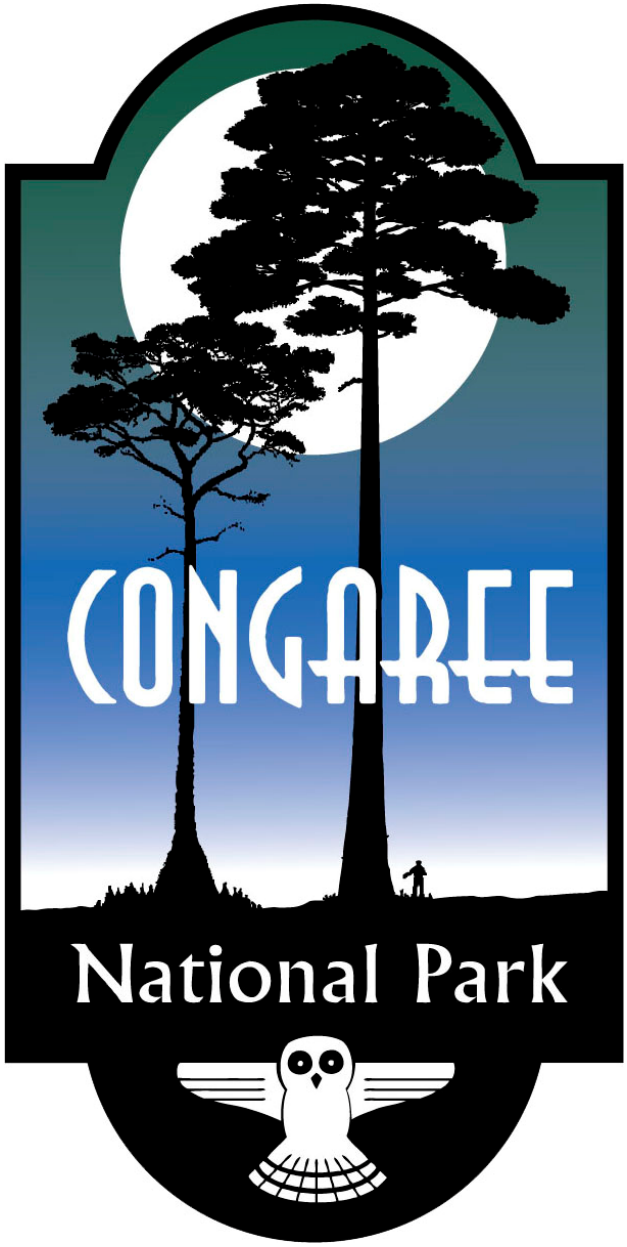


Congaree National Park Research Symposium

February 26 – 28, 2008

COLUMBIA, SOUTH CAROLINA

local coordination provided by:
Old-Growth Bottomland Forest Research and Education Center
Congaree National Park

2008 Research Symposium

Acknowledgements

Special thanks go to the Congaree National Park staff for supporting this event, including meeting planning and logistic support. Generous donations from the Friends of Congaree Swamp and Eastern National provided refreshments and food during the meeting.

Additional thanks go to Jennifer Freeman and the staff at the Columbia Metropolitan Convention Center and Ovations Catering; Thanks to George Crowe from Displays Unlimited and Britt Hogg at Advanced Video for logistical and technical support.

Several individuals have helped make this event run smoothly, including the session moderators and volunteers helping with registration, especially John Moskel, Bob Render, Gail Johnson, Kate Hartley, Alex Gregg, Bill Hulslander, Theresa Yednock, David Shelley, Quentin Goodson, John Treasure and Tracy Swartout.

THANK YOUs go to all those who contributed presentations and posters during the 2008 Research Symposium. Additional thanks go to all those attending this meeting. Without your enthusiastic participation, celebrating the last 30 years of research in Congaree wouldn't be possible. Thank you in advance for your input and participation over the next three days, outlining the goals for research in Congaree over the next 30 years!

Please share your comments on the symposium evaluation form, and help us update the Research Bibliography for Congaree National Park.

Columbia, SC – Specific Information

Columbia was planned to be in the middle of it all! South Carolina's capital is at the precise geographic center of the state, born out of compromise between Charleston and the Upstate. More than 700,000 people live in the Columbia metro area. Columbia provides access to historic homes, theaters, galleries, museums, cycling, canoeing and kayaking - all within minutes of the city center. Columbia is also close to other unique southeastern travel destinations, including Charleston, SC; Asheville, NC; and the Blue Ridge Parkway.

Conference Venue
The meeting will be held at the Columbia Metropolitan Convention Center. This 142,500 square-foot facility is situated in the Vista Riverbanks Area of Columbia. Free parking is available for all meeting participants in the convention center parking lot. The convention center is close to many hotels, restaurants, entertainment, and outdoor activities.

Columbia Metro Convention Center
1101 Lincoln Street, Columbia SC, 29202
Phone 1-800-264-4884 or (803) 545-0000; Fax (803) 545-0013
www.columbiaconventioncenter.com

Hotel Accommodations
There are many lodging options in and around Columbia, but some would require you to provide your own transportation to the Convention Center.

Airports
Columbia Metropolitan Airport (CAE) www.columbiaairport.com
The Columbia Metropolitan Airport is a short distance from downtown Columbia and transportation to hotels and the Convention Center is convenient by taxi and hotel courtesy shuttles. Airlines in operation at CAE are Continental, Delta, Delta Connection, Independence Air, Northwest, United Express and USAirways.

Charlotte Douglas International Airport (CLT) www.charlotteairport.com
Distance from Columbia, SC: 94 miles (about 1.5 hour drive).

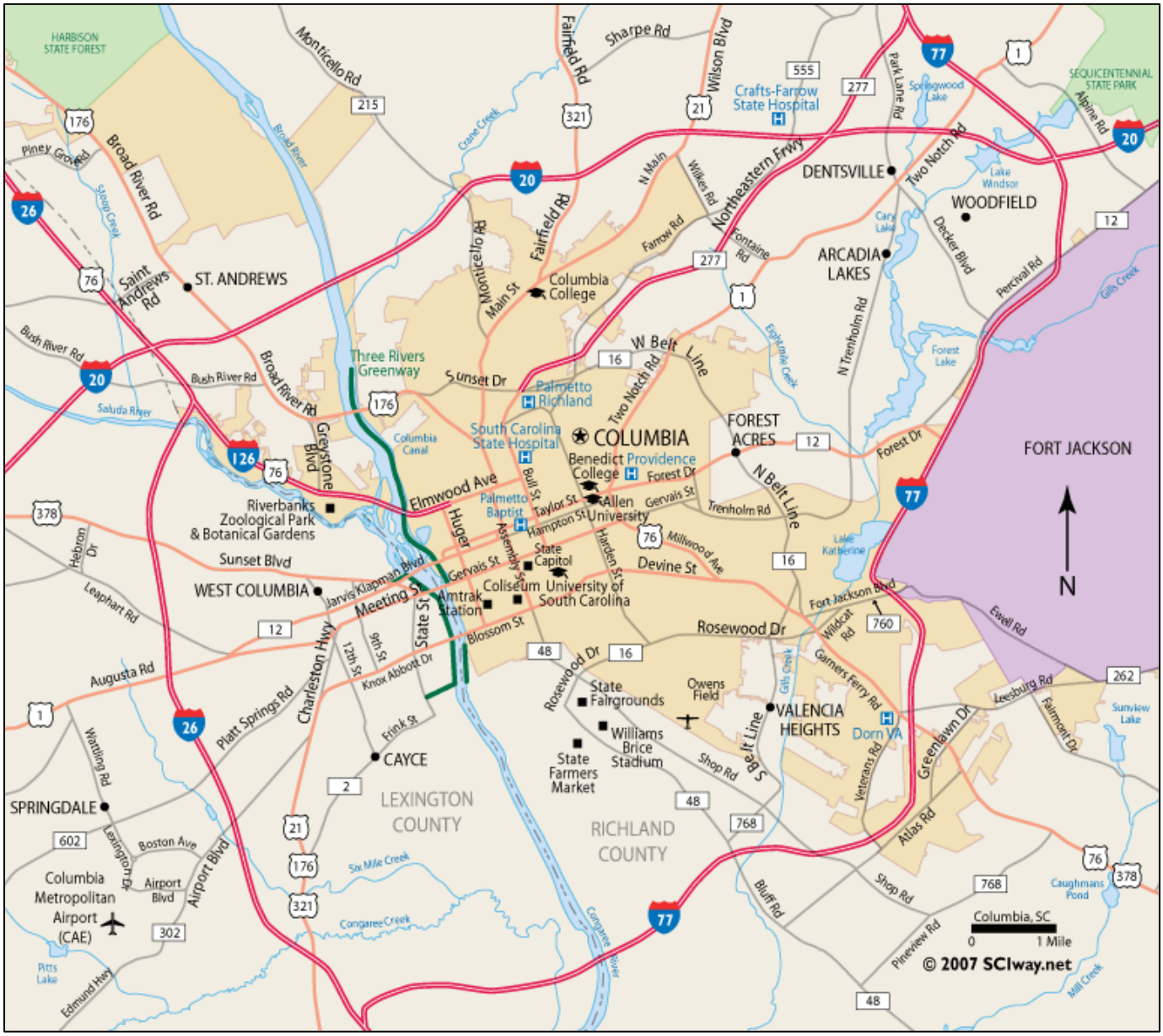
Greenville/Spartanburg International Airport (GSP) www.gspairport.com
Distance from Columbia, SC: 105 miles.

Additional Visitor Information
Columbia South Carolina Riverbanks Region, PO Box 15, Columbia, SC 29202
Telephone: (803) 545-0001; Toll Free: (800) 264-4884; Fax: (803) 545-0013
http://www.columbiacvb.com

Columbia SC Home Page: http://www.columbiasc.net
SC Department of Parks, Recreation & Tourism: http://www.discoversouthcarolina.com

