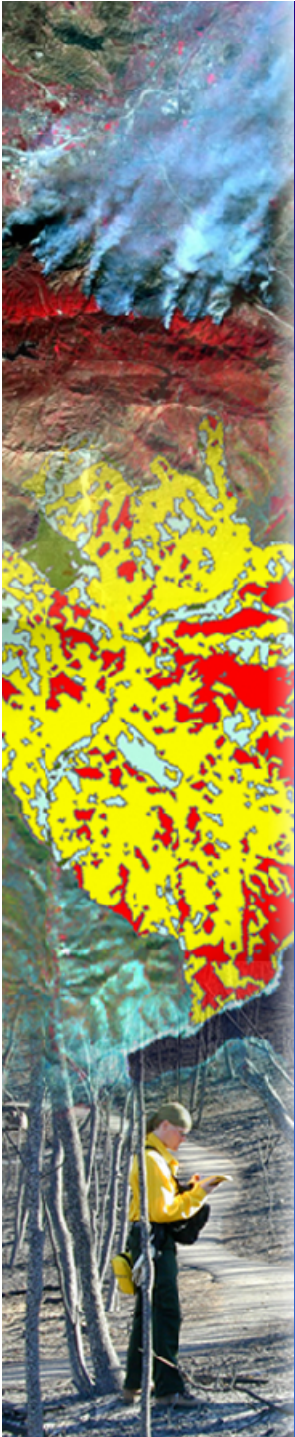


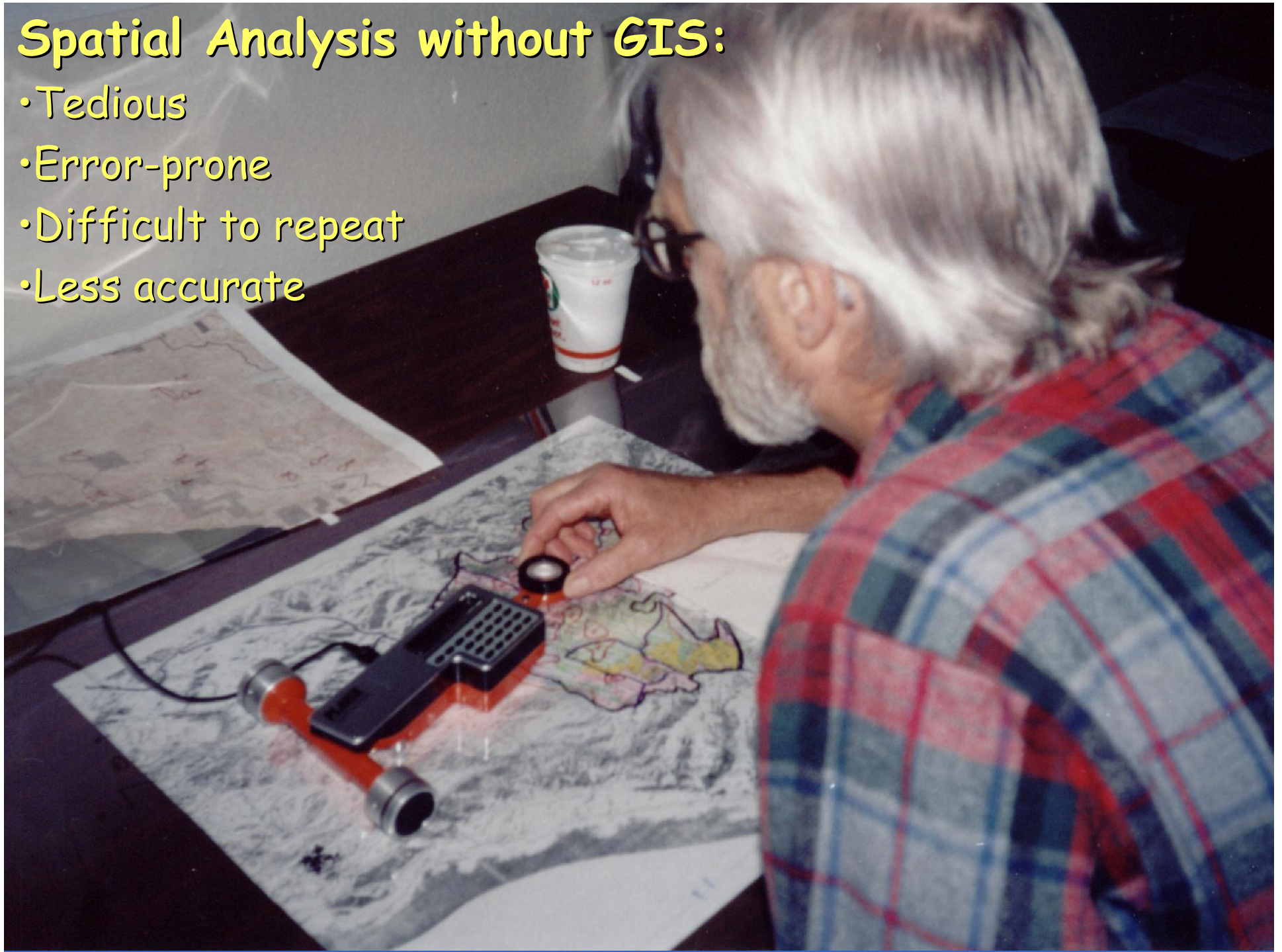
GIS Analysis Using the Soil Burn Severity Map

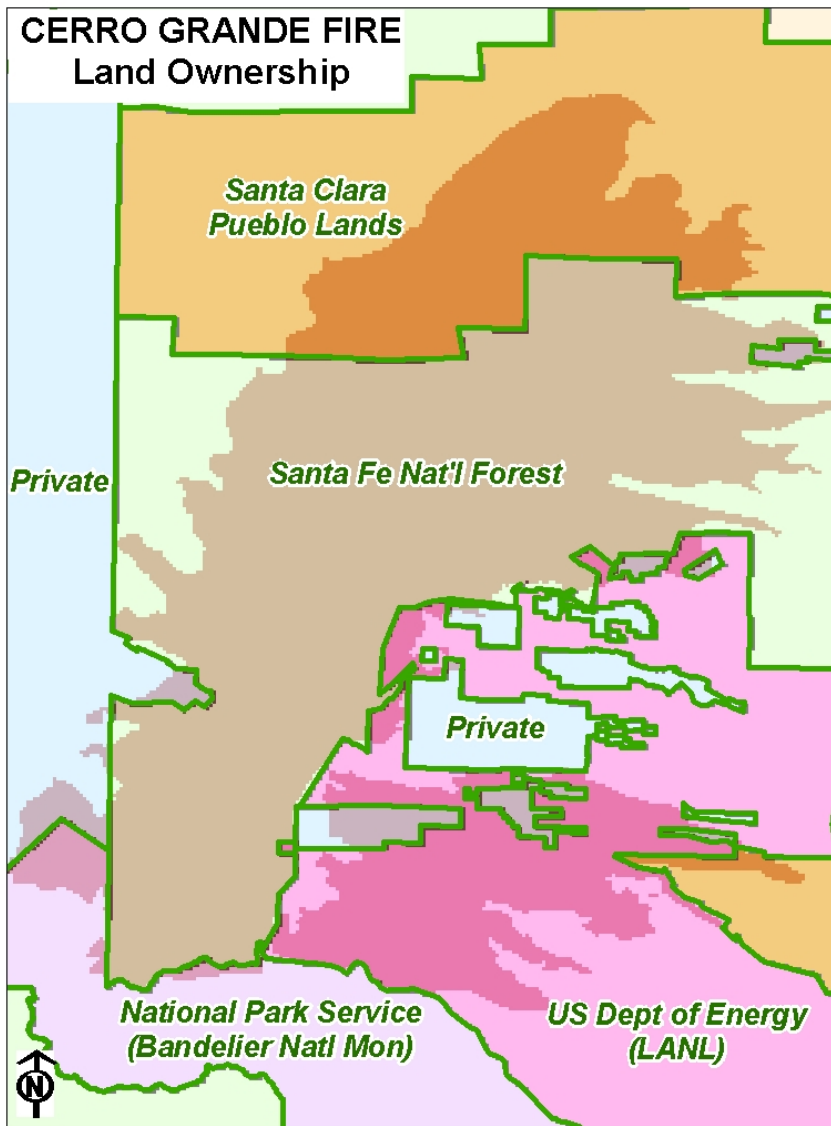
Discussion



Spatial Analysis without GIS:

