Synopsis of FPA System Alternatives

Alternative 1: Decision Support System Foundation

Alternative 1 uses Bayesian decision analysis to compare various combinations of fire program elements (Large Fires, Initial Response, Fuels, and Prevention) for each Fire Planning Unit. Cause and effect relationships are displayed in a graphical network (i.e., influence diagram) linking decisions to intermediate variables and ultimately to performance measures. The strength of each relationship is expressed through a conditional probability table, where probabilities are established by the FPU team members using expert opinion supported by historical data and existing analyses and models. Extensive spatial analysis is optional, although some analysis of spatial information may be essential. An advantage of Alternative 1 is that it is relatively simple in design.

Alternative 2: Add Initial Response Simulator

Alternative 2 adds an initial response simulation model to build probability tables used in the decision support system described above. With the initial response simulator, initial response success is simulated under various combinations of preparedness organizations, weather, and fuel treatments. The initial response simulator incorporates a quasi-spatial approach, requiring basic spatial information.

Alternative 3: Add Large Fire Probability Surrogate

Alternative 3 incorporates a GIS–based analysis of factors contributing to large fire occurrence and intensity to derive spatial indices of risk. Existing indices such as the Wildland Fire Sensitivity Index (WFSI) provide prototypes for the type of analysis to be conducted. For example, WFSI assigns an index of the relative probability of burning based on fuel conditions, weather patterns, and historical fire size and uses established models of fire behavior. Comprehensive spatial analysis is a key element of this alternative.

Alternative 4: Add Large Fire Probability Simulator

Alternative 4 incorporates a large-fire simulator that mimics the spatial and temporal pattern of large fires. By simulating large numbers of fires in a Monte Carlo fashion, probabilities of burning under different intensities can be assigned to individual pixels in a landscape. The effects of fuel treatments are more realistically portrayed because the model evaluates the effect of the treatments on fire size, intensity, and spatial patterns. Individual fires can be examined to create probability distributions of fire effects, suppression costs, and impacts on resource values. The large fire simulator can be directly linked to the initial attack simulator, ensuring logical consistency in analysis.

Alternative 5: Add Large Fire Strategy and Vegetation Change Modeling

Alternative 5 builds on Alternative 4 by including two additional modules: a vegetation change model and a large fire strategy model. The vegetation change model provides a process to project effects of fuels treatments for the FPU using existing scientific models of vegetation succession and change. The large fire strategy model would allow mechanistic modeling of different management responses to fire (e.g., suppression tactics or wildland fire use) rather than relying on simpler assumptions incorporated in other options.