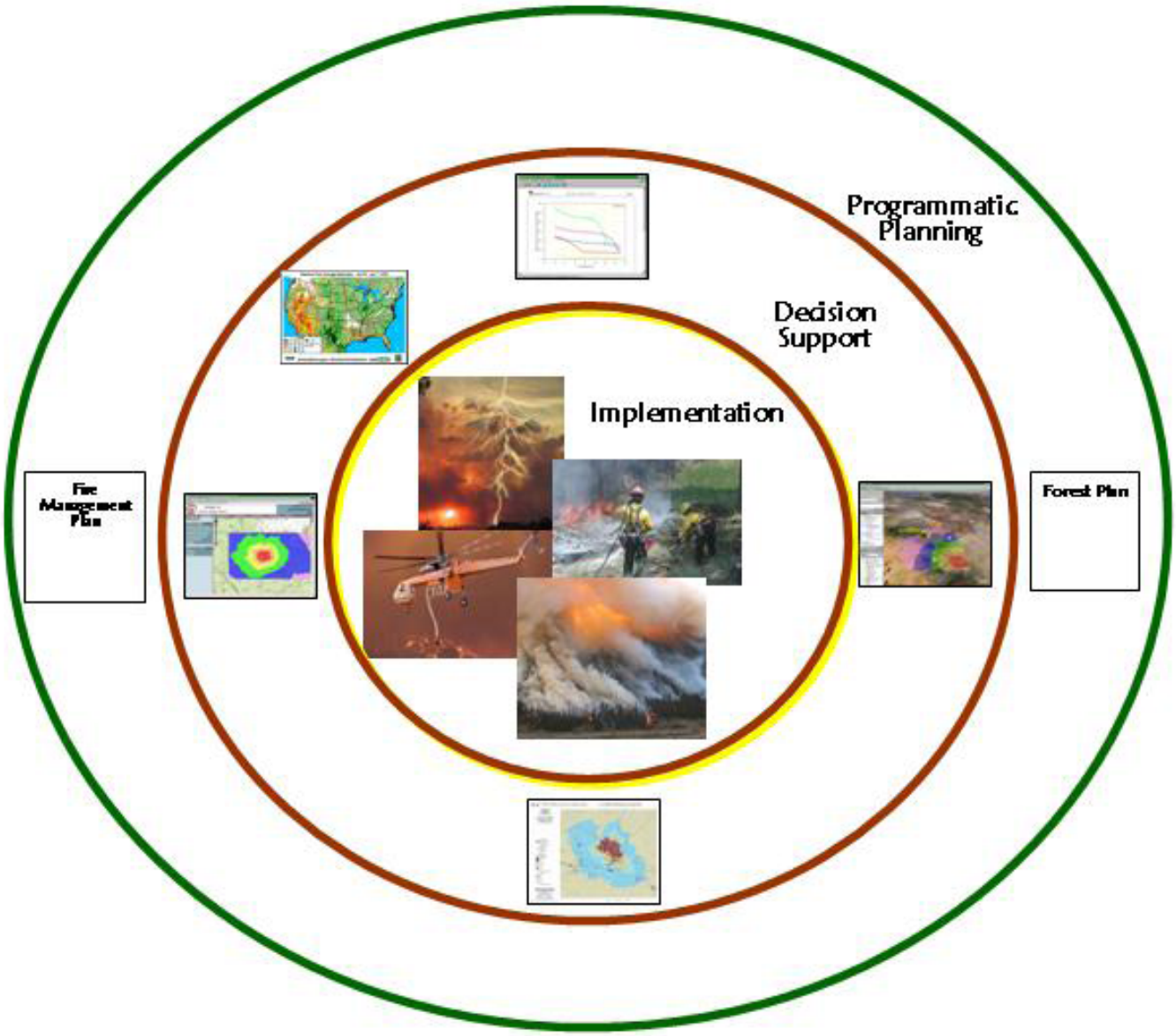
United States
Department of
Agriculture

Forest
Service

July 2007

Wildland Fire Management Efficiencies

Implementation Guidelines



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Executive Summary

The fire environment that wildland fire management agencies deal with is becoming increasingly more complex. Decades of land use practices and fire suppression have resulted in altered vegetative situations and fuel complexes. Expanding development at the fringes and inside wildland areas is causing dramatic increases in wildland-urban interface concerns and protection needs. As a result, fire suppression costs have been increasing exponentially during recent years. A review of management efficiencies and decisionmaking on wildfire incidents was conducted to determine ways to reduce growing Federal fire suppression expenditures. A total of 47 management areas were identified as possibilities to improve efficiency in operational capability.

But, operational capability alone cannot meet the rising complexity of wildland fire. Recent advances in science and technology supporting wildland fire management and decision support for managers must be utilized to the fullest extent. These management elements, in combination with operational capability, will better position wildland fire management agencies to respond to the increasing complexity.

These guidelines have been prepared to offer assistance in interpreting and implementing the management efficiencies. Wildland fire management activities are described in terms of categories of programmatic planning, decisionmaking – during both strategic analysis and tactical planning, and implementation. Wildland fire management starts with planning activities that provide the foundation for the actual implementation. Discussions are provided for the programmatic planning function of wildland fire management, the decisionmaking component, and the implementation phase. Reviewing management actions during the decisionmaking and implementation stages are most important to influencing management efficiencies.

The Appropriate Management Response (AMR) is defined with discussions on what the principles of AMR are, what it specifically is and is not, when it is required, how it is developed, and where it is used. Decisionmaking areas presented include: decisions regarding how the fire will be managed, what strategic objective will be selected for management actions, and strategy and tactics. Sources of information to support these decisions will include the Fire Management Plan; components of the Wildland Fire Implementation Plan (WFIP) Stage I, II, and III or Wildland Fire Situation Analysis (WFSA); decision support tools and data, including: WFDSS – FSPro, WFDSS – RAVAR, and Stratified Cost Index (SCI); and dependent upon projected costs to manage the fire, a Regional Forester's Representative (RFR) and Decision Support Group (DSG) or Chief's Principle Representative (CPR) and DSG. Specific information is provided on how to prepare to utilize the decision support tools, what input information is needed, and how outputs may be used by a local unit or RFR and CPR. Specific information is provided on what RFR, DSG, and CPRs are, how they operate, and how they are established.

Implementation actions are a function of the decisionmaking and preparation of strategic alternative selection and implementation plans. Feedback to decisionmaking areas can occur as a result of improved information and decision support outputs during the implementation phase.

Introduction

The fire environment that wildland fire management agencies deal with is becoming increasingly more complex. Decades of land use practices and fire suppression have resulted in altered vegetative situations and fuel complexes. Expanding development at the fringes and inside wildland areas is causing dramatic increases in wildland-urban interface concerns and protection needs. Ecosystem health is showing progressive decline, further exacerbating land management issues and wildland fire management concerns and activities.

Figure 1 illustrates changes and trends in wildland fire conditions and management capabilities.

Wildland fire complexity has followed a trend originating early in the twentieth century at a moderately high level. Large wildfires occurred in many parts of the country and posed particular problems that led to development of fire control organizations. Complexity declined during the middle of the century as environmental conditions exhibited cooler and wetter conditions, probably the coolest and wettest period in the last 100 years. Then, as drought conditions became more prevalent, altered fuel complexes affected fire frequency, size, and intensity, and wildland-urban interface expanded at an increasing rate combining in a steady increase in overall complexity. This current

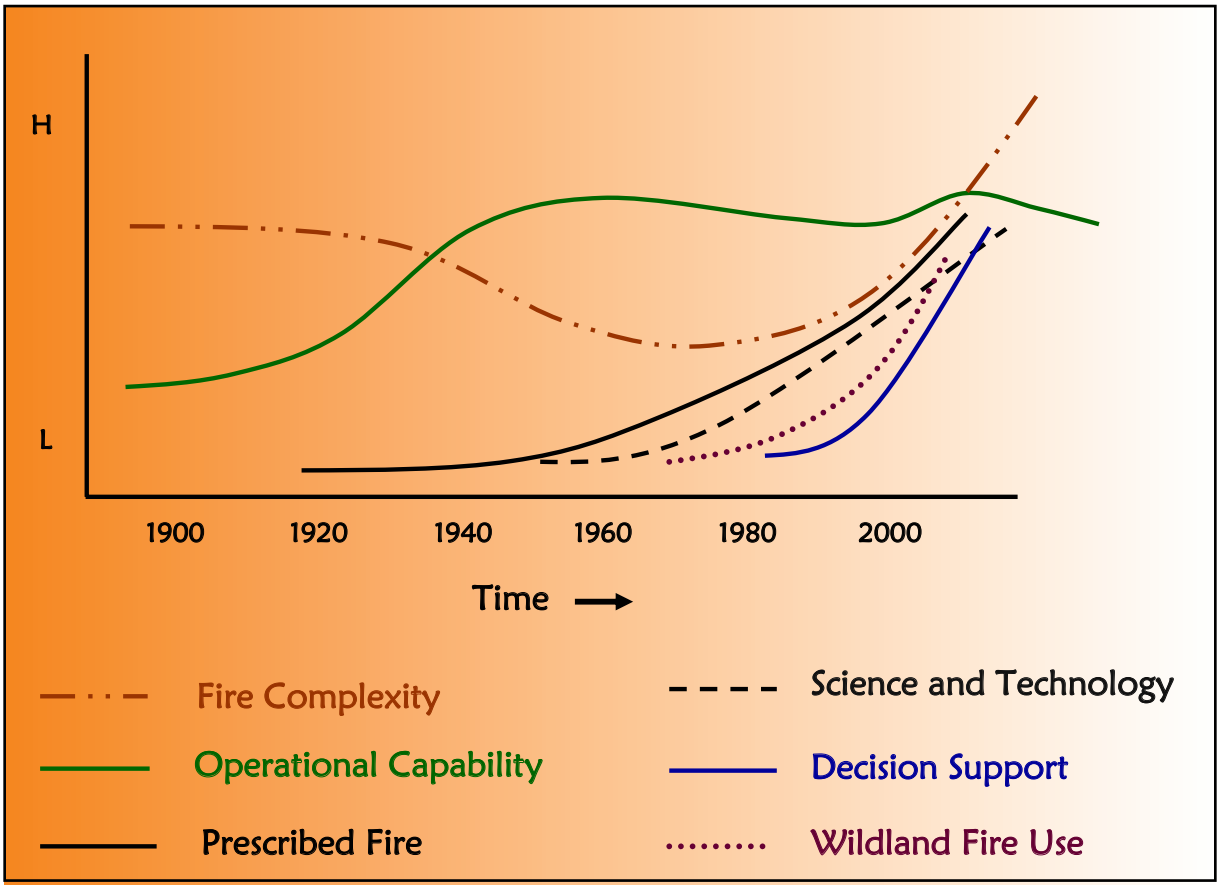

Figure 1. Management capability and efficiency in comparison to wildland fire complexity.

increasing trend in wildland fire complexity does not show any indications of slowing or declining into the foreseeable future.

