



FIRE DANGER RATING AREAS

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OBJECTIVE(S)

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

1. Explain what a Fire Danger Rating Area (FDRA) is.
2. Identify the role of FDRAs in NFDRS (planning, analysis, application, actions).
3. Identify and apply "best practices" relating to the development and implementation of FDRAs.

NARRATIVE

I. INTRODUCTION

A. Basic Concepts – What is an FDRA?

1. **The NFDRS is comprised of many elements** – formulas and algorithms, fuel models and parameters, network of weather stations, inputs, outputs (components and indices), a community of users, plans and decision points, etc. But, fundamentally, Fire Danger tells us someTHING about someWHERE because it applies to the landscapes we manage. The Fire Danger Rating Area (FDRA) is the connection that ties the other NFDRS elements to a particular location. FDRAs represent the fire environment and related concepts, such as potential containment difficulty, for a given geographic area, which are influenced by physical factors.
2. **Characteristics of FDRAs:** An FDRA is a geographic (i.e. landscape-level) area where the physical environment and weather conditions result in similar fire danger throughout that area. Given the widely varying conditions in the real world that cannot always be distilled easily into spatial compartments, delineating an FDRA requires some discretion and subjectivity. Having a good understanding of how FDRAs are intended to be used for Fire Danger Rating, plus the particular circumstances and needs for your unit, will help you decide how to subdivide the overall planning area into unique FDRAs.
3. **Role of FDRAs in NFDRS:** Within NFDRS, the FDRA is the basic (spatial) unit that is analyzed in FireFamilyPlus to identify decision points that are used in planning documents to inform management decisions and invoke associated activities. Current and forecasted outputs are generated in WIMS to provide situational awareness, trigger the readiness and response actions dictated by those plans, and help decision-makers assess and manage risk for a particular FDRA. For consistency within NFDRS and to allow meaningful comparison of planning units at the

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Geographic Area or national scale, it is important that we have a consistent understanding of the meaning and intent for the FDRA concept and that we then apply those principles accordingly.

B. Why do we have FDRAs?:

1. As seasoned NFDRS practitioners and users, most workshop participants already understand the fundamental concepts (i.e. the “what”) pertaining to FDRAs. With this lesson, they are encouraged to consider “best practices”, reassess the validity of any existing FDRAs, and focus on “why” FDRAs are needed and how best to delineate and apply them for their planning unit. With a thoughtful, high-level assessment of the intended role of the FDRA, planners can subdivide the planning area into FDRAs that accurately represent actual and predicted fire danger and provide meaning information to inform decisions and trigger management actions.
2. FDRAs are the mechanism that connects large geographic areas with similar fire potential to the NFDRS model, thereby allowing us to support decisions based upon the current and forecasted fire danger. These decisions are used to affect the behavior of public and industrial entities, as well as the efficiency, effectiveness, and safety of our agency personnel who respond to wildland fires.
3. The FDRAs are the elemental units (nothing smaller) that are used for analysis and defined in plans where Fire Danger is the primary consideration. For example, Fire Danger Adjective Ratings, Staffing Levels, and Response Levels are typically defined for each FDRA. However, there can be exceptions, such as Preparedness Levels, which usually apply to the entire planning area (all FDRAs combined), or response “run cards” that can vary for each Response Zone that exists within a given FDRA.
4. Ultimately, we want to use NFDRS to provide good decision support, based on reliable predictions and at an appropriate scale. Accordingly, the FDRAs must be defined so that they produce unique, accurate, and meaningful NFDRS outputs, but at a scale that is neither too nuanced nor too general.

II. BEST PRACTICES FOR FIRE DANGER RATING AREAS

A. Inputs and other determining factors:

1. When delineating FDRAs, it is best to focus primarily on the elements that characterize the fire environment and, thereby, affect Fire Danger. Because weather and fires do not observe political or administrative

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boundaries, the three primary inputs that should be used when delineating FDRAs are:

- a. Vegetation
 - b. Climate
 - c. Topography
2. In combination, these elements typically result in unique Fire Danger conditions. When these inputs are used as the basis for FDRA delineation, we can assume that each FDRA bounds lands that are relatively homogeneous with regard to Fire Danger.
3. It is not a good practice to initially consider inputs that do not directly influence Fire Danger. Such inputs may become secondary considerations, used to align the FDRA edges or, sometimes, to help decide whether to split out or lump areas where the primary inputs are somewhat inconclusive. For example, the following spatial delineations are often quite consequential with regard to fire management decisions and activities, but by themselves do not typically affect Fire Danger, so they should only be used as secondary inputs (if at all) when delineating FDRAs:
- a. Agency jurisdiction or land ownership
 - b. Land Use Plan compartments
 - c. Fire Management Plan objectives/restrictions
 - d. Protection agreements
 - e. Operational efficiencies
 - f. Other existing boundaries, such as Predictive Service Areas (PSAs) or Fire Weather Forecast Zones
 - g. One way to incorporate these kinds of administrative and political boundaries is by creating Response Zones (discussed below).

