

# MICHAEL C. STAMBAUGH

ASSOCIATE RESEARCH PROFESSOR, UNIVERSITY OF MISSOURI

## ADDRESS

School of Natural Resources  
203C ABNR Building  
University of Missouri  
Columbia, MO 65211-7270

Phone: Office (573) 882-8841  
Fax: (573) 882-1977  
E-mail: [stambaughm@missouri.edu](mailto:stambaughm@missouri.edu)  
<http://faculty.missouri.edu/stambaughm>

## EDUCATION

Ph.D.	Forestry (Fire Science)	University of Missouri 2008
M.S.	Forestry (Forest Ecology)	University of Missouri 2001
B.S.	Forest Resource Management	University of Missouri 1996

## ADDITIONAL EDUCATION

Doctoral studies in dendrochronology	University of Arizona	2004-2006
GIS Certificate	University of Missouri	2006
Study Abroad: Tropical Forestry	E.A.R.T.H. University	Costa Rica 1995

## PROFESSIONAL EXPERIENCE AND APPOINTMENTS

Associate Research Professor	University of Missouri	2016 - present
Adjunct Assistant Professor	University of Tennessee	2014 - present
Visiting Scientist	Jones Ecological Res. Center, GA	2015 - present
Assistant Research Professor	University of Missouri	2011 - 2016
Research Associate	University of Missouri	2007 - 2011
Senior Research Specialist	University of Missouri	2001 - 2007
Graduate Research Assistant	University of Missouri	1999 - 2001
Wilderness Ranger (GS-5)	U.S. Forest Service, OR,	1998
Forester (GS-5)	U.S. Bureau of Land Mngmt, OR	1997

## HONORS, AWARDS, AND AFFILIATIONS

National Geographic Explorer / Waitt Grantee  
Missouri Conservation Partners Award (to Oak Woodlands & Forests Fire Consortium), 2017  
Association for Fire Ecology, 2008-present  
American Geophysical Union, 2007-present  
International Association of Wildland Fire, 2006-2007  
MU Staff Development Award, 2005  
Sigma Xi (2003-present)  
PAGES (Past Global Changes) Group (2003-present)  
Tree-Ring Society (2002-2003)  
Natural Areas Association (2001-2002, 2011)  
Visiting Scholar, Univ. of Arizona, Laboratory of Tree-Ring Research, 2002  
MU Conservation Biology Graduate Fellowship, 2001

## PROFESSIONAL ACTIVITIES AND SERVICE

Director: Missouri Tree-Ring Laboratory (2016-present)  
Chair & PI: Oak Woodlands & Forests Fire Consortium (Joint Fire Science Program)  
Editorial Board (since 2014): Forests  
Director's Faculty Advisory Committee, MU School of Natural Resources. 2017-2019.

Development Committee: MU CAFNR Climate Change Science Center. Since 2015.  
Promotion and Tenure Committee: MU School of Natural Resources. Since 2016.  
Search Committee: Asst. Res. Prof. of Forest Biogeosciences, Univ. Missouri, 2016.  
Scholarship Committee, MU Forestry Department: 2012, 2013  
Conference Committee: 20<sup>th</sup> Central Hardwood Forest Conference, Columbia, MO. 2015.  
Program Committee Chair: 2016 Missouri Natural Resources Conference.  
Program Committee: 6<sup>th</sup> International Fire Ecology and Management Congress. 2015.  
Program Committee: 7<sup>th</sup> International Fire Ecology and Management Congress. 2017.  
Program Committee: 2013 Ouachita SAF Annual / Regional Shortleaf Pine Meeting  
Executive Committee: 6<sup>th</sup> Fire in Eastern Oak Forests Conference. 2018.  
Steering Committee: 2013 Shortleaf Pine Management and Restoration Conference  
Steering Committee: Shortleaf Pine Initiative, Central Hardwoods Joint Venture. Since 2013.  
Steering Committee: 4<sup>th</sup> Fire in Eastern Oak Forests Conference, Springfield, MO. 2012  
Member: Missouri Prescribed Fire Council, MU Faculty representative. Since 2016.  
Proceedings Editor: 4<sup>th</sup> Fire in Eastern Oak Forests Conference. Gen. Tech. Rep. NRS-P-102.  
Dendrochronology consultant: Morton Arboretum (2010), Texas State Parks (2009, 2012, 2013),  
University of Kansas (2008-9), Missouri Botanical Garden (2008), Columbia College (2007),  
Missouri Historical Society (2004, 2006), National Park Service (2004), SCI Engineering (2004),  
Missouri State Highway Patrol (2003, 2015), Nelson-Atkins Art Museum (2002), Beaver Ponds  
Environmental Education Center (2016)

### ***PEER-REVIEWER***

**Journals:** Applied Vegetation Science, American Midland Naturalist, Canadian Journal of Forest Research, Ecography, Ecology, Ecological Research, Fire Ecology, Forests, Forest Ecology and Management, Great Plains Research, Invasive Plant Science and Management, Journal of Applied Ecology, Journal of Vegetation Science, New Forests, Physical Geography, Plant Ecology, Quarterly Review of Biology, Southeastern Naturalist, Tree-Ring Research, Trees-Structure and Function,

**Books & Proceedings:** Saving the World's Deciduous Forests (R.A. Askins, Yale University Press), Central Hardwoods Forest Conference Proceedings (USDA), Fire in Eastern Oak Forests Conference Proceedings (USDA), Shortleaf Pine Restoration and Ecology Symposium Proceedings (USDA),

**Proposals:** National Science Foundation, Paleo Perspectives on Climate Change (P2C2) Program, Geosciences Directorate (2013), Geography and Spatial Sciences (GSS) Program, Geosciences Directorate (2013, 2015), National Fish & Wildlife Foundation (2015, 2016), National Geographic Society (2016), Joint Fire Science Program (2014)

### ***INTERNATIONAL EXPERIENCE***

Colombia: host of visiting scientist intern (Andres Avella) to University of Missouri – 2015, ongoing research in Colombia since 2016  
Australia: 9<sup>th</sup> International Conference on Dendrochronology and fire tour of southeastern Australia, hosted by Ross Bradstock, University of Wollongong- 2014  
Poland and Hungary: collaboration with forest scientists at Polish Botanical Institute, attended Tree-Rings, Archeology, Climate, and the Environment (TRACE) conference- 2008  
China: presented fire research at both the 7<sup>th</sup> International Conference on Dendrochronology and the International Association of Landscape Ecology (IALE) workshop- 2006  
Venezuela: month long tour national parks of Venezuela with Natural Areas Association- 2001  
Costa Rica: undergraduate semester abroad; forest ecology, E.A.R.T.H. University- 1995

### ***TEACHING EXPERIENCE***

2015-2017 Co-instructor / Guest Lecturer, University of Missouri, Department of Forestry, *Forest Fire Control and Use* (FOR3207)  
2013-2014 Guest Lecturer, University of Missouri, Department of Forestry, *Forest Fire Control and Use* (FOR3207), *Practice of Silviculture* (FOR4330), *Forest Ecology* (FOR4302), *Topics*

- in Nat. Resources* (NATR 4001)
- 2011 Guest Lecturer, University of Missouri, Department of Geography, *Introduction to Physical Geography* (GEOG2610)
- 2001-2011 Guest Lecturer, University of Missouri, Dept. of Forestry, *Forest Ecology* (FOR4302), *Landscape Ecology* (FOR4395), *Wood Technology* (FOR3240)
- 2010 Co-Instructor, Midwest Fire Training Academy, Jefferson City, MO  
*RX-310: Introduction to Fire Effects* (NWCG)
- 2009-2010 Guest Lecturer, University of Missouri, Dept. of Geography: *Mapping the Environment* (GEOG 1840)
- 2009 Guest Lecturer, University of Missouri, Dept. of Soil, Environmental, and Atmospheric Sciences: *Meteorological Observation and Instrumentation* (ATMSC 4500)
- 2000 Instructor, University of Missouri, Dept. of Forestry Courses: *Forest Surveying* (FOR2540, Forestry Summer Field Studies)
- 1999-2001 Teaching Assistant, University of Missouri, Dept. of Forestry: *Forest Ecology Laboratory Sections* (FOR4302)

### **UNDERGRADUATE ADVISING**

Faculty Advisor: Mizzou Student Association for Fire Ecology (SAFE), 2011-present  
 Faculty Mentor: to over 35 undergraduate student employees working in laboratory technician positions at the Missouri Tree-Ring Laboratory, 2010-present

### **GRADUATE ADVISING**

#### **M.S. Committee Chair**

Lyndia Hammer, 2010-2012 (School of Natural Resources, Univ. of Missouri)  
 Molly Rooney, 2015-2017 (School of Natural Resources, Univ. of Missouri)  
 Mary Short, 2015-2017 (School of Natural Resources, Univ. of Missouri)

#### **M.S. Committee**

Samantha Anderson, 2014-2016 (School of Natural Resources, Univ. of Missouri)  
 Christopher Petruccelli, 2014-2015 (Dept. of Geography, Univ. of Missouri)  
 Sean Zieger, 2011-2014 (School of Natural Resources, Univ. of Missouri)  
 Nathan Mackley, 2010-2017 (Dept. of Geography, Univ. of Missouri)  
 Carter Kinkead, 2010-2012 (School of Natural Resources, Univ. of Missouri)  
 Joseph Marschall, 2010-2013 (School of Natural Resources, Univ. of Missouri)

#### **Ph.D. Committee**

Daniel Godwin, 2011-2015 (Dept. of Biological Sciences, Univ. of Missouri)  
 Andrew Vander Yacht, 2014-2018 (Dept. FF&W, Univ. of Tennessee)  
 Sean Zieger, 2014-2018 (School of Natural Resources, Univ. of Missouri)  
 Carter Kinkead, 2014-2018 (School of Natural Resources, Univ. of Missouri)

#### **M.S. Mentoring**

Adam Bale, 2007-2009, (School of Natural Resources, Univ. of Missouri)  
 Steve Voelker, 2002-2004, (School of Natural Resources, Univ. of Missouri)

#### **Ph.D. Mentoring**

Thomas Faust, 2001-2004 (School of Natural Resources, Univ. of Missouri)  
 Chad King, 2008-2012 (School of Natural Resources, Univ. of Missouri)  
 Fumiko Shirakura, 2007 (Dept. of Biology, Oklahoma State Univ.)  
 Lauren Pile, 2014 (School of Agric., Forests & Environ. Sci., Clemson Univ.)  
 Andres Avella, 2015 (National University of Colombia, Bogotá, Colombia)

### **RESEARCH STAFF SUPPORTED / SUPERVISED**

Senior Research Specialist, Joseph Marschall (2006 to present, Univ. of Missouri)  
 Research Specialist 1, Erin Abadir (2008 to 2010, 2012 to present, Univ. of Missouri)  
 Research Specialist 1, Elizabeth Wright (2014-2015, Univ. of Missouri)

Research Specialist 1, David Matthew Bourscheidt (2015 to 2016, Univ. of Missouri)  
Research Specialist 1, Samuel Garrett McKee (2016 to present, Univ. of Missouri)

### ***EXPERIENCE – RESEARCH***

#### 1. Roles as research faculty in School of Natural Resources

*Director*, Missouri Tree-Ring Laboratory

- Collaborative research with diverse programs including Agricultural Sciences, Biological Sciences, Nuclear Sciences, Geography, Atmospheric Sciences, Fisheries and Wildlife, Geology, and Anthropology
- Maintain largest database fire scar history data in eastern U.S. (80+ sites, 22 states) and archive of oldest wood samples from North America

*PI / Chair*, Oak Woodlands & Forests Fire Consortium (Joint Fire Science Program)

#### 2. Active research projects (*Total external funding since 2011: \$2,507,955*):

*APPLIED HISTORICAL ECOLOGY OF FIRE ACROSS EASTERN U.S. FOREST ECOSYSTEMS*. I am the PI of this project funded for \$40,000 over 5 years by the U.S. Forest Service.

*HISTORICAL FIRE REGIMES IN THE CUMBERLAND PLATEAU AND APPALACHIAN MOUNTAINS*. I am the PI of this project funded for \$50,000 for 2 years by U.S. Forest Service, Southern Research Station.

*FEASIBILITY ASSESSMENT FOR RECONSTRUCTING HISTORIC FIRE REGIMES AT WILDLIFE REFUGES IN REGION 2 (TX, OK)*. I am the PI of this project funded for \$117,000 over 3 years by the U.S. Fish & Wildlife Service.

*COMPARING THE EFFECTS OF PRESCRIBED BURNING AND THINNING TREATMENTS ON VEGETATION DEVELOPMENT IN OAK WOODLANDS OF KANSAS*. I am the PI of this project funded for \$171,298 over 4 years by the U.S. Forest Service.

