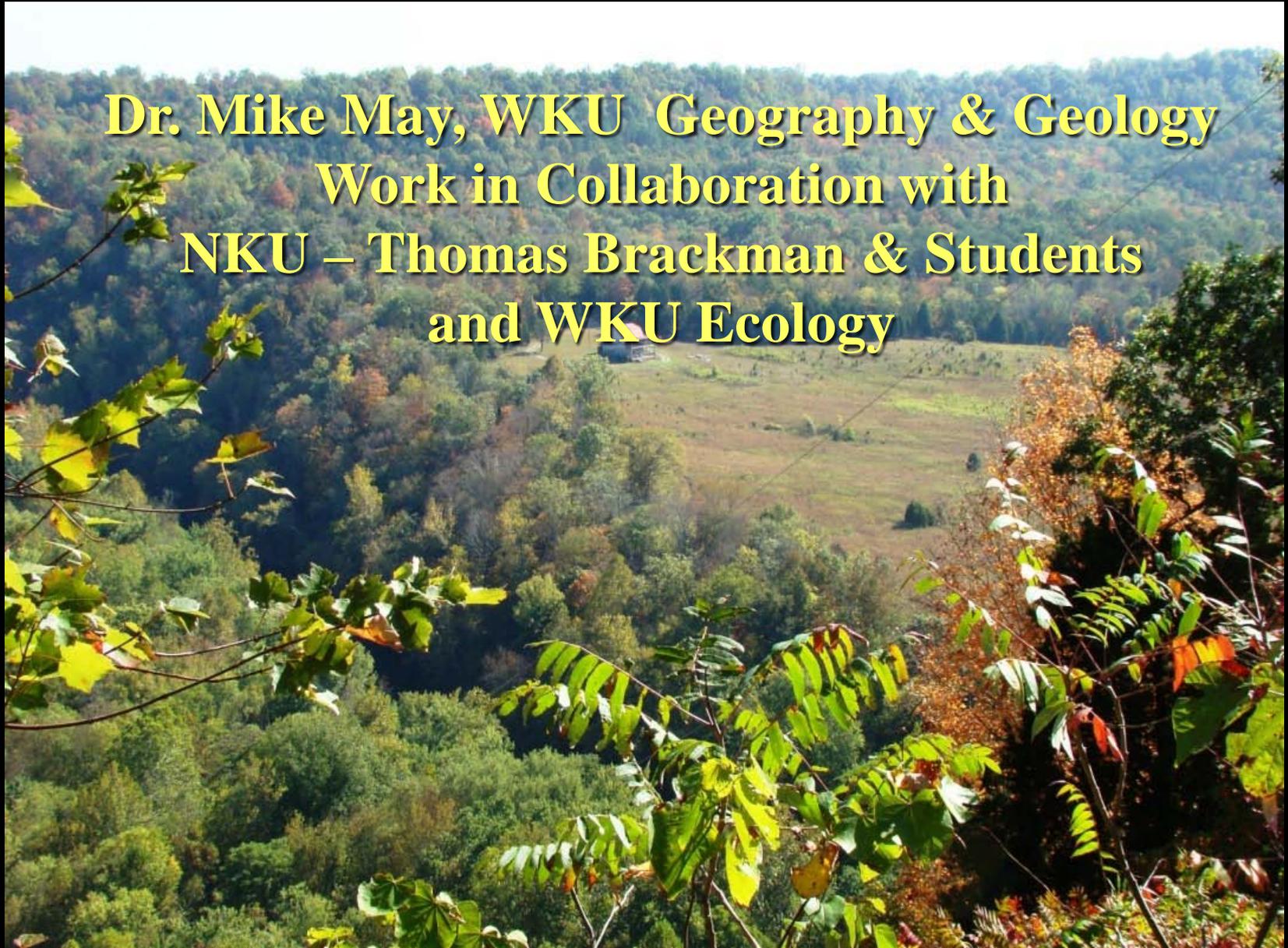
Species	p-value < 0.05
Eastern meadowlark	0.000450
Grasshopper sparrow	0.033239
Mourning dove	0.011365



- **10 of 35 species** found in the 19 sites were found significantly more often in CREP sites than in pasture sites.
- **3 species** were found significantly more often in pasture sites than CREP sites.

