

Date of Report: September 18, 2007

**BURNED-AREA REPORT**  
(Reference FSH 2509.13)**PART I - TYPE OF REQUEST**

## A. Type of Report

- ☒ 1. Funding request for estimated emergency stabilization funds  
☐ 2. Accomplishment Report  
☐ 3. No Treatment Recommendation

## B. Type of Action

- ☒ 1. Initial Request (Best estimate of funds needed to complete eligible stabilization measures)  
☐ 2. Interim Report # \_\_\_\_\_  
    ☐ Updating the initial funding request based on more accurate site data or design analysis  
    ☐ Status of accomplishments to date  
☐ 3. Final Report (Following completion of work)

**PART II - BURNED-AREA DESCRIPTION**A. Fire Name: RatB. Fire Number: MT-BDF-113C. State: MontanaD. County: BeaverheadE. Region: NorthernF. Forest: Beaverhead-DeerlodgeG. District: WisdomH. Fire Incident Job Code: P1DV2A

I. Date Fire Started: 08/09/2007

J. Date Fire Contained: 60% as of Sept 9K. Suppression Cost: \$5.0 mm

L. Fire Suppression Damages Repaired with Suppression Funds

1. Fireline rehabilitated (miles): In progress (total is 29 miles)2. Fireline seeded (miles): To be determined3. Other (identify): \_\_\_\_\_M. Watershed Number: 100200040501, 100200040503, 100200040506, 100200040507, 100200040509, 170102050501

N. Total Acres Burned:

NFS Acres (25,017)    Other Federal ( )    State (0)    Private (411)

O. Vegetation Types: Subalpine fir/spruce (15%); lodgepole pine forest (65%); 8% grassland

P. Dominant Soils: Soil within the Rat Creek fire perimeter are derived mainly from granitic parent materials. The dominant soils are classified as Typic Eutrocrypts with sandy loam and loam surface textures.

Q. Geologic Types: -weathered and eroded granite and quartzite

R. Miles of Stream Channels by Order or Class: 1<sup>st</sup>: 52 miles; 2<sup>nd</sup>: 9 miles; 3<sup>rd</sup>: 13 miles; 4<sup>th</sup>: 2 miles

S. Transportation System

Trails: 18 miles Roads: 70 miles

### **PART III - WATERSHED CONDITION**

A. Burn Intensity \_\_\_\_\_ Burn Intensity rates the effect of fire on vegetation

Ownership	Class 1 - Unburned	Class 2 - Low	Class 3 - Moderate	Class 4 - High	Grand Total	%
Private	7	124	209	71	411	2
Beaverhead- Deerlodge National Forest	4,570	4,080	7,057	9,230	24,937	97
Bitterroot National Forest	66	13	0	1	80	1
Total	4,643	4,217	7,266	9,302	25,428	100
%	18	17	29	36	100	

Burn Severity (acres): Soil Burn Severity rates the effect of fire on soil and the ecosystem.

All soils are rated at "Low" soil burn severity for the Rat Creek Fire.

B. Water-Repellent Soil (acres): 25,427 (all soils within the perimeter are water repellent, either due to fire or drought).

C. Soil Erosion Hazard Rating (acres): \_\_\_\_\_ (low) 2,348 acres (moderate and high) 6,879 acres

D. Erosion Potential: 3.9 ton/acre on the average

E. Sediment Potential: 0.04\_ tons/acre

### **PART IV - HYDROLOGIC DESIGN FACTORS**

A. Estimated Vegetative Recovery Period, (years): 2 grass shrub, 20-50 conifers

B. Design Chance of Success, (percent): 90

C. Equivalent Design Recurrence Interval, (years): 10

D. Design Storm Duration, (hours): 6

- E. Design Storm Magnitude, (inches): 1.3
- F. Design Flow, (cubic feet/second/square mile): 15
- G. Estimated Reduction in Infiltration, (percent): 40
- H. Adjusted Design Flow, (cfs per square mile): 30

## **PART V - SUMMARY OF ANALYSIS**

### **A. Describe Critical Values/Resources and Threats:**

No heritage resources are at risk in this area. There are no risks to fisheries treatable by BAER.