*APPLIED HISTORICAL ECOLOGY OF FIRE IN REMNANT PINE FORESTS OF SOUTHERN OHIO*. I am the PI of this project funded for \$20,000 over 2 years by the U.S. Forest Service. Collaborators are T. Hutchinson (USFS), J. Marschall and R. Guyette (Univ. MO)

*FIRE SCAR CLOSURE RATES IN WHITE OAK (QUERCUS ALBA) AND THE IMPLICATIONS TO PRESCRIBED BURNING*. I am the PI of this project funded for \$49,000 by the U.S. Forest Service. Collaborators are K. Smith and D. Dey (USFS), J. Marschall and R. Guyette (Univ. MO), and A. Stevenson (MDC)

*RECONSTRUCTING HISTORICAL FIRE REGIMES ACROSS PENNSYLVANIA*. I am the PI of this project funded for \$471,088 over 4 years by the Pennsylvania Game Commission. Co-PIs are J. Marschall and R. Guyette (Univ. MO), collaborators are P. Brose and D. Dey (USFS)

*OAK WOODLANDS & FORESTS FIRE CONSORTIUM (2016 TO 2019)*. I am the PI of this project funded for \$493,294 over 3 years by the Joint Fire Science Program. This project supports a coordinator, part-time employees, MU faculty, and the programmatic operations of the regional fire consortium.

*FIRE HISTORY TO SUPPORT FIRE MANAGEMENT IN EASTERN NORTH AMERICA. 2016-2021*. I am a Co-PI of this project led by R. Guyette (UMC) funded for \$30,000 per year by the U.S. Forest Service. This research builds upon an effort to develop fire scar histories in the Lake States region that directly address current fire management challenges.

*EFFECTIVENESS OF JOINT FUEL TREATMENTS AND VEGETATION MANAGEMENT IN RESTORING EASTERN UPLAND OAK ECOSYSTEMS*. I am co-PI of this project led by P. Keyser with Charles Kwit (both with Univ. Tenn - Knoxville) funded for \$275,000 over 3 years by the Joint Fire Science Program.

#### 3. Completed research projects at University of Missouri

*FUTURE PRECIPITATION EFFECTS ON FIRE FREQUENCY AND SPECIES DISTRIBUTION IN THE SOUTH CENTRAL U.S.* I was the PI of this project funded for \$162,483 by the Southcentral Climate Science Center. Collaborators: E. Stroh (USGS PI), R. Guyette (Univ. MO), M. Struckhoff (USGS), and K. Grabner (USGS)

*CHARACTERIZING AND COMPARING OAK FORESTS IN COLOMBIAN HIGHLAND AND ANDEAN REGIONS.* I was the PI on this project funded for \$30,000 for 5 years by the U.S. Forest Service.

*ASSESSMENT OF SHORTLEAF PINE FIRE HISTORY IN NEW JERSEY.* I was the PI of this project funded for \$10,990 for 2 months by U.S. Forest Service, Southern Research Station.

*RECONSTRUCTION OF THE HISTORICAL FIRE REGIME AND FOREST DYNAMICS AT BASTROP STATE PARK.* I was PI of this project funded for \$37,981 over 2.5 years by Texas Parks & Wildlife Department.

*FIRE HISTORY TO SUPPORT FIRE MANAGEMENT IN EASTERN NORTH AMERICA. 2011-2015.* I was a Co-PI of this project led by R. Guyette (UMC) funded for \$43,000 per year by the U.S. Forest Service. This research built upon an effort to develop fire scar histories in the Lake States and Northeastern U.S. regions related to current management challenges.

*OAK WOODLANDS & FORESTS FIRE CONSORTIUM (2014 TO 2016).* I was the PI of this project funded for \$300,000 over 2 years by the Joint Fire Science Program. This project supports a coordinator, part-time employees, MU faculty, and the programmatic operations of the regional fire consortium.

*EFFECTS OF PRESCRIBED BURNING AND THINNING TREATMENTS ON BIOPHYSICAL CONDITIONS.* I was the PI on this project funded for \$112,949 over 5 years by the U.S. Forest Service. This project investigated changes in vegetation communities, structure, and tree growth in the Ozark forests.

*EFFECTS OF PRESCRIBED BURNING FREQUENCY ON STAND STRUCTURE, FOLIAR NUTRIENTS, AND RADIAL GROWTH OF HARDWOOD TREES IN THE MISSOURI OZARKS.* I was a co-PI on this project (PI: B. Knapp) funded for \$6,196 for 1 year by the MU Research Council.

*EXTENSION OF THE OAK WOODLANDS AND FORESTS FIRE CONSORTIUM IN 2014.* I was the PI of this project funded for \$75,000 over 6 months by the Joint Fire Science Program. This project supports a coordinator, part-time employees, MU faculty, and the programmatic operations of the regional fire consortium.

*QUANTIFYING CHANGES IN VEGETATION COMPOSITION AND STRUCTURE CAUSED BY THE FERGUSON FIRE AND CALIBRATION OF BURN SEVERITY IN THE CROSS TIMBERS VEGETATION TYPE.* I was the PI on this project funded for \$34,000 by the U.S. Fish & Wildlife Service.

*MODELING FIRE REGIMES USING CLIMATE AND HUMAN POPULATION DATA FROM TWO CONTINENTS - AUSTRALIA (UNIVERSITY OF WOLLONGONG, UNIVERSITY OF TASMANIA, CSIRO).* I was a co-PI on the project (PI: R. Muzika, Co-PI: R. Guyette) funded for \$4,000 by the University of Missouri CAFNR International Program Research Incentive Program.

*FIRE HISTORY AND VEGETATION DYNAMICS AT THE WICHITA MTNS. NWR, OKLAHOMA.* I was the PI of this project funded for \$168,098 over 3 years by the U.S. Fish and Wildlife Service. This investigated landscape variability in fire and the demographics of forests, in particular eastern redcedar, at the Wichita Mtns, Oklahoma. This project supported one M.S. student and several undergraduate research techs under my advisement.

*IMPLEMENTATION OF THE OAK WOODLANDS AND FORESTS FIRE CONSORTIUM (2012 TO 2014).* I was the PI of this project funded for \$300,000 over 2 yrs by the Joint Fire Science Program. This project supported a coordinator, part-time employees, forestry faculty, USGS personnel, and the overall operations of the regional fire consortium.

*ARCHIVAL OF EASTERN U.S. FIRE SCAR HISTORY DATA.* I was the PI of this project funded for \$9,989

over 1 year by the Joint Fire Science Program. This project supported this generation of metadata describing eastern U.S. fire histories and the efforts to prepare and submit them to public archives.

*DETERMINING LUMBER YIELD CHANGES FOR PRESCRIBED FIRE INJURED TREES.* This project was supported by Missouri Department of Conservation and Phase II in an effort to measure and model lumber grade and volume changes of oak trees following injuries by prescribed burning. I was a Co-PI and the lead PI was R. Guyette.

*DEVELOPING A REGIONAL FIRE SCIENCE CONSORTIUM (2011 TO 2012).* I was a Co-PI on this project led by K. Grabner (USGS) that significantly advanced fire science delivery in the Central U.S. This effort involved conducting needs assessments and an implementation proposal to establish a regional fire consortium in an oak-dominated region including 11 states.

*FIRE HISTORY IN THE OKLAHOMA OZARKS.* This was a collaborative project with The Nature Conservancy funded by a state Oklahoma Fish and Wildlife Grant (\$37,820). I was a Co-PI and R. Guyette was PI.

*INTERACTIONS BETWEEN MANAGEMENT DISTURBANCES AND FOREST FUELS.* This project involved measuring fuel loading at multiple Ozark sites following various combinations of forest management and prescribed burning. This project was funded by the U.S. Forest Service, Northern Research Station. I was a Co-PI and R. Guyette was PI.

*FIRE HISTORY AND FOREST COMMUNITY DYNAMICS OF BARRENS AT ARNOLD AIR FORCE BASE, TENNESSEE.* This project was funded by CH2M Hill (PI – R. Guyette)

*FUELS ASSESSMENT AND FIRE RISK IN THE OZARKS HIGHLANDS AND INTERIOR LOWLAND PLATEAU.* U.S. Forest Service, Northern Research Station. (PI – R. Guyette)

*RECONSTRUCTING RIPARIAN FIRE REGIMES OF THE OZARK NATIONAL SCENIC RIVERWAYS.* National Park Service-Ozark National Scenic Riverways (PI – R. Guyette)

*MODELING AND MAPPING HISTORIC FIRE FREQUENCY IN NATIONAL PARKS OF THE GREAT PLAINS.* This was a geographically broad effort that resulted in fire scar history reconstructions from national parks, monuments, and recreation areas. This project was funded by the National Park Service and the U.S. Geological Survey (PI – R. Guyette)

*DEVELOPING AND USING FIRE SCAR HISTORIES IN THE EASTERN UNITED STATES.* Joint Fire Science Program (PI – R. Guyette)

*DETERMINING THE EFFECTS OF PRESCRIBED BURNING ON OAK TREES. MISSOURI DEPARTMENT OF CONSERVATION.* I was a Co-PI and R. Guyette was PI.

*CONSTRUCTING A MULTI-MILLENNIA OAK TREE-RING CHRONOLOGY IN THE AGRICULTURAL HEARTLAND.* National Science Foundation. (PI – R. Guyette)

*FIRE REGIMES AT THE HURON MOUNTAIN CLUB.* Huron Mountain Wildlife Trust. I was a Co-PI and R. Muzika was PI.

**PEER-REVIEWED JOURNAL ARTICLES (N = 50)** - (ISI impact factor = IF, Source Normalized Impact per Paper = SNIP, \*denotes graduate student contributor Google Scholar: h-Index = 18, i10-index = 32, total citations = 1073 (as of 09/01/2017))

Wood, J., B.O Knapp, R.-M. Muzika, **M.C. Stambaugh**, L. Gu. 2017. The importance of drought-pathogen interactions in driving oak mortality events in the Ozark Border Region. *Environmental Research Letters* doi.org/10.1088/1748-9326/aa94fa (IF=4.40, SNIP=1.58)

Wonkka, C. D. Twidwell, C.H. Bielski, C.R. Allen, and **M.C. Stambaugh**. 2017. Regeneration and invasion of cottonwood riparian forest following wildfire. *Restoration Ecology* DOI:

10.1111/rec.12577 (IF=1.74, SNIP=0.99)

Kinkead\*, C.O., **M.C. Stambaugh**, and J.M. Kabrick. 2017. Mortality, Damage, and Growth in an Oak Woodland Following Prescribed Fire and Commercial Thinning in the Ozark Highlands. *Forest Ecology and Management* 403: 12-26. (IF=2.83, SNIP=1.422)

Guyette, R.P., **M.C. Stambaugh**, D.C. Dey, and R.-M. Muzika. 2017. The direction, magnitude, and theory of ecosystem fire probability as constrained by precipitation and temperature. *PLoS ONE* 12(7): e0180956. (IF=2.81, SNIP=1.09)

Avella, A.M., D.C. Dey, **M.C. Stambaugh**, and J.M. Kabrick. 2017. Gradientes ambientales en los boques de roble (*Quercus humboldtii* Bonpl.) de Colombia: influencia de la altitud y la precipitación en la composición florística y la estructura de los robledales. Oak forest (*Quercus humboldtii* Bonpl.) in Colombia: influence of altitude (temperature) and rainfall on the distribution. *Colombia Diversidad Biótica XV*: 123-148. (IF=na, SNIP=na)

Pile, L.S., G.G. Wang, B.O. Knapp, J.L. Walker, and **M.C. Stambaugh**. 2017. Effects of land-use legacy and contemporary forest management on Chinese tallow (*Triadica sebifera*) invasion in maritime forests. *Forest Ecology and Management* 398: 10-24 (IF=2.83, SNIP=1.422)

**Stambaugh, M.C.**, G. Creacy, J. Sparks, and M. Rooney\*. 2017. Three centuries of fire and forest vegetation transitions preceding Texas' most destructive wildfire: Lost Pines or lost oaks? *Forest Ecology and Management* 396: 91-101 (IF=2.83, SNIP=1.422)

**Stambaugh, M.C.**, K.T. Smith, and D.C. Dey. 2017. Fire scar growth closure rates in white oak (*Quercus alba*) and the implications for prescribed burning. *Forest Ecology and Management* 391: 396-403 (IF=2.83, SNIP=1.422)

