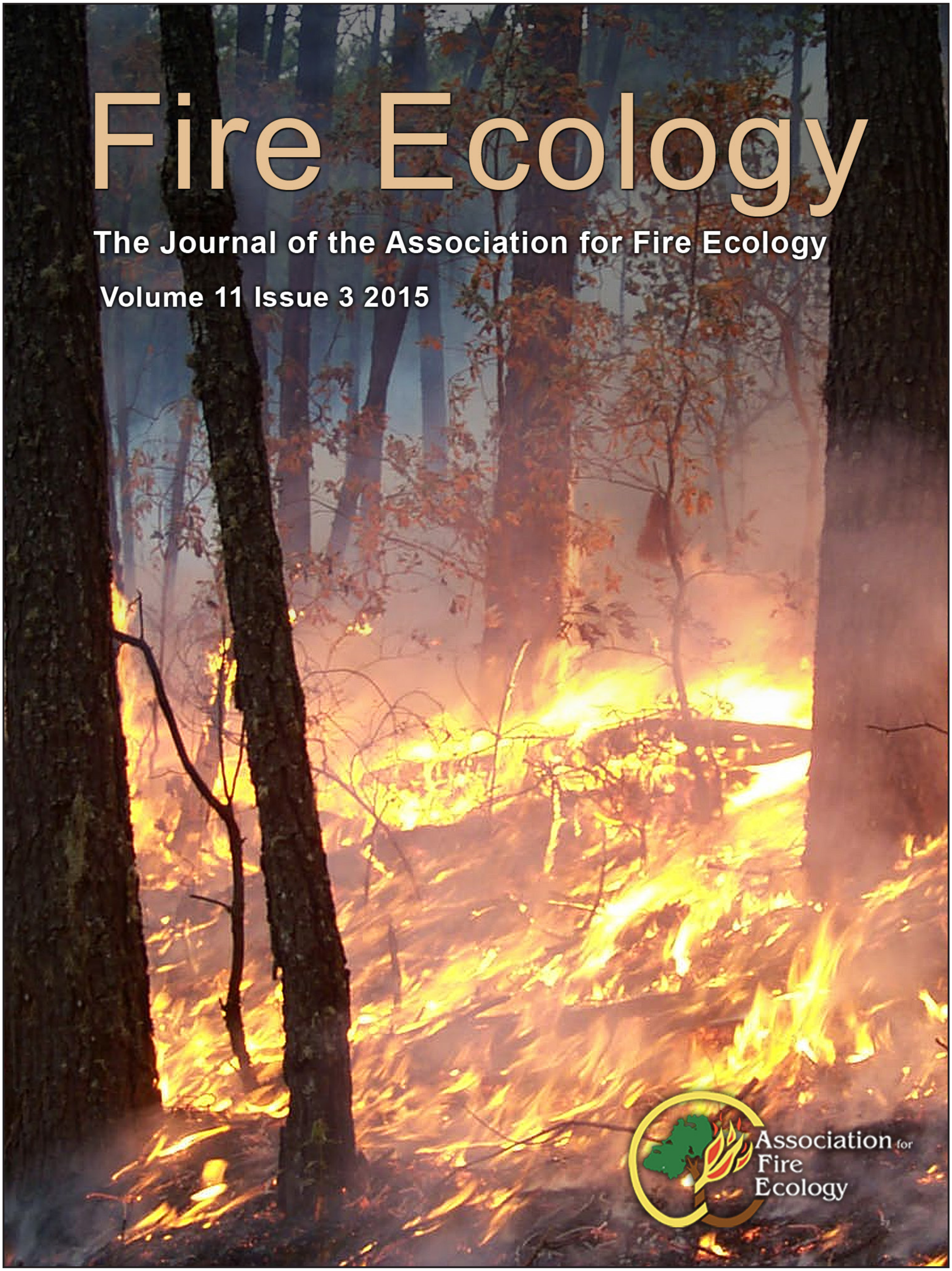

High-severity fire in the Sierra de Manantlan, Mexico.
Photo by ***Salvador García.*** *Fire Ecology* cover designed by ***Brett Cole.***

