



Defining Fire Workload Areas IR_013_WP

Topic

Defining Fire Workload Areas (FWAs) within a Fire Management Unit (FMU) for Fire Program Analysis (FPA).

Introduction

The FPA Initial Response Simulation (IRS) requires users to define at least one Fire Workload Area (FWA) per Fire Management Unit (FMU) as part of the data input process. This paper provides guidelines for developing FWAs. Each FMU may be subdivided into as many separate FWAs required to adequately reflect management variations in different portions of the FMU using the characteristics discussed below.

Terms

Fire Workload Area - An area or areas within an FMU that share one or more characteristics that distinguish it from the rest of the FMU.

Travel Time Point – A system-calculated point used to calculate travel time from a fire Dispatch Location to a Fire Workload Area (FWA).

Wildland Urban Interface (WUI) - The line, area, or zone where structures and other human development meet or intermingle with wildland or vegetation.

Dispatch Logic – User-defined settings by Fire Dispatch Level (FDL) to represent the maximum number and type of resources sent to ignitions in the Initial Response Simulation (IRS) module.

Background

Planners have expressed the need to model initial response at a scale smaller than the FMU in order to address resource management directives and/or to improve model outputs for initial response.

Discussion

A Fire Workload Area (FWA) is a polygon that designates a geographically identified subset of a Fire Management Unit (FMU). It shares with its parent polygon (the FMU) the same overall management objectives when matched to the FMU polygon.

The FWA sub-unit provides planners with a way to apply specific response to ignitions. An FWA is a container for fire occurrence, fire management actions, and fire effects on the resources present that take place over time within an area of the FMU. Each FWA represents a unique set of characteristics that could include the following:

- Frequency of fire occurrence,



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- Dispatch and use of initial response resources,
- Area of unique resource value, and/or
- An area of strategic fuel treatments.

When one or more of these characteristics are uniform across an FMU, only a single FWA is required. This FWA perimeter must match the FMU perimeter polygon. When there are important differences in how an FMU manages ignitions, more than one FWA may be required.

In FPA, Fire Planners define the number and type of resources required to respond to an ignition within an FWA based on direction from Fire Management Plans. FPA calls this process Dispatch Logic and it mimics what fire resource response a duty officer or dispatcher would follow for an FWA on a given day.

Fire Workload Areas (FWA) Rules

- Each FMU must have at least one FWA. When there is only one FWA in an FMU it is contiguous with the FMU perimeter. FMU names may be up to 30 characters in length.
- Each FMU may be subdivided into multiple FWAs to appropriately reflect management differences within the FMU. Considerations for defining FWAs are listed in the following section.
- An FWA must be located within an FMU; it may not extend into another FMU.
- FWAs may be non-contiguous (two or more spatially defined locations that are not adjacent) within a single FMU. For example, FWA 1 may be located in both the southwestern and northeastern parts of an FMU.
- Name FWAs uniquely within the FMU so the system can correctly track them. The FWA name must not exceed 20 characters (e.g. for the Kernville FMU, “Kern 1”, “Kern 2”, “Kern n”).
- FWA shapefiles must be submitted in NAD 83 decimal degree format.

Considerations When Creating One or More Fire Workload Areas (FWAs) Within a Fire Management Unit (FMU)

Fire Frequency

The number and extent of FWAs can be determined by variations in fire occurrence. It is best to separate concentrations of fire starts from areas of more scattered occurrence when there is likely to be a different mix in the kind, number, or travel time of fire resources dispatched to the FMU. By defining two or more separate FWAs, it allows the Initial Response Simulation (IRS) module to represent variations in fire occurrence. The reason for



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representing concentrations of fires separately is that in the IRS, the travel time from a Dispatch Location to the FWA is based upon the geographic centroid of the FWA, not the centroid of ignitions.

Dispatch of Initial Response Resources

Each FWA is an area within the FMU; it is not a single point. When planning for resource travel time data (represents the arrival time of initial response fire resources from Dispatch Locations to the FWA and the fire event), Fire Planners may want or need to create more than one FWA per FMU to model these travel times.

