Southern Sierra Nevada Geographic Information Cooperative
Analysis Workshop Notes
May 23-24, 2000
California Department of Forestry
Visalia, California

Wednesday, May 23, 2000
Jeff Manley started with an overview of the purpose and objectives of the meeting.

Purpose and Objectives:
- *Share* information on existing fire planning process, analysis tools, and products used for fuels/vegetation management
- *Evaluate* applicability of existing process, tools, and products to the SSGIC interagency planning effort
- *Identify* gaps in knowledge or technology critical to the effort
- *Select* a critical pathway, including preferred tools (or desirable attributes of analysis tools) and planning process, for SSGIC to pursue for the pilot project

California Department of Forestry
- Agency definition of the terms (*paraphased from the California Fire Plan*):
Hazard – *A combination of high risk and high probability of large fire occurrence (degree of risk)*
Risk – *Reisitance to control defined by a combination of fire history, and vegetation type and age*
Value - *Social, economic, and ecological values at risk of unacceptable change from wildfire*

- Fuels/vegetation management objectives.
"The overall goal is to reduce total costs and losses from wildland fire in California by protecting assets at risk through focused prefire management prescriptions and increasing initial attack success." California Fire Plan. 1996

- The general planning process used to identify and prioritize project areas.
1) Assess level of service needed to provide acceptable initial attack, identify assets at risk, characterize flammability using vegetation type and age as surrogates, and define severe fire weather occurrence and periods.
2) Combine elements in 1) to identify high risk/high value areas within each Ranger Unit.
3) Develop prefire plans and projects based on analysis in 2).
4) Seek stakeholder cooperation in implementing high priority projects.
(See full text of California Fire Plan – 1996. Additional information on fire planning on the web at: http://frap.cdf.ca.gov/)

- Describe the analysis tools used in the planning process.
See below

- Describe the end products of the planning process
See above

- Summarize additional planning process or analysis capabilities in development, or that your agency would like to see developed (if any).

Additional Information :
Wayne Mitchell presented the CDF planning process from the statewide perspective. They have aimed to have their process field driven while remaining consistent across units. This has proven difficult.

Problems need to be defined ahead of time – CDF primarily addresses cost and damage. They have defined approximately 15 assets at risk. Some are commodity, many are non-commodity, i.e. social values. Assets were rated on fire impact, not dollar values. The Asset Aggregator software program creates arcview shapefiles based on a value ranking prompter.

Initial attack, a main thrust of fire planning for assessing the level of service (LOS) was described. A example success ratio table was laid out as follows:

Intensity of Burn WX	Spot Fires 0 - ¼ acre	Small Fires ¼ - 1 Acre	Medium Fires 1-5 Acres	Large Fires 5-25 Acres	Escaped Fires 25+ Acres
Low	# events				
Mod					
High					

Unmatched WX - no weather data assumes a High Intensity

The number of events table is calculated for each vegetation/fuel type. The success ratio is calculated by the number of events that were successful divided by the total number of events. Big problems in balancing initial attack need versus resources can be identified here – as well as when and where are escapes happening, etc.

CDF also presented the CA Fire Plan Assessment Flowchart (draft version)

CDF uses 450 acre grid cells. The WAFL (weather, assets, fuels, level of service) tool was also described.

BLM
Agency definition of the terms:
Hazard – *A fuel complex defined by kind, arrangement, volume, condition, and location that forms a special threat of ignition or of suppression difficulty, or simply put, wildland with the potential to burn.*

Risk - *The chance of a fire starting as determined by the presence and activity of causative agents.*

Value - *Natural resources and improvements that may be affected if a fire occurs.*

- Fuels/vegetation management objectives.