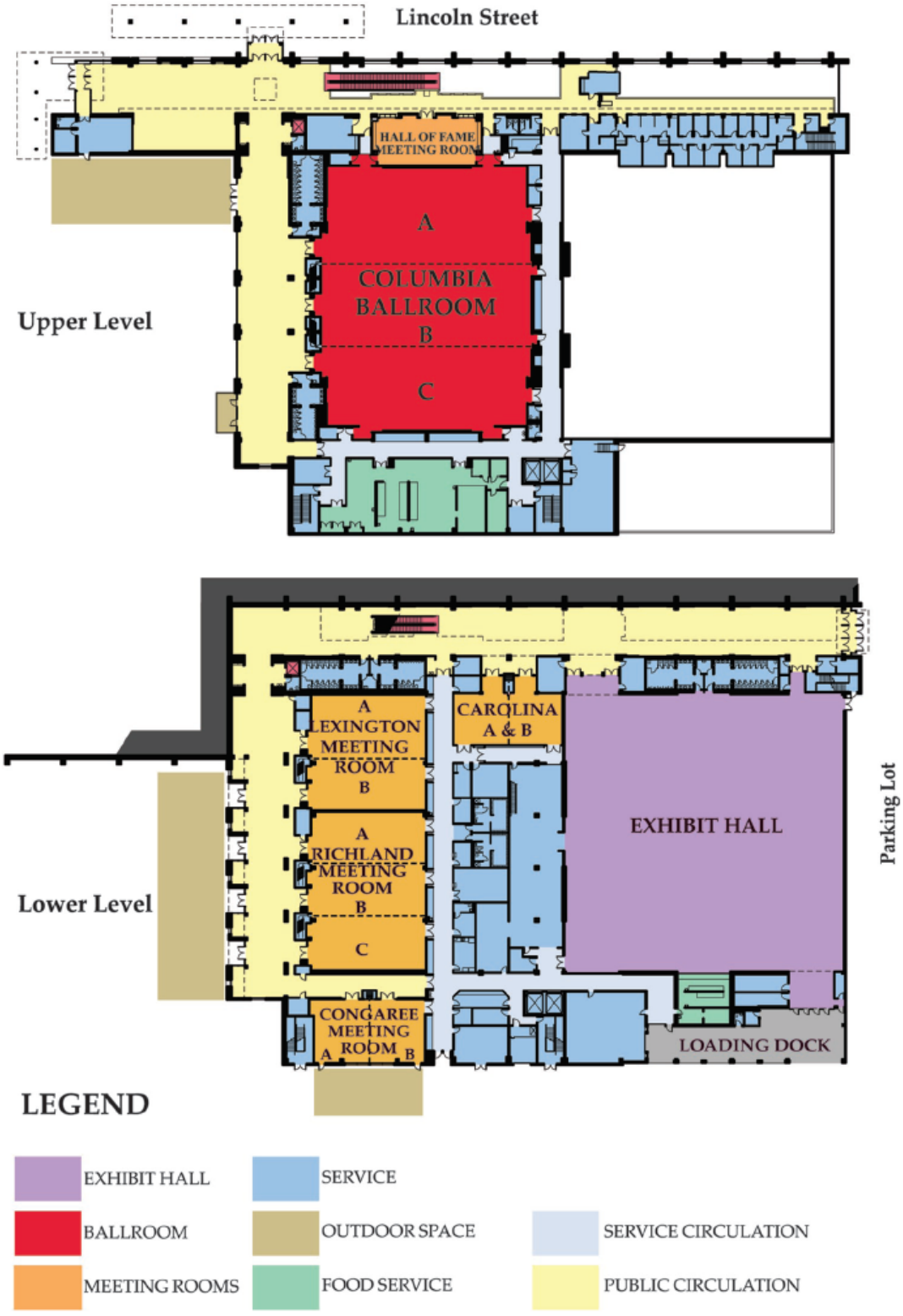
Area Maps

Columbia, SC



Downtown Columbia, SC

Columbia Metropolitan Convention Center Floor Plan



Meeting Schedule

Tuesday - February 26, 2008			Wednesday - February 27, 2008			Thursday - February 28, 2008		
Starting	**Event**	**Presenter**	**Starting**	**Event**	**Presenter**	**Starting**	**Event**	**Presenter**
8:00 AM	Registration and Coffee		8:00 AM	Registration and Coffee		8:00 AM	Registration and Coffee	
8:15 AM			8:15 AM			8:15 AM		
8:30 AM			8:30 AM			8:30 AM		
8:45 AM			8:45 AM			8:45 AM		
9:00 AM	***Session 1*** **WELCOME INTRODUCTION**	Congaree Staff	9:00 AM	***Session 7*** **KEYNOTE PRESENTATION**	W. Graf	9:00 AM	***Session 12*** **KEYNOTE PRESENTATION**	J. DeVivo
9:15 AM			9:15 AM			9:15 AM		
9:30 AM			9:30 AM			9:30 AM		
9:45 AM	***Session 2*** **KEYNOTE PRESENTATION**	R. Sharitz	9:45 AM			9:45 AM		
10:00 AM			10:00 AM	***Session 8*** **HYDROLOGY**	K. Meitzen	10:00 AM	***Session 13*** **RESOURCE PROGRAMS**	E. DiDonato
10:15 AM			10:15 AM		K. Meitzen	10:15 AM		M. Byrne
10:30 AM			10:30 AM		T. Feaster	10:30 AM		R. Albright
10:45 AM	Break		10:45 AM	Break		10:45 AM	Break	
11:00 AM	***Session 3*** **VEGETATION DYNAMICS**	B. Allen	11:00 AM	***Session 9*** **HYDROLOGY - FLOODPLAIN ECOLOGY**	P. Conrads	11:00 AM	***Session 14*** **RESEARCH LEARNING CENTER**	T. Thom
11:15 AM		J. Kupfer	11:15 AM		T. Doyle	11:15 AM		D. Shelley
11:30 AM		B. Song	11:30 AM		T. Doyle	11:30 AM		M. Moskwik
11:45 AM		A. Cohen	11:45 AM		C. Journey	11:45 AM		R. Wolff
12:00 PM	Lunch		12:00 PM	Lunch		12:00 PM	Lunch	
12:15 PM			12:15 PM			12:15 PM		
12:30 PM			12:30 PM			12:30 PM		
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1:45 PM			1:45 PM			1:45 PM		
2:00 PM	***Session 4*** **GEOLOGY WATER QUALITY**	D. Shelley	2:00 PM	***Session 10*** **AQUATIC ECOLOGY**	C. Evans	2:00 PM	***Session 15*** **SPECIES OF CONCERN**	S. Bennett
2:15 PM		A. Wilson	2:15 PM		J. Glover	2:15 PM		K. Weeks
2:30 PM		S. McAnally	2:30 PM		J. Ciegler	2:30 PM		S. Zengel
2:45 PM		S. Montebello	2:45 PM		W. Worthen	2:45 PM		B. Friebel
3:00 PM	Break		3:00 PM	Break		3:00 PM	Break	
3:15 PM	***Session 5*** **MAMMALOGY LAND USE**	S. Loeb	3:15 PM	***Session 11*** **INVENTORY & MONITORING**	J. Dudycha	3:15 PM	**RESEARCH BIBLIOGRAPHY**	T. Thom
3:30 PM		J. Lucas	3:30 PM		J. Bulak	3:30 PM		
3:45 PM		M. Kinzer	3:45 PM		L. Rose	3:45 PM	**MEETING SUMMARY FUTURE DIRECTION**	ALL
4:00 PM	***Session 6*** **POSTER SESSION**	ALL	4:00 PM		J. Price	4:00 PM		
4:15 PM			4:15 PM		JD Willson	4:15 PM		
4:30 PM			4:30 PM		L. Barnhill	4:30 PM		
4:45 PM			4:45 PM		L. Reid	4:45 PM		
5:00 PM	Adjourn		5:00 PM	Adjourn		5:00 PM	Adjourn	

Meeting Program

Session 1
Welcome and Introduction
Tuesday, February 26, 2008 – Richland Room

9:00 AM **Welcoming Remarks**……. Tracy Swartout, Superintendent
Congaree National Park

9:30 AM **Meeting Logistics**……. Theresa Thom, Congaree National Park

Session 2
Keynote Presentation
Tuesday, February 26, 2008 – Richland Room

10:00 AM Invited Speaker: Rebecca R. Sharitz, University of Georgia - SREL
Factors Maintaining Species Richness in Old-Growth Bottomland Forests
R.R Sharitz and B.P. Allen

Session 3
Vegetation Dynamics
Tuesday, February 26, 2008 – Richland Room

11:00 AM Invited Speaker: Bruce P. Allen, University of Georgia - SREL
Dendroecology of Two Liana Species in the Old-Growth Floodplain Forests of the Congaree National Park
B.P. Allen, P.C. Goebel, and R.R. Sharitz

11:15 AM Invited Speaker: John Kupfer, University of South Carolina
Early Post-logging Succession on the Bates Fork Tract, Congaree National Park
J.A. Kupfer

11:30 AM Invited Speaker: Bo S. Song, Clemson University
Developing a 3-D Visualization of Forest Recovery and Long-term Monitoring of Hurricane Hugo Effect over the Forest Communities at Congaree National Park
B. Song, C.A. Gresham and B. Hulslander

11:45 AM Invited Speaker: Arthur D. Cohen, University of South Carolina
Paleoecological Research in the Congaree National Park Using Pollen and Spores, Plant Fragments, and Diatoms
A.D. Cohen, J. Witt, S. Hausmann, and R. Bhattacharya

Session 4
Geology and Water Quality
Tuesday, February 26, 2008 – Richland Room

2:00 PM Invited Speaker: David C. Shelley, Congaree National Park
Geomorphology of the Congaree River Floodplain
D.C. Shelley

2:15 PM Invited Speaker: Alicia Wilson, University of South Carolina
Groundwater Flow in a Peat-forming Rim Swamp
A. Wilson and A. Rodgers

2:30 PM Invited Speaker: A. Steve McAnally, University of South Carolina
Assessment of Contaminant Sources and Pathways Affecting Congaree National Park
L.M. Baker, A.S. McAnally and R. Kloot

2:45 PM Invited Speaker: Stacey D. Montebello, Artefix Academy
An Analysis of the Concentrations of *Enterococci* and *Escherichia coli* in Cedar Creek, Tom's Creek, Wise Lake, and Weston Lake in Congaree National Park (CNP)
S.D. Montebello and M. Montebello

Session 5
Mammalogy and Land Use
Tuesday, February 26, 2008 – Richland Room

3:15 PM Invited Speaker: Susan C. Loeb, Southern Research Station, Clemson
The Bats of the Congaree and Other Southeastern Parks: Effects of Urbanization and Development
S.C. Loeb and S.T. Hall

3:30 PM Invited Speaker: Jessica Lucas, Clemson University
Roost Tree Selection of Rafinesque's Big-eared Bat on Multiple Spatial Scales in Congaree National Park
J. Lucas and S.C. Loeb

3:45 PM Invited Speaker: Mark Kinzer, National Park Service - SERO
Land Use History of the Beidler Tract and Adjacent Lands. Congaree National Park
M. Kinzer

Session 6
Poster Session
Tuesday, February 26, 2008 – Richland Room

4:00 PM Invited Speaker: Jeffrey R. Duncan
Ecologically Sustainable Water Management for the Congaree River: A Science Based, Stakeholder-inclusive Process for Balancing Human and Ecological Needs
J. Duncan, T. Thom and B. Hulslander

Invited Speaker: Sonja Hausmann
Flood Reconstruction of the Congaree National Park
S. Hausmann, R. Bhattacharya, A.D. Cohen, J.J. Hains and B. Bixby

Invited Speaker: Andy Miller
A Survey of Potential *Coliform* Bacteria Sources and Associations in the Congaree River from Columbia to the West Boundary of Congaree NP
A. Denman, D. Eargle and A. Miller

Invited Speaker: David C. Shelley
Geology and Geomorphology of the Lower Congaree River Floodplain
D.C. Shelley and A.D. Cohen

Session 7
Keynote Presentation
Wednesday, February 27, 2008 – Richland Room

9:00 AM Invited Speaker: William .L. Graf, University of South Carolina
Science and Decision Making for Restoration of American Rivers
W.L. Graf

Session 8
Hydrology
Wednesday, February 27, 2008 – Richland Room

10:00 AM Invited Speaker: Kimberly Meitzen, University of South Carolina
Congaree Floodplain Decision Support Project Phase II: GIS Floodplain Inundation Modeling, Congaree National Park, South Carolina
K. Meitzen and W.L. Graf

10:15 AM Invited Speaker: Kimberly Meitzen, University of South Carolina
Development, Disturbance, and Maintenance: Process-Pattern Relationships in Riparian Environments, Congaree River, Congaree National Park, SC
K. Meitzen

10:30 AM Invited Speaker: Toby D. Feaster, USGS – SC Water Science Center
Using Peak Flow Data to Assess Changes in the Magnitude and Frequency of Floods in the Congaree River, South Carolina
T. Feaster, P. Conrads, and L. Harrelson

Session 9
Hydrology – Floodplain Ecology
Wednesday, February 27, 2008 – Richland Room

11:00 AM Invited Speaker: Paul Conrads, USGS – SC Water Science Center
Using Data-mining Techniques to Analyze the Hydrologic Effects of the Saluda River Dam
P. Conrads, T. Feaster, L. Harrelson, and E. Roehl

11:15 AM Invited Speaker: Thomas W. Doyle, USGS – National Wetlands Research Ctr.
Modeling Floodplain Hydrology of Congaree National Park
T.W. Doyle

11:30 AM Invited Speaker: Thomas W. Doyle, USGS – National Wetlands Research Center
Tree Ring Analysis of Forest History and Response to Climate & Flooding
T.W. Doyle

11:45 AM Invited Speaker: Celeste Journey
Mercury Cycling in Aquatic Ecosystems – Comparative Studies in SC
C.A. Journey, P.M. Bradley and F.H. Chapelle

Session 10
Aquatic Ecology
Wednesday, February 27, 2008 – Richland Room

2:00 PM Invited Speaker: Chris Evans, SC DHEC
Arbovirus Surveillance in Congaree National Park - 2006
C. Evans, T. Brewer, J. Wilkins, S. Phillips and R. Taylor

2:15 PM Invited Speaker: James Glover, SC DHEC
SC DHEC's Bioassessment Program: Macroinvertebrates Collected from Streams Entering the Congaree National Park
J.B. Glover

2:30 PM Invited Speaker: Janet Ciegler
Water Beetle Collection in the Congaree Swamp National Monument
J.C. Ciegler

2:45 PM Invited Speaker: Wade Worthen, Furman University
Dragonflies at Congaree National Park: Report on a 2002 Survey and Plans for a 2008 Survey and Experiment on Perch Height Selection
W.B. Worthen

Session 11
Inventory & Monitoring – Aquatic and Terrestrial
Wednesday, February 27, 2008 – Richland Room

3:15 PM Invited Speaker: Jeff Dudycha, University of South Carolina
Oxbow and Pond Community Inventories at Congaree National Park
J. Dudycha

3:30 PM Invited Speaker: Jim Bulak, SC Department of Natural Resources
Striped Bass Investigations on the Congaree River
J. Bulak

3:45 PM Invited Speaker: Leo Rose, SC Department of Natural Resources
Species Diversity and Condition of the Fish Community During a Drought in Congaree National Park
L. Rose and J. Bulak

4:00 PM Invited Speaker: Jennifer Price, SC Department of Natural Resources
A Comparison of Sampling Methods for Crayfishes in Congaree National Park
J. Price and S. Welch

4:15 PM Invited Speaker: J.D. Willson, University of Georgia - SREL
Inventory and Monitoring of Reptiles and Amphibians in the Southeast Coast Inventory and Monitoring Network Parks
W. Gibbons, T. Tuberville and J.D. Willson

4:30 PM Invited Speaker: Laurel Barnhill, SC Department of Natural Resources
Bird Monitoring in South Carolina and Within Congaree National Park
L. Barnhill and L. Glover

4:45 PM Invited Speaker: Laurie Reid, SC Forestry Commission
The Search for Non-native Bark and Ambrosia Beetles in South Carolina
L. Reid, T. Baumann, and V. Cannarella

Session 12
Keynote Presentation
Thursday, February 28, 2008 – Richland Room

9:00 AM Invited Speaker: Joe DeVivo, National Park Service Southeast Coast Inventory & Monitoring Network
Ecological Monitoring in the Southeast Coast I&M Network
J.C. DeVivo

Session 13
Resource Programs
Thursday, February 28, 2008 – Richland Room

10:00 AM Invited Speaker: Joe DeVivo, Southeast Coast I&M Network
Assessing the Health of NPS Southeast Coastal Waters Using USEPA's National Coastal Assessment Protocol
E. DiDonato and J. DeVivo

