Wildland Fire Management Research, Development and Application (WFM RDA)

Annual Report FY2010

Integrating science, technology and fire management.

Contents

Introduction

Transfer of research findings into useable applications for field implementation has long been an area of concern. Congressional studies reported in 1972 that the transfer of research findings to the field needed improvements and led to the establishment of Research, Development, and Application (RD&A) programs as a formal organizational approach to improve technology transfer. Later reports indicated that while actions to improve performance had been implemented, better evaluation, upward reporting, and adjustments to research programs based on actual experience were still needed. Specifically, opportunities to make the best possible use of research findings and to refocus research as needed to maximize benefits to land managers were identified as growth areas.

As Forest Service RD&A programs became established, they were structured to have certain basic characteristics, including abilities to:

- Respond to an urgent need to improve management practices and procedures,
- Integrate new science and technologies into management operations,
- Solve high-priority problems in a specific period of time,
- Coordinate with a variety of experts,
- Involve users and stakeholders,
- Implement a planned, financed program with responsibility and authority assigned collectively by program partners, and
- Achieve specific objectives established using an interdisciplinary approach

Wildland Fire Management RD&A Program

Although new wildland fire management knowledge and applications continue to be developed, many of these advances are not being consistently or completely incorporated into routine business practices. Recent Research and Development strategic initiatives have articulated a need for improved methods to determine what information is of use, to whom, and the best way to partner with managers to achieve the integration of science into management.

Figure 1. WFM RDA Website, http://www.wfmrda.nwcg.gov/

The establishment of a dedicated program and formal process to ensure effective and timely communication between research and management and integration of new knowledge and processes into management was determined to be a sound option to enhance the application of the best science in wildland fire management. As a result, the Wildland Fire Management RD&A (WFM RDA) was nationally chartered in 2006. Principal areas of focus include:

- Sponsoring and guiding development and application of wildland scientific knowledge; developing decision support tools; and providing science application services to the interagency wildland fire community.
- Acting as a primary point of contact for communication between scientists and participating field managers, and an advisor to program administrators at local, regional, and national levels.

Support of National Strategic Direction

As a national program, the WFM RDA directly supports national strategic direction, mission statements from both R&D and FAM, and recommendations in the 2009 Quadrennial Fire Review (QFR). Goals, mission statements, and recommendations that are directly supported by the WFM RDA are shown in Table 1.

Table 1. Strategic direction, mission statements, and recommendations with direct relationship to activities of the WFM RDA

Source	Direction Applicable to WFM RDA
Forest Service Strategic Plan	***Goal 1.*** *Restore, sustain, and enhance the Nation's forests and grasslands.* ***Goal 7.*** *Provide science-based applications and tools for sustainable natural resources management.*
Forest Service R&D Mission	*To develop and deliver knowledge and innovative technology to improve the health and use of the Nation's forests and rangelands – both public and private.*
2009 Quadrennial Fire Review-Mission Strategies: Fire Management's Next Decade, strategic elements	• *Expand risk management to enable a much greater involvement in fire management planning and implementation activities. Advocate and carry out investments in risk management commensurate with production pressures, expectation demands, and increasing accountability.* • *Promote inclusion of new models, new scientific knowledge, and other emerging information on human error, safety, risk management, and implications for safe and effective operations throughout all fire and aviation management activities.* • *Develop new outcome measures that place safety metrics on a level equal with post-fire resource impacts and cost efficiency.*
2009 Quadrennial Fire Review-Asymmetric Fire and Strategic Management Response	*Improve wildland fire decision-making and implementation through the introduction of a system to document strategic decisions, facilitate access and use of the next generation of risk-informed decision support tools, and allow for the completion of a detailed set of implementation actions as needed. Realign decision-making to be more agile, flexible, and responsive to rapidly developing and changing conditions and retain relevancy over longer time periods.*
2009 Quadrennial Fire Review-Achieving "Fire Adapted Communities"	*Incorporate understandable and demonstrable metrics on what fire-adapted means. Include these outcome metrics in strategic management response development.*
2009 Quadrennial Fire Review – Cross-cutting Strategies: An Integrated Fuels Portfolio in Support of Land management Objectives	*Integrate fuels management investments and projects into larger land management priorities. Integrate management objectives and techniques with all natural resource management functional programs and expand to landscape-scale management capability.*
Federal Wildland Fire Management Policy (2009 Guidance for Implementation of Federal Wildland	• *Guides for Implementation: Managers will use a decision support process to guide and document wildfire management decisions. The process will provide situational assessment, analyze hazards and risk, define implementation*

Fire Management Policy)	*actions, and document decisions and rationale for those decisions.*
	• *Guiding Principles:*
	  ○ *Sound risk management is a foundation for all fire management activities.*
	  ○ *Fire management programs and activities are economically viable, based upon values to be protected, costs, and land and resource management objectives.*
	  ○ *Fire Management Plans and activities are based upon the best available science.*
	• *Policy Statements – Science:*
	  ○ *Fire Management Plans and programs will be based on a foundation of sound science. Research will support ongoing efforts to increase our scientific knowledge of biological, physical, and sociological factors. Information needed to support fire management will be developed through an integrated interagency fire science program. Scientific results must be made available to managers in a timely manner and must be used in the development of land management plans, Fire Management Plans, and implementation plans.*
	  ○ *Increase the body of scientific knowledge and understanding of management tools and transfer of knowledge to practitioners and decision makers.*

National Wildfire Management, Report to Congress and Cohesive Strategy (in review)	*The Science Perspective provides statements of the importance of risk-based management, leveraging technology and analysis models within a risk framework to fire management planning and implementation. The National Cohesive Wildfire Management Strategy section states that the best available science will be used to identify land and communities with highest risk and using that information in decision making for appropriate actions.*
Elements of the Federal Land Assistance, Management and Enhancement Act 2009 (FLAME Act)	• *Element 1: Most Cost-Effective Means for Allocating Budget Resources, using sound scientific protocols.* • *Element 3: Assessing Risk to Communities* • *Element 4: Employ Appropriate Management Response* • *Element 5: Allocation of Hazardous Fuels Reduction Funding Based on Priority Projects* • *Element 6: Assessing the Impacts of Climate Change and the Frequency and Severity of Wildfire*
RMRS Strategic Framework Update 2008	• *Create credible, innovative, science-based solutions for resource management problems.* • *Identify relevant needs and quickly and efficiently convert science gaps into findings and products for managers and citizens.* • *Anticipate and respond to emerging issues.*

Wildland Fire Management RD&A Mission and Objectives

The WFM RDA focuses its resources on development and application of tools which can be deployed to the wildland fire community, obtaining research services as needed from existing Forest Service research work units, universities, and the private sector across the country. The WFM RDA utilizes this expertise as necessary to accomplish priority work through various agreements and by providing funding where necessary and appropriate. Its mission will not be doing original research; rather it will be to identify research that shows promise for refinement into deliverable field applications. The WFM RDA has six objectives that guide its activities. These include:

Objective 1: ***Coordinate Fire Science Application.*** This element of the work program will focus on the delivery of existing and new wildland fire applications and knowledge.

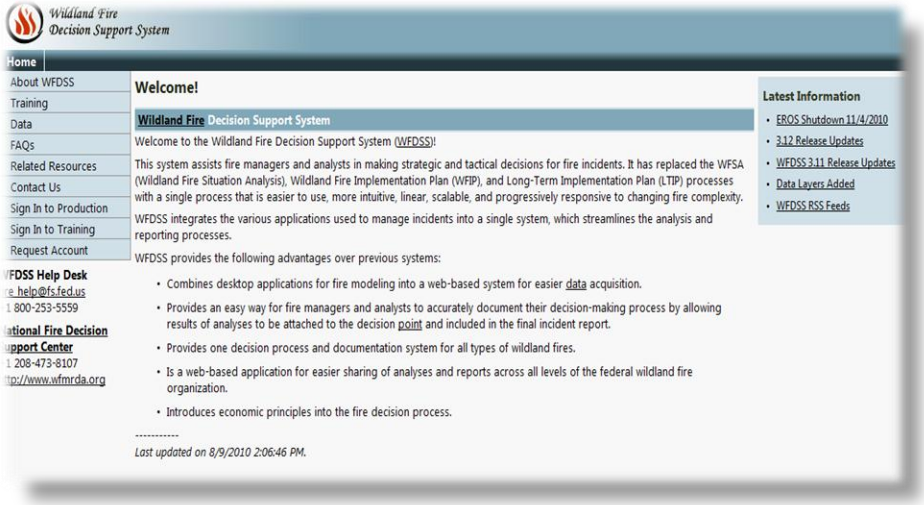
- **Emphasis on:**
  - improving participative, interactive application pilot and demonstration projects;
  - conducting applied fire research issue sensing and evaluation;
  - utilizing innovative communication and marketing techniques,
  - securing mutually productive partnerships between fire managers, line officers and researchers

- **Interoperability and Delivery of Wildland Fire Decision Support Systems.**
  - The WFM RDA Program will sponsor fire science applications that can be bundled and built with interoperability. Working with proven model developers and programmers (internal and external) for the expressed purpose of improving the user interfaces and connectivity between applications will result in more efficient use of resources

- **Science Liaison with Fire Program Analysis Project.** The Fire Program Analysis (FPA) project is tasked with developing an interagency budgeting and planning program for Federal fire management.
  - WFM RDA may provide a science liaison with the FPA Steering Committee and the Development Team during the model development phase, which entails identifying experts to provide advice and support on topics as needed and assisting in organizing scientific review of FPA modules.

Objective 2: ***Develop and Support a Wildland Fire Decision Support System*** **(WFDSS)**

- WFM RDA will focus on developing and supporting improved applications that will contribute information regarding fire spread probabilities, fire effects and economic aspects of wildland fire decision support. The current applications used to support decision making concerning the management of unplanned ignitions need to be updated with new research knowledge. This knowledge can be translated into new applications for use by land managers of all Federal agencies and many states e.g. WFDSS.



Objective 3: ***Project Fire Season Costs.*** Continued emphasis must be given to integrating fire weather and severity forecasts into existing and new decision-support tools for both pre-season planning and in-season decision making.

- WFM RDA will support and coordinate weather and climate modeling research and application development including improved long range forecast models, for use in such areas as budget and resource allocation among wildland fires, severity forecasting, and resource pre-positioning.

Objective 4: ***Coordinate Scientific Efforts Associated with Wildland Fire Costs.*** Coordinate the development of wildland fire economics knowledge and tools with emphasis on large wildland fire costs and benefits.

- Provide economic data for analysis, establishing valuation tools for economic effects of fire on natural resources, effects on local economies of risk attitude by land managers and the public in managing wildland fire, and modeling to support costing and other economic analyses.
- WFM RDA coordinates efforts to conduct studies and develop solution approaches via different methodologies like simulation models, cost-benefit analysis, survey questionnaires, and others deemed useful and applicable

Objective 5: ***Participate in Developing Hazardous Fuels Planning Applications.*** With the emphasis to increase hazardous fuels treatments by all of the wildland fire agencies there exists a need to develop new applications that can be used by fuels managers and their partners. The scale of the problem is such that in order to implement projects that will achieve the desired results in affecting large fire outcomes spatial landscape planning applications need to be provided to managers. Applications currently exist to help fuels specialists and others in landscape level fuels planning. These tools have been developed separately with little ability to connect them or provide information as to how and why they differ.

Little Beaver Complex, Boise National Forest

- The WFM RDA will work to develop and support applications individually or in conjunction with others that improve the use and understanding of these tools by redesigning them into compatible suites.

Objective 6: ***Participate in and Manage the National Fire Decision Support Center (NFDSC).*** Large fire suppression costs within all wildland fire management agencies continue to grow dramatically each year. Efforts to control causes of rapid cost escalation are expanding and becoming more focused on improving initial strategic as well as subsequent tactical decisions. New efforts are being implemented to advance the capabilities of fire decision making in the Forest Service. These efforts are designed to:

- ✓ Improve the science basis for decision making
- ✓ Improve fire management decision support tools and processes, and
- ✓ Improve agency capability to manage fire expenditures

To accomplish these goals under a comprehensive effort, the **National Fire Decision Support Center (NFDSC)** was established through collaboration between Fire and Aviation Management (FAM) and Research and Development (R&D). This Center serves as a single focal point to support goals of improving strategic and tactical decision making for large fires by providing improved and consistent decision support information on large and long duration wildland fires, improving capability to make strategic decisions through a directed research program, and increasing awareness and application of decision support information in risk-informed decision making.

