RESEARCH SUPPORTING SOUND DECISIONS

JOINT FIRE SCIENCE PROGRAM

2017 PROGRESS REPORT

Joint Fire Science Program

Leadership Corner

John Hall, Program Director

Fire is an agent of change. Moreover, the changing environmental and societal conditions under which wildland fire occurs are their own agents of change and will challenge our future ability to adapt to and live with fire.

In a similar manner, the Joint Fire Science Program (JFSP) has adapted to change since our last progress report in 2016. In response to reduced funding over the last couple of years, we are focused on accomplishing a leaner mission—one that concentrates on a high return on investment and our core strengths. These are science delivery, workforce development, and strengthening partnerships.

Examples of our strengths, as well as other program success stories, are contained throughout this progress report. I hope you enjoy reading about our successes and share our pride in the program's accomplishments—whether you are a science producer, translator, or consumer of wildland fire science.

Paul Steblein, Governing Board Chair

While the JFSP has funded research for 20 years during many of the greatest challenges in wildland fire management, its unique contribution is the Fire Science Exchange Network. The 15 regional fire science exchanges are a primary delivery mechanism of fire science to fire and land managers in the field, with about 6,000 participants engaging in face-to-face science delivery each year. This is in addition to all of their outreach publications, webinars, and social media engagements.

In combination with fostering the exchange of information among scientists and practitioners, the Fire Science Exchange Network is an important source of feedback on future science needs. It is unique in that the exchanges provide coverage in all 50 states. Each regional exchange is typically comprised of members representing university and federal scientists, state and federal land and fire management agencies, and other organizations fostering a real lyceum in knowledge, experience, and ideas.

JFSP is a Self-Reflective,

Outcomes-Based Program

2017 JFSP Program Review

The JFSP staff and governing board periodically (about every 5 years) charter an external program review. The purpose of the program review is to assess current operations and help confirm or adjust the strategic direction of the program. This helps the JFSP staff evaluate the effectiveness of program components and explore potential refinements or shifts.

The fourth program review was conducted as a part of the JFSP's ongoing adaptive program management philosophy. The review specifically considered topics related to current and future JFSP operations, products, and strategic vision.

Key Observations and Recommendations

The dedicated JFSP staff and Governing Board are highly effective and efficient in addressing fire and fuels science needs and delivering use-inspired science, and it is clear that the JFSP is dedicated to periodic program review and open to strategic improvements to program function and direction. Overall, the review team suggests that the JFSP remains strategic and adaptable in its visioning.

"The JFSP represents the gold standard in recognizing gaps in knowledge and partnering to meet research needs."

–2017 Program Review Final Report

The JFSP Smoke Science Plan: "It's a Wrap"

The Smoke Science Plan provided guidance and served as an organizational tool for the JFSP for smoke-related research from 2011 until 2016. It helped guide the funding and management of 41 research and technology development projects under four research themes.

Smoke Line of Work

Four Research Themes of the Smoke Science Plan

- Smoke emissions inventory (10 projects)
- Fire and smoke model validation (12 projects)
- Human populations and smoke (10 projects)
- Smoke and climate change (9 projects)

Funding

- 41 research projects
- A total of $23.4 million
  - The JFSP committed $15.2 million
  - Research organizations committed $8.2 million

Some Related Projects

- "Creation of a Smoke and Emissions Model Intercomparison Project (SEMIP) and Evaluation of Current Models"
- "Wildland Fire Smoke Health Effects on Wildland Fire Fighters and the Public"
- "Public Perceptions of Smoke: Contrasting Tolerance Amongst WUI and Urban Communities in the Interior West and the Southeast United States"
- "A Compendium of Brief Summaries of Smoke Science Research in Support of the Joint Fire Science Program Smoke Science Plan": https://tinyurl.com/yaom9lyg

"A Compendium of Brief Summaries of Smoke Science Research in Support of the Joint Fire Science Program Smoke Science Plan" was released in April 2017 as part of the conclusion and wrap-up of the Smoke Science Plan. The summaries in this document guide the JFSP's smoke line of work (smoke research portfolio) and provide readers with concise statements about each of the projects under the Smoke Science Plan. The brief statements provide the reader information about the type of research that has been done and, more importantly, results that may address their needs.

The Smoke Science Plan final report, executive summary, and summary statements can all be found here: https://www.firescience.gov/JFSP_smoke_air.cfm

Next Steps

After consideration of the research accomplished under the Smoke Science Plan, the JFSP smoke science advisors identified some remaining science gap challenges. For example: "Increased use of models for developing information for health and safety alerts will necessitate improving models; such improvements must come from field data and theoretical work." The Western Wildfire Campaign (described on the next page) is one specific project that may provide some answers.

Western Wildfire Campaign: Meeting Challenges through Partnerships

An important challenge is to improve wildland fire and smoke model prediction systems to enhance their operational capabilities. To do this, we first need to fully characterize and understand the elements and processes involved from the time a fire starts to its eventual impact on local and regional air quality. Then we can begin to apply this knowledge toward advancing the science underlying these prediction systems.

The Western Wildfire Campaign is a collaborative project among the JFSP, National Oceanic and Atmospheric Administration, National Aeronautics and Space Administration, Department of Defense, Environmental Protection Agency, and National Science Foundation. It addresses the previously described challenge by taking advantage of the availability of aircraft and satellite assets to advance the understanding of smoke chemistry, aging, and transport. In conjunction with JFSP-funded fire characterization measurements, which are focused primarily on fuels and consumption information, the Western Wildfire Campaign is designed as a rapid-deployment campaign aimed at:

(1) Characterizing western wildfires with the potential of dynamic plume development and long-range smoke transport during the summers of 2018 and 2019.

(2) Integrating collected data with fuels information to help direct measurement platforms to appropriate targets of opportunity.

If sufficient funding is available, additional aircraft and ground-based remote sensing of fuel consumption, fire energy, and plume dynamics will be added to this project.

Reference: Ottmar R., T.J. Brown, N.H.F. French, and N.K. Larkin. 2017. Fire and Smoke Model Evaluation Experiment (FASMEE) Study Plan. Project 15-S-01-01. Joint Fire Science Program, Boise, ID.

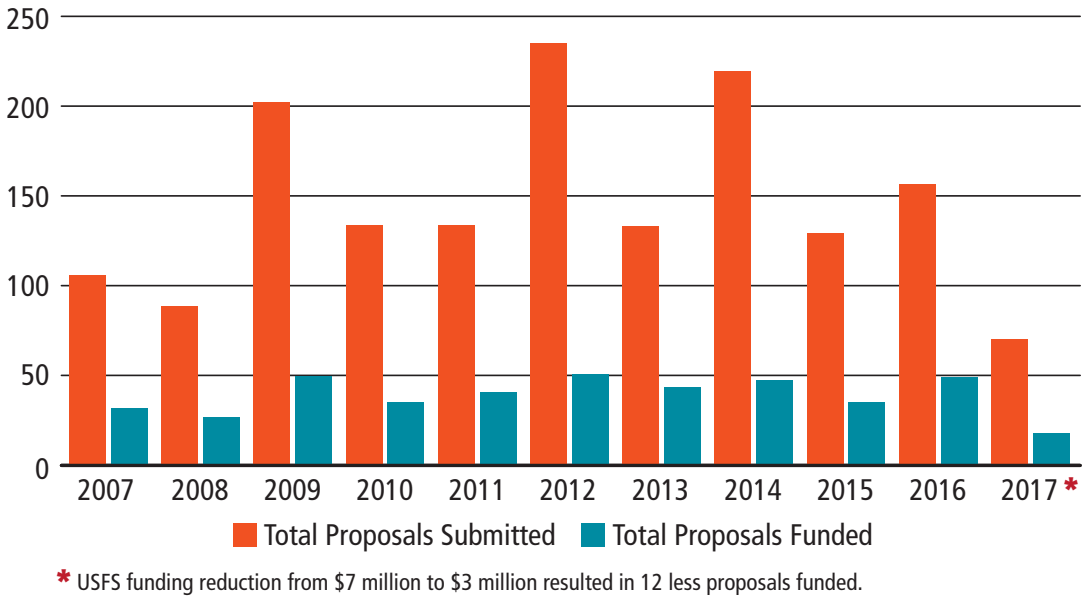
Kelly Cornwall, USFS

A stand replacement fire conducted at Fishlake National Forest in Utah during fall 2017.

