



FRAMING THE FIRE OCCURRENCE

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OBJECTIVE(S)

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

1. List the three primary target groups associated with fire starts and effected by fire danger management decisions.
2. Identify feasible management actions intended to mitigate fire occurrence issues.
3. Describe the factors influencing the ability of land management agencies to effectively regulate the actions of each target group based on fire danger levels.
4. Identify the degree of control a land management agency has on each target group.
5. Provide examples of management actions and consequences.

NARRATIVE

I. INTRODUCTION

The National Fire Danger Rating System (NFDRS), simply put, is a “tool” for fire managers to use in their decision-making process. These decisions may range from daily staffing levels to long-term budget requests. For NFDRS to be effective however, the user must first “frame” their overall fire problem. Framing the problem is an essential step in the process of organizing complex fire AbcD

II. IDENTIFICATION OF FIRE IGNITION ISSUES

Fire Management issues present a challenging arena for problem solving. They are complex, plagued with uncertainty, and extremely political. Consequently, there are many ways of looking at the problem. The risks are high, and the consequences of our actions can be long-term and irreversible.

A. What’s the Issue?

The initial step commences with a broad overview of the planning area fire ignitions. The goal here is to identify factors and elements of the system of interest and understand the scope of the problems and resources (e.g., time, money, expertise, skills, and technology) required to address fire danger issues.

Places to look might include Prevention Plans, FireFamilyPlus “Fires Summary” reports, and GIS data to include ignition points classified by general cause.

We do not start from a clean slate with respect to our ideas, concepts, perspectives and tools to aid us in framing and solving complex problems. These legacies are revealed in policies, programs, and beliefs that can sharply distort how problems are framed and what solutions are sought.

For example, the recent issuance of Department of Interior Secretarial Order #3336 places priority on “protecting, conserving, and restoring the health of the sagebrush-steppe ecosystem and, in particular, greater sage-grouse habitat.” The implementation plan places significant priority on aggressive suppression action to protect sage-grouse habitat. Specifically, Dispatch Plans (“Run Cards”) and Staffing Plans (“Draw-down Levels”) must be reviewed to ensure the intent of the Secretarial Order is achieved. If, in the past, areas affected by this Order were not considered any differently from the surrounding landscape with respect to fire danger decisions, recent policy direction will redefine our perspective.

B. What’s the Problem?

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Just because fires occur within the planning area, it does not necessarily suggest a problem exists. Simply because there are several escaped campfires reported over the past 10 years, it does not mean a problem exists. Land management agencies hire and train firefighters that are expected to suppress wildland fires; that's our job!

Identify the problem specific to the area of concern. If this accomplished as a team or group, participants must avoid withholding fundamental disagreement about the problem and introducing it later in the process. There must be agreement on the problem before agreeing on the solution. What are the specific ignition causes? When does fire activity become a burden to the local suppression forces? Define the questions in explicit terms. This should include measures of the appropriate spatial and temporal scales involved and should also be framed in terms that facilitate improvement in conditions.

III. FRAMING THE PROBLEM

To apply fire danger rating as a viable decision support tool, fire managers must be able to associate fire suppression workload with a specific target group. An understanding of the specific target group from which the suppression workload originates will help determine the appropriate communication methods and deterrence measures which may effectively change the behaviour of the respective target group. The Fire Workload Analysis Table provides a means of identifying the planning area's fire ignition issues and concerns.

The ability to regulate, educate, or control a user group will be based upon the interface method and how quickly they can react to the action taken. Consequently, the most appropriate decision tool would depend upon the sensitivity of the target group to the implementation of the action. In addition, each action will result in positive and/or negative impacts to a user group. In selecting a component and/or index, several factors must be considered:

A. Affected Target Group:

The goal is to frame the problem such that a single "Target Group" is affected. Obviously, when implementing fire danger-related decisions, the "Agency" will always be affected. However, which Target Group must be affected by the agency to mitigate the fire problem? There are three Target Groups commonly associated with fire problems (Agency, Industry, or Public).

