
INSTRUCTOR:

LESSON: Wildland Fire Decision Support System

COURSE: S-520 – Advanced Incident Management

Emphasis: introduce concepts of WFDSS decision support and available tools that could assist in the fire environment. Introduce process and adherence to WFDSS decision in managing an incident.

OBJECTIVES:

Upon completion of this lesson, participants will be able to:

1. Describe the Wildland Fire Decision Support System (WFDSS) and how it is used for decision making to support fire management.
2. Identify the multitude of support tools and how they can be utilized to support incident actions.
3. Identify the Incident Management Team (IMT) and Agency Administrator role in providing or utilizing information contained within WFDSS.

I. WFDSS INTRODUCTION

The Wildland Fire Decision Support System (WFDSS) is a web-based decision support system that provides a single dynamic documentation system for use beginning at the time of discovery and concluding when the fire is declared out. WFDSS allows the Agency Administrator to describe the fire situation, create Incident Objectives and Requirements, develop a Course of Action, evaluate Relative Risk, complete an Organization Assessment, and publish a decision.

As an internet based system with multiple database links, WFDSS can give decision support in a timely and efficient manner. WFDSS provides the following advantages over previous systems:

- Allows users to pre-load Fire Management Plan/Land and Resource Management Plan Strategic Objectives and Requirements in advance of fire season by Fire Management Unit, Strategic Objective or other boundary.
- Combines desktop applications for fire modeling into a web-based system for easier data acquisition.
- Provides an easy method for fire managers and analysts to accurately document decision-making processes by allowing results of analyses to be included in the incident content and inserted into a decision.
- Allows for quick inclusion of necessary objectives and requirements into a decision and aids in ensuring the Course of Action taken for an incident is in compliance with unit specific plans.

- It is a web-based application for easier sharing of analyses and reports across all levels of the federal wildland fire organizations.
- Introduces economic principles into the fire decision process.
- Provides a map display intended to help users visualize data geographically.
- Integrates national and interagency geospatial datasets.
- Spatially displays unit's Fire Management Units (FMU) or Strategic Objective/Management Requirement shapes (SO) so decision makers can quickly determine which areas are likely to be impacted by an incident and provide planning direction to address those areas in the decision.
- Provides one decision process and documentation system for all types of wildland fires. Decisions in WFDSS are approved and published by the appropriate Line Officer. It is imperative that a decision be reviewed carefully as once approved and published, a decision becomes a system of record and all WFDSS users can view the information. Additionally, the action CANNOT be undone. If there is an error in the information, or new information is added for documentation or update (i.e. fire behavior, Management Action Points) a new decision must be created and approved to permanently update the record.

II. USING WFDSS

The Wildland Fire Decision Support System (WFDSS) is a web-based decision support system that provides a single dynamic documentation system for use beginning at the time of discovery and concluding when the fire is declared out. WFDSS allows the Agency Administrator to describe the fire situation, create Incident Objectives and Requirements, develop a Course of Action, evaluate Relative Risk, complete and Organization Assessment, and publish a decision.

All fires will have a published decision within WFDSS when they:

- Escape initial attack; or
- Exceed initial response; or
- Include objectives with both protection and resource benefit elements consistent with land management planning documents.

These incidents will have a Published Decision within WFDSS. A Published WFDSS Decision establishes objectives, a Course of Action and Rationale for incidents with varying duration, spread potential, costs, or other considerations. The level of documentation to publish a decision should be commensurate to the incident duration, spread potential, cost, or Relative Risk. Agency-specific direction established in memos or other policy documents may further define WFDSS documentation requirements.

Additional information can be found in Chapter 11 and Appendix N of the Red Book, and the WFDSS Help (http://wfdss.usgs.gov/wfdss_help/index.htm).

1. Initial Decision

When determining if a decision is needed consider the following (Redbook Chapter 11):
The fire affects or is likely to affect more than one agency or more than one administrative unit within a single agency (for example more than one National Forest).

- The fire is burning into or expected to burn into wildland-urban interface.

- Significant safety or other concerns such as air quality are present or anticipated.
- The Relative Risk Assessment indicates the need for additional evaluation and development of best management practices for achieving land and resource objectives.

2. Criteria for a New Decision

Redbook Chapter 11: A new decision is required when:

- The Periodic Assessment indicates the Course of Action (decision) is no longer valid; or
- The fire moves beyond the Planning Area; or
- The incident exceeds an established agency threshold for approval authority (cost or complexity); or
- The Risk and Complexity Assessment indicates that the incident exceeds existing management capability.

Considerations for determining when a new decision is needed:

- Costs are expected to exceed the estimated final costs in the current Decision; or
- Management Action Points have changed since the current Decision was published.

Additional information about WFDSS can be found in the Redbook Appendix N and Appendix 8 of this document. User support information, training materials, and other resources can be found at the WFDSS homepage. https://wfdss.usgs.gov/wfdss/WFDSS_Home.shtml

III. WFDSS DECISION AND THE INCIDENT MANAGEMENT TEAM

The Unit Line Officer has the overall responsibility for completing the incident decision documentation, including objectives, priorities, course of action(s), and publishing the WFDSS Decision. However, when an IMT has been delegated authority to manage an incident it is important the team and the local unit work together to outline the Course of Action to be taken to successfully manage that incident. If the incident is multi-jurisdictional, the issue of responsibility could be further compounded between agencies. On some incidents, the Line Officer(s) may choose to delegate some WFDSS tasks to the IMT. For more specific guidance review NWCG memo 005-2012 "Wildland Fire Decision Support System and the Role of Incident Management".

<https://www.nwcg.gov/sites/default/files/memos/eb-m-12-005.pdf> and attachment <https://www.nwcg.gov/sites/default/files/memos/eb-m-12-005a.pdf>

When the decision has been made to order a Type 1 or Type 2 incident management team to take over management of a wildland fire, the following must be completed by the responsible Line Officer with jurisdictional and/or protection authority for the area on which the incident occurs.