10:15 AM Invited Speaker: Michael W. Byrne
An Amphibian Fungal Pathogen in Southeastern National Parks
M.W. Byrne

10:30 AM Invited Speaker: Ray Albright, University of Tennessee
Connecting Partners in Science: The Cooperative Ecosystem Studies Unit (CESU) Program
R. Albright

Session 14
Old-Growth Bottomland Forest Research and Education Center
Thursday, February 28, 2008 – Richland Room

11:00 AM Invited Speaker: Theresa Thom, Congaree National Park
Floodplain Research at the Old-Growth Bottomland Forest Research and Education Center, Congaree National Park
T. Thom and D. Shelley

11:15 AM Invited Speaker: David Shelley, Congaree National Park
Recent Developments in Education Programs at the Old-Growth Bottomland Forest Research and Education Center
D.C. Shelley and T.A. Thom

Session 14 (continued)
Old-Growth Bottomland Forest Research and Education Center
Thursday, February 28, 2008 – Richland Room

11:30 AM Invited Speaker: Matthew Moskwik, The Nature Conservancy
Methodology and Results of Ivory-billed Woodpecker Searches in South Carolina
M. Moskwik, T. Thom, L. Barnhill, C. Watson and J. Kilgo

11:45 AM Invited Speaker: Robert J. Wolff, Clemson University
The Orb Weaver (Araneidae) Fauna and the Spider BioBlitz at Congaree National Park
R.J. Wolff

Session 15
Species of Concern
Thursday, February 28, 2008 – Richland Room

2:00 PM Invited Speaker: Stephen H. Bennett, SC Department of Natural Resources
Ecology, Life History and Molecular Phylogeny of Selected Plethodontid Salamanders at Congaree National Park (CNP): Preliminary Results
S.H. Bennett, D. Beamer, D. Tufford and T. Lamb

2:15 PM Invited Speaker: Katherine Weeks, Clemson University
Genetic Diversity and Structure in Carolina Bogmint (*Macbridea caroliniana*) and Implications for Species Conservation
K.F. Weeks, J.L. Walker and J.L. Hamrick

2:30 PM Invited Speaker: Scott Zengel, PBS&J Ecological Sciences
Wild Pig Disturbance in Floodplain Wetland Forests and Adjacent Pine Flatwoods at Congaree National Park, 2000 - 2003
S. Zengel and W. Conner

2:45 PM Invited Speaker: Brad Friebel, USDA/APHIS
Determination of Feral Hog Movement Patterns in Congaree National Park
B.A. Friebel and P.G.R. Jodice

3:15 PM **Session 16**
Research Bibliography
Thursday, February 28, 2008 – Richland Room

3:45 PM **Session 17**
Meeting Summary and Future Directions
Thursday, February 28, 2008 – Richland Room

THANK YOU
for coming to the 2008 Congaree National Park Research Symposium!

- Please submit your comments and evaluation forms to NPS staff or in the containers on the registration table.
- Please submit any citations or relevant literature that you feel should be included in the updated research bibliography for Congaree National Park. You can submit this information to Theresa Thom (theresa_thom@nps.gov) Congaree National Park, 100 National Park Road, Hopkins, SC 29061

CONNECTING PARTNERS IN SCIENCE:
THE COOPERATIVE ECOSYSTEM STUDIES UNIT PROGRAM

R. Albright

Ray Albright, Southern Appalachian CESU, TN

Principal Contact
Ray Albright, University of Tennessee, Dept. Forestry, Wildlife and Fisheries,
2431 Joe Johnson Drive, Rm 274. Knoxville, TN 37996-4563
PHONE: 865.974.8443; FAX: 865.974.4714; **ray_albright@nps.gov**

Abstract
What is a CESU? This presentation will explain what the Cooperative Ecosystem Study Unit Program is all about and its ability to connect partners. The purpose of the CESU program will be framed by the history, the organization, and the partnerships. Specific attention will be given to the Piedmont-South Atlantic CESU through which Congaree National Park has partnered for several of its science projects. Examples of projects and CESU initiatives will be discussed. Questions are encouraged throughout the presentation.

DENDROECOLOGY OF TWO LIANA SPECIES IN THE OLD-GROWTH FLOODPLAIN FORESTS OF THE CONGAREE NATIONAL PARK

B.P. Allen, P.C. Goebel, and R.R. Sharitz

Bruce P. Allen, Rebecca R. Sharitz, Savannah River Ecology Laboratory, Univ. of Georgia
P. Charles Goebel, Department of the Environment and Natural Resources, Ohio State Univ.

Principal Contact
Bruce P. Allen, 8192 Lakespring Drive, West Chester, OH 45069
PHONE: 513.503.0162; **Bruce.P.Allen@gmail.com**

Abstract
Radial increment data from lianas can provide insight into long-term trends in diameter growth, response to disturbance, and longevity. Increases in liana density, proportions of stems, and size in temperate and tropical forests may indicate shifts in functional composition of forests. Floodplains of the southeastern United States are species rich and include a dense and diverse liana community. The Congaree National Park provides the ideal location to apply dendroecological techniques in a temperate floodplain forest where lianas reach a sufficient size for core extraction. One hundred radial cores were collected from two species with distinct annual rings: *Toxicodendron radicans* and *Campsis radicans*. Samples were collected across the range of environments and disturbance histories, from relatively undisturbed old-growth floodplain forests to areas clear cut in the 1970's. Ring width data suggest that liana species respond differently to the extent of canopy disturbance. *Campsis* consistently grew faster than *Toxicodendron,* with one exception being the five years following Hurricane Hugo in areas that suffered severe damage. *Toxicodendron* diameter growth rates increased through time starting in the 1970's in areas than were not heavily damaged. Distinct patterns of release and suppression emerge that reflect colonization pattern and the extent of disturbance.

ASSESSMENT OF CONTAMINANT SOURCES AND PATHWAYS AFFECTING CONGAREE NATIONAL PARK

L.M. Baker, A.S. McAnally and R. Kloot

Laura (Maliszewski) Baker, Cox and Dinkins, Inc., Columbia, SC
A. Steve McAnally, Dept. of Civil and Environmental Engineering, Univ. of South Carolina
Robin (Buz) Kloot, Earth Sciences and Resources Institute, Univ. of South Carolina

Principal Contact
Steve McAnally, Univ. of South Carolina, Department of Civil and Environmental Engineering, 300 Main Street, Columbia, SC 29208
PHONE: 803.777.7403; FAX: 803.777.0670; **mcanally@engr.sc.edu**

Abstract
The University of South Carolina (Department of Civil and Environmental Engineering and Earth Sciences and Resources Institute) teamed with Congaree National Park to address some of the recommendations of the Park's 1996 Water Resources Management Plan. This work was primarily conducted through the efforts of Laura Baker in completing her M.S. thesis. The position of Congaree National Park at the lower end of the massive Congaree and Wateree River watersheds exposes the Park ecosystem to water-borne contamination originating upstream from urban, industrial, military, agricultural, and silvicultural land uses. The first objective of this study was to compile and categorize previous water quality data collected in numerous databases for the watersheds, and then develop a single relational database that can be analyzed for trends and critical areas of concern. Due to the limitations in time and resources, the study concentrated on a "high impact" zone identified as the Congaree River Watershed from the confluence of the Congaree and Saluda Rivers to Congaree National Park. As a result of this study, two collaborative research proposals were submitted to NPS in order to: (1) better assess the level of heavy metal contamination and pathway of entry into the park boundaries, and (2) determine reaches of Toms Creek that contribute most to the excessive fecal contamination entering Congaree National Park.

ECOLOGY, LIFE HISTORY AND MOLECULAR PHYLOGENY OF SELECTED PLETHODONTID SALAMANDERS AT CONGAREE NATIONAL PARK (CNP): PRELIMINARY RESULTS

S.H. Bennett, D. Beamer, D. Tufford and T. Lamb

Stephen H. Bennett, SC Department of Natural Resources, Columbia, SC
Dave Beamer, East Carolina University, Greenville, NC
Dr. Dan Tufford, University of South Carolina, Columbia, SC
Dr. Trip Lamb, East Carolina University, Greenville, NC

Principal Contact
Stephen H. Bennett, SC DNR - Wildlife and Freshwater Fisheries Division
1000 Assembly Street, P.O. Box 167, Columbia, SC 29202
PHONE: 803-734-3930; **bennetts@dnr.sc.gov**

Abstract
Two species of plethodontid salamanders, the southern dusky salamander (*Desmognathus auriculatus*) and Chamberlain's dwarf salamander (*Eurycea chamberlaini*), known to occur at CNP, have been identified as "in need of conservation" by South Carolina's Comprehensive Wildlife Conservation Strategy. Little is known about the life history and ecology of these two species and their taxonomy, and the taxonomy of their respective "groups" remains unresolved. Our proposed study has two primary objectives: 1. To collect data on the life history and ecology of these two species at CNP, including information critical to the conservation of these species. 2. Include CNP as a sample site for a study of the molecular phylogeny of these species, and their respective "groups" in South Carolina. Preliminary results from the molecular phylogeny study indicate that the species of *Desmognathus* occurring at CNP is not *auriculatus,* but a previously undocumented lineage of this genus. In addition the *Desmognathus* occurring at CNP is significantly different from *Desmognathus* inhabiting seepage wetlands in Calhoun County, just across the Congaree River from CNP. Our research and surveys indicate the importance of seepage wetlands, of many “types” to Plethodontid salamanders in the Coastal Plain of South Carolina.

AN AMPHIBIAN FUNGAL PATHOGEN IN SOUTHEASTERN NATIONAL PARKS

M.W. Byrne

Michael W. Byrne, National Park Service, GA

Principal Contact
Michael W. Byrne, Wildlife Ecologist, Southeast Coast I&M Network
Cumberland Island National Seashore, P.O. Box 806, St. Mary's, GA 31558
PHONE: 912.882.9203; FAX: 912.882.9274; **michael_w_byrne@nps.gov**

Abstract
A chytrid fungus, known to be a causative agent of population declines in several local amphibian populations worldwide, was discovered in several species in southeastern national parks. In 2005, the presence of the fungus was confirmed in one species at Congaree National Park and two species at Chattahoochee National Recreation Area. These findings prompted further investigations at other southeastern national parks in 2006, where the fungus was detected in two additional species in two other parks. This fungus is of special concern given that the southeastern United States is host to the most diverse amphibian community worldwide and that the fungus has been shown to have a significant negative impact on amphibian populations. An overview of fungus will be presented as will upcoming monitoring activities implemented by the Southeast Coast Inventory and Monitoring Network to further investigate the presence and distribution of the fungus in southeastern national parks.

WATER BEETLE COLLECTION IN THE CONGAREE SWAMP NATIONAL MONUMENT

J.C. Ciegler

Janet C. Ciegler, West Columbia, SC

Principal Contact
Janet C. Ciegler, 2636 Pine Lake Drive, West Columbia, SC 29169
PHONE: 803.796.2862; **jciegler@sc.rr.com**

Abstract
From March to August 2002, as a part of the Aquatic Invertebrate Survey led by Manuel L. Pescador (Florida A&M University, Tallahassee, FL), over 15.5 thousand water beetles of 153 species were collected and identified. Methods employed were ultraviolet light trapping, dip-netting, and examining submerged wood. The beetles found were members of 16 families, and represent about 40% of the water beetle species known from South Carolina. Voucher specimens reside in the Clemson University Arthropod Collection.

PALEOECOLOGICAL RESEARCH IN THE CONGAREE NATIONAL PARK USING POLLEN AND SPORES, PLANT FRAGMENTS, AND DIATOMS

A.D. Cohen, J. Witt, S. Hausmann and R. Bhattacharya

Arthur D. Cohen and Jessica Witt, University of South Carolina, SC
Sonja Hausmann and Bhattacharya Ruchi, University of Arkansas, AR

Principal Contact
Art Cohen, Dept. of Geological Sciences, University of South Carolina, Columbia, SC 29208
PHONE: 803.777.4502; FAX: 803.777.6610; **cohen@geol.sc.edu**

Abstract
Three interrelated research projects designed to aid in reconstructing the late Pleistocene to Holocene paleoecological history of the Congaree National Park are ongoing. These studies all involve information extracted by coring in paleomeanders within the Congaree River floodplain. The first and longest running project involves the use of pollen and other organic components from Muck Swamp, an organic-rich rimswamp-type paleomeander located at the northern edge of the floodplain. The base of this deposit dates at about 21,000 years B.P. This study focuses on changes in vegetational and depositional environments. The second study is an analysis of the trace elements in this same paleomeander to determine types, locations, and potential sources of inorganic elements; and the third project, which is just beginning, involves a study of sediments within Weston Lake and other oxbow paleomeanders to reconstruct paleoflood frequencies, land-use changes, and paleoclimatic history using diatoms, pollen, and other paleoecological proxies. This talk focuses on results from the paleoecological studies in Muck Swamp.

The sediments in Muck Swamp can be subdivided into 3 major zones and several subzones. Spruce, hemlock, and certain herbaceous plants characterize the basal zone. This zone also contains indicators of ponding, such as algal filaments and abundant water lily tissues. These results suggest deposition in an ox-bow lake under cool dry conditions, consistent with a Pleistocene age. Gums, hollies, hickories, elms, and heaths with a significant complement of sedges, ferns, and mosses dominate the middle zone. This assemblage resembles vegetation occurring today in many coastal plain river swamps of the Southeast. An increase in charcoal, fungal remains, and degraded tissue fragments suggest that the original lake has filled in and hydrology is now largely controlled by fluctuations in groundwater flow from the bluffs and floods. The uppermost zone begins with an abrupt drop in pines, increases in certain shrubs and ferns, and first occurrence of cereal grains, probably reflecting land-use changes. The trace element study in Muck Swamp shows abrupt changes in inorganic components (metals, etc.) coincident with certain stratigraphic boundaries and especially at the base of uppermost subzone.