10-YEAR ANNIVERSARY!
The Best of *Fire Ecology*
2005–2015

The Association for Fire Ecology is celebrating the 10-year anniversary of publication by its journal, *Fire Ecology.* The journal is now indexed by all the major indexing institutions, and is highly ranked among ecology and forestry journals. For this conference, we decided to highlight *Fire Ecology* by publishing abstracts of 13 of its best papers, chosen by me and two Associate Editors of the journal. There is no ranking implied by the order of presentation, as it is chronological, and the choices are rather subjective, as others may feel (as I do!) that their own papers were worthy of inclusion. I hope this will encourage you to browse through our past volumes, which are all available online at fireecologyjournal.org, to read these and other fine papers within our archived history.

James K. Agee, Managing Editor

Fire Ecology 2005, Volume 1, Issue 1, pages 2–19

Fire History in Coast Redwood Stands in the Northeastern Santa Cruz Mountains, California

Scott L. Stephens and ***Danny L. Fry***

Fire regimes in coast redwood forests in the northeastern Santa Cruz Mountains were determined by ring counts from 48 coast redwood stumps, downed logs, and live trees. Degradation of remnant materials from post-harvest fires severely limited available fire scars in this region. The earliest recorded fire was recorded in approximately 1615 and the last fire recorded was in 1884. The Ohlone and early immigrants were probably the primary source of ignitions in this region. For all sites combined, the mean fire return interval (FRI) was 12.0 years; the median FRI was 10 years. There was no significant difference in FRIs between plot aspects but there was a significant difference in MFI between the four sampled sites. The grand mean FRI for single trees (point) was 16.3 years. Past fire scars occurred most frequently in the latewood portion of the annual ring or during the dormant period. It is probable that the number of fires recorded in coast redwood trees is a subset of those fires that burned in adjacent grasslands and oak savannahs. Continued development of old-growth and young-growth coast redwood forests toward prehistoric conditions may be dependent of a fire regime where prescribed burning substitutes for the now-absent aboriginal ignitions.

Fire Ecology 2006,Volume 2, Issue 1, pages 31–52

Modeling Spatial Patterns of Fuels and Fire Behavior in a Longleaf Pine Forest in the Southeastern USA

Diane K. Kennard and ***Kenneth W. Outcalt***

Characterizing spatial patterns of fire behavior is an important and rarely considered means of understanding patterns of vegetation recovery following a fire event. Using geostatistics, we characterized spatial patterns of pre-burn fuel loads, fire temperature and duration during prescribed burns, and post-burn fuel loads in four longleaf pine stands in the southeastern USA. Fire temperatures exhibited moderate to strong spatial dependence over medium spatial scales. Variograms suggest that 61-99% of sample population variance was spatially dependent at scales of 27-157 m. Patterns of pre-burn fuel loads were only moderately related to patterns of mean fire temperature, confirming that fuel loads alone cannot predict fire patchiness. Other fuel parameters and microscale changes in wind and relative humidity likely influenced patterns of fire intensity as well. Strength and scale of fuel load spatial patterns were altered by fire as indicated by pre- and post-burn measurements. Spatial analysis provides a useful way to quantify burn patchiness and can help to identify which patch size may be desirable for different management goals. Studies that examine fire effects need to recognize spatial autocorrelation when characterizing fire behavior and account for this variation at appropriate scales.

Fire Ecology 2006, Volume 2, Issue 2, pages 107–118

Spatial Autocorrelation and Pseudoreplicaton in Fire Ecology

Amanda L. Bataineh, Brian P. Oswald, Mohammad Bataineh, Daniel Unger, I-Kuai Hung, and ***Daniel Scognamillo***

Fire ecologists face many challenges regarding the statistical analyses of their studies. Hurlbert (1984) brought the problem of pseudoreplication to the scientific community's attention in the mid 1980s. Now, there is a new issue in the form of spatial autocorrelation. Spatial autocorrelation, if present, violates the traditional statistical assumption of observational independence. What, if anything, can the fire ecology community do about this new problem? An understanding of spatial autocorrelation, and knowledge of available methods used to reduce the effect of spatial autocorrelation and pseudoreplication will greatly assist fire ecology researchers.

