

**Stacy Allen Drury**

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**Experience:**

**May 2016 – Present. Research Ecologist. Fire and Fuels Program. USDA Forest Service Pacific Southwest Research Station, Davis CA 95618.** Research Interests, Projects, Duties and Accomplishments:

Research interest. **Restoring natural role of wildland fire to fire adapted landscapes.** Many fire adapted ecosystems in California are overstocked. Due to multiple decades of successfully reducing the amount of landscape burned by wildfires these dense forests are characterized by high levels of standing biomass and dead and downed fuels. Fire needs to be introduced into these ecosystems under conditions where potential hazards can be reduced and potential resource and ecosystem benefits can be achieved. I am currently investigating when, where, and under what conditions unplanned ignitions can be managed to meet resource management goals. Expected outcome is a long term research program with multiple publications, presentations, and other forms of tech transfer.

Research interest. **Fire management in response to insect caused tree mortality.** California is experiencing an insect caused tree mortality epidemic. With over 100 million insect killed trees standing in southern and central California, and more mortality expected as trees in California continue to be stressed by drought, federal, state, and local land managers are going to need to understand and decide on the best strategies for managing landscapes characterized by large quantities of dead standing trees. I envision that understanding fire behavior and fire effects in bug-killed stands will be a major focus of my research over the next five to ten years. Expected outcome is a long term research program with multiple publications, presentations, and other forms of tech transfer.

Research interest. **Fire Behavior and Fire Effects Modeling.** I am interested in all forms of research on evaluating the use and reliability of fire behavior and fire effects modeling. I am currently evaluating how managers may use the next generation of physics based fire behavior and the coupled atmospheric fire behavior models. I expect this will be a

long term research area and expect to produce multiple publications, presentations, and guidelines on the use of fire behavior and fire effects for land management.

- Current project. **Longevity and efficacy of mastication treatments in Northern California.** Collaborator on JFSP funded project. In process of creating a photoseries documenting potential changes in fire behavior due to mastication. Photoseries will be published as a General Technical Report.
- Current project. **Duration and cost effectiveness of fuel treatments in the Alaska Boreal Region.** Co-Principal Investigator on JFSP funded process. Multi-disciplinary project to study the effectiveness of fuels reduction treatment strategies overtime in Alaska. Dr Drury is leading the fire behavior modeling mitigation aspect of the project. Expected outcomes are a series of peer reviewed publications.
- Current project. **Evaluating fuel consumption on spring verses fall prescribed burns.** Principle Investigator. Project looks to identify seasonal differences in fuel consumption. Study results will be used to evaluate efficacy of the FOFEM and Consume fire effects modeling systems. Expected outcome is a peer reviewed journal article.

**April 2009 – April 2016. Senior Fire Ecologist. Fire and Fuels Science Group. Sonoma Technology, Inc. Petaluma CA 94954.** Projects, Duties and Accomplishments:

- **Marin County Wildfire Protection Plan.** Task lead on fuel modeling and risk assessment. Lead team of fire ecologists and GIS specialists to produce new fire behavior fuel models and conduct an objective, quantitative risk assessment for prioritizing fuels treatment locations. CWPP was produced and accepted by FireSafe Marin and their stakeholders. The CWPP is available here <http://www.readysetgomarin.org/cwpp>
- **Nevada Lake Tahoe Basin Fuel Modeling project.** Principle Investigator. Led diverse team of GIS specialists and fire ecologists to create new fuel model for fire behavior modeling and fuel treatment scenario testing based on field plot sampling and lidar based canopy fuels information. Final report produced for North Lake Tahoe Fire Department. On file at Sonoma Technology Inc., Petaluma CA and available upon request.
- **Review of the National Ambient Air Quality Standards (NAQFS).** Principle Investigator. Reviewed biological integrity and state of the vegetation science informing EPA's suggestions for setting ozone standards. Co-author on final report submitted to the Electrical Power Research Institute (EPRI). On file at Sonoma Technology Inc., Petaluma CA and available upon request.
- **Automated Fuels Treatment Effectiveness Evaluation using Remote Sensing (AFTEERS).** Principle Investigator. NASA Funded Project. Principle Investigator and project manager for NASA project to use NASA remote

sensing products for assessing fuels treatment effectiveness. Led diverse team of physical scientists, remote sensing specialists and fire behavior modelers to investigate how NASA remote sensing products such as MTBS (Landsat) and MODIS could be integrated into rapid assessments of fuels treatment effectiveness. Worked with Fuels Treatment Effectiveness Monitoring (FTEM) team to incorporate FTEM and AFTEERS based GIS and Remote Sensing products into IFTDSS (See IFTDSS discussion below). Final Report submitted and accepted by NASA and available upon request.