- Tedious
- Error-prone
- Difficult to repeat
- Less accurate

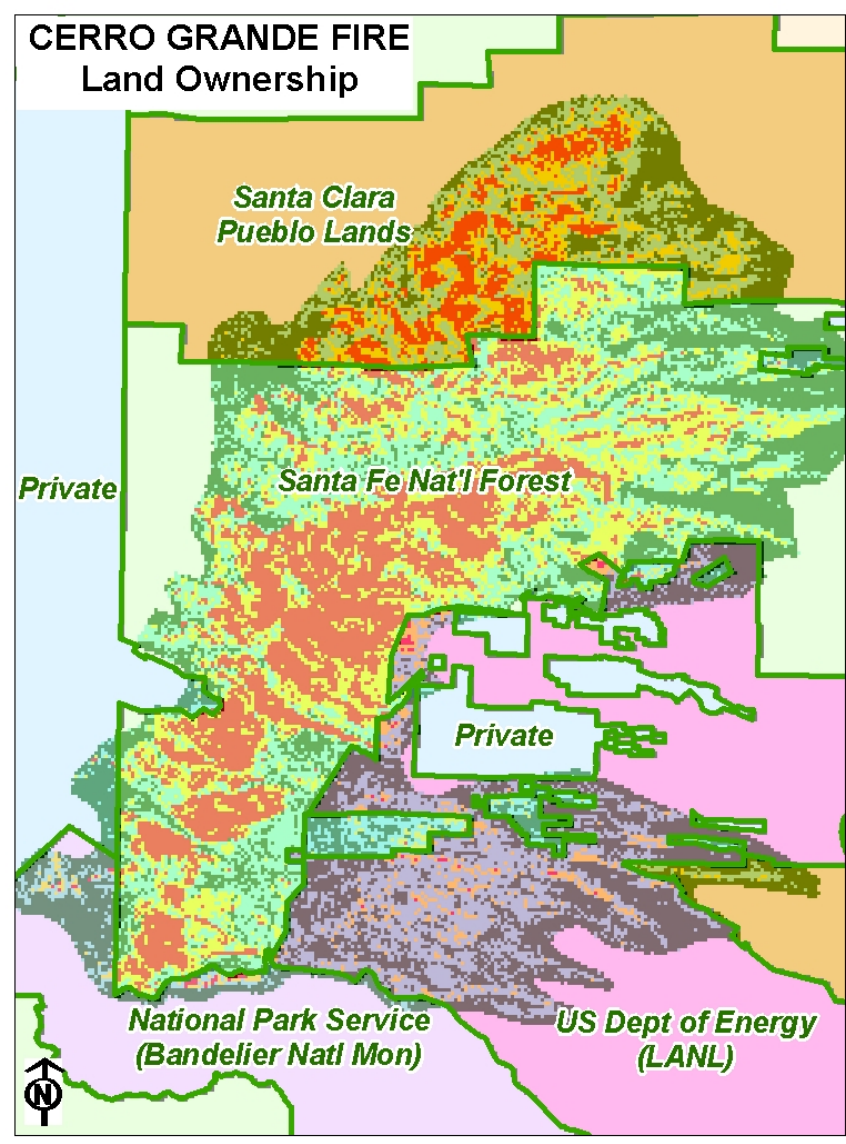




GIS - Quick and easy reporting of acres by ownership, watershed, etc

OWNERSHIP	ACRES
DOE	7373
USFS	25628
Indian Lands	6967
NPS	827
Private	2060
TOTAL	42855

GIS - Quick and easy reporting of acres by ownership, watershed, treatment polygons, etc



OWNERSHIP	SOIL BURN SEV.	ACRES
Dept of Energy	High	200
	Low/Unb	6370
	Mod	811
Dept of Energy Total		7381
USFS	High	12325
	Low/Unb	12196
	Mod	1108
USFS Total		25630
Indian Lands	High	2047
	Low/Unb	3526
	Mod	1395
Indian Lands Total		6968
NPS	High	94
	Low/Unb	696
	Mod	39
NPS Total		828
Private	High	62
	Low/Unb	1781
	Mod	225
Private Total		2068
Grand Total		42875

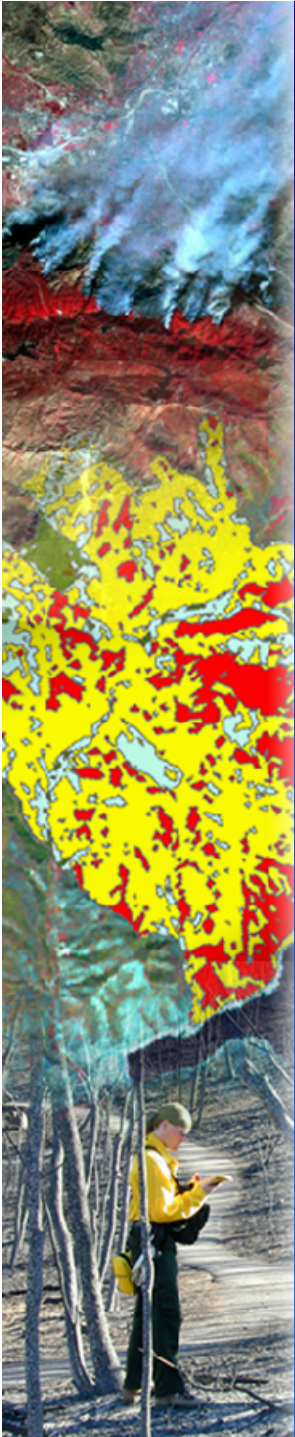
DEMO - GIS ANALYSIS

Hayman Fire

20 min

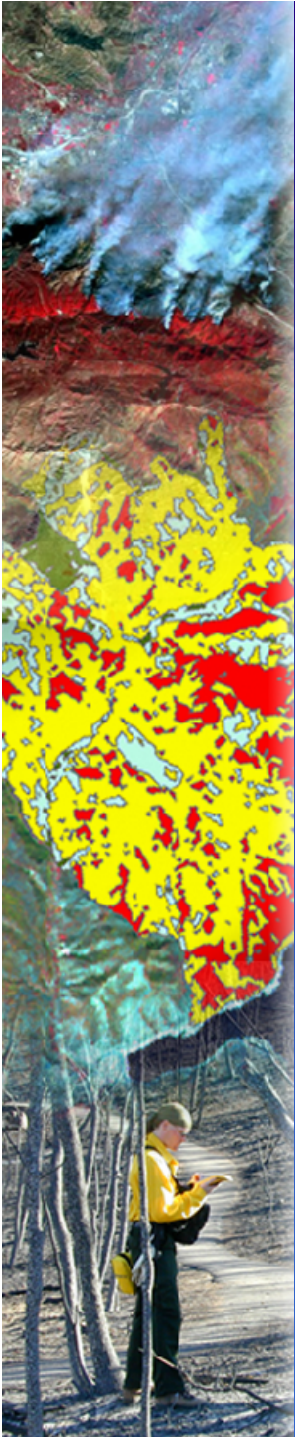
GIS Analysis Using the Burn Severity Map

Exercise



Spatial Modeling Using the BARC-Derived Soil Burn Severity

Discussion



Soil Burn Severity to Derivatives:

Post-fire EROSION and RUNOFF

- Watershed Response
 - How much **sediment** and **peak flow** can we expect during a particular weather event?
 - ERMiT, WEPP/GeoWEPP, RUSLE
 - Rational Method, WMS, others...



Soil Burn Severity to Derivatives:

VALUES AT RISK

- Values at Risk
 - What **values** (cultural / health and human safety / private property / infrastructure / etc.) **are at risk** downstream due to the wildfire?