1. **Agency:** Employees of the federal, state, and local governments involved in the cooperative effort to suppress wildland fires. This includes Federal, State, and County land management employees, along with fire departments who share a similar protection mission to manage wildland fires.
2. **Industry:** Employees affiliated with organizations which utilize natural resources and/or obtain permits or leases to conduct commercial activities

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on federal, state, or private lands. These entities or activities could include ranchers, wilderness camps, railroads, mines, timber harvesting, filming, building construction, oil and gas, electric generation, guiding services, etc.

3. **Public:** Individuals who use public lands for non-commercial purposes such as off-highway vehicle (OHV) use, camping, hiking, hunting, fishing, skiing, firewood gathering, agriculture, mountain biking, general travel and recreation. This group also includes those living within the wildland/urban interface (WUI).

Understanding the target group will help effectively frame the problem so that we can subsequently apply fire danger mitigation tools.

B. Ignition Cause

Identifying various ignition causes can help fire managers identify potential target groups associated with unplanned ignition issues on the local unit. Historical general ignition cause classes (nine standard cause classes) can be analyzed and displayed in FireFamilyPlus (FFP). Specific ignition causes should be more clearly explained in relation to the target group. For example, “Campfire” can be more expressly described as “Unattended (and escaped) campfires around developed recreation sites.”

C. Relative Control of Target Group

This is a general description of how much control the fire management agencies have over the target group (High → Moderate → Low). This is a measure of how quickly the affected target group can respond to changing fire danger levels. How quickly can the target group respond to management actions? Generally, we would expect to have relatively low control over the Public, moderate control over Industry, and high control over Agency personnel. The level of control relates directly to the reaction time of the respective target group. For example, we would expect very quick reaction with our own agency personnel (Dispatch Level); however, the public’s ability to react to a fire danger message communicated by the agency is relatively slow. Understanding the associated target group’s control & reaction time is critical when implementing fire danger decisions.

D. Anticipated Communication Method(s) with Target Group

Various methods of communication are utilized to influence an affected target group to change their behavior. Depending upon the specific target group, communication may include face-to-face verbal conversations, radio, telephone, email, newspaper, television, signing/posting, text-messaging, etc.

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The method(s) of communication to/from the Target Group will be important when deciding the best fire danger management tool(s) to use.

E. Workload Description

This is the fire unit's suppression workload. Human-caused fires are usually described in terms of an ignition cause related to public and industrial target groups. Natural-caused (or lightning) fire workload is usually described as the Agency's workload. For example, lightning is not "the problem"; rather, the problem is the local unit's ability to respond to multiple ignitions, exceeding the staffing capabilities.

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Fire Problem Analysis (Shasta-Trinity Example)

TARGET GROUP		IGNITION CAUSE		RELATIVE DEGREE OF CONTROL	COMMUNICATION METHODS	WORKLOAD DESCRIPTION
GENERAL	SPECIFIC	GENERAL	SPECIFIC			
Public	Overnight campers & day-use picnickers.	4 - Campfire	Unattended (and escaped) Campfires around Shasta Lake	Moderate	The primary target group includes day use and overnight campers. Communication is often limited to signage and/or random face-to-face dialogue. Communicated by Command Center staff once per day to agency personnel for implementation. The intent is to raise the awareness of potential fire danger in simple easy to communicate terms via local radio, TV, newspaper, "Smokey's Arm" sign at the USFS office on I-5 in Mountaingate	<ul style="list-style-type: none"> • PIO(s) may need to invest additional efforts with various media sources to provide current fire danger information to the public. • Increased Law Enforcement, recreation, and fire patrol workload.
Public	Backcountry campers & hikers.	4 - Campfire	Unattended (and escaped) Campfires in the Trinity Alps Wilderness area.	Low	The primary target group includes backcountry hikers and campers. Communication with this group is random and infrequent. Communicated by Command Center staff once per day to agency personnel for implementation.	<ul style="list-style-type: none"> • Increased Education/Mitigation efforts workload • Increased Law Enforcement and backcountry patrols workload