General objectives are:

1. ***Utilize fuels management techniques to maximize firefighter safety during unwanted fire situations. (Source: Federal Wildland Fire Policy)***
2. ***Utilize fuels management techniques to restore the natural role of fire into the ecosystem. (Source: Caliente RMP)***
3. ***Utilize fuels management techniques to minimize suppression costs. (Source: Federal Wildland Fire Policy)***

Specific objectives are:
Specified as "Compartment Fuel Treatment Objectives" as identified in FATE. Fate defaults are:

1. *Community Protection (Public Safety)*
2. *Threatened & Endangered Species*
3. *Commercial Forest Products*
4. *Recreation - Developed*
5. *Political/Social Issues*
6. *Increase Firefighter Safety*
7. *Reduce Catastrophic Fire Potential*
8. *Lower Fire Suppression Costs*
9. *Ecosystem Restoration*
10. *Forest Health*
11. *Other – List*

- The general planning process used to identify and prioritize project areas.
Selection of project areas responds to direction set in the Caliente Resources Management Plan and local unif fire management objectives contained in the Fire Management Plan. The Fire Management Plan was prepared utilizing a computerized program called FATE (Fuels Analysis & Treatment Evaluation). The program, used at the field office level, allows entry of several factors used to determine the prioritization of areas (compartments) to treat. FATE is part of the Risk Assessment & Mitigation System the BLM uses. Criteria for determining priority projects are:

1) *Interagency projects*
2) *Protection of the wildland/urban interface*
3) *Restoration of Ecosystem*
4) *Ease of Implementation*

- Describe the analysis tools used in the planning process.

- IIAA
- PCHA
- FATE
- PWA2

- Describe the end products of the planning process

So far:

1. *Prioritized Compartment list based on risks, hazards, values, historical fire history, and protection capability. If IIAA available for compartment, a benefit is estimated for each project based on % of compartment (RL).*
2. *A list of projects by fiscal year stating name, size, and estimated cost.*
3. *A list stating fiscal year totals including acres and costs for all projects. Costs broken down also by planning, implementation, and other fixed costs.*

- Summarize additional planning process or analysis capabilities in development, or that your agency would like to see developed (if any).

GIS maps with layers for vegetation, fire occurrence, cause, compartment and FTZ boundaries, IIAA boundaries, urban interface areas, etc, for Arc View.

NPS

Agency definition of the terms "Hazard", "Risk" and "Value".

- Fuels/vegetation management objectives.

Protect Life and Property
Restore natural range of conditions (usually prior to Euro-American Settlement).
Allow natural processes to function as much as is possible.
Preserve for the use of future generations

- The general planning process used to identify and prioritize project areas.

- Describe the analysis tools used in the planning process.

- Describe the end products of the planning process

- Summarize additional planning process or analysis capabilities in development, or that your agency would like to see developed (if any).

Corky Conover presented the NPS methods of analysis. There was an understanding from previous presentations that the NPS could show values better. Tony Caprio (fire ecologist) will have more work when Sequoia and Kings Canyon National Parks finishes their new vegetation mapping project. The NPS now shows Hazard, Risk, & Values. Hazard, defined from the NPS perspective, is the resistence to control once an ignition occurs. Risk is the probability of occurrence based on historic ignitions. Values are ecosystem (FRID), life safety, and infrastructure. The re-burn schedule GIS layer was discussed. This is a layer created to show when the date vegetation will begin to cross out of one fire return interval based on fire history and the knowledge of the historic fire return interval.

USFS

Agency definition of the terms "Hazard", "Risk" and "Value".

- Fuels/vegetation management objectives.

- The general planning process used to identify and prioritize project areas.

- Describe the analysis tools used in the planning process.

- Describe the end products of the planning process

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Aaron Gelobter presented the Forest Service's Fire Susceptability Analysis methods. He talked about how the Sierra Nevada Framework DEIS and the Roadless Areas DEIS will affect all Land Management Plans for the USFS. The components of their analysis include: hazard, risk, probability of severity of length of fire season, and values. FLAMMAP, a program developed by Mark Finney, was used for the Framework. It can be used to model hazard and run much the same way that FARSITE is run, but across the landscape. Severity probability is higher at lower elevations, so that elevation can be used as a proxy for severity of length of fire season. Risk takes into account the urban interface, major road corridors, recreation areas, and lightning corridors.