Voelker, S.L., **M.C. Stambaugh**, J.R. Brooks, F.C. Meinzer, B. Lachenbruch, R.P. Guyette. 2017. Evidence that greater CO<sub>2</sub> has increased the temperature-sensitivity of tree growth: a comparison of modern and paleo oaks. *Oecologia* doi: 10.1007/s00442-017-3831-6. (IF=2.90, SNIP=1.24)

Marschall, J.M., **M.C. Stambaugh**, B.C. Jones, R.P. Guyette, P.H. Brose, and D.C. Dey. 2016. Fire regimes of remnant pitch pine communities in the Ridge and Valley region of central Pennsylvania, USA. *Forests* 224: doi:10.3390/f7100224 (IF =1.69, SNIP=0.73)

Guyette, R.P., **M.C. Stambaugh**, D.C. Dey, J.M. Marschall, J. Saunders, and J. Lampereur. 2016. 350 years of fire-climate-human interactions in a Great Lakes sandy outwash plain. *Forests* 189: doi:10.3390/f7090189. (IF =1.69, SNIP=0.73)

Scasta, J.D., J.R. Weir, and **M.C. Stambaugh**. 2016. Droughts and wildfires in western U.S. rangelands. *Rangelands* 38: 197-203. (IF =0.45, SNIP=0.49)

**Stambaugh, M.C.**, R.P. Guyette, J.M. Marschall, D.C. Dey. 2016. Scale dependence of oak woodland historical fire intervals: contrasting The Barrens of Tennessee and Cross Timbers of Oklahoma, USA. *Fire Ecology* 12(2): 65-84. (IF=1.16, SNIP=0.64)

Harper, C.A., W.M. Ford, M.A. Lashley, C.E. Moorman, and **M.C. Stambaugh**. 2016. Fire effects on wildlife in the Central Hardwoods and Appalachian Regions. *Fire Ecology* 12(2): 127-159. (IF =1.16, SNIP=0.64)

Voelker, S.L., Brooks, R.J., Meinzer, F.C., Anderson, R., Bader, M.K-F., Battipaglia, G., Becklin, K.M., Beerling, D., Bert, D., Betancourt, J.L., Dawson, T.E., Domec, J.-C., Guyette, R.P., Körner, C., Leavitt, S.W., Linder, S., Marshall, J.D., Mildner, M., Ogée, J., Panyushkina, I., Plumpton, H.J., Pregitzer, K.S., Saurer, M., Smith, A.R., Siegwolf, R.T.W., **Stambaugh, M.C.**, Talhelm, A.F., Tardif, J.C., Van de Water, P.K., Ward, J.K., Wingate, L. 2016. A dynamic leaf gas-exchange strategy is conserved in woody plants under changing ambient CO<sub>2</sub>: evidence from carbon isotope

discrimination in paleo and CO<sub>2</sub> enrichment studies. *Global Change Biology* 22(2):889-902. doi: 10.1111/gcb.13102. (IF =8.04, SNIP=2.52).

**Stambaugh, M.C.**, L.D. Hammer\*, and R. Godfrey. 2015. Performance of burn-severity metrics and classification in an eastern U.S. grassland-oak landscape. *Remote Sensing* 7:10501-10522 (IF=3.18, SNIP=1.79).

Zeiger\*, S.J., J.A. Hubbart, S.H. Anderson, **M.C. Stambaugh**. 2016. Quantifying and modeling urban stream temperature: a central U.S. watershed study. *Hydrological Processes* 30(4): 503-514. DOI: 10.1002/hyp.10617 (IF=2.68, SNIP=1.33).

Guyette, R.P., **M.C. Stambaugh**, J.M. Marschall. R.-M. Muzika. 2015. An analytic approach to climate dynamics and fire frequency in the Great Plains. *Great Plains Research* 25: 139-150 (IF=0.20, SNIP=0.24)

Brose, P.H., R.P. Guyette, J.M. Marschall, and **M.C. Stambaugh**. 2015. Fire history reflects human history in the Pine Creek Gorge of north-central Pennsylvania. *Natural Areas Journal* 35(2):214-223 (IF =0.71, SNIP=0.58)

**Stambaugh, M.C.**, J.M. Varner, R.F. Noss, D.C. Dey, N.L. Christensen, R.F. Baldwin, R.P. Guyette, B.B. Hanberry, C.A. Harper, S.G. Lindblom, and T.A. Waldrop. 2015. Clarifying the role of fire in the deciduous forests of eastern North America: reply to Matlack. *Conservation Biology* 29(3):942-946 (IF =4.36, SNIP=1.95)

Voelker, S.L., **M.C. Stambaugh**, R.P. Guyette, X. Feng, D.A. Grimley, S.W. Leavitt, I Panyushkina, E.C. Grimm, J.P. Marsicek, B. Shuman, and B.B. Curry. 2015. Deglacial hydroclimate for midcontinental North America. *Quaternary Research* 83(2):336-344 (IF =2.58, SNIP=1.20)

Muzika, R.-M., R.P. Guyette, **M.C. Stambaugh**, and J.M. Marschall. 2015. Fire, drought, and humans in a heterogeneous Lake Superior landscape. *Journal of Sustainable Forestry* 34:49-70 (IF=NA, SNIP=0.39)

**Stambaugh, M.C.**, J.C. Sparks, and E.R. Abadir. 2014. Historical pyrogeography of Texas. *Fire Ecology* 10(3):72-89 (IF=1.16, SNIP=0.64)

Guyette, R.P., F.R. Thompson, J. Whittier, **M.C. Stambaugh**, and D.C. Dey. 2014. Fire likelihood modeling with climate change data and physical chemistry. *Forest Science* 60(5):862-870 (IF=1.09, SNIP=1.00)

Marschall, J.M. \*, R.P. Guyette, **M.C. Stambaugh**, and A. Stevenson. 2014. Fire damage effects on red oak lumber value loss. *Forest Ecology and Management* 320:182-189 (IF=2.77, SNIP=1.70)

**Stambaugh, M.C.**, J.M. Marschall, and R.P. Guyette. 2014. Linking fire history to successional changes of xeric oak woodlands. *Forest Ecology and Management* 320:83-95 (IF=2.77, SNIP=1.70)

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**Stambaugh, M.C.**, R.P. Guyette, and J.M. Marschall. 2013. Fire history in the Cherokee Nation of Oklahoma. *Human Ecology* 41:749-758 (IF=1.63, SNIP=0.73)

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- Stambaugh, M.C.**, R.P. Guyette, and J.M. Marschall. 2011. Longleaf pine (*Pinus palustris* Mill.) fire scars reveal new details of a frequent fire regime. *Journal of Vegetation Science* 22(6):1094-1104 (IF=2.38, SNIP=1.4)
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- Stambaugh, M.C.**, R.P. Guyette, R. Godfrey, E.R. McMurry, and J.M. Marschall. 2009. Fire, drought, and human history near the western terminus of the Cross Timbers, Wichita Mountains, Oklahoma. *Fire Ecology* 5(2):51-65 (IF=1.16, SNIP=0.64)
- Stambaugh, M.C.** and R.P. Guyette. 2009. Progress in developing a long oak chronology from the Central United States. *Tree-Ring Research* 65:147-156 (IF=0.92, SNIP=NA)
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- Guyette, R.P. and **M.C. Stambaugh**. 2004. Post oak fire scars as a function of diameter, growth, and tree age. *Forest Ecology and Management* 198:183-192 (IF=1.95, SNIP=1.34)

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**Stambaugh M.C.**, R.-M. Muzika and R.P. Guyette. 2002. Disturbance characteristics and overstory composition of an old-growth shortleaf pine (*Pinus echinata* Mill.) forest within the Ozark Highlands, Missouri, USA. *Natural Areas Journal* 22:108-119 (IF=0.57, SNIP=0.56)

#### ***JOURNAL ARTICLES IN REVIEW OR PREPARATION***

**Stambaugh, M.C.**, J.M. Marschall, E.R. Abadir, B.C. Jones, P.H. Brose, D.C. Dey, R.P. Guyette. In review. Wave of fire: an anthropogenic signal in historical fire regimes of remnant pine forests across central Pennsylvania, U.S.A. *Ecography*.

Vander Yacht, A.L., P.D. Keyser, C. Kwit, **M.C. Stambaugh**, W.K. Clatterbuck. In review. Shortleaf pine and warm-season grasses: patterns in establishing keystone components informs the restoration of an imperiled fire-dependent community.

**Stambaugh, M.C.**, R.P. Guyette, E.D. Stroh, M.A. Struckhoff, J.R. Whittier. In review. Future changes in southcentral U.S. wildfire probability due to climate change. *Climatic Change*.

Stroh, E.D., M.A. Struckhoff, **M.C. Stambaugh**, and R.P. Guyette. In review. Future fire and climate suitability for woody ecosystems in the south central United States. *Fire Ecology*.

Hammer, L.D. and **M.C. Stambaugh**. In review. Juniper expansion from refugia in the southern Great Plains. *Biological Invasions*.

Brose, P.H., D.C. Dey, R.P. Guyette, J.M. Marschall, and **M.C. Stambaugh**. In prep. Forest composition during active fire regimes in northern Pennsylvania. *Forest Science*.

Guyette, R.P., D.C. Dey, **M.C. Stambaugh**, J.M. Marschall, R.-M. Muzika. In prep. Historical fire regimes of red pine forests in Maine.

Voelker, S.L. J.R. Brooks, F.C. Meinzer, **M.C. Stambaugh**, B. Lachenbruch, K. Falk. In review. Evidence for convergence in tree canopy leaf temperatures across space and time. *New Phytologist*.

#### ***PEER-REVIEWED BOOK CHAPTERS (N = 2)***

**Stambaugh, M.C.**, J.M. Varner, and S.T. Jackson. 2017. The Biogeography of longleaf pine: an interweave of climate, fire, and humans. Pages 17-38 In: *Ecological Restoration of Longleaf Pine*, ed. K. Kirkman and S. Jack. CRC Press.

Bigelow, S.W., **M.C. Stambaugh**, A. Larson, and M. Battaglia. 2017. Longleaf Restoration in Context: Comparisons Among Frequent-Fire Forests. Pages 311-338 In: *Ecological Restoration of Longleaf Pine*, ed. K. Kirkman and S. Jack. CRC Press.

#### ***PEER-REVIEWED TECHNICAL REPORTS (N = 21)***

Knapp, B.O., J.M. Marschall, and **M.C. Stambaugh**. 2017. Effects of long-term prescribed burning on timber value in hardwood forests of the Missouri Ozarks. USDA Forest Service GTR-NRS-P-167: 304-313.

Dey, D.C., R.P. Guyette, C.J. Schweitzer, **M.C. Stambaugh**, and J.M. Kabrick. 2015. Restoring oak forest, woodlands and savannas using modern silvicultural analogs to historic cultural fire regimes. Pp. 116-122 In: *Proceedings of the 2<sup>nd</sup> International Congress of Silviculture* (ed. O. Ciancio), Florence, Italy, November 26<sup>th</sup>-29<sup>th</sup>, 2014. Accademia Italiana di Scienze Forestali.

Kabrick, J.M., D.C. Dey, C.O. Kinkead\*, B.O. Knapp, M. Leahy, M.G. Olson, **M.C. Stambaugh**, and A.P. Stevenson. 2014. Silvicultural considerations for managing fire-dependent oak woodland ecosystems. USDA

Forest Service GTR-NRS-P-142. pp. 2-15.

Marschall, J.M., R.P. Guyette, **M.C. Stambaugh**, and A. Stevenson\*. 2014. Red oak timber product loss due to fire damage. *Proceedings of the Fire in Appalachia Conference*. USDA GTR-SRS-199. pp. 111-112.

Grabner, K., **M.C. Stambaugh**, J.M. Marschall, and E.R. Abadir. 2014. Oak woodlands and forests fire consortium: a regional view of fire science sharing. *Proceedings of 4th Fire Behavior and Fuels Conference*, February 18 – 22, 2013, Raleigh, North Carolina, USA. pp. 287-297.

Kinkead, C.O.\*, J.M. Kabrick, **M.C. Stambaugh**, and K.W. Grabner. 2013. Changes to oak woodland stand structure and ground flora composition caused by thinning and burning. *Central Hardwoods Forest Conference Proceedings*. USDA Forest Service GTR NRS-P-117. pp. 373-383

Sparks, J., **M.C. Stambaugh**, and E.L. Keith. 2012. Restoring fire suppressed Texas oak woodlands to historic conditions using prescribed fire. *Proceedings of the 4<sup>th</sup> Fire in Eastern Oak Forests Conference*. USDA Forest Service GTR-NRS-P-102. pp.127-141.

