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
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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.
• Funding
• Education
• Research
• Conservation
• Service
• Future Directions
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.
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
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

<table>
<thead>
<tr>
<th>Species</th>
<th>p-value &lt; 0.05</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amercian goldfinch</td>
<td>0.000060</td>
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<tr>
<td>Blue grosbeak</td>
<td>0.003844</td>
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<tr>
<td>Brown-headed cowbird</td>
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</tr>
<tr>
<td>Common yellowthroat</td>
<td>0.027059</td>
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<tr>
<td>Field sparrow</td>
<td>0.000450</td>
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<tr>
<td>Indigo bunting</td>
<td>0.033239</td>
</tr>
<tr>
<td>Northern bobwhite</td>
<td><strong>0.015973</strong></td>
</tr>
<tr>
<td>Northern cardinal</td>
<td>0.001199</td>
</tr>
<tr>
<td>Ruby-throated hummingbird</td>
<td>0.049489</td>
</tr>
<tr>
<td>Yellow-breasted chat</td>
<td>0.033469</td>
</tr>
</tbody>
</table>

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<thead>
<tr>
<th>Species</th>
<th>p-value &lt; 0.05</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eastern meadowlark</td>
<td>0.000450</td>
</tr>
<tr>
<td>Grasshopper sparrow</td>
<td>0.033239</td>
</tr>
<tr>
<td>Mourning dove</td>
<td>0.011365</td>
</tr>
</tbody>
</table>

• **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
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

ing ring pink

cubeshell

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

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
Plant Restorations
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
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
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
ward 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)
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.