The NFDSC is a virtual organization comprised of team members from multiple USFS research and management programs and potentially other cooperator organizations (Figure 2). The Rocky Mountain Research Station (RMRS) coordinates oversight and hosts a major portion of the NFDSC positions in the WFM RDA. Existing Forest Service units that will provide staff for integration in this effort include, but are not limited to: WFM RDA (RMRS and DOI involvement); Human Factors and Risk Management RD&A (RMRS); Fire Spread Research (Fire, Fuel, and Smoke Science Program, RMRS); Fire Economics Research (Human Dimensions Science Program, RMRS); and Fire and Aviation Management (Headquarters Office). Other research program areas may be involved as warranted and available.

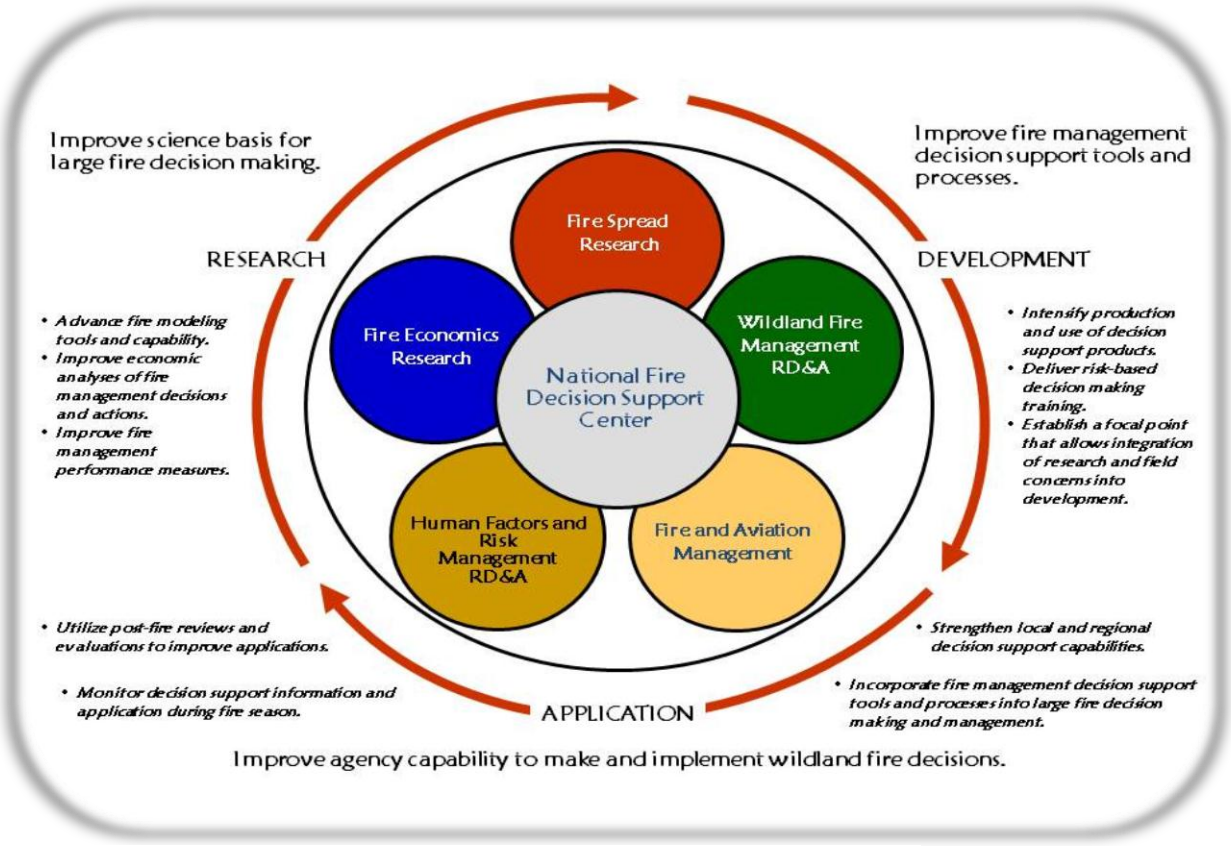
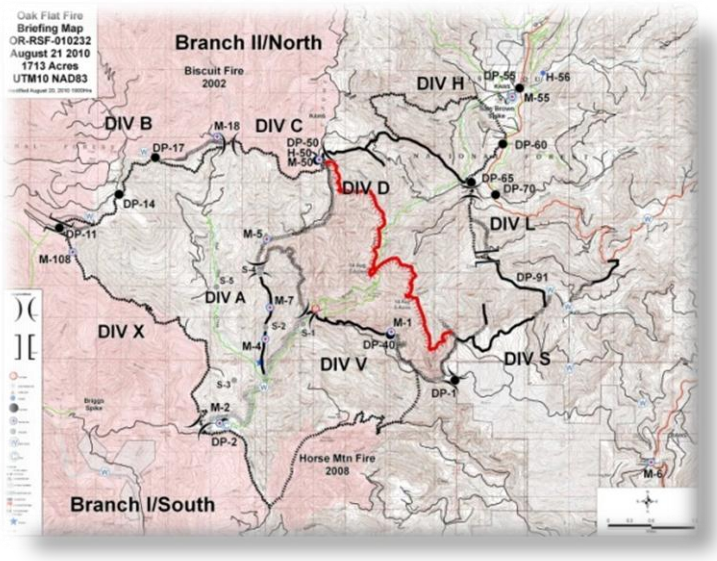


Figure 2. NFDSC composition showing collaborating programs

Roles of the WFM RDA in the National Fire Decision Support Center (NFDSC):

- Conduct decision support analyses for large wildland fires under Interagency jurisdiction,
- Develop, improve, and increase production and operational use of decision support products,
    - Increase Agency Administrator capability to use budget and risk tools in determining fire management direction.
    - Improve ability to rapidly prepare fire cost estimation for large fires,
    - Improve agency capability to better manage large fire costs,
    - Advance Agency Administrator and Incident Management Team understanding of the importance and value of risk-informed decision making,



Oak Flat Fire, Siskyiou National Forest

- Provide practical mentoring and other means to strengthen decision support capacity at regional and field levels, and achieve refresher and currency training for non-NFDSC analysts,
- Develop a comprehensive plan for integrating new knowledge into existing wildland fire curricula,
    - Participate on national and regional training cadres for decision analysis, risk management, and other decision management training,
    - Develop and deliver new and existing training on use of risk-based decision making,

Twitchell Canyon Fire, Fishlake National Forest

- Provide 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.
    - Conduct decision support application on large fire management and maintain an active involvement in a directed research program to advance the scientific basis for decision support tools,
    - Integrate new and existing science and technology into all wildland fire decision making levels,
    - Provide focused technical expertise to increase opportunities for operational implementation consultation,
    - Pursue new collaborative opportunities with all research stations and other applicable organizations.
- Strengthen post-fire reviews and evaluations to improve applications and develop lessons learned,
    - Monitor and review decision support information and application during fire season.

Program Scope

Activities carried out by the WFM RDA provide support to all levels of wildland fire management agencies and organizations, including national, regional/state/area (both internal and external), and local and incident levels, as shown in figure 3.

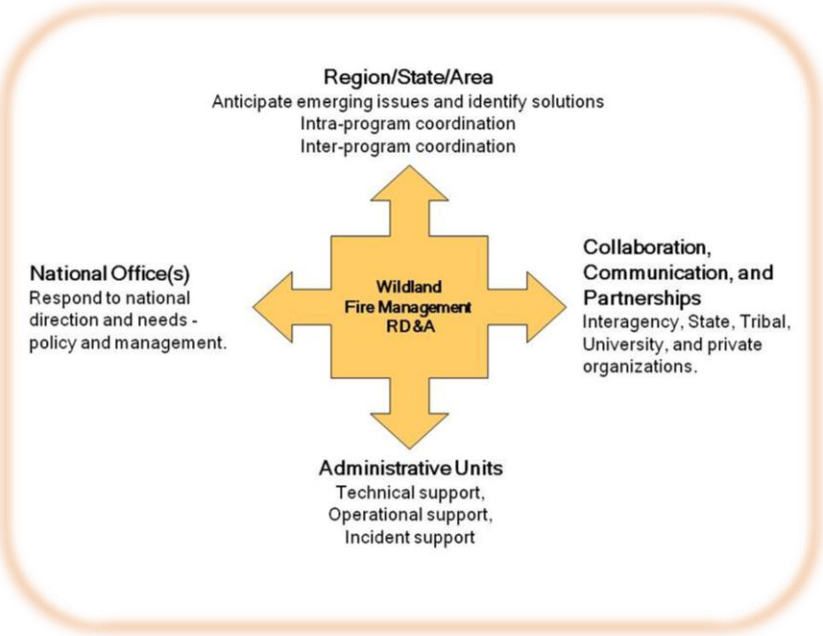


Figure 3. Wildland Fire Management RD&A levels of interactions and involvement

Organization

The WFM RDA is organizationally situated as part of the Rocky Mountain Research Station (RMRS) but centered at the National Interagency Fire Center (NIFC). This location enhances opportunities for frequent, direct contact with wildland fire management leadership from the wildland fire management agencies and groups headquartered there. The WFM RDA is a national program having interagency implications and benefits and consists of multiple agency personnel representing diverse fire management program interests and concerns. This program has the capability to respond to interagency management needs and link national fire management research with all wildland fire management agency practitioners. The WFM RDA is made up of multiple groups of individuals working with specific focus on defined areas of responsibility (figure 4). These areas include: WFDSS Development, WFDSS Documentation & Training, WFDSS Data Management, Fire Management Decision Support, and the Rocky Mountain Center.

Personnel from multiple organizations collectively staff these work groups. The RMRS hosts the WFM RDA Program Manager as well as five other permanent positions working in Fire Science and Decision Support Development (shown in white in figure 4). The Rocky Mountain Center Manager position (Air Resource Specialist) is an RMRS position that was incorporated in to the WFM RDA in July 2010. The National Fire and Aviation Management (FAM) program provides seven full-time individuals to the WFM RDA as part of the NFDSC (shown in green in figure 4). The Department of Interior (DOI) through the Office of Wildland Fire (OWF) provides four positions (as NPS FTE's) to the WFM RDA program: Data Coordinator, GIS Specialist and two Fire Application Specialists that work in Fire Science and Decision Support System Development and the NFDSC (shown in orange in figure 4).

An Advisory Group for the WFM RDA provides guidance, assists in development of and recommends the annual work plan, ensures funding within the agreed framework, and provides accountability oversight. This group is made up of individuals from FAM, WO R&D, OWF and RMRS.

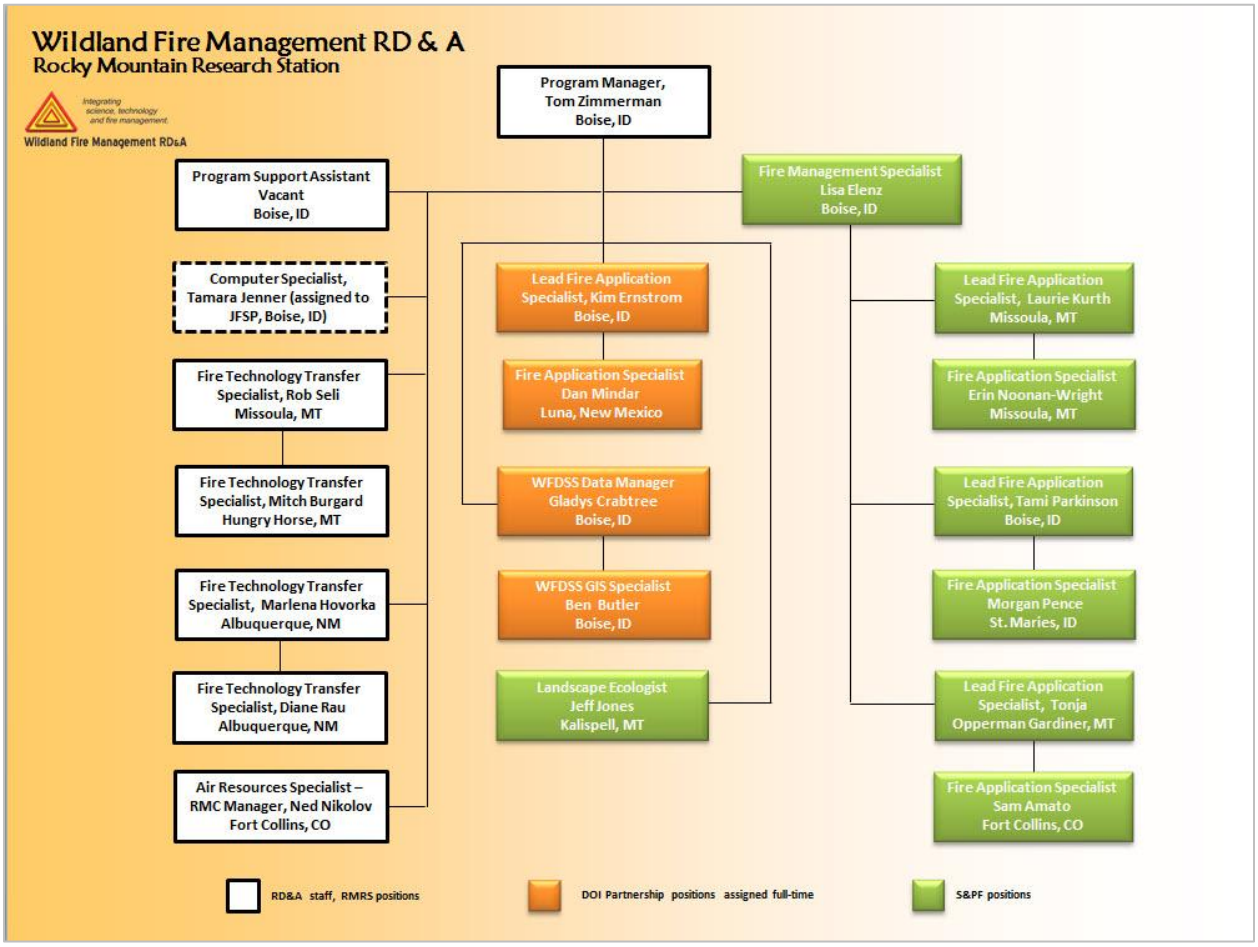


Figure 4. WFM RDA Working Organization Chart

Partnership Activities

The WFM RDA is actively involved in partnerships and cooperative arrangements across a wide range of Federal, state, university, and private partners in support of the overall objectives. Currently over 25 Cooperating organizations interact with the WFM RDA staff:

- Fire, Fuel, and Smoke Science Program, RMRS, http://firelab.fire.org
- Human Dimensions Program, RMRS
- LANDFIRE Program, http://www.landfire.gov
- Airfire Program, PNWRS, http://www.airfire.org
- Fire Program Analysis Program (FPA), http://www.fpa.nifc.gov
- University of Idaho Wildland Fire Science Program
- FRAMES – University of Idaho, http://frames.nbii.gov
- National Center for Landscape Fire Analysis (NCLFA) - University of Montana, http://firecenter.umt.edu
- Humboldt State University Fire Science Program
- Technical Fire Management (TFM), sponsored by the Washington Institute http://www.washingtoninstitute.net
- Desert Research Institute, http://www.dri.edu
- Department of the Interior – Office of Wildland Fire Coordination (OWFC), http://www.doi.gov/pmb/owfc
- 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
- National Wildfire Coordinating Group (NWCG), www.nwcg.gov
- National Predictive Services Program (NIFC)
- USFS Fire & Aviation http://www.fs.fed.us/fire/
- Pacific Southwest Research Station
- Pacific Northwest Research Station
- The Nature Conservancy (TNC)

Oak Flat Fire, Siskyiou National Forest

Hurd Fire, Boise National Forest

WFM RDA 2010 Accomplishments

Continued development and maintenance of the WFDSS system, oversight of the IBM contract for WFDSS, managing the NFDSC, and filling remaining vacancies within the WFM RDA were primary focus areas of the program in 2010. Other specific efforts leading to significant accomplishment involved integrating the Rocky Mountain Center Manager into the WFM RDA organization, expanding coordination with the AirFire Team to further integrate the smoke modeling portal, development of a WFM RDA Website, and funding and oversight to two Master's Thesis projects (University of Montana and University of Alaska).

View Lake Complex, Mt. Hood National Forest

Wildland Fire Management RD&A provided incident decision support to wildland fire managers throughout the fire season as well as continuing training and information dissemination of WFDSS to expand user knowledge and expertise.

The following sections describe 2010 accomplishments in detail as they pertain to the WFM RDA objectives.

Position Management

By the end of July 2010 the WFM RDA was fully staffed for a total of seventeen positions funded by RMRS, FAM, and DOI. Three Fire Application Specialists were hired for the NFDSC bringing the total to six. The Department of Interior, Office of Wildland Fire Coordination (OWFC) contributed funding through the National Park Service to add two Fire Application Specialists to WFM RDA, which were hired summer 2010. Movement of the Rocky Mountain Center from the Fire, Fuel, and Smoke Science Program into the WFM RDA necessitated recruitment of a Manager for the RMC which was filled in July of 2010 and is located in Ft. Collins, Colorado.

Objective 1: Coordinate Fire Science Applications

The WFM RDA worked to integrate, develop, test and deliver existing and new wildland fire applications to fire managers. A significant accomplishment was the incorporation of the Rocky Mountain Center into the WFM RDA organization. RMC was formally a research project, and one of the five centers of the Forest Service FCAMMS (Fire Consortia for Advanced Modeling of Meteorology and Smoke) Program. Over the past 10 years, RMC established itself as a technology transfer project with an emphasis on development & deployment of customized fire-weather applications to fire- and air-resource managers. Adding RMC to WFM RDA was an excellent realignment of research to application and will greatly benefit both programs.

Throughout 2010, WFM RDA continued and expanded collaboration with the AirFire Team based out of the Pacific Northwest Research Station. AirFire is part of the Threat Characterization and Management Program in the USDA Forest Service's Pacific Northwest Research Station. AirFire is an applied research team focused on understanding how the atmosphere interacts with wildland fire. Their projects address issues related to smoke and air quality, fire behavior, fire danger and climate dynamics. With continued partnership, WFM RDA and AirFire established and expanding links to connect WFDSS with smoke dispersal models through the air quality portal http://firesmoke.us/wfdss/. Training and educating users on these tools is an ongoing collaborative effort between both programs.

Other WFM RDA fire science application activities ongoing throughout FY2010 that support objective 1:

- Expanded use of FRAMES for collaborative and communication services, including: establishment of an WFM RDA community website, staff information sharing, and data storage.
- Ongoing development of continuous improvement techniques for delivery of training and communication of information regarding decision support systems.
  - ❖ Use of webinar process for training (see WFDSS Training and Information Dissemination section).
  - ❖ Use of Content Management System for providing on-line help and information dissemination in WFDSS.
- Continued and expanded cooperation with the Desert Research Institute including: WFDSS Air Quality Portal, Fire Weather Information, and Science Information Delivery.
- Cooperative work with the LANDFIRE Program to validate fuel models for annual updates into WFDSS.
- Cooperative work with fire behavior researchers in FSPro validation.
- Cooperative work with Fire System Applications programs to establish links to provide WFDSS data to Fire Systems applications (fire reporting, fire code, etc.).

Objective 2: Develop and Support the Wildland Fire Decision Support System (WFDSS)

Background

The WFM RDA has the lead for the development of the Wildland Fire Decision Support System (WFDSS) for the federal (and potentially State) wildland fire agencies. This effort was chartered through the National Fire and Aviation Executive Board (NFAEB) to "develop a scalable decision system for agency administrators that utilizes appropriate fire behavior modeling, economic principles, and information technology to support effective wildland fire decisions consistent with Resource and Fire Management Plans." Since this time, the NFAEB has evolved into the National Wildfire Coordinating Group (NWCG) which supported the development of "a single process for all wildland fires that replaces the earlier processes of the Wildland Fire Situation Analysis (WFSA), Wildland Fire Implementation Plan (WFIP), and Long-Term Implementation Plan (LTIP) and meets all current WFSA user need."

In conjunction with the 2009 modifications to the Federal Wildland Fire Management Policy, the continued development of WFDSS is also supported by the Wildland Fire Leadership Council (WFLC) in their policy implementation direction that "e*very wildland fire will be assessed following a decision support process that examines the full range of responses and the system currently under development is the Wildland Fire Decision Support System (WFDSS)."*

The WFDSS project evolved from the need to streamline and improve wildland fire decision-making processes, as well as take advantage of improvements in technology, fire modeling, and geospatial analysis.

The Key Features of WFDSS Include:

- A web based system that documents decisions, supports analysis, and allows for the completion of an operational plan.
- Textual and spatial information from land management and fire management plans are preloaded into WFDSS and provide the sidebars for the decision space.
- Fire behavior modeling, fire spread probability, value assessment and cost estimation tools are incorporated into the system.
- Information is spatially oriented and graphically displayed thereby reducing text input requirements.
- Decision makers are able to follow a progressive decision process that can be scaled, adapted, and be responsive to changes in the wildland fire environment.

The decision support system itself is constantly evolving, incorporating additional data, analysis tools, and adding enhancements. As future technological advancements are made in wildland fire science and technology they will continue to be integrated into WFDSS.

The following sections describe accomplishments in the areas of WFDSS delivery, FY 2010 use, training and information dissemination, WFDSS helpdesk and feedback activities, WFDSS data management milestones and infrastructure, and IBM development infrastructure.

WFDSS Development and Delivery Milestones

Routine meetings and conference calls with the IBM programmers resulted in significant milestones being met throughout this second year of development and implementation, highlights include:

- General user enhancements, filtering, merging of Production and Training accounts
- New data layers available – FMU's, Building Clusters, Surface Management Agency
- Addition of Relative Risk Charts and Analysis procedures (figure 5)
- Addition of a medium term fire behavior model similar to the desktop application FARSITE (figure 6)
- Addition of a means to link Spatial Data to Incident Objectives

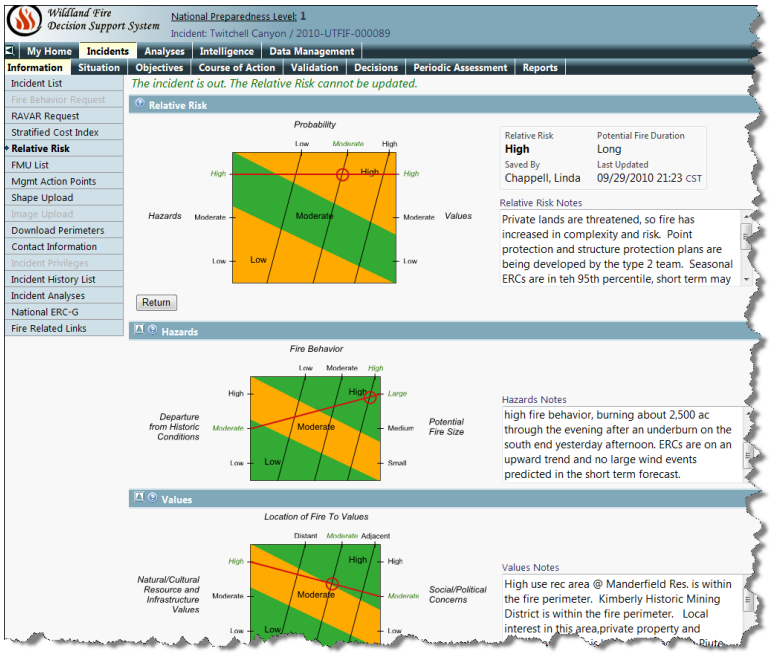


Figure 5. Example of Relative Risk Chart available in WFDSS

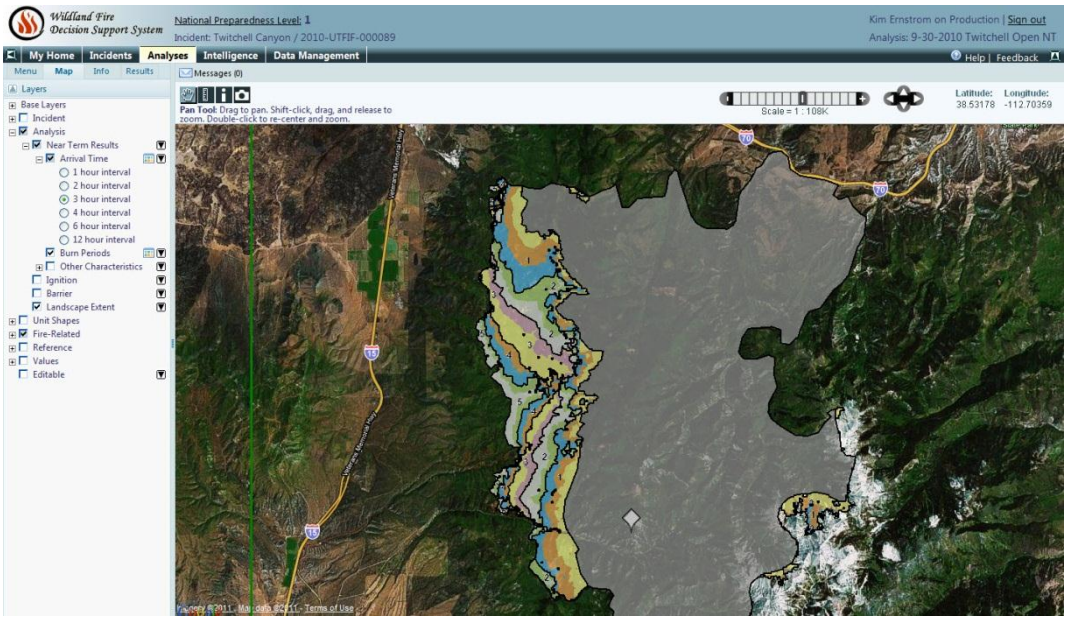


Figure 6. Example of medium term (Near Term) Fire Behavior Analysis similar to FARSITE

The following table is a summary of the key updates made as each new version of WFDSS was released.