1. Determining Team Type - Wildfire Risk and Complexity Assessment (Redbook Chapter 11)

The National Wildfire Coordinating Group has adopted the Risk and Complexity Assessment (RCA) as a replacement for the Incident Complexity Analysis and the Organizational Needs Assessment. The RCA assists personnel with evaluating the situation, objectives, risks, and management considerations of an incident and recommends the appropriate organization necessary to manage the incident. The Risk and Complexity Assessment is found in Appendix E of the Redbook and within the Wildland Fire Decision Support System.

The RCA also includes common indicators of incident complexity to assist firefighters and managers with determining incident management organizational needs. These common indicators are found in Appendix F of the Redbook.

The RCA can be used to populate the Relative Risk Assessment and Organization Assessment portions of the Wildland Fire Decision Support System (WFDSS). The RCA is also available at <http://www.nwcg.gov/publications/210>.

2. Ordering an Incident Management Team and Transfer of Command

The following Information is from regional guides developed for field use.

The responsible Line Officer will;

- Place the request for an incident management team, in coordination with unit fire staff, through their Dispatch Center as soon as that need has been identified and verified by Operational Needs Assessment for the incident. Identify the type of team needed, place for the team to report to for the Line Officer's briefing, and time to report at that location.
- Be sure ordered time lines are reasonable. Consider the time necessary to assemble and transport the team, avoid night mobilization when possible, and most likely time to effect transition from the current incident management organization to the national or geographic area team.
- The ordering unit will specify times of arrival and transfer of command, and discuss these timeframes with both the incoming and outgoing command structures.

3. Prior to meeting the Team

The responsible Line Officer, with assistance from appropriate staff will;

- Prepare and document a Decision within WFDSS and Line Officer's briefing package.
- Prepare the Delegation of Authority and Leader's Intent Letter.
- Appoint a resource advisor to work with the incident management team and brief that person on their responsibilities and authority.
- Consider the need for an incident business advisor (IBA) to assist in managing fiscal aspects of the incident. A general advice for when an IBA should be used is anytime the incident is suspected to be a person-caused trespass fire, whenever claims are involved or likely to be, or whenever a Type 1 incident management team is to be assigned.
- Notify and assemble key staff and other personnel, including cooperators, essential to preparing for and transitioning to the incoming incident management team.
- Transition from local management to team management of the incident
- Avoid transition during the active burning period or an operational period to which resources are assigned and being managed by the local organization.
- If no resources are assigned to the incident, take-over of the incident by the team may occur as practical; however, current fire behavior and area involved by the incident should be compatible with objectives stated for the team within the Published WFDSS Decision.
- Ensure the availability of the current incident commander and any key personnel to personally meet with and brief the incoming team.

4. Setting Team Expectation

In 2014, the WO FAM requested a field review of WFDSS Decision Documentation. It was noted

that the Incident Objectives being written in many decisions were not site specific, but general and applicable to any acre on any landscape. Additional findings noted that many Delegation of Authority (DOA) letters, Leaders Intent, In-Briefing Packages and the WFDSS decision documentation lacked consistency, providing potentially misleading direction to Incident Management Teams. It was challenging for the IMTs to interpret and implement the expectations from all of these documents since they were all outlining different priorities or expectations. In response to these inconsistencies the WFM RD&A pulled together several example documents to build consistent templates for the DOA, Leaders Intent and In-Briefing Package for the field to use to help alleviate these inconsistencies. These templates can be found in the 2018 Red Book as cited below (Appendix D and G), as well as on the WFM RD&A– References and Guidance page: https://wfmrda.nwcg.gov/line_officer_resources.php

a. Delegation of Authority Letter

Agency Administrators must approve and publish decisions in WFDSS (and subsequent Courses of Action) and issue delegations of authority to the incident commander.

Chapter 11 and Appendix G of the Red Book provides direction and templates on delegations of authority and leader's intent. Agency Administrators must issue written delegations of authority to Incident Commanders.

The delegation should bridge direction provided in the Wildland Fire Decision Support System Decision, the Leader's Intent Letter and the Team In-Briefing Package.

b. Leaders Intent

This is an **optional** document to provide leadership expectations from the Agency Administrator information to an IMT that is not directly related to the strategic direction for managing a wildfire (strategic direction belongs in the WFDSS Decision). This Leader's Intent Document is one piece of many components of the entire Briefing Package provided to the Incident Management Team (IMT).

Appendix G of the Red Book and the WFM RD&A webpage – References and Guidance page: https://wfmrda.nwcg.gov/line_officer_resources.php provides an example Leaders Intent letter.

c. Line Officer/IMT Briefing Checklist

The Line Officer's (Agency Administrator's) briefing is a crucial procedure that should be given thorough attention and preparation, in consideration of the general hurried state of business during the transition between extended attack, an escaped fire and the anticipation of an incident management team. The Line Officer's briefing will provide information, guidance, and direction, including constraints, necessary for the successful management of the incident.

The briefing must be provided any time an incident management team is assigned, including changing teams before all incident objectives have been met, and whenever major jurisdictional responsibilities are added or otherwise change within the incident. Either at the time of the Line Officer's briefing for the incident management team, or at a separate place and time if necessary, ensure that the IMT has an opportunity to meet with, be briefed by, and thoroughly transition with the current incident commander and the members of their organization prior to assuming command of the incident.

For an Agency Administrators Briefing to IMT template consult Appendix D of the Red Book while

also consulting Geographic Area and Regional sites for localized specific information regarding briefings.

d. Purpose of the Line Officer's briefing

The purpose of the Line Officer's briefing is to:

- Provide a common understanding between the Line Officer and the incident management team of the environmental, social, political, economic, legal, and other management issues relevant to the incident and its location.
- Inform the IMT of the history, current status of the incident and actions taken to date, including weather, fire behavior, and effectiveness of tactics.
- Present other documents providing intelligence and aids to management of the incident, including maps (units using Spatial Fire Planning in WFDSS could display directly from WFDSS or download the relevant maps for display purposes), photos, GIS products, weather forecasts, Fire Management Plans, phone lists, agreements, operational period plans, and current ICS-209.
- Present the published decision and the Delegation of Authority letter from the Line Officer to the Incident Commander.
- Identify key agency personnel who will be involved with the IMT, including the Line Officer's Representative, Resource Advisor, and Incident Business Advisor.
- Establish procedures and schedules for communication between the Line Officer and incident commander.
- Establish how news media, public information, and important local and political contacts will be handled on the incident.
- Establish resource ordering procedures.
- Identify the IMT's responsibility for initial attack and support of other Forest incidents.
- Establish the disposition of Forest suppression resources and local participation on the incident.
- Establish understanding for the use of trainees on the incident.
- Establish Forest and incident policy on compensable meal breaks, work / rest, rest and recuperation, and open vs closed camps.
- Establish standards for return of the incident to local management, including mop-up and fire suppression rehabilitation expectations. Refer to section L for more information.
- Identify special safety awareness concerns and expectations.