**Trails:** Within the Rat fire perimeter, 18.5 miles of NFS system trails have been burned over with a moderate to high intensity wildfire. The trail system provides access for year around recreation opportunities, cattle allotments, hunting opportunities, fire suppression, wildlife surveys, and culturally significant sites.

These trail miles occur on steep side slopes that are susceptible to erosion events during normal runoff years. A large fire event such as the Rat fire makes the trails system susceptible to washouts, gullying, and rilling during the upcoming fall and spring runoff events. The increased erosion associated with the fire event will increase the risk to ecological health, the trail resource, and stream sedimentation within the fire area. Only trails with steeper slopes (>20%), and high fire intensity are candidates for emergency treatment. Other trails may be at risk of later failure, but they are addressed in longer-term forest restoration activities.

**Range:** The Rat Fire burned most of the Tie Johnson allotment. The BAER team recommends temporary resting of this allotment until recovery has occurred (two years). Because there is extensive livestock grazing on the adjacent private land there is a high likelihood that trespass will occur, damaging recovering lands and a population of sensitive plants in a seed treated area. There is a ten acre area at risk from erosion near those lands, burned over and impacted by fire suppression activities<sup>1</sup>.

**Noxious weeds/invasive plants:** Noxious weeds/invasive plant species pose a serious threat to the composition, structure, and function of native plant communities. Depending on burn severity and site potential, fire as a disturbance process has the potential to greatly exacerbate infestations of certain noxious weed species. Soil disturbances resulting from all levels of burn intensities in a wildfire incident and fire suppression related activities (hand lines, structure protection, drop spots, camps, etc.) that cause vegetation and soil alteration provide the optimum conditions for noxious weed invasion. Road and trail corridors, as well as trailheads and campgrounds, are extremely vulnerable to noxious weed invasion. Burning removes existing vegetation, increasing the prevalence and spread of existing weed populations.

The potential is high for accelerated expansion of noxious weed species within the fire perimeter, especially along roads. Moderate to high intensity burn acres provide ideal seedbeds for noxious weed establishment with little competition from native vegetation.

**Roads:** About 18 of the 70 total miles of roads within the Rat Creek fire are at risk. Several cross-drain ditches are at risk from plugging and overtopping and localized sections of roads are subject to increased erosion from ditch clogging. Six small culverts are at risk of failure. Some road segments have no ditch nor outsloting/insloping for drainage. One gate has burned which formerly prevented access to a non-maintained road.

The most critical mitigation is the replacement of the existing undersized stream crossing on the South Fork of Tie Creek. The existing structure needs to be replaced with a larger structure that can accommodate the  $Q_{100}$ ,

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<sup>1</sup> Temporary fencing, noxious weed treatment, seeding, and erosion control are all interrelated treatments designed to ensure effectiveness.

facilitate aquatic species passage, and allow the passage of the considerable woody debris that can be expected from a watershed with nearly 50% of the contributing area in a high intensity burned condition.

Devil's Elbow is a large eroding fill that has a burned slash filter windrow at its base. This windrow was burned in the Rat Creek fire, allowing sediment to escape to Tie Creek.

Maybe Meadows is a large boggy meadow that was largely burned in the Rat Creek fire. It is the home to the Bog Lemming, a Sensitive mammalian species. Burning has opened up the meadow to access by vehicles, and suppression vehicles have driven extensively in the area leaving tracks that may increase user access.

**Hazard Trees:** There are hazard trees on this fire. Pre-fire density of stems was high and many areas are now unsafe as a result of stand-replacing burn intensity.

There are two Sensitive plant species populations in two burned areas. These are near populations of weeds and the burned boundary fence.