USING DATA-MINING TECHNIQUES TO ANALYZE THE HYDROLOGIC EFFECTS OF THE SALUDA RIVER DAM

P. Conrads, T. Feaster, L. Harrelson, E. Roehl

Paul A. Conrads, Toby D. Feaster, Larry G. Harrelson, USGS – SC Water Science Center
Edwin A. Roehl, Jr. – Advanced Data Mining – Greenville, SC

Principal Contact
Paul A. Conrads, SC Water Science Center, 720 Gracern Road, Columbia, SC 29210
PHONE: 803.750.6140; FAX 803.750.6181; **pconrads@usgs.gov**

Abstract
The Congaree National Park is located along the Congaree River, 25 river miles downstream from the confluence of the Saluda and Broad Rivers. The park includes extensive flood plains of old growth bottom hardwood forest. Since 1930, the Congaree River has been regulated by the Saluda Dam on the Saluda River. Many ecologists and water-resource managers have hypothesized that the regulated flows on the Saluda River have substantially decreased the magnitude and frequency of flooding of the riparian wetlands in the Park. Data mining is an emerging field that addresses the issue of converting large databases into knowledge. Data mining employs methods for maximizing the information content of data, determining which variables have the strongest relationships to problems of interest, and developing simulation models to analyze systems. Data-mining techniques were applied to the long-term hydrologic data base that exists for the Saluda, Broad, and Congaree Rivers to assess the effects of the Saluda Dam on the water-level in the Congaree River. Artificial neural network (ANN) models were developed using 5 years of preregulated flow data (1925 to 1929) to synthesize a 75-year (1930 to 2005) water-level hydrograph of a “no dam” or “no regulation” condition to compare with the actual regulated flows. Comparison of the 75-year simulated “no-dam” hydrograph with the actual hydrograph showed that the operation of the Saluda Dam may have more of an affect on low and medium water levels than high water levels. The dam increased water levels during low and medium river stages by as much at 1.7 feet. During medium high and high flows, the dam decreased water levels at high river stages by approximately 1 foot.

ECOLOGICAL MONITORING IN THE SOUTHEAST COAST I & M NETWORK

J.C. DeVivo

Joe Devivo, National Park Service, GA

Principal Contact
Joe DeVivo, Program Coordinator, Southeast Coast Inventory & Monitoring Program
National Park Service, Division of Science and Natural Resource Management
100 Alabama Street, SW, Atlanta, GA 30303
PHONE: 404.562.3113 x739; FAX: 404.562.3201; **joe_devivo@nps.gov**

Abstract
The Southeast Coast Network (SECN) is one of 32 National Park Service (NPS) Networks established to implement an integrated monitoring program under the Natural Resource Challenge. The SECN contains twenty parks, seventeen of which contain significant and diverse natural resources. In total, SECN parks encompass more than 184,000 acres of federally-managed land across North Carolina, South Carolina, Georgia, Alabama, and Florida. The following major objectives of the of the SECN monitoring program are associated with the landscape-scale issues that many of our parks have in common:

1) monitor changes in water quality,
2) monitor changes in structure and community composition of terrestrial vegetation and habitats,
3) monitor changes in structure and community composition of wildlife communities,
4) monitor coastal dynamics, or the large-scale changes in landscape features in our coastal parks,
5) monitor changes in land use and land cover inside and around network parks, and
6) monitor weather and climate as a driver of larger ecosystem change across the network.

The SECN identified 26 Vital Signs to be monitored including measures of Air & Climate, Geology & Soils, Water, Biological Integrity, Human Use, and Ecosystem Pattern & Processes.

ASSESSING THE HEALTH OF NATIONAL PARK SERVICE SOUTHEAST COASTAL WATERS USING EPA'S NATIONAL COASTAL ASSESSMENT PROTOCOL

E. DiDonato and J.C.. DeVivo

Eva DiDonato, National Park Service, SC
Joe DeVivo, National Park Service, GA

Principal Contact
Eva DiDonato, Aquatic Ecologist, National Park Service, Southeast Coast I&M Program
Fort Sumter National Monument, 1214 Middle Street, Sullivan's Island, SC 29482
PHONE: 843.883.5036; FAX: 843.883.3910; **eva_didonato@nps.gov**

Abstract
The Southeast Coast Network (SECN) of the National Park Service (NPS) contains seventeen National Park units located between Florida and North Carolina and as far west as Alabama. All parks contain significant natural resources, but six contain significant areas of estuarine habitats. SECN is currently developing a water quality monitoring program for the estuarine habitats within these parks. For network estuaries, specifically, SECN has partnered with US EPA to assess existing data, develop survey designs and select appropriate indicators for monitoring. The US EPA, in partnership with the states, sampled these waters between 1999 and 2004 as part of the National Coastal Assessment (NCA) program. Using these data, SECN is able to assess the health condition of network estuarine waters over the past six years and develop a baseline for future monitoring efforts. As part of the network's long term monitoring program, SECN is implementing the NCA model and sampling intensively one park per year on a rotating basis. This will allow an assessment of the health condition of estuarine habitats within one park each year; more importantly, this approach will facilitate a network-wide assessment of estuarine condition every six years, and comparison of water quality with areas outside of NPS boundaries.

MODELING FLOODPLAIN HYDROLGY OF CONGAREE NATIONAL PARK

T.W. Doyle

Thomas W. Doyle, U.S. Geological Survey, Lafayette, LA

Principal Contact
Thomas W. Doyle, USGS, National Wetlands Research Center
700 Cajundome Blvd., Lafayette, LA 70506
PHONE: 337.266.8647; FAX: 337.266.8586; **tom_doyle@usgs.gov**

Abstract
A floodplain hydrology study of Congaree National Park was conducted to determine the flood relations of backswamp forests and park trails as influenced by river stage and floodplain elevation utilizing an integrated field and modeling approach. Water level gages were spread across the length and width of a 5 km X 16 km floodplain to capture the lag and peak flood relations to river stage and were monitored over a period of years. Historical water level stage and discharge data from the Congaree River have been digitized from published sources and USGS archives to obtain long-term daily averages for an upstream gage at Columbia, South Carolina. Elevation surveys were completed for all park trails and for additional circuits of roads and boundaries. All elevation surveys were then processed and rectified into a geographic information system and predictive flood inundation model. Regression models have been applied to establish time lags and stage relations between gages at Columbia, SC and in the upper, middle, and lower reaches of the river and backswamp within the park. Flood relations among backswamp gages show the retention and recession behavior between floodplain reaches with greater hydroperiod in the lower reaches than upper and middle reaches of the Congaree Swamp. A flood inundation model has been developed to predict critical river stages and potential inundation of hiking trails on a real-time basis and 24hr forecast.

TREE RING ANALYSIS OF FOREST HISTORY AND RESPONSE TO CLIMATE AND FLOODING

T.W. Doyle

Thomas W. Doyle, U.S. Geological Survey, Lafayette, LA

Principal Contact
Thomas W. Doyle, USGS, National Wetlands Research Center
700 Cajundome Blvd., Lafayette, LA 70506
PHONE: 337.266.8647; FAX: 337.266.8586; **tom_doyle@usgs.gov**

Abstract
Tree-ring analysis and water-level recorders were used to evaluate and to predict the effects of flood events and flood history on visitor safety and forest resources at Congaree National Park. Early tree core collections had been taken from Congaree National Park to age select stands of loblolly pine (Peterson et al. 1995) and select individuals of baldcypress (Laary Cushman and Joy Young, personal communication). These forays verified the old-growth status of tree specimens exceeding 200 years of age. Tree-ring records provide other valued information for reconstructing climate, flood, and fire history and for determining the sensitivity and response of biological systems to environmental change. Tree core samples have been collected from populations of Loblolly pine, Baldcypress, Tupelo Gum, Ash, Oak, and Sycamore from select sites in the Congaree Swamp floodplain in short and long-retention flood sites. Findings show that all pine trees and nearly all baldcypress collections are post-colonial, dating from 100-300 years in age. Growth chronologies show positive and negative inflections over the last century that correspond with macroclimate patterns, Hurricane Hugo, and logging and ownership history more than flood effects. Operations of the Murray Dam (post-1934) have increased average daily stage in the Congaree River and floodplain with little or no effect on long-term forest productivity. Stemwood production on average was less for trees and species on sites with longer flood retention and hydroperiod.

ECOLOGICALLY SUSTAINABLE WATER MANAGEMENT FOR THE CONGAREE RIVER: A SCIENCE BASED, STAKEHOLDER-INCLUSIVE PROCESS FOR BALANCING HUMAN AND ECOLOGICAL NEEDS

J. Duncan, T. Thom and B. Hulslander

Jeffrey R. Duncan, National Park Service – RTCA, TN
Theresa A. Thom, Bill Hulslander, Congaree National Park, SC

Principal Contact
Jeffrey R. Duncan, Ph.D., National Park Service – RTCA
175 Hamm Road, Suite C, Chattanooga, TN 37405
PHONE: 423.266.1150; FAX: 423.266.2558; **jeff_duncan@nps.gov**

Abstract
The National Park Service (NPS), the US Fish and Wildlife Service, American Rivers, the South Carolina Coastal Conservation League, The Nature Conservancy (TNC), and others are working together to facilitate a science-based, stakeholder-inclusive process balancing human and ecosystem needs for water flows of the Saluda and Congaree rivers. Modeled after TNC's Ecologically Sustainable Water Management approach (ESWM), the goal of this partnership is to improve knowledge, collaboration, and communication, within the context of the ongoing FERC relicensing, concerning the allocation of water in Lake Murray, the lower Saluda River, and the Congaree River near Columbia, South Carolina.

Congaree National Park (CNP) lies along the Congaree River and was authorized by Congress in 1976 to protect the largest remnant tract of old growth bottomland hardwood forest in the United States. CNP currently protects a floodplain ecosystem consisting of nearly 25,000 acres in the heart of South Carolina's Piedmont ecoregion. Historically, the Congaree River experienced seasonal fluctuations in water levels and lateral flow across its floodplain producing alternating periods of flooding and drying. Over thousands of years, the presence of these environmental conditions led to the co-evolution of a complex and interdependent ecological community with the CNP floodplain. Since 1930, flow in the Congaree River has been regulated by the Saluda Dam located upstream on the Saluda River, and to a lesser degree, by small dams on the Broad River. After the Saluda Dam became operational, floods dynamics on the Congaree River floodplain changed markedly. Although the exact ecological effects of this altered flood frequency are poorly known, preliminary studies have shown that operations of the Saluda Dam create a series of relatively cold pulses that move down the Saluda River to its junction with the Broad River, and then downstream on the Congaree River to CNP.

As originally developed, ESWM is a multi-step process that incorporates scientific information, professional judgment, and diverse stakeholder interests in order to develop one or more flow recommendations that meet the needs of as many stakeholder interests as possible while improving the health and function of the ecosystem. This is accomplished by convening a series of facilitated workshops that merge scientific tools and information, technical expertise, and stakeholder interests to enhance the dialogue about water allocation.

ARBOVIRUS SURVEILLANCE IN CONGAREE NATIONAL PARK, 2006

C. Evans, T. Brewer, J. Wilkins, S. Phillips and R. Taylor

Chris Evans, South Carolina Department of Health and Environmental Control, SC
Tammy Brewer, Jim Wilkins, Scott Phillips, Robbie Taylor: Richland County Vector Control, SC

Principal Contact
Chris Evans, SC DHEC, Bureau of Laboratories
8231 Parklane Road, Columbia, SC 29223
PHONE: 803.896.3802; FAX 802.896.0657; **evanscl@dhec.sc.gov**

Abstract
We collected mosquitoes (Family Culicidae) and sand flies (Family Psychodidae, *Lutzomyia* species) in Congaree National Park in Hopkins, South Carolina, to determine species composition and abundance and to test for arboviruses (arthropod-borne viruses) such as West Nile virus and eastern equine encephalitis (EEE) virus. During the 2003 EEE disease outbreak, 12 horses, 2 birds, and 1 mosquito pool were positive for EEE within a 22.6-km radius of Congaree National Park. CDC miniature incandescent light traps were set for eleven nights from April 13 to November 14, 2006, to generate 42 trap nights. All light traps were suspended approximately 1.5 m above ground and baited with dry ice as an attractant. Individual traps were at least 15 m apart. The light-trap collections yielded 876 mosquitoes representing 22 species and 167 sand flies representing one genus, *Lutzomyia* species. All 167 sand flies (4 pools) and 816 mosquitoes (61 pools) were tested for arboviruses, using two methods: Vero cell cultures and molecular detection of viral RNA (Reverse Transcriptase Polymerase Chain Reaction). Sixty mosquitoes (28 pools) were collected, but not tested because pool sizes were too small. All of the mosquito and sand fly pools tested negative for arboviruses. The most dominant ecologic type of mosquitoes was the Floodwater Group mosquitoes (71.1%), followed by the Transient Water Group (11.6%), the Permanent Pool Group (11.3%), and the Artificial Container and Tree-hole Group (5.9%). Populations of floodwater mosquitoes, females of which deposit their eggs in damp soil that is intermittently flooded, peaked during the summer months, with *Aedes vexans* populations peaking in early to mid-July.