Operational capability in figure 1, as evidenced by organizational budgets, staffing levels, equipment, and resources, shows a very low level initially, but a rapid increase as organizations and agencies were established, equipment was developed, workforces were organized, and the collective ability to respond to wildland fire increased. Toward the mid-twentieth century, operational capability increased to the point where it exceeded fire complexity. During the next few decades, capability began a slow decline. This was evidenced by staffing levels that provided 800 to 1,200 firefighting crews and multiple incident management teams available in subgeographic areas. As capability declined near the end of the 1990s, fire complexity was rapidly rising, eventually surpassing the organizational capability. The National Fire Plan in 2001 infused funds and staffing into the fire program but following that, organizational capability is again declining as evidenced by the availability of less than 500 firefighting crews and reductions in incident management team numbers to single digit numbers of teams per geographic area.

As a result, fire suppression costs have been increasing exponentially during recent years. In most years, over 97 percent of all wildland fires are suppressed during initial attack, but 2 to 3 percent of wildland fires become large suppression actions and account for nearly 80 percent of the Federal suppression expenditures. Suppression expenditures accounted for 41 percent of the Forest Service budget in 2006 and such increasing costs are reducing the agency's capacity to deliver other components of its mission.

Operational capability alone cannot meet the rising complexity of wildland fire. Recent advances in science and technology supporting wildland fire management and decision support for managers must be utilized to the fullest extent. These management elements, in combination with operational capability, will better position wildland fire management agencies to response to the increasing complexity. Prescribed fire and wildland fire use are additional management activities that can lower complexity or reduce its rate of increase over the long term by affecting fuel complexes.

In order to determine ways to reduce growing Federal fire suppression expenditures, a group was established to review management efficiencies and decisionmaking on wildfire incidents. A total of 47 management efficiencies were identified and divided into categories of leadership, organization, and management.

The purpose of these guidelines is to provide additional information, clarification, and procedures for implementing wildland fire management efficiencies. Implementation of recommendations to improve management efficiencies will focus on areas of programmatic planning, decisionmaking, and implementation.

Wildland Fire Management Activities

Wildland fire management activities can be described in terms of categories of programmatic planning, decisionmaking—during both strategic analysis and tactical planning—and implementation. Each of these three phases can have important influences on fire suppression costs. Wildland fire management activities start with programmatic planning that provide the foundation for the actual implementation. Forest plans and Fire Management Plans define objectives, resource practices, fire management strategies and tactics, and the overall program to manage wildland and prescribed fire. This direction will influence both decisionmaking and implementation of management actions in the later stages. Scale, scope, and duration of management actions result from the fire situation and decisions made during the decisionmaking stage. It is critically important to accumulate the best available information and compare and evaluate alternatives during decisionmaking. Good, informed decisions can limit potentials for unnecessarily excessive or long-term suppression expenditures. The implementation stage is where decisions are fully implemented and goals of achieving management efficiencies do not stop once implementation starts. Continual monitoring, evaluation, and revision as needed contribute to improved management efficiency. Figure 2 shows these categories and the flow of activities from land use planning to implementation for a specific incident.

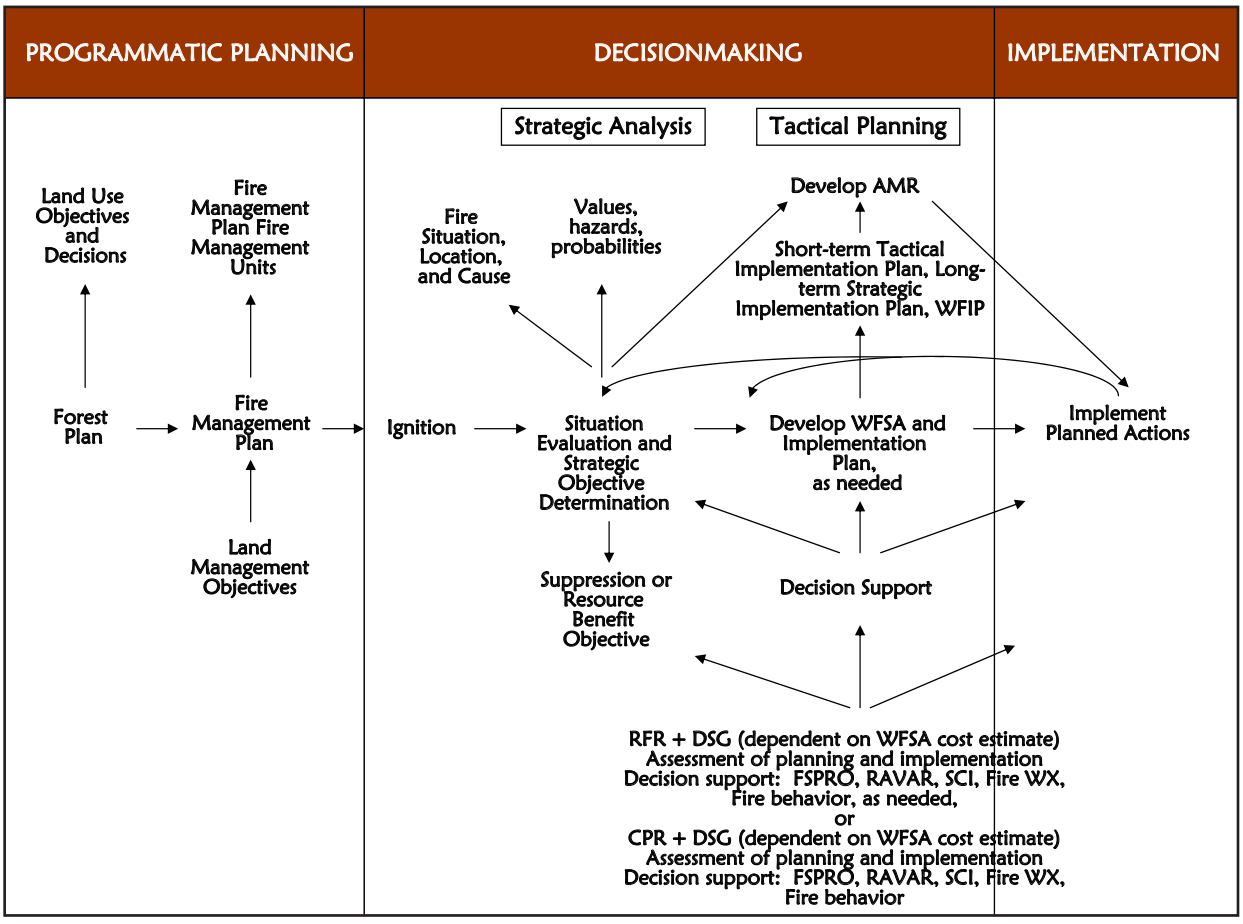

Figure 2. Generalized flow of management activities from programmatic planning to implementation.

Programmatic Planning

Programmatic planning involves planning activities conducted at the program level and produces forest plans and Fire Management Plans (FMP) (figure 3). Forest plans are those broad land and resource management plans that:

- Describe the availability of land for resource management;
- Predict levels of resource use and outputs;
- Provide for a variety of resource management practices;
- Set land and resource management objectives; and
- Identify wildland fire management strategies.

Fire Management Plans represent the functional activity plan for wildland fire management. Federal Wildland Fire Management Policy and Forest Service Manual state that every area of burnable vegetation must have an approved Fire Management Plan. These plans provide the following information:

- Strategic definition of the program to manage wildland and prescribed fires based on the area's approved forest plan, and
- Translation of programmatic direction from forest plans into operational implementation activities, including:
  - Describe organization, facilities, equipment, staffing needs, activities, timing, locations and related costs.
  - Provisions for firefighter and public safety.
  - Fire management strategies, tactics, and alternatives.
  - Values to be protected and public health issues.
  - Consistency with resource management objectives, activities of the area, and environmental laws and regulations.

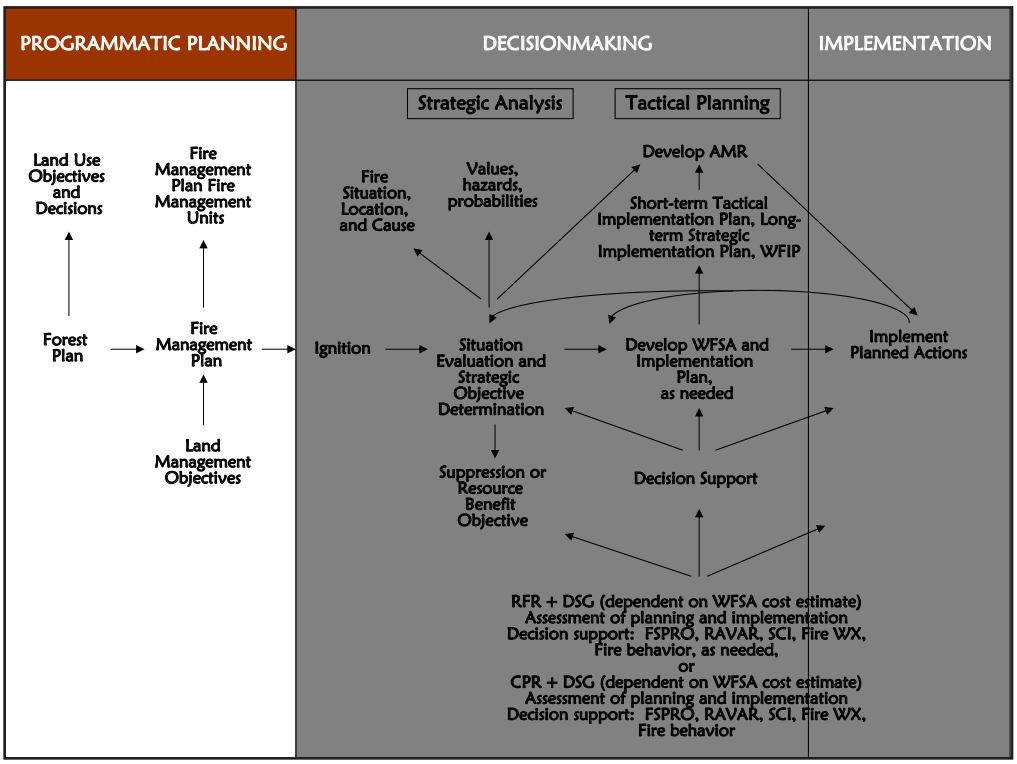

Figure 3. Programmatic planning aspects of wildland fire management.

