



Understanding FPA and the Performance Metrics used in Analyzing Investment Alternatives PM_021_WP

Topic

Understanding Fire Program Analysis (FPA) and the calculated performance metrics used for analyzing the effectiveness of FPU-developed investment alternatives.

Purpose

Performance metrics provide insight to fire planners as to the trade-offs in different investment alternatives within local fire program strategies. When incorporated into a national goal programming process, performance metrics provide a consistent method of characterizing the trade-offs between different investments at the FPU level. Performance metrics provide valuable information for national-level decision makers when recommending out-year fire program budgets.

Terms

Goal Programming - An analysis used to determine the way to achieve the best outcome given a list of requirements and multiple, often conflicting, objective measures.

Trade-off Analysis: A systematic approach to balancing the pros and cons of investment alternatives when the objective is to simultaneously meet multiple goals.

Exceed Simulation Limits - A fire that exceeds the limits of the Initial Response Simulator based on either time or size, as defined by FPU level planners.

Stratified Cost Index (SCI)¹ - Regression equation that calculates the expected suppression cost of a large fire (greater than 300 acres) given its characteristics.

¹ See http://www.fs.fed.us/rm/pubs_other/rmrs_2007_gebert_k001.pdf for more information.



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Discussion

In 2006, the Wildland Fire Leadership Council (WFLC)² identified five broad management concerns that FPA was chartered to address:

- 1) Growing annual suppression costs for large fires.
- 2) Fires that occur and cause significant damage within the Wildland Urban Interface (WUI.)
- 3) Attaining fire and fuels management objectives on federal lands.
- 4) Fires that cause severe impacts to highly valued resources.
- 5) Concerns with prevention and suppression of unwanted and unplanned fires.

This paper identifies the five performance metrics that FPA calculates to provide indicators used for comparative analysis of investment alternatives at the FPU level. These five performance metrics, when used in the national goal-program, have outcomes consistent with fire management objectives. Each of the concerns is restated below followed by a definition of the FPA performance metric and some of its corresponding assumptions.

Concern 1: Growing Annual Suppression Costs for Large Fires

Performance Metric #1: The expected total suppression cost for all unplanned and unwanted fires.

Assumptions:

- The total cost of managing fires contained in the Initial Response Simulator (IRS) are calculated from an average acre cost estimate, and
- The total cost of fires that exceed the simulation limits in IRS are modeled using the Stratified Cost Index (SCI).

² See

http://www.fpa.nifc.gov/Library/Docs/Science/FPA_Exec_Summary_overview_proposed_global_architecture_final_061006.pdf for more information.



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Concern 2: Fires that occur and cause significant damage within the Wildland Urban Interface (WUI).

Performance Metric #2: The total Wildland Urban Interface (WUI) acres burned.

Assumptions:

- Fires at any Fire Intensity Level (FIL) are undesirable in the WUI, and
- WUI is defined using the University of Wisconsin's SILVIS³ Laboratory definitions for Interface and Intermix, with an additional 1.2-mile buffer to account for urban growth since the 2000 Census.

Concern 3: Attaining Fire and Fuels Management Objectives on Federal Lands

Performance Metric #3: The total number of acres burning at or below FPU-defined Fire Intensity Levels (FIL) damage thresholds plus the total number of acres treated.

Assumptions:

- These thresholds correspond to the FPU's local fire and fuels management objective.
- All fires burning above the FPU-defined threshold within a Fire Workload Area (FWA) are undesirable. FPU's can indicate that all flame lengths are acceptable by specifying a very high threshold.
- All acres treated in FPA use Fuel Program funding for the purpose of achieving fire and fuels management objectives.

Concern 4: Fires that Cause Severe Impacts to Highly Valued Resources (HVR)

The FPA Executive Oversight Group (EOG), working with the Interagency Science Team (IST), developed a consistent interagency definition and subsequent data layer for HVR. FPA will adopt that data layer in the first year to calculate this performance measure.

Performance Metric #4: The total Highly Valued Resources (HVR) acres burning above FPU-defined Fire Intensity Levels (FIL) damage thresholds.

Assumptions:

- HVR is a nationally defined and geospatially delineated data layer as accepted by all participating bureaus/agencies. For the FY2009 analysis year, this layer is comprised of or a subset of the following nationally valued resources:

³ http://silvis.forest.wisc.edu/projects/WUI_Main.asp



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- Endangered Species Critical Habitat as represented by Federally registered species and sage grouse critical habitats that are negatively impacted by fire
- Municipal Watersheds as represented by Level 6 Hydrologic Unit Codes
- The HVR layer indicates what areas or features of the national landscape are nationally significant. A point on the landscape is either significant or not. The HVR performance measure does not provide for levels of significance.
- All fires burning above the FPU-defined flame length threshold set for each Fire Workload Area (FWA) are undesirable. FPU's can indicate that all flame lengths are unacceptable by specifying a zero threshold when assigning the threshold for each FWA.
- These thresholds correspond to the fire and fuels management objectives of the FPU.
- By definition, some portions of locally significant FPU landscapes may not fall within the area defined by the national HVR layer used for calculating the HVR performance measure.

Concern 5: Preventing and Suppressing Unwanted and Unplanned Fires

Performance Metric #5: The number of fires contained in IRS and the number of fires prevented in the Prevention Module.

For each investment alternative, FPA models the number of fires:

- Contained in the Initial Response Simulator (IRS).
- Exceed Simulation Limits in IRS.
- Prevented in the Prevention Module.

Assumptions:

- FPA models containment from the FPUs' LMP/FMP goals. These goals may differ for every FWA within the FPU.

Interpreting the Metrics

FPA modeled results are in terms of probability distributions (e.g. probability of burning, probability of damage,). The metrics used in the calculations are single expected values for each of the distributions rather than ranges of probabilities. This method reports one value for each performance metric per investment alternative proposed at the FPU level.