Fire Ecology 2007, Volume 3, Issue 2, pages 68–82

PATTERNS IN LIGHTNING-CAUSED FIRES AT GREAT SMOKY MOUNTAINS NATIONAL PARK

Dana Cohen, Bob Dellinger, Rob Klein, and ***Beth Buchanan***

Fires that burn unimpeded behave differently than suppressed or prescribed (management-ignited) fires. Studying this fire behavior increases our understanding of historic fire regimes. Wildland fire use policy allows for managing lightning-caused fires for resource benefit without suppressing them provided specific pre-defined conditions are met. Great Smoky Mountains National Park has managed ten fires under this policy from 1998 to 2006. Data from these fires and data from park fire reports for suppressed lightning-caused fires since 1940 were examined to illustrate patterns for non-anthropogenic fires. Lightning-caused fires occurred most frequently during the growing season and many persisted through numerous precipitation events. Unsuppressed fires had long durations (up to 38 days) and exhibited a wider range of fire behavior than found by previous studies for lightning-caused fires in the region. These unsuppressed fires exhibited the largest perimeter growth in periodic bursts of higher-intensity behavior; yet smoldered and crept through the majority of the active burning window. The total area burned by the ten fires managed under the wildland fire use policy from 1998 to 2006 (787 ha) has surpassed the aggregate within-park acreage of 122 suppressed lightning-caused fires over the previous 56 years (523 ha).

Fire Ecology 2008, Volume 4, Issue 1, pages 87–100

SEED INVASION FILTERS AND FOREST FIRE SEVERITY

Tom R. Cottrell, Paul F. Hessburg, and ***Jonathan A. Betz***

Forest seed dispersal is altered after fire. Using seed traps, we studied impacts of fire severity on timing of seed dispersal, total seed rain, and seed rain richness in patches of high and low severity fire and unburned Douglas-fir (*Pseudotsuga menziesii*) forests in the Fischer and Tyee fire complexes in the eastern Washington Cascades. Unburned plots had the lowest average seed production. The high severity fire patches in the Fischer Fire Complex had a higher total seed production than low severity fire patches of the same complex. At the Tyee Fire Complex, the total seed production for each of the two fire severities was similar, but the period of maximum seed dispersal was later for high severity than low severity fire. Seed rain at the Fischer Fire patches (sampled one year after the fire) was predominantly composed of annual species, while that of the Tyee Fire patches (sampled nine years after fire) was predominantly perennial species. Seed rain richness was greater in Tyee high severity patches than paired low severity fire patches. In these paired Tyee patches the average number of new seed species (species not found in the extant plot vegetation) was greater for high severity than low severity fire. Our results suggest that high severity fire plots are more porous to seed rain than low severity plots. Intact forest canopies may filter seed rain and reduce seed influx, while high severity fires are more open to invasion by seed dispersal.

Fire Ecology 2008,Volume 4, Issue 2, pages 46–62

WINTERING GRASSLAND BIRD HABITAT SELECTION FOLLOWING SUMMER PRESCRIBED FIRE IN A TEXAS GULF COAST TALLGRASS PRAIRIE

Damion E. Marx, Sallie J. Hejl, and ***Garth Herring***

We examined changes in winter habitat use by four grassland passerine birds in response to summer prescribed burning within a Texas gulf coast tallgrass prairie during 2001 and 2002. We used a traditional Before-After/Control-Impact (BACI) design consisting of one treatment plot (burned during summer 2001) and one control plot (no burning during the study period, but burned in previous years) at two study areas. Examination of use versus availability suggested that savannah sparrows (*Passerculus sandwichensis*) preferred recently burned patches. In contrast, sedge wrens (*Cistothorus platensis*) and Le Conte's sparrows (*Ammodramus leconteii*) avoided recently burned patches and preferred later successional stages. Our results suggest that grassland birds partitioned the prairie mosaic along a gradient of successional ecotypes, and that post-fire succession is an important ecological process influencing wildlife habitat use. Our results also highlighted the potential to sustain grassland bird habitats by managing Texas gulf coast tallgrass prairie with 3 yr to 4 yr rotational summer burns, similar to the historic fire return interval for this habitat type. We suggest that reinstating fire on its natural return interval will produce coarse-grained (e.g., 100 ha to 300 ha) habitat mosaics within the landscape and will sustain winter habitat diversity required for the guild of wintering grassland birds.