Table 2. WFDSS Release highlights, FY2010

September/October 2009 – versions 3.5 and 3.6	• Security Audit Trail – provides administrators documentation on system use and user actions • Enhancements to the user address book • Incident, Strategic Objective, Analysis List filtering capabilities improved • WildCAD integration and batch upload capability • Cost estimator spreadsheet added to the Course of Action tab for direct downloading • Fire Behavior Analysis enhancements – basic and short term fire behavior analysis display capabilities improved, ability for analysts to edit fuel moistures and landscape files added, copying of analyses enabled
December, 2009 version 3.8	• Security Requirements for passwords updated, 60 and 30 days set for default and "privileged" passwords • User Accounts "Locked" after 90 days of inactivity • Fire Perimeters and Analysis Ignition shapes differentiated for fire behavior analysis • Feature Information link added to query map points and layers • Fire Danger Rating Graphs added to Fire Behavior analysis pages and the ability to add graph to incident decision content was enabled
March, 2010 version 3.9	• Incident Info. page fields renamed to conform with NWCG Standards • Final Fire Perimeters enabled to allow users to designate a final fire perimeter - will be rolled into annual fire history layers • Email notification with hyper link added when a Decision or Analysis is available for review or approval • Relative Risk Analysis added – users provide input for Hazards, Values and Probabilities and an overall Relative Risk is determined – notes are automatically saved to incident decision content • Production/Training accounts merged, single password required for both • Map display performance enhanced • Feature Information download and copy enabled
May, 2010 version 3.10	• Expansion of help icon (question mark symbol) throughout application • Page level HELP enhancements and content added • Summary reports added to Intelligence Tab • Stratified Cost Index models updated for Forest Service and added individual models for each of the DOI agencies

July, 2010 version 3.11	• New map layers added – Building Clusters, FMU's , Fires 2010, BLM Buildings, Communication Towers, Mines, Sage Grouse Habitat • RAWS layer activated, Fire Danger graphs and station info linked • Alpha version of Near Term Fire Behavior available for testing by Super Analysts • Smoke Dispersion link added to Information panel – link to FCAMMS Smoke Dispersion Forecast Guidance table
October, 2010 version 3.12	• Excel spreadsheet download function enabled for various lists • Objective Shapefiles - added to link local spatial data to incident objectives

WFDSS Use Statistics

WFDSS was available for use in creating decision documents on April 1, 2009. 2010 WFDSS use significantly increased from 2009 which may be due to the addition of all federal agencies using the system. The federal agencies have implemented the use of WFDSS differently.

- September 1, 2009 the Forest Service required the use of WFDSS for all Fires.
- October 1, 2009 the Bureau of Indian Affairs (BIA) required the use of WFDSS for all unplanned wildland fires.
- April 30, 2010 the National Park Service (NPS) required the use of WFDSS for all wildland fires.
- Spring 2010 the Bureau of Land Management (BLM) and the US Fish and Wildlife Service (USFWS) required use of WFDSS for all fires that escape initial attack.

Statistics to the end of the fiscal year showed approximately 11,579 incidents documented in the system with all agencies represented, this is double the number of incidents entered in FY2009. Of the 11,579 incidents entered into the system, 606 Decision Documents were published (figure 7).

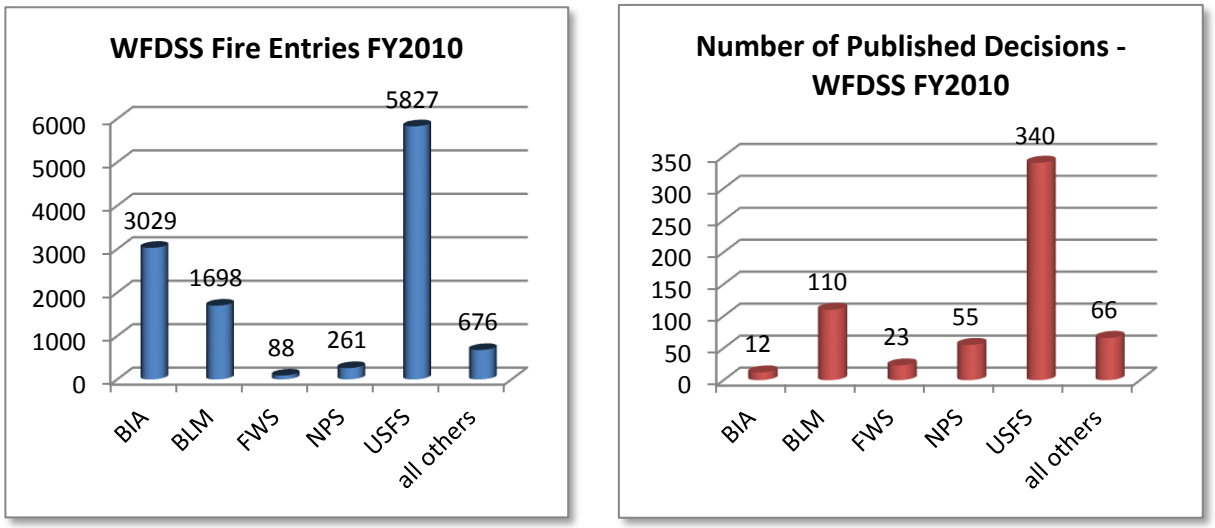


Figure 7. Wildland Fire Decision Support Use, October 1, 2009 - September 30, 2010

WFDSS Training and Information Dissemination

In 2009, the focus of WFDSS training was on reaching the most users as possible in the short time before and during fire season. In 2010 many users had already been introduced to WFDSS and were going into their second fire season with some previous experience with WFDSS. This enabled the WFM RDA staff to focus on teaching users how to strengthen the content within the Decision Document by utilizing some of the new features in WFDSS that became available in the spring such as Management Action Points, Relative Risk Analysis and Stratified Cost Index. Another area of training emphasis was on incorporating the fire behavior tools and their related outputs into the Decision framework.

Tolkat Fire, Tanana Zone Alaska

WFM RDA staff continued the use of Webinar and Go-To-Meeting technology to deliver many training sessions, but several hands-on workshops were also conducted when an interagency audience was assembled. All agencies and geographic areas participated in WFDSS training, it is estimated that approximately 1000 users participated in formal training with additional participation throughout the fire season during going fires, informal meetings, webinars, phone calls and individual incident support.

WFDSS Training Sessions FY2010

The number in parentheses represents the number of attendees

- **Technical Fire Management**, WFDSS Decisions and Fire Behavior, Interagency (30)
- **Pacific NW WFDSS Workshop**, Interagency (80)
- **Region 9 WFDSS Decision Process and FSPro Training**, USFS (24)
- **Southeast DOI WFDSS Overview**, NPS/FWS (9)
- **Region 9 Train the Trainer**, USFS (5)
- **Region 9 WFDSS Workshop**, USFS (30)
- **NPS Fire, Aviation, Management Workshop**, NPS (250)
- **NWCG Geospatial Task Group**, Interagency (129)
- **WFDSS Webinar Geographic Area Leads**, Interagency (58)
- **R1 Fire Behavior Workshop**, Interagency (35)
- **Idaho Panhandle NF Fire Behavior Tool Review**, USFS (3)
- **Payette National Forest WFDSS Training**, USFS (40)
- **Region 2 & 4 Fire Behavior Workshop**, Interagency (40)
- **Southern Area Advanced Fire Academy**, Interagency (40)
- **Region 3 Fire Behavior Workshop**, USFS (25)
- **Indian Fire Simulation** – FSPro, NIMO
- **Missouri Fire Simulation** – FSPro, NIMO
- **Apache-Sitgreaves NF WFDSS refresher**, USFS (40)
- **BIA WFDSS Training**, BIA (20)
- **FlamMap Workshop**, International Researchers/Fire Managers (10)
- **WFDSS Decision Support Webinar**, Interagency (30)

Training Course Instruction FY2010

- **S-520, Advanced Incident Command.** *Decision Support, WFDSS.* NAFRI. Tucson, AZ.
- **S-590, Advanced Fire Behavior Interpretation.** *Decision Support, WFDSS.* NAFRI. Tucson, AZ.
- **S-580, Advanced Fire Use Applications.** *Decision Support, WFDSS.* NAFRI. Tucson, AZ.
- **National Fire Management Leadership**. *Decision Making and the Wildland Fire Decision Support System.* NAFRI. Tucson, AZ.
- **S-495, Geospatial Fire Analysis, Interpretation, and Application**. *Wildland Fire Decision Support System.* NAFRI. Tucson, AZ

WFDSS Helpdesk and User Feedback

The Fire and Aviation Management (FAM) Fire Application Help Desk provided support to the WFDSS application by assisting with troubleshooting decision documentation issues, providing feedback, and facilitating user access and resetting passwords etc. They functioned primarily as first and second level help and when necessary more advanced issues were elevated to WFM RDA staff as experts in WFDSS development and fire behavior applications.

Sheep Fire, Sequoia- Kings Canyon National Park

Feedback on WFDSS was received from the Fire Application Help Desk and the field. WFDSS has internal feedback built into the system that allows the developers to receive comments directly from the field. The feedback feature was utilized for both help and feedback, which allowed the developers to respond quickly to user issues and improve system functionality. If changes to the program became necessary due to information received from user feedback but could not be "Hot Fixed", they were implemented in the next release of the application.

In May of 2010 a new system was implemented that consolidated user feedback into a single searchable database. When WFDSS user feedback is received it is labeled based on the type of information. For example, issues could be identified as a system 'glitch', a user enhancement suggestion, or flagged for future inclusion in WFDSS help documentation. Though it was a relatively slow fire season nationally, more than 230 user feedback emails were responded to between May 15th and September 30th. User feedback was essential in the continued development and improvement of the application.

- WFDSS developers provided an average of 2 responses per day to user feedback (though six to eight incoming emails were common during busier periods)
- The majority of feedback consisted of relatively detailed user questions regarding specific functions of WFDSS
- Twenty emails were flagged as 'glitches' and all of these issues were patched or fixed within the program
- Eighteen emails were flagged as user suggestions for improvement and these were either implemented or added to a list of potential future enhancements.

The WFDSS development team continues to utilize the 16 page 2009 After Action review document that was produced from user feedback. This comprehensive document containing 115 summary points has provided valuable information to the development team throughout FY2010. As topics are addressed within the application notes are made to advise users of the revision and the status of their concern and input. The Document will be available on the WFM RDA website for users to track the status of their feedback to the system.

WFDSS Data Management Infrastructure and Milestones

Little Beaver Complex, Boise National Forest

The WFDSS application is "data rich." It requires spatially oriented data and graphically displays information to support wildland fire and other natural resource decisions. Due to the type and number of interagency spatial data sets required an Interagency GIS Team continued to provide data support for WFDSS. This Team was responsible for acquiring, consolidating, and validating their agency spatial and tabular data. In addition this Team developed and maintained communications among local, regional, and national agency personnel to improve the collection process and provide explicit guidance on data needs.

New Data Added FY2010

The WFDSS Interagency GIS Team continually explores and exposes new spatial datasets to users within WFDSS. In 2010 several new layers were created, obtained from the field, and/or discovered. These layers are meant to enhance the application and allow the user to make better informed decisions about how to manage wildland fires.