- **Realtime Fire Weather Accuracy Assessment.** CO-Principle Investigator. JFSP funded project. Led diverse team of meteorologists, climate modelers, and database engineers to build the fire weather assessment system. Responsible for building data base, developing data acquisition system for compiling meteorological data observations (RAWS and ASOS) and modeled meteorological data (NDFD, GFS, NAM, WRF). Responsible for producing an online system that compiles and displays the modeled meteorological forecasts and compares them with observed data at RAWS and ASOS station locations. Responsible for developing an ignition potential grid that incorporates moisture, fuels, and lightning ignition potential. Responsible for developing an online map display system to dynamically display ignition potential maps, fuel moisture maps, and fuel moisture maps. Final report submitted and accepted by the Joint Fire Science Project. On file at Sonoma Technology Inc. and available upon request.
- **Interagency Fuels Treatment Decision Support System (IFT-DSS).** Senior Fire Science Advisor.
  - Task leader for developing and refining fuels treatment work flow scenarios. Prepared report describing the fuels treatment workflow scenarios and the functionality of the IFT-DSS proof of concept.
  - Task leader for outreach to user community. Set up user advisory groups. Solicited feedback from target user community to determine needs and evaluate progress of IFTDSS project at multiple stages. Conducted face-to-face interviews with fire management planners. Compiled interview notes into briefing reports and internal documents.
  - Task leader for science development. Designed workflows for assessing fire behavior potentials, hazard analysis and risk analysis. Assessed fire behavior, fire effects, and fire growth models. Designed interactions among highly variable models. Conducted multiple webinars and face to face instructional workshops.
  - Task leader for nationwide series of workshops and webinars to evaluate IFTDSS. Collaborated with Carnegie Mellon's Software Engineering Institute (SEI) and the Interagency Wildland Fire Research, Development, and Applications Group to set up regionally based in person workshops for evaluating the utility of IFTDSS as a fire management system.

-Assisted on numerous final reports to USDA Forest Service Fire and Aviation Management, Joint Fire Science Program, and the Interagency Wildland Fire Research, Development, and Applications Group.

-First author on paper describing IFTDSS published in the *Journal for Fire Ecology*.

- **Megafire Prediction Project.** Task manager for Megafire literature review. Lead author on report to USDA AirFire team and University of Idaho. Contributing author on Final Report submitted and accepted by Joint Fire Science Program.
- **Smoke Emissions Modeling Intercomparison Project (SEMIP).** Task Manager for fire size analysis, fuel consumption and emissions modeling, GIS specialist.
  - Task leader for developing model intercomparisons for the Tripod Fire Complex (2006) and the Georgia Bay Complex (Bugaboo Fire:2007). Compared Smoke Modeling Variables using a range of fire effects models and fuel loading maps at each modeling step from Fire Size through Fuel Loading and Fuel Consumption to Smoke Emissions. First author on paper discussing model intercomparisons on the 2006 Tripod Fire Complex published in the *Journal for Fire Ecology*.
- **BlueSky Framework.** NASA funded project. Performed quality assurance and model intercomparison tests to insure that the models in the BlueSky Framework in 2009 (Consume, FOFEM, FEPS, EPM) were compatible with the parent desktop versions.
  - Task leader for evaluating live fuel moisture inputs into BlueSky framework. Conducted literature search on the influence of live fuel moisture on fuel consumption. Evaluated and developed plan to incorporate live fuel moisture into BlueSky Framework. Report submitted to the USDA AirFire Team and to the NASA Disturbances Program. On file at Sonoma Technology Inc., Petaluma CA and available upon request.

**February 2007 – August 2015. Geography and Biology Instructor for the consortium of Colorado Community Colleges Online.** Accomplishments and duties:

- **Online instructor for the following courses:**
  - BIO105 Science of Biology w/Lab
  - BIO111 General College Biology I w/Lab
  - ENV101 Introduction to Environmental Science w/Lab
  - GEO15 World Regional Geography
- Assisted in the development of online lectures, lesson plans, and grading rubrics for each of these courses.

**May 2007- April 2009. GS-12 Ecologist (0408). Fire, Fuels, and Smoke Science Program Missoula Fire Lab, Rocky Mountain Research Station, USDA Forest Service, Missoula, MT 59808.** Fire Ecologist and GIS Specialist. Projects, Duties and

Accomplishments:

- TREELIST. Development and evaluation of a spatially consistent tree list for the United States. LANDFIRE database plots were used to construct a tree-list map and associated lookup table for use as a data substitute for forest structure data. Published General Technical Report describing the treelist
- FIREHARM. Created input land cover grids using ArcGIS for the Ecosystem Management Decision Support system. LANDFIRE data grids were used as input to the fire research model FIREHARM to create spatial coverages of predicted fire effects and predicted fire behavior. These land cover grids are then input into the EMDS logic model to produce a spatially explicit decision support matrix for making land management decisions.
- Evaluation of FIREHARM fire effects and fire behavior predictions. Used FIREMON (Fire effects monitoring and inventory protocols) protocols to field sample fire effects from 2007 wildfires. Fire effects data was then used to evaluate the efficacy of the FIREHARM predictions for each wildfire. Coauthor of paper describing FIREHARM in press for the Journal *Ecological Modeling*.
- FLEAT (Fire and Landscape Ecology Assessment Tool). Collected field data on fire effects and vegetation responses to wildfire within a range of historic burn perimeters to evaluate the FLEAT model. FLEAT models the effects of wildfire on successional pathways with the objective of determining if a burning wildfire is moving the current landscape towards or away from the historic range of variability on the same landscape.
- Participated in discussions on possible scenarios for developing a nationwide worst case fire severity map. CO-PI on a successful Joint Fire Science Program proposal to produce a series of potential fire severity models and digital maps for use by fire planners.