The Western Wildfire Campaign is a collaborative project among the JFSP, National Oceanic and Atmospheric Administration, National Aeronautics and Space Administration, Department of Defense, Environmental Protection Agency, and National Science Foundation.

Funding History of
Core Research

Figures 1 and 2 illustrate two aspects of the JFSP's funding history. First, the percentage of research proposals accepted for funding averages nearly 25% for the previous 11 years. This rate is often considered the "sweet spot" for extramural funding programs such as the JFSP. Second, funding distribution is almost evenly split between the university community and U.S. Forest Service research stations. Successful proposals often reflect a combined government and nongovernment research team. Such partnering demonstrates the leveraging and integration opportunities that JFSP funding often provides.



* USFS funding reduction from $7 million to $3 million resulted in 12 less proposals funded.

Figure 1. Total numbers of research proposals submitted to and funded by the JFSP from FY 2007 through FY 2017. The average research proposal acceptance rate is 24.6 percent for the past 11 years.

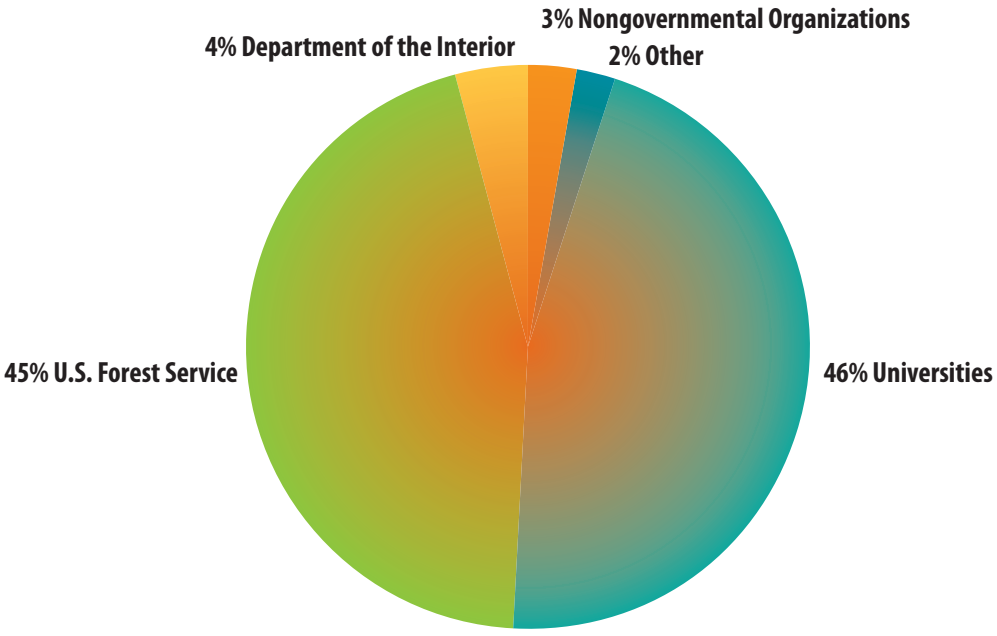


Figure 2. Average of JFSP funding percentages by organization from FY 2010 through FY 2017. Funding percentages change annually.

Summary of

2016 Research

In 2016, the JFSP funded 38 core research projects and 5 Graduate Research Innovation projects out of 156 total proposals (nearly 28% of projects funded) (Table 1). Also in 2016, the JFSP received 27 final reports on research it funded (Table 2).

Ongoing research can be accessed at: https://www.firescience.gov/JFSP_research.cfm

Table 1. FY 2016 research proposals received and funded by the JFSP, by research topic.

Task Number	Research Topic	Proposals Received	Proposals Funded
16-1-01	Implications of changing ecosystems in selected regions	16	6
16-1-02	Social and regulatory barriers and facilitators to implementing prescribed fire	16	4
16-1-03	Maintenance and restoration of sagebrush habitat in the Great Basin	16	3
16-1-04	Effects of fire on tree mortality	8	4
16-1-05	Post-fire landscape management	19	5
16-1-06	Regional needs - Consortium of Appalachian Fire Managers and Scientists: Season of prescribed burning to reach management objectives	6	1
16-1-07	Regional needs - Oak Woodlands and Forests Fire Consortium: Prescribed fire effects on wood products	1	1
16-1-08	Regional needs - Southern Fire Exchange: Prescribed fire smoke emissions	4	1
16-2-01	Graduate Research Innovation (GRIN) Award	33	5
16-3-01	New Science Initiative - Ecological and social dimensions of resilient landscapes	28	5
16-4-01	Fire and Smoke Model Evaluation Experiment (FASMEE) - Fuels and consumption	2	1
16-4-02	FASMEE - Fire behavior and energy	1	1
16-4-03	FASMEE - Plume development and meteorology	1	1
16-4-04	FASMEE - Smoke emissions, chemistry, and transport	1	1
16-4-05	FASMEE - Modeling leads	4	4
Total		**156**	**43**

Table 2. Final reports funded by the JFSP that were completed in FY 2016.

Project ID	Principal Investigator	Project Title
07-1-2-17	Richard T. Reynolds	Pre- and Post-Treatment Effects of the 2006 Warm Fire on Northern Goshawks and Their Prey Populations
08-2-1-13	Jan L. Beyers	Synthesis of Current Knowledge on Post-Fire Seeding for Soil Stabilization and Invasive Species Control
09-2-01-20	Kathleen A. Dwire	A Guide to Fuels Management in Riparian Areas of the Interior West
10-1-01-10	Michael A. Battaglia	Mastication Effects on Fuels, Plants, and Soils in Four Western U.S. Ecosystems: Trends with Time-Since-Treatment
10-1-04-7	Steven E. Sesnie	A New Time Series Remote Sensing Approach to Mapping Fine Fuels in Sonoran Desert Ecosystems

Table 2 (continued). Final reports funded by the JFSP that were completed in FY 2016.