EXAMPLE

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TARGET GROUP		IGNITION CAUSE		RELATIVE DEGREE OF CONTROL	COMMUNICATION METHODS	WORKLOAD DESCRIPTION
GENERAL	SPECIFIC	GENERAL	SPECIFIC			
					Backcountry wilderness patrols will be necessary to conduct face-to-face awareness of fire danger. Prevention personnel must be notified to change signs.	
Agency	Local agency fire suppression resources.	1 - Lightning	Multiple lightning fires starting at the same time.	High	Dispatch Center retrieves actual & forecasted NFDRS indices via WIMS twice/daily; processes indices for Staffing, Dispatch, Preparedness, and Adjective Rating Levels; communicates resultant Fire Danger Levels via telephone or text to Duty Officer (Staffing Level & Preparedness Level); via radio or telephone to Prevention Personnel to change fire danger signs (based upon Adjective Level); dispatch information via radio to suppression resource(s) (based upon Dispatch Level).	<p>This problem exists most frequently when more than half of the local IA resources are committed to multiple fires (most often associated with the onset of lightning occurrence, and within one day after the lightning event).</p> <ul style="list-style-type: none"> Increased aerial detection patrols may be necessary. During periods of “high” fire danger, when less than half of the local IA resources are available, new fires tend to get large quickly. Out-of-area suppression resources may need to be ordered.
Industry	Power Company	2 - Equipment	Fires caused by down powerlines	Moderate	Command Center staff retrieves the forecasted fire danger from WIMS	<ul style="list-style-type: none"> Loss of power to customers; power company repair/work crews need to

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TARGET GROUP		IGNITION CAUSE		RELATIVE DEGREE OF CONTROL	COMMUNICATION METHODS	WORKLOAD DESCRIPTION
GENERAL	SPECIFIC	GENERAL	SPECIFIC			
			during periods of high wind events		and communicate this info. to the state office of Pacific Gas and Electric Co (PG&E). PG&E then has the opportunity to change their operational plans.	<ul style="list-style-type: none"> be able to access areas with damaged powerlines. • Suppression resources need to ensure work areas are safe before repair crews can enter areas with damaged power lines. • Socio-Economic impacts to power customers; loss of revenue to power company.
Industry	Timber Harvesting Operations	2 - Equipment	Fires caused during logging operations (e.g. equipment overheating, equipment malfunctions).	Moderate	<p>Larger companies have cell phone and/or radio communication with employees.</p> <p>Some contract fallers have infrequent contact (daily/weekly) by phone or face-to-face. Advise loggers on private land of fire danger. Contract stipulations.</p>	<ul style="list-style-type: none"> • Increased fire patrol workload. • Ensure BMP enforcement by agency COR(s) during periods of high fire danger. • Socio-Economic impacts to local communities and timber harvesting companies & employees.
Public	Fuelwood cutting – harvesting.	2 - Equipment	Fires resulting from fuelwood cutting activities (e.g. chainsaws without spark arrestors, dragging tow chains).	Low	Permit stipulations. Post PAL via website(s), newspaper, radio. Fire prevention patrolling for face-to-face communication and enforcement.	<ul style="list-style-type: none"> • Increased Law Enforcement, recreation, and fire patrol workload.

IV. SUMMARIZING THE PROBLEM

The ability to regulate, educate, or control a user group will be based upon communication method(s) and how quickly the user/target group can react to the action taken. In addition, each action will result in positive and/or negative impacts to the user groups. Consequently, the decision tool which would be most appropriate would depend upon the sensitivity of the target group to the implementation of the action, and ultimately change their behavior.

