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**INSTRUCTOR:**

**LESSON:** Wildland Fire Decision Support System

**COURSE:** Advanced National Fire Danger Rating System

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**Emphasis: introduce concepts of WFDSS decision support and available models and tools that could assist in informing managers of risk associated with various decisions.**

**OBJECTIVES:**

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

1. Describe the Wildland Fire Decision Support System (WFDSS).
2. Identify support tools and how they use National Fire Danger Rating System (NFDRS) to produce products that might be utilized in developing decisions and implementation actions.
3. Identify ways NFDRS might drive Strategic Objectives and Management Requirements from management plans.

**I. INTRODUCTION**

WFDSS is designed to establish a process for documenting strategic decision, provides decision support, and facilitates the development of either short- or long-term management plans. The WFDSS process is linear, scalable, and progressively responsive to changing fire complexity and provides a consistent decision analysis and documentation process for all types of wildland fires. WFDSS provides a platform for risk-informed decision-making.

Documentation and analysis of wildland fire management decisions has been required by federal agency policy for nearly 30 years. The 2009 Policy Implementation Guidance requires-

“Managers will use a decision support process to guide and document wildfire decisions. The process will provide situational assessment, analyze hazards and risk, define implementation actions, and document decisions and rationale for those decisions.”

The Wildland Fire Decision Support System (WFDSS) has been developed to meet this need. The Forest Service (FS), Fish and Wildlife Service (FWS), and Bureau of Indian Affairs (BIA) enter all fires into WFDSS, regardless of size. National Park Service (NPS) and Bureau of Land Management (BLM) are only required to enter fires into WFDSS when it escapes initial attack. At 98% initial attack success, there may not be a lot of need for analysis to inform decisions. However as incidents escape initial attack or are managed for multiple objectives more analysis is needed to inform the decision.

## II. WHEN A WFDSS DECISION IS NEEDED

It is recommended that a decision be considered if;

- Wildland fires are no longer following the initial action defined by the Land and Resource Management Plan (LRMP), or the Fire Management Plan (FMP), or
- Fire continues to actively spread beyond a few burning periods, or
- Wildland fires are being managed or considered for multiple objectives, or
- Prescribed fires exceed prescriptions and are declared wildfires

Decision-making associated with managing wildland fire can have critical impacts. It is important to make the highest quality informed decisions possible facilitated by factual information and prediction of the range of outcomes and associated consequences of the decision. Publishing a decision provides documentation of the management action taken on the fire and the rationale behind it which will provide support if the fire is litigated in the future.

## III. WHAT IS WFDSS?

WFDSS is designed to be consistent with accepted models of risk-informed decision making. WFDSS is a web based system that allows users to acquire information, analyze that information, apply that information to inform their decision and gain situational awareness, then to archive the decision and the associated documentation. To accomplish this, WFDSS maximizes the use of appropriately-based deliberation as well as analysis. It is an iterative, information-goal directed process.

**Risk-informed decision making** - requires two distinct but linked processes:

1. **Analysis:**
  - Rigorous, replicable methods to provide information about factual questions.
  - Brings new information into the process – **informs deliberation.**
2. **Deliberation:**
  - Discussion, reflection, and persuasion to communicate, raise, and collectively consider issues, increase understanding, and facilitate substantive decisions.
  - Brings new insights, questions, and problem formulations – **frames analysis.**

Examples of decision making at this level involve developing a strategic alternative and objectives for a wildfire incident; consider a range of values, hazards and probabilities and focus on longer time periods. They are usually completed at least once, but may require revision, adjustment or a completely new decision as the incident evolves and conditions change.

## IV. YOUR ROLE IN WFDSS

As a person knowledgeable in NFDRS you may be asked to provide input or interpretation of indices to assist with developing, amending, or implementing a WFDSS decision. Knowledge and understanding of the risk-informed decision-making process will be critical. Fire managers are increasingly becoming involved in longer duration events where risks, values, costs, and probability of success all must be weighed in developing management strategies. Without your understanding of these processes and involvement in the strategic planning process relevant fire data may be missed.