Select Geophysical Surveys of the GRP

**Dr. Mike May, WKU Geography & Geology
Work in Collaboration with
NKU – Thomas Brackman & Students
and WKU Ecology**



Geophysics

Indirect Methods/Non-invasive

Purpose – to look at earth materials & associated fluids

Determine soil/rock interface; depth to groundwater, soil moisture etc.

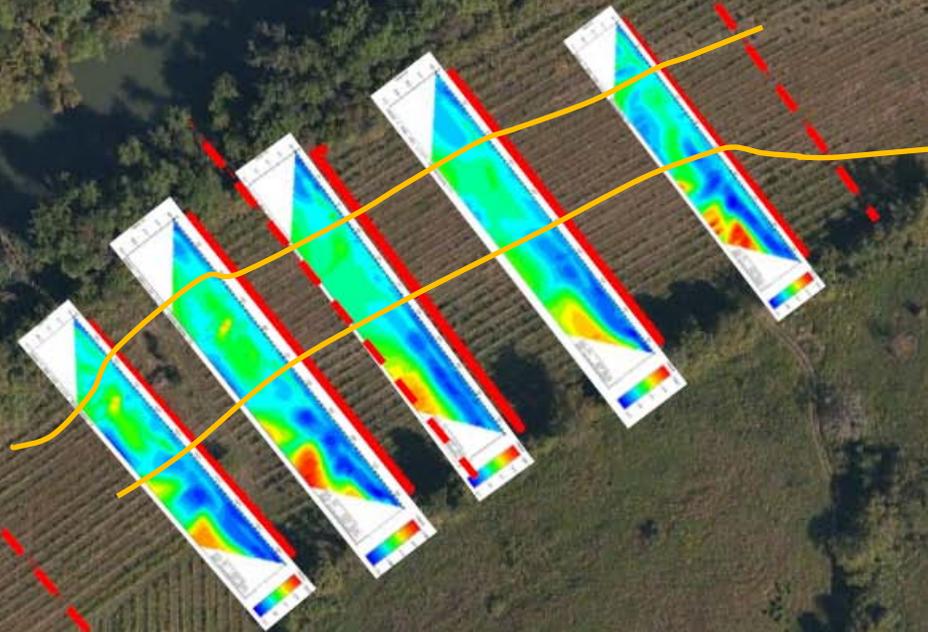


Electrical Resistivity (ER)

Station: 3D array, surveying in ER lines



Relating resistivity to moisture and tree growth



----- Electrical resistivity 2007
————— Electrical resistivity 2013

0 40 80 120 160 200 240 280 320 Feet



**Folk Studies and Anthropology:
Dr. Michael Ann Williams and
Dr. Darlene Applegate and their students**

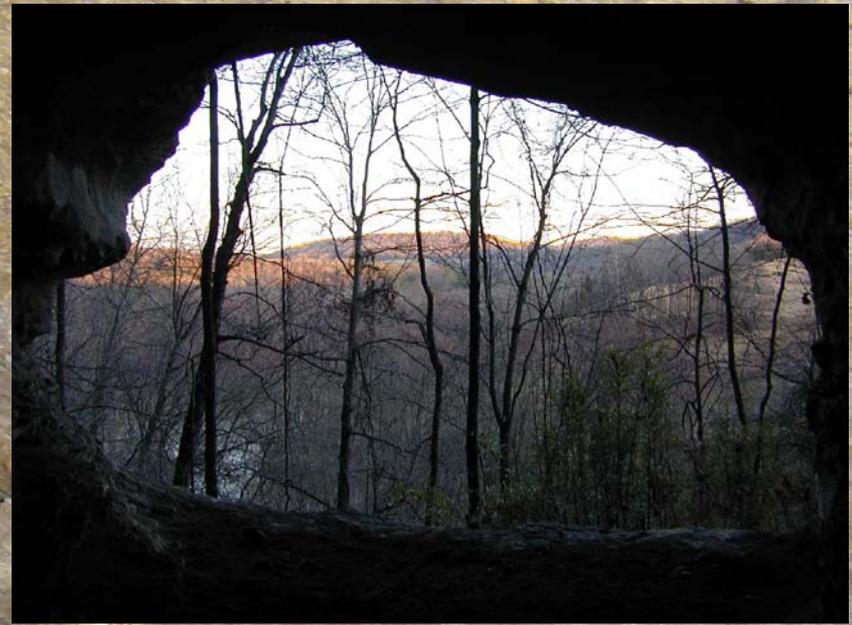


**Cultural conservation research:
Restoration, exhibits, and open house**

Archaeology field school: undergraduate research



Archaeological research in Saltpeter Cave



Conservation

- Habitats
- Species
- Communities





fanshell



pink mucket



ring pink

Some of the Federally Endangered Mussel Species
historically found at the Green River Preserve