●VAR Calculation Tool



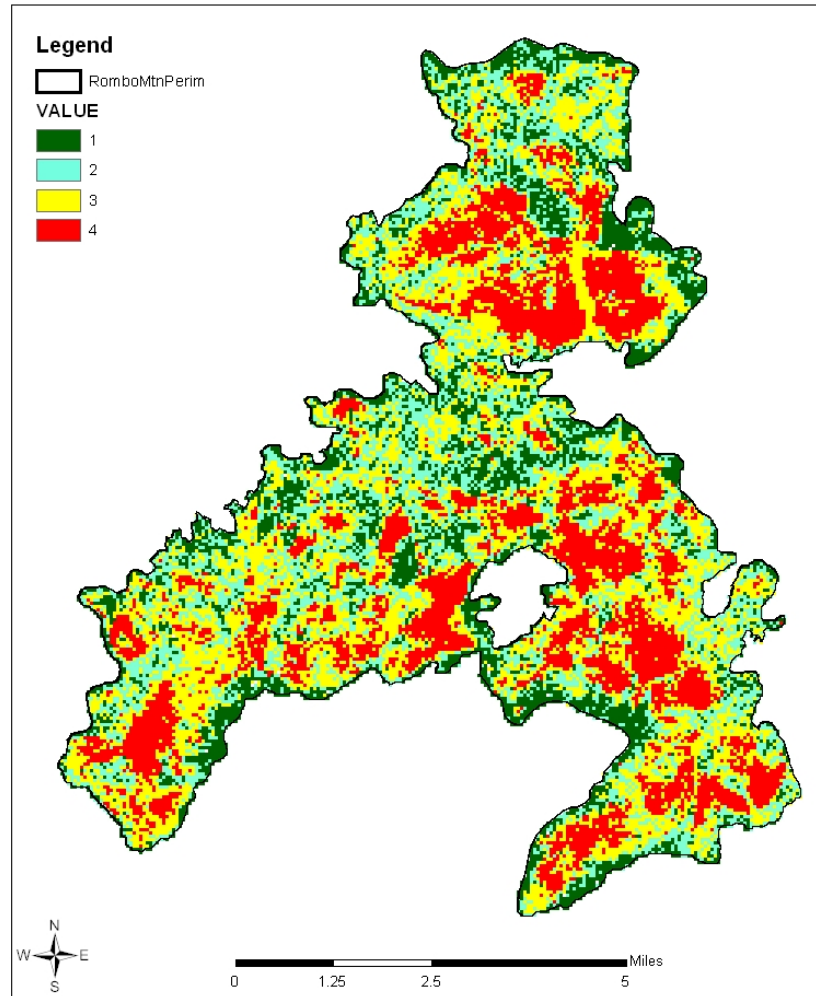
BARC Vs BITE

Soil Burn Severity Vs Veg Mortality

Burn Intensity Timber Estimate
:-)

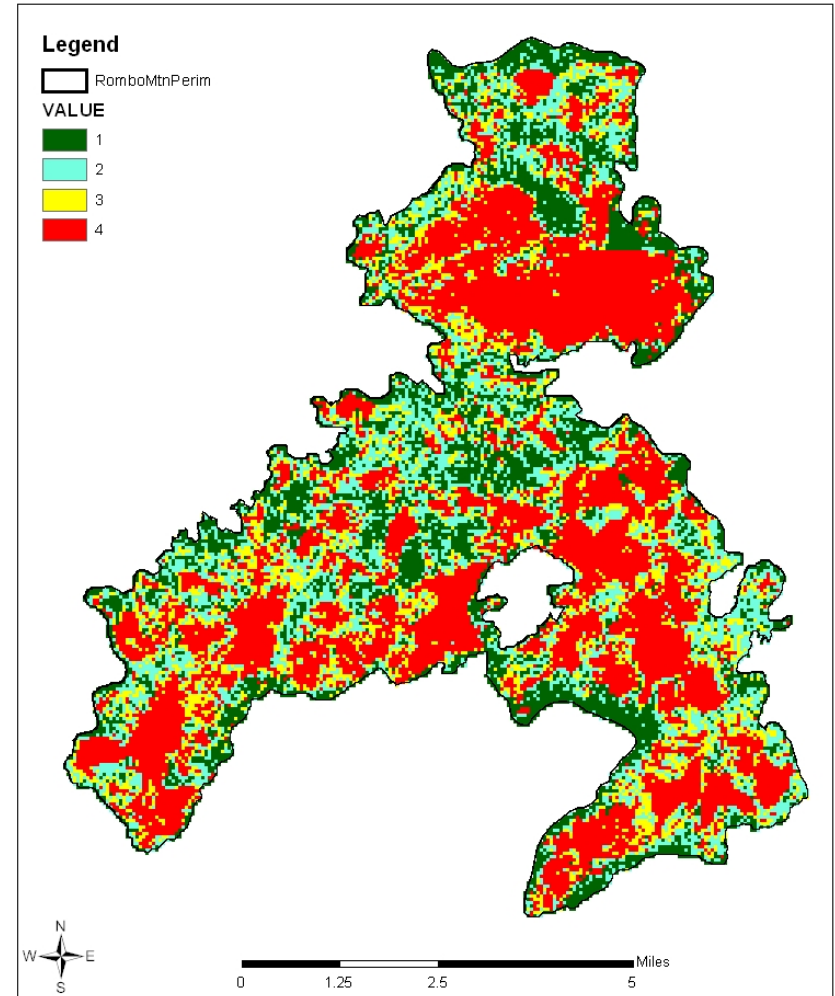
ROMBO FIRE - Montana 2007

BARC (BAER Team Preliminary Soil Burn Severity)



ROMBO FIRE - Montana 2007

RAVG (Vegetation Mortality)



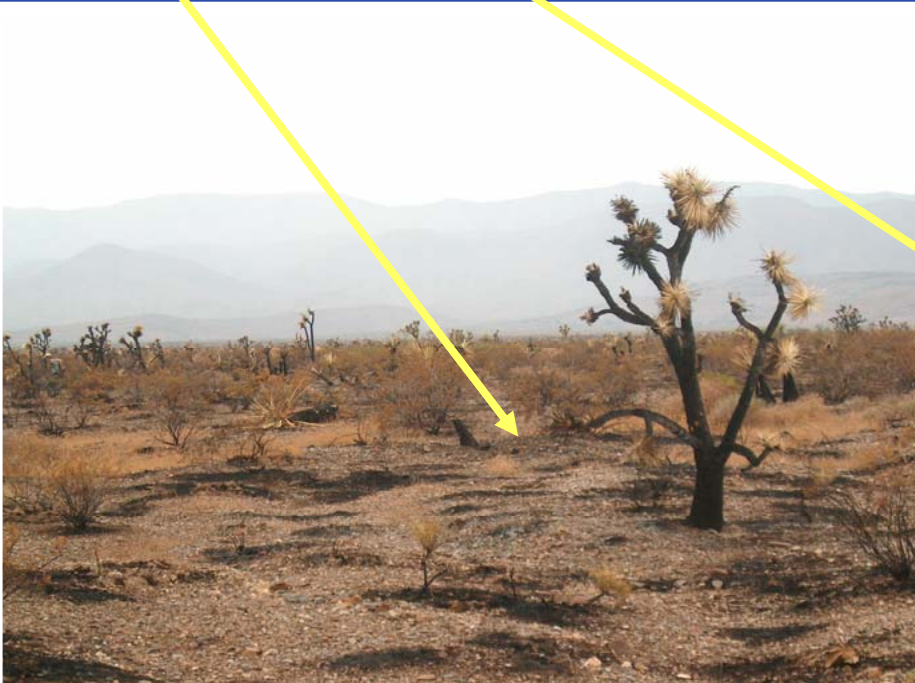
Similar Products and/or Derivatives:

Vegetation Mortality (RAVG)




Rapid Assessment of Vegetation Condition

- Separate from BARC (later)
- Used in salvage planning

Low or moderate soil burn severity but high **vegetation** mortality



Modeling Tools - BAER

- Revised Universal Soil Loss Equation (RUSLE)
 - Estimates average annual soil movement resulting from interrill and rill erosion (slope, cover, soil, climate)
- Water Erosion Prediction Project (WEPP-GeoWEPP)
 - Estimates sediment yield and runoff from interrill and rill erosion processes at the hillslope scale (slope, cover, soil, climate)
- Erosion Risk Management Tool (ERMiT)
 - Uses multiple runs of WEPP over a range of input parameters to predict event sediment delivery in probabilistic terms on burned and recovering forest, range, and chaparral lands (slope, soil, climate, soil burn severity)
- Values At Risk (VAR) Calculation Tool
 - Supports valuation of Values at Risk; considers spatial info (burn severity, treatments, in relation to identified VARs) and ERMiT results