**Aug 1999- May 2006: Teaching Assistant: Department of Geography. University of Colorado, Boulder, CO. 80309.** Accomplishments and Duties:

- **Taught the labs for the following courses:**
  - Environmental Systems I: Climate and Vegetation
  - Environmental Systems II: Landscapes and Water
  - World Regional Geography
  - Environment and Culture
- Developed lectures, lesson plans, grading rubrics for each of these lab classes
- Occasional guest lecture for lecture section of each course.
- Served as liaison between course instructor and students.
- Rewrote and upgraded sections of each lab course as appropriate.
- Led and supervised field laboratories

**Jan 2002-May 2004: Graduate Part-time Teaching Instructor: University of Colorado Boulder, Boulder, CO. 80309** Duties and Accomplishments:

- **Lecturer for the following courses:**
  - Conservation Thought: 3422: Spring 2004
  - Environmental Systems I: Climate and Vegetation: Summer 2003; Fall 2003; Summer 2004
  - Environmental Systems II: 1010: Landscapes and Water: Spring 2002; Summer 2004
- Developed lectures, lesson plans, grading rubrics for each of these courses.
- Supervised from one to three grad students (teaching assistants)
- Coordinated and supervised field trips for lectures and labs

**June 2002- Mar 2003: Visiting Researcher: Instituto de Silvicultura e Industria de la Madera (ISIMA), Universidad Juarez del Estado de Durango (UJED), Durango, DGO, Mexico.** Duties and Accomplishments:

- Assessed historical fire regimes and post-disturbance regeneration patterns in Mexican pine-oak forests. First author on peer reviewed journal article published in the journal *Plant Ecology*.
- Determined relationships between forest communities and disturbance regimes.
- Provided advice to land managers regarding role of fire in relation to forest regeneration and forest health.

**May 1998- May 2000: GS-9 Forester (0460): Yukon Flats National Wildlife Refuge, US Fish and Wildlife Service Fairbanks, AL 99701.** Projects, Duties, and Accomplishments.

- Used standard dendrochronological techniques to assess fire history, fire occurrence, fire behavior, fire severity, and fire effects on the Yukon Flats Wildlife Refuge, interior Alaska.
- Provided technical advice to Yukon Flats Wildlife Refuge manager on management issues concerning fire ecology such as when and where to let wildfires burn.
- Primary author on a fire history manuscript for the Yukon Flats Wildlife Refuge published in the journal *Forest Ecology and Management*.
- Participated in the founding of the Interagency Fire Effects Task Group in Fairbanks Alaska
- Assisted in developing photo point monitoring protocols for monitoring long term fire effects on Alaska Wildfires.

**Sept 1994- May 1998: GS-9 Forester (0460): Fire and Environmental Research Applications, Pacific Northwest Research Station, USDA Forest Service, Seattle, WA 98103.** Projects, Duties, and Accomplishments:

- Developed a study to assess the smoldering combustion potentials of large woody logs on prescribed fires in western coniferous forests. Sampled fuel moisture and smoldering consumption on large logs. An unpublished report is on file in the PNW Research Station Seattle. Available upon request.
- Contributed to the development of the large woody log consumption algorithms in the fuel consumption program CONSUME
- Supervised field crews in the establishment of field plots for fuel consumption studies on prescribed burns in Alaska, Washington, Oregon, and Arizona. Supervised the pre and post-burn data collection activities, analyzed the data, and prepared unpublished reports for land management cooperators on these studies.
- Assisted in the conduction of prescribed burn operations in the above mentioned study areas
- Supervised field crews in the establishment of photo series studies in Alaska, Oregon, Ohio, North Carolina, and Kentucky.
- Assisted in developing the publication format for the PNW Stereo photo series.
- Assisted in field data collection for a regional fire history and forest structure study in the xeric pine-oak ecosystem in Mexico's Sierra Madre Occidental.
- Trained hot shot crews to use Brown line intercept transects to measure pre and post treatment woody fuel quantities in the Blue Mountains of eastern Oregon.
- Assisted in the design and implementation of a biomass assessment and burning potential study of logged and unlogged tropical forest lands in the Brazilian state of Para.
- Served a six month detail with the Alaska Fire Service in Fairbanks Alaska.  
Projects, Duties and Accomplishments included:
  - Designed and coordinated an interagency duff moisture sampling study.
  - Trained National Park Service, US Fish and Wildlife Service Bureau of Land Management, and Alaska Fire Service personnel in sampling strategies to assess duff fuel moisture.
  - Primary author of an unpublished report on duff fuel moisture sampling.
  - Assessed fire behavior, fuel consumption, and pre-burn fuel moisture relations on two wildfires in black spruce forests in interior Alaska.
  - Author of two unpublished reports for land managers on fuel consumption and the efficacy of fire behavior models on these wildfires.
  - Trained Alaska Fire Service personal to use standard fuel consumption methods for assessing fuel consumption on prescribed fires.

**Sept 1992- Sept 1994: Forest Ecology Technician: Wayne National Forest Ecological Classification. Wright State University, Dayton OH and The Ohio State University, Columbus OH. Projects, Duties and Accomplishments.**

- Devised and implemented methodologies for measuring and inventorying the forest vegetation of SE Ohio and implemented these methodologies.
- Collected and analyzed data to investigate the abiotic and biotic factors affecting forest dynamics and composition.

- Identified the effects of disturbances in SE Ohio forests due to changes in land use, farm abandonment, and changing fire regimes.

**Sept 1992- Sept 1994: Teaching Assistant: Wright State University, Dayton, OH 45435**

- **Taught the labs for the following courses:**
  - Ecology
  - Ecology and Evolution
  - Plant Biology and Systematics
- Developed lectures, lesson plans, grading rubrics for each of these lab classes
- Served as liaison between course instructor and students.
- Rewrote and upgraded sections of each lab course as appropriate.
- Led and supervised field laboratories

**Jan 1992 to Sept 1992: GS-5 Physical Science Technician: Fire and Environmental Research Applications, Pacific Northwest Research Station, USDA Forest Service, Seattle, WA 98103** Duties and Responsibilities:

- Forestry technician for a fuels inventory crew (75% of duties).
  - Collected pre and post-prescribed burn information on fuel loadings and fuel consumption.
  - Assisted in conducting prescribed burn operations in clear cut units and natural fuels areas.
  - Performed data entry and lab determinations of fuel moisture
- Physical Science technician (25% of duties).
  - Monitored air sampling equipment worn by firefighters to determine levels of smoke exposure on prescribed burns and natural fires.