clubshell



rough pigtoe



northern riffleshell





McCoy Blue Hole, home to the federally endangered Mammoth Cave shrimp – only 9 known populations in the world

Cooperating with the USFWS and Iowa State University to protect and assess this population





A cave on the property is inhabited by bats, including the federally endangered gray bat, and numerous Allegheny woodrats

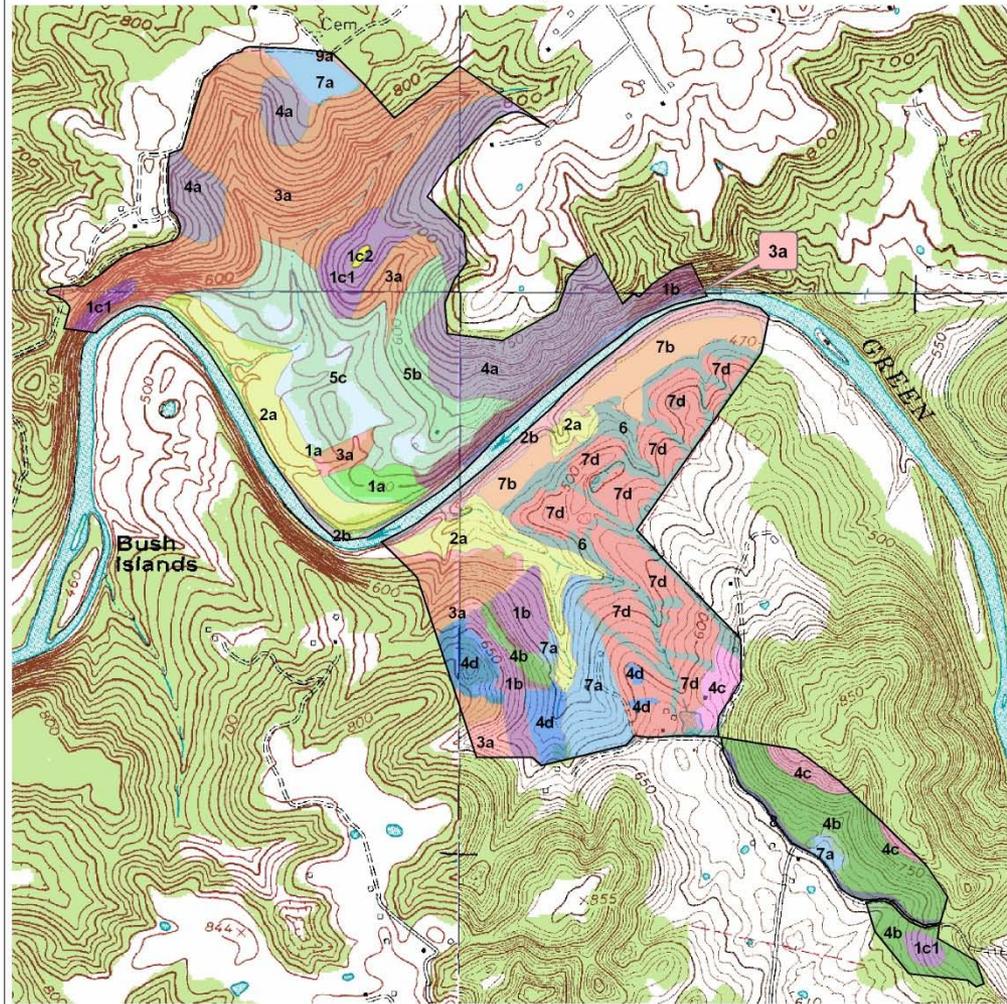


Baseline surveys

- Fish
- Amphibians
- Reptiles
- Birds
- Mammals
- Endangered species
- Plant surveys
- Archaeological survey
- Water quality
- Mussel species
- Lepidopteran survey; insect families
- Earthworm survey for non-natives