## **B. Emergency Treatment Objectives:**

### **Land Treatment:**

**Trail Treatments** - Objective of the trail treatments is to protect these travel routes and downstream aquatic systems from the consequences of post-fire flow events likely in the first two years after the fire. Without treatment, these sites and routes will be at high risk of washing out, losing the investment in the travel route while also contributing sediment to the aquatic ecosystem. The detrimental post-fire effects on the trails system can be mitigated with the proposed installation of drainage structures (i.e water bars and drain dips).

**Road treatments** – Decrease the risk of diverting overland flow and stream flow down roadways, which can accelerate erosion and damage road facilities. Culvert replacement is designed to reduce the risk that stream flows will overtop the road and potentially damage the road and or culvert. The road treatments are also designed to reduce sediment yield to fisheries. Replacing a burned gate will prevent access to a non-maintained, closed road that is a watershed risk. The objective of the slash filter windrow is to reduce sedimentation from an eroding fill at Devil's Elbow. The barrier at Maybe Meadows is to prevent access temporarily to a dispersed site until vegetative recovery is sufficient to prevent access to the wet areas.

**Range treatments** - It is recommended to install temporary electric fence to ensure livestock exclusion until new boundary fences can be constructed, and to allow for vegetative recovery, as well as protecting native-seed treatments on burned sensitive plant areas. Seeding is to reduce erosion associated with the burned area and reduce noxious weed expansion.

**Invasive Plant Species:** Evaluate and assess fire effects to the forest vegetation resource, including sensitive plant species, and identify values at risk associated with vegetation changes and losses. Determine rehabilitation and monitoring needs supported by specifications to aid in vegetative recovery and watershed stabilization efforts. Provide management recommendations to assist in vegetative recovery, prevent noxious weed spread into burned areas, and protect or restore species of concern.

**Noxious Weed/Invasive Species Detection:** Monitor noxious weed treatment, as described in the specification sheet, in the first year following chemical or biological treatment to determine success of weed control. Monitoring would also include looking for new weed infestations and prescribing appropriate treatments.

**Hazard Trees:** Protect the BAER workers from dangerous trees near trails or roads on which they are working. Only trees presenting clear and present danger will be removed.

## **C. Probability of Completing Treatment Prior to Damaging Storm or Event:**

Land 80 % Channel     % Roads/Trails 80 % Protection/Safety 90 %

**D. Probability of Treatment Success:**

	Years after Treatment		
	1	3	5
Land	80	90	
Channel			
Roads/Trails	80	90	
Protection/Safety	95	100	

**E. Cost of No-Action (Including Loss):**

Using the new economic model developed by the RMRS, the benefit/cost ratio for road treatments based on market value is 2.0 and for trails based on market value is 5.0. These are all highly positive, indicating there is an economic benefit to their application.

For Range/Ecological Integrity, no direct market value was calculated. However, the Implied Minimum Value (IMV) is \$24,780 which is the minimum resource value this treatment must have to be cost-effective. The BAER team's opinion is that range and ecological integrity have at least this value.

See the attachment for the Values at Risk Analysis

**F. Cost of Selected Alternative (Including Loss):** See above.

**G. Skills Represented on Burned-Area Survey Team:**

<input checked="" type="checkbox"/> Hydrology	<input checked="" type="checkbox"/> Soils	<input checked="" type="checkbox"/> Geology	<input checked="" type="checkbox"/> Range
<input type="checkbox"/> Forestry	<input checked="" type="checkbox"/> Wildlife	<input type="checkbox"/> Fire Mgmt.	<input checked="" type="checkbox"/> Engineering
<input type="checkbox"/> Contracting	<input checked="" type="checkbox"/> Ecology	<input checked="" type="checkbox"/> Economics	<input checked="" type="checkbox"/> Archaeology
<input checked="" type="checkbox"/> Fisheries	<input checked="" type="checkbox"/> Research	<input type="checkbox"/> Landscape Arch	<input checked="" type="checkbox"/> GIS

Team Leader: Henry Shovic

Email: hshovic@fs.fed.us

Phone: 406-570-7946 (cell)

FAX 406-xxx-xxxx

**H. Treatment Narrative:** See the BAER Treatment map for locations of treatments.

**Land Treatments:**

Trail Treatments: The installation will be in accordance with EM-7720-102 standard specification for construction of trails. An average of four waterbars will be constructed per mile on the affected trails.