e. AA Role with IMT throughout the Incident

General Guidelines:

After assigning the incident management team to a wildland fire on your unit, the Line Officer should allow those with delegated authority and responsibility to manage the situation and resources assigned to it. The responsible Line Officer will provide oversight to the incident management team, primarily through monitoring the appropriateness of the WFDSS Published Decision, effectiveness of the team's tactical implementation of that decision, direction in the delegation of authority and/or Leader's Intent Letter, and overall relationship with the host unit, cooperators, and incident support organization. You must be prepared to provide necessary oversight, guidance, and direction to each level of the incident management organization by staying informed of events and participating in intelligence and strategy discussions in order to

understand the current and emerging situation, and be able to respond when decisions and direction are required.

Remember, the team is working for you. You have the same obligation to them as you would to any other member of your regular organization to support their needs to get the job done. Find out what other specific needs the team may have or anticipate, and help make those resources available to them.

The responsible Line Officer, or a delegated representative (Line Officer's representative or fire staff) should be available to the incident commander for quick consultation and decision making on an arranged basis through established communications contact points and times and scheduled meetings.

The following are suggestions for the Line Officer to help you remain focused during a large fire incident on your unit.

- Recognize that every fire has potential.
- Be available and be involved, do not micro-manage the incident. Let people do their work, and make sure they know you are there to lead and support them.
- Review daily Incident Action Plans and ensure tactics and other direction are compatible with the strategic objectives and incident objectives provided for the incident within WFDSS. Firefighter and public safety must be given visible and sincere emphasis.
- Provide oversight and direction to the Resource Advisor.
- Ensure that unit/district welfare and caretaking is on-going. Local personnel can become overwhelmed by the events, activities, and organization related to a large fire. Keep your folks informed and involved, but do not let them become overloaded by a combination of the fire and their normal duties, and do not let them feel left out.
- Keep your key publics and local government officials informed and involved.
- Understand the big picture; do the best you can with what you have. Increasingly, your large fire is not the only game in town. If you are competing for resources you may need to consider alternative management strategies.
- Know what is going on, see for yourself, stay ahead of the power curve.
- Use experienced advisors, coaches, or deputies to help you and your staff better manage the situation of increased volume and complexity of business during this period.
- Do not hesitate to bring in help to increase your unit's depth and situational management capability.

f. Delegating portions of WFDSS to the IMT

The Line Officer should negotiate with the IMT regarding the type of WFDSS involvement desired and clearly document those decisions within the Delegation of Authority or Leader's Intent as directed by the agency. Local unit capability may be exceeded by the activity or complexity level on the unit. In those situations, the Line Officer may decide to delegate some WFDSS tasks to the IMT through coordination with local fire personnel, interagency partners, and IMT agreement. The Incident Commander (IC) should ask questions to fully understand the Line Officer's expectations before signing the delegation.

Incident management tasks that are best performed through the cooperation of the local unit and the IMT might include:

- Updating (uploading) fire perimeters.

- Ordering and managing staff to run fire models and/or complete a long-term assessment.
- Drafting updates for inclusion in the Periodic Assessment that describe the current incident status and key events. The Periodic Assessment should be completed by the Line Officer, who is responsible to ensure the WFDSS Decision is still representative of the actions being taken on the fire, but the IMT should provide input for the Line Officer's consideration.
- Updating strategic tactical responses to the incident such as MAP development and revision, outlining and modifying the Course of Action, estimates and updates of expected final incident costs.

g. Line Officer responsibilities regarding Decisions

All decision documentation functions can be performed by the IMT through a delegation of authority with the exception of the responsibilities of the Line Officer which includes:

- Approving a decision.
- Writing the rationale for the decision.
- Initiating a new decision process during the Periodic Assessment. However, working together the IMT usually provides recommendations about changing conditions, needed tactics, and implementation strategies that might initiate a new decision within WFDSS.
- Entering or editing objectives or requirements for the local unit from local unit planning documents. However, the team has the responsibility to clarify local unit objectives and requirements with that unit.

IV. WFDSS FIRE BEHAVIOR TOOLS

1. Basic Fire Behavior (BFB)

BFB is often described as a “spatial Behave Plus,” predicting fire behavior for one point in time over a landscape. BFB is a spatial fire behavior tool that gives simple fire behavior outputs such as flame lengths and rates of spread from initial fuel moistures and a single wind-speed/direction input by the user. BFB uses the inputs to calculate gridded winds and fuel moistures that vary spatially across the landscape. Although the map output shows variations in fire behavior, each pixel is the result of an independent calculation for fire behavior prediction. BFB provides outputs as if each pixel has its own custom BehavePlus run. For more information about BFB, what the outputs mean, potential uses, and assumptions and limitations see the WFDSS Help Topics *Automated Basic Fire Behavior* and *WFDSS Analyst-Assisted Basic Fire Behavior* https://wfdss.usgs.gov/wfdss_help/WFDSSHelp_Fire_Behavior_Ref.html