WKU Upper Green River Biological Preserve Vegetation Survey, 2004-2005



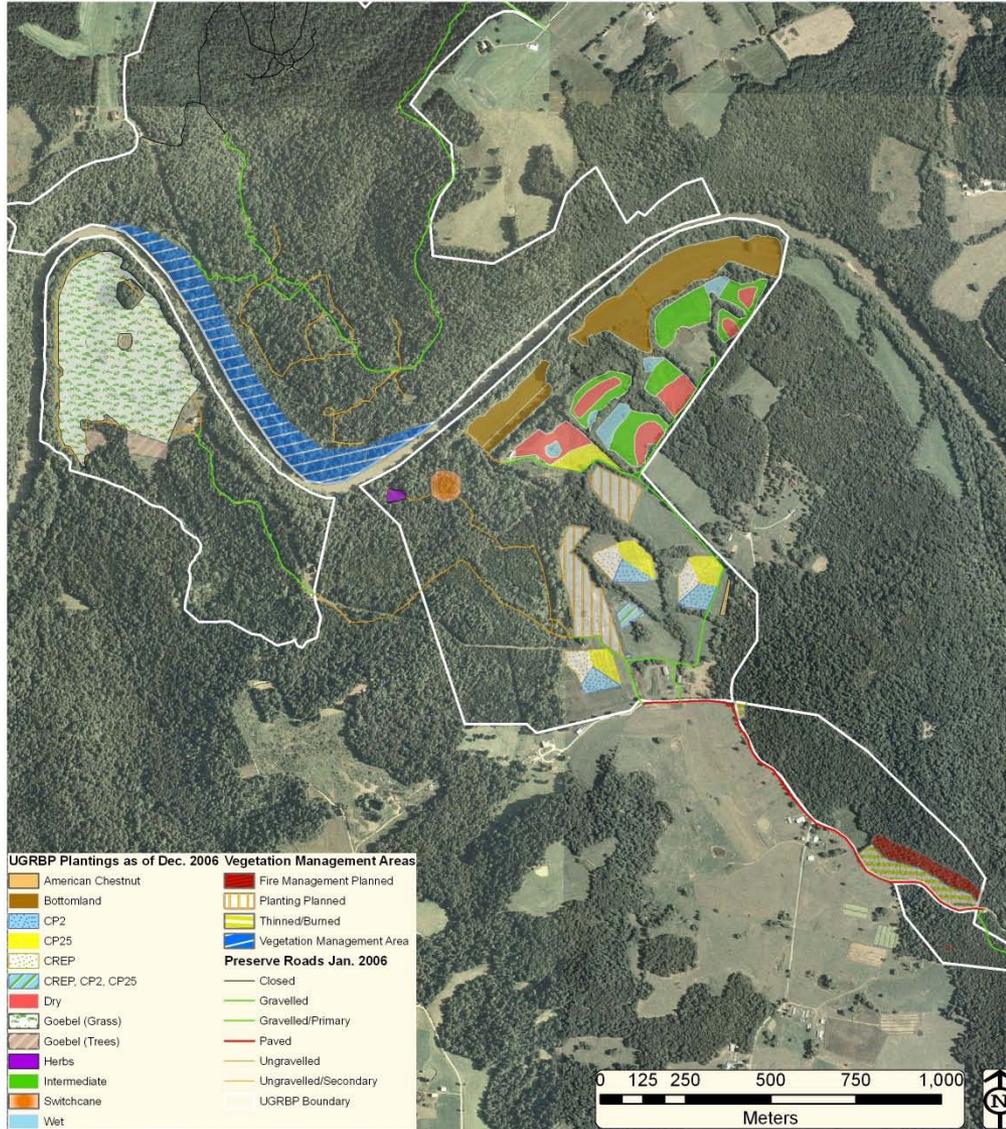
- | | | |
|---|---|--|
| ■ evergreen forest - pine (1a) | ■ oak-hickory forest - white oak and hickory (4a) | ■ field - oldfield (7a) |
| ■ evergreen forest - redcedar (1b) | ■ oak-hickory forest - chingquapin (4b) | ■ field - bottomland (7b) |
| ■ evergreen forest - redcedar limestone glade (1c1) | ■ oak-hickory forest - chestnut oak (4c) | ■ field - upland (7d) |
| ■ evergreen forest - flatrock limestone glade (1c2) | ■ mixed hardwood forest (4d) | ■ barrens (8) |
| ■ bottomland hardwood forest (2a) | ■ evergreen oak-hickory chinquapin successional (5b) | ■ wetlands - cattail (9a) |
| ■ bottomland hardwood forest - riverfront (2b) | ■ pine mixed hardwood successional (5c) | |
| ■ mesic forest (3a) | ■ hedgerow (6) | |