Decisionmaking

In the absence of detailed preplanning, the decisionmaking process that directly influences the management of wildland fires begins after an ignition occurs. Decisions will be made regarding requirements of the fire to be managed for resource benefits; what the risk of the fire is in terms of site-specific values, threats, and probability of negative impacts; if this level of risk is acceptable to Agency Administrators; what strategic objective will be selected for management actions, and strategy and tactics. Sources of information to support these decisions will include the FMP; components of the Wildland Fire Implementation Plan (WFIP) Stage I, II, and III; Wildland Fire Situation Analysis (WFSA); decision support tools and data; and dependent upon projected costs to manage the fire, a Regional Forester's Representative (RFR) and Decision Support Group (DSG) or Chief's Principle Representative (CPR) and DSG. Information associated with the decision process will assist in the preparation of and be documented in the WFSA, WFIP, any short-term implementation plan, or other long-term implementation plan, and may aid in development of the appropriate management response.

Inputs, outputs, and information flow, during Strategic Analysis and Tactical Planning are shown in figure 4.

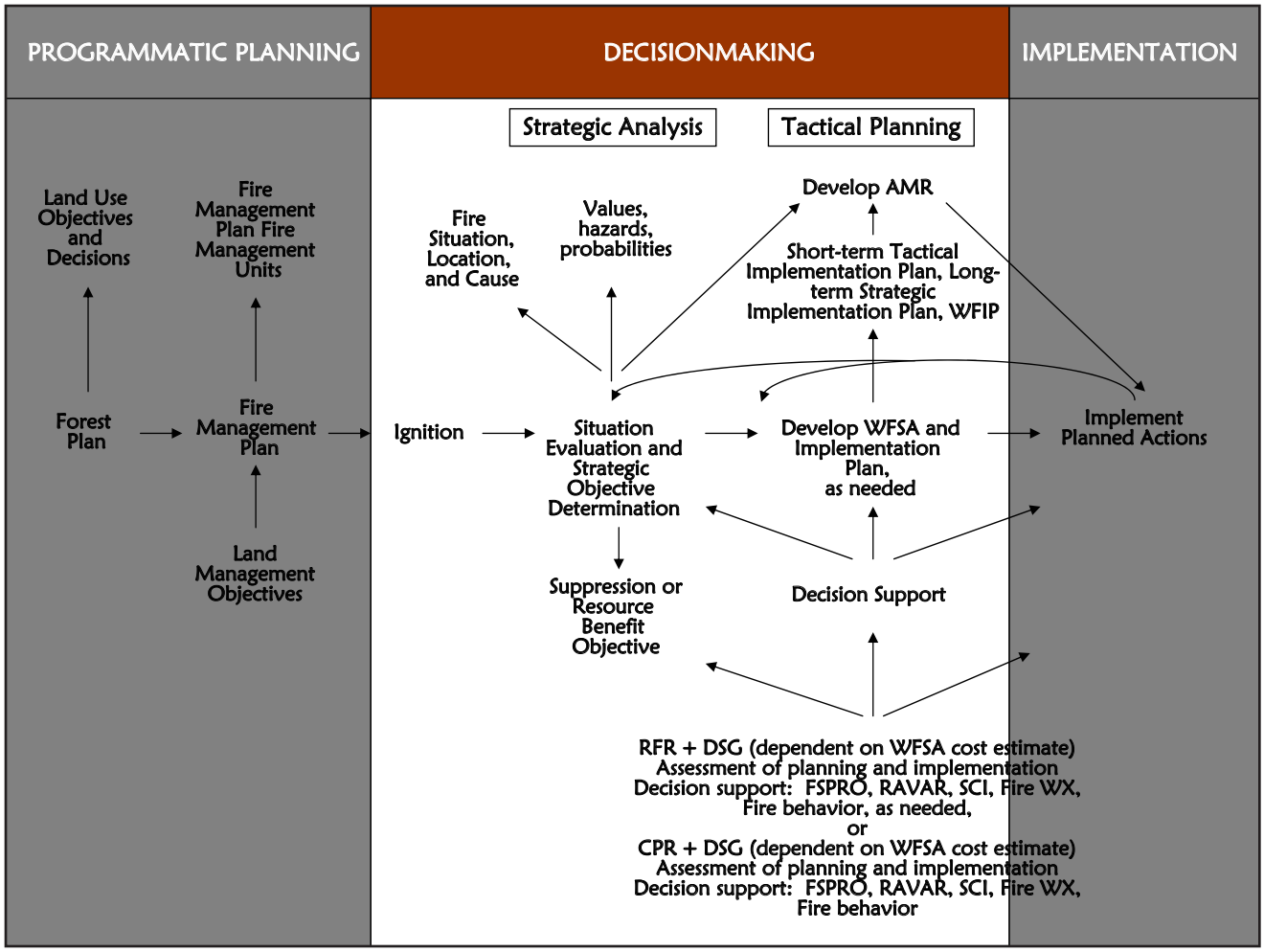

Figure 4. Decisionmaking components and information flow.

Situation Analysis and Strategic Objective Determination

After an ignition occurs, a standard information set (refer to Incident Response Pocket Guide or Interagency Standards for Fire and Fire Aviation Operations, WFIP Stage I Strategic Fire Size-Up, or locally developed operating guidelines and forms) is needed for managers to determine if the fire meets requirements for management under wildland fire use or suppression strategies. Two key pieces of information must be acquired to make this determination: fire location in regard to the Fire Management Plan's Fire Management Unit and the cause of the fire. Additionally, basic information regarding the situation surrounding the fire, including observed and predicted weather; observed and predicted fire behavior; fuels and fuel moisture situations; fire danger, local, regional, and national situations; values, hazards, and probabilities of effects on values; and Agency Administrator input are needed. After review of this information, managers will have a description of the fire situation, an initial assessment of risk, and clarification of the strategic objectives for the fire.

Fire Management Plans, initial fire size-up, fire danger information, and weather and fire behavior information as well as preplanned information are readily available to local managers. New tools and information analysis processes have been developed to provide further decision support assistance to managers. Products generated from this phase of decisionmaking include: documentation of fire situation, location, and cause; completion of risk assessment; determination and documentation of strategic objective; and definition of an initial appropriate management response.

Appropriate Management Response

The concept of appropriate management response is integral to the Federal wildland fire management policy and is clearly evident in the policy flowchart (figure 5).

The Appropriate Management Response (AMR) is any specific action suitable to meet Fire Management Unit (FMU) objectives. Typically, the AMR ranges across a

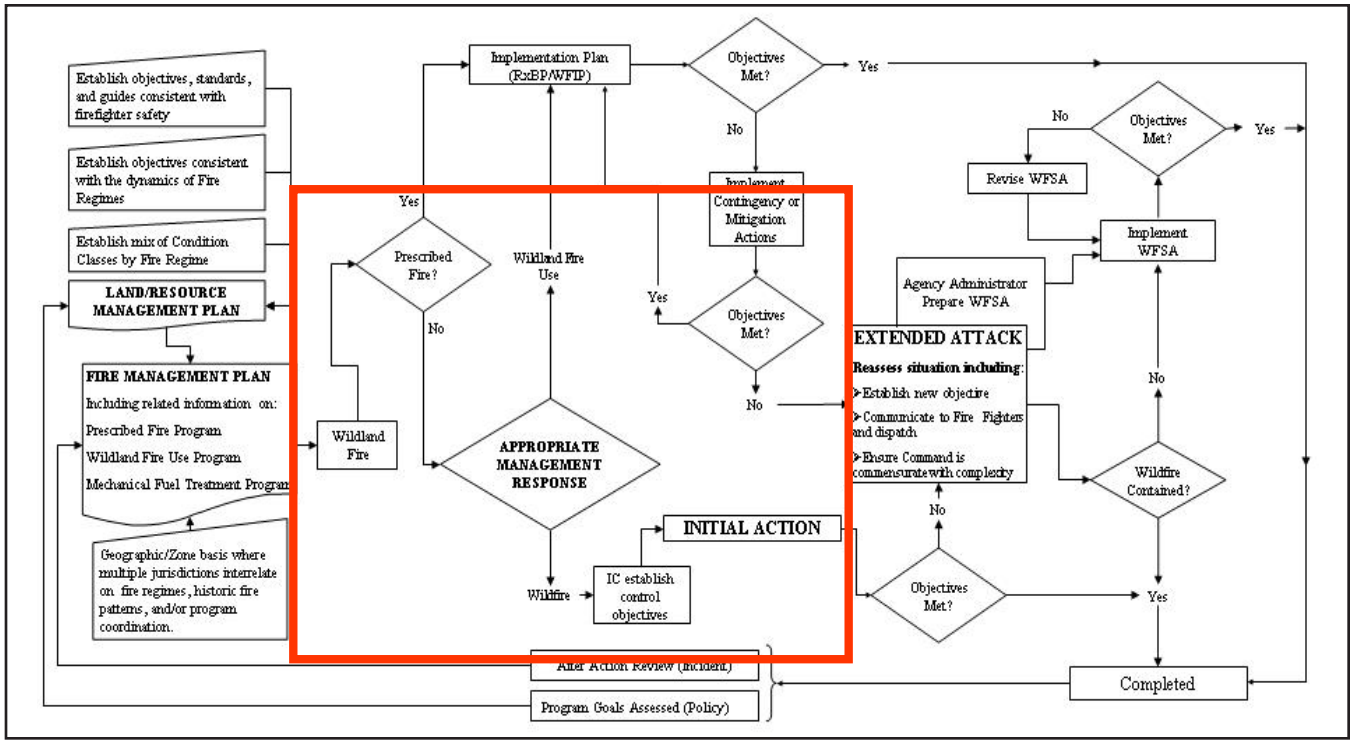

Figure 5. Federal wildland fire management policy flowchart.

spectrum of tactical options, from monitoring to intensive management actions. The AMR is developed by using FMU strategies and objectives identified in the Fire Management Plan. The AMR concept provides managers with the flexibility to implement a response appropriate to each individual set of circumstances and conditions and to utilize a full range of responses. It does not lock tactical options to fire type designations. As conditions change, the particular response can change to accomplish the same objectives.