Project ID	Principal Investigator	Project Title
11-1-1-7	Monica G. Turner	Paths of Recovery: Landscape Variability in Forest Structure, Function and Fuels After the 1988 Yellowstone Fires
11-1-2-19	David M. Engle	Development and Evaluation of Dynamic Vegetation Models for Grassland Fuels under Variable Fire and Grazing Regimes
11-1-2-30	Douglas J. Shinneman	Quantifying and Predicting Fuels and the Effects of Reduction Treatments Along Successional and Invasion Gradients in Sagebrush Habitats
11-1-3-10	Alexander M. Evans	Evaluating the Effectiveness of Mitigation Activities in the Wildland Urban Interface; Community Wildfire Protection Plans (CWPPs)
11-1-3-29	Alexander Maranghides	Evaluating the Effectiveness of Mitigations Activities in the Wildland Urban Interface
11-1-4-16	Michael J. Jenkins	The Influence of Fuel Moisture and Flammable Monoterpenes on the Combustibility of Conifer Fuels
11-1-4-19	David R. Weise	Determination of the Effects of Heating Mechanisms and Moisture Content on Ignition of Live Fuels
11-1-5-13	Serena H. Chung	Modeling Study of the Contribution of Fire Emissions on BC Concentrations and Deposition Rates
11-1-7-4	Narasimhan K. Larkin	Future Megafires and Smoke Impacts
11-1-8-4	Clinton S. Wright	How Do Pile Age and Season of Burn Influence Combustion and Fire Effects?
11-S-2-6	Susan E. Meyer	Enhancing the Effectiveness of Annual Grass Weed Biocontrol with the Black Fingers of Death Pathogen (*Pyrenophora semeniperda*) on Intermountain Rangelands
12-1-01-17	Alejandro A. Royo	Exploring the Causes of Failed Oak Regeneration in Eastern Deciduous Forests: The Importance of Historic Disturbance Regimes
12-1-02-15	Matthew C. Reeves	Development of the Rangeland Vegetation Simulator: A Module of the Forest Vegetation Simulator
12-1-03-11	Nicholas S. Skowronski	Evaluation and Optimization of Fuel Treatment Effectiveness with an Integrated Experimental/Modeling Approach
12-2-01-10	Cassandra Moseley	Managing the Market: How Procurement Practices Impact Private Sector Wildfire Response Capacity
13-1-04-53	Chad M. Hoffman	Assessing the Effectiveness of Spatially Heterogeneous Fuel Reduction Restoration Treatments
13-3-01-22	Donald Z. McKenzie	Impacts of Changing Fire Regimes in the Alpine Treeline Ecotone
14-2-01-11	Anne E. Black	Risk Perception, Sense-Making and Resilient Performance: The Sounds of Wildland Firefighting in Action
14-3-01-16	Jennifer M. Fraterrigo	Fire-Based Management for Promoting Drought Resistance of Woody Seedlings in a Changing Climate
14-3-01-30	Gary J. Roloff	Fire Effects on a Special Concern Species, the Eastern Box Turtle
14-3-01-37	S. Mazeika Sullivan	Fire and Food Webs in Yosemite National Park: Implications of Fire Regimes on Linked Stream-Riparian Ecosystems
14-S-01-01	Matthew C. Reeves	Incorporating Ecological Sites into the Rangeland Vegetation Simulator

Summary of

2017 Research

In 2017, the JFSP funded 14 core research projects and 8 Graduate Research Innovation projects out of 91 total proposals (about 24% of projects funded) (Table 3). Also in 2017, the JFSP received 32 final reports on research it funded (Table 4).

Table 3. FY 2017 research proposals received and funded by the JFSP, by research topic.

Task Number	Research Topic	Proposals Received	Proposals Funded
17-1-01	Landscape fuel treatment strategies and wildfire management	7	2
17-1-02	Effects of changing wildfire management strategies	5	1
17-1-03	Post-fire recovery	18	3
17-1-04	Fire effects on herbaceous and shrub species	16	3
17-1-05	Validating mesoscale, atmospheric boundary prediction models and tools	9	3
17-1-06	Factors that affect the co-management of wildland fire risk	12	2
17-2-01	Graduate Research Innovation (GRIN) Award	24	8
Total		**91**	**22**

Table 4. Final reports funded by the JFSP that were completed in FY 2017.

Project ID	Principal Investigator	Project Title
10-2-01-5	David W. Peterson	A Synthesis of Fire and Oak Restoration in the Northeastern U.S.
12-1-01-10	Becky K. Kerns	Effects of Prescribed Burn Regime and Grazing on Eastern Oregon Ponderosa Pine Vegetation and Fuels: The Season and Interval of Burn Study
12-1-03-30	Russell A. Parsons	STANDFIRE: An IFT-DSS Module for Spatially Explicit, 3D Fuel Treatment Analysis
12-1-04-5	Rachel A. Loehman	ArcBurn: Linking Field-Based and Experimental Methods to Quantify, Predict, and Manage Fire Effects on Cultural Resources
12-1-07-1	Wei Min M. Hao	Critical Assessment of Wildland Fire Emissions Inventories: Methodology, Uncertainty, Effectiveness
12-2-01-47	Branda L. Nowell	Relational Risk Assessment and Management: Investigating Local Capacity in Wildfire Response Networks
12-1-03-31	J. Morgan Varner III	Longevity and Effectiveness of Mechanical Mastication Treatments
13-1-02-14	Joseph W. Domitrovich	Wildland Fire Smoke Health Effects on Wildland Firefighters and the Public
13-1-04-22	Alan H. Taylor	Do Fuel Treatments Restore Ecosystem Function? Water Use Efficiency Before and After Fire Suppression and Fuels Treatments in Fire-Prone Pine Forests in the Western United States
13-1-04-45	Jonathan D. Coop	Integrating Fuels Treatments and Ecological Values in Piñon-Juniper Woodlands: Fuels, Vegetation, and Avifauna
13-1-05-8	Robert E. Keane	Surface Fuel Characteristics, Temporal Dynamics, and Fire Behavior of Masticated Mixed-Conifer Fuelbeds of the U.S. Southeast and Rocky Mountains

Table 4 (continued). Final reports funded by the JFSP that were completed in FY 2017.

Project ID	Principal Investigator	Project Title
13-1-06-8	R. Dwayne Elmore	Managing Fuels While Enhancing Prairie Chicken Habitat
13-3-01-26	Ernesto C. Alvarado	Detailed Fuelbed Characterization, Mapping and Future Fire Hazard Assessment for Eglin Air Force Base, FL
13-3-01-35	Christopher J. Dunn	Mixed-Severity Fire and Salvage Logging in Dry Forests of Oregon's Western Cascades
13-4-01-9	Brett A. Morrissette	Rogue River-Siskiyou NF LTEP Data Archival Project
14-1-02-5	Lisa M. Ellsworth	Long-Term Impacts of Wildfire on Fuel Loads, Vegetation Composition, and Potential Fire Behavior and Management in Sagebrush-Dominated Ecosystems
14-1-03-26	Sonia M. Kreidenweis	Phase Dynamics of Wildland Fire Smoke Emissions and Their Secondary Organic Aerosols
14-2-01-26	Antonie J. Jetter	Policy Scenarios for Fire-Adapted Communities: Understanding Stakeholder Risk-Perceptions, Using Fuzzy Cognitive Maps
14-3-01-07	Luigi Boschetti	Spatially-Explicit Impacts of Climate on Past, Present, and Future Fire Regimes in Alaskan Boreal Forest and Tundra Ecosystems
14-3-01-32	Daniel M. Kashian	Can the Arrangement of Pine Barrens Mediate the Spread of Wildfires under Various Climate Change Scenarios?
14-3-01-43	Stephanie Bohlman	Food, Fuel, and Fire: Assessing the Effects of Fuel Treatments on Wildlife Habitat Quality in Longleaf Pine-Wiregrass Ecosystems
16-2-01-3	John A. Volckens	A Low-Cost Sensor Network for Wildfire Smoke Detection and Monitoring
16-2-01-33	Jennifer L. Pierce	Overlapping Layers of Fire Management Examined through the Lens of Post-Fire Erosion
16-4-01-15	Andrew T. Hudak	Hierarchical 3D Fuel and Consumption Maps to Support Physics-Based Fire Modeling
16-4-02-2	Matthew B. Dickinson	Active Fire Datasets for Fire and Smoke Model Evaluation
16-4-03-1	Brian E. Potter	Development of a Comprehensive Plume Dynamics and Meteorology Study Plan for FASMEE
16-4-04-1	Shawn P. Urbanski	Accelerating Awareness, Understanding, and Adoption of Wildland Fire Science Information
16-4-05-1	William E. Mell	FIRETEC and WFDS Modeling of Fire Behavior and Smoke in Support of FASMEE
16-4-05-2	Yongqiang Liu	Application of Daysmoke and PB-P Models in Phase I of the Fire and Smoke Model Evaluation Experiment
16-4-05-3	Adam K. Kochanski	Modeling Support for FASMEE Experimental Design Using WRF-SFIRE-CHEM
16-4-05-4	Kirk R. Baker	U.S. EPA Smoke Emissions, Chemistry, and Transport Modeling
16-S-01-2	Richard Birdsey	Potential Climate Feedbacks of Changing Fire Regimes in the U.S.: A Review