Noxious Weed/Invasive Treatment: Treat noxious weed/invasive species infestation sites within the burned area to reduce the population and help prevent the expansion of weeds into newly disturbed sites. Chemical methods will be used to help prevent the spread and establishment of noxious weeds, especially within the moderate- to high-intensity burn areas.

Noxious Weed/Invasive Species Detection: Monitor noxious weed treatment, as described in the specification sheet, in the first year following chemical or biological treatment to determine success of weed control. Monitoring would also include looking for new weed infestations and prescribing appropriate treatments.

Native Seeding: Collect native seed and spread on ten acres of burned area.

Road Treatments: Road treatments identified for implementation include upgrading/installing culverts in the Rat Creek burned area. There are six culverts and one stream crossing structure specified, as well as 30 waterbars and 30 rubber barriers.

In addition the proposed treatments include ditch maintenance/cleaning, cleaning ditch relief culverts, augmenting road drainage around culverts with armored dips, and removing additional (beyond fire suppression road hazard tree removal) hazard trees to protect BAER treatment crews. The gate will be installed per the treatment map. The slash filter windrow will be installed at the base of the fill at Devil's Elbow. The barrier at Maybe Meadows is to be made of slash and burned trees.

Range Treatments: Construct 3 miles of temporary electric fence (on the boundary line fence line) to reduce trespass of cattle on the burned area.

Protection/Safety Treatments: The removal of hazard trees on all associated miles of trails is required to provide a safe working environment for BAER crews if they are to accomplish the work necessary to mitigate post-fire erosion.

#### **I. Monitoring Narrative:**

The monitoring specified is to be completed by a five-individual team of resource specialists for a one day review. It's purpose is to determine treatment completion and effectiveness. In particular, monitoring is needed to make sure weed treatments do not affect native sensitive plant populations.