2. Short-Term Fire Behavior (STFB)

Short-term fire behavior predicts fire growth for a set of constant conditions in time over a landscape. It predicts fire growth using FlamMap's Minimum Travel Time (MTT). In addition to the similar outputs of BFB, STFB also generates outputs of fire arrival time and major travel paths. Although the visual output of STFB is similar in appearance to FARSITE and Near Term Fire Behavior, it is not modeled in the same way. Rather, it is more similar to the manual vectoring and plotting of fire growth using tabular Behave Plus outputs. It is merely Rate Of Spread x time (burn period) plotted in the direction of maximum spread for each point of calculation along the perimeter of the ignition file or subsequent modeled fire perimeters. It is important to remember that the arrival time output in STFB is based on static weather like BFB. The Major flow-paths output is similar to a hydrologic map for fire on the landscape. Based on the fuels, topography, and weather

inputs major flow paths are projected based on direction of maximum spread and the influence each cell has every other cell within the time of arrival grid. For more information about STFB, what the outputs mean, potential uses, and assumptions and limitations see the WFDSS Help Topic *WFDSS Short-Term Fire Behavior*

https://wfdss.usgs.gov/wfdss_help/WFDSSHelp_Fire_Behavior_Ref.html

3. Near-Term Fire Behavior (NTFB)

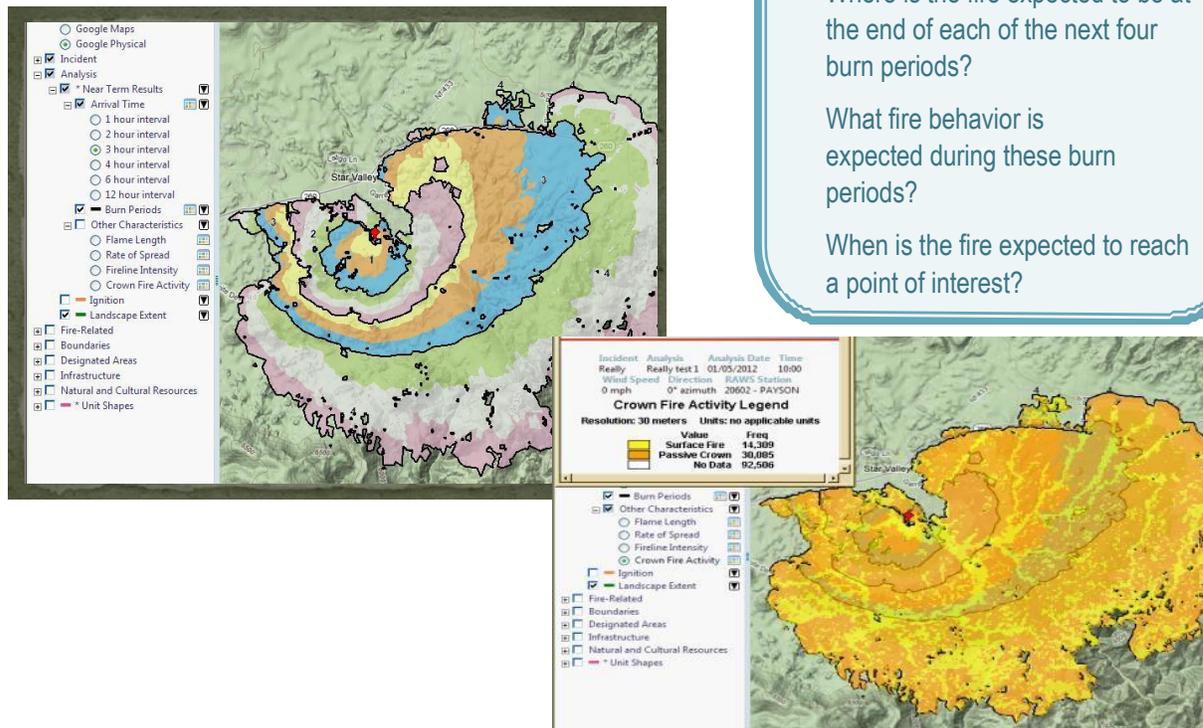
(based on FARSITE) – Near Term Fire Behavior (NTFB) models fire growth in the form of a fire progression. Unlike Short-Term Fire Behavior, NTFB models fire behavior using inputs for weather and wind that change over the duration of the simulation. NTFB can model fire growth for up to 7 days, however caution should be used when projecting beyond reliable weather forecast timeframes. Near Term Fire Behavior simulates where and when a fire may grow, and also predicts fire behavior characteristics on the landscape where it does burn. In this example of NTFB output below each color represents a 3-hour interval; the black lines represent daily burn periods.

Clarifying Questions

Where is the fire expected to be at the end of each of the next four burn periods?

What fire behavior is expected during these burn periods?

When is the fire expected to reach a point of interest?

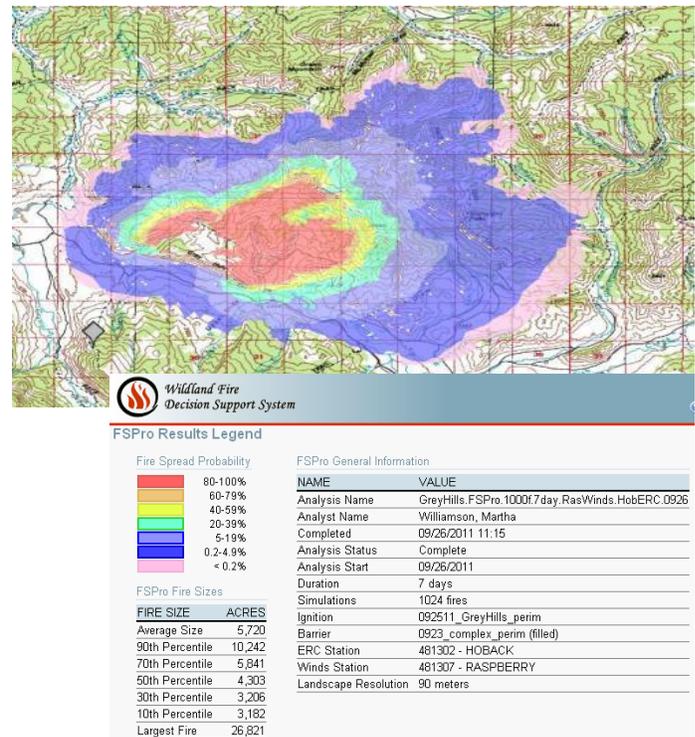


4. Fire Spread Probability (FSPro)

FSPro is a geospatial probabilistic model that predicts fire growth, and is designed to support long-term decision-making (more than 5 days). FSPro addresses fire growth beyond the timeframes of reliable weather forecasts by using historic climatological data. FSPro calculates and maps the probability that fire will visit each pixel on the landscape of interest during the specified period of time, in the absence of suppression, based on the current fire perimeter or ignition point. The results do not predict actual fire perimeters, but instead show the probability that each cell will burn.