Science Delivery

The final research reports received in 2016 and 2017, shown in Tables 2 and 4, are a small fraction of the research findings that have been distributed to the wildland fire community of scientists and managers in the past few years. Through its publications, conference support, social media, and the Fire Science Exchange Network, the JFSP continues to lead the way with innovative fire science delivery. Here are some highlights:

Publications

In FY 2017, the JFSP published three Fire Science Digests:

Issue 23, October 2016, Secretarial Order 3336 Science Priorities: The Role of Science Past, Present, and Future
This issue describes the purpose of Secretarial Order 3336, the role of the JFSP in the order's establishment and subsequent strategic planning, and the JFSP's support of previous and ongoing research related to sagebrush ecosystems and fire.

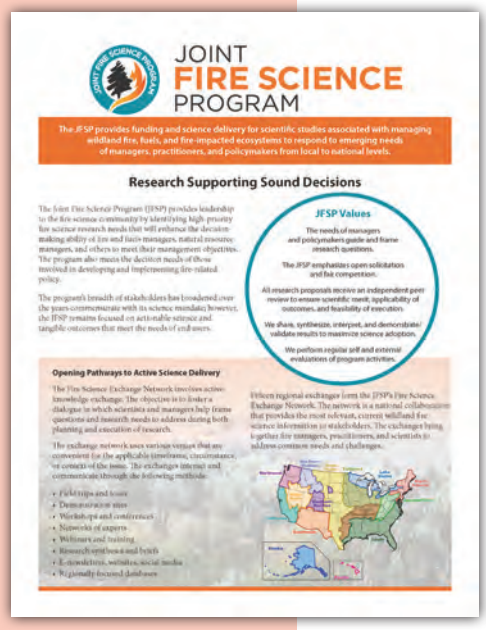
Issue 24, February 2017, Bridging the Gap: Joint Fire Science Program Outcomes
This issue addresses the effectiveness of JFSP-funded research projects in reaching potential users and informing management decisions and actions. Several studies helped the JFSP identify matters and barriers so the JFSP can continue to make program improvements, such as enhancing the use of fire science information by the broader fire management community.

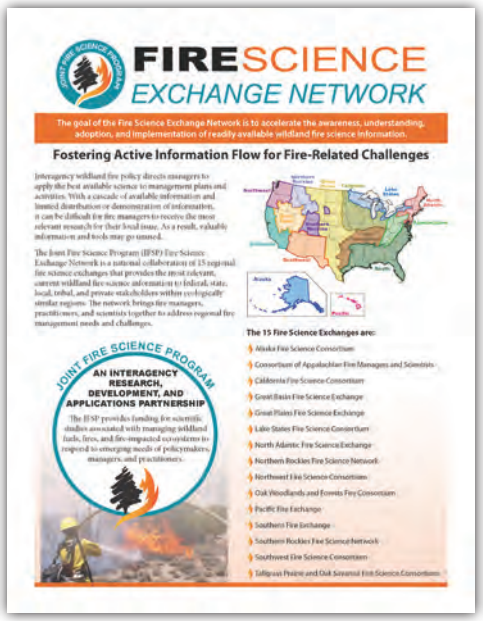
Issue 25, July 2017, Telling Fire's Story through Narrative and Art
This issue describes nonscientific venues funded by the JFSP in an attempt to reach audiences that scientists may rarely reach. Some of these venues include narratives about wildland fire history and fire culture, creative fire art projects and exhibits, history accounts from Native American elders, and modern dance performances.

All JFSP publications can be viewed or downloaded at: https://www.firescience.gov/JFSP_publications.cfm

New Fact Sheet Series

Also in FY 2017, the program added a newly formatted publication: a two-page fact sheet series. The goal of creating these handouts is to provide stakeholders a quick overview of the program's roles and accomplishments. This past year, the JFSP published the following three fact sheets:





JFSP Fact Sheet
This fact sheet provides a general overview of the JFSP, highlighting the program's role, values, research opportunities, and an introduction of the Fire Science Exchange Network.

Fire Science Exchange Network (FSEN) Fact Sheet
This fact sheet provides a detailed overview of the Fire Science Exchange Network.

The Science of Fuel Treatments Fact Sheet
This fact sheet describes how the JFSP contributes to the scientific basis and effectiveness of fuel treatments throughout the U.S. by highlighting different fuel treatment studies, findings, and results.