Grabner, K.W., **M.C. Stambaugh**, R.P. Guyette, D.C. Dey, and G. Willson. 2012. Genesis of a Midwest Oak Woodlands and Forests Fire Consortium. *Proceedings of the 4<sup>th</sup> Fire in Eastern Oak Forests Conference*. USDA Forest Service GTR-NRS-P-102. pp. 207-211.

Guyette, R.P. and **M.C. Stambaugh**. 2010. Perspectives and comparisons of smoke emissions from historic and modern fires: taking the elephant out of the closet and putting it in the stadium. Pages 21-24 in *Proceedings of the Tall Timbers Fire Ecology Conference: The Future of Prescribed Fire: Public Awareness, Health, and Safety*. Tall Timbers Research Station, Tallahassee, Florida, USA.

Guyette R.P. and **M.C. Stambaugh**. 2008. Pioneer Forest: in the heart of roughness. USDA Forest Service GTR SRS-108. pp. 61-64.

**Stambaugh, M.C.** and R.-M. Muzika. 2007. Successional trends of six mature shortleaf pine forests in Missouri. USDA Forest Service GTR NRS-P-15. pp. 59-67.

**Stambaugh, M.C.**, R.P. Guyette, and D.C. Dey. 2007. What fire frequency is appropriate for shortleaf pine regeneration and survival? USDA Forest Service GTR NRS-P-15. pp. 121-128.

**Stambaugh, M.C.**, R.P. Guyette, and D.C. Dey. 2007. Forest fuels and landscape-level fire risk assessment of the Ozark Highlands, Missouri. USDA Forest Service GTR-SRS-101. pp. 258-266.

**Stambaugh, M.C.**, R.P. Guyette, K.W. Grabner, and J. Kolaks. 2006. Understanding Ozark forest litter variability through a synthesis of accumulation rates and fire events. USDA Forest Service RMRS-P-41. pp. 321-332.

Guyette, R.P., **M.C. Stambaugh**, A. Lupo, R.-M. Muzika, and D.C. Dey. 2006. Oak growth in Midwestern North American linked with post-glacial climate epochs in the North Atlantic. *PAGES (Past Global Changes) News* 14(2):21-22.

Guyette R.P., D.C. Dey, **M.C. Stambaugh** and R.-M. Muzika. 2006. Fire scars reveal dynamics of eastern fire regimes. In: *Fire in eastern oak forests: delivering science to land managers*. USDA Forest Service GTR NRS-P-1. pp. 20-39.

**Stambaugh M.C.**, R.P. Guyette and C. Putnam. 2005. Fire in the pines: a 341-year history of wildland fire at Big Spring Pines Natural Area, Ozark National Scenic Riverways. *Park Science* 23(2):43-47.

Guyette, R.P. R.-M. Muzika, J. Kabrick. **M.C. Stambaugh**. 2004. A perspective on Quercus life history characteristics and forest disturbance. In: (Spetich, M.A. ed.) *Upland Oak Ecology Symposium: history current conditions, and sustainability*. USDA Forest Service GTR-SRS-73. pp. 138-142.

Dey D.C., R.P. Guyette, and **M.C. Stambaugh**. 2004. Fire history of a forest, savanna, and fen mosaic at White Ranch State Forest. In: *Upland Oak Ecology Symposium: history current conditions, and sustainability*. USDA Forest GTR-SRS-73. pp. 132-137.

**Stambaugh M.C.** and R.P. Guyette. 2004. Long-term growth and climate response of shortleaf pine at the

Missouri Ozark Ecosystem Project (MOFEP). *Proceedings of the 14th Central Hardwoods Forest Conference*. USDA Forest Service GTR-NE-316. pp. 448-458.

Guyette, R.P. and **M.C. Stambaugh**. 2004. Fire history of Panther Cave Hollow. In: (Hartman, Holst, and Palmer eds.) *Proceedings of SRM 2002: Savanna/Woodland Symposium*. Missouri Department of Conservation. Jefferson City, Missouri. pp. 27-39.

#### **AGENCY REPORTS AND POPULAR PUBLICATIONS (N = 15)**

**Stambaugh, M.C.** and D.C. Dey. 2016. Changing values of fire. *Ignis: Newsletter of the Oak Woodlands & Forests Fire Consortium* 4:2.

**Stambaugh, M.C.**, and D.C. Dey. 2016. Returning Fire to Forest Management, Part 3: In the future, fire will...? *Green Horizons* 23:X.

**Stambaugh, M.C.**, and D.C. Dey. 2016. Returning Fire to Forest Management, Part 2: Balancing Challenges and Opportunities *Green Horizons* 21:2.

**Stambaugh, M.C.**, and D.C. Dey. 2016. Returning Fire to Forest Management, Part 1: History and the Rub. *Green Horizons* 20:8.

Guyette, R.P., T. Gallagher, D.C. Dey, and **M.C. Stambaugh**. 2014. Three centuries of fire history at Norway Beach, Chippewa National Forest. A report prepared for the US Forest Service, Northern Research Station. 10 pp.

Guyette, R.P., **M.C. Stambaugh**, and J.M. Marschall. 2010. A quantitative analysis of fire history at national parks in the Great Plains. A report prepared for USGS and NPS. 78 pp.

Guyette, R.P., **M.C. Stambaugh**, and J.M. Marschall. 2010. Developing and using fire scar histories in the southern and eastern United States. Final Report to the Joint Fire Science Program. Project 06-3-1-16, 46 pp.

Guyette, R.P., **M.C. Stambaugh**, A. Stevenson, and R.-M. Muzika. 2008. Prescribed fire effects on the wood quality of oak (*Quercus* species) and shortleaf pine (*Pinus echinata*). A report to the Missouri Department of Conservation. 115 pp.

Guyette R.P. and **M.C. Stambaugh**. 2005. Historic barrens forest structure and fire regimes assessment-Interim report 2. Prepared for CH2MHill. 121 pp.

**Stambaugh, M.C.** and R.-M. Muzika. 2004. Promoting shortleaf pine: canopy openness and pine regeneration in closed canopy forests. Notes for Forest Managers, Report #7, Missouri Department of Conservation, Jefferson City MO.

Dey D.C., R.P. Guyette and **M.C. Stambaugh**. 2003. Ancient woods uncovered. *Missouri Conservationist*, 64(1): 5-8.

Guyette R.P. and **M.C. Stambaugh**. 2002. Dendrochronology of ceiling timbers from a 12th century cathedral of Tarragona, Spain. A report to the Nelson-Atkins Art Museum, Kansas City, MO. 5 pp.

**Stambaugh, M.C.** and R.-M. Muzika. 2004. Promoting shortleaf pine: canopy openness and pine regeneration in closed canopy forests. Notes for Forest Managers, Report #7, Missouri Department of Conservation, Jefferson City MO.

**Stambaugh M.C.** and R.-M. Muzika. 2001. Pining for the dwindling shortleaf. *Missouri Conservationist*, 62(12): 20-24.

Bekker, M.F., C.D. Craig, J. Harris, P. Hartshough, J. Kincaid, I. Larin, D. B. Lewis, S. McCloskey, J. Rauchfuss, D.L. Rubino, D.W. Stahle, **M.C. Stambaugh**, et al. 2003. Reconstruction of July Precipitation for West-Central Montana. 13<sup>th</sup> Annual North American Dendroecological Fieldweek. Lubrecht Experimental Forest, MT.

#### **CONFERENCES, SYMPOSIA, AND WORKSHOPS ORGANIZED (N = 10)**

*Science and Management of Frequently Burned Conifer Ecosystems in North America.* Nov. 18<sup>th</sup>, 2015. 6th International Fire Ecology and Management Congress, San Antonio, TX. Organizers: M. Stambaugh (Univ. MO) and L. Loudermilk (USFS-SRS)

*Prescribed Fire in the Mid-South: Fire Tour and Conference.* June 2-5, 2014. Crossville, TN. Organizers: J. Marschall, M. Stambaugh (Univ. MO), and K. Grabner (USGS)

*Fire Effects on Reptiles and Amphibians.* Oct. 6<sup>th</sup>, 2013. The Wildlife Society Annual Meeting, Milwaukee, WI. Organizers: R. Semlitsch, K. O'Donnell, B. Rothermel, M. Stambaugh

*Fire Ecology and Management of Texas Oak Woodlands.* Feb 5<sup>th</sup>, 2013. 67<sup>th</sup> Annual Meeting of the Society for Range Management, Oklahoma City. Organizer: M. Stambaugh

*Prescribing Fire for Woodland Restoration: How is Success Measured.* Jan. 31<sup>st</sup>, 2013. Missouri Natural Resources Conference, Lake of the Ozarks, MO. Organizers: J. Marschall, M. Stambaugh, K. Grabner

*Prescribed Fire and Timber Quality.* Workshop by Oak Woodlands and Forests Fire Consortium. Oct. 16-17<sup>th</sup>, 2012, Poplar Bluff, MO. Organizers: M. Stambaugh, J. Marschall (Univ. MO) and K. Grabner (USGS)

*Sharing Fire Information From Throughout the Midwest.* 2012 Missouri Natural Resources Conference. Organizers: M. Stambaugh and K. Grabner (USGS)

*4<sup>th</sup> Fire in Eastern Oak Forests Conference: Managing Oak Woodlands & Savannas in the Forest-Prairie Region,* Springfield, MO May 17-19, 2011. Steering Committee.

*Dendrochronology: The Language of Tree Rings.* Natural Areas Conference 2010, Lake of the Ozarks, Oct. 24, 2010. Organizers: Richard Guyette and Michael Stambaugh (Univ. of Missouri).

*Eastern U.S. Fire History Workshop: Lessons from Fire History: Past and Future,* University of Missouri, Oct. 22-26, 2007. Organizers: Michael Stambaugh (Univ. of Missouri), Richard Guyette (Univ. of Missouri), Daniel Dey (U.S. Forest Service). Sponsors: U.S. Forest Service, MU Forestry Graduate Student Assoc.

#### **FIELDTRIPS LED / CO-ORGANIZED (N = 10)**

Kansas Oak Woodland Restoration, Marais Des Cygnes State Wildlife Area, KS. June 1, 2017.

Buffalo Road Pine-Bluestem Fieldtour, Ouachita National Forest, AR, Joint Fire Science Program Exchange Annual Meeting, Fayetteville, AR, May 25, 2015.

Arkansas Fire Tour, 215 participants representing 9 states, Batesville, AR, May 3-5, 2015.

Pushmataha Wildlife Management Area, fire management field tour (48 participants, assisted Oklahoma State Univ. and OK Dept. of Wildlife Conserv.), October 7, 2014, Clayton, OK

Western Star Flatwoods Natural Area, fire management field tour (65 participants, partnered with Mark Twain National Forest), September 30, 2014, Rolla, MO

Using fire to restore and maintain early successional plant communities (72 participants, partnered with Tennessee Wildlife Resources Agency and University of Tennessee). Bridgestone-Firestone Wildlife Management Area, June 6, 2014, Crossville, TN

Prescribed fire and cultural preservation at Stones River National Battlefield (32 participants, partnered with National Park Service), June 5, 2014. Murfreesboro, TN

Oak woodland and grassland restoration at Land Between the Lakes (42 participants, partnered with U.S. Forest Service). June 4, 2014. Golden Pond, KY

Prescribed Fire & Timber Quality (156 participants, partnered with Missouri Department of Conservation). Oct 28<sup>th</sup>, 2012. Poplar Bluff, MO.

Brushy Creek Natural Area: dendrochronological applications to natural areas (37 participants). 2011 Natural Areas Conference, Lake of the Ozarks, MO

## ***FIRE TRAINING***

TNC Prescribed Fire Training Course – Camp Robinson, AR (8/2013)  
NWCG S-130: Firefighter Training (current), NWCG S-190: Introduction to Wildland Fire Behavior (current)  
NWCG L-180: Human Factors in the Wildland Fire Service (current)  
NWCG IS-100: Introduction to Incident Command System (current)  
NWCG IS-700: National Incident Management System: An Introduction (current)  
NWCG S-212: Wildland Fire Chain Saw Use (B class faller, not current)  
Missouri Fire Training Level 1 (current)

## ***COLLABORATORS (PROPOSALS & MANUSCRIPTS SINCE 2011)***

Andres Avella (Columbia Nat'l. Univ.)	
Seth Bigelow (Jones Ecol. Res. Ctr.)	Patrick Keyser (Univ. Tennessee)
Patrick Brose (U.S. Forest Service)	Anthony Lupo (Univ. Missouri)
Edward Cook (Columbia Univ.)	David Meko (Univ. Arizona)
Daniel Dey (U.S. Forest Service)	Rose-Marie Muzika (Univ. Missouri)
Ralph Godfrey (U.S. Fish & Wildlife)	Reed Noss (Univ. Central Florida)
Keith Grabner (USGS-CERC)	Kevin Smith (U.S. Forest Service)
Richard Guyette (Univ. Missouri)	Jeff Sparks (Texas Parks & Wildlife)
Craig Harper (Univ. Tennessee)	Aaron Stevenson (MO Dept. Conserv.)
Todd Hutchinson (U.S. Forest Service)	Esther Stroh (USGS-CERC)
Steve Jack (Jones Ecol. Res. Ctr.)	Morgan Varner (U.S. Forest Service)
John Kabrick (U.S. Forest Service)	Steve Voelker (Utah State Univ.)
Ben Knapp (Univ. Missouri)	Orlando Rangel (Columbia Nat'l Univ.)
John Weir (Oklahoma State Univ.)	