It is important to note that the appropriate management response is not a replacement term for wildland fire use, or the suppression strategies of control, contain, confine, limited, or modified, but is a model that offers managers a choice from the full spectrum of responses. It is based on objectives, environmental and fuel conditions, constraints, safety, and ability to accomplish objectives. It is applied during wildland fire suppression at all levels, including initial attack, and in managing wildland fires for resource benefits. Use of this concept dispels the interpretation that there is only one way to respond to each set of circumstances.

An important component of the changed conditions, improved knowledge, greater awareness and different expectations that have helped shape the current wildland fire policy is that not all fires are bad. Fire on most landscapes has played the major role in developing and maintaining ecosystems and their diversity, including resistance and resilience to disturbances on an unnatural scale. It has become clear in today's changing environment that there are unwanted wildfires that threaten high values, life, and property that must be suppressed as quickly and efficiently at the minimize size. However, it must also be realized that not all fires can be suppressed and not all fires should be suppressed, and appropriate tactics must be developed from the full tactical response spectrum.

Wildland fires determined to be unwanted should be suppressed as efficiently as possible. Other fires can be managed through less aggressive tactical approaches when values of resources at risk are low, threats to exceed management capability are low, firefighter exposure and risk are high, and expected costs of aggressive suppression actions are high.

The cost of wildland fire management, especially large fire suppression, continues to increase at an alarming rate. Fire suppression may never be an inexpensive activity, but it must become a more cost-efficient activity. In the past, and still today in many situations, managers allow their capabilities, primarily or alone to determine a suppression response, particularly after initial attack is unsuccessful. If suppression resources are available in sufficient force, they may be employed in a more or less habitual approach to perimeter control, regardless of the fire potential, values at risk, or cost effectiveness and efficiency of the response. If resources are insufficient, less intensive suppression strategies and actions are chosen by default. In either case, this response is viewed as having the least professional risk insofar as managers confidently feel that all efforts are being taken, even if success, defined as prompt control, is difficult to reach.

Not only is fire suppression very expensive, but once a commitment to a plan is made, it is often very difficult to change. Increasingly, a few very large or long duration fires that are likely to burn until ended by weather events are still being managed through more or less conventional suppression objectives emphasizing full perimeter control. These fires demand and receive a sizeable part of the national fire suppression resource capability. Less available resources and demands by inflexible objectives and tactics on long duration fires contribute to more frequently occurring critical resource shortages.

The high and increasing cost of fire suppression, knowledge that some wildland fire should burn on certain landscapes even when we must protect portions of the same landscapes, and the understanding that fire suppression can be accomplished by a range of tactical applications to fit the circumstances has led to the understanding that fire management decisions should fundamentally be made on what is the right thing to do, not just on what we can do, or

used to do. Appropriate Management Response, as defined in the Federal Wildland fire Management Policy, is a course that will lead to much greater efficiency.

Appropriate Management Responses available to managers vary widely, can take on various forms, and can represent a combination of tactical actions on a single incident. The application of an AMR provides management the greatest flexibility possible and promotes opportunities to achieve greater balance in the wildland fire management program.

What are the Principles of AMR?

- AMR is an element of the Federal Wildland Fire Management Policy developed by Federal agencies with state representation in 1995, reviewed and updated in 2001, and given operational clarification for consistent implementation in 2003.
- Every wildland fire that is not a prescribed fire will receive an appropriate management response.
- An AMR is developed from the range of tactical responses.
- In implementing an AMR, the full spectrum of tactical options, from monitoring a fire at a distance to intensive suppression actions are available. During the initial response to any wildland fire, decisions will reflect the goal of using available firefighting resources to manage the fire for the most effective, most efficient, and safest means available.
- The AMR may be different in time, as well as place. Decisions will be made about a fire based on the situation at that moment. A decision to manage a fire with a certain strategy today may not be the same decision that would have been made yesterday, or could be made tomorrow.

What AMR Is and Is Not

- AMR is any specific action suitable to meet Fire Management Unit (FMU) objectives.
- AMR is an authorized action, suitable to meet preplanned objectives for the area, and under the circumstances of which a fire occurs. In some cases the AMR is an action that managers must take, while in other cases the AMR may be selected from a range of alternative actions managers may take.
- Appropriate Management Response options may include:
  - Monitoring from a distance
  - Monitoring onsite
  - Confinement
  - Monitoring with limited contingency actions
  - Monitoring with mitigation actions
  - Initial attack
  - Suppression with multiple strategies
  - Control and extinguish
  - Any combination of some or all of the above tactics.
- AMR is a more efficient way of responding to wildland fires.
- AMR is not a different way of doing business.
- AMR is not an alternative action response.
- AMR is not a less safe way of managing wildland fires.

When is AMR required?

- All unplanned wildland fire ignitions require an AMR.

How is an AMR Developed?

- An AMR is developed from consideration of firefighter and public health and safety, land and resource management objectives, fire cause, current and predicted weather, current and potential fire behavior, fuel conditions, values to be protected from or benefiting by fire, management priorities, resource availability, and cost effectiveness. Looking longer term, fire managers must also weigh the possible ecological affects of managing the fire such as rehabilitation needs, smoke event frequency, duration and intensity, fire effects on soils, vegetation and wildlife, and overall effects on the landscape of having fire present or excluded.

Where is AMR Used?

- For all unwanted wildland fires (wildfire), the overarching goal of suppression will be applied in every case. The initial suppression action will usually focus on prompt and decisive control of the fire commensurate with firefighter and public safety and cost effectiveness. In the initial or subsequent suppression responses, a full and immediate control objective may be modified, and the commitment of resources and actions reduced, when:
    - o personnel cannot safely or effectively engage the fire;
    - o suppression resources necessary for a successful outcome are not available; or
    - o the values to be protected and at risk from the fire are less than the expected cost of continuing an aggressive suppression effort.
- Where wildland fire use is authorized by the LMP and implementation criteria are established in the FMP, an unplanned, naturally-caused ignition may be managed for resource benefits. Where wildland fire use is an approved management strategy, the decision to suppress a candidate fire is still available if circumstances contributing to a high probability of success for fire use are not compelling. In such cases, the spectrum of possible suppression responses and reasons to choose are the same as they are for a fire that must be declared a wildfire (when fire use is not an option).

A significant point is that the AMR is developed from a single tactical response spectrum. Different objectives for fires do not automatically indicate that separate sets of tactical responses are used to develop the AMR. The figure to the right (figure 6) illustrates how, regardless of the objectives and strategy, the same, single tactical response spectrum is used to develop the AMR.

Decision Support Tools

Tools have been developed for fire managers and agency administrators to improve understanding of wildland fire decisions and the rationale behind them and to assist decisionmaking regarding strategies and tactics on wildland fires.

Technological advances in fire behavior prediction, meteorological analysis, fire spread estimation, fire effects prediction, smoke production and dispersal, rare event assessment, and fire area simulation make it possible to obtain better information, reduce uncertainty, assess potential fire outcomes, evaluate consequences of failure, determine probabilities of success, and evaluate strategic alternatives and tactics more effectively than ever before. Using these tools to gain the type of information necessary for consideration in decisionmaking can promote better management choices, improved management efficiency, and hopefully, more desirable outcomes. As new technology becomes available for application, it must be utilized to improve operational actions to the greatest degree possible.

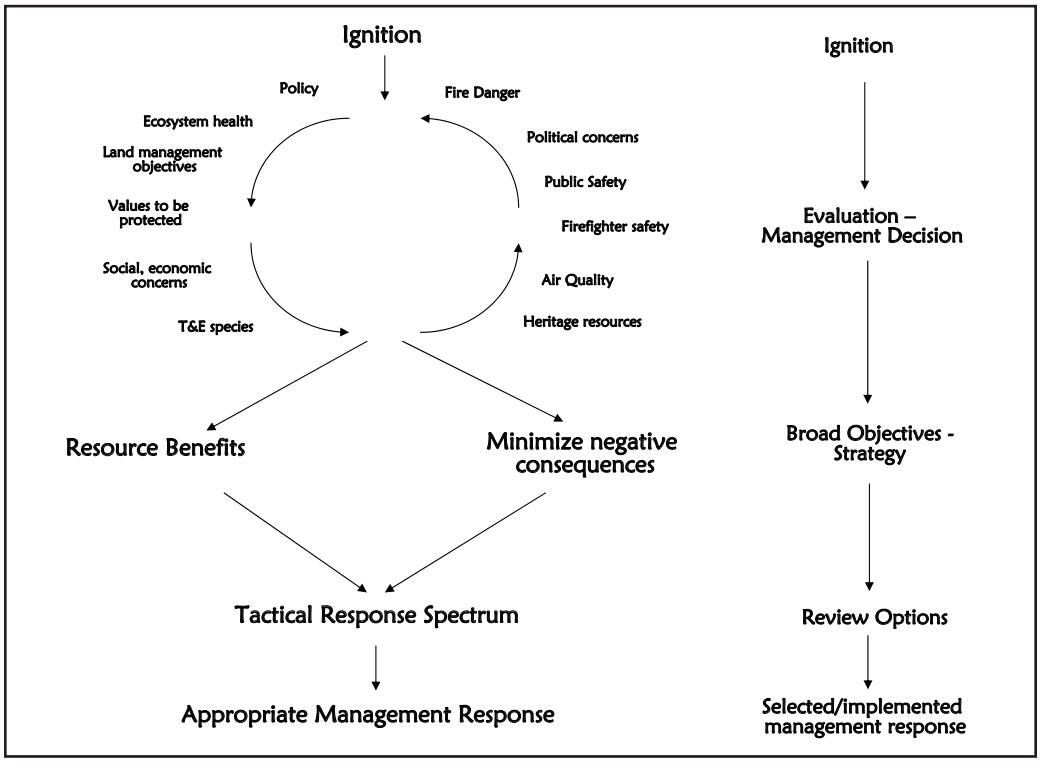

Figure 6. Generalized process for developing an AMR.