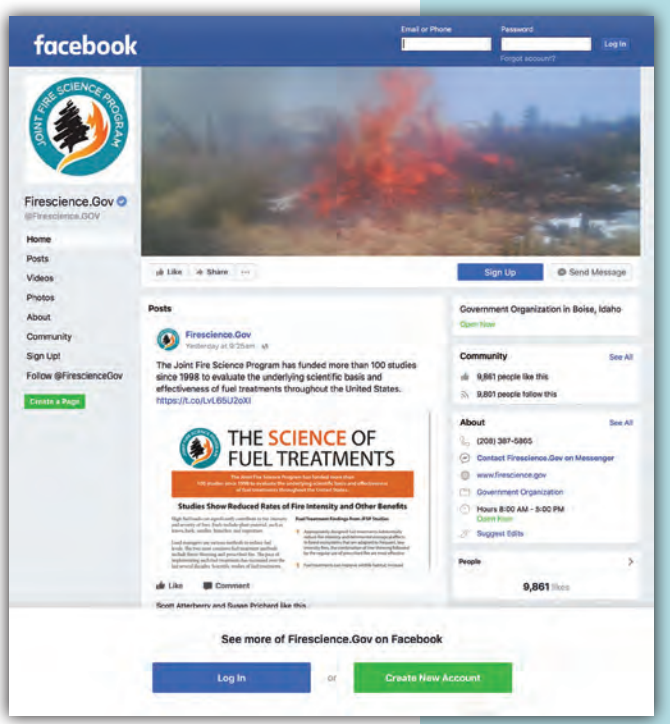
Conference Support and Participation

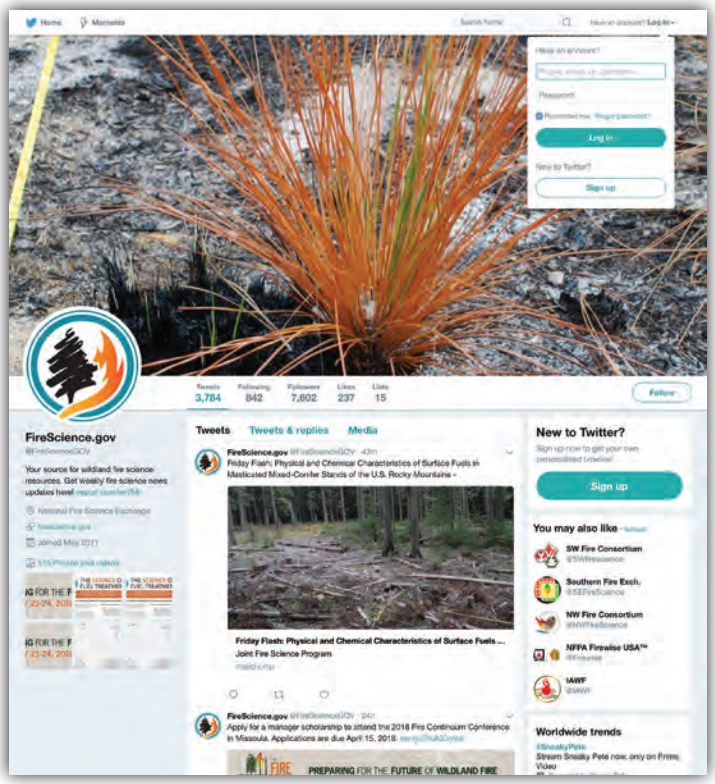
Another important priority of the wildland fire management and science community is face-to-face exchange of information at workshops and conferences. The JFSP was able to sponsor, support, or participate in the following events in FY 2016 and FY 2017 alongside partners from other federal agency research programs and National Wildfire Coordinating Group committees. Most of these were organized by two professional societies, namely the International Association of Wildland Fire and the Association for Fire Ecology.

2nd International Smoke Symposium	Fuels Treatment Effectiveness Workshops	Southwest Fire Ecology Regional Conference/ Workshop	National Cohesive Wildland Fire Management Strategy Workshop	7th International Fire Ecology and Management Congress/ Fire Circles

Social Media

In 2016, the JFSP rekindled its social media campaign with a new vigor, by focusing on branding and adding a new science writer. The number of Facebook engagements through new "friends" and "likes" reflected a healthy period of growth, characterized by a better sense of vested partners who share JFSP posts. The Twitter platform echoed this sentiment with increased growth in "follows" and "re-tweets," a trend from 2015 to 2016 that continued from 2016 to 2017.





Fire Science Exchange Network Accomplishments:

Facilitating Knowledge Exchange

The JFSP supports 15 regional fire science exchanges to provide the most relevant and current wildland fire science information to federal, tribal, state, local, and private stakeholders within ecologically similar regions.

Face-to-Face Science Delivery in FY 2016 and 2017*

- Nearly 12,000 participants
- More than 600 field trips and consultations

Leadership Briefings: Informing Decisionmakers/Obtaining Feedback

- Nearly 200 leadership briefings
- Including approximately 1,100 decisionmakers

* Numbers were generated from Fire Science Exchange Network annual reports that tracked field trips, tours, demonstrations, roadshows, field consultations, and expert cadres.

In the autumn of 2016, the JFSP Fire Science Exchange Network, program office staff, and Governing Board members met in the New Jersey Pinelands. In the photo above, North Atlantic Fire Science Exchange principal investigator Nick Skowronski introduces a field study topic led by a fire science researcher in the New Jersey Pine Barrens.

In terms of Fire Science Exchange Network activities (Figure 3), the past 3 years reflect a smaller amount in the activity/event category (yellow) since 2014. It is assumed that this is because many fire management professionals have barriers to attendance at face-to-face events; however, the numbers of social media activities (red), including webinars, continue to increase.

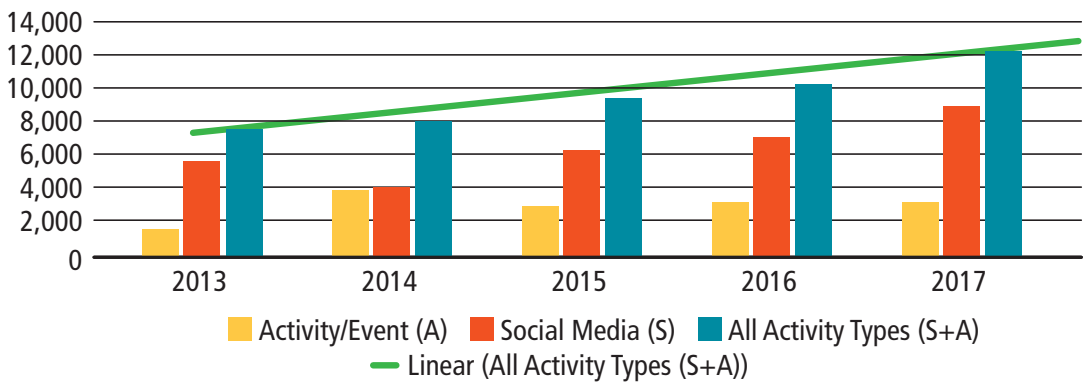


Figure 3. Linear growth of Fire Science Exchange Network activities from FY 2013 through FY 2017.

An external review team has evaluated the Fire Science Exchange Network annually for the last 7 years. This year's report, titled "Joint Fire Science Exchange Network 2017 Evaluation Report: A National Cluster Evaluation of the Fire Science Exchange Network Processes and Impacts," indicated findings similar to previous years through feedback from the fire management community. One stakeholder provided the comment in the margin.

Figure 4 shows a year-to-year comparison of the number of Fire Science Exchange Network participants by organizational group. In FY 2016 (blue) and FY 2017 (teal), all organization types experienced steady growth in participation, with the largest percent increase in the regional/state/local category. The 2017 program review encouraged the JFSP to increase growth in this particular category.

"I really like the [exchange's] webinar series. I can fit it into my schedule and it helps me keep current with what is being learned by the fire science community."