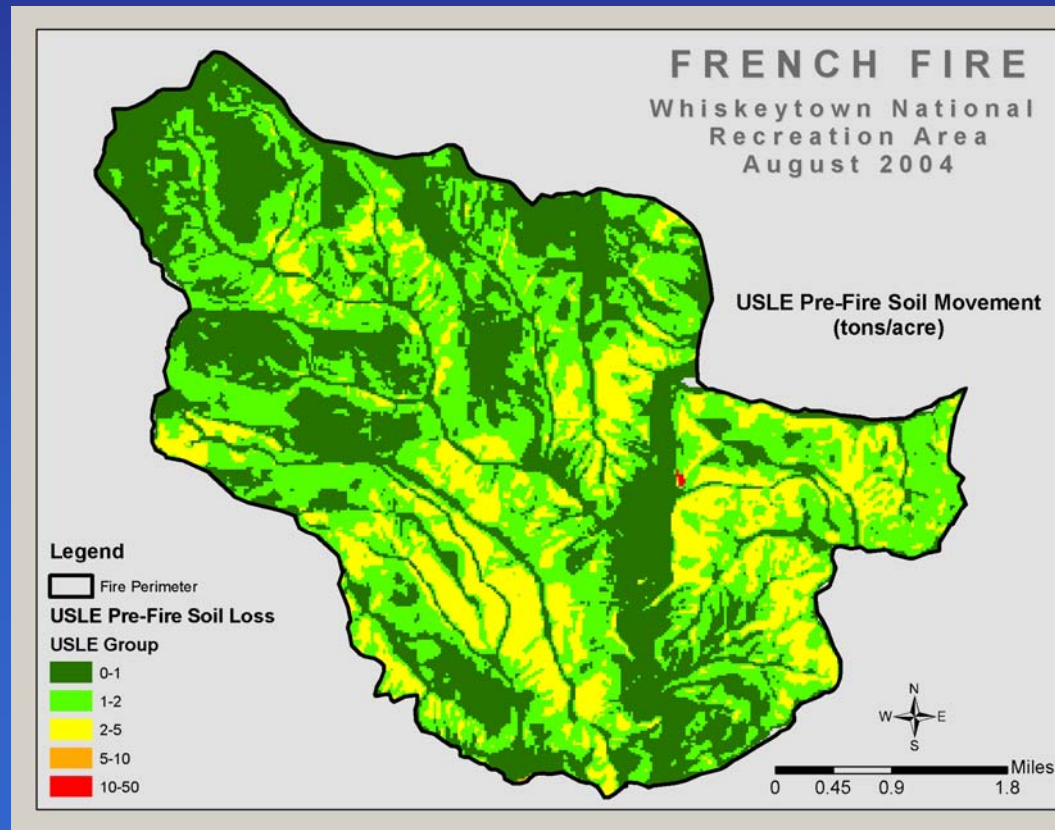
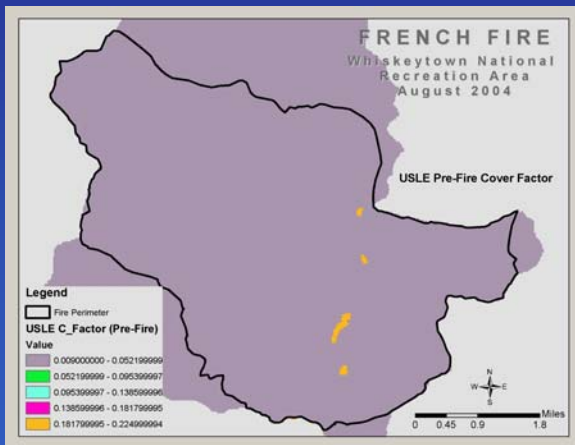
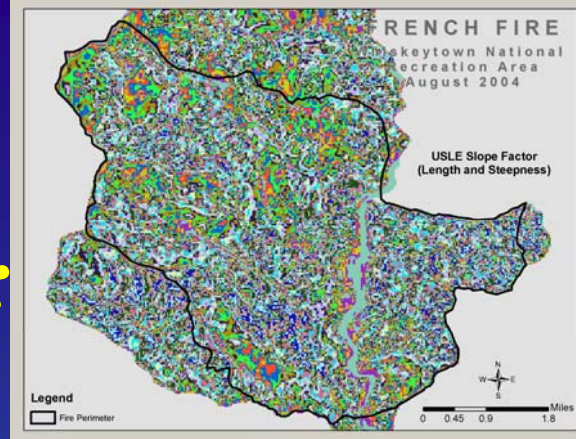
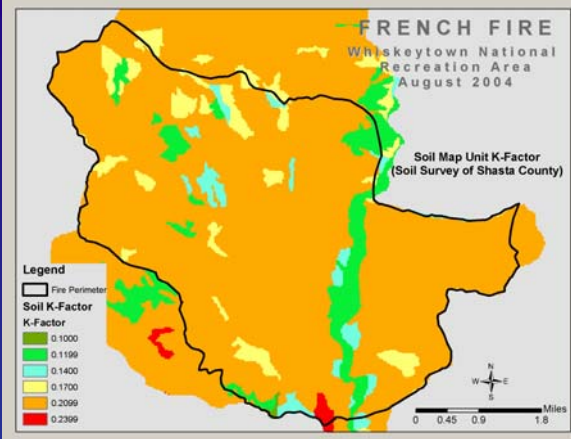
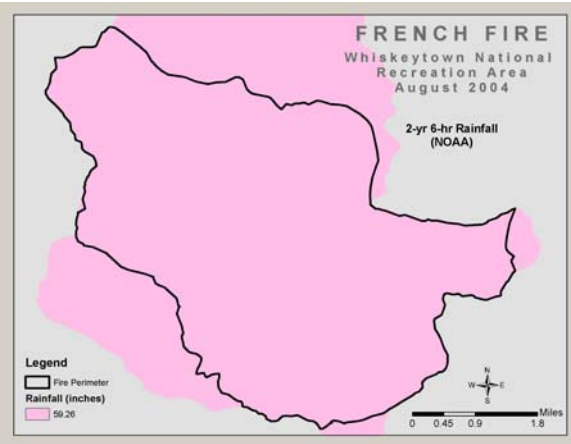
All models have similar inputs:

- RUSLE, WEPP/GeoWEPP, ERMiT
- WMS, Rational Method, SCS Curve #

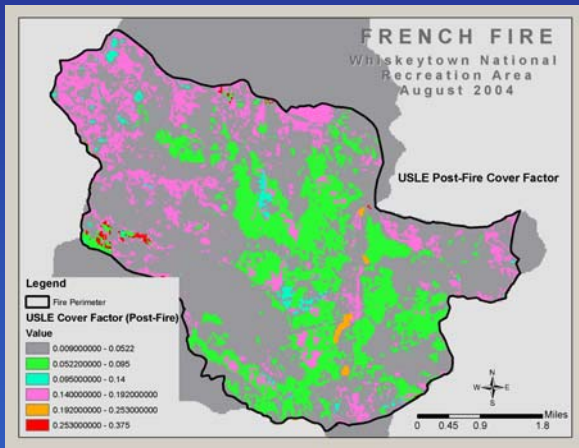
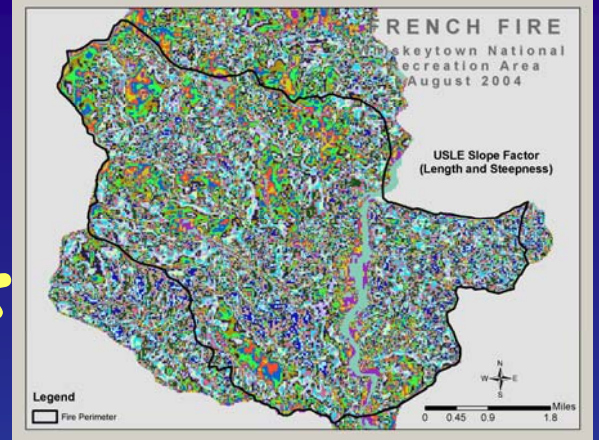
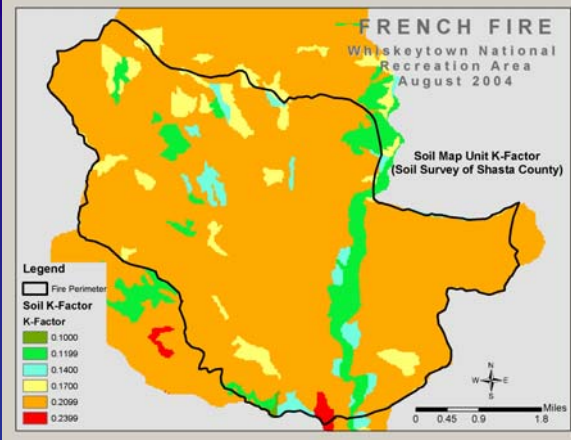
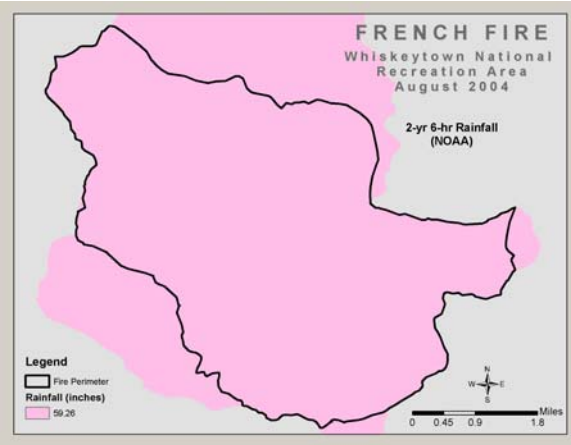
Volume of Sediment (erosion) or
Peak Flow (runoff) are functions of:

Not affected by fire

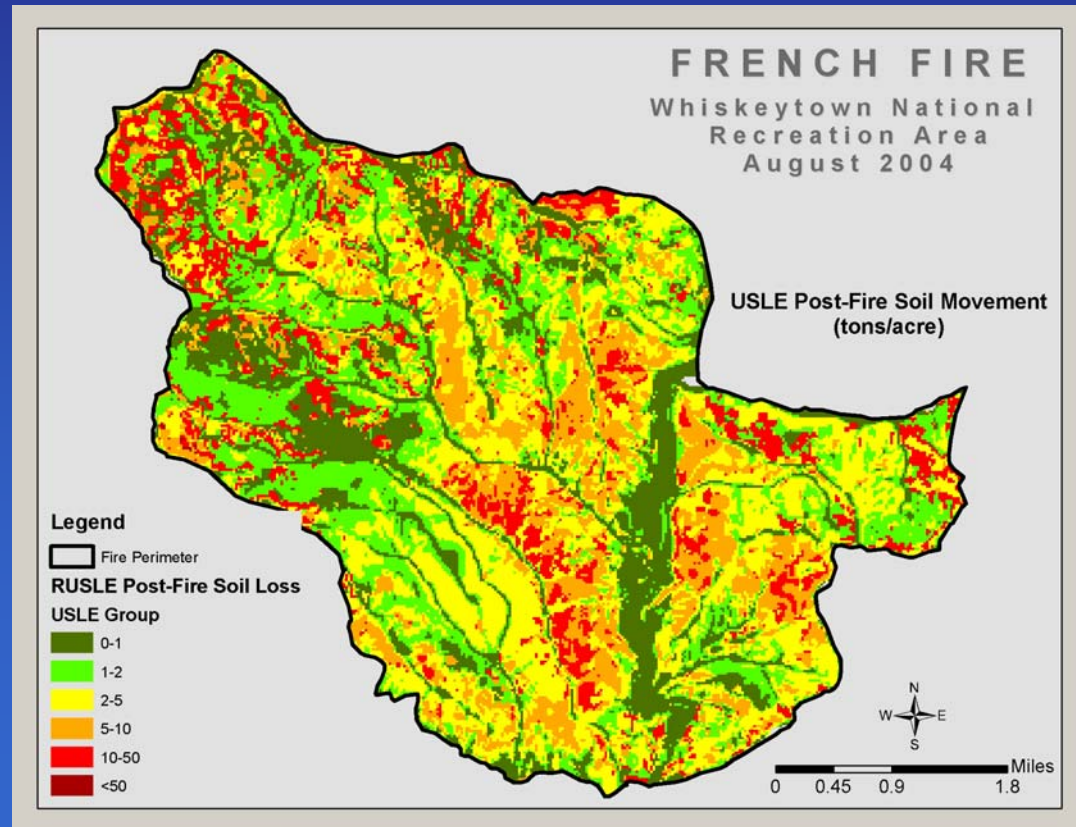
- Climate (amount, duration, intensity, form)
- Soil Erodability (texture, structure, infiltration)
- Slope Steepness/Length/Complexity
- Cover (IS affected by fire) (infiltration can be too)



Pre-fire Cover Factor



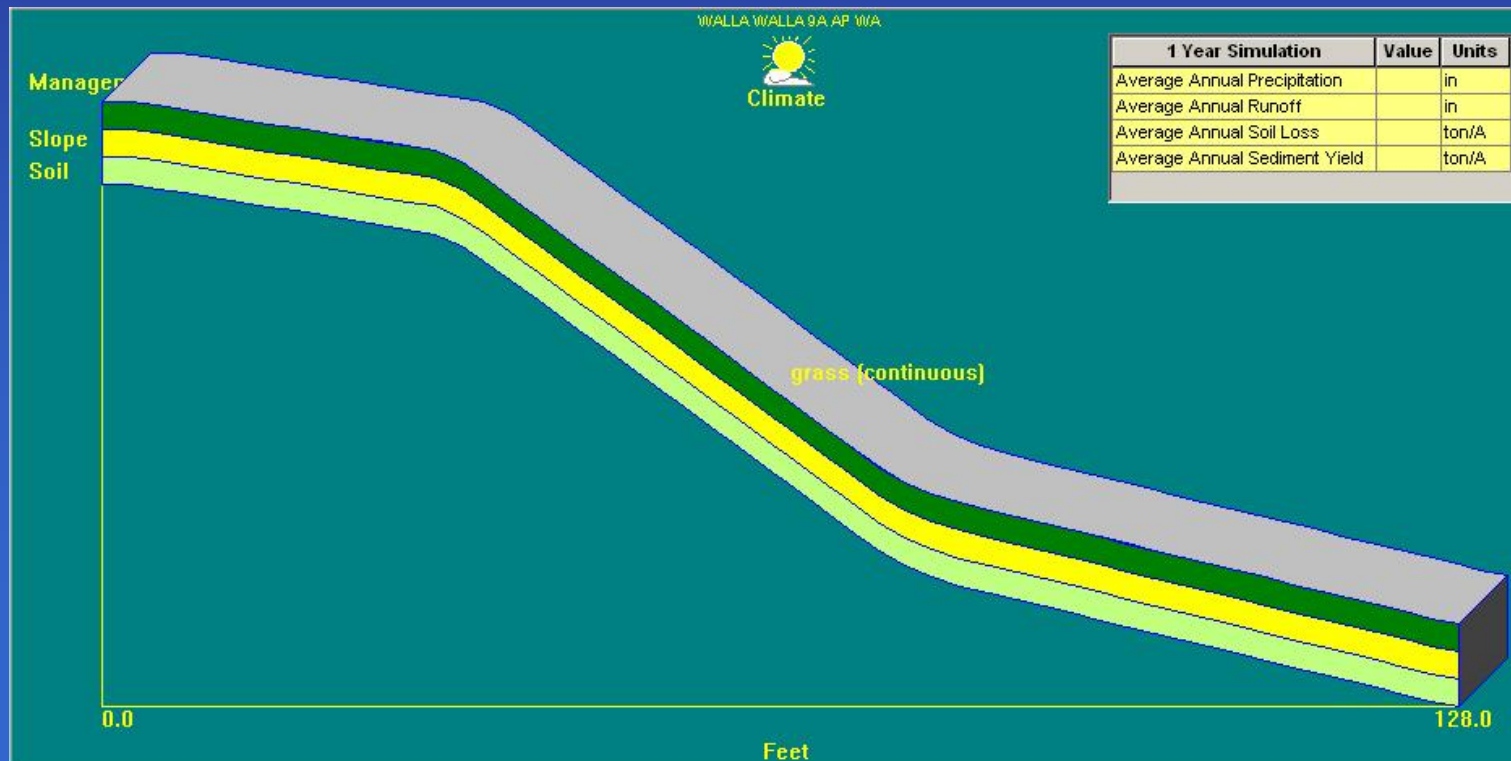
Post-fire Cover Factor
(affected by
Soil Burn Severity)