Based on the historical data FSPro produces many weather scenarios for the selected time period. Each weather scenario is used to model an individual fire, (normally 1,000 to 4,000 fires), that are overlaid to produce a map with the probabilities. The FSPro output map produced is often misinterpreted as a perimeter map.

In this example below, FSPro simulated 1,024 fires for 7 days. The red area represents a 80-100% probability of being burned. The orange are represents 60-79%, the yellow area 40-59%, the green area 20-39%, the light purple 5-19%, the dark purple .2-4.9%, and the pink < .2 % change of burning in the 7 day period under the modeled conditions.



5. Fire Behavior Modeling Assumptions and Limitations

Most of these tools are not best-utilized straight “out of the box”. It is imperative that you understand the major assumptions and limitations imposed not only by the tool but by the particular fire situation. The analyst you are working with should have a complete understanding of the tools, analysis assumptions and limitations, and be able to communicate them to you. The analyst should provide a written record that may be given to future analysts to improve the quality of analyses over time. The WFDSS Help provides assumptions and limitation for each tool.

6. Choosing the Right Fire Behavior Decision Support Tools

Before deciding which tool you need, ask these questions:

- *Do you actually need Decision Support Tool outputs to make a decision (use of these tools is not required), or has a decision essentially been made?*
- *Is your question about fire spread, fire behavior, or values at risk?*
- *Do you want information for a specific time period such as “the next 24 hours” or “the next 14 days”?*

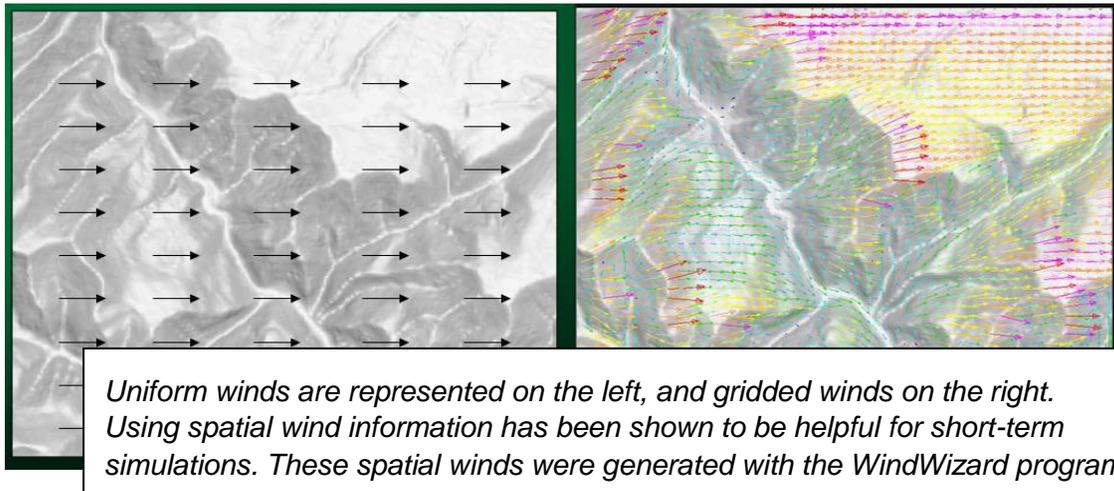
- How much time do you have before the product is needed?
- The following tables can guide your choice of Decision Support Tools. The “*” indicates a tool available as desktop software outside of WFDSS.

Table 1. Fire Behavior Tools

Tools	Basic Fire Behavior (BFB)	FlamMap* or Short-Term Fire Behavior (STFB)	FARSITE* or Near-Term Fire Behavior (NTFB)	Fire Spread Probability (FSPro)
Type of Tool	Spatial, only in WFDSS	Spatial, desktop and WFDSS	Spatial, desktop and WFDSS	Spatial, only in WFDSS
General Time Frames	For current burn period	For Next 1-3 Days	For Next 1-7 Days	For 7-30 Days in Future
Fire Behavior Questions	Basic Fire Behavior (BFB)	FlamMap* or Short-Term Fire Behavior (STFB)	FARSITE* or Near-Term Fire Behavior (NTFB)	Fire Spread Probability (FSPro)
How and where will the fire spread with the forecast weather?		Using <i>unchanging</i> weather, wind and fuel moistures provides map of fire spread over next 1-3 days. Identifies fastest fire travel routes.	Using <i>variable</i> (e.g. hourly, diurnal) weather, and fuel moisture, provides a map of fire spread over the next 1-7 days.	
What fire behavior (e.g. flame length, rates of spread, spotting) is expected with known weather and fuel conditions?	Using <i>static</i> weather/wind input and varying fuel models/terrain, provides fire behavior outputs within a “box” drawn around the fire area.	Using <i>static</i> weather/wind input and varying fuel models/terrain, provides output of fire behavior for a “box” around the fire; fire size, and time of arrival also given.	Using <i>variable</i> weather/wind inputs and varying fuel models/terrain, provides output of fire behavior, fire size, and time of arrival. Used with next 1-7 days of forecast weather.	
If a fire reaches a point of concern, what fire behavior can I expect at that location?	Fire behavior outputs are available within a “box” drawn around the point of concern; uses static weather scenario.	Fire Behavior outputs and fastest fire travel routes are available for a “box” around the fire; uses one static weather scenario.	Mapped Fire Behavior outputs are only available if the modeled fire actually reaches the point of concern, if so it is for the weather conditions modeled when the fire reaches that point	
What is the <i>probability</i> the fire may reach a point of concern in the next 1-7 days? In 8 or more days?				Uses forecast weather and climatological probabilities for a probabilistic fire spread output. Outputs best used after calibrating the landscape and tool.
There is a major wind event in the forecast—how far might the fire travel? What is the potential fire behavior?		A single windspeed and direction (static or gridded) input can show fire growth and behavior in complex fuels/terrain.	Multiple windspeeds and directions per day can show fire growth and behavior in complex fuels/terrain.	

