2016 Accomplishment Report

WILDLAND FIRE MANAGEMENT RESEARCH DEVELOPMENT & APPLICATION

Integrating science, technology and fire management.

Wildland Fire Management RD&A

Photo from Cover Page: Hayden Pass Fire, Colorado on July 15, 2016. Photo Credit: Mark Hale

Contents

WFM RD&A Program Charter Summary

The Wildland Fire Management Research, Development, and Application (WFM RD&A) program was created to promote application of wildland fire scientific knowledge; develop decision support tools; and provide science application services to the interagency wildland fire community. The WFM RD&A serves as a primary point of contact for communication between scientists and participating field fire managers, as a liaison between research, wildland fire planning and operations, interagency wildland fire information technology (IT) groups, and as an advisor to program administrators at local, regional, and national levels. The WFM RD&A was initially chartered in 2006 and re-chartered in 2011 for a five year period. The charter is recommended by the Directors of the Rocky Mountain Research Station, Forest Management Sciences, and Fire and Aviation Management and signed by the Deputy Chief of Research and Development, the Deputy Chief of State & Private Forestry as well as the Chief of the US Forest Service. The charter defines the areas the WFM RD&A will work and focus their attention. The focus areas are:

- Coordinate relevant and timely fire science applications.
- Develop and support a Wildland Fire Decision Support System (WFDSS).
- Coordinate technology and development efforts for hazardous fuels and vegetation management and support interagency training in this area.
- Develop applications, disseminate information and conduct training for existing and emergent research priorities.
- Participate in and manage the National Fire Decision Support Center (NFDSC).

Technology and Science are ever changing to reflect current and future direction in the interagency wildland fire community. In the fall of 2014 the WFM RD&A also took time to update their direction by revisiting their vison and mission statements. Below are those new statements.

Vision Statement

Promote fire management innovations through the integration of science and technology.

Mission

The Wildland Fire Management Research, Development, and Application program serves as leaders and role models within the interagency wildland fire community.

We serve as a primary point of contact for communication between scientists and participating field managers, and as an advisor to program administrators at local, regional, and national levels by:

- Mentoring practitioners,
- Supporting improved and informed decision making while tying fire management activities to land management goals,
- Supporting partnerships between agencies, and
- Finding creative solutions to fire management issues and processes.

We sponsor and guide the development and application of wildland scientific knowledge; develop decision support tools; and provide science application services through:

- Technology transfer,
- Developing fire science application,
- Exploring the application of new technologies, and
- Providing advice on best practices and standards in technology development and use.

Program Organization

The WFM RD&A is a virtual organization with staff members physically located throughout the country. The organizational chart (Figure 1) shows the title and location of each staff member. More information about the staff can be found on the WFM RD&A staff webpage: http://www.wfmrda.nwcg.gov/staff_bio.php
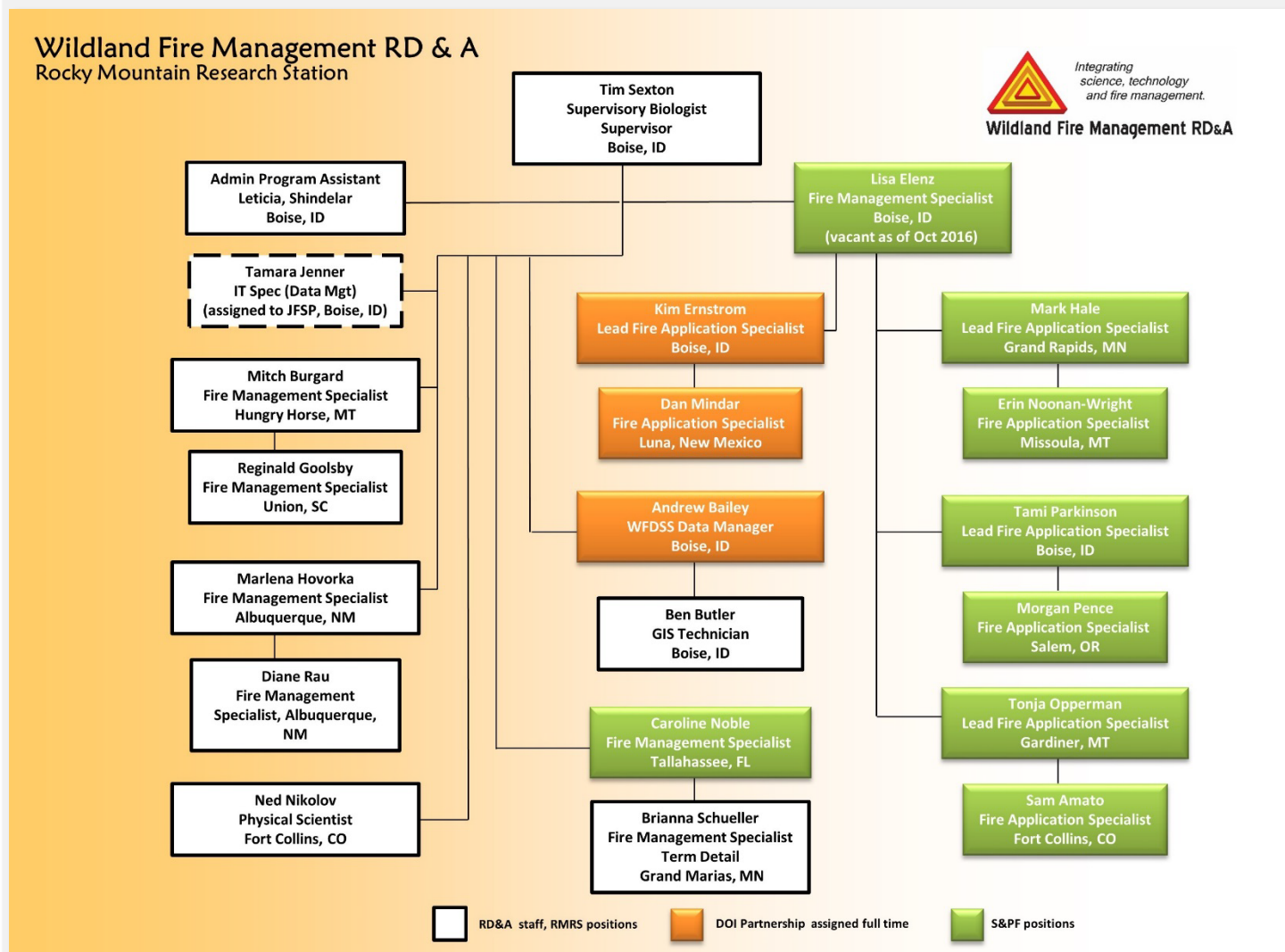

Figure 1 WFM RD&A 2016 organization chart which includes Rocky Mountain Research Station (RMRS), Department of Interior (DOI), and State & Private Forestry (S&PF) positions.

Message from the Program Manager, Tim Sexton

While the 2016 Fire Season was much less severe than the previous two, the WFM RD&A kept very busy with a wide range activities. We continue to provide decision support for wildfires on federal and some state lands through our WFDSS application as well as through personal consultation via telephone, computer, and in-person. We experienced some personnel, contracting, and priority changes that are described in this report. Some of the highlights include:

Figure 2 Tim Sexton

- Rechartering – Our initial charter expired at the end of 2016 calendar year. We have developed a new charter, updated to reflect new and emerging issues. It is pending final approval in the Washington Office.
- WFDSS – We have a new contract for WFDSS which is experiencing some episodic difficulties, but have assigned one of our own, Marlena Hovorka as interim Project Manager to ensure the new contractors get the best help to be successful.
- IFTDSS – Our new application for planning and implementing fuels management projects underwent a complete overhaul and work continues to complete development for release to full use by the field.
- Incident Risk Console (RisC) – This application has been used by the WO and many regional offices to gain situational awareness of wildfire activity within regions and across the nation.
- Communications and Science Delivery – We continue to search for ways to improve communication and delivery of science to the field. During 2016 we adopted the "Story Map" as a way to convey information, developing an interactive website for the Pacific Northwest Region to enable them to tell the story of the 2015 fire season. We also initiated a cooperative project with the University of Idaho to investigate ways to better communicate with the diverse groups we support.
- Organization changes – Lisa Elenz, Deputy Program Manager, was selected for the newly created Assistant Fire Director for Capabilities, Development, and Integration. We wish her good luck, but we really miss her contributions.
- Objectives Project – This is a continuing effort to investigate how Agency Administrators are providing direction to Incident Management Teams, how well that direction is understood, and how well it is carried out. In 2016, we focused on initial response and how line officers might ensure leader's intent for all responders and response.
- Rocky Mountain Center FCAMM – The RMC has developed a close relationship with Predictive Services and will continue to develop science-based applications for nationwide consistent use and partnership with Predictive Services.

The following report provides descriptions of many more projects we worked on during FY16. Please take a few minutes to read through the report for a review of these activities.

Awards and Recognition

Fire Application Specialist, Morgan Pence received a Smokey Bear blanket from the Forest Service Washington Office as an award in appreciation for her efforts relating to the Learning Reviews of fires in 2016. The Learning Reviews conducted by the Washington Office were to increase the capacity for organizational learning tied to the 2016 Life First Engagement Sessions conducted throughout the Forest Service. Learning Reviews were conducted on select fires to garner additional learning from the units and teams managing the incidents. Morgan and colleagues assisted by providing each Learning Review team member with a packet of material to better understand the background and history of the fires to facilitate a deeper and more thorough discussion.

FY 2016 Accomplishments

The WFM RD&A organizes projects among three broad goals as distilled from the focus areas in the charter. This section highlights FY 2016 accomplishments that support these goals.

Goal 1: Foster fire management decision support systems that are risk-based, relevant, timely, and integrated, including planning (fuels) and incident response.