Interagency Fire Program Analysis

Jeff Manley discussed how the 1995 fire program review stressed the need for greater interagency cooperation. Congress drives the need for consistency of reporting across agency boundaries. Jeff showed the Cost Effectiveness Analysis, a curve that can outline the costs vs. effectiveness of actions.

Evaluation and Planning

Carol Miller gave a presentation on modeling the Risks and Benefits of Wildland Fire. She is working on developing a decision support/risk assessment tool that is GIS based. She defined risk as the probability of a negative outcome. Benefit was described as the probability of gain due to fire, whether these are improving ecological conditions or allowing for better management options. Carol's model will look at both the spatial and temporal context of fire, i.e., can fire spread to any particular area and how long will it take to get there. She takes into account the historic ignitions, the likelihood of a fire-stopping weather event, and the time it takes for fire to spread. The time element can be calculated using GRID's PATHDISTANCE function where the rate of spread divided by cell size equals the time it takes to get to a cell. It can be adjusted for slope and wind.

Don Carlton

Don Carlton presented his work on the Lake Tahoe project, a test of concept for the Sierra Nevada Framework. He also presented a paper entitled "Fire Planning and Assessments", geared toward the SSGIC. He stressed the need to define terms. Risk was an especially tricky term. He asked if probability of occurrence * value = risk. He also stressed that this group should focus on the process used for planning, not the specific type of computer program to be used.

Don presented the Land Management Planning Cycle – a flowchart presented in the paper. He stated that the output of assessments is usually a map. Information should only be as detailed as is necessary. A full range of alternatives should be developed and described.

Fire program elements were discussed – prevention, detection, fuels mgmt, preparedness, fire-use. Preparedness was identified as the most analyzed option. Dollars saved reducing fuels is a large unknown, i.e., a probability. All elements of this project must be aligned with each agency's processes and needs.

The public didn't trust the Forest Service for the Lake Tahoe project so they hired a contractor. Risk, hazard, and value assessments were done for the basin. FLAMMAP was built for this project. FLAMMAP calculates the fire behavior per cell, giving a flammability probability, somewhat equivalent to hazard maps. Input layers are similar to those used for FARSITE, but FLAMMAP runs across the entire landscape. The program can be downloaded from ftp://fire.org/pub/flammap. Fire Occurrence Areas (FOA) were defined as areas where the probability of fire igniting was similar. The final output, the Wildland Fire Susceptability Index (WSI), combined the FOA data and output from FLAMMAP (see paper for details).

Thursday, May 24, 2000 – Analysis Tools & Planning Process

Pat Lineback started with an overview of the SGIC project to place the analysis portion in context of the overall project.

TASKS OF THE DAY:
1) Define Hazard, Risk, Values – any other critical definitions or analyses needed?
2) ID Common or Unique objectives
3) What are the Tools/Processes/Products
4) Pros/Cons of each
5) Decide on Tools/Processes/Products
6) Map Pathways
7) Develop Workplan

- Discuss and confirm definition of terms "Risk", "Hazard" and "Value" as they will be applied within this project
- List common elements and significant differences between agency planning processes, analysis tools, and products
- List pro's and con's of each agencies planning process, individual analysis tools/models, and product utility (outcome of planning process).
- List pros and cons of; using integrated interagency analysis process and tools, using separate agency analysis and combining results, and a combination of strategies. Make decision on overall strategy for the SSGIC
- Discuss and list critical gaps in present planning process and tools that will need to be develop for the SSGIC project
- Decide on critical pathway and develop work

Aaron Gelobter presented his perspective on what we were trying to capture. He drew a chart of this, with commentary and changes, illustrated as follows:

Fire elements	- Hazard (FLAMMAP-flame length)
	- Risk (FOA-Lake Tahoe version)
Social	- Value (as loss/cost) – use Asset Analyzer (CDF) – weights are critical
	Suppression Costs
	Effects - Mkt
	Non-Mkt – can be handled as constraints
Ecological	- FRID (as benefit) – NPS Role of Fire
	- Habitat – needs/conditions, game vs. non-game

Robin Marose pointed out that the weights for Assets are critical and may differ for each agency.
The critical issue seems to be how to prevent large expenditures for suppression
Assets – do we create larger buffers around our boundaries to consider the other agencies in our analyses?
Is habitat/% habitat important – private vs. public land considerations?
What are the taxpayers viewpoints?
Air Quality is a limitation
County can't short resources to support other agencies.
The Interagency Fuels Planning Group wants to focus on areas of HIGH Hazard, Risk, & Value
How will interagency priorities be set?
Identify treatments that benefit Fire Mgmt Operations – reduce fuels
Jointly select projects
Propose treatments
Agency Implementation
Benefit cross-boundary issues
Are we dealing with 2 types of values, cost and benefit? We want to model both. Is value the loss/cost and benefit the gain?

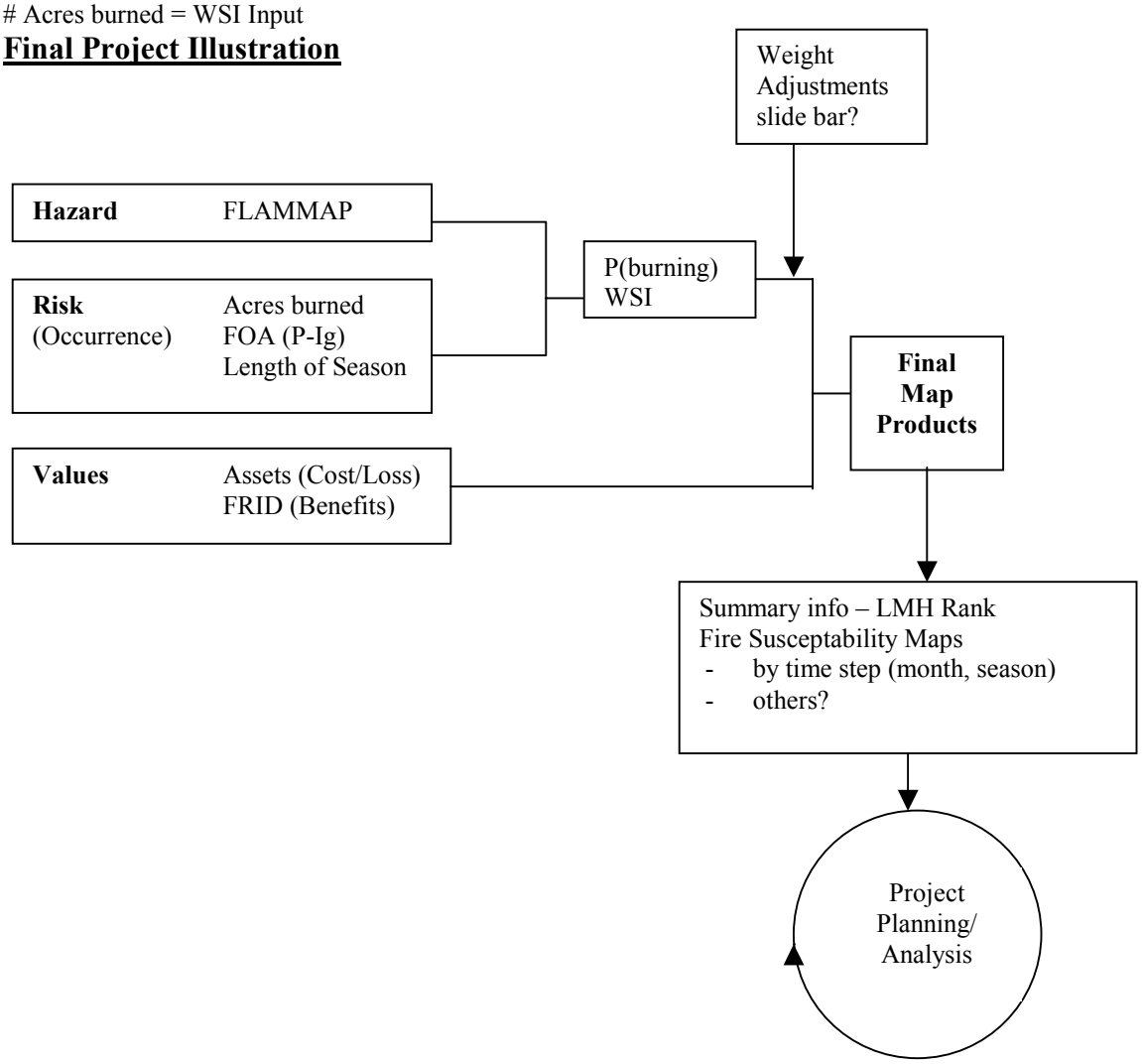
<u>Ratings</u>
FLAMMAP (Flame Length or others) – LMH