- ***Interagency Wilderness and Other Special Designated Area (SDA) data layer (figure 8)*** Compilation of the data contained in an interagency wilderness and other SDA data layer was enabled in WFDSS in July 21, 2010. This comprehensive data set displays the areas recognized by the BLM, NPS, USDA FS, or USFWS as having a special designation (e.g., wilderness, inventoried road less area, wilderness study area, etc.). It is the result of combining four sources of spatial data to make an interagency, national wilderness and other SDA data layer

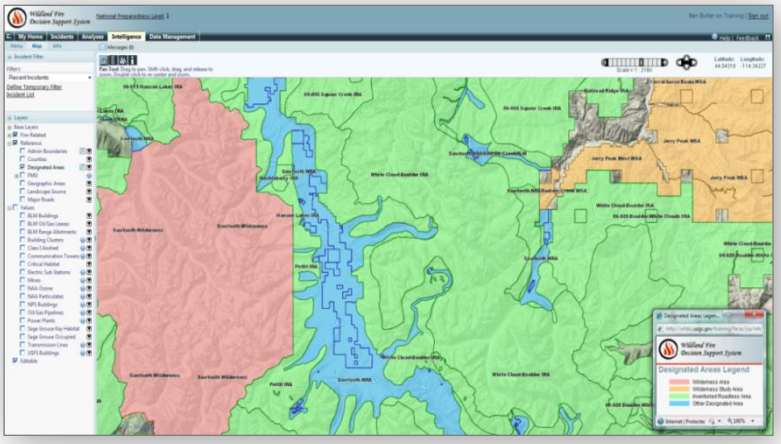


Figure 8. Example of Wilderness and Special Designated Areas in WFDSS

- ***Sage Grouse Habitat data layers***
  At the request of the BLM two Sage Grouse habitat data layers were added to WFDSS. The Sage Grouse Key Habitat layer and the Sage Grouse Occupied Habitat data layers were added to WFDSS on July 26, 2010. These polygon data represent two different modeled versions of Sage Grouse habitat throughout the Western United States and are meant to serve as a reference within WFDSS.

- ***BLM, USFS, NPS Buildings and Cadastral data layer (figure 9)***
  A national BLM buildings layer (facilities and recreation sites) was obtained from GeoCommunicator; the publication site for the BLM National Integrated Land System. The layer depicts building locations nationally for the BLM. This is the third layer of its kind as WFDSS also contains the USDA Forest Service and National Park Service building locations. In July private building clusters (cadastral data) was enabled for viewing on the map. All four of these layers were updated during the 2010fire season to display the most current building locations for these agency structures and the cadastral data.

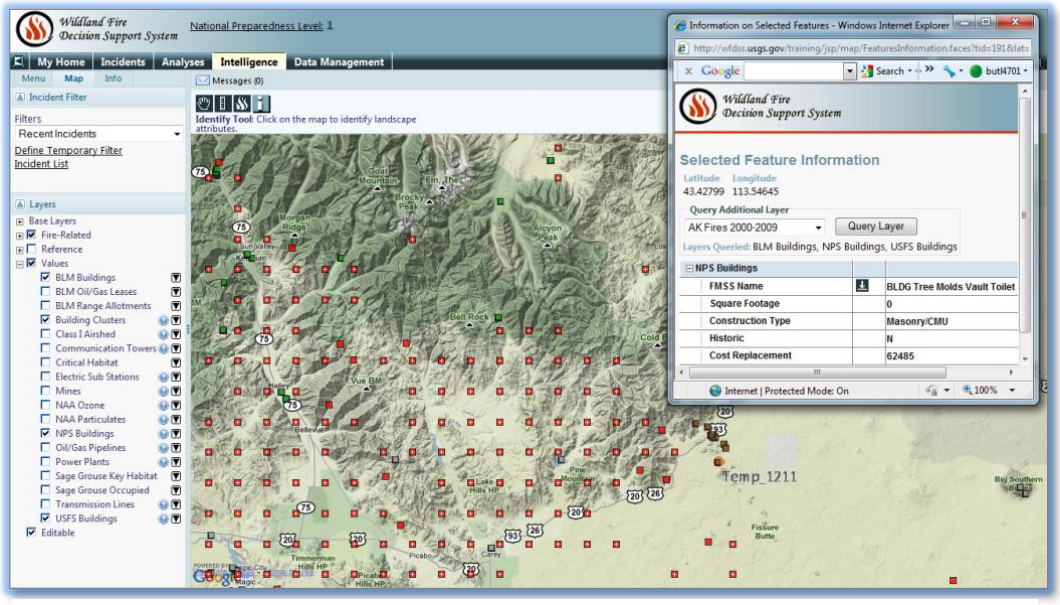


Figure 9. Example of Building Clusters in the WFDSS map display

- ***BLM Range Allotments data layer***
  The range allotments layer was also obtained from the GeoCommunicator and was included in WFDSS on October 18, 2010. The emphasis of the layer is to communicate the locations of range allotments and pastures (where pastures are subdivisions of allotments) that are managed for livestock grazing on federal lands by the Bureau of Land Management.
- ***BLM Oil and Gas Leases***
  This is the third of three layers that was downloaded from the GeoCommunicator and included in WFDSS at the request of the BLM. Enabled on October 18, 2010, this layer spatially depicts the oil and gas agreements and leases on federal lands or on lands where there are federal minerals.

Data Updates and Maintenance

Throughout FY2010 the WFDSS GIS Team examined each data layer in WFDSS to determine if the authoritative data sources had produced updated versions. In addition other data sources were explored to determine whether or not the current source contained the best available data. If the "other" source contained better data than the original the new data source was used to replace the existing data. A data refresh plan was established tracking

which data sets (i.e. National Fire Management Units - FMUs) required frequent updates and therefore were edited on a more aggressive schedule. Information about a small sample of data layer updates is included below:

- ***National Surface Management Agency (SMA) data layer***
  In July of 2010 BLM provided an updated SMA data layer. The layer portrays tracts of federal land for the entire US and classifies these holdings by administrative agency. The new data layer went through a series of quality assurance and control processes to ensure the highest level of accuracy and precision. As part of this processing the NWCG Unit Identifiers, unit name, and administrative agency attributes were examined closely to ensure accuracy. The updated layer was enabled in WFDSS on August 2nd.
- ***NWCG Unit Identifiers***
  The NWCG Unit Identifier is used in WFDSS which highlights the need to have an accurate NWCG Unit Identifier for all field units. WFDSS currently maintains its own version of the Unit Identifier table which is a sub-set of the active NWCG Unit Identifiers. This table is continually updated as FMU data are brought into the application. In the near future the intent is to link or connect to a service for the NWCG Unit Identifier's authoritative data source which will provide a dynamic and current listing of NWCG Unit Identifiers for WFDSS.
- ***National Fire Management Unit (FMU) Layer (figure 10)***
  Collection of the spatial FMU data was open to all of the federal wildland fire management agencies and received from each. As of October 2010, spatial FMU's have been collected for 499 NWCG Unit IDs. This breaks down to approximately 46% of the USDA Forest Service, 28% of the BIA, 67% of the NPS, and 51% of the BLM's FMU spatial data being uploaded into WFDSS at the present (figure 10). The vast majority of these units have also entered and activated strategic objectives and/or management requirements in the WFDSS Production System.

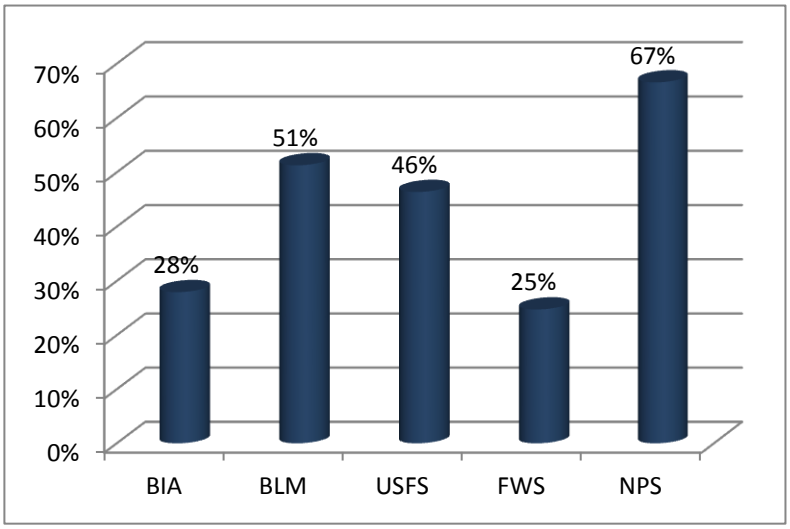


Figure 10. Spatial Fire Management Unit (FMU) Data available in WFDSS.

In figure 10, Percentages were calculated from total number of Unit IDs available in WFDSS. For specific information on individual agencies or regions contact agency data management representatives found on the FRAMES website (http://frames.nbii.gov) under Partner Sites/WFDSS/Spatial Data Contacts and Resources.

Note: In addition to the agencies listed in the chart 14 other units submitted FMU data in Alaska (1 AK Native, 12 Other, 1 State)

WFDSS Version 3.11 included the ability to view the spatial FMU layer on every map page except for the Intelligence map which was then included in the version 3.12 With these new releases users can now view all of the FMUs for a given unit or choose an individual FMU to view (figure 11).

- ***National NPS Building Layer***
  The NPS building layer is updated on a monthly basis by the National Park Service. The WFDSS GIS Team receives the update each month, examines the updates (number of additions and edits, location of new data etc.) and then makes a decision whether to update the WFDSS layer for that month. Throughout 2010 the layer was updated in WFDSS a total of five times.

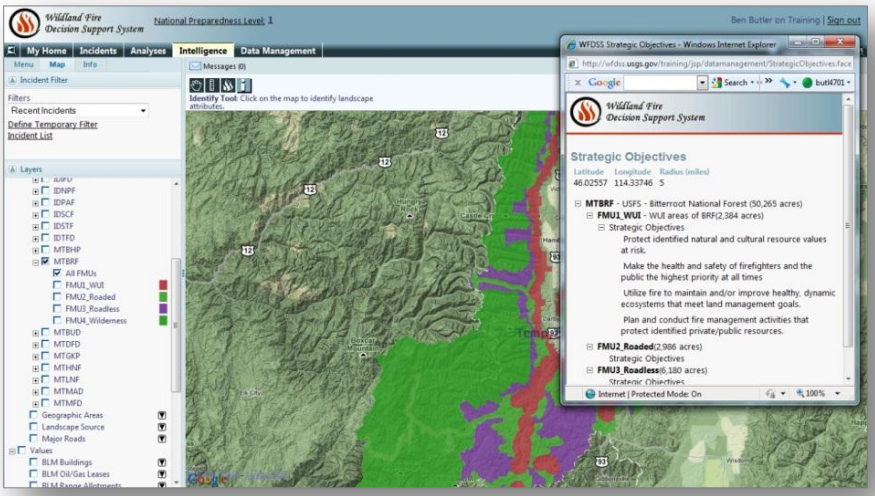


Figure 11. Example of Fire Management Unit (FMU) display in WFDSS

- ***WFDSS Values Data Layers***
  Several of the value layers (electric substations, mines, oil and natural gas pipelines, power plants, and transmission lines) in WFDSS come from the Homeland Security Infrastructure Program (HSIP) Gold 2010 version. HSIP Gold 2010 is a unified inventory of homeland infrastructure foundational geospatial data assembled by the National Geospatial-Intelligence Agency in partnership with the Department of Defense, Department of Homeland Security, and U.S. Geological Survey for use by the Homeland Security/Homeland Defense Community. It is a compilation of the best available Federal Government and commercial proprietary data. The HSIP data in WFDSS is provided (as specified by the data agreement) as view only to the WFDSS users.

Information/Data Sharing and Distribution

WFDSS Help Content

In an effort to provide more information about the data layers used in WFDSS help content was developed for each layer. This content was then incorporated into the application through the use of "Question Mark" buttons. The buttons appear beside each of the layers and when clicked, open the help system in a new window to display information specific to the data layer (figure 12). The content describes the purpose, source, currency, extent, projection, and who to contact if you have questions or concerns regarding the layer. These pages will continue to be improved and edited based on user feedback and/or changes to the data layers they represent.

Figure 12. HELP content - "Question Mark" button for NPS Buildings layer

FRAMES Spatial Data and GA Editor Resources Website (figure 13)

The FRAMES spatial data and GA editor resources page was developed in early 2010 with the intent of providing dynamic WFDSS information. This site is specific to the WFDSS application and provides information for WFDSS users and to individuals who do not have access to WFDSS. The information provided is dynamic and updates are ongoing. One highlight of the site is the spatial data downloads page which provides users with links to download a subset of the spatial data that are used in WFDSS. In addition, the site contains calendars that outline the dates and times of upcoming WFDSS trainings and meetings. For more information and to view the site please go to: http://frames.nbii.gov/wfdss.