**Education:** PhD. Biogeography, University of Colorado Boulder 2006

M.S. Biological Sciences, Wright State University 1996

B.S. Terrestrial Ecology, Western Washington University 1991

**PhD Dissertation:** The Effects of Climate and Disturbance on Madrean Pine-Oak Forests in Mexico's Sierra Madre Occidental.

**Accomplishments:** Developed a scientific based study plan, obtained funding to conduct the study, conducted the field and lab work, analyzed and published the results of a study that used standard dendrochronological techniques to describe the relationships between fire occurrence, climate, and changes in land use practices in xeric forests in North-Central Mexico. In addition I clarified the relationship between fire occurrence, fire severity, climate and successful conifer seedling establishment within these forests. **Baseline conclusions:** Significantly more fires with shorter fire return intervals occurred within the study area prior to 1950 than after 1950. Widespread fire years occurred during dry years that lagged wet years – widespread fire years lagged the negative El Niño phase of the of the southern oscillation for one year – but were not synchronized by the positive La Niña phase. Successful conifer regeneration occurred during multi-annual periods



of above average precipitation that followed severe fires.

**Masters Thesis:** Forest vegetation change in the forests of southeast Ohio: Are maples replacing oaks?

**Accomplishments:** Developed a scientific based study plan, conducted the field and lab work, analyzed and published the results of a study that used space-for-time substitution sampling strategies to identify successional trends. **Baseline conclusions:** Oak seedlings were not surviving to reach the canopy in forests with oak dominated canopies in South-East Ohio. Maples dominated the sub-canopies of all study sites and were likely to become the canopy dominants if current conditions persist. Older forests did not serve as accurate models for predicting the composition and structure of younger forests.

### **Military Service:**

Active duty: March 24 1976 to August 21 1980. United States Air Force. Aircraft Maintenance Technician 43151C. Active duty: March 24 1976 to August 21 1980. Honorably Discharged.

### **Related Skills, Honors, Service:**

- 2016 Paper titled “Intercomparison of Fire Size, Fuel Loading, Fuel Consumption, and Smoke Emissions Estimates on the 2006 Tripod Fire, Washington, USA” selected as one of the top papers published in the journal *Fire Ecology* 10(1).
- 2004: University of Colorado Geography Department Annual Award For Excellence in Teaching
- 2004: Graduate Representative, University of Colorado Internal Review Committee for the Department of Geology
- 2001-2002: Graduate Representative, Department of Geography, University of Colorado
- Proficient with ArcGIS, WordPerfect, Excel, Word, Quattro Pro, SAS statistical computer software, the dendrochronological software programs FHX2 and COFECHA and the fire effects and fire behavior programs FOFEM, Consume, BEHAVE and FARSITE.
- 1994 Wright State University Biology Graduate Student of the Year
- Fluent in Spanish

### **Grants Received:**

**2016:** \$150,000. Principle investigator. Improving Spatial Resolution of Wildland Fire Location and Fuel Biomass Data Inputs to NOAA’s NAQFC. Grant from the National Oceanic and Atmospheric Administration (NOAA).

**2015:** \$90,000. Science lead. Marin County Wildfire Protection Plan Grant from FireSafe Marin.

**2014:** \$46,000. Principal investigator for Nevada Lake Tahoe Fuel model mapping project to support Nevada Basin CWPPs. Grant from North Lake Tahoe Fire Department, Incline Village, Nevada.

- 2014:** \$40,000. Principle investigator. NASA closeout award for AFTEERS project.
- 2009-2014.** ~6 million. Science lead on grants and add on contracts from the JFSP and the DOI Interagency Fuels Treatment Decision Support System (IFTDSS).
- 2012:** \$169,00. Principle Investigator. AFTEERS: Automated Fuels Treatment Effectiveness Evaluation Using Remote Sensing Information NASA Roses Wildfire Award.
- 2010:** \$486,186. Co-Principal Investigator. Forecasting Integrated Lightning and Fuels Ignition Potentials in a System with Realtime Analysis of Fire Weather Prediction Accuracy. Joint Fire Science Program Award.
- 2009:** \$555,020. Co-Principle Investigator. A Fire Severity Mapping System (FSMS) for realtime fire management applications and long term planning. Joint Fire Science Program Award.
- 2002:** \$10,000 USD, National Science Foundation, Doctoral Dissertation Research Improvement Award. Fire History and Stand Dynamics in Mexico's Sierra Madre Occidental.
- 2001:** \$1,000 USD, Beverly Sears Small Grant, University of Colorado. Graduate student dissertation award.

### **Publications:**

- Drury, S.A. and J. Herynk. 2011. A spatially explicit tree-list for the United States. General Technical Report RMRS-GTR-254. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 26 p.
- Keane, R.E., Drury, S.A., Karau, E.A., Hessburg, P.F. and K.M. Reynolds. 2010. A method for mapping fire hazard and risk across multiple scales and its application in fire management. *Ecological Modeling*.
- Drury, S.A. and P.G. Grissom. 2008. Fire history and management implications in the Yukon Flats National Wildlife Refuge, interior Alaska. *Forest Ecology and Management*. 256: 304-312
- Drury, S. A and T.T. Veblen. 2008. Spatial and temporal variability in fire occurrence within the Las Bayas Forestry Reserve, Durango, Mexico. *Plant Ecology*. 197:299-316.
- Drury, S.A. and J.R. Runkle. 2006. Forest vegetation change in southeast Ohio: Do older forests serve as useful models for predicting the successional trajectory of future forests? *Forest Ecology and Management*. 223: 200-210.

