4. Wildland Fire Situation Analysis

A format, procedures, and aides
for completing a WFSA.

4. Wildland Fire Situation Analysis

I. Wildland Fire Situation Analysis

Few decisions agency administrators make obligate more money, commit more people to hazardous duty, have longer term impacts on natural resources, or determine the scope of future management decisions than the selection of a large fire suppression strategy.

This guide is to assist you and your staff in preparation of the wildland fire situation analysis (WFSA), providing sufficient analysis to make safe and sound decisions.

A. Purpose

The wildland fire situation analysis (WFSA) is a decision-making process through which the agency administrator describes the fire situation, establishes objectives and constraints for managing the fire, compares various strategies for fire management alternatives, evaluates the expected effects of those alternatives against important local, regional, or national criteria, selects the preferred alternative, and documents the decision made.

The WFSA is essential when fire characteristics exceed local suppression and management capability. This applies to wildland fires declared wildland fires from the start, to wildland fires initially managed for resource objectives, and to prescribed fires which have burned beyond their prescription.

The WFSA will document the appropriate suppression action and cost decision making process for the incident which is expected to, or has exceeded, the actions prescribed in the forest fire management plan.

The responsible agency administrator will promptly implement this direction and the appropriate management response which is indicated by the WFSA.

B. Policy

A WFSA will be prepared by the responsible agency administrator for all wildland fires which exceed the conditions and objectives established by the appropriate management response. This direction applies to fires initially declared unwanted wildland fires, as well as to wildland fires initially managed for resource benefits or prescribed fires which have burned beyond the limits established in approved plans, and have been declared unwanted wildland fires, and that cannot be controlled by initial suppression actions.

On lands under the agency administrator's jurisdiction, but protected by another agency, the protection agency is required to prepare and is responsible for a WFSA for all escaped, unwanted wildland fires. In such cases, as the agency with jurisdiction, the agency administrator must be included in development of the WFSA to ensure all land and fire management objectives are recognized and will be met by the selected alternative.

The WFSA must be completed and approved by the agency administrator prior to significant expenditure of fire suppression funds, including mobilization of forces from outside the local area or ordering an Incident Management Team.

C. Requirements of the WFSA

The WFSA requires:

1. Identification of Evaluation Criteria

Criteria will reflect the priority for firefighter and public safety as well as land and resource management objectives and constraints, potential resource damage, and suppression costs. Local, regional, and national fire suppression activities and resource capabilities shall be considered.

2. Development of Suppression Alternatives

Develop alternatives that represent a reasonable range of strategies for the situation, commensurate to land management plan and fire management plan direction.

Each alternative must:

a. be developed with a focus on firefighter and public safety.

b. be economically viable.

c. include a strategic plan of control for the incident.

d. have an estimate of the suppression forces required to achieve the objective.

e. assess the probability of success and consequences of failure to meet the objective.

f. estimate the times of containment and control, acreage burned, suppression costs, and resource damage.

g. be responsive to environmental issues and direction provided by the land management plan, including given constraints.

h. be responsive to pertinent social and political issues.

In this process, be prepared to discuss why other alternatives were not considered in order to give strength to your rationale for those that were considered.

3. Analysis of Suppression Alternatives

Use evaluation criteria to analyze each alternative. Be certain that estimates of expected suppression actions are consistent with resource objectives and values to be protected. Identify the alternative that provides for firefighter and public safety, minimizes the sum of suppression costs plus resource damages, and has an acceptable probability of success.

4. Approval and Notification

The agency administrator will select the most appropriate WFSA alternative and approve all revisions to the original and subsequent WFSA. Inform the public and cooperators of the selected alternative as appropriate.

5. Monitoring and Evaluation

The agency administrator must ensure validation of the selected WFSA alternative daily. Base validation on the current and predicted situation, including success at meeting objectives, weather and fire behavior observations and forecasts, and other local, regional, or national activity affecting availability of suppression forces.

6. Documentation

Document the analysis, including any revisions and maintain as part of the permanent fire record. A map showing the predicted fire area for each alternative will be prepared.