B. Appropriate size and quantity:

1. FDRAs should be relatively large in size, in part because the spatial scale for weather inputs to NFDRS is rather coarse. They are typically landscape-scale, ranging from tens to hundreds of thousands of acres. Each FDRA adds workload to the analyses, the development of plans, and the daily implementation of those plans and the activities they prescribe. Accordingly, it is often best to keep the number of FDRAs to as few as possible. The tradeoff, of course, is to ensure each FDRA accurately

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reflects the Fire Danger conditions in that area and is appropriate to support the decisions that must be made for that area.

2. In determining the number of FDRAs that are needed, the planning team must first identify the range of Fire Danger outputs that can be considered “similar”. Moreover, every FDRA should large enough to be meaningful but not so large that the conditions there are overly-generalized. Finally, it is important to consider the unique combinations of management decisions and activities that will arise and then ensure that the FDRAs effectively bound those areas. If a particular area has environmental conditions that yield significantly different Fire Danger levels, but that particular area has very little fire occurrence, generally low risk, or otherwise does not pose a unique concern for management, then a separate FDRA may not be needed there. In other words, that area of low concern can be lumped into an adjacent FDRA, provided that it is understood that the Fire Danger outputs for that FDRA may not be particularly representative of that area of low concern.
3. Generally speaking, the planning team should avoid adding FDRAs if their presence will only add complexity to the unit’s management. Rather, additional FDRAs should be delineated only when the management complexity requires them.

C. Avoiding bias:

Each planning cycle/update provides an opportunity to reassess the existing FDRAs and make adjustments if they can be improved. Perpetuating long-established FDRAs without periodic revalidation is a decision trap (anchoring/sunk cost). Periodically re-doing the task to define FDRAs “from scratch” helps avoid the “status quo” decision trap (and serves as a powerful validation if the task yields FDRAs that match the existing ones). Limiting the input considerations to just those elements that affect fire danger (i.e. vegetation, climate, and topography) helps avoid the “framing” decision trap.

III. BEST PRACTICES FOR RESPONSE ZONES

A. Why do we have Response Zones?

While the FDRAs should delineate areas across which the Fire Danger is similar, there may be a need to further sub-divide the FDRAs to represent unique areas where the planned responses and other management decisions and activities (based on Fire Danger) will differ. In each Response Zone, the pre-planned Initial response to a wildfire is influenced by factors such as administrative or jurisdictional boundaries, objectives and constraints identified in the Land Use Plan or Fire Management Plan, operational efficiency (e.g. response time, accessibility, water sources, etc.), and risk management considerations (e.g. WUI, resource values, hazards, etc.).

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1. Via a Response Plan that uses Fire Danger Rating decision points to identify Response (or Dispatch) Levels, each Response Zone can have a unique array of pre-planned responses, often called “run cards”, that is used to send an appropriate mix and effective quantity of resources when a wildfire is reported in that area. Of course, the actual response force can be adjusted based on specific conditions once a qualified Incident Commander arrives and sizes-up the incident.

B. Avoiding the “split decision”:

When creating FDRAs and Response Zones, planners should strive to remove ambiguity and instead define clear and distinct response decisions and actions. Two situations to avoid are:

1. **Single FDRA with areas requiring different responses (but no Response Zones):** When factors such as jurisdiction require different responses (e.g. “run-cards”) within a FDRA at a given Fire Danger-based decision class (e.g. Response/Dispatch Level), the solution is to subdivide the FDRA into two or more Response Zones to accommodate those differences. For example, if an area of private lands (under State protection) typically requires a motor grader to be automatically dispatched to improve existing fuel breaks when a fire occurs at Response Level 4 (corresponding to relatively high Fire Danger), but the federal lands in that area do not have fuel breaks and, therefore, do not have an automatic need for a motor grader, then two different Response Zones, aligned on the federal/private ownership boundary, should be created, and the “run cards” for their respective Response Zones should include/exclude the motor grader accordingly.
2. **Single (previously-created) Response Zone spanning two FDRAs:** Because the pre-planned response for a given Response Zone will be driven by Fire Danger, having a single Response Zone overlaid onto two FDRAs can result in a situation where there are different Response Levels in play, so the selection of the appropriate “run card” is uncertain. Take an example that further builds on the scenario described above: If that private land extends into a newly-created, adjacent FDRA, but is encompassed by a single (previously-created) Response Zone (now spanning both FDRAs), and if Response Level 3 (corresponding to relatively moderate Fire Danger) does not require the automatic dispatch of a motor grader, consider the dilemma that arises when a fire occurs near the boundary of the FDRAs, but one FDRA is in high Fire Danger (so, Response Level 4) and the other is in moderate (Response Level 3). In this situation, it is unclear whether to automatically dispatch the grader since the Response Zone occupies an area where two different Response Levels in effect at the same time. The solution, of course, is to split the Response Zone along the FDRA boundaries. With these 2 new Response Zones, each delineating the private lands/State jurisdiction in their respective FDRA, it