Fire Ecology 2009, Volume 5, Issue 1, pages 67–78

Predicted Fire Behavior and Societal Benefits in Three Eastern Sierra Nevada Vegetation Types

Christopher A. Dicus, Kenneth Delfino, and ***David R. Weise***

We investigated potential fire behavior and various societal benefits (air pollution removal, carbon sequestration, and carbon storage) provided by woodlands of pinyon pine (*Pinus monophylla*) and juniper (*Juniperus californica*), shrublands of Great Basin sagebrush (*Artemisia tridentata*) and *rabbitbrush* (*Ericameria nauseos*a), and recently burned annual grasslands near a wildland-urban interface (WUI) community in the high desert of the eastern Sierra Nevada Mountains. Fire behavior simulations showed that shrublands had the greatest flame lengths under low wind conditions, and that pinyon-juniper woodlands had the greatest flame lengths when winds exceeded 25 km hr^{-1} and fire transitioned to the crowns. Air pollution removal capacity (PM_{10}, O_3, NO_2, etc.) was significantly greater in pinyon-juniper stands, followed by shrublands and grasslands. Carbon storage (trees and burned tree snags only) did not significantly differ between pinyon-juniper and burned stands (~14 000 kg ha^{-1}), but will change as burned snags decompose. Annual C sequestration rates in pinyon-juniper stands averaged 630 kg ha^{-1} yr^{-1}. A landscape-level assessment showed that total compliance with residential defensible space regulations would result in minimal impact to air pollution removal capacity and carbon sequestration due to a currently low population density. Our methodology provides a practical mechanism to assess how potential management options might simultaneously impact both fire behavior and various environmental services provided by WUI vegetation.

Fire Ecology 2010, Volume 6, Issue 1, pages 80–94

A Way Forward for Fire-Caused Tree Mortality Prediction: Modeling a Physiological Consequence of Fire

Kathleen Kavanagh, Matthew B. Dickinson, and ***Anthony S. Bova***

Current operational methods for predicting tree mortality from fire injury are regression-based models that only indirectly consider underlying causes and, thus, have limited generality. A better understanding of the physiological consequences of tree heating and injury are needed to develop biophysical process models that can make predictions under changing or novel conditions. As an illustration of the benefits that may arise from including physiological processes in models of fire-caused tree mortality, we develop a testable, biophysical hypothesis for explaining pervasive patterns in conifer injury and functional impairment in response to fires. We use a plume model to estimate vapor pressure deficits (D) in tree canopies during surface fires and show that D are sufficiently high to cause embolism in canopy branches. The potential implications of plume conditions and tree response are discussed.

Fire Ecology 2011,Volume 7, Issue 1, pages 57–73

Personal Perspectives on Commercial Versus Communal African Fire Paradigms when Using Fire to Manage Rangelands for Domestic Livestock and Wildlife in Southern and East African Ecosystems

Winston S.W. Trollope

Africa is often referred to as the Fire Continent, and fire is recognised as a natural factor of the environment due to the prevalence of lightning storms and an ideal fire climate in the less arid regions with seasonal drought. On a global scale, the most extensive areas of tropical savanna, characterized by a grassy under stories that become extremely flammable during the dry season, occur in Africa. The use of fire in Africa to manage vegetation for domestic livestock and indigenous wildlife is widely recognized by both commercial and communal land users. Research on the effects of fire has been conducted throughout the grassland and savanna areas since the early twentieth century, resulting in the development of effective and practical guidelines for prescribed burning for domestic livestock and wildlife management systems. Generally, the reasons for prescribed burning in Africa are similar for both commercial and communal land users, namely, to remove moribund and or unacceptable plant material and to control the encroachment of undesirable plants negatively affecting domestic livestock and wildlife. In addition, commercial operators use fire to manage wildlife conservation areas. Prescribed burning to control ticks is also widely used in communal communities but is generally not recognised in commercial livestock enterprises. However, research has shown that tick populations can be reduced using fire to alter the micro-habitat for these organisms. Until recently, commercial and communal land users held differing views on the appropriate season for prescribed burning, with the former igniting fires shortly after the first spring rains and the latter burning throughout the dry winter period. Subsequent research has shown that both seasons of burn have similar

effects; the key requirement being that the grass sward is dormant at the time of burning to minimise the negative effects on the vegetation. A valuable tentative comparison has been made between fire management practices applied by commercial land users and communal land users, and provides an exciting opportunity for further and essential research to be conducted to gain greater insight into how communal African communities use fire. Based on extensive experience, my aim is to provide a personal perspective on the use of fire by commercial and communal land users for managing rangelands in southern and east African regions of the continent.