## ***INVITED PRESENTATIONS (Total since 2011 = 46)***

- 2018 Mesophication of eastern U.S. forests. 103<sup>rd</sup> Annual Meeting of the Ecological Society of America, New Orleans, LA (declined due to conflict).
- 2017 *Wave of fire: The historical signal of New World colonization and settlement.* 7<sup>th</sup> International Fire Ecology and Management Congress, Orlando, FL
- Applied historical ecology of oak woodlands.* Oak Symposium: sustaining oaks into the 21<sup>st</sup> century through science based management, Oct. 24-26<sup>th</sup>, Knoxville, TN.
- Applied historical ecology of forests at Arnold Air Force Base – the past informing the present.* Fire and Forestry field tour at the UT Highland Rim Forest, September 29<sup>th</sup>, Tullahoma, TN
- Decoding tree rings.* September 19<sup>th</sup>, Saturday Morning Science, University of Missouri, Columbia, MO
- Wave of fire: anthropogenic signals in historical fire regimes and forests across central Pennsylvania.* July 11. Consortium of Appalachian Fire Managers and Scientists (invited webinar).
- The Oak Woodlands & Forests Fire Consortium.* June 7<sup>th</sup>, Southern Group of State Foresters Annual Meeting, Rogers, AR.
- Ancient trees reveal droughts and plant growth in the Midwest over thousands of years.* February 8<sup>th</sup>, 70<sup>th</sup> Annual Meeting of Cass County Soil and Water District, Virginia, IL.
- Backyard Sugarin'.* Jan. 19<sup>th</sup>, Missouri Community Forestry Council MidMo Taproot Series, Columbia, MO.
- Fire regimes of remnant pine communities in Pennsylvania.* Jan. 17<sup>th</sup>. North Atlantic Fire Science Exchange (invited webinar).
- Vignettes of eastern U.S. historical fire regimes: trends, outliers, and their implications.* Jan. 13<sup>th</sup>, Joseph

- Jones Ecological Research Center, Ichuaway, GA.
- 2016 *Historical ecology of wildland fire in the northeastern U.S.* Dec. 6<sup>th</sup>, Joint Meeting of the Northeastern and Mid-Atlantic Forest Fire Protection Compacts, Wildfire in the Northeast Conference, Mystic, CT.
- Dendrochronology and herbchronology in alpine environments.* July 28<sup>th</sup>, Beaver Ponds Environmental Education Center, Fairplay, CO.
- The history of fire in the Big Barrens and beyond.* March 24<sup>th</sup>, University of the South, Sewanee, TN.
- Historical ecology of fire in the ridge and valley province of Pennsylvania.* February 17<sup>th</sup>, Pennsylvania Prescribed Fire Council Annual Meeting, State College, PA.
- How to tap your backyard maple trees.* Feb. 11<sup>th</sup>, Missouri Community Forestry Council MidMo Taproot Series, Columbia, MO.
- Wave of fire: fire history and settlement patterns across the eastern U.S.* January 29<sup>th</sup>, University of Illinois Urbana-Champaign, Natural Resources and Environmental Science Seminar Series, Champaign, IL.
- Fire ecology and management in oak woodlands and savannas of Texas.* Texas Parks and Wildlife Department fire workshop, January 26<sup>th</sup>, Gus Engeling Wildlife Management Area, TX.
- 2015 *The Oak Woodlands & Forests Fire Consortium.* Missouri Forest Resources Advisory Council (MOFRAC), Sept. 2<sup>nd</sup> Meeting, Jefferson City, MO.
- Embracing 'smart ignitions' in the combustion dynamics of ecosystems.* Special session: Bridging gaps between fire ecology and archaeology: A millennial perspective on managing cultural-ecological landscapes at 6<sup>th</sup> International Fire Ecology and Management Conference, San Antonio, TX, Nov. 16-20. (presented by R. Guyette)
- Applied historical ecology of fire in eastern oak woodlands.* 5<sup>th</sup> Fire in Eastern Oak Forests Conference. May 27-29, University of Alabama, Tuscaloosa, AL.
- Dendrochronology in the eastern U.S.: the potential within longleaf pine communities.* April 28<sup>th</sup>, Joseph Jones Ecological Research Center, Ichuaway, GA.
- Wave of fire: fire history and settlement patterns across the eastern U.S.* Organization of American Historians Annual meeting. April 17<sup>th</sup>, St. Louis, MO
- Past and future frequent fire regimes.* Frequent fire in conifer ecosystems workshop. Jan. 7-9, Joseph Jones Ecological Research Center, Ichuaway, GA.
- Historical fire regimes and fire management.* Natural Resource Ecology and Management Department Seminar Series. Iowa State University, Ames, IA (declined due to conflict).
- 2014 *Fire regimes of oak woodlands.* 41<sup>st</sup> Annual Natural Areas Conference (declined due to conflict) Oct. 15-17, Dayton, OH.
- Use of prescribed fire in oak woodland management. Managing Kansas and Nebraska woodlands and forests for wildlife: a workshop for natural resource professionals.* Oct. 29, 30, Council Grove, KS.
- The role of fire in natural community evolution and restoration.* Bird Conservation Alliance Meeting, Restoring Natural Communities for Bird Conservation. Sept 21<sup>st</sup>, St. Louis, MO.
- Historical fire regimes, management, and restoration of open woodland natural communities.* Congressional Tour of Missouri Pine-Oak Restoration Project, Cooperative Forest Landscape Restoration Program. April 23<sup>rd</sup>, Winona, MO.
- 2013 *Red oak timber product value loss due to fire damage.* Wildland Fire in the Appalachians: Discussions among Managers and Scientists Conference. Roanoke, VA. Oct. 7<sup>th</sup>. (presented by J. Marschall)
- Fire history and ecology of shortleaf pine.* 2013 Ouachita Society for American Foresters Meeting, Ft.

- Smith, AR. Dec. 5, 6.
- Fire research at the Wichita Mountains Wildlife Refuge.* 2013. Oklahoma Academy of Sciences, Lawton, OK. Dec. 5<sup>th</sup> (declined due to conflict)
- Paleo-perspectives on drought and growth in the U.S. agricultural heartland.* University Industry Consortium, Des Moines, IA. Oct. 24<sup>th</sup>.
- Rise, fall, rise: trends and issues in fire science and management.* Fall Seminar Series, Dept. of Forestry, Univ. of Missouri, Columbia, Oct. 10<sup>th</sup>.
- The Missouri Tree-Ring Laboratory.* CAFNR Faculty/Staff Meeting, Univ. of Missouri, Columbia, MO. Oct. 9.
- 2012 *Midwestern drought during the last millennium.* 2012 Crop Management Conference, Columbia, MO. Dec. 18, 19.
- Illuminating historical fire regimes...before it's too late?* Chicago Botanical Garden, Janet Meakin Poor Symposium; Chicago, IL. Oct. 26.
- Prescribed fire effects on timber quality / introduction to the Oak Woodlands & Forests Fire Consortium.* Woodland and Savanna Workshop, Crossville, TN. Sept. 5 & 6.
- Trends and complexity in the fire history of the Great Plains.* Dept. of Biology Fall Seminar Series, Missouri State Univ., Aug. 31<sup>st</sup>, Springfield, MO.
- Introduction to the Oak Woodlands and Forests Fire Consortium.* 2<sup>nd</sup> Annual Prescribed Fire Council Meeting, May 8, Lawton, OK.
- Long-term changes in fire and oak woodlands at the Wichita Mountains National Wildlife Refuge.* 2<sup>nd</sup> Annual Prescribed Fire Council Meeting, May 8, Lawton, OK.
- Introduction to the Oak Woodlands and Forests Fire Consortium.* Shortleaf Pine Restoration Initiative Meeting, April 12-13, Branson, MO
- Dendrochronology and fire scars: reconstructing the past to understand the future.* Tri-State Forestry Conference. March 10-11, Dubuque, IA.
- Missouri natural areas as dendroecology labs.* Celebrating 40 years of natural areas on Missouri Department of Conservation lands; Missouri Natural Resources Conference. Feb 1-3, 2012, Osage Beach, MO.
- 2011 *Fire return intervals for shortleaf pine – case studies.* Shortleaf Pine Conference: East meets west: bridging the gap with research and education across the range. Sept. 20-22, 2011, Huntsville, AL.
- Developing a fire consortium in the Midwestern oak woodlands and savannah region.* 4<sup>th</sup> Fire in Eastern Oak Forests Conference: Managing Oak Woodlands & Savannas in the Forest-Prairie Region. May 17-19, 2011, Springfield, MO.
- 2010 *Long-term changes in North American temperate forest ecosystems.* Nov. 8<sup>th</sup>, Natural History Museum, Smithsonian Institute, Washington D.C.
- Shortleaf pine and fire-adapted ecosystems in a changing climate.* Restoring the Shortleaf Pine/Oak Savanna Ecosystem—A Working Group Symposium. Sept. 22-24, Raleigh, NC.
- Fire history of national parks in the Great Plains.* 22<sup>nd</sup> North American Prairie Conference, Cedar Falls, IA.
- 2009 *Perspectives and comparisons of smoke emissions from historical and modern fires: taking the elephant out of the closet and putting it into the stadium.* Tall Timbers 24th Fire Ecology Conference, Tallahassee, FL (Plenary).
- 2008 *New fire histories from the eastern U.S. and Great Plains regions.* The Nature Conservancy Fire Learning



- Network, St. Francis National Forest, Marianna, AR.
- Development and importance of a long oak tree-ring chronology in the Midwestern USA.* Polish Institute of Botany, Krakow, Poland.
- 2007 *Multiple uses of fire history information.* Lessons from fire history: past and future workshop. Univ. of Missouri, Columbia, MO.
- Illuminating the past: fire history of the Missouri River loess hills.* Dept. Natural Resource Ecology and Management Seminar, Iowa State Univ., Ames, IA.
- High resolution mapping of historical fire regimes.* U.S. Forest Service Mark Twain National Forest fire planning meeting, Rolla, MO.
- Illuminating the past: fire history of the Missouri River loess hills.* Iowa Prairie Conference, Briar Cliff Univ., Sioux City IA.
- Forest science using tree rings.* Missouri Forest Products Association, Osage Beach, MO.
- 2006 *Oak old-growth: lessons from the Holocene.* 7<sup>th</sup> Eastern Old-growth Conference. Little Rock, AR.
- Defining historical fire regimes using tree-ring science.* U.S. Forest Service, Shawnee National Forest fire planning meeting, Anna, IL.
- Fire history of the loess hills.* Hill Prairie Conference, Principia College, IL.
- 2005 *Human, climate, and fire interactions in eastern North America.* Fire history and climate synthesis in the western United States. Guyette, R.P., M.C. Stambaugh, and D.C. Dey. May 1-3, Flagstaff, Arizona.
- Ancient buried oak wood in the Midwest.* Ancient Cypress Symposium. Guyette, R.P. and M.C. Stambaugh. Johnstonville, SC.
- 2004 *Human, topographic, and climatic influences on fire regimes in mid and eastern North America.* Ecological Society of American. Symposium presentation: Cultural and Environmental Controls on Past Fire Regimes in Inhabited Woodlands. Guyette, R.P., M.C. Stambaugh, and D.C. Dey. Portland, OR
- American long oak chronology: using scanning electron microscope for defining decay.* Presentation at the meeting of the Central States Microscopy and Microanalysis Society, Adams Conference Center in the School of Veterinary Medicine, University of Missouri, Columbia, MO Guyette, R.P., M.C. Stambaugh, and D.C. Dey.
- 2003 *The effects of climate, humans and topography on Missouri forests.* Upland forest workshop, Missouri Department of Conservation Guyette, R.P., M.C. Stambaugh, and D.C. Dey. 2003. Van Buren, Missouri.
- 1999 *Fire history in Missouri Savannas.* Stambaugh, M.C. and R.P. Guyette. 1999. Missouri Savanna Workshop. Bolivar, Missouri.