7. Decision Tree Analysis

Decision tree analysis provides a useful way for displaying and comparing alternatives against their respective probability of success or failure. A decision tree analysis will be prepared for each alternative in the WFSA and attached to the WFSA document.

D. Factors to Consider in the WFSA Process

The WFSA strategy and direction it provides may be the single most important decision an agency administrator makes regarding a wildland fire. Poorly considered, developed, and monitored WFSAs with inappropriate or unrealistic direction have resulted in enormous commitments of fire suppression forces, money, and time against insurmountable odds presented by the wildland fire. Unnecessary exposure of firefighters to the hazards of the wildland fire environment is another frequent outcome of WFSA direction to implement strategies that simply will not be effective until other conditions change.

The WFSA process is designed to bring out creative thinking focused on a unique situation. No two large fires are identical and no school solution will apply perfectly to any fire. The agency administrator should consider the momentum initiated by the WFSA, the commitment of fire suppression forces, money, and the effect on land and resource values that result from their decision, and the inertia that commitment to a weak or ineffective WFSA usually produces before a more appropriate strategy is adopted.

Factors which contribute to a ***STRONG*** WFSA include:

- Firefighter and public safety is recognized throughout the process;
- Realistic assessment of fire suppression resources availability and capability is used;
- Realistic timeframes are used;
- Realistic costs and resource values are used;
- Environmental resource issues are appropriately identified and considered;
- Social and political issues are recognized and addressed; and
- Constraints are identified and their impacts are considered and clearly understood.

Factors which contribute to a ***WEAK*** WFSA include:

- Planning for and calculating effectiveness of suppression forces that are not available, or underestimating the number or kind of forces required to achieve the objectives set forth by the planned strategy.

  Hint - Know what else is going on and the priority of the incident you are responsible for. Can you get what your analysis says you will need to meet the objectives for the incident and reasonably ensure the probability of success? Does the success of your strategy depend on the availability of suppression forces that are questionable or unlikely?

- Unrealistic time estimates to put suppression forces on the fire.

  Hint - Consider where the fire will be when the forces you intend to deploy are actually engaged and becoming effective?

- Poor estimates of fire spread and perimeter increase over time.

Hint - Are your fire behavior predictions reasonable, and do you have a reliable weather forecast; did you develop good maps for your alternatives to show what the fire is capable of doing?

- Overestimating the effectiveness of suppression forces that are available.

  Hint - Are those forces going to have to run to stay even? Are you considering weather, fuels, and topography factors which influence fire behavior and may result in constraints to tactics and logistics?

- Underestimating the time it will take to achieve the objectives of the planned strategy.

  Hint - Will your strategy really work, or are you going to watch the pages of the calendar turn until something beyond your control occurs?

The Fireline Handbook, Appendix A and B, provides good guidelines for estimating fire size and production rates for and recommended numbers of suppression forces. The Southwestern Coordination Center can provide good information on the availability of suppression forces, regional and national activity competing for resources, and their arrival at incident timelines.

E. Cost Estimation for Large Fire Suppression Planning

1. Large Fire Suppression Costs

The cost of suppressing large wildland fires has, over the last decade, been accelerating to levels which are unprecedented, even considering inflation. Too many variables have influenced this trend to detail those in this guide. However, the agency administrator should be aware of the significance placed on large fire cost management and the potential scrutiny which a large wildland fire will be reviewed for effective cost management, beginning with the WFSA.

Cost management should be considered as prudent selection of strategies and application of tactics to achieve bonafide objectives that are effective and efficient. Cost management does not include accepting shortcuts which compromise firefighter or public safety or accomplishment of valid objectives.

The following displays typical percentages, by category, of large fire costs.

Crews	15% - 30%
Overhead	15% - 20%
Aircraft	15% - 25%
Incident Support	15% - 20%
Equipment	10% - 20%
Supplies	5% - 10%

(Costs will vary within these ranges depending on strategy and tactics, and crew and other resource types available and used.)