1.1 Objective: Integrate research and technology into decision support systems

New Data in Response to Policy Changes

The WFM RD&A data manager and geographic information science (GIS) specialist coordinated with regional and national staff of the National Park Service (NPS), United States Fish & Wildlife Service (USFWS), and Bureau of Land Management (BLM) to incorporate several new datasets into WFDSS that improve the implementation of agency policy. Following the record of decision (ROD) and approved Resource Management Plan Amendments (RMPAs) for Greater Sage Grouse, BLM developed a series of updated habitat maps for sage grouse. These updated habitat maps are now included in WFDSS as an "all-lands" layer that increase awareness of important sage-grouse habitat areas. Spatial representations of areas where specific management requirements apply were also added to WFDSS for all BLM lands in the lower 48 states and for all lands in Alaska. When fire planning areas are drawn, the relevant management requirements are automatically added decisions that contain consistent and non-redundant language.

Amazon Web Services

The WFM RD&A program has had the opportunity to continue to test Amazon Web Services (AWS) to determine the capabilities of the cloud environment and test additional beta applications. The WFM RD&A currently hosts the Wildfires Near Me project in the AWS government cloud environment. The capabilities of AWS allows analysts to scale the needs of the system to meet the needs of the end user. In addition, the Rocky Mountain Research Station (RMRS) fire lab did testing within AWS for their beta application, WindNinja. Field personnel can load the application on their Android or Apple mobile device, through the iTunes or Google Play stores. Users can draw a polygon around an area, hit submit, and within minutes there is a full wind vector grid for the polygon that was drawn. In the past, this would have taken hours to produce and would have been limited to someone's hard drive. Now, it is available for field personnel to assist with on-the-ground, real-time decision making. Additional testing of capabilities of the beta mobile application will continue through 2017.

WFDSS Contracting

WFDSS has had several contracts this year to achieve system stability and meet user needs. The WFM RD&A team has been supporting these efforts through project management, business leads, and subject matter experts.

- WFDSS Operations and Maintenance (O&M) contract for continued operation and maintenance. This contract achieves minor software upgrades and deals with vulnerability patches.
- WFDSS Development Modernization and Enhancement (DME) contract sponsored through DOI. This contract is addressing the needs of the field. It is also deploying the latest version of foundational software.
- WFDSS Linux migration contract is a Forest Service effort to modernize the application and move it off of old hardware. This effort will be coupled with the DOI DME contract to bring WFDSS to a new operating system, foundational software, and address user needs for 2018.
- WFDSS 508 compliance audit was funded through the Forest Service. This effort audited the application, reviewed the code base, and provided constructive feedback to meet 508 compliance.

- WFDSS External Review contract was funded through a DOI effort. The review will help lay the foundation for the future of WFDSS. It will determine if WFDSS is still a viable application to meet the needs of fire managers and line officers.

WFDSS O&M and DME contracts are ongoing annual occurrences. Linux migration, 508 compliance audit, and External Review Efforts are in process and will be concluded at the end of FY 2017.

1.2 Objective: Maintain, test, identify, and suggest WFDSS application enhancements

508 Compliance

The WFM RD&A program is committed to 508 Compliance per Section 508 and has made great strides in its goal to deliver applications and products that are in line with Section 508 standards. WFM RD&A strives to be a proponent of change within the Agency; participating in the national dialog to help guide compliancy-related planning within the Agency, and sharing experience and lessons learned with others looking to gain compliancy-related skills and experience.

Applications and products are developed, maintained and delivered with compliancy in mind. Compliant practices are incorporated into contract terms and implemented as applications

Figure 3 The WFM RD&A program utilizes several tools to ensure products delivered are in compliance with Section 508

evolve. Applications and associated web pages are evaluated with Agency-provided tools and resources, as well as outside contractors for thoroughness. Web-based presentations and videos have captions, as do their downloadable counterparts. Training materials, accessible online or downloaded, are evaluated by multiple sources for compliance. The WFM RD&A program is committed to gaining the skills necessary to ensure our work meets Section 508 standards and will continue to invest time and effort into understanding where improvements to our existing skillset can be made.

WFDSS Feedback

WFDSS users regularly submit feedback in both WFDSS Training and Production to report bugs, identify errors or provide enhancement suggestions to improve tasks and/or workflow. Feedback is oftentimes the first indication of system failure/issue so it plays a critical role in maintaining system health and function. Enhancement suggestions are compiled for consideration throughout the year and help guide future development of the application.

WFDSS HelpDesk

The WFM RD&A has worked cooperatively with the Interagency Incident Applications (II-A) HelpDesk to manage WFDSS-related help tickets. Since the II-A HelpDesk transition to a new contractor (Peckham) in 2015, work has been ongoing to train HelpDesk personnel and ensure that the WFDSS knowledge base is both adequate and correct.

The WFM RD&A has developed a very positive relationship with the new contractor, resulting in good communication between the two entities and with II-A HelpDesk customers as a result. Work is ongoing to improve upon the knowledge base and increase the skill of HelpDesk personnel to help troubleshoot issues that WFDSS users report.

Incorporating New Kinds of Datasets

Two new geospatial data services were added to WFDSS in 2016: Burn Severity from the Monitoring Trends in Burn Severity (MTBS) project and the Estimated Population from Oak Ridge National Laboratory's Landscan USA dataset. MTBS provides a remote-sensing derived burn severity classification of wildfires and prescribed fires beginning in 1984.

These data provide fire managers with objective and consistent data showing severity of past fires, which may be used to determine changes to fuel loading, develop masks for landscape rule application, or evaluate risk to firefighting personnel from high severity fire in timber. MTBS is provided through a data service, which allows data to be delivered using automatic updates and therefore reduces data management costs. Landscan population provides nationwide and consistent population estimates, supplementing building cluster data and providing an objective measure of potential population exposure within fire planning areas and fire spread model outputs.

1.3 Objective: Test, identify, and suggest developments to the IFTDSS application

Interagency Fuels Treatment Decision Support System (IFTDSS)

Figure 4 IFTDSS website with portals to Strategic Planning, Fire Behavior Modeling, and Risk Assessment.

After two years of planning and contract negotiations, the WFM RD&A in partnership with the Forest Service and the Office of Wildland Fire (OWF) awarded a five-year contract to International Business Machines (IBM) in February to further the development of the IFTDSS application. Evaluation of the existing system began in February and programming of a brand new application started in June.

IFTDSS is a web application that is being designed to make fuels treatment planning and analysis more efficient and effective. Users will be able to acquire and view fire management data, critique, and edit LANDFIRE data as well as perform a variety of fire behavior, risk assessment, and fire effects analyses for planning and reporting. The existing system, IFTDSS 2.0 Beta, will remain available to users until the new application is released in early 2017.

IFTDSS is being developed around a Fuels Planning Cycle that will include Landscape Evaluation, Strategic Planning, Implementation Planning, Monitoring, and Reporting (Figure 5).

The IFTDSS team is in close communication with the Interagency Fuels Management Committee, agency advisors, and field personnel to determine priority functionality for development. Highlights for the expected first release in early 2017 include a new user-friendly mapping interface based on ArcGIS Online, a Fuels Treatment Comparison Dashboard, LANDFIRE Landscape editing tools and Fire Behavior Modeling capabilities based on FlamMap 5.0.

Figure 6 Web view of the Fuels Treatment Effectiveness Monitoring (FTEM) database.

Figure 5 Fuels Planning Cycle

Following the first release, additional functionality will come online throughout 2017 starting with the Fuels Treatment Effectiveness Monitoring (FTEM) database. This addition will allow users to enter Fuels Treatment/Wildfire interaction data into a spatial version of the current database.

The WFM RD&A, through an agreement with the University of Idaho, will provide user support and technology transfer materials that will be available within the application. Resources such as YouTube videos, webinars, and online materials will guide users through the application.

IFTDSS will be available to the five federal land management agencies as well as state, university, and other non-federal cooperators. Development will continue through the four option years of the contract and future functionality will be based on user feedback and agency direction.

1.4 Objective: Test, identify, and suggest development to emerging risk and decision making applications

Integrated Reporting of Wildland-Fire Information (IRWIN) Development and Integration

The WFM RD&A continued its participation as a partner in the IRWIN project and the National Wildfire Coordinating Group (NWCG) Data Management Committee. IRWIN, or Integrated Wildland Fire Information and Reporting, is a data exchange capability which has dramatically reduced manual data entry into WFDSS and increased consistency of data across wildland fire computer applications. Important work this year included improved data exchange with the SIT/209 application, the development of an interagency standard for managing data related to wildland fire complexes and merged fires, and improved resolution of conflicts and invalid incidents.

Incident Risk Console (RisC) Application

RisC continues to be a source of information for the Washington Office (WO) and regional staff. Users can make rapid comparisons of risk elements between fires and get incident specific detail related to resources, values, and more. Work in 2016 included adding a child and parent fire relationship therefore allowing incidents that had been complexed within the ICS-209 or Wildcad systems to be visible within a parent complex. Briefings were provided in the spring and summer to the WO and regions. The WO utilized the RisC data in a variety of ways including the 2016 Life First Engagement Session Learning Reviews, known as Inquiries.

Figure 7 Incident Risk Console (RisC) user interface

2016 Life First Engagement Session Learning Reviews – Inquiries

The WFM RD&A supported the Life First Engagement Session Learning Reviews, known as Level 1, 2, 3, and 4 Inquiries. The WFM RD&A assisted in providing the survey forms used to collect information from teams and agency administrators for the Level 1 reviews. WFM RD&A staff supported the Level 2 Inquiry discussions utilizing the Incident Risk Console, the Wildland Fire Decisions Support System (WFDSS), and other systems on an on-going basis. Staff provided background material such as maps, decision history and assessments, impacted values, and incident specific data for incident review team member and directly assisted the Level 3 Inquiries for seven incidents. Background material for one of the Level 4 Inquiries was also provided. Assisting in this effort was mutually beneficial for the WFM RD&A and the WO staff conducting the reviews. The WFM RD&A gained insight into the needs of the WO and was able to refine and tailor information to fit the need for future similar efforts.