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will be clear which FDRA's Response Level (and corresponding "run card") should be applied when a fire occurs in that area.

C. Edge matching:

It is best if the FDRA boundary and the exterior boundaries of the Response Zones are aligned. As noted above, a previously-created Response Zone should not span multiple FDRAs and should, instead, be split along the FDRA boundary to create a unique Response Zone for each FDRA.

1. Alternately, the edge of the FDRA can be adjusted to align with the outer boundary of the Response Zone. This alternative violates the principle that FDRAs should be delineated by (only) factors that influence Fire Danger Rating (namely, vegetation, climate, and topography), so it should only be invoked when the area added to the FDRA is relatively small or is otherwise poses minimum concern for management (e.g. comparatively low resource values, typically low risk, and/or infrequent fire occurrence). Because Response Zones are typically defined by discernable features, such as fenced ownership boundaries or road corridors that affect response time, using the Response Zone boundaries as FDRA boundaries can be beneficial for easier recognition. But, in general, FDRA boundaries should be first delineated based on vegetation, climate, and topography, and only later adjusted to edge-match the Response Zones when appropriate, rather than incurring the inherent bias of using jurisdictional boundaries and other factors that do not affect Fire Danger as a starting point for FDRA delineation.
2. In the absence of Response Zones, other refinements to the FDRA boundary may be appropriate and necessary. Sometimes, recognizing administrative boundaries is more important to the fire management decisions (vs basing them strictly on the homogenous fire environment boundary that dictates Fire Danger). For example, it may not be appropriate for a FDRA to dissect existing dispatch or response blocks if those blocks are based on the agencies' authority to respond (i.e. one county's firefighting resources may not have authority to respond to a fire in another county). Also consider the placement of boundaries in enforcing fire management decisions, such as the impact of enforcing campfire restrictions on one side of a road while not having restrictions on the other side of the same road

D. Response Zone inputs: When creating Response Zones and delineating their boundaries, the following factors should be considered:

1. **Administrative boundaries:** Response Zones may be aligned based on land ownership and/or jurisdiction that affect pre-planned response decisions. For example, different automatic responses may be required

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for lands owned/administered by federal agencies, state agencies, counties or municipal governments.

2. **Management objectives:** Existing plans, such as a Land-Use Plan or Fire Management Plan, may have already defined compartments, such as Fire Management Units, for which specific pre-planned responses are appropriate. Special land designations, such as Wilderness Areas or Areas of Critical Environmental Concern may impose constraints or elevated priorities that dictate the types and quantities of resources that can be used in response to fires.
3. **Operational efficiencies:** It is common for Response Zones to be delineated to bound areas where there are factors affecting the operational environment and responders. These factors may include protection agreements, response time, accessibility (e.g. slope, road network, etc), proximity to water sources, Retardance Avoidance Areas, etc.
4. **Risk:** Response Zones may be aligned on existing compartments used for Risk Assessments or Potential wildland fire Operational Delineations (PODs). Other risk-related factors that could be reflected in Response Zones include areas of high (or low) resource values, densely (or sparsely) populated areas, high (or low) fire occurrence frequency/concentration, or persistent hazards to firefighters or aircraft.

E. Example

1. Provide an example (preferably, a local example) of an interagency dispatch area where the initial attack response to wildland fires is based upon two inputs: fire danger (the fire danger rating delineated by FDRAs) and static decision factors, such as administrative boundaries, land management objectives/constraints, operational efficiencies, and risk management (delineated by Response Areas). Demonstrate how safety, efficiency, and effectiveness can help support fire danger-based decisions by incorporating pre-identified response areas.

IV. SUMMARY

Process and best practices for delineating and validating FDRAs.

Characterize vegetation, climate, topography first to identify areas having relatively homogeneous Fire Danger, thereby creating draft FDRAs.

If additional detail is needed for Response/Dispatch Plan, subdivide FDRAs into Response Zones. Alternatively, edge match draft FDRAs to align with existing Response Zones (or other compartments such as PSAs) but use these as secondary considerations to the factors listed in #1 above.

REVIEW OBJECTIVE(S)

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