2. Resource Value

An integral component of the decision-making process during the WFSA is realizing the impacts of various suppression alternatives on the resource values threatened. Understanding the potential value of resources that may be lost or damaged by either the fire itself or the suppression tactics will contribute to making a stronger decision. Often, resource value information is not available in a timely fashion to consider during the WFSA process. A good source for this information is the data that was used for

NFMAS/FIREPRO/FIREBASE planning. Contact your fire management officer to get this information and have it on hand as part of this guide prior to a situation occurring on your unit.

3. Cost Planning Guidelines

The following two guides are provided to help develop planning values for large fire suppression costs.

The **"Cost Estimation Guide for Large Fire Suppression Planning"** provides average costs (hourly, daily, or by load) for each of the principal fire suppression resource types and is based on the Incident Standard Rate Estimates from the Fire Business Management Handbook. Cost information can also be obtained via the Internet at www.fs.fed.us/r3/fire/welcome.htm under Fire Management, Finance. Local resource cost information should be used if known.

The "**Cost Worksheet for WFSA Preparation"** should be used to calculate the cost for each alternative considered in the wildland fire situation analysis. This process will provide a relative comparison of suppression costs for each alternative.

F. Planning for the Automated WFSA

Each administrative unit should download the program files (see section G) to a local PC. WFSA Plus is divided into four parts. These parts are the WFSA Prep, Wildland Fire Implementation Plan (WFIP), Basic WFSA, and WFSA. The WFIP is to be used for management of a natural ignition when a fire management plan is in place and it is appropriate to manage the fire for resource benefits. A WFSA Prep file is typically developed for each administrative unit. A WSFA Prep file stores values for computing suppression costs and impacts on resource values. Setting up these files in advance will save precious time when a fire is burning and chaos is mounting.

G. Wildland Fire Situation Analysis Format

The following interagency format may be used to complete the wildland fire situation analysis.

The WFSA (WFSA Plus4.2) is also available and may be downloaded from the Internet to any local unit in a PC software version. To download go to www.fs.fed.us/r3/fire/welcome.htm and select: Fire Management - Software – Wildland Fire Situation Analysis.

Annual, or as appropriate, updates to the WFSA program and procedures will be provided with necessary direction.

WILDLAND FIRE SITUATION ANALYSIS

U.S. DEPARTMENT OF THE INTERIOR

Bureau of Land Management
National Park Service
Bureau of Indian Affairs
Fish and Wildlife Service

U.S. DEPARTMENT OF AGRICULTURE

Forest Service

Incident Name: _____

Jurisdiction(s): _____

Date and Time Completed: _____

5100.fire.mgmt/5130.suppression/5130-2.wfsa/wfsa.format

I. WFSA Information Page (directions and guidelines)

I.A. Jurisdiction(s): Assign the agency or agencies that have or could have fire protection responsibility for the area involved by the fire (e.g. USFWS, USFS, etc.).

I.B. Geographic Area: Assign the recognized Geographic Coordination Area the fire is located in (e.g. Northwest, Northern Rockies, etc.).

I.C. Unit(s): Designate the local administrative unit(s) the fire is located on (e.g. Hart Mtn. National Wildlife Refuge, Flathead Indian Reservation, etc.).

I.D. WFSA No.: Identify the number assigned to the most recent WFSA for this fire.

I.E. Fire Name: Identify the unique name assigned to this fire.

I.F. Incident No.: Identify the incident number assigned to this fire.

I.G. Accounting Code: Identify the local unit's accounting management code assigned to this fire.

I.H. Date/Time Prepared: Identify for this WFSA.

I.I Attachments: Check here to designate items used to complete the WFSA package. "Other" can include data or models used in the development of the WFSA; briefly describe any used.

WILDLAND FIRE SITUATION ANALYSIS

I. Incident Identification (to be completed by Agency Administrator(s))

A. Jurisdiction(s)	B. Geographic Area
C. Unit(s)	D. WFSA No.
E. Fire Name	F. Incident No.

G. Accounting Code
H. Date and Time Prepared

I. Attachments

1. Complexity Matrix/Analysis * [ ]
2. Risk Assessment/Analysis * [ ]
   Probability of Success * [ ]
   Consequences of Failure * [ ]
3. Maps of alternatives * [ ]
4. Decision Tree Analysis ** [ ]
5. Fire Behavior Projections * [ ]
6. Calculations of Resource Requirements * [ ]

- Other (specify)

_____ [ ]

_____ [ ]

* Required by all agencies
** Required by USFS

II. Objectives and Constraints (directions and guidelines)

A. Objectives: Specify objectives which *must* be considered in the development of alternatives. Safety objectives for firefighter, aviation, and the public *must* receive the highest priority. Suppression objectives *must* relate to resource management objectives in the unit's approved resource management plan.