### **Meeting Presentations and Conference Proceedings**

- Pavlovic N., Huang S., Drury S., Lavezzo T., Neill C., and Lando T. (2016) Development of a high-resolution (5-m) fuel model map for Marin County, California, based on LiDAR and NAIP. Poster presented at the *IAWF 2nd International Smoke Symposium, Long Beach, CA, November 14-17*. STI-6510.
- Pavlovic N., Huang S., Drury S., Lavezzo T., Neill C., and Lando T. (2016) Development of a high-resolution (5-m) fuel model map for Marin County, California, based on LiDAR and NAIP. Poster presented at the *IAWF Fire Behavior and Fuels Conference, Portland, OR, April 11-15*. STI-6493.
- Huang S., Pavlovic N., Lavezzo T., Drury S., Neill C., Walsh T., and Lando T. (2016) Development of a high-resolution (5-m) fuel model map for Marin County, California, based on LiDAR and NAIP. Conference proceedings of the *IAWF Fire Behavior and*

*Fuels Conference, Portland, OR, April 11-15, in press. STI-6524.*

- Sullivan, D.C. and Drury S.A. (2015) The Decadal Survey for Earth Science and Applications from Space 2017. Presented at the *NASA Applied Remote Sensing Training Workshop, Pocatello, ID, October 7*, by Sonoma Technology, Inc., Petaluma, CA. STI-915027-6366.
- Craig K.J., Raffuse S., Larkin S., Huang S., and Drury S. (2015) Megafires and smoke exposure under future climate scenarios in the contiguous United States. Presented at the *14th Annual CMAS Conference, Chapel Hill, NC, October 5-7*. STI-6361.
- Raffuse S.M., Larkin S., Huang S., Drury S.A., and Lorentz K.A. (2015) Megafires and smoke exposure under future climate scenarios in the contiguous U.S. Presented at the *11th Symposium on Fire and Forest Meteorology, Minneapolis, MN, May 6*. STI-6268.
- Drury S.A. (2015) Fuel break analysis for the Monterey Ranger District, Los Padres National Forest. Presented at the *13th International Wildland Safety Summit and 4th Human Dimensions of Wildland Fire Conference, Boise, ID, April 20-24*, by Sonoma Technology, Inc., Petaluma, CA. STI-6138.
- Drury S.A. and Chinkin L.R. (2015) Modeling potential fire behavior changes due to fuel breaks in the Monterey Ranger District, Los Padres National Forest, California. Poster presented at the *13th International Wildland Safety Summit and 4th Human Dimensions of Wildland Fire Conference, Boise, ID, April 20-24*, by Sonoma Technology, Inc., Petaluma, CA. STI-6178.
- Drury S.A., Weyenberg S., Huang S., Raffuse S.M., and Chinkin L.R. (2015) Modeling fire behavior, fire effects, and smoke concentrations for prescribed burns on the Indiana Dunes National Lakeshore. Poster presented at the *Midwest Fire Conference: Keeping Fire Working for the Land, Dubuque, IA, February 17-19*. STI-6167.
- Huang S., Larkin N.K., Raffuse S.M., Lorentz K.A., Drury S.A., and Craig K.J. (2014) Megafires and smoke exposure under future climate scenarios in the contiguous United States. Poster presented at the *AGU Fall Meeting, San Francisco, CA, December 15-19*, by Sonoma Technology, Inc., Petaluma, CA. STI-6041.
- Drury S.A. and Chinkin L.R. (2014) Modeling potential fire behavior changes due to fuel breaks in the Monterey Ranger District, Los Padres National Forest, California. Poster presented at the *A Future with Fire Conference, McClellan, CA, December 2-3*, by Sonoma Technology, Inc., Petaluma, CA. STI-6136.
- Drury S.A., Russell A.R., DeWinter J.L., Ekstrand A.L., and Lorentz K.A. (2014) AFTEERS: Automated Fuels Treatment Effectiveness Evaluation Using Remote Sensing Information. Poster presented at the *Large Wildland Fires Conference, Missoula, Montana, May 20*. STI-5900.
- Drury S.A., DeWinter J.L., and Russell A.R. (2014) AFTEERS: Automated Fuels Treatment Effectiveness Evaluation using Remote Sensing. Webinar presented to the National Aeronautics and Space Administration's ROSES-2011 A.35 Wildfire Phase I Review Panel, January 28, by Sonoma Technology, Inc., Petaluma, CA. STI-912047-5893.
- Russell A.R., Drury S.A., DeWinter J.L., Ekstrand A.L., and Lorentz K.A. (2013) Automated fuels treatment effectiveness evaluation using remote-sensing information. Poster presented at the *American Geophysical Union Fall Meeting, San Francisco, CA, December 9-13*, by Sonoma Technology, Inc., Petaluma, CA. STI-5732.