TwitterFire and Wildfires Near Me

Throughout the 2016 fiscal year, the Wildland Fire Management RD&A continued to provide support for two beta web applications: Wildfires Near Me and TwitterFire. The 'Wildfires Near Me' web application continued to gain widespread support throughout the public community. The application focuses on bringing notifications and information to users by allowing them to monitor the places they care about during a wildfire incident. Once a user sets their preferences in the app they receive notifications any time a new wildfire start falls within a chosen distance of any and all locations they have selected. Subsequently, the emerging information a user receives through this application as a wildfire unfolds, allows them to be more prepared and engaged as the event progresses.
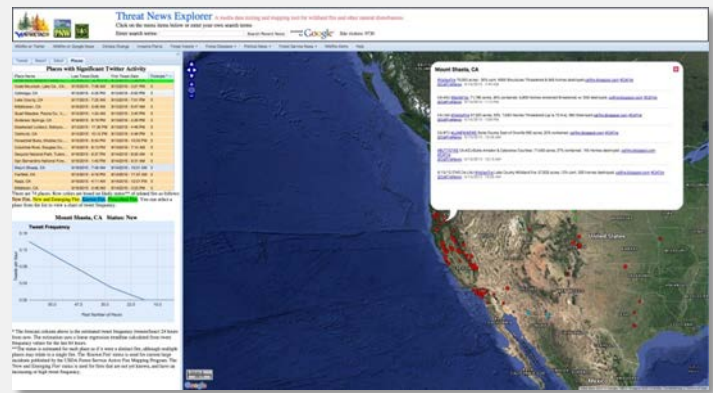
Figure 8 TwitterFire user interface

The TwitterFire application continues to be a stable resource for those looking for collated information from Twitter regarding wildfires. Built as a prototype test to determine if an early warning system could be driven by tweets about wildfires, the application has proven to be a worthy companion to the newer 'Wildfires Near Me' app. Combining data with public tweets has given our users a unique picture of the wildfire environment and allows for one-stop-shopping for current information about fires.

The WFM RD&A plans to continue supporting both beta versions of these web applications into the future and is currently actively looking for a partner to take over the day-to-day management of the Wildfires Near Me web application.

Goal 2: Conduct technology transfer activities that foster innovation, improve risk-based decision-making, and promote the use of these tools by the interagency wildland fire community.

2.1 Objective: Train the wildland fire community in utilization of the products we create/sponsor

Integrating Fire into Land Management Plan Revision

In 2016, the WFM RD&A continued to support development of a technical guide for Land Management Plan (LMP) revision by being part of an interdisciplinary team to contribute expertise, write, and edit sections of the technical guide. This guide will help fire managers better integrate wildland fire into plan components. Wildland fire plan components will be used to support land management decisions and spatial fire planning. Completion of the technical guide is anticipated for early spring 2017.

S-495 Geospatial Fire Analysis, Interpretation, and Application Course

Many WFM RD&A staff continue to work as mentors, coaches, instructors, steering committee members, and as co-chair of the S-495 Geospatial Fire Analysis, Interpretation, and Application course. S-495 is the premier, national-level training class that teaches many of the fire behavior modeling tools in the Wildland Fire Decision Support System (WFDSS). WFM RD&A members strive to teach the applied uses of fire behavior modeling outputs to inform strategy and the ultimate decisions made on wildland fires. In FY 2016, many of the staff assisted with the online portion of the class that introduces students to the WFDSS environment and how to do spatial fire behavior modeling. The WFM RD&A staff look forward to teaching the one-week class portion to 55 students at the National Advanced Fire and Resource Institute (NAFRI) in Tucson, AZ the week of April 2, 2017.

S-590 Advanced Fire Behavior Interpretation – Teach, Coach, Mentor, and Chair

Figure 9 The Boreal Fire was a new exercise developed for S-590 in 2015

WFM RD&A staff worked as coaches, instructors, and steering committee members for the S-590 Advanced Fire Behavior Interpretation held at the National Advanced Fire and Resource Institute (NAFRI) in Tucson, AZ. Staff members assisted with pretesting, coaching students, and teaching sessions during the two week course held from March 7 – 18, 2015. In 2015, portions of the classroom sessions were updated and staff helped with development and beta testing of a new module. The new module "Boreal Fire" incorporated updates to modeling and exposed students to fuel types in the northeast (Figure 9) as well as the Canadian Forest Fire Danger Rating System, commonly used in the Great Lakes region and Alaska. Students ran through scenarios over the two week period in which they were given various pieces of information to interpret and then had to write fire behavior forecasts, present different types of briefings, and prepare documentation. Students learned how to gather and interpret data to give briefings that will help firefighters and agency administrators with decision-making when managing resources to protect values while considering firefighters and public safety on a wildfire incident. Students passing the class can pursue qualifications as a Fire Behavior Analyst (FBAN) and/or Long Term Fire Analyst (LTAN).

Advanced Fire Environment Lessons Unit

The Advanced Fire Environment Learning Unit, a NWCG sponsored group, strives to provide accessible continuing education opportunities to fire behavior specialists via facilitation of webinars and workshops. This year, the group sponsored a 2016 Lessons Learned Webinar attended by approximately 80 folks to review salient case-studies of the fire season. Near-term fire behavior and perspectives of an Incident Meteorologist on the Soberanes Fire in Big Sur, California along with using MesoWest data from Alaska were among the topics discussed.

Figure 10 Advanced Fire Environment Learning Unit title slide

Mentee Program Oversight & Long-term Detailers

The Wildland Fire Management RD&A hosted three mentees for two-week assignments during the summer of 2016. Casey Teske, Grand Canyon National Park; Daron Reynolds, Medicine Bow-Routt National Forest, and Sean McEldery, BLM Southern Nevada District Office all played a critical hand in helping WFM RD&A to support wildfires through fire modeling and decision support.

Figure 11 Wes Hall

The WFM RD&A's mentee program provides field practitioners an opportunity to improve their analysis skills and work virtually with the WFM RD&A on on-going projects. The WFM RD&A supported two long-term detailers in FY 2016. Diane Abendroth, Fire Ecologist from Grand Teton National Park assisted with analysis and decision support during the 2016 wildfire season. Diane traveled to three incidents and supported a total of 20 wildfires during her 120-day detail. She also assisted with IFTDSS testing and was instrumental in completing a large portion of research for the Incident Control Console (RisC). Wes Hall, Resource Specialist on the Coconino National Forest, detailed to the WFM RD&A and helped with Amazon Web Services and IFTDSS testing and support as well as WFDSS documentation and decision support.
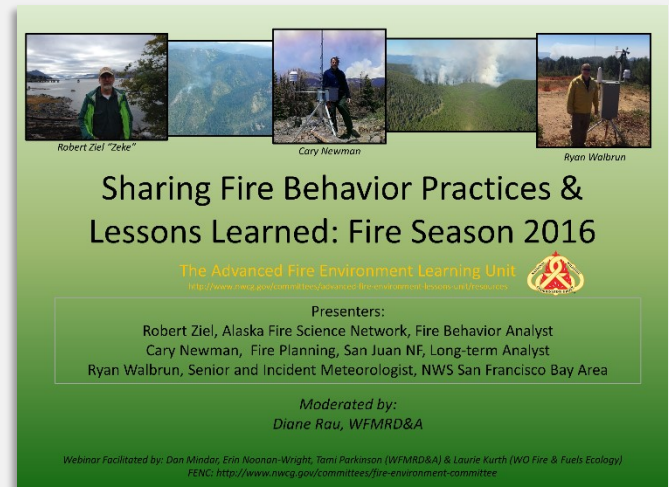

Figure 12 Diane Abendroth

Incident Objectives Project – Clear and Concise Communication

Members of the WFM RD&A meet weekly to discuss ideas for improving strategic decision-making in the wildland fire environment. This project started by providing guidance on articulating limited and clear WFDSS Incident Objectives and Requirements after several meetings with agency administrators and Type 1/Type 2 Incident Management Teams. In FY 2016, we focused on Type 3, 4, and 5 fires at the local level in the Forest Service by interviewing administrators, fire management officers, fire planners, duty officers, and firefighters in several states to determine how local units are establishing and delivering Leader's Intent for initial attack. Groups of 4-15 individuals gathered to discuss questions about reactions to the 2016 Chief's Letter, pre-season guidance for firefighters, discussions with cooperators, use of WFDSS, determination of risk, using fire for resource benefits, locally developed written guidance, training scenarios, and use of technology for managing fires. The most compelling discussions centered on the idea of "unnecessary exposure"—defining it, abiding by it, and weighing options. Notes were assembled in an anonymous fashion by topic to be used in developing future regional and national direction. We hope to continue these types of meetings in 2017, focusing on topics relevant to the fire management community.
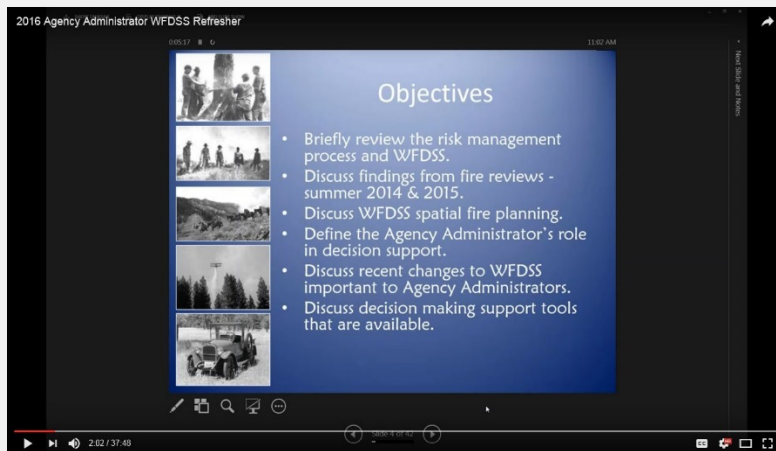
Figure 13. Excerpt from the 2016 Agency Administrator WFDSS Refresher which addressed the Incident Objectives Project

The Incident Objectives group proposed a new outline for Briefing Packages, Delegations of Authority (DOA), and Leader's Intent based on information from several units. The purpose was to avoid redundancies among these documents and overlap with WFDSS Decisions. Redundancies tend to manifest as confusing direction as an incident continues or increases in complexity. The edits were given to the Red Book Committee for inclusion in the 2017 version.