## **V. NFDRS USES IN WFDSS**

WFDSS uses NFDRS in several ways. In the most basic way WFDSS can produce a Fire Danger Rating Graph which is a graph of the Energy Release Component (ERC) for fuel model G. Because WFDSS is designed to be automated it will select a weather station nearest the latitude and longitude of the incident or the latitude and longitude set in the Info tab. Because of this automated nature there is no logic used to determine if the weather station is representative of the fire area. WFDSS uses all available data from the station to generate the graph. There is no data checking or filter settings on this graph, therefore the graph should be used with some caution. With little effort, the graph can be produced and it can give a good indication of seasonal trends, but for greater precision, data should be evaluated and run in a NFDRS calculator such as FireFamilyPlus.

ERC is also used in the Fire Spread Probability (FSPro) model. ERC classes are used to define a range of historical weather data (climatology) that help drive FSPro. These ERC values have been grouped into ranges of historical data called bins. Each bin also contain fuel moisture values derived from NFDRS. Live fuel moistures are derived using Growing Season Index (GSI). The ERC percentile for the selected weather station define each bin range for the model to select when generating the analysis. The values in each bin defines the fuel moisture, burn period, spotting probability and ignition delay that are used to drive fire spread during the simulation. This is a good example of how fire danger is being used in fire behavior modeling.

Weather Information Management System (WIMS) data is used by WFDSS for historical (past) weather. Forecasted (future) weather is obtained from the National Weather Service point forecast. Weather data extent and quality will be station dependent and reflect the local areas commitment to their weather station network and more importantly, their data. The actual weather data available for an individual station is unique to each station. The number of years, months or days within a specific year that actual weather data exist cannot be determined in WFDSS. The months and actual days a station actively collects information and the quality of this data is best determined outside the WFDSS system such as KCFast or FireFamilyPlus.

## **VI. STRATEGIC OBJECTIVES AND MANAGEMENT REQUIREMENTS IN WFDSS.**

Strategic Objectives are broad statements from land and resource management (LRMP) and fire management plans (FMP) that identify changes in water, soil, air, or vegetation from the present to proposed conditions, but can also describe an existing resource condition that should be maintained. Management Requirements are derived from Land & Resource (LRMP) and/or Fire Management Plan (FMP) standards and guidelines information. Management Requirements represent the recommended technical and scientific specifications for management activities and/or potential actions to help achieve objectives across broad areas in general terms. They both provide the foundation, framework, and limitations/challenges for potential management of a fire.

Because Strategic Objectives and Management Requirements are tied to the management plans they are often tied to or should be tied to the NFDRS Operating plan. For example a Strategic Objective may be "Manage fires to achieve resource benefits when conditions and fire start location warrant". There are a number of ways to define what conditions might warrant managing a fire for resource benefits but fire danger is very likely a component of that condition definition. ERC, Burning Index (BI), or other NFDRS indice often define a range of values used to determine if a condition has been met to allow or exclude a particular action or process.

## VII. ELEMENTS WFDSS

WFDSS is designed to include models and tools to analyze and assess the incident. The outputs can then be used to support the decision and assist in driving strategies and future tactics. WFDSS is divided into subsections represented by tabs within the program. These sections are: Information, Situation, Objectives, Courses of Action, Validation, Decisions, Periodic Assessment, and Reports. The WFDSS system is updated from time to time, so menu options may change, but the basic function of each tab will remain the same. A summary of the most recent revisions to WFDSS can be found on the WFDSS Home page.

[http://wfdss.usgs.gov/wfdss/WFDSS\\_Home.shtml](http://wfdss.usgs.gov/wfdss/WFDSS_Home.shtml) Tutorials, help files and contact numbers for WFDSS support can also be found on this page and do not require a WFDSS account password to access them.

### **Information**

**Purpose:** Documents the initial and continuing fire situation, and provides required information to complete administrative fire reporting.

Information includes: Incident Name, Point of Origin, Unique Fire Identifier, Fire Code, Fire Perimeter / Incident Size, Discovery Date/Time, Containment Date/Time, Controlled Date/Time, Out Date/Time, Landscape Data Source, Geographic Area, Responsible Unit at Point of Origin, Incident Cause, and Jurisdictional Agency at Point of Origin.