- Drury S.A., Haste T.L., Noha D.J., Banwell E.M., Huang S., Rauscher H.M., and Cissel J. (2013) Interagency Fuels Treatment Decision Support System (IFTDSS 2.0 beta): current software tools and data available online for fuels treatment planning. Poster presented at the *4th Fire Behavior and Fuels Conference, Raleigh, North Carolina, February 18-22*, Sonoma Technology, Inc., Petaluma, CA (STI-5509).
- Drury S.A., Larkin N.K., Strand T.T., Huang S., Strenfel S.J., Banwell E.M., O'Brien T., and Raffuse S.M. (2012) Comparing fire size, fuels, fuel consumption, and smoke emissions estimates: a case study using the 2006 Tripod wildfire. Presented at the *5th International Fire Ecology and Management Congress, Portland, OR, December 3-7*, by Sonoma Technology, Inc., Petaluma, CA. STI-5457.
- Drury S.A., Haste T.L., Banwell E.M., Noha D.J., and Chinkin L.R. (2012) Interagency Fuels Treatment Decision Support System (IFTDSS). Presented at the *5th International Fire Ecology and Management Congress, Portland, OR, December 3-7* (STI-5456).
- Drury S.A., Rorig M.L., Wheeler N.J.M., Craig K.J., Stilley J.C., Gray E.A., and Erdakos G.B. (2012) Real-time analysis of fire weather prediction accuracy: year two. Poster presented at the *5th International Fire Ecology and Management Conference, Portland, OR, December 3-7* (STI-5455).
- Drury S.A., Rorig M.L., Wheeler N., J. M., Craig K.J., Stilley J.C., Gray E.A., and Erdakos G.B. (2012) Real-time analysis of fire weather prediction accuracy. Poster presented at the *Southwest Fire Ecology Conference, Santa Fe, New Mexico, February 28* (STI-4301).
- Drury S.A., Rorig M., Craig K.J., Wheeler N.J.M., Strenfel S.M., Erdakos G.B., and Bothwell P. (2012) Uncertainty in model-generated fire weather values: how does model variability influence the reliability of dry thunderstorm risk and ignition potential predictions? Year 1 update. Presented at the *2012 Annual Meeting of the Association of American Geographers, New York, NY, February 24-28*, by Sonoma Technology, Inc., Petaluma, CA (STI-4241).
- Larkin N., Strand T., Solomon R., Martinez N., Drury S., Raffuse S., Huang S., and Strenfel S. (2011) Uncertainties in modeling smoke impacts from wildland fire. Presented at the *Ninth Symposium on Fire and Forest Meteorology, Palm Springs, CA, October 18–20*, by the USDA Forest Service, Seattle, WA, and Sonoma Technology, Inc., Petaluma, CA. Available at <https://ams.confex.com/ams/9FIRE/webprogram/Paper192364.html>.
- Drury S.A., Rorig M., Craig K.J., Wheeler N.J.M., Strenfel S.J., Erdakos G.B., and Bothwell P. (2011) Uncertainty in model-generated fire weather values: how does model variability influence the reliability of dry thunderstorm risk and ignition potential predictions? Year 1 update. Presented at the *Ninth Symposium on Fire and Forest Meteorology, Palm Springs, CA, October 18-20* by Sonoma Technology, Inc., Petaluma, CA (STI-4243).
- Wheeler N.J.M., Craig K.J., Drury S.A., Gray E.A., and Erdakos G.B. (2011) Real-time analysis of weather prediction accuracy. Paper presented at the *10th Annual CMAS Conference, Chapel Hill, NC, October 24-26*, by Sonoma Technology, Inc., Petaluma, CA (STI-4238).
- Wheeler N.J.M., Craig K.J., Drury S.A., Rorig M.L., Gray E.A., and Erdakos G.B. (2011) Real-time analysis of weather prediction accuracy. Poster presented at the *10th Annual CMAS Conference, Chapel Hill, NC, October 24*, by Sonoma Technology, Inc., Petaluma, CA (STI-4238).

- Raffuse S.M., Larkin N.K., Strand T.T., Drury S.A., Solomon R.C., Sullivan D.C., Wheeler N.J.M., and Chinkin L.R. (2010) Developing an improved wildland fire emissions inventory for the United States. Poster presented at the *International Workshop on Air Quality Forecasting Research, Quebec City, Canada, November 16-18*, by Sonoma Technology, Inc., Petaluma, CA (STI-4034).
- Drury S.A., Pryden D., Funk T.H., Nuss P.W., and Raffuse S.M. (2010) The Interagency Fuels Treatment Decision Support System. Paper presented at the *3rd Fire Behavior and Fuels Conference, Spokane, WA, October 25-29*, by Sonoma Technology, Inc., Petaluma, CA (STI-910902-4014).
- Drury S.A. (2010) Interagency Fuels Treatment Decision Support System (IFTDSS). Presented at the *3rd Fire Behavior and Fuels Conference, Spokane, Washington, October 25-29*, by Sonoma Technology, Inc., Petaluma, CA (STI-909029-3842).
- Drury S.A., Larkin N., Huang S., Strenfel S.J., O'Brien T., and Raffuse S.M. (2010) Fuel loading, fuel consumption, and smoke emissions simulations under wildfire conditions: the 2006 tripod wildfire case study. Poster presented at the *3rd Fire Behavior and Fuels Conference, Spokane, WA, October 25-29*, by Sonoma Technology, Inc., Petaluma, CA (STI-4010).
- Wheeler N., Funk T., Raffuse S., Drury S., Nuss P., Unger K., Yahdavi L., Pryden D., Healy A., Haderman M., Chinkin L., Cissel J., and Rauscher H.M. (2010) A new decision support system based on a service-oriented architecture. Paper presented at the *9th Annual CMAS Conference, Chapel Hill, NC, October 11*, by Sonoma Technology, Inc., Petaluma, CA (STI-3896).
- Drury S.A., Rauscher H.M., Swedberg T., Schlobohm P., Christiansen E., Funk T., and Raffuse S. (2009) Community development and the Interagency Fuels Treatment Decision Support System. Poster presented at the *4th International Fire Ecology & Management Congress: Fire as a Global Process, Savannah, GA, November 30-December 4*, by Sonoma Technology, Inc., Petaluma, CA (STI-3692).
- Drury S.A., Funk T.H., Raffuse S.M., and Rauscher H.M. (2009) Development of the Interagency Fuels Treatment Decision Support System. Training presented at the Technical Fire Management Course, Bothell, WA, by Sonoma Technology, Inc., Petaluma, CA, and Joint Fire Science Program, Boise, ID, STI-909029-3710, October.
- Drury S.A. (2008) Climate, fire, and conifer regeneration in the Las Bayas Forestry Reserve, North-Central Mexico. Presented at the *Thursday Colloquium, Missoula Fire Lab, Missoula, MT, October 9*.
- Drury S.A. (2007) Spatial and temporal variability in fire occurrence within the Las Bayas Forestry Reserve, Durango, Mexico. Presented at the *Geography Colloquium, University of Montana, Missoula, MT, October 9*.
- Drury S.A. (2005) Species distributions in relation to abiotic and historical site differences in Mexican Pine-Oak Forests. Presented at the *101st Meeting of the Association of American Geographers, Denver, CO, April 5-9*.
- Drury S.A. (2004) Fine scale variability in fire occurrence in Mexican pine-oak forests. Presented at the *100th Meeting of the Association of American Geographers, Philadelphia, PA, March 15-19*.