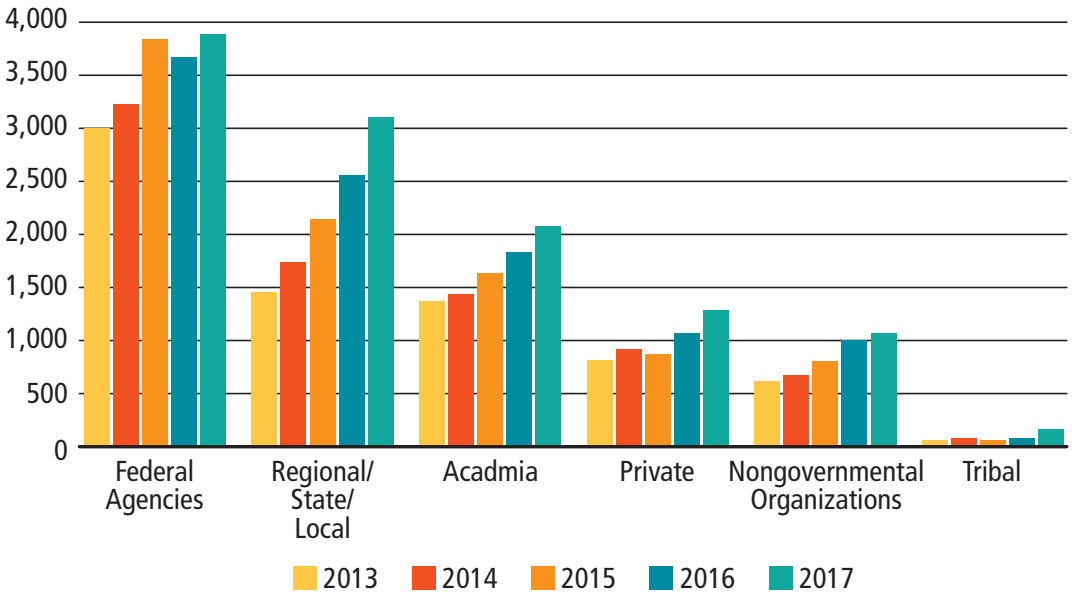


Figure 4. Number of Fire Science Exchange Network participants by organizational group (year-to-year comparison) from FY 2013 through FY 2017.

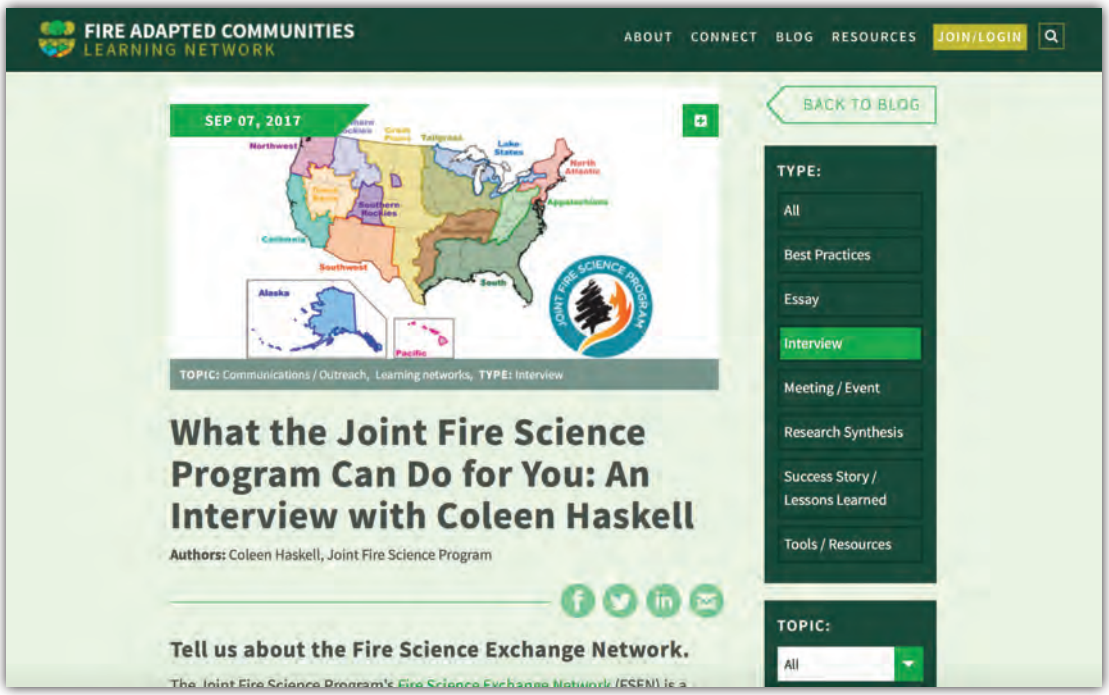
Mark Brunson

In May 2017, the JFSP Fire Science Exchange Network and program office staff participated in a field trip in the Pine Nut Mountains near Carson City, Nevada, to learn about fire science research that is underway in sagebrush ecosystems on public lands managed by the Bureau of Land Management. The field trip was led by fire ecologist Jeanne Chambers and hosted by the Great Basin Fire Science Exchange.

What Others Are Saying About FSEN

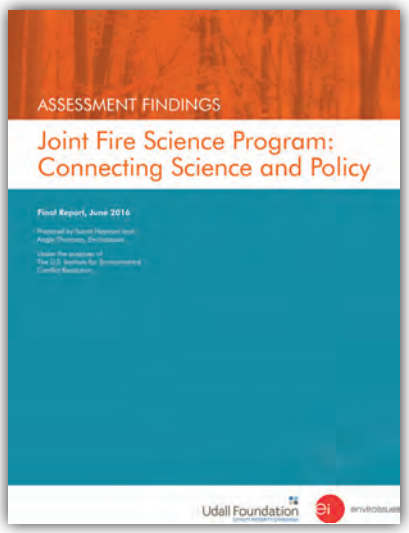
Read the blogs here: https://fireadaptednetwork.org/blog-type/interview/

Our partners at Fire Adapted Communities Learning Network produced two blogs featuring the Fire Science Exchange Network in 2017. The first one, in May, featured the North Atlantic Fire Science Exchange in an interview with the exchange's Science Communications Director Inga La Puma. The second one, in September, focused on the Fire Science Exchange Network in an interview with JFSP Communications Director Coleen Haskell.



North Atlantic Fire Science Exchange Science Communications Director Inga La Puma.

From Assessment to Implementation



In response to recommendations from the 2013 program review, the JFSP is exploring the fire science-policy nexus. As a part of phase 1, in FYs 2016 and 2017, the JFSP engaged an independent team of experts in wildland fire to broadly assess the needs and interests of the fire science and policy community. This assessment provided insights regarding how science is used to inform policy, examples of successful integration of science into policy, how policymakers access science, and policy issues that are most in need of science. The phase 1 report can be found at: https://www.firescience.gov/documents/2016_0609_AssessmentReport_Final.pdf

Suggested Mechanisms for Integrating Fire Science into Policy

During phase 2, a Science Policy Work Group developed 17 specific, actionable "mechanisms," or options, to foster the productive use of fire science to inform policy development. It became clear that existing mechanisms do not fully meet the needs of those seeking science information to support policy development, in particular those related to the synthesis of information and incorporating sociopolitical and economic impacts of potential courses of action.

Key suggestions for fostering the productive use of fire science to inform policy development include creating the following:

- A deliberative dialogue between those generating knowledge and those making decisions, potentially through annual conferences, workshops, or existing meetings.
- An independent body tasked with connecting fire science and policy.
- Training sessions for scientists to better communicate with policymakers or education programs to increase the visibility of fire science in the public eye.
- Task groups or teams to address high-priority policy issues, including scientists, management, academia, and others, across a wide span of disciplines.

All 17 mechanisms in the final report can be found at: https://www.firescience.gov/documents/10_JFSP_Science_Policy_Work_Group_Final_Report_Mar2017_final.pdf

JFSP's Role In Responding to and Identifying Fire Policy-Relevant Science Needs

"JFSP is uniquely poised in its central coordinating and networked position within the fire science landscape to serve agencies fulfilling these requests by tapping into the broader spectrum of fire science research and maximizing the information that responding agencies remit to policymakers. This new role would formalize JFSP as a key resource (among others) that agencies can consult when responding to fire-related congressional inquiries."