Economic objectives could include closure of all or portions of an area, thus impacting the public, or impacts to transportation, communication, and resource values.

Environmental objectives could include management objectives for airshed, water quality, wildlife, etc.

Social objectives could include any local attitudes toward fire or smoke that might affect decisions on the fire.

Other objectives might include legal or administrative constraints which would have to be considered in the analysis of the fire situation, such as the need to keep the fire off other lands, etc.

B. Constraints: List constraints on wildland fire action. These could include constraints to designated wilderness, wilderness study areas, environmentally or culturally sensitive areas, irreparable damage to resources or smoke management and air quality concerns. Economic constraints such as public and agency cost could be considered here.

II. Objectives and Constraints (to be completed by Agency Administrator(s))

A. Objectives (Must be specific and measurable)

1. *Safety*
   - Public

   - Firefighter

2. *Economic*

3. *Environmental*

4. *Social*

5. *Other*

B. Constraints

III. Alternatives (Directions and Guidelines)

A. Wildland Fire Management Strategy: Briefly describe the general wildland fire strategies for each alternative. Alternatives must meet resource management plan objectives.

B. Narrative: Briefly describe each alternative with geographic names, locations, etc. that would be used when implementing a wildland fire strategy. For example, contain within a specific named watershed within the first burning period.

C. Resources Needed: Resources described must be reasonable to accomplish the tasks described in the narrative in Section III. B. It is critical to look at the reality of the availability of these needed resources.

D. Final Fire Size: Estimated final fire size for each alternative at time of containment.

E. Estimated Contain/Control Date: Estimates of each alternative shall be made based on predicted weather, fire behavior, resource availability, and the effects of suppression efforts.

F. Cost: Estimate all incident costs for each alternative. Consider mop-up, rehabilitation, and other costs as necessary.

G. Risk Assessment: Probability of Success/Consequences of Failure: Describe the probability as a percentage and list associated consequences for success and failure. Develop this information from models, practical experience, or other acceptable means. Consequences described will include fire size, days to contain, days to control, costs, and other information such as closures and effects on critical habitat. Include fire behavior and long-term fire weather forecasts to derive this information.

H. Complexity: Assign the incident complexity rating calculated for each alternative; e.g. Type 1 or Type 2.

I. A map for each alternative should be prepared. The map shall be based on the Probability of Success/Consequences of Failure and include other relevant information.

III. Alternatives (to be completed by FMO / IC)			
	A	**B**	**C**
A. Wildland Fire Strategy			
B. Narrative			
C. Resources Needed handcrews engines dozers airtankers helicopters other			
D. Final Fire Size			
E. Estimated Contain/Control Dates			
F. Costs			
G. Risk Assessment Probability of Success Consequence of Failure			
H. Complexity Level			

I. Attach Map for Each Alternative			

IV. Evaluation of Alternatives (Directions and Guidelines)

A. **Evaluation Process**: Conduct an analysis for each element of each objective and each alternative. Objectives shall match those identified in Section II. A. Use the best estimates available and quantify whenever possible. Provide ratings for each alternative and corresponding objective element.

Fire effects may be negative, cause no change, or may be positive. Examples which may be used include:

- A system which employs a "-" for negative effects, an "0" for no change, and a "+" for positive effects; or
- A system which uses a numeric factor for the importance of the component being considered (soils, watershed, political, etc.) and assigns values (such as -1 to +1, or -100 to +100) to each consideration, then arrives at a weighted average; or
- If you have the information necessary to assign dollar amounts (estimates) for natural resource and cultural values, this level of data is preferred.

Use those methods which are most appropriate for the situation and agency. To be able to evaluate positive fire effects, the area must be included in the approved resource management plan, and there must be consistency with the objectives and prescriptions of the unit's fire management plan.