Specific Areas Where Decision Support Tools Can Add Value

- Indications of how the fire may burn; predictions of intensity and severity;
- Fuel conditions, moisture conditions, departures from average conditions;
- Fire dynamics—indicators of potential rapid escalation in fire behavior;
- Analysis of fire danger indicators, comparison with historic records;
- Fire history reviews, records of past fires in terms of area burned and type of fires (i.e., low to moderate intensity, surface fire, stand replacement, etc.);
- Probability of the fire reaching a planning area boundary;
- Probability of a season ending weather event;
- Indications of where the fire may spread or total area that may be burned by the fire;
- How fast the fire will travel;
- How soon the fire may reach critical sites or the planning area boundary;
- Predictions of the range of potential fire effects on natural and cultural resources;
- Projections of values to be protected in the proximity of the fire;
- Identification of primary resource values to be protected and/or at risk by ongoing large fire events; and
- Probability of where the fire will spread.

What Decision Support Tools are Available?

Decision support tools that can be utilized to provide additional information concerning the fire environment include, but are not limited to:

- FSPro – Fire Spread Probability Model
- RAVAR – Rapid Assessment of Values at Risk Model
- SCI – Stratified Cost Index, analysis of comparable fire suppression expenditures from historic data.
- Outputs from these models are planned to be available for priority fires through the Wildland Fire Decision Support System (WFDSS) Web site beginning with the 2007 summer fire season.
- FARSITE – A fire growth simulation model that computes fire behavior and spread over a range of time under conditions of heterogeneous terrain, fuels, and weather. This model projects where and how fast a fire may spread and how hot or intense it may burn. It is a fire growth simulation model that uses spatial information on topography and fuels along with weather and wind files. It incorporates the existing models for surface fire, crown fire, spotting, post-frontal combustion, and fire acceleration into a two-dimensional fire growth model.
- FlamMap – a fire behavior mapping and analysis program that computes potential fire behavior characteristics (spread rate, flame length, fireline intensity, etc.) over an entire FARSITE landscape for constant weather and fuel moisture conditions.
- BEHAVE Plus – a PC-based program that is a collection of models that describe fire and the fire environment. It is a flexible system that produces tables and graphs and can be used for a multitude of fire management applications.
- FireFamily Plus – a Windows program that combines the fire climatology and occurrence analysis capabilities of the PCFIRDAT, PCSEASON, FIRES, and CLIMATOLOGY programs into a single package with a graphical user interface.
- RERAP – Rare Event Risk Assessment Process, analyzes historical weather data to determine probabilities of rare weather events and season ending events.
- NFDRS – National Fire Danger Rating System, a system that combines weather, climate, and fuels information to predict the relative fire danger and potential for wildland fires to occur on a daily basis.
- Fuel Moisture Monitoring – tracking both live and dead fuel moisture contents can provide valuable information related to fire behavior potential.
- Satellite Greenness Data – a tool useful for providing rapid visual reference to areas of high fire potential.

WFDSS - FSPro – Fire Spread Probability Model

What is FSPro?

- WFDSS-FSPro is a spatial model that calculates and maps the probability of fire spread, in the absence of suppression, from a current fire perimeter or ignition point for a specified time period.

What Does FSPro Do?

- WFDSS-FSPro combines data layers including, the standard fuel models (13 or 40), current weather projections, historical weather scenarios, fuel moisture classifications, and wind speed and direction.

- FSPro can project probabilities of fire spread in specified increments, 7, 10, 14, 30, 90 days.
- It is not a fire perimeter like a FARSITE map.

How Does FSPro Help Decisionmaking?

- The model helps to assess a fire's growth potential by visually indicating the highest probability for spatial spread.
- Managers can develop appropriate strategies and tactics to meet objectives consistent with resource allocations.
- The model identifies probabilities of fire spread which potentially will provide managers a sound basis for prioritizing firefighting resources.
- It can also aid in communications with affected partners, the media, and the public.

WFDSS-RAVAR – Rapid Assessment of Values at Risk

What is RAVAR?

- WFDSS-RAVAR is a spatial model that shows the primary resource values to be protected and/or at risk from ongoing large fire events.

What Does RAVAR Do?

- RAVAR can be directly integrated with the WFDSS-FSPro model to identify the likelihood of different resources being threatened.
- The most important data layer generated by the WFDSS-RAVAR model is the structure layer using local parcel records, but WFDSS-RAVAR is not limited to the assessment of threatened structures.
- Any resource value that has been spatially mapped may be included within a WFDSS-RAVAR assessment including power lines, road networks, gas pipelines, recreation facilities, sensitive wildlife habitat, cultural heritage sites and municipal water intakes.

How Does RAVAR Help Decisionmaking?

- WFDSS-RAVAR identifies values to be protected segmented by risk categories from WFDSS-FSPro for managers and provides a sound foundation for the prioritization of firefighting resources.

When Should FSPro and RAVAR be Used?

- Wildfires having a WFSA that projects or are anticipated to reach $10 million or more will require a WFDSS-FSPro and WFDSS-RAVAR assessment.
- WFSAs projecting costs between $5 and $10 million will benefit from WFDSS-FSPro and WFDSS-RAVAR assessments, but are not required to have them; this will be left up to the discretion of the local unit and the regional office.

How are FSPro and RAVAR Outputs Acquired?

- Local units will place requests for WFDSS-FSPro and WFDSS-RAVAR through their regional office contact.
- The regional office contact will prioritize requests and send to NIFC.
- NIFC will assign WFDSS-FSPro/RAVAR runs to one of four groups who will complete the actual runs.
- Coordination for additional information or clarification will be between the local unit and the modeling staff. Communication links will initially be established through the WFDSS Web page - http://wfdss.nwcg.gov/. Regional office representatives for WFDSS coordination will need to set up an account via the introductory Web site.
- Requests for additional modeling will generally follow the same procedure noted above.

Table 1. Data and Informational requirements for FSPro and RAVAR simulations.

	Type	File Extension	Source	Supplier
FSPro Critical	Landscape File	.LCP	LANDFIRE or FARSITE/Flam Map	Host Unit/Cache
	Fire Shape	.shp	GPS Perimeter or Ignition coordinates	Host Unit/IMT
	Weather ERC /Wind	.fwx/.wnd	Fire Family Plus Processed	Host Unit/IMT
	Daily Burn Period	n/a	By Fuel Model: Derived from observed duration and/or local knowledge	Host Unit/IMT
	Duration	n/a	Desired duration of run in days(14-21 suggested)	Host Unit/IMT
	Barriers	.shp	Spatial barrier information relevant to fire perimeter	Host Unit/IMT
Additional	Ignition Operations	.shp	Spatial Information relative to firing operations	Host Unit/IMT
	Controlled Line	.shp	Spatial Information relative to controlled fire line/Division breaks	Host Unit/IMT
	Fire History	.shp	Spatial Information relative to historical fire	Host Unit
RAVAR	FSPro Simulation	n/a	Completed FSPro simulation	n/a
	Regional Significant	.shp	Previously identified and cached by each region	RAVAR Consultant
	Locally Important Threatened Resources	.shp	Spatial Information relative to locally important resources	Host Unit/IMT

What Information is Needed to Complete FSPro and RAVAR Analyses?

- Table 1 contains the required and additional files that are needed to run FSPro and RAVAR. Also included in table 1 are possible sources and suppliers to obtain these files. All required files should be housed on an agreed upon ftp site for access by multiple users.

In order to secure the information in table 1, the WFDSS support team will need to establish communications to help ensure delivery of the requested products. Maintaining these contacts throughout the duration of the incident will support initial simulations, validation of the simulations, and additional simulations.

SCI – Stratified Cost Index

What is SCI?

- The Stratified Cost Index (SCI) has been developed as an interim performance measure for suppression expenditures. The SCI assesses a variety of factors that influence suppression expenditures. Built using data on nearly 2,000 large Forest Service wildland fires occurring over the past 10 years, regression equations are used to calculate expected suppression costs of a large fire (>= 300 acres) given its characteristics. The expected cost is then compared to estimated and actual suppression expenditures.

What Does SCI Do?

- Through an analysis of historic fire cost data by geographic area and fuel type, SCI provides a quantifiable comparison of current expenditures with historic ranges.

How Does SCI Help Decisionmaking?

- The calculated suppression cost range from historic fires can be compared to current cost estimates and provide managers information to evaluate the appropriateness of planned tactics, resource allocation, and resource mix.

When Should SCI be Used?

- For all fires that are expected to exceed $5,000,000, an SCI analysis will be completed. The local unit will contact the regional office who will assign a regional contact person to work with the unit and the SCI developers in Missoula, MT.

How are SCI Outputs Acquired?

- The SCI analysis will be able to be accessed and completed though the WFDSS Web site by local units.
- Availability to access the SCI process through the WFDSS Web site is planned for June 15th. After this time, individual local units can access and obtain the analysis.
- A request will be made through the Wildland Fire Decision Support System (WFDSS) Web page at http://wfdss.nwcg.gov. A request can be made by any FS person with a valid user profile (user creates) at the WFDSS site.
- The request will be forwarded by the system to a regional representative.
- The regional representative will provide the inputs that will be required to access and complete an SCI calculation for the 2007 western fire season.
- The regional representative will post the completed SCI analysis on the WFDSS Web page by incident name and data.

What Information is Needed to Complete an SCI Analysis?

- Local units need to provide estimated area burned (acres), aspect, fuel type(s), NFDRS fuel model(s), latitude and longitude of fire origin, fire intensity level, slope, energy release component, region, identification of nearest weather station, location in terms of wilderness, roadless area, or other special designation, and distance to boundary of any special designated area. A sample input spreadsheet is shown in appendix A.

Regional Forester's Representative

What is an RFR?

- The Regional Forester's Representative (RFR) is an individual identified by the Regional Forester who will provide an additional review of incident processes and identify any areas where management efficiencies can be improved.

Who Will the RFR Be?

- The Regional Forester will establish the RFR; qualifications for the RFR will vary depending upon the fire situation, potential duration, and planning needs.
- The Regional Forester will analyze the situation with the director of Fire and Aviation Management and determine the appropriate background level necessary for the RFR.
- Depending on this analysis, RFRs may be filled by forest supervisors, Deputy Regional Foresters, regional Fire and Aviation Management staff, or highly experienced subject matter experts.