USING PEAK FLOW DATA TO ASSESS CHANGES IN THE MAGNITURE AND FREQUENCY OF FLOODS IN THE CONGAREE RIVER, SOUTH CAROLINA

T. Feaster, P. Conrads, and L. Harrelson

Toby Feaster, Paul Conrads, and Larry Harrelson, USGS SC Water Science Center, SC

Principal Contact
Toby Feaster, USGS South Carolina Water Science Center, Clemson Field Office
405 College Ave., Clemson, SC 29631
PHONE: 864.656.6747; FAX: 864.656.6779; **tfeaster@usgs.gov**

Abstract
Congaree National Park (CNP) is located in the floodplain of the Congaree River about 25 rivers miles downstream of the confluence of the Saluda and Broad Rivers at Columbia, South Carolina. The Congaree River forms the southern boundary of the CNP. During floods, water inundates the CNP floodplain by lateral transport from the Congaree River through numerous guts, sloughs, and tributaries.

Historically, the Congaree River experienced seasonal fluctuations in water levels producing alternating periods of flooding and drying in the CNP. Information published from a 1980's investigation indicated that flooding in the Congaree River, and subsequently in the CNP, had been significantly altered by the construction of the Saluda Dam (Patterson and others, 1985). In a current investigation, statistical techniques were used to synthesize unregulated peaks on the Congaree River for the period of 1931 to 2005. Recurrence-interval flows computed from the synthesized data were compared with those computed from the measured data. The results indicated that the percent differences in the 2-year to 100-year recurrence-interval flows for the unregulated and regulated periods ranged from 6.1 to 17.6 percent, respectively. This analysis, along with comparisons of other long-term streamflow data, indicate that the difference in the magnitude and frequency of floods on the Congaree River for the period before and after the construction of the Saluda Dam are more likely a result of major floods that occurred in the late 1800s and early 1900s, the magnitudes of which have not been experienced in the Congaree River basin in the last seven to eight decades.

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Patterson, G.G., Speiran, G.K., and Whetstone, B.H., 1985. Hydrology and its effect on distribution of vegetation in Congaree Swamp National Monument, South Carolina: U.S. Geological Survey Water-Resources Investigations Report 85-4256, 31 pp.

DETERMINATION OF FERAL HOG MOVEMENT PATTERNS IN CONGAREE NATIONAL PARK

B. A. Friebel and P.G.R. Jodice

Brad Friebel, USDA/APHIS/WS, SC
Patrick Jodice, Clemson University, SC

Principal Contact
Patrick Jodice, South Carolina Cooperative Fish and Wildlife Research Unit
G27 Lehotsky Hall, Clemson University, Clemson, South Carolina, 29634
PHONE: 864.656.6190; FAX: 864.656.1034; **pjodice@clemson.edu**

Abstract
One of the most destructive exotic wildlife species in the southeastern U.S. is the feral hog (*Sus scrofa*). In order to learn more about feral hog movement patterns and habitat use, hogs were radio-collared and tracked from April 2005 to November 2006 in Congaree National Park (CNP). Seven male and nine female hogs were monitored and their home ranges averaged (218.2 ± 42.9 ha) and (194.1 ± 31.0 ha), respectively. These home ranges proved relatively small when compared to results from other analyses of home range size in feral hogs, and suggest an abundant resource base in CNP. Habitat use was analyzed using USGS vegetation maps and polytomous logistic regression (PLR). Habitat use models were developed separately for males and females, as well as for all individuals pooled. In each case the final model indicated a positive relationship between hog use and some measure of oak abundance, suggesting the importance of oaks in CNP. It is important to understand the movement patterns and habitat use of hogs as their destructive nature can quickly decimate large areas and destroy native flora and fauna. CNP encompasses the largest intact tract of old-growth hardwoods in the U.S. making preservation from hogs an important issue.

SC DHEC'S BIOASSESSMENT PROGRAM: MACROINVERTEBRATES COLLECTED FROM STREAMS ENTERING THE CONGAREE NATIONAL PARK

J.B. Glover

James B. Glover, SC Department of Health and Environmental Control, SC

Principal Contact
James B Glover, SC Department of Health and Environmental Control – Aquatic Biology
2600 Bull Street, Columbia, SC 29201
PHONE: 803-898-4081; FAX: 803-898-4300, **Gloverjb@dhec.sc.gov**

Abstract
The South Carolina Department of Health and Environmental Control conducts ambient biological assessments of streams and rivers across South Carolina. Three streams that flow into the Congaree National Park are routinely sampled as part of the ambient monitoring effort. Cedar Creek, Myers Branch and Tom's Creek have been investigated since 1997. The bioassessments of these studies have indicated Good to Excellent Water Quality based on a diverse community of aquatic macroinvertebrates. Since 1997 over 380 different taxa have been identified representing over 15 different orders of macroinvertebrates.

SCIENCE AND DECISION-MAKING FOR RESTORATION OF AMERICAN RIVERS

W.L. Graf

William L. Graf, University of South Carolina, SC

Principal Contact
William L. Graf, Department of Geography, University of South Carolina
127 Callcott Building, Columbia, SC 29208
PHONE: 803.777.4437; FAX: 803.777.4972; **graf@sc.edu**

Abstract
All of America's large rivers are regulated by dams. These rivers pose restoration problems that are fundamentally different than those for small streams: their scale of operation is orders of magnitude larger, physical reconstruction of the channel is usually impossible, and multi-objective management is a prerequisite. At a national scale, regulation by large dams on rivers has radically altered fluvial hydrologic regimes and geomorphology. Experience with five examples, the Klamath River in Oregon and California, the Rio Grande in New Mexico, the Platte River in Nebraska, the Everglades in Florida, and the Congaree River in South Carolina shows that science and decision-making must effectively address three common themes in restoration of large rivers. First, the fundamental avenue to restoration is to at least partially restore the altered flows, requiring the use of dam operating rules and possibly re-engineering. Second, using regulated flows, restoration must reestablish physical integrity of the river before addressing biological integrity. Third, restoration planners must recognize targets and limits: it is likely that we can restore functionality but not at pre-dam scales, we are not likely to recreate a “natural” system, and the restored system must address historical and economic issues as well as ecological ones. The shortcomings of science for restoration in each of the four examples have been the same: lack of adequate quality assurance and control, inability to ask the right science questions and be adaptive, failure to integrate efforts among the sciences, and disconnection between empirical (historical) research and modeling (future-based) investigations. Despite these issues, science and decision-making for restoration of regulated American rivers is rapidly improving, and the need for this restoration is likely to drive the next wave of major theoretical and applied advances in river science and management.

FLOOD RECONSTRUCTION OF THE CONGAREE NATIONAL PARK

S. Hausmann, R. Bhattacharya, A. D. Cohen, J. J. Hains and B. Bixby

Sonja Hausmann and Bhattacharya Ruchi, University of Arkansas, AR
Arthur D. Cohen, University of South Carolina, SC
John J. Hains, Clemson University, SC
Becky Bixby, University of New Mexico, NM

Principal Contact
Sonja Hausmann, Dept. of Geosciences, University of Arkansas, Fayetteville, AR 72701
PHONE: 479-575-6419; FAX: 479-575-3469; **shausman@uark.edu**

Abstract
This study aims to reconstruct the paleoflood frequency, land-use changes, and paleoclimatic history of the Congaree National Park. Diatoms and several other paleoecological proxies archived in the sediments of Weston and Wise Lakes, along with the annual growth rings of the unique old-growth forest trees preserved in the Park will be used for the purpose. The records of Weston Lake (prominent tourist attractions in the Park) will be studied for the first time. These lakes are paleo-meanders of the ancestral Congaree River, which have been connected to the river, since separation from it, only by past flood events. To interpret the fossil diatom assemblages, indicator species for contact with the river will be identified and correlated with analyses of water chemistry of surrounding oxbow lakes to identify past water quality changes. Sub-samples of the same sediment cores analyzed for the fossil diatoms will be concurrently analyzed for pollen, spores, charcoal, and plant fragments to further elucidate changes over time in water chemistry, climate, and land-uses. This information will be complemented by studies of changes in thicknesses of growth rings of old-growth trees to support both climate history analyses and to date past events. Dating of events will be further accomplished by radiocarbon dating of plant fragments in the sediment cores and lead-210 dating of cores to establish rates of sedimentation. Additionally, modern algal communities and water chemistry will examine the effects of annual seasonal flood dynamics and connectivity between riverine and oxbow lake habitats in this floodplain ecosystem. Seasonal and temporal variation in modern-day algal community assemblages in the Congaree and Wateree rivers and their related oxbow lakes will be assessed and will assist in interpreting the diatom paleoecological record.

MERCURY CYCLING IN AQUATIC ECOSYSTEMS – COMPARATIVE STUDIES IN SOUTH CAROLINA

C.A. Journey, P.M. Bradley, and F.H. Chapelle

Celeste A. Journey, U.S. Geological Survey, South Carolina Water Science Center, SC
Dr. Paul M. Bradley, U.S. Geological Survey, South Carolina Water Science Center, SC
Dr. Frank H. Chapelle, U.S. Geological Survey, South Carolina Water Science Center, SC

Principal Contact
Dr. Frank Chapelle, U.S. Geological Survey, South Carolina Water Science Center
Suite 129, Columbia, SC 29210
PHONE: 803-750-6113; FAX: 803-750-6181; **chapelle@usgs.gov**

Abstract
Recent U.S. Geological Survey programs reported some of the highest fish-tissue mercury concentrations in the nation were in piscivorous fish in the Edisto River Basin of South Carolina. The South Carolina Department of Health and Environmental Control has issued restrictive fish consumption advisories in the Edisto River and other sites throughout the Coastal Plain Physiographic Province. However, substantially lower mercury concentrations are reported in piscivorous fish in the Congaree River and in streams within the Congaree National Park.

The dominant source of mercury in both basins is considered to be atmospheric wet deposition of mercury that averaged about 200 micrograms per square meter in Congaree National Park based on long-term monitoring by the Mercury Deposition Network program. Concurrent monitoring identified similar atmospheric wet deposition of mercury in the Edisto and Congaree River basins. In corroboration with atmospheric deposition findings, ranges of total mercury concentrations in sediments within the Edisto River basin were similar to those in the Congaree River basin.

The ability of the sediment microbial communities to convert the inorganic mercury pools to the bioavailable methymercury form was evaluated to determine if that would explain the differences in bioaccumulation between the two basins. In both Edisto and Congaree River basins, net methylation potential was low for in-channel sediments but ten-fold higher in wetlands sediments. In both systems, the net methylation potential was positively correlated with organic carbon and reducing redox conditions. These results suggested that the observed differences in fish-tissue mercury levels between the Edisto and Congaree River basins were not attributable to differences in source strength or the potential to produce methylmercury. Instead, differences in transport processes of methymercury from zones of production (wetlands) to points of entry into the food chain may contribute to the observed differences in fish-tissue levels between the two river systems.

LAND USE HISTORY OF THE BEIDLER TRACT AND ADJACENT LANDS, CONGAREE NATIONAL PARK

M. Kinzer

Mark Kinzer, National Park Service, GA

Principal Contact
Mark Kinzer, National Park Service, Southeast Regional Office
100 Alabama Street, S.W., Atlanta, GA 30303
PHONE: 404.562.3124 x 731; FAX: 404.562.3257; **Mark_Kinzer@nps.gov**

Abstract
Although established to preserve an outstanding example of "near virgin southern hardwood forest," Congaree National Park has a long history of human disturbance. Like the Indians before them, Europeans cleared land for crops, cut trees for fuel and building materials, and established seasonal dwelling sites. Over the course of the 18th and 19th centuries, two fairly distinct, but discontinuous, bands of disturbance developed in the so-called "Beidler Tract," i.e., the original acreage protected by Congress. The patchier of the two bands was located just below the northern bluff line and is characterized today by areas of loblolly pine (*Pinus taeda*) on floodplain ridges. The more extensive band lay along the river and is manifested by stands of even age forest in various age classes. These two bands of disturbance generally correspond to parts of the floodplain having soils well to moderately-well suited for pasture and cultivation. Grazing and farming were likely concentrated in these areas, although other parts of the floodplain with suitable soils may have seen these activities as well. Beginning around 1840, flooding and other factors caused floodplain agriculture gradually to diminish in importance, a trend that accelerated after the freeing of the slaves in 1865. Large scale commercial logging does not appear to have begun until the early to mid-1890's. In 1899, the Santee River Cypress Lumber Company began assembling most of the parcels that came to be known collectively as the Beidler Tract, after the company's founder, Francis Beidler. Santee cut most of the old-growth cypress from its Congaree holdings between 1899 and 1914; thereafter, the tract lay largely uncut for the next 50 years. Between 1969 and 1976, the Beidler family selectively logged or clearcut approximately 3,600 acres of old-growth and mature timber (24% of the 15,000-acre tract). Adjoining floodplain tracts were logged more frequently during the 20th century.