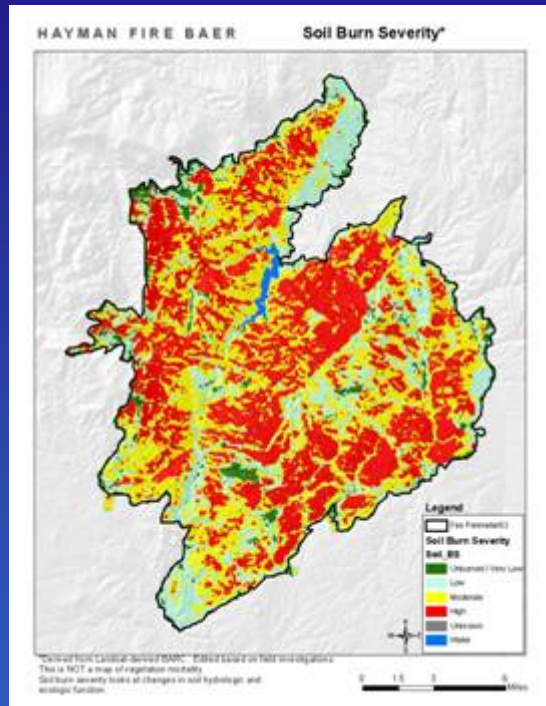
Watershed Response Variables (Not fire-affected)

Other Model Parameters

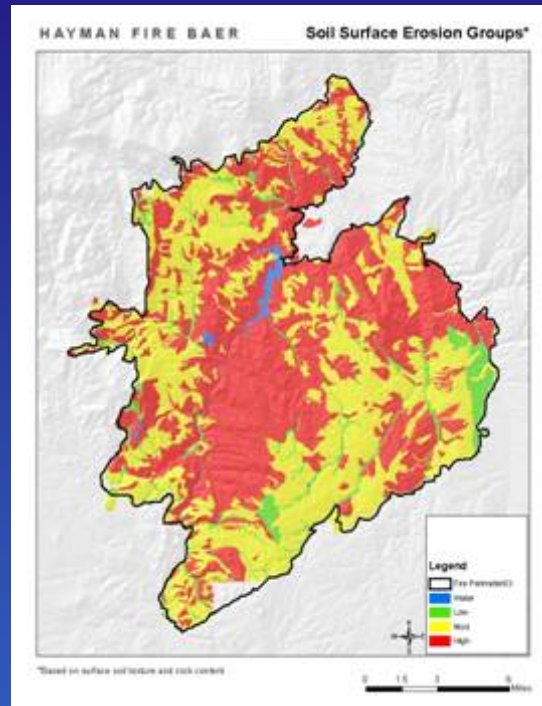
- Slope (steepness, shape, length)
- Climate (amount, duration, intensity)
- Surface texture
- Percent Rock



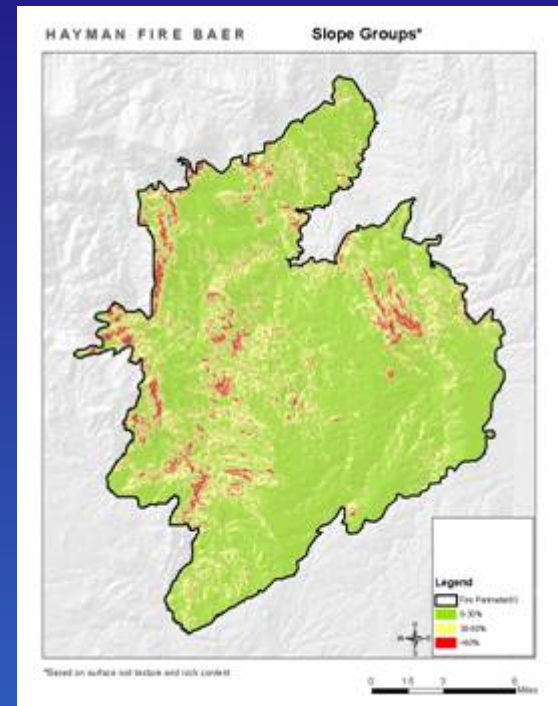
Pre-processing for ERMiT



Soil Burn Severity



Soil Erosion Groups



Slope Groups

Overlay layers to determine unique combinations (dominant) and the number of ERMiT runs necessary to characterize burned area









GIS Overlay (Union) analysis to stratify the burned area: what combinations of veg-soil-soil burn severity are there and how many acres of each combo.

You can use this to determine how many WEPP or ERMiT runs you need to make (dominant combinations).

	A	B	C	D
4	Sum of Acres			
5	Surface Txtr/Rock %	Slope Grp	Soil Burn Sev	Total
6	cl 5rk	A - 0 to 30	1-Unburned/Very Low	824
7			2-Low	2,292
8			3-Moderate	3,043
9			4-High	1,440
10		A - 0 to 30 Total		7,599
11		B - 30 to 60	1-Unburned/Very Low	63
12			2-Low	140
13			3-Moderate	176
14			4-High	159
15		B - 30 to 60 Total		538
16		C - 60+	1-Unburned/Very Low	1
17			2-Low	4
18			3-Moderate	3
19			4-High	2
20		C - 60+ Total		9
21	cl 5rk Total			8,145
22	s 25rk	A - 0 to 30	1-Unburned/Very Low	538
23			2-Low	5,579
24			3-Moderate	12,481
25			4-High	14,624
26		A - 0 to 30 Total		33,221
27		B - 30 to 60	1-Unburned/Very Low	983
28			2-Low	6,534
29			3-Moderate	10,915
30			4-High	10,646
31		B - 30 to 60 Total		29,078
32		C - 60+	1-Unburned/Very Low	520
33			2-Low	1,640
34			3-Moderate	1,622
35			4-High	1,212
36		C - 60+ Total		4,996
37	s 25rk Total			67,294



Forest Service WEPP Interfaces

	Cross Drain	Rock:Clime	
	WEPP:Road	WEPP:Road Batch	
	Disturbed WEPP	ERMiT	
	WEPP FuMe (Fuel Management)	Other WEPP resources	

metric English

personality (a to z)

<http://forest.moscowfsl.wsu.edu/fswepp/>

Bill Elliot, Project Leader, USFS Soil & Water Engineering, Moscow, ID

<http://forest.moscowfsl.wsu.edu/fswepp/> 04/22/2005 13:28:34

These interfaces funded in part by USDA FS San Dimas Technology and Development Center.

WEPP is an interagency model lead by the Agricultural Research Service's [National Soil Erosion Research Laboratory](#).

ERMiT Web Interface



Erosion Risk Management Tool



(- *) Climate (+)

CHARLESTON KAN AP WV
MOSCOW U OF I ID
DENVER WB AP CO
BIRMINGHAM WB AP AL
FLAGSTAFF WB AP AZ
MOUNT SHASTA CA
SEXTON SUMMIT WB OR

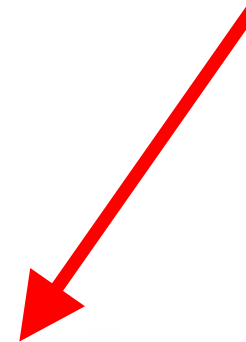
Custom Climate

Soil Texture ?

clay loam
silt loam
sandy loam
loam

Rock content ?

20 %



<u>Vegetation type</u> ?	<u>Hillslope gradient</u> ?	<u>Hillslope horizontal length</u> ?	<u>Soil burn severity class</u> ?
Forest Range Chaparral	Top 0 % Middle 50 % Toe 30 %	300 ft	<input type="radio"/> High <input type="radio"/> Moderate <input checked="" type="radio"/> Low
<u>Range/chaparral pre-fire community description</u> ?			
% shrub	% grass	% bare	