- The specific individual will likely not be from the region where the fire is occurring.
- Sharing of individuals among regions to fill the RFR position is recommended because:
    - Individuals from within the affected region could also have fires on their home units and may be reluctant or unable to leave their home unit.
    - Individuals from within the affected region could serve on an adjacent unit and have an interest or involvement in the specific fire.
    - Individuals from within the affected region could supervise IMT personnel on their home unit which could compromise or limit their objectivity.
    - Multiple RFR requirements in a single region could severely impact line officer capability.
    - Utilization of individuals from regions with complementary or sequential fire seasons will provide greater opportunities for experience, different perspectives, and greater objectivity.

When Should the RFR be Used?

- The RFR will be established for wildland fires where a WFSA estimates total fire suppression expenditures will exceed $5,000,000.
- The RFR will be established after the local agency administrator informs the Regional Forester and his/her staff that costs for a wildland fire incident are expected to exceed $5,000,000 and/or the fire will attain national significance in terms of attention, scrutiny, resource needs, and consequences.

What Does the RFR Do?

- The RFR will work directly for the Regional Forester and work closely with the local agency administrator and staff to review the incident planning process, applicable documentation, current and predicted fire situation, and offer any advice and counsel in areas that could assist the local unit in improving management efficiency.
- Once an individual has been designated as the RFR, the Regional Forester will provide that individual with a letter of expectations. This letter will clearly state the expectations of the Regional Forester, roles of the RFR, communication processes and frequency with the RO, and products required from the RFR.
- Roles and responsibilities of the RFR include, but are not limited to:
    - Provide regional and national perspective to the local line officer concerning the fire and others that may develop within the region during this time.
    - Review incident planning documents with the local agency administrator.
    - Utilize a Regional Decision Support Group (DSG) on the incident to gather additional decision support information.
    - Review the delegation of authority from the agency administrator to the IMT with focus on the stated objectives, operational constraints, special concerns, public information, and cost management.
    - Provide an outside review of the WFSA and offer recommendations as appropriate regarding:
        - selected suppression strategy and tactics and consistency with values at risk, resource availability, and probability of success;

- projected suppression costs; and
- resource allocation issues.

o Review incident management activities which would include both the Incident Management Team (IMT) and agency administrator functions.

o Review inter-forest aspects of incident management, such as communication, coordination, etc., if applicable.

o Review decision support group products and promote proper inclusion of data in the decisionmaking process if appropriate.

o Maintain close communications with the regional office and provide the regional office a daily progress report.

How Does the RFR Help Decisionmaking?

- The RFR will be supported by a Decision Support Group. This group will be established by the regional office from a pre-identified cadre of specialists and will work directly for the RFR. The group configuration will vary depending upon the fire situation, etc., and individuals can be drawn from within the affected region and from other regions. Utilizing individuals from outside the region is recommended to provide greater opportunities for experience.
- The RFR and DSG will work with the local agency administrator, his/her staff, and incident management team(s) to evaluate the incident planning and implementation processes. They will provide the local unit greater opportunity to evaluate decision support information, gain a better perspective on regional and national situations, and inform the agency administrator and Regional Forester of any areas where they feel that management efficiency can be improved. They may validate current strategies, tactics, and resource allocations by confirming that current management activities are being implemented efficiently.

Decision Support Group (in support of RFR)

What is the DSG?

- The DSG is a group of individuals who will provide primary support to the RFR, work directly for the RFR, and provide assistance to the local unit and to external groups supporting decisionmaking for the incident(s). The DSG will gather and complete input requirements for decision support tools, work with the local unit to field verify model outputs, as needed, and assist the RFR in documenting decision support information and processes used during the assignment.

When Should a DSG be Used?

- The Decision Support Group (DSG) will be established whenever there is a Regional Forester's Representative in place. The DSG could be convened to provide support to a local unit and/or IMT in the absence of an established RFR if decision support is needed.

What Does the DSG Do?

- Provides RFR and local agency administrator with decision support products including, but not limited to:
  - o Long range predictive services forecasting,
  - o Stratified cost index (SCI) analysis,
  - o Fire spread probabilities (FS PRO),
  - o Rapid Assessment values at Risk (RAVAR), and
  - o WFSA/WFIP planning review.

- Recommended basic skills needed include, but will vary from assignment to assignment depending upon the specific situation:
    - Fire operations background
    - Fire use management background
    - Planning/documentation background
    - Fire Behavior Analyst/Long-Term Fire Behavior Analyst, Meteorologist
    - FS PRO, RAVAR, analyst(s) (suggested composition of this skill area of the DSG may occur in two formats depending upon the situation:
        - FSPRO analyst and FARSITE technician, or
        - FSPRO analyst and incident/host unit FARSITE technician.
- The DSG may work remotely or at the incident; however, if at the incident the DSG will need logistical support.

Chief's Principle Representative (CPR)

What is the CPR?

- The CPR is an individual appointed by the interdeputy fire group, who will report to the chair of the interdeputy group.
- The CPR will provide risk sharing and decision support for Regional Foresters on large fires expected to exceed $10,000,000 in costs.
- The Chief's Principal Representative will bring a national perspective when conferring with Regional Foresters.

When Should the CPR be Used?

- In the infrequent situations where incidents reach national significance or when requested by a Regional Forester, a Chief's Principal Representative (CPR) will be assigned and available to assist agency administrators in reaching incident management decisions that will achieve safe, effective and efficient operations, commensurate with local protection objectives and national priorities. The CPR will also help the agency administrator assure that appropriate management and fiscal controls are in place and functioning.

What Does the CPR Do?

- The agency administrator will continue to carry incident decision authority associated with his/her position. The CPR is responsible for:
    - Representing the Chief of the FS in decisionmaking for incidents of national significance with expenditures expected to exceed $10 million.
    - Providing assistance and advice to the Regional Forester relative to national policies, budgetary objectives, and incident management priorities.
    - Sharing risk associated with incident decisions.
- The CPR will:
    - Provide advice to the Regional Forester relative to line officer certification and incident management performance.
    - Review selected suppression strategy and tactics to ensure they are in line with values at risk, resource availability, provide a reasonable chance of success and are appropriate in terms of cost/benefit.

- Review decision support team products and ensure proper interpretation and use of data developed.
- Review scarce or critical resources deployed on the incident along with the availability of or needs for those resources nationally.
- Provide a national perspective relative to the risk-informed decision process and priority deployment of resources for consideration in future agency administrator decisions on the incident.
- Assist in the development of public information products to ensure that risk-informed decision logic and discussions of national priorities are incorporated.
- Document actions and decisions of the CPR and DSG.
- Assist the agency administrator in the evaluation of incident management, including fiscal controls.
- Evaluate incident management, including performance of the IMT and agency administrator/line officer.
- Assist the Regional Forester in development of a budget for the incident.
- Assist in ensuring that effective, positive communications occur across all levels of the organization.
- In some cases, CPRs will be sent to the incident to work directly with the agency administrator and Regional Forester. In other cases, the CPR may work remotely with the agency administrator and Regional Forester through telecommunication means. The CPR will establish a National Decision Support Group to provide support not already available on the incident.

Decision Support Group (in support of CPR)

What is the National DSG?

- The national DSG is a group of individuals who will provide primary support to the CPFR, work directly for the CPR, and provide assistance to the local unit and to external groups supporting decisionmaking for the incident(s).
- The DSG will gather and complete input requirements for decision support tools, work with the local unit to field verify model outputs, as needed, and assist the CPR in documenting decision support information and processes used during the assignment.
- If a Regional DSG has been formed, the national DSG will integrate with this group to provide national perspective for incident management.

Development of WFSA and Implementation Plan(s)

The second stage of the decisionmaking process involves development of the WFSA and Implementation Plan(s), as needed. If fires occur in an area (FMU) designated as a suppression unit, suppression of all fires has been preselected as the desired strategy. Appropriate actions will be taken to accomplish the suppression objectives. Decisions for the initial response to a wildfire should have the goal of a decisive outcome to protect specific values in the fire environment. Initial actions in response to a wildfire should be as aggressive as necessary to accomplish the suppression objective while mitigating all concerns associated with firefighter and public safety. For all wildfires having an unsuccessful initial response, a Wildland Fire Situation Analysis (WFSA) will be initiated as the fire response moves into the extended attack phase.

If fires meet requirements for management to accomplish resource objectives, a Wildland Fire Implementation Plan (WFIP) will be prepared to document the decision and guide long-term implementation activities. If fires being managed for resource benefits are not meeting management objectives, the strategy can be re-assessed and shifted to a suppression strategy with preparation of a WFSA.

The same decision support tools and capabilities exist for this phase of the decisionmaking process. Decision support tools, RFR and DSG, and/or CPR and DSG capabilities can be utilized to support those activities conducted here, i.e., WFSA and Implementation Plan preparation. Products produced from this phase include: WFSA, WFIP, short-term tactical implementation plan, and other long-term strategic implementation plans.

Wildland Fire Implementation Plan (WFIP)

What is a WFIP?

- The WFIP is a comprehensive strategic implementation plan consisting of three distinct stages progressively developed for wildland fires managed for resource benefits.
- Depending on the specific stage developed (I, II, or III) the plan will identify objectives, fire location, cause, conditions of fuel continuity, current fire activity, predicted weather and fire behavior conditions, risk assessment results, threats, mitigation actions, and definition of maximum manageable area, estimated costs, and guides long-term management of wildland fires managed for resource benefits.

What is a WFIP Used For?

- The WFIP contains both a long-term risk assessment and detailed description of the tactical implementation of the identified strategic objectives.
- This plan also has applicability for other long duration wildland fires where long-term risk assessment and a long-term implementation plan are necessary.

How is a WFIP Prepared?

- Complete description of the WFIP and processes can be found in the “Wildland Fire Use: Implementation Procedures Reference Guide” at www.nifc.gov.

Wildland Fire Situation Analysis (WFSA)

What is a WSA?

- The WFSA is a process that allows managers to develop different management alternatives for wildland fires and compare these alternatives to determine which is the most effective in meeting management objectives, safety considerations, and fiscal goals. The WFSA process documents the alternative comparison, selection of the desired alternative, and allows for amendments or revisions to the original decision.

What is a WFSA Used For?