EARLY POST-LOGGING SUCCESSION ON THE BATES FORK TRACT, CONGAREE NATIONAL PARK

J.A. Kupfer

John Kupfer, University of South Carolina, SC

Principal Contact
John A. Kupfer, Department of Geography, University of South Carolina
709 Bull Street, Room 221, Columbia, SC 29208
PHONE: 803.777.6739; FAX 803.777.4972; **kupfer@gwm.sc.edu**

Abstract
Successful management and restoration of cleared and degraded southeastern floodplain forest ecosystems requires an understanding of seedling recruitment and establishment and the implications for successional changes. Examinations of pre-disturbance vegetation on a site (e.g., taken before logging) or inferences drawn from nearby intact sites can be helpful in predicting regeneration dynamics, but conditions under which mature stands established may have been very different from present conditions due to geomorphic changes, hydrologic alterations, non-native species invasions, climate change and other natural or human-mediated changes. Therefore, studies documenting post-disturbance recruitment and successional trajectories are important components of forest management and assessment. This study tests hypotheses about the interactive effects of site location and environmental conditions on early, post-logging succession in bottomland forest stands at Congaree National Park that were partially clearcut shortly before their acquisition by the Park Service in 2005.

Woody composition was sampled in 64 paired vegetation plots located along 32 forest-to-field transects spanning clearcut boundaries. Multivariate analyses showed that species patterns on regenerating sites were strongly related to local environmental controls including geomorphic setting, edaphic characteristics and hydrology. Because of these controls and the importance of root sprouting as a regeneration strategy, species regeneration did not vary consistently as a function of distance to the nearest intact forest. Empirical models of predicted species occurrence based on old-growth forest stands suggest that sprouting provides a link to past conditions but that regeneration was also strongly influenced by conditions during the pivotal, post-disturbance years.

THE BATS OF THE CONGAREE AND OTHER SOUTHEASTERN PARKS: EFFECTS OF URBANIZATION AND DEVELOPMENT

S.C. Loeb, C.J. Post, and S.T. Hall

Susan C. Loeb, Southern Research Station, Clemson, SC
Christopher J. Post, Steven T. Hall, Clemson University, SC

Principal Contact
Susan C. Loeb, U.S. Forest Service, Southern Research Station
233 Lehotsky Hall, Clemson University, Clemson, SC 29634.
PHONE: 864-656-4865; FAX: 864-656-1407; **sloeb@fs.fed.us**

Abstract
Bats are important components of many ecosystems and are good indicators of ecosystem health. However, little is known about the bat communities of southeastern national parks. As part of the National Park Service's Inventory and Monitoring Program, we surveyed the bats of 10 southeastern national parks (5 in the Southeast Coast Network and 5 in the Cumberland Piedmont Network). Our objectives were to document 90% of the bat species within each park and identify important roosting and foraging habitats within each park. We also tested the effects of park size and urbanization and development on bat community structure. We surveyed each park using mist nets and AnabatII acoustic detectors and used commercially available GIS databases to determine population density and land cover classes within each park, and in the 5 km area surrounding each park. Species richness ranged from 3 to 8 across the parks (6 for CNP), and species evenness ranged from 0.33 to 0.88 (0.64 for CNP). Two species captured in CNP, Rafinesque's big-eared bats and the southeastern myotis, are species of special concern. Neither species richness nor species evenness was related to park size. However, species richness was positively related to the total amount of wetland within the parks and negatively related to the amount of agriculture in the surrounding area. Species evenness was not related to any within park characteristics but was negatively related to population density and the amount of development in the surrounding area, and was positively related to the amount of forest plus wetland and canopy cover in the surrounding 5 km. The low evenness in urban parks was due to the dominance of big brown bats in these parks. Our data suggest that national parks are important refuges for bats and will become increasingly important as urbanization and development increase.

ROOST TREE SELECTION OF RAFINESQUE'S BIG-EARED BAT ON MULTIPLE SPATIAL SCALES IN CONGAREE NATIONAL PARK

J. Lucas and S.C. Loeb

Jessica Lucas, Clemson University, SC
Susan C. Loeb, Southern Research Station, Dept. of Forestry and Natural Resources, Clemson University, SC

Principal Contact
Jessica Lucas, Clemson University
G-27 Lehotsky Hall, Clemson, SC 29634
PHONE: 864-656-6793; **jslucas@g.clemson.edu**

Abstract
Roosts are critical resources for bats, as they provide protection from the elements and predators, in addition to a location for raising young. Rafinesque's big-eared bat is a South Carolina endangered species, and little is known about its roosting habits and preferences within its natural habitat. In the Coastal Plains, Rafinesque's big-eared bats are associated with bottomland hardwood forests and Congaree National Park supports a population of this rare species. During the summers of 2006 and 2007 I examined roost tree selection within the park at 3 different spatial scales: tree, plot, and landscape. I located 43 roost trees using tree searches and radiotelemetry. I compared characteristics of roost trees (maternity and solitary) and their surrounding vegetation to random trees and plots in comparable habitat. Maternity roosts averaged 28.5 m in height and 121.5 cm dbh; solitary roosts averaged 27.4 m in height and 103.8 cm dbh. Random trees were significantly smaller, averaging 23.2 m and 43.7 cm dbh. Selection of water tupelo (Nyssa aquatica) over other species was apparent at both the roost tree and plot levels. Water tupelo was the most common roost (67.4%) and composed 49.7% of roost plots compared to 20.1% of random plots. .However, black gum (*Nyssa sylvatica*), another common roost tree (14%), composed 7.9% of roost plots and 19.0% of random plots demonstrating some avoidance of this tree species at the plot level. At the landscape scale bats showed strong selection for the baldcypress (*Taxodium distichum*) - water tupelo - Carolina ash (*Fraxinus caroliniana*) land cover type for both maternity and solitary roost trees. This land cover comprises only 9% of Congaree National Park, but 83% of solitary roost trees and 100% of maternity roosts were found within this type. The preference of these specific tree species and habitat components helps define the roosting needs of this species, information that is critical for its management.

CONGAREE FLOODPLAIN DECISION SUPPORT PROJECT PHASE II: GIS FLOODPLAIN INUNDATION MODELING, CONGAREE NATIONAL PARK, SOUTH CAROLINA

K. Meitzen and W.L. Graf

Kimberly Meitzen, University of South Carolina, SC
William L. Graf, University of South Carolina, SC

Principal Contact
Kimberly M. Meitzen, University of South Carolina-Department of Geography
708 Bull Street, Columbia, South Carolina, 29208
PHONE: (803) 210-5421; FAX (803) 777- 4972; **Meitzenk@mailbox.sc.edu**

Abstract
Flood processes of the Congaree River produce and maintain a diversity of landforms which support the old-growth bottomland forest ecosystem protected by Congaree National Park, South Carolina. Recent research suggests that Saluda Dam, on the Saluda River, a main tributary to the Congaree River, affects the flood hydrology and ecological integrity of Congaree NP. Saluda Dam, a peaking hydro-electric facility, is currently in the license renewal process with the Federal Energy Regulatory Commission (FERC), and thus, this is the ideal opportunity for stakeholders to provide input regarding flow releases. A series of workshops, organized under the context of Ecologically Sustainable Water Management (ESWM), provide a framework for evaluating the effects of various flow scenarios on the resources supported by the Congaree River. As part of the ESWM process, the development of a hydraulic flood inundation model enables resource managers to assess the extent of Saluda Dam flow alterations on resources protected by Congaree NP. This project describes the development and application of a GIS-based decision support system for modeling the effects of various river flows on floodplain inundation depths at Congaree NP. Flood inundation modeling uses U.S. Army Corps of Engineers (USACE) Hydrologic Engineering Center's River Analysis System (HEC-RAS) software, a Geographic Information System (GIS), and HEC-Geo RAS GIS extension tools. Primary data sources include United States Geological Survey (USGS) stream flow data, and high-resolution LiDAR data. National Park resource managers apply model simulations to ESWM decision making for recommending flows to the FERC re-licensing of Saluda Dam.

DEVELOPMENT, DISTURBANCE, AND MAINTENANCE: PROCESS-PATTERN RELATIONSHIPS IN RIPARIAN ENVIRONMENTS, CONGAREE RIVER, CONGAREE NATIONAL PARK, SOUTH CAROLINA

K. Meitzen

Kimberly Meitzen, University of South Carolina, SC

Principal Contact
Kimberly M. Meitzen, University of South Carolina-Department of Geography
708 Bull Street, Columbia, South Carolina, 29208
PHONE: (803) 210-5421; FAX (803) 777- 4972; **Meitzenk@mailbox.sc.edu**

Abstract
Lateral channel migration initiates complex and dynamic biogeomorphic responses that are fundamental to the creation and maintenance of riparian habitats along low-gradient, coastal plain rivers. Lateral channel migration rates strongly influence structure and composition of pointbar and cutbank forests along the Congaree River, Congaree National Park, South Carolina. Lateral channel migration rates were measured in a GIS using geo-referenced aerial photos from 1938-2006. Forest structure and composition were measured from a stratified-random sample of 50 sites, including 25 paired edge-interior plots, and analyzed using Mann-Whitney tests, Spearman's correlations, Sorenson (Bray-Curtis) distance measures, and Non-metric Multi-dimensional Scaling (NMS) ordinations. Lateral channel migration produced a significant directional control on cutbank and pointbar forests through divergent successional responses. Pointbar forests exhibited a classic forward successional response, whereby one species assemblage replaced another dependant on spatial and temporal controls related to micro-topography and lateral migration rates. Cutbank forests exhibited a retrogressive, reverse successional response and increased in structural complexity with increasing proximity to the river; however vegetation indices varied inversely with lateral migration rates. Cutbank edges with low lateral migration rates allowed a longer time for trees to colonize and they contained greater density, basal area, and richness. Cutbanks characterized by high lateral migration rates contained lower tree densities, basal area, and richness. This examination reveals a continuum between bio-physical disturbances, forest response, and the maintenance of a dynamic equilibrium controlled by process-pattern linkages across varied environmental gradients. Lateral migration processes function as a natural disturbance that creates and maintains a diversity of habitats in river and floodplain environments. Congaree National Park provides a protected setting that enables these processes to operate in a relatively naturally environment, thereby, preserving the physical, biological, and ecological integrity of a functionally sustainable near-channel floodplain ecosystem.

A SURVEY OF POTENTIAL COLIFORM BACTERIA SOURCES AND ASSOCIATIONS IN THE CONGAREE RIVER FROM COLUMBIA TO THE WEST BOUNDARY OF CONGAREE NATIONAL PARK

A. Denman, D. Eargle, A. Miller

Anne Marie Denman, David Eargle, Andy Miller- South Carolina Department of Health and Environmental Control, Bureau of Water, SC

Principal Contact
Andy Miller, Watershed Manager SCDHEC
2600 Bull Street, Columbia SC 29201
PHONE: 803-898-4031; **millerca@dhec.sc.gov**

Abstract
SCDHEC Water quality monitoring station C-074, located on the Congaree River near the West Boundary of Congaree National Park, often exceeds South Carolina State Standards for fecal coliform bacteria. This site is currently listed on the state's 303(d) list of impaired waters. Special monitoring was conducted by SCHEC personnel from the Aquatic Biology Section of DHEC Bureau of Water's Water, Monitoring, Assessment and Protection Division. The goal of the survey was to locate the area(s) of any predominant sources of *coliform* bacteria beginning with urbanized Columbia through selected areas of the river's course to the station at C-074. These select areas included, zones of direct urban drainage, outlets of significant tributaries, outfall zones of point sources dischargers, and potential local sources in rural areas proximal to the west boundary. The data and analyses presented in this poster discusses associations with impairments at station C-074 and potential zones of interest along the river course that merit further investigation for abatement of standards violations in the river.

AN ANALYSIS OF THE CONCENTRATIONS OF *ENTEROCOCCI* AND *ESCHERICHIA COLI* IN CEDAR CREEK, TOM'S CREEK, WISE LAKE AND WESTON LAKE IN CONGAREE NATIONAL PARK (CNP)

S.D. Montebello and M. Montebello

Stacey Dugan Montebello and Michael Montebello, Artefix Academy, Cayce, SC

Principal Contact
Stacey D. Montebello, 104 Evergreen Lane, Cayce SC 29033
PHONE: 803.791.9921; **Artefix_academy@hotmail.com**

Abstract
This study attempts to quantify and compare the concentrations of *Enterococci* and *Escherichia coli (E. coli)* in Cedar Creek, Tom's Creek, Wise Lake and Weston Lake within Congaree National Park (CNP) to assess if these waters meet the freshwater bacteriological criteria established by the Environmental Protection Agency (EPA).

From August 6, 2007 through December 18, 2007, approximately 422 samples for both *Enterococci* and *E. coli* were collected and analyzed. Multiple Tube Fermentation (MTF) tests specifically Enterolert™ for *Enterococci* and Colilert® for *Escherichia coli* were used to assess the effectiveness of these methods to identify possible bacteriological contamination. In addition, water temperature, pH and dissolved oxygen (DO) measurements were taken at the collection sites on Cedar Creek, Tom's Creek, Weston Lake and Wise Lake. Four positive *Enterococci* samples were sent to Source Molecular Corporation for analysis of human DNA markers to potentially determine the source of the bacteriological material.

The results of the study indicated that Wise Lake, Weston Lake and a portion of Cedar Creek (at Bannister Bridge Canoe Landing) generally met EPA's criteria for *Enterococci* and *E. coli*. Tom's Creek and two downstream locations on Cedar Creek (near Wise Lake at Bridge B and the South Cedar Creek Canoe Landing) did not consistently meet the criteria. The possible bacteriological sources on Cedar Creek are presently unknown and the results were unexpected. Further investigation and continued analysis of bacteriological parameters will be needed to identify sources and improve the accuracy of these data.