**PUBLISHED ABSTRACTS / PRESENTATIONS (N = 64)**

- Rooney, M.\* and **M.C. Stambaugh**. 2016. An evaluation of historical fire occurrence, drought and the El Niño Southern Oscillation in the southcentral United States. American Geophysical Union, 2016 Annual Meeting, San Francisco, CA, Dec. 12-15. (poster presentation)
- Stambaugh, M.C.**, and K.T. Smith. 2016. Fire scar closure rates in oak and the implications for prescribed burning. 20<sup>th</sup> Central Hardwoods Forest Conference, Columbia, MO, March 28 – April 1 (poster presentation)
- Guyette, R.P., F. Thompson, D.C. Dey, and **M.C. Stambaugh**. 2015. Past and future wildfire in the Interior West as predicted by the calibrated combustion dynamics of ecosystems. Restoration and Fire in the Interior West, Logan, UT, Oct. 28, 29 (oral presentation)
- Stambaugh, M.C.** and R.P. Guyette. 2015. Projected climate change impacts on frequent fire regimes in the southcentral U.S. 6<sup>th</sup> International Fire Ecology and Management Conference, San Antonio, TX, Nov. 16-20.
- Guyette, R.P., **M.C. Stambaugh**, and D.C. Dey. 2015. The direction, magnitude and theory of ecosystem fire

probability as constrained by precipitation and temperature. 6<sup>th</sup> International Fire Ecology and Management Conference, San Antonio, TX, Nov. 16-20.

Marschall, J.M., **M.C. Stambaugh**, R.P. Guyette, B.C. Jones. 2015. Documenting frequent fire regimes in conifer forests of Pennsylvania. 6<sup>th</sup> International Fire Ecology and Management Conference, San Antonio, TX, Nov. 16-20 (oral presentation)

Dey, D.C., R.P. Guyette, C.J. Schweitzer, **M.C. Stambaugh**, J.M. Kabrick. 2015. Restoring oak forests, woodlands, and savannas using modern silvicultural analogs to historic cultural fire regimes. II International Congress of Silviculture, Florence, Italy. Nov. 26-29 (oral presentation)

York, A. et al. 2014. The Joint Fire Science Program Fire Exchange Network: facilitating knowledge exchange about wildland fire science across the U.S. American Geophysical Union, San Francisco, CA (poster)

**Stambaugh**, R.P. Guyette, J.M. Marschall. 2014. Extent, abundance, and ages of buried subfossil trees in streams of the Central U.S. 9<sup>th</sup> International Conference on Dendrochronology, Melbourne, Australia. Jan.13-17 (oral presentation)

**Stambaugh, R.P.** Guyette, J.M. Marschall, D.C. Dey. 2014. The trace of fire in eastern Native America. 9<sup>th</sup> International Conference on Dendrochronology, Melbourne, Australia. Jan.13-17 (poster)

Muzika, R.-M., R.P. Guyette, **M.C. Stambaugh**, and J.M. Marschall. 2014. Interactions of climate and humans in the Great Lakes fire regime. 9<sup>th</sup> International Conference on Dendrochronology, Melbourne, Australia. Jan.13-17 (oral presentation)

Guyette, R.P., F.R. Thompson III., J. Whittier, **M.C. Stambaugh**, and D.C. Dey. 2014. Using physical chemistry and tree rings to calculate the likelihood of fire. 9<sup>th</sup> International Conference on Dendrochronology, Melbourne, Australia. Jan.13-17 (oral presentation)

Guyette, R.P., F.R. Thompson III., J. Whittier, **M.C. Stambaugh**, and D.C. Dey. 2013. Future fire probability modeling with climate change data and physical chemistry. North American Forest Ecology Workshop Conference. Bloomington, IN. June 16 (oral presentation)

Kabrick et al. 2013. Sustaining Woodlands: Managing for Diverse Plant Communities, Wildlife Habitat, and Timber Production Using Area-Based Scheduling of Prescribed Burns. Missouri Natural Resources Conference, Lake of the Ozarks, MO (poster)

**Stambaugh, M.C.**, R.P. Guyette, and J.M. Marschall. 2012. The trace of fire in eastern Native America. 5<sup>th</sup> International Fire Ecology and Management Congress. Portland, OR (poster)

**Stambaugh, M.C.**, J.M. Marschall, and K.W. Grabner. 2012. Sharing fire science information about eastern oak forests and woodlands. 5<sup>th</sup> International Fire Ecology and Management Congress. Portland, OR (poster)

Guyette, R.P., **M.C. Stambaugh**, D.C. Dey. 2012. Advancement in modeling the physical chemistry of climate and fire regimes. 5<sup>th</sup> International Fire Ecology and Management Congress. Portland, OR (oral presentation)

Guyette, R.P. and **M.C. Stambaugh**. 2012. A quantitative method for estimating long-term influence of human ignitions on fire regimes. 5<sup>th</sup> International Fire Ecology and Management Congress. Portland, OR (oral presentation)

Marschall, J.M., R.P. Guyette, and **M.C. Stambaugh**. 2012. Prescribed fire scars and timber product value loss. 5<sup>th</sup> International Fire Ecology and Management Congress. Portland, OR (oral presentation)

Hammer, L.D.\* and **M.C. Stambaugh**. 2012. A performance test of wildfire burn severity assessments in an oak forest-prairie ecosystem. 5<sup>th</sup> International Fire Ecology and Management Congress. Portland, OR (oral presentation)

Kinkead, C.O., J.M. Kabrick, **M.C. Stambaugh**, and K.W. Grabner. 2012. Restoring oak woodlands: vegetation response to thinning and burning in the Ozark Highlands. 5<sup>th</sup> International Fire Ecology and

Management Congress. Portland, OR (oral presentation)

Brose, P., D.C. Dey, R.P. Guyette, J.M. Marschall, and **M.C. Stambaugh**. 2012. A 400-year fire history for the Pine Creek Gorge region of northcentral Pennsylvania. 5<sup>th</sup> International Fire Ecology and Management Congress. Portland, OR (oral presentation)

Kinthead, C.O., J.M. Kabrick, **M.C. Stambaugh**, and K.W. Grabner. 2012. Initiating restoration of woodland communities: the effect of thinning and prescribed fire on stand structure in the Ozark Highlands. Proceedings of the 4<sup>th</sup> Fire in Eastern Oak Forests Conference. USDA Forest Service GTR-NRS-P-102. pp.241-244.

Guyette, R.P., **M.C. Stambaugh**, D.C. Dey, and R-M. Muzika. 2012. The trace of fire in eastern Native America. Proceedings of the 4<sup>th</sup> Fire in Eastern Oak Forests Conference. USDA Forest Service GTR-NRS-P-102. pp.278.

Hammer, L.D.\* and **M.C. Stambaugh**. 2012. Influences of topography and fire on eastern redcedar (*Juniperus virginiana*) distribution in a prairie-forest transition zone. Proceedings of the 4<sup>th</sup> Fire in Eastern Oak Forests Conference. USDA Forest Service GTR-NRS-P-102. pp.279.

Marschall, J.M. R.P. Guyette, **M.C. Stambaugh**, and D.C. Dey. 2012. Determining lumber value changes in fire injured oak trees. Proceedings of the 4<sup>th</sup> Fire in Eastern Oak Forests Conference. USDA Forest Service GTR-NRS-P-102. pp.286.

Guyette, R.P., **M.C. Stambaugh**, R-M. Muzika, and D.C. Dey. 2012. Climate and physical chemistry in eastern fire regimes. Proceedings of the 4<sup>th</sup> Fire in Eastern Oak Forests Conference. USDA Forest Service GTR-NRS-P-102. pp.277.

**Stambaugh, M.C.**, R.P. Guyette, and J.M. Marschall. 2010. Fire scar confirmation of a long-term frequent fire regime in a longleaf pine-bluestem ecosystem, Kisatchie Hills Wilderness, Louisiana [abstract]. Page 113 in Proceedings of the 24<sup>th</sup> Tall Timbers Fire Ecology Conference.

**Stambaugh, M.C.**, R.P. Guyette, and J.M. Marschall. 2009. Confirmation of a long-term frequent fire regime in a longleaf pine-bluestem ecosystem. 4<sup>th</sup> International Fire Ecology and Management Congress, Savannah, GA (poster).

**Stambaugh, M.C.**, R.P. Guyette, and D.C. Dey. 2009. Perspectives and comparisons of smoke emissions from historic and modern fires: taking the elephant out of the closet and placing it into the stadium. 4<sup>th</sup> International Fire Ecology and Management Congress, Savannah, GA (oral presentation).

**Stambaugh, M.C.**, R.P. Guyette, and G. Willson. 2009. Progress in developing a network of fire scar history sites in the Great Plains. 4<sup>th</sup> International Fire Ecology and Management Congress, Savannah, GA (oral presentation).

Guyette, R.P. and **M.C. Stambaugh**, 2009. Great Plains fire frequency modeling and climate calibration. 4<sup>th</sup> International Fire Ecology and Management Congress, Savannah, GA. (oral presentation).

Muzika, R., R.P. Guyette, and **M.C. Stambaugh**. 2009. Fire history of the Huron Mountains landscape. 4<sup>th</sup> International Fire Ecology and Management Congress, Savannah, GA. (oral presentation).

Guyette, R.P., **M.C. Stambaugh**, R. Muzika, and D. Dey. 2009. Future continental- and global-scale climate forcing of fire frequency using the PC2FM model. 4<sup>th</sup> International Fire Ecology and Management Congress, Savannah, GA. (oral presentation).

Guyette, R.P., **M.C. Stambaugh**, R. Muzika, and D. Dey. 2009. Calibration and mapping of historic and future fire frequency in the continental United States. 4<sup>th</sup> International Fire Ecology and Management Congress, Savannah, GA (poster).

**Stambaugh, M.C.** and R.P. Guyette. 2009. Climate forcing of historic and future fire frequency in the continental United States. PAGES 3<sup>rd</sup> Open Science Meeting, Corvallis, OR (poster).

Guyette, R.P. and **M.C. Stambaugh**. 2009. Historic and future climate forcing of fire frequency in the southern plains and comparisons with North America. American Assoc. for the Advancement of Science (AAAS) – Southwest and Rocky Mtn. Division Annual Meeting, Tulsa, OK (oral presentation).

- Stambaugh, M.C.** 2008. New fire histories from the eastern U.S. and Great Plains regions. The Nature Conservancy Fire Learning Network, St. Francis National Forest, Marianna, AR (oral presentation).
- Bale, A.M., Guyette, R.P. and **M.C. Stambaugh**. 2008. Fire regime of a montane longleaf pine ecosystem, Alabama. Pages 54-59 In: Third Montane Longleaf Conference Proceedings; 2008 March 11-12; Auburn, AL. School of Forestry and Wildlife Sciences, Auburn University. 88 pp.
- Guyette, R.P. and **Stambaugh, M.C.** 2006. Quantitative estimates of historic fire intervals for the Pacific Coast and North America Pacific Coast Fire Conference: Changing Fire Regimes, Goals and Ecosystems. Dec., San Diego, CA. (oral presentation).
- Guyette, R.P., **Stambaugh, M.C.**, and Dey, D.C. 2006. An empirical calibration and comparison of fire intervals in the Southwest and contiguous U.S. Fire in the Southwest: Integrating Fire into Management of Changing Ecosystems, Nov. Tucson AZ. (oral presentation).
- Stambaugh, M.C.**, R.P. Guyette, and D.C. Dey. 2006. Continental and landscape-scale approaches to modeling historic spatio-temporal variability in fire frequency from fire scar data. IAWF 2<sup>nd</sup> Fuels and Fire Behavior Conference, Destin, FL (poster).
- Guyette, R.P., **M.C. Stambaugh**, and D.C. Dey. 2006. A calibration of temperature and fire frequency. American Geophysical Union (AGU) Fall Meeting, San Francisco, CA (oral presentation).
- Stambaugh, M.C.**, R.P. Guyette. 2006. Continental- and landscape-scale approaches to modeling historic spatio-temporal variability in fire frequency from fire scar data. 7<sup>th</sup> International Conference on Dendrochronology, Beijing, China (poster).
- Guyette, R.P., **M.C. Stambaugh**, R.M. Muzika, and D.C. Dey. 2006. Mapping historic fire intervals in North America using fire scars, temperature, precipitation and human population. Ecological Society of America annual meeting, Memphis, TN (poster).
- Guyette, R.P., **M.C. Stambaugh**, and D.C. Dey. 2006. Mapping historic fire intervals in North America using fire scars, temperature and human population. International Association of Landscape Ecologists Workshop, Beijing, China (oral presentation).
- Muzika, R.M., R.P. Guyette, R.P., **M.C. Stambaugh**, and D.C. Dey. 2005. Evidence of the Younger Dryas in oaks from agricultural regions of mid-continental North America. Poster and abstract. Ecological Society of America annual meeting, Montreal CA. August.
- Guyette, R.P., R.M. Muzika, and **M.C. Stambaugh**. 2005. Human, climate, and fire interactions in eastern North America. Presentation and abstract. Ecological Society of America Annual Meeting, Montreal CA. August.
- Stambaugh, M.C.** and R.P. Guyette. 2005. Subfossil wood: paleo-potential in Midwestern streams. Wood Anatomy of Tree Rings Course, May 16-20, Laboratory of Tree-Ring Research, University of Arizona (oral presentation)
- Stambaugh, M.C.**, Guyette, R.P., and D.C. Dey. 2005. Potential and problems for fire history in the Midwest and Eastern North America. Fire History and Climate Synthesis in the Western United States, May 1-3, in Flagstaff, AZ. (poster).
- Guyette, R.P., **M.C. Stambaugh**, and D.C. Dey. 2004. Human, topographic, and climatic influences on fire regimes in mid and eastern North America. Ecological Society of American. Abstract. Cultural and Environmental Controls on Past Fire Regimes in Inhabited Woodlands. Portland, OR.
- Guyette, R.P., **M.C. Stambaugh**, and D.C. Dey. 2004. American long oak chronology: potential and problems. Abstract. Radiocarbon. Symposium: Dendroclimatology: Sharpening the Focus. April. Tucson, AZ.
- Guyette, R.P., **M.C. Stambaugh**, and D.C. Dey. 2004. Riparian and upland fire frequency models and maps of the Current River. Missouri Natural Resources Conference, 28-30 January 2004, Osage Beach, MO.