Run ERMiT

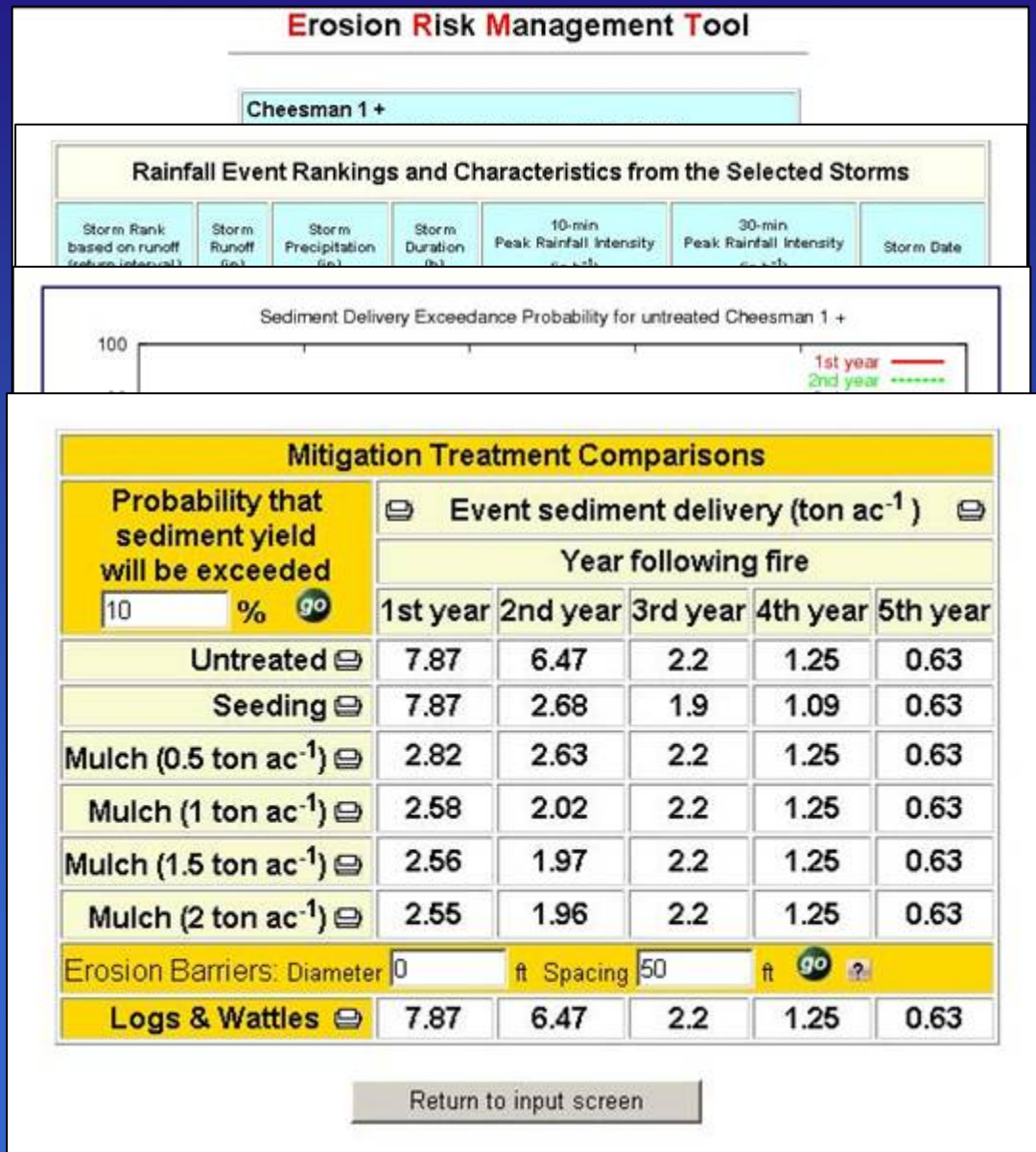
Citation:

Robichaud, Peter R.; Elliot, William J.; Pierson, Fredrick B.; Hall, David E.; Moffet, Corey A. 2006. **Erosion Risk Management Tool (ERMiT) Ver. 2006.01.18**. [Online at <<http://forest.moscowfs.wsu.edu/fswepp/>>.] Moscow, ID: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station.