METHODOLOGY AND RESULTS OF IVORY-BILLED WOODPECKER SEARCHES IN SOUTH CAROLINA

M. Moskwik, T. Thom, L. Barnhill, C. Watson, and J. Kilgo

Matthew Moskwik, The Nature Conservancy, SC
Theresa Thom, Congaree National Park, SC
Laurel Barnhill, South Carolina Department of Natural Resources, SC
Craig Watson, United States Fish and Wildlife Service, SC
John Kilgo, United States Forest Service, SC

Principal Contact
Matthew Moskwik, The Nature Conservancy
2231 Devine Street Suite 100, Columbia, SC 29205
PHONE: 803.254.9049 ext 30; FAX: 803.252.7134; **mmoskwik@tnc.org**

Abstract
In an effort to document the Ivory-billed Woodpecker's presence in South Carolina, a partnership was formed between 16 organizations and agencies, known as the South Carolina Ivory-billed Woodpecker Working Group. The member agencies and organizations shared information, resources, and provided funding for a statewide search. Search efforts were conducted in the winters of 2005-2006 and 2006-2007. In 2005-2006, 46 volunteers comprised the search team and efforts took place in Congaree National Park. In 2006-2007, a coordinator, 4-person full-time field crew, and 31 volunteers were involved in the search. Areas targeted in 2006-2007 included: the Francis Marion National Forest, Woodbury Tract, and Congaree National Park. After two years of search efforts, no definitive evidence of the Ivory-billed Woodpecker's existence in South Carolina has been found. However, inconclusive kent-like calls, double knocks, and sightings have been reported by the official search effort, as well as by independent individuals over the last 2 years. Based on this evidence, searches will be conducted in South Carolina during the winter of 2007/08.

A COMPARISON OF SAMPLING METHODS FOR CRAYFISHES IN CONGAREE NATIONAL PARK

J. Price and S. Welch

Jennifer Price, South Carolina Department of Natural Resources, SC
Shane Welch, Clemson University, SC

Principal Contact
Jennifer Price, South Carolina Department of Natural Resources
1921 VanBoklen Road, Eastover, SC 29044
PHONE: 803.353.8232; FAX 803.783.4241; **pricej@dnr.sc.gov**

Abstract
We sampled freshwater crayfishes, at 38 sites across six habitat types in the National Park. This was the first attempt to document the diversity of freshwater crayfishes in the Park, and six species were found. Within habitats containing standing water at the time of sampling, we compared the effectiveness of four collection methods. Electrofishing was the most successful technique in terms of the diversity of species collected, the number of individuals collected, and the widest range of sizes collected. Seine netting was the next most successful method. Baited minnow traps were biased towards form I males and larger individuals, while dip netting was biased towards smaller individuals. The relative effectiveness of electrofishing depended somewhat upon species. Electrofishing collected more individuals than any other technique of two stream dwelling species, *Procambarus acutus* and *P. chacei*. For *P. troglodytes*, the most abundant species, and a habitat generalist, electrofishing was superior to dip netting in some habitats, but did not significantly differ from traps or seine netting. For a fourth species, *Fallicambarus fodiens*, no significant differences between the effectiveness of any sampling methods were detected.

THE SEARCH FOR NON-NATIVE BARK AND AMBROSIA BEETLES IN SOUTH CAROLINA

L. Reid, T. Bauman, and V. Cannarella

Laurie Reid, Vincent Cannarella, South Carolina Forestry Commission, SC
Tessa Bauman, USDA Forest Service Southern Research Station, LA

Principal Contact
Laurie Reid, South Carolina Forestry Commission
5500 Broad River Road, Columbia, SC 29210
PHONE: 803.896.8830; FAX 803.896.8827; **Lreid@forestry.state.sc.us**

Abstract
As the introduction of non-native bark and ambrosia beetles can pose a threat to forests in South Carolina, the South Carolina Forestry Commission (SCFC) has been cooperating with USDA Forest Service Forest Health Protection on a pilot project for the Early Detection and Rapid Response of non-native bark and ambrosia beetles since 2001. Forest Health Protection implemented this detection, monitoring, and response project on a national scale in 2007 with 17 states participating. To survey for non-native bark and ambrosia beetles, Lindgren funnel traps baited with attractants are placed in 7-9 locations per state, such as state or national parks, urban forests, or wooded areas in the wildland-urban interface. In South Carolina, these locations have varied by year, and 20 counties have been trapped by SCFC since 2001.

In 2006, three traps were placed at Congaree National Park. Each of the three traps had a different attractant (ethanol, alpha-pinene and ethanol, and a three-component Ips lure) to target various native and non-native beetles in the subfamily Scolytinae (Coleoptera: Curculionidae). Traps were active over a 20-week period (during peak ambrosia beetle flight) from 28 March through 1 August. Insect samples were collected on a biweekly basis, insects were sorted, and the 12 most common ambrosia beetles were identified by SCFC. Unknown or unidentified ambrosia beetles were sent to a USDA Forest Service insect taxonomist for identification. During the survey, 1,480 specimens and 29 species of ambrosia beetles were trapped at Congaree National Park.

SPECIES DIVERSITY AND CONDITION OF THE FISH COMMUNITY DURING A DROUGHT IN CONGAREE NATIONAL PARK

L. Rose and J. Bulak

Leo Rose, SC Department of Natural Resources, SC
Dr. Jim Bulak, Research Coordinator, SC Department of Natural Resources, SC

Principal Contact
Leo Rose, SC Department of Natural Resources
2726 Fish Hatchery Road, West Columbia, SC 29172
PHONE: 803.755.0966; **RoseL@dnr.sc.gov**

Abstract
From the period including 1999 through 2002, the South Carolina Department of Natural Resources completed a total of 59 fish surveys under a cooperative agreement with Congaree National Park (CONG). Fifty surveys were completed from 33 sites within the CONG boundary and nine surveys were completed from nine sites outside the park boundary. This effort established baseline data to characterize the condition of the fish community in the park. Through this inventory, the goal was to accomplish two main objectives:

1. Inventory the fish species within CONG.
2. Define the relative condition of the fish community within the park.

Under normal meteorological conditions, the CONG floods periodically throughout the year. During this sampling effort, the CONG experienced extreme drought conditions and flooding events were rare. The dry conditions enabled sampling in areas that would normally not be suitable. Additionally, we were able to observe the fish community during natural degradation in fish habitat brought on by the drought. A follow-up survey was conducted after a flooding event in 2003 to evaluate the effects of flooding on fish communities in floodplain streams.

By using clustering and ordination techniques we were able to describe three distinctively separate fish communities in the park and correlate these groups with specific habitat conditions. The resulting information was used to develop a model that predicts the expected fish community given specific habitat conditions during a drought. With further testing under non-drought conditions, this model could be modified for use as a long term monitoring tool to measure the condition of the streams in the Congaree floodplain. Post-flood stream sampling yielded more fish at every site when compared pre-flood surveys. Community structure was also affected by flooding with some fish species moving out and others moving in resulting in a net species diversity increase post-flood.

FACTORS MAINTAINING SPECIES RICHNESS IN OLD-GROWTH BOTTOMLAND FORESTS

R. R. Sharitz and B. P. Allen

Rebecca R. Sharitz and Bruce P. Allen, Savannah River Ecology Laboratory, SC

Principal Contact
Rebecca R. Sharitz, Savannah River Ecology Laboratory, Drawer E, Aiken, SC 29802
PHONE: 803.725.5679; FAX 803.725.3309; E-MAIL **Sharitz@plantbio.uga.edu**

Abstract
The forests of the Congaree National Park are diverse and species-rich. Twenty-six plant communities (alliances) have been identified and mapped, and at least 79 tree, 45 shrub and 24 liana species have been identified. This remarkable species richness is related to a variety of factors, including floodplain geomorphic processes, hydrologic events, and wind disturbances that maintain a mixture of habitats for plant establishment and growth. Considered to be the best remaining tract of old-growth bottomland hardwood forest, the Congaree National Park was in the path of Hurricane Hugo in 1989. Damage from the windstorm varied among hardwood species, with large oaks (especially *Quercus laurifolia* and *Q. phellos*), sweetgum (*Liquidambar styraciflua*), elm (predominantly *Ulmus americana*) and green ash (*Fraxinus pennsylvanica*) trees experiencing the greatest uprooting or breakage. In contrast, baldcypress (*Taxodium distichum*) in the sloughs sustained little damage. Repeated measurements of tree size and forest condition in ten permanent plots over a 16-year period have revealed patterns of tree growth and establishment of new individuals that are related to species' shade and flood tolerances. Several dominant bottomland canopy species, including oaks and sweetgum, are shade intolerant and have experienced significant recruitment of juveniles only in more highly damaged forest areas. In contrast, green ash which is moderately shade tolerant, increased in density in both highly damaged and less damaged sites, and red maple (*Acer rubrum*), also moderately shade tolerant, had extensive sapling recruitment in highly damaged areas. Wind disturbances to southeastern bottomland forests may be a major factor in restructuring species composition and maintaining high levels of species diversity. Furthermore, there may be thresholds of disturbance that perpetuate a dominance of shade-intolerant species in the canopy.

GEOMORPHOLOGY OF THE CONGAREE RIVER FLOODPLAIN

D.C. Shelley

David C. Shelley, Congaree National Park, SC

Principal Contact
David C. Shelley, Ph.D., Old-Growth Bottomland Forest Research and Education Center
Congaree National Park, 100 National Park Road, Hopkins, SC 29061
PHONE: 803.776.4396 x15; FAX: 803.783.4241; **david_shelley@nps.gov**

Abstract
Recent geomorphic mapping in the Congaree River Floodplain (CRF) reveals a complex patchwork of surficial deposits. These deposits, which are mostly <25,000 years old (<25 ka), represent an archive of tectonic, climatic, and anthropogenic events as well as a fundamental spatial constraint on ecological processes.

Two principal unit types are mapped. Meanderbelts are distinct mosaics of old abandoned channels, point bars and levees formed during periods when hydrology, sediment supply, climate, valley gradient and other variables were in quasi-equilibrium. Much of Congaree National Park is underlain by a single meanderbelt. The modern channel and meanderbelt reflect both post-European land use changes in addition to the influence of buried faults. Bottomland terraces are older, less distinct fluvial surfaces. Many represent meanderbelt mosaics that have been significantly modified by subsequent floodplain processes, though one reflects a braided river regime developed under glacial conditions sometime from 16-60 ka. Many bottomland terraces represent slightly elevated “second bottoms” that only flood during high water. Assymetrical trends in meanderbelt and bottomland terrace geometries indicate long-term river migration and rotation caused by gentle, southeast tectonic tilting.

Many smaller deposits overlie these principal units. Dune complexes like Sampson Island formed under dry, windy, glacial conditions around 15-30 ka. Alluvial fans are slightly-elevated, moderately well-drained sand deposits associated with tributaries near the CRF margin. These fans, which probably reflect climate changes around 5-8 ka, underlie much of the CRF loblolly pine habitat. Groundwater Rimswamps like Muck Swamp, which are seepage wetlands containing organic-rich sediment deposited in association with wetter climates since ~5-6 ka, underlie the CRF's most diverse plant communities. Creek systems, such as Cedar Creek, and myriad floodplain guts have overprinted much of the floodplain with a veneer of migrating channels containing sand and clay. Artificial fill from human activity is also locally significant on a geologic scale.

RECENT DEVELOPMENTS IN EDUCATION PROGRAMS AT THE OLD-GROWTH BOTTOMLAND FOREST RESEARCH AND EDUCATION CENTER

D.C. Shelley and T.A. Thom

David C. Shelley and Theresa A. Thom, Congaree National Park, SC

Principal Contact
David C. Shelley, Old-Growth Bottomland Forest Research and Education Center
Congaree National Park, 100 National Park Road, Hopkins, SC 29061
PHONE: 803.776.4396 x15; FAX: 803.783.4241; **david_shelley@nps.gov**

Abstract
The Old-Growth Bottomland Forest Research and Education Center (RLC) at Congaree National Park has offered more than 100 education programs between fall 2006 and winter of 2008. The RLC has matured significantly in the process, and made considerable strides towards improving resource stewardship and promoting behavior changes related to conservation. The RLC has also developed partnerships with the Columbia Museum of Art, the University of South Carolina, and Richland School Districts One and Two.

Program foci are developing in three areas. "Congaree Science" focuses on floodplain science content by emphasizing actual research projects at Congaree. "Science Literacy" focuses on understanding the process, art and context of science. "Education Research" focuses on using social science research techniques to assess and refine program effectiveness.

Programs have targeted four audiences. K12 programs (mostly grades 3-7) are using a multi-component format that includes a nature walk, a standards-based science lesson and a standards-based art lesson. Citizen Science programs provide training and tools to interested volunteers and then solicits help with data collection; these programs have already documented >100 species of spiders, >50 species of butterflies, and >30 species of birds in the park and provided for the installation of 8 observation wells. University level programs have focused on resource management issues as well as field-experiences in geology, geomorphology, and geohydrology. Professional programs focus on sharing data with educators, scientists, and resource managers; examples include field experiences for teachers and a SC science-standards training workshop for local interpretive staff.