An early summer email was sent to national fire leaders, detailing avenues for finding assistance with strategic fire decision-making. We received positive feedback on the content of the message, but users want a central location to find information, rather than wading through email. We are investigating ways to build a decision-maker's "toolbox" on our website for one-stop shopping. Providing easily accessible tools to managers is important to fulfilling our mission and we are open to more ideas from users.

A video explaining how to assess risks to natural and cultural resources was produced based on experience managing long-term fires in the Northern Rockies. This video is on our website and shows one way to use fire probability, resource-specific fire effects, and fire behavior predictions in a format that can be presented during the 24-hour operational planning cycle in order to assess the need for actions. The WFM RD&A welcomes feedback on this process or alternatives being used at the incident level.

Delegation of Authority, Leaders Intent, and Briefing Package – Template Updates and Red Book Changes

In 2014, the Forest Service Fire & Aviation Management (FAM) leadership requested a field review of WFDSS decision documentation. It was noted that Incident Objectives written in many decisions were not site specific. Instead, they were general and applicable to any acre on any landscape. Additional findings noted that many Delegation of Authority (DOA) letters, Leaders Intent, Briefing Packages, and the WFDSS decision documentation were inconsistent, and at times in conflict of each other, resulting in unclear direction to Incident Management Teams (IMT). It was challenging for the IMT's to interpret and implement the expectations from all of these documents because they had priorities or expectations which differed. In response to these inconsistencies, the WFM RD&A program developed several example documents to use as templates for the DOA, Leaders Intent, and Briefing Package for field use. These documents were shared with the field in 2016 for implementation and testing. Feedback was incorporated into the templates and changes were made to the associated templates housed within the Interagency Standards for Fire and Aviation Operations, most notably, the "Red Book".

Virtual Training for Agency Administrators

Two virtual trainings were hosted through webinars – "Decision Making in WFDSS for Agency Administrators" and "2016 Agency Administrator WFDSS Refresher". The trainings provided a review of what Agency Administrators need to know about WFDSS and recent WFDSS changes they need to know, highlights of the Incident Objectives and Incident Requirements project, Spatial fire planning and why it is important, and lastly a review of the decision support tools that are available and how to request support. There were approximately 150 attendees for each webinar session. The webinars also included an allotted time for question and answers, allowing the attendees to interact with the presenters. The trainings are still hosted at the following website: http://www.wfmrda.nwcg.gov/line_officer_resources.php.

Spatial Fire Planning (SFP)

2016 was very busy as Forest Service units worked to get spatial fire planning implemented in WFDSS by fire season. As of September 30, 2016, 83 Forest Service units and 28 Department of Interior units had converted to Spatial Fire Planning (SFP), with 46 Forest Service units switching to spatial fire planning in FY 2016. WFM RD&A staff assisted with putting on workshops, presentations, and completing reviews of regional spatial fire planning efforts. In December of 2015, a review of all Region 9 Land Management Plans (LMP) was completed as well as a workshop to develop implementations strategies for 2016. Staff assisted a number of units including the Chippewa and Siuslaw National Forests with SFP implementation to learn and help develop strategies for future units. In late February 2016, WFM RD&A staff also assisted with a workshop and review of all LMP's for Region 2, reviewed LMP's for Regions 4 and 8, and assisted regionally with implementation of SFP.

Staff assisted the Pike and San Isabel National Forests during the summer and fall of 2016 in work with local partners including the Colorado Springs Utilities, Arkansas River Watershed Collaborative, Coalition for the Upper South Platte, Colorado Department of Public Health and Environment, and the City Of Victor, CO to identify risks to drinking water and infrastructure on both federal and private lands. This effort will be incorporated in the Pike and San Isabel National Forests SFP to enhance decision making.

In an effort to train data managers to implement SFP, a training webinar was developed and two virtual training sessions were held in February and March of 2016. These hour-long webinars were well received and were attended by 119

Figure 14 WFDSS data management training webinar posted to YouTube

participants from the Forest Service and Department of Interior. The webinar was also recorded and uploaded to YouTube for future learning. It is located at: https://www.youtube.com/watch?v=Tgt0zG9q0N0&feature=youtu.be. In addition, the WFM RD&A staff also put on presentations for the National Fire and Fuels Planner Conference in Spokane, WA and two virtual presentations for the National Park Service National Fire Planning and GIS Meeting and the Nevada State Bureau of Land Management Fire Planning Workshop.

2.2 Objective: Increase customer awareness of the Rocky Mountain Center and integrate their products into wildland fire management systems

Rocky Mountain Center (RMC) Reorganization

The Rocky Mountain Center (RMC) went through a reorganization phase in FY 2016 aimed at improving the efficiency and cost-effectiveness of the project, including the development of a 6-year Strategic Plan featuring 13 major research development projects designed to meet the increasing weather and smoke forecasting intelligence needs of fire and air quality managers across the lower 48 states and Alaska. The projects were identified and agreed upon with the active participation of numerous field users. The RMC Steering Committee has reviewed and approved the Strategic Plan in the course of several sessions. The RMC has also put together a new Business Management Plan for FY 2017, which analyzed various contracting options and identified a cost-effective approach to conducting research and development in partnership with Colorado State University Cooperative Institute for Research in the Atmosphere (CIRA). This new partnership will allow RMC to tap into the vast weather-modeling expertise of one of the top departments in atmospheric sciences in the country.

2.3 Objective: Seek opportunities to learn from and collaborate with domestic and international entities that produce and disseminate science and technology that has the potential to benefit the wildland fire community

Ecosystem Restoration & Integrated Fire Management, Indonesia

In February 2016, Mark Hale, Lead Fire Analyst, traveled to Jakarta and Sampit, Indonesia assisting International Programs in collaboration with United States Agency for International Development (USAID) and Michigan Tech University to develop and deliver training and field practice in Peatland Ecosystem Restoration and Integrated Fire Management. Peatlands play a critical role in the ecology and economics of the region. Peatlands also play an important role globally storing approximately 5% of the world's terrestrial carbon. In the fall of 2015, portions of Indonesia saw one of the worst fire seasons in years. Smoke from 2015 peatland fires impacted the entire region and lingered above unhealthy levels for several months in many areas, including the town of Sampit.

Figure 15 Indonesian Ministry with training organizers and presenters, Mark Hale fourth from the right

As part of the trip, a meeting was held in Jakarta with members of the Indonesian State Department, International programs, Forest Service, and USAID to discuss training opportunities and the training session in Sampit. The training in Sampit was given in Bahasa Indonesian using a translator and included sessions on restoration of peatlands, fire management, and a one-day field trip. In the classroom, attendees from Ministry and local/village governments learned about peatland ecosystems, restoration, and fire management (Figure 15). Attendees were able to work as integrated groups to share ideas, discuss issues and provide potential solutions. Timber operations in Indonesia utilize hand dug ditches that use water in peatland systems to transport timber harvest to canals where they can be shipped out for commerce. These

Figure 16 Students observe and participate in a demonstration on ditch blocking in Central Kalimantan, Indonesia

ditches contribute to drying of peatlands which result in uncharacteristic wildfires that are hard to extinguish and produce large volumes of dense smoke. During the field trip, attendees discussed fire management, learned methods for blocking ditches (Figure 16), and visited local projects, camps, and tree nurseries assisting in restoration efforts of affected areas.

Collaborating with Minnesota Department of Natural Resources to Host Indonesian Journalist Looking at United States Management of Peatlands

In early spring, the WFM RD&A collaborated with the Minnesota Department of Natural Resources (DNR) and the United States Department of State Foreign Press Center to host a foreign journalist from Indonesia. Mark Hale of the WFM RD&A worked with the Minnesota DNR to plan the journalist's visit to the Minnesota Interagency Fire Center (MIFC) to highlight how the United States manages wildfires in peatlands. Mark participated in interviews and was featured as part of a series on Peatlands on Kompas Malam television in Indonesia in late August of 2016 (Figure 17).

Advanced Technology in the US to Extinguish the Fire
[Click here to watch the Indonesian television clip](#)

Figure 17 Mark Hale discussing firefighting tactics in Minnesota for the Indonesian television series

Figure 18 Wildland Fire Decision Support Collaboration Workshop Summary cover page

WFDSS, Canada

The WFM RD&A participated in the Decision Support Collaboration workshop in Alberta, Canada in April 2016. The intent of the workshop was to assess the ongoing Ontario, Alberta, and United States projects to determine if there are collaborative opportunities. A list of action items were created to follow-up in sharing decision support tools, education materials, and fire science projects. The WFM RD&A's involvement with Canada may provide opportunities to share decision support tools as well as provide better fire behavior modeling in the boreal forests.

Workshop Objectives:

1. Explore common challenges and initiatives in order to improve the collaborative environment and discover opportunities for the future.

2. Develop a list of action items to ensure the collaboration discussion does not stop after the workshop.

2.4 Objective: Improve technical transfer mechanisms for broader audiences in the following categories: 1) Promote solutions that lead to broad use and sharing of interagency wildland fire data, 2) Promote the most current science and research in operational products, 3) Software and hardware technologies

Interagency Data Cache

Working with the NWCG's Geospatial Subcommittee, Fire Reporting Subcommittee, and Data Management Committee, WFM RD&A has taken a leadership role in defining requirements for an Interagency Data Cache (IDC). The IDC would combine aspects of a repository and a data store/data mart to serve wildland fire applications by providing authoritative and trusted interagency data. Currently, wildland fire agencies, programs, and projects produce, consume, and maintain numerous independent datasets to support various applications without a strategy for central storage or comprehensive data integration. This has been documented as a significant technology shortfall leading to limited accessibility, duplicative data collection, incomplete datasets, and inconsistent data and quality standards. By working with wildland fire business areas to define requirements and with agency IT programs through the Wildland Fire Information Technology (WFIT) process, WFM RD&A efforts are leading towards a more efficient and effective use of technology in wildland fire.