Fire Ecology 2012, Volume 8, Issue 3, pages 41–57

Trends in Wildfire Severity: 1984 to 2010 in the Sierra Nevada, Modoc Plateau, and Southern Cascades, California, USA

Jay D. Miller and ***Hugh Safford***

Data from recent assessments indicate that the annual area of wildfires burning at high severity (where most trees are killed) has increased since 1984 across much of the southwestern United States. Increasing areas of high-severity fire can occur when greater area is burned at constant proportion of high-severity fire, or when the proportion of high-severity fire within fire perimeters increases, or some combination of both. For the Sierra Nevada Forest Plan Amendment (SNFPA) area, which includes forestlands in eastern California and western Nevada, Miller *et al.* (2009*a*) concluded that the proportion of area burning at high severity in mixed-conifer forests had risen over the 1984 to 2004 period. However, no statistical assessment was made of the temporal trend in high-severity fire area because the analyzed dataset was incomplete in the early years of the study period. In this update, we use satellite-derived estimates of fire severity from the three most widely distributed SNFPA forest types to examine the trend in percent high severity and high-severity fire area for all wildfires ≥80 ha that occurred during the 1984 to 2010 period. Time-series regression modeling indicates that the percentage of total high severity per year for a combination of yellow pine (ponderosa pine [*Pinus ponderosa* Lawson & C. Lawson] or Jeffrey pine [*P. jeffreyi* Balf.]) and mixed-conifer forests increased significantly over the 27-year period. The annual area of high-severity fire also increased significantly in yellow pine-mixed-conifer forests. The percentage of high severity in fires ≥400 ha burning in yellow pine-mixed-conifer forests was significantly higher than in fires <400 ha. Additionally, the number of fires ≥400 ha significantly increased over the 1950 to 2010 period. There were no significant trends in red fir (*Abies magnifica* A. Murray bis) forests. These results confirm and expand our earlier published results for a shorter 21-year period.

Fire Ecology 2014, Volume 10, Issue 1, pages 56–83

Intercomparison of Fire Size, Fuel Loading, Fuel Consumption, and Smoke Emissions Estimates on the 2006 Tripod Fire, Washington, USA

Stacy A. Drury, Narasimhan (Sim) Larkin, Tara T. Strand, ShihMing Huang, Scott J. Strenfel, Theresa E. O'Brien, and ***Sean M. Raffuse***

Land managers rely on prescribed burning and naturally ignited wildfires for ecosystem management, and must balance trade-offs of air quality, carbon storage, and ecosystem health. A current challenge for land managers when using fire for ecosystem management is managing smoke production. Smoke emissions are a potential human health hazard due to the production of fine particulate matter ($PM_{2.5}$), carbon monoxide (CO), and ozone (O_3) precursors. In addition, smoke emissions can impact transportation safety and contribute to regional haze issues. Quantifying wildland fire emissions is a critical step for evaluating the impact of smoke on human health and welfare, and is also required for air quality modeling efforts and greenhouse gas reporting. Smoke emissions modeling is a complex process that requires the combination of multiple sources of data, the application of scientific knowledge from divergent scientific disciplines, and the linking of various scientific models in a logical, progressive sequence. Typically, estimates of fire size, available fuel loading (biomass available to burn), and fuel consumption (biomass consumed) are needed to calculate the quantities of pollutants produced by a fire. Here we examine the 2006 Tripod Fire Complex as a case study for comparing alternative data sets and combinations of scientific models available for calculating fire emissions. Specifically, we use five fire size information sources, seven fuel loading maps, and two consumption models (Consume 4.0 and FOFEM 5.7) that also include sets of emissions factors. We find that the choice of fuel loading is the most critical step in the modeling pathway, with different fuel loading maps varying by 108 %, while fire size and fuel consumption show smaller variations (36 % and 23 %, respectively). Moreover, we find that modeled fuel loading maps likely underestimate the amount of fuel burned during wildfires as field assessments of total woody fuel loading were consistently higher than modeled fuel loadings in all cases. The $PM_{2.5}$ emissions estimates from Consume and FOFEM vary by 37 %. In addition, comparisons with available observational data demonstrate the value of using local data sets where possible.