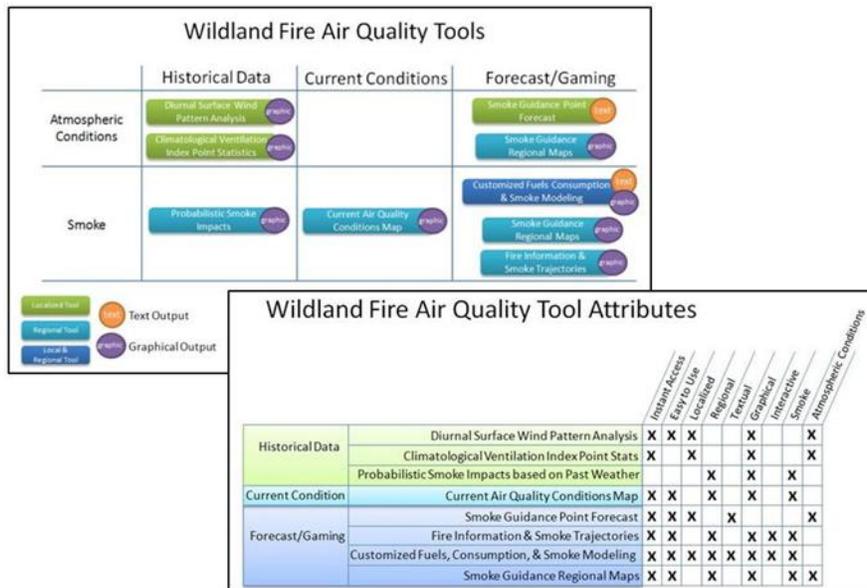
7. WindWizard- Gridded Wind Model –

Produces gridded wind data that can be used for visualization, or visual display and review; and input to fire prediction models and is a method to provide information about the effect of topography on local wind flow. Wind information at this detail is not available from the weather service. The shape files produced can be used for review of the channeling and checking effects of local topography on wind flow – useful for operational, planning and educational purposes. The high resolution wind information is useful in identifying areas and/or conditions that may produce high fire intensity and spread rates and for identifying locations where fire spotting might occur.



8. Air Quality Tools

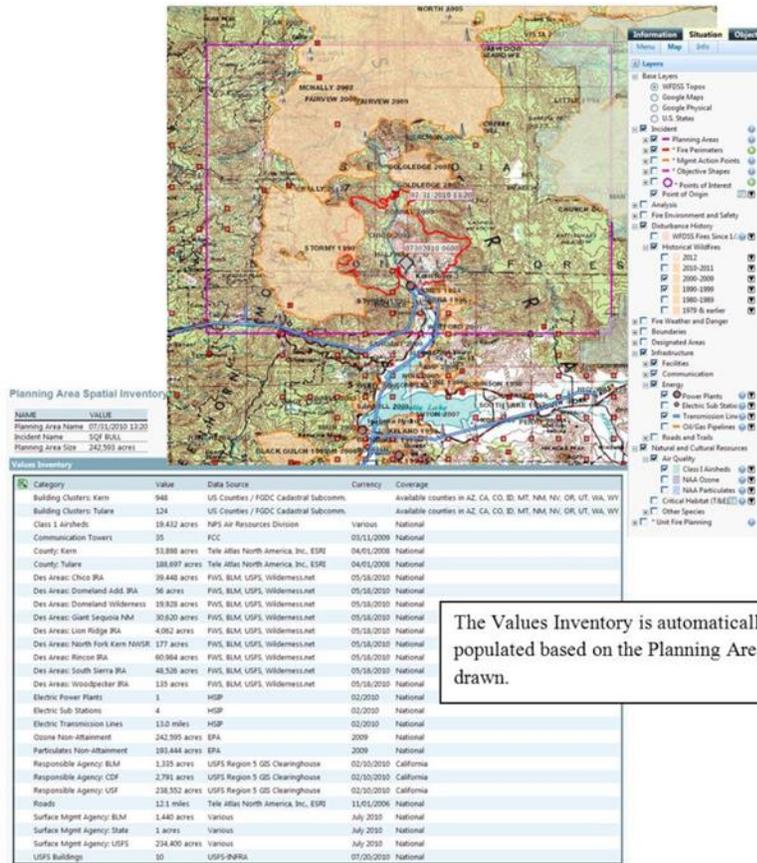
The USDA Forest Service, Pacific Northwest AirFire Team hosts the Wildland Fire Air Quality Tools site. The tools can be used to assess past, current, and potential smoke and atmospheric conditions on wildland fires. The images below display the different tool attributes found at: <http://firesmoke.us/wfdss/>



V. WFDSS ECONOMIC TOOLS

1. WFDSS Values Inventory

WFDSS Values Inventory (VI) provides a table of values within a given area (a Planning Area or the fire projection path from either Short-Term or Near Term Fire Behavior). The table provides information on the value quantity (acres, miles, count, etc.) data source, currency, and coverage. Users can view a map display of the queried area from the Situation tab to help users visualize data geographically and can be included as a map capture into the incident content or decision content. There are numerous national and interagency geospatial values layers in WFDSS. Local data can be loaded pre-season as Unit Shapes, see the WFDSS Help Topic on *Unit Shapes* https://wfdss.usgs.gov/wfdss_help/WFDSSHelp_unit_shapes.html. WFDSS Values Inventory includes geospatial data such as Class I Airsheds and national infrastructure to quantify the values within the given area. This is intended as a strategic tool and is the fastest method to see and quantify values within the fire planning or fire projection area. For more information see the WFDSS Help topic *Obtaining a Values Inventory*, https://wfdss.usgs.gov/wfdss_help/WFDSSHelp_Obtain_VI.html



2. WFDSS Values at Risk

WFDSS Values at Risk (VAR) combines FSPRO output with WFDSS and preloaded local value data to quantify the specific values within each probability contour (acres, miles, count, etc.). Similar to VI, VAR provides the values information in a table and a map of the inventory area is available from the Situation map. The map capture feature can be used to add an image to the incident and decision content. Like VI, VAR is also intended as a strategic tool and provides a quick method to quantify values within an FSPRO projection area. For more information see the WFDSS Help topic *Values at Risk Information*, https://wfdss.usgs.gov/wfdss_help/WFDSSHelp_values_at_risk_info.html.