FOA - # Fires/Yr (Probability of Ignition) – LMHVE – Time Interval can vary to depict seasonal dangers
FRID – LMHE
ASSETS – LMH – Identify loss to Stakeholder

Integrate all of the above items to come up with a final map ranked HIGH, MODERATE, LOW

Questions
Elevation – is this a surrogate for length of fire season?
FRID – surrogate for good
Assets – surrogate for bad
Fire Effects – Asset input + FRID
L.O.S – Level of Service (relates to FOA, CDF term)
Acres burned = WSI Input

Final Project Illustration



Planning Group's Expectations

Stratification by Low, Moderate, High – to show need of treatment/attention
Gross level and detail level maps
Resolution of data – should be 30 meter pixels
Kaweah & Kern watersheds to be initial analysis watersheds – look for holes in data & problems

Additional Information Gathering Needs

WSI – Don Carlton
Data Files compiled – to be completed by Karen Holmstrom
    Weather data
    Spatial Data – projection issues – state vs. federal
Seamless vegetation layers – crosswalk to Tony Caprio's fire return interval tables for each agency
    Fill in private lands/BLM with GAP data
Crosswalk to NPS FRID
Fire History data – occurrence (point data)/polygon info
Assets – list of 18 off the shelf (CDF CA Fire Plan) – Robin Marose lead (Aaron Gelobter, Corky Conover, Tony Sarzotti assist).
Potential Hazard – fire behavior characteristics
Risk – probability of
 fire starting at point source