Future plans involve continued development in these same areas. The RLC will host a day camp in summer 2008 as part of the K12 education and research programs, and intends to emphasize repeat fieldtrips for target audiences. The RLC is also pursuing several grant proposals to revise curriculum materials and integrate spreadsheets into university classes.

DEVELOPING A 3D VISUALIZATION OF FOREST RECOVERY AND LONG TERM MONITORING OF HURRICANE HUGO EFFECT OVER THE FOREST COMMUNITIES AT CONGAREE NATIONAL PARK

B. Song, C.A. Gresham, and B. Hulslander

Bo Song, Charles A. Gresham, Baruch Institute of Coastal Ecology and Forest Science, SC
Bill Hulslander, Congaree National Park, SC

Principal Contact
Bo S. Song, Baruch Institute of Coastal Ecology and Forest Science, Clemson University
P.O. Box 596, Georgetown, SC 29442-0596
PHONE: 843.545.5673; FAX: 843.546.6296; **bosong@clemson.edu**

Abstract
3D visualization modeling is a powerful tool that can portray current forest conditions as well as their recovery from disturbance under different management alternatives. This process can also be used to illustrate the occurrence of non-native, invasive plant species and their response to different restoration treatments and stages. Existing data will be utilized to place individual trees into the floodplain with realistic sizes and densities. The landscape terrain, as well as forest composition, size and density will be determined from existing forest inventory data and park data sets. GIS, remote sensing, LiDAR, and Visual Nature Studio software (VNS, 3D Nature, LLC) will be used to integrate all information and generate the 3-D virtual forest. Management effects pertaining to different restoration treatments will be portrayed.

As for the long term monitoring project, starting in 1993, 50 plots among four sites in South Carolina have been monitored at three year intervals to determine the recovery of forested areas impacted by Hurricane Hugo in 1989. One goal of this research has been to document the progression of the forest from the time of the impact through the return to a mature ecosystem. The study sites still have not shown completion of that cycle; the pre-hurricane dominant tree species have not yet regained dominance in the canopy. In light of this need to observe the recovery of coastal forests after a hurricane in long-term, we will continue monitoring the same site for another 10 years, which will culminate in a 20 year documentary dataset.

FLOODPLAIN RESEARCH AT THE OLD-GROWTH BOTTOMLAND FOREST RESEARCH AND EDUCATION CENTER, CONGAREE NATIONAL PARK, SC

T.A. Thom and D.C. Shelley

Theresa A. Thom, David C. Shelley, Congaree National Park, SC

Principal Contact
Theresa A. Thom, Old-Growth Bottomland Forest Research & Education Center
Congaree National Park, 100 National Park Road, Hopkins, SC 29061
PHONE: 803.695.0214; FAX: 803.783.4241; **theresa_thom@nps.gov**

Abstract
Congaree National Park encompasses approximately 26,000 acres of floodplain forest, including 15,010 acres of National Wilderness Area. Congaree was established to "preserve and protect for the education, inspiration, and enjoyment of present and future generations an outstanding example of a near-virgin southern hardwood forest situated in the Congaree River floodplain in Richland County, South Carolina". Congaree is home to nearly 90 species of trees, over 700 plant species, more than 180 species of birds, and provides critical habitat for various floodplain species.

As part of the South Atlantic Coastal Plain Biosphere Reserve, a Globally Important Bird Area, and a Wetland of International Importance, Congaree National Park provides an exceptional location for research and education. Ecological studies have been conducted within Congaree for over 50 years, with diverse projects including inventories, natural history work, and long-term ecological studies involving biological communities, geomorphology, surface water and groundwater hydrology, vegetation dynamics, and impacts from anthropogenic disturbances and natural catastrophic events. These data provide important baselines for current data interpretation and adaptive management.

In 2004, the park became home to the Old-Growth Bottomland Forest Research and Education Center, one of 17 Research Learning Centers across the Nation. The Center facilitates research, encourages science-based education, and is uniquely situated to capitalize on floodplain research, management, and educational opportunities. Congaree data sets, coupled with new technologies, park support, the connectivity to the National Park Service Network, and the close proximity to Columbia, South Carolina make Congaree National Park a desirable location for future collaborative floodplain science.

GENETIC DIVERSITY AND STRUCTURE IN CAROLINA BOGMINT (*Macbridea caroliniana*) AND IMPLICATIONS FOR SPECIES CONSERVATION

K.F. Weeks, J.L. Walker, and J.L. Hamrick

Katherine F. Weeks, Clemson University, Clemson, SC
Joan L. Walker, US Forest Service, Southern Research Station, Clemson, SC
James L. Hamrick, University of Georgia, Athens, GA

Principal Contact
Katherine Weeks, Clemson University, USGS SC Cooperative Fish and Wildlife Unit
G-27 Lehotsky Hall, Clemson, SC 29634
PHONE: 803.656.0320; **katherm@clemson.edu**

Abstract
Macbridea caroliniana is a globally imperiled perennial herb associated with bottomland hardwoods in the Carolinas and Georgia. There are 36 extant populations and the largest population occurs at the Congaree National Park. We used starch gel electrophoresis to describe the allozyme diversity and structure in this species. We sampled the young leaves of 24-48 individuals from 11 populations distributed across the species range including two populations at Congaree National Park, east of Cedar Creek (ECC) and west of Dry Branch (WDB). Of the 23 loci analyzed, 14 (60.9%) were polymorphic, with an average of 32.5% of the loci polymorphic within populations. Both ECC and WDB populations had higher than average population genetic diversity values (H_e = 0.123 and 0.145 respectively compared to the average H_e = 0.095). These populations are among those especially important to the conservation of *M. caroliniana*. Gene diversity measures for the species and for the populations are similar to those found for the only congener of the species, *M. alba*. However, in contrast to the near uniformity among *M. alba* populations, we found more than 30% of the total allelic diversity in *M. caroliniana* explained by population differentiation (G_{ST} = 0.33). Further, a Mantel test supported isolation by distance in *M. caroliniana*. These results suggest historic and/or recent obstacles to gene flow as might be expected for an insect pollinated species found in discrete watersheds. This study highlights the importance of conserving multiple populations for long term species security.

GROUNDWATER FLOW IN A PEAT-FORMING RIM SWAMP

A. Wilson and A. Rodgers

Alicia Wilson, April Rodgers, Dept Geological Sciences, University of South Carolina, SC

Principal Contact
Alicia Wilson, Department of Geological Sciences, University of South Carolina
701 Sumter Street, Columbia, SC 29208
PHONE: 803.777.1240; FAX 803.777.6610; **awilson@geol.sc.edu**

Abstract
Peat swamps have been mapped at the border of the Congaree floodplain and date to >20,000 yr. Knowledge of the factors that control and maintain peat formation in these areas is important for (1) understanding the capacity of these rim swamps to act as long-term natural filters for contaminants, (2) determining their role in the carbon and nutrient cycling within the floodplain, and (3) avoiding deterioration of these resources through anthropogenic impact. Peat formation requires that the deposits be wet throughout the year, and, in the Congaree floodplain, groundwater springs at the foot of the bluff maintain these wet conditions. The goal of the current project is to determine groundwater flow paths and flow rates surrounding the peat deposits and determine the groundwater response to climatic variability. As part of the initial phase of the work, 5 shallow piezometers were installed to monitor fluctuations in the water table in a ~100 m transect reaching from the bluff down into the peat swamp. The piezometers were instrumented in November 2007, following approximately 3 months with no rainfall. The data are currently being analyzed.

THE ORB WEAVER (ARANEIDAE) FAUNA AND THE SPIDER BIOBLITZ AT CONGAREE NATIONAL PARK

R.J. Wolff

Robert J. Wolff, South University and Adjunct in Entomology at Clemson University, SC

Principal Contact
Robert J. Wolff, 104 Cyclamen Court, Columbia, SC 29212
PHONE: 803.361.6036; FAX: 803.781.5930; **doctorspider@yahoo.com**

Abstract
Two fall BioBlitz events (2006 and 2007) have been held at Congaree National Park with amateur volunteers collecting spiders for the research of the author to determine the spider (Araneae) fauna of the Park. The events have been highly successful in terms of volunteer turnout, enthusiasm, education, and public relations. It has also been useful for the science of studying diversity. Determination of the fauna of the orb weaving spider family Araneidae has been enhanced by the specimens obtained during the Blitz, with new records collected. They also have helped show that the diversity of this family has increased since the 1970's in the Park. While one species, *Neoscona domiciliorum*, had been found in extremely high numbers compared to other orb weavers, the fauna is now much more balanced in population diversity. This indicates better environmental health and probable improved ecological stability from improving habitat management at the Park.

DRAGONFLIES AT CONGAREE: REPORT ON A 2002 SURVEY AND PLANS FOR A 2008 SURVEY AND EXPERIMENT ON PERCH-HEIGHT SELECTION

W.B. Worthen

Wade B. Worthen, Furman University, Greenville, SC

Principal Contact
Wade B. Worthen, Biology Department, Furman University, Greenville, SC 29613
PHONE: 864.294.3390; FAX: 864.294.2058; **worthen@furman.edu**

Abstract
The dragonfly communities of South Carolina are poorly described relative to other southeastern states like Florida, Georgia, and North Carolina. This sampling bias may be responsible for the disjunct distributions seen in several southeastern species. For instance, *Progomphus bellei* is recorded from Florida and North Carolina but has not been recorded from intervening states. Given the size and habitat diversity of Congaree National Park, I thought this would be an ideal site to find new species for South Carolina. In 2002, I sampled adults by net along the Wise Lake-Cedar Creek-Weston Lake loop, biweekly from March to September. I also sampled larvae once at several points on Cedar Creek. I collected 41 species, including 16 new records for Richland County. I plan to extend my survey in 2008, including habitats south of Cedar Creek to the Congaree River. In addition, I plan on testing for an interesting pattern of perch-height selection. Over the last few years, I have conducted experiments on perch selection at ponds near Greenville, SC. Using dowels as perches and dead mounted specimens as decoys, I have examined the role of inter- and intraspecific interactions on perching behavior. Dragonflies in these communities show a very regular pattern of perch height selection that is positively correlated with body size; large species perch higher than small species. Large species also displace small species from tall perches, and are more aggressive towards smaller species. Mean perch heights are distributed in a significantly non-random and regular pattern, suggesting competitive displacement and resource partitioning. Differences in perch height also correlate with important flight attributes (such as wing loading and aspect ratios), so biomechanical constraints might also be important. I plan to repeat these experiments at Congaree in 2008-2009. Although there is broad overlap in the perching species present in the South Carolina Upstate (Greenville) and Midlands (Congaree), there are some differences in these communities, as well. For example, *Celithemis ornata* and *Libellula vibrans* are more common at Congaree and *Libellula luctuosa* are more common in Greenville. It will be interesting to see how other species respond to these differences in the background community. In addition, I will compare perching behaviors in different habitats within the park.

WILD PIG DISTURBANCE IN FLOODPLAIN WETLAND FORESTS AND ADJACENT PINE FLATWOODS AT CONGAREE NATIONAL PARK, 2000-2003

S. Zengel and W. Conner

Scott Zengel, PBS&J Ecological Sciences, Tallahassee, FL and Clemson University, Department of Forestry and Natural Resources, SC
William Conner, Clemson University, Baruch Institute of Coastal Ecology and Forest Science, SC

Principal Contact
Scott Zengel, PBS&J, 2639 North Monroe Street, Building C, Tallahassee, FL 32303
PHONE: 850.575.1800; **sazengel@pbsj.com**

Abstract
Wild pig disturbance was evaluated over three years in fixed 1,000 m^2 plots at Congaree National Park. The study compared hog disturbance patterns among four habitats: bottomland hardwoods, cypress-tupelo, seepage floodplain forest, and pine flatwoods adjacent to the floodplain. Hog disturbance, averaged across all years, was more abundant in cypress-tupelo (19% total disturbance) compared to bottomland hardwoods (9%) and seepage forest (9%); all floodplain forests had greater disturbance than pine flatwoods (1%). Differences in hog disturbance may have been related to greater food resources, water/moisture, and temperature moderation on the floodplain versus flatwoods; and in cypress-tupelo versus the other floodplain forests. Drought and lack of flooding over the first two years of the study likely intensified hog activity on the floodplain and in cypress-tupelo, where hogs had continuous access to normally flooded areas. During the peak drought year, hog disturbance was even greater for cypress-tupelo (29%) versus the other floodplain forests (9-11%). In peak drought months, hog disturbance in cypress-tupelo reached mean values of 38-42%. Hog disturbance levels overall were greater for the peak drought year versus the non-drought year. In the non-drought year, disturbance differences were limited to seepage forest versus pine flatwoods, due to flooding elsewhere. A seasonal effect of decreased disturbance in November was attributed to leaf fall obscuring rooting sign. Other annual or seasonal influences were not observed, such as expected shifts in disturbance among habitats during flooding or mast fall. The latter may have been due to the absence of major mast events, related to normal mast cycles, advanced forest/tree maturity, or the drought. The persistence of hog disturbance was greatest in seepage forest (17 months versus 3-4 months elsewhere). This was attributed to organic muck soils and rooting depth in seepage forest, versus loamy soils and shallower rooting elsewhere. A geographic trend in hog disturbance was observed, increasing along a NW-SE gradient across the park, potentially related to human activity, water/moisture levels, and the frequency/magnitude of flooding. This finding may share commonalities with habitat differences described above, given the prolonged drought conditions.