NAME	VALUE
Incident Name	SQF 8344
Analysis Name	7.28.2010 7 day 1000 fires
Author	Multiple
Analyst	Hoed, Larry
Latitude	35.78472
Longitude	118.43972
Geographical Area	Southern California

Category	90-100%	69-79%	49-59%	29-39%	9-19%	0-9%	Expected Value
Building Clusters - Kern	252	44	7	361	417	532	1,309
Building Clusters - Tulare	2	8	3	1	59	933	96
Class 1 Airsheds	0 acres	69 acres	620 acres	4,917 acres	28,163 acres	41,296 acres	2,354 acres
Communication Towers	17	1	0	2	6	95	46
County - Kern	17,329 acres	6,201 acres	8,231 acres	15,210 acres	25,453 acres	52,362 acres	86,536 acres
County - Tulare	49,821 acres	10,781 acres	11,997 acres	23,203 acres	58,360 acres	190,112 acres	91,316 acres
Des Areas - Black Mtn. IRA	0 acres	20 acres					
Des Areas - Chico IRA	23,240 acres	2,789 acres	1,554 acres	2,310 acres	3,246 acres	5,063 acres	129 acres
Des Areas - Chimney Peak Wilderness	0 acres	6,662 acres	1,395 acres				
Des Areas - Domeland Add. IRA	0 acres	2 acres	14 acres	30 acres	9 acres	34 acres	0 acres
Des Areas - Domeland Wilderness	0 acres	87 acres	671 acres	5,190 acres	28,615 acres	58,553 acres	10,505 acres
Des Areas - Giant Sequoia NMA	2,228 acres	154 acres	128 acres	330 acres	9,885 acres	49,608 acres	7,661 acres
Des Areas - Greenhorn Creek IRA	0 acres	1,191 acres					
Des Areas - Kanab Wilderness	0 acres	4,531 acres	20,171 acres				
Des Areas - Lion Ridge IRA	0 acres	0 acres					
Des Areas - North Fork Kern NWSR	29 acres	0 acres	115 acres	0 acres	0 acres	0 acres	0 acres
Des Areas - Owens Peak WSA	0 acres	0 acres					
Des Areas - Owens Peak Wilderness	0 acres	0 acres					
Des Areas - Pinta Cypress ISA WSA	0 acres	0 acres					
Des Areas - Rincones IRA	24,282 acres	5,681 acres	5,084 acres	0 acres	0 acres	0 acres	0 acres
Des Areas - Rockhouse A WSA	0 acres	0 acres					
Des Areas - Sacatar Meadows WSA	0 acres	0 acres					
Des Areas - Sacatar Trail Wilderness	0 acres	0 acres					
Des Areas - Sycote WSA	0 acres	0 acres					

Category	Data Source	Currency	Coverage
Building Clusters	US Counties / FQDC Cadastral Subcomm.		Available counties in AZ, CA, CO, ID, MT, NM, NV, OR, UT, WA, WY
Class 1 Airsheds	NPS Air Resources Division	Various	National
Communication Towers	FCC	03/11/2009	National
County	Tele Atlas North America, Inc. ESRI	04/01/2009	National
Des Areas	FWS, BLM, USFS, Wilderness.net	05/15/2010	National
Electric Power Plants	HSP	02/20/10	National
Electric Sub Stations	HSP	02/20/10	National
Electric Transmission Lines	HSP	02/20/10	National
Ozone Non-Attainment	EPA	2009	National
Particulates Non-Attainment	EPA	2009	National
Responsible Agency	USFS Region 5 GIS Clearinghouse	02/10/2010	California
Roads	Tele Atlas North America, Inc. ESRI	11/01/2006	National
Surface Mgmt Agency	Various	July 2010	National
USFS Buildings	USFS #FRA	07/05/2010	National

Currency/Coverage of Values Reported

Coverage of Values Queried that Produced No Results
 Habitat (Habitat restricted to Gila National Forest), Mines (National), NPS Buildings (National (incomplete)), Oil and Gas Pipelines (National), Sage Grouse Key Habitat (National), USFS Buildings (National), USFS #FRA (National)

3. Stratified Cost Index (SCI)

SCI is intended as a self assessment tool for cost per acre for on fires larger than 300 acres and is not dependent on any spatial information except the latitude and longitude of the fire. The SCI tool is based on historical suppression costs based on fire size, location (inside or outside wilderness and distance to town), ERC percentile, fuel model, and the agency of jurisdiction. There are six separate models: including one for the Department of Interior (BIA, NPS, and BLM) and USDA Forest Service for the eastern and western U.S. The user can put up to 4 fire sizes into the tool. The result is a matrix of fire sizes and percentage of fires in comparison. The results are also color coded, anything less than the 50th percentile is green to indicate near or below average costs, yellow means costs are high and should be monitored and documented closely, red means you are in the upper 10% of similar fires and that you should carefully document your costs and decisions as a your costs are high and for some fires a cost review may be possible. See the WFDSS Help Topic on *Stratified Cost Index* for subsections on *Creating a Stratified Cost Index*, *Editing and Accepting an SCI*, and more, https://wfdss.usgs.gov/wfdss_help/WFDSS_Help_SCI.html.