# Part VI – Emergency Stabilization Treatments and Source of Funds

# Initial Request

Line Items	Units	Unit Cost	NFS Lands		Other \$	Other Lands				All Total \$
			# of Units	BAER \$		# of units	Fed \$	# of on Fed	on Fed \$	
<b>A. Land Treatments</b>										
Noxious Weeds/Invasive Treatments	acres	57	180	\$10,260	\$0		\$0		\$0	
Noxious Weeds/Invasive Detection	acres	1	2725	\$2,725	\$0		\$0		\$0	
Temporary boundary electric fence	miles	2500	3	\$7,500						
Native Seeding	acres	10	157	\$1,570						
<i>Subtotal Land Treatments</i>				<b>\$22,055</b>	<b>\$0</b>		<b>\$0</b>		<b>\$0</b>	
<b>B. Channel Treatments</b>										
<i>Insert new items above this line!</i>				\$0	\$0		\$0		\$0	
<i>Subtotal Channel Treat.</i>				<b>\$0</b>	<b>\$0</b>		<b>\$0</b>		<b>\$0</b>	
<b>C. Road and Trails</b>										
Construct barrier at Maybe Meadows	ea			\$0						
Replace slash filter windrow	ea	1560	1	\$1,560						
Trail head caution signs	EA	240	8	\$1,920			\$0		\$0	
Trail drainage improvements	miles	400	18.5	\$7,400			\$0		\$0	
Road ditch cleaning, riprap, outlet prot.	miles	3100	17.5	\$54,250			\$0		\$0	
Road - water bars, replace belt barriers	ea	60	405	\$24,300			\$0		\$0	\$24,300
Replace gate	ea	1000	1	\$1,000			\$0		\$0	\$1,000
Install Culverts	ea	2165	6	\$12,990			\$0		\$0	
Tie Creek major culvert replace	ea	44192	1	\$44,192			\$0		\$0	
<i>Insert new items above this line!</i>				\$0	\$0		\$0		\$0	
<i>Subtotal Road &amp; Trails</i>				<b>\$147,612</b>	<b>\$0</b>		<b>\$0</b>		<b>\$0</b>	
<b>D. Protection/Safety</b>										
<b>Hazard Tree Treatments -roads</b>	miles	275	18	\$4,950						
<b>Hazard Tree Treatments -trails</b>	Miles	1000	18.5	\$18,500						
<i>Insert new items above this line!</i>				\$0	\$0		\$0		\$0	
<i>Subtotal Structures</i>				<b>\$23,450</b>	<b>\$0</b>		<b>\$0</b>		<b>\$0</b>	
<b>E. BAER Evaluation</b>										
Team evaluation	ea	1	18,000	\$18,000	\$18,000		\$0		\$0	
	EA			---	\$0					
<i>Insert new items above this line!</i>				---	\$0		\$0		\$0	
<i>Subtotal Evaluation</i>				<b>\$18,000</b>	<b>\$18,000</b>		<b>\$0</b>		<b>\$0</b>	
<b>F. Monitoring</b>										
Local Review of treatments 5 specialists	LS	1	3000	\$3,000						
<i>Insert new items above this line!</i>				\$0	\$0		\$0		\$0	
<i>Subtotal Monitoring</i>				<b>\$3,000</b>	<b>\$0</b>		<b>\$0</b>		<b>\$0</b>	
<b>G. Totals</b>				<b>\$214,117</b>	<b>\$18,000</b>		<b>\$0</b>		<b>\$0</b>	
Previously approved										
Total for this request				<b>\$214,117</b>						