**Stambaugh, M.C.**, R.P. Guyette, and D.C. Dey. 2004. Riparian and upland mean fire interval models and maps of the Current River watershed, Missouri, USA. 1-6 August 2004. Ecological Society Annual Meeting. Portland, OR (poster).

Guyette, R.P., **M.C. Stambaugh**, and D.C. Dey. 2003. Holocene oak tree-ring chronology development and analysis in the agricultural landscape of the Midwestern United States. International Quaternary Society, July, Reno, Nevada.

Dey, D.C., R.P. Guyette, and **M.C. Stambaugh**. 2003. Fire history of a forest, savanna and fen mosaic at White Ranch State Forest. 29-31 January 2003. Missouri Natural Resource Conference: facing resource issues of the Mid-West. Osage Beach, MO. (poster, publication 61)

**Stambaugh, M.C.**, R.P. Guyette, and D.C. Dey. 2003. Sub-fossil oak: a new paleoclimate resource in the Midwestern U.S. presented at the North American Dendroecological Fieldweek, Lubrecht Experimental Forest, MT.

Guyette, R.P., R.M. Muzika, J. Kabrick, and **M.C. Stambaugh**, 2002. A perspective on Quercus life history characteristics and forest disturbance. Poster. Oak Ecology Symposium, Fayetteville, AR.

**Stambaugh, M.C.**, D.C. Dey, and R.P. Guyette. 2002. From historic fire regimes to prescribed burning practices. Published abstract. Missouri Natural Resources Conference. Published abstract. Lake of the Ozarks, MO.

Guyette, R.P., D.C. Dey, and **M.C. Stambaugh**. 2002. Carbon sequestering in large wood in north Missouri streams. The 4th Annual University of Missouri Center for Agroforestry Review. 14 November 2002. Columbia, MO.

Guyette, R.P., D.C. Dey, and **M.C. Stambaugh**. 2002. Temporal ecology of large wood in streams. Missouri Natural Resources Conference. 30 Jan. – 1 Feb. 2002. Lake of the Ozarks, MO. (abstract)

Dey D.C., R.P. Guyette, and **M.C. Stambaugh**. 2002. Fire history of White Ranch State Forest. Poster. Oak Ecology Symposium, Fayetteville, AR.

**Stambaugh, M.C.**, D.C. Dey, and R.P. Guyette. 2002. From historic fire regimes to prescribed burning practices. Presentation. Missouri Natural Resources Conference. Lake Ozark, MO.

Guyette, R.P., D.C. Dey, and **M.C. Stambaugh**. 2001. Carbon sequestering in large wood in North Missouri streams. Third Annual ARS/EPA Research Review. November 14-15, 2001. University of Missouri. Columbia, MO

#### ***OFFERED TECHNICAL PRESENTATIONS (UNPUBLISHED)***

2016 **Stambaugh, M.C.** and K.T. Smith. Fire scar closure rates in oak and the implications to prescribed burning. 20<sup>th</sup> Central Hardwood Forest Conference, March 28<sup>th</sup> (poster presentation).

**Stambaugh, M.C.** The Oak Woodlands & Forests Fire Consortium. Missouri Natural Resources Conference (oral presentation).

2015 Marschall, J.M. and **M.C. Stambaugh**. Developing fire science information sharing partnerships across oak ecosystems. Oklahoma Natural Resources Conference (oral presentation).

Guyette, R.P., **M.C. Stambaugh**, D.C. Dey. The past and future of ecosystem combustion and climate. American Geophysical Union Joint Assembly, Montreal, Canada May 3-7 (oral presentation)

**Stambaugh, M.C.** The Joint Fire Science Program Fire Exchange Network: facilitating knowledge exchange about wildland fire science across the U.S. Frequent Fire Conifer Ecosystems Workshop. Joseph Jones Ecological Research Center (poster)

Guyette, R.P., D.C. Dey, R.M. Muzika, **M.C. Stambaugh**, and J.M. Marschall. Past and future fire using the combustion dynamics of ecosystems in the northeastern U.S.. North Atlantic Fire Consortium (webinar)

- Stambaugh, M.C.** and R.P. Guyette. Projected climate change impacts on frequent fire regimes in the southcentral U.S. 6<sup>th</sup> International Fire Ecology and Management Congress, San Antonio, TX. Nov. 18. (oral presentation)
- Stambaugh, M.C.**, G. Creacy, M. Rooney, and J.C. Sparks. Three hundred years of change in fire and vegetation at Bastrop State Park. 6<sup>th</sup> International Fire Ecology and Management Congress, San Antonio, TX. Nov. 18. (poster presentation)
- Marschall, J.M., **M.C. Stambaugh**, R.P. Guyette, and B.C. Jones. Documenting frequent fire regimes in mixed pine-oak forests of Pennsylvania. 6<sup>th</sup> International Fire Ecology and Management Congress, San Antonio, TX. Nov. 18. (oral presentation)
- Guyette, R.P., **M.C. Stambaugh**, and D.C. Dey. The direction, magnitude, and theory of ecosystem fire probability as constrained by precipitation and temperature. 6<sup>th</sup> International Fire Ecology and Management Congress, San Antonio, TX. Nov. 18. (oral presentation)
- 2013 Marschall, J.M., R.P. Guyette, P. Brose, **M.C. Stambaugh**, and D.C. Dey. Red and Pitch pine fire histories illuminate fire regimes in the northeast United States. Ameridendro Conference 2013. Tucson, AZ.
- Stambaugh, M.C.**, J.M. Marschall, and K.W. Grabner. The Oak Woodlands & Forests Fire Consortium. 5<sup>th</sup> Missouri Natural Resources Conference. Lake of the Ozarks, MO Feb. 2 (poster).
- Stambaugh, M.C.**, J.M. Marschall, and K.W. Grabner. The Oak Woodlands & Forests Fire Consortium. International Association of Wildland Fire – Fire Behavior and Fuels Conference. Raleigh, NC. Feb. 2 (poster)
- Marschall, J.M., **M.C. Stambaugh**, and K.W. Grabner. The Oak Woodlands & Forests Fire Consortium. North American Forest Ecology Workshop Conference. Bloomington, IN. June 16 (poster)
- Marschall, J.M., **M.C. Stambaugh**, and K.W. Grabner. Introduction to the Oak Woodlands & Forests Fire Consortium. Tennessee Prescribed Fire Council Annual Meeting. Crossville, TN. Feb. 8. (oral presentation).
- 2012 Hammer, L.D. and **M.C. Stambaugh**. Long-term changes in eastern redcedar at the Wichita Mountains National Wildlife Refuge, Oklahoma. 2<sup>nd</sup> Oklahoma Prescribed Fire Council Annual Meeting. Lawton, OK.
- Stambaugh, M.C.**, R.P. Guyette, D.C. Dey, R. Muzika, J. Marschall. The trace of fire in eastern Native America. 5<sup>th</sup> International Fire Ecology and Management Congress: Uniting Research, Education, and Management. Portland, OR Dec. 3-7 (poster).
- Stambaugh, M.C.**, K.W. Grabner, and J.M. Marschall. Sharing fire science information about eastern oak woodlands and forests. 5<sup>th</sup> International Fire Ecology and Management Congress: Uniting Research, Education, and Management. Portland, OR Dec. 3-7 (poster).
- 2011 Guyette, R.P., **M.C. Stambaugh**, D.C. Dey, R. Muzika, and J. Marschall. The trace of fire in eastern Native America. 4<sup>th</sup> Fire in Eastern Oak Forests Conference, Springfield, MO May 17-19 (poster).
- Grabner, K.W., **M.C. Stambaugh**, R.P. Guyette, D.C. Dey, and G.D. Willson. Midwest oak woodland and forest fire consortium. 4<sup>th</sup> Fire in Eastern Oak Forests Conference, Springfield, MO May 17-19 (poster).
- Guyette, R.P., **M.C. Stambaugh**, R. Muzika, and D.C. Dey. Climate and physical chemistry in eastern fire regimes. 4<sup>th</sup> Fire in Eastern Oak Forests Conference, Springfield, MO May 17-19 (poster).
- Hammer, L.D. and **M.C. Stambaugh**. Influences of topography and fire on eastern redcedar (*Juniperus virginiana*) distribution in a prairie-forest transition zone. 4<sup>th</sup> Fire in Eastern Oak Forests Conference, Springfield, MO May 17-19 (poster).
- Marschall, J.M., R.P. Guyette, **M.C. Stambaugh**, and J. Dwyer. Determining lumber value changes in

- fire-injured oak trees. 4<sup>th</sup> Fire in Eastern Oak Forests Conference, Springfield, MO May 17-19 (poster).
- Kinthead, C.O., J.M. Kabrick, **M.C. Stambaugh**, and K.W. Grabner. Initiating restoration of woodland communities: the effect of thinning and prescribed fire on stand structure in the Ozark Highlands. 4<sup>th</sup> Fire in Eastern Oak Forests Conference, Springfield, MO May 17-19 (poster).
- 2010 Hammer, L.D., **Stambaugh, M.C.** Spatio-temporal distribution of eastern redcedar in a prairie forest transition zone, Wichita Mountains National Wildlife Refuge, Oklahoma. Natural Areas Association Annual Meeting, (poster).
- 2009 **Stambaugh, M.C.**, R.P. Guyette, and J.M. Marschall. Confirmation of a long-term frequent fire regime in a longleaf pine-bluestem ecosystem. 4<sup>th</sup> International Fire Ecology and Management Congress, Savannah, GA (poster).
- Stambaugh, M.C.**, R.P. Guyette, and D.C. Dey. Perspectives and comparisons of smoke emissions from historic and modern fires: taking the elephant out of the closet and placing it into the stadium. 4<sup>th</sup> International Fire Ecology and Management Congress, Savannah, GA (poster).
- Stambaugh, M.C.**, R.P. Guyette. Progress in developing a network of fire scar history research sites in the Great Plains. 4<sup>th</sup> International Fire Ecology and Management Congress, Savannah, GA (oral presentation).
- Guyette, R.P. and **M.C. Stambaugh**, Great Plains fire frequency modeling and climate calibration. 4<sup>th</sup> International Fire Ecology and Management Congress, Savannah, GA.
- Muzika, R., R.P. Guyette, and **M.C. Stambaugh**. Fire history of the Huron Mountains landscape. 4<sup>th</sup> International Fire Ecology and Management Congress, Savannah, GA.
- Guyette, R.P., **M.C. Stambaugh**, R. Muzika, and D. Dey. Future continental- and global-scale climate forcing of fire frequency using the PC2FM model. 4<sup>th</sup> International Fire Ecology and Management Congress, Savannah, GA.
- Guyette, R.P., **M.C. Stambaugh**, R. Muzika, and D. Dey. Calibration and mapping of historic and future fire frequency in the continental United States. 4<sup>th</sup> International Fire Ecology and Management Congress, Savannah, GA (poster).
- Roper, D.C., Lengyel, S., and **M.C. Stambaugh**. 2009. The Chronology of the Kansas Monument Site. Plains Archeological Conference (poster).
- Stambaugh, M.C.** and R.P. Guyette. Climate forcing of historic and future fire frequency in the continental United States. PAGES 3<sup>rd</sup> Open Science Meeting, Corvallis, OR (poster).
- Guyette, R.P., **M.C. Stambaugh**, and A. Lupo. A 14,000 year record of tree growth and <sup>13</sup>C in a mid-continental agricultural landscape coupled with oceanic climate proxies. PAGES 3<sup>rd</sup> Open Science Meeting, Corvallis, OR (poster).
- Stambaugh, M.C.** and R.P. Guyette. Long-term drought variability in the Central United States: Signal detection and agricultural connection. PAGES 1<sup>st</sup> Young Scientist Meeting, Corvallis, OR (poster).
- Stambaugh, M.C.** and R.P. Guyette. Fire, climate, and human history near the western terminus of the Cross Timbers, Wichita Mountains, Oklahoma. American Association for the Advancement of Science (AAAS) – Southwest and Rocky Mountain Division Annual Meeting, Tulsa, OK (oral presentation).
- Guyette, R.P. and **M.C. Stambaugh**. Historic and future climate forcing of fire frequency in the southern plains and comparisons with North America. American Assoc. for the Advancement of Science (AAAS) – Southwest and Rocky Mtn. Division Annual Meeting, Tulsa, OK (oral presentation).
- Stambaugh, M.C.** and R.P. Guyette. Fire scar history confirmation of a long-term frequent fire regime in a longleaf-bluestem ecosystem, Kisatchie Hills Wilderness, Louisiana. Tall Timbers 24<sup>th</sup> Fire Ecology Conference, Tallahassee, FL (oral presentation).
- Stambaugh, M.C.** and R.P. Guyette. Missouri climate and forest variability over the last 14,000 years.