Collaborative Efforts to Advance Wildfire Risk Assessment Applications – Large Fire Simulator (FSim) Workshop

On January 20, 2016, a small group of risk assessment modelers from the Rocky Mountain Research Station (RMRS), Pacific Northwest (PNW), Enterprise Teams, Fire Modeling Institute, Pyrologix, and the WFM RD&A met at the Forestry Sciences Laboratory in Missoula, MT to discuss calibrating FSim, the large fire spread simulator. The objective was to share methods of wildfire risk assessments spanning from landscape to national levels. Outcomes of the workshop included best practices and workflows to better define FSim's capacity, strengths, and weaknesses in assisting with wildfire risk assessments. The model developer, Mark Finney, was present to provide a background of the initial FSim application and early development. The workshop was attended in-person and virtually by 20 people and facilitated by Karin Riley of the Human Dimensions Group and Erin Noonan-Wright of the WFM RD&A.

Wildland Mobile Technologies Working Group (WMTWG)

The WFM RD&A has played an integral role in the structure and overall maintenance of the Wildland Mobile Technologies Working Group (WMTWG). WFM RD&A participated in the initial development of the working group in 2011. One of the projects the working group assisted with this past year was to help the Wildland Fire Safety Training Refresher (WFSTAR) program put together a Fire Technology Unit. This can be found at this website: https://www.nifc.gov/wfstar/library_EquipAviation.html#Tech. Further information and links regarding mobile technologies can be found here: http://www.wfmrda.nwcg.gov/mobile_technology.php.

National Line Officer Team Webpage

The WFM RD&A has assisted the National Line Officer Team (NLOT) in standing up a public facing webpage (Figure 19). The intention of the site is to provide tools and contacts for fellow line officers to be successful in meeting their fire management responsibilities and expectations. In addition, the NLOT is the FS conduit for agency administrators to raise awareness on emerging issues and ensure perspectives are shared with the National Fire Leadership. More information on who the NLOT is and what they do can be found at: http://www.wfmrda.nwcg.gov/national_line_officer_team.php.

Figure 19 NLOT page on the WFM RD&A website

Monthly Seminar Series

We organize a monthly internal "seminar series" for WFM RD&A employees to become acquainted with fire-related research from a variety of entities including universities, research laboratories, USDA/DOI research scientists, and private software developers. The seminar is held virtually with a 40-minute presentation and a 20-minute Q&A period. In many cases, discussions lead to future collaboration. The past year included talks from Dave Calkin and Kit O'Connor (firefighter exposure); Louis Fleming and Jim Riddering (fire behavior and weather database project); Matt Jolly (dynamic, severe fire weather potential maps); Russ Parsons (emerging tools for next generation fire science); Mark Finney (biophysical factors of fire management); Chuck Maxwell (decision support systems); Rochelle Pederson and Andrew Bailey (IRWIN data exchange); Matt Reeves (rangeland vegetation simulator); and Crystal Stonesifer and Erin Belval (wildland firefighting suppression resource use). Talks are welcome from any research or development related to wildland fire operations or decision-making. Anyone interested in presenting should contact the WFM RD&A team.
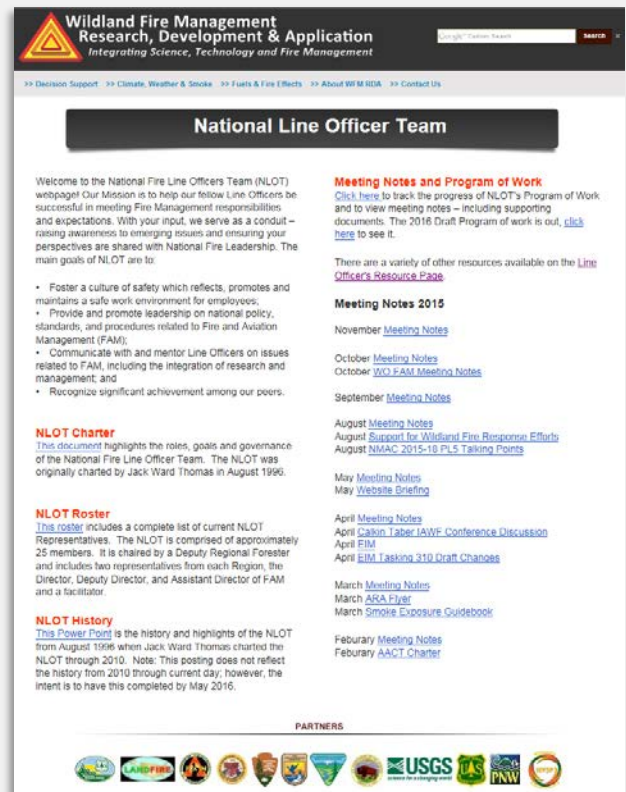
2.5 Objective: Support the field with timely and risk-based decisions

WFM RD&A Staff Helps Line Officers and Fire Managers Over 3,500 Times in FY 2016

One of the primary tasks of the WFM RD&A team is to support line officers, fire managers, and fire fighters with decision support on wildland fires. In FY 2016, formal and informal support totaled to 3,577 times WFM RD&A staff helped someone with decision support, assistance with spatial fire planning, and other WFDSS tools and data used on wildland fire incidents. The total number of *formal* support tickets in FY 2016 was 2,206 (Figure 20). Formal support includes contacts to the WFDSS HelpDesk via email or phone and Tier 2 Support for when the HelpDesk in unable to resolve an issue. In addition to formal support, the WRM RD&A staff receives informal questions throughout the year from users and colleagues. This amounts to over 1, 371 phone calls or emails that the WFM RD&A staff receives and answers.
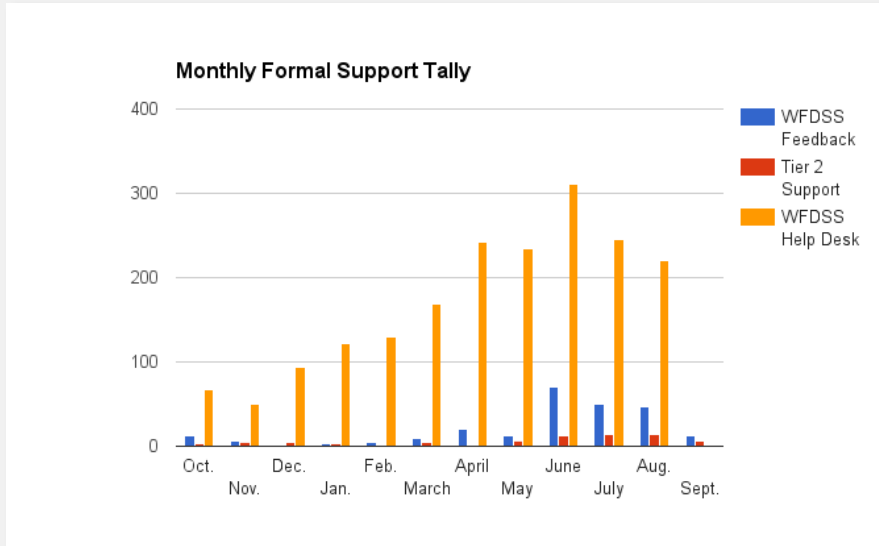

Figure 20. FY 2016 formal support including the Wildland Fire Decision Support Systems feedback, Tier 2 support and HelpDesk tickets. Tier 2 support are complicated questions that require answers from WFMRD&A staff.

Throughout the year, there are requests from WFM RD&A staff to apply their expertise in technology, analysis and decision support to assist with wildfires in a more involved manner. WFM RD&A staff assisted over 55 wildfire incidents in person or remotely, working with fire managers and line officers; or inserted as team members as Fire Behavior Analysts, Long-term Analysts, or Strategic Operational Planners. Analytical support includes running spatial fire behavior analyses including Basic, Short-term, Near-term and FSPRO fire behavior models to predict fire spread and assist with risk assessments. Also, increased expertise in fire effects analysis continues to be needed when home units use wildland fire to help keep forests healthy. Running analyses was by far the most requested type of support (Figure 21).

The majority of support provided was to the Great Basin, Rocky Mountains, and Northern Rockies (Figure 22). Given the slower fire season in 2016, Type 3 incidents received the most support followed by Type 2 and Type 1 incidents, respectively (Figure 23). WFM RD&A members continually seek to build skills and abilities in the field and on local units. To support that goal, team members trained or mentored 10 individuals while supporting 65 incidents in FY 2016.
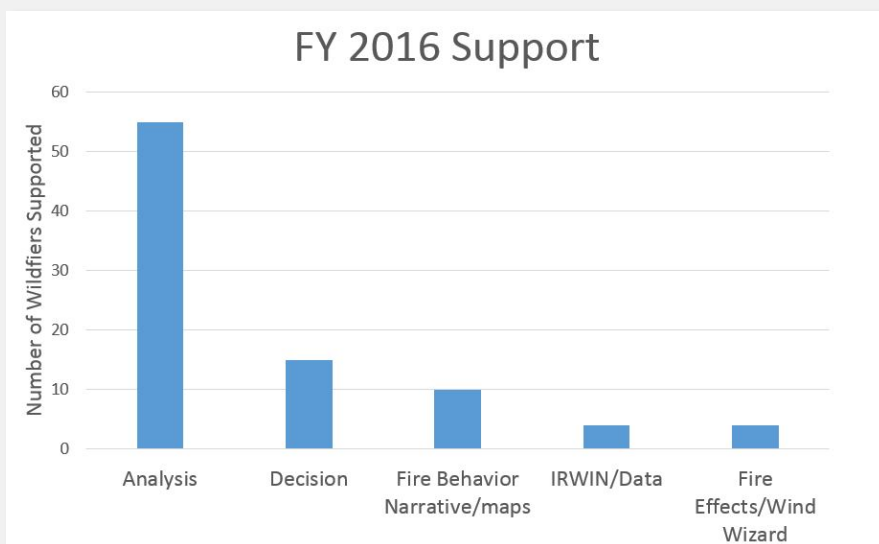

Figure 21 FY 2016 support included help with analysis, decision support, fire behavior narratives and map products, IRWIN reports and data requests, and fire effects and wind wizard analysis.