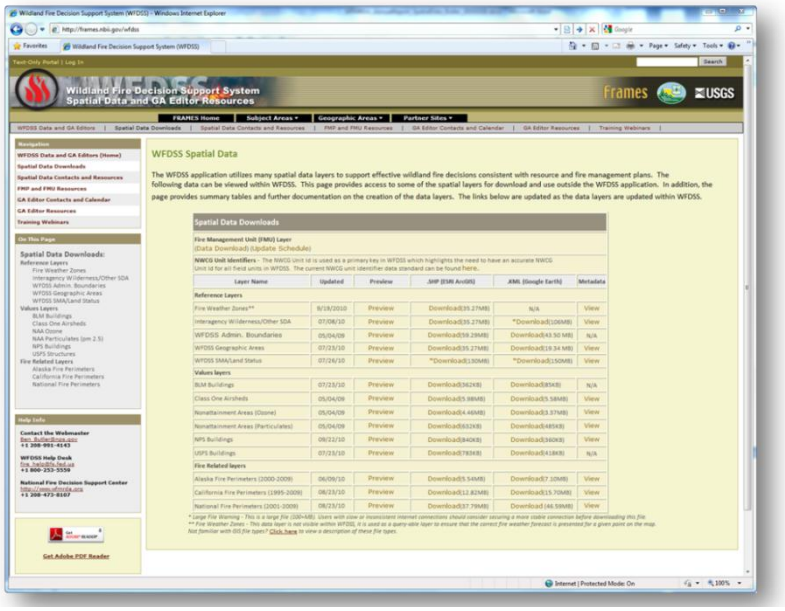


Figure 13. FRAMES website, http://frames.nbii.gov/wfdss

Other WFDSS Data Management Activities

- Cadastral data for WFDSS was managed and provided by the Missoula RAVAR team.
- Maintained close coordination with Missoula RAVAR team to ensure consistent data for WFDSS and RAVAR.
- Shared WFDSS data layers with various efforts in the WFM RDA in support of the WFM RDA mission and goals.
- Participated on the NWCG sponsored Interagency Wildland Fire Geospatial Governance Project developing an interagency wildland fire geospatial governance model.
- Participated in the Fire Globe Project.
- Served as member on the Enterprise Interagency Wildfire Geospatial Database Project.
- Worked with NWCG Branch Coordinator addressing NWCG data standards and NWCG glossary.

Objective 3: Project Fire Season Costs

The primary projection of fire season costs is completed by staff in the Human Dimensions Science Program in Missoula, MT and provided to the Fire and Aviation Management staff at the Headquarters Office. The WFM RDA contributed to this activity by:

- Supporting weather and climate modeling research and application development – discussions were initiated with the Rocky Mountain Center to further these efforts and cooperative working arrangements with the National Predictive Services Group will be accelerated in FY 2010,
- Supporting efforts to facilitate budget and resource allocation among wildland fires by participating on national work groups in this area.

Objective 4: Coordinate Scientific Efforts Associated with Wildland Fire Costs

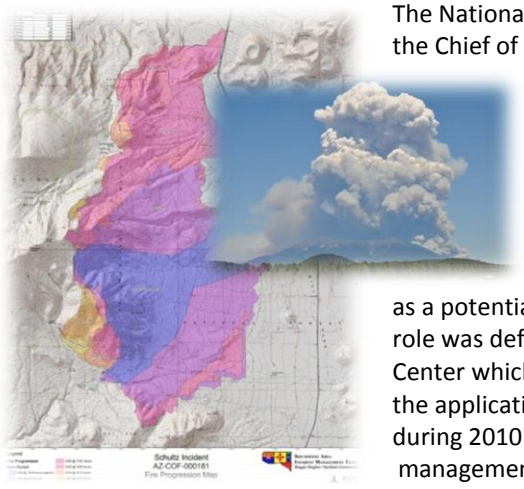
The WFM RDA worked to coordinate development in the areas of wildland fire economics knowledge and tools. This included emphasis on large wildland fire costs and benefits, providing economic data for analysis, establishing valuation tools for economic effects of fire on natural resources, effects on local economies of risk attitude by land managers and the public in managing wildland fire, and modeling to support costing and other economic analyses. This was all accomplished by maintaining close coordination with the Human Dimensions Science Program and through fiscal support to this unit. The WFM RDA NFDSC supported the RMRS Fire Research Economics group in training personnel in the field and the WFM RDA staffs on the Rapid Assessment Values at Risk (RAVAR) tool. A transition plan has been developed to move RAVAR out of the RMRS to the field and the WFM RDA.

Objective 5: Participate in Developing Hazardous Fuels Planning Applications

The Joint Fire Science Program (JFSP), NWCG, and Sonoma Technology, Inc. are developing a prototype of a new planning environment called the Interagency Fuels Treatment Decision Support System (IFT-DSS). In late 2009, lead representatives from WFDSS and the IFT-DSS met in person to discuss their respective programs and formalize a collaborative working relationship in order to share data and ideas and facilitate the free exchange of information between the two programs. Throughout 2010, the assigned liaisons for WFDSS and IFT-DSS held discussions and shared information, data and ideas amongst one another.

On March 2nd, 2010, representatives from BlueSky, FFA, IFT-DSS, JFSP, NWCG, IRWin, FamWeb, the Missoula Fire Lab and WFDSS met to discuss opportunities for integrating the various 'service oriented architectures' into a 'System of Systems'. A paper on 'the Emerging Vision for Software Systems' was drafted that discussed sharing information, data, inputs and outputs between the various models and decision support systems. WFDSS has shared fire behavior modeling code and the legends and color schemes for model outputs with IFT-DSS so that the two systems will operate on the same tools and share a similar look and feel.

Objective 6: Participate in and Manage the National Fire Decision Support Center (NFDSC)



Schultz Fire, Coconino National Forest

The National Fire Decision Support Center (NFDSC) was formally established by the Chief of the Forest Service in a memorandum dated May 24, 2009. This memorandum documented the collaborative effort between Fire and Aviation Management (FAM) and Research and Development and established functional goals and objectives. The NFDSC was created as a virtual Center with components located within numerous research projects and research, development, and application programs. Subsequent involvement by other research stations and agencies was stated as a potential growth area and identified as a desirable pursuit. A principal role was defined for the WFM RDA, located at the National Interagency Fire Center which is to oversee the NFDSC and manage the positions that deliver the application of wildland fire science to fire management. Accomplishments during 2010 are focused around the areas of program documentation, position management, program management, support to wildland fires, NFDSC presentations completed, and NFDSC interagency coordination.

NFDSC Program Documentation

The original WFM RDA Charter presented program definition and guidance that directly supported NFDSC goals and provided a solid foundation for implementation of a national decision support center. One new goal was added to the Original WFM RDA Charter to: "Participate in and manage the National Fire Decision Support Center." Approvals and signatures for this Charter Amendment were obtained early in FY 2010. Supporting objectives and tasks for this, definition of staffing levels, and funding procedures were also added to the WFM RDA Charter.

A Service Level Agreement (SLA) was also prepared to document the purpose, goal, funding, staffing, and focus areas of other programs participating in the NFDSC. The SLA is a formal agreement between the Washington Office Fire and Aviation Management and Washington Office Research and Development and provides a general implementation framework with specific objectives, staffing, and funding procedures. Subsequent approvals and signatures for the SLA were obtained early in FY 2010. The SLA is on file at the WFM RDA in Boise, ID and at the RMRS Headquarters in Fort Collins, CO.

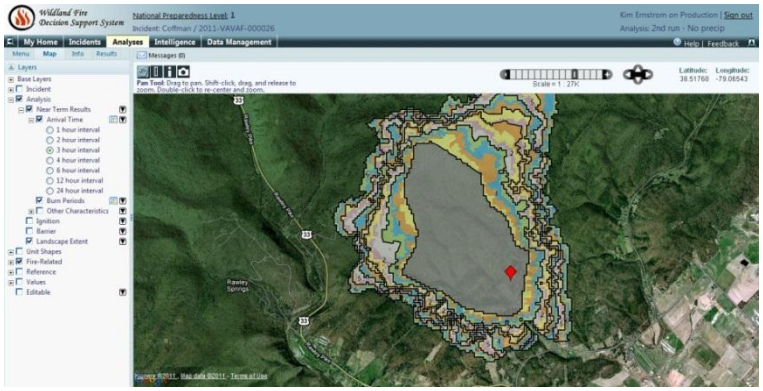
NFDSC Position Management

The WFM RDA NFDSC was fully staffed by early summer 2010. See Organization on page 8 and WFM RDA Position Management on page 11 for explanation of positions supporting the NFDSC.

NFDSC Program Management

The NFDSC was fully operational by March 1, 2010 with personnel on-call to provide assistance to the field when requested. Key components of operations included:

- Draft Standard Operating Procedures provided to the field via the Geographic Area Editors for input and guidance on procedures for ordering support.
- Continual coordination with Geographic Area Editors established at the beginning of the season and maintained as fire activity fluctuated throughout the season and across country. As fire danger increased contact was made with the affected Geographic Areas to ascertain potential support needs and gaps in Geographic Area analyst availability.



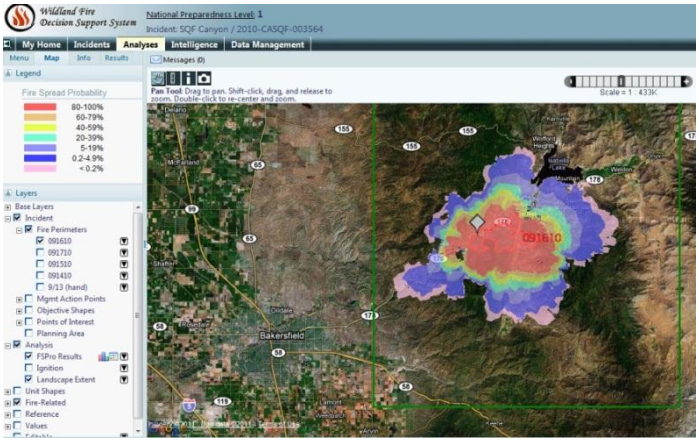
Coffman Fire, George Washington Jefferson National Forest - Near Term Fire Behavior Analysis

- Early in the season NFDSC established a list of interested fire behavior specialists (LTANs/FBANs/Technical Specialists) that were available throughout the country to provide support in Fire Behavior Analysis and decision documentation.
- WFM RDA staff established link to the WFM RDA webpage for use by field personnel that summarized information on requesting fire behavior analysis and decision documentation assistance. WFM RDA website provided explanation of the NFDSC and the WFM RDA, links to fire management policy, partner websites, WFDSS and relevant news and updates to the program.
- NFDSC/RMRS Economics group personnel developed transition plan to transfer support responsibility for RAVAR analyses from the RMRS Economics group to NFDSC staff. Transition plan included steps necessary to train RAVAR analysts at the Geographic Area and Regional level. Several webinar-based training presentations were completed during the 2010 season.

Since this was the first year of operations users of the NFDSC supplied comments through an online survey developed to evaluate the effectiveness and efficiency of the support center. Conducting fire behavior analyses remotely is a relatively new concept and opportunities to improve operations are actively sought. It is anticipated that standard operating procedures will be modified based on user input and changes in fire management applications and policy.

NFDSC Support to Wildland Fires

Incident support was provided throughout the United States in every geographic area. Although the fire season activity was not extensive or prolonged, it provided a significant opportunity to provide on-the-job training and practice in the use of decision support tools. The Alaska and Southwest wildfire seasons were active enough to warrant the establishment of temporary Decision Support Centers in each region respectively. Fourteen analysts supported Alaska both remotely and on site at the Alaska Interagency Coordination Center (AICC) over a 3 week period. Four analysts traveled to Albuquerque to provide support at the Southwest Interagency Coordination Center (SWICC) for a 2 week period during the peak of fire activity.



Canyon Fire, Sequoia National Forest - FSPro analysis near Bakersfield, CA

In FY2010 NFDSC Support was provided to 75 Wildland Fire Incidents and 1 prescribed fire.

- Primary analyst support (support to the unit solely to implement fire behavior requests) was requested and provided 41 times
- 32 incidents requested analyst assisted support, providing for opportunities to coach, mentor, and teach non-WFMRDA analysts.
- Approximately 91% of incident support was provided through a virtual workforce, and 6 percent was provided on scene.

The following graphs (figures 14 – 17) display the agencies and geographical areas supported, type of support, incident kind and incident type. The graphs do not represent the coordination that took place through the NFDSC that linked other non-NFDSC analysts with needs in the field.