Sum of Economic Values: Calculate for each element in each alternative the net effect of the rating system used. This can include the balance of; pluses (+) and minuses (-), numerical ratings, or natural and cultural resource values expressed in dollars.

Again, resource benefits may be considered as part of the analysis process when the wildland fire is within a prescription consistent with approved fire management plans and in support of the unit's resource management plan.

IV. Evaluation of Alternatives (to be completed by Agency Administrator(s) and FMO/IC)

A. Evaluation Process	A	B	C
Safety firefighter aviation public			
*Sum of **Safety** Values*			
Economic forage improvements recreation timber water wilderness wildlife other (specify)			
*Sum of **Economic** Values*			
Environmental air visuals hazardous fuels TE&S species other (specify)			
*Sum of **Environmental** Values*			
Social employment public concern cultural other (specify)			
*Sum of **Social** Values*			
Other (specify)			
*Sum of **Other** Values*			
Comparison of all Evaluated Categories			

V. Analysis Summary (Directions and Guidelines)

A. **Compliance with Objectives**: Prepare narratives that summarize each alternative's effectiveness in meeting each objective. Alternatives that do not comply with objectives are not acceptable. Narrative could be based on effectiveness and efficiency. For example, "most effective and least efficient," "least effective and most efficient." Answers could be based on a two-tiered rating system such as "complies with objective" and "fully complies with or exceeds objective." Use a system that best fits the manager's need.

B. **Pertinent Data**: Data for this section has already been presented and is duplicated here to help the Agency Administrator(s) confirm their selection of an alternative. Final fire size is displayed on page 7, section III. D. Complexity is calculated in the attachments and displayed on page 7, section III. H. Costs are displayed on page 7, section III. F. Economic values have been calculated and displayed on page 9. Probability of success/consequences of Failure is calculated in the attachments and displayed on page 7, section III. G.

C. **External and Internal Influences**: Assign information and data occurring at the time the WFSA is signed. Identify the Preparedness Index/Level (1 through 5) for the National and Geographic Area levels. If available, indicate the Incident Priority assigned to this incident by the MAC Group. Designate the Resource Availability status. This information is available from the Geographic Coordination Center and needed to select a viable alternative. Designate "yes" indicating a current weather forecast has been provided to, and used by, the Agency Administrator(s) to evaluate each alternative. Assign information to the "Other" category as needed by the Agency Administrator(s).

VI. Decision (Directions and Guidelines)

Identify the alternative selected. Must have clear and concise rationale for the decision, and Agency Administrator(s) signature(s), with date and time signed included.

V. Analysis Summary (to be completed by Agency Administrator(s) and FMO / IC)

Alternatives	A	B	C
A. Compliance with Objectives Safety Economic Environmental Social Other			
B. Pertinent Data Final Fire Size Complexity Suppression Costs Resource Values Probability of Success Consequences of Failure			

C. External / Internal Influences

National & Geographic Area Preparedness Levels _____

Incident Priority _____

Resource Availability _____

Wx Forecast (long range) _____

Fire Behavior Projections _____

VI. Decision (to be completed by Agency Administrator(s))

The Selected Alternative is:

Rationale:

_____

Agency Administrator(s) Date and Time

VII. Daily Review (Directions and Guidelines)

The date, time, and signature of reviewing officials are reported in each column for *each day* of the incident. The status of preparedness level, incident priority, resource availability, weather forecast, fire behavior projections, and WFSA validity is completed for each day reviewed. Ratings for the preparedness level, incident priority, resource availability, and weather forecast are addressed on page 10, section V. C. Assign a "yes" under "WFSA Valid" to continue use of this WFSA, without revision. A "no" indicates this WFSA is no longer valid and must be revised, or a new WFSA must be prepared.

VIII. Final Review (Directions and Guidelines)

This section is completed by the Agency Administrator(s). A signature(s), date, and time are provided once all conditions of the WFSA have been met.