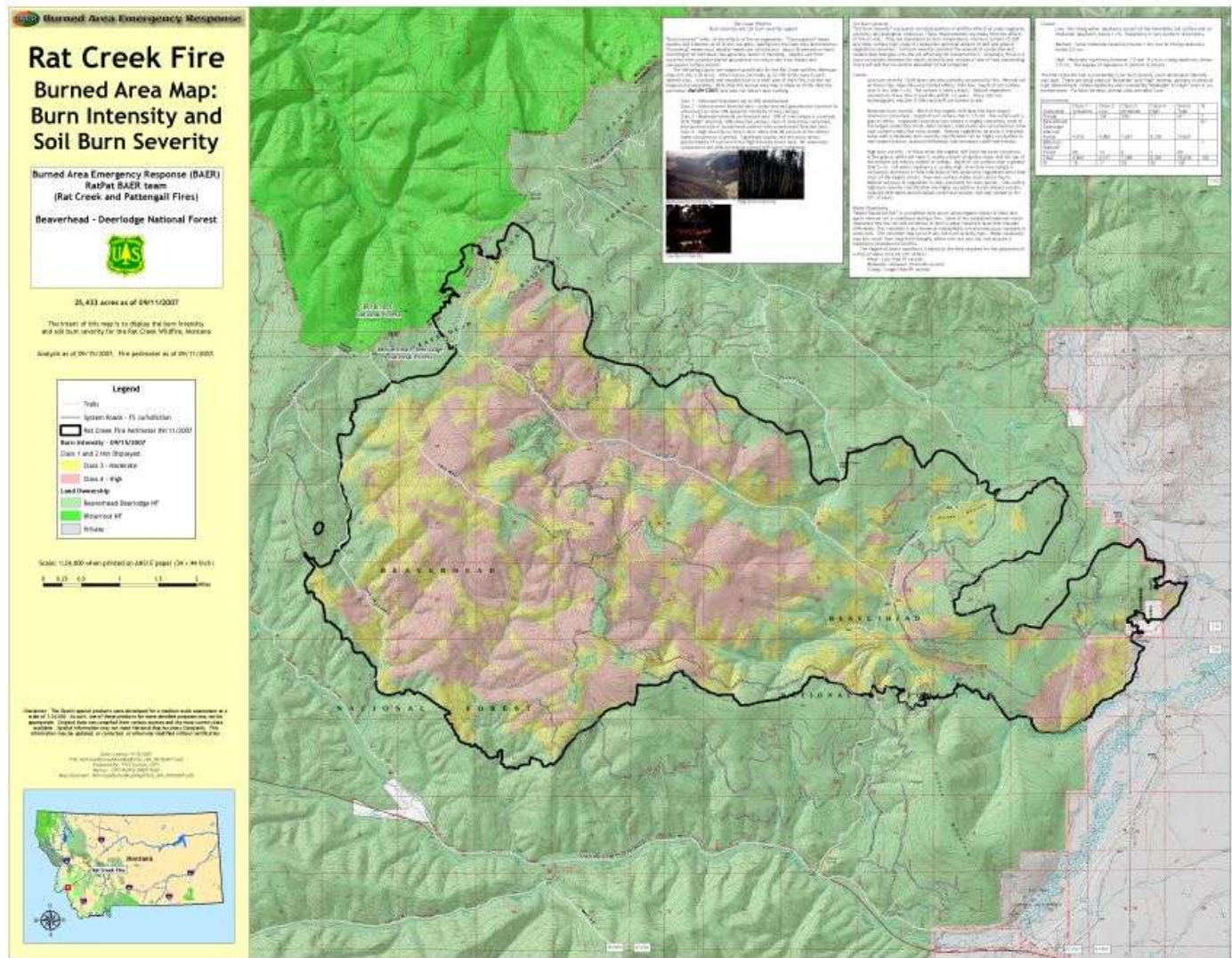
## PART VII - APPROVALS

1. /s/ Peri R. Suenram (for)  
Forest Supervisor (signature)

September 19, 2007  
Date

2.   
Regional Forester (signature)

Date





## **Rat Fire BAER Values at Risk Report**

By Dave Calkin and edited for the Rat Fire by Henry Shovic, BAER team leader

09/18/07

The BAER assessment for the Rat Creek and Pattengail fires applied a new Values at Risk (VAR) Calculation Tool developed by the Rocky Mountain Research Station. The tool was created to improve the economic assessment of the need for proposed treatments to protect the identified VAR, thus improving the selection and defensibility of proposed treatments. In developing this tool the authors surveyed BAER personnel to determine the effectiveness of economic analysis in the BAER assessment process. They found that three fundamental limitations compromise effective calculation of resource values-at-risk: 1) current valuation guidelines are unclear, 2) BAER team members typically have limited training and experience in the field of economics, and 3) data to support direct valuation of specific resources, particularly non-monetary resource values (e.g., sensitive wildlife species, undeveloped recreation, cultural artifacts), are not consistently available. These limitations to past assessments reduced the defensibility of proposed treatments.

### **Values at Risk Calculation Process**

#### *Terminology*

Wildfire risk is defined as the product of the likelihood of an event of a given intensity (threat) times the net value change to the affected resource at the given intensity (For example, if there is a 0.50 probability that a post-fire flood containing suspended ash will destroy a \$5,000 domestic water system, the monetized risk is \$2,500). Risk based assessments require that *threat (the likelihood of experiencing an event)* be clearly differentiated from *risk* and from *values-at-risk (VAR)*. Unless a valued resource is in harm's way there is only a threat, it poses no risk.