- Drury S.A. (2002) Fire history and post-fire regeneration in the Las Bayas Forestry Reserve, Durango, Mexico. Presented at the *98th Meeting of the Association of American Geographers, Los Angeles, CA, March 18-23*.
- Drury S.A. (2001) Fire history in the Yukon Flats National Wildlife Refuge, Alaska. Poster presented at the *86th Annual Meeting of the Ecological Society of America, Madison, WI, August 5-10*.
- Drury S.A. (2001) Cambios en Los Incendios Forestales en Los Bosques de Pinos y Encinos en La Sierra Madre Occidental. Presented at the symposium: *Cambio Climatico Global e Incendios Forestales, Instituto de Silvicultura e Industria de la Madera (ISIMA), Durango, DGO, Mexico, June 4*.
- Drury S.A. (2000) Using prescribed fire to enhance wildlife habitat on the Yukon Flats National Wildlife Refuge, interior Alaska. Presented at the *4th Annual Western Geography Student Conference, Boulder, CO, February 4-6*.
- Drury S.A. (1994) Are maples replacing oaks in Ohio's hill country? Presented at the *79th Annual Meeting of the Ecological Society of America, Knoxville, TN, August 7-11*.

### **Webinars and Workshops.**

- Drury S.A. (2014) Fuel break analysis for the Monterey Ranger District, Los Padres National Forest, California. Webinar presented to the Interagency Wildland Fire Research, Development, and Applications Group 11/20/2014. Also available on YouTube.
- Drury S.A. (2013) Introduction to the Interagency Fuels Treatment Decision Support System – IFTDSS. Presented to the Wildland Fire Lessons Learned Center 01/14/2013. Also available on YouTube
- Drury S.A. (2012) Webinar. Introduction to the Interagency Fuels Treatment Decision Support System (IFTDSS). Presented to the Northern Rockies Fire Science Network 10/18/2012.
- Drury S.A. (2013) Introduction to the Interagency Fuels Treatment Decision Support System – IFTDSS. Presented to the Wildland Fire Lessons Learned Center 01/14/2013. Also available on YouTube
- Drury S.A. (2011) Introduction to the Interagency Fuels Treatment Decision Support System – IFTDSS. Presented to North Carolina State University 12/14/2011.
- Drury S.A. (2009) Webinar. Introduction to the Interagency Fuels Treatment Decision Support System (IFTDSS). Presented to the Alaska Fire Science Consortium 10/17/2009.

### **Formal Reports:**

- Varner, J.M., Knapp, E.E., Drury, S.A., Kreye, J.K., Hamby, G., and Reed, W. (2016) Longevity and Effectiveness of Mechanical Mastication Treatments. Final Report to the Joint Fire Science Program. JFSP Project 12-1-03-31 Final Report. Available at [http://www.firescience.gov/projects/12-1-03-31/project/12-1-03-31\\_final\\_report.pdf](http://www.firescience.gov/projects/12-1-03-31/project/12-1-03-31_final_report.pdf)
- Drury S.A., Graham A., Ekstrand A., and Huang S. (2015) Nevada Tahoe fuel modeling. Final report prepared for the North Lake Tahoe Fire District, Incline Village, NV, by Sonoma Technology, Inc., Petaluma, CA, STI-914031-6412-FR, December 11.