The information gathered from the Fire Workload Analysis Table is important for completing the subsequent Decision Summary Table in the FDOP template. The Decision Summary Table provides a summation of the planning area's fire danger issues and concerns. Each issue is associated with a specific target group whose activities can be influenced through effective communication and implementation of specific control measures. The Decision Summary Table summarizes the relationships between the fire ignition issues and identifies common NFDRS-based management tools for the identified target groups.

- A. **Target Group:** Based on information gathered in the Fire Workload Analysis, select a target group from the drop-down list in the "Target Group" column (Public, Industry, Agency) in the Decision Summary Table. The same target group may be identified more than once depending on the ignition cause(s) identified in the analysis. For example, unplanned ignition issues related to the "Industry" target group may be associated with different cause classes (i.e. Railroad, Equipment).
- B. **Target Group:** Not all FDRAs may have a specific unplanned ignition issue that is associated with an identified target group. For example, "Lightning" may affect all FDRAs but certain industrial activities may occur in individual FDRAs. Enter the applicable FDRA(s) in the "Fire Danger Rating Area(s)" column for the identified target group on the Decision Summary Table.
- C. **Statistical Cause:** Analyzing and understanding ignition causes helps fire managers better understand how to effectively communicate with target groups and identify potential mitigation actions. Based on the information collected in the Fire Workload Analysis process, select the appropriate statistical cause associated with the selected target group from the drop-down list in the Decision Summary Table.
- D. **Climatological Breakpoints or Fire Business Thresholds:** The preferred choice is to develop and utilize fire business thresholds. Thresholds determined through a fire business analysis is preferred to climatological breakpoints (percentiles based strictly on weather data) when applying preparedness, response, and staffing decisions. Select from the drop-down list whether "Climatological Breakpoints" or "Fire Business Thresholds" will be used as decision point thresholds to address the target group behavior and

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associated fire occurrence issue (i.e. Public - escaped campfires, Industry - down power lines).

Fire Business thresholds are based upon the statistical correlation of weather data and historical fire occurrence. With a statistical correlation of weather and fire occurrence, decision points will be based upon the appropriate fire danger threshold at which a new action (decision) should be implemented.

Climatological breakpoints only consider weather data. Climatological breakpoints are points on the cumulative distribution curve of one fire weather/danger index computed from climatology (weather) without regard for associated fire occurrence/business.

For example, the value at the 90th percentile ERC is the climatological breakpoint (for a given period of record) at which only 10 percent of the ERC values are greater in value. Climatological breakpoints are valuable for comparisons of NFDRS values (such as an ERC value at the 90th percentile in one location versus another).

Note that caution should be used in using annual data, unless an area has year-round fire activity. The 'Very High' and 'Extreme' danger rating thresholds may be lower than warranted when including non-fire season months with low fire danger index values.

If annual data are used, annual data should be available for every year in the selected date range to avoid hidden biases. In addition, use of fire season data can be biased without a consistent definition of the 'fire season.' Additionally, the length of the fire season may be increasing; the definition of a 'fire season' should be sensitive to such changes (Heinsch,2009).

- E. **Index/Component:** The analysis process for each FDRA using FFP aids in determining which NFDRS2016 fuel model and NFDRS index/component best relates to your historical fire and weather occurrence data. Based on lessons presented in the workshop so far, select from the drop-down list the NFDRS index/component that, based on its sensitivity and characteristics, best fits. For example, ERC and BI outputs may be applied to determine adjective fire danger ratings which help to inform the public with fire danger information.

- F. **NFDRS2016 Fuel Model:** Select the applicable NFDRS2016 fuel model that will be used (i.e. V, W, X, Y, or Z). The analysis process for each FDRA using FFP aids in determining which NFDRS2016 fuel model best relates to your historical fire and weather occurrence data.