### **Application to the Rat Creek and Pattengail Fires**

At the outset of the BAER assessment process, VAR were identified and spatially coupled to probable threats. The probabilities of threats occurring as well as the probabilities of treatment success were estimated through the course of the BAER assessment using a team of specialists. The designers of the tool realize that assigning the probabilities of threat materializing can be difficult and are often based on expert opinion, and when possible informed by appropriate model runs.

The VAR tool applies a hybrid approach for assessing the economic efficiency of proposed treatments during post-fire assessments: 1) a probability-based Benefit Cost (B/C) analysis is used where monetary values are readily available and 2) an Implied Minimum Value (IMV) is assigned to estimate the efficiency of treatments related to non-monetary resources.

For these non-monetary resources, instead of directly assigning monetary values to non-monetary resources, a computation is used to derive a value of the resource needed to justify a proposed treatment. Implied Minimum Value equals the treatment cost divided by the reduction in likelihood of experiencing the negative outcome; the lower the IMV the easier the treatment justification:

$$\text{IMV} = \left( \frac{\text{treatment cost}}{\text{Prob(loss occurring with no treatment) - Prob(loss occurring after treatment)}} \right)$$

The IMV does not necessarily represent the actual dollar value of the resource loss averted—in fact, the true monetary value need not be defined. IMV simply reflects that in the BAER team's opinion avoiding the damage to a threatened non-monetary value is worth at least the calculated implied minimum value, and therefore, the proposed treatment is a wise investment of public funds.

The new VAR tool was applied to the Rat fire only. The Pattengail fire has small investments and are concluded to have positive benefits.

For more information about this tool please contact:

Dave Calkin, Rocky Mountain Research Station, Missoula, MT  
dcalkin@fs.fed.us.

#### Rat Creek Fire Benefit/Cost Calculations

			Implied Value and/or Benefit Cost
	Value Type	Value at Risk	
<b>Trails (at \$6,000 mile repl. Cost)</b>	Life and Safety	No	
	Non-Market: Cultural Values	No	
	Non-Market: Ecological Values	No	
	Market Values: Direct	No	\$ 111,000
	Market Values: Replacement	No	\$ -
	<i>Total Market Resource Value</i>		\$ 111,000
	<i>Proposed Treatment</i>		\$ 7,400
	Reduction in Probability of Loss		0.20
	Expected Benefit of Treatment		\$ 22,200
	Exp B/C Ratio of Treatment for Market Resources Only		5
	<b>Implied Minimum Value (IMV) of Protecting Non-Market Resource Values</b>		
			Implied Value and/or Benefit Cost
	Value Type	Value at Risk	
<b>Roads (at \$30,000 Per mile repl. costb)</b>	Life and Safety	No	
	Non-Market: Cultural Values	No	
	Non-Market: Ecological Values	No	
	Market Values: Direct	Yes	\$ 540,000
	Market Values: Replacement	No	\$ -
	<i>Total Market Resource Value</i>		\$ 540,000
	<i>Proposed Treatment</i>		\$ 140,612
	Reduction in Probability of Loss		0.51
	Expected Benefit of Treatment		\$ 275,400
	Exp B/C Ratio of Treatment for Market Resources Only		2.0
	<b>Implied Minimum Value (IMV) of Protecting Non-Market Resource Values</b>		

			Implied Value and/or Benefit Cost
	Value Type	Value at Risk	
Invasive Species And Range Integrity	Life and Safety	No	
	Non-Market: Cultural Values	Yes	
	Non-Market: Ecological Values	Yes	
			\$
	Market Values: Direct	No	-
			\$
	Market Values: Loss of Use	No	-
			\$
		<i>Total Market Resource Value</i>	-
			\$
		<i>Proposed Treatment</i>	22,055
		Reduction in Probability of Loss	0.89
			\$
		Expected Benefit of Treatment	-
		Exp B/C Ratio of Treatment for Market Resources Only	
		<b>Implied Minimum Value (IMV) of Protecting Non-Market Resource Values</b>	<b>\$ 24,780</b>