Designate a separate FWA when there are differences in the kind, category and type, or number of initial response resources that would be dispatched to an FWA. For example, if an FMU contains areas of grass fuel types and large areas of timber, the grass types may be managed with engines only, but the timber fuels may be managed with a mix of resources including engines, hand crews, and dozers. It would be appropriate to subdivide the FMU into FWAs that had more or less homogeneous fuels in each.

If the time it takes resources to reach fires in different areas of the FMU are known to affect initial attack success, those areas could be reflected by designating separate FWAs. Generally, if in doubt about a situation, delineate an additional FWA. By doing so, Fire Planners have greater confidence in the simulation results because results more accurately reflect real initial response situations.

Different kind, category, and type or numbers of fire resources may need to be dispatched to different parts of the FMU due to differences in potential fire consequences. For instance, based on resource values, the planned response to an ignition in an area of the FMU at low Energy Release Component (ERC) level may be significantly different than at an extremely high ERC level. Another area of the FMU, such as Wildland Urban Interface (WUI), may always require more or a specific type of resources. In this case, designate two FWAs within the FMU to model the differences.

It is important to evaluate differences in travel times to fires to determine what areas should be separated into an FWA. What constitutes a noteworthy difference depends upon both the fire spread rate and damage potential for the area. When spread rates and values at higher Fire Intensity Levels (FILs) are relatively low over the FMU, differences in the arrival time of 20 to 30 minutes in one portion of the FMU compared with another may not have a measurable enough effect on final fire sizes and resource values to warrant separate FWAs. In fuel types that have fast spreading fires, or where there is a high cost or resource value associated with even relatively small burned areas, a difference in arrival time of even 15 minutes between two locations may justify creating additional FWAs.

The area's accessibility may also affect suppression requirements. The IRS automatically handles fires in walk-in FWAs differently from those that represent fires that can be reached by ground vehicles and equipment. For walk-in fires, Walk-in Time Delays are included in



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the arrival time and engines use a hand crew fireline production rate, not the “wet” production rate of an engine.

Unique Values to Be Protected

Where resource and fire management objectives provide direction for constraints on the use of equipment such as dozers for different areas of an FMU, define a separate FWA for each unique situation. Model outputs for an initial response organization can be viewed for each FWA to determine how well they conform to the specific management objectives for each portion of the FMU, and the data settings affecting those resources’ modeled behavior for that FWA may be modified.

Travel Distance from Dispatch Location to FWA Travel Time Point

The IRS uses the distance, in miles, each fire resource travels to each FWA in order to calculate the travel times of the various fire resources dispatched. The system calculates the centroid of the FWA and uses this point as the Travel Time Point. Depending on whether the resource mobilizes by air or ground, IRS calculates the mileage from each Dispatch Location to each FWA Travel Time Point for each type.

- The user can develop a non-contiguous FWA-shape file attributed to the non-contiguous FMU (see [Figure 1](#)). The polygon of the FWA with the highest fire frequency is used to calculate the FWA Travel Time Point. When there is equal fire frequency within the FWA polygons, the system will use the polygon of largest area to calculate the Travel Time Point.