0 Meters 350 700



Vegetation Survey by Dr. Albert Meier, 2004-2005, Western Kentucky University.
Created by Kami MacDonald and Miranda Childs, Fall Winter 2005, in the lab of Dr. Ouida Meier, Western Kentucky University.

WKU Upper Green River Biological Preserve (UGRBP): Plantings and Areas of Vegetation Management



Cartography by Will Christopher and Dr. Ouida Meier
Updated: March 5, 2007; Western Kentucky University

Data Sources: NAIP04 imagery; internal road and plot locations from Albert Meier, Mike Stokes, Natalie Jones, Matt Skaggs, Ben Hughes, Kami MacDonald, Ouida Meier.

Previous Cartography: Ben Hughes, Kami MacDonald, Miranda Childs.



Plant Restorations



Switchgrass, little bluestem, big bluestem



Monitoring:

- Initial biological surveys - baseline
- Archaeological survey
- Water quality monitoring (NRCS, CREP) – water temperature, pH, turbidity, depth
- WQ monitoring with UGWW – atrazine, *E.coli*, nitrate, turbidity, other parameters (3 sites, seasonal)
- Air temperature, relative humidity, PAR (5 sites)
- Soil moisture (5 sites)

Management tools:

- River access: canoe / boat ramp
- Facilities: Field house, shelter, mussel rearing facility, cabin on newest tract
- Equipment - field vehicles, 4-wheelers, tractors and implements, canoes and trailers, boats

Management actions:

- Restoration of riparian corridor / tree plantings (CREP)
- Restoration of native grasslands (CREP)
- Restoration of forest understory
- Restoration of historic house
- Removal of exotic species
- Closed unneeded roads; improved useful ones
- Removed undesirable structures
- Cleanup: trash, oil spills
- Erosion control



Controlled Burning of Brush-Covered Durham Knob



Resulting Restored Barrens



Tall Grass Restoration



Service



Awards, Recognition and News

RECENT AWARDS

- Soil and Water Conservation Society: Honor Award (CREP), 2006
- Inaugural Kentucky Heritage Land Conservation Fund Board Stewardship Award for Best Preserve Management, 2009
- Honorary Kentucky Guardsman: A. Meier, M. Stokes and G. Ransdell, 2012
- Kentucky Biological Diversity Protection Award: S. Grubbs, A. Meier and O. Meier, 2012