VII. Daily Review (to be completed by Agency Administrator(s) or designate(s))

Selected alternative to be reviewed daily to determine if still valid until objectives have been met

Date	Time	By	PREPAREDNESS LEVELS	INCIDENT PRIORITY	RESOURCE AVAILABILITY	WEATHER FORECAST	FIRE BEHAVIOR PROJECTIONS	WFSA VALID

*** * * If WFSA Is No Longer Valid, A New WFSA Will Be Completed ***

VIII. Final Review (to be completed by Agency Administrator(s))

The elements of the selected alternative were met on:

Date: _____ Time: _____

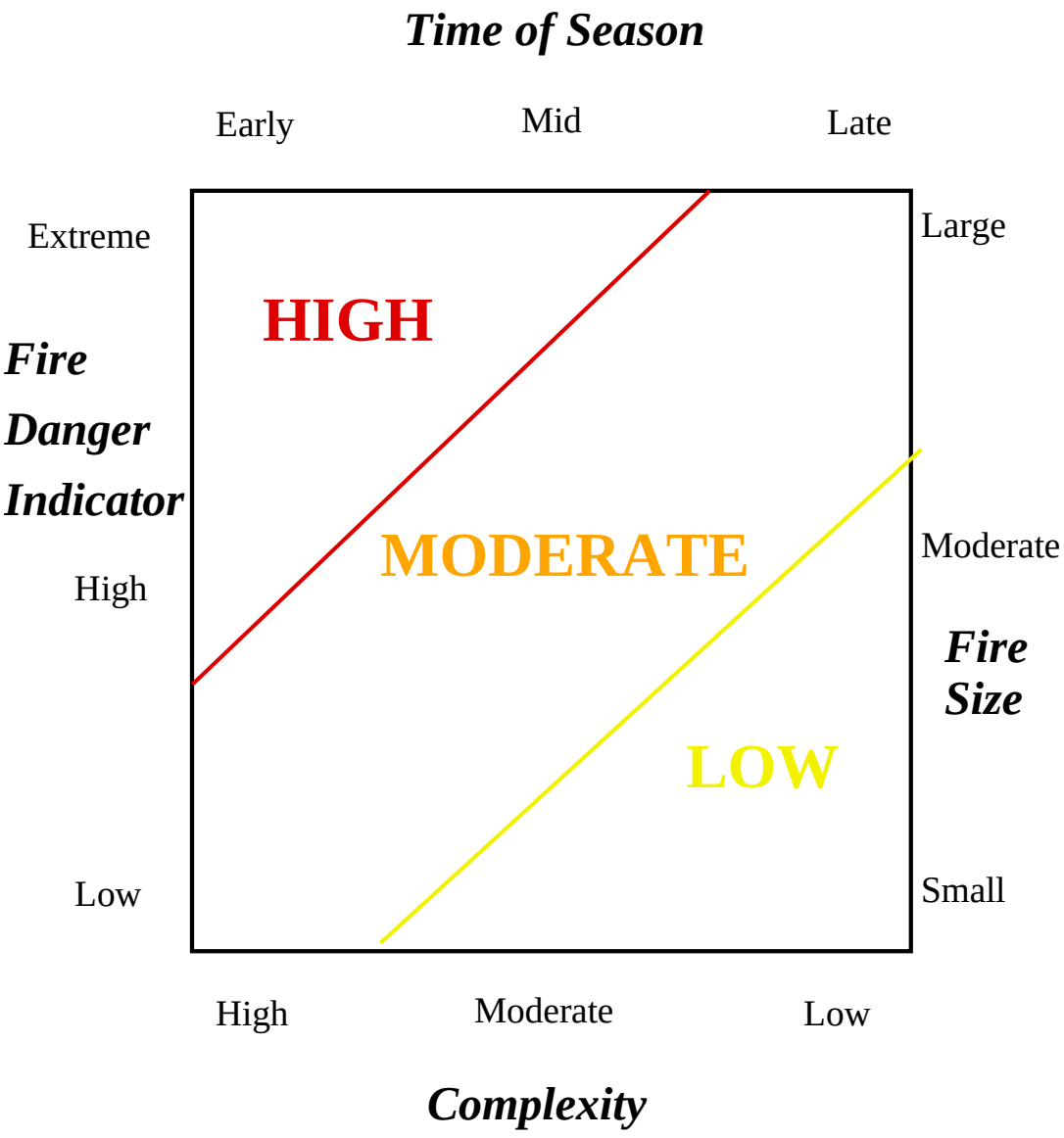
And final review made by:

Name(s):

_____
Agency Administrator(s)

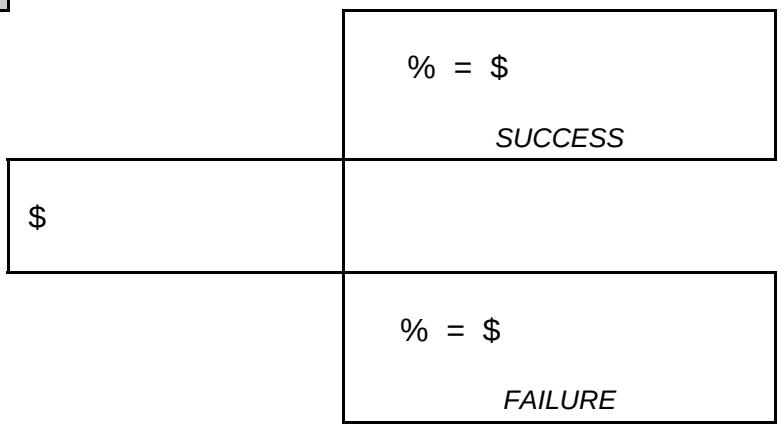
Remarks:

Wildland Fire Relative Risk Rating

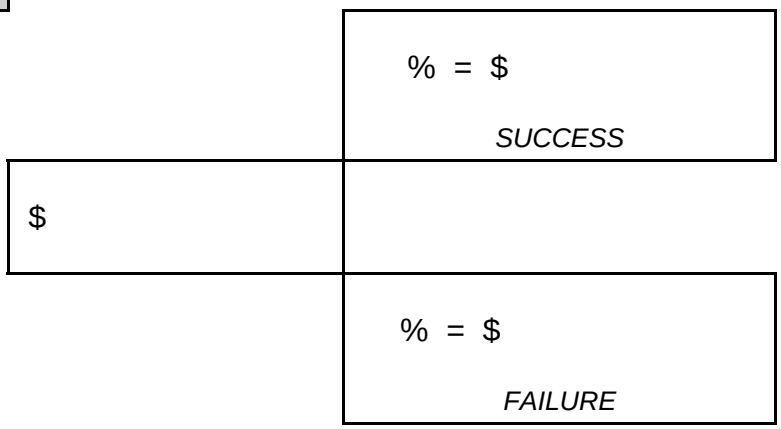


WFSA DECISION TREE ANALYSIS

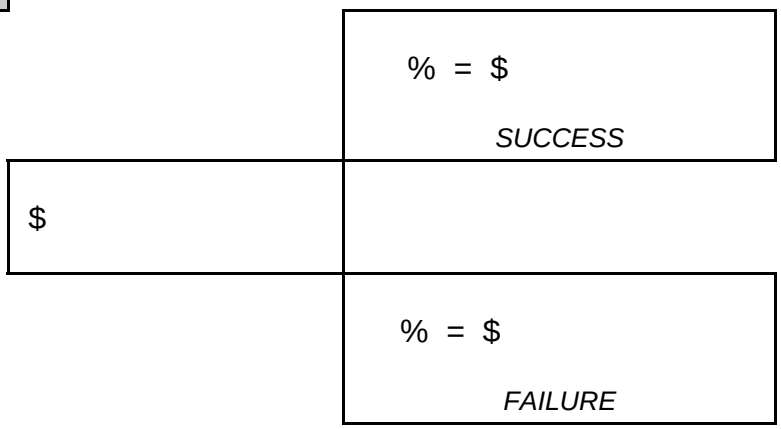
ALTERNATIVE ***A***



ALTERNATIVE ***B***



ALTERNATIVE ***C***



H. Wildland Fire Situation Analysis Example

The following is an example of a completed Wildland Fire Situation Analysis and Decision Tree Analysis.

(insert example WFSA here)