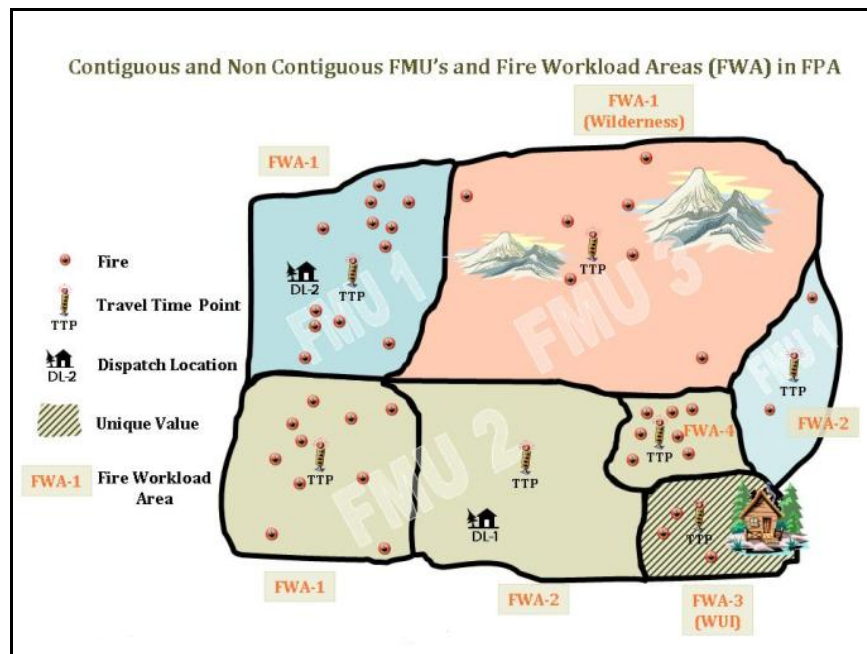


Figure 1: Example of FWA Designations in FPA



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- FPA calculates aerial resource travel time using a straight-line mileage from the Dispatch Location to the FWA Travel Time Point.
- FPA calculates ground-based resource travel time using the same straight-line distance used for aerial fire resources multiplied by an adjustment coefficient to increase the resource arrival time to represent road distances.
- In the instance of a non-contiguous FMU that has only one non-contiguous FWA there will only be ONE Travel Time Point used to represent travel time from Dispatch Locations to that FMU (see [Figure 2](#)).

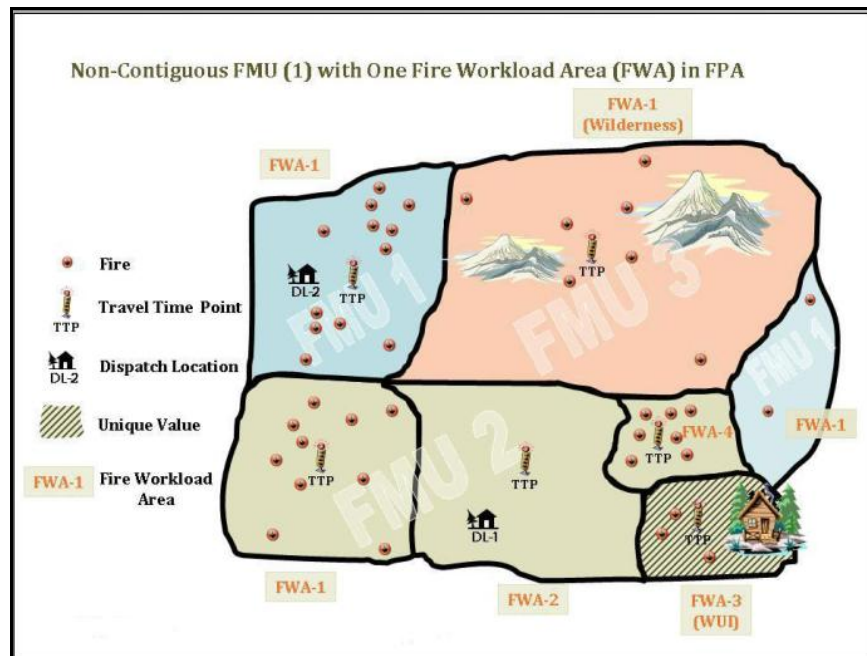


Figure 2: Non-Contiguous FMU (FMU 1) with One Fire Workload Area (FWA) and a Single Travel Time Point.

Reports

To assist with the analysis and rollup of information for the non-federal participants, FPU's may draw FWA boundaries entirely within a single state's boundaries where appropriate.

Future Directions

See related White Papers, Tech. News or FAQs as published.