- The WFSA allows the comparison of different strategic alternatives and assesses how well these alternatives may meet the objectives. The purpose for completing a WFSA is to document the strategic alternative comparison process, document the selected alternative, and provide direction to Incident Management Teams (IMT) regarding the objectives, proposed tactics, estimated resource amounts and mixtures, cost projections, and priorities as defined by an agency administrator short-term applications. The WFSA can also serve as a tool to share the approved strategy related to the fire with the public and cooperators. However, the WFSA does not provide specific implementation direction for long duration fires.
- The WFSA is required when management activities on a wildland fire do not accomplish the desired objectives or when the fire is expected to exceed initial action capability; when a prescribed fire exceeds the approved prescription and cannot be brought back within the planned parameters; or when a wildland fire use event is no longer meeting objectives and a shift to a new strategy is warranted.

How is a WFSA Prepared?

- A WFSA can be prepared through an electronic process available at: http://www.wildlandfireamr.net/ or through the WFSA Plus electronic program, available at http://www.fs.fed.us/fire/wfsa/index.htm.

Short-term Implementation Plan

What is a Short-Term Implementation Plan?

- Short-term tactical implementation plans are prepared on a frequent basis, usually daily, to provide clear direction on short-term implementation actions, specific assignments, and specific concerns. These are formally named Incident Action Plans (IAP).

What is a Short-Term Implementation Plan Used For?

- This type of plan may used for the duration of an incident to document and guide control objectives, tactical assignments, resource assignments, safety concerns, aviation operations, or may be used to document strategies and guide tactics while strategies are re-evaluated and a long-term implementation plan is completed.

How is a Short-Term Implementation Plan Prepared?

- This plan is prepared consistent with the Incident Command System guidelines for preparation of an Incident Action Plan.

Long-Term Implementation Plan

A long-term implementation plan other than a WFIP will be completed when the fire is expected to be of long duration, as determined locally compared to historic fire durations. Often, long duration fires result in situations where values to be protected are low, resource availability is low, and regional and/or national fire activity is high. This plan is similar to the WFIP, but will be utilized on wildfires having a suppression objective. A WFSA will identify values to be protected, cost projections for the fire, and the spatial alternative for management of the fire.

To maintain flexibility, a suggested format for the long-term implementation plan should address the following items with the level of analysis being commensurate with the complexity of the event:

What is a Long-Term Implementation Plan?

- All wildfires that escape initial and extended action, and are forecasted to last more than 7 days (may vary by geographic area and historic fire durations), should have a long-term plan developed that

describes the values to be protected and at risk from the fire, how managers can best protect those values in a safe and cost-effective manner, and hold the fire area to the boundary of the selected alternative in the WFSA.

- The long-term plan does not replace, but complements a WFSA.
- The long-term plan should describe how the fire will be managed to accomplish certain, clear outcomes set by the agency administrator. The plan should consider the format for Stage III of the Wildland Fire Implementation Plan.

What is a Long-Term Implementation Plan Used For?

- The long-term plan will document a risk assessment and provide implementation actions necessary for management of a wildland fire to accomplish identified objectives over a potentially long duration.
- This plan provides a definition of the acceptable management limits of individual or multiple fires, or fire complexes consistent with the WFSA selected alternative. It considers long-term fire behavior predictions and risk assessments and supports decisionmaking. It identifies threats from the fire and addresses operational actions to mitigate or eliminate those threats.

How is a Long-Term Implementation Plan Prepared?

- The long-term plan is prepared by the local unit, or by the unit in combination with a management organization, and is comparable to the WFIP Stage III.
- A risk assessment will be also be prepared to accompany the long-term plan. The assessment should document and evaluate the values to be protected, hazards presented by the fire and in the fire environment, and associated with management actions, and the probability of success as well as the consequences of failure of the selected alternative. The 4-step risk assessment process (values, hazard, probability, and relative risk) in the "Wildland Fire Use Implementation Procedures Reference Guide" is appropriate for long-duration wildfire events and should be used for this risk analysis.
- Risk analyses should consider both current risk and deferred risk, understanding that an acre protected from fire today will burn eventually, at a time and under circumstances that will present different challenges and opportunities than at present.

When is a Long-Term Implementation Plan Needed?

- A long-term implementation plan other than a WFIP should be considered anytime a fire is expected to be of long duration, as determined locally compared to historic fire durations.
- The following chart (figure 7) provides a means to determine if a long-term implementation plan is needed for a particular fire.

Contents of the long-term implementation plan do not exactly follow the WFIP format and are listed in table 2.

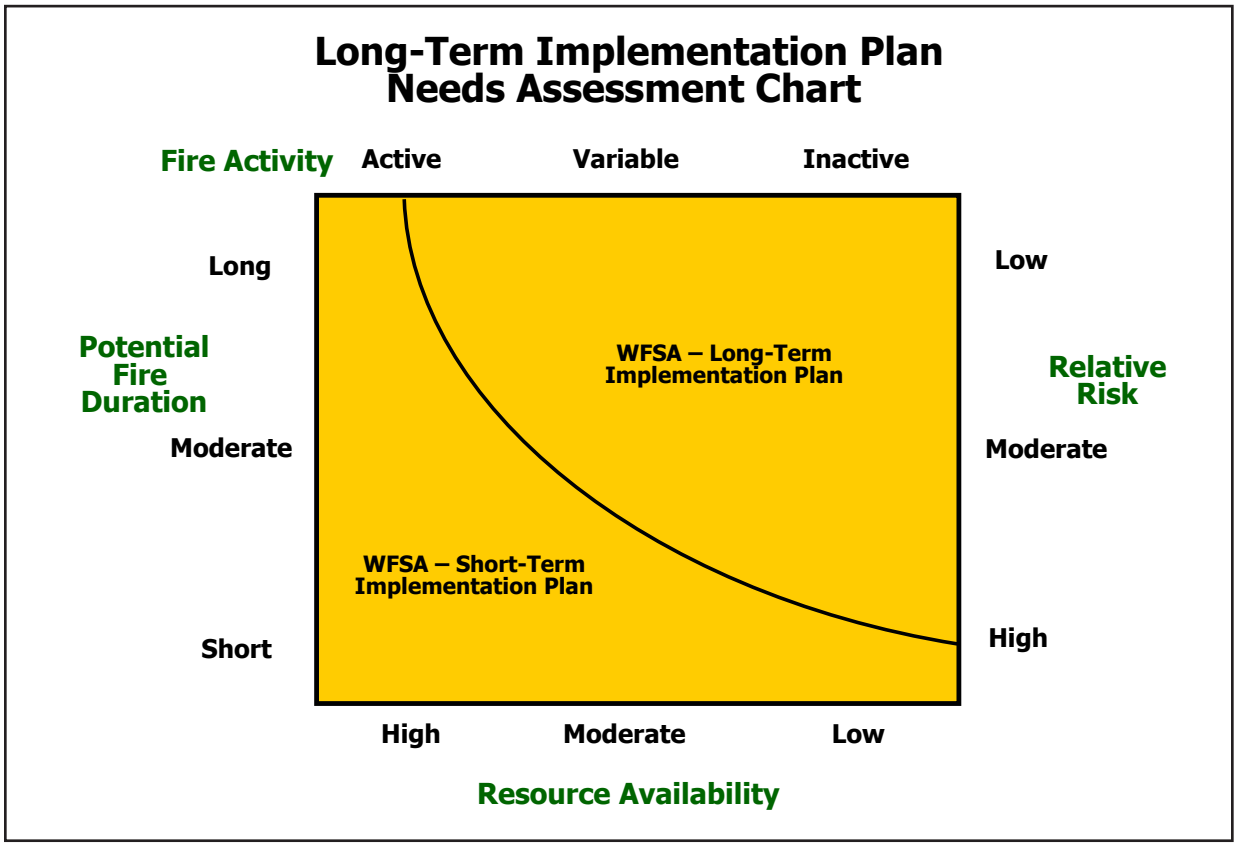

Figure 7. Long-term implementation plan needs assessment chart. (To determine the need for a long-term plan, connect the top and bottom elements and the left and right elements. Read the long-term plan needs at the intersection of the two lines).

Table 2. Long-term implementation plan contents.

Content Item	Explanation
Strategic Fire Size-Up	• Fire size-up information, current fire weather and fuel moisture conditions, local information, agency administrator input, and site-specific information from the Fire Management Plan (FMP).
Objectives	• Objectives represent site-specific statements of accomplishments for management of the particular fire and provide a link back to Fire Management Plans and Land Use Plans. • Objectives will be formulated from local unit input, agency administrator direction, Fire Management Plans, and Land and Resource Management Plans.

Validation of the selected WFSA alternative boundary and development of the Strategic Management Area with the boundary.	• The WFSA alternative boundary would be the starting point for the area within which the fire would be managed. Natural defensibility should be used in identifying the line within the selected alternative boundary. This line would be validated by operations personnel for feasibility and defensibility and adjusted if needed. In addition, fire simulation modeling could be used to help validate the line and probability of success of the strategy. If major changes are suggested, this would trigger a WFSA update/revision. This line would then serve as the planning reference for the risk assessment. • The WFSA alternative delineates the geographic limits of the fire area as defined by the capability of management actions to meet objectives and mitigate risk for a given wildland fire. This is an important tool in the long-term planning process and serves as a planning reference. It is based primarily on natural defensibility and facilitates identification of threats to a management boundary and threats to values within and adjacent to that boundary. It provides a planning basis for risk assessment analyses. It provides for closely directed fire management application in a specific area defined by resource objectives, fire and weather prescription elements, social concerns, political considerations, and management capability.
Weather Conditions and Drought Prognosis	• A discussion of current weather conditions and trends in comparison to historical records provides insight into the relative severity of the current situation, reinforces fire danger indicators, and supports decisionmaking. A review of the drought situation provides additional support to fire danger indicators and supports current and future decisions. This information is available from historical weather records, climatological reviews, research information, wildland fire assessment tools, and National Weather Service archives. Information presented here is valuable in further defining the hazard posed by the specific fire(s) being managed.
Long-Term Risk Assessment	This is one of the key items to be addressed in a long duration plan that is not typically done on a wildfire. • Risks and uncertainties relating to wildland fire management must be understood, analyzed, communicated, and managed as they relate to the cost of either doing or not doing an activity. It is important to make high quality and informed decisions. Decisionmaking is facilitated by factual information and prediction of outcomes or consequences of the decision. Of particular importance is the ability to assess the degree of risk presented by the particular wildland fire. • The qualitative process used in the WFIP Stage I and the Periodic Fire Assessment (Relative Risk Rating Chart) affords a quick and simple way to estimate fire risk. This process is based on assessing the values, hazard, and probability from a fire. In lieu of the quantitative long-term risk assessment, this qualitative assessment process provides the agency administrator with a quick and fairly comprehensive assessment of the “relative risk” of the fire.