There were a total of 1,390 published decisions in WFDSS in FY 2016. In addition, there were 525 wildfire incidents that had at least one decision in WFDSS. 57% of those decisions were from the Forest Service, followed by 30% from the Department of Interior, and 13% from state, county, and local governments.
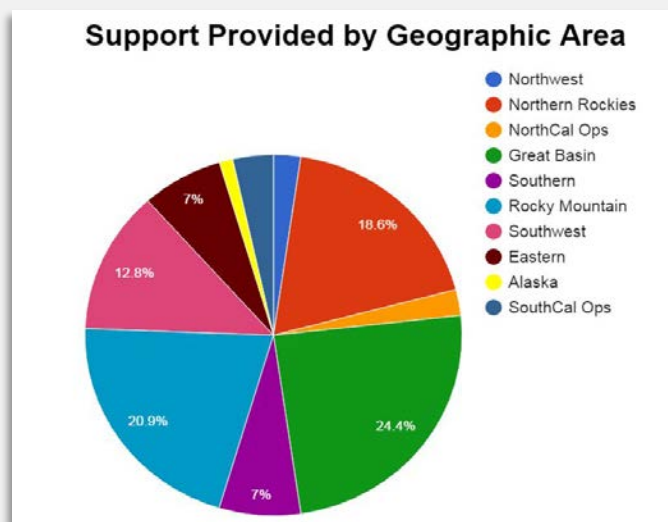

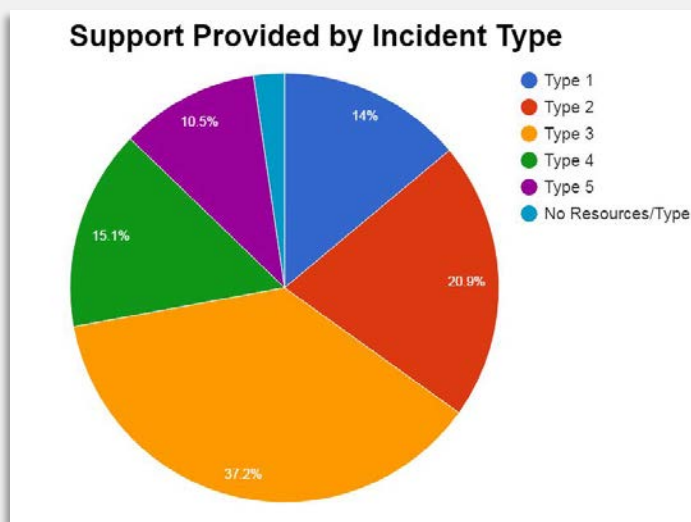*Figure 22 Support provided by geographic area.*

Figure 23 Support provided by incident type.

Goal 3: The Wildland Fire Management RD&A connects with stakeholders to modify projects and evaluate future needs.

3.1 Objective: Work with field practitioners to understand management needs

Geographic Area Editor Coordination

The WFM RD&A continues to maintain regular monthly communication with the WFDSS Geographic Area Editors (GAEs) who represent the interagency fire community with regard to WFDSS users and needs. GAEs provide feedback and comments to the WFM RD&A and coordinate as a group on issues and concerns that affect WFDSS users. Annual After Action Reviews (AARs) are held to review the previous year's successes and areas for improvement. Priority tasks are identified and tracked regularly through interaction. 2016 saw many new GAEs in all of the federal agencies as retirements and turnovers brought in new GAEs. Most notably this year, GAEs helped to clean up duplicative direction between NWCG memos, the Red Book, and the WFDSS Help to ensure quality information is available to the field.

Support Interagency Dispatch Improvement Project (IDIP) on Requirements for GIS Support of the CAD

The WFM RD&A data manager worked with the Interagency Dispatch Improvement Project (IDIP) to clearly define geospatial data access issues facing the wildland fire dispatch community. Tasks completed included an issue paper directed towards NWCG business stakeholder groups which included the National Coordination System Committee, Data Management Committee, and Geospatial Subcommittee, a list of required datasets to support local dispatching and incident decision-making, and coordination with the Rocky Mountain Geospatial Technology Committee and NWCG Geospatial Subcommittee.

3.2 Objective: Work with researchers to ensure that latest science is relevant and applicable to field needs

Fire Extremes Project

A three-part project was developed to begin addressing the question, *is fire behavior becoming more extreme*? The first part of the project aimed at understanding wildland firefighter's perceptions of extreme fire behavior and identifying if these perceptions have changed over time. Between July 2014 and June 2015, 237 narratives were collected from firefighters in the United States about their experiences with how they felt fire behavior was "unexpected, challenging, or unusual." These stories were collected primarily from students attending fire behavior courses (such as 490), but also at fire camps and individual units, such as district offices and field crews. A final report for this first part of the project should be released in the near future. The second part of the project focused on a quantitative approach that identified how energy release component values have changed over time at specific geographic locations. The third part of the project will look at how fire behavior experts perceive changes in fire behavior over time – this data will be collected through on-site or phone interviews.

Fire Weather Database

The WFM RD&A helped to sponsor a graduate master's project that created a one-stop shop for fire behavior and weather information produced during wildland fires. Traditionally, these data are stored as hard copies in boxes at the home unit and difficult to recover. The project created a spatially delineated, web-enabled platform to provide fire behavior specialists and incident meteorologists with the ability to upload their forecasts and chronologies. Storing this information via an online database during a wildland fire makes it easier to reference for future fires that are nearby and will promote information sharing and lessons learned regarding wildland fire behavior.

3.3 Objective: Work with the Washington Offices to ensure national interagency coordination

Staff Rides

Staff rides provide continuing education opportunities on-site for personnel to discuss fire behavior, leadership, crew dynamics, risk factors etc. Tami Parkinson, Lead Fire Application Specialist, was asked by the Salmon-Challis National Forest to assist in pulling together historical analyses and data to support the Butte staff ride. The first formal Butte staff ride was hosted in June 2016 because it was cancelled in 2015 due to travel restrictions.

Butte Fire Staff Ride, June 29-30, 2016

Tami Parkinson, Fire Application Specialist and FBAN was asked to participate in the first Butte Fire staff ride located on the Salmon-Challis National Forest. The Butte Fire (also known as the Long Tom Complex) occurred in 1985 and 73 firefighters deployed their shelters during the incident on August 29th. Tami teamed up with Chuck McHugh (LTAN) from the RMRS fire lab and local specialist Ken Rogers (FBAN) to provide a presentation to the participants with regard to the fire environment, weather factors associated with the burn over (predicted and forecasted), terrain features of the area, and associated fire behavior. The presentation also included a discussion of the fire models as available in 1985 and what is available to help inform decisions today.

Figure 24 Jim Steele, operations on the Butte Fire, provides a briefing to participants on the Butte Fire staff ride.

Tami Parkinson participated in an abbreviated Dude Fire staff ride in Arizona during October of 2015 as part of the Fire Behavior Subcommittee (FBS) meeting. The FBS tries to incorporate a staff ride into their meetings at least once per year. Staff rides offer a considerable learning platform for FBS members. Membership of the FBS includes Researchers, Incident Meteorologists, Predictive Services Meteorologists, Fire Management Officers, Fire Ecologists, and Public Affairs Officers. Qualifications within the group include: Type 1 Incident Commander (trainee) (ICT1), Operations Section Chief (OSC1/OSC2), Fire Behavior Analyst (FBAN), Long-term Fire Analyst (LTAN), Incident Meteorologist (IMET), Public Information Officer

Figure 25 Dude Fire sign provides a summary of events on the entrapment fire.

Type 2 (PIO2), and Prescribed Fire Burn Boss (RXB1/RXB2). The group has a vast amount of fire experience which further enables the discussions and learning environment of staff rides. FBS worked with the state of Arizona to contact the FBAN assigned to the Incident Management Team (IMT) at the time of the Dude Fire fatalities. This individual led the Dude Fire staff ride for the subcommittee.

Risk Terminology

Several WFM RD&A members helped plan and participated in the first Risk Summit held in Tucson in December 2014 and again in 2015. The Risk Summit was convened because risk assessment and management is a critical part of managing any fire but the concepts are not well defined. Throughout 2016, efforts were made to refine risk terminology to help all partner's focused on risk to understand the main terminology. Dan Mindar and Tim Sexton were part of this effort leading to a general technical report called "Risk Terminology Primer: Basic Principles and a Glossary for the Wildland Fire Management Community."
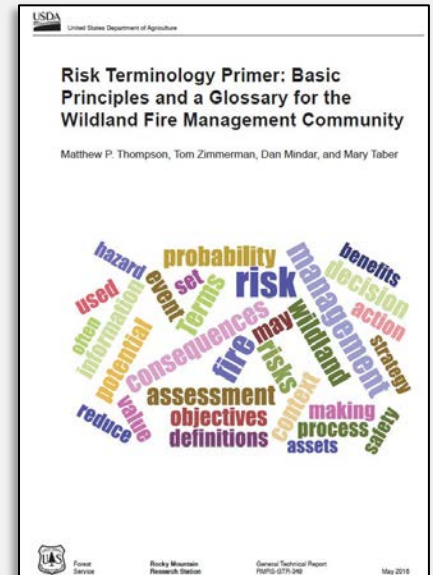

Figure 26 Risk Terminology document cover page.