73 ERMiT runs to date in 2008 (2,874 runs in 2007). Personality ""

ERMiT Results



Climate Summary

Local Storm Characteristics

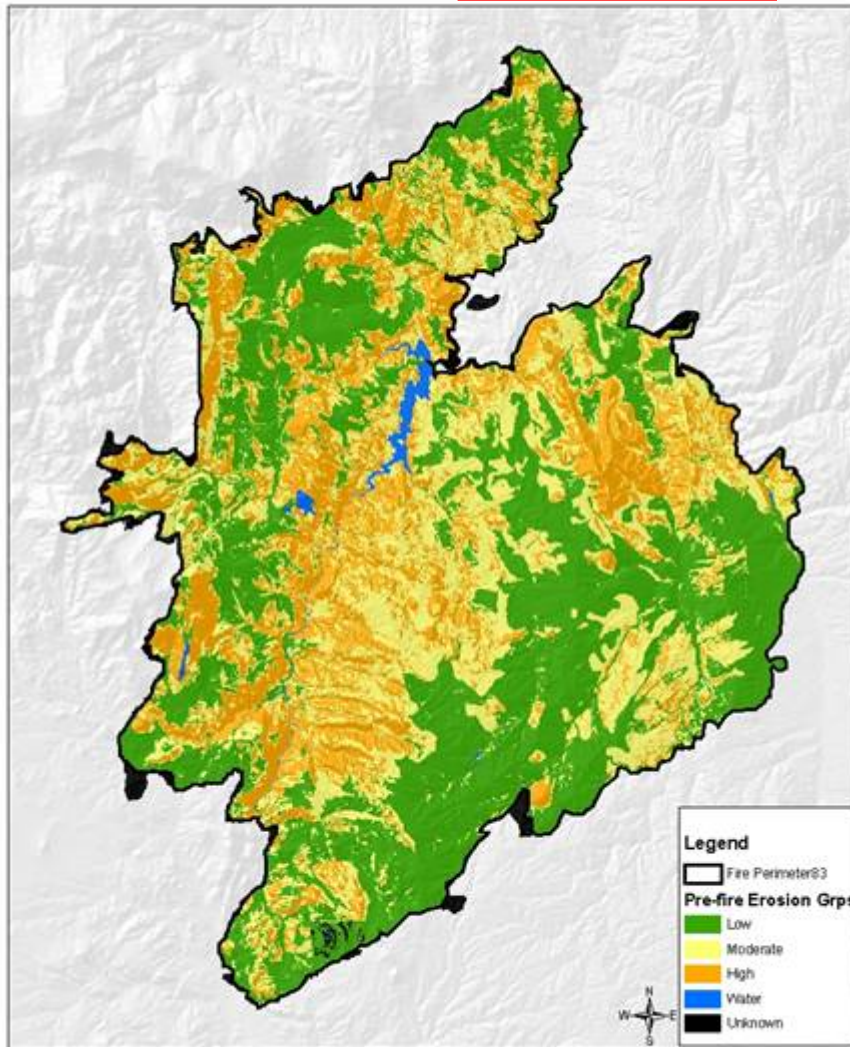
Sediment Delivery Probability

Treatment Comparisons

ERMiT Results Spatially Applied

HAYMAN FIRE BAER

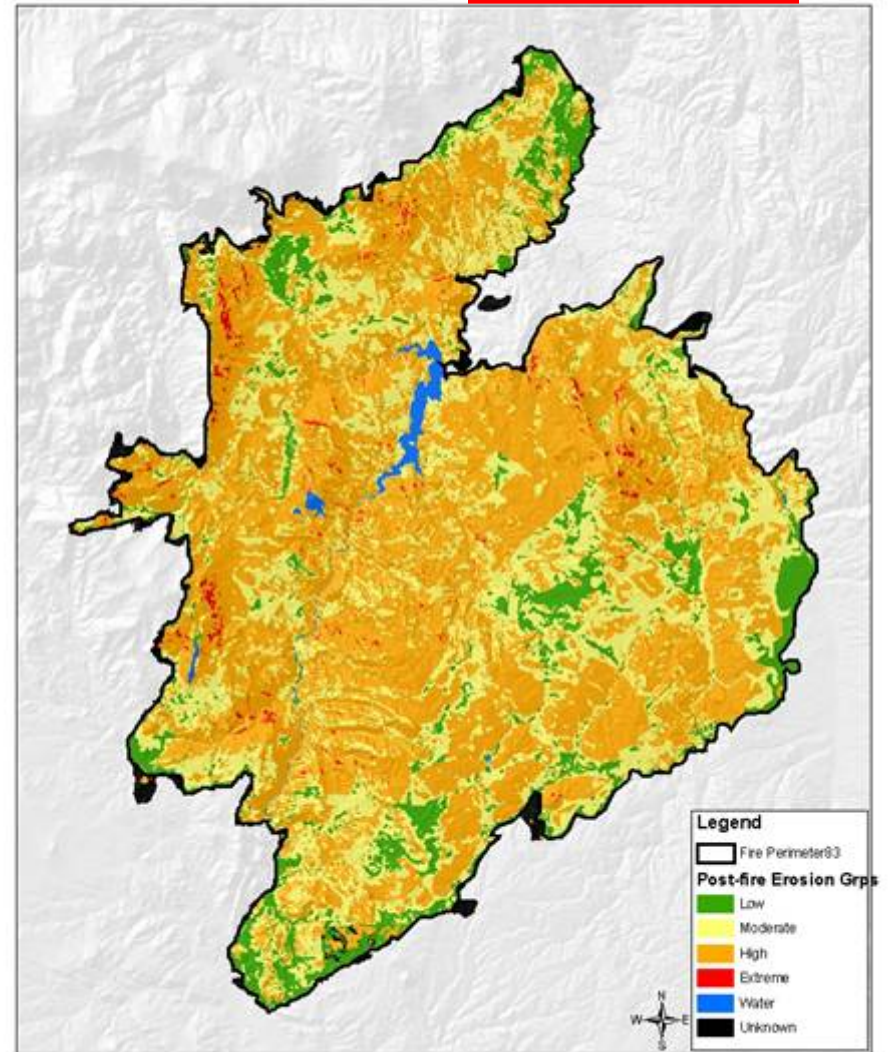
Pre-Fire Erosion Rate*



*Using ERMiT Erosion Modeling Tool
<http://forest.moscowsl.su.edu/cgi-bin/fswpp>

HAYMAN FIRE BAER

Post-Fire Erosion Rate*



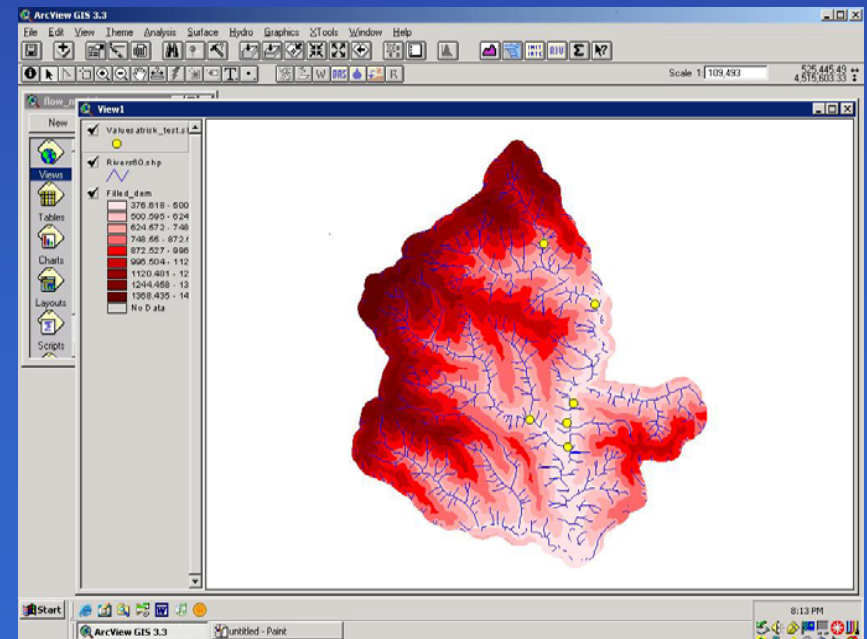
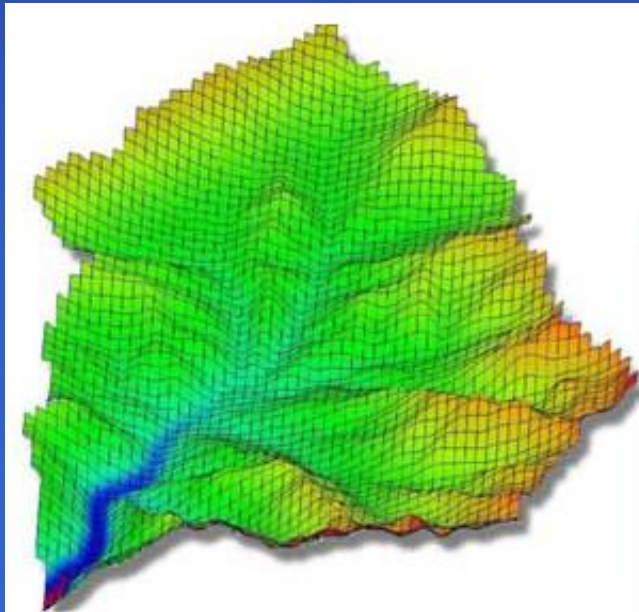
*Using ERMiT Erosion Modeling Tool
<http://forest.moscowsl.su.edu/cgi-bin/fswpp>

Peak Flow Modeling

- Watershed Modeling System (WMS)
- WEPP/ERMIT/GeoWEPP

WMS

- Flood forecasting (depth and velocity over entire 2D domain)
- Thunderstorm (localized rainfall) flood analysis
- Surface ponding and infiltration analysis
- Groundwater/surface water interaction modeling



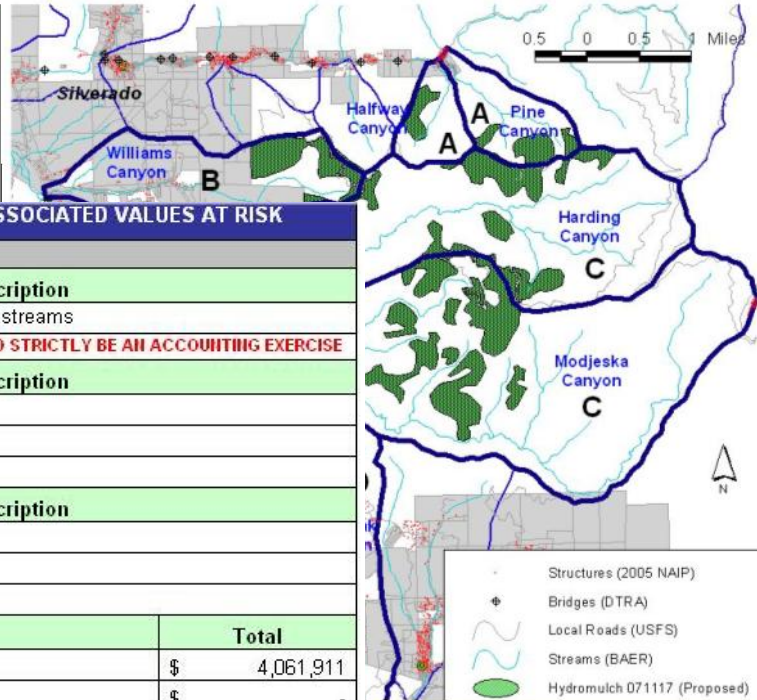
VAR Calculation Tool

THE BAER VALUES AT RISK (VAR) CALCULATION TOOL

Briefly describe VAR-Threat relationships for each Map Zone
(Note: the fields below will auto expand as needed)

Map Zone A	Halfway Canyon and Pine Canyon - Structures and other assets located where these canyons converge
Map Zone B	Williams Canyon - Single structure along stream channel
Map Zone C	Modjeska Canyon and Harding Canyon - Multiple structures, 2 hwy bridges, 6 residential access bridges, 2 water tanks all at risk proximate to canyon confluence
Map Zone D	Live Oak Canyon - 1 structure and 1 water tank identified at risk

NOTE: Life and safety identified at risk in all mapzones per geology specialist reports.



EACH MAP ZONE REPRESENTS A SYSTEM OF LINKED TREATMENTS AND ASSOCIATED VALUES AT RISK

MAP ZONE A - VALUES AT RISK (VAR)

Map link #	Life and Safety	Description	
	Debris Flow and flood threat	Throughout canyon floor adjacent to streams	
PLEASE NOTE: IF PUBLIC SAFETY IS A FACTOR, B/C RATIO SHOULD NOT BE RELEVANT AND SHOULD STRICTLY BE AN ACCOUNTING EXERCISE			
Map link #	Non-Market: Cultural Values	Description	
Map link #	Non-Market: Ecological	Description	
Map link #	Market Values: Direct	Description	Total
	7 Structures	Assumed to be residential	\$ 4,061,911
			\$ -
			\$ -
Map link #	Market Values: Loss-of-Use	Description	
			\$ -
			\$ -
			\$ -
			\$ -
Probability of experiencing the loss with no treatment (enter as decimal)			0.500
Source of loss probability with no treatment: Select Source...			
Market Resource Value			\$ 4,061,911
TREATMENT DESCRIPTION			
Map link #	Proposed treatment		Total
	Hydromulching upper watershed - 157 acres		\$ 550,296
			\$ -

User IDs VARS and Spatial Info

Details for each VAR

Jess Clark (801) 975-3769
Tony Guay (801) 975-3763
Annette Parsons (541) 941-0838



PRESS CTRL-ALT-DEL TO RE-BOOT