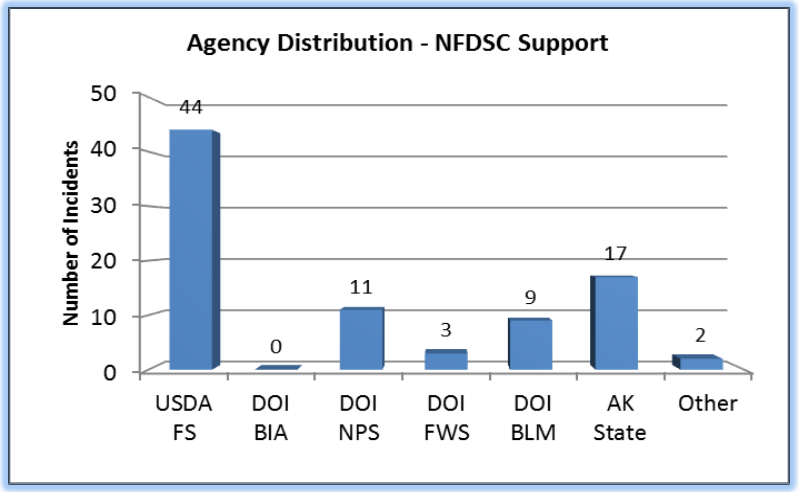


Figure 14. National Fire Decision Support Center, distribution of agency support FY2010

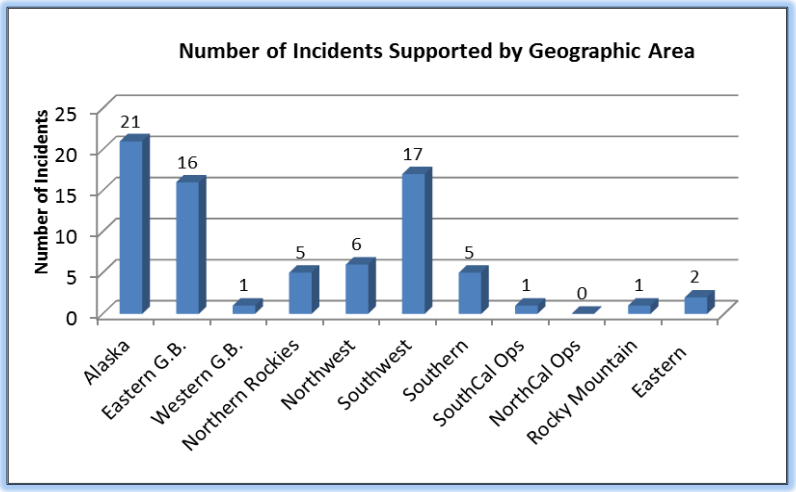


Figure 15. National Fire Decision Support Center, number of incidents supported FY2010

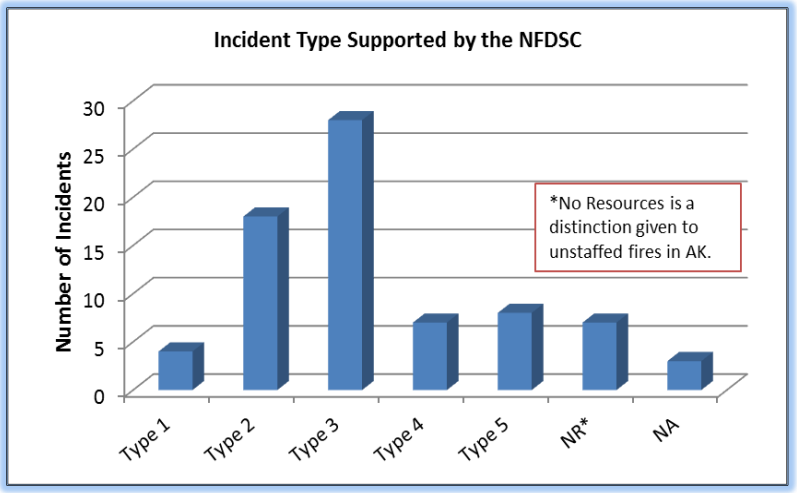


Figure 16. National Fire Decision Support Center, Incident Type supported FY2010

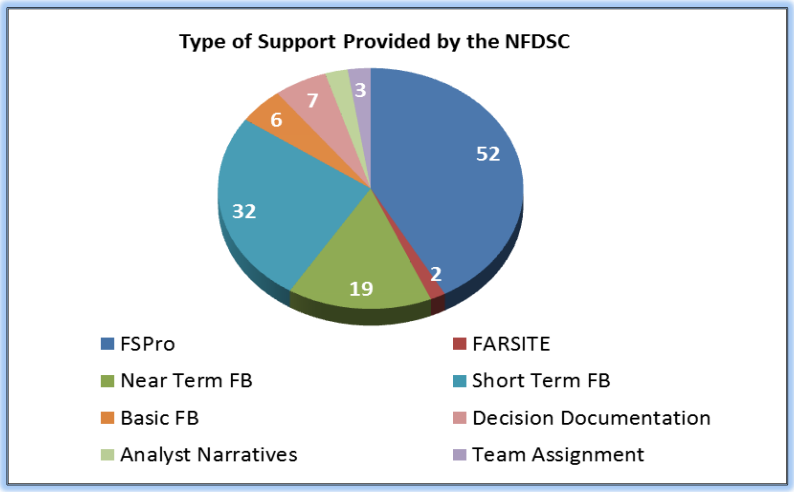


Figure 17. National Fire Decision Support Center, type (category) of support FY2010

NFDSC Presentations Completed

WFM RDA staff members delivered numerous presentations describing the NFDSC at the following functions:

- Fire Equipment Committee/Working Group, NFDSC and WFDSS. Missoula, MT
- Predictive Services Working Group, WFDSS and NFDSC. Lake Tahoe, NV.
- Northwest Regional Decision Support Round Table, WFDSS and NFDSC. Redmond, OR.
- Northwest Regional After Action Review. Portland, OR.
- Northern Rockies Dispatcher Workshop, WFDSS. Great Falls, MT.
- Northeastern Forest Managers Meeting. Portsmouth, NH.
- NPS National Fire and Aviation Meeting. San Antonio, TX.
- International Fire Ecology Conference, NFDSC and WFDSS. Savannah, GA.
- International Association of Wildland Fire and Human Dimensions Conference. San Antonio, TX.
- Technical Conference of the Fire Service; Capacity of Extinction of Wildland Fire. Girona, Spain.

NFDSC Interagency Coordination

The DOI Office of Wildland Fire Coordination funded two positions in support of the NFDSC and WFDSS implementation. The following opportunities for interagency participation and involvement were identified:

- DOI Partnership in the Research/Development/Application activities working in the interagency environment of technology transfer of fire science information focusing on the development and delivery of products.
- DOI Partnership in the National Fire Decision Support Center. The additional positions expanded the Center's capability to support fire management decision making for all agencies and to support capacity building in WFDSS use and decision analysis within DOI agencies, and
- Technical capability including broad agency participation to teach the decision support approach of writing good decisions based on best available data to make decisions. Capacity building will increase technical skills that can be shared across agency organizations.

Additional WFM RDA Activities FY2010

Meeting Attendance

- R6 Fire Management Meeting.
- National Predictive Services Meeting.
- Alaska Interagency Coordination Group (AICG) Meeting, Fairbanks, AK.
- S-590 Steering Committee Meeting.
- RMRS All Scientists Meeting, Fort Collins, CO.
- Fire Executive Council. *WFDSS status and update.* Boise, ID.
- National Wildfire Coordinating Group. *WFDSS status and update.* Boise, ID
- National Multi-Coordinating Group (NMAC) and Geographic Area Coordinating Group (GMAC) Meeting.
- USFS Region 1, Line Officers' Meetings. Complexity Analysis and WFDSS, Missoula, MT.
- Southwest Area IMT Meeting.
- Great Basin IMT Meeting.
- Fire-Climate Workshop, Tucson, AZ.
- IC/AC Meeting, San Diego, CA.
- Accident Prevention Analysis/Facilitated Learning Analysis (APA/FLA) Workshop, Sacramento, CA. Presented session on history of fire reviews, evolution of lessons learned – facilitated learning analysis, and discussion of variables contributing to success of reviews.
- Forest Supervisor Roundtable, Boise, ID.
- NE Forest Fire Supervisors' Meeting, Portsmouth, NH
- Georgia Forestry Commission-FWS Fire Coordination Meeting, Okefenokee NWR, Folkston, GA.
- Office of Wildland Fire Coordination (OWFC), DOI. *Wildland Fire Decision Support System*. Boise, ID.
- Interagency Fire Planner Meeting.

Publications

- Zimmerman, Thomas and Tim Sexton. 2010. Organizational Learning Contributes to Guidance for Managing Wildland Fires for Multiple Objectives. Fire Management Today. 70(1): 9-14. Forest Service, US Department of Agriculture, Washington, D.C.
- Larkin, N.S., T. Brown, P. Lahm, and T. Zimmerman. 2010. Fire Management Today. 70(2):36-40. Forest Service, US Department of Agriculture, Washington, D.C.

Conference Papers Presented

- International Fire Ecology Conference, NFDSC and WFDSS. Savannah, GA.
- International Association of Wildland – 2nd Human Dimensions in Fire Management Conference. San Antonio, TX.
- Technical Conference of the Fire Service; Capacity of Extinction of Wildland Fire. Girona, Spain.

Organizational Representation

WFM RDA staff members participated in a variety of roles on the following groups, committees, and training cadres in FY2010.

- S-490 Advanced Fire Behavior Calculations course cadre members
- S-495 Geospatial Fire Analysis, Interpretation, and Application Steering. Committee Chairmen, members of training cadre, and mentors.
- Rx-510, Advanced Fire Effects Steering Committee member.
- S-520, National Incident Management Training Course Steering Committee member.
- S-580, Advanced Wildland Fire Use Applications. Serve as member of training cadre.
- S-590 Advanced Fire Behavior Interpretation Steering Committee Co-chair, cadre and mentors.
- S-620, Area Command Steering Committee member.
- Fire Management Leadership – training Cadre member.
- Landscape Fire and Resource Management Planning Tools Project (LANDFIRE) group liaisons.
- Predictive Services/Intelligence liaison.
- Air Fire Group liaisons.
- Geospatial Equipment and Technology Applications (GETA) group liaison.
- National Incident Management Organizations (NIMO) liaisons.
- NWCG Fire Reporting subcommittee and 209 reporting liaisons.
- NWCG Fire Behavior Committee Co-Chair.
- NWCG Fire Planning Committee liaison.
- Research Representative to NWCG.
- Missoula Technology and Development Center (MTDC) liaisons.
- Disaster Assistance Support Program liaison.
- Fire Research and Management Exchange System liaison.
- NFDSC Fire economics liaison.
- NFDSC Human Factors and Risk Management liaison.
- NFDSC Fire Spread Research liaison.
- Wildland Fire Science Partnership member.
- National Interagency Fuels, Fire, and Vegetation Technology Transfer team liaison.
- Incident Management Team Succession Planning - committee member.
- National Fire Performance Measures Work Group member.
- NWCG Executive Board representative for WO R&D.
- National Fire Directors' Meeting – participant.

Special Assignments

- National Fire Policy Implementation Task Team.
- NWCG Complexity Analysis Development Project.
- NWCG IMT Succession Project Team. Serve as member of project team.
- Team Leader, Twin Escaped Prescribed Fire Review, Kaibab NF.
- Support to Meadow Creek Facilitated Learning Analysis (FLA), White River NF (support to review team).
- Completed video interview for Lessons Learned Center for Strategic Operations Planner video.
- Completed video interview for Lesson Learned Center for Leadership Video.
- Completed interview for NPS' "Leaders You Want to Talk With" program.
- Coordinated French-German Public Television Service interview and filming of wildfire science documentary in conjunction with NIFC Public Affairs Staff.

2011 WFM RDA Planned Activities

Objective 1: Coordinate Fire Science Applications

- Improve communications, information sharing, information dissemination, and education by maintaining the website for the WFM RDA Program for housing programmatic and NFDSC information. Additionally consideration will be given to housing real time information for dissemination to assist with providing quick user friendly links to the field.
- Participate as member of Wildland Fire Science Partnership (WFSP).
- Continue coordination with FRAMES, utilize file sharing, community collaborative sites etc.
- Continue coordination with and support to AirFire Program for smoke dispersal decision support work.
- Continue coordination with Desert Research Institute (DRI) for smoke modeling work.
- Coordinate with University of Idaho and Fire, Fuel, and Smoke Science Program staff members in the development of a fire severity data layer and map.
- Continue support and coordination with University of Alaska for data management and fire behavior modeling work.
- Continue coordination with the Joint Fire Science Program.
- Support an Operational System for Continental-Scale Evaluation and Verification of Fire-Weather Forecasts by the USFS Rocky Mountain Center.
- Coordinate and cooperate with the National Predictive Services Group.