Management Level: Select the most appropriate NFDRS-based fire danger rating **level** (i.e. Dispatch **Level**, Staffing **Level**, Preparedness **Level**, Adjective Rating **Level**, Public/Industrial Restrictions **Level**) that will be utilized to manage the identified fire ignition types. Each **level** has specific

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tasks or direction that address target group behavior in relation the identified ignition issue. For example, a “High” dispatch/response level has specific initial attach (IA) response recommendations associated with it; a preparedness level of “4” is associated with identified specific actions or recommendations. The various management levels and associated actions/recommendations are described in their respective subordinate FDOP plans (i.e. Staffing Plan, Preparedness Plan, Prevention Plan, Response Plan).

- G. Number of Decision Points:** The number of decision points and threshold values are determined in the analysis process when matching NFDRS outputs with fire business (i.e. five decision points are associated with adjective fire danger rating levels: Low, Moderate, High, Very High, Extreme); three decision points may be associated with initial response levels: Low, Moderate, High).

Keep in mind that the FDOP is be the “parent” document that defines the decision points based upon the fire business analysis. The FDOP does not specify what the decisions associated with the decision points will be. The subordinate plans are intended to explain the specific actions to be taken at the thresholds determined in the FDOP. Those actions could be different for each agency (where it makes sense); however, the thresholds would remain consistent (regardless of what each agency decides to do at each threshold).

- H. Preparedness Plan(s) to Modify Target Group Behaviour:** Select the appropriate preparedness (subordinate) plan that addresses how to modify target group behavior (i.e. Prevention Plan, Fire Danger Sign Plan, Staffing Plan, Preparedness Plan, Initial Response Plan).

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Fire Problem Summary (Shasta-Trinity Example)

Target Group	Fire Danger Rating Area(s)	Statistical Cause	Climatological Breakpoints or Fire Business Thresholds	Index / Comp	NFDRS2016 Fuel Model	Management Level	Number of Decision Points	Preparedness Plan(s) to Modify Target Group Behaviour
Public	FDRA #1	4 - Campfire	Fire Business Thresholds	ERC	Y	Adjective Fire Danger Rating Level	5	Prevention Plan
Industry	FDRA #1 FDRA #2	2 - Equipment	Fire Business Thresholds	BI	Y	Adjective Fire Danger Rating Level	5	Industrial Restriction Plan
Agency	All FDRAs	1 - Lightning	Fire Business Thresholds	BI	Y	Staffing Level	5	Staffing Plan
Agency	All FDRAs	1 - Lightning	Fire Business Thresholds	BI	Y	Response Level	3	Response Plan
Choose Target Group		Choose Statistical Cause Code	Choose Breakpoints or Thresholds		Choose a Fuel Model	Enter the Rating Level	Choose Number of Decision Points	Choose Prep Plan

V. SUMMARY

In order for the Fire Danger Operating Plan (FDOP) to be a functional document that can support fire managers with the decision-making process, the user must first “frame” their overall fire problem. Framing the problem is an essential step in the process of organizing complex fire management issues into rational and defensible solutions.

To effectively apply fire danger rating as a viable decision support tool, fire managers must be able to associate fire suppression workload with a specific target group. An understanding of the specific target group from which the suppression workload originates will help determine the appropriate communication methods and deterrence measures which may effectively change the behaviour of the respective target group. The Fire Problem Analysis Table provides a means of identifying and documenting the planning area’s fire ignition issues and concerns.

The information gathered from the Fire Workload Analysis Table is important for completing the Decision Summary Table in the FDOP template. The Decision Summary Table provides a summation of the planning area’s fire danger issues and concerns. Each issue is associated with a specific target group whose activities can be influenced through effective communication and implementation of specific control measures. The Decision Summary Table summarizes the relationships between the fire ignition issues and identifies common NFDRS-based management tools for the identified target groups.

REVIEW OBJECTIVE(S)

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

1. List the three primary target groups associated with fire starts and effected by fire danger management decisions.
2. Identify feasible management actions intended to mitigate fire occurrence issues.
3. Describe the factors influencing the ability of land management agencies to effectively regulate the actions of each target group based on fire danger levels.
4. Identify the degree of control a land management agency has on each target group.
5. Provide examples of management actions and consequences.

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