3.4 Objective: Communications with collaborators improve WFM RD&A functions (includes local, state, and non-government entities)

Graduate Student Project to Enhance Communications and Technology Transfer of Wildland Fire Science to Managers

As part of a collaborative effort to enhance communications and technology transfer of wildland fire science, the WFM RD&A worked with the University of Idaho to help develop and fund a master's project. During 2016, WFM RD&A staff assisted the University with the application process and selection of Peter Noble as a master's candidate. Currently, a proposal has been submitted by Noble to assess existing or potential user's preferences for a variety of trainings promoted by the WFM RD&A program. Project members will design data collection to obtain preferences from a variety of land management agencies and emergency services, including individuals at different stages in their career. A second goal of the project is to assess existing user's perceptions about the effectiveness of the WFM RD&A program content and delivery. Results of data collection and analysis on this topic will form the basis for recommendations about ways to improve or expand content delivery in ways that will be most effective for a variety of end users. Work on this project is expected to be underway during the summer of 2017 with data collection and analysis occurring in the late summer and fall of 2017.

Goal 4: Staff maintain and increase professional qualifications and explore professional interests that augment the WFM RD&A.

4.1 Objective: Developmental and continuing education opportunities are provided for our staff

Project Management of the Wildland Fire Decision Support System (WFDSS)

As federal employees retire, opportunities are presented to the WFM RD&A staff to fill those gaps. Marlena Hovorka is currently Project Manager of WFDSS behind Dorothy Albright. The WFM RD&A has entered into a Memorandum of Understanding (MOU) with the Fire and Aviation Management (FAM) IT program to provide Marlena's assistance with the project management duties.

Figure 27 Marlena Hovorka

WFM RD&A Detail to the National Fire Desk

WFM RD&A Fire Application Specialist Morgan Pence completed an assignment with the National Fire Desk (NFD) in the National Headquarters of the Forest Service in Washington, D.C. The NFD collects and classifies wildland fire and hazard intelligence and disseminates timely, accurate, and concise information to the Forest Service and USDA leadership. Morgan supported the NFD in September 2016 (and previously in 2014). The NFD heavily relies on detailed employees during fire season. WFM RD&A has sent staff to the NFD for the past four years. These assignments provide staff with opportunities to understand fire reporting and incident information delivery to various audiences.

Figure 28 Morgan Pence at the National Fire Desk in Washington, D.C.

Opportunities with the Fire Learning Network – Prescribed Fire Exchange

WFM RD&A Data Manager Andrew Bailey participated in the Northern California Prescribed Fire Training Exchange program, or "TREX", during October 2016. Training exchanges are deliberately designed to create opportunities for trainees to work on their position task books and receive evaluations from qualified trainers. Meanwhile, the host units get qualified workers to help with large or complex burn events. Andrew was able to work on eight fires in a 12-day period and complete portions of his Fire Effects Monitor and Engine Boss task books. During the course of the event, he gave a presentation to the cadre and participants on WFDSS and large fire decision support. Andrew also worked with the Southern Idaho Timber Protective Association (SITPA) for five weeks this summer as an engine boss trainee while providing instruction, technology transfer, and assistance to SITPA using next-generation mapping and mobile technology tools.

Figure 29 Andrew Bailey working on a fire

Continuing Education at the University of Montana

Erin Noonan-Wright, Fire Application Specialist, is in her third semester at the University of Montana focusing on refining her programming, statistics, and ecology skills to explore decision-making trends and risk perception as reported in the Wildland Fire Decision Support System (WFDSS) database. She is working with the University of Montana, Fire Center as part of this effort.

Figure 30 Erin Noonan-Wright

Closing Comments and Future of the WFM RD&A

In 2017, the WFM RD&A will continue to deliver the best available science to the field in support of wildfire decision making and the wide range of related wildland fire topics. We look forward to a beta release of IFTDSS during the late spring. This application promises to improve effectiveness and efficiency in developing hazardous fuel projects as well as prescribed fire planning for resource management. We will continue to improve the basic functioning of WFDSS while developing plans for a complete overhaul of the application to modernize the software and architecture.

We are continuing to work with US Forest Service research colleagues to improve decision-making on wildfires. We will provide training and in-person assistance to ensure local Fire Managers and Agency Administrators are fully supported when wildfires occur and require advanced levels of analysis.

Figure 31 Tim Sexton

Figure 32 WFM RD&A Staff - fall 2016

We are using our University of Idaho agreement to help us improve our communication and science delivery via a broad range of techniques including webinars, online training, podcasts, YouTube videos, blogs, workshops, and classroom training.

We are implementing a mentoring program designed to increase analytic capacity at the regions and local units. One goal of the mentoring program is to recruit members of under-represented groups to increase their representation in our work force.

Thank you for reviewing last year's work. We look forward to another interesting and productive year!

FY 2017 Planned Activities

Goal 1: Foster fire management decision support systems that are risk-based, relevant, timely, and integrated, including planning (fuels) and incident response.

- Test, identify, and suggest developments to emerging risk and decision making applications including TwitterFire.
- Partner with the RMRS Fire Economics and Fire Behavior Research groups to continue development applying analytical tools to support decision making.
- Maintain, test, identify and suggest WFDSS application enhancements.
- Test, identify, and suggest developments to the IFTDSS application.
- Support IRWIN development and maintenance.
- Develop and maintain the RisC application.

Goal 2: Conduct technology transfer activities that foster innovation, improve risk-based decision making, and promote the use of these tools by the interagency wildland fire community.

- Continue to support the transition of the interagency spatial fire planning efforts.
- Train the wildland fire community in utilization of the products we create and sponsor: NWCG courses, support Advancement Fire Behavior Learning Unit, develop tech and user guides, mentor field, and provide refresher materials.
- Continue support to international partners through USAID and other means as opportunities present themselves.
- Increase customer awareness of the Rocky Mountain Center, oversee and participate in the RMC steering committee, and support Predictive Services with development of large fire prediction algorithms.
- Improve technical transfer mechanism for broader audiences, maintain Fuel and Fire Planning Portal, continue involvement and support of interagency committee and working group that promote and further objectives.
- Provide daily support to ongoing fire incidents, remote and on-site as needed regarding decisions and fire behavior.

Goal 3: The Wildland Fire Management RD&A connects with stakeholders to modify projects and evaluate future needs.

- Coordinate with Geographic Area Editors and Fire Planners to understand and meet management needs.
- Work with researchers to ensure latest science is relevant and applicable to field needs: Implement changes of NFDRS in WFDSS.
- Work with Washington Office to ensure national interagency coordination: Land Resource Management Guide Wildfire Integration, geo-spatial data sets, participation of WFIT.
- Communications with collaborators improve WFM RD&A functions (includes local, state, and non-government entities): Cohesive Strategy Meeting, April 2017.
- Renew the National Fire Decision Support Center Charter and Service Level Agreement.

Goal 4: Staff maintain and increase professional qualifications and explore professional interests that augment the WFM RD&A.

- Employees apply technological advancements to communicate and work in a virtual environment.
- Provide developmental and continuing education opportunities for staff: provide detail opportunities for fire and fuels personnel to the WFMRD&A.

Appendix A: FY 2016 Activities & Coordination

Publications

- Thompson, Matthew P.; Zimmerman, Tom; Mindar, Dan; Taber, Mary. 2016. Risk terminology primer: Basic principles and a glossary for the wildland fire management community. Gen. Tech. Rep. RMRS-GTR-349. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 13 p.
- Pence, M. 2016. What is the Strategy? A Comparison of the Wildland Fire Decision Support System (WFDSS) and Incident Status Summary ICS-209. Proceeding of the 5th International Behavior and Fuels Conference, April 11-15, 2016, Portland, Oregon. Published by the International Association of Wildland Fire, Missoula, Montana. http://www.iawfonline.org/proceedings.php

Presentations

- IFTDSS Presentation, Fire Science Consortia, October 6, 2015, Fort Collins, CO
- IFTDSS Presentation, Office of Wildland Fire, Virtual, October 30, 2015
- "Assessing Resource Benefits at the Incident Level." Presentation at 6th International Fire Ecology & Management Congress: Advancing Ecology in Fire Management, November 16-20, 2015, San Antonio, TX
- "Informed Decision Making for Wildfire Response – Utilizing WFDSS Spatial Fire Planning to Represent Land and Resource Management Plan Direction." Oral presentation, at the 6th International Fire Ecology and Management Congress: Advancing Ecology in Fire Management, November 16-20, 2015, San Antonio, TX
- "Restoring Fire to North American Wildlands – A Call to Action." Presentation at the 6th International Fire Ecology & Management Congress: Advancing Ecology in Fire Management, November 16-20, 2015, San Antonio, TX
- "Simplistic Tools Used to Support Incident-level Decision-making: The Three Day Fire, Alaska." Poster presentation at the 6th International Fire Ecology & Management Congress: Advancing Ecology in Fire Management, November 16-20, 2015, San Antonio, TX
- "Fire Planning and Fuels Management Resource Portal." Poster presentation at the 6th International Fire Ecology & Management Congress: Advancing Ecology in Fire Management, November 16-20, 2015, San Antonio, TX
- "Fuel Accumulation and Forest Structure Change Following Fuel Treatments in California." Poster presentation at the 6th International Fire Ecology & Management Congress: Advancing Ecology in Fire Management, November 16-20, 2015, San Antonio, TX
- IFTDSS Presentation, NWCG, November 24, 2015, Boise, ID
- IFTDSS Presentation, BIA Fuels Planners, November 24, 2015, Boise, ID
- Spatial Fire Planning Presentations to Regional and Forest Fire Management Officers (FMO) and Fire and Fuels Planners at the Spatial Fire Planning Workshop, February 22-26, 2016, Denver, CO
- NFPORS UAG Presentation, Virtual, February 17, 2016
- Objectives Project Presentations to Regional and Forest Fire Management Officers (FMO) and Fire and Fuels Planners at the Spatial Fire Planning Workshop, February 22-26, 2016, Denver, CO
- "Wildland Fire Management Research Development & Application Program." Oral presentation for the NASA Wildfire Program Review Meeting, March 3, 2016, Boise, ID
- "Planning for Wildfire Management in the Twenty-first Century." Presentation at the 4th Central Oregon Fire Science Symposium, March 25, 2016
- IFTDSS Presentation, Local Fire Management Leadership (LFML), March 28,2016, Boise, ID
- 2016 Agency Administrator WFDSS Refresher, Virtual, March 24, 2016
- "What is the Strategy? A comparison of WFDSS and ICS 209." Oral presentation at the 5th International Fire Behavior and Fuels Conference: Wicked Problem, New Solutions, Our Fire, Our Problem, April 11-15, 2016, Portland, OR