RECENT NEWS

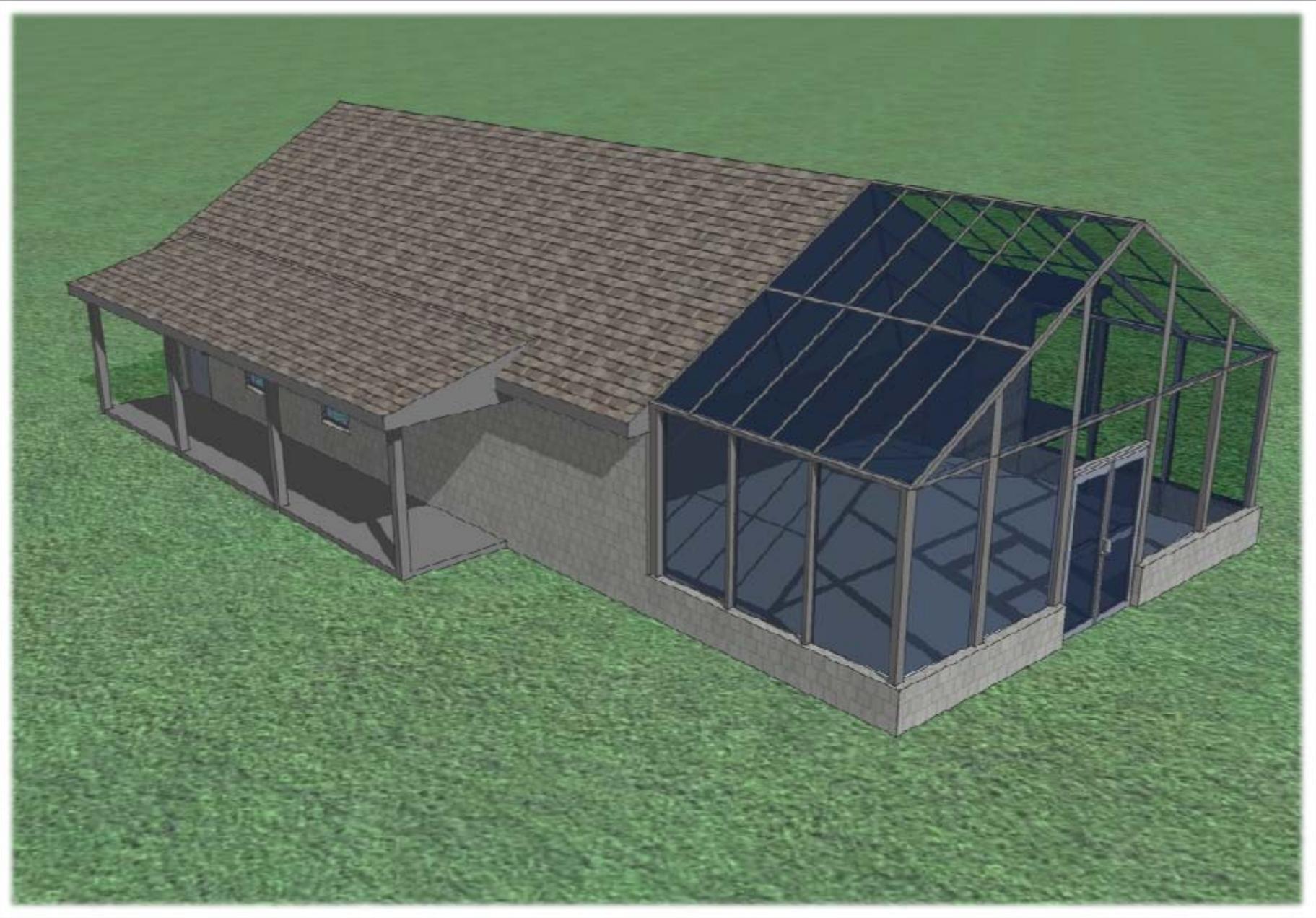
- Red Rock Films documentary film for Animal Planet on the Wildlife of Kentucky hosted at GRP, Sept 2013
- U.S. Representative Brett Guthrie, family and friends take canoe tour of the Green River Preserve, Aug 2013