	• No mandatory requirements exist for risk assessment. Units are encouraged to acquire input information and data and to utilize available long-term risk assessment techniques such as the Rare Event Risk Assessment Process (RERAP), Fire Area Simulator (FARSITE), fire effects indicators such as those gained from the Fire Order Fire Effects Model (FOFEM), smoke emissions models, FSPro, RAVAR, and SCI. Risk assessments will both utilize and affect information contained in the weather conditions and drought prognosis, threats, threats to public use and firefighter safety, and threats to smoke dispersion. Assessment outputs will have a direct bearing on information developed and included in the monitoring actions, mitigation actions, resources needed to manage the fire, and contingency actions sections. As the quality of risk assessment increases, the quality of subsequent decisions and probability of desirable outcomes will increase. Units should strive for the highest quality decisions possible.
Threats	• Identification of all known and anticipated threats is critical in evaluating values, hazard, and probability for the fire(s). The nature of long-term strategic planning involves anticipating and prediciting where the fire may move to, what it may impact, and designing a strategy to minimize or eliminate those impacts. Threats must be defined for the fire area planning boundary, all sensitive natural and cultural resources inside and immediately outside that boundary, firefighters and the public, air quality, and other concerns as appropriate.
Monitoring Actions	• A monitoring plan of action is necessary to ensure successful accomplishment of the objectives and to continually acquire information relevant to the fire situation. Monitoring is useful for documenting observed fire weather, observed fire behavior, fire movement toward management action points (MAP), fire effects, smoke dispersal and volume, and to aid in validating fire behavior and weather forecasts.
Mitigation Actions	• This is the section that provides a detailed plan that identifies mitigation actions, the activities for mitigating or eliminating risk. Risk can be mitigated or eliminated in three central ways: reduce the hazard, reduce the probability of the hazardous event occurring, and reduce the value of potential losses that could occur from the risk. • Mitigation actions are on-the-ground activities that serve to increase the defensibility of a particular point, area, or line, like a planning area boundary (to reduce the probability of the hazardous event occurring); to check, direct, or delay the spread of fire (reduce the hazard); and to minimize threats to life, property, and resources (reduce value of potential losses or impacts). • Mitigation actions serve to mitigate or eliminate identified threats and may include non-fire tasks (such as closures, evacuations, management actions to reduce impacts from smoke, etc.) and specific fire applications. • Management action points are tactical decision points, either geographical points on the ground both inside and outside the fire planning area or specific points in time where an escalation or alteration of management actions is warranted in response to fire activity, proximity to identified threats, time of season, weather changes, or management decisions. These points must be tied to identified threats in the plan. Each management action point will have one or more corresponding mitigation action described which will need implementation when the fire reaches it or after a specified time period. This documentation stays with the fire through its management and is amended periodically as new management action points and mitigation actions are developed.

Resources Needed to Manage the Fire	• Based on the monitoring and mitigation actions, the information plan, and management oversight and qualifications needed to accomplish the objectives, resources needed to implement the plan and accomplish the objectives must be identified in this section. Resources identified here include those needed for the projected duration of operations.
Resources Needed to Manage the Fire	• Based on the monitoring and mitigation actions, the information plan, and management oversight and qualifications needed to accomplish the objectives, resources needed to implement the plan and accomplish the objectives must be identified in this section. Resources identified here include those needed for the projected duration of operations.
Contingency Actions	• Contingency actions are actions necessary when mitigation actions are unsuccessful (impacts to values could occur). They are identified for implementation to control the spread of fire into unwanted areas or to prevent it from adversely impacting a sensitive value (reduce hazard and/or probability). • Contingency actions may also include preplanned coordinated actions with air regulatory agencies in the event that forecast or smoke management plans are not accurate.
Information Plan	• This element of the long-term plan provides documentation of the role of information during the wildland fire, the messages to be communicated, and operational procedures and processes to ensure that the information reaches all applicable audiences and supports local unit needs.
Estimated Costs of Long Term Implementation Actions	• Cost estimates are projections of expenditures expected to be incurred during implementation over the predicted duration of the fire. These estimates will include both costs expended to date and projections from the signed date into the future.
Signatures and Date	• The long-term implementation plan must be approved by the agency administrator or delegated individual upon completion. This approval is documented by signature and date.

Implementation

Following completion of the necessary planning documents, either short or long term, and development of the appropriate management response, implementation will take place. The appropriate management response will be implemented. Decision support will continue during the implementation phase as needed to evaluate the current decision and tactics, and provide input that may increase information which could support a new decision and revised tactics to maintain and/or improve efficiency. During implementation, information may become available that will affect the situation, evaluation, and strategic objective determination and the development of the WFSA and implementation plan sections. This information may pertain specifically to lack of success in accomplishing objectives and/or needs to shift strategies and tactics. If new information becomes available, the earlier in the process that decisions and actions can be modified or corrected, the greater the potential to affect ultimate suppression cost outcomes.

The implementation phase with inputs is shown in figure 8.

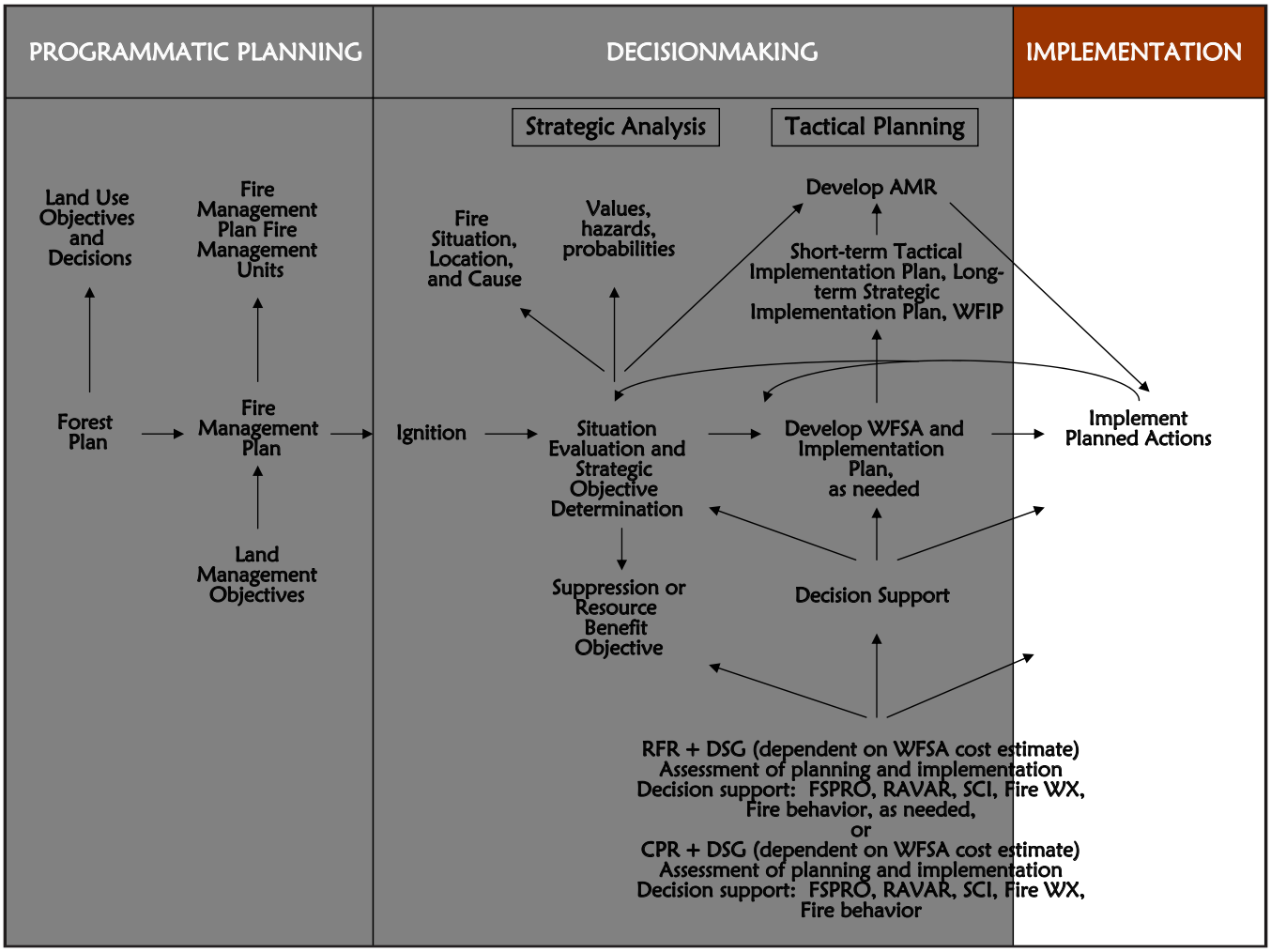

Figure 8. Wildland fire management implementation.

Appendix – Stratified Cost Index - Sample Input Spreadsheet

Fire Expenditure Prediction Model for Western U.S. (FS Regions 1-6)

Enter values for the following in the cells.

	Current	Alt. 1	Alt. 2	Alt. 3	Alt. 4
Estimated Area burned (acres)					

Aspect (please select from aspect descriptions provided) ☐

Aspect Description
Flat: North: Northeast: East: Southeast: South: Southwest: West: Northwest: Ridgetop

Predominant fuel type (Ignition Point)

NFDRS Fuel Models	❑ **A, L, S, C, T or N (Grass)** ❑ **F or Q (Brush)** ❑ **B or O (Brush 4)** ❑ **H, R, E, P, U, or G (Timber)** ❑ **K, J, or I (Slash)**

Latitude of fire origin (Decimal-Degree) ☐
Longitude of fire origin (Decimal-Degree) ☐

Fire intensity level (1-6) ☐

Slope (percent) ☐

Energy release component ☐ ID of nearest weather station ☐

Region (1-6) ☐

☐ In a wilderness area Distance to boundary ☐

☐ In a roadless area Distance to boundary ☐

☐ In other special designated area Distance to boundary ☐