- "Writing Incident Objectives in WFDSS: What we know, how we can do better?" Oral presentation at the 5th International Fire Behavior and Fuels Conference: Wicked Problem, New Solutions, Our Fire, Our Problem, April 11-15, 2016, Portland, OR
- "Restoring Fire to North American Wildlands – A Call to Action." Oral presentation at the 5th International Fire Behavior and Fuels Conference: Wicked Problem, New Solutions, Our Fire, Our Problem, April 11-15, 2016, Portland, OR
- "Developing and Implementing Geospatial Data Collection of Fuel Treatments, Lesson Learned." Oral presentation at the 5th International Fire Behavior and Fuels Conference: Wicked Problem, New Solutions, Our Fire, Our Problem, April 11-15, 2016, Portland, OR
- IFTDSS Presentation, FWS and FAAS, Virtual, April 11, 2016
- "Decision Making in WFDSS for Agency Administrators." Virtual, April 20, 2016
- IFTDSS Presentation, FACTS Working Group, Virtual, April 26, 2016
- IFTDSS Presentation, Southern Fire Exchange, Virtual, April 26, 2016
- IFTDSS Presentations to USFS Regional Fire Planners and Fuels Specialists at the National Fire and Fuels Planner meeting, May 1, 2016, Atlanta, GA
- Spatial Fire Planning Presentation to USFS Regional Fire Planners and Fuel Specialists at the National Fire and Fuels Planner meeting, May 4, 2016, Atlanta, GA
- Objectives Project Presentation to USFS Regional Fire Planners and Fuels Specialists at the National Fire and Fuels Planner meeting, May 5, 2016, Atlanta, GA
- IFTDSS Presentation, BLM IT for Resource Managers, Virtual, May 24, 2016
- "Simplistic Tools Used to Support Wildfire Decision-making: The Three Day Fire, Alaska." Poster presentation for the ESRI User Conference, June 27 – July 1, 2016, San Diego, CA
- RisC Presentation to Region 2 Fire Staff, July 22, 2016, Denver, CO
- "Wildland Fire Decision Support System." Oral presentation for the Southwest Idaho GIS Users Group, July 22, 2016, McCall, ID

Training/Course Instruction

- "Cultural, Chronological, and Climatological Complexities Concerning Conflagrations in the Crown of the Continent." Oral presentation and snowshoe fieldtrip for University of Montana students in an experiential learning course, January 19, 2016, Polebridge, MT
- Ecosystem Restoration & Integrated Fire Management Training, January 26 – February 7, 2015, Jakarta and Sampit (Central Kalimantan), Indonesia
- RX-340/341: Burn Boss Training, February 8-12, 2016, Boise, ID
- WFDSS Refresher and "Train the Trainer," Region 9 virtual trainings, February 16 and March 9, 2016
- GISS Preseason Webinars, February 17 and May 3, 2016
- Data Manager Deep Dive Training Webinars, February 25 and March 3, 2016
- S-590: Advanced Fire Behavior Interpretation, March 2016, Tucson, AZ
- IFTDSS Training, Fire Ecology Class, University of Idaho, Virtual, April 11, 2016
- WFDSS Training, Nez Perce/Clearwater National Forest, May 2015, Grangeville, ID
- S-290: Intermediate Wildland Fire Behavior, Itasca Community College, September 3 and 20, 2016, Grand Rapids, MN
- S-482: Strategic Operational Planner Class, Northern Rockies Training Center, April 12-14, 2016, Missoula , MT
- WFDSS and EGP Learning Opportunity, Office of Wildland Fire, June 27, 2016, Boise, ID

Workshops/Conference Attendance

- Fire Behavior Sub-Committee Meeting, October 5-9, 2015, Phoenix, AZ
- 6th International Fire Ecology & Management Congress: Advancing Ecology in Fire Management, November 16-20, 2015, San Antonio, TX
- BLM National Fire Planners Conference, December 8-10, 2015, Denver, CO

- Region 9 Spatial Fire Planning Workshop, December 15-16, 2015, Rhinelander, WI
- FSim Calibration Workshop, January 20, 2016
- National Fire Planning Workshop, January 26-28, 2016, Boise, ID
- IRWIN Integration Testing, January 26-28, 2016, Salt Lake City, UT
- Region 2 Spatial Fire Planning Workshop, February 22-26, 2016, Denver, CO
- Department of Interior Geospatial Advisory Group, "Federal Lnds Working Group and the Protected Areas Database – US," February 23, 2016
- ESRI Federal User Conference, February 24-25, 2016, Washington, D.C.
- 5th International Fire Behavior and Fuels Conference: Wicked Problem, New Solutions, Our Fire, Our Problem, April 11-15, 2016, Portland, OR
- Fire Behavior Sub-Committee Meeting, April 17-22, 2016, Missoula, MT
- IFTDSS Workshop, April 20, 2016, Boise, ID
- NWCG Geospatial Subcommittee Annual Meeting, April 25-28, 2016, Seattle, WA
- Free and Open Source GIS (FOSS4G) North American Conference, May 2-5, 2016, Raleigh, NC
- Western Region Cohesive Strategy, May 9-10, 2016, Portland, OR
- NWCG Fire Reporting Subcommittee Annual Meeting, June 28-30, 2016, Boise, ID
- Bob Marshall Wilderness Fire Management Field Trip and Workshop, July 11-14, 2016, Spotted Bear Ranger District, Flathead National Forest
- FGDC National Parcel Summit, June 17, 2016, Reston, VA
- Southwest Idaho GIS Users Group, July 22, 2016, McCall, ID
- 2016 Whitebark Pine Ecosystem Foundation Science and Management Workshop, September 16-20, 2016, Whitefish, MT

Organizational Representation

- NWCG US Forest Service Research Executive Board Representative
- NWCG Fire Behavior Subcommittee Chair
- NWCG Fire Planning Subcommittee Representative
- NWCG Fire Reporting Subcommittee Representative
- NWCG Fire Danger Subcommittee Member
- NWCG Geospatial Subcommittee Chair
- NWCG Data Standards and Terminology Subcommittee Representative
- NWCG Fire Environment Committee Representative
- NWCG Advanced Fire Environment Learning Unit Chair and Representatives
- LANDFIRE Liaison
- Predictive Services/Intelligence Liaison
- Fire Research And Management Exchange System (FRAMES) Liaison
- Air/Fire Group Liaison
- S-495: Geospatial Fire Analysis, Interpretation, Application Steering Committee Chairmen, Cadre, Mentors, and Coaches
- S-590: Advanced Fire Behavior, Interpretation, Steering Committee Chairmen, Cadre, Mentor, Coach
- National Incident Management Organizations (NIMO) Liaison
- Information Technology Advisory Board representative
- Wildland Mobile Technologies Working Group Chair and member
- Northern Rockies Consortium Liaison
- Fire Consortia for Advanced Modeling of Meteorology and Smoke (FCAMMS) Representative
- Desert Research Institute (DRI) Liaison
- BLM WFDSS Oversight group
- Interagency Fire Planning Committee Representative
- Incident Risk Console (RisC) WFM RD&A Representative

- Emerging Technologies Group Chair and Representative
- National Line Officer Team Liaison
- Southern Fire Exchange Consortia Steering Committee
- Rocky Mountain Center (RMC) Steering Committee

Cooperative Agreements and Partnerships

- Air Fire Program, Pacific Northwest Research Station, http://www.airfire.org
- LANDFIRE Program, http://www.landfire.gov/
- Cooperative agreement and development of Board of Directors for oversight of DOI Fire Application Specialists and their participation in the WFM RD&A and the NFDSC
- Desert Research Institute (DRI), http://www.dri.edu
- National Oceanic and Atmospheric Administration (NOAA) and the National Weather Service (NWS)
- Fire, Fuel, and Smoke Science Program, RMRS, http://firelab.fire.org
- Human Dimensions Program, RMRS
- University of Idaho Wildland Fire Science Program
- University of Idaho Cost Reimbursable Agreement
- Fire Research And Management Exchange System (FRAMES), University of Idaho, www.frames.gov
- National Center for Landscape Fire Analysis (NCLFA), University of Montana, http://firecenter.umt.edu
- Department of Interior (DOI) Office of Wildland Fire Coordination (OWFC), www.doi.gov/pmb/owf
- Bureau of Indian Affairs (BIA)
- Bureau of Land Management (BLM)
- Fish and Wildlife Service (FWS)
- National Park Service (NPS)
- US Geological Survey (USGS)
- Joint Fire Science Program (JFSP), www.firescience.gov
- Northern Rockies Fire Science Network, http://nrfirescience.org
- National Wildfire Coordinating Group (NWCG), www.nwcg.gov
- National Predictive Service Program (NIFC), www.predictiveservices.nifc.gov
- USFS Fire & Aviation http://www.fs.fed.us/fire
- Pacific Southwest Research Station, www.fs.fed.us/psw
- Pacific Northwest Research Station, www.fs.fed.us/pnw
- The Nature Conservancy (TNC), www.nature.org
- International Association of Wildland Fire (IAWF)