- Drury S.A. and Graham A. (2015) Automated Fuels Treatment Effectiveness Evaluation Using Remote-Sensing Information (AFTEERS): Phase I closeout and transition report. Prepared for the National Aeronautics and Space Administration, Washington, DC, by Sonoma Technology, Inc., Petaluma, CA, STI-912047-6395-FR, November 23.
- Larkin N.K., Abatzoglou J.T., Barbero R., Kolden C., McKenzie D., Potter B., Stavros E.N., Steel E.A., Stocks B.J., Craig K., Drury S., Huang S., Podschwit H., Raffuse S., and Strand T. (2015) Future megafires and smoke impacts. Final report to the Joint Fire Science Program by the USDA Forest Service, University of Idaho, University of Washington, B.J. Stocks Wildfire Investigations, Sonoma Technology, Inc., and Scion Research, JFSP Project 11-1-7-4, September 30.
- Drury S.A. and Rorig M. (2015) The fire weather accuracy and lightning ignition probability system. Final report prepared for the Joint Fire Science Program, Boise, ID, by Sonoma Technology, Inc., Petaluma, CA, 910049-6367-FR, September.
- DeWinter J., Drury S., McCarthy M., Brown S., Hafner H., and Roberts P. (2015) National Ambient Air Quality Standards (NAAQS) for ozone: recommendations for future research to inform the secondary standard. Draft report prepared for the Electric Power Research Institute, Palo Alto, CA, by Sonoma Technology, Inc., Petaluma, CA, STI-915031-6345, September 1.
- Raffuse S.M., Drury S.A., Huang S., and Craig K.J. (2015) Analysis of smoke transport and potential impact from very large fires. Technical memorandum prepared for the USDA Forest Service by Sonoma Technology, Inc., Petaluma, CA, STI-914039-6205, February.
- Drury S.A. (2013) AFTEERS: Automated Fuels Treatment Effectiveness Evaluation using Remote Sensing. Phase 1 final report prepared for the National Aeronautics and Space Administration by Sonoma Technology, Petaluma, CA, STI-912047-5797-FR, October 11.
- Keane R.E., Morgan P.M., Dillon G.K., Sikkink P.G., Karau E.C., Holden Z.A., and Drury S.A. (2013) A fire severity mapping system for real-time fire management applications and long-term planning: the FIRESEV project. Joint Fire Science Program Research Project Report, JFSP-09-1-07-4, January. Available at <http://digitalcommons.unl.edu/jfspresearch/18>.
- Haste T.L., Noha D.J., Drury S.A., Banwell E.M., Wheeler N.J.M., and Haderman M.D. (2012) Implementation of the Interagency Fuels Treatment Decision Support System. Final report prepared for the Joint Fire Science Program, Bureau of Land Management, Boise, ID, by Sonoma Technology, Inc., Petaluma, CA, STI-910901-5550, October.
- Larkin N.K., Strand T.M., Drury S.A., Raffuse S.M., Solomon R.C., O'Neill S.M., Wheeler N., Huang S., Rorig M., and Hafner H.R. (2012) Phase 1 of the Smoke and Emissions Model Intercomparison Project (SEMIP): creation of SEMIP and evaluation of current models. Final report prepared for the Joint Fire Science Program, Boise, ID, by the U.S. Forest Service, Seattle, WA, Sonoma Technology, Inc., Petaluma, CA, and Scion Research, Rotorua, NZ, STI-908054-5493-FR, September.
- Larkin N.K., Strand T.T., Drury S.A., Raffuse S.M., Solomon R.C., Huang S., O'Neill S.M., Wheeler N.J.M., and Hafner H.R. (2012) Phase 1 of the Smoke and Emissions Model

Intercomparison Project (SEMIP): test cases, methods, and analysis results. Draft general technical report prepared by the USDA Forest Service, Seattle, WA, Sonoma Technology, Inc., Petaluma, CA, and Scion Research, Rotorua, NZ, STI-908054-5488-GTR, September.

Drury S.A., Banwell E.M., and Huang S. (2012) IFTDSS surface fire behavior output evaluation. Technical memorandum prepared for the Joint Fire Science Program, Boise, ID, by Sonoma Technology, Inc., Petaluma, CA, STI-910902-4341-TM, February 1.

Drury S.A., Banwell E.M., and Huang S. (2012) A comparison of the functionality in BehavePlus 5.0.5 and in IFTDSS version 1.0. Technical memorandum prepared for the Joint Fire Science Program, Boise, ID, by Sonoma Technology, Inc., Petaluma, CA, STI-910902-4341-TM, February 1.

Drury S.A. and Herynk J.M. (2011) The national tree-list layer. Technical report prepared for the U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Ft. Collins, CO, Gen. Tech. Rep. RMRS-GTR-254, February.

Drury S.A., Rauscher H.M., Raffuse S.M., and Funk T.H. (2009) Refined work flow scenarios and proposed proof of concept system functionality for the interagency fuels treatment decision support system. Final report prepared for the Joint Fire Science Program, Boise, ID, by Sonoma Technology, Inc., Petaluma, CA, and Rauscher Enterprises LLC, Leicester, NC, STI-909029-3655-FR, July.

### **Software Documentation**

Drury S.A. (2015) The fire weather forecast accuracy assessment and lightning ignition probability system. User guide prepared for the Joint Fire Science Program, Boise, ID, by Sonoma Technology, Inc., Petaluma, CA, STI-915053-6359-UG, September 2015.

Banwell E.M., Drury S.A., and O'Brien T.E. (2012) Interagency Fuels Treatment Decision Support System (IFTDSS) version 2.0 user's guide. Online user's guide. Sonoma Technology, Inc., Petaluma, CA, STI-910907-4210, October.

Hafner H.R., Haste T.L., Drury S.A., Banwell E.M., and Penfold B.M. (2012) Interagency Fuels Treatment Decision Support System (IFTDSS) version 1 online documentation. Online user's guide. Sonoma Technology, Inc., Petaluma, CA, STI-910907-4210, February.

### **Additional training:**

- 2008 Introduction to Geoprocessing Script Using Python
- 2008 CCCOnline Faculty Development Course: Learning Styles
- 2008 CCCOnline Faculty Development Course: Managing Discussions
- 2007 Creating and Integrating Data for Natural Resource Applications. ESRI Training Center.
- 2007 Advanced Analysis with ArcGIS. ESRI Training Center Olympia WA
- 2007 FOR 437 LANDFIRE: Concepts, Data, and Methods. University of Idaho Online course



- 2007 Introduction to ArcGis II. ESRI Training Center Olympia WA
- 2007 Getting started with the Vista Learning Management System.
- 1998 Graduate of the S-290 Intermediate Fire Behavior Course
- 1997 Graduate of the Canadian Forestry Service's Advanced Wildland Fire Behavior Course
- 1992 Graduate of the I-190 Fire Behavior Course