- Missouri Natural Resources Conference, Lake of Ozarks, MO (oral presentation)
- 2008 **Stambaugh, M.C.**, R.P. Guyette, and E.R. McMurry. Towards a 14,000 year oak chronology: preliminary results of Holocene climate variability. Tree Rings, Archeology, Climatology, and the Environment (TRACE) Conference, Zakopane, Poland (oral presentation).
- McMurry, E.R., **M.C. Stambaugh**, and R.P. Guyette, Towards a 14,000 year oak chronology: methods, progress, and challenges. Tree Rings, Archeology, Climatology, and the Environment (TRACE) Conference, Zakopane, Poland (oral presentation).
- 2007 **Stambaugh, M.C.** and R.P. Guyette. Oaks and ice: linking continental North American and North Atlantic climate proxies between 9.5 and 14 k yr BP. American Geophysical Union (AGU) Fall Meeting, San Francisco, CA (poster).
- Stambaugh, M.C.**, R.P. Guyette, and D.C. Dey. A fuel hazard model for forests of the Missouri Ozark and Illinois Interior Lowland Plateau Ecoregions. IAWF 2nd Fuels and Fire Behavior Conference, Destin, FL (oral presentation).
- Stambaugh, M.C.**, R.P. Guyette, and D.C. Dey. Continental and landscape-scale approaches to modeling historic spatio-temporal variability in fire frequency from fire scar data. IAWF 2nd Fuels and Fire Behavior Conference, Destin, FL (poster).
- Muzika, R., J.A. Hubbart, R.P. Guyette, and **M.C. Stambaugh**. Long-term springflow reconstructions based on instrumental and tree-ring climate records in the Missouri Ozarks. American Geophysical Union (AGU) Fall Meeting, San Francisco, CA (poster).
- Guyette, R.P., **M.C. Stambaugh**, and D.C. Dey. A calibration of temperature and fire frequency. American Geophysical Union (AGU) Fall Meeting, San Francisco, CA.
- 2006 **Stambaugh, M.C.**, R.P. Guyette. Continental- and landscape-scale approaches to modeling historic spatio-temporal variability in fire frequency from fire scar data. 7<sup>th</sup> International Conference on Dendrochronology, Beijing, China (poster).
- Stambaugh, M.C.**, R.P. Guyette. 1000 years of tree-ring reconstructed drought from the Central United States. 7<sup>th</sup> International Conference on Dendrochronology, Beijing, China.
- Guyette, R.P., **M.C. Stambaugh**, R.M. Muzika, and D.C. Dey. Mapping historic fire intervals in North America using fire scars, temperature, precipitation and human population. Ecological Society of America annual meeting, Memphis, TN (oral presentation).
- Guyette, R.P., **M.C. Stambaugh**, and D.C. Dey. Mapping historic fire intervals in North America using fire scars, temperature and human population. International Association of Landscape Ecologists Workshop, Beijing, China (oral presentation).
- 2005 **Stambaugh, M.C.** and R.P. Guyette. Subfossil wood: paleo-potential in Midwestern streams. Wood Anatomy of Tree Rings Course, May 16-20, Laboratory of Tree-Ring Research, University of Arizona (oral presentation).
- Stambaugh, M.C.**, Guyette, R.P., and D.C. Dey. Potential and problems for fire history in the Midwest and Eastern North America. Fire History and Climate Synthesis in the Western United States, May 1-3, in Flagstaff Arizona (poster).
- 2004 Guyette, R.P., **M.C. Stambaugh**, and D.C. Dey. American long oak chronology: potential and problems. Symposium: Dendroclimatology: Sharpening the Focus. Tucson, Arizona (oral presentation).
- Guyette, R.P., **M.C. Stambaugh**, and D.C. Dey. Riparian and upland fire frequency models and maps of the Current River. Missouri Natural Resources Conference, 28-30 January 2004, Osage Beach, MO (oral presentation).
- Stambaugh, M.C.**, R.P. Guyette, and D.C. Dey. Riparian and upland mean fire interval models and maps of the Current River watershed, Missouri, USA. 1-6 August 2004. Ecological Society Annual Meeting.



- Portland, OR (poster).
- 2003 Guyette, R.P., **M.C. Stambaugh**, and D.C. Dey. Holocene oak tree-ring chronology development and analysis in the agricultural landscape of the Midwestern United States. International Quaternary Society, Reno, Nevada (oral presentation).
- Dey, D.C., R.P. Guyette, and **M.C. Stambaugh**. Fire history of a forest, savanna and fen mosaic at White Ranch State Forest. 29-31 January 2003. Missouri Natural Resource Conference: facing resource issues of the Mid-West. Dey gave this presentation. Osage Beach, MO. (poster, publication 61)
- Stambaugh, M.C.**, R.P. Guyette, and D.C. Dey. Sub-fossil oak: a new paleoclimate resource in the Midwestern U.S. presented at the North American Dendroecological Fieldweek, Lubrecht Experimental Forest, MT (oral presentation).
- 2002 Guyette, R.P., R.M. Muzika, J. Kabrick, and **M.C. Stambaugh**. A perspective on *Quercus* life history characteristics and forest disturbance. Oak Ecology Symposium, Fayetteville, Arkansas (poster).
- Guyette, R.P., D.C. Dey, and **M.C. Stambaugh**. Carbon sequestering in large wood in north Missouri streams. The 4<sup>th</sup> Annual University of Missouri Center for Agroforestry Review. 14 November Columbia, MO (oral presentation).
- Guyette, R.P., D.C. Dey, and **M.C. Stambaugh**. Temporal ecology of large wood in streams. Missouri Natural Resources Conference. 30 Jan. – 1 Feb. Lake of the Ozarks, MO. (oral presentation)
- Dey D.C., R.P. Guyette, and **M.C. Stambaugh**. Fire history of White Ranch State Forest. Oak Ecology Symposium, Fayetteville, Arkansas (poster).
- Stambaugh, M.C.**, D.C. Dey, and R.P. Guyette. From historic fire regimes to prescribed burning practices. Missouri Natural Resources Conference. Lake Ozark, Missouri (oral presentation).
- 2001 Guyette, R.P., D.C. Dey, and **M.C. Stambaugh**. Carbon sequestering in large wood in North Missouri streams. Third Annual ARS/EPA Research Review. November 14-15, University of Missouri. Columbia, MO

**ARCHIVED PALEOCLIMATE / PALEOECOLOGICAL DATASETS (N = 47)**

*Paleoecological data are archived at: IGBP PAGES/ World Data Center for Paleoclimatology Data. NOAA/NGC Paleoclimatology Program, Boulder, CO, USA. <http://www.ncdc.noaa.gov/paleo/paleo.html>. These data constitute high precision tree-ring measurements and annually resolved historical fire event dates.*

**Paleofire Event Chronologies** (listed by recorder species)

Bur oak (*Quercus macrocarpa*)

Loess Hills 1, Missouri River Hills, MO (USLOH001)

Longleaf Pine (*Pinus palustris*)

Brymer Mountain, Talladega National Forest, AL (ALXXXXXX)

Chocolocco Mountain, Talledega National Forest, AL (ALXXXXXX)

Kisatchie Hills, Kisatchie National Forest, LA. (USKIS001)

Post oak (*Quercus stellata*)

Boone Creek Barrens, Ohio River Hills, IN (USBCR001)

Huckleberry Creek Barrens, The Barrens, TN (USHCK003)

Land Between the Lakes, Interior Lowland Plateau, KY (USXXXXXX)

Red Pine (*Pinus resinosa*)

Burnt Mountain, Huron Mountains, MI (USXXXXXX)

Grindel Lake, Northeast Sands, WI (USXXXXXX)

Pine Lake and River, Huron Mountains, MI (USXXXXXX)

Rush Lake, Huron Mountains, MI (USXXXXXX)

Waubee Lake, Northwest Sands, WI (USXXXXXX)

Shortleaf Pine (*Pinus echinata*)

Alley Spring Camp, Ozark Highlands, MO (USALY001)

Big Spring Pines Natural Area, Ozark Highlands, MO (USBPA001)

Chigger Road, Boston Mountains, AR (USCHR002)  
Falling Waters, Richland Creek Wilderness Area, AR (USFLW001)  
Gee Creek, Boston Mountains, AR (USGEE001)  
Gobblers Knob, Boston Mountains, AR (USGOB001)  
Granite Mountain, Lower Buffalo Wilderness Area, AR (USGMT001)  
Granny Gap, Boston Mountains, AR (USGGP001)  
Hatton Ridge, Appalachian Plateau, KY (USHTN001)  
Missouri Ozark Forest Ecosystem Project (MOFEP) Site 5, MO (USMF5001)  
Missouri Ozark Forest Ecosystem Project (MOFEP) Site 6, MO (USMF6001)  
Pine Camp, Interior Lowland Plateau, KY (USXXXXXX)  
White Oak Mountain, Boston Mountains, AR (USWOM001)  
White Oak (*Quercus alba*) Nye Cabin, Mississippi River Hills, IA (USXXXXXX)

### **Tree-Ring Chronologies** (ring-width)

Bur Oak (*Quercus macrocarpa*)  
Brickyard Conservation Area, Loess Hills, MO (MO046)  
Tallgrass Prairie Preserve, KS (KS011)  
White Oak (*Quercus* spp.)  
Nye Homestead (IA034)  
Longleaf pine (*Pinus palustris*)  
Kisatchie Hills, LA (LA002)  
Pinus (*Pinus* spp.)  
Hatton Ridge, KY (KY006)  
Ponderosa Pine (*Pinus ponderosa*)  
Devils Tower National Monument, WY (WY034)  
Post Oak (*Quercus stellata*)  
French Lake, Wichita Mountains, OK (OK032)  
Lazy S-B Ranch, Chataquah Hills, KS (KS012)  
Red Pine (*Pinus resinosa*)  
Mountain Lake, Huron Mountains, MI (MI020)  
Pine Lake and River, Huron Mountains, MI (MI021)  
Rush Lake, Huron Mountains, MI (MI022)  
Burnt Mountain, Huron Mountains, MI (MI018)  
Grindle Lake, WI (WI011)  
Waubee Lake, WI (WI012)  
Shortleaf Pine (*Pinus echinata*)  
Piney Camground, Land Between the Lakes, TN (TN028)  
Missouri Forest Ecosystem Project (MOFEP) Sites (MO045)  
Gee Creek, Boston Mountains, AR (AR074)  
Pine Camp, Land Between the Lakes, TN (TN032)  
Nickel Preserve, OK (OK034)  
Subfossil Oaks (*Q. macrocarpa*, *Q. bicolor*)  
Grand River Basin, MO (MO047)

### **Climate Reconstructions**

Central United States 1000 Year Summer Palmer Hydrologic Drought Index (912 to 2004)