"Science/Policy Work Group Final Report: Mechanisms for Integrating Fire Science Policy" March 2017

Workforce Development: The JFSP's Commitment to

the Next Generation of Wildland Fire Managers and Scientists

Graduate Research INnovation (GRIN)

Launched in 2011, the GRIN competitive awards program is run by the JFSP with input from reviewers organized by the Association for Fire Ecology's Education Committee. GRIN has been highly successful in providing students with the experience of putting proposals together, receiving professional feedback, and participating in the peer review process—which, in turn, results in strong fire science.

- GRIN recipients are the managers, scientists, and leaders of tomorrow.
- GRIN enhances exposure to wildland fire and fuels management and/or policy.
- Since the award's inception, the JFSP has received 184 GRIN proposals, with 27% receiving funding totaling approximately $1.2 million (Figure 5).

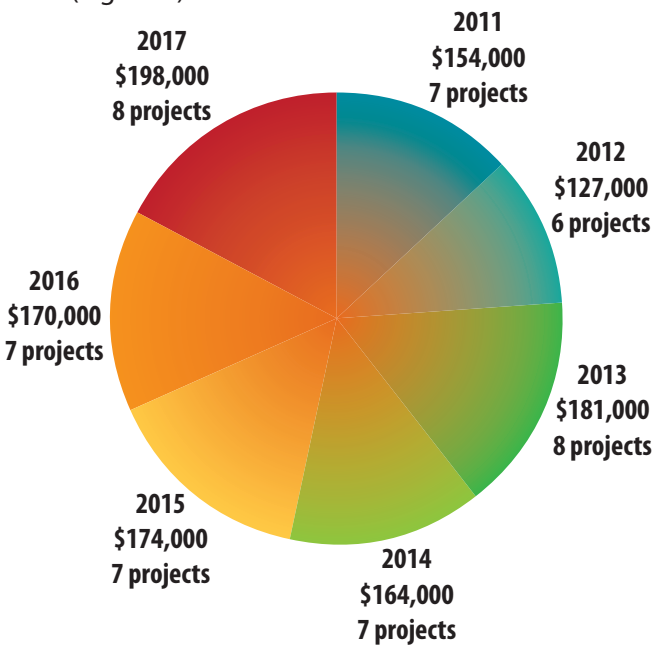


Figure 5. Graduate Research Innovation proposals funded by the JFSP from FY 2011 through FY 2017.

GRIN Topic Areas

- Fire behavior
- Fire effects
- Fuels management
- Post-fire recovery
- Emissions and air quality
- Social issues and fire

Thoughts from Leda Kobziar, University of Idaho Assistant Professor
"The establishment of the GRIN awards underscore the commitment of JFSP to the future of fire research for fire management applications. The JFSP has set the mold for targeted support of graduate student research, which across all other federal funding programs for natural resources was (and for the most part continues to be) nonexistent. Some of the resulting benefits were unpredictable and surprising. Not only did GRIN produce a broad array of highly applicable, high-quality, and cost-effective scientific products, it provided professional development that benefitted both the students and the fire management community. Through my activities on the Education Committee of the Association for Fire Ecology, I have had the privilege of reviewing GRIN proposals since the program was initiated. I often viewed the proposals as a snapshot, as taking the pulse, of the most innovative and timely fire science research in the country. The benefits for students were evident for awardees, but also extended to those reviewed and not chosen for support. Feedback to the students provided an invaluable learning experience to prepare students for future proposal writing. In securing letters of support from fire management practitioners, students learned the importance of their science being applicable to real-world questions and of strategic planning to communicate and disseminate the knowledge they hoped to gain. In this way, the GRIN proposal process prepared future fire scientists to conduct high-quality research with a clear pathway for that research making a difference in wildland fire management. The GRIN experience is akin to the first year of a post-doctoral position: students who have been supported by GRIN are far ahead of their peers."

"The JFSP has set the mold for targeted support of graduate student research, which across all other federal funding programs for natural resources was (and for the most part continues to be) nonexistent."

Travel, Research, and Educational Experience (TREE) Grants

In addition to GRIN awards, the JFSP supports students by promoting participation in conferences and workshops by funding Travel, Research, and Educational Experience (TREE) grants. These empower promising student scientists to attend and present their work at professional conferences, symposia, and workshops or to travel to conduct laboratory research in fire science.

- Initiated in 2011.
- From 2011 through 2016, the JFSP has awarded $150,000 in TREE grants—an average of about $630 per award.
- More than 230 students from 49 universities have been awarded TREE grants.

Overall Supported Student Research

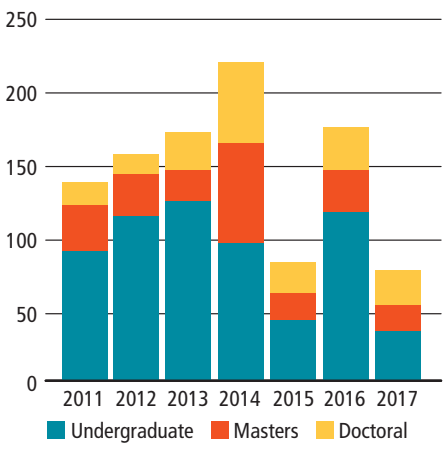


Figure 6. Total student involvement in JFSP projects from FY 2011 through FY 2017, including both GRIN and core research projects.

Thoughts from Penny Morgan, University of Idaho Professor
"Many current fire scientists earned their graduate degrees while conducting JFSP-funded research and communicating it to those who use it. Many have gone on to establish effective research and teaching programs at universities. Others now work in federal or state or county land management agencies or with nongovernment organizations. They are all making a difference as society faces growing wildland fire and fuels challenges. The science that JFSP has funded has helped to address these growing fire challenges—the challenges we face would be greater if we didn't have the people and knowledge fostered through the 20 years of JFSP. The rippling effect through natural resources education and management is beyond calculation—far more than the dollars, for you've enabled people to follow their dreams, to collaborate with each other, and to make a difference."

"…the challenges we face would be greater if we didn't have the people and knowledge fostered through the 20 years of JFSP."

Coeur D'Alene/Post Falls Press

GREAT BASIN
FIRE SCIENCE
EXCHANGE

JFSP Success
Stories

Beginning in the summer of 2017, the JFSP invited stories that demonstrate both the successes and challenges resulting from JFSP-funded fire science research to tell others how the outcomes of fire science are leading to tangible impacts in the work of practitioners and lives of stakeholders and to resiliency of fire-impacted landscapes. Respondents sent in their completed success stories, which fall into three categories: (1) general success stories that apply to the fire or fuels community at large; (2) Fire Science Exchange Network success stories; and (3) Graduate Research Innovation success stories.

The JFSP will archive these stories and develop them into innovative science delivery and outreach materials, such as fact sheets, story maps, and presentations. The following is a sample of one of the submitted stories.

Darcy McDaniel Develops GIS Training and Support for Fire Professionals in Nevada: Fighting Flames with Brains

The JFSP's Great Basin Fire Science Exchange supports the "Fire Science Online" project through the University of Idaho. It gives fire professionals more opportunities to take classes and earn degrees and certificates remotely.

After taking the GIS Applications in Fire Management course through the University of Idaho, Darcy McDaniel was hired as a zone fire planner with the Bureau of Land Management (BLM) and was inspired to develop and implement tools for on-the-ground managers. Among several examples, she developed Collector 4 Fuels and provided site-specific training and support during the 2017 fire season for fire professionals who were implementing fire data collection for the BLM.