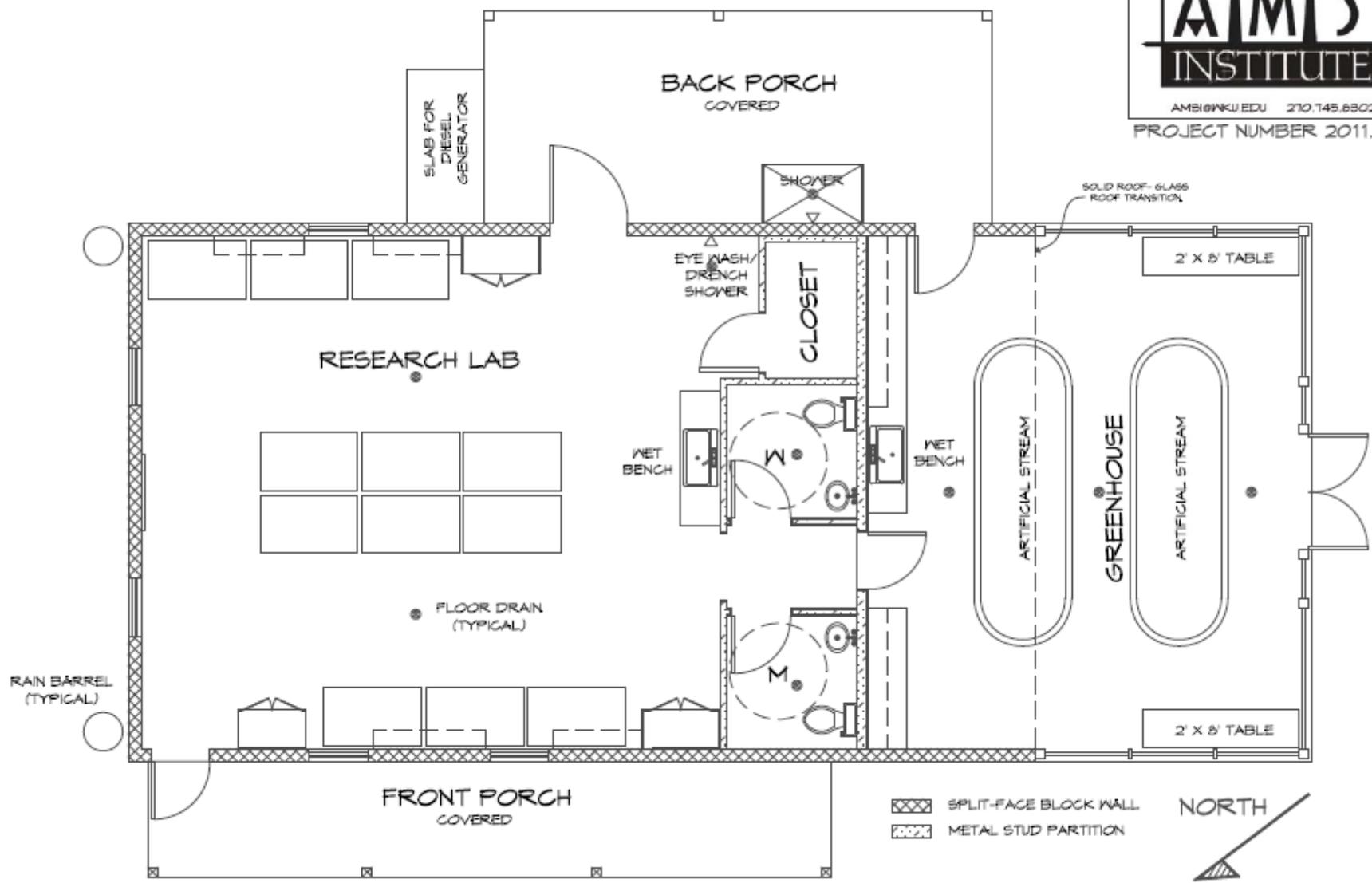
Future Directions

Broad planning effort in 2012 across WKU;
recommendations and opportunities

Committees:

1. Research
2. Teaching Initiatives
3. Outreach & Service
4. Economic Development & Tourism
5. Residential





 SPLIT-FACE BLOCK WALL
 METAL STUD PARTITION



Future Directions (cont.)

Areas of focus

1. Intensify research quantity and quality.
2. Foster broader participation in education and research both within & from outside WKU.
3. Provide a site and facilities for more students to understand, manage, & protect the environment.
4. Function like an LTER and work toward becoming one. (20 yr project)
5. Provide a site for a Kentucky USGS Cooperative Research Unit. (5 yr project)

Future Directions (cont.)

Recent and near-term planned actions toward accomplishing new directions:

- Staff (pt land mgr., directors)
- New education initiatives (classes, summer courses)
- Proposed facilities (NSF, HRL, revisit master plan)
- Maintenance building (cost-share, barns, wet space)
- Website (visitor access/prep, online data)
- Business plan (past and future revenue sources)
- Grants (education, research, facilities)
- Additional properties (with new habitats)

Future Directions (cont.)

As we grow in the opportunities we offer for education, research, and outreach, we must remember to keep our focus on people. As special as the place is, the people who love and appreciate the Preserve are even more important – they are the ones who will protect it and build its future, and that of Kentucky and beyond.

Friends of the WKU Green River Preserve:
Students, researchers, visitors – You.

www.wku.edu/greenriver