SCI Results				
Stratified Cost Index by Percentage				
Acres Burned	25%	50%	75%	90%
19322	\$226	\$865	\$3,317	\$5,916
31840	\$186	\$715	\$2,742	\$4,891
59000	\$147	\$565	\$2,167	\$3,866
120000	\$112	\$431	\$1,653	\$2,949

Accept Reject

Table: 2 Comparing the Three Economic Tools Currently Available

Tools	Values Inventory (VI)	Values at Risk (VAR)	Stratified Cost Index (SCI)
Time Period of Interest (must be same as analysis period)	1 – 7 days	Next 7 – 30 days	Immediate and cumulative
Time Needed to Complete Analysis	Less than one minute upon completion of STFB and NTFB, immediate upon drawing planning area	Completed with FSPro simulation	A few minutes
Analysis Type	Automated	Automated	Manual
What are the Values at Risk near this fire?	Lists the number of values by specific type within a planning area or STFB/NTFB Arrival Time footprint.	Lists the number of values by specific type and their probability of being affected by fire.	
How do costs on this fire compare to similar fires?			SCI is a table that compares costs of similar fires based on jurisdiction fuel model at point of ignition, and fire size.
What values are in the predicted fire movement over the next day or two?	X		
What is the probability and count of values being affected in the next week or two?		X	
Most values in FMUs are included. Primarily values related to land management agencies	X	X	
Buildings on federal land	X	X	
Local values data preloaded as Unit Shapes in the fire's vicinity such as species of concern, no dipping areas, specific habitat etc, provided the data manager selected to have the data populate in the values tables.	x	x	
Partial county building cluster data	X	X	

4. Choosing the Right WFDSS Economics Support Tools

Before deciding which tool you need, ask these questions:

- *Do you actually need Decision Support Tool outputs to make a decision (use of these tools is not required), or has a decision essentially been made?*
- *Is your question about values at risk or relative costs?*
- *Do you want information for a specific time period such as “the next 24 hours” or “the next 14 days?”*
- *How much time do you have before the product is needed?*

V. ADDITIONAL REFERENCES

1. Incident Objectives & Incident Requirements Review:

Examination of wildland fire incident decisions revealed that most Incident Objectives are written general enough that they could apply to any fire in the country. This makes them of little use to incident management teams in developing strategies and tactics to achieve an agency administrator's intent for managing a specific fire and for agency administrators seeking to clarify the objectives they want accomplished. Similarly, Strategic Objectives and Management Requirements, established from forest plans, are the basis for Incident Objectives and Incident Requirements but are rarely written with wildland fire specificity. This decreases the likelihood that NEPA-based management direction is adequately implemented on a wildfire or as intended. It also increases the likelihood of additional risk to firefighters with marginal benefit.

A systematic evaluation of wildfire incident decisions was undertaken during the 2014 fire season, to better understand the situation and recommend solutions. This included site visits to 23 fires and interviews with agency administrators, incident commanders and WFDSS authors. An analysis of all Incident Objectives in the WFDSS database as of May 2014 was also conducted. Findings from this work are summarized in a briefing paper while more explanation and detail can be found in the documents "Improving WFDSS Incident Objectives & Requirements and Relaying Leader's Intent" and "Creating Incident Specific Objectives in WFDSS". These documents can be found at the following web address under the heading "Incident Objectives Project: https://wfmrda.nwcg.gov/technology_transfer.php

The following documents can be found on the [References and Guidance](#) page of the Wildland Fire Management RD&A website: http://www.wfmrda.nwcg.gov/reference_&_guidance.php

- Decision Making for Wildfires: A guide for applying a risk management process at the incident level. This document was written to explain the risk decision process for wildland fire. There is a crosswalk in the document related to how it fits in WFDSS. Consider downloading the *Decision making for wildfires: A guide for applying a risk management process at the incident level*.
- WFDSS Related Documents
 - WFDSS Incident Groups and Decisions
 - Paper WFDSS documentation
 - Creating Incident Specific Objectives
- Wildland Fire Decision Support Tools Document
- NWCG Memos as they relate to WFDSS

The following documents can be found on the [Technology Transfer](#) page of the Wildland Fire Management RD&A website: https://wfmrda.nwcg.gov/technology_transfer.php

- Risk Assessment
 - A Six part video on Strategic-Level Risk Assessment - Although the videos indicate they are for Fire Behavior Specialists, the information contained in the videos is applicable to incident Owners, Editors, Approvers, and fire managers wanting to know more about or include strategic level risk assessment on their fires.

- Example Decisions
 - The following decision examples are provided as training aids to assist users in understanding how WFDSS can be used as a risk decision-making tool. The Gold Pan Fire of 2013 was an actual fire (located in WFDSS Production). The Gold Pan Fire was a long duration event that varied in IMT organization throughout the life of the fire. The Salt Spring Fire of 2013 is an RD&A created fire (located in WFDSS Training) and is an example of a short duration Type 3 fire. Reviewing incident example Decisions preseason will assist managers in preparing more thorough decisions during active incidents. The Salt Springs Fire and the Gold Pan Fire are posted on the technology transfer site linked above.
 - Salt Springs Fire, Type 3 incident - WFDSS Training
 - Gold Pan Fire, Long Duration incident – WFDSS Production
- Benefits Analysis Framework
 - One process that may be helpful in describing how fire threatens values at risk is described in the video below. The process combines the effect of fire type (surface fire, crown fire) on each resource of concern, the potential for that fire type to occur, the probability that fire will reach the value, and Management Action Points to prompt action when needed to protect the value. This process has not been widely used, but is available to be tested.
 - An example of a Susceptibility Severity Spreadsheet and a video tutorial is available on the Technology Transfer website.
- Incident Objectives Project (Described above)
 - Briefing paper of findings
 - Creating Incident Specific Objectives in WFDSS – A handy form to use as a tickler
 - Fire Example – demonstrates objective, incident requirements and course of action.

Additional References can be found within the [Line Officer Resources](#) page of the Wildland Fire Management RD&A website - http://www.wfmrda.nwcg.gov/line_officer_resources.php

- Line Officer Desk Reference
 - Although this document is for the Forest Service there are many sections within the document that are applicable to all agencies.
- Line Officer Guides and Templates
 - Example turn back standards
- WFDSS Refresher Training for Agency Administrators
- Agency Administrator Refreshers
- Delegation of Authority, Leaders Intent and Briefing Package Template

VI. SUMMARY

Management of wildland fire represents one of the most complex and highest risk activities in land management. Decision support and its contributions to decision-making are vital to fire management success. Decision support tools range from subjective information to quantitative long-term analysis processes and provide information to decision-makers. These tools and processes incorporate science and technology to facilitate decision making based on the best available information.

Decision support gives managers the ability to reduce the amount of uncertainty surrounding the fire, understand the amount of difficulty that could be encountered during management and possible outcomes, develop management strategies and operational tactics, and provide a

common understanding and clearer explanation of the situation.

Your understanding of and input to the decision analysis can be key in the success of managing an incident and providing for firefighter safety.