While working full time for the BLM in Winnemucca, Nevada, Darcy recently earned a Masters of Natural Resources degree from the University of Idaho.

In Search of the Elusive
Safety Zone

With funding that was kick-started by the JFSP nearly 20 years ago, research engineer Bret Butler of the U.S. Forest Service Missoula Fire Sciences Laboratory has developed guidelines to assist firefighters in selecting safety zones, areas where they can go to escape injury in the event that the fire becomes unsafe. This work has led to a significant change in fireline management practices to reduce risk of injury to firefighters working across the country.

U.S. Forest Service employees practicing using fire shelters.

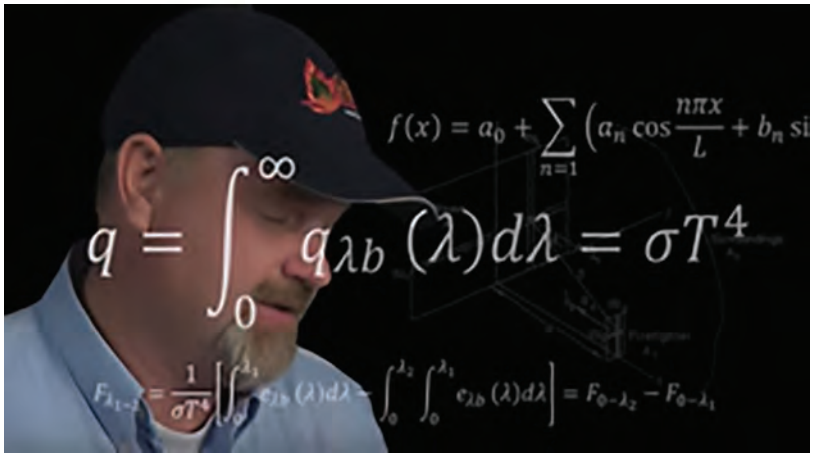
The problem is complex, but progress is being made. Research results are being used to help incident management teams manage fires more safely. Additionally, analysis continues toward developing a better understanding about the attributes that contribute to an effective escape route.

Some of the more recent updates to Bret's work involve mathematical analysis of how energy from the flaming front affects safety zone size, including the effects of slope and wind on energy transfer from the flames. A recent study by Wesley Page and Butler has developed an empirical model of safety zones based on entrapment data from the past 100 years. The results are comparable with the earlier physics-based model Butler developed. Both studies suggest that as fire intensity increases, larger safety zones are needed.

The latest study is featured on the JFSP-funded Northern Rockies Fire Science Network's website (http://www.nrfirescience.org/resource/16748) and is titled "An Empirically Based Approach to Defining Wildland Firefighter Safety and Survival Zone Separation Distances."

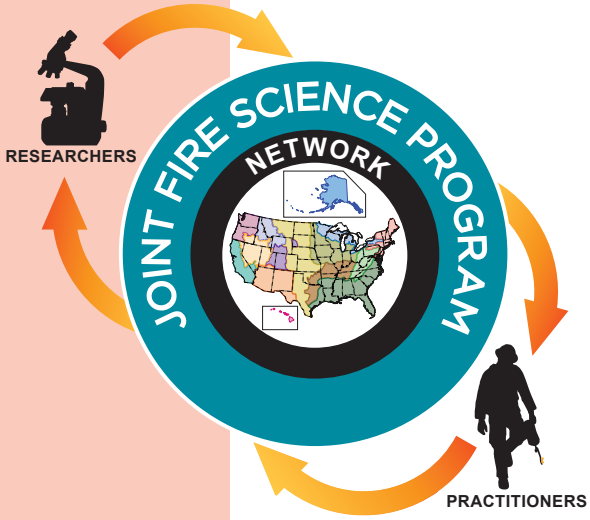
There is now a beta version safety zone calculator android app available for testing and feedback. Contact bwbutler@fs.fed.us for more details.

NORTHERN ROCKIES FIRE SCIENCE NETWORK

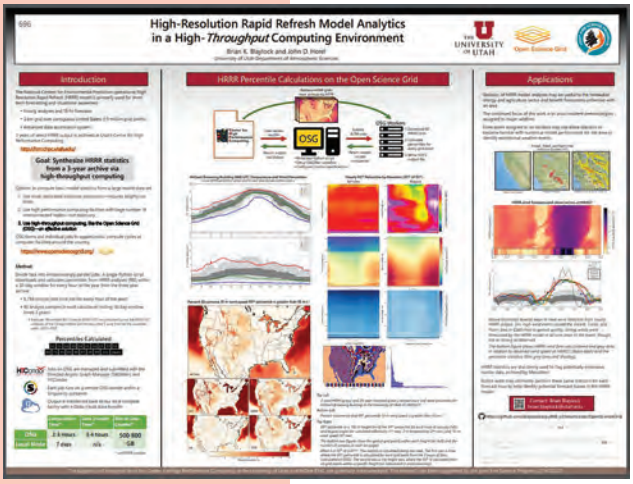


From Concept to Delivery—

Linking Practitioners with Researchers



In the aftermath of the tragic Yarnell Hill fire near Prescott, Arizona, in 2013, convective outflow wind forecasts came under criticism, and forecasters asked for validation of the models that are available to them for diagnosing atmospheric conditions that could lead to similar wind events. The operational fire weather community, namely the National Weather Service incident meteorologists and predictive services meteorologists in the Southwest U.S., asked the JFSP, through the National Wildfire Coordinating Group Fire Behavior Subcommittee, for research into this topic. The JFSP Governing Board subsequently endorsed this research topic as a critical applied research need for which the JFSP solicited applicable research proposals. Requested research focused on validating already developed models for operational purposes, with a focus on tailoring model outputs to meet end-user needs for accessible, relevant information.



University of Utah

Figure 7. Preliminary research results by John Horel and Brian Blaylock, as presented to the predictive services meteorologists.

The JFSP received nine proposals in response to the solicitation, which underwent an external peer review process that included members of the operational fire weather community. Three proposals ultimately were selected for funding, based in part on their emphasis on communicating model and tool outputs (predictions) within a risk management context that is meaningful to the operational fire weather community and firefighters. Researchers are encouraged to engage with the operational community as they conduct their research.

One of the funded projects is led by principal investigator John Horel from the University of Utah and is titled "Assessment of HRRR Model Forecasts of Convective Outflows in the Fire Environment" (Figure 7). The objective of this project is to enhance situational awareness within the operational fire weather community of the ability of the High-Resolution Rapid Refresh (HRRR) model and predictive tools that rely on its output to nowcast and forecast convective outflows. The continued focus of this work is to assist incident meteorologists assigned to major wildfires. Forecasters assigned to an incident may use HRRR statistics to become familiar with numerical model performance for the area or identify exceptional weather events.

The entire process to date involving these three projects, though not necessarily a true example of co-produced knowledge, has elements of coordination between science producer and user that future co-production models can build on. The JFSP is interested in further developing and implementing such models.

Learn more about the JFSP at:

www.firescience.gov

National Interagency Fire Center
3833 S. Development Ave.
Boise, ID 83705-5354

John A. Hall
Program Director
(208) 387-5945

Ed Brunson
Deputy Program Director
(208) 387-5975

Production services were provided by the BLM National Operations Center's Information and Publishing Services Section.

DOI Office of Wildland Fire

USGS
science for a changing world