SSGIC

Analysis Workshop
May 23-24, 2000
Results, Decisions, Direction

Definitions

Hazard: ***Fire behavior characteristics***

Risk: ***Probability of fire start***

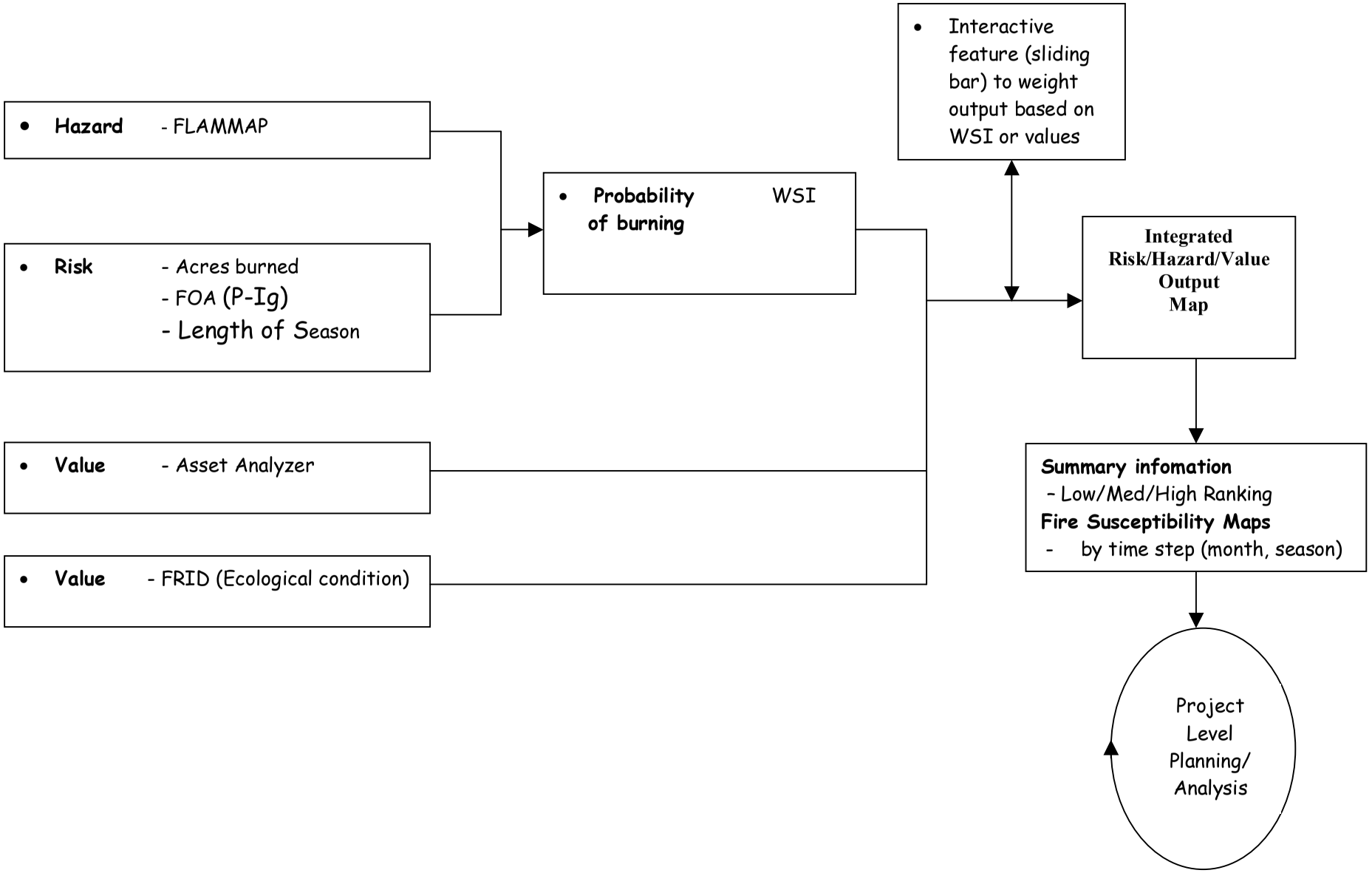
Value: ***Social, natural, or cultural resource subject to change due to fire event or fire suppression. Change in value may be negative or positive.***

Analysis Tools

Analysis	Purpose	Data Needs	Lead	
FRID (Fire Return Interval Departure)	Assess ecological need for fire	• Max. fire return interval for each veg type within project area • Date of last fire for each cell in project area	Tony Caprio *Sequoia & Kings Canyon National Parks*	
Asset Analyzer	Assess and prioritize values at risk	• Values at risk • Location of values • Assessment of potential change	Robin Marose *California Department of Fire and Forestry*	
FLAMMAP	Hazard Assessment	•	To be assigned	
WSI Wildfire Susceptibility Index	Integrates hazard and risk into single index (probability of burning)	•	To be assigned	

Analysis Process

- All analysis GIS based and spatially explicit



Assignments