### **Situation**

**Purpose:** Provides situational and risk assessment information to support strategic decisions and development of a course of action. Information on fire weather, features, values, fire danger, and more can be accessed. This tab features a map view to display most of the information in a spatially explicit format. Natural and manmade resource information can be toggled on and off to assess values at risk.

### **Objectives**

**Purpose:** Defines objectives as stated in Land & Resource (LRMP), and Fire Management Plans (FMP) and lists specific management and incident requirements that will frame and influence strategic decisions as well as tactical plan development and implementation. This information is loaded prior to the fire season as provided in the LRMP and FMPs. If spatially enabled, this list will be reflective of the fire location and the relevant plan information.

### **Course of Action**

**Purpose:** Defines a specific course of action ranging from a pre-planned initial response to an individualized response for a specific situation. Specificity varies with fire complexity and can include a defined planning area, management actions, resource commitments, and costs for the fire duration.

### **Validation**

**Purpose:** Provides a review of the Situation, Objectives, and Course of Action to ensure that Objectives can be met, and in the event they cannot be met, the Validation guides the development of a new Course of Action.

### **Decision Summary**

**Purpose:** Documents the response decision, the rationale for that decision, and stipulates the timeframe for revisiting and reassessing the decision.

## **Periodic Assessment**

**Purpose:** Provides a process to periodically review the current decision, response, and accomplishments to evaluate effectiveness and confirm accuracy or, if needed, indicate progression to a higher response level and associated planning activities.

## **Reports**

**Purpose:** Enables you to create three types of reports for your incidents. These reports are useful for conducting inbriefs and other meetings, as well as for preparing after action reviews and post-fire reclamation plans.

## **VIII. WFDSS Support Tools and Resources**

Numerous models and tools are available within WFDSS to analyze and assess the incident. The various outputs can then be used to support the WFDSS decision.

### **Models in WFDSS**

- Automated Basic Fire Behavior (BASIC\*)
- Automated Short Term Fire Behavior (STFB\*)
- Analyst Assisted Basic Fire Behavior (BASIC)
- Analyst Assisted Short Term Fire Behavior (STFB)
- Near Term Fire Behavior (NTFB)
- Fire Spread Probability (FSPro)
- Stratified Cost Index (SCI)
- Wildland Fire Air Quality Tools and Smoke Models

Most Models in WFDSS automatically pull in weather, landscape and fuel moisture data. The modeler can calibrate the LANDFIRE data for all models, except the Automated BASIC and Automated STFB. These models should be used to support decision making and are often incorporated in to the decision documentation

### **Tools in WFDSS**

- Wildland Fire Risk & Complexity Assessment
- Values Inventory
- Values at Risk (associated with FSPro)
- KMZ downloads
  - Incident KMZ
  - Analysis KMZ
  - Pending Incident KMZ
- Map Capture
- Fire Danger Graphs
- Weather forecasts

There are readily available technical experts that can assist in running these models and defining outputs for your incident. These models can and should be used to support decision making and are often incorporated in to the decision documentation.

## **WFDSS User Roles and Incident Privileges**

User Roles within WFDSS correspond to permissions which allow users to perform certain tasks within the application, such as creating an incident or conducting fire behavior analysis.

User Roles are: Viewer, Dispatcher, Author, Data Manager, Fire Behavior Specialist, geographic Area Editor, and Super Analyst.

User roles can be granted in WFDSS Training without granting those same roles in Production. A user account can be requested from the WFDSS Home Page by selecting the Request Account link.

Incident privileges are assigned at the time of (and are specific to) an incident. These privileges allow you to Own, Edit, Review, or Approve decision content. Modifying or uploading any data to the decision should be coordinated with the local unit or the individual responsible for maintaining the WFDSS decision.

Training aids are available on the WFDSS site on the Training tab.

[http://wfdss.usgs.gov/wfdss/WFDSS\\_Training.shtml](http://wfdss.usgs.gov/wfdss/WFDSS_Training.shtml) To help users become familiar with navigating in the program WFDSS 101 series is an excellent source for learning how to use WFDSS.

## **IX. 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.