Fire Ecology 2014,Volume 10, Issue 2, pages 64–75

Modeling Climate-Fire Connections within the Great Basin and Upper Colorado River Basin, Western United States

James D. Arnold, Simon C. Brewer, and ***Philip E. Dennison***

The specific temporal patterns of antecedent conditions associated with fire occurrence in the Great Basin and Upper Colorado River Basin are poorly understood. Using 25 years of combined fire and climate data, we identified unique antecedent patterns of climate conditions prior to fires in the Great Basin and Upper Colorado River Basin. Five distinct antecedent patterns of climate related to fire were found within the region; with these antecedent patterns we were able to construct models of fire danger. The occurrence of these antecedent patterns varies both spatially and temporally, and appears to be driven by drought severity. We used a Maximum Entropy approach to model the spatial extent and strength of these fire-climate patterns, and the associated fire danger. This approach provides land managers with a practical way to assess fire danger at a relatively fine spatial scale and also gives researchers a tool for assessing future fire danger.

Fire Ecology 2015, Volume 11, Issue 1, pages 10–31

Ecological Implications of Fine-Scale Fire Patchiness and Severity in Tropical Savannas of Northern Australia

Sofia L.J. Oliveira, Manuel L. Campagnolo, Owen F. Price, Andrew C. Edwards, Jeremy Russell-Smith, and ***José M.C. Pereira***

Understanding fine-scale fire patchiness has significant implications for ecological processes and biodiversity conservation. It can affect local extinction of and recolonisation by relatively immobile fauna and poorly seed-dispersed flora in fire-affected areas. This study assesses fine-scale fire patchiness and severity, and associated implications for biodiversity, in north Australian tropical savanna systems. We used line transects to sample burning patterns of ground layer vegetation in different seasons and vegetation structure types, within the perimeter of 35 fires that occurred between 2009 and 2011. We evaluated two main fire characteristics: patchiness (patch density and mean patch length) and severity (inferred from char and scorch heights, and char and ash proportions). The mean burned area of ground vegetation was 83 % in the early dry season (EDS: May to July) and 93 % in the late dry season (LDS: August to November). LDS fires were less patchy (smaller and fewer unburned patches), and had higher fire severity (higher mean char and scorch heights, and twice the proportion of ash) than EDS fires. Fire patchiness varied among vegetation types, declining under more open canopy structure. The relationship between burned area and fire severity depended on season, being strongly correlated in the EDS and uncorrelated in the LDS. Simulations performed to understand the implications of patchiness on the population dynamics of fire-interval sensitive plant species showed that small amounts of patchiness substantially enhance survival. Our results indicate that the ecological impacts of high frequency fires on fire-sensitive regional biodiversity elements are likely to be lower than has been predicted from remotely sensed studies that are based on assumptions of homogeneous burning.

The editors of *Fire Ecology* encourage you to submit an article for publication. Articles include our forum section (management and policy opinions), original research articles, reviews (critical syntheses of ecological issues), and book reviews. We have a fairly rapid turnaround time between original submission and publication. The journal has over 30 associate editors representing scientists on five continents. Issues are published three times per year: April, August, and December. Beginning in 2005 with Issue No. 1, we are now completing our eleventh year, and have published scientific papers of over 520 authors.

Fire Ecology is now indexed by all of the leading indexing institutions: Thomson Reuters ISI Web of Science, AGRICOLA, Biosis Reviews, Current Contents, Google Scholar, Scopus, and the Science Citation Index. These indicate that *Fire Ecology* has joined the ranks of the most prestigious international journals, and will be the journal of choice for significant research in fire ecology. Our long-term goal is to have the highest journal impact factor among journals publishing fire ecology research.