Objective 2: Develop and Support the Wildland Fire Decision Support System

Planned WFDSS Development Activities - FY2011

Development for FY2011 will focus on the WFDSS system reliability as well as some addition of new features within the WFDSS application. There are some technically challenging system needs that when addressed, will make the application more robust. These needs are related to the spatial and data aspects of WFDSS. Significant time has been spent in FY2010 working toward the implementation of the USDA security requirements to ensure all users meet the requirements. The following list includes many of the planned activities that the development team will focus on – many other "behind the scene" improvements will be made, but will not necessarily be evident to the user:

- Produce an Adobe PDF from a published report
- Implementation of Unique Fire Identifiers for future integration into other fire management applications – increase interoperability of systems
- Producing auto-generated "Situation Assessment" maps for inclusion in Decision Documents
- Add the ability to copy a published decision forward to a new Decision Document
- Addition of local level spatial data (shapefiles) for use on any incident
- Adding ability to specify Unit level Strategic Objectives
- Ability for users to prioritize (order) Strategic Objectives and Management Requirements
- Ability to "Bookmark" maps throughout application
- Upgrade Decision Document editor to enable drag and drop and copy and paste functionality
- More folders available in the Decision Document for additional information
- Linking Final Fire Perimeters to a web service for use in migration to multiple applications
- Clean up utility for Fire Behavior analyses on the training and development sites
- Increased HELP content – 'question marks' for page level HELP, HELP for individual data layers, Hover text, Frequently Asked Questions (FAQ)

- Fire Behavior Analyses improvements – ensemble Near Term analysis, National ERC percentile map, clustering FSPro runs for fires adjacent to each other
- Development has begun on a mobile device aware version of WFDSS with testing being done on a Droid wireless phone

2010 WFDSS After Action Review

A formal After Action Review for the FY2010 fire season will be completed in November, 2010. Geographic Area Editors and other WFDSS users and managers have been asked to solicit feedback from the field related to the use of WFDSS and incident support provided by the NFDSC. The meeting will focus on the following topics:

- Success stories
- WFDSS: what worked and what did not, feedback provided to development team
- WFDSS Tools: fire behavior requests and use of analysts on incidents, RAVAR use
- Geographic Area Editors: Roles and Responsibilities
- Future WFDSS changes and development

Information collected from this meeting will provide a comprehensive assessment from the field of the use of WFDSS and the NFDSC.

Data Requirements

WFDSS data management will continue to be a focus for 2011. The current WFDSS spatial layers will be refreshed in 2011 with an additional emphasis on integrating map and web services to maintain the best available data possible in WFDSS. Continuing to improve map performance and interoperability with other applications and data sources will be a priority in 2011. The long term goal for WFDSS is to be a consumer of an interagency wildland fire and agency enterprise data and other authoritative data sources.

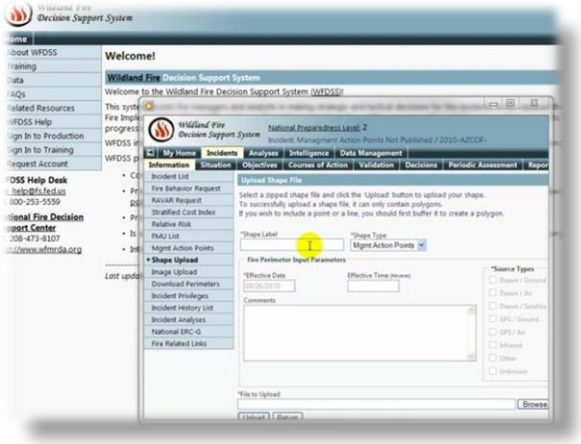
The following activities will continue in 2011:

- **Interoperability:** Pursue solutions to ensure data collection and eliminate redundant data to increase interoperability among applications such as WildCad, FireCode, Fire Reporting, etc.
- **National FMUs:** Continue to refine the interagency, national FMU spatial layer using an automated validation tool.
- **Duplicate Fires:** Strengthen WFDSS business rules to reduce duplicate fires with the long term goal to eliminate duplicate fire entries.
- **Pre-loading Local unit spatial data:** Based on a local units Land and/or Resource and/or Fire Management Plans a local unit will have the ability to pre-load spatial data for their unit which will be used in the decision process and documentation.
- **2010 Fires:** The 2010 fires entered in WFDSS will be incorporated into the WFDSS historical fire data layer.
- **WFDSS Fire History web map service:** Provide a service which will serve WFDSS fire history perimeters to other sources or applications
- **National Surface Management Agency (SMA) data:** This layer continues to be a very dynamic layer as Agency tracts of federal land holdings evolve.
- **LANDFIRE:** When LANDFIRE data is updated WFDSS will refresh the landscape data.
- **NWCG Unit Identifiers:** Working with the NWCG Unit Identifier Change Management Board to develop a dynamic link or service from the NWCG Unit Identifier authoritative data source.
- **Cadastral data (Building clusters):** In 2011 the vision for long-term sustainability of the US-wide cadastral data in conjunction with the Federal Geographic Data Committee (FGDC) Cadastral Subcommittee and the NFDSC Economics Group (RMRS – Missoula) will be developed.
- **RAVAR:** The RAVAR product and data will transition to the NFDSC early 2011 from the NFDSC Economics Group.

- **Homeland Infrastructure Foundation-Level data (HIFLD):** Continue to work with the HIFLD working group to support national infrastructure data collection and provide national interagency wildland fire spatial data layers.
- **508 map compliance:** Continue to work to improve 508 compliance within the application. Information has been posted on website to assist users who require 508 compliance web browser tools.
- **NWCG Data Standards and Glossary:** Work with the newly formed NWCG Data Standards Subcommittee (DSS) to develop and promote use of NWCG data standards and update the NWCG glossary.
- **Interagency Enterprise Wildland Fire Geospatial Portal:** Continue to drive efficiencies by developing and maintaining a long-term sustainable interagency, enterprise wildland fire information and spatial data portal to support wildfire operations and management.
    - Work closely with USDA Forest Service FAM, FAM RD&A, and other partners to develop national wildland fire spatial data in support of the WFM RDA mission and goals
    - Integrate decision support tools, information, and spatial data at an enterprise level for use by the interagency wildland fire community.
    - Improve delivery and display of spatial data by researching and developing tools such as a Fire Globe, viewers, and web or map services to facilitate the access and dynamic interaction with interagency, national wildland fire information and spatial data.

WFDSS Training Presentations Planned

The WFM RDA staff will host webinars in late winter and early spring of 2011. Webinar topics will include WFDSS Enhancements, Decision Document Development, Pre-loading Unit Specific Shapefiles and other topics identified by the field and geographic areas. The staff will continue to support impromptu webinars for geographic area workshops and other needs.



Example of short training video clip available in WFDSS

Training

There will be training material maintained on the WFDSS Training page (http://wfdss.usgs.gov/wfdss/WFDSS_Training.shtml). Training material will consist of PowerPoint presentations, short video clips and Webinar schedules. When there is a new release of the application, webinars will cover new enhancements. The WFM RDA staff will be available to assist with the regional efforts.

Objective 3: Project Fire Season Costs

Activities associated with this objective will be completed by members of the Human Dimensions Science Program in Missoula, MT.

Objective 4: Coordinate Scientific Efforts Associated with Wildland Fire Costs

Activities associated with this objective will continue to be coordinated with staff from the Human Dimensions Science Program, NFDSC, and collaborators.

Objective 5: Participate in Developing Hazardous Fuels Planning Applications

In FY2011 the WFM RDA will begin managing the National Interagency Fuel Technology Transfer Program (NIFTT). Responsibilities will include:

- providing a Project Manager,
- overseeing general mission and planned activities, and supporting these efforts within the RDA as needed
- developing on-line training for fuels management technology and other areas as needed (may include all areas of fire science technology transfer)

The WFM RDA will also continue to maintain a liaison position with the IFT-DSS team. Attendance at several coordination meetings will occur. Coordination with JFSP staff regarding this effort will take place on a recurring basis.

Objective 6: Participate in and Manage the National Fire Decision Support Center

- Revise and update the Standard Operating Procedures for the NFDSC and maintain staff work areas and operations to support this plan
- Inform users of standard protocols for requesting decision support analysis from the NFDSC
- Coordinate use of analysts through the Geographic Area Editors and provide training to priority analysts at the GACC level when feasible
- Provide RAVAR support to the field, ensuring a transition plan is followed and support to the program is developed as identified through field input and feedback
- Work with the AirFire Team to ensure training on smoke modeling tools is provided to the field as necessary
- Evaluate field use, output, and performance of decision support analysis tools. Provide appropriate feedback to research and the field
- Establish and maintain collaborative activities with universities, fire management groups, and other research projects to review and acquire additional decision support tools and evaluate 2011 operations. Collaborative efforts are underway with the Universities of Idaho and Montana; University of Nevada; Joint Fire Science Program; and Eastern Great Basin, Southwest, and National Interagency Coordination Center Predictive Services Units.
- Add NFDSC employees as cadre and steering committee members to national and regional training courses pertaining to decision support analysis, risk assessment, and incident management. Develop and prepare materials for training delivery in FY2011
- Develop a formal process for training and refreshing future and current analysts from IMTs, field units, GACCs, etc. through detail assignments, direct field support, and other means as appropriate.
- Maintain an FBAN/LTAN/technical specialist list for use by the NFDSC, Geographic Area Editors and Geographic areas for determining support and training opportunities
- Conduct evaluation of 2011 fire season activities, review procedures and develop improvements as appropriate, develop 2011 accomplishments and input for annual report

Additional WFM RDA Activities FY2011

Planned Presentations and Publications

The Wildland Fire Management RD&A staff continues to be requested for presentations and participation in many meetings, presentations, and conferences in FY2011. Planned presentations and publications include:

Presentations

- IMT meetings, TBD
- R3 Fire Behavior Workshop - Flagstaff, Arizona – February, 2011
- Fire Weather Subcommittee / WFDSS overview – Missoula, MT, October, 2010
- National Weather Service Meeting (weather in fire behavior modeling), October 20, 2010
- The Howling Prescribed Natural Fire- Long –Term Effects on the Modernization of Planning and Implementation of Wildland Fire, T. Zimmerman. 3rd Fire Behavior and Fuels Conference, Spokane WA, October 2010.
- Season Ending Events, A Matter of Perspective, L. Kurth. 3rd Fire Behavior and Fuels Conference, Spokane WA, October 2010.
- Improving Decision Support in 2010- Accomplishments and Lessons Learned from the National Fire Decision Support Center, M. Pence. 3rd Fire Behavior and Fuels Conference, Spokane WA, October 2010.
- The Wildland Fire Decision Support System- Decision Support for Fire Management Poster Presentation - 3rd Fire Behavior and Fuels Conference, Spokane WA, October 2010.
- The Wildland Fire Decision Support System- Decision Support for Fire Management Poster Presentation - Society of American Foresters National Convention Albuquerque, New Mexico October 27-31, 2010.
- The National Fire Decision Support Center- Supporting Decision Making Poster Presentation - 3rd Fire Behavior and Fuels Conference, Spokane WA, October 2010
- National Fire Decision Support Center- Supporting Decision Making Poster Presentation - Society of American Foresters National Convention Albuquerque, New Mexico October 27-31, 2010.
- 6th International Forest Fire Research Conference Portugal, Spain November 15-18, 2010.
- NWCG National Predictive Services Subcommittee Portland, Or, October 5-7, 2010.
- NWCG Fire Weather Subcommittee Missoula, MT, October 2010.
- Region 3 Fire Behavior and Fuels Workshop, Flagstaff, AZ, February 2011.
- Regional Fire Director Meeting Sacramento, CA, November 2-5, 2010.
- Incident Management Team Meetings locations to be determined, 2011.
- R6 Line Officer Meeting, Portland, OR. November 2010.
- National Multi-Coordinating Group (NMAC) and Geographic Area Coordinating Group (GMAC) Meeting. Boise, ID, December 2010.

Publications

- The Wildland Fire Decision Support System: Integrating Science, Technology, and Fire Management. M. Pence and T. Zimmerman. Fire Management Today.
- Advancing Fire Management Program Effectiveness Through Improved Decision Making. T. Zimmerman. Proceedings 2nd Human Dimensions in Fire Management Conference – San Antonio, TX.

Training Participation

WFM RDA staff is committed to participating as instructors, presenters and steering committee members in a variety of NWCG courses, University classes and other fire management training opportunities in FY2011.

- S-490 Advanced Fire Behavior Calculations course cadre members, Missoula, MT; Albuquerque, NM
- S-495 Geospatial Fire Analysis, Interpretation, and Application – Steering Committee Chairmen, members of training cadre, and mentors
- S-482 Advanced Fire Management Applications-Albuquerque, NM; Missoula, MT
- Humboldt State University Course – IFPM, McClellan, CA
- S-580, Advanced Wildland Fire Use Applications. Serve as member of training cadre.
- Rx-510, Advanced Fire Effects Steering Committee member
- Technical Fire Management (TFM)lesson instructors, Seattle, WA
- Fire Management Leadership – cadre member, Tucson, AZ
- Region 3 Fire Behavior Workshop – Flagstaff, AZ
- Rapid Assessment of Values At Risk (RAVAR) training as needed to field users

Wildland Fire Support

Provide support to wildland fire management incident activities as requested.